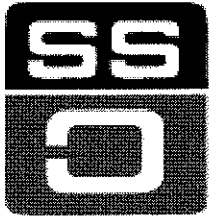

Service & Installation Manual

"MARK II"

Solid-State Digital Automatic
Controlled Sterilizers

CONSOLIDATED MODEL SR-24A-PB
ELECTRICALLY HEATED STERILIZER
SERIAL NUMBER 040907



Consolidated Stills & Sterilizers

Rev. 20050914

**PLEASE READ CAREFULLY BEFORE
ATTEMPTING TO OPERATE YOUR STERILIZER.**

Copyright:
Consolidated Stills and Sterilizers
76 Ashford Street
P.O. Box 297
Boston, MA 02134-0003 U.S.A.
Tel: (617) 782-6072 Fax: (617) 787-586

Note: Always have this machine's model and serial number (printed on the first page of this document) ready when calling Consolidated for service or parts.

WARNING

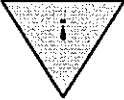
If this sterilizer's chamber is constructed of Stainless Steel, NEVER use CHLORIDE based cleaners to clean this sterilizer. NEVER sterilize items containing CHLORIDES or producing CHLORIDE GASES in this sterilizer. CHLORIDES have proven to damage the Stainless Steel material causing cracks and pin holes, which will lead to steam leaks.

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1. The room in which this sterilizer is to be installed **MUST** be vented and cooled very well. The sterilizer will not perform very well in a hot environment.
2. All *direct steam* units should be provided with a 3/4-inch steam line with a pressure of 50-PSI minimum to 80-PSI maximum. This steam line should be equipped with a shut-off valve *and* a float type inverted bucket trap to provide dry steam to the sterilizer. Dry steam is essential in obtaining best sterilization results.
3. Installation should be made in accordance with tagging instructions on the sterilizer. Unrate and place unit in its final position. Adequate space must be allowed at the sides and rear of unit for maintenance and service. As an aid for servicing, shut-off valves should be installed in steam and water service lines adjacent to the sterilizer.
4. Using a spirit level on one vertical side, plumb unit to vertical using the four (4) leveling screws - one in each corner of the steel angle frame of the sterilizer inside the stainless steel outer cabinet. Then place spirit level on front side of sterilizer at one corner and raise the back end of the sterilizer equally with both back leveling feet so that the whole sterilizer has a slight pitch forward. This is to allow a grade for any liquid within the chamber to drain into the drain hole at the front bottom of the

	<p>WARNING: DEGRADATION HAZARD</p>
<p>If you are using a 110-volt supply voltage for the valves and solenoids, make certain that the supply voltage is either 110 volt 50 Hz or 120 volt 60 Hz. Use of any other combination of voltage and frequency (for example 120 volts 50 Hz) will cause degradation of the coils on the solenoids and will lead to failure.</p>	
<p>If you are using a 220-volt supply voltage for the valves and solenoids, make certain that the supply voltage is either 220 volt 50 Hz or 240 volt 60 Hz. Use of any other combination of voltage and frequency (for example 240 volts 50 Hz) will cause degradation of the coils on the solenoids and will lead to failure.</p>	

1. Installation Instructions

- When piping the generator drain on electrically heated sterilizers, consideration should be given as to the placement of the manual ball valve. This valve should be piped so as to facilitate easy access when draining the generator on a regular basis.
 - Exhaust lines entering the funnel waste must be kept out of the funnel to avoid possible siphoning.
 - If exhaust steam is to be vented to a stack, the ductwork should be at least one pipe size larger than the exhaust line at the sterilizer and must not include any 90 degree angles.
- 1.1 Notes**
7. All *Vacuum equipped* sterilizers should be supplied with a suitable grade of feed water *free of calcium deposits*. If water quality is a concern at the installation site, a booster pump depending on the sterilizer vacuum system selected.
 6. On all electrically heated units the screws on the line and load terminals of the electrical contactor for the generator's elements must be tightened and torque measured to 40 PSI. This is critical to ensure long life for the contactor, wiring and the heating elements.
 5. All *electrically heated units* must have a handy power shut-off switch. While making the necessary wiring connections to the contactor, make sure all the wires are far enough away from the contactor's moving parts to prevent any obstruction. If a wire should become entangled and cause an obstruction, it is very possible that the contacts could get stuck in a closed position, which will result in a melt down in a low water situation.
- chamber. To check if sufficient grade is provided, slowly pour a glass of water on the back bottom surface of the sterilizer chamber and note if it runs freely to and down the drain hole.

If your machine is equipped with a Steam Generator, please be warned that the drain valves for the generator and the low water cut off are NOT piped into this cooling system. Before blowing down the generator, you must wait long enough for the generator water to cool off.

Some machines are supplied with a wastewater cooling system at the customer's request. This system is controlled by a temperature-actuated valve, which supplies an additional volume of water to prevent wastewater temperatures exceeding preset limits. A 1/4" needle valve is also supplied for the purpose of regulating the flow of water passing by the temperature probe, thus resulting in how long the valve remains open. The more the needle valve is opened, the shorter the period in which the water valve stays open resulting in less usage of water.

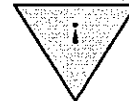
1.2 Waste water cooling system

- As per our tagging instructions, water supply pressure to sterilizer should be a minimum of 45 PSI and a maximum of 65 PSI.
- Steam, water, and power service are always clearly labeled for the sub-trades responsible for their connection.
- When new steam lines are run into the sterilizer, blow out lines before connecting to sterilizer to eliminate thread chips, excess pipe compound and dirt. When new piping is involved it is not uncommon for the steam traps to become fouled causing malfunction of the sterilizer if lines are not pre-cleaned.
- When waste connection is made to anything other than a floor drain, and piping changes are required, make sure that chamber steam trap is gravity-fed to open waste - IT MUST NOT BE PIPED UPHILL.

To abort a cycle in progress, press the red POWER key on the keypad assembly. This will shut off power to the unit. You will then need to open the green-handled manual exhaust valve below the chamber (labeled Manual Steam Exhaust Valve) by removing the access panel below the chamber door. Wait for the pressure inside the chamber to reach atmosphere before carefully opening the door.

Please note that if a cycle is aborted prior to successful termination, it must be considered incomplete and the load must be reprocessed (unwrapped goods or liquids) or repacked and reprocessed (wrapped goods).

WARNING: RISK OF NON-STERILE DEVICE

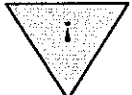


2.1 Aborting a cycle

The following safety instructions appear in this manual. Please read them carefully before operating the sterilizer.


2. Safety Instructions

Please see section 7.2 on load preparation before you start operating the machine.


<p>Please note that airborne microbial and particulate contamination is likely to be high in the decontamination area of the sterile processing department. Users MUST wear protective clothing and equipment when preparing goods for sterilization or when in the decontamination area.</p>	
<p>WARNING: RISK OF INFECTION</p>	

2.3 Preparing the load

To start a cycle, make sure the door is hand-tight. Press the appropriate selector switch for the type of cycle you are running (Fast, Dry, or Fluids), then press the red power button on the selector switch to start the cycle. See section 6 for a complete tutorial before you start operating the machine.

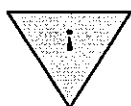
<p>If water leaks from the front of the sterilizer, DO NOT open the door. Contact service personnel.</p>	
<p>The operator MUST wear protective clothing including face shield, thermal gloves, and proper lab attire, when attempting to load and unload the chamber materials. Steam released from the sterilizer chamber can cause serious burns. Stand away while opening the door.</p>	
<p>WARNING: BURN HAZARD</p>	

2.2 Starting a cycle

	WARNING!
Sterilized liquids are not intended for direct patient contact.	

(See Section 3.3 on Sterilizing Fluids)
INJURY HAZARD: If the wrong cycle is selected to sterilize liquids, the containers may burst or crack during the processing. After completion of a FLUIDS cycle, take care that you do not agitate the fluids during removal from the chamber. Otherwise the containers may burst or crack.

2.4 Sterilizing Fluids

<p>WARNING: Damage to the Chart Recorder</p>	 <p>The Chart Recorder/Controller's Green Indicating Pointer and Orange Set Pointer (see Figure 5.1) must not be manipulated by hand or any tools in an attempt to swing them up or down the scale. This can result in serious damage to the recorder's linkage. This damage is <u>not</u> covered under your sterilizer's warranty.</p>
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See section 5 of the Operator's Manual about setting your sterilization temperature and changing the chart paper on the chart recorder controller.

2.5 Chart Recorder Care

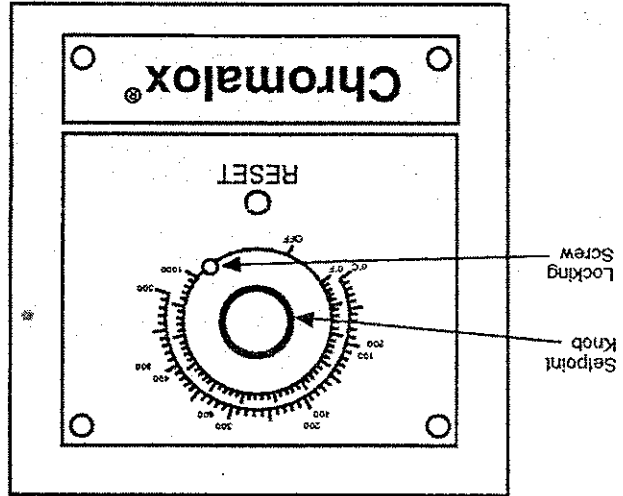
1. **EVERY MORNING**, run a short 5-minute sterilization cycle with an empty chamber. This helps the machine run better throughout the day.
2. **BEFORE EVERY CYCLE**, make sure the mesh screen from the front drain hole inside the sterilizer is totally free of debris. A clogged chamber drain strainer will prevent sterilizer from coming up to temperature.
3. **ONCE A WEEK**, flush Chamber with clean water. This is particularly necessary if saline solutions are being sterilized. Depending on the type of goods being sterilized, the chamber may also require wire brush cleaning (or other type) on a regular basis.
4. **ONCE A WEEK**, on units equipped with a steam generator, drain the generator immediately after the sterilizer has been shut down and while the water in the generator is still hot. This will aid in drawing off the sediments and impurities in the water and keep the generator clean.
5. **ONCE A WEEK**, Clean the head ring and the door gasket. The head ring is where the door gasket meets the sterilizer chamber when door is shut. Clean the gasket and apply some graphite to prevent sticking of the gasket to the head ring. Always have a spare door gasket in stock. If you have trouble sealing the door, it may be time to replace the door gasket.
6. **ONCE A MONTH**, check all hand valve spindles for leaks around packing nuts.
7. **ONCE A MONTH**, Calibrate the UE chart recorder's temperature sensor.
8. **ONCE A MONTH**, oil the door hinge pins, and lubricate the door hub. See section on door hub maintenance for instructions on lubricating the door hub.
9. **ONCE EVERY THREE MONTHS**, clean all steam traps. This should also be done when indications point to trap malfunctioning.
10. **ONCE EVERY THREE MONTHS**, on units equipped with a steam generator, clean and service the generator. See section on servicing the generator and low water cut off later in this manual.

3. Maintenance Recommendations

4. Sterilizers equipped with a Steam Generator

Some sterilizers with a steam generator are equipped with an optional Chromalox thermal protection device for the heating elements. This thermal protection device cuts the power to the coil of the contactor if the temperature of the heating elements rises above 350 degrees Fahrenheit. Usually this temperature rise is caused by insufficient flow of water into the generator. If you are unable to pressurize the jacket of your sterilizer, the thermal protection device may be the cause. Remove the front panel of the sterilizer under the chamber. You will see the optional Chromalox thermal protection device mounted adjacent to the steam generator. If the red light on the Chromalox box is ON, then the thermal protection has cut the power to the coil of the contactor.

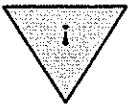
In this case, you must check the low water cut off assembly and switch for signs of failure. See the following section for instructions. Once you have corrected the source of the problem, you may press the reset button on the optional Chromalox thermal protector to reset the system and continue operation. The reset button will not operate if the elements are hotter than the threshold temperature of 350.



- A) Generator safety valve (50 PSI)
- B) Generator supports
- C) Manual shut off valves for sight glass (MUST BE OPEN when generator in use)
- D) Low water cut off assembly
- E) Check valve
- F) Water inlet solenoid valve
- G) Air Breaker
- H) Water strainer
- J) Manual shut off for water inlet
- L) Sight glass
- M) Eight (8) 1/2x13 studs
- N) Heating elements electrical connection studs
- P) Generator clean out plug
- Q) Low water cut off clean out plug
- R) Generator drain manual shut off valve
- S) Steam line to sterilizer jacket
- T) Water inlet to generator
- U) Screw jacks
- V) Chromalox Temperature probe mount (optional)
- W) Generator & low water cut off drain

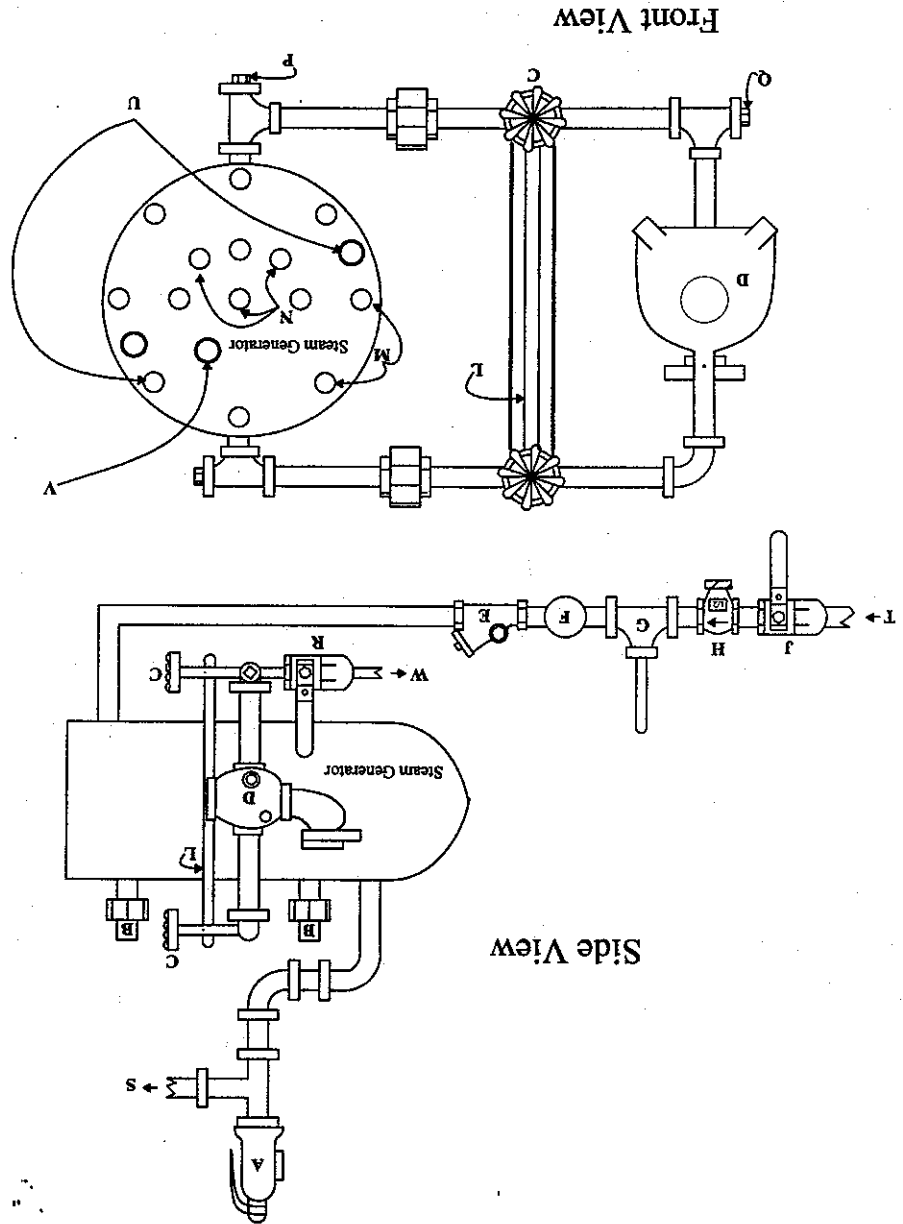
5.1 Identifying generator and Low water cut off parts

The following descriptions refer to the parts marked on figure 5.1 drawing on the next page.


WARNING: RISK OF SEVERE INJURY OR DEATH
Make sure that all power is shut off to the sterilizer, the controls, and the generator and that there is no water in the generator before attempting to service the sterilizer, the generator, and associated parts and accessories. Be mindful of hot water and steam still present in pipes even after shut down of sterilizer power and utilities.

5. Generator and Low water cut off assembly

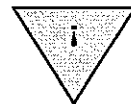
Figure 5.1



1. Make sure you have a gasket (o-ring) for the generator and a gasket for the low water cut off before attempting to service them. If you need to clean the sight glass, you will also need the o-rings for the sight glass.
2. Refer to figure 5.1 on the previous page for the descriptions contained here.
3. Disconnect the wires to the heating elements (N). Be careful not to break the screw terminals that attach the wires to the heating elements. Mark wires for proper reattachment. Unplug the (optional) Chromalox temperature probe connector (V).
4. Remove the eight nuts (M).
5. Pull the flange and the heating elements out of the generator. If needed, you can screw two 1/2x13 thread bolts into the screw jacks (U) to push the flange out.
6. Clean the heating elements, the temp probe, and their points of contact using warm water, soap, and a wire brush. Be careful to brush lightly so that you do not puncture the sheath on the elements. Also be very careful not to wet the electrical terminals (N). If the elements have a heavy cover of sediments, you should increase your cleaning intervals.
7. Use warm water, soap, and wire brush to clean the inside of the generator from any mineral build up.
8. Remove plug (P) and make sure the drain line is clean.
9. Put plug (P) back in and remove (Q) to make sure the line running between (P) and (Q) is clean and free of obstructions.

Make sure that all power is shut off to the sterilizer, the controls, and the generator and that there is no water in the generator before attempting to service the sterilizer, the generator, and associated parts and accessories. Be mindful of hot water and steam still present in pipes even after shut down of sterilizer power and utilities.

**WARNING: RISK OF SEVERE
INJURY OR DEATH**



5.2 Cleaning the generator & Low water cut off

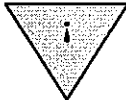
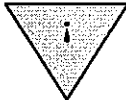
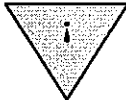
10. Put (Q) back in.

11. Put the steam generator flange back in using a new o-ring gasket for the flange.

Torque the nuts (M) down to 40 ft.lbs.

12. Reconnect the electrical connections to the heating element terminals (N). When tightening the screw terminals make sure you hold the back nut while you tighten the outside nut to avoid breaking the terminal. Reconnect the (optional) Chromalox temperature probe (V).

13. Double-check the wires on the contactors for the heating elements to ensure they have not loosened up during the cleaning procedure.

<p>Make sure that all power is shut off to the sterilizer, the controls, and the generator and that there is no water in the generator before attempting to service the sterilizer, the generator, and associated parts and accessories. Be mindful of hot water and steam still present in pipes even after shut down of sterilizer power and utilities.</p>		
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<p>WARNING: RISK OF SEVERE INJURY OR DEATH</p>		

5.3 Cleaning the low water cut off assembly

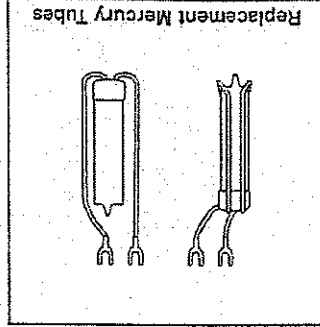
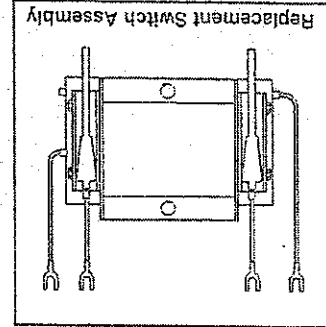
MAINTENANCE

SCHEDULE:

- Blow down control as follows when boiler is in operation:
 - Daily if operating pressure is above 15 psi.
 - Weekly if operating pressure is below 15 psi.

NOTE
More frequent blow-down may be necessary due to unusual water or system conditions, including dirt and minerals and/or local codes.

- Disassemble and inspect the low water cut-off/pump controller annually. Replace if it is worn, corroded, or if components no longer operate properly.
- Inspect the float chamber and equalizing piping annually. Remove all sediment and debris.
- Replace head mechanism every 5 years.
- More frequent replacement may be required when severe conditions exist such as rapid switch cycling, surging water levels, and use of water treatment chemicals.
- We recommend head mechanism replacement when the switch(es) no longer operate properly. If you choose to replace the switch(es), order the proper McDonnell & Miller replacement switch or switch assembly and follow the Repair Procedure provided.



CAUTION
Snap switches must be replaced as an assembly.

PROCEDURE:

CAUTION
To prevent serious personal injury from steam and hot water during blow down, connect piping to the discharge side of the blow down valve to avoid exposure to steam discharge.
Failure to follow this caution could cause personal injury.

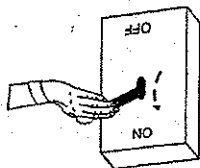
1. Blow down the low water cut-off when the water level is at its normal level and the burner is on. Slowly open the blow down valve until it is fully open and observe the water level fall in the gauge glass. Close the valve after verifying that the pump contacts have closed and the burner shuts off. If this does not happen, immediately shut off the boiler and correct the problem.

Testing

This control is factory calibrated for specific applications. The following testing procedure is only meant to serve as a verification of proper operating sequence.

IMPORTANT: Follow the boiler manufacturer's start-up and operating instructions along with all applicable codes and ordinances.

a. Turn on the electric power to the boiler. With the boiler empty the pump should go on and the burner must remain off.



If the burner comes on, immediately turn the boiler off and make the necessary corrections.

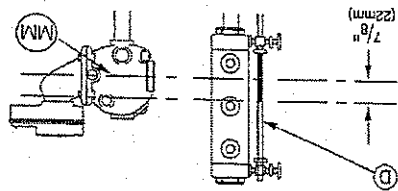
Failure to follow this warning could cause an explosion or fire and result in property damage, personal injury or death.



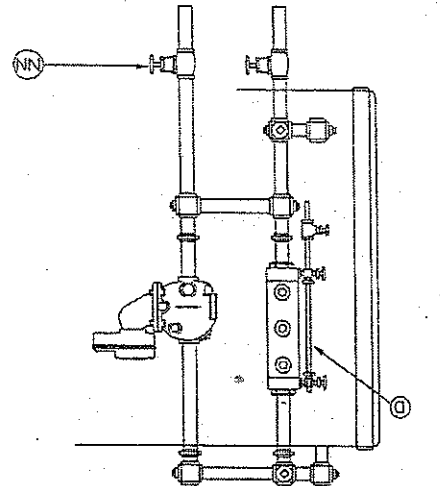
WARNING

b. The boiler should begin to fill with water. Watch the gauge glass (D) until the water level reaches approximately $\frac{7}{8}$ " (22mm) above the horizontal cast line (MM) on the low water cut-off. When the water level reaches approximately $\frac{7}{8}$ " (22mm) the burner should come on.

IMPORTANT: If water does not fill the boiler, immediately turn off the boiler and make the necessary corrections.



d.



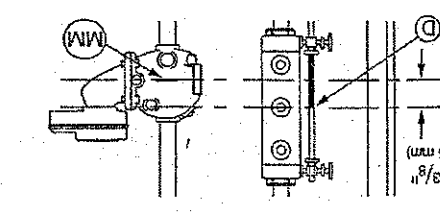
When the water level is at its normal level and the burner is on, slowly open the blow down valve (NN) until it is fully open. Watch the gauge glass (D) to see that the water level drops. Close the valve after verifying that the pump comes on and the burner shuts off. If this does not occur, immediately shut off the boiler and correct the problem and retest.

CAUTION

To prevent serious personal injury from steam and hot water during blow-down, connect piping to the discharge side of the blow-down valve to avoid exposure to steam discharge.

Failure to follow this caution could cause personal injury.

c. Continue watching the gauge glass (D) to see that the water continues to rise to approximately $1\frac{3}{8}$ " (35mm) above the horizontal cast line (MM). The pump should shut off.



5.4 Cleaning the sight glass



WARNING: RISK OF SEVERE INJURY OR DEATH
Make sure that all power is shut off to the sterilizer, the controls, and the generator and that there is no water in the generator before attempting to service the sterilizer, the generator, and associated parts and accessories. Be mindful of hot water and steam still present in pipes even after shut down of sterilizer power and utilities.

Figure 5.5 below shows the front view of the sight glass. Refer to this figure when following the directions to disassemble the sight glass and clean it.

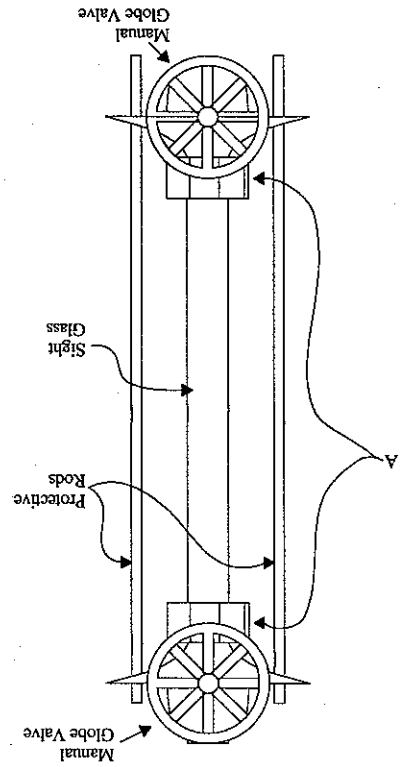


Figure 5.5
Front view of sight glass

1. Before you start, make sure you have two replacement o-rings for the sight glass available. (Part number D-1600-00)

2. Pull protection rods up and out of the bottom holders.

3. Remove the two nuts "A" in Figure 5.5 and pull them over the sight glass.

4. The o-rings are now exposed. Roll the o-rings over the sight glass.

5. Slide the sight glass up to clear the bottom holder. Once it clears the bottom holder, lean the sight glass towards the front and pull it out of the assembly.

6. Clean the inside of the sight glass thoroughly with a bottle washer brush.

7. Replace the o-rings with new ones and put the assembly back together.

Make sure that the two Manual Globe Valves (see figure 5.5) are always OPEN during normal operation of the machine.

6. Door hub assembly

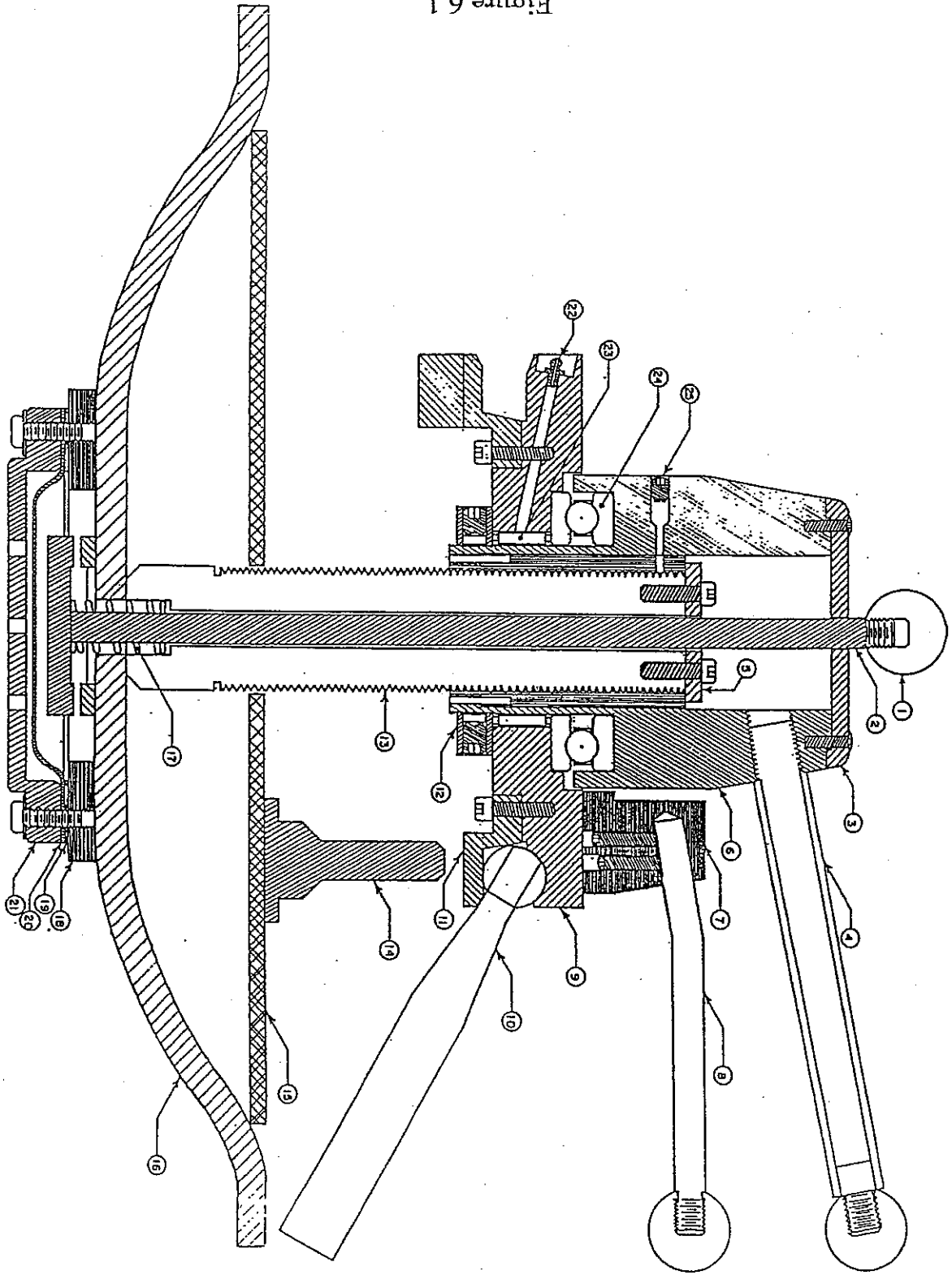
The nomenclature for the door hub assembly shown in figure 6.1 is as below:

- | | |
|--|--|
| 1. Bakelite ball (5 required for assembly) | 13. Threaded center door stud |
| 2. Internal door lock | 14. Trip alignment pin |
| 3. Hub closure cap | 15. Trip alignment pin, mounting plate |
| 4. Door handles (3 per assembly) | 16. Door (side to pressure) |
| 5. Center stud, hub travel stop | 17. Internal door lock spring |
| 6. Hub, with bronze insert | 18. Internal door lock assembly: mounting ring |
| 7. Trip handle mounting block | 19. Gasket |
| 8. Trip handle | 20. Diaphragm |
| 9. Upper pin retainer | 21. Cover |
| 10. Door locking pins | 22. Pin retainer assembly grease fitting |
| 11. Lower pin retainer, with trip alignment blocks | 23. Roller bearing |
| 12. Hub and pin retainer assembly, locking nut | 24. Thrust bearing |
| | 25. Central stud / hub lubricating port |

6.1 Lubricating the door hub

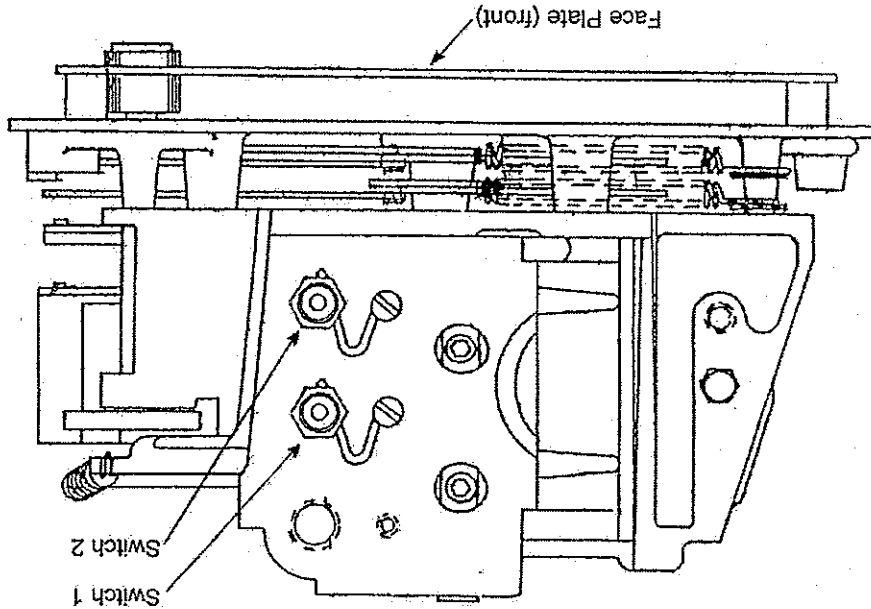
1. Find Grease fitting 22 and 25 on figure 6.1.
2. Once every three months pump ONE shot of grease into fitting 22 and THREE shots of grease into fitting number 25 using a grease gun.
3. Now take two handles and move them back and forth (in the direction of the sterilizer and yourself). If there is more than 1/8 inch of play in the handles, the hub needs to be inspected for possible damage to the threads:

Figure 6.1



7. Recorder Adjustment

If the recorder is recycling (resetting the sterilization time elapsed to zero), you should measure the "actual" temperature inside the chamber of the sterilizer using a secondary device and compare it to the recorder's temperature reading. If the recorder temperature reading matches the secondary device, then you should follow the following steps.



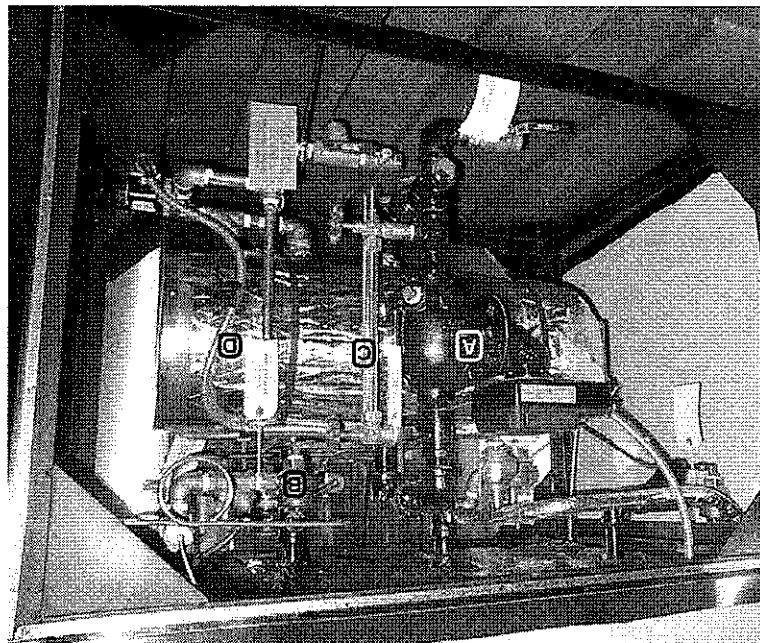
The above diagram shows a view from the UNDERSIDE of the recorder. You should open the recorder door, then open the faceplate and look under the recorder.

Switch 1) The micro switch set screw for the steam solenoid
Switch 2) The micro switch set screw for the timer light

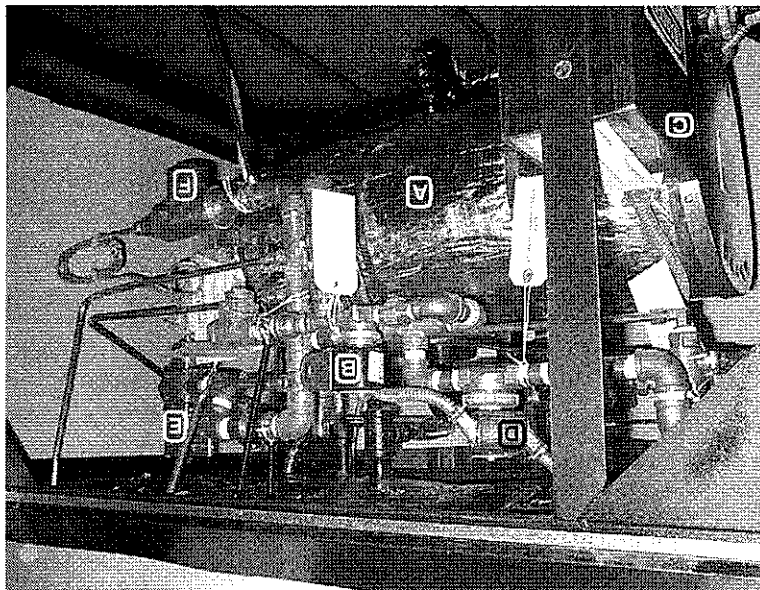
If the recorder is recycling often, using a 3/8 open-end wrench, you may adjust the timer micro switch (Switch 2) by turning it 1/8 of a turn clockwise. If the recycling problem continues, you should repeat this procedure.

8. Valves & Solenoids

- In the picture to the left:
- A) Low Water Cut Off
 - B) Chamber Steam Trap
 - C) Water Level Sight Glass
 - D) Steam Generator

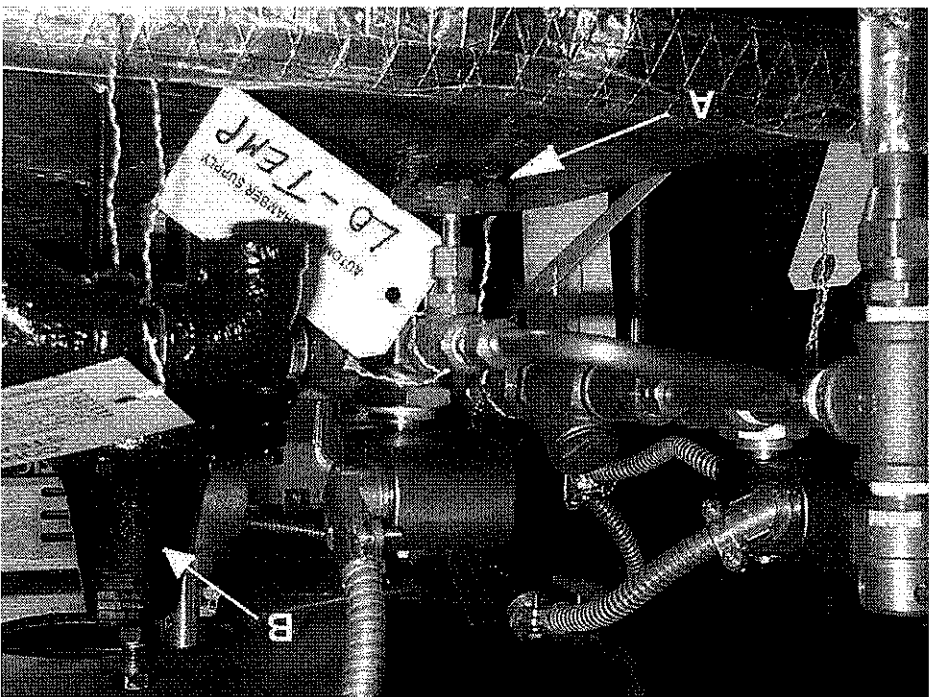


- In the picture to the left:
- A) Steam Generator
 - B) Water Solenoid
 - C) Contactor & Electrical Box for Steam Generator
 - D) Fast Exhaust Solenoid
 - E) Johnson Automatic Waste-Water Cooling Valve
 - F) Drain



9. Low-Temp Sterilizers

On sterilizers equipped with Low-Temp cycle, there is an adjustment valve located on the center rear of the sterilizer marked "A" in the picture below.

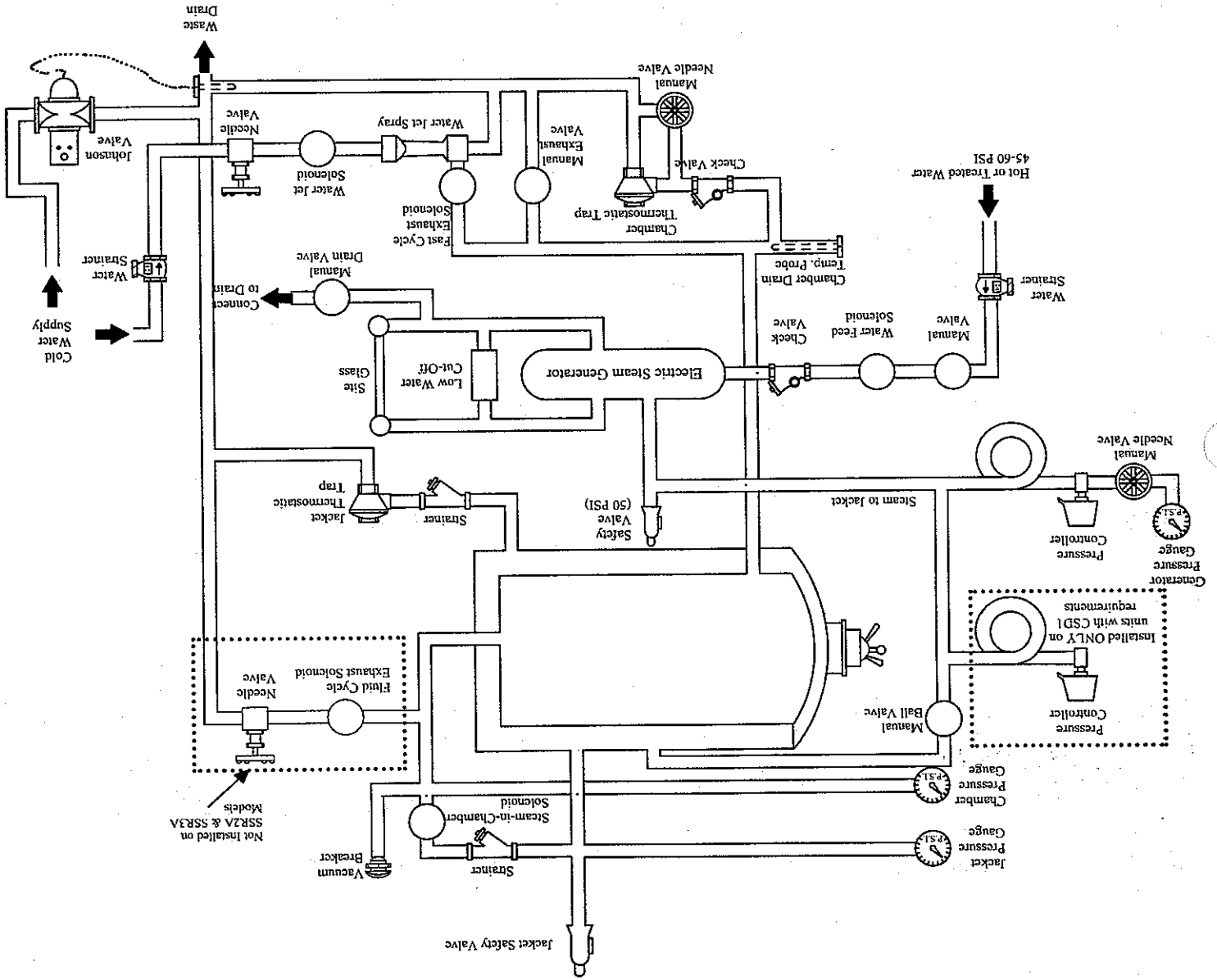


This 1/4 inch needle adjustment valve is tagged "Automatic Chamber Supply - Low Temp" and it controls the flow of steam into the chamber. To increase the flow of steam, turn the valve counter-clockwise. You will only need to adjust this valve once.

If the chamber temperature during the Low-Temp cycle overshoots the setting on the recorder, you should lower the setting on the chamber pressure regulator. This pressure regulator is marked "B" in the picture above and is adjacent to the adjustment valve "A". You can lower the pressure setting by turning the adjustment nut on top of the sterilizer counterclockwise.

10. Plumbing Schematic

Consolidated	
Stills and Sterilizers	Drawn By: RK
Stilizer Plumbing Diagram	Revised: Jun 19, 2005
PB Series, Electric Steam, Gravity	Date: October 04, 1998
Sheet 1 of 1	SS Drawing No.: PRGRPL Rev: 0A



11. Electrical Schematics

SOLID STATE DIGITAL CONTROLS (PUSH BUTTON)

Legend:

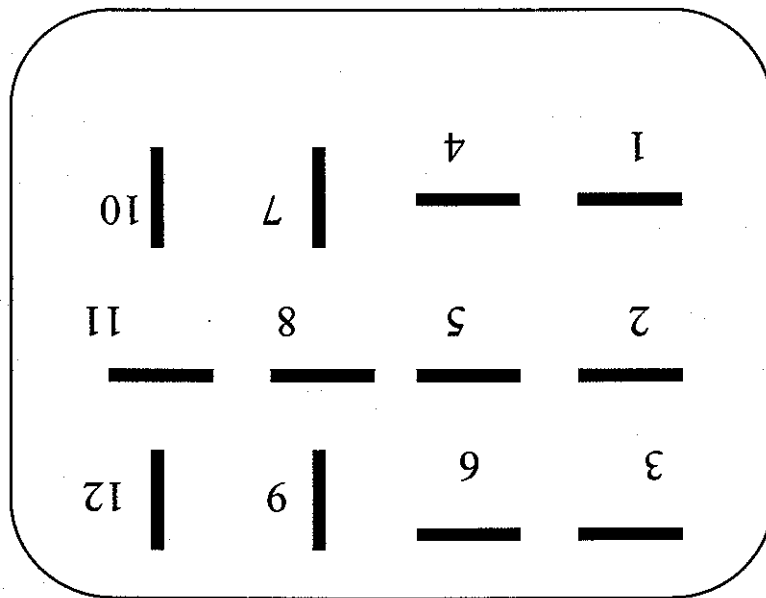
- TB1** Terminal Block #1
- TB2** Terminal Block #2
- P1** Timer Plug
- C** Common
- N.O.** Normally Open
- N.C.** Normally Closed
- SV** Solenoid Valve
- SW** Switch

AC
ACC
N.C.2
N.O.2
COM2
N.C.1
N.O.1
COM1

Controller/Recorder Terminals

- AC** 117 VAC INCOMING POWER
- NEUTRAL**
- ACC** TO STEAM SV CLOSSES AT SET PT OPENS AT
- N.C.2** No Connection 2 DEG ABOVE SET PT
- N.O.2** 117 VAC FROM TIMER
- COM2** No Connection
- N.C.1**
- N.O.1** P1, T10 TIMER GROUND
- COM1** P1, T11 CLOSSES AT SET PT TO START TIMER

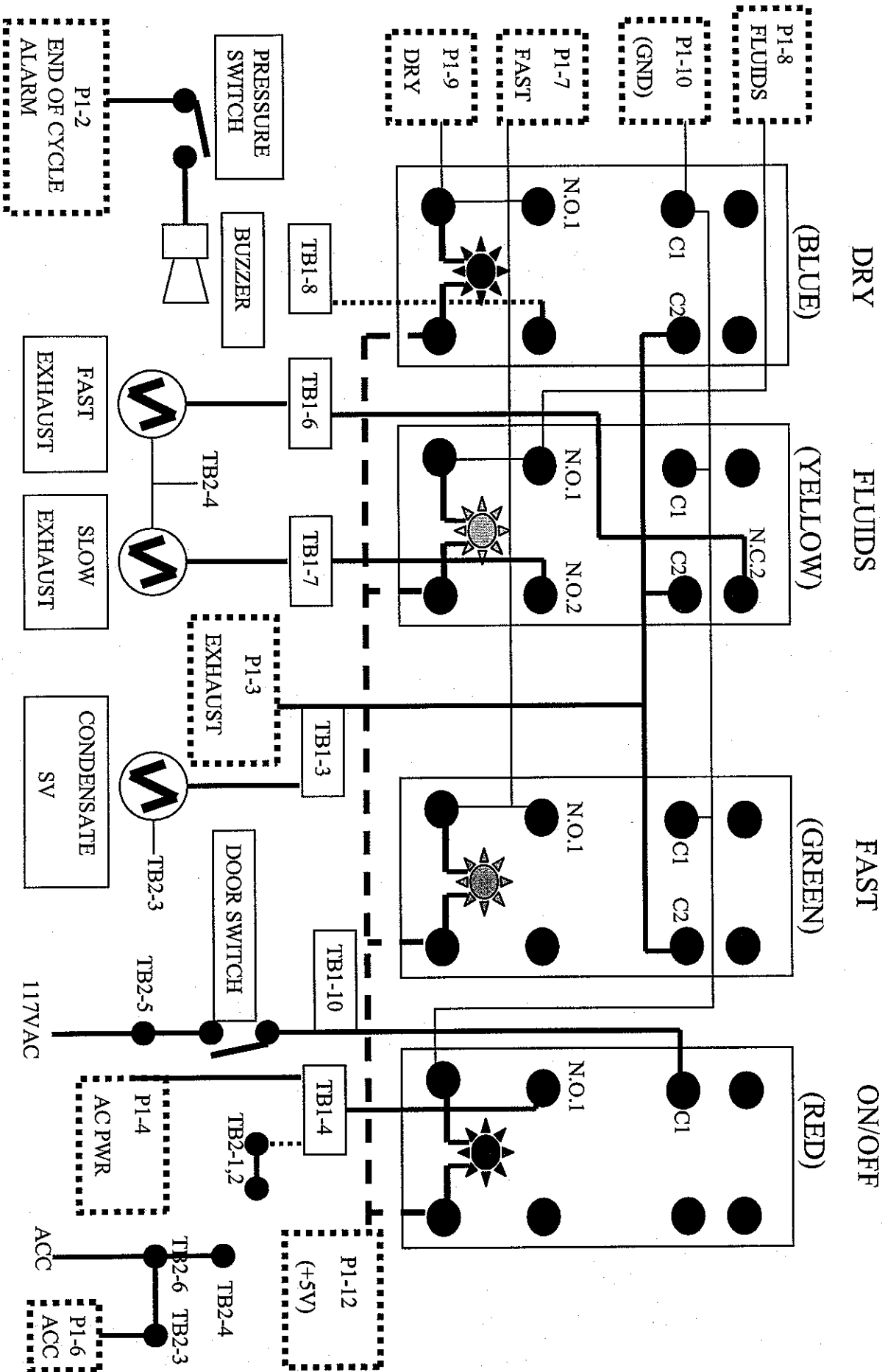
TIMER PLUG TERMINALS



Terminal	Signal	Connection
1	Initiate Sterilization Output	Controller/Recorder (Com-2)
2	End of Cycle Output	Pressure Controller (Com)
3	Exhaust Output	TB1-3 Jet Drying SV, Fluid PB Switch (Com-2)
4	AC Power	On/Off PB SW, NO-1 (TB1-4)
5	Not Used	
6	ACC Neutral	TB2-3
7	Fast Cycle Input	Fast PB Switch (NO-1)
8	Fluid Cycle Input	Fluid PB Switch (NO-1)
9	Dry Cycle Input	Dry PB Switch (NO-1)
10	Ground	Dry, Fluid, Fast PBs (COM-1)
11	Chamber at Temp Input	Controller/Recorder (Com-1)
12	+5 vdc Output to LED Lamps PB Switch Lights	

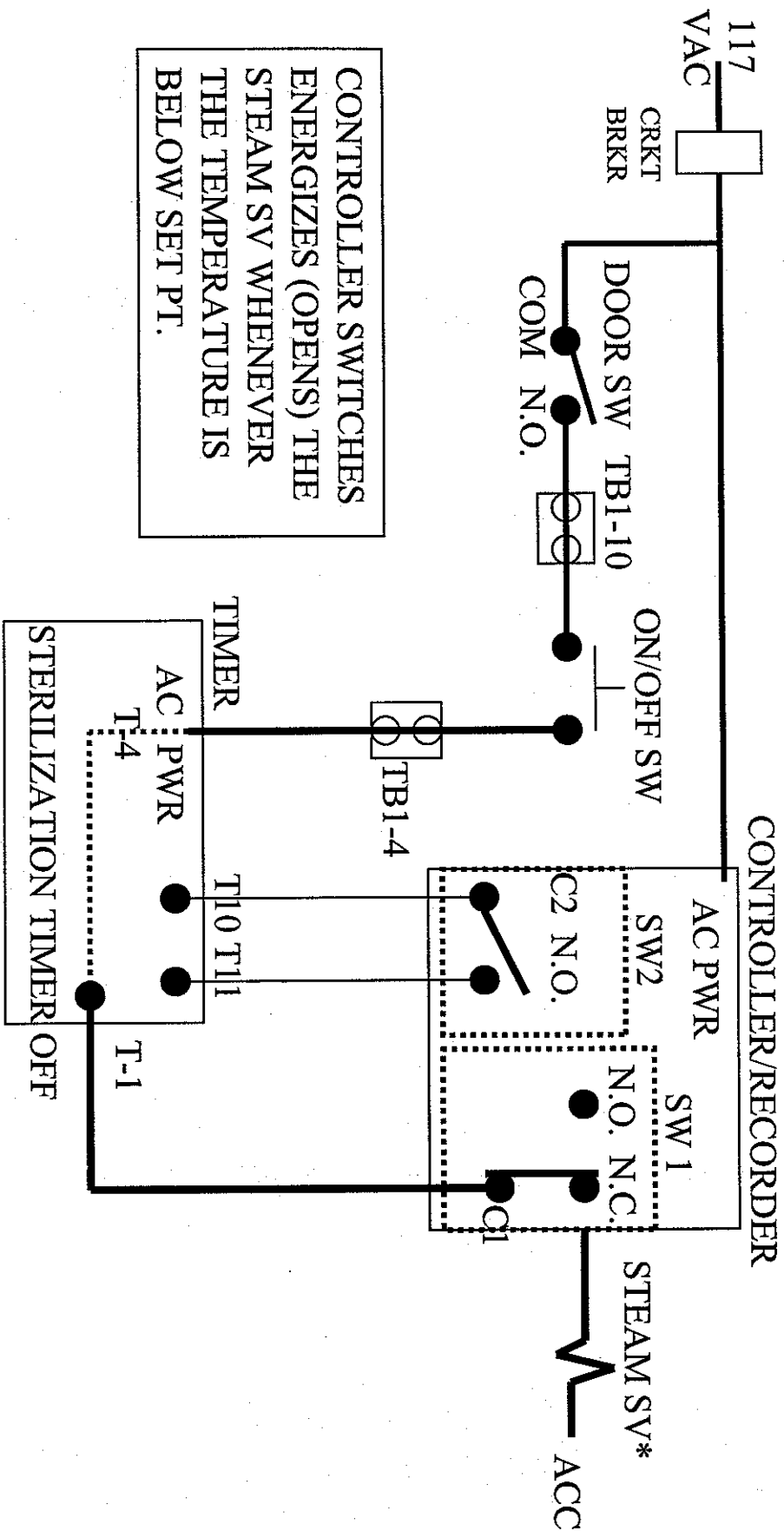
LIGHTED PUSH BUTTON SWITCHES

(Bottom View)



PUSH BUTTON - ELECTRICAL CONNECTIONS

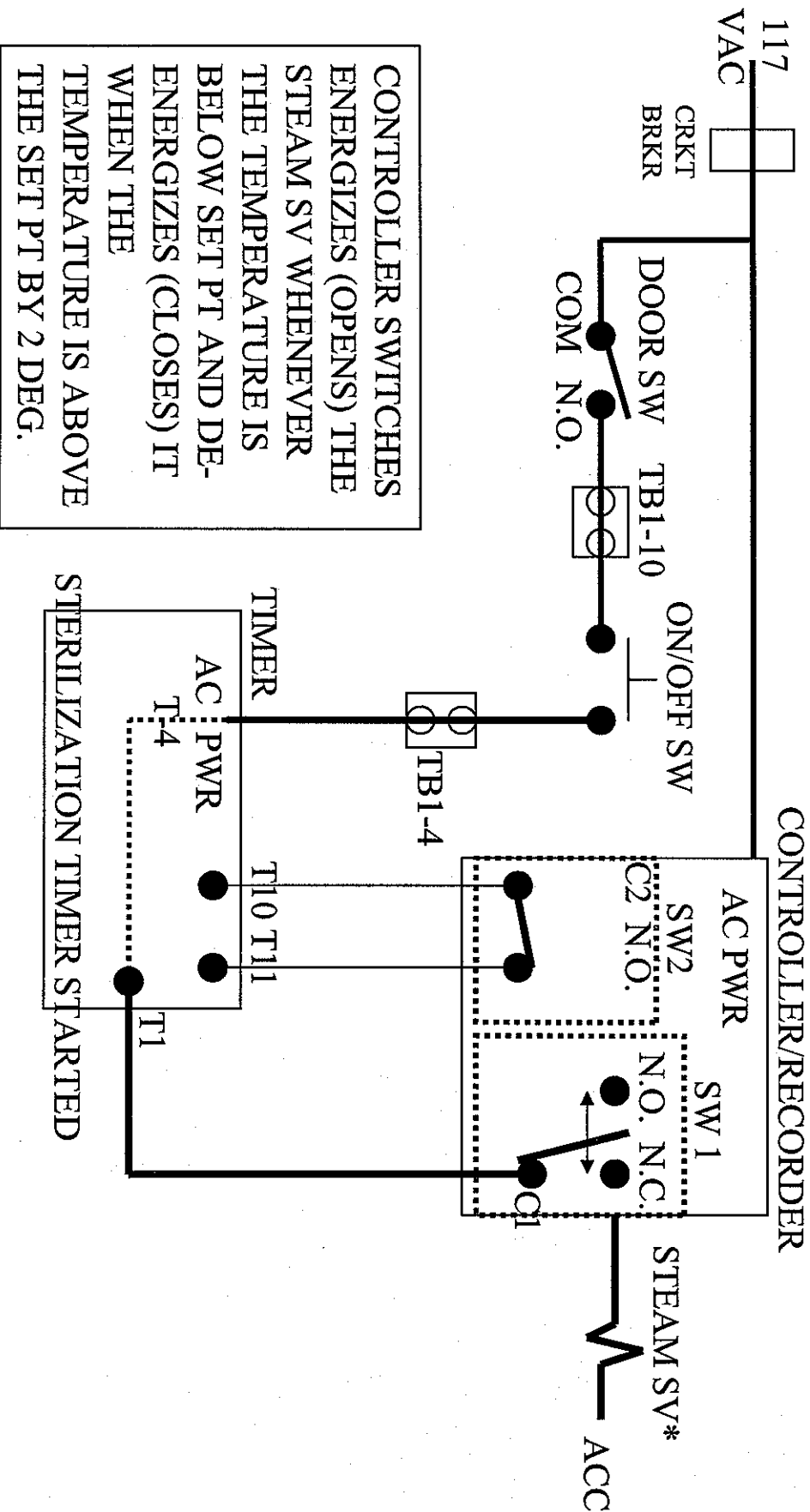
START UP PHASE:
TEMP < SET PT



* NORMALLY CLOSED

PUSH BUTTON - ELECTRICAL CONNECTIONS

EXPOSURE PHASE:
TEMP = SET PT



CONTROLLER SWITCHES ENERGIZES (OPENS) THE STEAM SV WHENEVER THE TEMPERATURE IS BELOW SET PT AND DE-ENERGIZES (CLOSES) IT WHEN THE TEMPERATURE IS ABOVE THE SET PT BY 2 DEG.

CONTROLLER/RECORDER

AC PWR

SW2

C2 N.O.

SW 1

N.O. N.C.

C1

STEAM SV*

ACC

TBI-10

ON/OFF SW

TBI-4

TIMER

AC PWR

T4

T10 T11

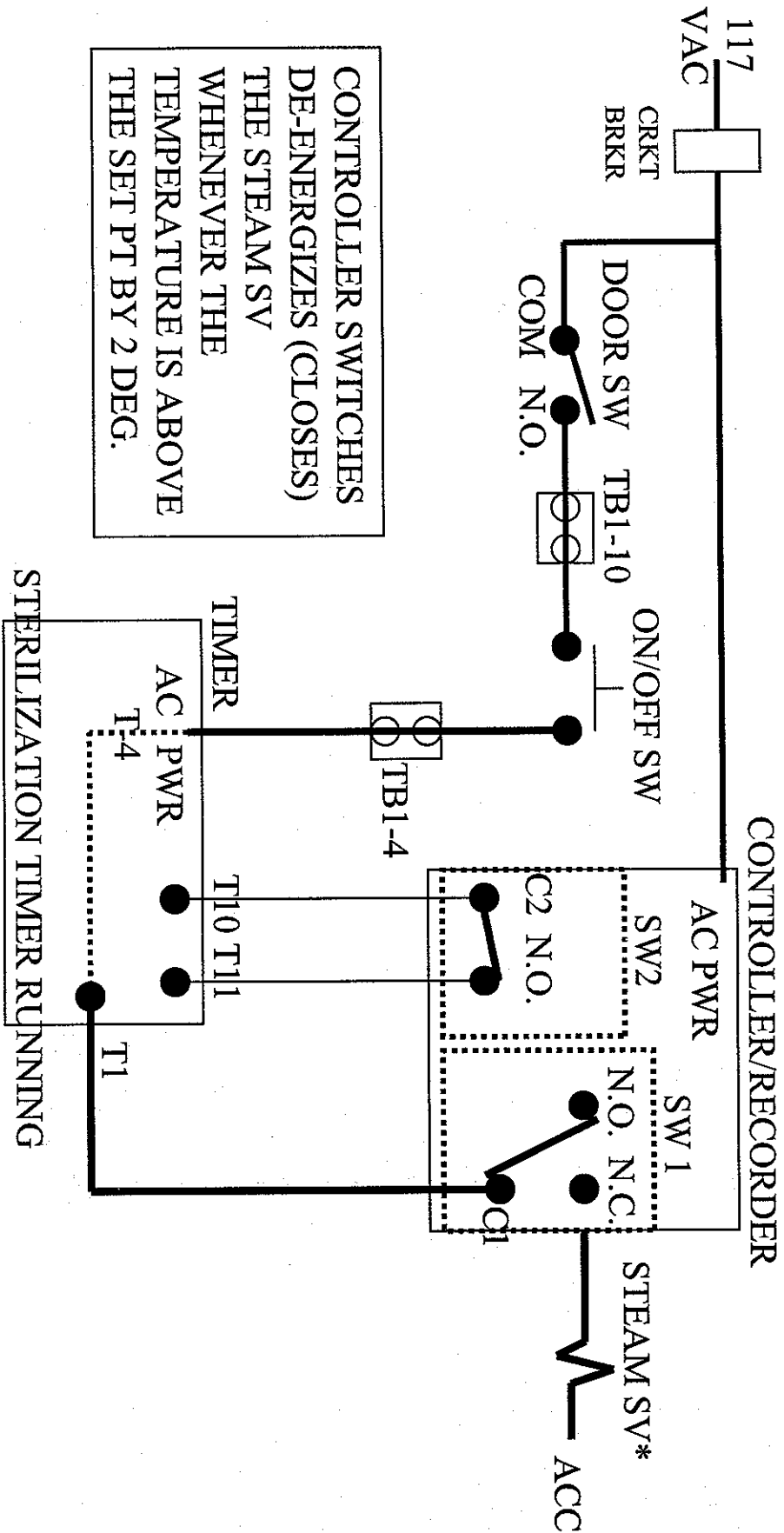
T1

STERILIZATION TIMER STARTED

* NORMALLY CLOSED

PUSH BUTTON - ELECTRICAL CONNECTIONS

EXPOSURE PHASE:
TEMP > SET PT



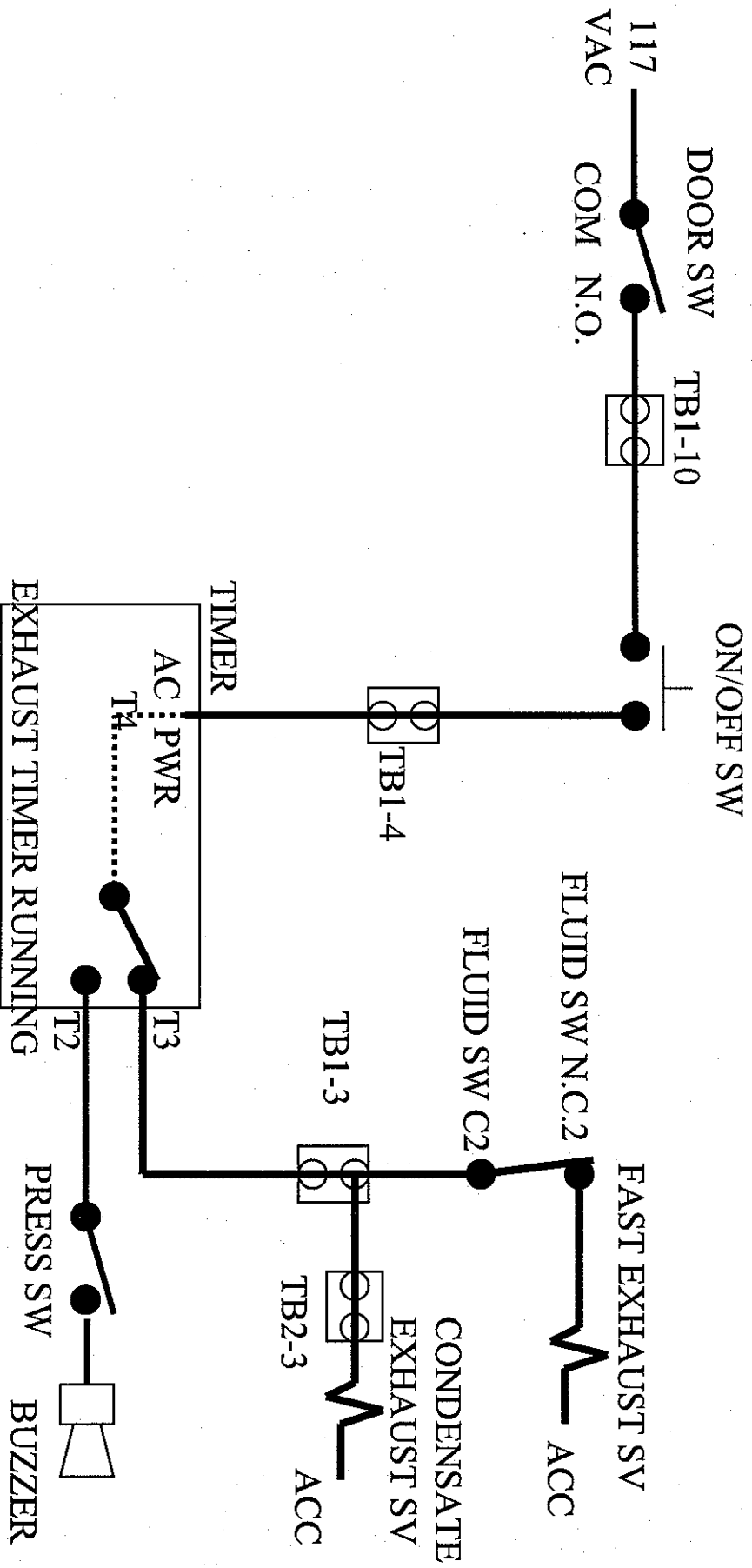
CONTROLLER SWITCHES
DE-ENERGIZES (CLOSES)
THE STEAM SV
WHENEVER THE
TEMPERATURE IS ABOVE
THE SET PT BY 2 DEG.

STERILIZATION TIMER RUNNING

* NORMALLY CLOSED

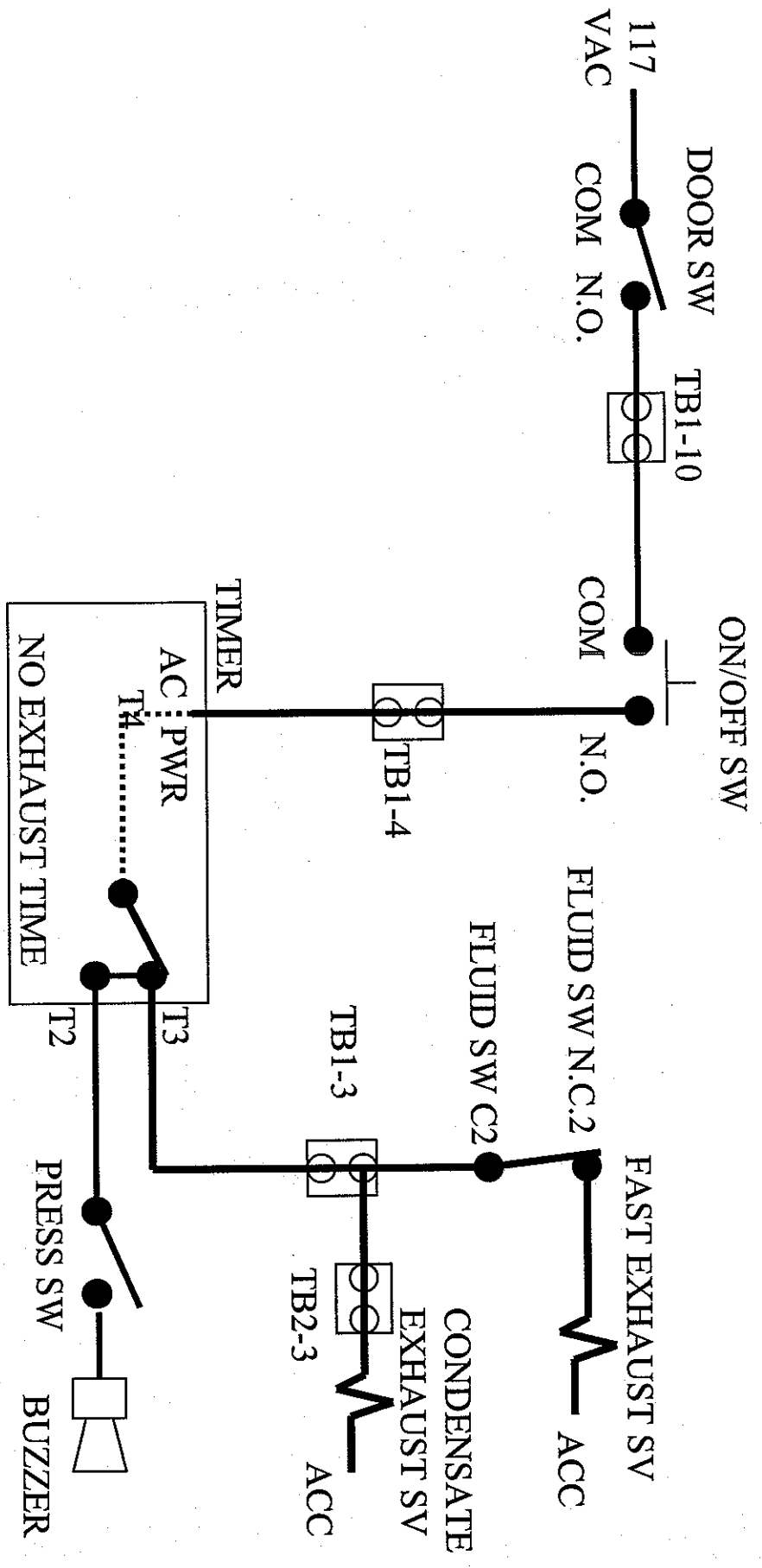
PUSH BUTTON - ELECTRICAL CONNECTIONS

DRY CYCLE - EXHAUST PHASE



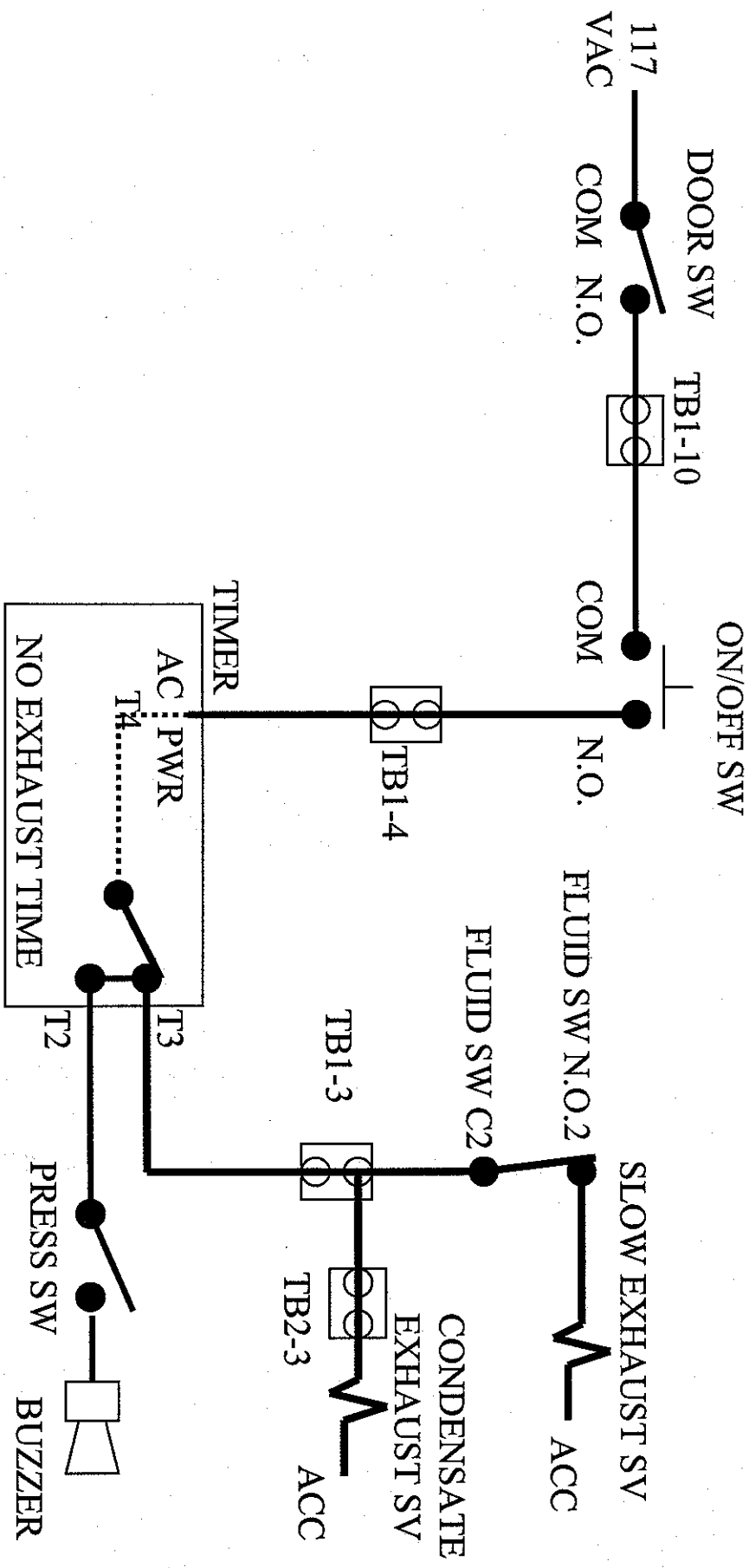
PUSH BUTTON - ELECTRICAL CONNECTIONS

FAST CYCLE - EXHAUST PHASE

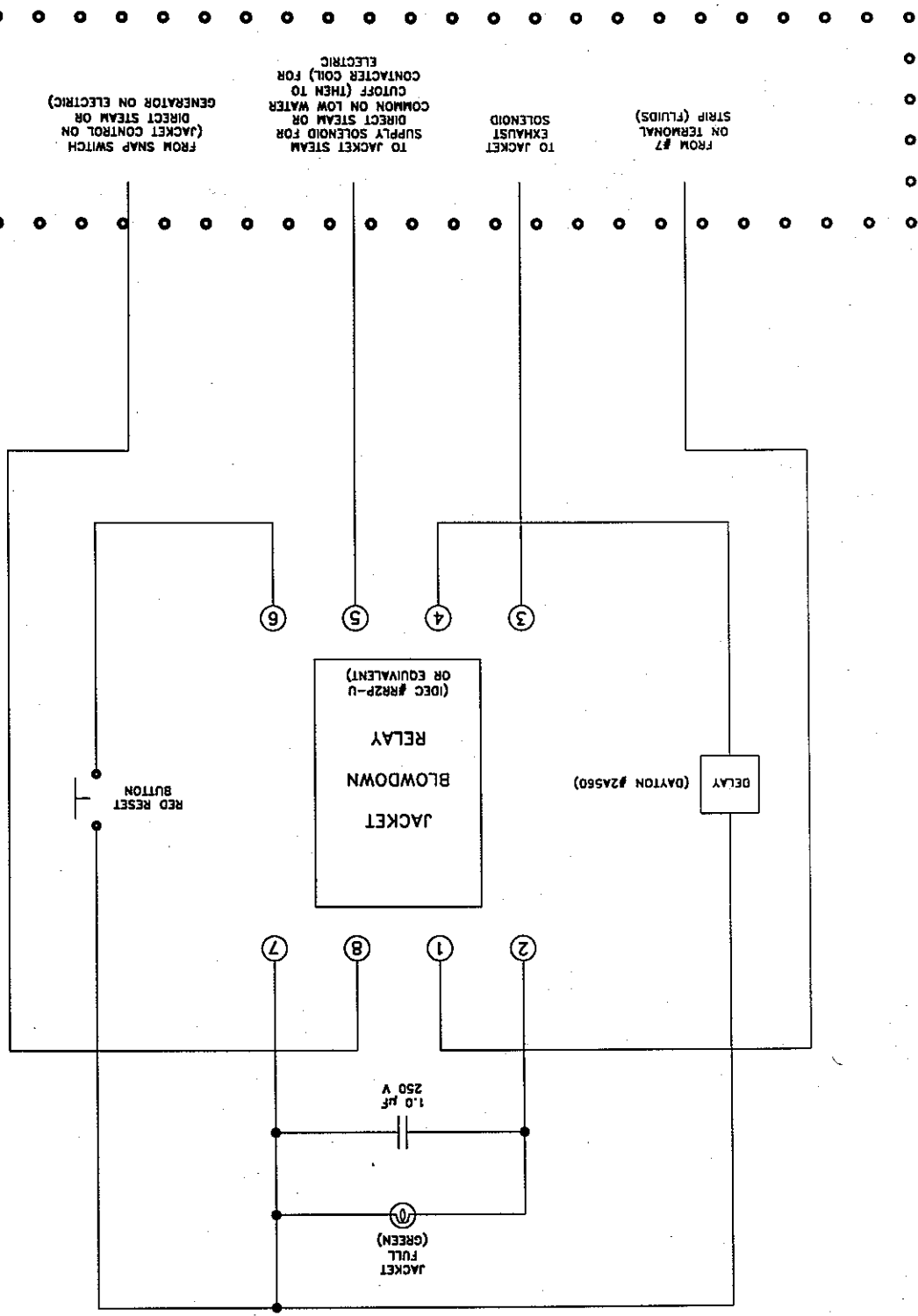


PUSH BUTTON - ELECTRICAL CONNECTIONS

FLUID CYCLE -
EXHAUST PHASE



WIRING DIAGRAM FOR PUSH BUTTON DIRECT STEAM & ELECTRIC JACKET BLOWDOWN



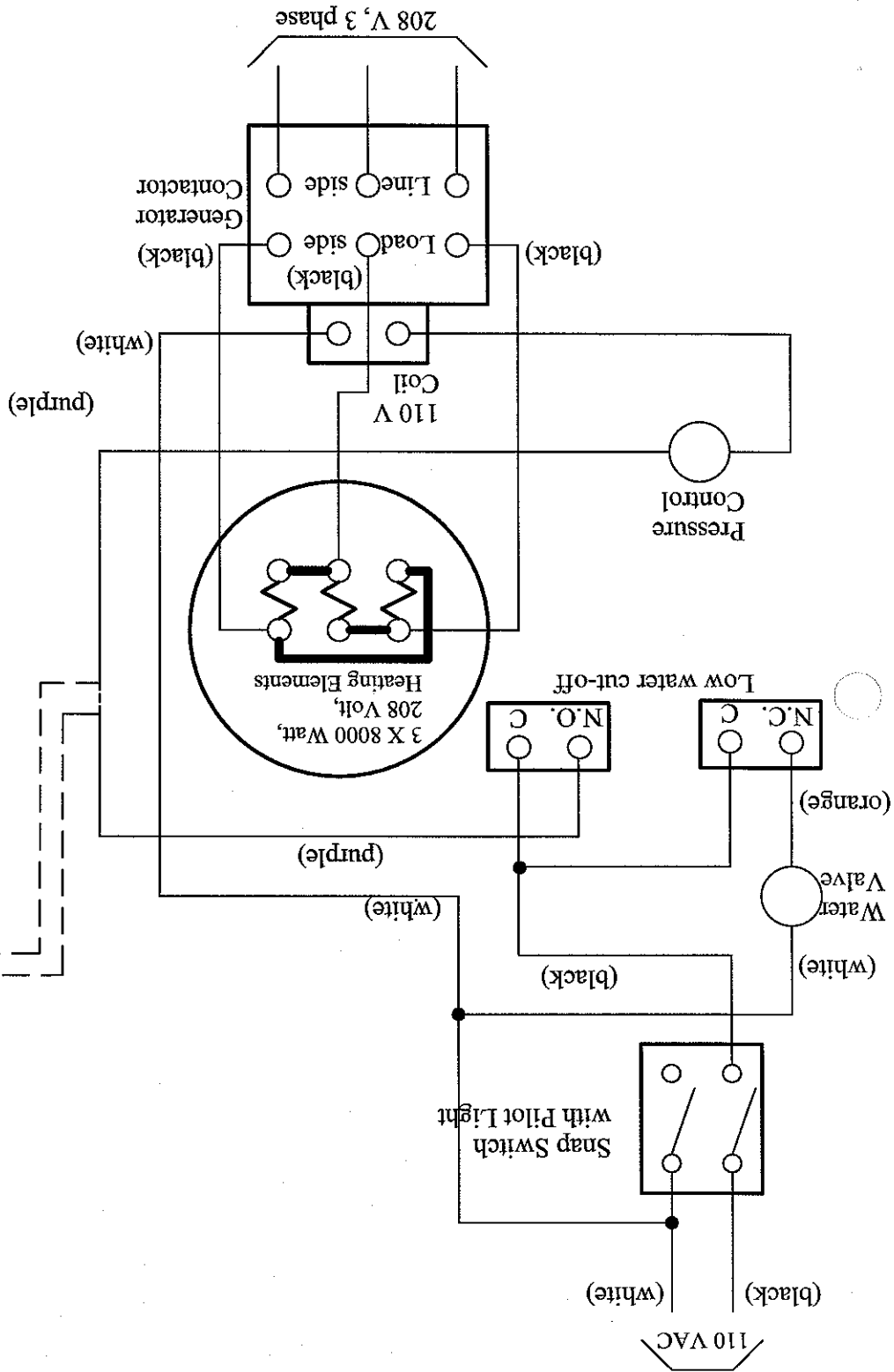
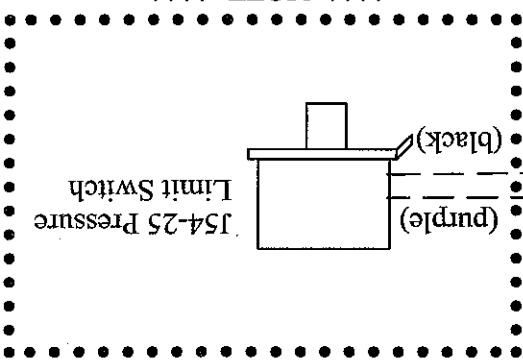
NOTES:

76 ASHFORD STREET, BOSTON, MA 02134--617.782.8072	CONSOLIDATED STILLS & STERILIZERS
76 ASHFORD STREET, BOSTON, MA 02134--617.782.8072	PUSH BUTTON JACKET BLOWDOWN
76 ASHFORD STREET, BOSTON, MA 02134--617.782.8072	ELECTRIC & DIRECT STEAM

DATE: 4-14-06
 DRAWN BY: I. BARRETT

Consolidated Still and Sterilizers	
Scale:	Drawn By: RK
Date:	Dec 04, 2003
Revised:	Dec 01, 2004
PB Series, Generator, Contactor, & Low Water Cut Off wiring diagram	
Sheet 1 of 1	
Rev: 03	
CSS Drawing No.: PGENERATOR110	

NOTE: ****
Pressure Limit Switch
installed ONLY on
sterilizers with
CSD-1 requirements



12. Spare Parts List

**STEAM HEATED AND ELECTRICALLY HEATED SR STERILIZERS
WITH SOLID STATE DIGITAL AUTOMATIC CONTROLS
SPARE PARTS**

\$ 130.00	Door Gaskets - 24" x 24", #24SDG - 24" x 36", #2436DG
349.00	Complete Thermostatic Trap, #N125ST-3/4
230.00	Trap Internals (Repair Kit), #RK-N-125ST
27.50	Ball Valve - 1/2", #B-6000-1/2
50.00	Pressure Gauge - Jacket, #J7214M-002
50.00	- Chamber, #J214M-001
137.00	Jacks Evans Solenoid Valve - 1/4", #GP-257-110V
149.00	Jacks Evans Solenoid Valve - 1/2", #GP-457-110V
61.00	Jacks Evans Solenoid Repair Kit - 1/4", #76725-GP257
61.00	- 1/2", #76729-GP457
372.00	ASCO Solenoid Valve - Steam to Chamber - #JST8222G47
272.00	- Repair Kit - #304032
98.00	Internal Door Lock Diaphragm, #IDL-D
9.00	Internal Door Lock Spring, #IDL-S
14.00	Internal Door Lock Gasket, #IDL-G
640.00	*Set of Heating Elements with Mounting Flange and Gasket, #3HEMFPG
780.00	*Set of ASME Compression Fitting Heating Elements w/Mounting Flange & Gasket, #3HEMFPGCF
721.60	*McDonnell Miller Low Water Cutoff Assembly, #129300
455.00	*Watts Low Water Cutoff Internals Complete with Float, #SAN50S
348.00	*Generator Pressure Switch, #J54-25
18.00	*Generator Gasket - 10" O-ring, #7531262
275.00	*Contactor - Electrical, #42EF35AF
48.00	Door Handle, #SR-DH-3/8
137.00	Safety Valve, #29-202L-36
60.00	Recorder Chart Paper - Box 50 Charts - Fahrenheit, #GCC70080
60.00	- Celsius, #GCC70079
68.00	Chamber Drain Strainer - 3/4", #TCG-3/4

*ELECTRICAL STERILIZERS ONLY

Prices are subject to change without notice. Minimum order is \$100.00.

CONSOLIDATED STEELS & STERILIZERS

P.O. Box 297, 76 Ashford St., Boston, MA 02134-0003 - Phone (617) 782-6072 - Fax (617) 787-5865

13. OEM Components Specifications

PARKER HANNIFIN CORPORATION
Skinner Valve Division

SERIES "GP" INDUSTRIAL SOLENOID VALVES

INSTALLATION and SERVICE INSTRUCTIONS

Valve Location

The valve location selected should be as clean and cool as conditions will permit. Poor locations always increase the possibility of encountering trouble, and definitely decrease the life of the valve no matter how durable the construction.

Installation

Parker-Skinner valves may be installed in any line regardless of the direction in which the line runs. The only caution to be observed is that the valve should never be mounted so that the coil is lower than the valve body (See Fig. 1).

Apply a small amount of pipe dope to the male threads on screwed line connections.

WARNING
REMOVE THE BONNET ASSEMBLY AND DIAPHRAGM BEFORE BRAZING LINE CONNECTIONS NEAR VALVE BODY.

Electrical Connections

The electrical data for the valve will be found on the coil housing. Make sure the voltage and frequency are correct. Many of the electrical codes require that each solenoid valve be protected by adequate fuses. Fuse capacities for Parker-Skinner solenoid valves should not exceed 2 amperes for voltages below 50 volts and 1 ampere for voltages above 50 volts.

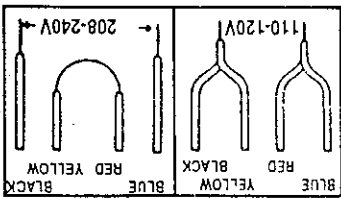
Solder all electrical connections and do not use conductors smaller than No. 18 B&S gauge.

The Junction Box or conduit connections on the coil housing can be moved to any desired position

TO REMOVE OR CHANGE THE COIL

To remove the solenoid coil, first take out the retaining screw at the top of the coil housing. The entire coil assembly can then be lifted off the enclosing tube.
 To reassemble, slide entire coil assembly over enclosing tube. Put data tag on and insert screw tightly.

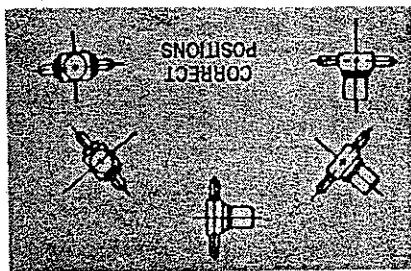
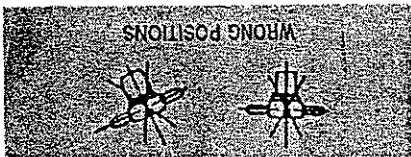
CAUTION: De-energize coil before removal from valve or equipment damage and/or personal injury may result.



Electrical Data Plate supplied with all multi-voltage coils has diagram (see Fig. 1) showing the correct hook-up for various electrical requirements.

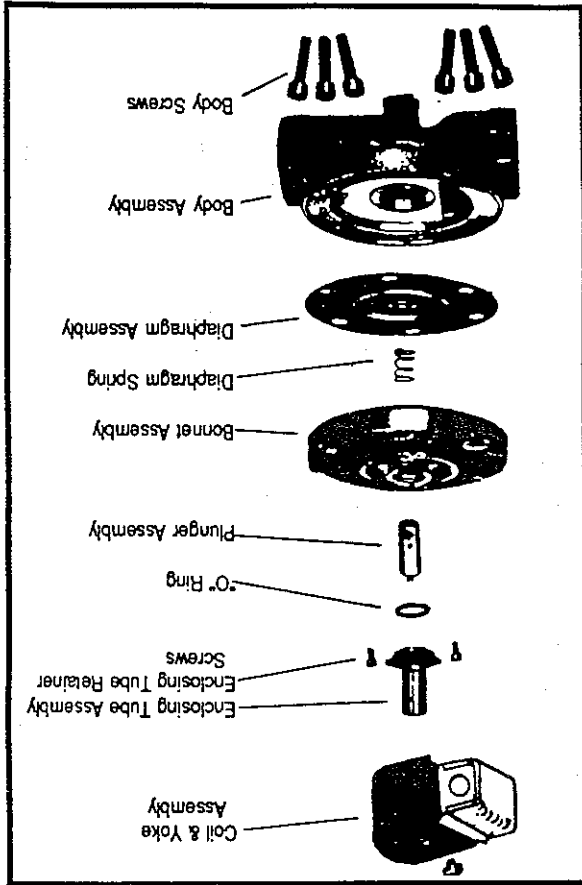
WIRING FOR MULTI-VOLTAGE COIL

by loosening the retaining screw at the top of the coil housing and rotating the housing to the desired position. Be sure to tighten the retaining screw after this operation.



SOLENOID VALVES THAT *SURPASS* THEIR SPECIFICATIONS
-For lasting customer satisfaction

Skinner Valve Division of Parker-Hannifin Corporation
 147 W. Hoy Road, Madison, Miss. 39110



To Reassemble -- Place the diaphragm in the body so that the guide sleeve enters the mating hole in the diaphragm edge and in the center of the buffer plate. Place the bonnet assembly in position on the body. Make sure that the guide sleeve (See Fig. 4) enters the matching hole in the bonnet assembly. Replace the socket head screws and tighten uniformly.

To Remove the Plunger -- First take off the coil assembly as outlined under "To Remove or Change the Coil". Remove the two small socket head screws which hold the enclosing tube to the bonnet. Then lift off the enclosing tube, being careful not to drop the plunger.

To Reassemble -- Hold the plunger with its synthetic seat against the pilot port in the bonnet. Lower enclosing tube over the plunger making sure "O" ring seal is in place. Replace socket-head screws and tighten uniformly. Reinstall coil assembly as outlined under "To Remove or Change the Coil".

To Remove the Diaphragm -- Remove the socket head body screws. (See Fig. 4) Next, carefully lift the bonnet assembly (upper part of the valve) off the body. The diaphragm assembly can then be removed. Be careful not to lose the diaphragm spring.

To Reassemble -- Place the diaphragm in the body so that the guide sleeve enters the mating hole in the diaphragm edge and in the center of the buffer plate. Place the bonnet assembly in position on the body. Make sure that the guide sleeve (See Fig. 4) enters the matching hole in the bonnet assembly. Replace the socket head screws and tighten uniformly.

These valves have the plunger and diaphragm in separate enclosures. The diaphragm is between the body and bonnet.

Types
 GP10, GP1057
 GP12, GP1257
 GP14, GP1457

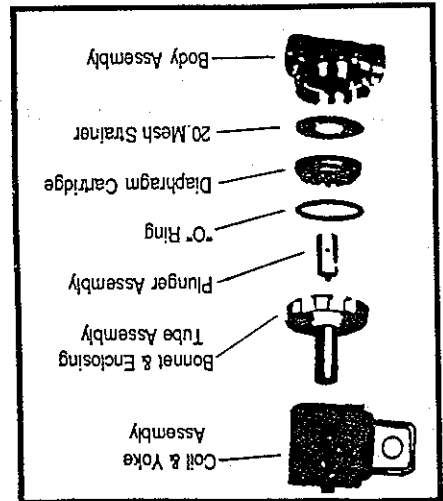
Disassembly -- These valves may be taken apart by unscrewing the bonnet and enclosing tube assembly from the valve body assembly. See Fig. 3. After unscrewing, carefully lift off the bonnet and enclosing tube assembly. Don't drop the plunger. The "O" ring seal and diaphragm cartridge can now be lifted out.

Be careful not to damage the machined faces while the valve is apart.

To Reassemble -- Place the diaphragm cartridge in the body with the pilot port extension up. Hold the plunger with the synthetic seat against the pilot port. Make sure the "O" ring is in place, then lower the bonnet and enclosing tube assembly over the plunger. Screw bonnet assembly snugly down on the body assembly.

Types
 GP2, GP200, GP207, GP257
 GP3, GP300, GP307, GP357
 GP4, GP400, GP407, GP457
 GP6, GP600, GP607, GP657

TO TAKE THE VALVE APART



INSTALLATION & MAINTENANCE INSTRUCTIONS

ASCO
BULLETIN

2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES
NORMALLY CLOSED OPERATION — STEAM SERVICE

1/2" AND 3/4" NPT — 1/2" ORIFICE

Form No. V5550R2

8222

DESCRIPTION

Bulletin 8222 valves are 2-way, normally closed, internal pilot-operated solenoid valves designed for heavy-duty service. Valves are made of forged brass.

Standard valves have a Type 1, General Purpose Solenoid Enclosure. Valves may also be provided with an explosion-proof solenoid enclosure designed to meet Enclosure Type 3-Rainight, Type 7(C & D)-Explosion-Proof Class I, Groups C & D and Type 9(E, F, & G)-Dust Ignition-Proof Class II, Groups E, F, and G. Installation and maintenance instructions for the explosion-proof solenoid enclosure are on Form No. V5380.

OPERATION

Normally Closed: Valve is closed when solenoid is de-energized; open when energized.

IMPORTANT: Minimum operating pressure differential required is 2 psi.

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service.

Temperature Limitations

Maximum valve ambient temperature is 77°F. Maximum valve fluid temperature is 353°F.

Positioning

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

IMPORTANT: To protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Bulletin 8600, 8601 and 8602 for strainers.

Wiring

Wiring must comply with local codes and the National Electrical Code. Solenoid housings are provided with a 7/8" diameter hole to accommodate 1/2" conduit. On some constructions, a green grounding wire is provided. Use rigid metallic conduit to ground all enclosures not provided with a green grounding wire. To facilitate wiring, the enclosure may be rotated 360° by removing the retaining clip. WARNING: When metal retaining clip is disengaged, it will spring upward. Rotate enclosure to desired position. Then replace retaining clip before operating.

Solenoid Temperature

Coils for Bulletin 8222 valves are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched by hand only for an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

MAINTENANCE

NOTE: It is not necessary to remove the valve from the pipeline for repairs. WARNING: Turn off electrical power supply and depressurize valve before making repairs.

Valve Disassembly

NOTE: For valves with general purpose solenoid enclosures, see Figure 2. For valves with explosion-proof solenoid enclosures, see Figure 3 and refer to Installation and Maintenance Instructions, Form No. V5380 for the solenoid portion of the valve.

CAUTION

Solenoid must be fully reassembled because housing and internal parts complete the magnetic circuit. Be sure to replace insulating washer at each end of non-molded coil.

WARNING: Depressurize valve and turn off electrical power supply.

Causes Of Improper Operation

1. Faulty Control Circuit: Check the electrical system by energizing the solenoid. A metallic "click" signifies that the solenoid is operating. Absence of the "click" indicates loss of power supply. Check for loose or blown fuses, open-circuited or grounded coil, broken lead wires or splice connections.

2. Burned-Out Coil: Check for open-circuited coil. Replace coil as necessary. Check supply voltage; it must be the same as specified on nameplate.

3. Low Voltage: Check voltage across the coil lead. Voltage must be at least 85% of nameplate rating.

4. Incorrect Pressure: Check valve pressure. Pressure to valve must be within range specified on nameplate.

5. Excessive Leakage: Disassemble valve (see Maintenance) and clean all parts. Replace worn or damaged parts. However, for best results, replace all parts as supplied with an ASCO Rebuild Kit.

Coil Replacement (Refer to Figure 2)

NOTE: For valves with explosion-proof solenoid enclosures (Figure 3), see Form No. V5380.

1. Disconnect coil lead wires and green grounding wire if present. WARNING: When removing retaining clip, nameplate, and housing, WARNING: When metal retaining clip disengages, it will spring upward.

3. Remove spring washer, insulating washers, and coil from solenoid base sub-assembly. Insulating washers are omitted when a molded coil is used.

4. Coil is now accessible for replacement. Reassemble in reverse order of disassembly. Use exploded view for identification and placement of parts.

CAUTION: Solenoid must be fully reassembled because housing and internal parts complete the magnetic circuit. Be sure to replace insulating washer at each end of non-molded coil.

NOTE: For valves with general purpose solenoid enclosures, see Figure 2. For valves with explosion-proof solenoid enclosures, see Figure 3 and refer to Installation and Maintenance Instructions, Form No. V5380 for the solenoid portion of the valve.

WARNING: Depressurize valve and turn off electrical power supply.

WARNING: Turn off electrical power supply and depressurize valve before making repairs.

NOTE: It is not necessary to remove the valve from the pipeline for repairs. WARNING: Turn off electrical power supply and depressurize valve before making repairs.

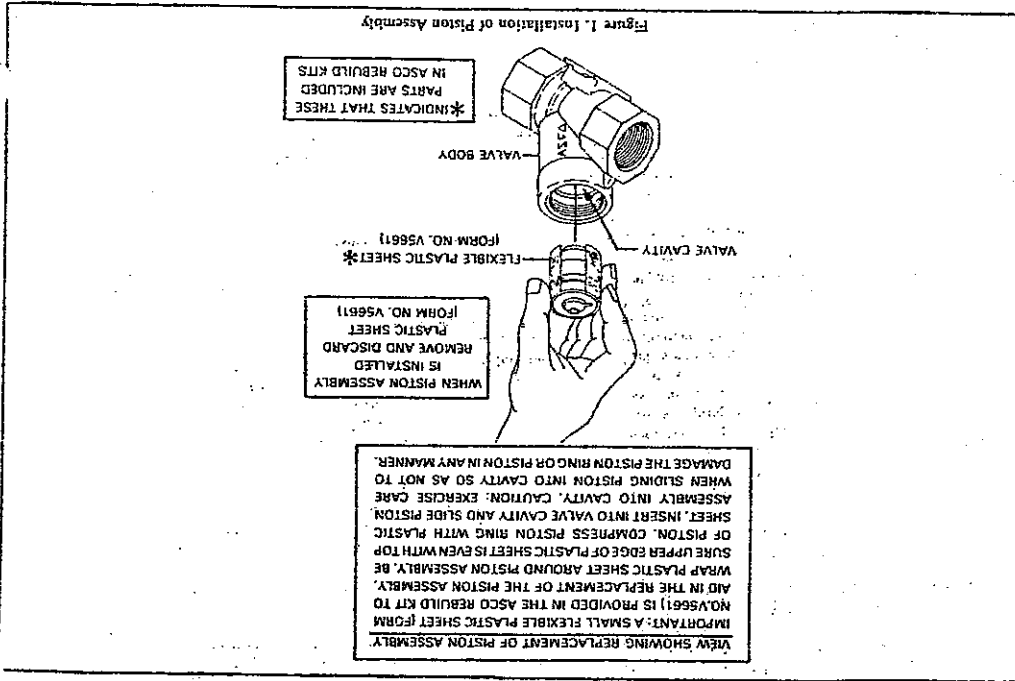


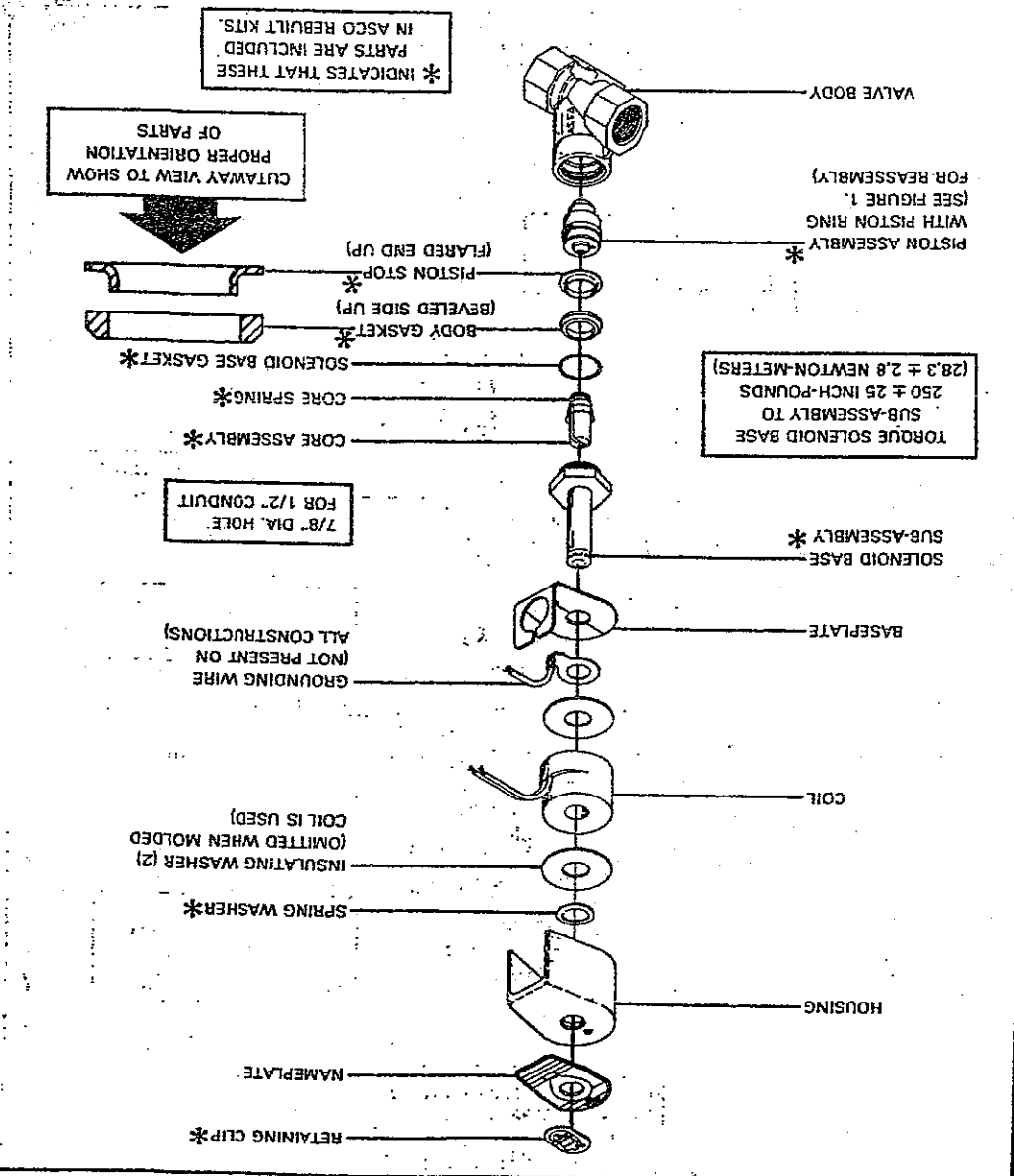
Figure 1. Installation of Piston Assembly

3. A flexible plastic sheet (Form No. V5661) is provided in the ASCO Rebuild Kit to aid in the installation of the piston assembly. Wrap the piston assembly with plastic sheet; be sure one edge of the sheet is placed opposite end of plastic sheet into valve cavity. Slide piston assembly into cavity and discard plastic sheet. **CAUTION:** Do not damage piston ring or force piston assembly into valve. Replace piston stop with flared end up and body gasket with beveled side up.
4. For valves with a general purpose solenoid enclosure (Figure 2), replace solenoid base gasket, core assembly with core spring, and solenoid base sub-assembly. Torque solenoid base sub-assembly to 250 ± 25 inch-pounds (28.3 ± 2.8 newton-meters). Replace the following solenoid parts:
- baseplate
 - grounding wire**
 - insulating washer
 - coil
 - insulating washer
 - retaining clip
 - spring washer
 - housing
 - bounding
 - nameplate
- ** Not present on all constructions.
- For valves with an explosion-proof enclosure (Figure 3), place adapter gasket in valve body. Apply Dow Corning Corporation's MOLYKOTE® Anti-Seize Thread Compound to adapter threads and install adapter into valve body. Then torque to 250 ± 25 inch-pounds (28.3 ± 2.8 newton-meters). For lubrication instructions, refer to Form No. V5380 before proceeding. Then install solenoid base gasket, core assembly with core spring, housing, and solenoid base sub-assembly. Torque solenoid base sub-assembly to 175 ± 25 inch-pounds (19.8 ± 2.8 newton-meters). Install remaining solenoid parts as shown on Form No. V5380.
6. Restore line pressure and electrical power supply to valve.
7. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic "click" signifies the solenoid is operating.

2. If necessary, disconnect coil lead wires, grounding wire (if present), and rigid conduit from solenoid housing.
3. For valves with general purpose solenoid enclosures, remove retaining clip and slip the entire solenoid enclosure off the solenoid base sub-assembly. **WARNING:** When metal retaining clip disengages, it will spring upward.
- For valves with explosion-proof solenoid enclosures, follow instructions on Form No. V5380 for disassembly of solenoid.
- NOTE:** Explosion-proof construction requires a special wrench adapter to remove solenoid base sub-assembly.
4. Unscrew solenoid base sub-assembly and remove the following parts:
- Explosion-proof (Figure 3)
- housing
 - core assembly
 - solenoid base
 - adapter
 - adapter gasket
 - body gasket
 - piston stop
- (Figure 2)
- core assembly
 - with core spring
 - solenoid base
 - gasket
 - body gasket
 - piston stop
- General Purpose (Figure 2)
- housing
 - core assembly
 - with core spring
 - solenoid base
 - gasket
 - adapter
 - adapter gasket
 - body gasket
 - piston stop
5. Insert a stiff wire, bent paper clip, or similar tool into the center hole (pilot orifice) of the piston assembly and dislodge piston assembly. Pull piston assembly with piston ring from valve body. Be careful not to damage pilot seating surface.
6. All parts are now accessible to clean or replace. Replace worn or damaged parts. However, for best results, replace all parts as supplied with an ASCO Rebuild kit.
7. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.

Valve Reassembly

Figure 2, Bulletin 8222, General Purpose Solenoid Enclosure Shown.



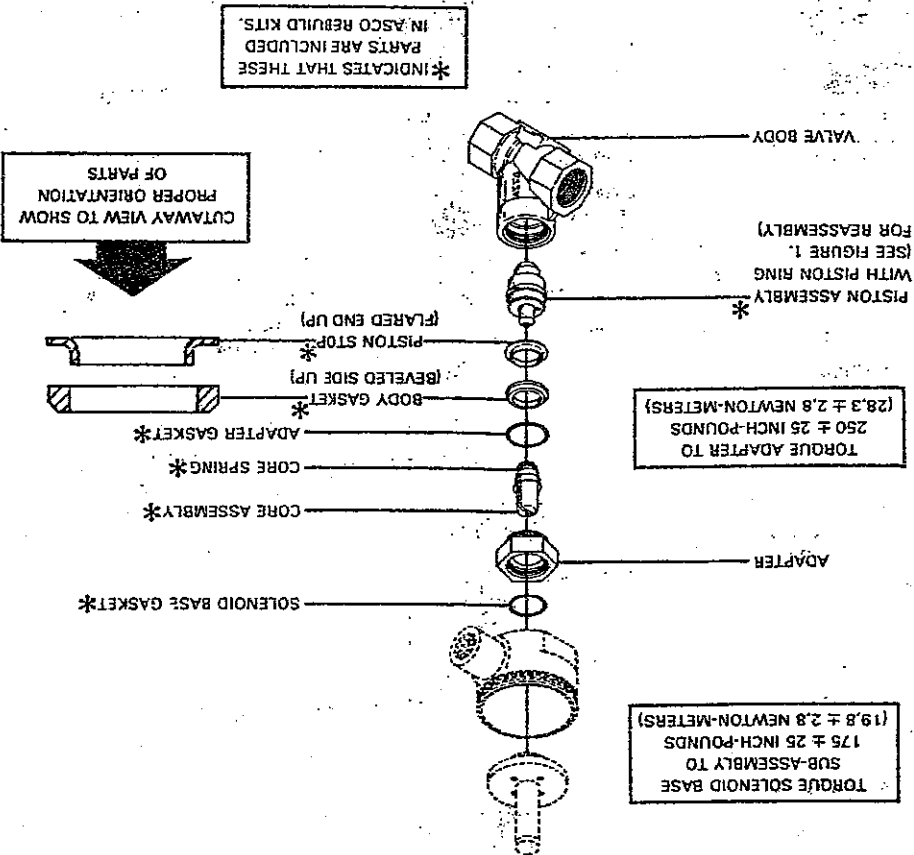
Parts marked with an asterisk (*) in the exploded view are supplied in Rebuild Kits.

+ If the number of the Rebuild Kit or the Coil is not stamped on your coil, stamp the number.

• When Ordering Coils for ASCO valves, order the number, Serial Number, Voltage, and Frequency. Number, order line and specify your valve's Catalog

FOR ASCO REBUILD KITS AND COILS

Figure 3. Partial View of Bulletin 8222, With Explosion-proof Solenoid Enclosure Shown, For the Portion of the Solenoid Not Shown, See Form No. V5380.



IMPORTANT FOR INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR THE EXPLOSION-PROOF SOLENOID ENCLOSURE, SEE FORM NO. V5380.

Installation & Maintenance Instructions



OPEN-FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS

SERIES
8003G
8202G

Form No. V6584R7

INSTALLATION

Check nameplate for correct catalog number, service, and wattage. Check front of solenoid for voltage and frequency.

▲ WARNING: Electrical hazard from the accessibility of live parts. To prevent the possibility of death, serious injury or property damage, install the open - frame solenoid in an enclosure.

FOR BLACK ENCLOSURE TYPES 7 AND 9 ONLY

▲ CAUTION: To prevent fire or explosion, do not install solenoid and/or valve where ignition temperature of hazardous atmosphere is less than 165° C. On valves used for steam service or when a class "H" solenoid is used, do not install in hazardous atmosphere where ignition temperature is less than 180° C. See nameplate/retainer for service.

NOTE: These solenoids have an internal non-resealable thermal fuse to limit solenoid temperature in the event that extraordinary conditions occur which could cause excessive temperatures. These conditions include high input voltage, a jammed core, excessive ambient temperature or a shorted solenoid, etc. This unique feature is a standard feature only in solenoids with black explosionproof/dust-ignitionproof enclosures (Types 7 & 9).

▲ CAUTION: To protect the solenoid valve or operator, install a strainer or filter, suitable for the service involved in the inlet side as close to the valve or operator as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601, and 8602 for strainers.

Temperature Limitations

For maximum valve ambient temperatures, refer to chart. The temperature limitations listed, only indicate maximum application temperatures for field wiring rated at 90° C. Check catalog number prefix and watt rating on nameplate to determine maximum ambient temperature. See valve installation and maintenance instructions for maximum fluid temperature. **NOTE:** For steam service, refer to *Wiring* section, *Junction Box* for temperature rating of supply wires.

Temperature Limitations For Series 8003G or 8202G Solenoids for use on Valves Rated at 10.1, 11.6, 17.1, or 22.6 Watts			
Watt Rating	Catalog Number Coil Prefix	Class of Insulation	Maximum Ambient Temp. †
10.1 & 17.1	None, FB, KF, KP, SC, SD, SF, & SP	F	125° F (51.7° C)
10.1 & 17.1	HB, HT, KB, KH, SS, ST, SU	H	140° F (60° C)
11.6 & 22.6	None, FB, KF, KP, SC, SD, SF, & SP	F	104° F (40° C)
11.6 & 22.6	HP, HT, KB, KH, SS, ST, SU, & SV	H	104° F (40° C)

† Minimum ambient temperature -40° F (-40° C)

Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Wiring

Wiring must comply with local codes and the National Electrical Code. All solenoids supplied with lead wires are provided with a grounding wire which is green or green with yellow stripes and a 1/2" conduit connection. To

— SERVICE NOTICE —

ASCO® solenoid valves with design change letter "G" or "H" in the catalog number (ex. 8210G 1) have an epoxy encapsulated ASCO® Red Hat II solenoid. This solenoid replaces some of the solenoids with metal enclosures and open-frame constructions. Follow these installation and maintenance instructions if your valve or operator uses this solenoid.

See separate instructions for basic valve.

DESCRIPTION

Catalog numbers 8003G and 8202G are epoxy encapsulated pull-type solenoids. The green solenoid with lead wires and 1/2" conduit connection is designed to meet Enclosure Type 1 - General Purpose, Type 2 - Dripproof, Types 3 and 3S - Raintight, and Types 4 and 4X - Watertight. The black solenoid on catalog numbers prefixed "EF" or "EV" is designed to meet Enclosure Types 3 and 3S - Raintight, Types 4 and 4X - Watertight, Types 6 and 6F - Submersible, Type 7 (A, B, C & D) Explosionproof Class I, Division 1 Groups A, B, C, & D and Type 9 (E, F, & G) - Dust-Ignitionproof Class II, Division 1 Groups E, F & G. The Class II, Groups F & G Dust Locations designation is not applicable for solenoids or solenoid valves used for steam service or when a class "H" solenoid is used. See *Temperature Limitations* section for solenoid identification and nameplate/retainer for service. When installed just as a solenoid and not attached to an ASCO valve, the core has a 0.250-28 UNF-2B tapped hole, 0.38 or 0.63 minimum full thread.

NOTE: Catalog number prefix "EV" denotes stainless steel construction. Catalog numbers 8202G1, 8202G3, 8202G5 and 8202G7 are epoxy encapsulated push-type, reverse-acting solenoids having the same enclosure types as previously stated for Catalog numbers 8003G1 and 8003G2.

Series 8003G and 8202G solenoids are available in:

- **Open-Frame Construction:** The green solenoid may be supplied with 1/4" spade, screw or DIN terminals. (Refer to Figure 4)
- **Panel Mounted Construction:** These solenoids are specifically designed to be panel mounted by the customer through a panel having a .062 to .093 maximum wall thickness. Refer to Figure 1 and section on *Installation of Panel Mounted Solenoid*

Optional Features For Type 1 - General Purpose Construction Only

- **Junction Box:** This junction box construction meets Enclosure Types 2, 3, 3S, 4, and 4X. Only solenoids with 1/4" spade or screw terminals may have a junction box. The junction box provides a 1/2" conduit connection, grounding and spade or screw terminal connections within the junction box (See Figure 5).
- **DIN Plug Connector Kit No. K2336034:** Use this kit only for solenoids with DIN terminals. The DIN plug connector kit provides a two pole with grounding contact DIN Type 43650 construction (See Figure 6).

OPERATION

Series 8003G - When the solenoid is energized, the core is drawn into the solenoid base sub-assembly. **IMPORTANT:** When the solenoid is de-energized, the initial return force for the core, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the AC construction is 11 ounces, and 5 ounces for DC construction.

Series 8202G - When the solenoid is energized, the disc holder assembly seats against the orifice. When the solenoid is de-energized, the disc holder assembly returns. **IMPORTANT:** Initial return force for the disc or disc holder assembly, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force is 1 pound, 5 ounces.

facilitate wiring, the solenoid may be rotated 360°. For the watertight and explosionproof solenoid, electrical fittings must be approved for use in the approved hazardous locations.

CAUTION: Cryogenic Applications - Solenoid lead wire insulation should not be subjected to cryogenic temperatures. Adequate lead wire protection and routing must be provided.

Additional Wiring Instructions For Optional Features:

- Open - Frame solenoid with 1/4" spade terminals. For solenoids supplied with screw terminal connections use #12-18 AWG stranded copper wire rated at 90°C or greater. Torque terminal block screws to 10 ± 2 in-lbs [1.0 ± 1.2 Nm]. A tapped hole is provided in the solenoid for grounding, use a #10-32 machine screw. Torque grounding screw to 15-20 in-lbs [1.7-2.3 Nm]. On solenoids with screw terminals, the socket head screw holding the terminal block to the solenoid is the grounding screw. Torque the screw to 15-20 in-lbs [1.7-2.3 Nm] with a 5/32" hex key wrench.
- Junction Box - The junction box is used with spade or screw terminal solenoids only and is provided with a grounding screw and a 1/2" conduit connection. Connect #12-18 AWG standard copper wire only to the screw terminals. Within the junction box use field wire that is rated 90°C or greater for connections. For steam service use 105°C rated wire up to 50 psi or use 125°C rated wire above 50 psi. After electrical hookup, replace cover gasket, cover, and screws. Tighten screws evenly in a crisscross manner.
- DIN Plug Connector Kit No. K236034 - The open-frame solenoid is provided with DIN terminals to accommodate the plug connector kit.
- 2. Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
- 3. Use #12-18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4" for installation in socket terminals. The use of wire-end sleeves is also recommended for approximately 1/4" Tinning of the ends of the lead wires is not recommended.
- 4. Thread wire through gland nut, gland gasket, washer and connector cover. NOTE: Connector housing may be rotated in 90° increments from position shown for alternate positioning of cable entry.
- 5. Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block according to markings on it. Snap terminal block into connector cover and install center screw.
- 6. Center screw to 5 ± 1 in-lbs [0.6 ± 1.1 Nm].

NOTE: Alternating current (AC) and direct current (DC) solenoids are built differently. To convert from one to the other, it may be necessary to change the complete solenoid including the core and solenoid base sub-assembly, not just the solenoid. Consult ASCO.

Installation of Solenoid

Solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid.

Installation of Panel Mounted Solenoid (See Figure 1)

1. Disassemble solenoid following instruction under *Solenoid Replacement* then proceed.
2. Install solenoid base sub-assembly through customer panel.
3. Position spring washer on opposite side of panel over solenoid base sub-assembly.
4. Replace solenoid, nameplate/retainer and red cap.
5. Make electrical hookup, see *Wiring* section.

Solenoid Temperature

Standard solenoids are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid becomes hot and can be touched by hand only for an instant. This is a safe operating temperature.

MAINTENANCE

WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize solenoid operator and/or valve, and vent fluid to a safe area before servicing.

Cleaning

All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on medium and service conditions. In general, if the voltage to the solenoid is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
- While in service, the solenoid operator or valve should be operated at least once a month to insure proper opening and closing.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any worn or damaged parts.

Causes of Improper Operation

- **Failure Control Circuit:** Check the electrical system by energizing the solenoid. A metallic click signifies that the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown fuses, open-circuited or grounded solenoid, broken lead wires or splice connections.
- **Burned-Out Solenoid:** Check for open-circuited solenoid. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate/retainer and marked on the solenoid. Check ambient temperature and check that the core is not jammed.
- **Low Voltage:** Check voltage across the solenoid leads. Voltage must be at least 85% of rated voltage.

Solenoid Replacement

1. Disconnect conduit, coil leads, and grounding wire.
- NOTE: Any optional parts attached to the old solenoid must be reinstalled on the new solenoid. For 3-way construction, piping or tubing must be removed from pipe adapter.
2. Disassemble solenoids with optional features as follows:
 - **Spade or Screw Terminals** - Remove terminal connections, grounding screw, grounding wire, and terminal block (screw terminal type only).
 - NOTE: For screw terminals, the socket head screw holding the terminal block serves as a grounding screw.
- **Junction Box** - Remove conduit and socket head screw (use 5/32" hex key wrench) from center of junction box. Disconnect junction box from solenoid.

DIN Plug Connector

- Remove center screw from DIN plug connector. Disconnect DIN plug connector from adapter. Remove socket head screw (use 5/32" hex key wrench), DIN terminal adapter, and gasket from solenoid.
- 3. Snap off red cap from top of solenoid base sub-assembly. For 3-way construction with pipe adapter (Figure 3), remove pipe adapter, nameplate and solenoid. Then using a suitable screwdriver, insert blade between solenoid and nameplate/retainer. Pry up slightly and push to remove.

Disassembly and Reassembly of Solenoids

1. Remove solenoid, see *Solenoid Replacement*.
2. Remove spring washer from solenoid base sub-assembly. For 3-way construction, remove plug nut gasket.
3. Unscrew solenoid base sub-assembly from valve body.
4. Remove internal solenoid parts for cleaning or replacement. Use exploded views for identification and placement of parts.
5. If the solenoid is part of a valve, refer to basic valve installation and maintenance instructions for further disassembly.
6. Torque solenoid base sub-assembly and adapter to 175 ± 25 in-lbs [19.8 ± 2.8 Nm].

ORDERING INFORMATION FOR ASCO SOLENOIDS

When Ordering Solenoids for ASCO Solenoid Operator or Valves, order the number stamped on the solenoid. Also specify voltage and frequency.

Figure 2. Series 8202G solenoids

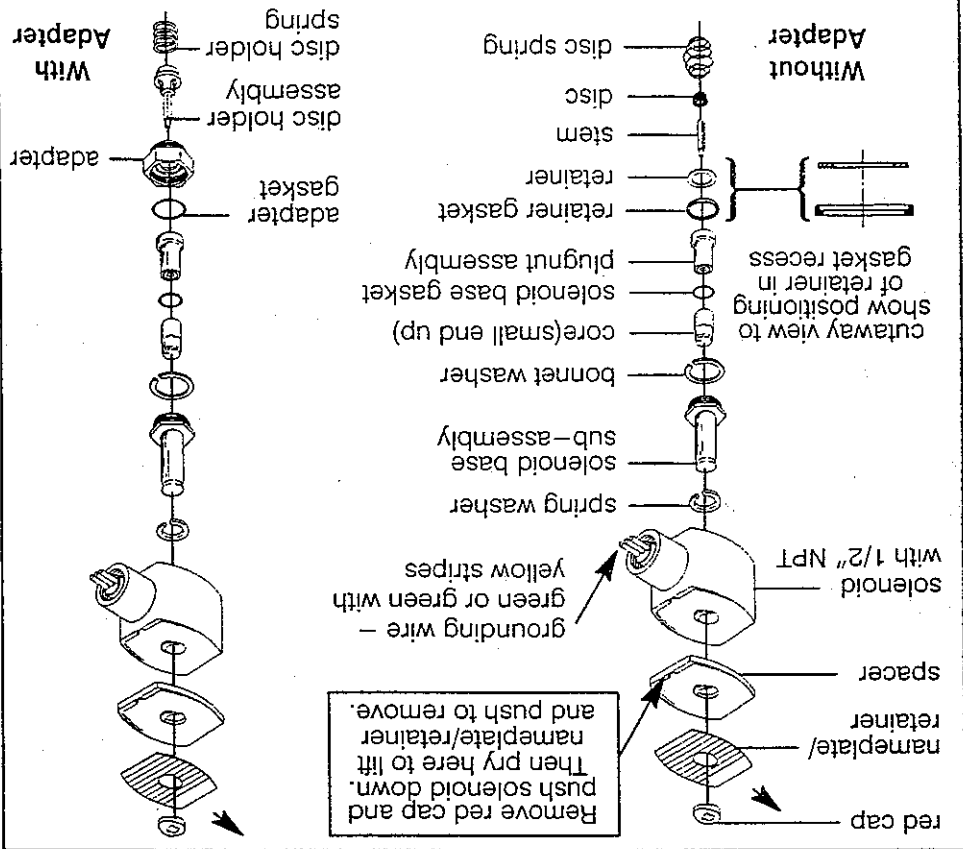
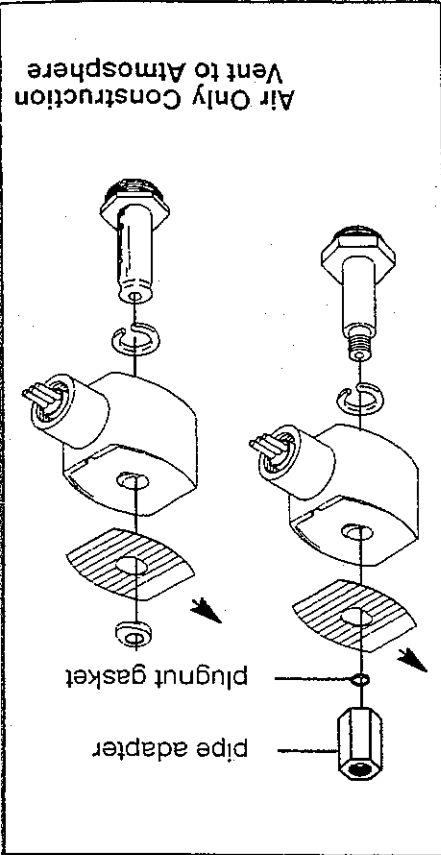
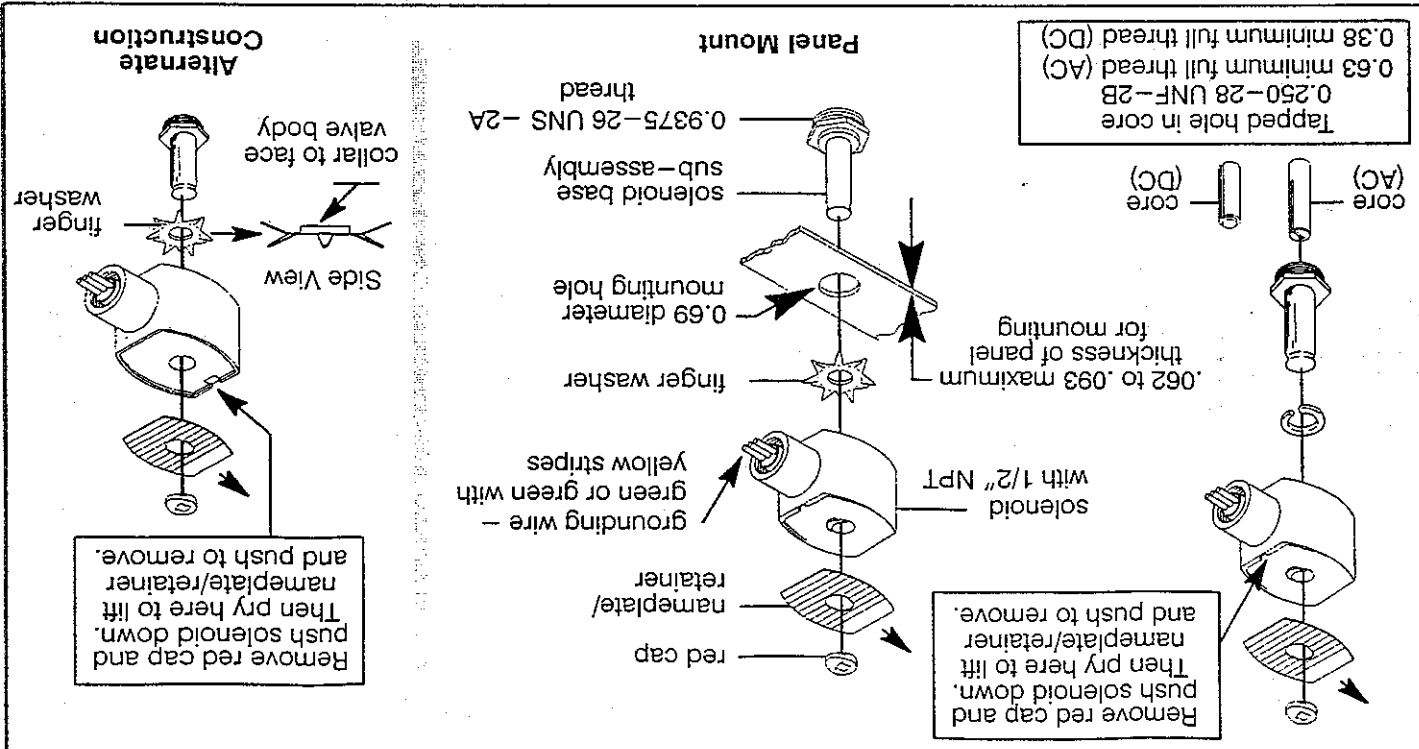


Figure 1. Series 8003G solenoids



Tapped hole in core
0.250 UNF-28
0.63 minimum full thread (AC)
0.38 minimum full thread (DC)



Part Name	Torque Value Inch-Pounds	Torque Value Newton-Meters
solenoid base sub-assembly & adapter	175 ± 25	19.8 ± 2.8
pipe adapter	90 maximum	10.2 maximum

Torque Chart

Figure 6. DIN plug connector kit No. K236034 (optional feature)

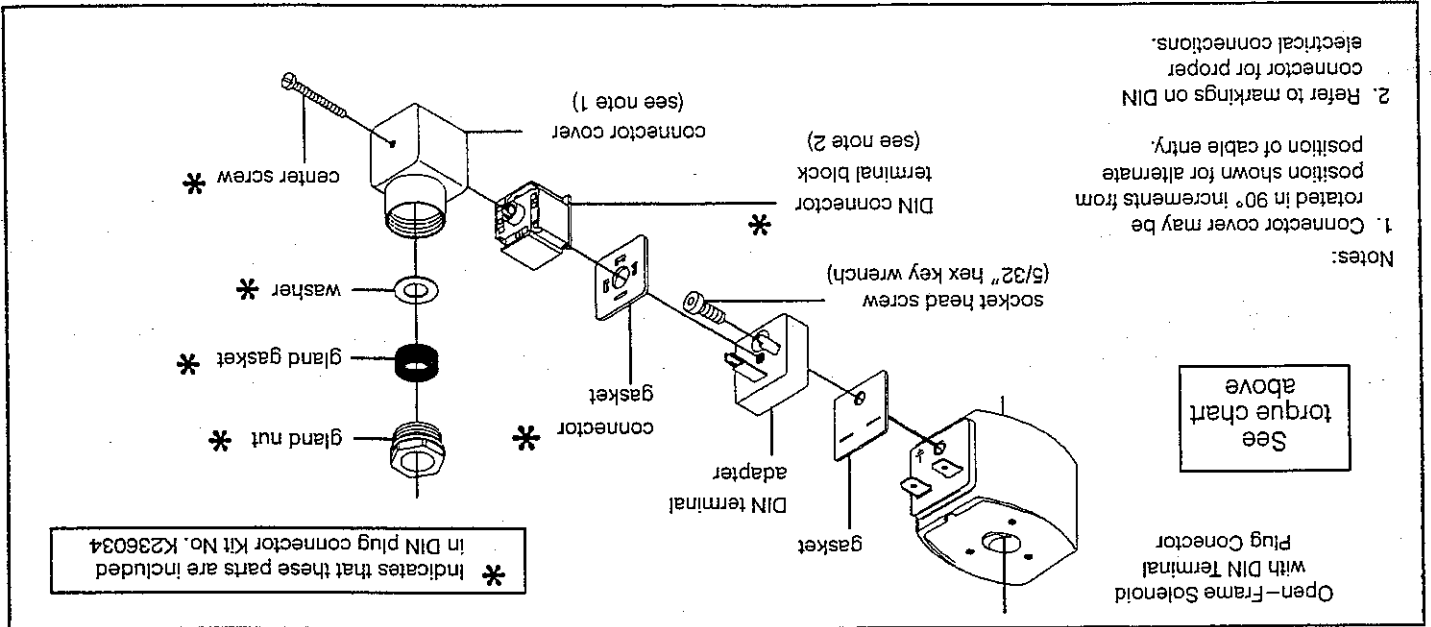


Figure 5. Junction box (optional feature)

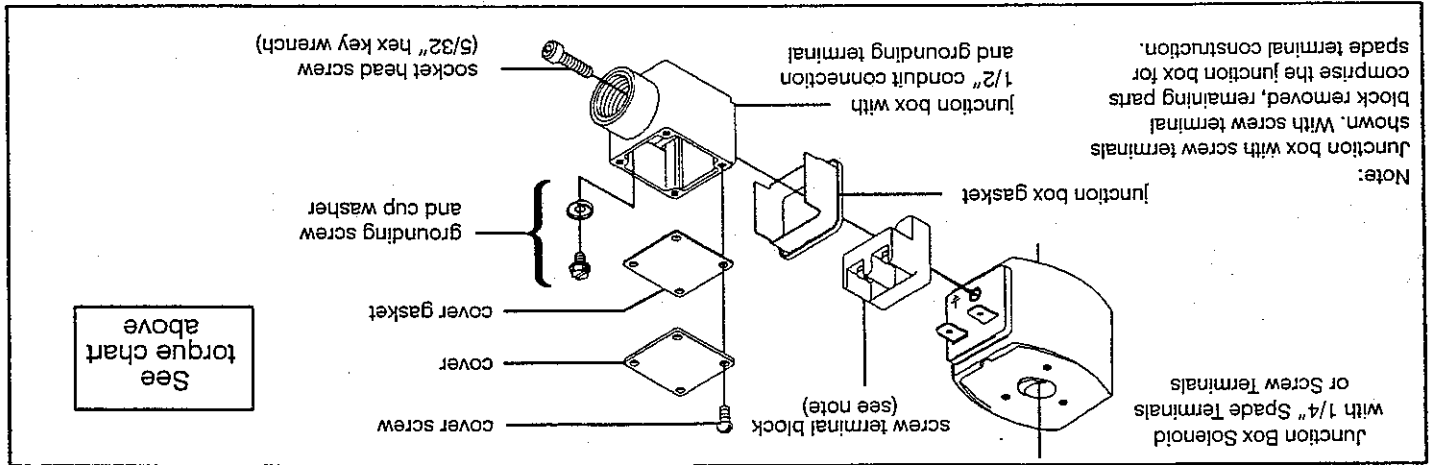
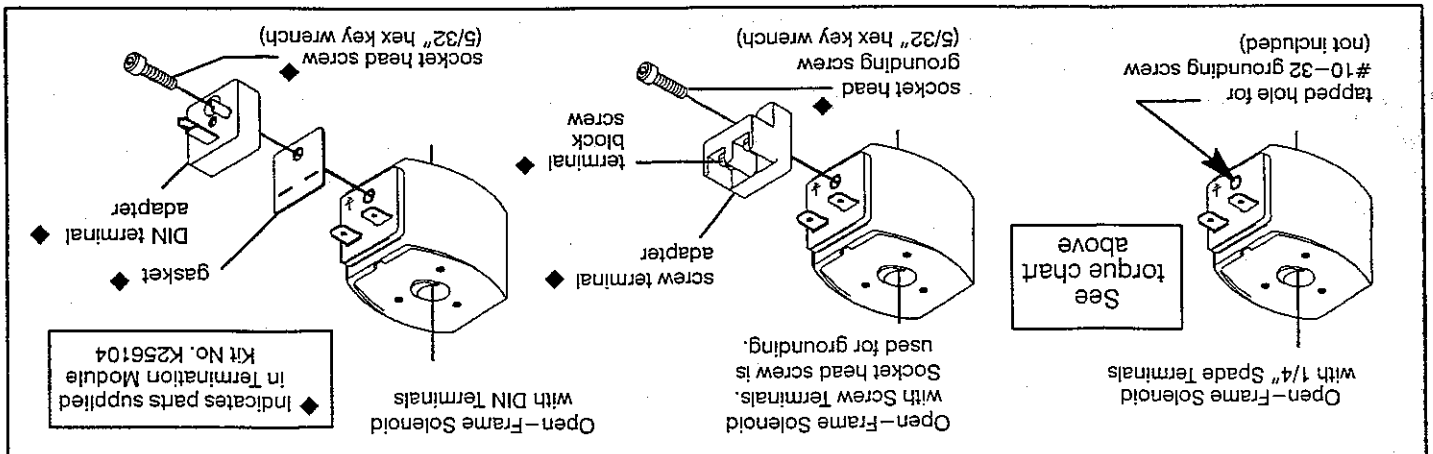


Figure 4. Open-frame solenoids



Part Name	Torque Value in Inch-Pounds	Torque Value in Newton-Meters
terminal block screws	10 ± 2	1,1 ± 0,2
socket head screw	15 - 20	1,7 - 2,3
center screw	5 ± 1	0,6 ± 0,1

Torque Chart

GENERAL INSTALLATION AND MAINTENANCE INSTRUCTIONS
INSTRUCTIONS GÉNÉRALES D'INSTALLATION ET D'ENTRETIEN
ALLGEMEINE BETRIEBSANLEITUNG

Note: These General Installation and Maintenance Instructions must be read in conjunction with the Instruction Sheet for the specific product.
Attention: Ces instructions générales d'installation et d'entretien complètent la notice spécifique du produit.
Achtung: Diese Allgemeine Betriebsanleitung gilt in Zusammenhang mit der jeweiligen Betriebsanleitung für die speziellen Produkte.

INSTALLATION
MONTAGE
INBAU

ASCO/JOUCOMATIC components are intended to be used only within the technical characteristics as specified on the nameplate. Changes to the equipment are only allowed after consulting the manufacturer or its representative. Before installation depressurize the piping system and clean internally.
 The equipment may be mounted in any position if not otherwise indicated on the product by means of an arrow.
 The flow direction and pipe connection of valves are indicated on the body.
 The pipe connections have to be in accordance with the size indicated on the nameplate and fitted accordingly.
Caution:
 Reducing the connections may cause improper operation or malfunctioning.
 For the protection of the equipment install a strainer or filter suitable for the service involved in the inlet side as close to the product as possible.
 If tape, paste, spray or a similar lubricant is used when tightening, avoid particles entering the system.
 Use proper tools and locate wrenches as close as possible to the connection point.
 To avoid damage to the equipment, DO NOT OVERTIGHTEN pipe connections.
 Do not use valve or solenoid as a lever.
 The pipe connections should not apply any force, torque or strain to the product.

ELECTRICAL CONNECTION
 In case of electrical connections, they are only to be made by trained personnel and have to be in accordance with the local regulations and standards.
Caution:
 Turn off electrical power supply and de-energize the electrical circuit and voltage carrying parts before starting work.
 All electrical screw terminals must be properly tightened according to the standards before putting into service.
 Dependent upon the voltage electrical components must be provided with an earth connection and satisfy local regulations and standards.
 The equipment can have one of the following electrical terminals: Spade pins conforming according to ISO 4400 or 3 x DIN 46244 (when correctly installed in metal enclosure with "Pg" cable gland).
 Embedded screw terminals in metal enclosure with "Pg" cable gland.
 Spade terminals (AMP type).
 Flying leads or cables.
PUTTING INTO SERVICE
 Before pressurizing the system, first carry-out an electrical test. In case of solenoid valves, energize the coil a few times and notice a metal click signifying the solenoid operation.
SERVICE
 Most of the solenoid valves are equipped with coils for continuous duty service. To prevent the possibility of personal or property damage do not touch the solenoid which can become hot under normal operation conditions.
SOUND EMISSION
 The emission of sound depends on the application, medium and nature of the equipment used. The exact determination of the sound level can only be carried out by the user having the valve installed in his system.

ENTRETIEN
 L'entretien nécessaire aux produits ASCO/JOUCOMATIC varie avec leurs conditions d'utilisation. Il est souhaitable de procéder à un nettoyage périodique dont l'intervalle varie suivant la nature du fluide, les conditions de fonctionnement et le milieu ambiant. Lors de l'entretien, les composants doivent être examinés pour détecter toute usure excessive. Un ensemble de pièces internes est proposé en pièces de rechange pour procéder à la réparation. En cas de problème lors du montage/entretien ou en cas de doute, veuillez contacter ASCO/JOUCOMATIC ou ses représentants officiels.
 A separate Declaration of Incorporation relating to EEC-Directive 86/32/ECC Annex II B is available on request. Please provide identification number and serial numbers of products concerned.
 The product complies with the essential requirements of the EMC Directive 89/32/ECC and amendments and the Low Voltage directives 73/23/ECC and 93/68/ECC. A separate Declaration of Conformity is available on request. Please provide identification number and serial numbers of the products concerned.
 AUTOMATIC SWITCH CO. 1581 Columbia Highway, 50-60 Hanover Road, Plainfield Park, New Jersey 07922
 Tel. (973) 966-2000 Fax (973) 966-2628
 AUTOMATIC SWITCH CO. ANGARA SCIENTIFIC 52 Horseshill Road, Cedar Knolls, New Jersey 07927
 Tel. (973) 538-2700 Fax (973) 538-5937
 AUTOMATIC SWITCH CO. Printed in U.S.A. Page 1 of 2

ENTRETIEN
 L'entretien nécessaire aux produits ASCO/JOUCOMATIC varie avec leurs conditions d'utilisation. Il est souhaitable de procéder à un nettoyage périodique dont l'intervalle varie suivant la nature du fluide, les conditions de fonctionnement et le milieu ambiant. Lors de l'entretien, les composants doivent être examinés pour détecter toute usure excessive. Un ensemble de pièces internes est proposé en pièces de rechange pour procéder à la réparation. En cas de problème lors du montage/entretien ou en cas de doute, veuillez contacter ASCO/JOUCOMATIC ou ses représentants officiels.
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For maximum valve ambient and fluid temperatures, refer to chart above. Check catalog number on nameplate to determine maximum temperatures.

Temperature Limitations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

Future Service Considerations

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

INSTALLATION

Note: No minimum operating pressure differential required. See nameplate for maximum.

Normally Open: Valve is open when solenoid is De-energized; closed when energized.
 Normally Closed: Valve is closed when solenoid is De-energized; open when energized.

OPERATION

Series 8267 valves are 2-way normally closed or normally open direct-acting solenoid valves. These valves are designed for steam service. The guillotine-type disc provides straight through flow, minimizing pressure drop and turbulence through the valve. Series 8267 valves may be provided with a general purpose, raintight/explosionproof or raintight/wateright/explosionproof solenoid enclosure.

DESCRIPTION

NOTICE: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Causes of Improper Operation, Coil or Solenoid Replacement

CAUTION: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601, and 8602 for strainers.

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

Piping

Valve must be mounted with solenoid vertical and upright.

Positioning

Catalog Number	Coil Insulation Class	Maximum Ambient Temp.	Maximum Fluid Temp.
8267A1 8267A5 8267A9 8267A13 HT8267B9 HT8267B13	H	104°F (40°C)	320°F (160°C)
8267A3 8267A7 8267A11 8267A15 HT8267B3 HT8267B11	H	104°F (40°C)	280°F (138°C)
FT8267A11, FT8267A1104974	F	104°F (40°C)	190°F (88°C)
8267B7 8267B15	F	86°F (33°C)	250°F (121°C)
8267B3 8267B11	F	86°F (33°C)	280°F (138°C)
8267G1 8267G5 8267G9 8267G13	H	125°F (51.7°C)	320°F (160°C)
8267G3 8267G11	H	125°F (51.7°C)	274°F (134°C)
8267G7 8267G15	H	125°F (51.7°C)	250°F (121°C)

Installation & Maintenance Instructions
 2-WAY DIRECT-ACTING SOLENOID VALVES
 NORMALLY CLOSED OR NORMALLY OPEN OPERATION
 3/8", 1/2", OR 3/4" NPT - STEAM SERVICE

SERIES 8267

Form No. V5338R3

▲ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, and vent fluid to a safe area before servicing the valve.

NOTE: Piping must be removed from inlet side of valve body.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean valve strainer or filter when cleaning the valve.

Preventive Maintenance

1. Keep the medium flowing through the valve as free from dirt and foreign material as possible.
2. While in service, the valve should be operated at least once a month to insure proper opening and closing.
3. Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Causes of Improper Operation

1. **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
2. **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Valve Disassembly (Refer to Figure 1 & 2)

1. Disassemble valve in an orderly fashion. Use exploded views for identification and placement of parts.
2. Remove solenoid, see separate instructions.
3. Unscrew solenoid base sub—assembly from valve body.
4. Remove pipe adapter screws and lockwashers (2). Then remove pipe adapter, adapter gasket, disc spring, and disc guide from valve body.
5. Slip core/disc sub—assembly with retainer guide sub—assembly and core spring from valve body.
6. Remove solenoid base gasket from valve body.
7. Remove valve seat with seat gasket from valve body.

▲ CAUTION: During removal for cleaning, do not damage seating surface of valve seat (see Figure 1&2).

NOTE: If seat removal is difficult, remove valve body from pipe line and dislodge seat through valve outlet. Use a wooden dowel or similar tool.

8. All parts are now accessible to clean or replace. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

MAINTENANCE

Valve Reassembly

1. Lubricate seat gasket with DOW CORNING® 111 compound lubricant or with an equivalent high—grade silicone grease. Then install seat gasket in groove of valve seat.
 2. Insert valve seat gasket end first into valve body. Use a rubber tool to prevent damage to the *seating surface* of the valve seat. Apply pressure until valve seat bottoms in valve body.
- NOTE: When installing a valve seat in a 3/4" NPT valve (see Figure 2) the elongated hole in the seat must be aligned horizontal to mate with the hole in the core/disc sub—assembly.
3. Install core/disc sub—assembly with sharp edge of hole in core/disc sub—assembly toward valve seat.
 4. Install disc guide large diameter end first into valve body. Then position disc spring on disc guide.
 5. Lubricate solenoid base gasket and adapter gasket with an equivalent high—grade silicone fluid.
 6. Position adapter gasket on pipe adapter.
 7. Install pipe adapter with gasket on valve body.

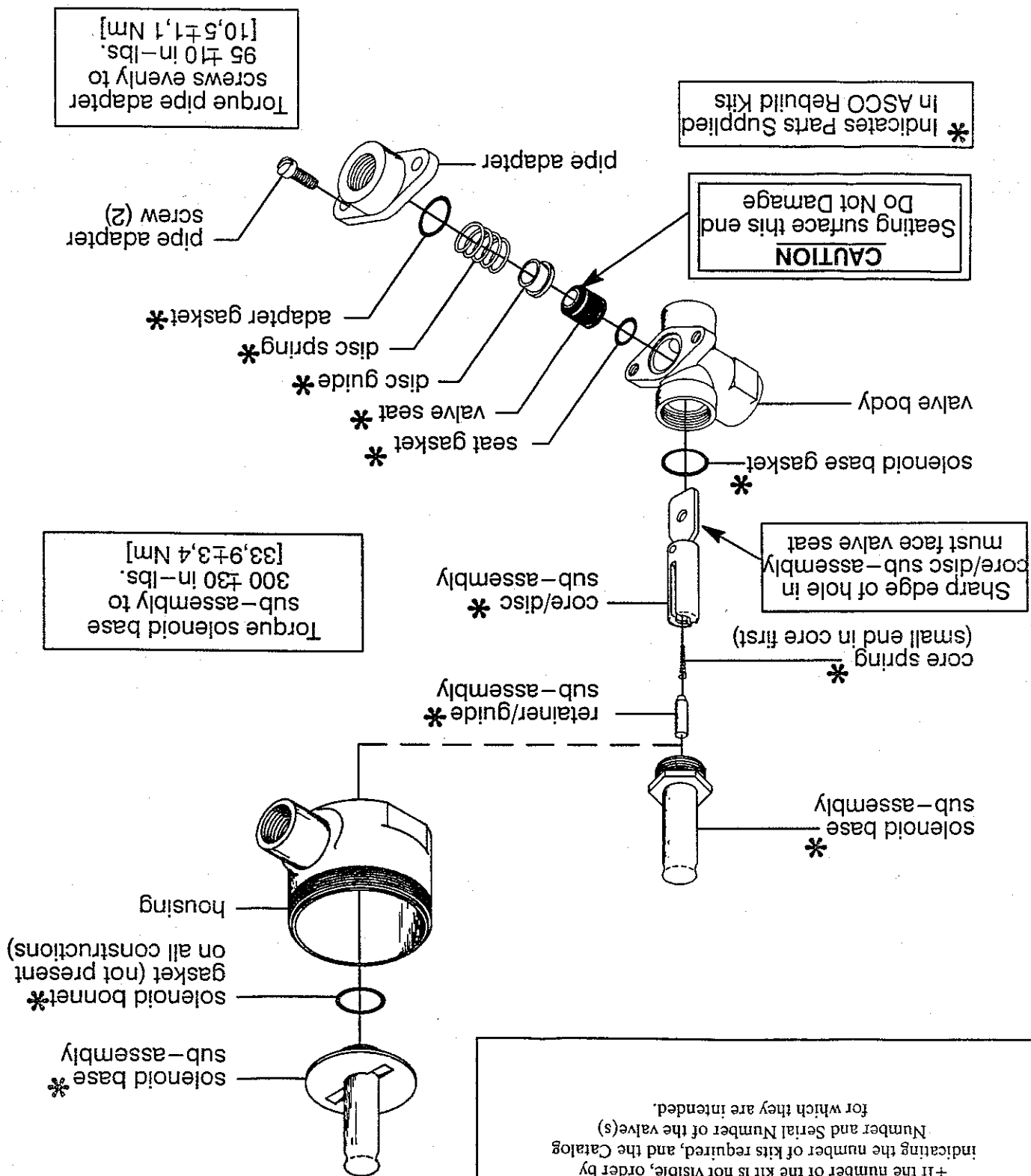
▲ CAUTION: Align pipe adapter evenly with valve body to avoid damage to adapter gasket

8. Holding the pipe adapter in alignment, replace screws with lockwashers (lockwashers use on 3/4" NPT valves only). Torque screws evenly to 95 ± 10 in—lbs [10,5 ± 1,1 Nm].
9. Position solenoid base gasket in valve body.
10. Install core spring small end first into the top of the core/disc sub—assembly. Then install retainer/guide sub—assembly.
11. For 3/4" NPT Valves with a raintight/explosionproof or raintight/watertight/explosionproof solenoid enclosure, torque bonnet adapter to 175 ± 25 in—lbs [19,8 ± 2,8 Nm].
12. Install solenoid base sub—assembly into valve body. Torque solenoid base sub—assembly to 300 ± 30 in—lbs [33,9 ± 3,4 Nm].
13. Replace solenoid (see separate instructions) and make electrical hookup.
14. Makeup piping to inlet side of valve body.

▲ WARNING: To prevent the possibility of death, serious injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

15. Restore line pressure and electrical power supply to valve.
16. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic "click" signifies the solenoid is operating.

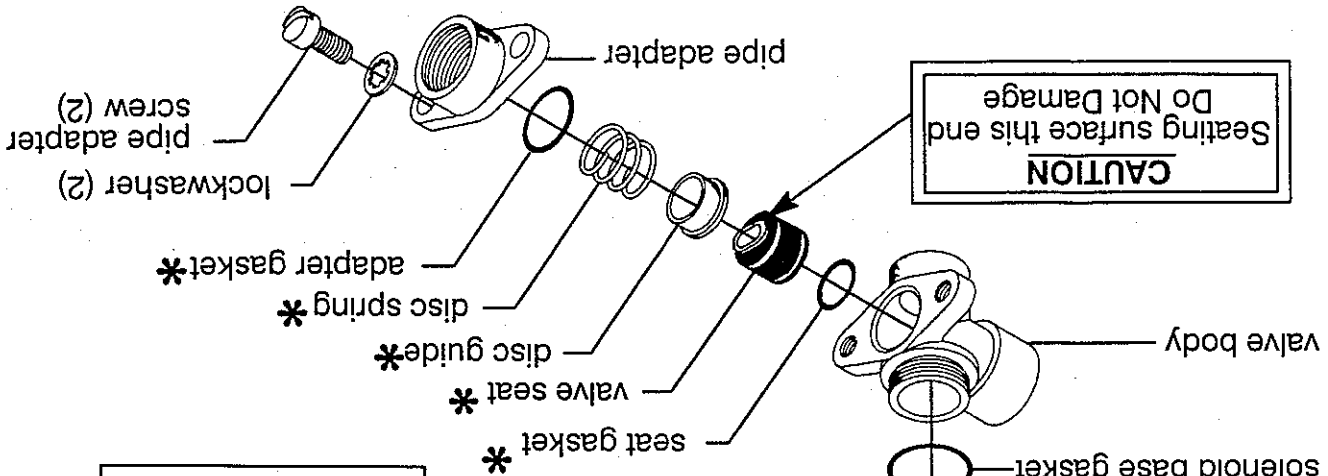
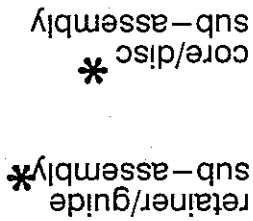
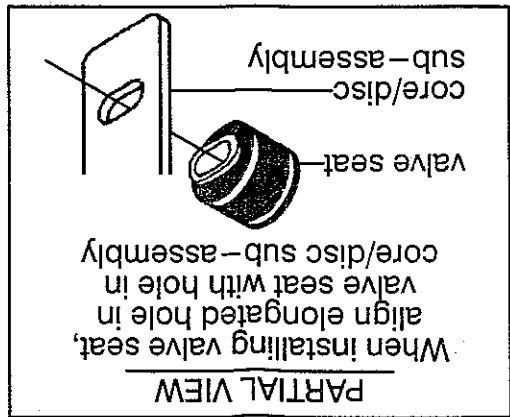
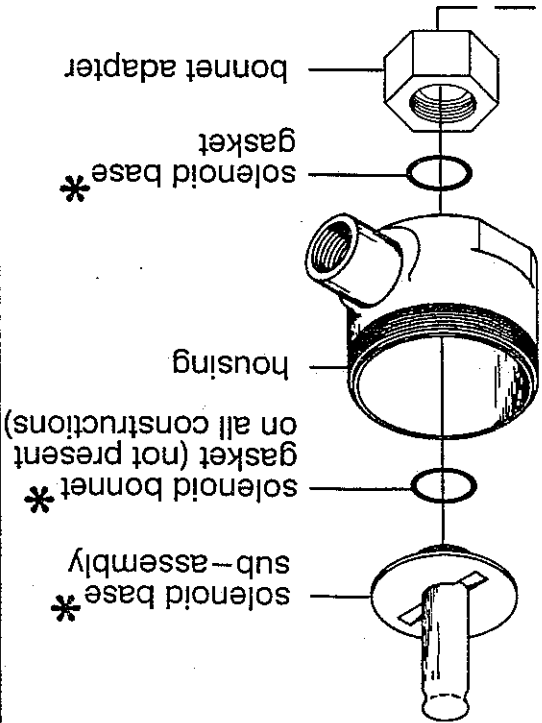
Figure 1. Series 8267 valve without solenoid - 3/8" & 1/2" NPT shown.



ORDERING INFORMATION FOR ASCO REBUILD KITS

Parts marked with an asterisk (*) in the exploded view are supplied in Rebuild Kits. •When Ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. + If the number of the kit is not visible, order by Number and Serial Number of the valve(s) for which they are intended.

* Indicates Parts Supplied
in ASCO Rebuild Kits



Torque pipe adapter screws evenly to 95 ± 10 in-lbs. $[10,5 \pm 1,1$ Nm]

Figure 2. Series 8267 valve without solenoid - 3/4" NPT shown.

Installation & Maintenance Instructions

ASCO Red-Hat II

OPEN-FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS

SERIES
8017G
8014G
Form No. V7221R1

FOR BLACK ENCLOSURE TYPES 7 AND 9 ONLY

CAUTION: To prevent fire or explosion, do not install solenoid and/or valve where ignition temperature of hazardous atmosphere is less than 180° C.

NOTE: These solenoids have an internal non-resettable thermal fuse to limit solenoid temperature in the event that extraordinary conditions occur which could cause excessive temperatures. These conditions include high input voltage, a jammed core, excessive ambient temperature or a shorted solenoid, etc. This unique feature is a standard feature only in solenoids with black explosionproof/dust-ignitionproof enclosures (Types 7 & 9).

CAUTION: To protect the solenoid valve or operator, install a strainer or filter, suitable for the service involved in the inlet side as close to the valve or operator as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601, and 8602 for strainers.

Temperature Limitations

For maximum valve ambient temperatures, refer to chart. The temperature limitations listed, only indicate maximum application temperatures for field wiring rated at 90° C. Check catalog number prefix and watt rating on nameplate to determine maximum ambient temperature. See valve installation and maintenance instructions for maximum fluid temperature. **NOTE:** For steam service, refer to *Wiring* section, *Junction Box* for temperature rating of supply wires.

Watt Rating	Catalog Number Coil Prefix	Class of Insulation	Maximum Ambient Temp. †
16.1	None, KF, KP SD, SF, & SP	F	125°F (54° C)
20.1	FB, KF, KP, SD, SF, & SP	F	104°F (40° C)
16.1	None, KB, KH, SS, ST & SU	H	140°F (60° C)
20.1	HB, KH, SS, ST, SU & SV	H	140°F (60° C)

† Minimum ambient temperature -40° F (-40° C).

Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Wiring

Wiring must comply with local codes and the National Electrical Code. All solenoids supplied with lead wires are provided with a grounding wire which is green or green with yellow stripes and a 1/2" conduit connection. To facilitate wiring, the solenoid may be rotated 360°. For the watertight and explosionproof solenoid, electrical fittings must be approved for use in the approved hazardous locations.

CAUTION: Cryogenic Applications - Solenoid lead wire insulation should not be subjected to cryogenic temperatures. Adequate lead wire protection and routing must be provided.

WARNING: Electrical hazard from the accessibility of live parts. To prevent the possibility of death, serious injury or property damage, install the open-frame solenoid in an enclosure.

Check nameplate for correct catalog number, service, and wattage. Check front of solenoid for voltage and frequency.

INSTALLATION

Series 8014G - When the solenoid is energized, the disc holder assembly seats against the orifice. **IMPORTANT:** Initial return force for the disc or disc holder assembly, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force is 1 pound, 12 ounces. When the solenoid is de-energized, the disc holder assembly returns.

Series 8017G - When the solenoid is energized, the core is drawn into the de-energized, the initial return force for the core, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force is 1 pound, 12 ounces.

OPERATION

- Junction Box:** This junction box construction meets Enclosure Types 2, 3, 3S, 4, and 4X. Only solenoids with 1/4" spade or screw terminals may have a junction box. The junction box provides a 1/2" conduit connection, grounding and spade or screw terminal connections within the junction box (See Figure 3).
- DIN Plug Connector Kit No. K236034:** Use this kit only for solenoids with DIN terminals. The DIN plug connector kit provides a two pole with grounding contact DIN Type 43650 construction (See Figure 4).

Construction Only

Optional Features For Type 1 - General Purpose

General purpose solenoids (green) are available in open-frame construction. This construction may be supplied with 1/4" spade, screw or DIN terminals (Refer to Figure 2).

Series 8017G and 8014G are epoxy encapsulated solenoids. The green solenoid with lead wires and 1/2" conduit connection is designed to meet Enclosure Type 1 - General Purpose, Type 2 - Dripproof, Types 3 and 3S - Raintight, and Types 4 and 4X - Watertight. The black solenoid on catalog numbers prefixed "EF" is designed to meet Enclosure Types 3 and Type 7 (A, B, C & D) Explosionproof Class I, Division 1 Groups A, B, C, & D and Type 9 (E & F) - Dust-Ignitionproof Class II, Division 1 Groups E & F. See *Temperature Limitations* section for solenoid identification and nameplate/retainer for service. When Series 8017G is installed just as a solenoid and not attached to an ASCO valve, the core has a 0.250-28 UNF-2B tapped hole, 0.38 minimum full thread.

Catalog Nos. 8017G1 and 8017G2 are pull type direct-acting solenoids, white Catalog Nos. 8014G1 and 8014G2 are push type reverse-acting solenoids.

DESCRIPTION

NOTICE: See separate valve installation and maintenance instructions for information on: Operation, Positioning, Mounting, Cleaning, Preventive Maintenance, Causes of Improper Operation, Disassembly and Reassembly of basic valve.

Cleaning
 All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on medium and service conditions. In general, if the voltage to the solenoid is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean strainer or filter when cleaning the valve.

WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize solenoid operator and/or valve, and vent fluid to a safe area before servicing.

MAINTENANCE

Solenoid Temperature
 Standard solenoids are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid becomes hot and can be touched by hand only for an instant. This is a safe operating temperature.

Installation of Solenoid
 Solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid.

1. Position connector gasket on solenoid and install plug connector.
2. Snap terminal block into connector cover and install center screw.
3. Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block according to markings on it.
4. Position connector gasket on solenoid and install plug connector.

NOTE: Connector housing may be rotated in 90° increments from position shown for alternate positioning of cable entry.

1. The open-frame solenoid is provided with DIN terminals to accommodate the plug connector kit.
2. Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
3. Use #12-18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4" for installation in socket terminals. The use of wire-end sleeves is also recommended for these socket terminals. Maximum length of wire-end sleeves to be approximately 1/4". Tinning of the ends of the lead wires is not recommended.
4. Thread wire through gland nut, gland gasket, washer and connector cover.

DIN Plug Connector Kit No. K236034

The junction box is used with spade or screw terminal solenoids only and is provided with a grounding screw and a 1/2" conduit connection. Connect #12-18 AWG standard copper wire only to the screw terminals. Within the junction box use field wire that is rated 90°C or greater for connections. For steam service use 105°C rated wire up to 50 psi or use 125°C rated wire above 50 psi. After electrical hookup, replace cover gasket, cover, and screws. Tighten screws evenly in a crisscross manner.

Open-Frame solenoid with 1/4" spade terminals.
 For solenoids supplied with screw terminal connections use #12-18 AWG stranded copper wire rated at 90°C or greater. Torque terminal block screws to 10 ± 2 in-lbs [1.0 ± 1.2 Nm]. A tapped hole is provided in the solenoid for grounding, use a #10-32 machine screw. Torque grounding screw to 15-20 in-lbs [1.7-2.3 Nm]. On solenoids with screw terminals, the socket head screw holding the terminal block to the solenoid is the grounding screw. Torque the screw to 15-20 in-lbs [1.7-2.3 Nm] with a 5/32" hex key wrench.

Additional Wiring Instructions For Optional Features:

Part Name	Torque Value In-lbs	Torque Value Nm
Solenoid base sub-assembly & adapter	175 ± 25	19.8 ± 2.8

Torque Chart

When Ordering Solenoids for ASCO Solenoid Operators or Valves, order the number stamped on the solenoid. Also specify voltage and frequency.

ORDERING INFORMATION FOR ASCO SOLENOIDS

1. Remove solenoid, see *Solenoid Replacement*.
2. Remove spring washer from solenoid base sub-assembly.
3. Unscure solenoid base sub-assembly from valve body. For Series 8014G solenoids a special wrench adapter for the solenoid base sub-assembly is supplied in the ASCO Rebuild Kit. For wrench adapter only, order Wrench Kit No. K218950.
4. Remove internal solenoid parts for cleaning or replacement. Use exploded views for identification and placement of parts.
5. If the solenoid is part of a valve, refer to basic valve installation and maintenance instructions for further disassembly.
6. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.
7. Torque solenoid base sub-assembly and adapter to 175 ± 25 in-lbs [19.8 ± 2.8 Nm].

Disassembly and Reassembly of Solenoids

1. Disconnect conduit, coil leads, and grounding wire.
2. Snap off red cap from top of solenoid base sub-assembly.
3. Push down on solenoid. Then using a suitable screwdriver, insert blade between solenoid spacer and nameplate/retainer. Pry up slightly and push to remove.
4. Remove solenoid spacer and solenoid from solenoid base sub-assembly.
5. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.

Solenoid Replacement (Refer to Figure 1)

1. Disconnect conduit, coil leads, and grounding wire.
- NOTE:** Any optional parts attached to the old solenoid must be reinstalled on the new solenoid. For removal or assembly of optional parts, see Figure 2, 3 or 4.
 - 2. Snap off red cap from top of solenoid base sub-assembly.
 - 3. Push down on solenoid. Then using a suitable screwdriver, insert blade between solenoid spacer and nameplate/retainer. Pry up slightly and push to remove.
 - 4. Remove solenoid spacer and solenoid from solenoid base sub-assembly.
 - 5. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.

Causes of Improper Operation

- Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic click signifies that the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown fuses, open-circuited or grounded solenoid, broken lead wires or splice connections.
- Burned-Out Solenoid:** Check for open-circuited solenoid. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate/retainer and marked on the solenoid. Check ambient temperature and check that the core is not jammed.
- Low Voltage:** Check voltage across the solenoid leads. Voltage must be at least 85% of rated voltage.

Preventive Maintenance

- Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
- While in service, the solenoid operator or valve should be operated at least once a month to insure proper opening and closing.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any worn or damaged parts.

Figure 1. Series 8017G and 8014G solenoid assemblies.

Note:
Special wrench adapter supplied in
ASCO Rebuild Kit. For wrench kit
only, order No. K218950.

**Series 8017G
Direct-Acting
Solenoid**

Tapped hole in core
0.250-28 UNF-2B
0.38 minimum full thread.

core
0.9375-26 UNS-2A
solenoid base *
sub-assembly *

grounding wire
with yellow strips
green or green

* Indicates that these
parts are included
in ASCO Rebuild Kit

Remove red cap and
push solenoid down.
Then pry here to lift
nameplate/retainer
and push to remove.

**Series 8014G
Reverse-Acting
Solenoid**

disc holder *
spring

disc holder *
assembly

adapter
0.9375-26 UNS-2A

adapter gasket *
plugnut assembly *

core *
(small end up)

solenoid base *
sub-assembly *
(see note)

spring washer

solenoid with
1/2" NPT

spacer

nameplate/retainer

red cap

