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KIMRAY INC.®

LEVER OPERATED LIQUID LEVEL CONTROLS

PISTON BALANCED LEVER OPERATED

APPLICATIONS:

As oil or water dump valves on separators, treaters, knock-outs, and other similar accumulators where higher pressures may occur

FEATURES:

Balanced, single soft seat
Teflon packed, rotary stuffing box
All internal parts easily be removed with valve in line

CERTIFICATIONS:

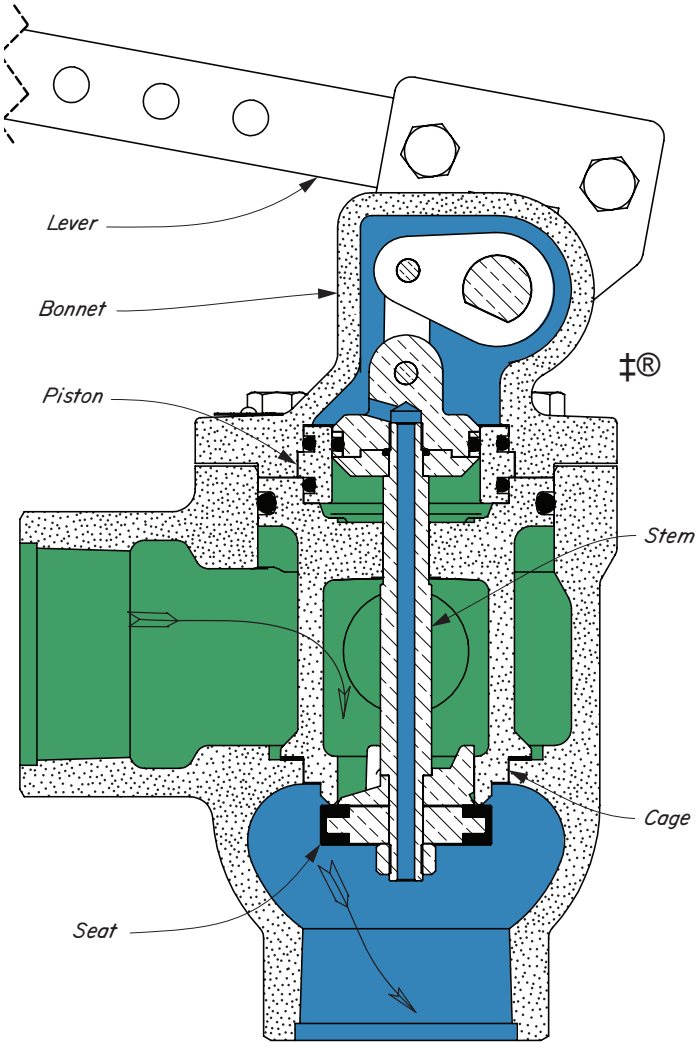
Canadian Registration Number (CRN):
0C16234.24567890NTY (Ductile)
0C15610.24567890NTY (Steel)

OPERATION:

The Oil Valve is mechanically operated through a LEVER by a Float in a separator or other vessel to which the valve is connected. The STEM AND SEAT ASSEMBLY is driven through a crank by the LEVER. The area of the PISTON is the same as the area of the SEAT so that Separator Fluid Pressure (Green) acting down on the SEAT is cancelled by the upward force of the pressure on the PISTON. Downstream Pressure (Blue) is communicated through the hollow STEM to the top side of the PISTON. Downstream Pressure (Blue) acting up on the SEAT is cancelled by the downward force of the same pressure on the top side of the PISTON. The valve can be operated easily by float since it is unaffected by Separator Fluid Pressure (Green) or Downstream Pressure (Blue). The entire STEM AND SEAT ASSEMBLY with the CAGE can be withdrawn from the valve as a unit by removing the BONNET screws.

NOTE:

The Customer is responsible for specifying linkage arm lengths and proper installation of float trunnions, valves and linkage assemblies. The total resulting force generated by the float is a function of the size and density of the float, the specific gravity of the fluid, the lever arm positions and angles and proper installation of the equipment. These criteria at least should be considered when specifying and installing linkage assemblies between vessels and valves.



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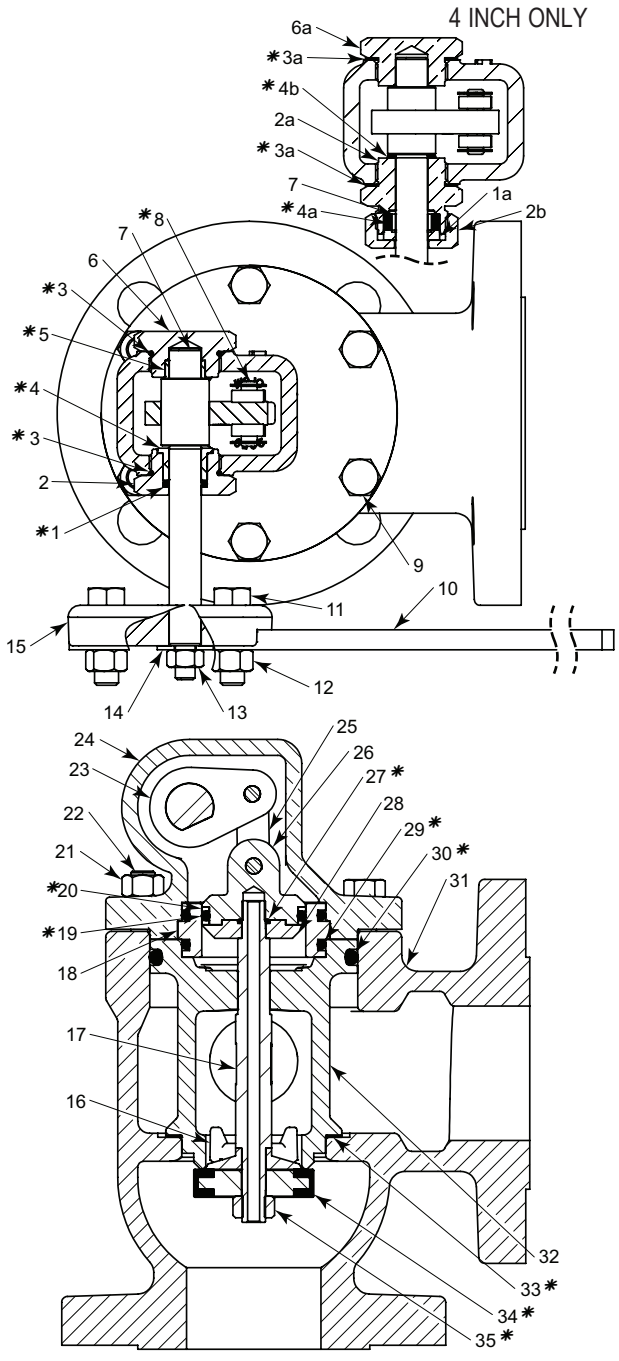
LEVER OPERATED LIQUID LEVEL CONTROLS

PISTON BALANCED LEVER OPERATED STEEL



ITEM	QTY.	DESCRIPTION	PART NO. 2 INCH	PART NO. 3 INCH	PART NO. 4 INCH
1	1	O-RING ✱	154HSNPS	491HSNPS	-----
1a	1	FOLLOWER ✱	-----		350
2	1	STUFFING BOX	7661	7593	-----
2a	1	STUFFING BOX	-----		359
2b	1	NUT	-----		347
3	2	O-RING ✱	2131HSN	5226HSN	-----
3a	2	GASKET ✱	-----		366
4	1	BUSHING ✱	7660	7592	-----
4a	1	PACKING RING ✱	-----		353
4b	1	THRUST WASHER ✱	-----		362
5	1	PACKING ✱	7662	355	356
6	1	TRUNNION PLUG	7522	7523	-----
6a	1	TRUNNION PLUG	-----		369
7	1	SHAFT	7404	7408	7427
8	2	LINK PIN w/ SNAP RINGS ✱ (kit includes Snap Rings only)	316	317	
9		BOLT	1672 x 4	1672 x 6	1672 x 8
10	1	LEVER	340		
11	2	BOLT	247		
12	2	NUT	241		
13	1	NUT	7366	7411	7486
14	1	WASHER	4492	7544	4491
15	1	LEVER HUB	7600	7601	7602
		SET SCREW (NOT SHOWN)	7608		
16	1	RATIO PLUG	332DEL	333DEL	334
17	1	STEM	326	327	328
18	1	CYLINDER	1679	1861	1865
19	1	O-RING ✱	808HSN	802HSN	2083
20	2	BACK UP ✱	1685	1870	1871
21	2	NUT	5109	-----	
22	2	STUD	5108	-----	
23	1	TRUNNION HUB	7403	7407	7454
24	1	BONNET	2954	4269	1716
25	2	LINK	318SS6	319SS6	
26	1	PISTON	2950SS6	4266S6	4267SS6
27	1	O-RING ✱	265HSN	154HSN	154
28	1	SEAL RETAINER	2949	1860	4268
29	2	O-RING ✱	774HSN	329HSN	1872
30	1	O-RING ✱	329HSN	330HSN	331
31	1	BODY			
		FLANGED ANGLE	4349	2471	2472
		FLANGED THRU	3092	3094	-----
32	1	CAGE ‡	304	305	306
33	1	GASKET ✱	276	277	309
34	1	SEAT ✱	7498HSN	7499HSN	-----
		SEAT ✱	----		165HSN
		SEAT DISC	----		160
35	1	LOCK NUT ✱	173	906	
	2	LIFTING RINGS (not shown)	----	7559	

‡ Delrin Cage available on request for 4 inch valves

VALVES AVAILABLE:

PART NO.	BODY CONNECTION	BODY TYPE	MODEL NO.	OPER. PRES.	MAX †† W.P.	REP. KIT
CAR	2" 150RF	ANGLE	228 FOA PB-S	10-285	285	RNA
CAW	3" 150RF	ANGLE	327 FOA PB-S	10-285	285	RNB
CAY	4" 150RF	ANGLE	427 FOA PB-S	10-285	285	RNC
CGR	2" 150RF	THRU	228 FOT PB-S	10-285	285	RNA
CAH	3" 150RF	THRU	327 FOT PB-S	10-285	285	RNB

NOTE: This valve contains Ductile & Cast Iron wetted parts & Brass packing material.

NOTES:

✱These parts are recommended spare parts and are stocked as repair kits.

For standard & optional Seals, Metals, Cv values, Material specifications & Dimensions see Technical Data on pages C2:I - C2:V

†† Max W.P. values based on -20°F to 100°F. See page C2:V for temps above 100°F

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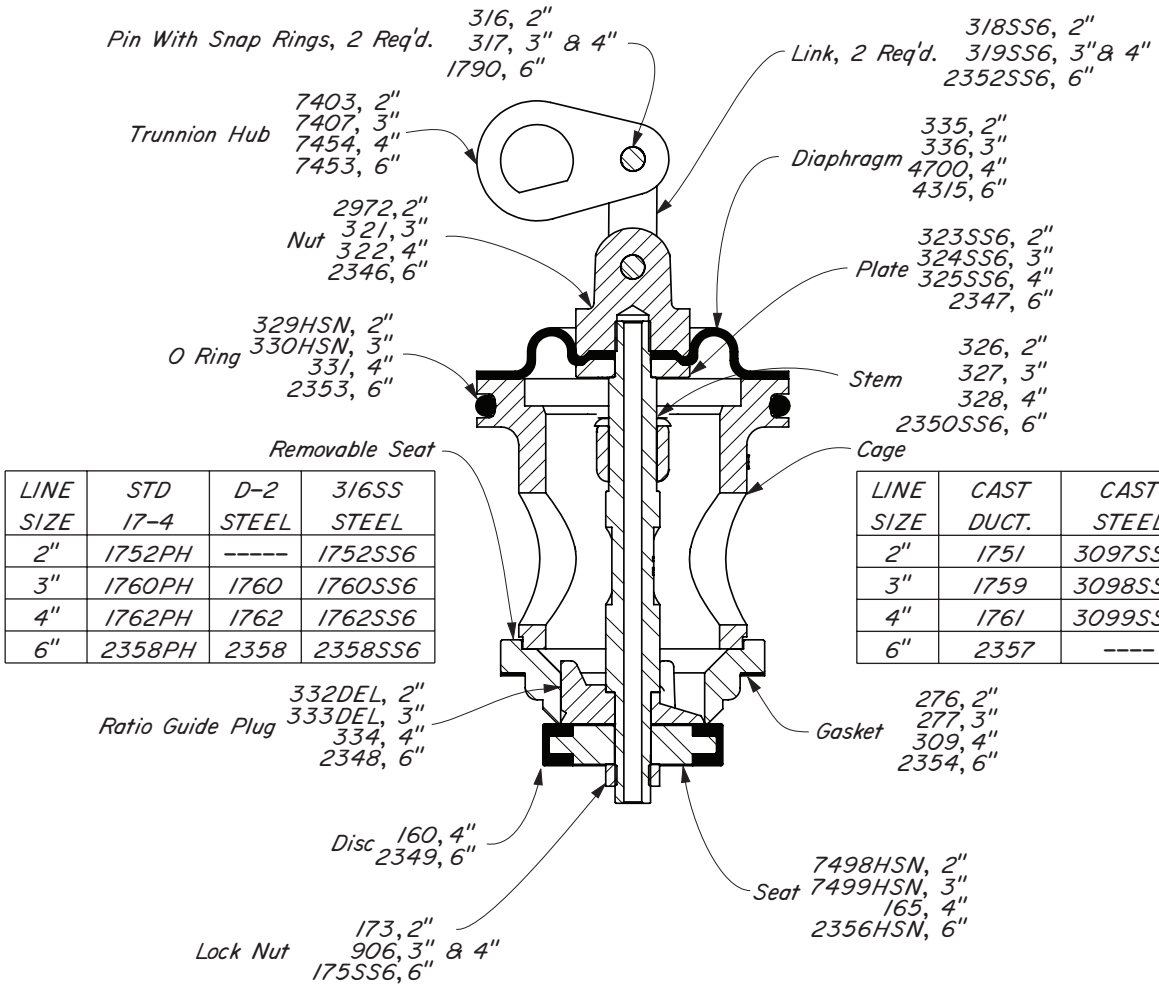
KIMRAY INC.®

LEVER OPERATED LIQUID LEVEL CONTROLS

CAGE & HARD SEAT ASSEMBLY
DUCTILE IRON



LINE SIZE	STD 17-4	D-2 STEEL	316SS STEEL
2"	1752PH	-----	1752SS6
3"	1760PH	1760	1760SS6
4"	1762PH	1762	1762SS6
6"	2358PH	2358	2358SS6

LINE SIZE	CAST DUCT.	CAST STEEL
2"	1751	3097SS6
3"	1759	3098SS6
4"	1761	3099SS6
6"	2357	----

ASSEMBLIES AVAILABLE:

PART NO.	LINE SIZE	VALVE TYPE	VALVE DESCRIPTION
CBS1	2"	DIAPHRAGM BALANCED	212 S/FOA
CBT1	3"	DIAPHRAGM BALANCED	312 S/FOA
CBU1	4"	DIAPHRAGM BALANCED	412 S/FOA
CBZ1	6"	DIAPHRAGM BALANCED	612 FOA

NOTES:

The numbers of a series assigned to a part indicate different line sizes. For example: Shaft 370-2", 371-3", 372-4".

For standard & optional Seals, Metals, Cv values, Material specifications & Dimensions see Technical Data on pages C2:I - C2:V

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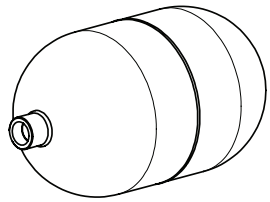
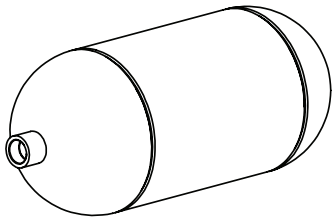
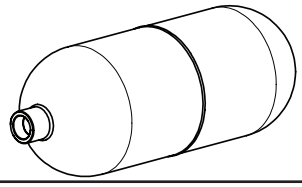
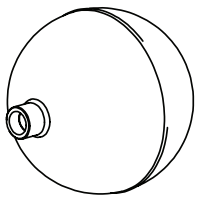
KIMRAY INC.®

LEVER OPERATED LIQUID LEVEL CONTROLS

TRUNNION FLOATS & ARMS
STEEL

Floats for Trunnion Assemblies						
	Part Number	Size	Material	Weight (oz)	Displacement in Water (oz)	Max. Working Pressure
	4009S4	7in. x 12 in.	304SS	100	214.9	600
	4009S6	7in. x 12 in.	316SS	100	214.9	600
	7143S4	7in. x 16 in.	304SS	100	305.6	275
	5581S4	5 1/2in x 14in.	304SS	63	166	350
	5581S6	5 1/2in x 14in.	316SS	63	166	350
	2822S4	7 3/4in.	304SS	53	141	250

Float Arms for Trunnion Assemblies			
	4041	12 in.	All float arms are made of 3/4" NPT Schedule 40 ASTM A53.
	4041L14	14 in.	
	4041L16	16 in.	
	4041L18	18 in.	
	4041L24	24 in.	
	4041L31	31 in.	

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Table 1 - Flow Coefficient(Cv) for Mechanical Level Controls										
2" Mechanical Level Control Diaphragm & Piston Balanced										
Trim Size in. (mm)	**Cf**	Valve Opening Percentage								
		10	20	30	40	50	60	70	80	90	100
1 1/2 in (38mm)	**0.79**	5.0	8.5	11.7	14.6	17.0	19.0	20.5	21.6	22.6	23.3
3" Mechanical Level Control Diaphragm & Piston Balanced										
Trim Size in. (mm)	**Cf**	Valve Opening Percentage								
		10	20	30	40	50	60	70	80	90	100
2 1/4 in (57 mm)	**0.79**	6.7	11.1	15.6	20.3	24.8	29.2	33.4	37.2	40.7	43.8
4" Mechanical Level Control Diaphragm & Piston Balanced										
Trim Size in. (mm)	**Cf**	Valve Opening Percentage								
		10	20	30	40	50	60	70	80	90	100
3 in (76 mm)	**0.79**	12.0	18.9	25.8	32.8	39.9	46.9	53.7	60.0	65.7	70.1
6" Mechanical Level Control Diaphragm Balanced										
Trim Size in. (mm)	**Cf**	Valve Opening Percentage								
		10	20	30	40	50	60	70	80	90	100
4.88 in (124 mm)	**0.79**	14.2	21.0	31.6	61.2	98.3	139.0	179.7	217.6	250.2	277.0
2" Mechanical Level Control Severe Service										
Trim Size in. (mm)	**Cf**	Valve Opening Percentage								
		10	20	30	40	50	60	70	80	90	100
1 1/2 in (38mm) Reduced	**0.75**	3.5	5.0	7.4	9.6	11.8	13.9	16.2	18.4	20.4	22.7
2 in (51 mm) Full Port	**0.75**	6.6	12.3	18.4	24.2	29.5	34.1	38.0	41.2	44.0	47.0
3" Mechanical Level Control Severe Service										
Trim Size in. (mm)	**Cf**	Valve Opening Percentage								
		10	20	30	40	50	60	70	80	90	100
3 in (76 mm)	**0.75**	12.7	18.7	29.0	41.0	52.9	63.4	71.9	78.4	83.7	89.0

Kimray flow equations conform to ANSI/ISA - 75.01.01-2002
Kimray inherent flow characteristics conform to ANSI/ISA 75.11.01 -1985

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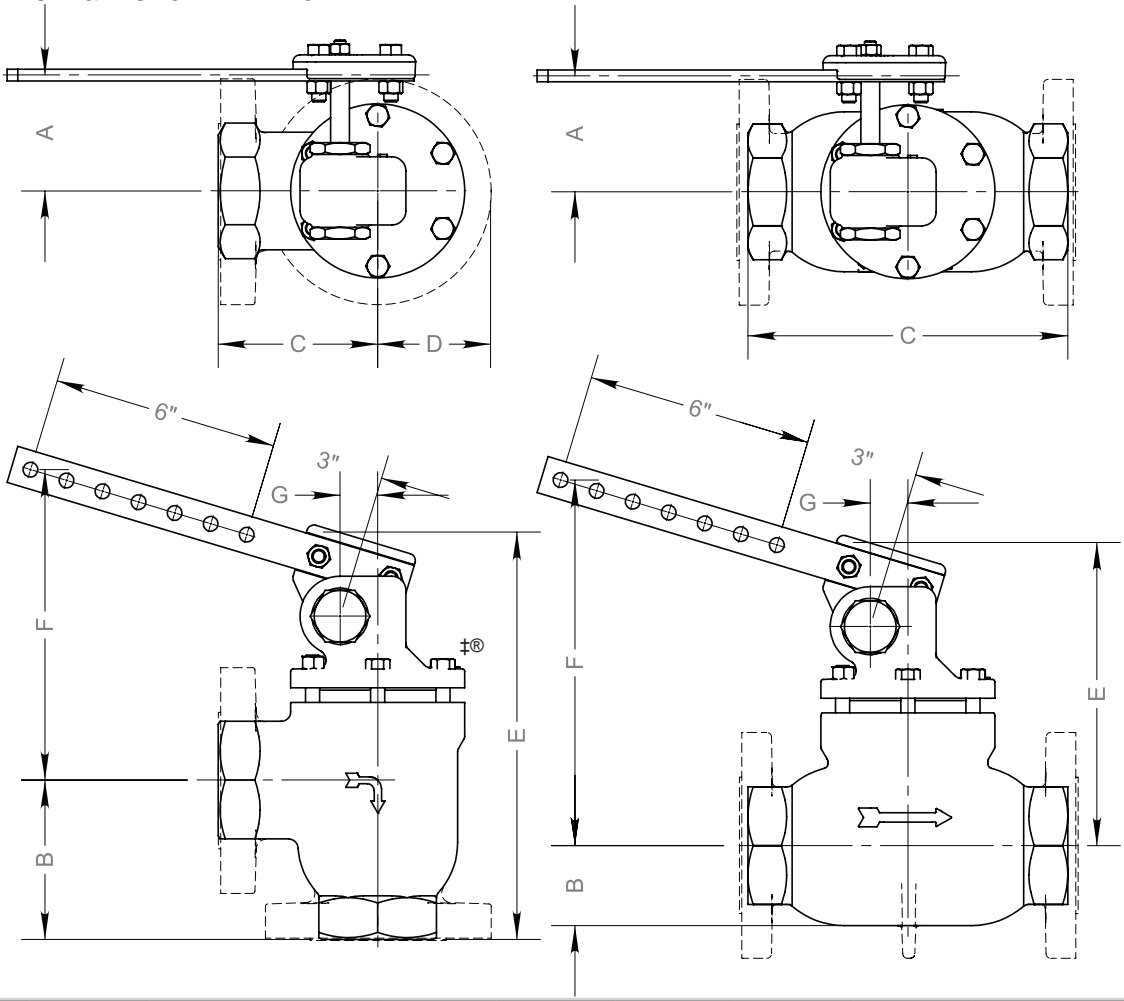
LEVER OPERATED LIQUID LEVEL CONTROLS

KIMRAY INC.®

DIMENSIONS
DIAPHRAGM & PISTON BALANCED

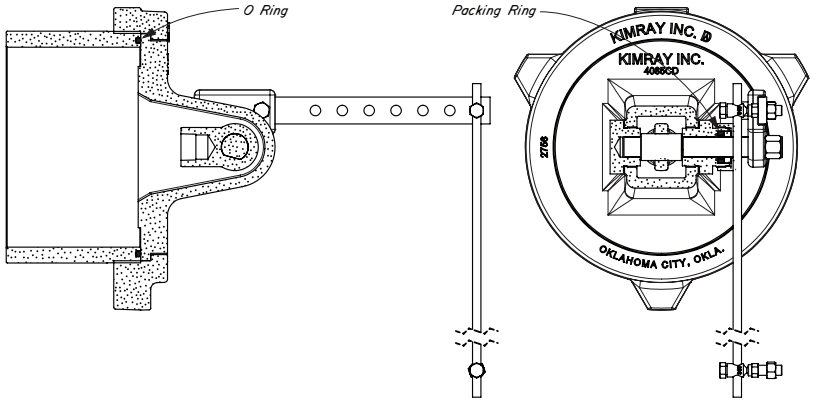


LINE SIZE	MATERIAL	BODY TYPE & END CONNECTION	A	B	C	D	E	F	G
2 in	DUCTILE	NPT / ANGLE	3 3/4 in	4 1/4 in	4 1/4 in	3 in	10 5/8 in	6 3/4 in	1 in
		NPT / THRU	3 11/16 in	2 1/8 in	8 1/2 in	3 in	7 7/8 in	8 1/4 in	1 in
		FLANGED / ANGLE	3 3/4 in	4 1/4 in	4 1/4 in	3 in	10 5/8 in	6 3/4 in	1 in
		FLANGED / THRU	3 11/16 in	2 1/8 in	9 in	3 in	7 7/8 in	8 1/4 in	1 in
	STEEL	FLANGED / ANGLE	3 3/4 in	4 5/16 in	4 5/16 in	3 in	10 7/8 in	6 3/4 in	1 in
		FLANGED / THRU	3 11/16 in	2 1/8 in	9 1/8 in	3 in	7 7/8 in	8 1/4 in	1 in
3 in	DUCTILE	NPT / ANGLE	3 3/4 in	6 1/8 in	5 1/2 in	3 3/4 in	13 13/16 in	7 1/8 in	1 3/8 in
		NPT / THRU	3 3/4 in	2 7/8 in	12 in	3 3/4 in	9 9/16 in	8 15/16 in	1 3/8 in
		FLANGED / ANGLE	3 3/4 in	5 1/2 in	5 1/2 in	3 3/4 in	13 3/16 in	7 1/8 in	1 3/8 in
		FLANGED / THRU	3 3/4 in	2 7/8 in	12 3/16 in	3 3/4 in	9 9/16 in	8 15/16 in	1 3/8 in
		GROOVED / ANGLE	3 3/4 in	5 1/2 in	5 1/2 in	3 3/4 in	13 13/16 in	7 1/8 in	1 3/8 in
	STEEL	FLANGED / ANGLE	3 3/4 in	5 1/2 in	5 1/2 in	3 3/4 in	13 3/8 in	8 15/16 in	1 3/8 in
4 in	DUCTILE	FLANGED / ANGLE	3 3/4 in	6 1/2 in	6 1/2 in	4 1/2 in	15 in	9 1/4 in	1 3/8 in
		FLANGED / THRU	3 13/16 in	3 11/16 in	15 in	4 1/2 in	10 9/16 in	11 1/2 in	1 3/8 in
	STEEL	FLANGED / ANGLE	3 3/4 in	6 1/2 in	6 1/2 in	4 1/2 in	15 1/16 in	9 1/4 in	1 3/8 in
6 in	DUCTILE	FLANGED / ANGLE	4 1/16 in	10 1/4 in	7 11/16 in	5 1/2 in	21 5/8 in	12 5/8 in	1 5/8 in
		FLANGED / THRU	4 1/16 in	4 7/8 in	22 1/16 in	5 1/2 in	14 7/8 in	16 1/16 in	1 5/8 in
	STEEL	FLANGED / ANGLE	4 1/16 in	10 1/4 in	7 3/4 in	5 1/2 in	21 7/16 in	12 5/8 in	1 5/8 in

FLANGE DIMENSIONS ARE ANSI 125/150 STANDARD.

Table 2 - Seal Options Level Controllers		
Part	**Standard Material**	**Optional Material**
O-rings	HSN	FKM, AFLAS®
Diaphragm	HSN	FKM, AFLAS®
Bushing	PTFE	N/A

Table 3 - Seal Options Trunnion Assemblies		
Part	**Standard Material**	**Optional Material**
O-rings	Nitrile	FKM, HSN, AFLAS®



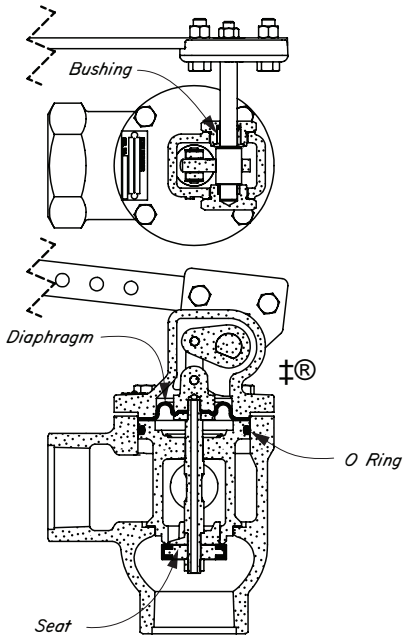


Table 4 - Seal Specifications							
		NITRILE	HIGHLY SATURATED NITRILE	FKM	AFLAS®	POLY-URETHANE	GYLON
	Kimray Suffix	-	HSN	V	AF	P	GY
Resistance	**Abrasion**	G	G-E	G	G	E	E
	Acid	F	G-E	G-E	E	P	E
	Chemical	F	F	E	E	F	E
	Cold	G	G	P	P	G	E
	Flame	P	P	E	E	P	P
	Heat	G	E	E	E	F	E
	Oil	G-E	E	E	E	G	E
	Ozone	P	G	G-E	E	E	E
	Set	G	G	G-E	P	F	P
	Tear	F	F	F	P	G-E	E
	Water/Steam	F	E	P	G	P	E
	Weather	F	G	E	E	E	E
	CO2	F-G	G	G	G	G	E
	H2S	P	F	P	E	G	E
	Methanol	F	E	P	P	P	E
Properties	**Dynamic**	G	G	G	G	E	P
	Electrical	F	F	F	G-E	F	E
	Impermeability	G	G	G	G	G	E
	Tensile Strength	G	G-E	G	F	G-E	E
	Temp. Range (°F)	-20° to +225°F	-20° to +250°F	-15° to +400°F	+15° to +450°F	-40° to +180°F	-450° to +500°F
	Temp. Range (°C)	-29° to +107°C	-29° to +121°C	-26° to +204°C	-9° to +232°C	-40° to +82°C	-268° to +260°C
	Form	O,S,D	O,S,D	O,S,D	O,S,D	S,D	S,D
RATINGS: P-POOR, F-FAIR, G-GOOD, E-EXCELLENT							

MATERIAL SPECIFICATION

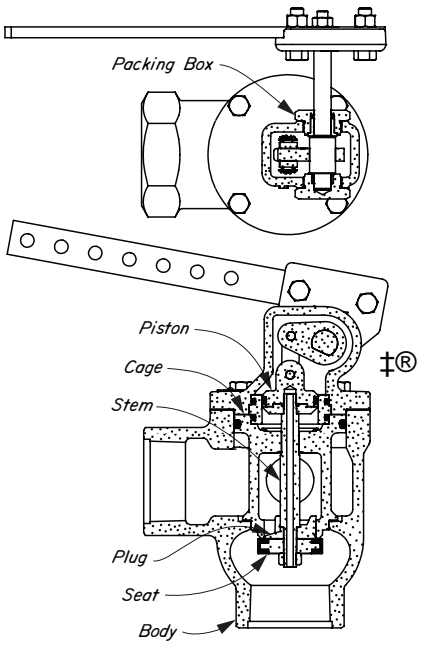
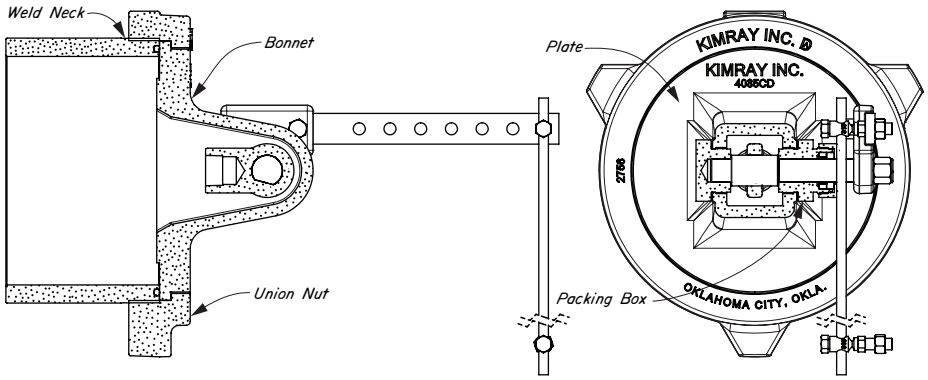


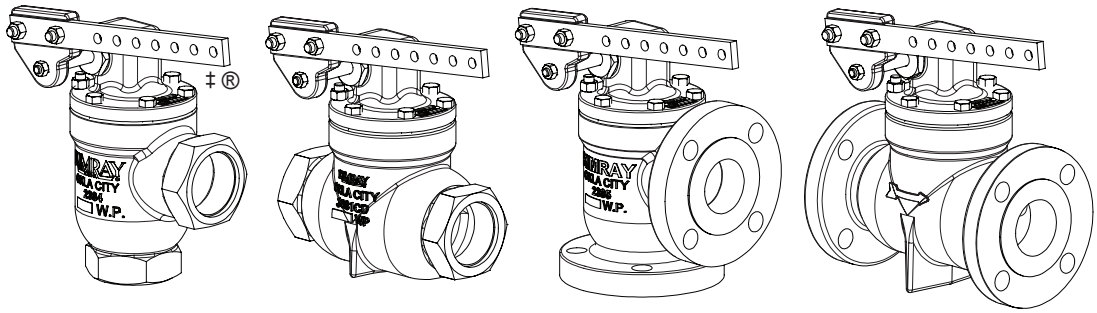
Table 5 - Level Controller Materials of Construction		
Part Description	**Standard Material**	**Optional Material(s)**
Body	Ductile Iron, ASTM A-395	ASTM A-216 WCB,
Stem	ASTM A-582 303SS	316S, ASTM A-213
Plug	Delrin	ASTM A-316
Cage	Delrin	ASTM A-316, A-351
Seat	HSN	FKM
Piston	316S, ASTM A-351	
Packing Box	ASTM A-582 303SS	ASTM A-479 316SS

Table 6 - Trunnion Materials of Construction		
Part Description	**Standard Material**	**Optional Material(s)**
Bonnet	Ductile Iron	ASTM A216 WCB
Plate	Steel SA - 515 Grade 70 Plate	
Packing Box	Brass with Nitrile/Teflon Packing ASTM B-429	ASTM A-316, ASTM A-479
Shaft	303S, ASTM A-582	ASTM A-316, ASTM A-479
Float Hub	ASTM A-316	ASME SA-351, ASTM A-351
Union Nut	Ductile Iron	ASTM - A395
Weld Neck	8 in. Schedule 100 Pipe ASTM A-106 Grade B	
Lever Hub	Gray Iron, ASTM A-126-B	



Current Revision:
Remove stainless body option

Table 7 - Temperature vs. Pressure Rating	
ASTM Class Temperature °F (°C)	Flange Class
	150 RF
	Static Test Pressure (psig)
	450 (31 bar)
Maximum Allowable Non-Shock Pressure (psig)	
CAST DUCTILE ASTM A-395	
	Flange Class
	150 RF
-20 to 100 (-28 to 37)	250 (17.2 bar)
200 (93)	235 (16.2 bar)
300 (148)	215 (14.8 bar)
400 (204)	200 (13.7 bar)
500 (260)	170 (11.7 bar)
600 (315)	140 (9.6 bar)
650 (343)	125 (8.6 bar)
700 (371)	
CAST STEEL ASTM A-216 - WCB	
	Flange Class
	150 RF
-20 to 100 (-28 to 37)	285 (20.0 bar)
200 (93)	260 (17.9 bar)
300 (148)	230 (15.9 bar)
400 (204)	200 (13.8 bar)
500 (260)	170 (11.7 bar)
600 (315)	140 (9.7 bar)
650 (343)	125 (8.6 bar)
700 (371)	110 (7.6 bar)



SCREWED ANGLED (NPT) **SCREWED THRU (NPT)** **FLANGED ANGLED (150RF)** **FLANGED THRU (150RF)**

Kimray valves conform to ASME B16.34-2009 for working pressure vs working temperature & ASME B16.5-1996 for flanges and flanged fittings.