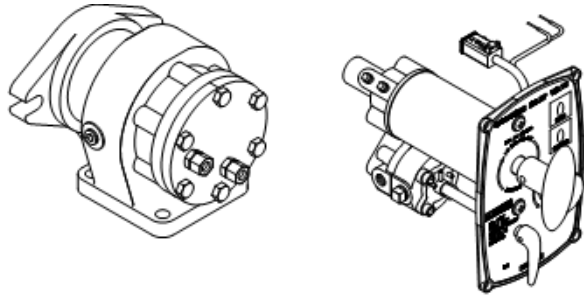


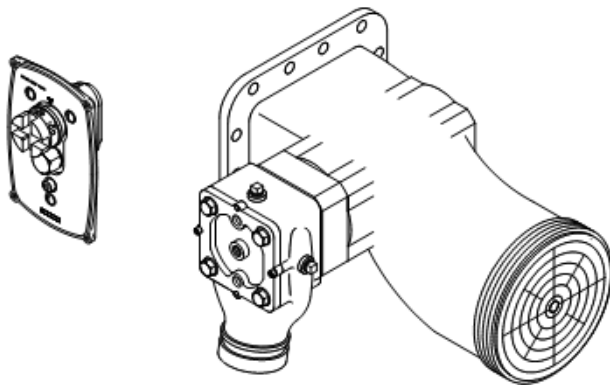
# Pressure Control Systems

# Installation Instructions

Form No.	Section	Issue Date	Rev. Date
F-1031	3010	08/20/96	MMS



L3031.2



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**Read through the installation instructions carefully before installing your Waterous Pressure Control Systems.**



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# Discharge Relief Valve System

## System Description

The Waterous discharge relief valve system provides sensitive pump control to protect firefighters from sudden pressure surges resulting from changes in discharge flows from the pump. Designed with a "built-in-memory", this system has a wide continuous range of pressure control from a minimum of 90 to a maximum of 300 psig depending upon pump performance characteristics, and may be put in or taken out of operation without disturbing the pressure setting. This lets you leave the system at a pre-set, ready-to-use pressure setting.

The Waterous discharge relief valve system incorporates two separate units; a panel-mounted pilot valve which controls the operation of the relief valve, and the relief valve which is normally mounted on the pump.

The pilot valve has two controls, one to adjust the relief valve operating pressure, and the other, an ON-OFF control, to place the relief valve in or out of operation.

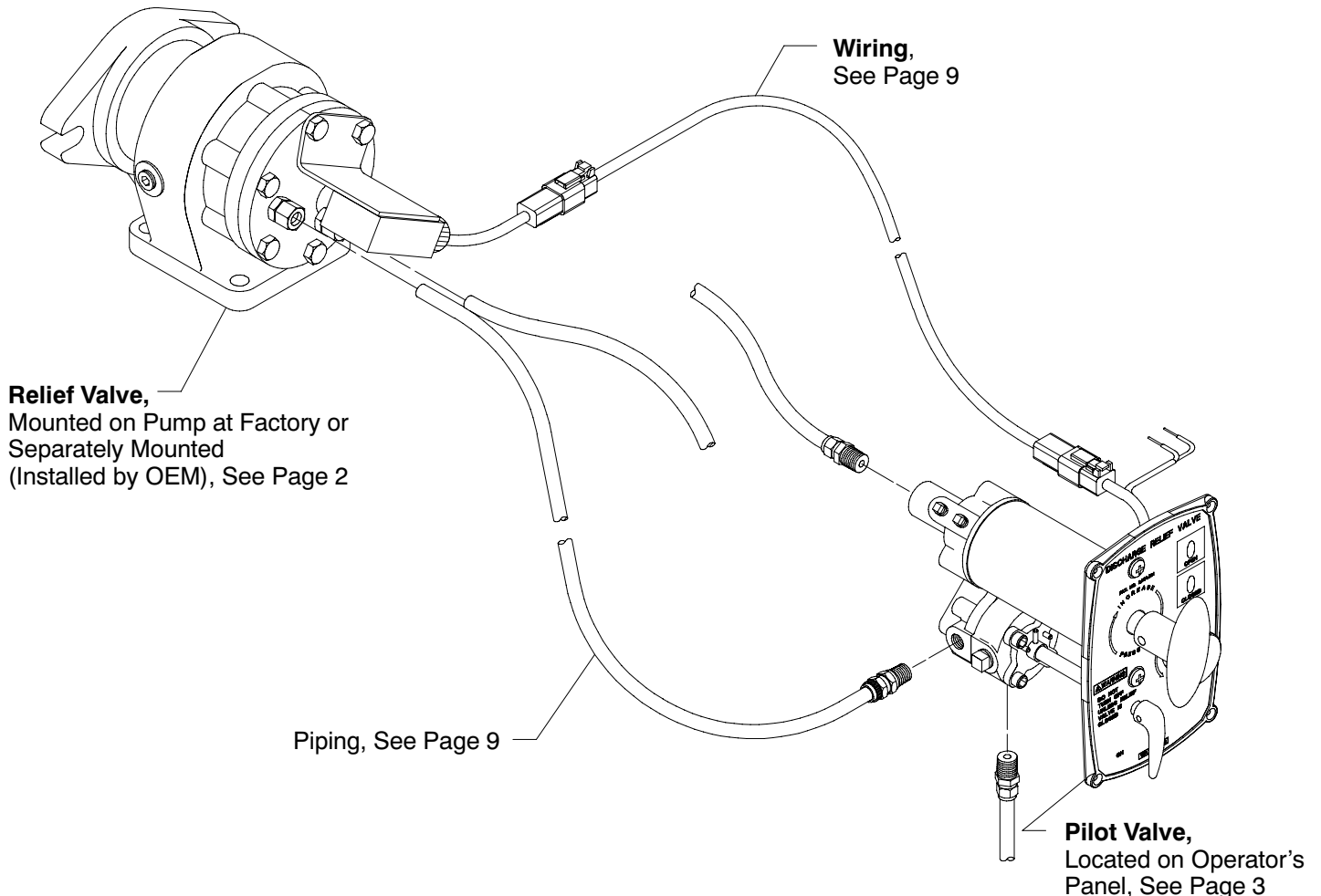
Turning the ON-OFF control to OFF puts the relief valve out of operation (hydraulically holding the relief valve

closed) when a pressure higher than set pressure or higher than 300 psig is desired. Turning this control to ON permits the relief valve to operate again at whatever pressure was previously set without further adjustment.

The relief valve is mounted on the pump or in the piping between the intake and discharge sides of the pump. It modulates flow between discharge sides and intake by ranging between the fully open and fully closed position in response to hydraulic signals from the pilot valve. The relief valve is available in three sizes. For pumps with rated capacities of 750 gpm or less, a two inch outlet diameter relief valve is used. For pumps with rated capacities through 1250 gpm, a three inch outlet diameter relief valve is used. For 1500 gpm through 2250 gpm, a four inch outlet diameter relief valve is recommended.

On indicating relief valves two indicator lights show the position of the relief valve; green for fully closed and amber for at least partially open.

**Figure 1. Discharge Relief Valve System**



# Discharge Relief Valve System

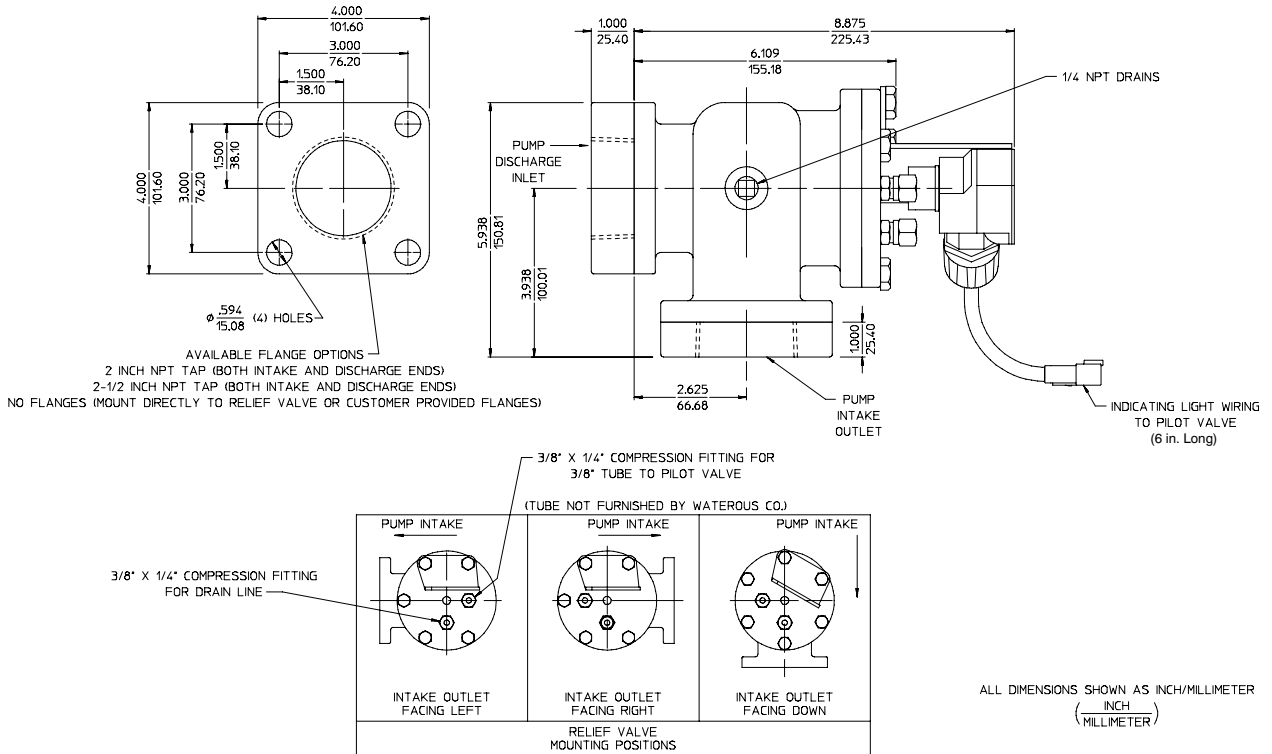
## Relief Valve Installation

1. On most Waterous pumps, the relief valve will be installed at the factory. Occasionally the relief valve must be mounted and piped when the pump is installed. Suitable flanges are available from Waterous Company to install 2 inch, 3 inch and 4 inch relief valves in a standard piping system.
2. When selecting a location, keep the piping between pump intake and the relief valve as short and straight as possible to reduce the amount of friction loss.
3. To ensure proper draining, the relief valve cannot be mounted with either opening facing up.
4. See Table 1 for details of separately mounted relief valves:

Table 1. Separately Mounted Relief Valve Details

Valve Size	End Connections	See Figure
2 in.	2 in. NPT	2
	2-1/2 in. NPT	
	Blank 4-Bolt Flange	
3 in.	3 in. NPT	3
	3 in. Victaulic	4
4 in.	4 in. NPT or BSP	5
	4 in. Victaulic	6

Figure 2. 2 Inch Relief Valve



NOTE: CUSTOMER TO FURNISH 3/8" TUBING TO PILOT VALVE AND FURNISH PIPING FROM PUMP DISCHARGE AND TO PUMP INTAKE.

From PL82084\_4

# Discharge Relief Valve System

## Relief Valve Installation

Figure 3. 3 Inch Relief Valve (NPT)

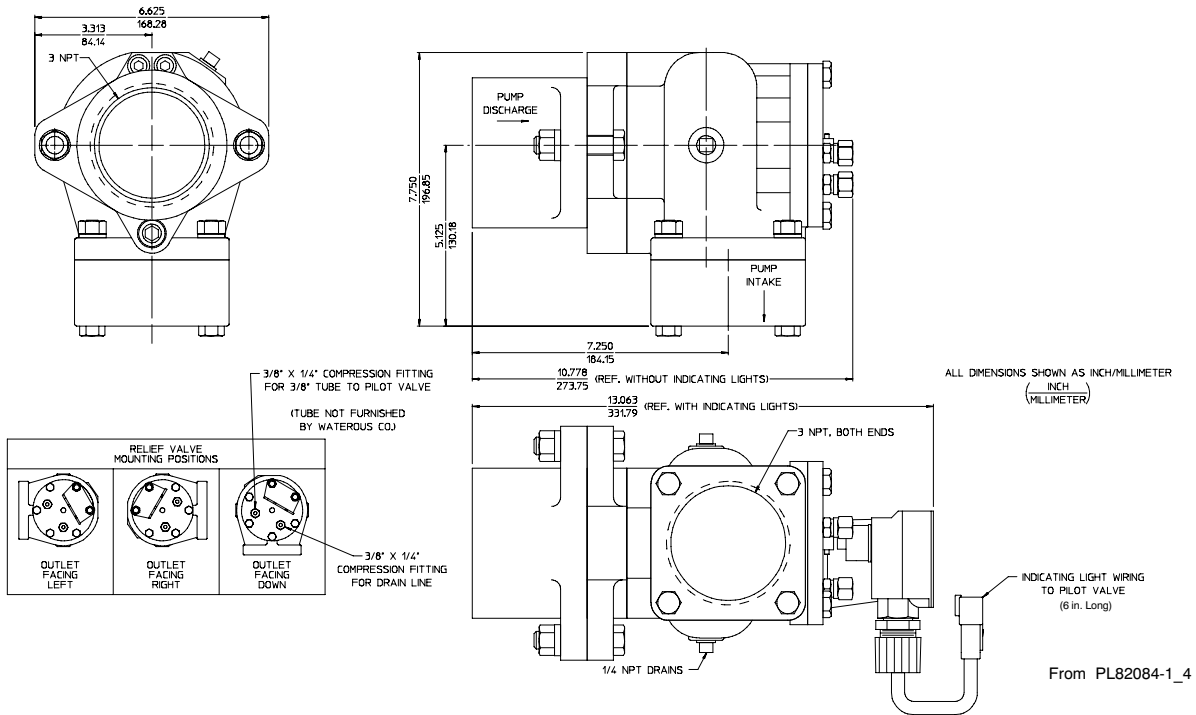
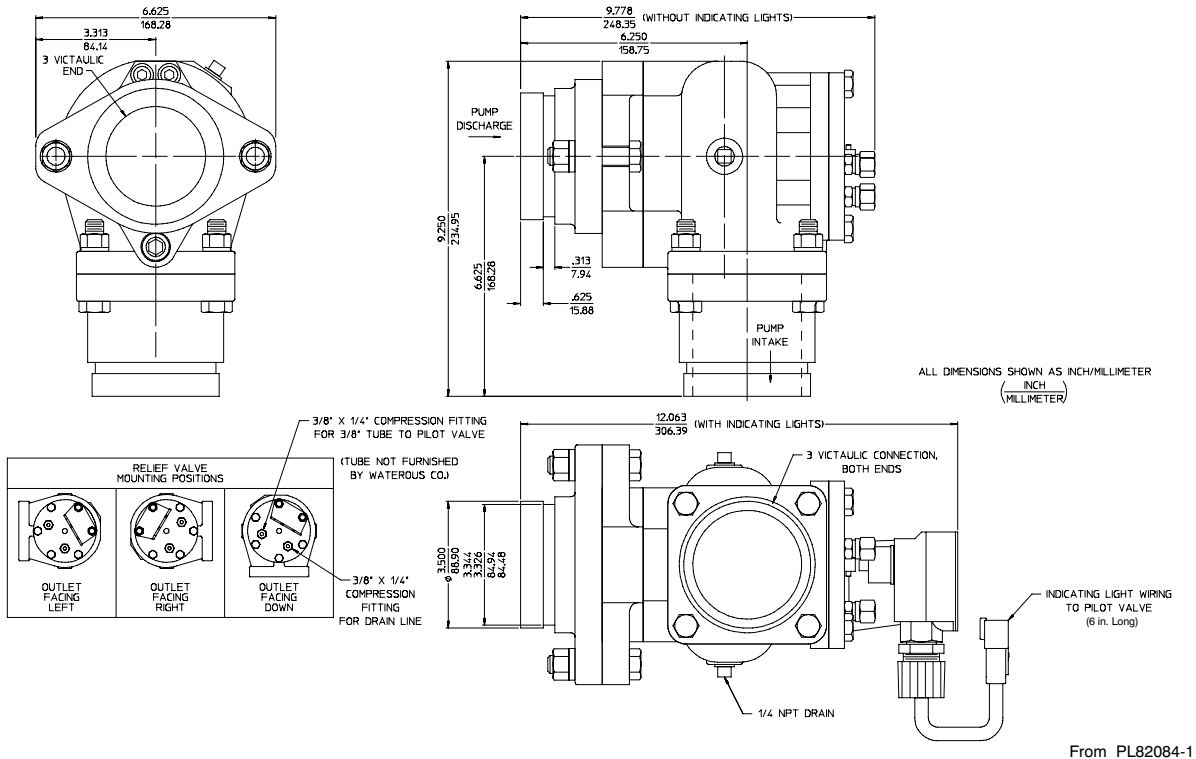


Figure 4. 3 Inch Relief Valve (Victaulic®)



# Discharge Relief Valve System

## Relief Valve Installation

Figure 5. 4 Inch Relief Valve (NPT or BSP)

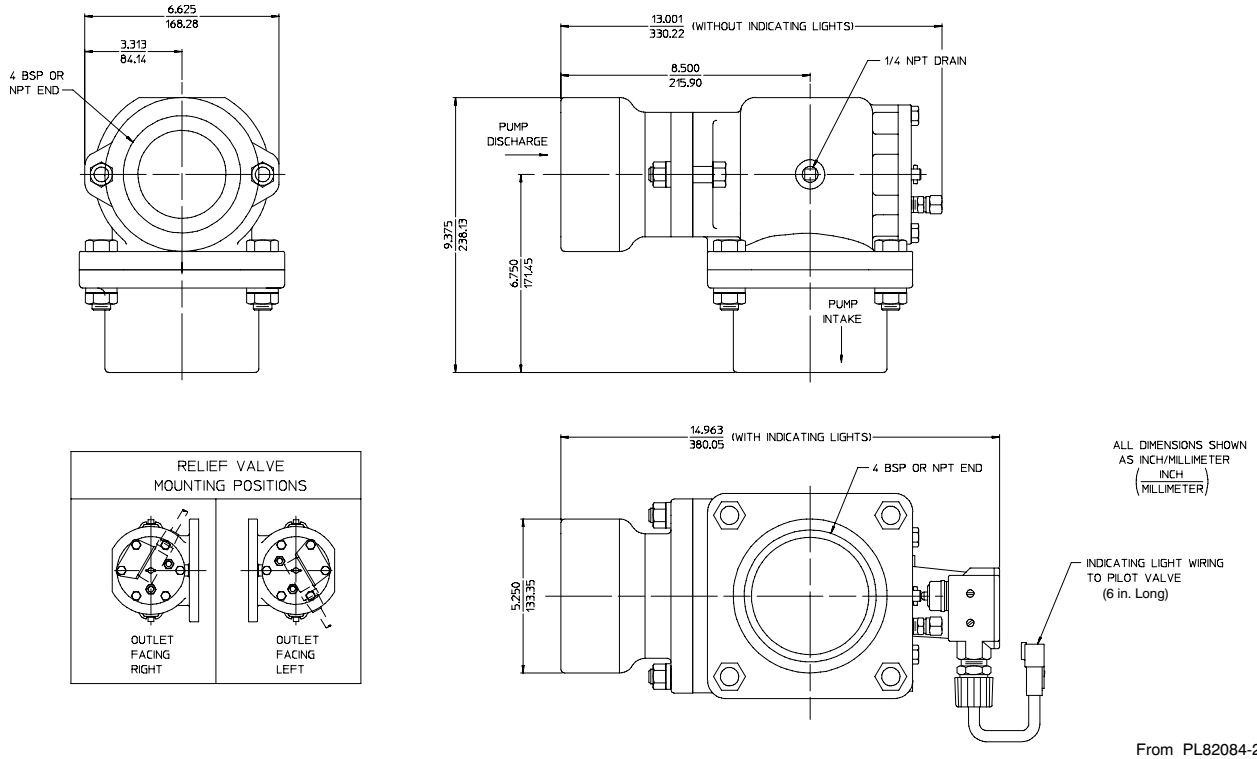
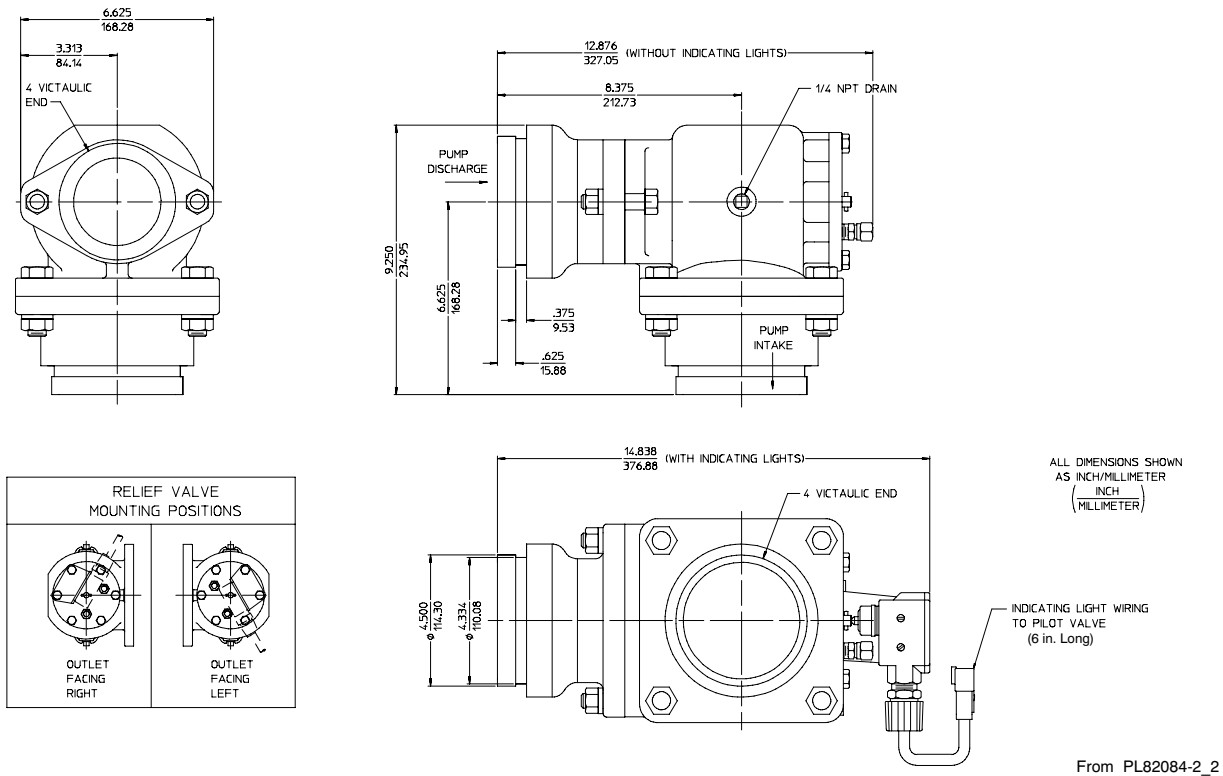


Figure 6. 4 Inch Relief Valve (Victaulic®)

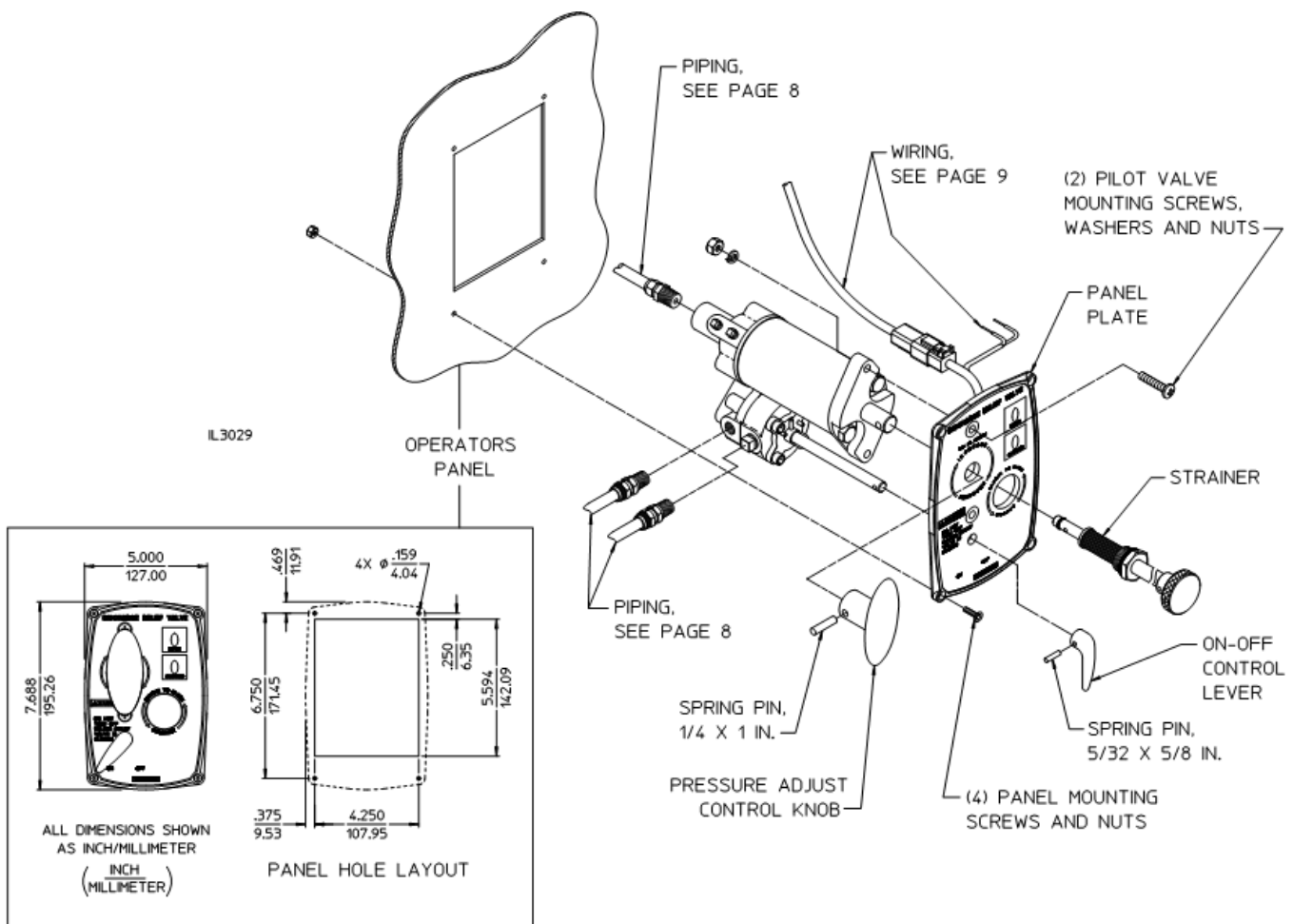


# Discharge Relief Valve System

## Pilot Valve Installation

1. When mounting the pilot valve, choose a location which is higher than the pump. This will eliminate the need to install a separate drain to the pilot valve. See Figure 8 for dimensions of pilot valve.
2. Position the panel plate on the operator's panel and mark the location of the screw holes. Also mark the square cut-out (see the panel cut-out detail in Figure 7). Deburr all holes and openings cut in the panel.
3. Unscrew the strainer from the pilot valve and set aside. Take care not to damage the O-rings on the strainer.
4. Install the panel plate on the valve by sliding the plate over the Pressure Adjustment and On-Off control stems. Secure the panel to the valve with the (2) screws, washers and nuts furnished.
5. Install the Panel/Valve assembly in the panel. Secure to the panel with the (4) screws and nuts provided. Use a thread locking compound on the screws and nuts.
6. Install the Pressure Adjustment Knob and On-Off Lever on the protruding stems using the pins provided.
7. Install the strainer through the opening in the panel and thread into the valve body. Tighten hand tight.
8. See Page 8 for piping connections and Page 9 for wiring connections.

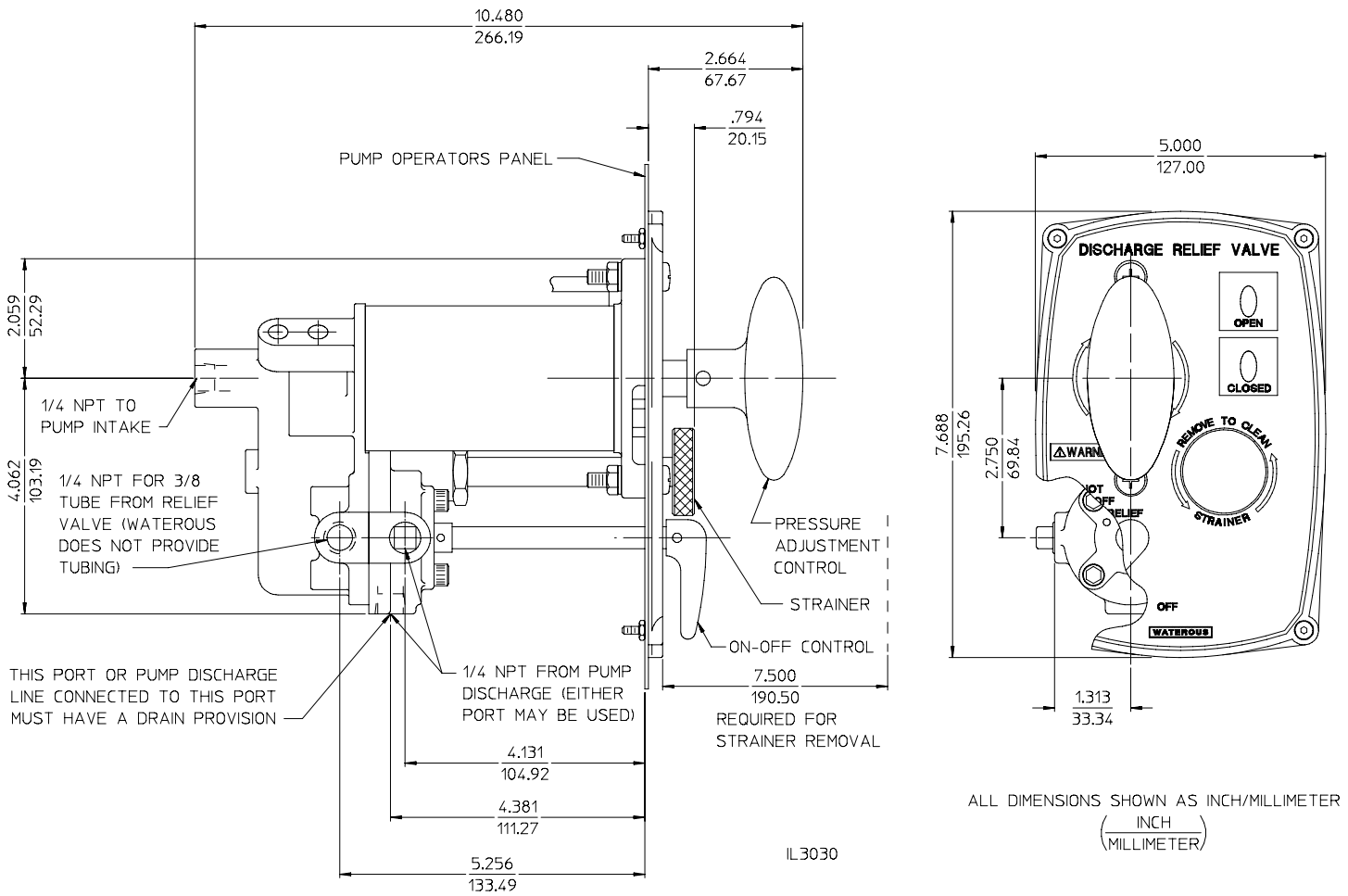
Figure 7. Pilot Valve Installation



# Discharge Relief Valve System

## Pilot Valve Installation

Figure 8. Pilot Valve Dimensions



# Discharge Relief Valve System

## Piping Installation (See Figure 9)

Use 3/8 inch I.D. tubing for all connections (the ports are 1/4 inch NPT). Tubing should be rated at 600 psi minimum working pressure and 1400 psi burst pressure. Excessive pressure surges and erratic operation may result if a smaller size tube is used. Make sure all lines are free of low spots or sharp bends which will prevent the lines from draining properly.

### **WARNING**

All tubing lines connected to the pilot valve should be dedicated lines. Any pressure fluctuations from devices connected to them will cause the system to malfunction.

1. If the pilot valve is installed higher than the pump, connect a line from the bottom discharge port to the same tap used for the pump pressure gauge. The side pump discharge port should be plugged. If the pilot valve is installed lower than the pump, connect a line from the side discharge port to the same tap used for the pump pressure gauge. The bottom port will be used for a drain.
2. Connect a line from the relief valve port of the pilot valve to the upper port on the relief valve cap.

### **WARNING**

Do not connect anything else into this line.

3. Connect a line from the pump intake port of the pilot valve to an intake pressure tap.

4. If necessary, install a drain line from the bottom port of the pilot valve to a separately controlled drain valve. (This is necessary if the pilot valve is mounted lower than the pump.)

### **WARNING**

Do not connect the drain line to a multi-port drain valve.

5. Install a drain line from the lower port on the relief valve cap to a separately controlled drain.

**NOTE:** The relief valve cap may need to be rotated to position the drain port at the bottom.

### **WARNING**

Do not connect the drain line to a multi-port drain valve.

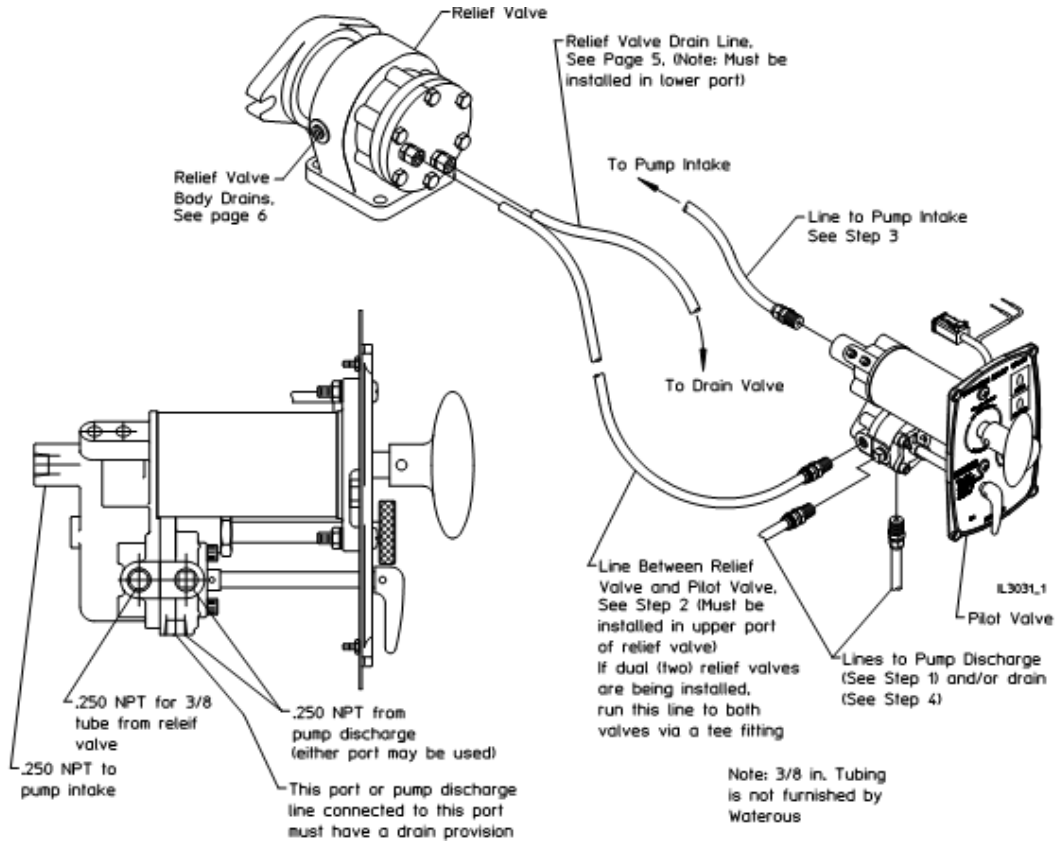
6. Install a drain line from the relief valve body to a multi-port drain or other suitable valve. This port will normally be under intake pressure.
7. Plug all unused ports.



# Discharge Relief Valve System

## Piping Installation (See Figure 9)

Figure 9. Piping Installation

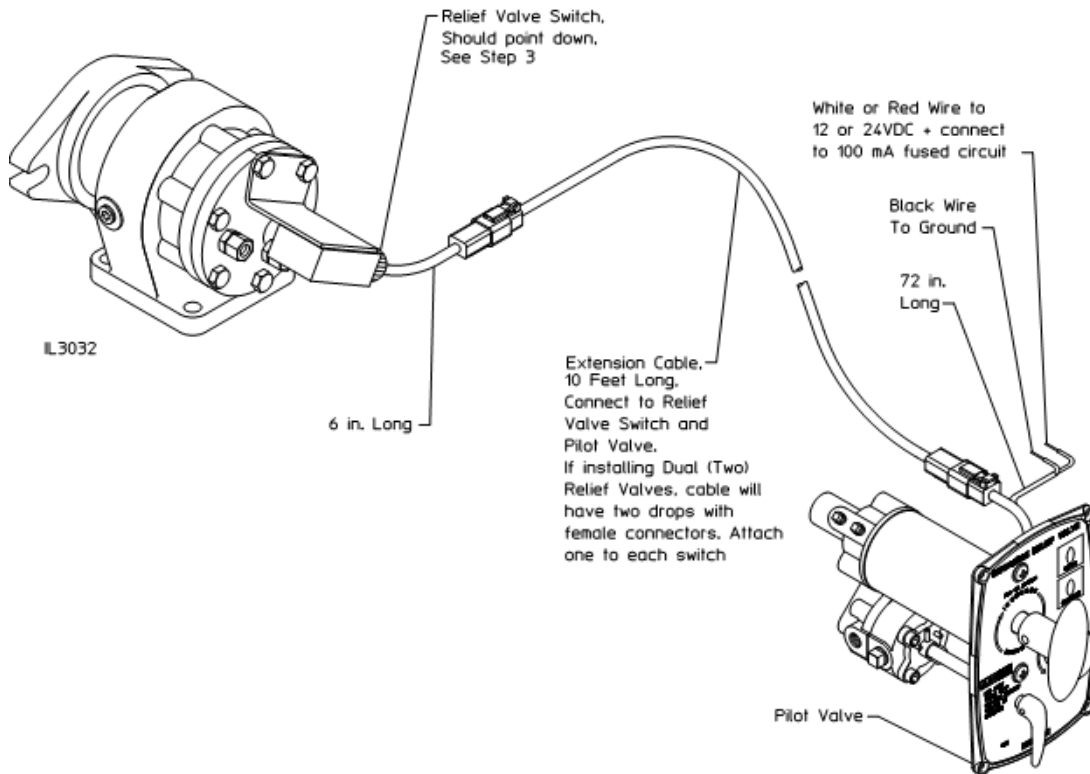


# Discharge Relief Valve System

## Wiring Installation

1. Connect relief valve switch to the panel bezel LED module (see Figure 10).
2. Connect black wire from pilot valve to ground. Connect white wire to 12 or 24 VDC power supply.
3. If necessary, reposition mounting bracket on relief valve cap so connecting and sealing device is horizontal or points down at least slightly. Although wire connection is sealed, water may collect if connection points up, and may eventually seep along the wires into switch. If the connection must point up, silicone sealant may be used to ensure the wire connection is sealed.

Figure 10. Wiring Installation

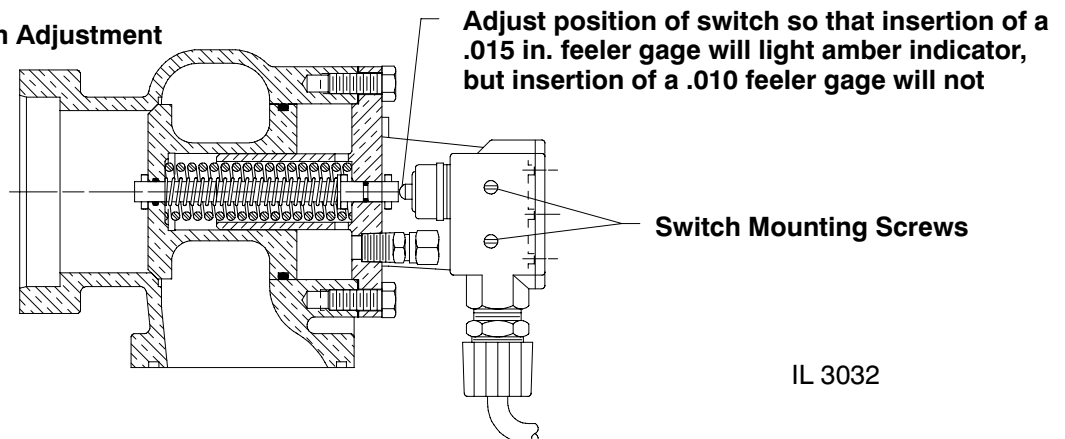


## Valve Light Switch Adjustment

1. Adjust the clearance between the switch plunger and actuating rod so that the insertion of a 0.015 inch feeler gage will light the amber indicator, but insertion

of a 0.010 inch gage will not. Loosen switch mounting screws and re-tighten when adjustment is complete.

Figure 11. Valve Light Switch Adjustment



# Intake Relief Valve System

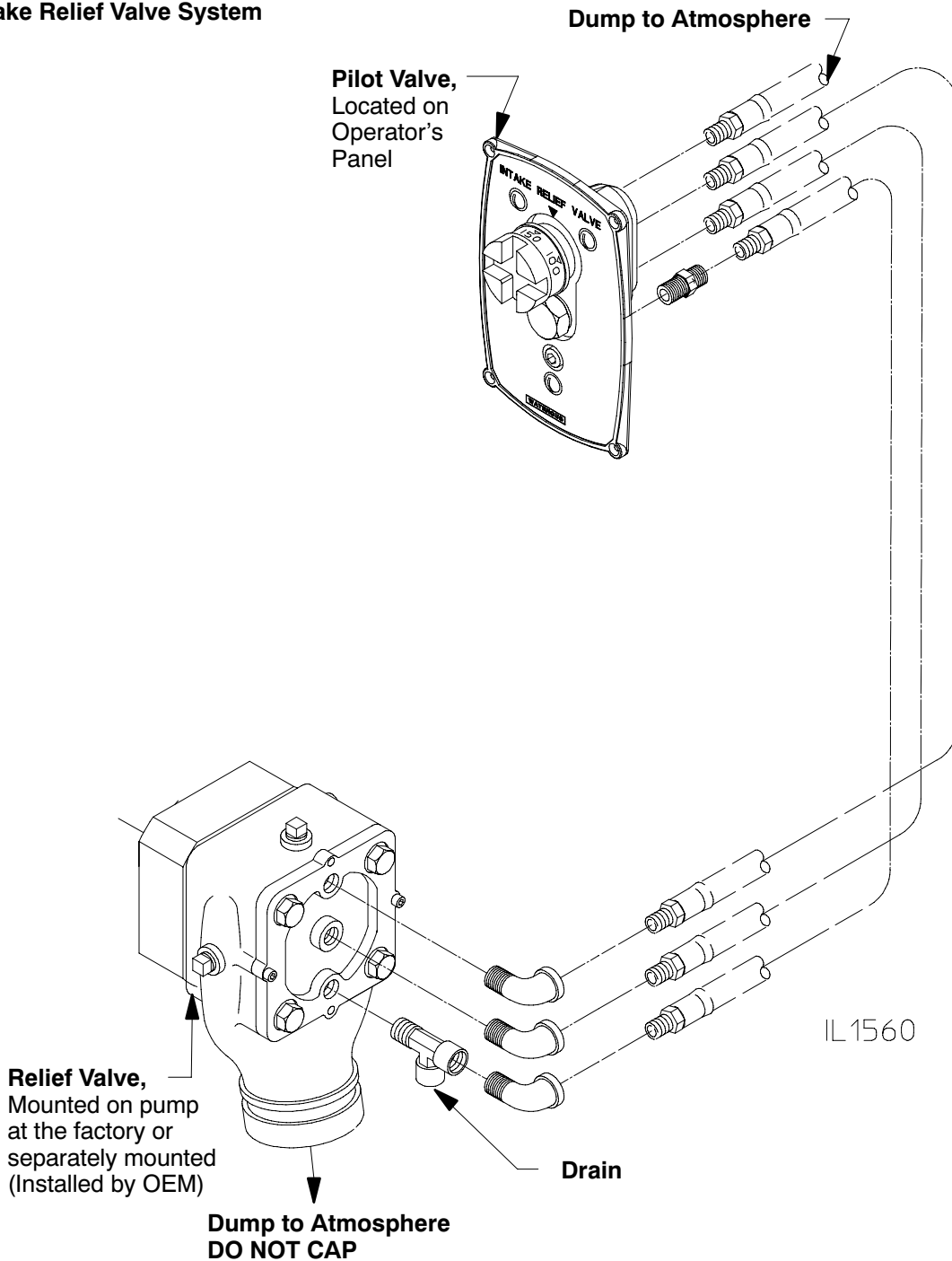
## System Description

The Waterous Intake Relief Valve system is designed to act as a safety valve by “dumping” excess pressure from the inlet side of the pump. This makes it less likely that “water hammer” will burst the supply line, and allows the discharge relief valve or governor system to properly control discharge pressure.

The Waterous Intake Relief Valve system incorporates two separate units for flexibility in installation and operation:

the pilot valve and the relief valve. The pilot valve controls operation of the relief valve and can be panel mounted to be easily field adjusted for varying operating conditions (between 50 and 250 psi), or compartment mounted and preset for a specific pressure. It includes a removable strainer and removable needle valve for easy servicing.

**Figure 12. Intake Relief Valve System**



# Intake Relief Valve System

## Relief Valve Installation

1. On most Waterous pumps, the relief valve will be installed at the factory. Occasionally the relief valve must be mounted and piped when the pump is installed. Suitable flanges are available from Waterous to install the relief valve in a standard piping system. (See Figure 13).
2. To ensure proper drainage, pilot valve ports (tapped holes) on the relief valve must be located in a vertical line.
3. Attach the relief valve assembly to the tapped flange using four 7/16-14 hex head screws and copper washers.

### ! WARNING

Tighten these screws to a torque between 30 and 40 lb ft. Failure to properly torque screws may result in leaks.

4. Attach suitable piping to the 2-1/2 inch Victaulic outlet of the relief valve. The piping should be a minimum of 2-1/2 inch I.D. and be firmly attached to the truck.

5. Attach warning plate near the piping outlet. See Page 15.

### ! WARNING

Do not cap the outlet of the relief valve. This system is designed to hold vacuum while priming and operating from draft.

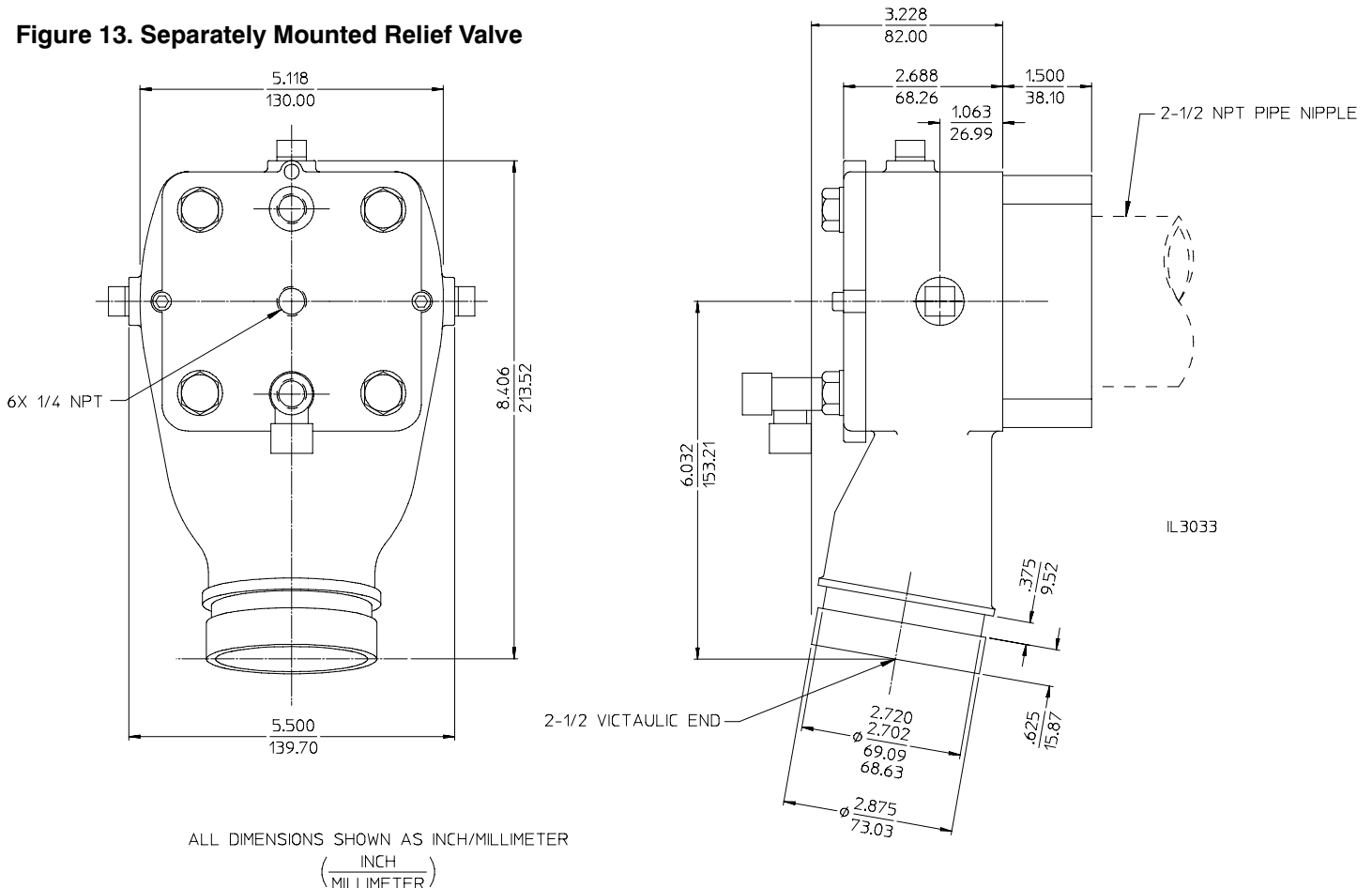
### ! DANGER

**Intake Pressure Relief Outlet Hazard. Will result in serious injury or death.**

**Do not cap the intake pressure relief outlet.**

A hose is connected to this outlet must be secure to prevent violent movement of the hose during pump operation. Position the hose to aim away apparatus and people.

**Figure 13. Separately Mounted Relief Valve**

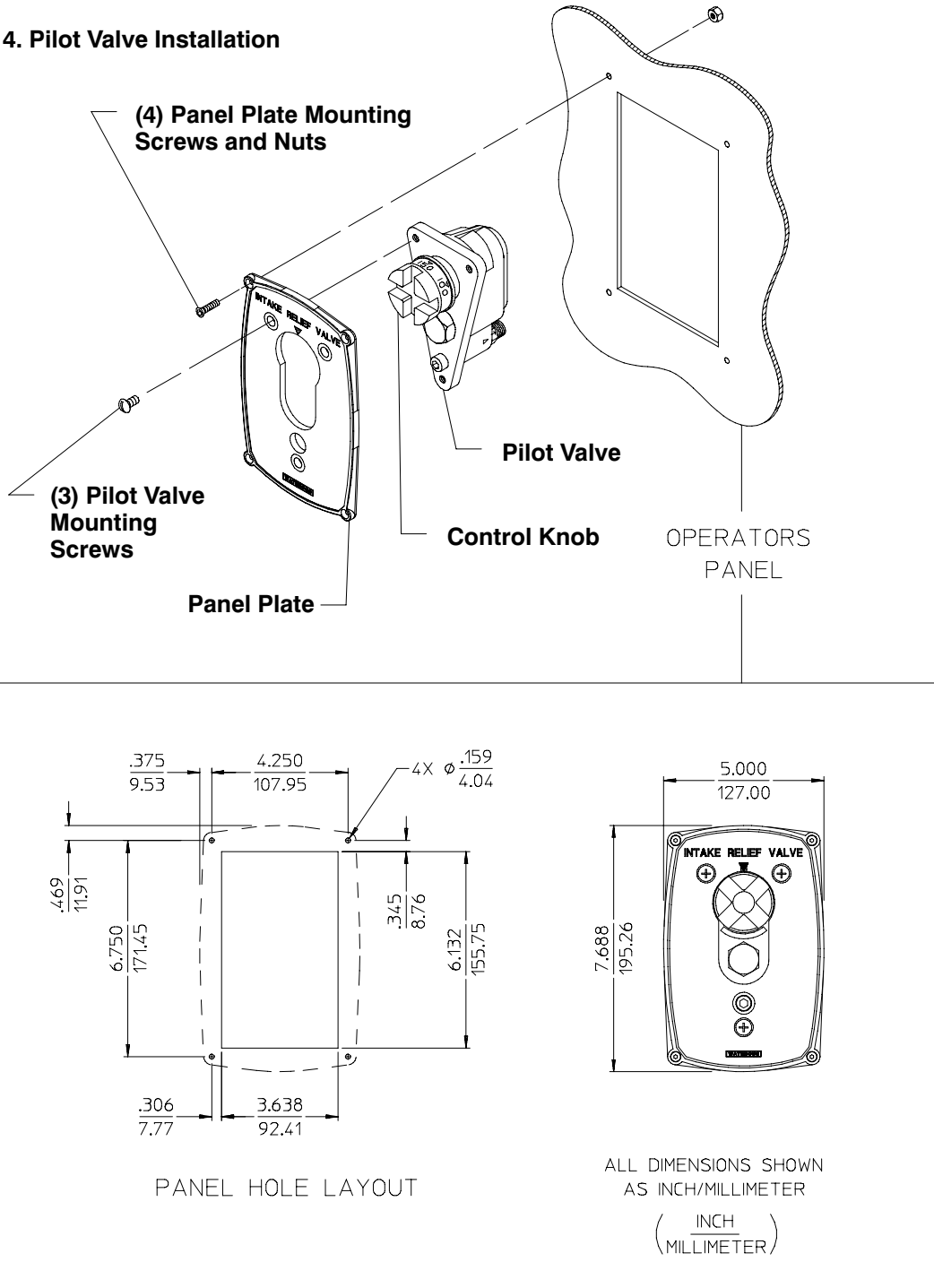


# Intake Relief Valve System

## Pilot Valve Installation (See Figure 14)

1. When mounting the pilot valve, choose a location which is higher than the intake relief valve. See Figure 15 for pilot valve dimensions.
2. Position the panel plate on the panel and mark the location of the screw holds. Also, mark the square cut-out (see panel cut-out detail in Figure 14). Deburr all holes and openings in the panel.
3. Rotate the pilot valve control knob fully counter-clockwise.
4. Install the panel plate on the pilot valve by sliding over the control knob. Secure the panel plate to the valve with the (3) screws provided. **Note: Do not remove the set screw on the control knob, the panel plate will slide over the set screw.**
5. Install the Panel/Valve assembly in the panel. Secure to the panel with the (4) screws and nuts provided. Use a thread locking compound on the screws and nuts.

Figure 14. Pilot Valve Installation

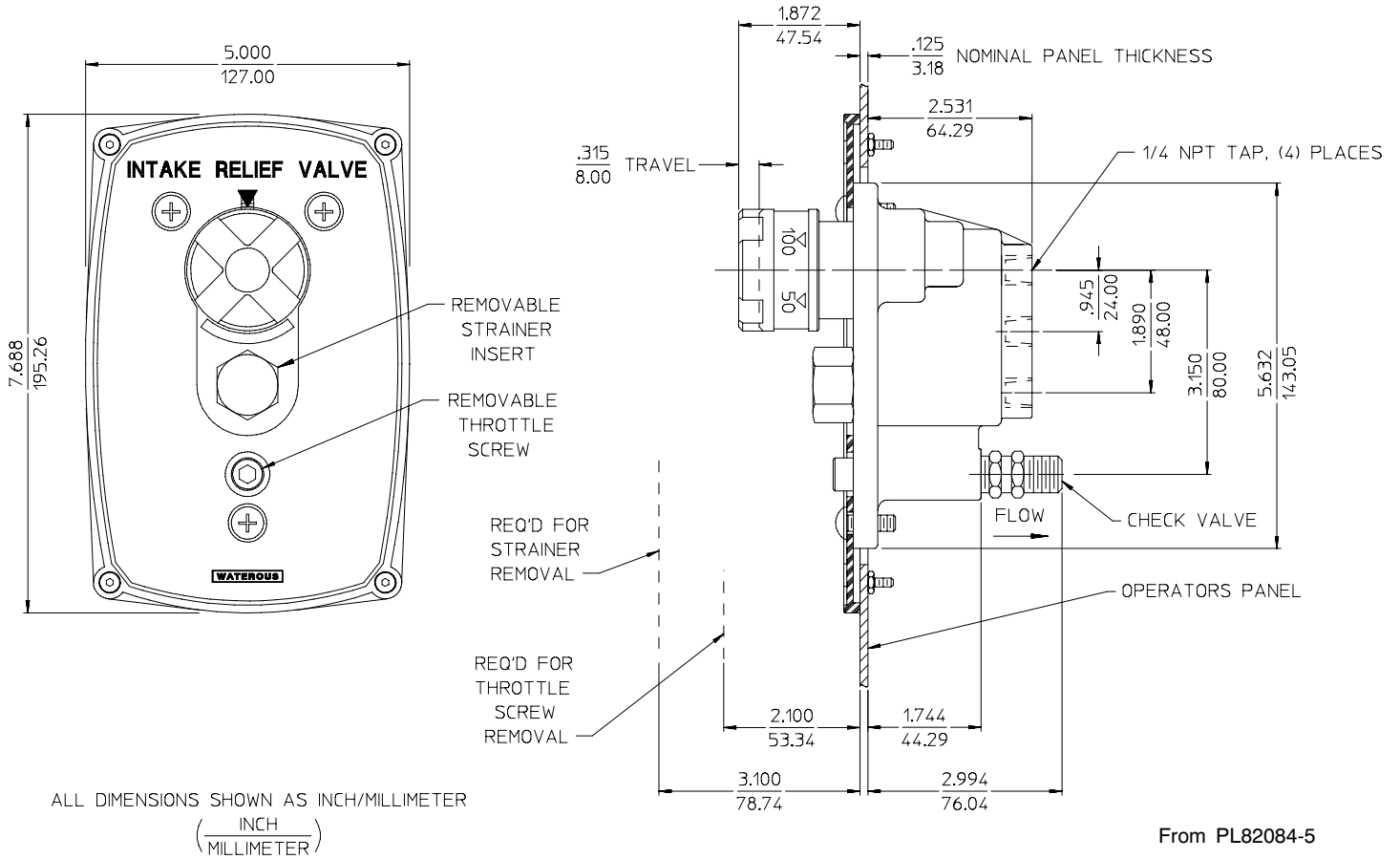


IL3034

# Intake Relief Valve System

## Pilot Valve Installation

Figure 15. Pilot Valve Dimensions



From PL82084-5

# Intake Relief Valve System

## Piping Installation

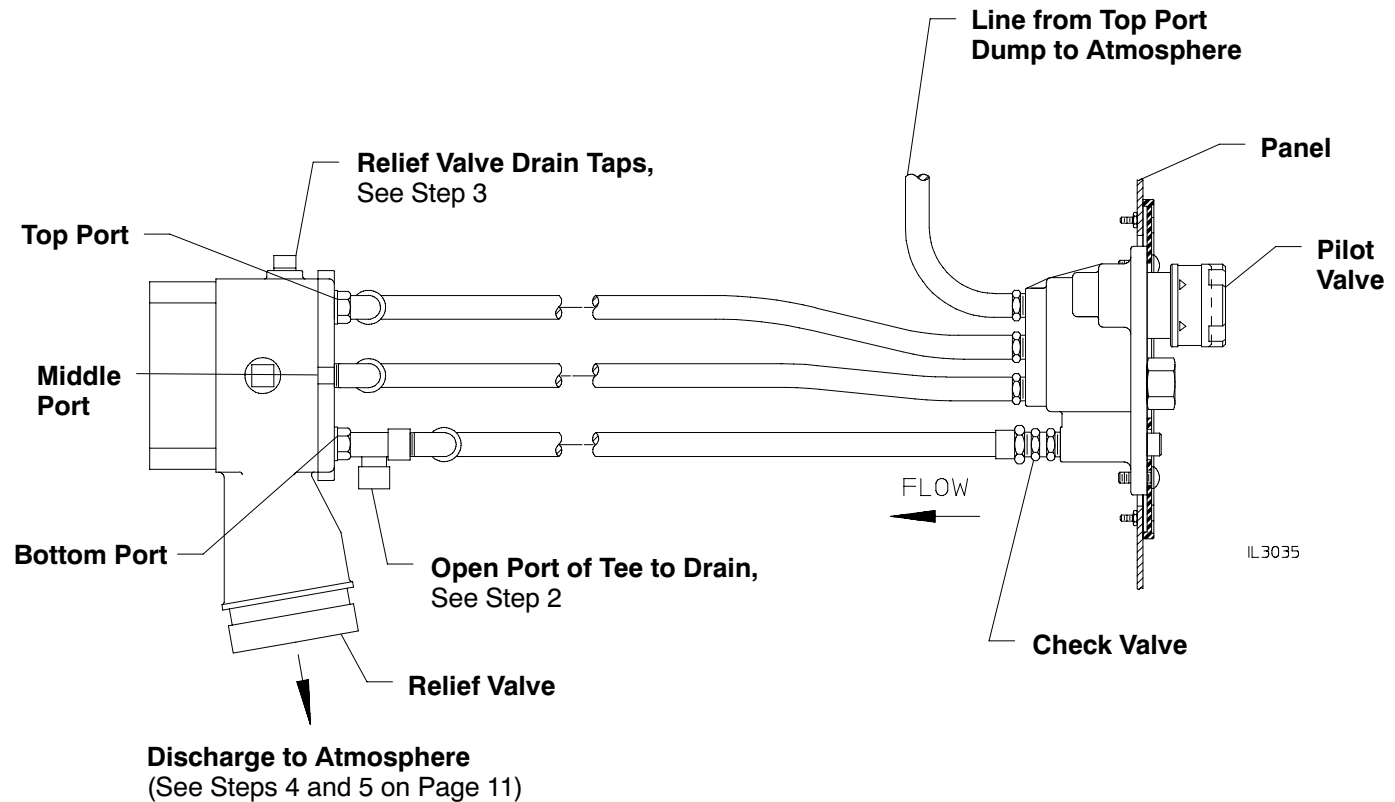
Use 1/4 inch I.D. tubing for all connections (.188 minimum I.D. through fitting). Excessive pressure surges and erratic operation may result if a smaller size tube is used. Tubing should be rated at 300 psi minimum working pressure and 1400 psi burst pressure. Make sure all lines are free of low spots or sharp bends which will prevent the lines from draining properly.

### WARNING

All tubing lines connected to the pilot valve should be dedicated lines. Any pressure fluctuations from devices that may be connected to them will cause the system to malfunction.

1. Connect tubing between the pilot valve and relief valve as shown.

Figure 16. Piping Installation



**Note: Tubing between relief and pilot valve not furnished by Waterous.**

2. Install a drain line from the street tee on the relief valve cover to a separately controlled drain.

### WARNING

Do not connect the drain line to a multi-port drain valve.

3. If the relief valve outlet is not facing down for natural draining, install a drain line from the relief valve body to a separately controlled drain.

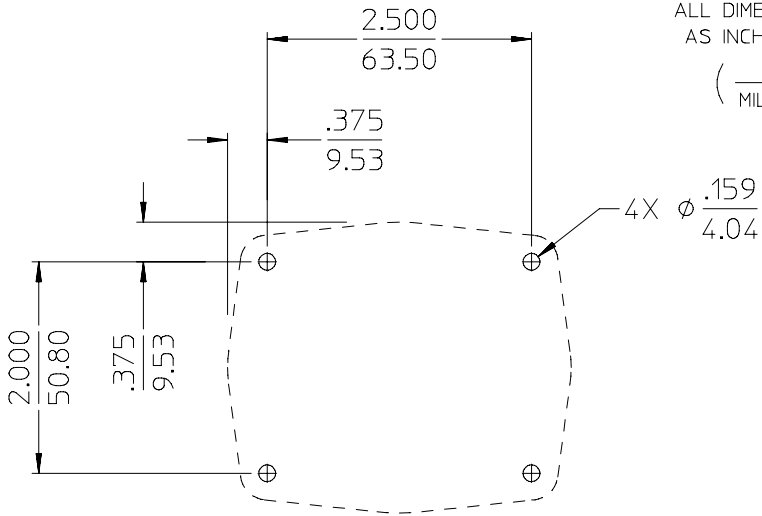
### WARNING

Do not connect the drain line to a multi-port drain valve.

# Intake Relief Valve System

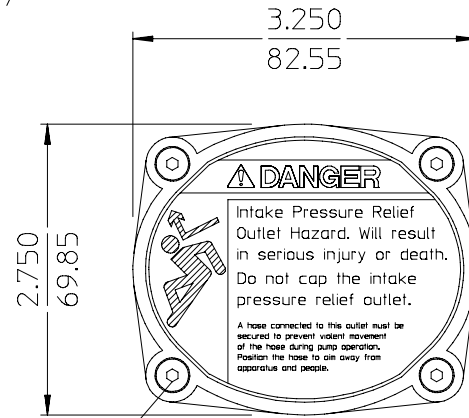
## Warning Plate Installation

1. Install warning plate on apparatus near relief valve discharge.



PANEL HOLE LAYOUT

ALL DIMENSIONS SHOWN  
AS INCH/MILLIMETER  
( $\frac{\text{INCH}}{\text{MILLIMETER}}$ )



IL3036

(4) Mounting Screws and Nuts Furnished



# Intake Relief Valve System

## Setting Operating Pressure

1. Test the Intake relief valve system using a pressurized water source capable of supplying continuous flow at 60 to 100 psi.
  - a. Set the pilot valve slightly above the source pressure and apply this pressure to the pump intake. Relief valve should remain closed.
  - b. Reduce pilot valve setting to slightly below source pressure. Relief valve should open, “dumping” a large volume of water.
  - c. Reset pilot valve above source pressure. Relief valve should close.
2. Set final operating pressure by aligning the desired setting on the calibration dial with the arrow on the top of the panel plate. A spanner wrench may be used to move the calibration dial.

**Figure 18. Pilot Valve Pressure Setting**

