

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

**Figures 220-D, 220-DS, 220-U and 220-US  
Drawing C- 1146**

**2-1/2" to 20"**

**Lever & Weight Swing Check Valves**

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# INSTALLATION, OPERATION and MAINTENANCE

## Figures 220-D, 220-DS, 220-U, 220-US Lever & Weight Swing Check

### INTRODUCTION

This manual will provide the information to properly install, operate and maintain the valve to ensure a long service life. The Figure 220 Swing Check Valve is ruggedly constructed to provide years of trouble-free operation with minimal maintenance.

#### CAUTION

The valve is NOT recommended for use with toxic or highly corrosive fluids, fuels or fluids containing hazardous gases

The Shop Order (SO) Number, Figure Number, size and pressure rating are stamped on a nameplate attached to the valve. Please refer to the SO number when ordering parts.

### DESCRIPTION OF OPERATION

The Figure 220 Swing Check Valve is a counter-weighted rubber- or metal-seated check valve designed to permit flow in one direction and close to prevent reverse flow. The valve opens when the inlet pressure exceeds the outlet pressure. The degree of opening depends on the fluid velocity through the valve. The valve will swing closed as fluid velocity decreases and be fully seated before flow reversal precluding slam and bang.

### RECEIVING AND STORAGE

Inspect the valve upon receipt for damage during shipment. Carefully unload all valves to the ground without dropping.

The valves should remain in a clean, dry and weather protected area until installed. For long term storage (greater than 6 months) the rubber surfaces of the seat should be coated with a non-toxic lubricant such as "SuperLube" made by Synco Chemical. Do not expose the rubber parts to sunlight or ozone.

### INSTALLATION

Figure Numbers suffixed with "D" indicated the valve has ANSI Class 125 flanged connections, Figure Numbers suffixed with "U" indicate the valve has ANSI Class 250 flanged connections.

Consult the drawings of record to verify the configuration supplied and installed.

Prior to installation ensure all debris, packing material or other foreign material has been removed from both ports.

The valve can be installed in a horizontal or vertical (upward flow direction) pipe. In either case the counterweight arm must be horizontal when the valve is closed.

Install the valve in the proper flow direction. Forward flow should tend to open the valve.

If installed outdoors, below ground in a vault or in an unheated area, adequate freeze protection must be provided.

Adequate isolating valves should be installed between the valve and the pipeline or system to facilitate maintenance.

The valve is not designed to support adjacent equipment, piping loads should not be imposed on the valve and large valves should be properly supported. Ensure mating flanges are square and parallel to the valve flanges before tightening flange bolts.

Flat-faced flanged valves should be mated with flat-faced flanges and full-face gaskets. If ring gaskets are used the bolt material shall be ASTM A307 Grade B (or equivalent). Higher strength bolting should only be used with full-face gaskets.

Lower heavy valves using slings or chains around the valve body and/or the lifting eye. Lubricate the bolts or studs and insert around flange. Lightly tighten bolts until gaps are eliminated. Torque bolts in an alternating pattern in graduated steps. If leakage occurs wait 24 hours and re-torque the bolts but do not compress the gasket more than 50% or exceed bolt maximum torque rating.

### VALVE CONSTRUCTION

The standard Series 220 Swing Check Valve has a cast iron body, bronze or stainless steel (indicated by Figure Number suffixed with "S") body seat, stainless steel hinge shaft and cast iron disc with a rubber disc seat. An "M" suffixed to the Figure Number (e.g., 220-DM) indicates optional metal-to-metal seating

was supplied. Refer to the List of Materials submitted for the order if non-standard materials were provided.

Refer to Page 3 for details of construction and parts location.

### START-UP

The valve generally does not require any calibration or adjustment prior to start-up. The counterweight(s) should be initially placed at the far end of the arm and secured by tightening the set screw (31A).

The valve should smoothly swing open as flow through the valve increases. The amount of opening depends on the flow velocity through the valve and can be observed by watching the external counterweight arm. The valve is "full ported" at about 22 degrees of swing but can swing open as much as 60 degrees.

Shut down the pump and observe the valve's closure. If the valve was less than 60 degrees open and the closure was smooth and quiet then the weight(s) may be moved incrementally toward the shaft. Repeat these steps to the point where the valve opens to the extent possible but still closes quietly.

Non-slam operation is achieved when the counterweight closes the valve prior to flow reversal. In extreme cases, it may be necessary to install additional counterweight(s) to effect non-slam closure.

### PREVENTIVE MAINTENANCE

Figure 220 Swing Check Valves require no scheduled lubrication, adjustment or preventive maintenance.

A monthly inspection should be performed for the first 6 months of operation to ensure the valve is functioning properly and there is no external fluid leakage or audible evidence of water leaking backwards through the closed valve.

Thereafter, a quarterly visual inspection should be performed.

### TROUBLESHOOTING

- Shaft packing leakage  
Tighten packing gland nuts equally just enough to stop leakage, no more than ½ turn at a time. DO NOT OVER-TIGHTEN!  
Replace packing if necessary.
- Leakage past seat when closed  
Inspect valve for debris, clean  
Inspect seating surfaces for damage, replace as necessary
- Leakage past cover or flange gaskets  
Tighten cover or flange bolts
- Disc oscillating when open  
Move counterweight(s) toward shaft
- Valve slams upon closing  
Move counterweight(s) toward end of arm  
Ensure shaft packing is not too tight  
Install additional counterweight(s)

### WARNING

Removing the valve from the line or disassembling the valve while there is pressure in the valve body may result in injury or damage to the valve

### WARNING

Follow all applicable safety regulations and codes and read and understand all instructions before undertaking disassembly.

### DISASSEMBLY

All Figure 220 valves can be serviced while the body remains connected to the pipeline. A skilled technician should perform all work. No special tools are required.

First ensure there is no pressure within the valve and operating equipment is tagged and locked out. Refer to page 5 for parts identification.

It is not necessary to disassemble the entire valve to replace the shaft packing, follow steps 1 to 3 and 5a.

1. Ensure there is no pressure within the valve and operating equipment is locked out.
2. Mark the position of the counterweight(s) on the arm. Loosen the counterweight set screw (31A) and slide the weight(s) off the arm. Loosen the counterweight arm set screws (30A) and slide the arm (30) off the shaft, being careful not to lose the key (30B).
3. Loosen and remove the gland stud nuts (16), slide off the gland (15) and remove the shaft packing (17).
4. Remove the end plate bolts (35), the end plate (34) being careful not to lose or damage the end plate seal (36) unless it is to be replaced
5. Remove the cover bolts (10) and lift off the cover (9). If necessary, carefully pry the cover off using a cold chisel between the body and cover. Be careful not to damage or lose the cover gasket (8) unless it is to be replaced.
6. Remove the shaft lock pin (18) by threading a screw into the tapped hole.
7. With the disc and disc arm properly supported, loosen the disc arm set screw (12) and pull the shaft (11) out of the valve. It may be necessary to drive out the shaft from the opposite end.  
NOTE: The outer bushing (14) and disc arm key (19) should come out with the shaft. Be careful not to lose the disc arm key. After the shaft is out, remove the inner bushing (13) from the opposite side.
8. Carefully lift the disc arm assembly out of the body. Remove the disc nut pin (6B), disc nut (6) and disc nut washer (6A).
9. Remove the seat screws (5C), the seat follower (5B) and the renewable seat (5A) or metal seat washer (5D).

10. In the unlikely event it's necessary to remove the body seat (2), the spring pins holding it into the body must be compressed until they no longer "bite" into the body. This is best accomplished by compressing the seat pins (2B) using "vice-grips" and pulling the pins in a radial direction towards the valve centerline.

Inspect all parts for wear and damage. Replace damaged parts.

### ASSEMBLY

The valve is reassembled by reversing the disassembly sequence with consideration of the following:

- 1a. Clean and polish all machined bearing and sealing surfaces. Apply a light coat of lubricant to assist in the assembly.
- 2a. Ensure the disc arm key slides inside the disc arm before installing the shaft lock pin (18). Ensure the shaft lock pin has dropped into the groove provided for it on the shaft.
- 3a. Install the inner and outer bushings then install the shaft packing. Install the end plate (34) with seal (36). Install and tighten the end plate bolts (35) while ensuring the end plate seal (36) remains in the groove provided for it in the end plate.
- 4a. Lift the disc assembly several times to ensure free closure with no metal-to-metal contact.
- 5a. Wrap the packing around the shaft and cut on a 45-degree angle, staggering the cuts with each ring.
- 6a. Tighten gland bolts evenly until packing is slightly compressed. After pressure has been introduced into the valve, re-tighten evenly until leakage stops.
- 7a. Ensure cover gasket sealing surfaces are clean and apply a thin coat of Permatex™ #2 to both surfaces. Tighten cover nuts in an alternating pattern. Re-tighten as needed after pressure has been introduced.
- 8a. Re-install the counterweight arm (30) with key (30B) and tighten counterweight set screws (30A).
- 9a. Slide counterweight(s) onto shaft and lock in place using set screws (31A). Lift counterweight arm and allow it to fall to ensure free movement.

### REPLACEMENT PARTS

Genuine replacement parts are available from your local GA Industries, LLC representative or from the factory:

GA INDUSTRIES, LLC  
9025 Marshall Road  
Cranberry Township, PA 16066 USA  
Telephone: 724-776-1020  
Fax: 724-776-1254  
E-mail: [parts@gaindustries.com](mailto:parts@gaindustries.com)

Please have the nameplate data available when ordering parts. Identify needed part(s) by Shop Order (SO) Number, Figure Number, valve size and individual part number.

Part No.	Part Name	Std. Material
1	Body	Cast Iron
2	Body Seat	Bronze or SS
2A	Seat O-Ring	Buna-N
2B	Seat Pins	Stainless Steel
3	Disc with Center Pin	Cast Iron/Steel
4	Disc Arm	Ductile Iron
5A*	Renewable Seat	Buna-N
5B	Seat Follower	Bronze or SS
5C	Seat Screws	Stainless Steel
5D	Metal Seat Washer (Opt'l)	Bronze or SS
6	Disc Nut	Steel
6A	Disc Nut Washer	Steel
6B	Disc Nut Cotter Pin	Stainless Steel
8*	Cover Gasket	Fiber
9	Cover	Steel
10	Cover Bolt (and Nut)	Steel
11	Shaft	Stainless Steel
12	Disc Arm Set Screw	Stainless Steel
13	Inner Bushing	Bronze
14	Outer Bushing	Bronze
15	Gland	Cast Iron
16	Gland Stud & Nut	Steel
17*	Packing	Teflon
18	Shaft Lock Pin	Brass
19	Disc Arm Key	Stainless Steel
30	Counterweight Arm	Ductile Iron/Steel
30A	C'weight Arm Set Screw	Stainless Steel
30B	Counterweight Arm Key	Stainless Steel
31	Counterweight(s)	Cast Iron
31A	Counterweight Set Screw	Stainless Steel
33	Cover Plug (18" & 20" only)	Steel
34	Shaft End Plate	Steel
35	Shaft End Plate Screws	Steel
36*	Shaft End Plate Seal	Buna-N

\* Recommended spare parts

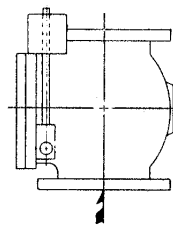
# LIST OF PARTS

1	BODY	19	DISC ARM KEY
2	SEAT	20	COVER PLUG
3	SEAT WASHER	21	INNER BUSHING
4	DISC ARM	22	GLAND STUDS
5	DISC ARM SET SCREWS	23	END PLATE BOLTS
6	DISC NUT	24	END PLATE SEAL
7	DISC NUT WASHER	25	SEAT FOLLOWER
8	DISC NUT PIN	26	SEAT WASHER
9	COVER GASKET	27	METAL SEAT WASHER
10	COVER BOLTS	28	DISC NUT
11	SHAFT	29	DISC NUT WASHER
12	DISC ARM SET SCREWS	30	DISC NUT PIN
13	INNER BUSHING	31	COVER GASKET
14	OUTER BUSHING	32	COVER BOLTS
15	GLAND	33	SHAFT LOCK PIN
16	GLAND STUDS	34	COVER PLUG
17	END PLATE BOLTS	35	INNER BUSHING
18	END PLATE SEAL	36	GLAND STUDS

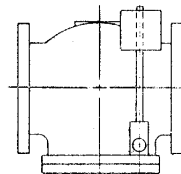
	2 1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
A	IN. 12	12	13	17 1/2	18	23	28	33	36	40	40
	MM 305	305	330	445	457	584	711	838	914	1016	1016
B	IN. 7	7	8 1/2	9	12	14	16	22	23	24	24
	MM 178	178	216	229	305	356	406	559	584	610	610
C	IN. 5	5	5	6	9	9	11	13	14	17 1/4	17 1/4
	MM 127	127	127	152	229	229	279	330	356	438	438
D	IN. 10	10	11	12	14	15	17	20	24	28	28
	MM 254	254	279	305	356	381	432	508	610	711	711
E	IN. 5	5	5	7	8	9	11	14	16	18	18
	MM 127	127	127	178	203	229	279	356	406	457	457

FLANGES PER ANSI B16.1

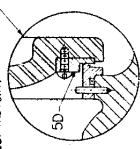
## HORIZONTAL INSTALLATION



## VERTICAL INSTALLATION



SECTION SHOWING ALTERNATE VALVE WITH METAL TO METAL SEAT. SEAT AND SEAT FOLLOWER ARE ONE PIECE. OPTIONAL AT EXTRA COST. CONSULT FACTORY.



NOTE: SUFFIX 'A' USED AFTER FIGURE NUMBER FOR VERTICAL INSTALLATION (i.e. 220-UM-A)

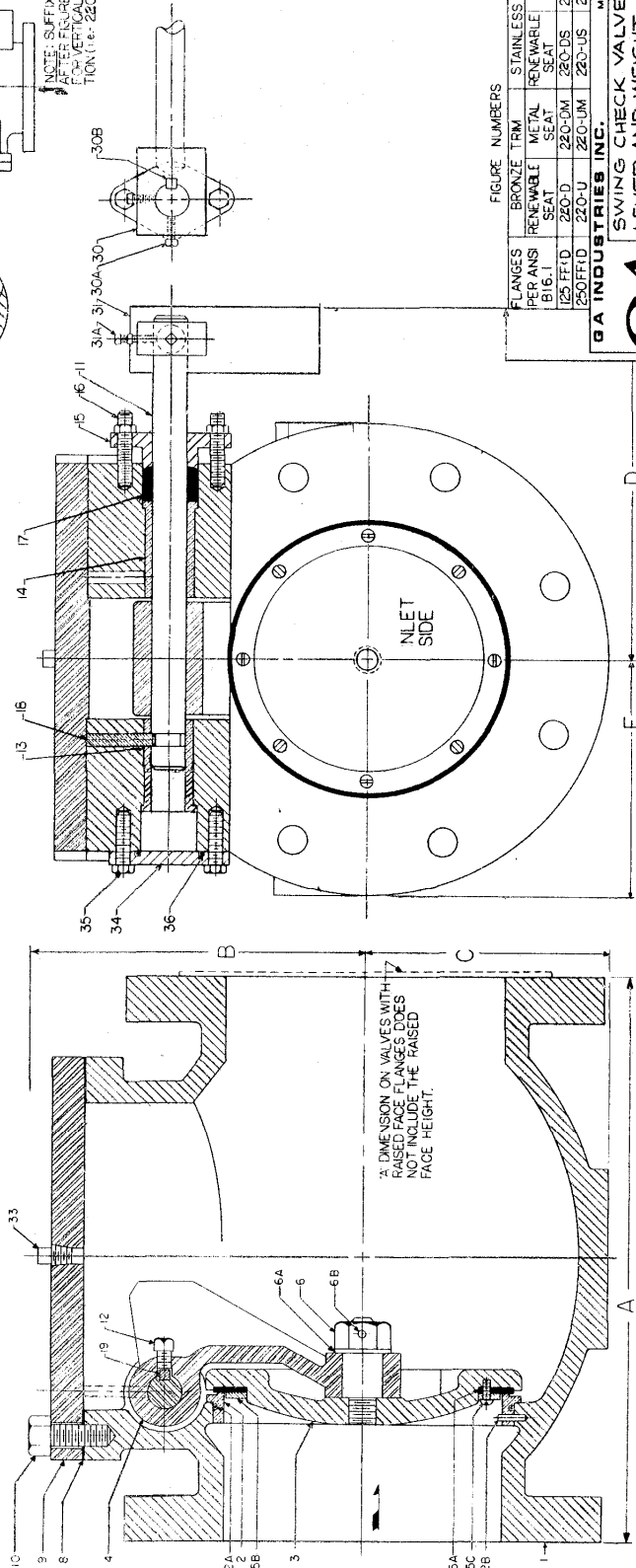


FIGURE NUMBERS			
FLANGES PER ANSI B16.1	BRONZE TRIM	RENEWABLE SEAT	STAINLESS TRIM
125-FFD	220-U	220-US	220-USM
250-FFD	220-U	220-US	220-USM
GA INDUSTRIES INC. SWING CHECK VALVE LEVER AND WEIGHT HARRIS, PA.			
GA			
REVISIONS			
BY	DATE	DESCRIPTION	FIG. NO.
1-27-71	1-27-71	REVISION	C-1146

## Warranty

GA Industries, LLC (Seller) warrants to the original Buyer that all products delivered hereunder shall be free from defects in manufacture for a period of one year from the date of delivery, provided that such products are installed, used, operated, adjusted and serviced only in a proper and appropriate manner and in strict accordance with any instructions relating thereto furnished to Buyer by Seller. In no event shall the foregoing warranty extend to any products in any way caused or allowed to be, or installed, operated or used in such a manner as to be subject or exposed to conditions of misuse, abuse or accident.

Products not manufactured by Seller shall be warranted only to the extent of warranty to Seller.

*The foregoing warranty is exclusive and lieu of any and all other warranties, expressed or implied. No warranty of merchantability, no implied warranty of fitness for any particular purpose, and no implied warranty arising by usage of trade, course of dealing or course of performance is given by Seller or shall arise by or in connection with this sale and/or the Seller's and/or Buyer's conduct in relation thereto or to each other, and in no event shall Seller be liable on any such warranty with respect to any product.*

Liability of the Seller under or in connection with this sale and/or the foregoing warranty shall be limited, at the sole option of the Seller, to one of repair or, replacement of, or a refund of the purchase price of any products or part thereof with respect to which Seller receives. Promptly after Buyer's discovery of any alleged defect and prior to the expiration of the one-year warranty period as provided above, notice, in writing, from Buyer of Buyer's claim of defect, and which shall be returned to Seller by Buyer, as provided herein, promptly after Buyer's discovery of such alleged defect and which shall be determined by the Seller to have proved defective within the one-year warranty period provided above, failure by Buyer so to notify Seller and return such products to Seller after Buyer's discovery of such alleged defect shall constitute a waiver by Buyer of any and all claims of any kind with respect thereto. Any products returned by Buyer to Seller under the foregoing terms shall be returned to Seller's place of business freight prepaid, accompanied or preceded by Buyer's particularized statement of the claimed defect. The risk of loss and freight charges to and from Seller in connection with any returned products shall be borne by Buyer; but Seller shall bear such additional freight charges arising in connection with any returned products ultimately determined by Seller to be defective under the terms of the foregoing warranty, the cost of repair or replacement (if any) of such products, and the risk of loss or damage while such products are in Seller's possession at its place of business. The foregoing remedy shall constitute the sole and exclusive remedy of the Buyer under or in connection with this sale and/or warranty of the Seller. Except as specifically provided herein, Seller shall not be responsible or liable for any costs, expenses or damages of Buyer in connection with any removal, repair or replacement (including any attempts or actions relating thereto) of any allegedly defective products, and no charge or setoff of any kind of Buyer relating thereto shall be made against the Seller without prior and specific written approval of Seller.

*In no event shall Seller be responsible or liable for any special, indirect, incidental or consequential damages arising in any way in connection with any products or this sale.*

The agreement of Seller to sell its products is expressly conditioned upon the Buyer's assent to, and Seller agrees to sell its products only upon, all terms and conditions set forth in the Seller's Terms and Conditions of Sales. Failure to comply with terms will void warranty. Buyer's acceptance of any products provided under this sale constitutes such assent.



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