RETURN to Index

M-501-A1125-03R

Horizontal Storage Tank Parts & Operation Manual

HOW TO ORDER PARTS

To assure prompt delivery when ordering parts, please furnish the following information: **1)** Complete name and address of consignee. **2)** Method of shipment preferred. **3)** Is shipment to be prepaid or collect? **4)** Serial numbers of units to which parts apply. **5)** Complete part numbers and descriptions. **6)** Any special instructions.

Specify unit serial number when ordering parts!

WARRANTY

E. D. Etnyre & Co. warrants to the original Purchaser, it's replacement parts to be free from defects in material and workmanship for a period of twelve (12) months after date of delivery to original Purchaser.

The following are exceptions to this policy:

(1) All new electronic components are warranted for a period of 60 days. This is subject to vendor approval.

(2) Remanufactured electronic components are warranted for a period of 30 days.

(3) Remanufactured hydraulic components are warranted for a period of 60 days.

(4) All non-Etnyre manufactured components are subject to the original warranty of the manufacturer.

(5) New hydraukic components are warranted for the period of time set forth by the vendor of the individual item.

The obligation of the Company is limited to repairing or replacing any defective part returned to the Company and will not be responsible for consequential damages or any further loss by reason of such defect. Furthermore, the Etnyre Co. will not be responsible for any labor charges, freight charges, or transportation costs incurred by the purchaser if said part were to fail.

This warranty does not apply to:

(1) Normal start-up services, normal maintenance services or adjustments usually performed by the selling dealer, factory service representative or customer personnel.

(2) Any product manufactured by E. D. Etnyre & Co. purchased or subjected to rental use.

(3) Any product or part thereof which shows improper operation, improper maintenance, abuse, neglect, damage or modification after shipment from factory.

(4) Any product or part thereof damaged or lost in shipment. Inspection for damage should be made before acceptance or signing any delivery documents releasing responsibility of the delivering carrier.

This warranty and foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties of merchantability or otherwise, express or implied in fact or by law.

The company excludes all implied warranties of merchantability and fitness for a particular purpose. There are no warranties, express or implied, which extend beyond the description of the goods contained in this contract.

E. D. ETNYRE & CO., Oregon, Illinois 61061-9778
1333 South Daysville Road Phone: 800-995-2116 Fax: 800-521-1107
www.etnyre.com sales@etnyre.com

Safety Precautions,
Hazard Seriousness Level

You will find safety information boxes throughout this manual. These boxes contain information alerting you to situations or actions to avoid.

Signal words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Their selection is based on the likely consequence of human interaction with a hazard. Definitions of hazard levels are as follows.

⚠ **DANGER -** Immediate hazards which **will** result in severe personal injury or death.

⚠ **WARNING -** Hazards or unsafe practices which **could** result in severe personal injury or death.

⚠ **CAUTION -** Hazards or unsafe practices which could result in minor personal injury or product or property damage.

⚠ **HOT SURFACES -** Since this tank is intended to store hot liquid asphalt, the surfaces of the tank and equipment may be hot. All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns. The piping is heated with electric heat tape, it will be hot even though it has not been used recently.

⚠ **HOT LIQUIDS -** The liquids stored in this tank are hot. The piping and hoses used to transfer the liquids are hot. Wear insulated gloves, protective clothing and a face shield when transferring hot liquids or handling hot liquid hoses to avoid burns. Stay clear ofpiping thar may contain hot liquids. Leave all valves closed unless you are performing an operation which requires a valve to be opened. Do not open valves unless you are prepared for asphalt to flow.

⚠ **ELECTRICAL SHOCK -** This equipment is powered by high voltage electricity. To avoid electrical shock causing personal injury or death do not attempt to make repairs or adjustments without turning off the main power at the control panel. Do not attempt to operate this equipment with the control panel door open.

⚠ **MOVING PARTS -** This equipment contains moving parts, turning shafts, pulleys and belts. Keep all guards in place when operating. The agitator is controlled by a timer and may start unexpectedly. To avoid entanglement, do not attempt to make repairs or adjustments without urning off the main power at the control panel.

⚠ **FALLS -** To avoid falls that could result in death or serious injury, do not climb over guard rails on to th top of the tank for any reason. Be careful when working on top of the tank to avoid dropping tools or parts that could strike someone on the ground

⚠ **WARNING**

Do not use this machine for any operation which is not described in this manual.

If you have any questions about operation of this machine, contact the Etnyre Service Department at
1-800-995-2116 or 1-815-732-2116.

Operations that are not approved could cause serious injury or death.

Reporting Safety Defects

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying E. D. Etnyre & Co.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, and E. D. Etnyre & Co.

To contact NHTSA, you may call the Auto Safety Hotline too-free at 1-800-424-9393 (or 366-0123 in the Washington, D.C. area). Or, you may write to: U.S. Department of Transportation, Washington, D.C. 20696. You may also obtain other information about motor vehicle safety from the Auto Safety Hotline.

⚠ **WARNING**

Fluoroelastomer handling

Some “O” rings and seals used in this vehicle are made from fluoroelastomers. When used under design conditions, fluoroelastomers do not require special handling. However, when fluoroelastomers are heated to temperatures beyond their design temperature (around 600 degrees Fahrenheit), decomposition may occur with the formation of hydrofluoric acid. Hydrofluoric acid can be extremely corrosive to human tissue if not handled properly.

A degraded seal may appear as a charred or black sticky mass. Do not touch either the seal or the surrounding equipment without wearing neoprene or PVC gloves if degradation is suspected. Wash parts and equipment with 10% lime water (calcium hydroxide solution) to neutralize any hydrofluoric acid.

If contact with the skin occurs, wash the affected areas immediately with water. Then rub a 2.5 calcium gluconate gel into the skin until there is no further irritation, while seeking prompt medical attention.

Note to physicians: For advice or treatment of HF Burns, call the DuPont Medical Emergency Number 1-800-441-3637.

This manual covers standard features and options. If your unit incorporates custom features, some of the information contained in this manual may not apply. If you have any questions regarding this manual or your unit, contact your dealer or the E. D. Etnyre Service Department at 1-800-995-2116

PROPOSITION 65 WARNING

Diesel Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Please note this warning and remember -

Always start and operate the engine in a well-ventilated area;

If in an enclosed area, vent the exhaust to the outside;

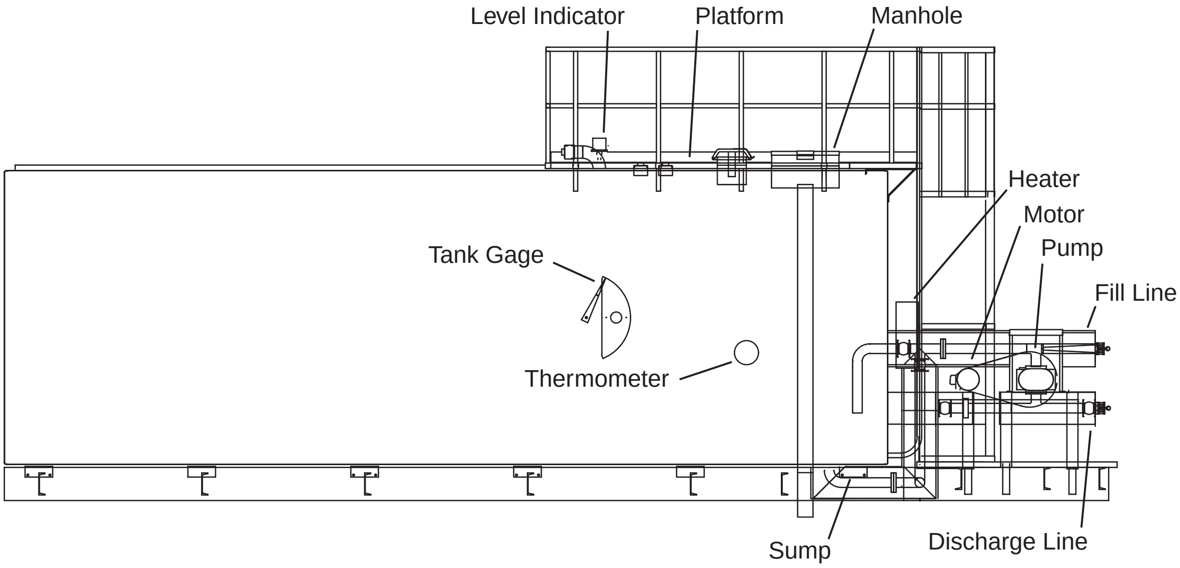
Do not modify or tamper with the exhaust system.

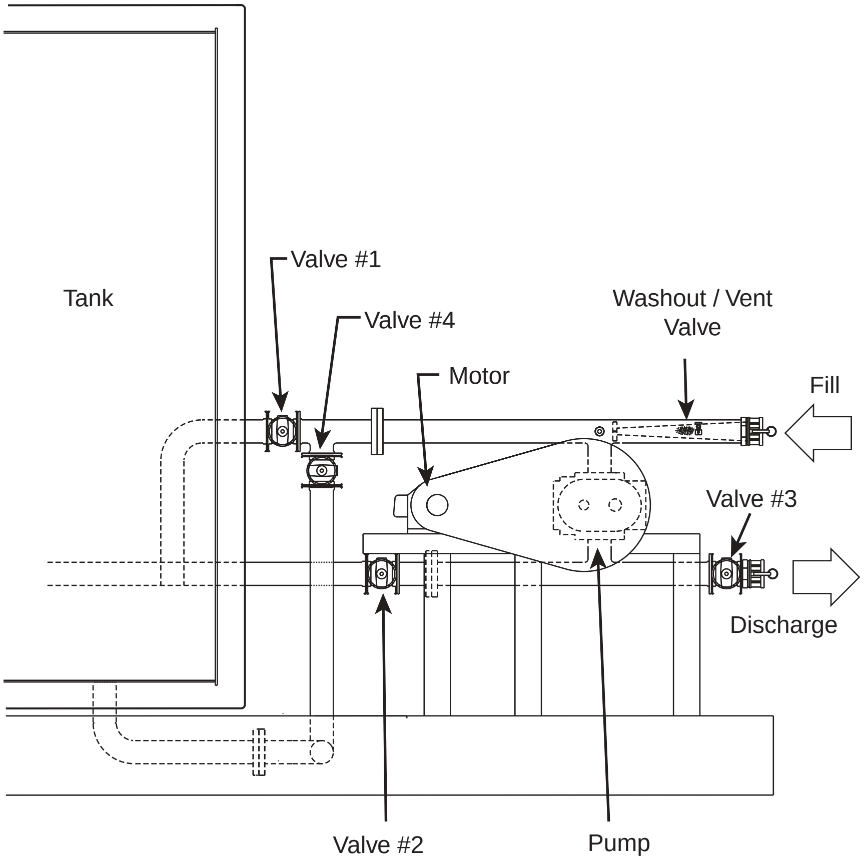
Table Of Contents

List Of Illustrations

Component Vendor Information

General Identification





Insulation

The tank is covered with fiberglass insulation, four inches thick. The insulation is intended to maintain the temperature of the heated asphalt. The insulation is covered with aluminum sheeting of .040” min thickness for weather protection.

Electric Heater

The tank is heated with a 28KW Unitized Heater. The heater is located inside the bottom of the tank. It is controlled by a thermostat located n the control box. A light in the control box door indicates when the heater is on.

Float Gage

The tank is equipped with a float type level gage. The white line on the indicator weight aligns the tank.

Electric Power

Tanks with pumps require 240/480 volt three phase power, with a four wire (neutral wire) system. Conversion to other voltages is done with wiring inside the control box.

⚠ **WARNING**

This equipment is powered by high voltage electricity. Turn off main power at control panel before making repairs or adjustments

Thermometer

A dial thermometer is located in a dry well on the side of the tank. The thermometer indicates the temperature of the asphalt inside the tank. The thermometer may be removed from the well with asphalt in the tank.

⚠ **WARNING**

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

Plumbing

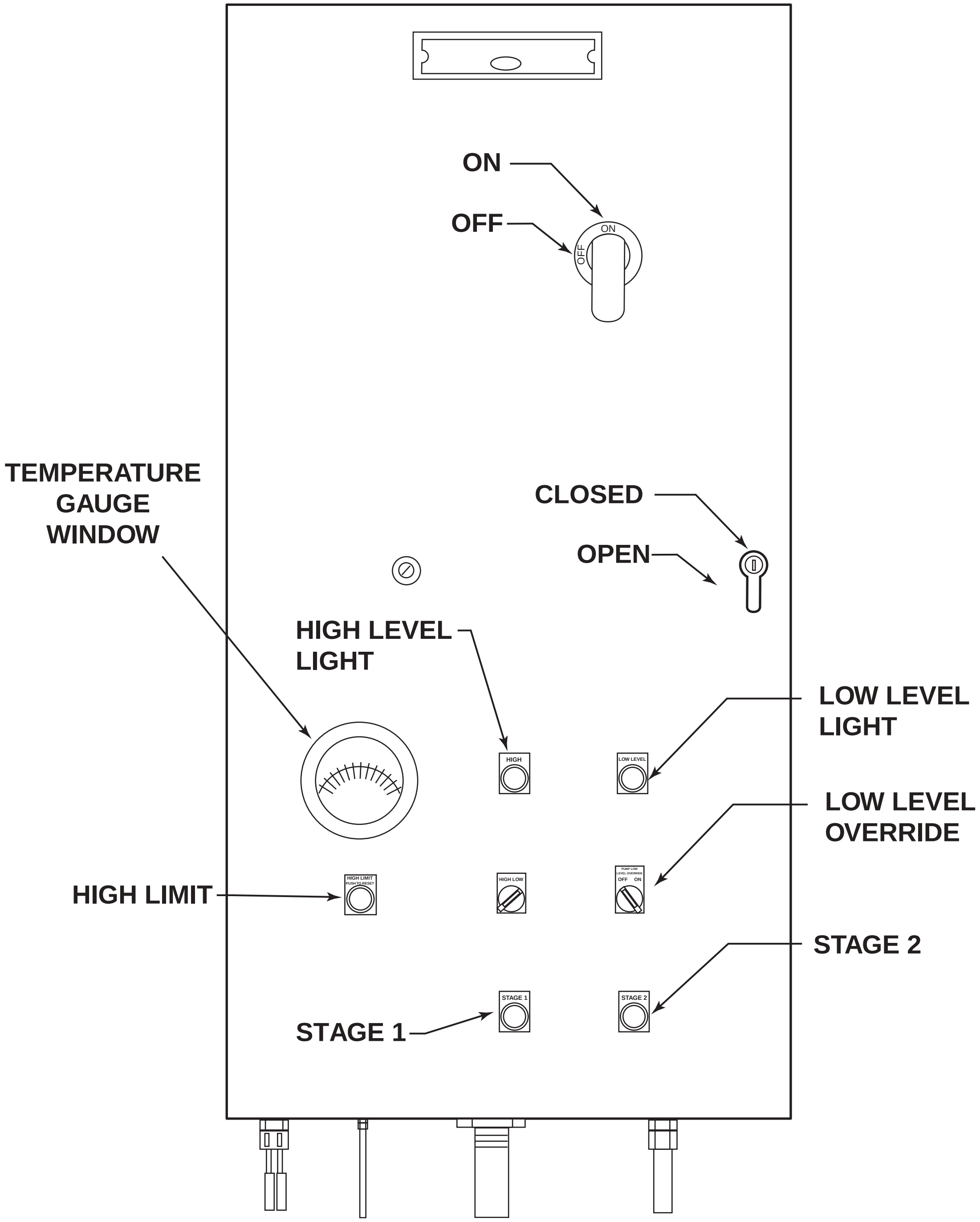
Three inch diameterlines run from the bottom of the tank to the pump. The pump is belt driven by a five horsepower 240/480 volt three phase electric motor. It may be used to pump out of the storage tank into other small tanks, or used to pump into the storage tank from transport tanks. The system may also be used to recirculate the product in the storage tank. All lines are insulated and heated with 115 volt heat tape.

Control Box

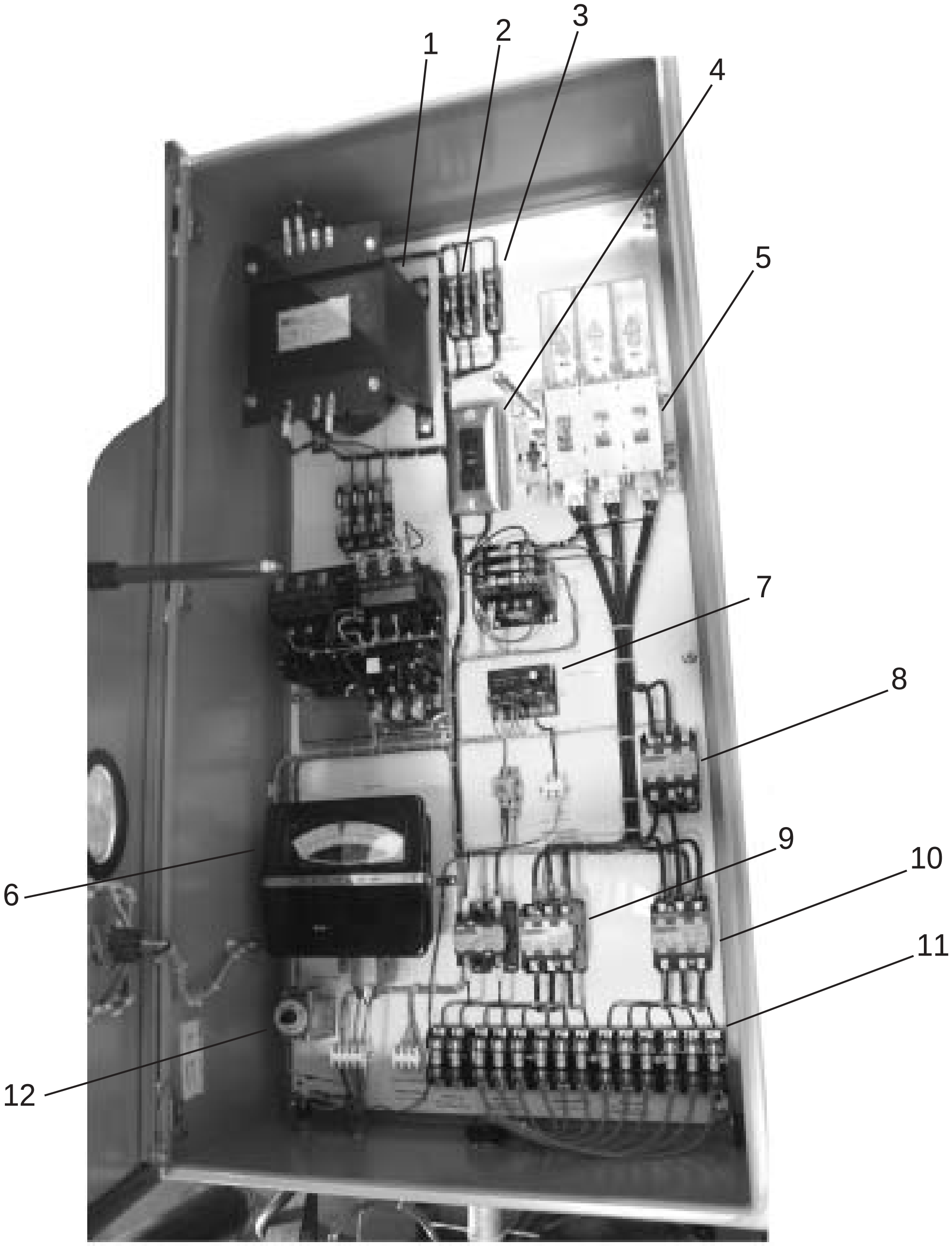
The control box is located on the side of the tank opposite the ladder. In the door of the control box is a master disconnect switch which controls the power for all electrical functions. A heater indicator light is also located in the door, indicating when the heaters are on. A pump switch which selects forward, off, and reverse, is located in the door as well. there is also a low level light and a high limit reset switch located in the door. Inside the box there are various electrical components that operate the electrical equipment. A timer for the agitator and the thermostat for the heater is located in the box. Also located inside the box is a 115 volt receptacle (GFI), that may be used to power a trouble light or power tools up to 15 amp capacity.

⚠ **WARNING**

This equipment is powered by high voltage electricity.



Storage Tank Control Panel Outside View



Storage Tank Control Panel Inside View.

1. Control Power Transformer
2. Control Fuses
3. Control Fuses
4. GFI 110 Volt Receptacle
5. Reversing Motor Starter
6.
7. Heat Trace Temperature Control
8. Heat Trace Fuse Block
9. Motor Protection Fuses
10. Motor Protection Fuses
11. Motor Protection Fuses
12. Tank High Limit Temperature Control
13.
14. Tank Temperature Control
15.
16.

Preparation For Use

Inspection

Unpack the ladder, ladder cage, and handrail. Check for damage that may have occurred during shipment. Visually inspect the the tank, particularly the tank jacketing and insulation for damage that may have occurred during shipment. Report any damage to the driver delivering the tank.

Setting The Tank in Place

1. The tank level gage float has been secured to the roof of the tank for shipment.

2. Install the ladder, ladder cage, handrails and platform. Securely tighten all fasteners.

⚠ **WARNING**

To avoid falls that could result in death or serious injury, do not climb over the handrails on top of the tank for any reason.

⚠ **WARNING**

Keep all guards in place when operating.

Connecting Power

480 volt three phase power with a neutral wire is required for power. Power connection and wiring should be done by a qualified electrian to conform to local and national electric codes.

General Operating Instructions

Heater Operation

⚠ WARNING

This equipment is powered by high voltage electricity. Turn off main power at control panel before making repairs or adjustments

⚠ WARNING

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

⚠ WARNING

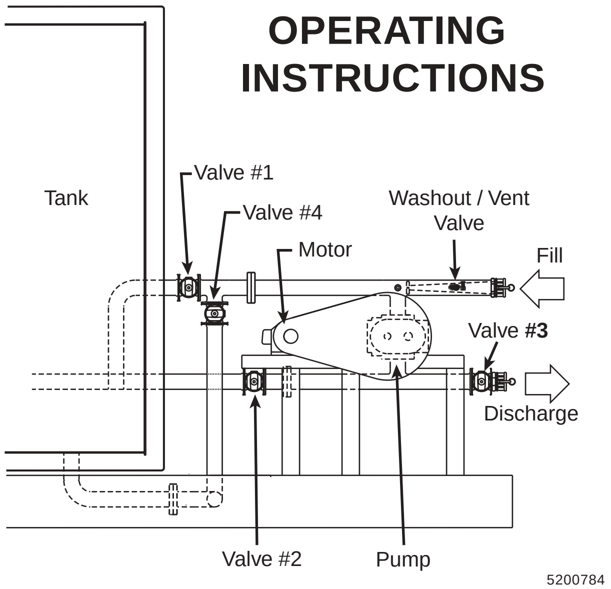
Keep all guards in place when operating.

⚠ WARNING

The liquids stored in this tank are hot. Wear insulated gloves, protective clothing when handling hoses

1. Do not operate the heaters unless there is a minimum of 700 gallons of asphalt in the tank.
2. Turn the master power switch off and open the control box door.
3. Set the desired temperature on the thermostat knob.
4. Close the control box door and turn the master power switch on.
5. The heaters will turn on and off automatically to maintain the set temperature.
6. The indicator light on the control box door will be lit whenever the heaters are actually on.
7. Clean the pump after any operation has been completed.

OPERATING INSTRUCTIONS



5200784

Operation	Valve 1	Valve 2	Valve 3	Valve 4	
Fill Using Storage Tank Pump	Close	Open	Close	Close	
Unloading Storage Tank To Top of Heaters	Open	Close	Open	Close	
Recirculation	Close	Open	Close	Open	
Drain Tank Completely	Close	Close	Open	Open	Turn Off Heaters

Filling From Transport Using Storage Tank Pump

⚠ WARNING

Do not open valves unless you are prepared for asphalt to flow. The liquids stored in this tank are hot

⚠ WARNING

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

⚠ WARNING

The liquids stored in this tank are hot. Wear insulated gloves, protective clothing when handling hoses

1. Be sure the discharge valve on the transport is closed.

2. Connect the transport's hose to the discharge valve on the transport.

3. Close valves 1, 2, 3 and 4.

4. Remove the fill line cap and connect the hose from the transport to the 3" fill line on the storage tank.

5. Open valve #2 on the storage tank and open the discharge valve on the transport.

6. Start the storage tank pump.

7. Watch the tank level gage on the storage tank to prevent over filling the storage tank.

8. When the storage tank is full close the discharge valve on the transport.

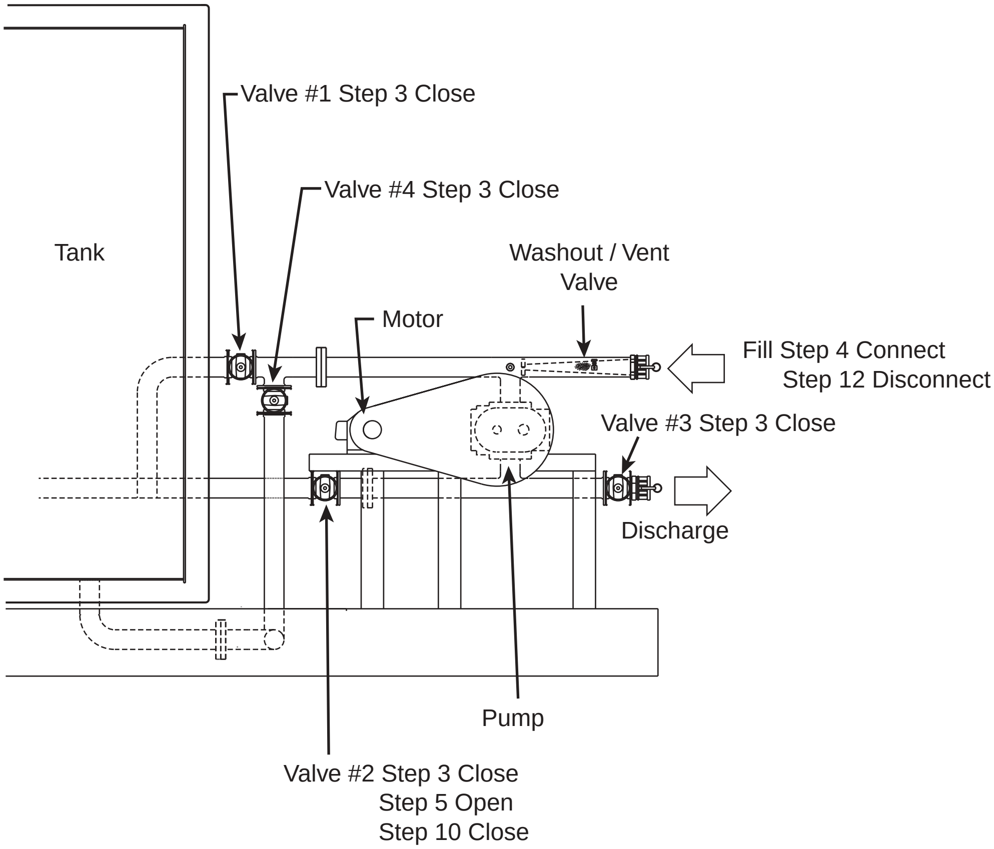
9. Suck the hose clean as described in the transport operating instructions.

10. Close valve #2 on the storage tank.

11. Shut off the pump.

12. Disconnect the hose from the storage tank and install the cap on the fill line.

13. Clean the pump.



Filling From Transport

Unloading From Above the Heaters Using Storage Tank Pump

WARNING

Do not open valves unless you are prepared for asphalt to flow. The liquids stored in this tank are hot

WARNING

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

WARNING

The liquids stored in this tank are hot. Wear insulated gloves, protective clothing when handling hoses

1. Close valves 1, 2, 3 and 4.

2. Remove the discharge line cap and connect the hose to the discharge on the pump.

3. Connect the other end of the hose to the distributor or kettle's fill line.

4. Open valve #3.

5. Open the distributor's fill line valve if there is one.

6. Open valve #1 on the storage tank.

7. Turn the pump switch to forward.

8. Watch the tank level gage on the distributor to prevent over filling the distributor.

9. When the distributor tank is full close valve #1.

10. Shut off the pump.

11. If there is a valve at the distributor, close it.

12. If you are loading the distributor or kettle through a top opening, raise the hose above the level of the liquid in the distributor or kettle.

13. Open valve #1.

14. Turn the pump switch to reverse and suck the material from the hose and pump it back into the storage tank to clean the hose.

15. If the hose is connected to piping on the distributor or kettle, crack open the connection ot allow air air into the hose.

16. Disconnect the hose from the distributor or kettle and raise the end so that any remaining asphalt in the hose can drain back to the pump.

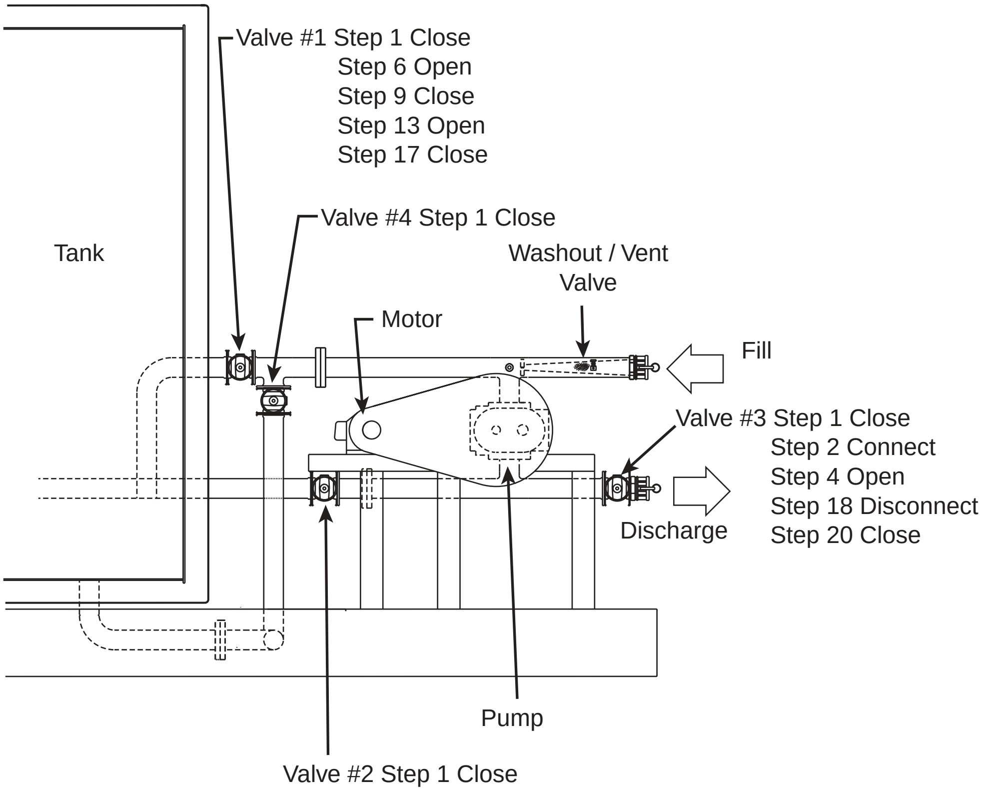
17. Once the hose is clean, close valve #1

18. Disconnect the hose from the discharge line.

19. Shut off the pump.

20. Close valve #3 and install the discharge line cap.

21. Clean the pump.



Unloading to a Distributor or Kettle

Recirculating Using Storage Tank Pump

⚠ WARNING

Do not open valves unless you are prepared for asphalt to flow. The liquids stored in this tank are hot

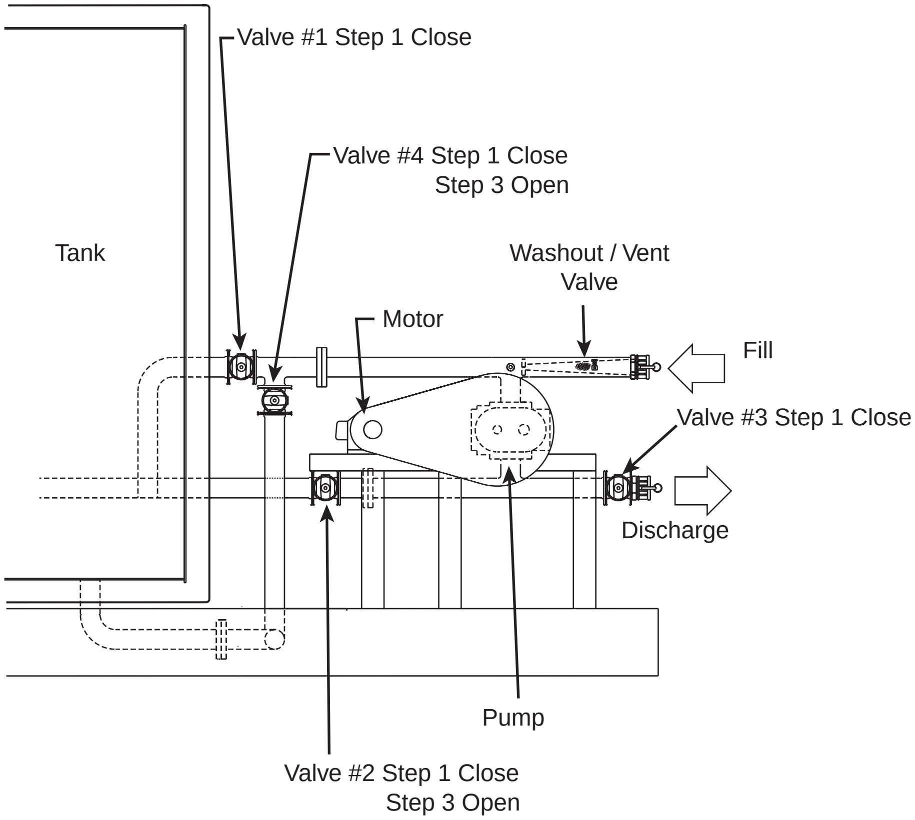
⚠ WARNING

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

⚠ WARNING

The liquids stored in this tank are hot. Wear insulated gloves, protective clothing when handling hoses

1. Close valves 1, 2, 3 and 4.
2. Check that the caps are on and locked on both the fill and discharge lines.
3. Open valve #2 and valve #4.
4. Start the pump in the forward direction
5. Clean the pump..



Circulating In The Tank

Pump Off Using Storage Tank Pump

WARNING

Do not open valves unless you are prepared for asphalt to flow. The liquids stored in this tank are hot

WARNING

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

WARNING

The liquids stored in this tank are hot. Wear insulated gloves, protective clothing when handling hoses

1. Close valves 1, 2, 3 and 4.

2. Remove the discharge line cap and connect the hose to the discharge on the pump.

3. Connect the other end of the hose to the distributor or kettle's fill line.

4. Open valve #3.

5. Open the distributor's fill line valve if there is one.

6. Open valve #4 on the storage tank.

7. Turn the pump switch to forward.

8. Watch the tank level gage on the distributor to prevent over filling the distributor.

9. When the storage tank is empty close valve #4.

10. Shut off the pump.

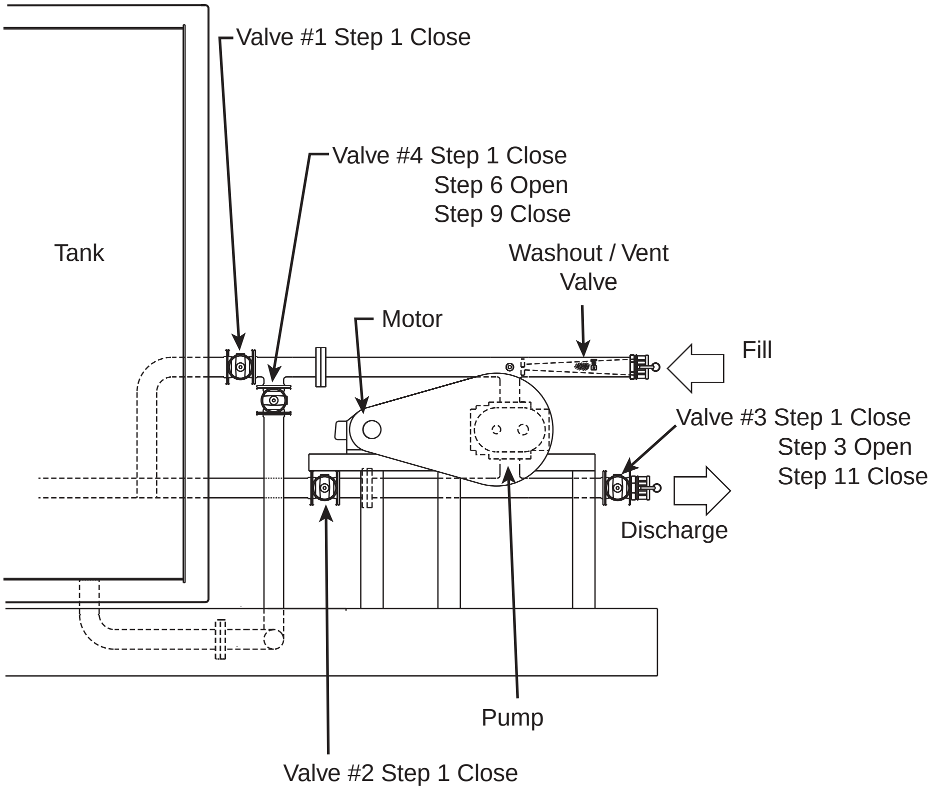
11. Close valve #3.

12. Disconnect the hose from the distributor or transport and place the end in a suitable container.

13. Disconnect the hose from the discharge line and raise the end so that any remaining asphalt in the hose can drain into the container.

14. Install the discharge line cap.

15. Clean the pump.



Pump Off

Cleaning The Asphalt Pump

WARNING

Do not open valves unless you are prepared for asphalt to flow. The liquids stored in this tank are hot

WARNING

All surfaces and equipment should be considered to be hot. Wear insulated gloves and protective clothing to prevent burns.

WARNING

The liquids stored in this tank are hot. Wear insulated gloves, protective clothing when handling hoses

WARNING

Extinguish all sources of flame, lit cigarettes, torches or lighters

1. Close valves 1, 2, 3 and 4.

2. Remove the discharge line cap and connect the 3” hose to the discharge on the pump.

3. Put the other end of the 3” hose in a bucket

4. Check the area for sources of flame, lit cigarettes, torches or lighters. Extinguish all sources of flame.

5. Open valve #3.

6. Put the end of the small 3/8” hose which is attached to the breather vent into a bucket of diesel fuel.

7. Open the breather vent valve between the pump and the hose.

8. Hold both hoses to avoid being splashed.

9. While holding both hoses securely, momentarily turn the pump switch to forward. This will draw the solvent from the diesel fuel bucket, pump it through the pump, and out into the catch bucket.

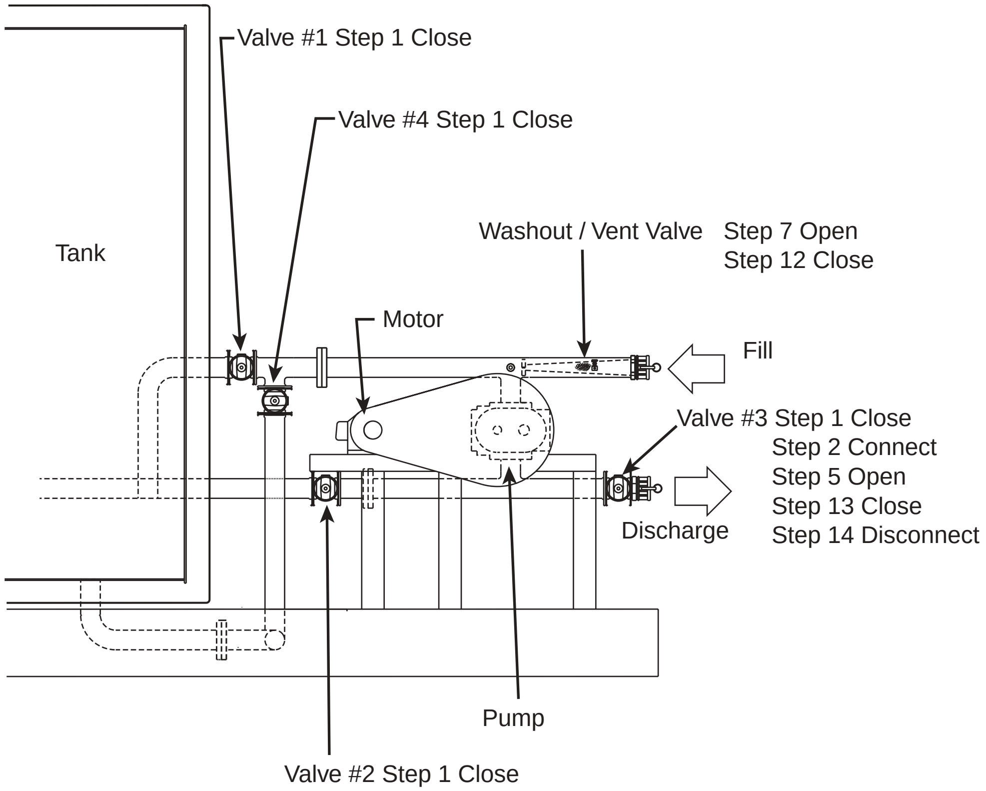
10. Shut off the pump.

11. Drain the remaining solvent from the 3” hose into the catch bucket.

12. Close the breather vent valve between the pump and the 3/8” hose.

13. Close valve #3.

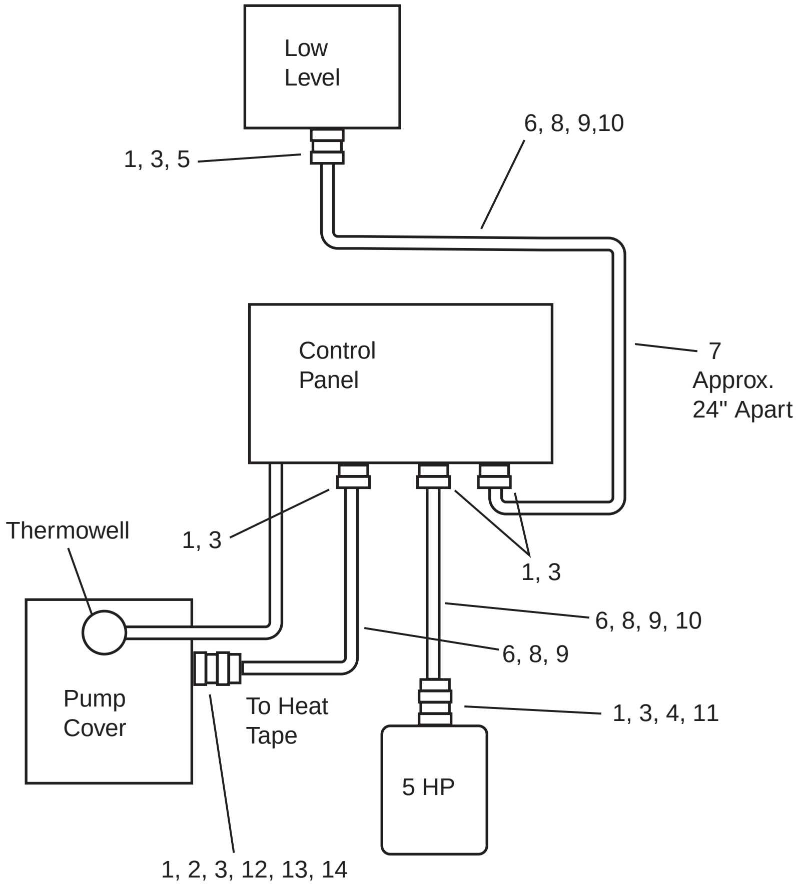
14. Remove the 3” hose and replace the discharge line cap.



Cleaning The Asphalt Pump

Wiring- Storage Tank

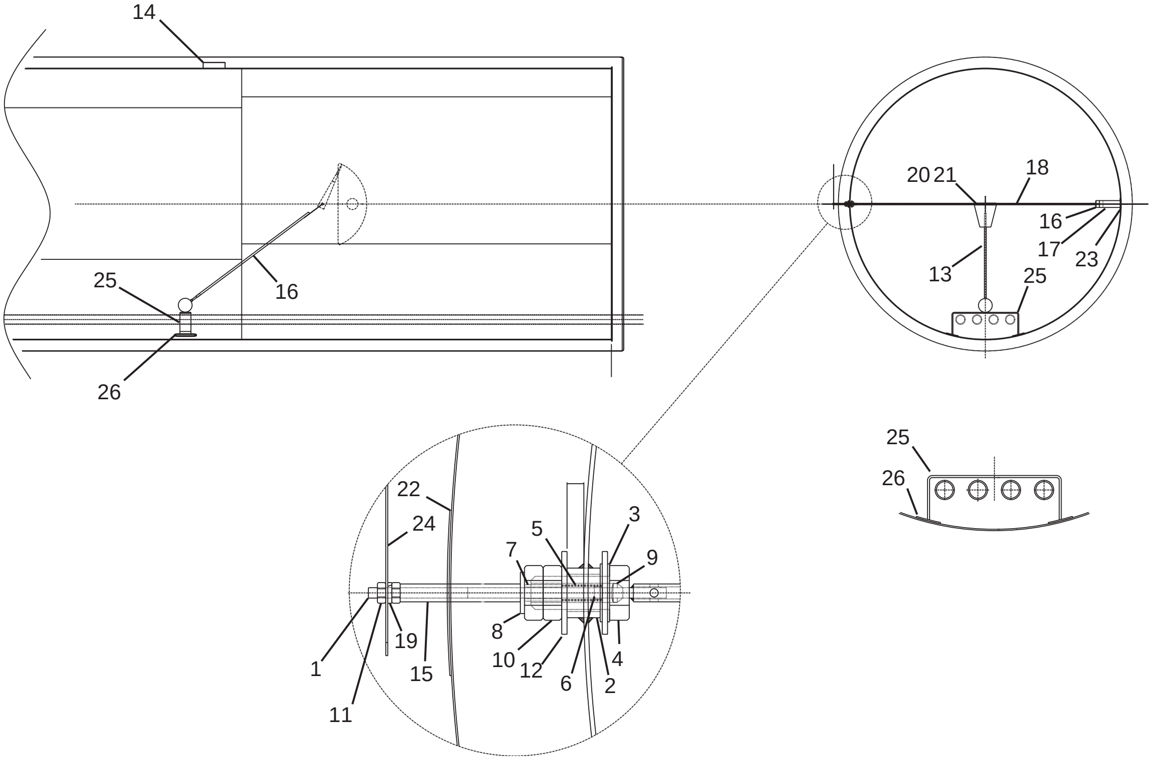
5200299



REF	PART NO.	QTY	DESCRIPTION	REF	PART NO.	QTY	DESCRIPTION
1	6700969	6	Connector-FEMT,0.50”,Liquid,Res				
2	6700858	1	Cord Grip-Male,0.50x90,Liquid,Res				
3	6702282	7	Nut-Conduit,1/2”,Sealing				
4	6700970	1	Connector-FEMT,0.50x90,Liquid,Res				
5	0144042	1	Bushing-Pipe,0.75x0.50NPT,PD				
6	6700710	25	Conduit-FEMT,0.50,Sealtite,EF				
7	6000968	6	Clamp-Tube,15/16,Berg#1511-7				
8	6702304	25	Wire-10 Ga,AWG,White,Type THWN				
9	A100110	25	Wire-10 Ga,AWG,Black,Type THWN				
10	6702499	25	Wire-10 Ga,AWG,Green,Type THWN				
11	A100107	76	Wire Nut-10 Ga				
12	6700349	1	Cover-Unilet K50 Form 35				
13	6700023	1	Gasket-0.50 In Box #GK50-N				
14	A100105	1	Unilet-1/2 LB50-M				

Tank Gage Assembly

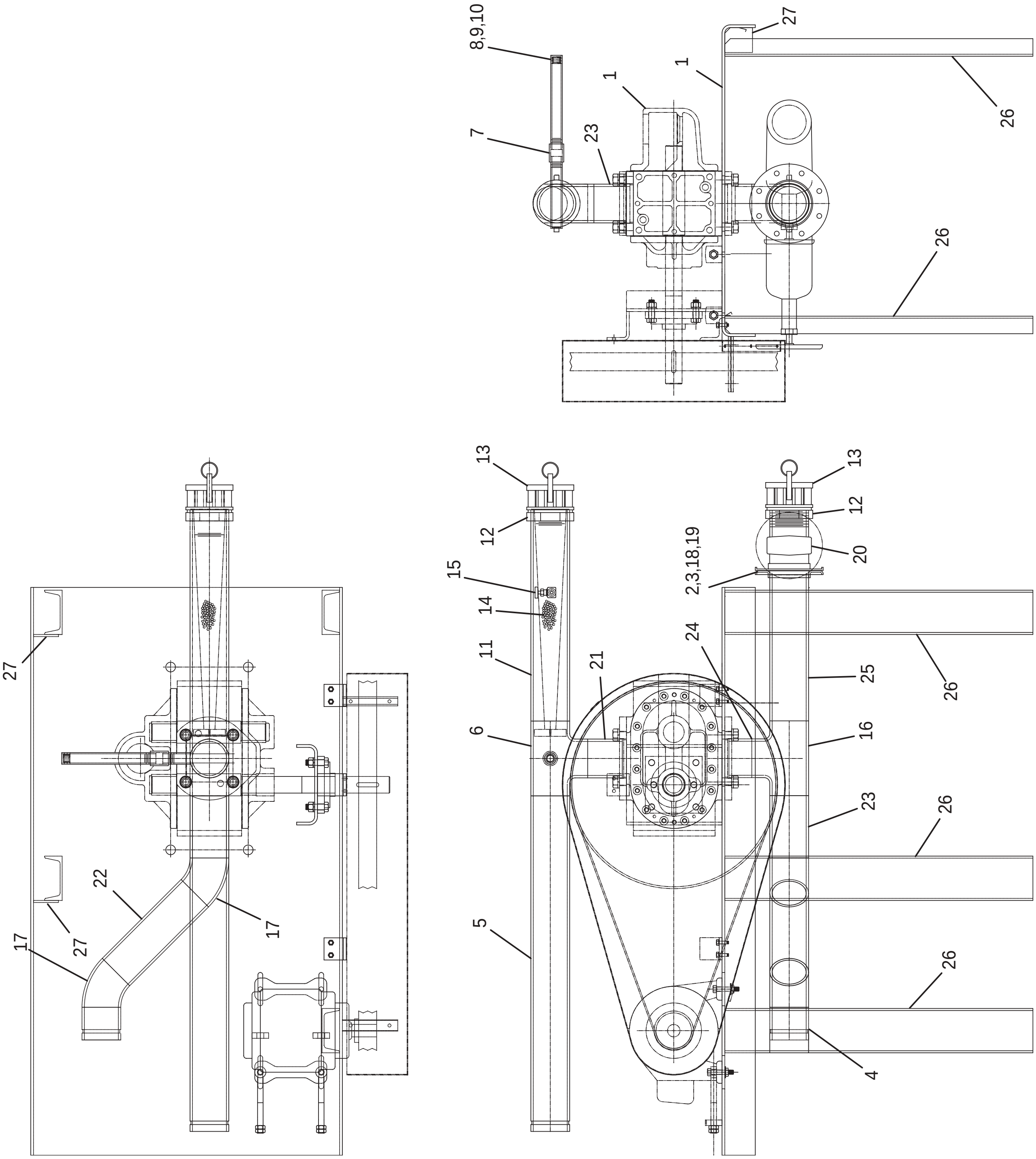
5200696



26	2	5200659	PAD-STANDOFF
25	1	5200690	PLATE-FORMED,FLOAT CHANNEL
24	1	3301181	DIAL POINTER STAINLESS STEEL
23	1	2750593	PAD-RING, TANK
22	1	3341199	COVER-JKT,DRIVE,SHAFT TK GAGE
21	2	9416509	NUT-HEX,LOCK,0.25,GRB,PN
20	2	0121900	SCREW-HEX,0.25NCX1.00,GR2,PD
19	1	0120214	WASHER-LOCK,0.31,SPRING,PD
18	1	5200693	SHAFT-TANK GAGE,89"
17	2	3361166	LEG-SOCKET,TANK GAGE
16	1	3361167	SOCKET-TANK GAGE SHAFT
15	1	A1077EF	SPACER-PNTR,TANK GAGE,4" INSUL
14	1	3360196	DOME ASSEMBLY-TANK GAUGE
13	1	5200695	STEM ASM-TANK GAGE,98" DIA
12	2	0131002	WASHER-FLAT,1.00A(1.06X2.50)PD
11	2	0120376	NUT-HEX,0.31NC,PD
10	1	0426899	NUT-HEX,JAM,1.00NC,PD
9	1	3360204	PACKING-TANK GAUGE
8	1	3360828	NUT ASM-PACKING RETAINER,SAM
7	1	3301164	SPACER PACKING TANK GAUGE
6	1	3360187	SLEEVE-PACKING,TANK GAUGE
5	1	3360192	SPRING-PACKING, TANK GAUGE
4	1	3301163	SCREW-FITT TANK GAGE,1"NC MOD.
3	2	3360825	GASKET-ASB,GARLOCK1 3/4x1x1/16
2	1	3301165	SPACER-TANK GAUGE
1	1	A1077EE	SHAFT-DRIVE TANK GAGE,4" INSUL
REF	REQ	PART NO	DESCRIPTION

Pump, Motor, Piping

5200652



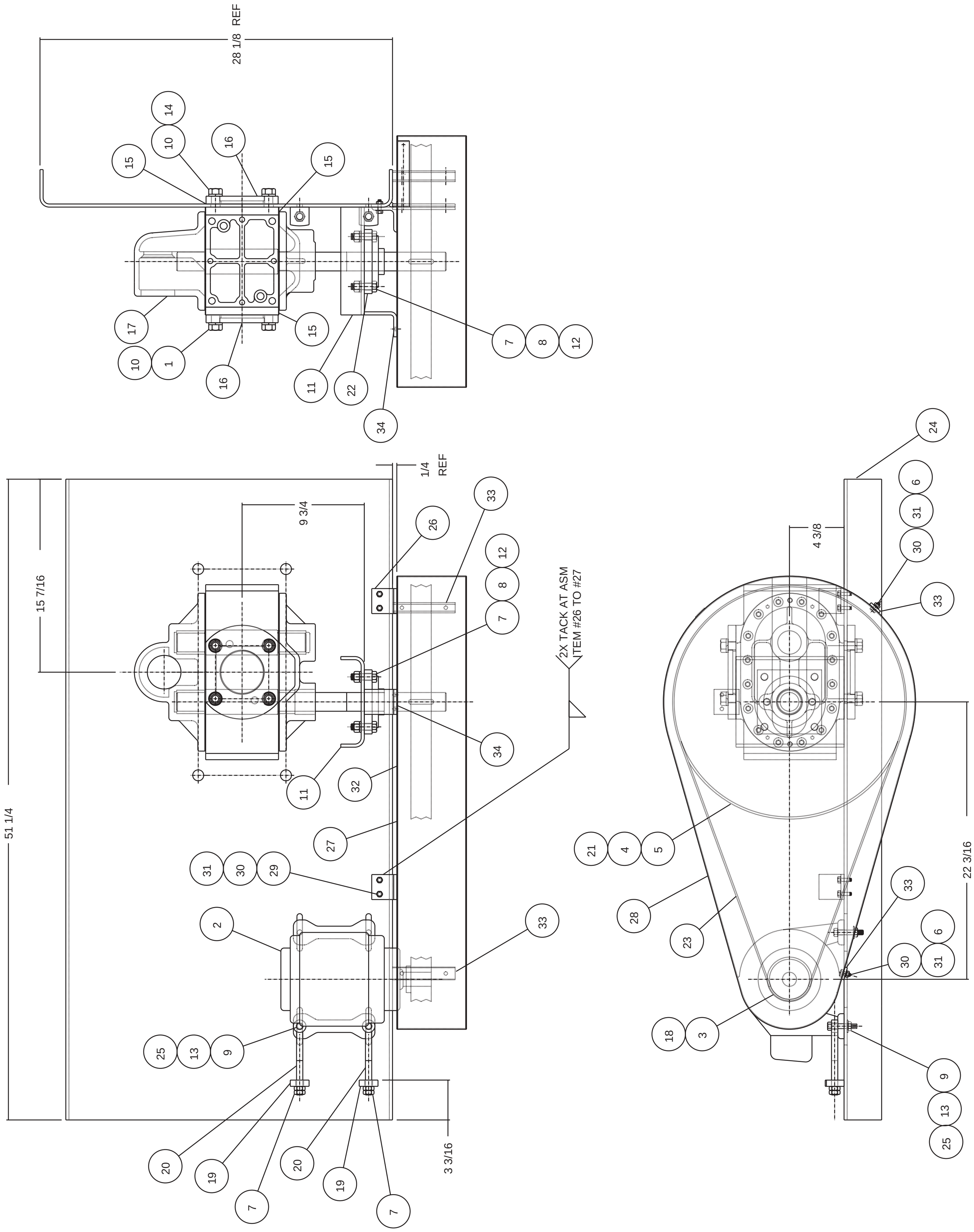
Pump, Motor, Piping

5200652

REF	REQ	PART NO	DESCRIPTION
27	2	5200763	TAB,CHANNEL/BASE
26	4	5200656	CHANNEL-MOTOR & PUMP MOUNTING
25	1	5200054	PIPE-3" X 13-9/16,RECRG
24	1	5200762	PIPE-3" X 2 1/16,RECRG
23	1	5200276	PIPE-SCH40,3" X 5-5/8 LG.
22	1	5200655	PIPE-SCH40,3" X 10-1/16"
21	1	5200274	PIPE-SCH40,3" X 3-1/8 LG.
20	1	6600051	VALVE-GATE,HOSE,3 INCH
19	8	0274993	NUT-HEX,LOCK,0.38NC,EA,PD
18	8	0122145	SCREW-HEX,0.38NCX1.25,GR2,PD
17	2	6200619	ELBOW-WELD,45,3.00,LG RAD
16	1	6200514	TEE-STRAIGHT,3IN,PART NO 20
15	1	5200196	WASHOUT/VENT VALVE INSTL
14	1	3340004	STRAINER ASSEMBLY
13	2	6600281	CAP-DUST,3 IN,ALUM, W/CHAIN
12	2	6600277	ADAPT-3 IN,ALUM,PRT A,EVR-TITE
11	1	5200053	PIPE-3" X 19-1/16,SUCTION
10	1	6500079	BOX-STUFFING GE #6A440
9	1	3360479	CAP-THERMO WELL,TEMP CONTROL
8	1	5200062	WELL ASM-THERMOCOUPLE,8 1/4"
7	1	0144071	COUPLING-PIPE,0.75,PD
6	1	5200063	TEE & THERMOCOUPLE WELL ASM
5	1	5200654	PIPE-SCH40,3' X 29-11/32",VIC
4	1	5200653	PIPE-SCH40,3' X 2 15/16,VIC
3	1	6000068	FLG#20056A,3FLUED ALEGNY CPLG
2	1	6000071	GASKET-3 FLANGE,AV#10233B,ASB.
1	1	5200651	PUMP UNIT-P200,5HP,240V 3PH

Pump Unit

5200651



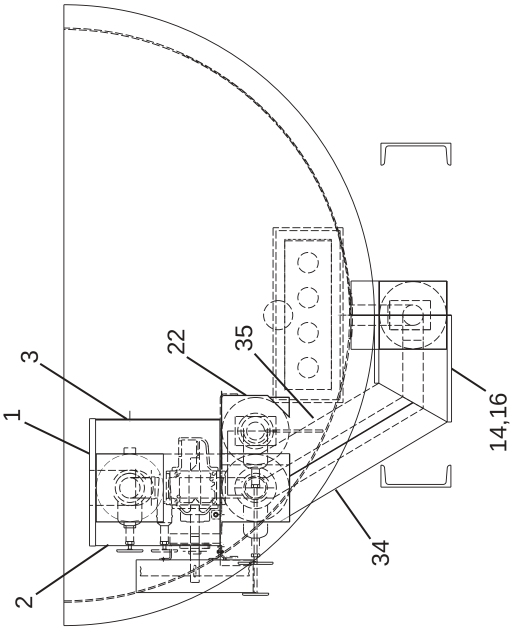
Pump Unit

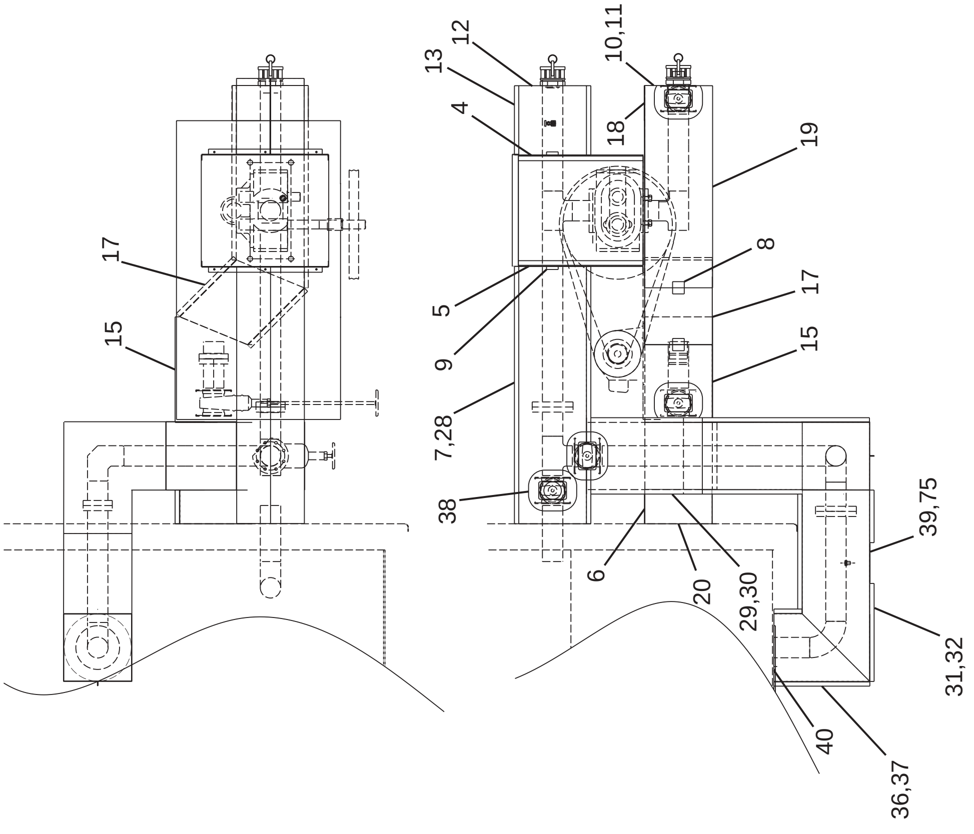
5200651

REF	REQ	PART NO	DESCRIPTION
34	1	5200040	ANGLE-BELT GUARD COVER
33	2	5200039	PLATE-BELT GUARD COVER
32	5	6000550	SCREW-HEX,0.25-14X0.75,TEK3,PD
31	8	0120380	WASHER-LOCK,0.25,SPRING,PD
30	8	0120375	NUT-HEX,0.25NC,PD
29	4	0121900	SCREW-HEX,0.25NCX1.00,GR2,PD
28	1	5200032	BELT GUARD WELDMENT
27	1	5200033	REAR COVER-BELT GUARD
26	2	5200034	ANGLE-INSIDE SUPT,BELT DRIVE
25	4	0122181	SCREW-HEX,0.38NCX2.00,GR2,PD
24	1	5200650	PLATE-PUMP BASE,HORZ. TANK
23	1	6430363	BELT-TRI-POWER BX79 2/SET
22	1	6420114	BEARING-FLANGE,4 BLT,1.50 SHFT
21	1	5200795	KEY-PUMP/SHEAVE,1/4X3/8X1 3/4
20	2	4050188	BOLT-DRAW,ELECT.,PUMPING UNIT
19	2	4050185	BRACE-DRAW BOLT
18	1	3560086	KEY-0.25X0.25 CR X 1.75 LG
17	1	3340593	PUMP ASM-200GAL,LG RD SHF
16	2	3340352	FLANGE-BOTTOM, 200 GAL. PUMP
15	3	3340341	GASKET-200 GAL. PUMP
14	4	0428691	SCREW-HEX,0.63NCX2.00,GR2,PD
13	4	0274993	NUT-HEX,LOCK,0.38NC,EA,PD
12	4	0122459	SCREW-HEX,0.50NCX2.00,GR2,PD
11	1	5200035	CHANNEL-SUPPORT BEARING
10	8	0121574	WASHER-LOCK,0.62,SPRING,PD
9	4	0274517	WASHER-FLAT,0.375,B,PD
8	4	0120384	WASHER-LOCK,0.50,SPRING,PD
7	8	0120378	NUT-HEX,0.50NC,PD
6	4	0120854	SCREW-HEX,0.25NCX0.63,GR2,PD
5	1	6425036	SHEAVE-2BK190H FHP
4	1	6420208	BUSHING-1-1/2 H FHP
3	1	6425035	SHEAVE-FHP 2BK34 X 1-1/8
2	1	6702285	MOTOR-5HP 1750RPM 460V TEFC
1	4	0428217	SCREW-HEX,0.63NCX1.50,GR2,PD

Insulation And Heat Shield

5200748





INSTALL SCREWS (ITEM #23)
EQUALLY SPACED APART-TYP

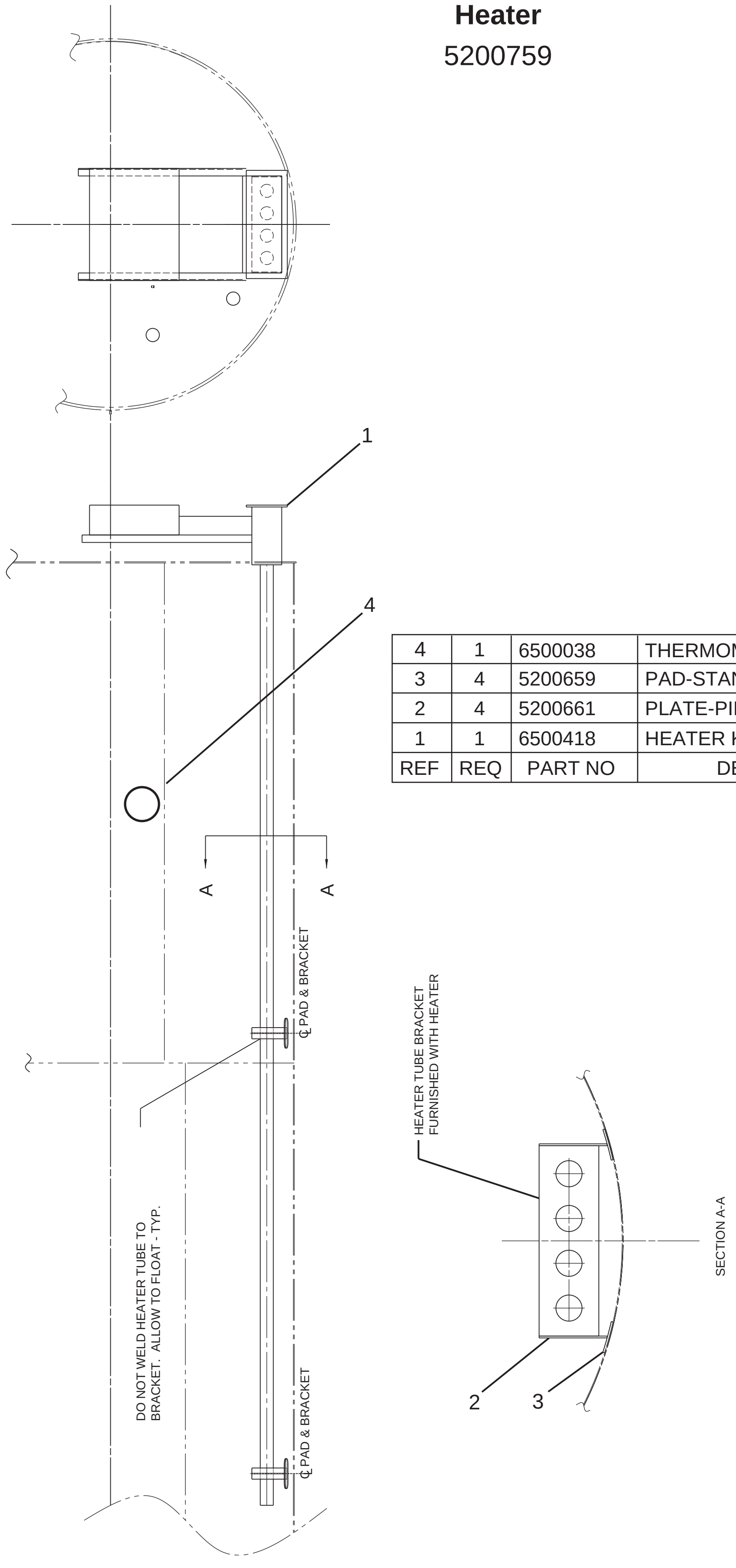
Insulation And Heat Shield

5200748

REF	REQ	PART NO	DESCRIPTION
40	2	5200794	FINISH RING,HEAT SHEILD
39	1	5200793	COVER-FINISH,HEAT SHEILD
38	4	5200201	RING-FINISHING,VALVE BODY
37	1	5200747	SHIELD-HEAT,LOWER,R/H
36	1	5200746	SHIELD-HEAT,LOWER,L/H
35	1	5200741	SHLD-HEAT,LOWER,BEVELED,SHT,RH
34	1	5200740	SHLD-HEAT,LOWER,BEVELED,SHT,LH
33	2	6700858	CORD GRIP-MALE,0.5X0.375,#1206
32	1	5200751	SHIELD-HEAT,HORIZONTAL,L/H
31	1	5200745	SHIELD-HEAT,HORIZONTAL,L/H
30	1	5200744	SHIELD-HEAT,VERTICAL,R/H
29	1	5200743	SHIELD-HEAT,VERTICAL,L/H
28	1	5200742	SHIELD-HEAT,UPPER,LONG,LH
27	1	6702462	CHROMALOX #RTRES END SEAL KIT
26	5	6000753	INSULATION-FBRGLASS,2IN THK/SF
25	60	6702495	WIRE-HEAT TRACE,10W /FT
24	2	6001636	INSULATION-ELBOW ,4"THK FOR 3" PIPE ELBOW
23	75	6000550	SCREW-HEX,0.25-14X0.75,TEK3,PD
22	1	5200753	SHIELD-HEAT,BOTTOM
21	24	6001635	INSULATION-PIPE 4"THK FOR 3"PIPE
20	1	5200754	SHIELD-HEAT,BOTTOM
19	1	5200750	SHIELD-HEAT
18	1	5200752	PLATE-COVER,HEAT SHIELD
17	1	5200739	SHLD-HEAT,LOWER,BEVELED
16	1	5200755	SHIELD-HEAT,LOWER
15	1	5200737	SHLD-HEAT,LOWER,BEVELED,SHT,RH
14	1	5200756	SHIELD-HEAT,LOWER,REAR
13	2	5200735	SHIELD-HEAT,UPPER,SHORT
12	1	5200734	PLATE-END,HEAT SHIELD,UPPER
11	1	5200733	PLATE-END,HEAT SHIELD,LOWER,RH
10	1	5200732	PLATE-END,HEAT SHIELD,LOWER,LH
9	8	5200076	ANGLE-HEAT SHIELD,2"
8	4	5200296	ANGLE-HEAT SHIELD,2",45 DEG
7	1	5200731	SHIELD-HEAT,UPPER,LONG
6	1	5200730	PLATE-COVER,HEAT SHIELD,LOWER
5	1	5200729	PLATE-HEAT BOX,SIDE,RH
4	1	5200728	PLATE-HEAT BOX,SIDE,L/H
3	1	5200727	PLATE-HEAT BOX,FRONT
2	1	5200726	PLATE-HEAT BOX,REAR
1	1	5200067	COVER-HEAT BOX

Heater

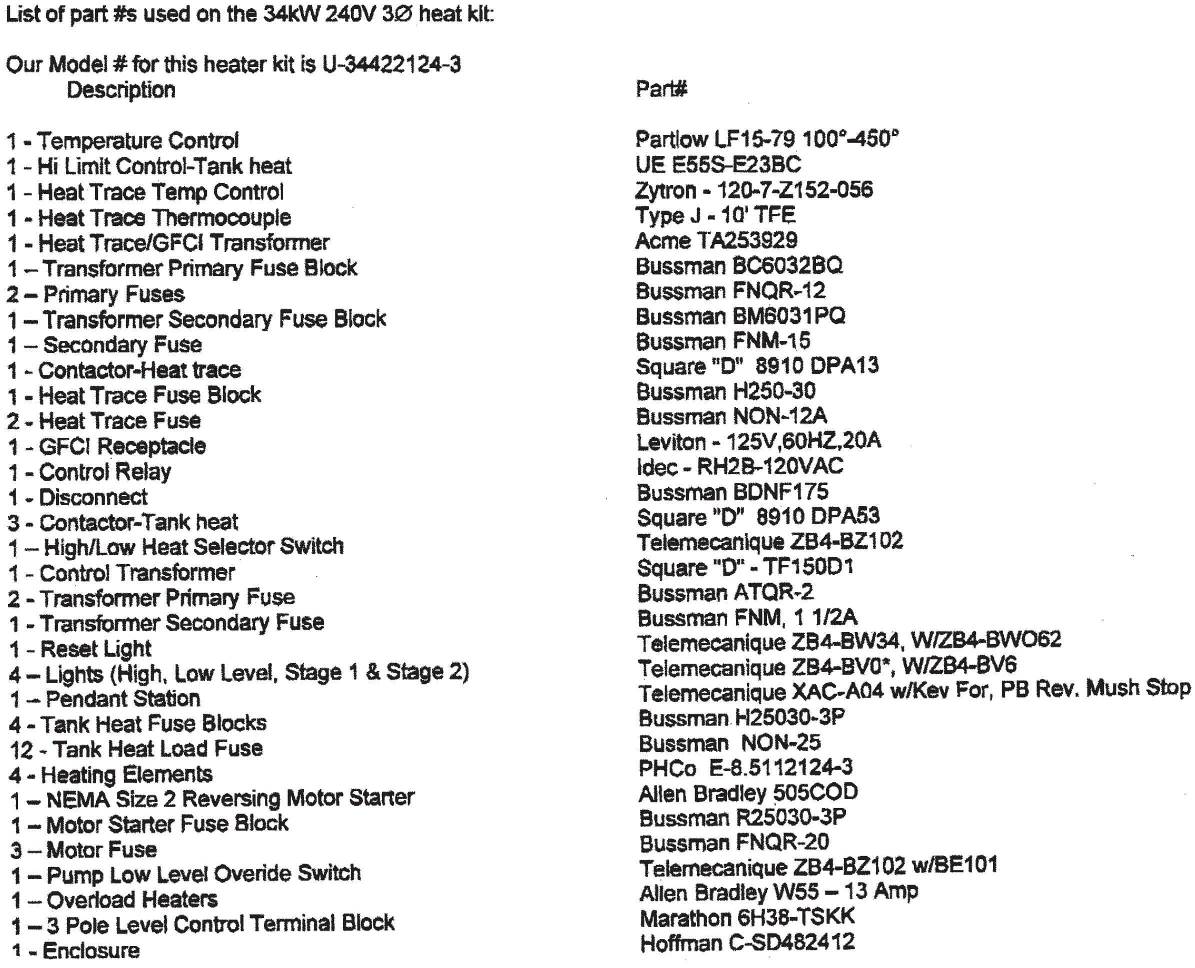
5200759



4	1	6500038	THERMOMETER-5"DIA,50-550,9" LG
3	4	5200659	PAD-STANDOFF
2	4	5200661	PLATE-PIPE,SUPPORT
1	1	6500418	HEATER KIT,34KW/240 VOLT
REF	REQ	PART NO	DESCRIPTION

Heater

5200759



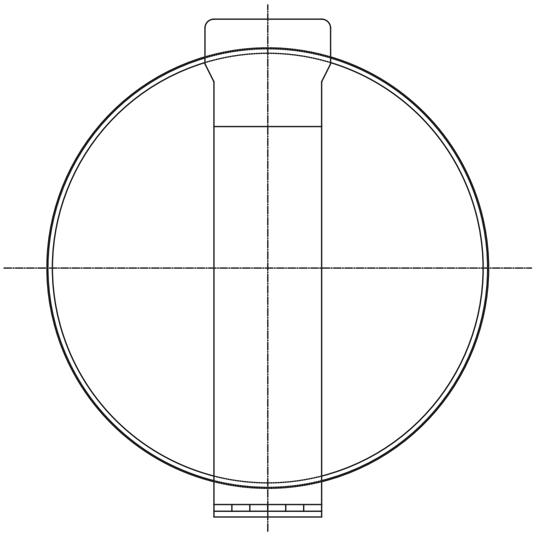
List of part #s used on the 34kW 240V 3Ø heat kit:

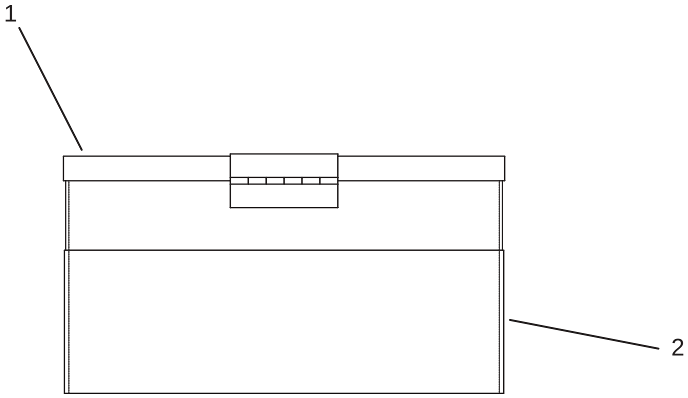
Our Model # for this heater kit is U-34422124-3

Description	Part#
1 - Temperature Control	Partlow LF15-79 100°-450°
1 - Hi Limit Control-Tank heat	UE E55S-E23BC
1 - Heat Trace Temp Control	Zytron - 120-7-Z152-056
1 - Heat Trace Thermocouple	Type J - 10' TFE
1 - Heat Trace/GFCI Transformer	Acme TA253929
1 – Transformer Primary Fuse Block	Bussman BC6032BQ
2 – Primary Fuses	Bussman FNQR-12
1 – Transformer Secondary Fuse Block	Bussman BM6031PQ
1 – Secondary Fuse	Bussman FNM-15
1 - Contactor-Heat trace	Square "D" 8910 DPA13
1 - Heat Trace Fuse Block	Bussman H250-30
2 - Heat Trace Fuse	Bussman NON-12A
1 - GFCI Receptacle	Leviton - 125V,60HZ,20A
1 - Control Relay	Idec - RH2B-120VAC
1 - Disconnect	Bussman BDNF175
3 - Contactor-Tank heat	Square "D" 8910 DPA53
1 – High/Low Heat Selector Switch	Telemecanique ZB4-BZ102
1 - Control Transformer	Square "D" - TF150D1
2 - Transformer Primary Fuse	Bussman ATQR-2
1 - Transformer Secondary Fuse	Bussman FNM, 1 1/2A
1 - Reset Light	Telemecanique ZB4-BW34, W/ZB4-BWO62
4 – Lights (High, Low Level, Stage 1 & Stage 2)	Telemecanique ZB4-BV0*, W/ZB4-BV6
1 – Pendant Station	Telemecanique XAC-A04 w/Kev For, PB Rev. Mush Stop
4 - Tank Heat Fuse Blocks	Bussman H25030-3P
12 - Tank Heat Load Fuse	Bussman NON-25
4 - Heating Elements	PHCo E-8.5112124-3
1 – NEMA Size 2 Reversing Motor Starter	Allen Bradley 505COD
1 – Motor Starter Fuse Block	Bussman R25030-3P
3 – Motor Fuse	Bussman FNQR-20
1 – Pump Low Level Overide Switch	Telemecanique ZB4-BZ102 w/BE101
1 – Overload Heaters	Allen Bradley W55 – 13 Amp
1 – 3 Pole Level Control Terminal Block	Marathon 6H38-TSKK
1 - Enclosure	Hoffman C-SD482412

Manhole Assembly

5200683

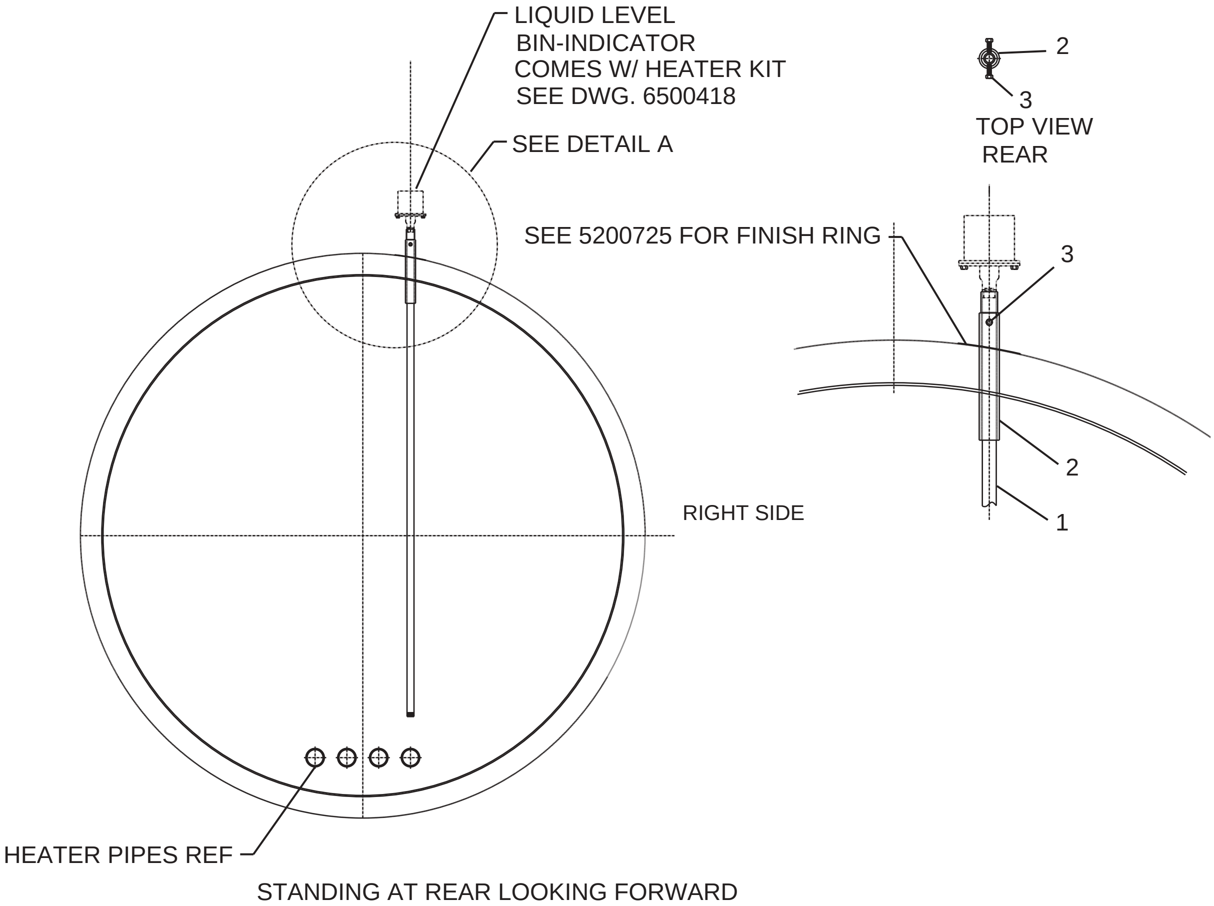




REF	PART NO.	QTY	DESCRIPTION	REF	PART NO.	QTY	DESCRIPTION
1	6001631	1	Manhole Asm-24” w/Gasket				
2	5200681	1	Collar-Manhole,24 x 8, Non Relieving				

Level Indicator

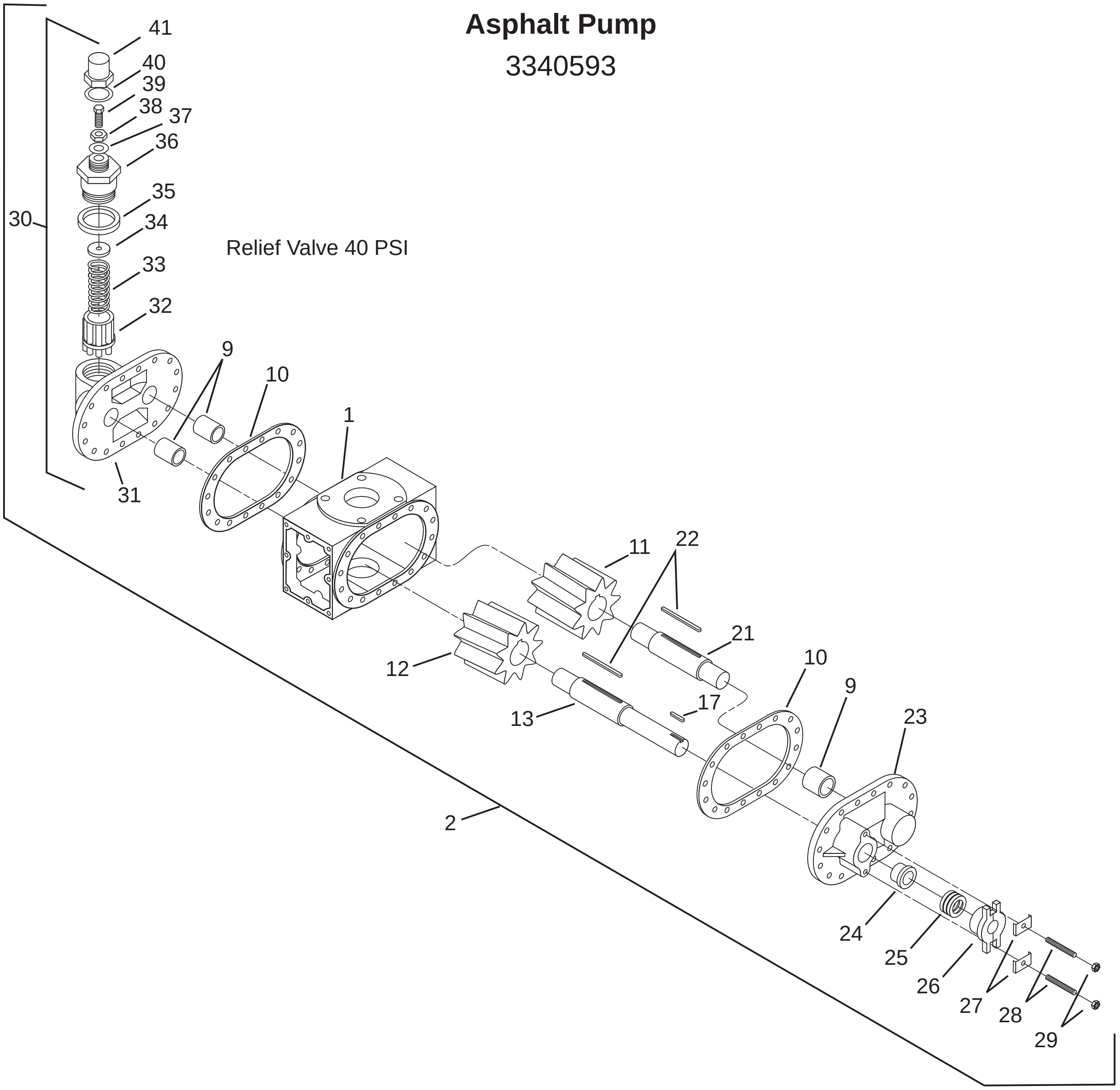
5200646



3	2	6001629	SCREW-HEX,0.38NCX1.00,SS304
2	1	5200639	PIPE-LEVEL IND.BRACKET
1	1	5200637	CAP/PIPE INSERT,WELDMENT
REF	REQ	PART NO	DESCRIPTION

Asphalt Pump

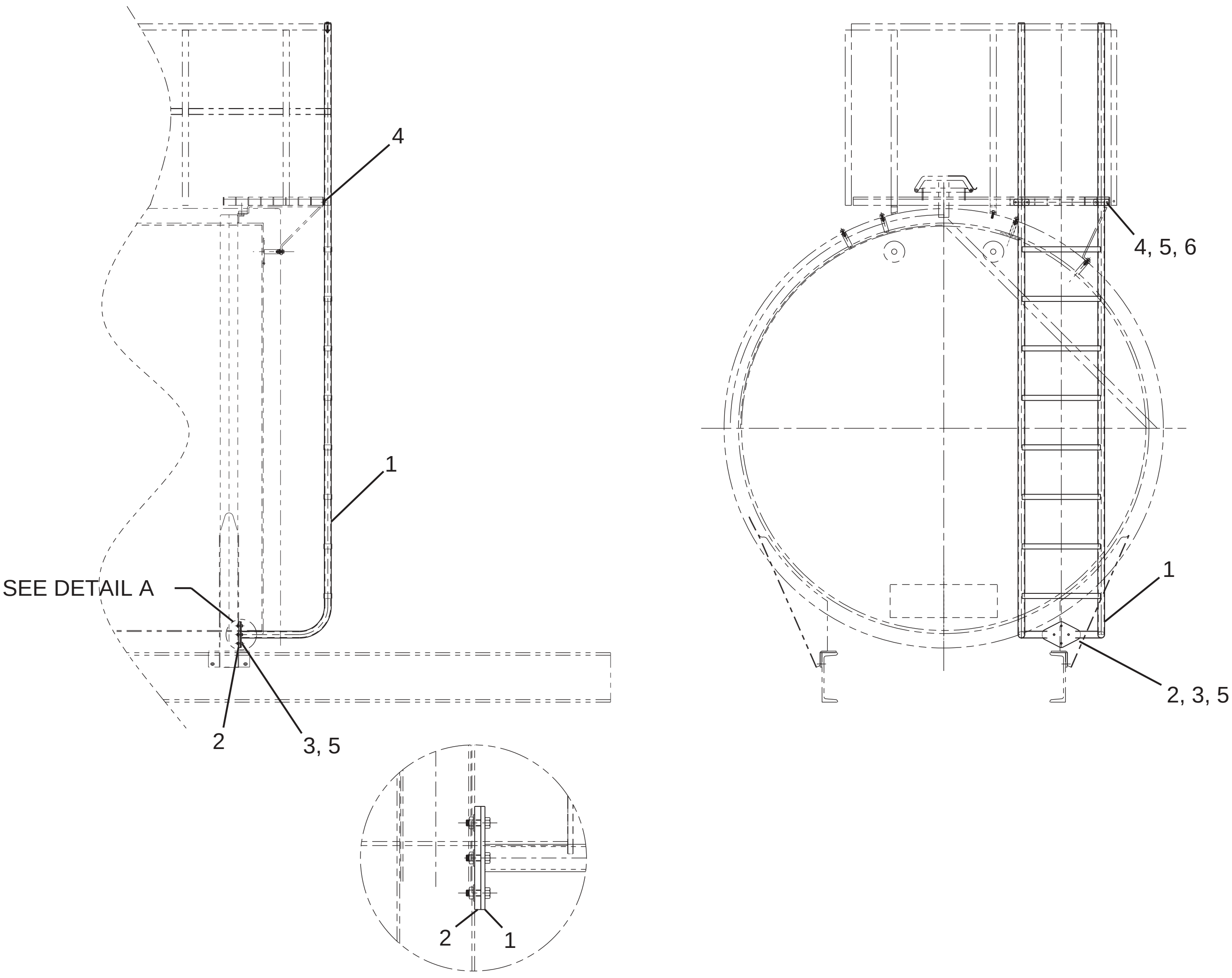
3340593



REF	PART NO.	QTY	DESCRIPTION
1	3340311	1	Case
2	3340532	1	Pump Asm-200 Gpm, w/Relief Valve
3	0122145	32	Bolt-Hex, 3/8 x 1 1/4 (Not Shown)
4	0103615	4	Pin-No 5 x 1 1/4 (Not Shown)
5	3340314	3	Bearing
6	3340573	2	Gasket
7	3340335	1	Impeller
8	3340334	1	Impeller
9	3340340	1	Driveshaft
10	6000468	1	Key-3/8 x 1 7/8
11	3340337	1	Shaft
12	6000469	2	Key-3/8 x 5
13	3340312	1	Face Plate
14	3340294	1	Sleeve
15	6600310	1	Packing
16	3340307	1	Gland
17	3340308	2	Clip
18	3340949	2	Stud-Packing Gland
19	0124843	2	Nut-Hex, Jam, 9/16NC
20	3340342	1	Valve Asm-Bypass
21	3340343	1	Face Plate-Bypass
22	3340344	1	Valve Body
23	3340345	1	Spring
24	3340346	1	Spring Bearing
25	6600208	1	Gasket
26	3340347	1	Plug
27	6600244	1	Gasket
28	0271501	1	Nut-Hex, 7/16NC
29	3340348	1	Adjusting Bolt
30	3340349	1	Gasket
31	3340350	1	Cap

Ladder

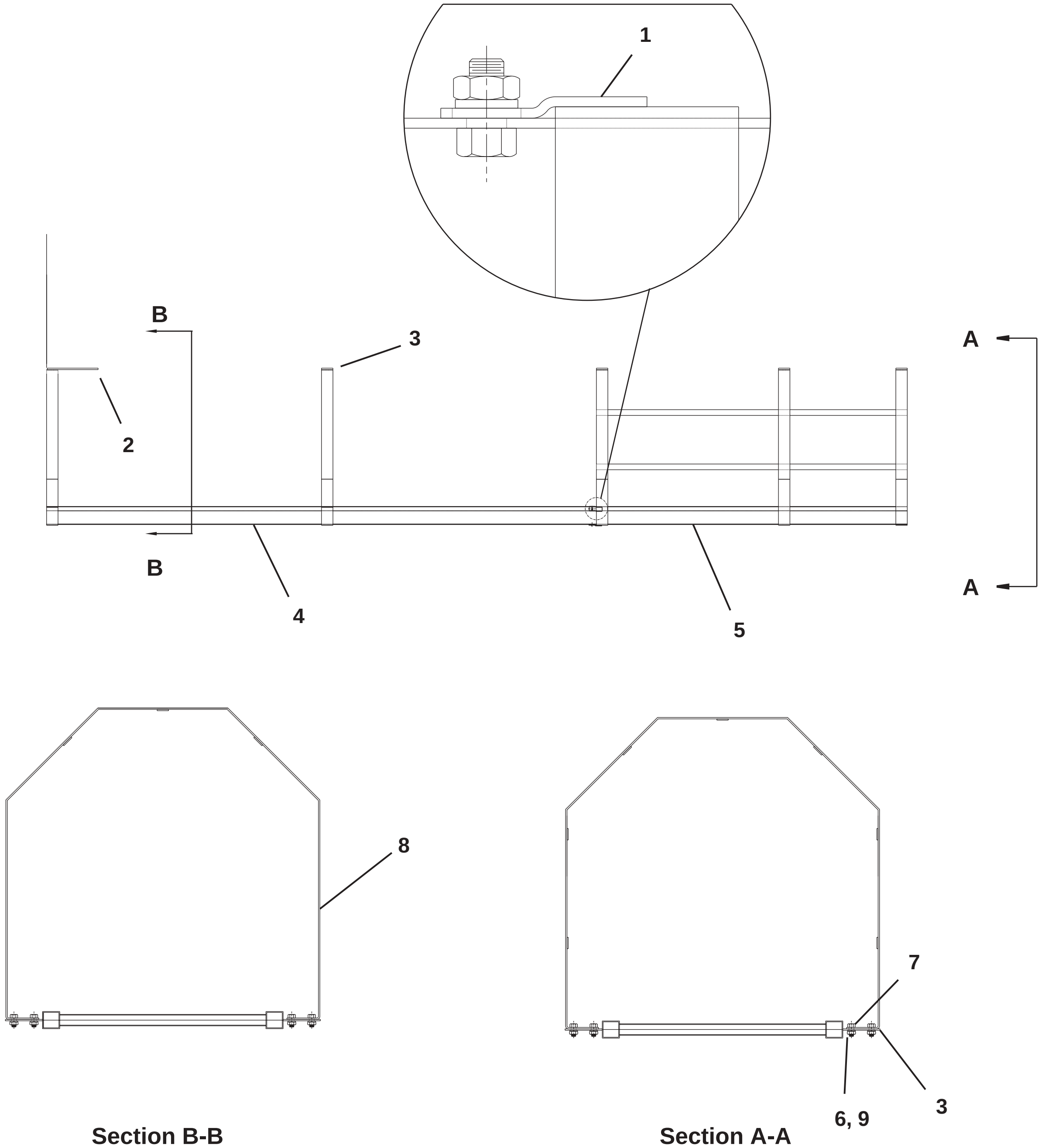
5200779



6	4	0274993	NUT-HEX,LOCK,0.38NC,EA,PD
5	8	0274517	WASHER-FLAT,0.375,B,PD
4	4	0122145	SCREW-HEX,0.38NCX1.25,GR2,PD
3	4	0122119	SCREW-HEX,0.38NCX0.75,GR2,PD
2	1	5200667	PLATE-LADDER,MTG.TAPPED
1	1	5200666	ASM-LADDER
REF	REQ	PART NO	DESCRIPTION

Ladder Cage

5200776

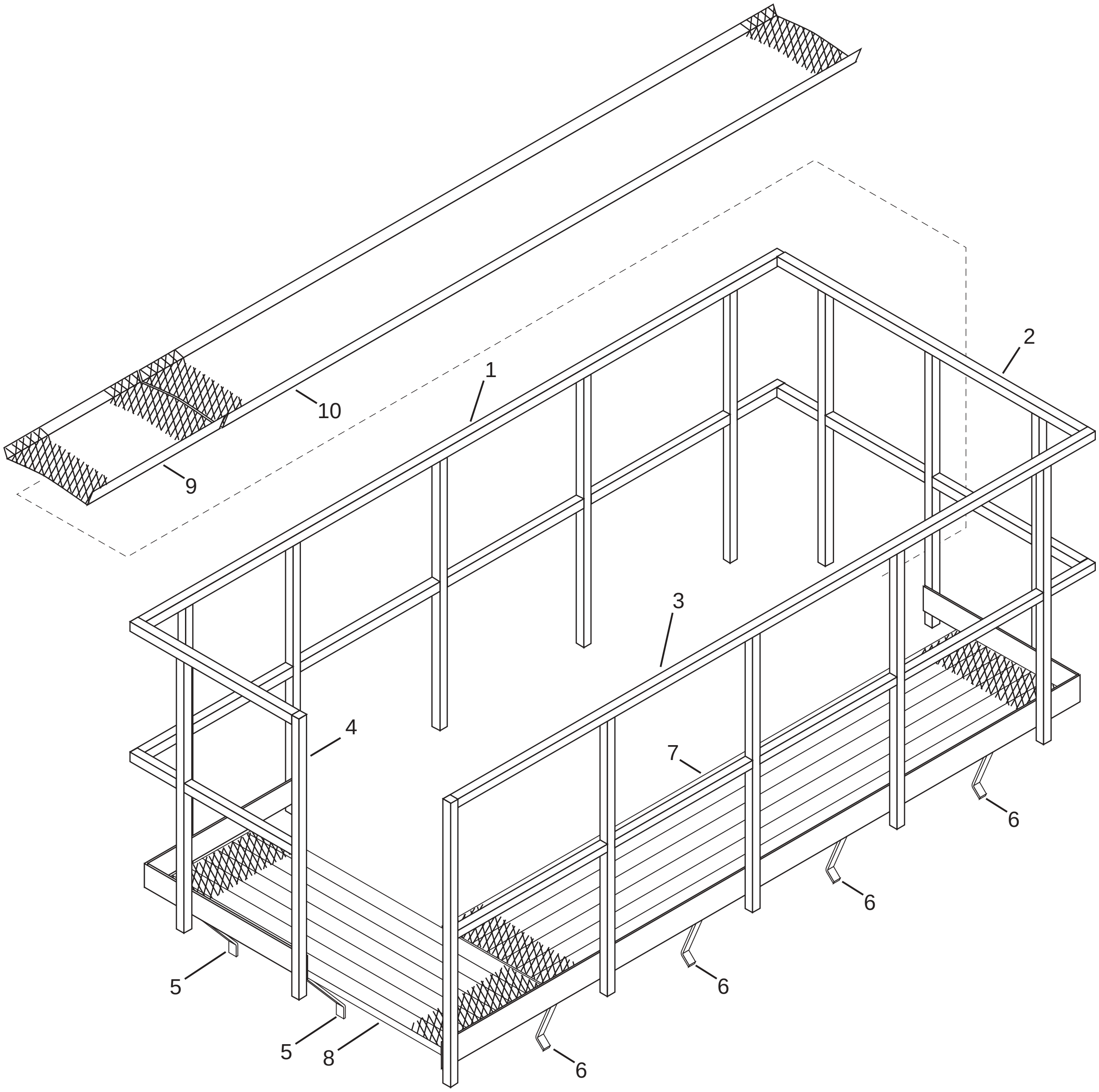


Section B-B

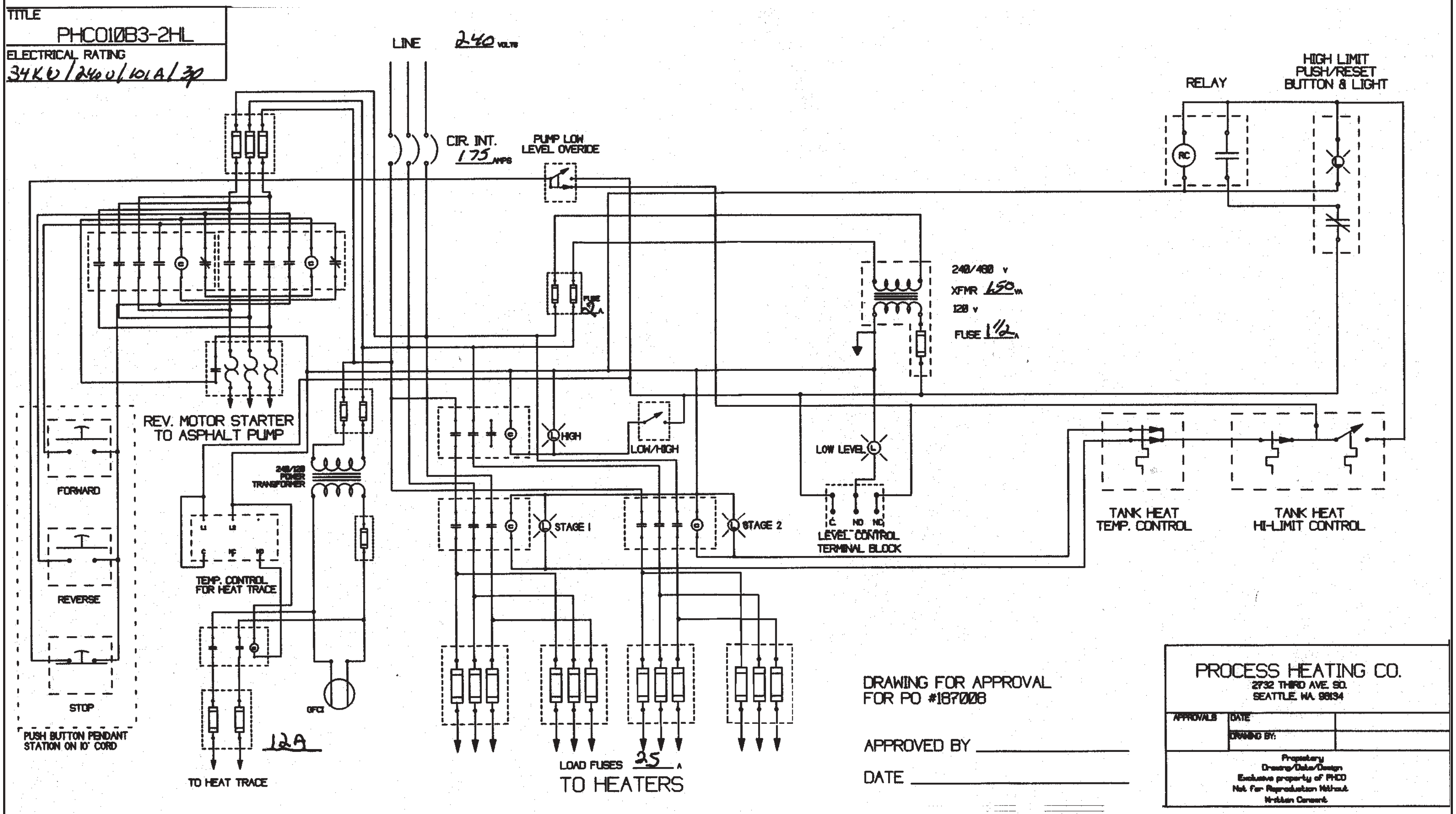
Section A-A

9	20	0274517	WASHER-FLAT,0.375,B,PD
8	2	A1001LR	SIDE SUPPORT BOTTOM CAGE
7	20	0122126	SCREW-HEX,0.38NCX0.88,GR2,PD
6	20	0274993	NUT-HEX,LOCK,0.38NC,EA,PD
5	1	5200775	CAGE-TOP SECTION
4	1	5200370	CAGE-BOTTOM SECTION,3 BAR
3	8	5200134	BRACKET-CAGE TO LADDER
2	2	5200777	BRACKET-CAGE TO LADDER
1	7	5200135	CLIP-CAGE
REF	REQ	PART NO	DESCRIPTION

Handrails, Platform And Catwalk



REF	PART NO.	QTY	DESCRIPTION
1	5200715	1	Handrail Asm-Left
2	5200717	1	Handrail Asm-Front
3	5200718	1	Handrail Asm-Right
4	5200714	1	Handrail Asm-Rear
5	5200672	2	Bracket-Walkway Support
6	5200675	4	Bracket-Walkway Support
7	5200677	1	Walkway Asm
8	5200680	1	Walkway Asm
9	5200783	1	Catwalk-Alum Rough Tread, 36”
10	5200782	1	Catwalk-Alum Rough Tread, 156”



Wiring Diagram

Motor Reset Button

Instructions for Reset Operator Kit RSK-12, for A/200 Motor Starters Used in Control Panels

I.L. 13203-C
File 8200

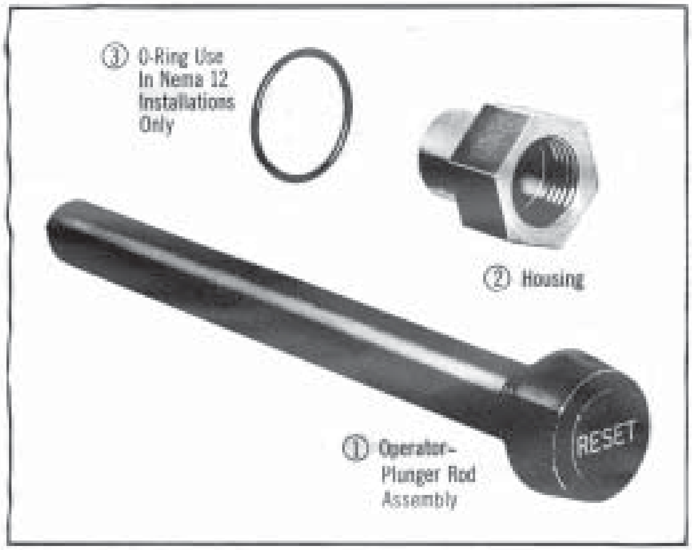


Fig. 1 *Component Parts of Reset Operator Kit S#176C585G02*

The Westinghouse reset operator kit is designed for use with A/200 Motor Starters used in control panels. For illustration of component parts refer to Figure 1.

Utilize the same drilling plan for NEMA 12 and NEMA 1 kits. Follow the same installation procedure and adjustment sequence for both types except for NEMA 12 kits, the O-ring (3) supplied with the kit must be positioned between the operator and the cover before securing the operator to the cover. For NEMA 1 kits, the O-ring (3) is discarded.

Installation of Cover Mounted Reset Button

1. For applications where the cover thickness is less than .187 the top of the starter reset rod must be at least 1" below the underside of the cover. (See Figure 4)

Note

If the starter reset rod is less than 1" from the underside of the cover, use the RSK-B12 reset kit (I.L. 14507).

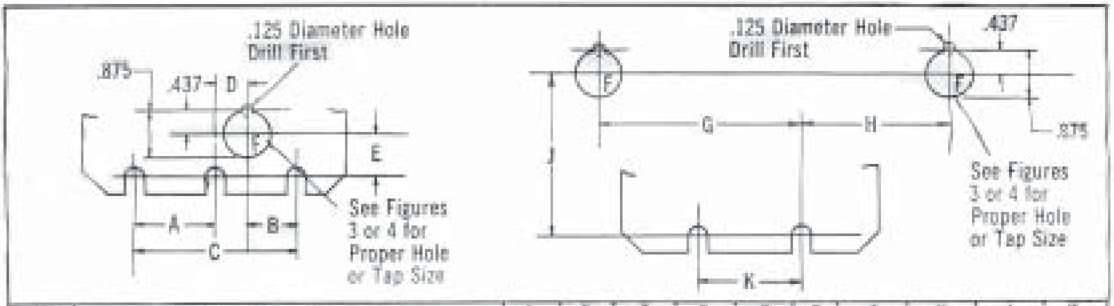
2. For application where the cover thickness is greater than .187 the operator must be mounted in a 3/4-16 tapped hole with a .094 front counterbore (See Figure 3).

3. Determine the type of starter which you are using and refer to Figure 2 for the cover drilling plan. Note that the single pole overload relays require two holes in the cover and two reset kits. The block type overload relay mounted below the starter requires one hole and one reset kit. Drill or tap for proper cover thickness and starter type.

4. Take operator-plunger rod assembly (1) insert through cover hole and position so that the lettering on operator is horizontal and the key on the operator lines up with the offset in the cover hole. Place housing (2) on the rear of the operator and tighten securely. This method is utilized where the cover thickness is .187 maximum. See Figure 4. For covers greater than .187 thick, thread the operator-plunger assembly through the cover hole and tighten down securely. (See Figure 3.) The housing (2) is discarded for this application.

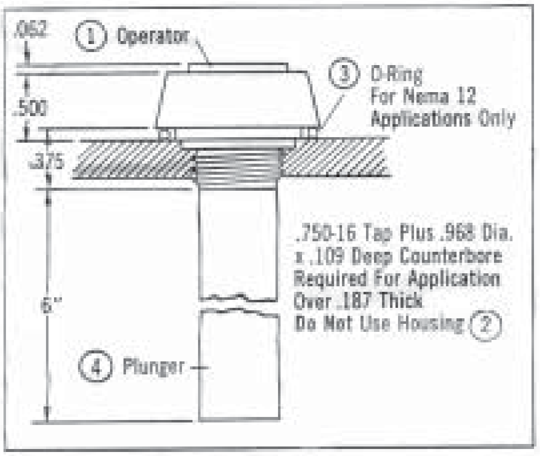
5. After the operator is mounted in the cover, determine the desired plunger rod (4) length by measurement or trial. Then cut plunger rod to suit the application.

Effective January, 1971 Supersedes I.L. 13203B dated March, 1968



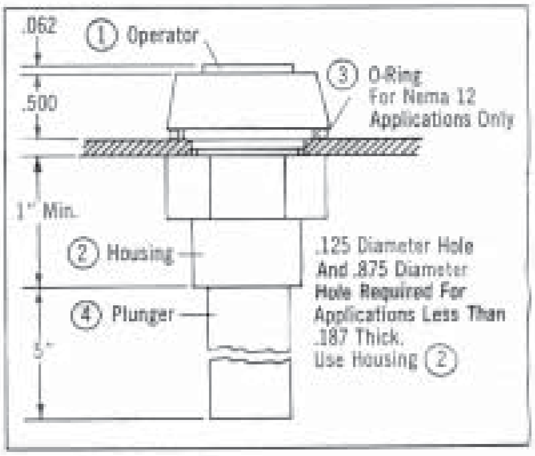
Size	3 Pole 3 Phase Linestarter	A	B	C	D	E	F	G	H	J	K
00	2 Single Pole Overload Relays—Side Mounted						2	2.703	1.640	1.484	1.500
00	2 or 3 Pole Overload Relays—Bottom Mounted	.937		1.875	.390	.421	1				
0-1	2 Single Pole Overload Relays—Side Mounted						2	2.703	1.640	1.484	1.500
0-1	2 or 3 Pole Overload Relays—Bottom Mounted	.937		1.875	.390	.421	1				
2	2 Single Pole Overload Relays—Side Mounted						2	2.703	1.640	1.140	1.500
2	2 or 3 Pole Overload Relays—Bottom Mounted	.937		1.875	.265	.687	1				
3-4	2 Single Pole Overload Relays—Side Mounted						2	3.640	2.718	2.890	1.875
3-4	2 or 3 Pole Overload Relays—Bottom Mounted		.890	2.875		.796	1				

Fig. 2 *Drilling Plan and Tabulation*



.750-16 Tap Plus .968 Dia. x .109 Deep Counterbore Required For Application Over .187 Thick Do Not Use Housing ②

Fig. 3 *Operator Mounting for Covers Over .187 In. Thick*

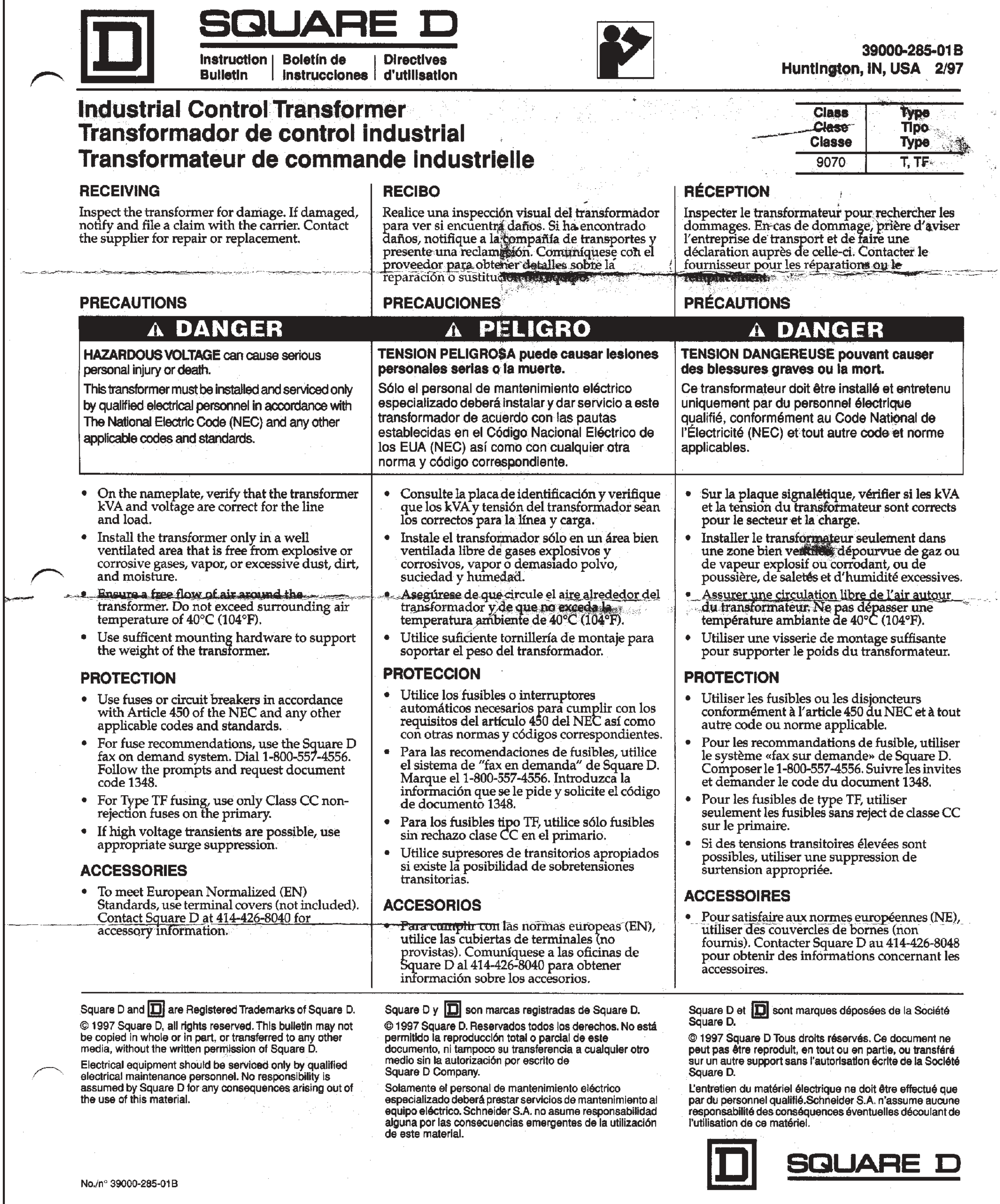


.125 Diameter Hole And .875 Diameter Hole Required For Applications Less Than .187 Thick. Use Housing ②

Fig. 4 *Operator Mounting for Covers Up To .187 In. Thick*

Westinghouse Electric Corporation
Control Division, Asheville, NC 28813

Control Transformer



SQUARE D

Instruction Bulletin | Boletín de instrucciones | Directives d'utilisation

39000-285-01B
Huntington, IN, USA 2/97

Industrial Control Transformer
Transformador de control industrial
Transformateur de commande industrielle

Class Clase Classe	Type Tipo Type
9070	T, TF

RECEIVING

Inspect the transformer for damage. If damaged, notify and file a claim with the carrier. Contact the supplier for repair or replacement.

PRECAUTIONS

⚠ DANGER

HAZARDOUS VOLTAGE can cause serious personal injury or death.

This transformer must be installed and serviced only by qualified electrical personnel in accordance with The National Electric Code (NEC) and any other applicable codes and standards.

- On the nameplate, verify that the transformer kVA and voltage are correct for the line and load.
- Install the transformer only in a well ventilated area that is free from explosive or corrosive gases, vapor, or excessive dust, dirt, and moisture.
- Ensure a free flow of air around the transformer. Do not exceed surrounding air temperature of 40°C (104°F).
- Use sufficent mounting hardware to support the weight of the transformer.

PROTECTION

- Use fuses or circuit breakers in accordance with Article 450 of the NEC and any other applicable codes and standards.
- For fuse recommendations, use the Square D fax on demand system. Dial 1-800-557-4556. Follow the prompts and request document code 1348.
- For Type TF fusing, use only Class CC non-rejection fuses on the primary.
- If high voltage transients are possible, use appropriate surge suppression.

ACCESSORIES

- To meet European Normalized (EN) Standards, use terminal covers (not included). Contact Square D at 414-426-8040 for accessory information.

RECIBO

Realice una inspección visual del transformador para ver si encuentra daños. Si ha encontrado daños, notifique a la compañía de transportes y presente una reclamación. Comuníquese con el proveedor para obtener detalles sobre la reparación o sustitución del equipo.

PRECAUCIONES

⚠ PELIGRO

TENSION PELIGROSA puede causar lesiones personales serias o la muerte.

Sólo el personal de mantenimiento eléctrico especializado deberá instalar y dar servicio a este transformador de acuerdo con las pautas establecidas en el Código Nacional Eléctrico de los EUA (NEC) así como con cualquier otra norma y código correspondiente.

- Consulte la placa de identificación y verifique que los kVA y tensión del transformador sean los correctos para la línea y carga.
- Instale el transformador sólo en un área bien ventilada libre de gases explosivos y corrosivos, vapor o demasiado polvo, suciedad y humedad.
- Asegúrese de que circule el aire alrededor del transformador y de que no exceda la temperatura ambiente de 40°C (104°F).
- Utilice suficiente tornillería de montaje para soportar el peso del transformador.

PROTECCION

- Utilice los fusibles o interruptores automáticos necesarios para cumplir con los requisitos del artículo 450 del NEC así como con otras normas y códigos correspondientes.
- Para las recomendaciones de fusibles, utilice el sistema de "fax en demanda" de Square D. Marque el 1-800-557-4556. Introduzca la información que se le pide y solicite el código de documento 1348.
- Para los fusibles tipo TF, utilice sólo fusibles sin rechazo clase CC en el primario.
- Utilice supresores de transitorios apropiados si existe la posibilidad de sobretensiones transitorias.

ACCESORIOS

- Para cumplir con las normas europeas (EN), utilice las cubiertas de terminales (no provistas). Comuníquese a las oficinas de Square D al 414-426-8040 para obtener información sobre los accesorios.

RÉCEPTION

Inspecter le transformateur pour rechercher les dommages. En cas de dommage, prière d'aviser l'entreprise de transport et de faire une déclaration auprès de celle-ci. Contacter le fournisseur pour les réparations ou le remplacement.

PRÉCAUTIONS

⚠ DANGER

TENSION DANGEREUSE pouvant causer des blessures graves ou la mort.

Ce transformateur doit être installé et entretenu uniquement par du personnel électrique qualifié, conformément au Code National de l'Électricité (NEC) et tout autre code et norme applicables.

- Sur la plaque signalétique, vérifier si les kVA et la tension du transformateur sont corrects pour le secteur et la charge.
- Installer le transformateur seulement dans une zone bien ventilée dépourvue de gaz ou de vapeur explosif ou corrodant, ou de poussière, de saletés et d'humidité excessives.
- Assurer une circulation libre de l'air autour du transformateur. Ne pas dépasser une température ambiante de 40°C (104°F).
- Utiliser une visserie de montage suffisante pour supporter le poids du transformateur.

PROTECTION

- Utiliser les fusibles ou les disjoncteurs conformément à l'article 450 du NEC et à tout autre code ou norme applicable.
- Pour les recommandations de fusible, utiliser le système «fax sur demande» de Square D. Composer le 1-800-557-4556. Suivre les invites et demander le code du document 1348.
- Pour les fusibles de type TF, utiliser seulement les fusibles sans reject de classe CC sur le primaire.
- Si des tensions transitoires élevées sont possibles, utiliser une suppression de surtension appropriée.

ACCESSOIRES

- Pour satisfaire aux normes européennes (NE), utiliser des couvercles de bornes (non fournis). Contacter Square D au 414-426-8048 pour obtenir des informations concernant les accessoires.

Electrical equipment should be serviced only by qualified electrical maintenance personnel. No responsibility is assumed by Square D for any consequences arising out of the use of this material.

Solamente el personal de mantenimiento eléctrico especializado deberá prestar servicios de mantenimiento al equipo eléctrico. Schneider S.A. no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

L'entretien du matériel électrique ne doit être effectué que par du personnel qualifié. Schneider S.A. n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de ce matériel.

No./n° 39000-285-01B

SQUARE D

CONNECTION AND INSTALLATION

⚠ DANGER

HAZARDOUS VOLTAGE can cause serious personal injury or death.

TURN OFF POWER before servicing.

1. If necessary, install jumpers to obtain input and/or output voltages. If terminals are tapped, do not use jumpers.
   - Figure 1 shows *typical* **parallel** connection to obtain the lower of the two possible voltages. On primary side, connect one jumper to H1 and H3 and one to H2 and H4. On secondary side, connect one jumper to X2 and X4 and one to X1 and X3.
   - Figure 2 shows *typical* **series** connection to obtain the higher of the two possible voltages. On primary side, connect *both* jumpers to H2 and H3. On secondary side, connect *both* jumpers to X2 and X3. See the nameplate wiring diagram for connections.
2. Connect only the primary according to nameplate wiring diagram (**A**).
3. Energize the transformer. Measure the secondary voltage to ensure transformer voltages are correct for the load.
4. Turn off the primary supply and connect the load to the secondary terminals (**B**). All terminals are not always used. See the nameplate wiring diagram.
5. Tighten all unused screws. Torque remaining screws as follows:

6–32 screw	7–9 lbs-in (0.8–1.0 N•m)
8–32 screw	14–16 lb-in (1.6–1.8 N•m)
10–24 screw	17–19 lb-in (1.9–2.2 N•m)

6. If applicable, install covers.
7. Energize the transformer.

MAINTENANCE

1. De-energize the transformer.
2. Check for loose connections and wiring, or lead deterioration. Tighten, insulate, or replace where necessary.

CONEXION E INSTALACION

⚠ PELIGRO

VOLTAJE PELIGROSO peude causar lesiones personales serias o la meurte.

DESCONECTE LA ALIMENTACION antes de darle servicio.

1. Si fuese necesario, instale puentes de conexión para obtener tensiones de entrada y/o salida. Si las terminales han sido derivadas, no utilice puentes de conexión.
   - La figura 1 muestra una conexión **paralela** *típica* para obtener la tensión más baja posible de las dos. En el lado del primario, conecte un puente a H1 y H3 y el otro puente a H2 y H4. En el lado del secundario, conecte un puente a X2 y X4 y el otro puente a X1 y X3.
   - La figura 2 muestra una conexión en **serie** *típica* para obtener la tensión más alta posible de las dos. En el lado del primario, conecte *ambos* puentes a H2 y H3. En el lado del secundario, conecte *ambos* puentes a X2 y X3. Consulte el diagrama de cableado en la placa de identificación para las conexiones.
2. Conecte solamente el primario según el diagrama de cableado en la placa de identificación (**A**).
3. Energice el transformador. Mida la tensión secundaria y asegúrese de que las tensiones del transformador sean las correctas para la carga.
4. Desconecte la fuente de alimentación del primario y conecte la carga a las terminales del secundario (**B**). No siempre se usan todas las terminales. Consulte el diagrama de cableado en la placa de identificación.
5. Apriete todos los tornillos sin usar. Apriete el resto de los tornillos de la siguiente manera:

Tornillo 6–32	0.8–1.0 N•m (7–9 lbs-pulg)
Tornillo 8–32	1.6–1.8 N•m (14–16 lbs-pulg)
Tornillo 10–24	1.9–2.2 N•m (17–19 lbs-pulg)

6. Si fuese aplicable, instale las cubiertas.
7. Energice el transformador.

MANTENIMIENTO

1. Desenergice el transformador.
2. Realice una inspección para ver si encuentra conexiones y cables sueltos, o conductores en mal estado. Apriete los tornillos, aísle o reemplace los cables que sean necesarios.

CONNEXION ET INSTALLATION

⚠ DANGER

TENSION DANGERUSE pouvant causer des blessures graves ou la mort..

COUPEZ LE COURANT avant l'entretien.

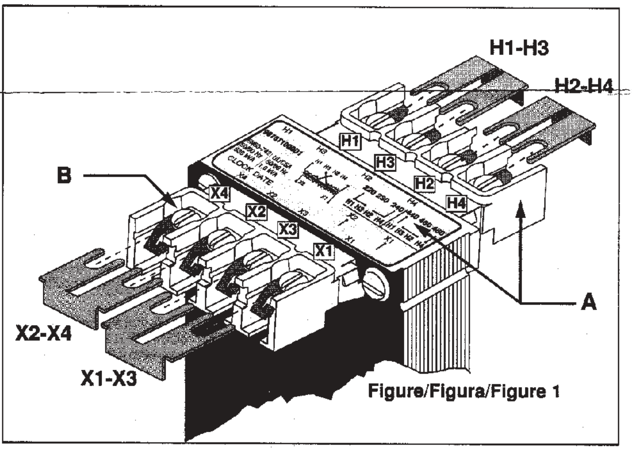
1. Si nécessaire, installer des cavaliers pour obtenir les tensions d'entrée ou de sortie. Si des dérivations sont effectuées sur les bornes, ne pas utiliser de cavalier.
   - La figure 1 indique la connexion **parallèle** *typique* pour obtenir la tension la plus faible des deux tensions possibles. Sur le côté primaire, connecter un cavalier entre H1 et H3 et un autre entre H2 et H4. Sur le côté secondaire, connecter un cavalier entre X2 et X4 et un autre entre X1 et X3.
   - La figure 2 indique la connexion en **série** *typique* pour obtenir la tension la plus élevée des deux tensions possibles. Sur le côté primaire, connecter les *deux* cavaliers entre H2 et H3. Sur le côté secondaire, connecter les *deux* cavaliers entre X2 et X3. Voir le schéma de câblage de la plaque signalétique pour obtenir les connexions.
2. Connecter seulement le primaire conformément au schéma de câblage de la plaque signalétique (**A**).
3. Mettre le transformateur sous tension. Mesurer la tension secondaire pour s'assurer que les tensions du transformateur correspondent à la charge.
4. Couper l'alimentation primaire et connecter la charge aux bornes secondaires (**B**). Les bornes ne sont pas toujours toutes utilisées. Voir le schéma de câblage de la plaque signalétique.
5. Serrer toutes les vis non utilisées. Serrer les autres vis aux couples suivants :

Vis 6–32	0,8 à 1,0 N•m (7 à 9 lb-po)
Vis 8–32	1,6 à 1,8 N•m (14 à 16 lb-po)
Vis 10–24	1,9 à 2,2 N•m (17 à 19 lb-po)

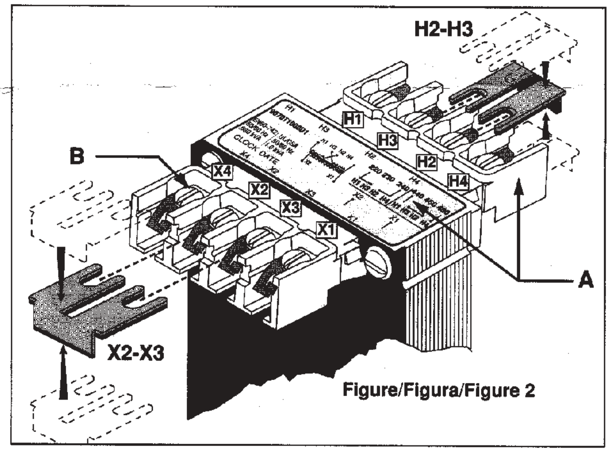
6. Le cas échéant, installer les couvercles.
7. Mettre le transformateur sous tension.

ENTRETIEN

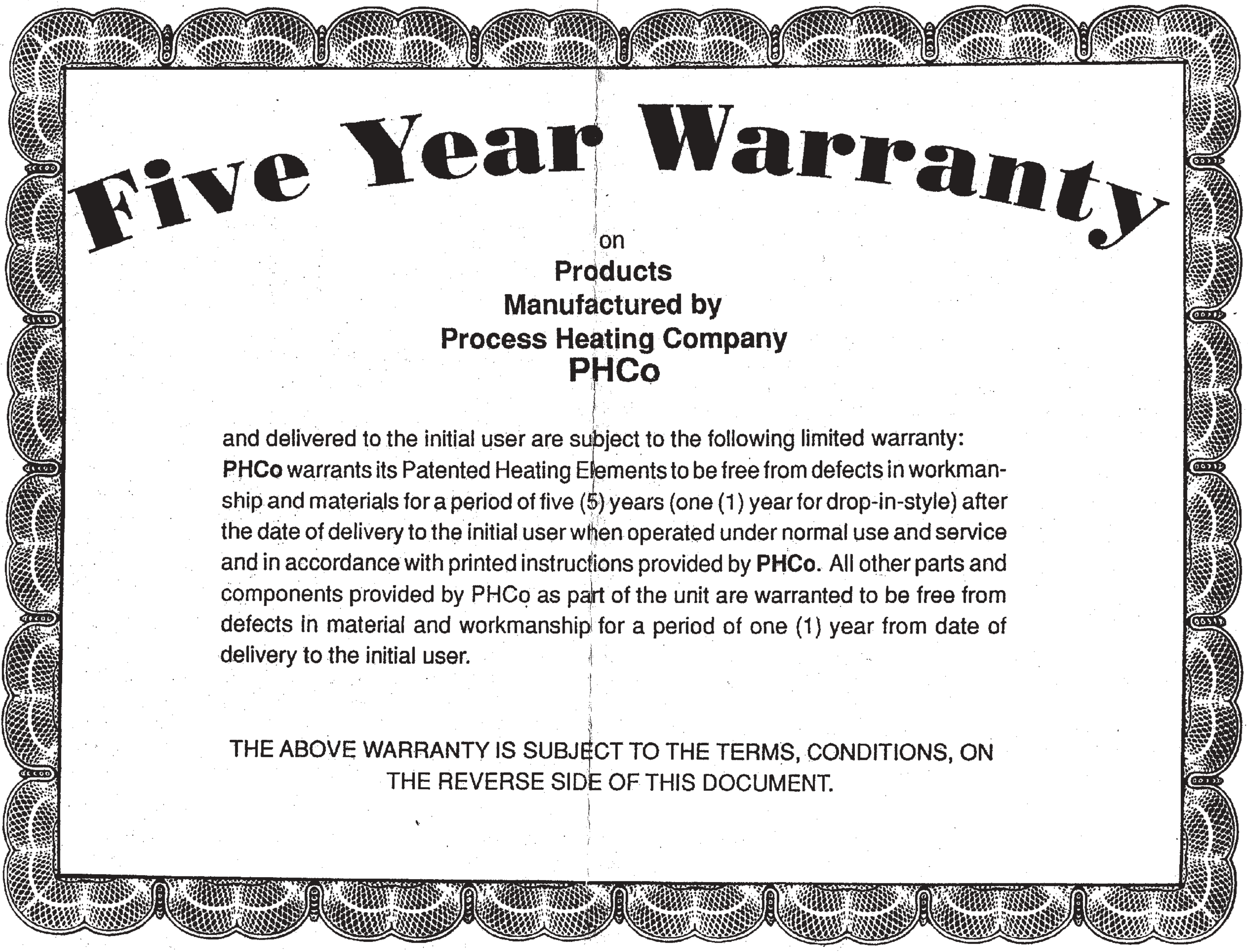
1. Mettre le transformateur hors tension.
2. Rechercher les connexions et les câbles desserrés, ou les conducteurs endommagés. Serrer, isoler ou remplacer lorsque nécessaire.



Figure/Figura/Figure 1



Figure/Figura/Figure 2



Five Year Warranty

on

Products
Manufactured by
Process Heating Company
PHCo

and delivered to the initial user are subject to the following limited warranty: **PHCo** warrants its Patented Heating Elements to be free from defects in workmanship and materials for a period of five (5) years (one (1) year for drop-in-style) after the date of delivery to the initial user when operated under normal use and service and in accordance with printed instructions provided by **PHCo**. All other parts and components provided by PHCo as part of the unit are warranted to be free from defects in material and workmanship for a period of one (1) year from date of delivery to the initial user.

THE ABOVE WARRANTY IS SUBJECT TO THE TERMS, CONDITIONS, ON THE REVERSE SIDE OF THIS DOCUMENT.

Unless otherwise agreed in writing by Process Heating Company ("PHCo"), all of the following terms and conditions shall apply to its transaction with you (the "buyer"):

1. LIMITED WARRANTY; DISCLAIMERS. PHCo warrants that the goods sold under this contract shall be free from defects in workmanship and materials at the time delivery is tendered. If there is discovered any failure of goods to conform to this limited warranty within one (1) year after tender of delivery (five (5) years in the case of immersion type heating elements other than drop-in style elements), and if Buyer notifies PHCo in writing of such fact within thirty (30) days following such discovery, PHCo at its own expense either will repair the defective item, or replace it, or refund to Buyer the purchase price paid for that item (with the choice between repair, replacement or refund to be made solely by PHCo). The foregoing limited warranty and remedy are exclusive of all other warranties, express or implied, and constitute PHCo's exclusive liability, and Buyer's exclusive remedy, on account of any claim relating to any item sold. PHCo DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. If PHCo should elect to repair or replace a defective item and if for any reason the repair of replacement should fail in its essential purpose (which is to provide Buyer with a non-defective item), then PHCo's liability nevertheless shall be limited to the purchase price charged by PHCo for the goods. PHCo shall have no liability on account of any claim asserted under principles of negligence or other tort, breach of any statutory duty, indemnity or contribution, or on any other basis, if PHCo's liability on account of such claim would exceed or in any respect differ from its liability under the forgoing limited warranty and exclusive remedy.

2. LIABILITY OF PHCo UNDER THE FOREGOING LIMITED WARRANTY SHALL EXIST ONLY IF:
a. The goods are installed, operated and tested in accordance with the PHCo approved installation and operation instruction.
b. The goods are used and maintained in conformity with installation and operation instructions approved or published by PHCo.
c. Written authorization must be given by PHCo before any warranty work is done.
The above limited warranty shall be void and no further in effect if the goods are subject to abuse, strain, impact or loading that is greater than their normal

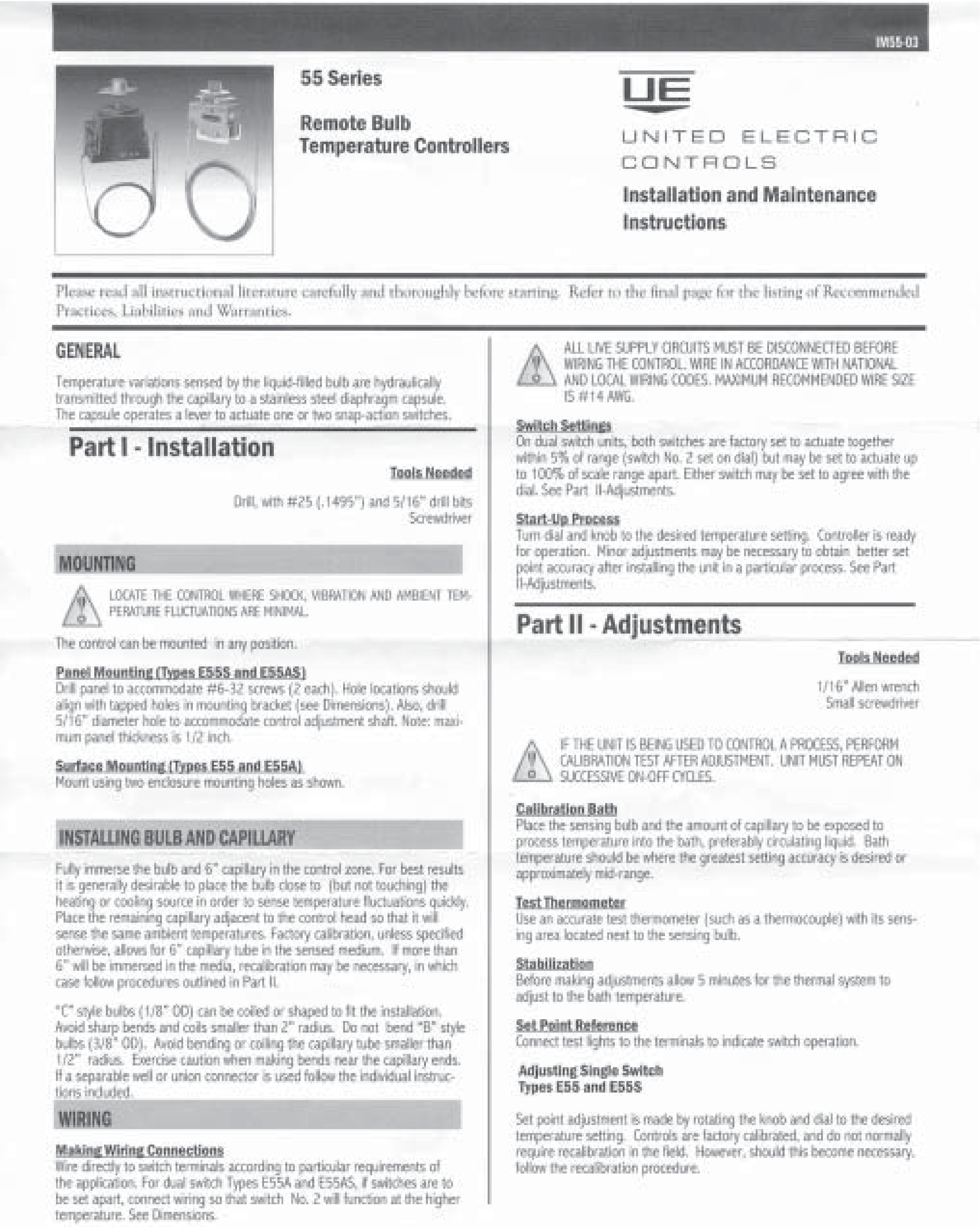
3. LIMITATION OF LIABILITY. UNDER NO CIRCUMSTANCES SHALL PHCo OR ANYONE ELSE INVOLVED IN THE MANUFACTURE OR SALE OF THE GOODS BE LIABLE TO BUYER OR OTHERS FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOST PROFITS, EVEN IF PHCo HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY DAMAGES OR SUMS PAID BY BUYER OR OTHER TO THIRD PARTIES. THE FOREGOING LIMITATION OF LIABILITY SHALL APPLY WHETHER ANY CLAIM FOR ANY SUCH DAMAGES IS BASED UPON PRINCIPLES OF CONTRACT, WARRANTY, NEGLIGENCE OR OTHER TORT, BREACH OF ANY STATUTORY DUTY, PRINCIPLES OF INDEMNITY OR CONTRIBUTION, THE FAILURE OF ANY LIMITED OR EXCLUSIVE REMEDY TO ACHIEVE ITS ESSENTIAL PURPOSE, OR ANY OTHER BASIS.

4. AUTHORITY OF PHCo'S AGENTS. No agent, employee or representative of PHCo has any authority to bind PHCo to any other affirmation, representation, promise or warranty concerning the goods sold under this contract, unless it is in writing and included as part of the terms of this a contract.

5. MODIFICATION OF WAIVER. No subsequent waiver or modification of this Limited Warranty and Liability shall be effective unless the same is in writing and signed by the party against whom such waiver or modification is asserted. No waiver in any one instance shall constitute a waiver of the same or any other term or condition on any subsequent occasion. None of the express terms of this Limited Warranty and Liability may be waived or varied by course of dealing or usage of trade.

6. DISPUTES. This agreement shall be governed by the laws of the State of Washington without reference to its choice of law rules. Any action to enforce any of the terms or conditions of this agreement may be commenced or maintained at the option of either party in any federal or state court located in King County, Washington having jurisdiction over the matter, and both parties consent in advance to the exercise by such courts of jurisdiction over them personally. No action by either party arising out of or relating to this contract (including any action based upon principles of contract, tort or otherwise) may be commenced more than one (1) year after the cause of action has accrued, and any action commenced by a party thereafter shall be dismissed at the instance of the other party.

Remote Bulb Temperature Controller



IM55-03

55 Series

Remote Bulb Temperature Controllers

UNITED ELECTRIC CONTROLS

Installation and Maintenance Instructions

Please read all instructional literature carefully and thoroughly before starting. Refer to the final page for the listing of Recommended Practices, Liabilities and Warranties.

GENERAL

Temperature variations sensed by the liquid-filled bulb are hydraulically transmitted through the capillary to a stainless steel diaphragm capsule. The capsule operates a lever to actuate one or two snap-action switches.

Part I - Installation

Tools Needed

Drill, with #25 (.1495") and 5/16" drill bits
Screwdriver

MOUNTING

⚠ LOCATE THE CONTROL WHERE SHOCK, VIBRATION AND AMBIENT TEMPERATURE FLUCTUATIONS ARE MINIMAL.

The control can be mounted in any position.

Panel Mounting (Types E55S and E55AS)
Drill panel to accommodate #6-32 screws (2 each). Hole locations should align with tapped holes in mounting bracket (see Dimensions). Also, drill 5/16" diameter hole to accommodate control adjustment shaft. Note: maximum panel thickness is 1/2 inch.

Surface Mounting (Types E55 and E55A)
Mount using two enclosure mounting holes as shown.

INSTALLING BULB AND CAPILLARY

Fully immerse the bulb and 6" capillary in the control zone. For best results it is generally desirable to place the bulb close to (but not touching) the heating or cooling source in order to sense temperature fluctuations quickly. Place the remaining capillary adjacent to the control head so that it will sense the same ambient temperatures. Factory calibration, unless specified otherwise, allows for 6" capillary tube in the sensed medium. If more than 6" will be immersed in the media, recalibration may be necessary, in which case follow procedures outlined in Part II.

"C" style bulbs (1/8" OD) can be coiled or shaped to fit the installation. Avoid sharp bends and coils smaller than 2" radius. Do not bend "B" style bulbs (3/8" OD). Avoid bending or coiling the capillary tube smaller than 1/2" radius. Exercise caution when making bends near the capillary ends. If a separable well or union connector is used follow the individual instructions included.

WIRING

Making Wiring Connections
Wire directly to switch terminals according to particular requirements of the application. For dual switch Types E55A and E55AS, if switches are to be set apart, connect wiring so that switch No. 2 will function at the higher temperature. See Dimensions.

⚠ ALL LIVE SUPPLY CIRCUITS MUST BE DISCONNECTED BEFORE WIRING THE CONTROL. WIRE IN ACCORDANCE WITH NATIONAL AND LOCAL WIRING CODES. MAXIMUM RECOMMENDED WIRE SIZE IS #14 AWG.

Switch Settings
On dual switch units, both switches are factory set to actuate together within 5% of range (switch No. 2 set on dial) but may be set to actuate up to 100% of scale range apart. Either switch may be set to agree with the dial. See Part II-Adjustments.

Start-Up Process
Turn dial and knob to the desired temperature setting. Controller is ready for operation. Minor adjustments may be necessary to obtain better set point accuracy after installing the unit in a particular process. See Part II-Adjustments.

Part II - Adjustments

Tools Needed

1/16" Allen wrench
Small screwdriver

⚠ IF THE UNIT IS BEING USED TO CONTROL A PROCESS, PERFORM CALIBRATION TEST AFTER ADJUSTMENT. UNIT MUST REPEAT ON SUCCESSIVE ON-OFF CYCLES.

Calibration Bath
Place the sensing bulb and the amount of capillary to be exposed to process temperature into the bath, preferably circulating liquid. Bath temperature should be where the greatest setting accuracy is desired or approximately mid-range.

Test Thermometer
Use an accurate test thermometer (such as a thermocouple) with its sensing area located next to the sensing bulb.

Stabilization
Before making adjustments allow 5 minutes for the thermal system to adjust to the bath temperature.

Set Point Reference
Connect test lights to the terminals to indicate switch operation.

Adjusting Single Switch
Types E55 and E55S

Set point adjustment is made by rotating the knob and dial to the desired temperature setting. Controls are factory calibrated, and do not normally require recalibration in the field. However, should this become necessary, follow the recalibration procedure.

Adjusting Dual Switch Types E55A and E55AS

55 Series controllers are standardly supplied with the No. 2 (higher temperature) switch set to the dial. To adjust switch settings for these controllers, follow the recalibration procedure.

RECALIBRATION PROCEDURE

Set the dial to the same temperature as the test bath. Using 1/16" allen head wrench, loosen knob set screw and remove dial, taking care not to rotate the shaft.

Shaft has calibrated flat for easy dial replacement. Using 1/16" allen wrench, turn zero adjustment, located inside adjustment shaft, until switch No. 2 actuates. Turn counter clockwise for higher setting, clockwise for lower setting. Replace dial on shaft and secure.

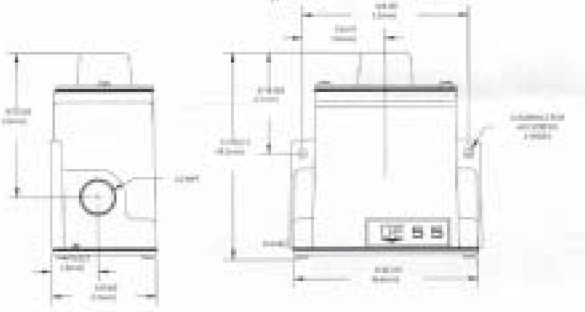
To Separate Switches

Replace dial on shaft. Do not secure. Turn dial to a higher setting equal to temperature differential (°F or °C) desired between switches No. 1 and No. 2. Remove dial for access to the No. 1 switch adjustment screw. Using a small screwdriver turn in or out the No. 1 switch adjustment screw (accessible through opening behind dial). Replace dial, tighten dial set screw to calibrated flat. Controller is ready for operation.

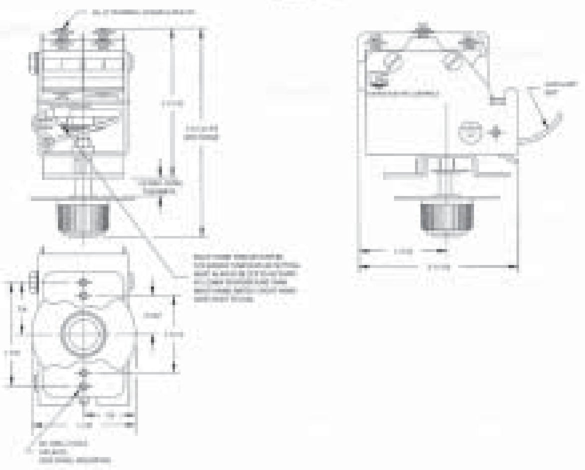
For single switch units the only adjustment needed is the set screw adjustment in the middle of the shaft.

Dimensions

Type E55, E55A



Type E55AS



RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum pressure or temperature is acceptable on a limited basis (e.g., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum pressure or temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. Orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- For all applications, a factory set unit should be tested before use.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts. INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 24 months from the date of manufacture by the Seller. Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF SELLER'S LIABILITY

Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be inputted to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.

UE
UNITED ELECTRIC
CONTROLS
180 Dexter Ave. P.O. Box 9143, Watertown, MA 02472-9143 USA
617 926-1000 Fax 617 926-2568
EMD05M203

Partlow

INSTRUCTIONS

Piston-Pak* Mercury Bulb Elements

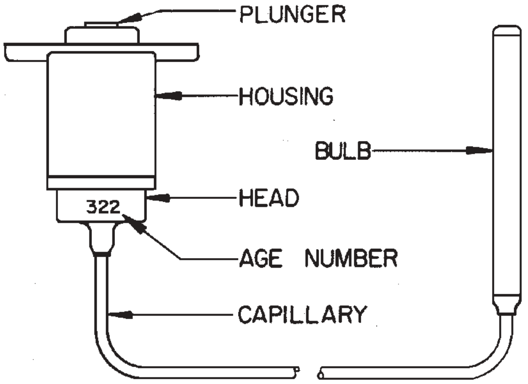


Fig. 1
Partlow Thermal Element

The Partlow **thermal element** is the temperature sensing portion of all Partlow temperature controls. It is a hermetically-sealed, mercury-filled assembly consisting of bulb (temperature sensing portion), capillary tube and head assembly (Fig. 1).

When assembled to the Partlow instrument, the element provides mechanism actuation through the expansion and contraction of mercury in the bulb due to temperature change.

PISTON-PAK ELEMENT

As of March, 1972, the Piston Pak thermal element has been supplied with a new one-piece housing-flange assembly. This replaces the two-part housing and flange combination previously in use.

The new assembly attaches to the instrument case with two hex-head ¼″ screws in the same manner as the old style combination unit, but the size of the screw head has been reduced from 7⁄16″ to ⅜″ to accommodate the use of a socket wrench. Either size head, however, will work satisfactorily.

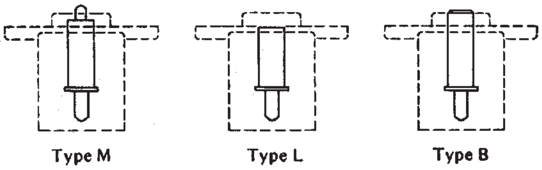
When elements-only are shipped as replacement units, a yellow plastic cap is supplied over instrument-end of housing to keep out foreign material.

When installing replacement element, remove and discard yellow cap and tighten hex-head screws to approximately 75 inch-pounds torque.

Thermally-Operated Gas Controls—Elements for use on gas controls incorporate a pin-type, spring-loaded plunger type M (see Fig. 2). Gas should be turned off when changing element. Be sure O-ring has been transferred from old element and is in proper position before fastening new element. After gas has been turned on, check element fit with soapy water to be certain no leakage exists (also see Partlow Instructions for the particular gas control being used).

ELEMENT INSTALLATION

1. Be sure that entire bulb is in area to be sensed or, if in liquid, that it is completely immersed.
2. Locate bulb where air or liquid is circulating as freely as possible.
3. Capillary may be bent to a radius of ½″ but not sharper as it might constrict the tubing. **Never bend pencil (or "P-type") bulb.**
4. Do not overheat the bulb beyond its range limits.
5. The element head assembly is subject to ambient temperature limitations of −30°F to 125°F for 112 and 217 range elements, and +32°F to 150°F for all other ranges. These temperature limitations must be considered when locating instruments.
6. In mounting bulb, avoid the use of tape or other insulating materials on the bulb itself.
7. Bulbs may be elevated 40 feet above the control without affecting calibration.
8. This assembly is hermetically sealed. If any part of the tubing or bulb is cut or ruptured, the seal is broken and the element will no longer function.
9. If you are installing a "Y" or "U" type bulb in its coiled form, the coil should be opened up to provide at least ½″ between coils to permit circulation. If the "Y" or "U" type bulb is to be used in its elongated form thru the chamber being sensed, it may be bent to follow a prescribed path, but never sharper than a 2″ radius.
10. Steel bulbs should not be used where subjected to temperatures expected to continuously exceed 750°F.
11. Nickel bulbs should not be used in temperatures exceeding 665°.



Type M Type L Type B

Fig. 2

Element plunger types: Type M is used on all thermal gas valves, type B on non-indicating controls, series O and N and Indicator 194, type L on all other non-indicating, indicating and recording models.

---

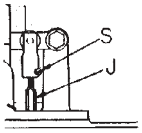
*U.S. Patent No. 3,103,818

STUFFING BOX INSTALLATION—Overtightening of 21-T-105 steel or stainless steel stuffing boxes can damage the thermal element by restricting the capillary bore. To prevent damage, the stuffing box gland nut should be turned ½ to ¾ of a revolution from a finger-tight position. This is equivalent to a torque of 65 to 100 inch-pounds for steel and 130 to 180 inch-pounds for stainless steel.

RE-ZEROING PROCEDURE — At the time of installation, the instrument and replaced element should be checked for accuracy.

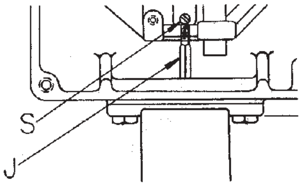
Use reliable check instrument you know is accurate. Attach sensing bulb of check instrument directly to Partlow instrument bulb.

On All Indicating or Recording Instruments — If Partlow indicating pointer or recording pen agree with checking instrument, no adjustment is necessary.



1. If the Partlow instrument does not agree with checking instrument, hex shaft J extending into thermal element must be shortened or lengthened to accomplish the re-zeroing.
2. Loosen set screw S at threaded end of hex shaft J.
3. Using 3/16" wrench, turn shaft J so that indicating pointer or pen agrees with check instrument.
4. Tighten set screw S.

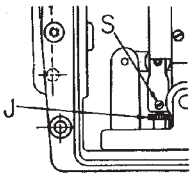
On Non-indicating Electrical Instruments with External Calibrated Dial: (Series ZC, G, GW)—If setting pointer agrees with checking instrument, no adjustment is necessary.



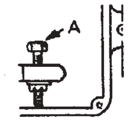
1. If adjustment is necessary, hex shaft J extending into thermal element must be shortened or lengthened so that both readings agree.
2. Loosen set screw S at threaded end of hex shaft J.
3. Using 3/16" wrench, turn shaft J so that the temperature being sensed settles out to agree with the setting of the control dial.
4. Retighten set screw S.

On Non-indicating Electrical Instruments with External Calibrated Dial: (Series ZF)—If setting pointer agrees with checking instrument, no adjustment is necessary.

1. If adjustment is necessary, adjust dial setting to agree with temperature indicated by test instrument.
2. **Without disturbing dial setting,** remove dial knob.
3. Remove cover-dial assembly.
4. Loosen set screw S and make adjustments by turning pinion gear J with a screwdriver. Screw is shortened to raise temperature, lengthened to lower temperature. Turn pinion gear J until switch actuates. Be certain check thermometer and control setting still agree. If they do not, make further adjustment.
5. Tighten set screw S, replace cover and setting knob.

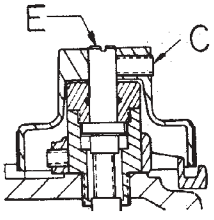


On Non-indicating Electrical Instruments (Without Setting Dial): (Series O, N, GB and GWB; and Electrical Non-indicating Instruments with Uncalibrated Dials (0-50) — Elements for the above instruments are not calibrated. Actuation point of control is adjusted by adjusting switch actuation screws using checking thermometer to indicate when the desired actuation point is reached.



On Mechanical Non-indicating Gas Controls (Series 10, 20, 28, 40, 48, 60, 68, 70, 713) —

1. Set control at desired normal operating temperature.
2. Using a check thermometer as above, determine if the setting of the control agrees with the reading of the check thermometer.
3. If they disagree, loosen the set screws C on the setting knob and reposition the knob and pointer to agree with the check instrument. When repositioning knob, use screwdriver in slot of stem E to prevent its turning. Reset control to the desired operating temperature and consult check instrument again. (Several rechecks and readjustments may be necessary since they are throttling type controls.)



ELEMENT MAINTENANCE —

1. Do not lubricate thermal element or instrument.
2. Moisture should never be permitted to enter element.
3. If an attempt is made to unthread element housing from element head, **OBSERVE CAUTION—the element housing contains a heavy return spring.**

ELEMENT INTERCHANGEABILITY — Elements of the same temperature range and the same plunger type are interchangeable.

ELEMENT IDENTIFICATION—The specification of the element is marked in coded symbols on the bottom of the element head. This should be used in ordering a replacement. The number appearing on the side of the element head is a coded age number which may be required in establishing warranty.

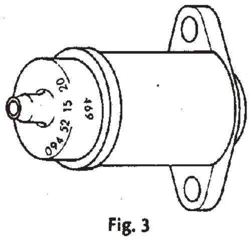


Fig. 3

Explanation of Marking Symbols

Number stamped on side of element head is the age number code. Code stamped on the bottom is the element discription.

ORDERING MATRIX

OPERATING RANGE AND MATERIAL

List price includes 5' capillary

Temperature Range °F	°C	Element Material		Order Code
20 to 120	– 5 to 50	Stainless		091
		Steel		117
– 30 to 170	– 35 to 75	Stainless		094
		Steel		119
50 to 250	10 to 120	Stainless		101
		Steel		121
100 to 350	40 to 175	Stainless		104
		Steel		237
100 to 450	40 to 230	Stainless		106
		Steel		123
100 to 550	40 to 290	Stainless		108
		Steel		125
100 to 650	40 to 340	Stainless		109
		Steel		126
100 to 800	40 to 425	Stainless		111
		Steel		128
100 to 1000	40 to 540	Stainless		113
		Steel		130
100 to 1100	40 to 600	Stainless		115
		Steel		N/A

HEAD ASSEMBLY

High Ambient Temperature 32° to 150°F	
Plunger Type	Order Code
L	51
B	53
M	55
Low Ambient Temperature – 30° to 125°F	
Plunger Type	Order Code
L	52
B	54
M	56

CAPILLARY LENGTH

Length (feet)	SST Adder	Steel Adder	Order Code
1	—	—	01
2	—	—	02
3	—	—	03
4	—	—	04
5	—	—	05
7			07
10			10
12			12
15			15
20			20
25			25
30			30
35			35
40			40
50			50
60			52
70			54
80			56
90			58
100			60
110			62
120			64

OPTIONAL BULB SIZES

	Tubing			Bulb Length in Inches										Order Code	
	Bulb Type	O.D. (")	Gauge	Range Code 091	Range Code 094	Range Code 101	Range Code 104	Range Code 106	Range Code 108	Range Code 109	Range Code 111	Range Code 113	Range Code 115	For Sleeve	No Sleeve
STAINLESS STEEL 316	U*	.137	.095"	244	120	123	101	72	57	47	36	36	29	N/A	15
	Y*•	3/16	21	146	72	74	61	44	34	28	22	18	16	N/A	16
	P	1/4	20	N/A	N/A	N/A	28.5	20.6	16.2	13.4	10.7	8.46	7.70	40	17
		5/16	18	N/A	24.3	24.9	20.4	14.9	11.7	9.71	7.81	6.25	5.71	41	18
		3/8	9/32"	29	14.4	14.7	12.2	8.93	7.10	5.94	4.84	3.94	3.63	43	20
		7/16	18	20	10.4	10.6	8.22	6.60	5.34	4.54	3.78	3.16	2.95	45	22
		1/2	18	14.6	7.67	7.82	6.56	4.99	4.09	3.52	2.98	2.54	2.39	46	23
		9/16	17	12	6.50	6.63	5.61	4.33	3.60	3.14	2.70	2.34	2.05	47	24
		5/8	17	9.56	5.34	5.43	4.65	3.67	3.11	2.76	2.42	2.14	2.02	48	25
		3/4	16	6.90	4.06	4.14	3.61	2.95	2.57	2.33	2.11	1.92	1.86	50	27

* U-Bulb SST Adder $18; Y-Bulb SST Adder $10

• If Teflon or Geon coating is specified for Y-Bulb, use Order Code 51

				Range Code 117	Range Code 119	Range Code 121	Range Code 237	Range Code 123	Range Code 125	Range Code 126	Range Code 128	Range Code 130	Order Code For Sleeve	Order Code No Sleeve
STEEL 1010	U*	.137	.095"	222	110	112	92	66	52	42	34	26	N/A	02
	Y*•	3/16	20	145	72	73	59	43	34	28	21	17	N/A	03
	P	1/4	20	N/A	30.9	31.6	26	18.9	14.8	12.2	9.90	7.90	29	04
		5/16	18	N/A	22.2	22.6	18.7	13.6	10.8	8.93	7.29	5.79	30	05
		3/8	9/32"	26	13.2	13.4	11.1	8.21	6.55	5.49	4.49	3.67	32	07
		7/16	18	18.2	9.50	9.69	8.12	6.10	4.96	4.23	3.54	2.98	33	08
		1/2	18	13.2	7.05	7.18	6.07	4.63	3.82	3.30	2.81	2.41	34	09

* Y-Bulb ST Adder $8.25

• If Teflon or Geon Coating is specified for Y-Bulb, use Order Code 52

COATINGS

Applicable to Range Codes 091, 117, 094, 101, 121, 104, 237, 108 and 123 only

TEFLON Y-Bulbs Only

Length in Feet	5	10	15	20	25	30	35	40
	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code
	02	03	04	05	06	07	08	09

GEON Also applies to Range Codes 106, 123, 091, 117, 094, 119, 101 and 121

Length in Feet	5	10	15	20	25	30	35	40
	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code
P-Bulb	29	30	31	32	33	34	35	36
P-Bulb & Sleeve	20	21	22	23	24	25	26	27
Y-Bulb	11	12	13	14	15	16	17	18

LEAD 3/8" O.D. × 9/32" I.D., Bulbs only; sleeves 15". Applies to Range Codes 091, 117, 094, 119, 101, 121, 104 and 237

Length in Feet	5	10	15	20	25	30	35	40
	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code	Order Code
Stainless	47	48	49	50	51	52	53	54
SST & Sleeve	73	75	77	79	81	83	85	87
Steel	38	39	40	41	42	43	44	45
ST & Sleeve	56	58	60	62	64	66	68	70

SLEEVES 5/16" O.D.

For P-Bulbs Only

Length (")	SST Order Code		Steel Order Code	
5	05		55	
6	06		56	
7	07		57	
8	08		58	
9	09		59	
10	10		60	
15	15		65	

STUFFING BOXES

Not available if coating is selected

Type	Size (")		Order Code		Order Code
21-T-105 Capillary Only	1/4		02		11
	3/8		03		12
	1/2		04		13
	3/4		05		14
21-T-105 with 5/16" Sleeve	1/4		20		29
	3/8		21		30
	1/2		22		31
	3/4		23		32
T112 Capillary Only	3/8		54		45
	1/2		55		46
	3/4		56		47
131 with 5/16" Sleeve	3/8		78		69
	1/2		79		70
	3/4		80		71
T-110 Brass	1/2 or smaller				86

These products are sold by The Partlow Corporation ("Partlow") under the warranties set forth in the following paragraph. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from Partlow or from a Partlow distributor, representative or reseller, and are extended only to the first buyer thereof who purchases them other than for the purpose of resale.

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Partlow factory, and to conform at that same time to the specifications set forth in the relevant Partlow instruction sheet (or sheets) for such products.

Partlow's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, at Partlow's option, free of charge, the products which are reported in writing to Partlow at its main office - The Partlow Corporation, Campion Road, New Hartford, New York 13413 - and which, if so advised by Partlow, are returned with a statement of the observed deficiency to the designated facility during normal business hours, transportation charges prepaid, and which upon examination by Partlow are found not to comply with the above warranties. PARTLOW SHALL NOT BE LIABLE FOR ANY INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, SPECIAL DAMAGES, OR ANY OTHER DAMAGES, COSTS OR EXPENSES, EXCEPTING ONLY THE COST OR EXPENSE OF REPAIR OR REPLACEMENT AS ABOVE DESCRIBED.

THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREINABOVE SET FORTH. PARTLOW MAKES NO WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.

Partlow
PROCESS INSTRUMENTATION

The Partlow Corporation
Two Campion Road
New Hartford, NY 13413
315-797-2222
Telex 937428

Mechanical Heater Temperature Controller

Form Number 3019
Published April 1990
First Edition
Revised April 1992

**SPECIFICATIONS
INSTALLATION
OPERATION**

LF15-79

DUAL SWITCH INDICATING MECHANICAL TEMPERATURE CONTROLLER

The LF15-79 is a dual switch indicating controller which operates in a fixed relationship to the temperature setting. Differential between switches can be adjusted up to 5 % of element range. It derives its simplicity and efficiency from the Piston-Pak filled system sensing element.

Partlow

The Partlow Corporation • Two Campion Rd. • New Hartford, NY 13413 USA • 315-797-2222 • FAX 315-797-0403

QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA

LF15-79 PRODUCT SPECIFICATIONS

Dimensions	8 5/8" x 8" x 4 9/32" D
Panel Mount Cutout	7 inches wide by 7 3/4 inches high;
Surface Mounting	Mounting brackets included
Switch Type	Two 3- wire single pole double throw.
Switch Sensitivities	Normal 1% of range (#79 Switch) Super Sensitive 1/2% of element range (#73 Switch - Optional)
Switch Differential (Between each Switch)	0 to 5% of element range
Electrical Connection	Terminal block accessible through top cover hatch
Conduit Openings	1/2 inch NPS holes on each side of the case for 1/2 inch conduit fitting; drill guide hole spotted in the rear of the case showing optional rear opening location.
Electrical Rating	50VA, inductive; 500VA, non inductive; 250V maximum AC only.
Agency Approvals	UL and CSA Approved
Warranty	One year, details on the last page
Approx. Net Weight*	5 lbs
Approx. Ship. Weight*	8 lbs

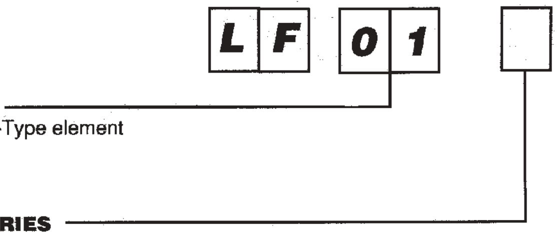
* Weight may vary depending on element length.

Note:

It is strongly recommended that Partlow equipped applications incorporate a high or low limit protective device which will shut down the equipment at a preset temperature condition in order to preclude possible damage to property or product.

This document should accompany the instrument to its final installation in order to provide operational and service assistance to the end user.

LF15-79 ORDER MATRIX



LF15-79*
(Requires L-Type element plunger).

ACCESSORIES
0 None
1 201 Weather Resistant **

** The first switch is always a #15. The standard second switch on the LF15-79 is a #79 which offers an accuracy of 1% of span. Accuracy of 0.5% of span may be achieved by specifying a #73 switch. However, a #73 switch must be ordered separately and will be shipped separately. User must remove the factory standard #79 switch and install the #73 switch. (See SWITCH REPLACEMENT section in this document). To order the #73 switch specify part #64403018.*

*** Requires an inverted dial scale. Check factory on availability.*

PISTON-PAK THERMAL SENSING ELEMENT
A Piston-Pak Thermal Sensing Element must be specified for each LF15-79. Use Partlow Form Number 3028 "Mechanical Products Cross Reference and Pricing Guide" to configure the matrix number for the sensing element.

INSTALLATION AND WIRING

LOCATION

The element head assembly is subject to ambient temperature limitations of -30°F to 125°F (-35°C to 52°C) for low temperature head assemblies, and 32°F to 150°F (0°C to 66°C) for high temperature head assemblies. These temperature limitations must be considered when determining the instrument location. It should be located in an area as free from vibration as possible.

MOUNTING

The instrument(s) are shipped to be surface mounted. Figure 1 illustrates hole placement for surface mount combinations. Note: Holes in brackets supplied are 9/32 clearance holes for 1/4" bolts. The three holes called out in the drawing may be any size that will accommodate the fastening required, (ie 9/32 for 1/4" thru-bolt with nut fastener) or #7 drill for 1/4" x 20 NC tapped hole fastening or #3 drill for 1/4" x 28 NF tapped hole fastening.

The instrument may also be flush mounted. This is accomplished by removing the three surface mounting angle brackets from the instrument. Figure 1A illustrates panel cut out dimensions. Cut the panel opening to 7" wide by 7 3/4" high. Drill 9/32 clearance holes in four locations if 1/4" thru-bolt with nut installation is desired. Should a tapped hole be more preferred, drill a #7 hole in four locations for a 1/4" x 20 NC or a #3 drill hole in four locations for a 1/4" x 28 NF.

Note: All configurations require a flat head screw for proper cover installation. With the instrument in the upright position, insert it and the element into the panel opening and tilt it into place. Depending upon your panel size it may be easier to make electrical connections before finally con[illegible] the instrument into the panel.

Figure 1 - Surface Mount Dimensions

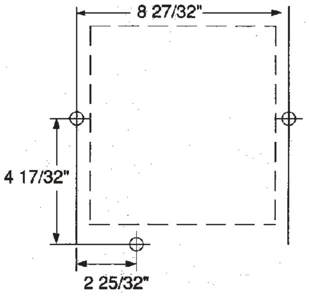
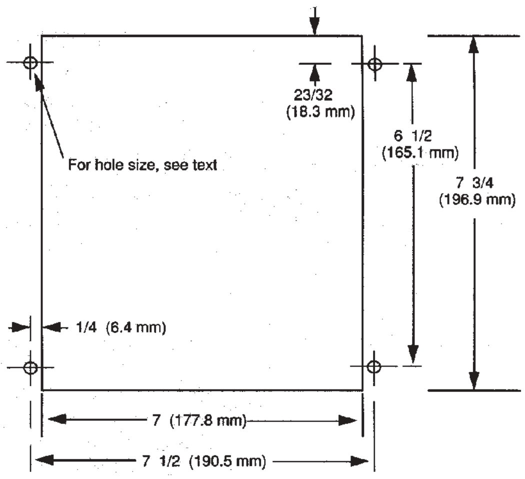


Figure 1A - Panel Cutout Illustration (in inches)



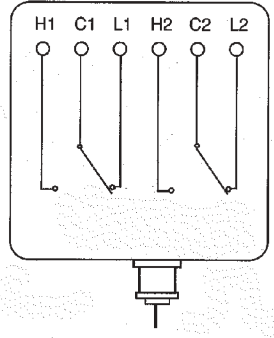
WIRING

Check applicable electrical codes, ordinances and regulations regarding use of conduit, etc. **If acceptable, make connections using short sections of flexible cable or conduit.** It is recommended that the rear conduit hole be used for panel mount installations. A drill guide hole is spotted in the back of the case to accommodate field drilling. Refer to the wiring diagram in Figure 2, page 4 and proceed. Withdraw screws H (Figure 3, page 4) and remove the cover hatch. This will allow access to the wiring connection terminal block. The terminal block is labeled H1, C1, L1, H2, C2, and L2. The letters H, C and L represent the normally open, common and normally closed sides, respectfully, of the switches. Note that when temperature is below switch setpoint a circuit is made between L and C terminals. Make wiring connection according to Figure 2 (page 4) and replace the top cover hatch.

PLACING THE THERMAL SENSING ELEMENT

Locate the thermal sensing bulb in the most agitated part of the medium to be measured and completely immerse it. (When U and Y type bulbs are used, note separation coupling between bulb and capillary, be certain that the entire element is immersed in process). Do not bend capillary to less than 1/2 inch radius and never bend it too close to the element bulb or element head. Pencil type bulbs must never be bent as this will affect instrument accuracy. U and Y-type bulbs many be bent, but never to less than a two inch radius. Anchor the excess capillary securely to prevent vibration damage. If the bulb is to be subjected to corrosive or scouring conditions, it should be protected by a thermal well, separable socket or other protected material. These bulbs may be elevated up to 40 feet above the instrument without affecting calibration.

Figure 2 - Control Switch



STUFFING BOX INSTALLATION (IF APPLICABLE)

Overtightening of 21-T-105 stuffing boxes can damage the thermal element by restricting the capillary bore. To prevent damage, the stuffing box gland nut should be turned 1/2 to 3/4 of a revolution from a finger-tight position. This is equivalent to a torque of 130 to 180 inch-pounds for stainless steel.

INSTRUMENT OPERATION

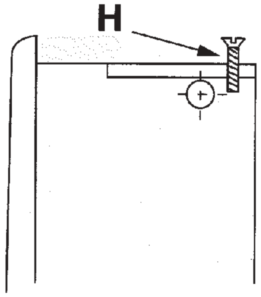
Prior to putting the instrument into service, check it against an accurate test thermometer. As with any precision instrument minor adjustments may be necessary after shipment and installation. If you are unfamiliar with how to perform this check refer to the CHECKING TEMPERATURE and RE-ZEROING of this document.

Control temperature is established by turning the knob on the front of the instrument and moving the set pointer along the scale to the desired temperature. This positions the instruments's two snap acting switches. Both switches are spring loaded to the set pointer and are set in a fixed relationship to the set point.

Switches are actuated by the same temperature responsive mechanism that moves the indicating pointer. The first switch to be actuated on a rise must always be Switch 1 (front leaf type). Second is Switch 2 (rear, pin-type), actuated only when the temperature exceeds the operation point of the first switch.

Switches are mounted one behind the other, each having its own circuit. Differential between the two switches may be adjusted from 0 to 5% of sensing element range by turning the set screws inside the instrument case (see Differential Adjustment).

Figure 3 -Cover Hatch Removal



MAINTAINING YOUR LF15-79

CHECKING TEMPERATURE

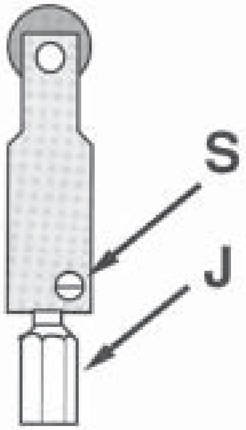
When checking and verifying your temperature be sure to use a test thermometer of known accuracy. Position the test thermometer sensing bulb or probe adjacent to the thermal sensing bulb from the LF15-79. Turn the knob on the LF15-79 to the desired process temperature. Wait for the temperature to stabilize, then compare the test thermometer reading with that of the LF15-79. If the two readings do not agree, the LF15-79 should be re-zeroed.

RE-ZEROING YOUR LF15-79

Be sure that the process temperature is stable. Note the amount of temperature difference between the test thermometer reading and the black indicating pointer reading. Remove the instrument knob and cover. Note hex shaft J and set screws (Figure 4, page 5). Zeroing is accomplished by turning shaft J with the wrench provided. Lengthening shaft J (counterclockwise) raises the black indicating pointer reading; shortening shaft J (clockwise) lowers the reading. Shut off the power to the instrument and turn set pointer (reinstall knob on setting shaft) to high end of scale; then turn shaft J accordingly and correct the reading of the black indicating pointer the same number of degrees as was found to be the error (difference) noted. Re-tighten screw S. Return set pointer to original setting and restore power to instrument. After temperature stabilization, black indicating pointer reading should agree with test thermometer reading. If necessary, repeat above procedure until properly zeroed. Replace cover and knob.

Note: Power shut down described above prevents process temperature from building while adjustments are being made. If, however, the situation exists where power shutdown is not feasible, follow the same procedures but make shaft J adjustments as quickly as possible. In systems where temperature builds very rapidly, zeroing procedures may have to be repeated several times.

Figure 4 - Re-Zeroing



SWITCH REPLACEMENT

#15 Micro Switch (Leaf Switch) Replacement (see Figure 10 for more details)
Turn the power to the LF15-79 off. Remove the cover and dial scale (see Exploded View Illustration on Page 8). Remove the two switch mounting screws from the front switch. (Note: the #15 switch has a spring leg actuator attached to it). Transfer the switch wires from the existing switch to the replacement switch one wire change at a time to avoid wiring confusion. Reattach the replacement switch to the switch bracket with the two mounting screws. Note the routing of the switch wires, be sure they do not interfere with proper switch actuation. Be sure to check switch actuation and adjust screw E2 (see Figure 5) as needed for proper control switch actuation.

#73 or #79 Micro Switch (Pin Type) Replacement
Turn the power off to the instrument. Remove the cover and dial scale (see Exploded view on page 8). Remove the two switch mounting screws from mechanism (page 7, see figure 10 for more details). One switch mounting screw will be part of the lower mounting screw from the front #15 switch. The second switch mounting screw will be below the first and it will be set back on the mechanism. Remove the switch from the bracket. Remove the wires from the original switch and transfer them one at a time to the replacement switch. Re-install the new switch and the mounting screws. Note the routing of the switch wires, be sure that they do not interfere with proper switch actuation. Be sure to check switch actuation and adjust screw E1 (see Figure 5) as needed for proper control switch actuation.

Note: After replacing either switch it may be necessary to make an adjustment to the switch actuation screws E (Figure 5). If, during normal process temperature cycling, the indicating pen registers a constant differential over or under the red set pointer adjust the appropriate actuation screw E 1 or 2 to correct. Lengthening the screw lowers the temperature while shortening it raises the temperature. Note: there are two adjusting screws, the one closest to the cover is #15 adjustment and the one behind it is the #73 or #79 adjustment screw.

Figure 5 - Switch Replacement

SWITCH DIFFERENTIAL ADJUSTMENT

Screw Switch actuation E1 and E2 are adjusted at the factory such that the #15 switch (Front switch with switch leaf) actuates before setpoint (approximately 1% of span temperature). As the temperature continues to rise, the second switch #73 or #79 will actuate at setpoint. The actuation of the first switch and/or the actuation of the second may be adjusted either upscale or downscale with the E1 and E2 switch actuators. Note that whatever switch adjustments are desired, the front #15 switch should always actuate first before the rear #73 or #79 does. The maximum second switch actuation point should not be more than 5% of scale. Adjusting the E2 screw will cause the #15 switch to be moved either further below, or closer to setpoint. Rotating the screw CW will cause the switch to actuate closer to setpoint. Rotating the screw CCW will cause the switch to actuate further below setpoint. Adjusting E1 CW will cause the rear switch, either #73 or #79, to be moved further above setpoint. Adjusting E1 CCW will cause the rear switch to be moved below setpoint. Note, wherever switch actuators are eventually positioned, the differential between each switch should not exceed 5% of span, nor should the rear switch actuate before the front switch.

BRAKE TIGHTENING

With use, the setting shaft brake may require tightening. If the brake is too loose, over travel movement of the black indicating pointer will tend to drag the red set pointer upscale from its set position. To tighten the brake, turn the adjusting screw U (Figure 6) clockwise. Check screw U adjustment by positioning the red set pointer to a low scale setting; then, with thumb placed at the base of the black indicating pointer arm, simulate over-travel by moving the black pointer upscale through and beyond the red pointer setting and repeat several times. If the set pointer moves noticeably from its set position screw U is not tight enough. If over-tightened, the set pointer will stay in position, but the setting knob will be very difficult to turn. Brake adjustment screw U should be tightened so that the red pointer retains its set position when over-traveled by indicating pointer, and setting knob turns with relative ease.

PISTON-PAK THERMAL SENSING ELEMENT IDENTIFICATION

An element designation number is stamped on the bottom of the element head. This is a coded description of the element specifications and should be used whenever a replacement element is ordered. The number appearing on the side of the element head (Figure 7) is the element age code, which may be required in establishing warranty.

ORDERING/SPECIFYING THE PISTON-PAK SENSING ELEMENT

The sensing element is ordered separately from the LF15-79 and requires its own matrix number. To determine the correct sensing element configuration for your instruments and application see Partlow Form 3028 "Mechanical Products Cross Reference and Pricing Guide."

ELEMENT REPLACEMENT

To change a thermal sensing element start by removing screws D (Figure 8) and withdrawing the element from the instrument body. Then remove the element bulb from the medium. Install the new element and tighten screws D. Insert the new element bulb into the medium being measured. Note: After the element has been replaced check the temperature setting as re-zeroing may be necessary. If so see the CHECKING TEMPERATURE section.

Caution: The inside mechanism(s), particularly the inside of the element housing, should never be oiled. However, if the instrument is subject to corrosion or gunking conditions, the mechanical linkage should be sprayed periodically with corrosion inhibiting CRC 2-26, 3-36, or 5-56. Use only CRC 2-26, 3-36, or 5-56 as other lubricants may cause build up and sticking of internal parts. CRC 2-26 may be purchased from Partlow in a 15 oz. container (part #63600401). CRC 5-56 may be purchased locally from any hardware or automotive store.

Figure 6 - Brake Tightening

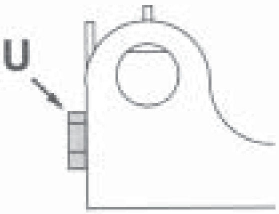


Figure 7 - Sensing Element ID

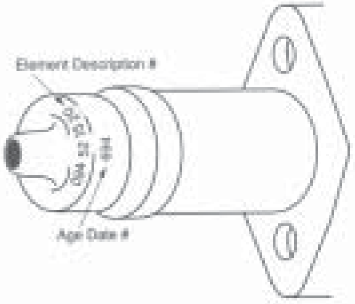
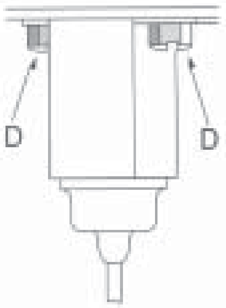


Figure 8 - Replacing Element



DIMENSIONAL DRAWING

Figure 9 - Dimensional Drawing

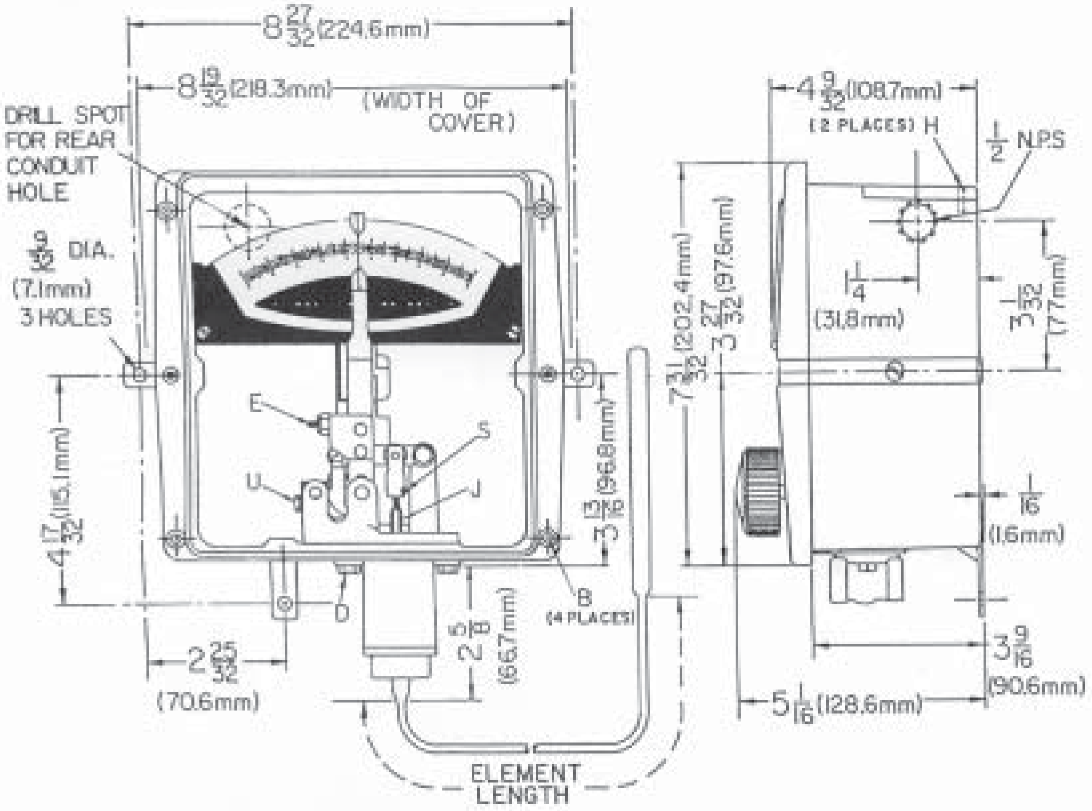
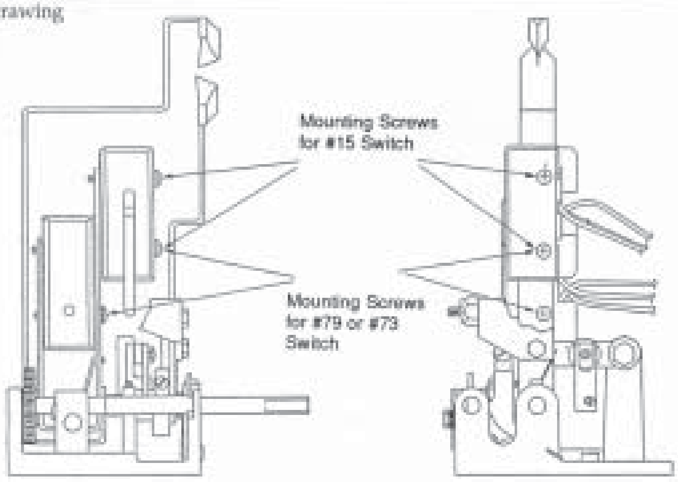


Figure 10 - Mechanism Drawing

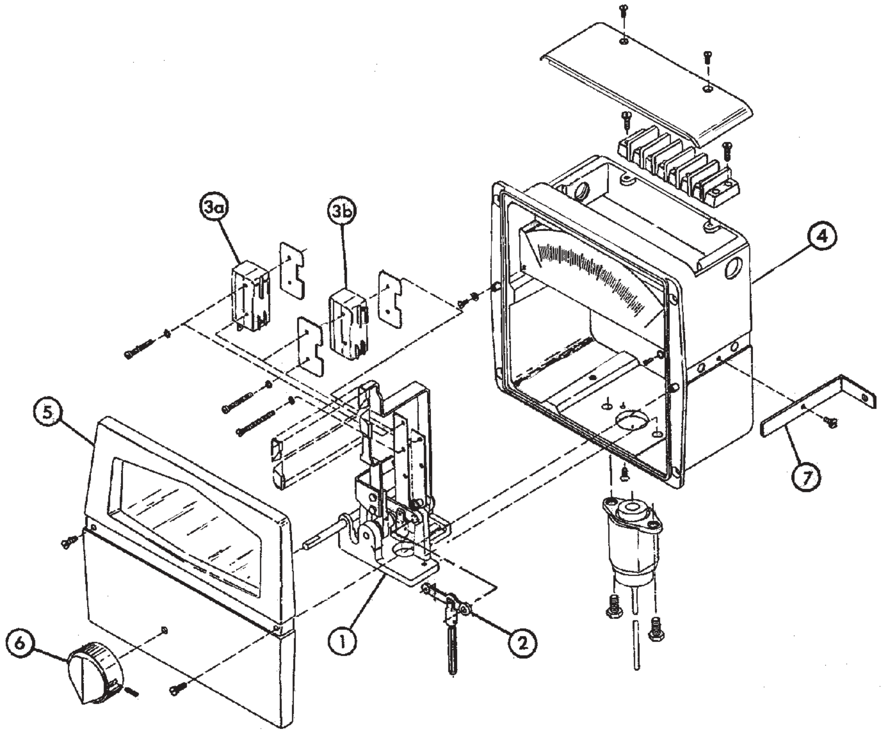


Left Side View

Front View

Exploded Illustration and Parts List

1. Mechanism Assembly Includes: Switches #15 and #79, Wiring & Terminal Block With Mounting Screws, Push Rod.	**10072114**
2. Main Lever Assembly Includes: Main Lever with Push Rod Cap, Push Rod, Set Screw.	**64412001**
3. Micro Switches	
#15 Micro Switch	**64403008**
#79 Micro Switch	**64403021**
Both include terminal screws	
Note: #79 replaces #4 switch	
4. Case Assembly Includes: Top Plate With Screws, Terminal Block Barrier, Mounting Brackets With Screws	**64412101**
5. Cover Assembly Cover, Glass & Cover Screws	**64412201**
6. Knob Assembly Knob With Set Screw	**10041301**
7. Mounting Brackets (3 required) Brackets As Illustrated, sold separately	**64402003**
8. Standard Hardware Kit (not shown) Includes: Cover Screws , Switch Screws, Dial Screws, Terminal Block Mounting Screws Mechanism Holding Screws, Mounting Bracket Screws, Push Rod Set Screw, Top Plate Screw, Ground Screw	**64412701**



Warranty

These products are sold by The Partlow Corporation ("Partlow") under the warranties set forth in the following paragraph. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from Partlow or from a Partlow distributor, representative or reseller, and are extended only to the first buyer there of who purchases them other than for the purpose of resale.

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Partlow factory, and to conform at that same time to the specifications set forth in the relevant Partlow instrumentation sheet, sheets, manual or manuals for such products.

Partlow's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, at Partlow's option free of charge, the products which are reported in writing to Partlow at its main office - The Partlow Corporation, 2 Campion Road, New Hartford, New York 13413 or FAX MAIL 1-315-797-0403 and which if so advised by Partlow, are returned with a statement of the observed deficiency to the designated facility during normal business hours, transportation charges prepaid and which upon examination by Partlow are found not to comply with the above warranties. PARTLOW SHALL NOT BE LIABLE FOR ANY INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, SPECIAL DAMAGES, OR ANY [redacted] REPLACEMNT AS ABOVE DESCRIBED.

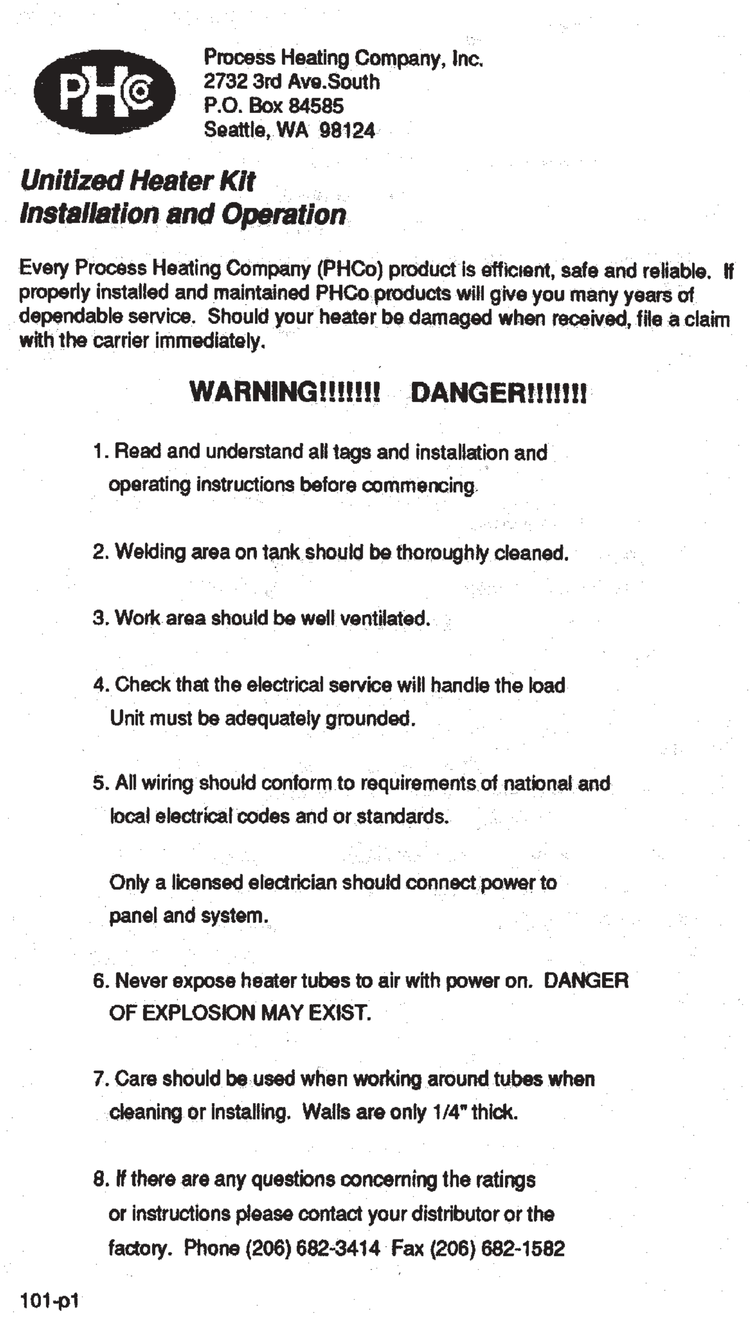
THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN ABOVE SET FORTH. PARTLOW MAKES NO WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.

Partlow

Form Number 3019
Published April 1990
First Edition
Revised April 1992

Represented/Distributed By:

Installation and Maintenance Instructions



Process Heating Company, Inc.
2732 3rd Ave.South
P.O. Box 84585
Seattle, WA 98124

Unitized Heater Kit
Installation and Operation

Every Process Heating Company (PHCo) product is efficient, safe and reliable. If properly installed and maintained PHCo products will give you many years of dependable service. Should your heater be damaged when received, file a claim with the carrier immediately.

WARNING!!!!!!! DANGER!!!!!!!

1. Read and understand all tags and installation and operating instructions before commencing.

2. Welding area on tank should be thoroughly cleaned.

3. Work area should be well ventilated.

4. Check that the electrical service will handle the load Unit must be adequately grounded.

5. All wiring should conform to requirements of national and local electrical codes and or standards.

   Only a licensed electrician should connect power to panel and system.

6. Never expose heater tubes to air with power on. DANGER OF EXPLOSION MAY EXIST.

7. Care should be used when working around tubes when cleaning or installing. Walls are only 1/4" thick.

8. If there are any questions concerning the ratings or instructions please contact your distributor or the factory. Phone (206) 682-3414 Fax (206) 682-1582

101-p1

ADDITIONAL IMPORTANT WARNINGS AND INFORMATION

1. These instructions cannot possibly cover every situation concerning the operation, inspection adjustment and test of the equipment furnished. Process Heating Company (PHCo), in the furnishing of this equipment and these instructions, must presume that the operating and maintenance personnel using this equipment have sufficient technical knowledge and experience to apply sound safety and operational practices which may not be mentioned.

2. In applications where PHCo furnished equipment is to be integrated with a process or other equipment, these instructions should be thoroughly reviewed to determine the proper integration of the equipment into the overall plant or system operational procedures.

3. PHCo does not supply, recommend, or approve the various systems in which its products are or may be used. Unless designed, manufactured, and used properly, various systems may be inherently unsafe or dangerous. The user should check and comply with all federal, state and local regulations and other regulations and recommendations such as: NFPA, UL, API, OSHA, etc.

101-p2

UNITIZED HEATER KIT-INSTALLATION & OPERATION

Preparation

1. Remove jacketing and insulation from section of tank heater is to be installed through.

2. Mark location of opening of tank. Heater should be kept as low as possible in tank.

CAUTION!

BEFORE BURNING OR WELDING ON TANK CLEAN THOROUGHLY AND KEEP WELL VENTILATED

Installation

1. Burn opening in tank slightly larger than heater terminal box (snug fit). Remove slag and grind opening smooth.
2. Remove blocking and slide heater through opening in tank. Stop at marked "weld line" on heater terminal box.
3. Heater tube support plates should be attached to tank bottom. Level heater tubes and weld supports to tank. DO NOT weld heater tubes to support plates.
4. Weld heater terminal box to tank. Terminal box is 1/4" thick steel plate. Weld must be liquid tight.
5. Tank discharge should be kept 2" to 3" above heater tubes. Never expose heater tubes to air with power on. DANGER OF EXPLOSION MAY EXIST.
6. Re-install insulation and jacketing around heater terminal box.
7. Have licensed electrician connect proper voltage and phase with properly sized conductors to main power switch. Unit must be adequately grounded. Check all electrical connection for tightness.

101-p3

Operation

1. Fill tank with desired material. Turn on power at main switch.

2. Set main indicating temperature control to proper tank holding temperature.

3. Set Hi-Limit control 20 to 30 degrees above main control set point. Hi-Limit will act only in event of main control failure. Heater will continue to cycle at Hi-Limit set point and red light on panel door will indicate "Hi-Limit" condition. Press light to reset when condition is remedied.

4. If unit is equipped with a time clock, see instruction sheet for proper clock setting.

5. Heater operation is now completely automatic. Check electrical connections periodically for tightness. Keep panel door closed tightly at all times.

6. Clean tank at regular intervals. Heater tubes are 1/4" thick steel pipe. Use care with jack hammers and chisels so as not to rupture tube wall.

*****Note*****

Terminal block if provided is to inter-lock heat "off" while other loads are running. (Remove jumper and connect to terminals #1 & #2.)

CONTROL PANEL

ALL WIRING SHOULD CONFORM TO REQUIREMENTS OF APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES AND OR STANDARDS.

Rating and voltage of the unit will be found on the name plate located on the inside of door in the control panel, and conduit enclosed insulated conductors of the proper gauge should be brought from the main circuit breaker or fused disconnect switch.

The controlling thermostat can be pre-set to any desired temperature within the thermostat dial range.

If the control panel has been equipped with a time clock please refer to the separate instructions enclosed for proper clock setting

Your unit has also been equipped with an over-temperature thermostat that should be set 20 - 30 degrees above main temperature control. Its primary function is to protect against over heating in the event of main temperature control malfunction. The unit will cycle at this new temperature and a red Hi-Limit warning light, on the outside of the control panel will light. This light will remain on until the limit circuit is reset to alert personnel that there is a malfunction.

The cause of the malfunction should be investigated at once. Possible reasons are:

1. Capillary rupture on the main temperature controller (indicated by temperature indicating pointer at far left hand position).

2. "Over Ranging" of the main temperature controller (indicated by incorrect temperature reading on the scale).

3. Thermostat temperature setting is too high.

4. Main temperature controller out of calibration.

5. Over-Temperature thermostat out of calibration.

Unitized Heaters

Maintenance checklist

1. **Check electrical** connections for tightness.
2. Tank should be cleaned at regular intervals.
3. Check to be sure the control panel door is tightly closed at all times.
4. Be sure to **see** that tank has adequate insulation. Insulation tends to break down in time thus costing dollars in lost efficiency

DATE	DESCRIPTION OF MAINTENANCE	INITIALS

101-p6

101-p7

Something Wrong with this manual?

If you find inaccurate or confusing information in this manual, or just have a suggestion for improvement, please let us know.

Mail or FAX this form to us at: E. D. ETNYRE & CO. 1333 S. Daysville Rd. Oregon, Illinois 61061 • Fax: 800-521-1107 • www.etnyre.com
Attn: Service Manager

Recommended changes from: ______________________

Address ______________________

City, State, Zip ______________________

Phone ______________________

Date Sent ______________________

Manual Number (upper right corner of front cover) ______________________

Manual Title ______________________

Explain the problem in the space below.

Page Number	Reference Number	Paragraph Number	Figure Number	Problem (please be specific)