

## Surge Sentinel™ Series

Electronically Controlled Surge Anticipator Valve



# Surge Sentinel™

## What is it?

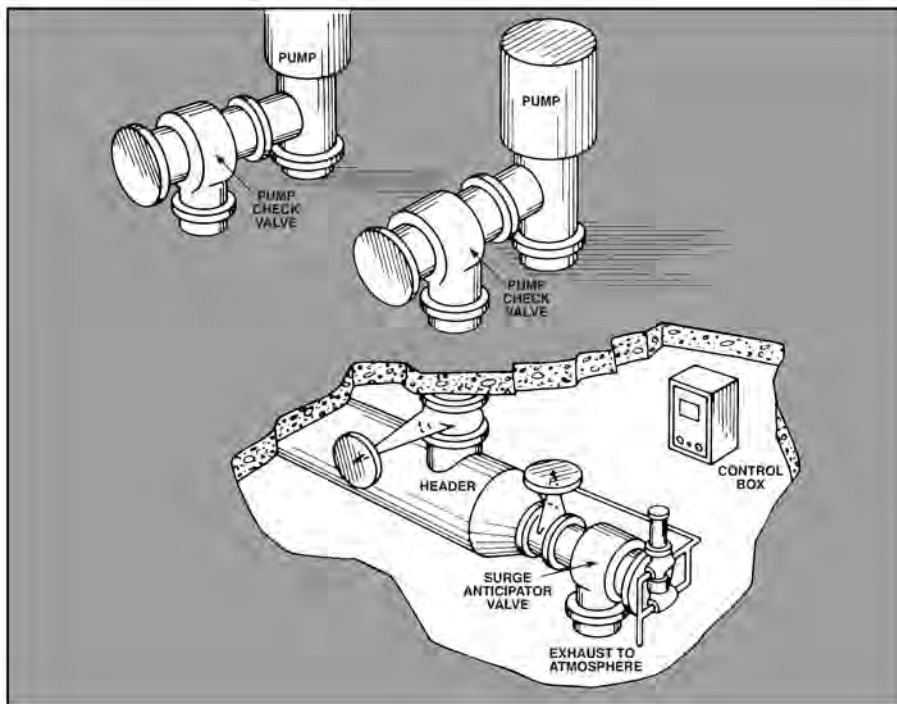
The unique surge anticipator "Surge Sentinel" is a dramatic break through in the implementation of micro solid state electronics combined with an hydraulic valve to provide maximum range of protection against surge and water hammer.

## What does it do?

The surge anticipator "Surge Sentinel" functions to protect a pumping system from destructive overpressures by opening a valve in response to causes of a pressure surge.

## Where it is installed?

The surge anticipator valve is installed off the main header downstream of the pump check valve(s) and discharges to sewer or atmosphere.



## Transient Overpressure Protection!

YES, the GA Electronic Surge Anticipator, using the miracle of solid state electronics and space age components offers maximum protection for your system against surge and water hammer.

ONLY GA Industries Inc. offers features, available now for the first time, to guard against damage from overpressure resulting from surge.

ONLY GA Industries Inc. offers the combination of a reliable hydraulic valve, the sensitive-adjustable range control box, and the years of experience—to protect your water system.

## Advantages

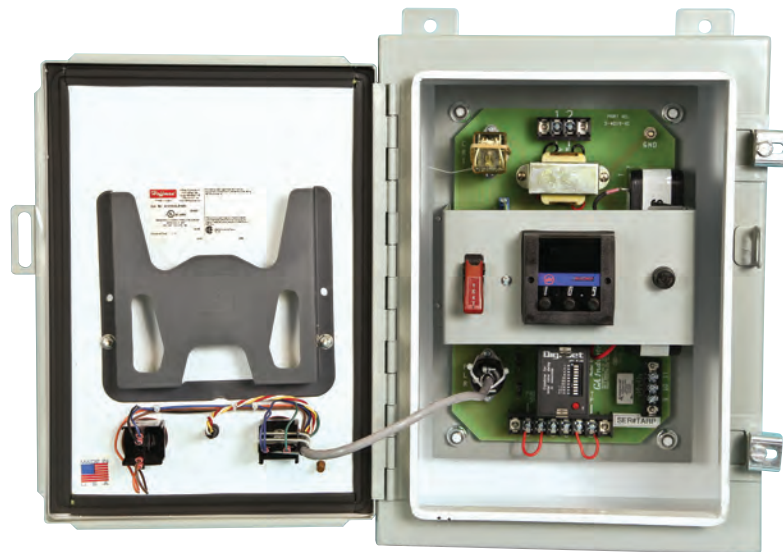
1. A dependable timing device (adjustable) permits coordination of valve operation with initial pump start up.
2. A dependable timing device (adjustable) permits coordination of valve operation with timing of return surge wave.
3. The electronic controls function independent of main pump station power source, so main power outage does not impair the operation of the surge anticipator.
4. Small orifices and impulse lines, normally subject to clogging from foreign matter and dirt are minimized — thereby providing maximum operational dependability.
5. The electronic control unit is provided with many test-check features to facilitate a maintenance and operational dependability periodic check program.
6. The surge anticipator utilizes an overpressure pilot which operates the unit on over pressure, independently of the electronic controls.
7. The unique long life battery in the control box is designed with a temperature compensated, constant current, trickle charger.
8. Dual operating modes (A and B) are optional with selector switch.
9. The hydraulic valve is completely bronze trimmed, with "V" port seat opening, adjustable closing speed, provides tight closure, and is available in either Angle or Globe Body design.
10. The electronic control box can be protected with a padlock to prevent tampering.

**YES**, the GA Industries "Surge Sentinel" is a new dimension in protection against the dangers of surge and water hammer. Our engineers and representatives will be glad to discuss your applications and furnish additional information.

# Features

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1. Light signal to show operational condition of battery and/or fuse.
2. Light signals show operational posture of control box.
3. Adjustable surge wave timer with 30 second range (greater range available).
4. Adjustable Delay Timer—range up to 300 seconds, preventing premature valve operation on initial pump start up.
5. Manual cycle test switch to indicate operation viability.
6. Extra heavy NEMA 12 control enclosure.
7. All mini solid state electronics.
8. Dual mode (A and B) operation optional with select switch.
9. Limit switch on valve indicator for panel lite, etc.
10. Extra heavy abnormal surge pilot with easy adjustment.
11. Surge Anticipation through solenoid pilot-pressure switch control.
12. Valve provides modulating opening.
13. Valve provides tight closure when closed.
14. All bronze internal parts in valve.
15. “V” type seat opening to prevent surge from valve opening and closing.
16. Valve available in ANGLE or GLOBE body design—sizes to 24”.
17. Contact closure provided for remote signal transmission.
18. Long life, constant current, temperature compensated trickle charged battery.
19. Valve seat design places maximum velocity of water downstream of the seat contact—thereby minimizing effects of cavitation—consequently, — minimum wear and maximum life.



**Control Box**



**Surge Sentinel™ Electronic Control Box**

# Operating Instructions

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## **Installation** (page 7)

The valve is installed with the flow entering the valve in accordance with the arrow indication on the drawing or name tag on the valve. It is recommended that an isolating gate valve be installed on the inlet side of the surge valve to permit servicing and testing.

The power water control lines must be made to the main header. Users are discouraged from connecting impulse or power lines into the inlet side of the surge valve body. During high rates of discharge, pressures within the valve may drop quite low due to a venturi effect at high velocities. The resulting pressure may be an inaccurate representation of the system pressure or may be too low to close the valve. There is usually adequate pressure in the header and header pressure is more representative of the system pressure.

All electrical connections to the control box must be made by referring to the appropriate drawings. The electronic control box 120 volt A.C. power must originate from the same source as the pump power. A power failure to the pumps must also be a power failure to the electronic control box.

## **Valve Operation** (pages 8 & 9)

The main valve operates on the differential area principle and contains just one moving part—the piston part No 2. The upper surface area of the piston is considerably greater than the lower or seating surface area. When equal pressures are applied to both surfaces, there is a powerful closing force equal to the difference in areas times the working pressure.

To open the main valve, all that is required is to exhaust the pressure atop the valve piston to atmosphere. Line pressure under the piston will then force the piston open. To close the main valve, pressure is re-admitted to the top of the main valve piston.

The various controls attached to the valve cover provide the means by which the main valve is opened or closed.

## **Sequence of Operation – Main Valve** (page 7)

The main valve is controlled directly by a two-way 24 volt solenoid pilot valve and a normally closed, spring loaded, diaphragm operated, over pressure, pilot valve. These pilot valves are installed on the main valve in parallel.

When either pilot valve opens, pressure will be exhausted from atop the main valve piston at a faster rate than it can be admitted through needle valve “A”. The pressure on the underside of the piston will then force the piston to the open position. After the particular pilot valve recloses, then the constant supply of water entering the top of the main piston, through needle valve “A”, cannot escape. The pressure builds up and forces the piston into the closed position. The closing speed is adjusted by needle valve “A”.

## **Over Pressure** (page 7)

Should an over pressure condition occur, over pressure pilot “J” will open once the over pressure exceeds the spring adjustment. Once open, pilot “J” will vent to atmosphere the pressure atop the main valve piston at a greater rate than the pressure can enter through needle valve “A”. This action will cause the main valve to open. When the over pressure subsides, pilot “J” will close. The constant trickle of pressure entering the top of the main valve cover through needle valve “A” cannot escape. The pressure builds up and returns the main valve to its normal closed position. The main valve will close at a rate set on the closing speed control valve “A”. The over pressure pilot will take precedence over any other control.

## **Electronic Control Sequence** (page 7)

In the control piping from the top of the main valve piston and parallel to the over pressure pilot “J” is a two-way 24 volt solenoid pilot valve “E”. Solenoid pilot “E” is normally de-energized and closed. An electrical power failure to the pumps will cause the solenoid “E” to become energized by way of the internal battery within the control box. The open solenoid then exhausts to atmosphere the pressure atop the main valve piston. The main valve opens wide in anticipation of the over pressure surge shortly to arrive.

Simultaneously with energizing the solenoid, the main timer within the control box begins its sequence. After a pre-set time has elapsed, the solenoid pilot “E” is de-energized closing its internal port. The constant trickle of pressure entering through needle valve “A” once again causes the main valve to close. The closing speed needle valve “A” should be initially set at approximately one turn opened and modified to suit during testing of the valve.

## **Electronic Control Box** (page 11)

On the control box door there are two main indicator lights. One light is amber which may flash or display a steady light. The other light is a split lens, two color (red and green), dual lamp indicator. The green lamp may flash or display a steady light.

## **Steady Amber (on delay)** (page 11)

Simultaneously with the initial starting of a pump, a steady amber indication is given which is termed the “on delay”. This “on delay” is adjusted by way of the small timer “E”. Its function is to delay arming the control box for a specified period during a normal pump start-up where pressure transients may be experienced and it is preferred that the control box not respond.

To initiate the “on delay” cycle, the following conditions must be met.

1. There must be A C power to the control box.
2. The system pressure must exceed the pressure switch setting.
3. There must be continuity between terminals 7 and 8 which indicates a pump has started. (Terminals 7 and 8 in some installations can be jumpered negating the last pump off feature.)

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## **Steady Green (ready)**

After the preset time period, steady amber light will go out and the "green" portion of the split lens indicator will light steady indicating the box is "armed" and will respond as required.

## **Mode Switch** (page 11)

On the left center portion of the control box panel is the "mode switch". The mode switch permits selecting either of two operating methods.

In the "B" mode, the control box, when armed will respond to a pressure switch actuation (downsurge) or a power failure to the pumps. The solenoid pilot "E" will be energized opening the main valve.

With the mode selector switch in the "A" mode, the control action is the same as for the "B" mode with the exception that the control box will not respond to a power failure unless accompanied by a downsurge, (pressure switch actuation). This feature precludes the opening of the surge valve upon a power failure where no significant surge would have resulted. For example, a power failure to a small pump in a large pumping station may not result in any significant surging. The "A" mode operation requires a downsurge low enough to open the pressure switch contacts before the surge valve will respond.

## **Red Light (valve open)** (page 11)

Whenever the control box response to a pressure switch or power failure signal and the valve solenoid pilot "E" becomes energized, the "red" portion of the split lens indicator will light. This steady "red" light will remain lit for the duration of time set on the main surge wave timer—B.

At the completion of the valve open sequence, and timer B has timed out following a power failure, all of the control box indicator lights will be out until there is once again A.C. power.

## **Flashing Green (off delay)** (page 11)

Following the normal shut-down of the last pump, continuity between terminals 7 and 8 will be opened. The flashing green light indication will begin and continue flashing for 30 seconds after the pump has been shut down. The control box during this time is still armed and will respond.

## **Flashing Amber (stand by)** (page 11)

After the 30 second duration of the flashing green light transpires, the flashing amber indication will begin. The amber will continue to flash indicating the control box is on stand-by until a pump is once again started. The control box is not armed during this time.

## **Last Pump Off Feature** (page 11)

Terminals 7 and 8 within the control box should be connected to a relay in the pump starter circuit, in parallel, so that the control box is aware of any pump that is running. The jumper should be removed.

If it is impractical to connect terminals 7 and 8 to the pumps, the jumper may be left in place. This means the control box will respond to power failures or subnormal pressure conditions whether a pump is running or not.

## **Battery/Circuit Indicator** (page 11)

The small light in the lower center of the control box door is a tri-chromatic L.E.D. indicator which by way of a red, yellow, or green light will indicate the condition of the battery or associated circuitry. The "green" light denotes a satisfactory condition while a "red" light signifies a fault in the battery, battery charger, line voltage, or fuse. The yellow light is a short transitional phase between red and green.

The battery condition is being monitored by a unique temperature compensated battery condition circuit. Charging current is accurately maintained at 100 Ma. The battery, rated at one amp hour, is a G.E. NiCad "Gold Top" quality, 24 volt of the sealed cell design.

## **Power Failure Sequence** (page 11)

When a power failure occurs to the pumps, the D.C. solenoid pilot "E" become energized, the main valve will open as explained previously. Simultaneously, the main timer, timer B, will begin its sequence. When the pre-set timer runs out, the solenoid pilot (page 7) again be de-energized. The main valve will have opened, remain full open for a specified period, then reclosed at a controlled rate of speed.

## **Valve Testing** (page 11)

The control box is provided with a manual test button C. This button, when pressed momentarily, will simulate a power failure and cause the main valve to open as described in the power failure paragraph.

It is recommended that the valve be tested periodically to assure proper operation when necessary.

Before testing the main valve, the isolating gate valve upstream of the main valve should be closed and reopened about three or four turns of the handwheel. This will provide adequate pressure to test the valve without disturbing the entire water system.

The closing speed of the main valve can be checked at this time. The valve should be set for a very slow closure by way of needle valve "A". (page 7)

## **Pressure Switch** (page 7)

A pressure switch, when used, is connected with its normally open contacts across terminals three and four. The switch senses under-pressure conditions and opens the main valve as on a power failure. When a pressure switch is not required, a jumper is installed across terminals 3 and 4 (page 11). Typically, the pressure switch is set for about one-half the static system pressure.



# Operating Instructions

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## Start-Up

Assuming the valve is correctly installed and all electrical connections properly made, and with the main valve inlet gate closed, electrical power may be admitted to the control box. Water pressure may be admitted to the controls of the surge valve. Any convenient pipe plug or union should be slightly loosened to purge air from the controls and main valve piston. The limit switch should be checked for proper position. The limit switch is not required for valve operation, but is provided for customer's use.

When the "green" ready light comes on, the surge valve is ready for its initial test. Open the inlet gate valve three or four turns to admit water into the valve inlet. Pressing the valve cycle test button will cause the main valve to open as described before. The valve opening may be slowed due to a partially open inlet gate. The valve will close after timer "B" times out and the closing speed may be modified if desired.

When sufficient testing has been done to assure proper operation, the inlet gate may be opened fully and the valve is now fully operational.

## Sizing Surge Anticipator Valves

Our engineering department will be glad to assist you in proper size valve selection. Our Engineers Automatic Valve Reference Catalog, furnished at all GA Industries, LLC seminars, deals in greater detail on the subject of proper selection of valve size. A copy of this valuable catalog is available to you upon request on your letterhead to our home office.

## Maintenance

When the valve is first installed, a small drip or slight leakage may appear at the valve air vent—part no 22. When the seals become soft and pliable, this leakage should stop.

An excessive leakage from the air vent may indicate the seals are worn and need to be replaced. Refer to instructions on valve dismantling.

Suggested parts required for overhauling the main valve are: Piston Cup, Part No. 4; Liner Cup, Part No. 7; Cover Gasket, Part No. 15; and Seat Rubber, Part No. 10.

The battery is sealed and requires no maintenance, and should last 5 to 7 years or longer.

## Trouble Shooting (page 7)

If the valve fails to open during a test or actual power failure:

1. Check Solenoid Pilot "E" for coil burn-out or other malfunction.
2. Check exhaust line from controls for blockage.
3. Inlet gate must be open.
4. Battery power too low.

If valve fails to close, once open:

1. Check for adequate pressure in controls.
2. Make sure hand valve "A" is not closed or fouled.
3. Check solenoid pilot for proper action. Solenoid should be de-energized and closed. No leakage or flow should appear from the controls or exhaust line.
4. Check solenoid "E" for malfunction. (Any experimenting with control pilots should be done with the inlet gate valve nearly closed.)

## Additional Comments

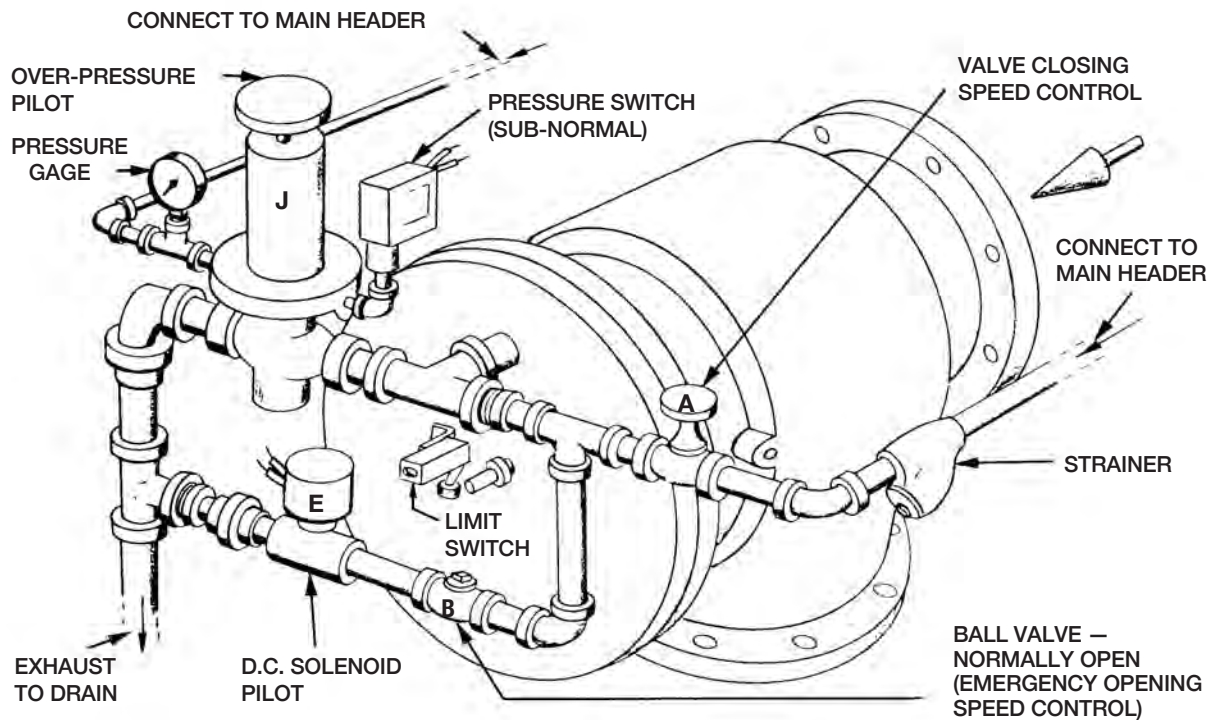
- A. The main timer B setting equals one critical period of the pipe. Factory set per specs.
- B. The small timer E (page 11), "on delay" setting, customer to set to suit. A setting of 2 is typical. Each digit is about 25 seconds from a setting of 2 and higher, below 2, the timer is nonlinear.
- C. The battery circuit fuse used is 2 AMP to protect against high discharge rates due to a short.
- D. Terminals 9, 10, and 11 provide a means of obtaining a remote indication of the status of the control box. A relay is provided with a normally open and normally closed contacts. When the "green" ready light is on, contacts 10 and 11 are closed, and 9 and 10 are open. Any condition which causes the "red" valve open light to come on or the "red" battery circuit indicator L.E.D. to light will reverse the relay to its normal state. Terminals 9 and 10 will be closed, terminals 10 and 11 will be open.

The box supplies no power to these terminals. It is strictly a contact closure for the customer's use indicating a valve open condition or fault in the battery circuitry or fuse.

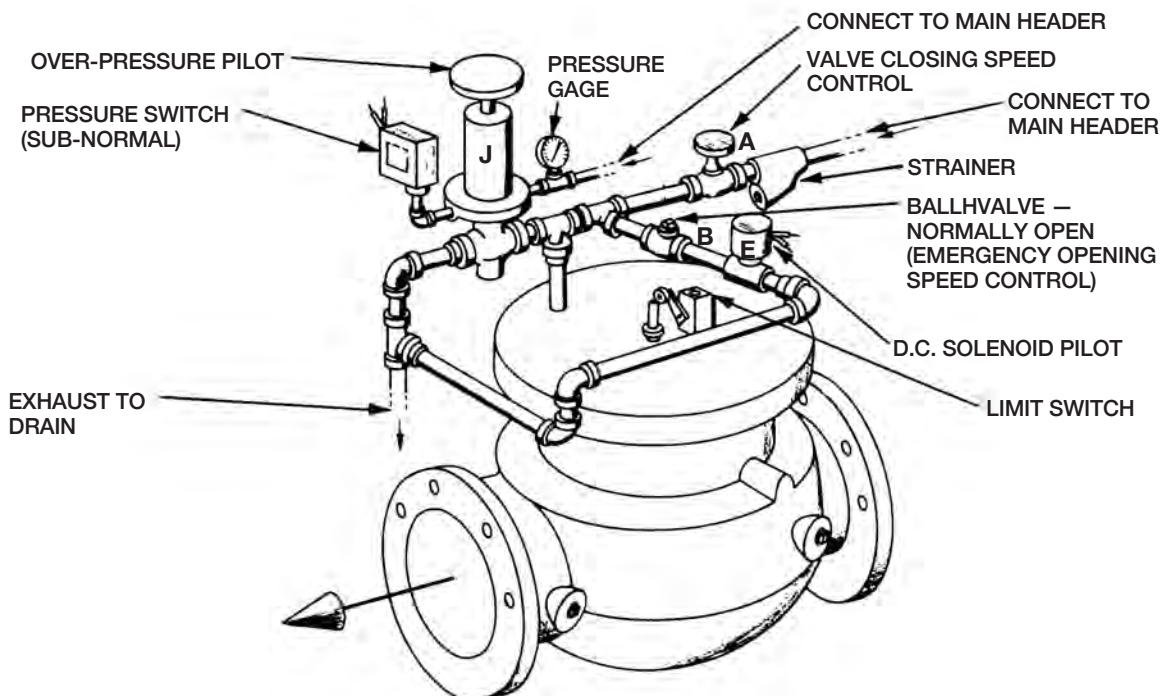
# Globe and Angle Parts

Valve may be installed in any position  
AND controls may be panel mounted (option).

## Angle Body

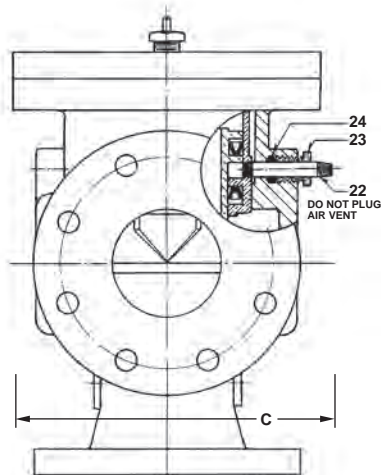
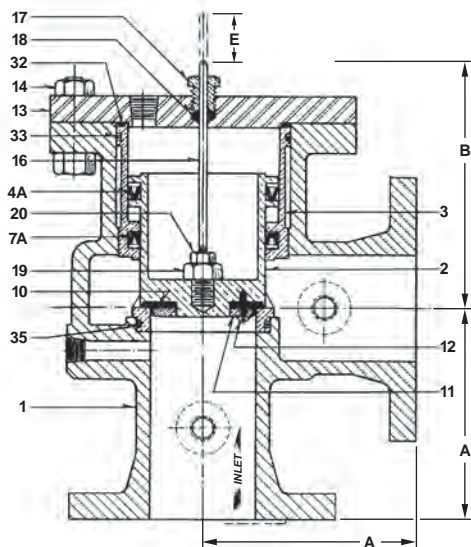


## Globe Body



# Angle Body • Dimensions and Parts

## 2½" – 10" Angle Body



Flanges Per  
ANSI B 16.1

		2½"		3"		4"		6"		8"		10"	
		In.	MM	In.	MM	In.	MM	In.	MM	In.	MM	In.	MM
A	Center to Face	6	152	6	152	6½	165	8¾	222	11¼	286	14¼	362
B	Center to Top	8	203	8	203	9	229	11	279	13	330	16	406
C	Side Clearance	9	229	9	229	11	279	16	406	20	208	24	610
E	Stroke	1¾	35	1¾	35	1¾	41	2¼	57	3	76	3¾	

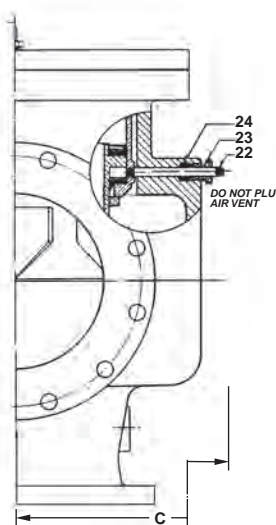
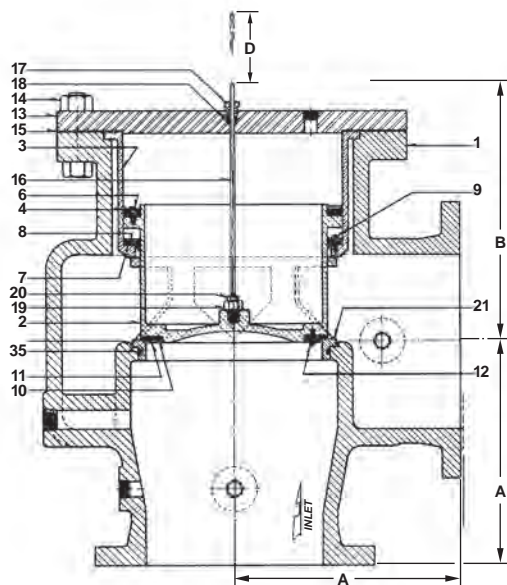
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### List of Parts

- |                       |                      |                       |
|-----------------------|----------------------|-----------------------|
| 1 Body                | 13 Cover             | 23 Vent Bushing       |
| 2 Piston              | 14 Cover Bolts       | 24 Vent Packing       |
| 3 Liner*              | 16 Indicator Rod     | 32 Cover O Ring       |
| 4A Piston U Cup       | 17 Indicator Gland   | 33 Top Liner O Ring   |
| 7A Liner U Cup        | 18 Indicator Packing | 34 Upper Liner O Ring |
| 10 Seat Ring          | 19 Indicator Bushing | 35 Lower Liner O Ring |
| 11 Seat Ring Follower | 20 Indicator Locknut |                       |
| 12 Follower Screws    | 22 Vent Tube         |                       |

\*NOTE: Part No. 3 on 8" and 10" size valves is in two pieces.

## 12" – 20" Angle Body



Flanges Per ANSI

		12"		14"		16"		18"		20"	
		In.	MM	In.	MM	In.	MM	In.	MM	In.	MM
A	Center to Face	15½	394	16½	419	18	457	20½	521	20½	521
B	Center to Top	17	432	20	508	23	584	26	660	26	660
C	Center to Side	13	330	15	381	18	457	20	208	20	208
D	Stroke	4⅞	124	5⅞	130	6⅞	175	7⅞	202	7⅞	202

Consult factory for 24" dimensions and parts list.

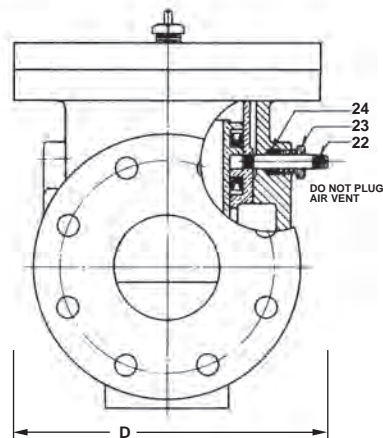
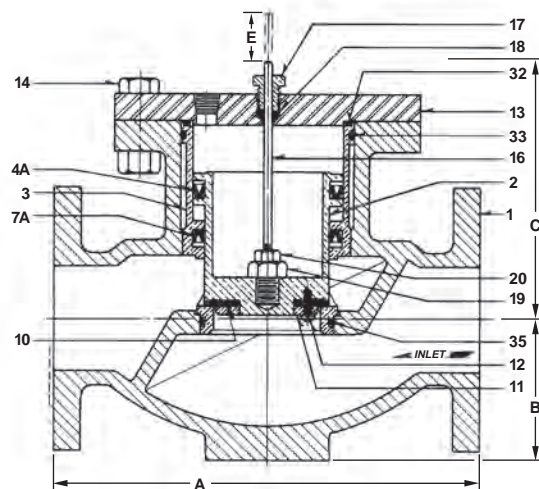
### List of Parts

- |                          |                       |                       |
|--------------------------|-----------------------|-----------------------|
| 1 Body                   | 10 Seat Ring          | 19 Indicator Bushing  |
| 2 Piston                 | 11 Seat Ring Follower | 20 Indicator Locknut  |
| 3 Liner                  | 12 Seat Ring Screws   | 21 Seat Crown         |
| 4 Piston Cup             | 13 Cover              | 22 Vent Tube          |
| 5 Piston Cup Follower    | 14 Cover Bolts        | 23 Vent Tube Gland    |
| 6 Piston Follower Screws | 15 Cover Gasket       | 24 Vent Gland Packing |
| 7 Liner Cup              | 16 Indicator Rod      | 35 Seat Crown O Ring  |
| 8 Liner Cup Follower     | 17 Indicator Gland    |                       |
| 9 Liner Follower Screws  | 18 Indicator Packing  |                       |



# Globe Body • Dimensions and Parts

## 2½" – 10" Globe Body

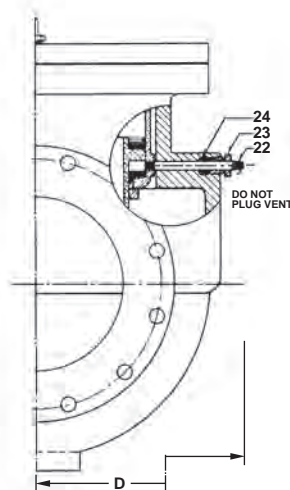
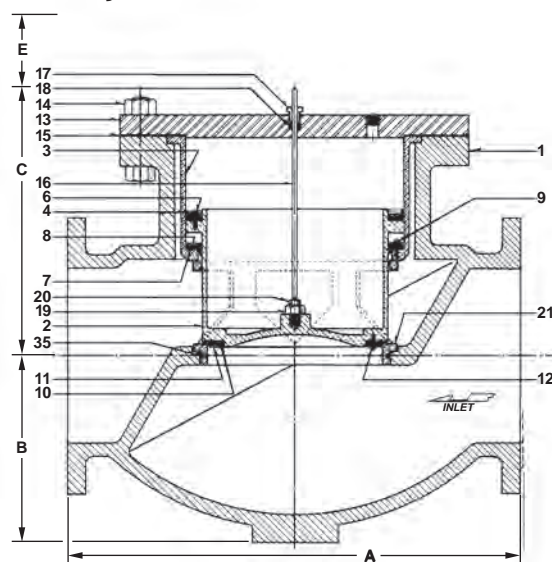


Flanges Per ANSI B 16.1		2½"		3"		4"		6"		8"		10"	
		In.	MM	In.	MM	In.	MM	In.	MM	In.	MM	In.	MM
A	Face to Face	12	305	12	305	13	330	18	457	24½	622	26	660
B	Center to Bottom	4¼	108	4¼	108	5¼	133	6½	165	8¼	210	9¼	248
C	Center to Top	8	203	8	203	9	229	11	279	14	356	16	406
D	Side Clearance	9	229	9	229	10	254	14	356	18	457	24	610
E	Stroke	1⅞	35	1⅞	35	1⅞	41	2¼	57	3	76	3¾	95

- List of Parts**
- |                       |                      |                       |
|-----------------------|----------------------|-----------------------|
| 1 Body                | 13 Cover             | 23 Vent Bushing       |
| 2 Piston              | 14 Cover Bolts       | 24 Vent Packing       |
| 3 Liner*              | 16 Indicator Rod     | 32 Cover O Ring       |
| 4A Piston U Cup       | 17 Indicator Gland   | 33 Top Liner O Ring   |
| 7A Liner U Cup        | 18 Indicator Packing | 35 Lower Liner O Ring |
| 10 Seat Ring          | 19 Indicator Bushing |                       |
| 11 Seat Ring Follower | 20 Indicator Locknut |                       |
| 12 Follower Screws    | 22 Vent Tube         |                       |

\*NOTE: Part No. 3 on 8" and 10" size valves is in two pieces.

## 12" – 20" Globe Body

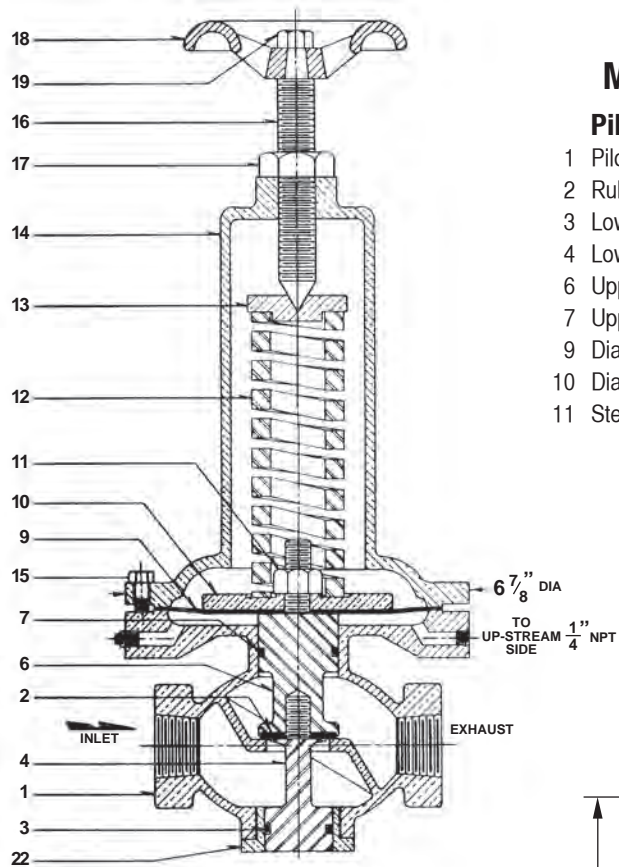


Flanges Per ANSI		12"		14"		16"		18"		20"	
		In.	MM	In.	MM	In.	MM	In.	MM	In.	MM
A	Face to Face	31	787	33	838	36	914	40	1016	40	1016
B	Center to Bottom	13	330	12¼	311	13½	343	17	432	17	432
C	Center to Top	18	457	20	508	24	610	27	686	27	686
D	Center to Side	14	356	15	381	16	406	20	508	20	508
E	Stroke	4⅞	124	5⅞	130	6⅞	175	7⅞	202	7⅞	202

- List of Parts**
- |                          |                       |                       |
|--------------------------|-----------------------|-----------------------|
| 1 Body                   | 10 Seat Ring          | 19 Indicator Bushing  |
| 2 Piston                 | 11 Seat Ring Follower | 20 Indicator Locknut  |
| 3 Liner                  | 12 Follower Screws    | 21 Seat Crown         |
| 4 Piston Cup             | 13 Cover              | 22 Vent Tube          |
| 5 Piston Cup Follower    | 14 Cover Bolts        | 23 Vent Tube Gland    |
| 6 Piston Follower Screws | 15 Cover Gasket       | 24 Vent Gland Packing |
| 7 Liner Cup              | 16 Indicator Rod      | 35 Seat Crown O Ring  |
| 8 Liner Cup Follower     | 17 Indicator Gland    |                       |
| 9 Liner Follower Screws  | 18 Indicator Packing  |                       |

Consult factory for 24" dimensions and parts list.

# Relief Pilot • Parts and Dimensions



## Pilot Parts for Main Valve Sizes 12" – 16"

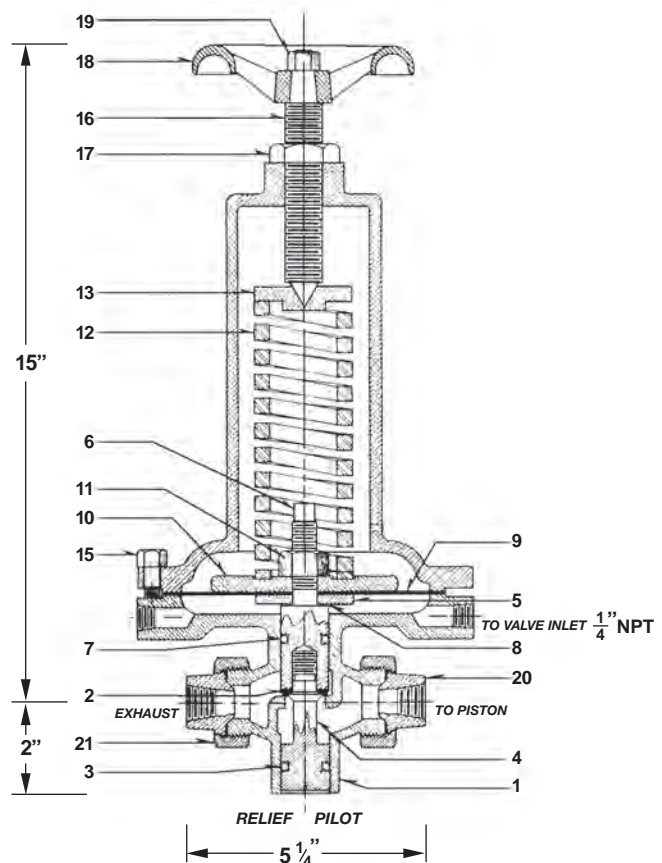
### Pilot Parts

- |                   |                      |
|-------------------|----------------------|
| 1 Pilot Body      | 12 Spring            |
| 2 Rubber Seat     | 13 Spring Guide      |
| 3 Lower O-Ring    | 14 Spring Chamber    |
| 4 Lower Stem      | 15 Chamber Screws    |
| 6 Upper Stem      | 16 Adjusting Screws  |
| 7 Upper O-Ring    | 17 Screw Locknut     |
| 9 Diaphragm       | 18 Handwheel         |
| 10 Diaphragm Disc | 19 Handwheel Locknut |
| 11 Stem Nut       | 22 Body Bushing      |

## Pilot Parts for Main Valve Sizes 2" – 10"

### Pilot Parts

- |                    |                     |
|--------------------|---------------------|
| 1 Pilot Body       | 12 Spring           |
| 2 Rubber Seat      | 13 Spring Guide     |
| 3 Lower O-Ring     | 14 Spring Chamber   |
| 4 Lower Stem       | 15 Chamber Screws   |
| 5 Diaphragm Washer | 16 Adjusting Screws |
| 6 Upper Stem       | 17 Screw Locknut    |
| 7 Upper O-Ring     | 18 Handwheel        |
| 8 Stem Gasket      | 19 Handwheel Nut    |
| 9 Diaphragm        | 20 Tail Piece       |
| 10 Diaphragm Disc  | 21 Union Ring       |
| 11 Stem Nut        |                     |



120V-60HZ POWER MUST COME FROM SAME  
SOURCE AS PUMP POWER

CYCLE TEST SWITCH WITH GUARD FOR TESTING VALVE AND CONTROL BOX. (SEE INSTRUCTIONS)

DOOR LIGHT SOCKET. PERMITS REMOVAL OF INTERNAL CONTROL PANEL

DELAY TIMER 0-1000 SECONDS ADJUSTABLE. PREVENTS VALVE ACTUATION DURING INITIAL PUMP START-UP.

PRESSURE SWITCH ON SURGE VALVE

24 VDC SOLENOID PILOT ON VALVE —  
(ENERGIZE TO OPEN MAIN VALVE) —

TO PREVENT VALVE ACTUATION WHEN A POWER FAILURE OCCURS WITH NO PUMP RUNNING, REMOVE JUMPER AND CONNECT CONTACTS 7&8 TO EACH PUMP CONTACTOR IN PARALLEL. FOLLOWING LAST PUMP SHUT DOWN, CONTROL BOX WILL WAIT 30 SECONDS THEN DE-ACTIVATE POWER FAILURE AND SUBNORMAL FEATURE. WITH JUMPER, BOX IS ALWAYS ACTIVE.

(USERS OPTION) TERMINALS 9,10,&11 PROVIDE MEANS OF REMOTE INDICATION OF STATUS OF CONTROL BOX. ANYTIME "RED" BATTERY CIRCUIT LIGHT OR VALVE OPEN "RED" LIGHT COMES "ON" CONTACTS 9 & 10 WILL CLOSE. THE CONTROL BOX PROVIDES NO POWER TO 9,10,OR 11.

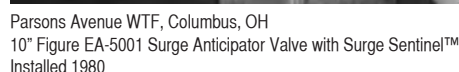
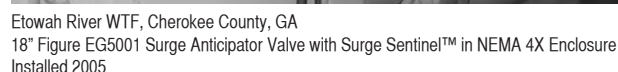
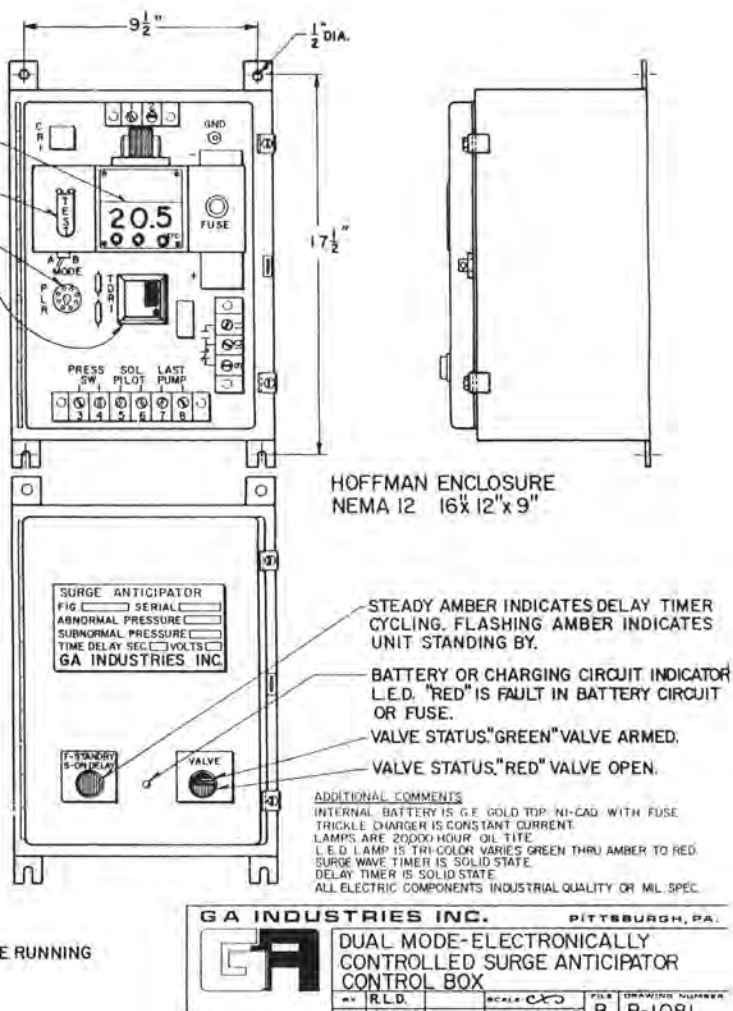
### GENERAL SEQUENCE OF OPERATION

A. MODE. (CONTACTS 7 & 8 WIRED TO PUMP CONTROLS)

1. SURGE VALVE WILL OPEN ON A PUMP POWER FAILURE ONLY IF ACCOMPANIED BY A DOWNSURGE BELOW THE SETTING OF THE PRESSURE SWITCH.
2. VALVE WILL THEN REMAIN OPEN UNTIL SURGE WAVE TIMER TIME TRANSPIRES, THEN RECLOSE.
3. SURGE VALVE WILL OPEN ANYTIME SYSTEM PRESSURE EXCEEDS THE OVER PRESSURE PILOT SETTING.
4. TO CYCLE TEST SURGE VALVE, A.C. POWER IS REQUIRED AND PRESSURE SWITCH CONTACTS, CLOSED OR JUMPED.

B MODE (CONTACTS 7&8 WIRED TO PUMP CONTROLS)

1. SURGE VALVE WILL OPEN ON EVERY POWER FAILURE IF A PUMP WERE RUNNING  
2. OTHER SEQUENCES SAME AS MODE "A".



Valve Size	2 1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Weight	290	290	420	600	800	1175	1850	2000	2530	3900	3900	6300



# Specifications

## General

The function of the electronically controlled surge anticipator valve control box is to open a surge valve in response to events which create pressure surges such as a pump power failure or pump failure which is not a power failure. The surge valve will then be fully open before the returning surge arrives at the valve. The surge valve will, after a pre-set time delay, close slowly. The surge relief valve shall respond at any time to over pressure surges independently of the electronic controls.

## Operation

The control box shall be capable of operating in either one of two different modes depending on the system requirements. The two modes termed "A" and "B" shall be selected by a switch position within the box.

In either mode, the control box shall be provided with an adjustable time delay feature which can preclude any surge valve action for a pre-set time period on initial pump start-up. The control box will then not respond to minor or insignificant surges normally associated with the start-up of pumps which employ conventional mechanical check valves. The adjustment period shall be zero to 300 seconds. During this time period, a steady amber light indication shall be given on the control box door.

In the "A" mode, the following sequences shall be provided.

1. The control box shall cause the surge valve to open on a downsurge anytime a pump has been running and for approximately 30 seconds after a power failure or the last pump is shutdown. A steady green panel light indication on the control box door shall indicate the control box is armed and will respond to a downsurge. After a power failure or shutting down of the last pump, and for the 30 second period in which the control box is still armed, a flashing green panel light indication shall be given. After approximately 30 seconds, the flashing green light shall cease and the flashing amber begins indicating the control box is standing by for an initial pump start-up.
2. The control box shall be provided with an adjustable surge wave timer on which the duration of time the surge valve is to be fully open can be adjusted. Anytime the control box commands the surge valve to open, a steady red light indication shall be given on the control box door. After the time period on the adjustable zero to 30 seconds surge wave timer transpires, the red light shall go out and the surge valve will begin to close. The

control box at this time shall be completely de-activated. When normal system pressure and A.C. power is once again restored, a flashing amber light indication shall be given and the control box shall be prepared to arm itself.

In the "B" mode selected by a switch position, the control box and surge valve operation shall be similar to the "A" mode with the following addition, the control box shall command the surge valve to open anytime a power failure occurs while a pump is running and for 30 seconds after the last pump is shutdown.

## Construction

The electronic controls shall be housed in a gasketed NEMA 12 enclosure with provision for a pad lock. All electronic components shall be of industrial quality or military specifications.

The electric power for control of the surge relief valve shall come from a power supply within the control box consisting of a fused 24 volt G.E. "Gold Top" NiCad battery of one ampere hour capacity. A constant current battery charging circuit shall assure the battery is fully charged. A battery condition circuit shall be provided with its own indicating light on the control box door, displaying a green light for normal battery condition and charger circuit operations. An abnormal charging circuit, battery condition, or blow fuse shall be indicated by a red light.

Provision shall be provided for periodically manually testing the surge valve and control box by way of a momentary contact switch. The switch shall be provided with a military type switch guard to preclude inadvertent valve actuation.

The mode switch shall be located at a relatively inaccessible place on the control board to preclude unauthorized tampering.

All surge valve condition indicator lights shall be of the oil tight types with 20,000 hour lamps and shall be connected to the control box panel board by way of a plug and receptacle. The control box panel board shall be removable from the control box in its entirety. A terminal on the control panel shall be provided for grounding.

An auxiliary relay shall be provided within the control box for a means of providing a remote signal indication of the Emergency Status of the Control Box. Any Emergency condition which causes the Red Battery Circuit light or Red Valve Open light to come on will also result in a contact closure which can, if desired, be connected to a telemetry system.

The valve shall operate on the differential piston principle such that the underside of the piston is no less than the inlet pipe area, and the upper surface area of the piston is approximately two times the underside piston area.

The valve shall be guided on its O.D. throughout its entire stroke by long stationary vee ports on the downstream side of the seating area. There shall be no stems, guides, or spokes within the water way. The flow area through a full open valve shall at all times be not less than the inlet pipe area. The valve shall be capable of operating in any position. The valve shall incorporate one flanged cover opening at the top from which all internal parts are accessible.

The valve body shall be constructed of Cast Iron ASTM A-126-B with flanges conforming to latest ANSI standards. The valve shall be of extra heavy construction throughout. The interior operating surfaces of the valve shall have an easily renewable resilient seat and replaceable seals.

All controls and piping shall be non-corrosive construction. A visual position indicator shall be provided for observing valve position at any time, which is directly attached to the valve piston.

The valve body shall be capable of withstanding hydrostatic test pressures of 1 1/2 times the working pressure.

The valve shall not employ any diaphragms or springs to assist its closing.

A limit switch shall be provided for panel light indication of the surge valve being open. A pressure gage shall be provided on the valve controls for reading system pressure.

The electronically controlled surge anticipator and control box shall be of first class workmanship throughout and furnished by suppliers experienced with the water hammer phenomenon and its control.

The surge anticipator shall be as furnished by GA Industries, LLC of Cranberry Township, Pennsylvania, and shall be their figure number EA-5001-BD angle pattern valve or EG-5001-BD for the globe pattern valve.

## WARRANTY

This GA INDUSTRIES product is made of the finest available suitable materials and every possible precaution has been taken to assure premium workmanship consistent with established quality control. Valves or parts which are proved faulty due to defective materials or poor workmanship will be replaced free of charge, F.O.B. our plant upon presentation of such proof. This warranty shall not cover the cost of installation and is valid for a period of one year from date of shipment. Specifications are subject to change, certified prints upon request with order.



9025 Marshall Road  
Cranberry Township, PA 16066-3696 USA  
Phone: (724) 776-1020 · Fax: (724) 776-1254  
www.gaindustries.com  
Email: ga@gaindustries.com



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