KUNKLE MODELS 91/218/228 LIQUID RELIEF VALVES

SAFETY AND RELIEF PRODUCTS

Cast iron liquid relief valves with bronze trim including models UL and FM approved for fire pump installations.

MODEL 228

FEATURES

- Bolted bonnet allows easy inspection and servicing without removal from system.
- Quality cast iron body and bonnet.
- Insert and disc available in bronze or stainless steel and lapped for optimum performance.
- Springs are steel with plating for corrosion protection.
- High lift, wing-guided disc offers high relieving capacity.
- Pivot between disc and spring corrects misalignment and compensates for spring side thrust.
- ANSI B16.1 rated 250# inlet and 125# outlet flanged connections as standard.
- Optional epoxy-coated internal body and bonnet for corrosive environments (to 125°F (52°C)).

GENERAL APPLICATION

Liquid relief valves suitable for overpressure relief, pressure regulation and protection of pumps, tanks, lines and hydraulic systems. Models 218, 228 are UL 1478 listed and FM approved for fire pump service.

TECHNICAL DATA

Connections:	1½ to 4" FNPT 1½ to 6" flanged
Temperature range[1]:	-20 to 406°F (-29 to 208°C)
Pressure ranges[1]:	
Model 91:	5 to 400 psig (0.34 to 27.6 barg)
Models 218, 228:	60 to 200 psig (4.1 to 13.8 barg)

NOTE

1. For other pressure and temperature limits consult ANSI B16 cast iron flange standards.

MODEL OVERVIEW

Model 91: bronze trim with pressure-tight cap. Suitable for maximum back pressure of 60 psig (4.1 barg)[1].

Model 218: bronze trim, UL and FM approved for fire pump installations. Special design offers minimum set pressure of 60 psig. Easily adjustable with handwheel to 200 psig (13.8 barg) (175 psig (12.1 barg) with optional 125# inlet flange).

Model 228: bronze trim with pressure-tight cap. UL and FM approved for fire pump installations. Suitable for maximum back pressure of 60 psig (4.1 barg)[1]. Supplied with handwheel.

NOTE

1. Back pressure increases set pressure on a one to one basis and reduces capacity. Back pressure in excess of 10% of set pressure is not recommended.

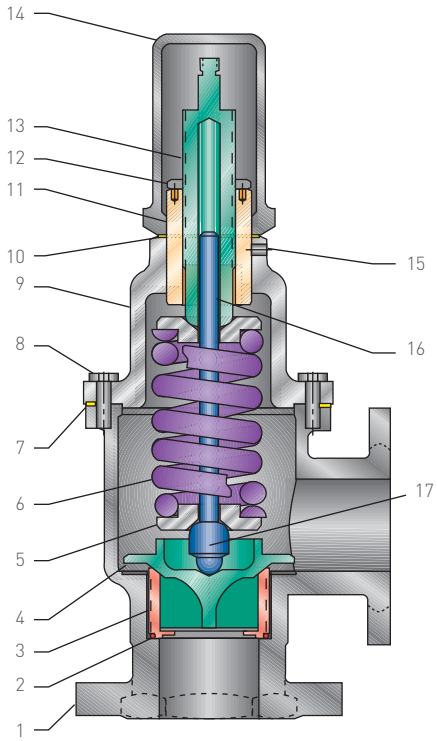
PARTS AND MATERIALS - MODEL 91[3, 6] - NON-CODE, LIQUID RELIEF VALVE

No.	Part name	Materials
1	Body	Iron, A126 class A or B
2	O-ring	NBR[9]
3	Insert	[1]
4	Disc	[1]
5	Spring step	[2]
6	Spring	Steel, aluminum coated
7	Bonnet gasket	Fiber and nitrile, klinger C-4400 or C-4401
8	Hex head cap screw[3]	Steel, SAE Gr. 5
9	Bonnet	Iron, A126 class A or B
10	Cap gasket[5]	Fiber and nitrile, klinger C-4400 or C-4401
11[7]	Compression screw bushing	Iron, A536 80-55-06
12	Jam nut	[4]
13	Compression screw	[4]
14	Cap[5]	Iron, A126 class A or B
15	Socket set screw	Steel, commercial
16	Stem	[2]
17	Stem end	[8]
Items not shown		
	Handwheel[5]	Iron, A126 class A or B
	Handwheel jam nut[5]	Steel plated, commercial

NOTES

1. Disc (item 4) and insert (item 3) material bronze, B-584 alloy 84400 or B62, also available in SS, A743 Gr. CF-8, as a package option
2. Material CS with anti-corrosion coating, commercial Gr. or brass, B16
3. 6 bolts required for 3" and 4" sizes, and 8 bolts required for 6" size
4. Material SST A582-416, BRS B16-H02, SST A582-303 or STL A108-1018 zinc plate
5. Handwheel option available, delete cap (item 14) and gasket (item 10).
6. Flanges per ANSI B16.1. 250# inlet flange standard and 125# inlet flange optional. Outlet flange 125#.
7. Only used in orifices K through P.
8. Material SST or brass, B16
9. For variation 22 O-ring material is Viton®.

MODEL 91



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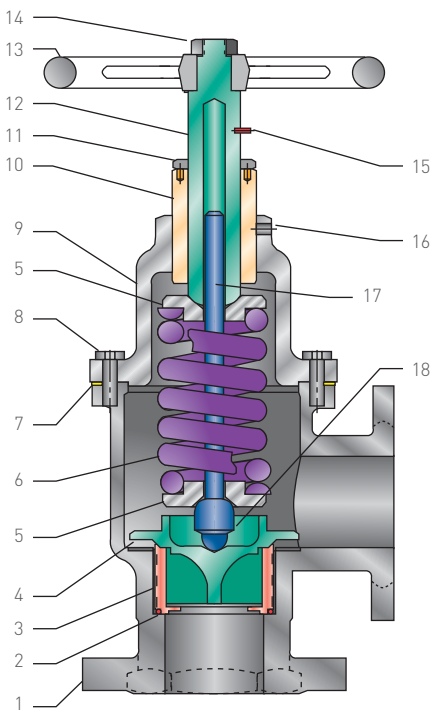
PARTS AND MATERIALS - MODELS 218 AND 228 - NON-CODE

No.	Part name	Materials
1	Body[1]	Iron, A126 class A or B
2	O-ring	NBR
3	Insert	[2]
4	Disc	[2]
5	Spring step	[3]
6	Spring	Steel, aluminum coated
7	Bonnet gasket	Fiber and nitrile, klinger C-4400 or C-4401
8	Hex head cap screw[4]	Steel, SAE Gr.[5]
9	Bonnet	Iron, A126 class A or B
10	Compression screw bushing	Brass, B16
11	Jam nut	Brass, B16
12	Compression screw	[5]
13	Handwheel	Iron, A126 class A or B
14	Handwheel locknut	Steel plated, commercial Gr.
15	Spring pin	Steel, commercial Gr.
16	Socket set screw	Steel, commercial Gr.
17	Stem	[3]
	Compression screw locknut wrench[6]	Steel, A366
	Installation instruction[6]	Paper, commercial Gr.
18	Stem end	[3]
Model 228 only		
18	Cap[7]	Iron, A126 class A or B
19	Cap gasket[7]	Gasket, klinger silicone C-4400

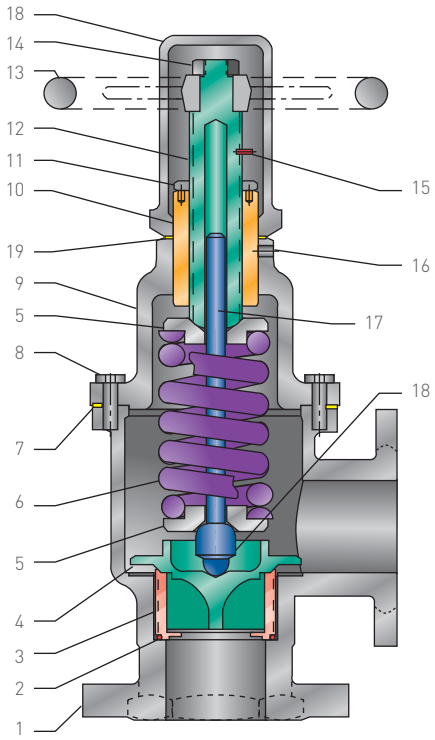
NOTES

1. Flanges per ANSI B16.1. 250# inlet flange standard and 125# inlet flange optional. Outlet flange 125#.
2. Disc (item 4) and insert (item 3) material bronze, B-584 alloy 84400 or B62, also available in SS, A743 Gr. CF-8, as a package option.
3. Material CS with anti-corrosion coating, commercial Gr., brass, B16 or SS, A582 TY 416.
4. 6 bolts required for 3" and 4" sizes, and 8 bolts required for 6" size.
5. Material brass, B16 or bronze, B584 casting (Model 218 only), B584 alloy 84400 (Model 228 only).
6. Not shown on assembly.
7. Cap (item 18), gasket (item 19) and locknut (item 11) factory installed. Handwheel (item 13) and Handwheel locknut (item 14) shipped unassembled (Models 218 and 228). A wrench is included to install the Handwheel locknut.

MODEL 218



MODEL 228



SPECIFICATIONS - MODEL 91[1]

Model number	Valve size (in.)	Connections ANSI standard Inlet	Connections ANSI standard Outlet	Valve dimensions (in.) A	Valve dimensions (in.) B	Valve dimensions (in.) C	Min/max set pressure (psig)	Approx. weight (lb)
091A-G	1½ x 1½	FNPT	FNPT	4¾	4¼	11⅞	5/400	27
091H-G	1½ x 1½	125# FL	125# FL	4¾	4¼	11¼	5/175	36
091K-G	1½ x 1½	250# FL	125# FL	5	4¾	11¼	5/400	36
091A-H	2 x 2	FNPT	FNPT	4⅛	4⅛	12¾	5/400	35
091H-H	2 x 2	125# FL	125# FL	4¾	4⅝	12¾	5/175	47
091K-H	2 x 2	250# FL	125# FL	5	4⅝	12¾	5/400	47
091A-J	2½ x 2½	FNPT	FNPT	4½	4½	14¼	5/400	48
091H-J	2½ x 2½	125# FL	125# FL	5¼	4¾	14¼	5/175	65
091K-J	2½ x 2½	250# FL	125# FL	5¼	4¾	14¼	5/400	65
091A-K	3 x 3	FNPT	FNPT	5⅞	5⅞	21	5/400	81
091H-K	3 x 3	125# FL	125# FL	5⅞	5⅞	21¾	5/175	98
091K-K	3 x 3	250# FL	125# FL	6¼	5⅞	21¾	5/400	98
091A-M	4 x 4	FNPT	FNPT	6⅝	6½	26	5/400	132
091H-M	4 x 4	125# FL	125# FL	6⅝	6½	26	5/175	170
091K-M	4 x 4	250# FL	125# FL	6⅝	6½	26	5/400	170
091H-P	6 x 6	125# FL	125# FL	9⅜	8½	31	5/175	340
091K-P	6 x 6	250# FL	125# FL	9⅜	8½	31	5/300	340

SPECIFICATIONS - MODELS 218 AND 228[1]

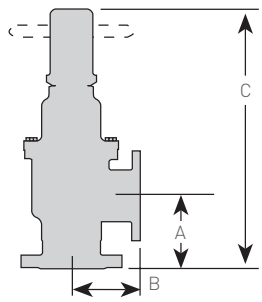
Model number	Valve size (in.)	Connections ANSI standard Inlet	Connections ANSI standard Outlet	Valve dimensions (in.) A	Valve dimensions (in.) B	Valve dimensions (in.) C (218)	Valve dimensions (in.) C (228)	Min/max set pressure (psig)	Approx. weight (lb)
2*8A-K[2]	3 x 3	FNPT	FNPT	6⅛	5⅞	20⅝	21⅝	60/200	85
2*8H-K[2]	3 x 3	125# FL	125# FL	6⅛	5⅞	20⅝	21⅝	60/175	110
2*8K-K[2]	3 x 3	250# FL	125# FL	6⅛	5⅞	20⅝	21⅝	60/200	110
2*8A-M[2]	4 x 4	FNPT	FNPT	6⅝	6½	25	26	60/200	143
2*8H-M[2]	4 x 4	125# FL	125# FL	6⅝	6½	25	26	60/175	185
2*8K-M[2]	4 x 4	250# FL	125# FL	6⅝	6½	25	26	60/200	185
2*8H-P[2]	6 x 6	125# FL	125# FL	9⅜	8½	30	31	60/175	350
2*8K-P[2]	6 x 6	250# FL	125# FL	9⅜	8½	30	31	60/200	350

Dimensions are for reference only.
FL Flange
FNPT Female NPT

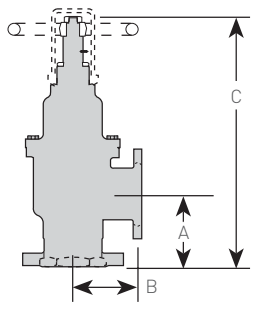
NOTES

1. Temperature limits -20 to 406°F.
2. Replace asterisk with desired model number. Data applicable to Models 218, 228.

MODEL 91



MODELS 218, 228



CAPACITIES - NON-CODE LIQUID - 25% ACCUMULATION (GPM) - MODEL 91 ONLY

Set pressure	Inlet size					
(psig)	1½"	2"	2½"	3"	4"	6"
5	31	56	87	125	224	447
10	44	79	123	177	316	632
20	63	111	174	250	447	894
30	77	136	213	307	548	1095
40	88	157	246	354	633	1265
50	99	176	275	396	707	1414
60	108	193	301	434	775	1549
70	117	208	325	468	837	1673
80	125	223	348	501	895	1789
90	133	236	369	531	949	1897
100	140	249	389	560	1000	2000
110	147	261	408	587	1049	2097
120	153	273	426	613	1096	2191
130	159	284	443	638	1140	2280
140	165	295	460	663	1183	2366
150	171	305	476	686	1225	2449
160	177	315	492	708	1265	2530
170	182	325	507	730	1304	2607
180	188	334	522	751	1342	2683
190	193	343	536	772	1379	2757
200	198	352	550	792	1414	2828
210	203	361	563	811	1449	2898
220	207	369	577	831	1483	2966
230	212	378	590	849	1517	3033
240	217	386	602	867	1549	3098
250	221	394	615	885	1581	3162
260	225	401	627	903	1613	3225
270	230	409	639	920	1643	3286
280	234	417	650	937	1673	3346
290	238	424	662	954	1703	3406
300	242	431	673	970	1732	3464
310	246	438	684	986	1761	—
320	250	445	695	1002	1789	—
330	254	452	706	1017	1817	—
340	258	459	717	1033	1844	—
350	261	466	727	1048	1871	—
360	265	472	738	1062	1898	—
370	269	479	748	1077	1924	—
380	272	485	758	1092	1950	—
390	276	492	768	1106	1975	—
400	280	498	777	1120	2000	—

LIQUID OVERPRESSURE FACTORS

To determine capacities at other than 25% overpressure/accumulation, multiply capacity shown by:
10% acc. = 0.6
15% acc. = 0.8
20% acc. = 0.9

MODELS 218, 228 CAPACITIES

UL/FM	Certified capacities[1]
Size (in.)	GPM
3 x 3	500
4 x 4	1000
6 x 6	2000

NOTE

1. Rated at 100 psig set pressure and 25% accumulation 125 psig.

SELECTION GUIDE

Example:	091	K	-	M	01	A	M	S	0400
Model									
091									
218									
228									
Connection type									
A Female x female NPT									
H 125# flange x 125# flange									
K 250# flange x 125# flange									
Connection size									
G 1½" inlet x 1½" outlet									
H 2" inlet x 2" outlet									
J 2½" inlet x 2½" outlet									
K 3" inlet x 3" outlet									
M 4" inlet x 4" outlet									
P 6" inlet x 6" outlet									
Variation									
01 Catalog standard									
02 SS seat and disc (all models except Model 218K-P)									
03 Model 91 w/handwheel (K, M and P inlet only)									
03 SS seat and disc (Model 218K-P only)									
03 Models 218 and 228 epoxy coated body and bonnet internal surfaces (except Model 218K-P)									
04 Model 218K-P epoxy coated body and bonnet internal surfaces									
05 Model 91 epoxy coated body and bonnet internal surfaces									
06 SS seat and disc with epoxy coated body and bonnet internal surfaces									
22 Model 91 SS seat and disc with Viton® O-ring seal									
Design revision									
Indicates non-interchangeable revision									
Current design at revision 'A'									
Valve service									
M Liquid									
Spring material									
C Aluminum coated, ASTM A229 steel (G, H, J inlet sizes only)									
S Aluminum coated, ASTM A229 steel (K, M, P inlet sizes only)									
Set pressure									
0005 5 psig									
0400 400 psig									

NOTE

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