



Engineered Products Division – Equipment Submittal

Project: IMMUCELL, Portland, ME

Contractor: AAA Energy, Scarborough, ME

Engineer: Stantec, Albany, NY

Products: CRIMSON Heat Transfer SKID
REVISIONS - February 17, 2017

Prepared on:

2-17-17

Kelly Sauberlich - Engineered Products Division
Emerson-Swan: 4 Fundy Road, Suite 203, Falmouth, ME 04105
(207) 781-2046 Office Phone
KSauberlich@emersonswan.com

NOTES / RESPONSES to returned submittals:

1. Pump impeller trims will be maxed out so HP will be noted as approx. 5.0 NOL – no overall change to pump models.
2. Drain valves added at the suction diffusers.
3. Manual air vent added as noted at heat exchanger.
4. Pipe size at expansion tank changed to 1" and remove the reducer.
5. Water PRVS noted as 75 PSI.
6. Take exception SINGLE POINT POWER
Power requirements at the skid include 115/1 at the glycol make up unit, and the (2) pumps which will be wired to and controlled by the VFDS that are provided, mounted, and wired elsewhere.
7. The steam supply config changed.
8. Take exception to the 1-1/2" piping at the condensate discharge of the heat exchangers.
Condensate trap required (will attach Armstrong cut sheet) is 2".
Contractor can field reduce to 1-1/2" if desired.

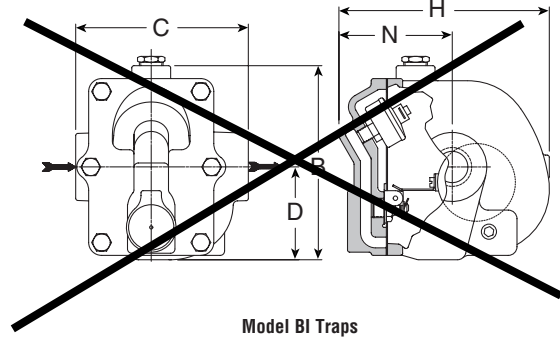
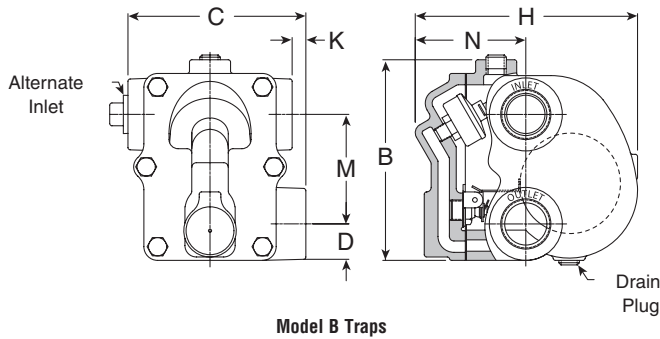


B and BI Series Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

For Pressures From Vacuum to 30 psig (2 bar)...Capacities to 8,900 lb/hr (4,037 kg/hr)

Steam Trapping and Steam Tracing Equipment



Description

Armstrong B and BI Series F&T traps combine high standards of performance and long life with economy for heating service where continuous drainage with high air-venting capacity is required.

Because of the wide use of vacuum returns in systems of this type, the thermostatic air vent element is charged to give it the capability of compensated response to the pressure-temperature curve of steam at any pressure from less than 20" (500 mm) Hg vacuum to 30 psig (2 bar) gauge. B and BI Series F&T traps will vent air at slightly below steam temperature throughout this entire range of operation.

All B Series traps, except the 1/2" (15 mm) and 3/4" (20 mm), have inlet connections on both sides of the body to provide flexibility in piping. The BI Series F&T traps in sizes 1/2", 3/4" and 1" feature the convenience of in-line connections with the same internals as the B Series.

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model B2-B3: 125 psig @ 353°F (8.5 bar @ 178°C)

Model B4-B8: 175 psig @ 377°F (12 bar @ 191°C)

Maximum operating pressure:

15B, BI: 15 psig (1 bar) saturated steam

30B, BI: 30 psig (2 bar) saturated steam

NOTE: Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

Connections

Screwed NPT and BSPT

Materials

Body and cap:

ASTM A48 Class 30

Internals:

All stainless steel—304

Valve:

Stainless steel—303 or 440

Seat:

Stainless steel—303 (ASTM A582)

Stainless steel—440F in 1-1/2" and 2"

Thermostatic air vent:

Stainless steel and bronze with phosphor bronze bellows, caged in stainless steel

Options

Integral vacuum breaker. Add suffix VB to model number.

CAUTION: Do not use a conventional vacuum breaker open to the atmosphere in any system that incorporates a mechanical return system that carries pressure less than atmospheric pressure. This includes all return systems designated as vacuum returns, variable vacuum returns or subatmospheric returns. If a vacuum breaker must be installed in such a system, it should be of the type that is loaded to open only when the vacuum reaches a calibrated level well in excess of the design characteristics of the system.

Specification

Float and thermostatic steam trap, type ... in cast iron, with thermostatic air vent.

For a fully detailed certified drawing, refer to CD #1167.

How to Order

Pressure	Model	Connection Size	Option
15	B	2	VB
15	B = Standard Connection	1 = 1/2" *3 = 3/4" 4 = " 5 = 1-1/4" 6 = 1-1/2" 8 = 2"	VB = Vacuum Breaker
30	BI = In-line Connection	2 = 1/2" 3 = 3/4" 4 = 1"	

*No alternate inlet available.

B and BI Series Traps

Trap Series	B Model										BI Model	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1	25	1-1/4	32	1-1/2	40	2	50	1/2, 3/4, 1	15, 20, 25
"B" (Height)	4-7/8	124	5-1/2	140	5-1/2	140	7-7/16	189	9-5/8	244	5-5/8	143
"C" (Face to Face)	3-7/8	98	4-7/8	124	4-5/8	117	5-3/4	146	7-5/8	194	5	127
"D" (Bottom to ϕ)	7/8	22.2	1	25.4	1-7/32	31.0	1-7/16	36.5	1-11/16	42.9	2-11/16	68
"H" (Width)	5-3/8	137	6	152	7-3/4	197	8-7/16	214	11-5/8	295	6-5/8	168
"K" (Connection Offset)	1/8	3.2	3/8	9.5	—	—	—	—	—	—	—	—
"M" (ϕ to ϕ)	2-3/4	69.8	3	76.2	3	76.2	4-3/16	106	6	152	—	—
"N" (Top to ϕ)	2-9/16	65.1	3	76.2	3-3/8	85.7	3-3/4	95.2	5	127	2-9/32	83
Weight lb (kg)	6 (2.7)		8-1/2 (3.9)		11 (5.0)		19 (8.6)		40 (18.1)		9-3/4 (4.4)	

NOTE: Cast iron traps should not be used in systems where excessive hydraulic or thermal shock are present.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

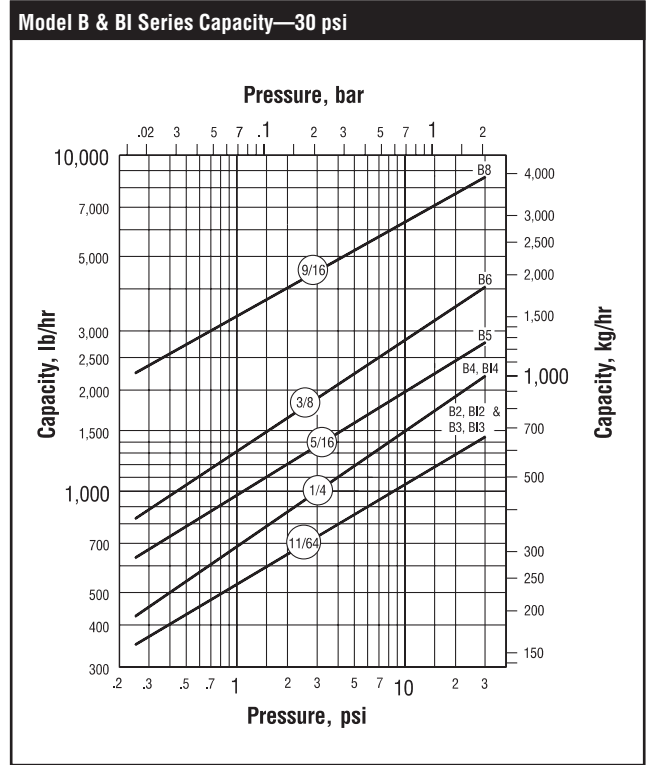
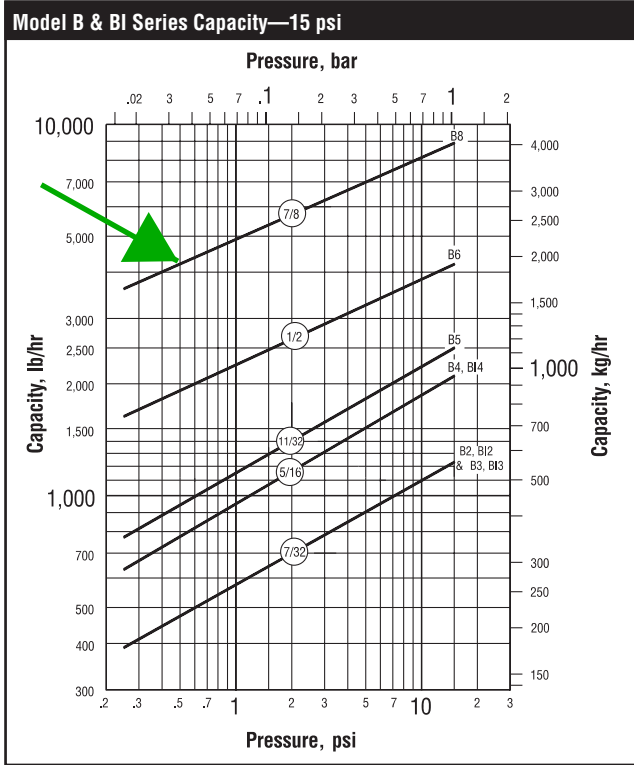
B and BI Series Float & Thermostatic Steam Trap

Cast Iron for Horizontal Installation, With Thermostatic Air Vent

For Pressures From Vacuum to 30 psig (2 bar)...Capacities to 8,900 lb/hr (4,037 kg/hr)



Steam Trapping and
Steam Tracing Equipment



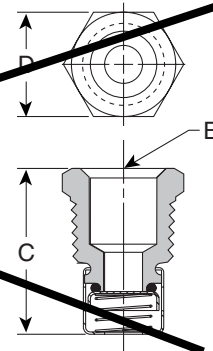
Options

Vacuum Breakers 3/8" (10 mm) and 1/2" (15 mm) NPT

Many times, condensate will be retained ahead of steam traps because of the presence of a vacuum. To break a vacuum, air must be introduced into the system by means of a vacuum breaker.

For maximum protection against freezing and water hammer in condensing equipment under modulated control, vacuum breakers are recommended. Armstrong B and BI Series F&T traps are available with integral vacuum breakers. Maximum pressure is 150 psig (10 bar).

Vacuum Breakers				
Size	in	mm	in	mm
	1/2 NPT	15 3/8	NPT	10
"B" Pipe Connections	3/8 NPT	10	1/4 NPT	6
"C" Height	1-1/4	32	1-3/32	28
"D" Width	7/8 Hex	22 Hex	11/16 Hex	17 Hex



February 9, 2017

EMERSON-SWAN
IMMUCELL HEAT TRANSFER PACKAGE
BILL OF MATERIALS REV. 2

<u>ITEM NO.</u>	<u>QTY.</u>	<u>MANUFACTURER</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
1	2	Taco	KS Series Vertical Pumps	KS3007
2	2	Taco	Suction Diffusers	SD030030-5
3	2	Taco	Multi-Purpose Valves	MPV030-4
4	2	Taco	Shell & Tube Heat Exchangers	E08210-S
5	1	Taco	Expansion Tank	CA-140-125
6	1	Taco	4" Air Separator	4904ADR-125
7	2	Armstrong	Float and Thermostatic Traps	2" 15B8VB
8	40	Milwaukee	Valves & Strainers	Misc.
9	4	Kunkle	Relief Valves	912 & 6010
10	2	Kadant	¾" Vacuum Breakers	VB8
11	5	Weiss	(4) Pressure & (1) Temperature. Gauges	Misc.
12	1	J. L. Wingert	Bypass Feeder	DB-5HD
13	1	J. L. Wingert	Glycol Feed	GL50-E1

All equipment is mounted and piped on a common steel base, completed at factory.



Submittal Data Information

KS Series Vertical Split Coupled Pumps

301-1155

EFFECTIVE: JUNE 25, 2016

SUPERSEDES: JANUARY 8, 2010

1760 RPM MODEL 3007

JOB Immucell

ENGINEER Stantec - NY

CONTRACTOR AAA Energy

REP. Emerson Swan - KJSS

ITEM NO. HGP-1&2 REV	MODEL NO. KS3007	IMPELLER DIA. 7.3	G.P.M. 160	HEAD/FT. 53.2	H.P. 5	ELEC. CHAR. 460/3/60
------------------------------------	---------------------	----------------------	---------------	------------------	-----------	-------------------------

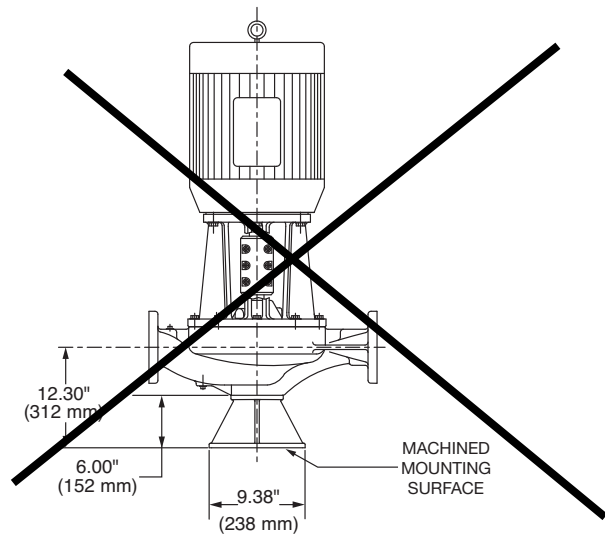
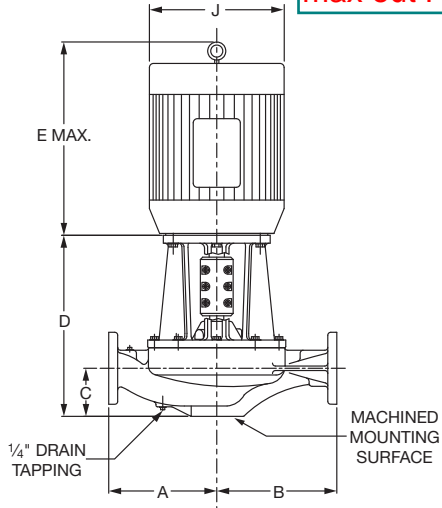
NSF 61 Certified

Yes No

WEIGHT _____ PUMP/MOTOR _____

MAX impeller to max out HP

PUMP WITH OPTIONAL SUPPORT STAND



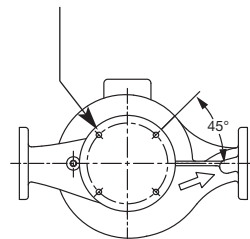
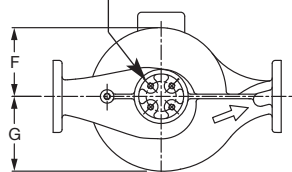
OPERATING SPECIFICATIONS

	Standard		Optional
Flange	ANSI Class 125	ANSI Class 250	
Pressure	175 PSIG* (1210 KPA)	300 PSIG (2070 KPA)	CF
Temperature	250°F (120°C)	300°F (120°C)	CF

Motors: All NEMA Standard ODP Frame (CZ Shaft)
 * In accordance with ANSI Standard B16.1 Class 125
 ** In accordance with ANSI Standard B16.1 Class 250 Dim.

FOUR 3/8" -16 UNC THREADED MOUNTING HOLES ON A 2.88" (73 mm) BOLT CIRCLE

FOUR 0.63" (16 mm) MOUNTING HOLES ON A 7.75" (197 mm) BOLT CIRCLE



MAXIMUM ASSEMBLY WEIGHT

Motor Frame	Weight without Optional Stand Lbs (Kg)	Weight with Optional Stand Lbs (Kg)
143CZ - 145CZ	229 (104)	248 (112)
182CZ - 184CZ	270 (122)	289 (131)
213CZ - 215CZ	332 (151)	351 (159)

DIMENSIONS

*A & B Dimensions apply for all pump sizes.

Model No.	Conn.	Motor Frame	HP 1760 RPM	Flange Size ASA	A*	B*	C	D	E MAX	F	G	H	J DIA
3007	3 x (76 x 76)	145CZ	1.5	3 (76)	10.00 (254) if ANSI Class 125	10.00 (254) if ANSI Class 125	6.30	16.96 (431)	14.05 (357)	5.29	6.31	0.25	7.05 (179)
		182CZ	3					16.96 (431)	14.05 (357)				7.05 (179)
		184CZ	5					16.96 (431)	15.64 (397)				8.49 (216)
		213CZ	7.5					16.96 (431)	16.68 (424)				8.49 (216)
								16.96 (431)	19.13 (486)				10.18 (259)

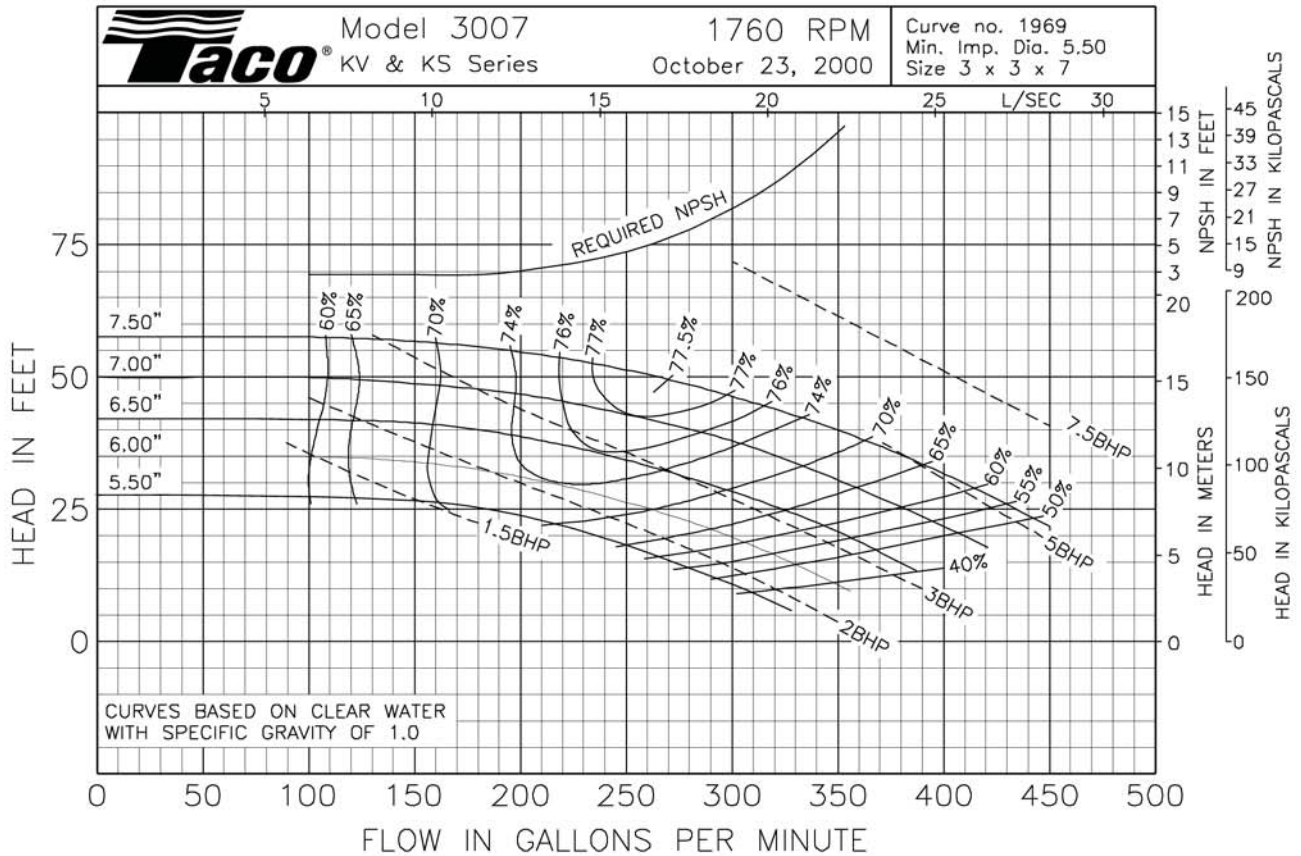
English dimensions are in inches. Metric dimensions are in millimeters. Metric data is presented in (). Do not use for construction purposes unless certified.

MATERIALS OF CONSTRUCTION

	BRONZE FITTED			ALL IRON			NSF 61		
	STANDARD PUMP CONSTRUCTION		OPTIONAL	STANDARD PUMP CONSTRUCTION		OPTIONAL	STANDARD PUMP CONSTRUCTION		OPTIONAL
	125# Flange	250# Flange	125# or 250#	125# Flange	250# Flange	125# or 250#	125# Flange	250# Flange	125# or 250#
Casing	Cast Iron ASTM A48/ A48M-03 Class 30A	Ductile Iron ASTM A536-84 Grade 65-45-12	N/A	Cast Iron ASTM A48/ A48M-03 Class 30A	Ductile Iron ASTM A536-84 Grade 65-45-12	N/A	Cast Iron ASTM A48/A48M-03 Class 30A	Ductile Iron ASTM A536-84 Grade 65-45-12	N/A
Impeller	Bronze ASTM B584 ALLOY C83600 or C84400	Bronze ASTM B584 ALLOY C83600 or C84400	N/A	Cast Iron ASTM A48/A48M- 03 Class 30A	Cast Iron ASTM A48/A48M- 03 Class 30A	N/A	Stainless Steel ASTM A351/A 351M-08	Stainless Steel ASTM A351/A 351M-08	N/A
Wear Ring	N/A	N/A	Bronze ASTM B584-98A C92200	N/A	N/A	N/A	N/A	N/A	Bronze ASTM B584-98A C92200
Shaft	Stainless Steel TYPE 416"™" or 410"™" ASTM A582	Stainless Steel TYPE 416"™" or 410"™" ASTM A582	N/A	Stainless Steel TYPE 416"™" or 410"™" ASTM A582	Stainless Steel TYPE 416"™" or 410"™" ASTM A582	N/A	Stainless Steel TYPE 416"™" or 410"™" ASTM A582	Stainless Steel TYPE 416"™" or 410"™" ASTM A582	N/A
Coupling	Aluminum Alloy 6061-T6	Aluminum Alloy 6061-T6	N/A	Stainless Steel TYPE 303 ASTM A276	Aluminum Alloy 6061-T6	N/A	Aluminum Alloy 6061-T6	Bronze ASTM B584-98A C92200	N/A
Mechanical Seal	Ceramic/EPT	Ceramic/EPT	Tungsten Carbide/EPT or Silicon- Carbide/EPT	Ceramic/EPT	Ceramic/EPT	Tungsten Carbide/EPT or Silicon- Carbide/EPT	Ceramic/EPT	Ceramic/EPT	N/A
Seal Flush Line	Copper & Brass C3600	Copper & Brass C3600	CF	Copper & Brass C3600	Copper & Brass C3600	CF	Copper & Brass C3600	Copper & Brass C3600	N/A
Support Stand	N/A	N/A	Ductile Iron ASTM A536-84 Grade: 65-45-12	N/A	N/A	Ductile Iron ASTM A536-84 Grade: 65-45-12	N/A	N/A	Ductile Iron ASTM A536-84 Grade 65-45-12

N/A = Not available C/F = Consult factory

Revised Jul 06-2016



Comments:

Taco Comfort Solutions™ A Taco Family Company
 Taco, Inc., 1160 Cranston Street, Cranston, RI 02920 | Tel: (401) 942-8000 | FAX: (401) 942-2360
 Taco (Canada), Ltd., 8450 Lawson Road, Suite #3, Milton, Ontario L9T 0J8 | Tel: (905) 564-9422 | FAX: (905) 564-9436
 Visit our web site: www.TacoComfort.com | Printed in USA | ©2016 Taco, Inc.

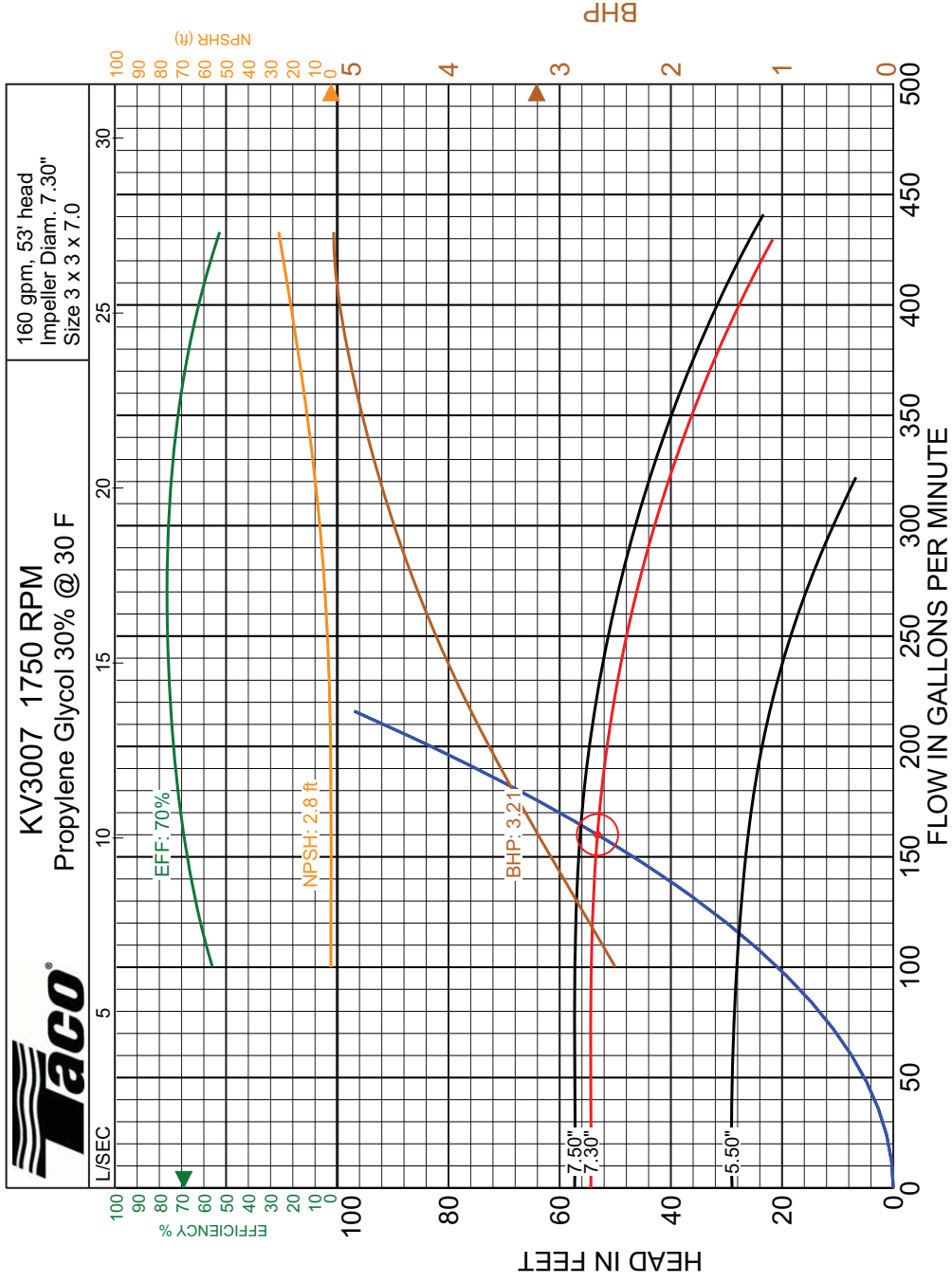


Vertical Pumps Model: KS3007

Tag: HGP-1&2
REV

- Flow Rate (Gpm): 160
- Head Loss (Ft): 53.2
- Working Fluid: Propylene Glycol 30% @ 30 F
- Efficiency (%): 70%
- Construction: Iron
- Design Hp: 3.21
- Net Hp: 5.00
- Motor Hp: 5
- Npsh (Ft): 3
- Rpm: 1760
- Imp Dia: 7.3
- Volt/Ph/Hz: 460/3/60

Notes:





Submittal Data Information

Suction Diffuser Rear Strainer Pullout (RSP) "Flanged"

301-239.1

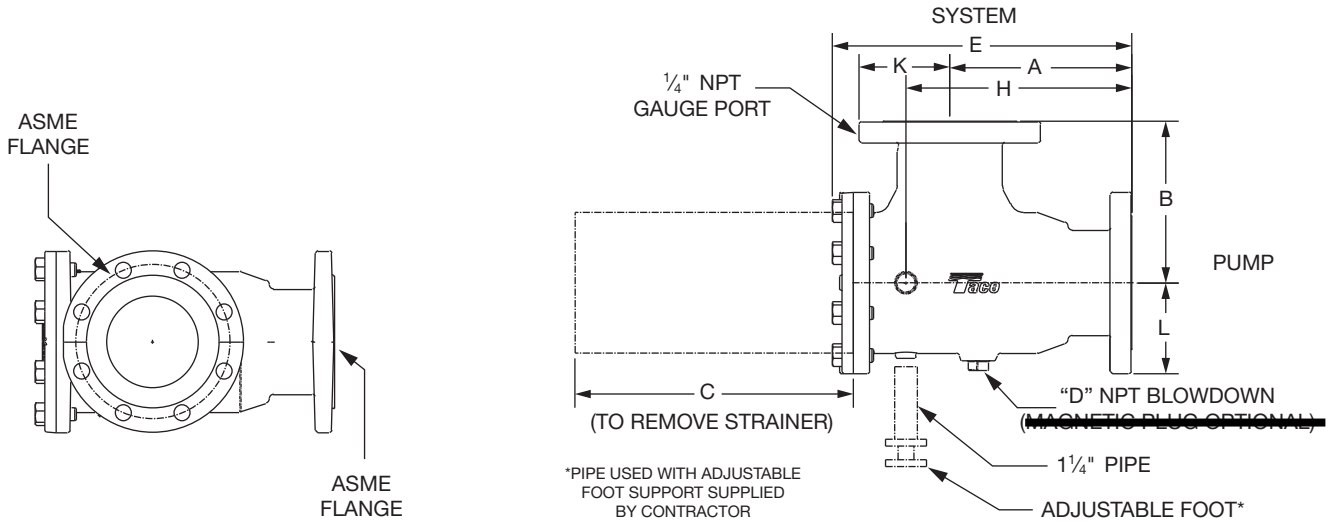
SUPERSEDES: August 1, 2012

EFFECTIVE: September 17, 2013

JOB Immucell ENGINEER Stantec CONTRACTOR AAA Energy REP. Emerson Swan

ITEM	QUANTITY	MODEL NO.	SIZE
HGP-1 & 2	2	SD030030RSP	3 x 3

DIMENSIONS



Model Number	System	Pump	C _v	Free Area (sq. in.)	A (Class 125)*	A (Class 250)*	B	C	D	E (Class 125)*	E (Class 250)*	H (Class 125)*	H (Class 250)*	K (Class 125)*	K (Class 250)*	L (Class 125)*	L (Class 250)*	WGT. (Class 125)*	WGT. (Class 250)*
SD020015-5	2 Flanged	1½ Flanged	54	21	5.69 (145)	6.06 (154)	5.39 (137)	8.49 (216)	¾	9.25 (235)	9.62 (244)	6.92 (176)	7.29 (185)	3.00 (076)	3.25 (083)	2.50 (064)	3.06 (078)	22 (010)	27 (012)
SD020020-5	2 Flanged	2 Flanged	106	21	5.44 (138)	5.69 (145)	5.39 (137)	8.24 (209)	¾	9.00 (229)	9.25 (235)	6.67 (169)	6.92 (176)	3.00 (076)	3.25 (083)	3.00 (076)	3.25 (083)	24 (011)	28 (013)
SD025020-5	2½ Flanged	2 Flanged												3.50 (089)	3.75 (095)	3.00 (076)	3.25 (083)	27 (012)	35 (016)
SD030020-5	3 Flanged	2 Flanged												3.75 (095)	4.12 (105)	3.00 (076)	3.25 (083)	29 (013)	39 (018)
SD025025-5	2½ Flanged	2½ Flanged	135	24	6.06 (154)	6.56 (167)	6.01 (153)	8.97 (228)	¾	9.83 (250)	10.35 (263)	7.41 (188)	7.91 (201)	3.50 (089)	3.75 (095)	3.50 (089)	3.75 (095)	38 (017)	54 (025)
SD030025-5	3 Flanged	2½ Flanged			6.06 (154)	6.56 (167)	6.01 (153)		1	9.83 (250)		7.41 (188)	7.91 (201)	3.75 (095)	4.12 (105)	3.50 (089)	3.75 (095)	38 (017)	52 (024)
SD040025-5	4 Flanged	2½ Flanged	220	35	6.07 (154)	6.07 (154)	6.45 (167)	10.47 (266)	¾	9.00 (227)	12.18 (309)	7.50 (193)	7.50 (193)	4.40 (113)	4.00 (105)	2.50 (064)	3.75 (095)	50 (024)	65 (030)
SD030030-5	3 Flanged	3 Flanged			7.62 (194)	6.56 (167)	1		11.41 (290)	8.32 (211)		9.09 (231)	3.75 (095)	4.12 (105)	3.75 (095)	4.12 (105)	50 (023)	66 (030)	
SD040030-5	4 Flanged	3 Flanged			6.86 (174)	8.94 (227)	1		11.41 (290)	4.50 (114)		5.00 (127)	3.75 (095)	4.12 (105)	55 (025)	72 (033)			
SD050030-5	5 Flanged	3 Flanged			6.86 (174)					8.51 (216)		8.51 (216)	4.93 (125)	5.43 (138)	3.75 (095)	4.13 (105)	65 (026)	83 (038)	
SD040040-5	4 Flanged	4 Flanged	380	64	7.94 (202)	8.93 (227)	8.45 (215)	12.86 (327)	1	13.96 (355)	14.90 (378)	10.29 (261)	11.28 (287)	4.50 (114)	5.00 (127)	4.50 (114)	5.00 (127)	73 (033)	91 (041)
SD050040-5	5 Flanged	4 Flanged												5.00 (127)	5.50 (140)	4.50 (114)	5.00 (127)	75 (034)	97 (044)
SD060040-5	6 Flanged	4 Flanged												5.50 (140)	6.25 (159)	4.50 (114)	5.00 (127)	79 (036)	109 (049)

NOTE: Dimensions are in inches. Metric dimensions are in millimeters and are in parentheses (). Weights are in lb (kg).
*C' is the distance required to replace strainer.

* Append 'A' for Class 250 working pressure flanged units (pump side) – e.g. Model Number SD040030-4A.

FEATURES

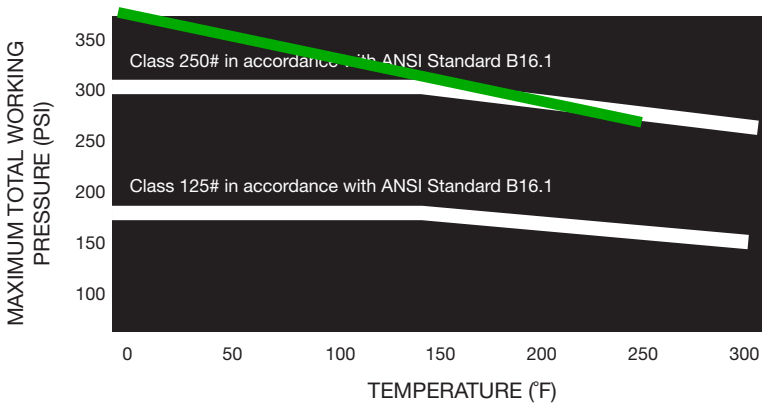
- Integral Cast Straightening Vanes ensure uniform flow to the suction inlet of the pump
- Oversized Body Cylinder ensures minimal pressure drop
- Metering Port allows for the monitoring of system conditions
- Disposable Fine Mesh Start-Up Strainer promotes cleaner, more trouble-free system
- Removable Cover Plate and reusable "O" Ring allows for easy access and maintenance of Permanent Strainer
- Blow Down port allows for routine maintenance and removal of sediment and debris
- Ductile Iron Body on all units
- Optional Magnetic Insert to trap small metallic particles
- Available with Class 125* flanges or Class 250* flanges. Consult pressure/temperature chart below for operating limitations. (Flanged units are raised faced design.)

(All sizes available with optional DIN Flanges. Consult factory for details)

MATERIALS OF CONSTRUCTION

- | | |
|------------------------------|-------------------------|
| Body | - Ductile Iron |
| Cover | - Ductile Iron |
| Straightening Vanes | - Integral Ductile Iron |
| Permanent Strainer | - Stainless Steel (304) |
| Disposable Start Up Strainer | - Bronze (16 Mesh) |
| Cover O-Ring | - EPDM |

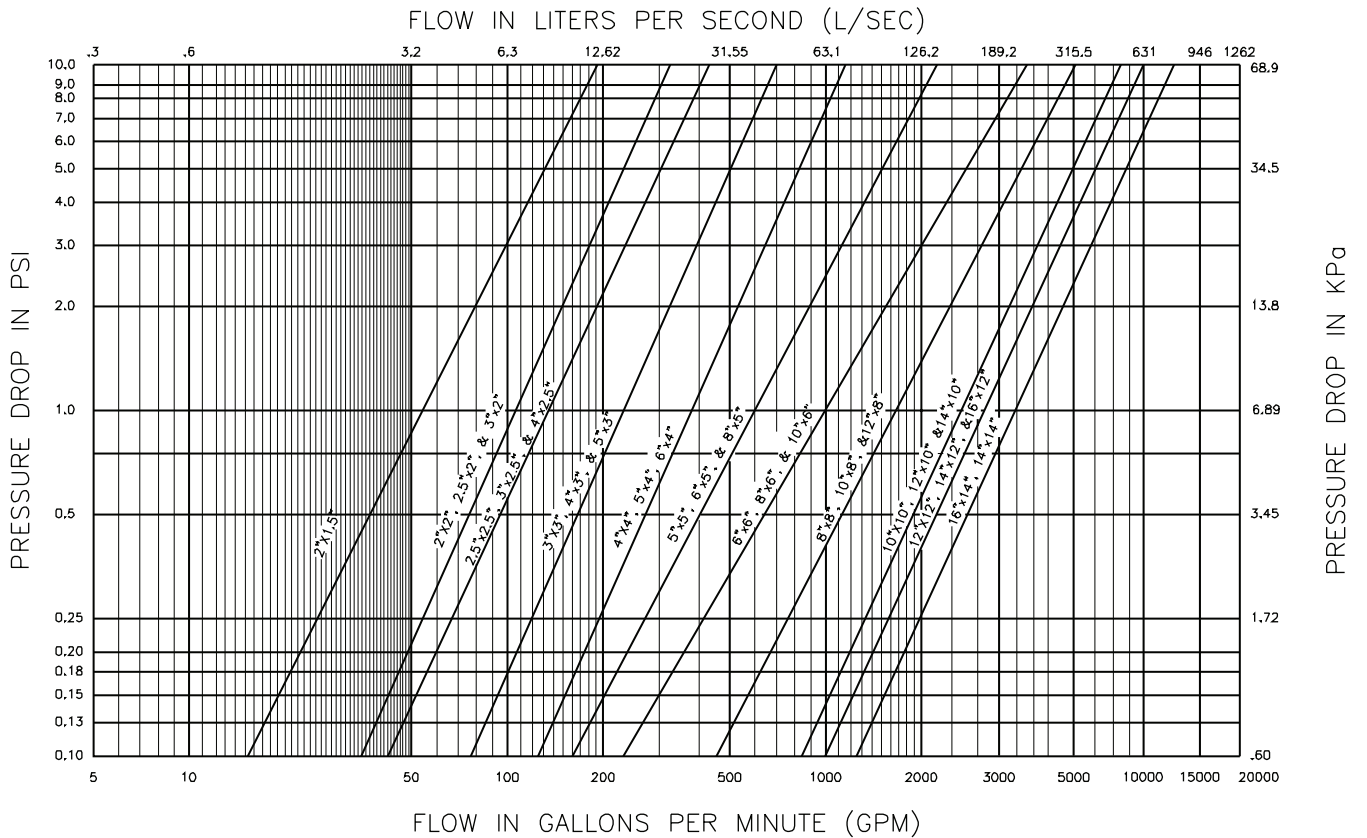
PRESSURE TEMPERATURE RATINGS



OPERATING SPECIFICATIONS

	Standard	Optional
Flange	Class 125*	Class 250*
Pressure	175 PSIG* (1210 KPA)	300 PSIG* (2070 KPA)
Temperature	250°F (120°C**)	250°F (120°C**)

* Per Pressure Temperature Ratings chart to left.



Do it Once. Do it Right.®

TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 FAX: (401) 942-2360.

TACO (Canada), Ltd., 8450 Lawson Road, Unit #3, Milton, Ontario L9T 0J8. Telephone: 905/564-9422. FAX: 905/564-9436.

Visit our web site at: <http://www.taco-hvac.com>

Printed in USA

Copyright 2013

TACO, Inc.

SUPERSEDES: September 1, 2008

EFFECTIVE: December 10, 2015

JOB Immucell ENGINEER Stantec CONTRACTOR AAA Energy REP. Emerson Swan

ITEM	QUANTITY	MODEL NO.	SIZE
for HGP-1 & 2	2	MPV030	3"

DIMENSIONS

Model Number	Size	Connection	A	B (Class 125*)	B (Class 250*)	C	D	E	F	C _v	Weight (125#)	Weight (250#)
MPV 015-4	1½ (38.1) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 020-4	2 (50.8) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	77	12 (5.5)	12 (5.5)
MPV 025-4	2½ (63.5) NPT	Threaded	10.00 (254)	1.88 (048)	1.88 (048)	5.87 (149)	3.50 (089)	7.00 (178)	1.3 (33.0)	100	20 (9.1)	20 (9.1)
MPV 030-4*	3 (76.2)	Flanged	11.75 (298)	3.75 (095)	3.75 (095)	6.15 (156)	3.90 (099)	7.85 (199)	1.8 (45.7)	209	38 (17)	48 (22)
MPV 035-4*	4 (101.6)	Flanged	13.75 (349)	4.50 (114)	4.50 (114)	8.51 (216)	4.18 (106)	9.63 (245)	2.1 (53.3)	357	67 (30)	84 (38)
MPV 050-4*	5 (127.0)	Flanged	17.63 (448)	5.00 (127)	5.50 (140)	11.26 (286)	5.25 (133)	12.28 (312)	2.4 (61.0)	459	105 (48)	126 (57)
MPV 060-4*	6 (152.4)	Flanged	20.35 (517)	5.50 (140)	6.25 (159)	11.28 (287)	6.07 (154)	14.23 (361)	2.7 (68.6)	701	134 (61)	176 (80)
MPV 080-4*	8 (203.2)	Flanged	25.88 (657)	6.75 (171)	7.50 (191)	13.58 (345)	6.75 (171)	19.13 (486)	3.9 (99.1)	1200	293 (133)	341 (155)
MPV 100-4*	10 (254.0)	Flanged	30.00 (762)	8.00 (203)	8.75 (222)	15.82 (402)	8.81 (224)	21.20 (538)	4.4 (111.8)	1826	466 (212)	536 (243)
MPV 120-4*	12 (304.8)	Flanged	36.70 (932)	9.50 (241)	10.25 (260)	17.54 (446)	9.98 (253)	26.64 (677)	4.9 (124.5)	2430	724 (329)	811 (368)
MPV 140-4*	14 (355.6)	Flanged	41.56 (1056)	10.50 (267)	11.50 (292)	22.80 (579)	12.09 (307)	29.47 (749)	5.4 (137.2)	3147	1105 (502)	1182 (537)

NOTE: Dimensions are in inches. Metric dimensions are in millimeters and are in parentheses (). Weights are in lb (kg).

*'F' is the distance required to replace packing under pressure. *A,C,D,E,F' applies to Class 250* flanged units also.

* Append 'A' for Class 250* working pressure flanged units (e.g. Model Number MPV 030-4A).

FEATURES

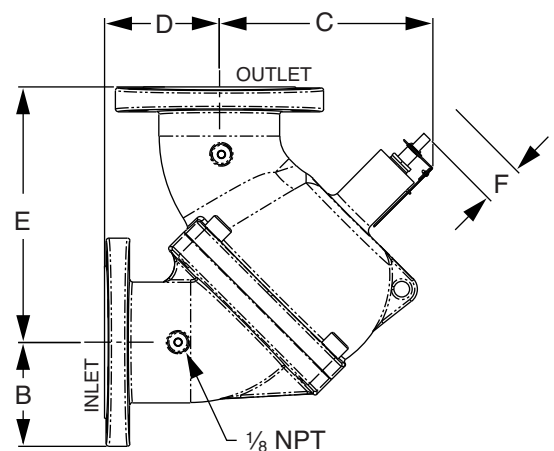
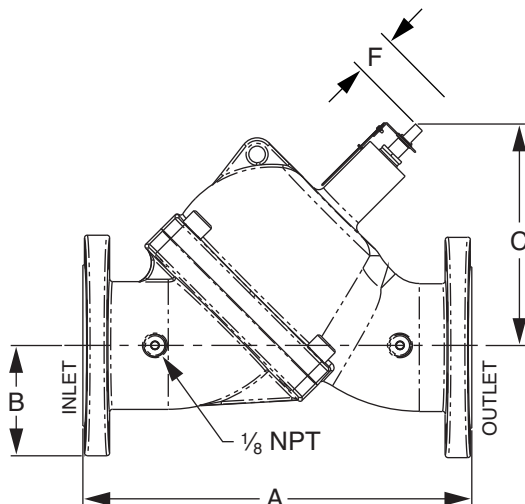
- Horizontal or Vertical Installation
- Field Convertible to a Right Angle Valve
- Stem Seal Packing (replaceable under pressure)
- Bronze Fitted Construction
- Memory Indicator, Pointer and Scale
- Shrader Valve Metering Connections
- "O" Ring Sealed Valve Body
- Replaceable "Soft Seal"
- Low Pressure Drop (equal to or better than any comparable valve on the market today)

- Five (5) Valves in One:
 - Shut Off Valve
 - Flow Control Valve (globe style)
 - Non Slam Check Valve
 - Flow Metering Valve
 - Straight Pattern Valve Convertible to a Right Angle Pattern Valve
- Available with Class 125* flanges or Class 250* flanges. Consult pressure/temperature chart on page 2 for operating limitations. (Flanged units are raised faced design.)
- Available with Flanged or Grooved End Connections

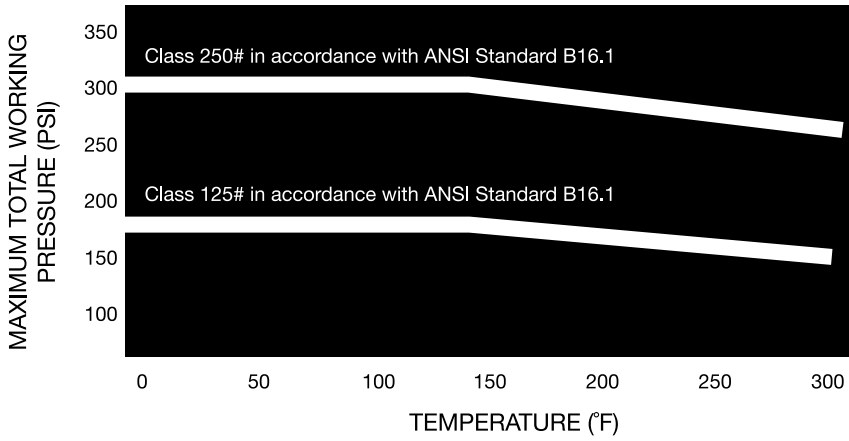
MATERIALS OF CONSTRUCTION

- Body - Ductile Iron
- Spring - Stainless Steel (302)
- Gland - Bronze
- Stem Packing - Teflon Impregnated Aramid Fiber (asbestos free)
- Stem - Bronze/Stainless Steel (416)
- Seat - EPDM
- Seat Disc - Stainless Steel (304)
- Body O-Ring - EPDM

(All sizes available with optional DIN flanges. Consult Factory for details.)



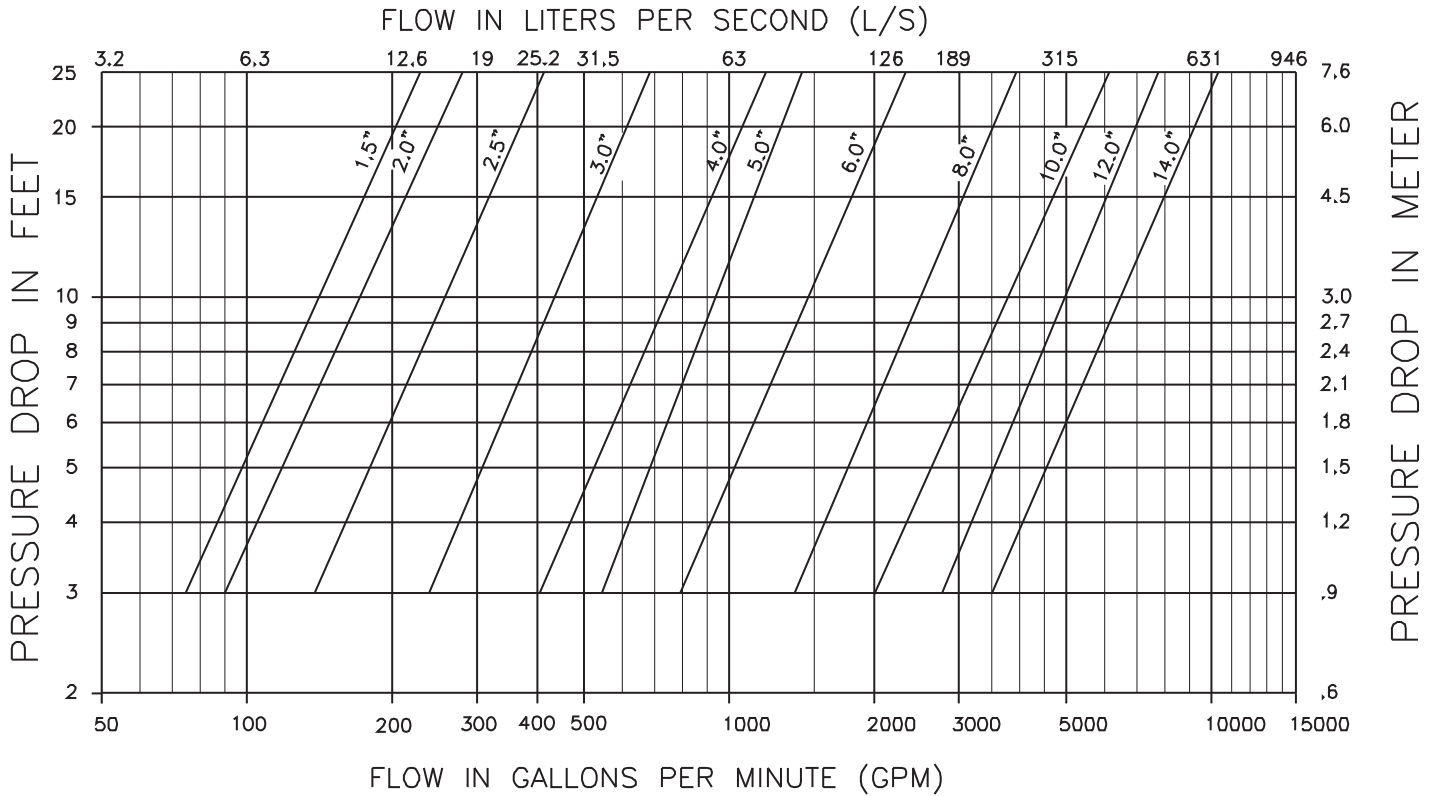
PRESSURE TEMPERATURE RATINGS



OPERATING SPECIFICATIONS

	Standard	Optional
Flange	Class 125*	Class 250*
Pressure	175 PSIG* (1210 KPA)	300 PSIG* (2070 KPA)
Temperature	250°F (120°C**)	250°F (120°C**)

* Per Pressure Temperature Ratings chart to left.
** Per Pressure Temperature Ratings chart to left.



Taco Comfort Solutions™ A Taco Group Company

Taco, Inc., 1160 Cranston Street, Cranston, RI 02920 | Tel: (401) 942-8000 | FAX: (401) 942-2360

Taco (Canada), Ltd., 8450 Lawson Road, Suite #3, Milton, Ontario L9T 0J8 | Tel: (905) 564-9422 | FAX: (905) 564-9436

Visit our web site: www.TacoComfort.com | Printed in USA | ©2015 Taco, Inc.





Submittal Data Information

U Tube Heat Exchangers

201-009T

Model E8210S 8" Diameter Steam, 2 Pass, 5' Length

JOB: Immucell

CONTRACTOR: AAA Energy

ENGINEER: Stantec

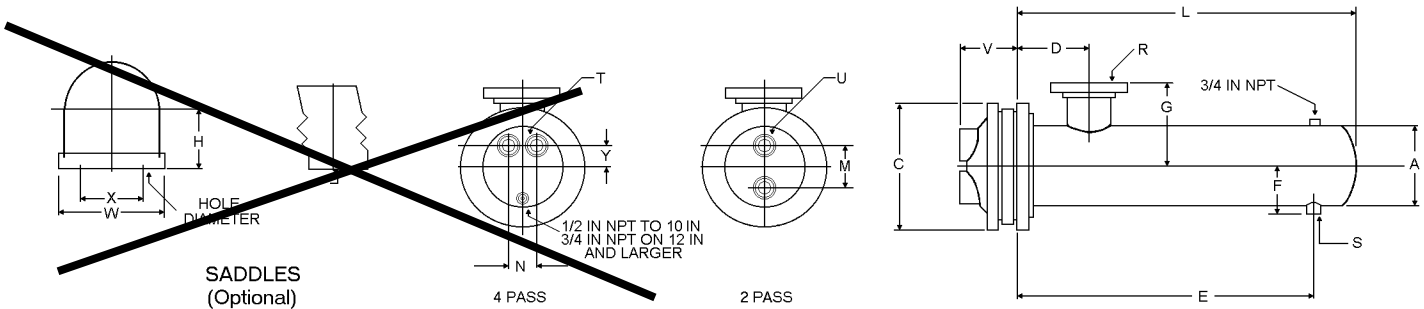
REP: Emerson Swan

COMMENTS:

ITEM NO.	MODEL NO.	PASSES
HTX-1 & HTX-2	E08210-S	2

TUBESIDE	FLUID	FLOW (gpm)	TEMP. IN (F)	TEMP. OUT (F)	PRESS. DROP (ft)	VELOCITY (fps)
	P.G. 30%	160	150	180	2.10	5.89

SHELLSIDE	STEAM	LBS. PER HOUR	SAT. STEAM TEMP.	STEAM PRESSURE		
		2412.5	249.76	15		



* Dimensions in inches, heating surface in sq.ft., weight in lbs.

M	U	V	A	C	D	E	F	G	L	R	S	Heating Surface	Shipping Weight
5	3T	3-3/8	8-5/8	13-1/2	8	54	6	8-7/8	60	4F	1T	44.7	326

SADDLE DIMENSIONS: H-7-5/16; W-11-1/4; X-9; Hole Diameter.-5/8

MATERIALS OF CONSTRUCTION

	Standard	Optional
Shell	Steel	304ss, 316ss
Head	Cast Iron 4-10"	Fabricated Steel, Cast Bronze, Fabricated 304ss/316ss
Tubes	Fabricated Steel 12-30"	Cast Bronze, Fabricated 304ss/316ss
Tube Sheet	3/4 x 20 BWG Copper	3/4 18 BWG Copper, Steel, 304ss, 316ss, 90/10 Cu Ni, Admiralty
Separators	Steel	Bronze, Brass, 304ss, 316ss, 90/10 Cu Ni
Working Pressure	Steel	Bronze, Brass, 304ss, 316ss, 90/10 Cu Ni
Max. Temperature	150 PSIG (ASME)	Consult Factory
	375 deg. F	Consult Factory

COMPARE. YOU'LL TAKE TACO.

TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401)942-8000 FAX: (401)942-2360.
 TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone:905/564-9422. FAX: 905/564-9436



Submittal Data Information

401-176

"4900" Series Removable Cover, Air/Dirt Separator

SUPERSEDES: September 15, 2015

EFFECTIVE: March 8, 2016

JOB Immucell ENGINEER Stantec CONTRACTOR AAA Energy REP. Emerson Swan

ITEM	QUANTITY	MODEL NUMBER	SIZE
AS-2	1	4904ADR-125	4"

SPECIFICATIONS

- Designed and constructed per ASME Code Section VIII Div. 1
- Registered with the National Board of Pressure Vessel Manufacturers
- Standard Design Pressure and Temperature: 125 psi @ 240°F
- Construction: Carbon Steel with exterior red oxide primer finish
- 304 Stainless Steel Coalescence Pall Rings
- Taco 4900 units are designed to be self-supporting in the piping system. Factory review is necessary should any piping loads be present.

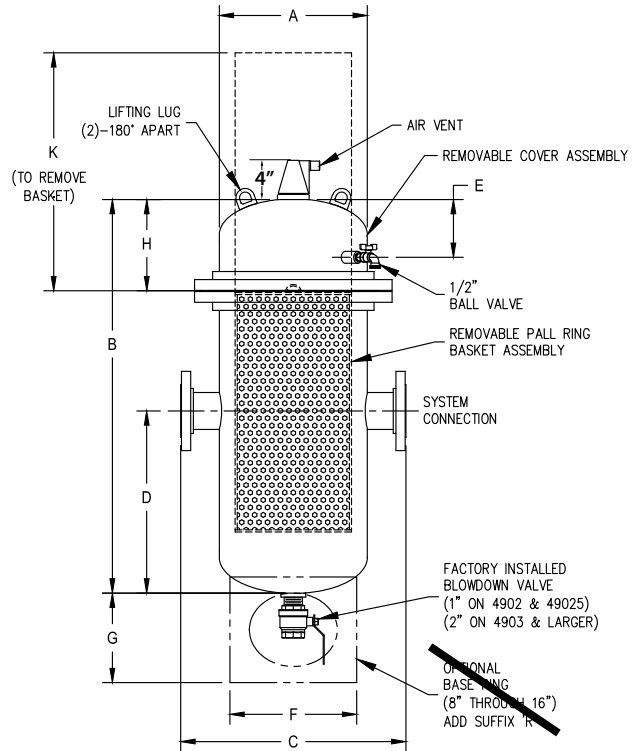
CAUTION: LIFTING LUGS FOR RIGGING AND LIFTING USE ONLY, NOT FOR ANCHORING OR HANGING.

FACTORY INSTALLED

- Air Vent is suitable for water, max. 50% glycol
- Blowdown Valve
- Flush Valve

OPTIONS

- Higher design pressures and temperatures
 - 150 psi @ 240°F, Available
- Optional System Connection sizes available
- Optional Base Ring
 - Add Suffix 'R' (4905 thru 4916), Exp. 4912AD-125R Not Available (4902 thru 4904)



PIPE SIZE	MODEL NUMBER ⁽¹⁾	A DIA. (INCH)	B MAX. (INCH)	C (INCH)	D (INCH)	E (INCH)	F DIA. (INCH)	G (INCH)	H (INCH)	K (INCH)	FLOW @ 2 PSI P.D.	APPROX. WGT. (LBS)
2	4902ADTR-125	10	20	12*	7 1/12	5 1/4	-	-	8	11	51	85
2	4902ADR-125	10	20	20	7 1/12	5 1/4	-	-	8	11	51	85
2 1/2	49025ADTR-125	10	20	12*	7 1/12	5 1/4	-	-	8	11	73	90
2 1/2	49025ADR-125	10	20	20	7 1/12	5 1/4	-	-	8	11	73	90
3	4903ADTR-125	12	26	14 1/2*	11 5/8	6	-	-	9	14	113	135
3	4903ADR-125	12	26	22	11 5/8	6	-	-	9	14	113	135
4	4904ADR-125	12	26	22	11 5/8	6	-	-	9	14	204	140
5	4905ADR-125	14	34 1/2	24	15 3/4	6	-	-	10	21	306	430
6	4906ADR-125	14	34 1/2	24	15 3/4	6	-	-	10	21	469	440
8	4908ADR-125	18	41 1/2	28	18 1/8	7 1/4	17 1/2	12 5/8	12	25	816	630
10	4910ADR-125	24	56 1/4	36	25 3/8	8 7/8	20	12 7/8	15	35	1291	1155
12	4912ADR-125	24	63 1/4	36	26 3/8	8 7/8	20	12 7/8	15	39	1837	1180
14	4914ADR-125	30	74	42	33	10 1/2	24	13 3/4	18	44	2106	1550
16	4916ADR-125	30	80 3/4	42	34	10 1/2	24	13 3/4	18	51	2790	1580

⁽¹⁾ FOR 150 PSI MODEL NUMBERS, REPLACE -125 WITH -150
*DIMENSIONS FOR "T" OPTION ONLY



Taco, Inc., 1160 Cranston Street, Cranston, RI 02920 | Tel: (401) 942-8000 | FAX: (401) 942-2360
Taco (Canada), Ltd., 8450 Lawson Road, Suite #3, Milton, Ontario L9T 0J8 | Tel: (905) 564-9422 | FAX: (905) 564-9436
Visit our web site: www.TacoComfort.com | Printed in USA | ©2015 Taco, Inc.



SUPERSEDES: July 30, 2014

EFFECTIVE: December 1, 2014

JOB Immucell ENGINEER Stantec CONTRACTOR AAA Energy REP. Emerson Swan

ITEM NO.	LOCATION	MODEL NO.	QUANTITY	PRE-CHARGE *	WORKING PRESSURE
ET-2	Skid Pkg	CA 140	1	12 *Field charge	125

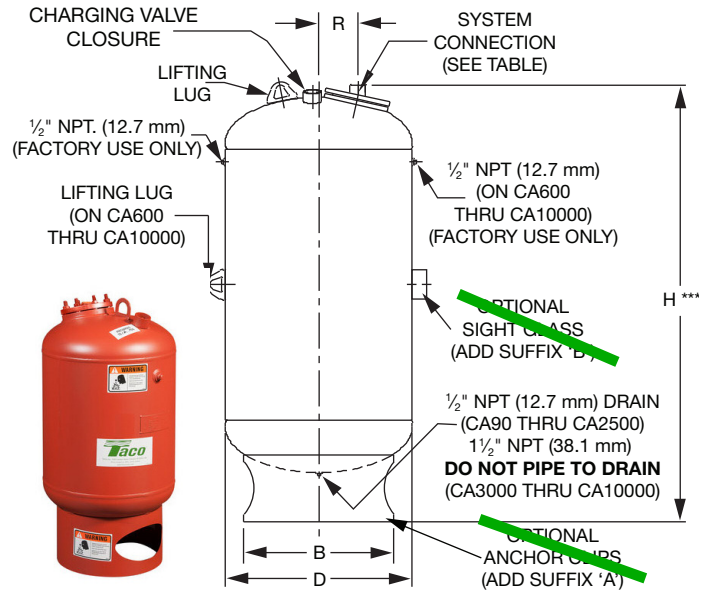
* Unless otherwise specified, pre-charge of 12 psi (83 kPa).

SPECIFICATIONS

- Designed and constructed per ASME Code Section VIII, Div. 1.
- Construction: Carbon Steel with exterior red oxide primer finish
- Standard Design Pressure and Temperature: 125 psi @ 240°F (862 kPa @ 116°C) Max.
- Registered with the National Board of Pressure Vessel Manufacturers
- U-1A Data Report
- Bladder type for permanent separation of air and water.
- Water expands into bladder, air pre-charge on shell side.
- Bladder – Heavy Duty Butyl, removable for inspection.
- Suitable for Vertical or Horizontal Installation
- ~~Optional Design Pressures and Temperatures~~
 - 125 psi @ 280°F (862 kPa @ 138°C)
 - 150 psi @ 240°F (1034 kPa @ 116°C)
 - 175 psi @ 240°F (1207 kPa @ 116°C)
 - 250 psi @ 240°F (1724 kPa @ 116°C)
 - 300 psi @ 240°F (2069 kPa @ 116°C)
 - 150 psi @ 280°F (1034 kPa @ 138°C)
 - 175 psi @ 280°F (1207 kPa @ 138°C)
 - 250 psi @ 280°F (1724 kPa @ 138°C)
 - 300 psi @ 280°F (2069 kPa @ 138°C)

- ~~Optional System Connection Materials, "For Potable Water Use", Non NSF/ANSI 61~~
 - [K] 304 Stainless Steel

- ~~Optional Options~~
 - [A] Anchor Clips
 - [B] Bulls Eye Sight Glass



MODEL NUMBER	TANK VOLUME		H HEIGHT ***		B DIAMETER		D DIAMETER		R RADIUS		SHIPPING WEIGHT **		SYSTEM CONNECTION SIZE	
	GAL.	liter	INCH	mm	INCH	mm	INCH	mm	INCH	mm	LBS.	kg	Imperial	metric
CA90-125	22	83	29 1/8	743	16	406	20	508	4 1/2	114	120	155	1" NPT	25.4mm
CA140-125	37	140	40 1/8	1019	16	406	20	508	4 1/2	114	195	88	1" NPT	25.4mm
CA175-125	57	213	53 3/8	1363	18	457	24	610	5	127	200	100	1" NPT	25.4mm
CA300-125	79	300	57 3/4	1467	20	508	24	610	5	127	320	145	1 1/2" NPT	38.1mm
CA450-125	119	450	77 3/8	1965	20	508	24	610	5	127	400	181	1 1/2" NPT	38.1mm
CA500-125	132	500	85 3/4	2178	20	508	24	610	5	127	420	191	1 1/2" NPT	38.1mm
CA600-125	158	600	71 7/8	1826	24	610	30	762	6 1/4	159	460	209	1 1/2" NPT	38.1mm
CA700-125	185	700	80 3/8	2048	24	610	30	762	6 1/4	159	525	238	1 1/2" NPT	38.1mm
CA800-125	211	800	89 7/8	2283	24	610	30	762	6 1/4	159	590	268	1 1/2" NPT	38.1mm
CA900-125	238	900	73 1/8	1857	30	762	36	914	7 7/16	189	690	313	1 1/2" NPT	38.1mm
CA1000-125	264	1000	79	2007	30	762	36	914	7 7/16	189	790	358	1 1/2" NPT	38.1mm
CA1100-125	291	1100	85 1/4	2165	30	762	36	914	7 7/16	189	865	392	1 1/2" NPT	38.1mm
CA1200-125	317	1200	91	2311	30	762	36	914	7 7/16	189	940	426	1 1/2" NPT	38.1mm
CA1300-125	344	1300	97	2464	30	762	36	914	7 7/16	189	980	445	1 1/2" NPT	38.1mm
CA1400-125	370	1400	103	2616	30	762	36	914	7 7/16	189	1020	463	1 1/2" NPT	38.1mm
CA1500-125	396	1500	73 3/8	1864	40	1016	48	1219	10 15/16	278	1200	544	1 1/2" NPT	38.1mm
CA1600-125	422	1600	76 5/8	1946	40	1016	48	1219	10 15/16	278	1380	626	1 1/2" NPT	38.1mm
CA1800-125	475	1800	83 1/2	2121	40	1016	48	1219	10 15/16	278	1515	687	1 1/2" NPT	38.1mm
CA2000-125	528	2000	90 3/8	2296	40	1016	48	1219	10 15/16	278	1650	748	1 1/2" NPT	38.1mm
CA2500-125	660	2500	107 1/8	2721	40	1016	48	1219	10 15/16	278	1838	834	1 1/2" NPT	38.1mm
CA3000-125	792	3000	94 1/8	2391	44	1118	54	1372	11 7/16	291	2025	919	2" NPT	50.8mm
CA4000-125	1056	4000	120 3/4	3067	44	1118	54	1372	11 7/16	291	2400	1089	2" NPT	50.8mm
CA5000-125	1320	5000	150 1/4	3816	44	1118	54	1372	11 7/16	291	3100	1406	2" NPT	50.8mm
CA7500-125	1980	7500	128 3/4	3270	62	1575	72	1829	11 1/2	292	3850	1746	3" NPT	76.2mm
CA10000-125	2640	10000	158 1/4	4020	62	1575	72	1829	11 1/2	292	4500	2041	3" NPT	76.2mm

** Weight shown is for 125 psi models only. Consult factory for shipping weight of higher design pressure models.

*** Allow 18" minimum clearance above tank for piping system connection.

COMMENTS:



DIMENSIONS & DATA CERTIFIED FOR:

Representative:

Order:

Customer:

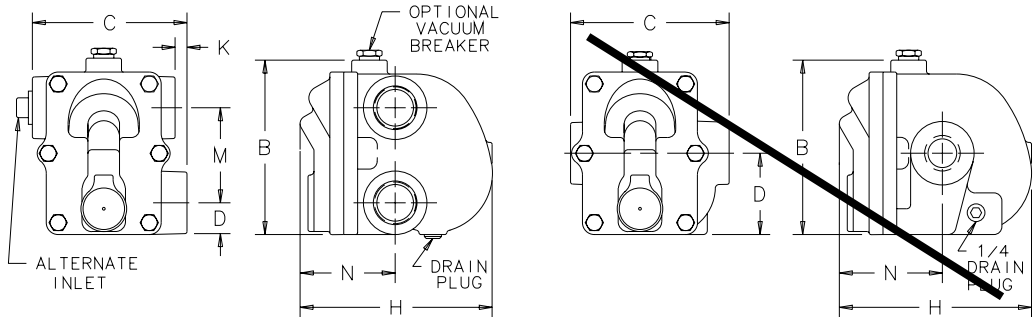
Order:

Project:

Requirements:

By:

Date:



SERIES "B"

SERIES "BI"

TRAP SERIES	B SERIES						BI SERIES
Pipe Connections	1/2, 3/4	1"	1-1/4	1-1/2	2	2, 3/4, 1"	
B (Height)	4-7/8	5-1/2	5-1/2	7-7/16	9-5/8	5-5/8	
C (Face to Face)	3-7/8	4-7/8	4-5/8	5-3/4	7-5/8	5	
D (Bottom to ϕ)	7/8	1	1-7/32	1-7/16	1-11/16	2-11/16	
H (Width)	5-3/8	6	7-3/4	8-7/16	11-5/8	6-7/8	
K (Connection Offset)	1/8	3/8	—	—	—	—	
M (ϕ to ϕ)	2-3/4	3	3	4-3/16	6	—	
N (Top to ϕ)	2-9/16	3	3-3/8	3-3/4	5	3-9/32	
Weight (lbs)	6	8-1/2	11	19	40	9-3/4	
Maximum Allowable Pressure (Vessel Design)	125 psig at 450° F	175 psig at 450° F			175 psig at 450° F		
Maximum Operating Pressure (psig)	30 psig, saturated steam						

NOTE: DIMENSIONS ARE IN INCHES

NAME OF PART	B, BI SERIES
Cap and Body	ASTM A48 Class 30
Bolting	SAE Grade 2
Gasket	Graphite with Surlyn
Valve	440 Stainless Steel
Valve Seat	303 Stainless Steel • ASTM A582
Float	304 Stainless Steel
Mechanism	Stainless Steel
Balanced Pressure Thermostatic Air Vent	Stainless Steel and Bronze with phosphor bronze bellows, entire unit caged in stainless steel.

*440F Stainless Steel in 1-1/2 inch size and larger

OPTIONS
CONNECTIONS, NPT OR BSPT
INTEGRAL VACUUM BREAKER <input type="checkbox"/>


 Armstrong International, Inc.
 Three Rivers Division
 Three Rivers, MI 49093
Armstrong (616) 273-1415 Fax (616) 278-6555
 Posted on Armstrong's homepage www.armstrong-intl.com

Product	CD No.	Date
B & BI SERIES FLOAT & THERMOSTATIC STEAM TRAP	1167	02/04/00
		Rev. A

BUTTERFLY VALVE

CL SERIES-REV. C

2"-12" - 200 PSI (1380 kPa)

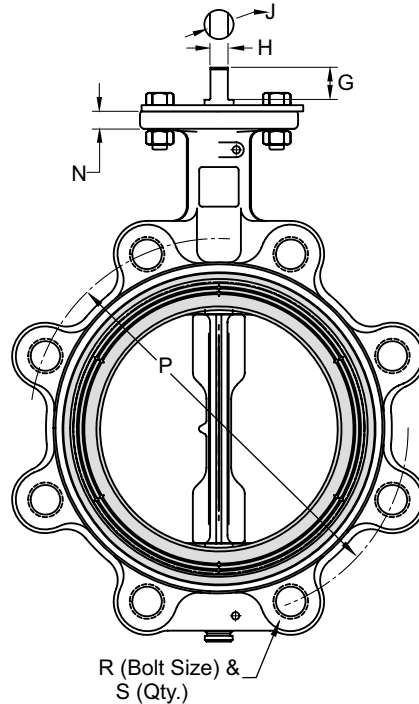
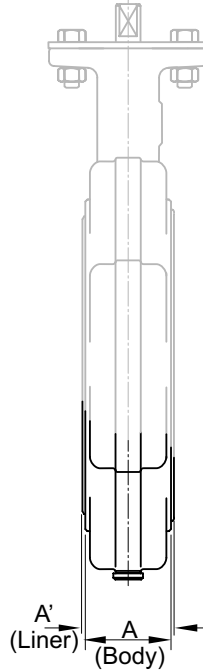
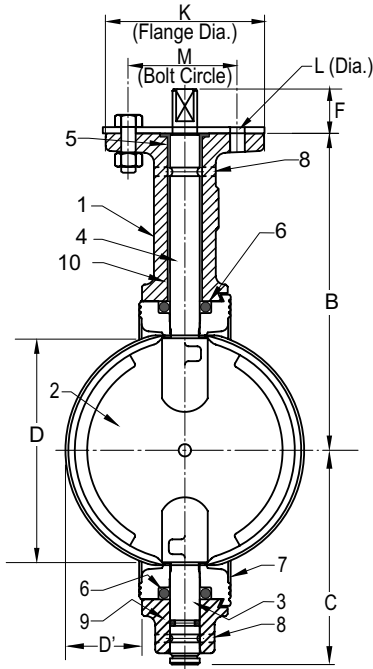
Dead End Service to 150 psi

RATINGS

200 PSI Butterfly Valve
Non Shock Water, Oil,
Gas

SPECIFICATIONS

MSS SP-67
API-609



Approved by U.S. Coast Guard
for use in Category A service as
described in Title 46 Code of
Federal Regulations 46.20-15.

ITEM	PARTS NAME	MATERIAL
1	BODY	CAST IRON-ASTM A 126 CL B
2	DISC	ALUMINUM BRONZE-ASTM B 148
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
4	TOP STEM	STAINLESS STEEL TYPE 416
5	TOP BEARING	THERMOSET POLYMER
6	SEAL	EPDM
7	LINER	EPDM
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM
10	LOWER BEARING	THERMOSET POLYMER
11	OPERATOR	LEVER HANDLE
		EPOXY COATED LEVER
		GEAR OPERATOR
		GEAR OP W/ MEMORY STOP
		GEAR OP W/ LOCK
		ACTUATOR-AIR/AIR ACTUATOR-AIR/SPRING ACTUATOR-ELECTRIC

CL_101000_MAT.XLS

DIMENSIONS

	INCHES	2	2-1/2	3	4	5	6	8	10	12
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06
	mm	42.9	46.1	46.0	52.5	55.6	55.6	60.3	68.3	78.0
A' (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.31	2.51	2.82	3.21
	mm	46.1	49.1	49.1	55.8	58.8	58.7	63.6	71.5	82.0
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.19	12.06
	mm	139.7	152.4	158.8	177.8	191.3	203.2	238.1	258.8	306.4
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	6.56	7.88	9.25
	mm	77.8	84.1	95.3	108.0	125.4	141.3	166.7	200.0	235.0
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68
	mm	37.8	51.1	67.1	93.2	119.6	143.8	196.1	246.4	296.7
D' (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50
	mm	7.1	11.1	17.5	27.0	38.1	49.2	72.2	93.7	114.3
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50
	mm	28.6	28.6	28.6	28.6	28.6	28.6	38.1	38.1	38.1
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06
	mm	20.6	20.6	20.6	20.6	20.6	20.6	27.0	27.0	27.0
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71
	mm	8.9	8.9	8.9	10.2	10.2	11.2	13.5	18.0	18.0
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00
	mm	12.6	12.6	12.6	14.2	14.2	15.8	19.0	25.4	25.4
K		4	4	4	4	4	4	6	6	6
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56
	mm	11.1	11.1	11.1	11.1	11.1	11.1	14.3	14.3	14.3
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00
	mm	82.6	82.6	82.6	82.6	82.6	82.6	127.0	127.0	127.0
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50
	mm	11.1	11.1	11.1	11.1	11.1	11.1	12.7	12.7	12.7
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00
	mm	120.7	139.7	152.4	190.5	215.9	241.3	298.5	362.0	431.8
R		5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9
S		4	4	4	8	8	8	8	12	12

Rev.4

The information presented on this sheet is correct at the time of publication. Milwaukee Valve reserves the right to change design, and/or material specifications without notice. For the most current information access www.milwaukeevalve.com



BA-100/100S

1/4" - 3"

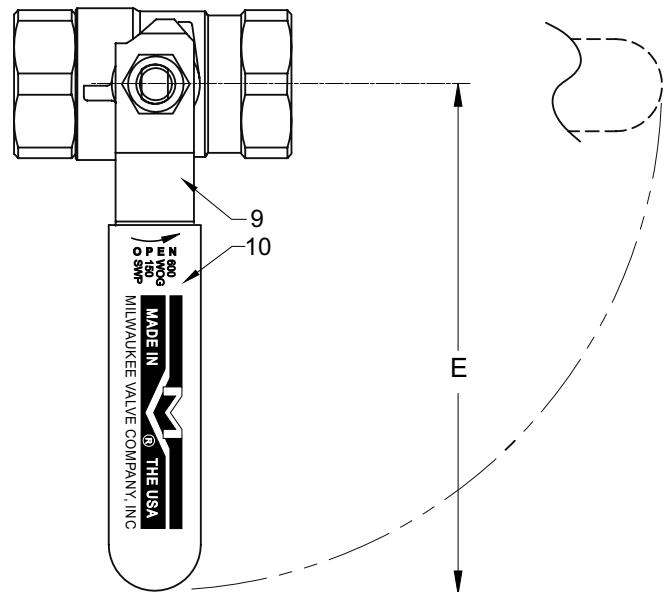
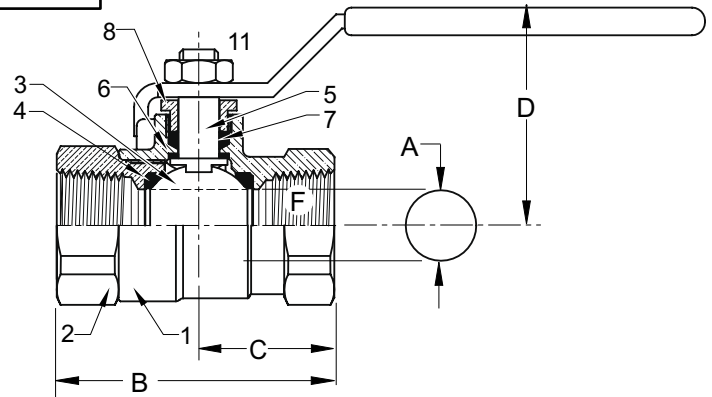
**BRONZE BALL VALVE
TWO-PIECE, STANDARD-PORT
600 PSIG WOG / 150 PSIG SWP *
THREADED ENDS**

MSS SP-110

MATERIALS LIST

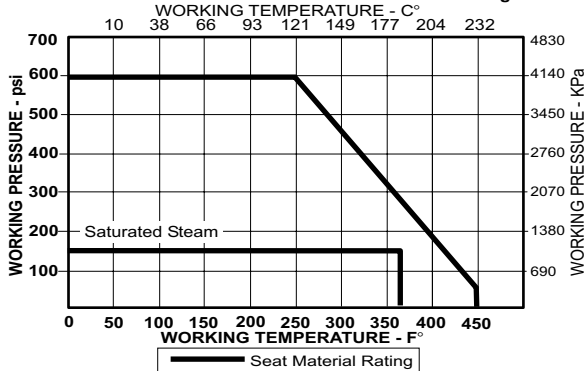
ITEM	PART	MODEL	MATERIALS	ASTM SPEC.
1	Body	100 & 100S	Cast Bronze	B584
2	Tailpiece	100 & 100S	Brass Cast Bronze (1" & up)	B16 B584
3	Ball	100 100S	Brass w/ Hard Chrome Plating 316 Stainless Steel	B16 A276
4	Seat	100 & 100S	RPTFE, 15% Glass Filled	
5	Stem	100 100S	Brass 316 Stainless Steel	B16 A276
6	Thrust Washer	100 & 100S	RPTFE, 25% Glass Filled	
7	Packing	100 & 100S	PTFE	
8	Packing Nut	100 & 100S	Brass	B16
9	Handle	100 & 100S	Steel w/ Zinc Plating	B633
10	Hand Grip	100 & 100S	Vinyl	
11	Handle Nut	100 & 100S	Steel w/ Zinc Plating	B633

* Milwaukee Valve Company recommends the use of Stainless steel ball and stem for steam applications. Please consult factory for more information.



PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.



DIMENSIONS

UNITS	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
	DN6	DN10	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80
A (DIA)	INCHES	0.38	0.38	0.50	0.76	0.88	1.06	1.31	1.56	2.00
	mm	9.7	9.7	12.7	19.3	22.4	26.9	33.3	39.6	51.0
B	INCHES	1.86	1.86	2.19	2.64	3.17	3.50	4.30	5.56	6.20
	mm	45.6	45.6	53.7	64.7	77.7	85.8	97.0	105.4	136.2
C	INCHES	1.00	1.00	1.10	1.30	1.58	1.74	1.97	2.15	2.79
	mm	24.5	24.5	27.0	31.9	38.7	42.6	48.3	52.7	68.4
D	INCHES	1.78	1.81	1.91	2.08	2.25	2.66	2.84	3.00	3.47
	mm	43.6	44.3	46.8	51.0	55.1	65.2	69.6	73.5	85.0
E	INCHES	3.81	3.81	3.81	4.56	4.56	6.31	6.31	7.19	7.19
	mm	93.3	93.3	93.3	111.7	111.7	154.6	154.6	176.2	176.2
F	THREAD SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT
	Cv	7	7	13	30	38	61	87	121	228

Note: DN (Diameter Nominal) = Metric equivalent size.

Rev. 7

The information presented on this sheet is correct at the time of publication. Milwaukee Valve reserves the right to change design, and/or material specifications without notice. For the most current information access www.milwaukeevalve.com



CHECK 509

HORIZONTAL SWING – BRONZE

125 lb. SWP-200 lb. WOG† • General Service
Bronze Disc • Threaded Ends

For Steam service specify 509-T (Teflon Disc).

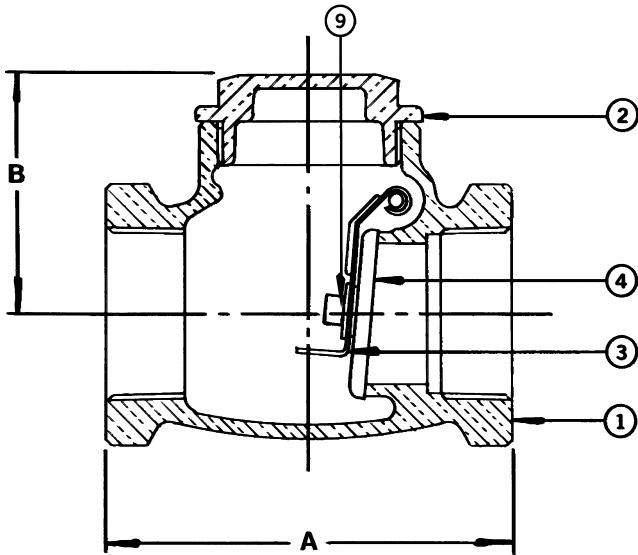
SPECIFICATIONS

509	Conforms to: MSS SP-80, Type 3, Class 125, Threaded Ends.
-----	--

MATERIAL LIST

NO.	PART	MATERIAL	SPECIFICATION
1	Body	Bronze	ASTM B 62
2	Cap	Bronze	ASTM B 62
3	Lever	St. Steel	Commercial 1/4" to 2" Incl.
		Bronze	ASTM B 62 2 1/2" and 3"
4	Disc	Brass	ASTM B 16 1/4" to 3/4" Incl. ASTM B 62 1" to 3" Incl.
5	Pin	St. Steel	Commercial
6	Plug (not shown)	Brass	ASTM B 16
7 ¹	Washer	Bronze	Commercial
8 ¹	Disc Nut	Bronze	Commercial
9	Retaining Ring	St. Steel	Commercial

¹ Used on 2 1/2" and 3" sizes only



DIMENSIONS - INCHES / MILLIMETERS

Units	Size	A	B
Inches	1/4	2 1/8	1 7/16
MM	6.35	53.98	36.53
Inches	3/8	2 1/8	1 7/16
MM	9.53	53.98	36.53
Inches	1/2	2 5/16	1 7/16
MM	12.70	58.75	36.53
Inches	3/4	2 5/8	1 11/16
MM	19.05	66.68	42.88
Inches	1	3 1/4	2
MM	25.40	82.55	50.80
Inches	1 1/4	3 9/16	2 1/8
MM	31.75	90.50	53.98
Inches	1 1/2	4	2 3/8
MM	38.10	101.60	60.33
Inches	2	4 3/4	2 13/16
MM	50.80	130.18	207.98
Inches	2 1/2	6	3 5/8
MM	63.50	152.40	92.08
Inches	3	6 7/8	4 3/16
MM	76.20	174.63	106.38

† Non-Shock

Rev. 1

INNOVATION IN EVERY VALVE



MILWAUKEE VALVE

The information presented on this sheet is correct at the time of publication. Milwaukee Valve reserves the right to change design, and/or material specifications without notice. For the most current information access www.milwaukeevalve.com

www.milwaukeevalve.com

Model: 11M**Cast Iron Screwed End Y Strainers**
Sizes: 1/4" - 4" (6-100mm)

Pressure / Temperature – Non-Shock		
Model	Material	Rating
11M	Cast Iron	400psi @ -20°F to 150°F 27.58 bar @ 65.56°C 250psi @ 406°F 17.24 bar @ 207.78°C

11M**Class 250**

Model 11M

Typical Service

- Used extensively to strain foreign matter from pipe lines and provide economical protection for costly pumps, meters, valves and other similar mechanical equipment.

Features

- Machined seats in both body and cap align and lock the screen in place to stop sediment bypass.

Construction

- Gasketed cap is used for easy disassembly and assembly. Many others use Loctite, rendering disassembly virtually impossible.

Self-Cleaning

- Self cleaning is accomplished by opening the plug or valve connected to the blowoff outlet.

Blowoff Outlets

- Outlets are NPT Tapped
- Sizes of tapping specified on the next page.
- Not normally furnished with plug. Plug available, specify with order.

Capacity

- Generously proportioned bodies
- Open Area Ratio much greater than pipe size, ensure low pressure loss.

Screens

MODEL	SIZES	STANDARD (WATER)		STEAM RECOMMENDATION	
		MATERIAL	OPENING	MATERIAL	OPENING
11M	1/2" - 2"	304SS	20 mesh	304SS	30 mesh
11M	2 1/2" - 4"	304SS	.062 perf	304SS	.045 perf

Pressure Drop

Pressure Drop Charts in Technical Data section of Mueller Steam Specialty Engineering binder.

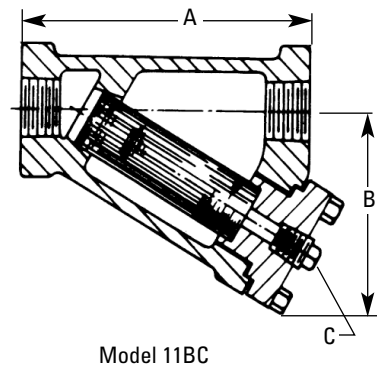
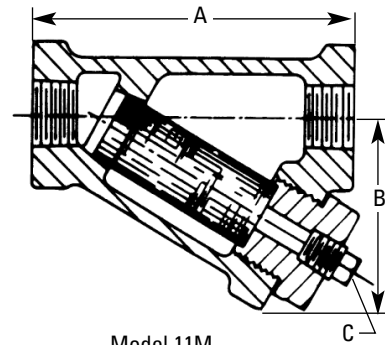
Materials

11M	
Body	Cast Iron ASTM A126 Class B
Gasket	Metal filled Graphite

Dimensions and Weights

SIZE		DIMENSIONS				WEIGHTS			
		A		B		C			
in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.
1/4	6	3 3/16	81	2 1/16	52	1/4	6	1.6	0.7
3/8	10	3 3/16	81	2 1/16	52	1/4	6	1.6	0.7
1/2	15	3 3/16	81	2 1/16	52	1/4	6	1.6	0.7
3/4	20	3 3/4	95	2 7/16	61	3/8	10	2.4	1.1
1	25	4	102	2 5/8	66	3/8	10	3.0	1.4
1 1/4	32	5	127	3 3/8	85	3/4	20	5.2	2.3
1 1/2	40	5 3/4	146	3 7/8	98	3/4	20	8.0	3.6
2	50	7	177	4 3/4	121	1	25	12.5	5.7
2 1/2	65	9 1/4	234	5 7/8	149	1 1/2	40	22.0	10.0
3	80	10	254	6	152	1 1/2	40	30.0	13.6
4	100	15 3/16	386	11 1/4	286	1 1/2	40	70.0	32.0

Apply For Certified Drawings.



Mueller Steam Specialty product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Mueller Steam Specialty Technical Service. Mueller Steam Specialty reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Mueller Steam Specialty products previously or subsequently sold.



A Division of Watts Water Technologies, Inc.

USA: 1491 NC Hwy 20 West St. Pauls, NC 28384; www.muellersteam.com
 Tel: 910-865-8241 Fax: 910-865-6220
 Toll Free Phone 1-800-334-6259 Toll Free Fax: 1-800-421-6772

KUNKLE

Features

- O-ring seats available for exceptional leak-free performance, reduced maintenance cost, multiple cycles with tight shutoff, improved seating integrity.
- Wide hex on valve nozzle provides wrenching service clearance for easy installation.
- Dual control rings offer easy adjustability for precise opening with minimum preopen or simmer and exact blowdown control.
- Pivot between disc and spring corrects misalignment and compensates for spring side thrust.
- Grooved piston model disc reduces sliding area and friction.
- Each Kunkle valve is tested and inspected for pressure setting and leakage.

Model Descriptions

Model 6010: Side outlet. Full nozzle design with bronze/brass trim. Available with O-ring seats. For exceptional leak-free performance.

Model 6021: Same as model 6010 with Teflon® (PFA) disc insert. For exceptional leak-free performance (use on steam only).

Model 6030: Same as model 6010 except Stainless Steel (SS) trim (nozzle and disc). Available with O-ring seats for exceptional leak-free performance.

Model 6182: Top outlet. Full nozzle design with bronze/brass trim. O-ring seat available for exceptional leak-free performance.

Model 6121: Same as model 6182 with Teflon® (PFA) disc insert. For exceptional non-leak performance (use on steam only).

Model 6130: Same as model 6182 except SS trim (nozzle and disc). O-ring seat available for exceptional leak-free performance.

Model 6186: Top outlet. Full nozzle design with bronze/brass trim. 150 psig [10.3 barg] maximum set pressure. Replaces Model 86 (original equipment only).

Model 6283: Over-sized side outlet. Full nozzle design bronze/brass trim.

Model 6221: Same as model 6283 with Teflon® (PFA) disc insert. For exceptional leak-free performance (use on steam only).

Model 6230: Same as model 6283 except SS trim (nozzle and disc).

Model 6933: Same as model 6010 except certified for ASME code Section IV. Low pressure steam heating boilers set at 15 psig [1.0 barg] only.

Model 6934: Same as model 6021 except certified for ASME code Section IV. Low pressure steam heating boilers set at 15 psig [1.0 barg] only.

ASME Section I and VIII, Steam, “V” and “UV,”
ASME Section VIII, Air/Gas “UV” National Board Certified.
Models 6933, 6934, and 6935 are ASME Section IV, “Steam”
“HV” National Board Certified.

PED Certified for Non-Hazardous Gas.



Model 6935: Same as model 6030 except certified for ASME code Section IV. Low pressure steam heating boilers set at 15 psig [1.0 barg] only.

Applications

- Steam Boilers and Generators.
- Air/Gas Compressors - reciprocating or rotary - portable or stationary, intercoolers and aftercoolers.
- Pressure Vessels - containing steam, air or non-hazardous gas. Including tanks, receivers, sterilizers and autoclaves.
- Pressure Reducing Stations - protection of the discharge or low pressure side of system.

Pressure and Temperature Limits

Models 6010, 6021, 6182, 6283, 6221
Steam Service

3 to 250 psig [0.2 to 17.2 barg]
-60° to 406°F [-51° to 208°C]

Air/Gas Service

3 to 300 psig [0.2 to 20.7 barg]
-60° to 406°F [-51° to 208°C]

Models 6030, 6130, 6230

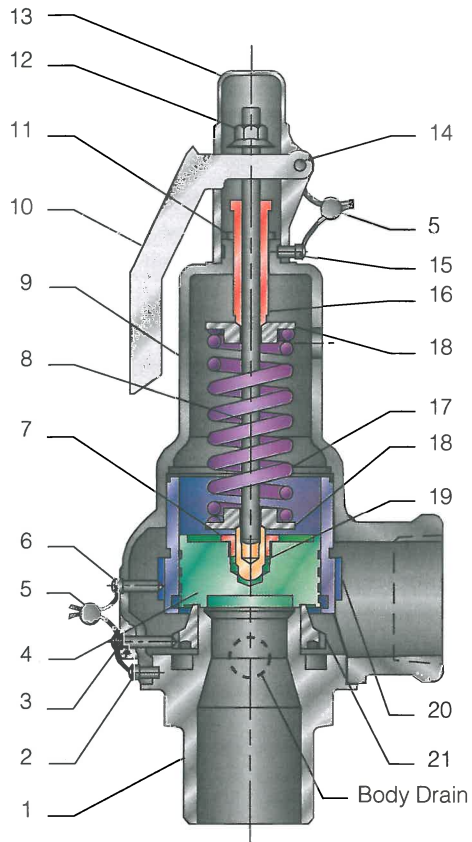
Steam and Air/Gas Service

3 to 300 psig [0.2 to 20.7 barg]
-60° to 425°F [-51° to 218°C]

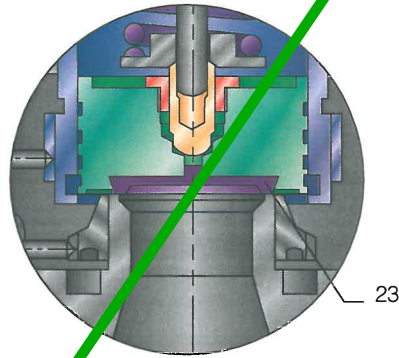
Note

1. Resilient seats determine temperature range (see page 11).

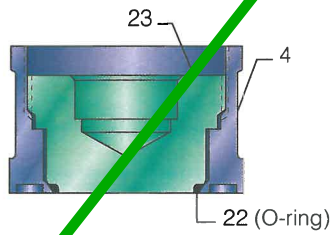
Parts and Materials



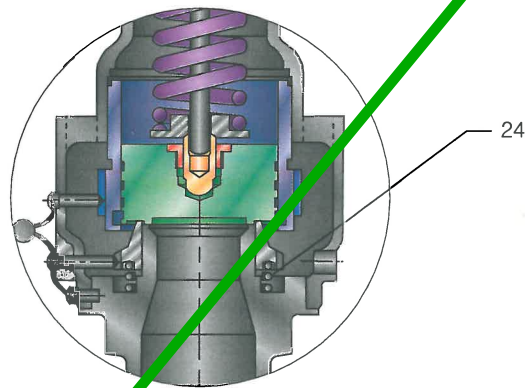
Models 6010, 6030, 6283,
6230, 6933, 6935



Models 6121, 6221, 6934
Teflon® Seat Configuration



Models 6010, 6030, 6283,
6230, 6933, 6935
Optional Soft Seat



Models 6182, 6121, 6130, 6186
Top Outlet Configuration

Kunkle Safety and Relief Products

Series 6000

Parts and Materials

No.	Part Name	Materials
1	Nozzle	BRS B283-C48500 or BRZ SB62 ³
2	Body Set Screw	SS 18-8
3	Warn Ring Set Screw	SS 18-8
4	Disc	B21 C48500 ⁴
5	Wire and Seal	SS Wire and Lead Seal
6	Guide Set Screw	SS 18-8
7	Retainer Nut ²	Brass B16
8	Stem	SS, A582 TY416
9	Body	BRZ B584-C84400
10	Lever	STL A109 or JIS SPCC Equivalent/ZN Plated Yellow
11	Jam Nut	Brass B16
12	Lift Nut	STL A108-1018/ZN Plated
13	Cap	Aluminum, Anodized
14	Lever Pin	STL A108-12L14
15	Cap Set Screw	SS 18-8
16	Compression Screw	BRS B16
17	Spring	ASTM A-313 TY 631
18	Spring Step	BRS B16
19	Stem Retainer	BRS B16
20	Guide	BRS B16 for D and E Orifice BRZ B584-C84400 for F through J Orifice
21	Warn Ring ⁷	BRS B16
22	Seat	Note 1
23	Seat Retainer	BRS B16 ⁵
24	Warn Ring Spring ⁶	STL

Notes

- Models 6021, 6121, 6221 and 6934 Teflon®, optional O-ring seat available for all others except models 6933 and 6935.
- Section IV only.
- Models 6030, 6130, 6230 and 6935 are SS SA351-CF8.
- Models 6030, 6130, 6230 and 6935 are SS SA479-304 (D through H Orifice) or SS SA479-316 (J Orifice).
- Models 6030, 6130 and 6230 are SS SA479-304.
- Variation 02 (vibration dampening) only.
- Soft seat "D" and "E" orifice require special warn ring (notch on O.D. of fins).

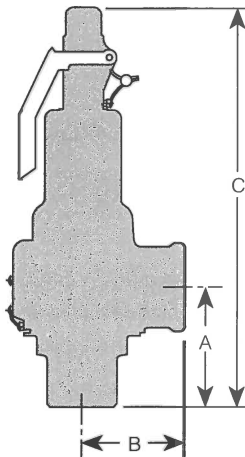
Specifications

Model Number ¹	Orifice	Connections		Valve Dimensions			Approximate Weight	
		ANSI Standard		A	B	C	lb	[kg]
		Inlet in [mm]	Outlet in [mm]					
60**DC#	D	1/2 [12.7]	3/4 [19.0]	2 1/8 [54]	1 5/8 [41]	6 1/2 [165]	1 1/2 [0.7]	
60**DD# ²	D	3/4 [19.0]	3/4 [19.0]	2 1/8 [54]	1 5/8 [41]	6 1/2 [165]	1 3/4 [0.8]	
61**DC#	D	1/2 [12.7]	—	—	—	6 1/2 [165]	1 1/4 [0.6]	
60**ED#	E	3/4 [19.0]	1 [25.4]	2 3/8 [60]	1 3/4 [44]	7 1/2 [191]	2 1/2 [1.1]	
60**EE# ²	E	1 [25.4]	1 [25.4]	2 1/2 ⁴ [64]	1 3/4 [44]	7 5/8 ⁵ [194]	2 3/4 [1.2]	
61**ED#	E	3/4 [19.0]	—	—	—	7 1/2 [191]	2 1/4 [1.0]	
62**ED#	E	3/4 [19.0]	1 1/4 [31.75]	2 7/8 [73]	1 3/4 [44]	7 1/2 [191]	2 3/4 [1.2]	
60**FE#	F	1 [25.4]	1 1/4 [31.8]	2 5/8 [67]	2 [51]	8 1/2 [216]	3 1/2 [1.6]	
60**FF# ²	F	1 1/4 [31.8]	1 1/4 [31.8]	2 7/8 [73]	2 [51]	8 3/4 [222]	3 3/4 [1.7]	
61**FE#	F	1 [25.4]	—	—	—	8 1/2 [222]	3 1/4 [1.5]	
62**FE#	F	1 [25.4]	1 1/2 [38.0]	2 7/8 [73]	2 [51]	8 1/2 [222]	3 3/4 [1.7]	
60**GF#	G	1 1/4 [31.8]	1 1/2 [38.0]	3 1/8 [79]	2 3/8 [60]	9 5/8 [244]	5 1/2 [2.5]	
60**GG# ²	G	1 1/2 [38.0]	1 1/2 [38.0]	3 3/8 [86]	2 3/8 [60]	10 [254]	5 3/4 [2.6]	
61**GF#	G	1 1/4 [31.8]	—	—	—	9 5/8 [244]	5 [2.3]	
62**GF#	G	1 1/4 [31.8]	2 [51.0]	3 3/8 [86]	2 1/4 [57]	9 5/8 [244]	5 3/4 [2.6]	
60**HG#	H	1 1/2 [38.0]	2 [51.0]	3 5/8 [92]	2 3/4 [70]	10 5/8 [270]	7 3/4 [3.5]	
60**HH# ²	H	2 [51.0]	2 [51.0]	4 1/8 [105]	2 3/4 [70]	11 1/8 [283]	8 [3.6]	
61**HG#	H	1 1/2 [38.0]	—	—	—	10 5/8 [270]	7 1/4 [3.3]	
62**HG#	H	1 1/2 [38.0]	2 1/2 [64.0]	3 7/8 [98]	3 [76]	10 5/8 [270]	8 [3.6]	
60**JH#	J	2 [51.0]	2 1/2 [64.0]	4 1/4 [108]	3 3/8 [86]	13 5/8 [346]	15 1/2 [7.0]	
60**JJ# ²	J	2 1/2 [64.0]	2 1/2 [64.0]	4 1/2 [114]	3 3/8 [86]	14 [356]	15 3/4 [7.2]	
61**JH#	J	2 [51.0]	—	—	—	13 5/8 [346]	15 [6.8]	
62**JH#	J	2 [51.0]	3 [76.0]	4 5/8 [117]	3 3/8 [86]	13 5/8 [345]	15 1/2 [7.0]	

Dimensions are for reference only.

Notes

1. Replace asterisks with desired model number. Replace # with desired seat material.
2. Model 6030 available only 1/2 x 3/4" [12.7 x 19 mm], 3/4 x 1" [19 x 25.4 mm], 1 x 1 1/4" [25.4 x 31.8 mm], 1 1/4 x 1 1/2" [31.8 x 38 mm], 1 1/2 x 2" [38 x 51 mm] and 2 x 2 1/2" [51 x 64 mm].
3. Models 6933, 6934 and 6935 have same dimensions as model 6010.
4. 2 1/4" for BSP [57].
5. 7 3/8" for BSP [192.5].



Kunkle Safety and Relief Products

Series 6000

Capacities

Non-code¹ and ASME Section VIII Steam (U.S., lb/h)

Flow Coefficient = 0.878

Set Pressure (psig)	Orifice Area, in ²					
	D (0.121)	E (0.216)	F (0.338)	G (0.554)	H (0.863)	J (1.414)
3	87	155	243	398	621	1017
4	100	178	279	457	711	1166
6	121	215	337	552	860	1409
8	137	245	384	629	980	1606
10	152	271	424	695	1083	1775
15	179	319	500	819	1276	2091
20	206	368	576	944	1471	2410
25	234	417	653	1070	1666	2730
30	261	466	729	1195	1861	3050
35	291	520	813	1333	2076	3401
40	321	573	897	1470	2291	3753
45	351	627	981	1608	2505	4105
50	381	681	1065	1746	2720	4456
55	411	734	1149	1884	2934	4808
60	442	788	1233	2022	3149	5160
65	472	842	1317	2159	3364	5511
70	502	896	1401	2297	3578	5863
75	532	949	1486	2435	3793	6215
80	562	1003	1570	2573	4008	6566
85	592	1057	1654	2710	4222	6918
90	622	1110	1738	2848	4437	7270
95	652	1164	1822	2986	4651	7621
100	682	1218	1906	3124	4866	7973
105	712	1272	1990	3262	5081	8325
110	742	1325	2074	3399	5295	8676
115	773	1379	2158	3537	5510	9028
120	803	1433	2242	3675	5725	9380
125	833	1487	2326	3813	5939	9731
130	863	1540	2410	3950	6154	10083
135	893	1594	2494	4088	6368	10434
140	923	1648	2578	4226	6583	10786
145	953	1701	2662	4364	6798	11138
150	983	1755	2746	4502	7012	11489
160	1043	1863	2915	4777	7442	12193
170	1104	1970	3083	5053	7871	12896
180	1164	2077	3251	5328	8300	13599
190	1224	2185	3419	5604	8729	14303
200	1284	2292	3587	5879	9159	15006
210	1344	2400	3755	6155	9588	15709
220	1404	2507	3923	6430	10017	16413
230	1465	2615	4091	6706	10446	17116
240	1525	2722	4259	6981	10876	17819
250	1585	2829	4428	7257	11305	18523
260	1645	2937	4596	7533	11734	19226
270	1705	3044	4764	7808	12163	19929
280	1766	3152	4932	8084	12592	20632
290	1826	3259	5100	8359	13022	21336
300	1886	3367	5268	8635	13451	22039

Note

1. No code stamp or "NB" on nameplate below 15 psig set.

Kunkle Safety and Relief Products

Series 6000

Ordering Information

ASME Section I and VIII, Steam, ASME Section VIII, Air/Gas National Board Certified. Models 6930, 6933, 6935 ASME Section IV, National Board Certified

Model Number/Order Guide

Model Number Position	1	2	3	4	5	6	7	7	8	9	10	11	12	13	14	15
Example	6	0	1	0	H	G	M	0	1	-	A	M	0	1	5	0

Model		
6010	6130	6230
6021	6186	6933
6030	6283	6934
6182	6221	6935
6121		

Orifice	
D	G
E	H
F	J

Inlet Size		
C - 1/2"	[12.7]	G - 1 1/2" [38.1]
D - 3/4"	[19.0]	H - 2" [50.8]
E - 1"	[25.4]	J - 2 1/2" [63.5]
F - 1 1/4"	[31.8]	

Seat Material	
M	- Metal
E	- EPR
V	- Viton®

Variation (01 to 99)	
01	- Plain lever
02	- Plain lever with vibration dampener
03	- Plain lever with gag
60	- BSP Threads

Design Revision
 Indicates non-interchangeable revision.
 Dash (-) if original design.

Valve Service	
A	- Steam ASME Section I
K	- Air/Gas ASME Section VIII
L	- Steam ASME Section VIII
G	- Steam ASME Section IV (Models 6933, 6934, 6935 only)
P	- Steam, Non-code
N	- Air, Non-code

Spring Material	
M	SS

Set Pressure 0025
 0015 - 15 psig [1.0 barg] only for Models 6933, 6934, 6935

KUNKLE

953 Old U.S. Highway 70
 Black Mountain, North Carolina 28711-2549
 Customer Service Phone: 1-828-669-3700

www.kunklevalve.com

Tyco Flow Control (TFC) provides the information herein in good faith but makes no representation as to its comprehensiveness or accuracy. This data sheet is intended only as a guide to TFC products and services. Individuals using this data sheet must exercise their independent judgment in evaluating product selection and determining product appropriateness for their particular purpose and system requirements. TFC MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT(S) TO WHICH THE INFORMATION REFERS. ACCORDINGLY, TFC WILL NOT BE RESPONSIBLE FOR DAMAGES (OF ANY KIND OR NATURE, INCLUDING INCIDENTAL, DIRECT, INDIRECT, OR CONSEQUENTIAL DAMAGES) RESULTING FROM THE USE OF OR RELIANCE UPON THIS INFORMATION. Patents and Patents Pending in the U.S. and foreign countries. Tyco reserves the right to change product designs and specifications without notice. All registered trademarks are the property of their respective owners. Printed in the USA.

Models 912, 913, 918 and 919 ASME Section VIII, Air/Steam/Gas/Liquid, "UV" National Board Certified.
Also available for Vacuum Service.
PED Certified for Non-Hazardous Gas.



Model 912

Model Descriptions

Model 912: Full nozzle design. Stainless Steel (SS) warn ring and disc with brass/bronze base. Bronze/brass body and bonnet.

Model 913: Full nozzle design. Bronze/brass body and bonnet. 316 SS trim (base, disc and disc holder).

Model 918: Same as model 912 except resilient seat/seal. Superior "leak-free" performance. FM approved with 316 SS base for fire pump installations in "BDD" and "BDE" sizes².

Model 919: Same as model 913 except resilient seat/seal. Superior "leak-free" performance. Bronze body and bonnet. 316 SS trim (base, disc and disc holder).

Features

- Available with soft seat.
- Threaded cap is standard (back pressure tight).
- Hex on valve nozzle provides for easy installation.
- Warn ring offers easy adjustability.
- Pivoting disc design corrects misalignment and offers exceptional performance.
- Guide to nozzle ratio reduces friction.
- Full nozzle design for optimum flow performance.
- Threaded side outlet for piped off discharge to eliminate fugitive emissions.

Pressure and Temperature Limits

Models 912, 918: – Steam
3 to 250 psig [0.2 to 17.2 barg]¹
-320° to 406°F [-195° to 208°C]

Models 913, 919: – Steam
3 to 300 psig [0.2 to 20.7 barg]¹
-320° to 425°F [-195° to 219°C]

Models 912, 918: – Air/Gas/Liquid
3 to 300 psig [0.2 to 20.7 barg]
-320° to 406°F [-195° to 208°C]

Models 913, 919: – Air/Gas/Liquid
3 to 1400 psig [0.2 to 96.5 barg]
-320° to 425°F [-195° to 219°C]

Vacuum – 6" to 29" HG
[200 to 1000 mbarg] – 300°F [149°C]

Maximum back pressure 50 psig [3 barg] – threaded cap and packed lever³

Applications

- Air/gas compressors - intercoolers - aftercoolers.
- Liquid filled pressure vessels/systems - ASME Section VIII (UV).
- Pressure vessels - containing gas, air, liquid or steam. Including tanks and receivers.
- Vacuum systems including pumps, tanks and equipment.
- Optional materials for low temperature - cryogenic applications.
- Oil/gas separators.
- Overpressure relief and protection of pumps, tanks, lines and hydraulic systems.
- By-pass relief or pressure regulation.

Options

- Threaded cap. (variation 01)
- Threaded cap with gag. (variation 02)
- Plain lever. (variation 03)
- Plain lever with gag. (variation 04)
- Plain lever with vibration dampener. (variation 05)
- Packed lever. (variation 06)
- Packed lever with gag. (variation 07)

Code:  

Notes:

1. ASME standard valves for air or steam service must have lift lever. For steam boilers and generators.
2. Requires Variation 08 for specific set pressure or variations listed below for adjustable relief pressure settings:
Variation 10: 60 - 125 psig [4.1 - 8.6 barg],
Variation 11: 125 - 175 psig [8.7 - 12 barg], or
Variation 12: 176 - 250 psig [12.1 - 17.2 barg]
3. 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.

Specifications - Models 912, 913, 918, and 919

Models 912, 913, 918, 919 ASME Section VIII, Steam/Air/Gas/ Liquid, "UV" National Board Certified, Also available for Vacuum Service

Seat/Seal Materials ¹	Service Recommendation
BUNA-N (-30° to 275°F) [-40° to 135°C]	Air, Anhydrous Ammonia, Butane, Carbon Dioxide, Diesel Oil, Ethyl Chloride, Ethyl Ether, Freons #11 and 12, Fuel Oil, Gasoline, Helium, Hydrogen Sulphide, Kerosene, Lube Oil, Natural Gas, Nitrogen, Oxygen (Gas), Propane, Propylene, Sulphur Dioxide, Vinyl Chloride
Viton® A (-15° to 406°F) [-26° to 208°C]	Acetone, Air, Amyl Alcohol, Aniline, Benzene, Butane, Carbon Disulphide, Carbon Tetrachloride Dowtherm "A" and "E," Ethyl Chloride, Ethylene, Ethylene Glycol, Ethyl Alcohol, Gasoline, Hexane, Hydrogen Sulphide, Isobutyl Alcohol, JP - 4 Fuel, JP - 5 Fuel, Kerosene, Lube Oil, Natural Gas, Naphtha, Nitrogen, Propane, Propylene, Propyl Alcohol, Sulphur Dioxide, Toluene, Trichloroethylene, Turpentine, Water, Xylene
Silicone (-100° to 406°F) [-73° to 208°C]	Air, Helium, Nitrogen, Oxygen (Gas)
Ethylene Propylene (-70° to 400°F) [-57° to 205°C]	Steam, Hot Water
Neoprene (-45° to 300°F) [-43° to 149°C]	Air, Anhydrous Ammonia, Butane, Butyl Alcohol, Castor Oil Denatured Alcohol, Ethanol, Ethyl Alcohol, Freons (12, 13, 14 and 22), Glycols, Natural Gas and Silicate Esters

Note:

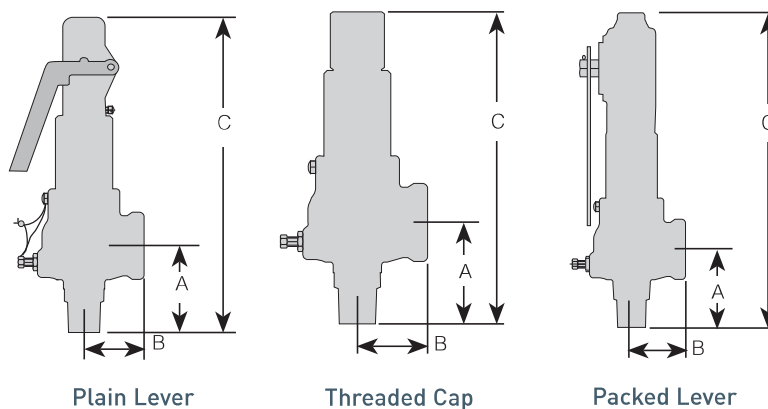
1. These recommendations are a guide only. For the final selection of the proper material, your experience with available elastomers of various lading fluids should be considered.

Model ² Number	Orifice	Connections ANSI Standard		Maximum Set Pressure psig [barg]		Dimensions, in [mm]						Approx. Weight lb [kg]
		Inlet	Outlet	912-918 ⁴	913-919 ⁵	A	B	C Plain Lever	C Threaded Cap	C Packed Lever		
9*BDC	D	1/2" [12.7]	3/4" [19.0]	300 [20.7]	1400 [96.5]	23/8 [60]	15/8 [41]	83/8 [213]	71/4 [184]	9 [229]	3 [1.4]	
9*BDC ⁷	D	1/2" [12.7]	1" [25.4]	300 [20.7]	1400 [96.5]	23/8 [60]	15/8 [41]	83/8 [213]	71/4 [184]	9 [229]	3 [1.4]	
9*BDD ³	D	3/4" [19.0]	3/4" [19.0]	—	1400 [96.5]	23/8 [60]	15/8 [41]	83/8 [213]	71/4 [184]	9 [229]	3 [1.4]	
9*BDD ^{3,8}	D	3/4" [19.0]	1" [25.4]	—	1400 [96.5]	23/8 [60]	15/8 [41]	83/8 [213]	71/4 [184]	9 [229]	3 [1.4]	
9*BDE ³	D	1" [25.4]	1" [25.4]	—	1400 [96.5]	25/8 [67]	15/8 [41]	85/8 [219]	71/2 [191]	91/8 [232]	3 [1.4]	
9*BED	E	3/4" [19.0]	11/4" [31.8]	300 [20.7]	1000 [68.9] ⁹	25/8 [67]	2 [51]	83/4 [222]	75/8 [194]	93/8 [238]	4 [1.8]	
9*BEF ³	E	11/4" [31.8]	11/4" [31.8]	—	1000 [68.9] ⁹	3 [76]	2 [51]	91/8 [232]	8 [203]	93/4 [248]	4 [1.8]	
9*BFE	F	1" [25.4]	11/2" [38.1]	300 [20.7]	700 [48.3] ¹⁰	27/8 [73]	23/8 [60]	97/8 [251]	83/4 [222]	101/2 [267]	6 [2.7]	
9*BFG ³	F	11/2" [38.1]	11/2" [38.1]	—	700 [48.3] ¹⁰	3 [76]	23/8 [60]	10 [254]	87/8 [225]	105/8 [270]	6 [2.7]	
9*BGF	G	11/4" [31.8]	2" [50.8]	300 [20.7]	600 [41.4]	31/4 [83]	25/8 [67]	111/4 [286]	101/8 [257]	113/4 [298]	8 [3.6]	
9*BGH ³	G	2" [50.8]	2" [50.8]	—	600 [41.4]	31/4 [83]	25/8 [67]	111/4 [286]	101/8 [257]	113/4 [298]	8 [3.6]	
9*BHG	H	11/2" [38.1]	21/2" [63.5]	300 [20.7]	500 [34.5]	31/2 [89]	23/4 [70]	13 [330]	111/8 [283]	121/2 [318]	11 [5.0]	
9*BJH	J ⁶	2" [50.8]	3" [76.2]	300 [20.7]	500 [34.5] ¹¹	4 [102]	31/4 [83]	141/2 [368]	121/2 [318]	151/8 [384]	15 [6.8]	

Dimensions are for reference only.

Notes:

- Maximum temperature controlled by resilient seat/seal material.
- Replace asterisk with desired Model Number. Data applicable to all models.
- Available with SS trim (models 913 and 919) only.
- Maximum pressure on steam is 250 psig.
- Maximum pressure on steam is 300 psig.
- For C dimensions: pressures above 200 psig [14 barg] add 1.25" [31.8 mm] to the overall height.
- Special variation required [12 - Threaded Cap, 13 - Threaded Cap with gag, 14 - Plain Lever, 17 - Packed Lever].
- Special variation required [13 - Threaded Cap, 14 - Plain Lever, 17 - Packed Lever].
- 900 psig for liquid service or high temp alloy spring.
- 600 psig for liquid service or high temp alloy spring.
- 367 [25.3] for plain lever with gag.



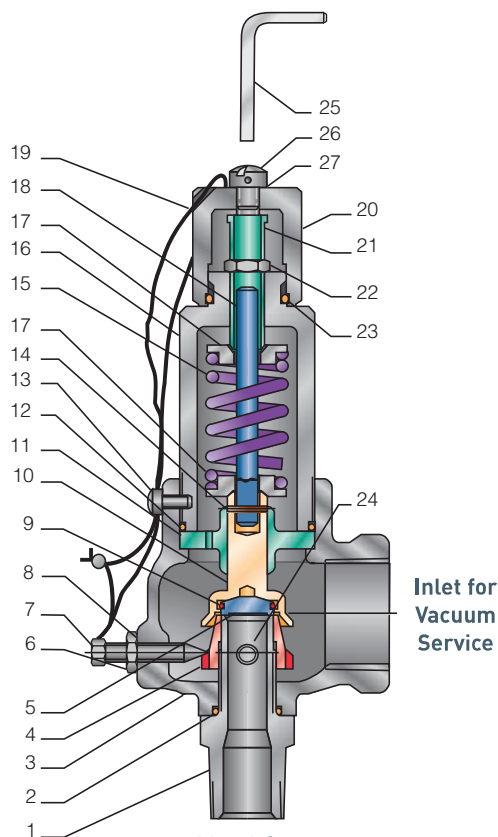
Specifications - Models 912, 913, 918, and 919

Models 912, 913, 918, 919 ASME Section VIII, Steam/Air/Gas/ Liquid, "UV" National Board Certified.

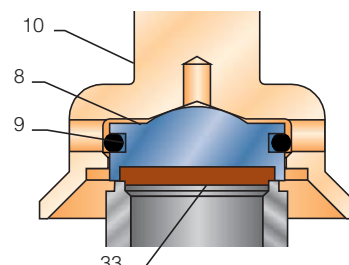
Also available for Vacuum Service

Parts and Materials - Models 912, 913, 918, 919 Threaded Cap

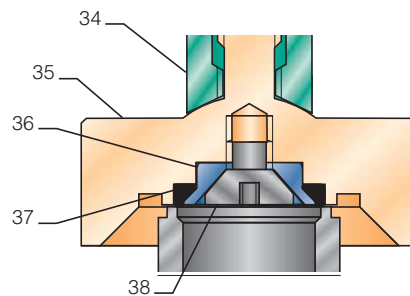
No.	Part Name	Materials
1	Nozzle ²	Brass, B21 or B283 Alloy 485, (SS, SA351-CF8M ⁵ Models 913, 919 only)
2	O-ring Body ⁶	Teflon®
3	Body	Bronze, B584 Alloy 84400
4	Warn Ring	SS, A743-CF8M
5	Disc ¹	SS, A479-316
6	Set Screw Nut	SS 18-8
7	Set Screw	Brass, B16
8	Seal	Teflon®
9	Retainer Ring	SS, A313-316
10	Disc Holder	Brass, B16, (SS A351-CF8M Models 913, 919 only)
11	Guide ³ Guide Lock Nut ⁷ Shield ⁷	Brass, B16 Brass, B16 SS, A167-316
12	Bonnet O-ring ⁶	Teflon®
13	Screw	SS, Commercial 18-8
14	Coiled Spring Pin	SS, A313-302
15	Spring	SS: A313-316 or A313-T631/Alloy steel: A681-H12 or B637-X750
16	Bonnet ⁴	Brass, B16-H02
17	Spring Step	Brass, B16
18	Stem	Brass, B16
19	Wire and Seal	SS wire and lead seal, Commercial
20	Cap	Brass, B16
21	Compression Screw	Brass, B16
22	Jam Nut	SS 18-8 or Brass, B16
23	Cap O-ring	BUNA-N
24	Body Plug	Brass, B16 [1/4" - 18 NPT]
25 ⁸	Gag Screw	Steel A108-1018/Zinc Plated
26 ⁹	Gag Screw Plug	SS 18-8
27 ⁹	Gag Screw Gasket	Teflon®



**Metal Seat
Threaded Cap Option
(shown with Gag Option)**



Soft Seat F to J Orifice



Soft Seat D and E Orifice

Parts and Materials - Models 918 and 919 Soft Seat, F to J Orifice

No.	Part Name	918	919
8	Disc	SS A479-316	SS A479-316
9	Ring, Retainer	SS A313-316	SS A313-316
10	Disc Holder	Brass, B16	SS A351-CF8M
33	Molded Seat ¹		

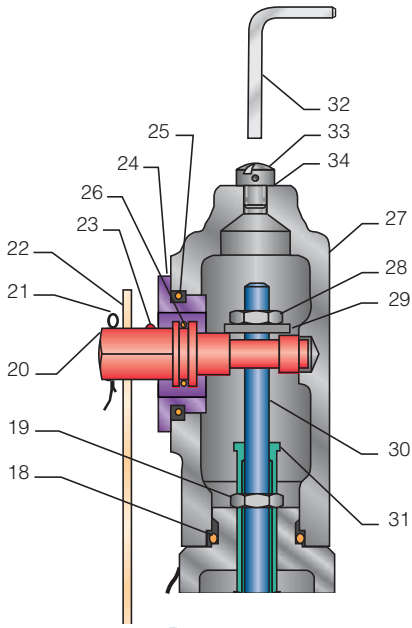
Parts and Materials - Models 918 and 919 Soft Seat, D and E Orifice

No.	Part Name	918	919
34	Spindle	Brass, B16	SS A479-316
35	Disc Holder	Brass, B16	SS A479-316
36	Retainer	Brass, B16	SS A479-316
37	O-ring Seat ¹		
38	Seat Retainer Screw	SS 18-8	SS 18-8

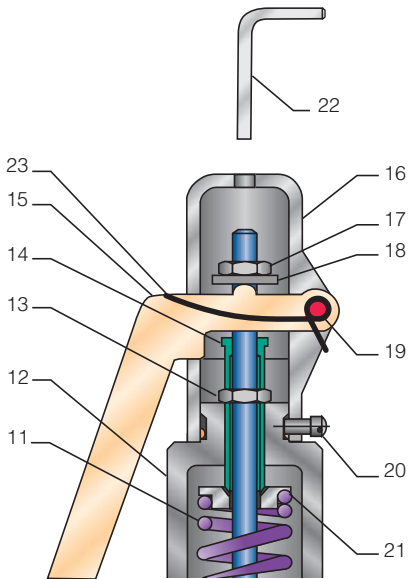
Notes:

- Material Letter Designation
BUNA-N - B
Ethylene Propylene (EPR/EPDM) - E
Neoprene - N
Silicone - S
Viton® - V
- F through J orifice nozzle material is Bronze, B62.
- G through J orifice guide material is Bronze, B584, Alloy 84400.
- F through J orifice bonnet material is Bronze, B584, Alloy 84400.
- "D" and "E" orifice, 9*BFG, and 9*BGH nozzle material is SS, SA479-316.
- For threaded cap and packed lever only.
- For "J" orifice only (not shown).
- Gag screw ships with valve, not installed.
- For threaded cap and packed lever gag option only.

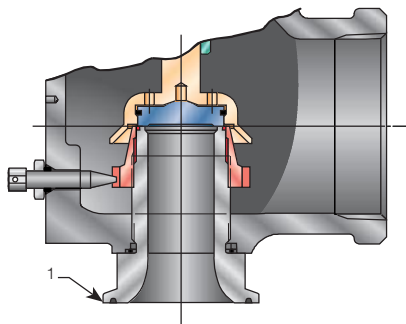
Specifications - Models 912, 913, 918, and 919



Packed Lever
[shown with Gag Option]



Plain Lever
[shown with Gag and Vibration Dampening Spring Options]



Tri-Clover (Inlet only)

Models 912, 913, 918, 919 ASME Section VIII, Steam/Air/Gas/Liquid,
"UV" National Board Certified. Also available for Vacuum Service

Parts and Materials - Model 912 Packed Lever

No.	Part Name	Materials
18	Cap O-ring	BUNA-N 70 Duro, Commercial
19	Jam Nut	Brass, B16
20	Lift Cam	SS, A743 CF8M
21	Cotter Pin	Steel, Commercial
22	Lever	Zinc Plated Steel, A108
23	Drive Screw	SS, Commercial
24	Retainer Nut	Brass, B16
25	Retainer O-ring	BUNA-N 70 Duro, Commercial
26	Lift Cam O-ring	BUNA-N 70 Duro, Commercial
27	Cap	Bronze, B584 Alloy 84400
28	Lift Nut	SS, A479 316
29	Lift Washer	SS, A479 316
30	Stem	Brass, B16
31	Compression Screw	Brass, B16
32 ²	Gag Screw	Steel A108-1018/Zinc Plated
33 ³	Gag Screw Plug	SS 18-8
34 ³	Gag Screw Gasket	Teflon®

Parts and Materials - Model 912 Plain Lever

No.	Part Name	Materials
11	Spring	Steel: A231/A231M w/coating ¹ SS: A313-302 SS: A313-316 Alloy steel: A681-H12
12	Bonnet	Brass, B16
13	Jam Nut	Brass, B16
14	Compression Screw	Brass, B16
15	Lever	Steel, A109 w/coating ¹
16	Cap	Aluminum, Anodized
17	Lift Nut	SS, A479-316
18	Lift Washer	SS, A479-316
19	Rivet	Steel, Commercial
20	Screw	SS, Commercial Gr. 18-8
21	Spring Step	Brass, B16
22 ²	Gag Screw	Steel A108-1018/Zinc Plated
23 ⁴	Vibration Dampening Spring	Phosphor BRZ 510

Model 911 - Available with Tri-Clover Adapter Inlet

Model	Inlet	Orifice	Outlet
911 ZDE	1"	D	1"
911 ZEE	1"	E	1 1/4"
911 ZFG	1 1/2"	F	1 1/2"
911 ZGG	1 1/2"	G	2"
911 ZGH	2"	G	2"
911 ZHH	2"	H	2 1/2"
911 ZJJ	2 1/2"	J	3"

Notes:

1. Corrosion preventative coating.
2. Gag screw ships with valve, not installed.
3. For threaded cap and packed lever gag option only.
4. Variation 05 only.

KUNKLE SAFETY AND RELIEF PRODUCTS

MODEL 900

Models 912, 913, 918, 919 ASME Section VIII, Steam/Air/Gas/ Liquid,
 "UV" National Board Certified. Also available for Vacuum Service

Model Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Example	9	1	2	B	J	H	M	0	1	—	K	E	0	3	0	0

Model

912, 913, 918, 919

Connection Model

B - Male x Female Threaded or NPT

Orifice

D, E, F, G, H, J

Inlet Size

C - 1/2" [15 mm] F - 1 1/4" [32 mm]
 D - 3/4" [18 mm] G - 1 1/2" [40 mm]
 E - 1" [25 mm] H - 2" [50 mm]

Seat/Seal Material

M - Metal-to-metal S - Silicone
 B - BUNA-N V - Viton®
 E - EPR N - Neoprene

Variation

Number provided only by manufacturer to cover specific feature or option.

- | | |
|--|---|
| 01 - Threaded cap | 13 - Threaded Cap with Gag (9**BDC with 1" outlet) |
| 02 - Threaded cap with gag | 14 - Plain lever - D orifice with 1" outlet |
| 03 - Plain lever | 15 - Plain Lever with Gag (D orifice with 1" outlet) |
| 04 - Plain lever with gag | 16 - Plain Lever with Vibration Dampener (D orifice with 1" outlet) |
| 05 - Plain lever with vibration dampener | 17 - Packed lever - D orifice with 1" outlet |
| 06 - Packed lever | 18 - Packed Lever with Gag (D orifice with 1" outlet) |
| 07 - Packed lever with gag | 60 - BSP threads with threaded cap |
| 12 - Threaded cap (9*BDC with 1" outlet) | |
| 12 - Plain Lever with drain plug (913 BDDM only) | |
| 13 - Threaded cap (9*BDD with 1" outlet) | |

Design Revision

Models	Orifice Size					
	D	E	F	G	H	J
912	-	-	-	-	-	-
913	-	-	-	-	-	-
918	B	B	-	-	-	-
919	B	B	-	-	-	-

Valve Service

- J - Liquid ASME Section VIII (Standard Cap/Packed Lever only)
- K - Air/Gas ASME Section VIII (Plain Lever/Packed Lever required for air)
- L - Steam ASME Section VIII (Plain Lever/Packed Lever required)
- M - Non-Code Liquid (Standard Cap/Packed Lever only)
- N - Non-Code Air Gas
- P - Non-Code Steam
- Q - Vacuum (Standard Cap/Packed Lever only)

Spring Material

- E - SST
- F - Alloy Steel (high temperature)

Set Pressure

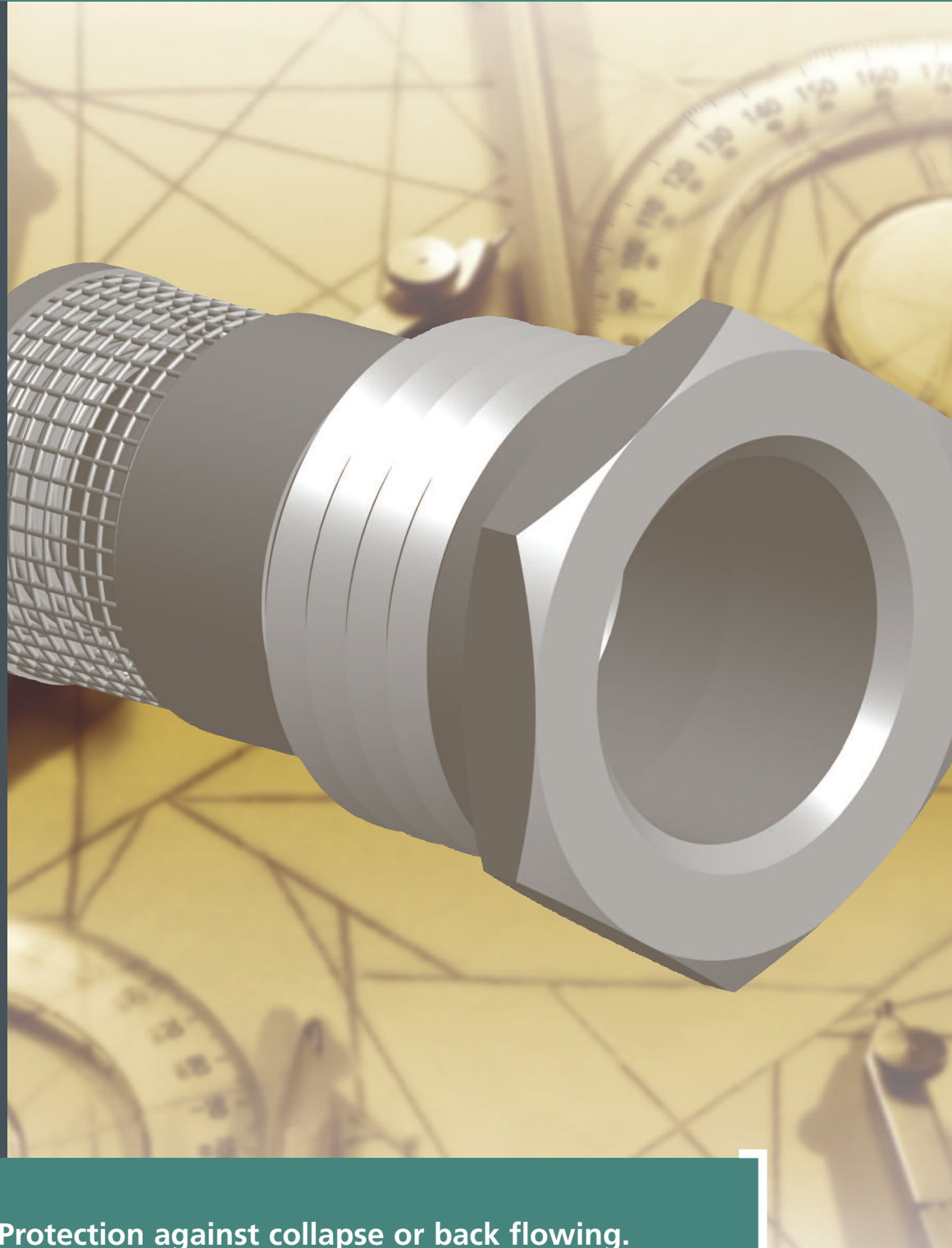
- 3 psig [0.2 barg] [0003] to 900 psig [62 barg] [0900]
- Vacuum 6" HG [200 mbarg] [0006] to 29" HG [1000 mbarg] [0029]

Vacuum Breakers

Anti-siphoning check valves

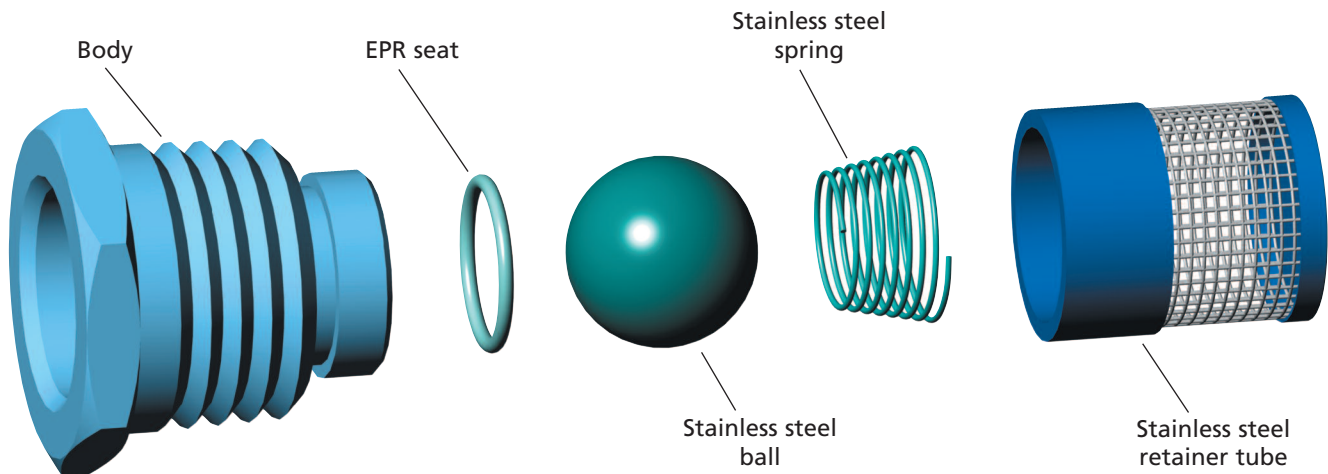
KĀDANT
AN ACCENT ON INNOVATION

Vacuum check
valves and
backflow devices.



Protection against collapse or back flowing.

Series VB8



Fast acting, tight closing, high capacity

Kadant Johnson vacuum breakers provide a simple, dependable way to relieve any unwanted vacuum condition that may develop in a closed vessel or pipeline. They can be used to prevent contamination from back flowing in fluid handling systems and to protect equipment against collapse or implosion. They combine tight closing with instant response; provide large air venting capacity; are designed for easy installation and long service life.

Positive closing, low breakaway

The successful combination of the spring action on a round ball and the soft resilient seat assures positive bubble-tight closing, even at very low differential pressures. And, of course, the higher the pressure the tighter the seal.

Since only slight spring pressure is needed for seating, the ball comes off the soft seat at a very low vacuum condition, providing almost instantaneous protection. Sealing is accomplished by an EPR o-ring. The supporting seat, however, is designed to assume any pressure in excess of the small amount needed for sealing, thus preventing any excessive compression of the o-ring.

Quiet, trouble-free operation

The soft resilient seat, combined with the gentle spring action, provides quiet opening and closing; chatter is completely eliminated. Corrosion-resistant seating surfaces leave little danger of any sticking or leaking. The simple design assures long and dependable service life, as proven both in the laboratory and in the field.

Easily installed, easily maintained

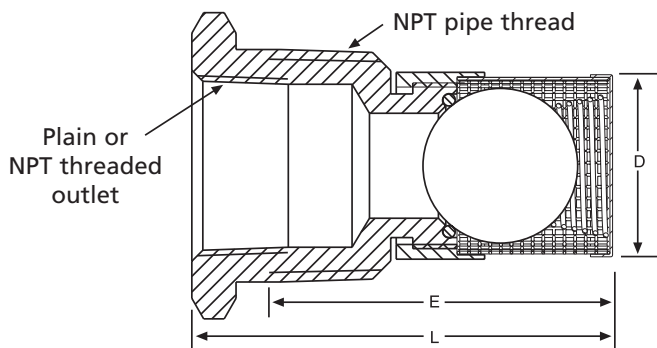
Kadant Johnson vacuum breakers have hex heads and standard NPT pipe threads, and are simply threaded into pipe fittings or available tank openings. Outlets can be threaded if desired.

Rigorously tested

In exhaustive endurance tests Kadant Johnson vacuum breakers have been subjected to 120 psig of steam and then vacuum, four times a minute, and still opened freely and closed bubble-tight after a million such test cycles. Every individual vacuum breaker is bubble-tested before it leaves the factory.

High-pressure and temperature

Kadant Johnson vacuum breakers are rated for use with pressures up to 300 psig and temperatures up to 365°F. Higher operating pressures are possible, depending upon size, seal materials, and temperatures.



Size	Quick Ship No. (Brass)	Quick Ship No. (Stainless Steel)	Outlet	Outlet Size	Total Length "L"	Engaged Length "E"	O.D. of Tube "D"	Diameter of Orifice
3/8"	-	24A75500	Plain	1/4"	1 1/2"	1 1/8"	9/16"	1/4"
3/8"	24A75200	24A75600	Threaded	1/4"	1 1/2"	1 1/8"	9/16"	1/4"
1/2"	24A75900	24A76300	Plain	3/8"	1 3/4"	1 3/8"	11/16"	9/32"
1/2"	24A76000	24A76400	Threaded	3/8"	1 3/4"	1 3/8"	11/16"	9/32"
3/4"	24A76700	24A77100	Plain	1/2"	2 1/8"	1 5/8"	13/16"	13/32"
3/4"	24A76800	24A77200	Threaded	1/2"	2 1/8"	1 5/8"	13/16"	13/32"
1"	24A77500	24A77900	Plain	3/4"	2 3/8"	1 7/8"	1 1/16"	19/32"
1"	24A77600	24A78000	Threaded	3/4"	2 3/8"	1 7/8"	1 1/16"	19/32"
1 1/4"	24A78300	24A78500	Plain	1"	2 15/16"	2 5/16"	1 5/16"	3/4"
1 1/4"	24A78400	24A78600	Threaded	1"	2 15/16"	2 5/16"	1 5/16"	3/4"
1 1/2"	24A78700	24A78900	Plain	1 1/4"	3 1/16"	2 1/2"	1 9/16"	7/8"
1 1/2"	24A78800	24A79000	Threaded	1 1/4"	3 1/16"	2 1/2"	1 9/16"	7/8"

Simple installation

The drawings at the right show how the vacuum breaker can be installed in a threaded opening in either a vertical or horizontal position. When installed in a pipeline fitting, use of a reducing bushing is required to make sure the vacuum breaker does not intrude far enough to impede flow in the line or bind against any internal wall.

Figure 1

Horizontal installation in either end or side outlet of tee, showing use of reducing bushing.

Figure 2

Vertical installation in top outlet of tee, showing use of reducing bushing.

Figure 3

Vertical installation in bottom outlet of tee, showing use of reducing bushing.

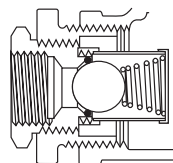


Figure 1

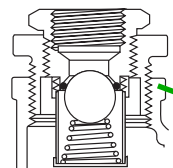


Figure 2

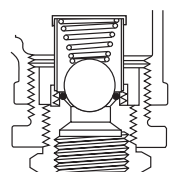


Figure 3

Vacuum required to open

		Vacuum required to open			
		Horizontal	Vertical		
			Top Outlet	Bottom Outlet	No Spring
VB8-38 3/8"	In. H ₂ O	7.00	4.30	10.5	3.50
	In. Hg	0.51	0.32	0.77	0.26
	PSI	0.25	0.16	0.38	0.13
VB8-51 1/2"	In. H ₂ O	9.30	10.6	18.0	4.40
	In. Hg	0.68	0.78	1.32	0.32
	PSI	0.34	0.38	0.65	0.16
VB8-76 3/4"	In. H ₂ O	15.3	15.0	25.0	5.10
	In. Hg	1.13	1.10	1.84	0.37
	PSI	0.55	0.54	0.90	0.18
VB8-101 1"	In. H ₂ O	10.0	5.90	19.5	6.60
	In. Hg	0.73	0.43	1.43	0.48
	PSI	0.36	0.21	0.70	0.24
VB8-126 1 1/4"	In. H ₂ O	10.5	7.10	21.0	6.90
	In. Hg	0.77	0.52	1.54	0.51
	PSI	0.38	0.26	0.76	0.25
VB8-151 1 1/2"	In. H ₂ O	10.0	4.90	20.3	7.90
	In. Hg	0.73	0.36	1.49	0.58
	PSI	0.36	0.18	0.73	0.29

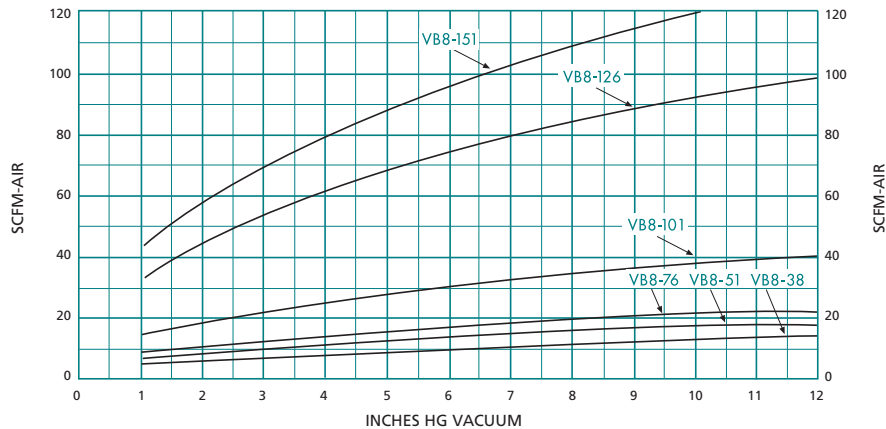
Note: Stainless steel ball was used to arrive at all figures.

Values given are averages of test results and may vary slightly.

Kadant Johnson Vacuum Breakers

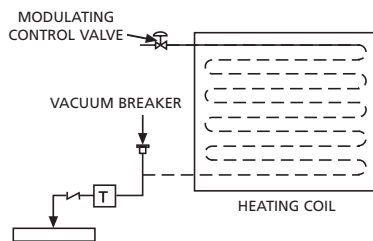
Approximate air handling capacities

The air handling capacity curves were plotted from calculations using the C_v factors of the vacuum breaker. The C_v factor is a flow coefficient determined by actual test which mathematically gives the relationship between the rate of flow and the pressure drop. The flow formula used was recommended by the Fluid Controls Institute.

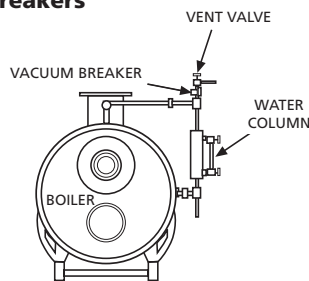


NOTE: Capacities will vary slightly due to position of installation.

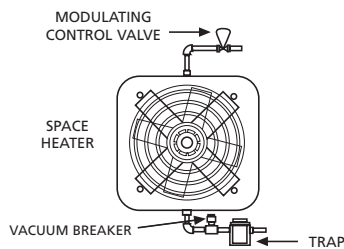
Typical installations of Kadant Johnson vacuum breakers



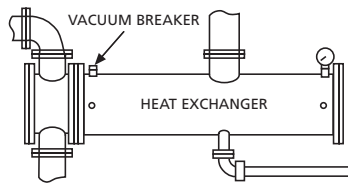
Vacuum breaker installed on heating coil. When the modulating control valve closes, the steam in the coil will condense. A vacuum may exist in the coil even with the control valve partly open and positive pressure between the control valve and the coil.



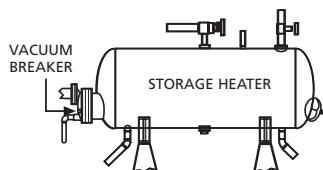
Typical application of a vacuum breaker as used on a steam boiler to break a vacuum imposed when a boiler is shut down, thereby condensing the steam in the boiler and creating a vacuum. This condition causes the boiler to be flooded by pulling in excess water from the return system.



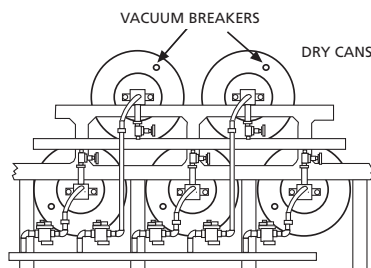
Typical space heater installation with vacuum breaker protection.



Typical installation of a vacuum breaker in a heat exchanger.



Horizontal storage heater with heating coils protected by a vacuum breaker.



Textile dry cans, multiple slasher cylinders, print cans, etc., can be protected against collapse with vacuum breakers.

KADANT
AN ACCENT ON INNOVATION

Kadant is a global supplier of high-value, critical components and engineered systems used in process industries worldwide.

www.kadant.com

Contact us:

KADANT JOHNSON INC.
805 Wood Street
Three Rivers, MI 49093 USA

Tel: +1-269-278-1715

Fax: +1-269-279-5980

Email: info@kadant.com

Vacuum Breakers-3001 (US) 04/2015

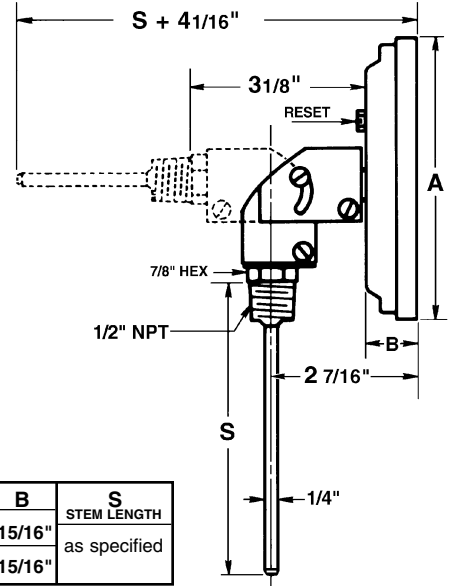
Replaces: VB-3000 (US)

© 2015 Kadant Inc.



WINDOW - Glass
CASE & RING - 304SS Hermetically Sealed
STEM - Welded Stainless Steel
ACCURACY - 1% Full Scale
EXTERNAL RECALIBRATION
CONFORMANCE ASME B40.2

© Vari-angle is a registered trademark of Weiss Instruments, Inc.



DIAL SIZE	A	B	S STEM LENGTH
3"	3 1/4"	15/16"	as specified
5"	5 1/4"	15/16"	

QTY.	CAT. NO.	DIAL SIZE	STEM LENGTH	RANGE	TAG

3" DIAL		
Catalog No.	Stem Length (incl. thread)	NPT
3VBM25	2 1/2"	1/2"
3VBM4	4"	1/2"
3VBM6	6"	1/2"
3VBM9	9"	1/2"
3VBM12	12"	1/2"
Longer stem lengths available		
NOTE: When ordering Liquid Filled Bimetals add Prefix SF to appropriate Catalog No. EX: SF3VBM4		

5" DIAL		
Catalog No.	Stem Length (incl. thread)	NPT
5VBM25	2 1/2"	1/2"
5VBM4	4"	1/2"
5VBM6	6"	1/2"
5VBM9	9"	1/2"
5VBM12	12"	1/2"
Longer stem lengths available		

FAHRENHEIT	FIG. INTERVAL	SCALE DIV.	CELSIUS	FIG. INTERVAL	SCALE DIV.	DUAL SCALE - F & C
-80/0/120	20°	2°	-50/0/50	10°	1°	-80/0/120F -60/0/50C
-20/0/120	20°	2°	**0/50	5°	1/2°	-20/0/120F -30/0/50C
**30/130	10°	1°	0/100	10°	1°	**30/130F 0/55C
0/200	20°	2°	0/150	10°	1°	0/200F -15/0/90C
0/250	20°	2°	0/200	20°	2°	0/250F -20/0/120C
50/300	20°	2°	0/300	50°	2°	50/300F 10/150C
50/400	50°	5°	*0/450	50°	5°	50/400F 10/200C
50/550	50°	5°	**100/550	50°	5°	50/550F 10/260C
*100/800	100°	10°				*100/800F 40/425C
**200/1000	100°	10°				**200/1000F 100/540C

* Satisfactory for continuous service up to 800°F or 425°C. Can be used for intermittent service from 800-1000°F or 425-500°C.
 ** Minimum stem length for these Ranges is 4". ** Minimum stem length is 4" Straight and Vari-angle Form.

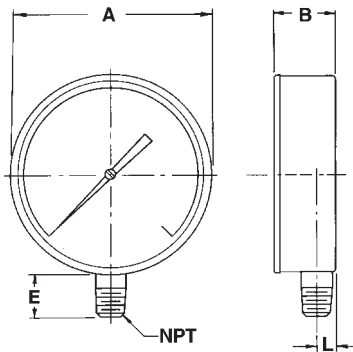
CUSTOMER _____
 PROJECT _____
 ENGINEER _____
 PRO or P.O. NO. _____



WEISS INSTRUMENTS, INC.
 HOLTSVILLE, NEW YORK 11742

DESCRIPTION:
3" & 5" Dial Vari-angle® Bimetals
 Series 3VBM and 5VBM

DRAWN BY: _____ DATE: _____ DRAWING: _____



CASE - Drawn stainless steel, with push-in Lexan window.
TUBE & SOCKET - Phosphor bronze. Brass socket and 1/4" male NPT lower connection. Soft soldered connection.
DIAL - White coated metal lithographed with black graduations lines and numerals.
MOVEMENT - All brass construction, precision gear and pinion.
POINTER - Slotted adjustable.
ACCURACY - 1% ANSI-ASME B40.1 Grade 1A.

SERIES		A	B	E	L	NPT
4CTS	INCH	4.62	1.12	1.062	.437	1/4"
	MM	117.3	28.4	26.9	11.09	

QTY.	CAT. NO.	DIAL DIA.	RANGE	TAG
	4CTS	4 1/2"		
	4CTS	4 1/2"		
	4CTS	4 1/2"		
	4CTS	4 1/2"		
	4CTS	4 1/2"		

PRESSURE (psi) - Series 4CTS

Range ¹	Figure interval	Minor graduation
0-15	1	0.2
0-30	5	0.5
0-60	5	1.0
0-100	10	1.0
0-160	20	2.0
0-200	20	2.0
0-300	50	5.0
0-400	50	5.0
0-600	50	10.0

Range	Figure interval		Minor graduation	
	in Hg	psi	in Hg	psi
30"Hg-15psi	10	5	1	0.5
30"Hg-30psi	10	5	1	1
30"Hg-60psi	10	10	2	2
30"Hg-100psi	15	10	5	2
30"Hg-150psi	30	20	2	2

VACUUM

Range	Figure interval	Minor graduation
0-30"Hg	5"Hg	0.5"Hg

¹ All dial ranges available in dual scale - psi & Kpa, psi & Kg/cm2. Ranges 15psi thru 200psi available dual scale - psi & Ft H₂O.

CUSTOMER _____
 PROJECT _____
 ENGINEER _____
 PRO or P.O. NO. _____



WEISS INSTRUMENTS, INC.
 HOLTSTVILLE, NEW YORK 11742

DESCRIPTION:
4 1/2" HVAC Pressure Gauge
 Series 4CTS

DRAWN BY: _____ DATE: _____ DRAWING: _____

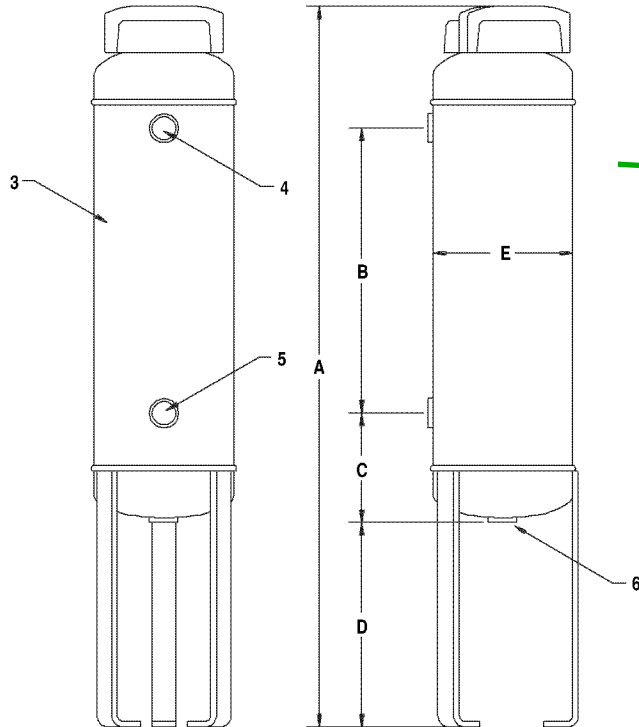
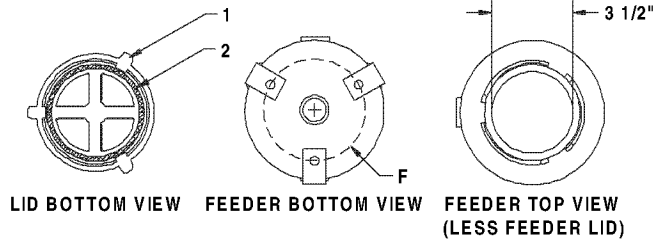
J.L. WINGERT CO.

P.O. Box 6207 • Garden Grove, CA 92846-6207 / 11800 Monarch Street • Garden Grove, CA 92841-2113
 Phone (714) 379-5519 • Fax (714) 379-5549 ■ Email: customerservice@jllwingert.com
 Northern California Region • Phone (510) 487-5310 ■ Southwest Region • Phone (602) 470-1015
www.jllwingert.com

MANUFACTURING: Mixers, Bypass Feeders, Filter Feeders, Bromine Feeders, Sample Coolers, Sludge Traps, Separators, Separator Systems, Tank Stands,
 Tank Package Systems, Glycol Feed Systems, Coupon Racks, Control Stations, NEMA Enclosures, Custom Packaged Systems and Specialty Welding

Specification Sheet #032002 Rev. "F" (12/99)

DOME BOTTOM BYPASS FEEDERS



PARTS, MATERIALS AND SPECIFICATIONS:

KEY	PART	SPECIFICATIONS
1	3071	CLOSURE: 3 1/2" cast iron, 1/4 turn closure. (O-ring included)
2	3072	O-RING: Buna-N O-ring 200° F
3		BODY: Carbon steel
4		OUTLET: 3/4" FNPT
5		INLET: 3/4" FNPT
6		DRAIN: 3/4" FNPT
MAX. PRESSURE		200 PSI (13.6 BAR)
MAX. TEMPERATURE		200° F (93° C)

VOLUME (FILL CAPACITY)

MODEL	GALLONS	LITERS
DB-2HD	2.39	9.04
DB-5HD	6.30	23.85
DB-12HD	13.28	50.27
DB-18HD	19.74	74.72

DIMENSIONS, WEIGHT & CUBE:

KEY	DB-2HD	DB-5HD	DB-12HD	DB-18HD
A	31 3/8"	31 5/8"	52 1/8"	70 7/8"
B	12 1/2"	10 3/4"	31"	44"
C	4 3/4"	6 1/2"	6 1/2"	10 7/8"
D	8 3/4"	7 3/4"	7 3/4"	7 3/4"
E	6"	10"	10"	10"
F	4"	8"	8"	8"
WEIGHT	23 lbs. (10.4 kgs.)	37 lbs. (16.8 kgs.)	62 lbs. (28.1 kgs.)	86 lbs. (39 kgs.)
CUBE	6" X 6" X 32"	10" X 10" X 32"	10" X 10" X 53"	10" X 10" X 72"

Note: All dimensions are +/- 1/8". All weights are approximate. All dimensions are subject to change without notice.

J.L. WINGERT CO.

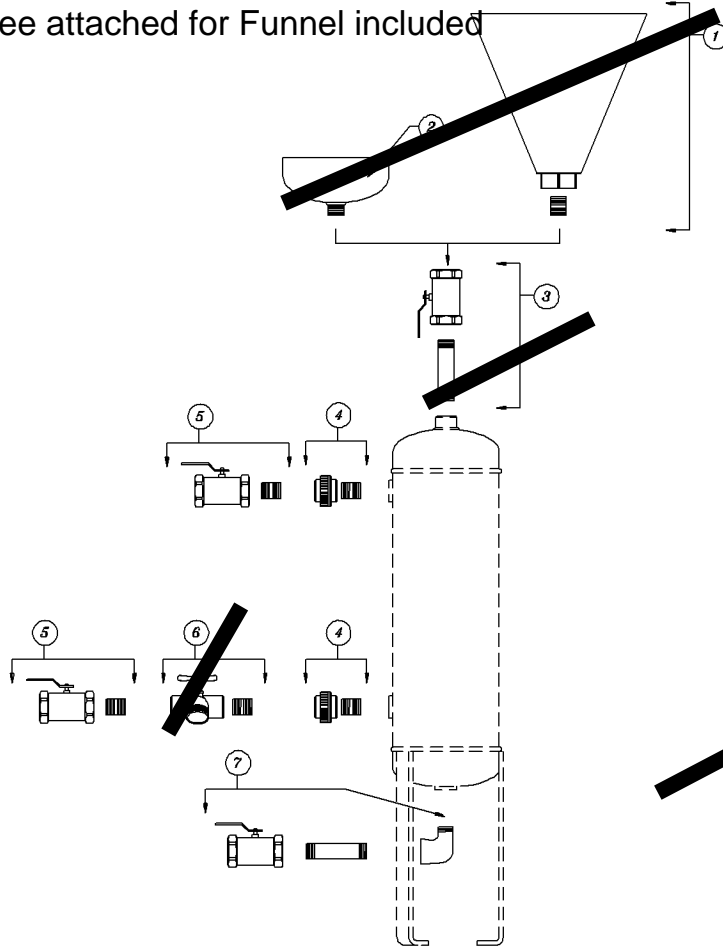
P.O. Box 6207 • Garden Grove, CA 92846-6207 / 11800 Monarch Street • Garden Grove, CA 92841-2113
 Phone (714) 379-5519 • Fax (714) 379-5549 ■ Southwest Region • Phone (602) 470-1015
 30998 Huntwood Avenue, Unit 105 • Hayward, CA 94544-7033 • Phone (510) 487-5310 • Fax (510) 487-5137
 On the Internet: www.jlwingert.com • Email: customerservice@jlwingert.com

MANUFACTURING: Mixers, Bypass Feeders, Filter Feeders, Bromine Feeders, Sample Coolers, Sludge Traps, Separators, Separator Systems, Tank Stands,
 Tank Package Systems, Glycol Feed Systems, Coupon Racks, Control Stations, NEMA Enclosures, Custom Packaged Systems and Specialty Welding

Instruction Sheet #0323 Rev. "D" (2/01)

VALVE PACKAGE INSTRUCTION SHEET

See attached for Funnel included



GENERAL NOTES

KEY	PART NUMBER	DESCRIPTION
1	3069P	PE FUNNEL: 10" diameter polyethylene fill funnel
2	3069	FUNNEL: 6" diameter carbon steel fill funnel
3	3142	FILL VALVE: 1" NPT 300PSI brass ball valve and 5" black nipple
4	3079	UNION VALVE: 3/4" NPT 300 PSI black union valve and installation nipple
5	3141	ISOLATION VALVE: 3/4" NPT 300 PSI brass ball valve and installation nipple
6	3063	HOSE BIBB: 3/4" NPT 300 PSI hose bibb with installation tee and nipple
7	3143	DRAIN VALVE: 3/4" NPT 300 PSI brass ball valve with installation street ell and nipple

VALVE PACKAGES

PART NUMBER	DESCRIPTION	INCLUDES KEY NUMBERS
3138	Flat bottom valve package	(2) #4 (2) #5 (1) #6
3139	Dome bottom valve package	(2) #4 (2) #5 (1) #7
3140	High pressure valve package with steel funnel	(1) #2 (1) #3 (2) #4 (2) #5 (1) #7
3140P	High pressure valve package with PE funnel	(1) #1 (1) #3 (2) #4 (2) #5 (1) #7

UNPACKING:

- 1) Ensure that there has been no damage in shipping. If any damage has occurred, please notify the carrier and the J.L. Wingert Company immediately.

INSTALLATION:

- 1) Assemble valves and fittings as shown on the diagram above.
- 2) Wingert Bypass Feeders and Pleated Filter Feeders should be installed with the inlet at the lower side entry. Wingert Filter Feeders should be installed with the inlet at the upper side fitting.

The J.L. Wingert Company offers a full line of feeder installation fittings such as sight flow indicators, air release valves, and filter bag kits. See our product brochure or call our customer service department for help with your application.

All dimensions are subject to change without notice.

J.L. WINGERT CO.

P.O. Box 6207 • Garden Grove, CA 92846-6207 / 11800 Monarch Street • Garden Grove, CA 92841-2113
 Phone (714) 379-5519 • Fax (714) 379-5549 ■ Email: customerservice@jllwingert.com
 Northern California Region • Phone (510) 487-5310 ■ Southwest Region • Phone (602) 470-1015
www.jllwingert.com

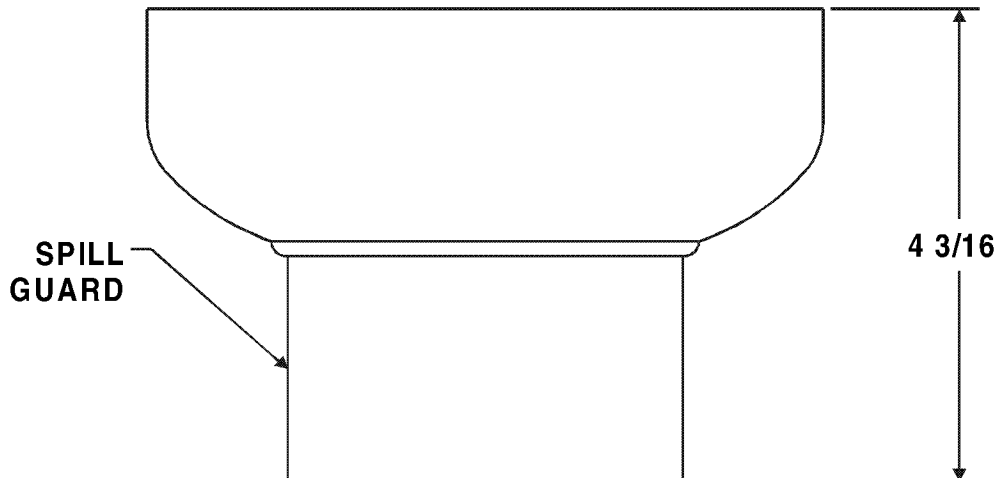
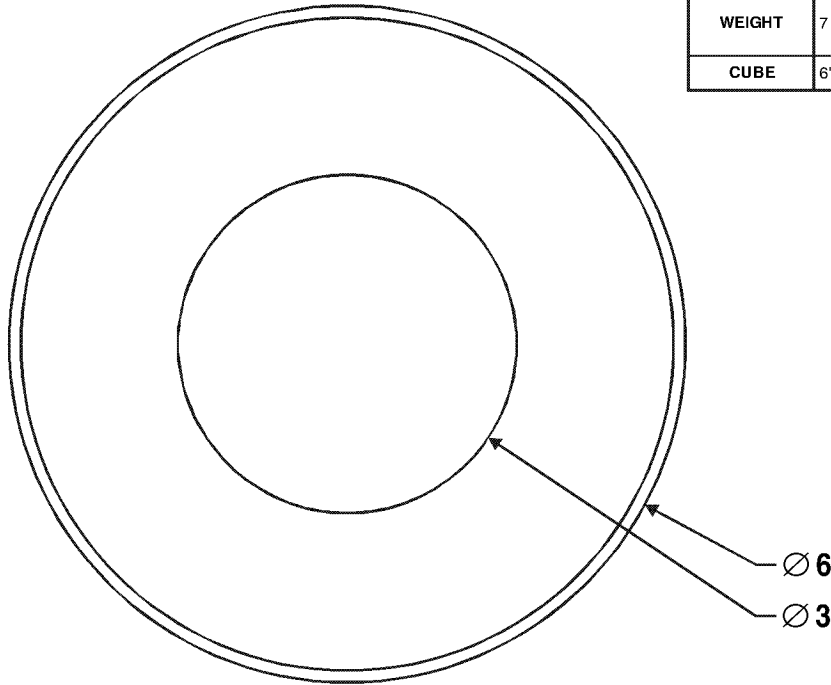
MANUFACTURING: Mixers, Bypass Feeders, Filter Feeders, Bromine Feeders, Sample Coolers, Sludge Traps, Separators, Separator Systems, Tank Stands,
 Tank Package Systems, Glycol Feed Systems, Coupon Racks, Control Stations, NEMA Enclosures, Custom Packaged Systems and Specialty Welding

Specification Sheet #032032 Rev. "A" (12/02)

STEEL "HD" FILL FUNNEL (3218)

SPECIFICATIONS:

FUNNEL	Carbon steel fill funnel with 2" spill-guard neck to prevent overflow
WEIGHT	7 1/2 lbs. approx.
CUBE	6" X 6" X 6"



Note: All dimensions are +/- 1/8". All weights are approximate. All dimensions are subject to change without notice.

GMU-2
 Model GL50-E1-1/C-
 HC-HTM-MXR
 Job: IMMUCCELL
 ENG: STANTEC
 Contractor: AAA
 ReP: Emerson Swan

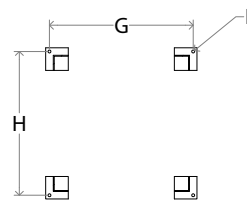
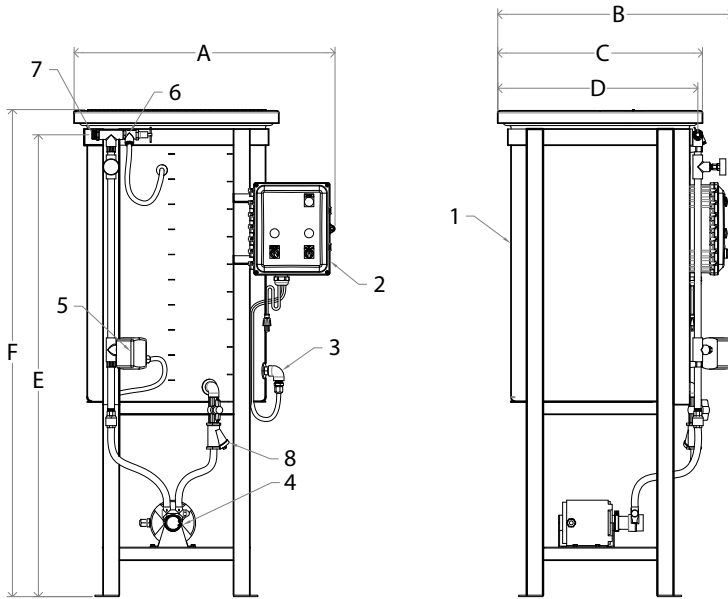


Specification Sheet

ECONOMY GLYCOL FEED SYSTEM

MODEL GL[]-E[]-[]

SS161000.C 12/15



SPECIFICATIONS:

KEY	MODEL	DESCRIPTION
TANK/TANK STAND:		
	GL15-E[]-[]	15 Gallon polyethylene tank with cover. Tank is supported and restrained by a carbon steel tank stand. Tank stand is coated with water based enamel paint.
	GL30-E[]-[]	30 Gallon polyethylene tank with cover. Tank is supported and restrained by a carbon steel tank stand. Tank stand is coated with water based enamel paint.
1	GL50-E[]-[]	50 Gallon polyethylene tank with cover. Tank is supported and restrained by a carbon steel tank stand. Tank stand is coated with water based enamel paint.
	GL100-E[]-[]	100 Gallon polyethylene tank with cover. Tank is supported and restrained by a carbon steel tank stand. Tank stand is coated with water based enamel paint.
CONTROL PANEL:		
2	ALL	NEMA 4X control panel includes the following: -8ft 115VAC power cord -Main power off-on switch and green LED indicator light -Pump H-O-A switch and green LED indicator light -Red low level LED indicator light -15 Amp slow blow fuse -115VAC Auxiliary low level output
LOW LEVEL SWITCH:		
3	ALL	Polypropylene side entry low level switch with 12 Amp relay.
PUMP:		
4	ALL	1/3HP brass rotary vane pump that provides even flow against pressure. See the Pump Curves on page. 2. *Optional 1/2HP brass rotary vane pump (E2)
PRESSURE SWITCH:		
5	ALL	1/4" NPT pressure switch. See Pressure Code on page 2 for cut-in and cut-out values.
PRESSURE RELIEF VALVE:		
6	ALL	20-150 PSI brass pressure relief valve
OUTLET:		
7	ALL	3/4" MNPT
SUCTION ASSEMBLY:		
8	ALL	Sch80 PVC fittings, PVC isolation ball valve, cast iron Y-Strainer
MAXIMUM PRESSURE:		100 PSI (6.9 BAR)
MAXIMUM TEMPERATURE:		85 °F (29.4 °C)
MAXIMUM PRESSURE (HTM OPTION):		150 PSI (10.3 BAR)
MAXIMUM TEMPERATURE (HTM OPTION):		150 °F (65.5 °C)

DIMENSIONS

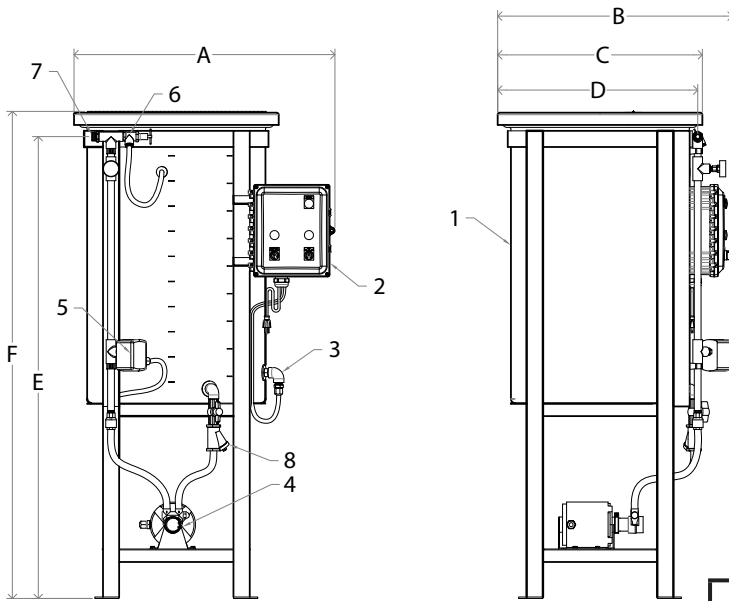
	GL15-E[]-[]	GL30-E[]-[]	GL50-E[]-[]	GL100-E[]-[]
A	25 5/8"	28 1/4"	32 3/16"	36 3/8"
B	22 3/8"	25"	28 15/16"	33 1/8"
C	17 1/8"	20 3/16"	25 1/4"	30 1/4"
D	18 1/8"	20 3/4"	24 11/16"	28 7/8"
E	44"	51 1/16"	57"	68 1/2"
F	46 13/16"	54 11/16"	60 1/8"	72 3/8"
G	14 1/8"	16 1/4"	19 1/8"	22 1/2"
H	14 1/8"	16 1/4"	19 1/8"	22 1/2"
I	3/8"	3/8"	3/8"	3/8"
APPROX. SHIPPING WEIGHT	115 lbs	145 lbs	165 lbs	205 lbs

Note: All dimensions are +/- 1/8". All weights are approximate. All dimensions are subject to change without notice.

MANUFACTURING: Mixers, Bypass Feeders, Filter Feeders, Bromine Feeders, Sample Coolers, Sludge Traps, Separators, Separator Systems, Tank Stands, Tank Package Systems, Glycol Feed Systems, Coupon Racks, Control Stations, NEMA Enclosures, Custom Packaged Systems and Specialty Welding

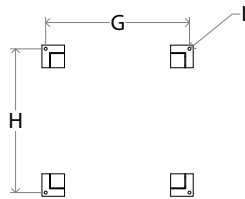
P.O. Box 6207 | Garden Grove, CA 92846-6207 / 11800 Monarch St. | Garden Grove, CA 92841-2113 | Phone (714) 379-5519 | Fax (714) 379-5549
 Northern California Region | Phone (510) 487-5310 | Southwest Region | Phone (602) 470-1015 | Email: customerservice@jlwingert.com

www.jlwingert.com



MOTOR DATA

	E1	E2
HP:	1/3	1/2
MOTOR TYPE:	Split-Phase Carbonator Pump Motor	Split-Phase Carbonator Pump Motor
ENCLOSURE:	ODP	ODP
NEMA FRAME:	48Y	48Y
VOLTAGE:	115	100-120/200-240
PHASE:	1	1
FULL LOAD AMPS:	6.5	7.1-7.3/3.4-3.6
THERMAL PROTECTION:	YES	YES
INSULATION CLASS:	B	B
SERVICE FACTOR:	1	1
NAMEPLATE RPM:	1725	1725



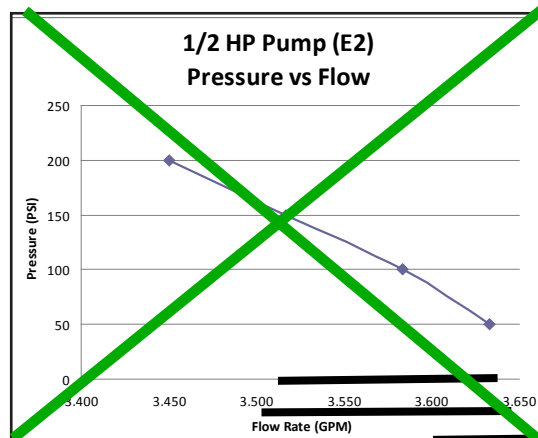
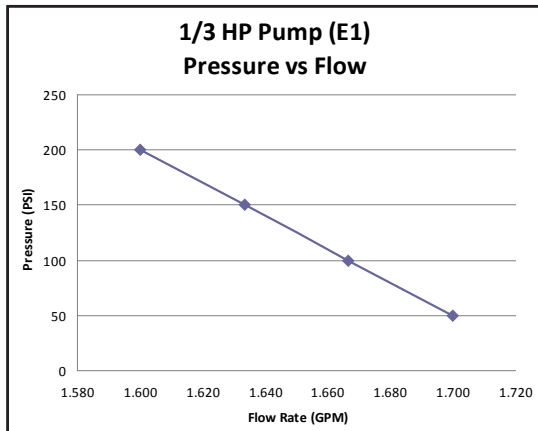
PRESSURE CODE	CUT-IN RANGE (PSI)	CUT-OUT RANGE (PSI)	PRESSURE DIFFERENTIAL (PSI)
1*	10-45	20-60	10-30
2	40-80	65-100	20-40
3	3-10	9-30	6-20
D**	0-149	1-150	1-149
X	No Pressure Switch		

*Code 1 is standard. Code 2 and Code 3 are available at no additional charge.
 **Code D is digital.

NOTE: For pressures over 100PSI, HTM must be used.

OPTIONAL FEATURES

-B	95 decibel audible alarm and silence switch
-C	Remote dry contact on low level, (PLC interface, control room alarm)
-ET	Expansion tank, 4.5 gallon with adjustable pressure reducing valve
-HC	High level float switch with remote dry contact (PLC interface)
-HN	1/3 hinged cover using stainless steel piano hinge with stainless steel hardware
-HTM	High temperature steel discharge manifold with high temperature hoses
-MXR	TEFC, tank stand mounted mixer and ON/OFF switch
-TEFC	TEFC, (Totally Enclosed Fan Cooled), pump motor
-OUTDOOR	Outdoor rated glycol feed system, (TEFC pump, solid cover, cover is bolted to the tank)



Note: All dimensions are +/- 1/8". All weights are approximate. All dimensions are subject to change without notice.

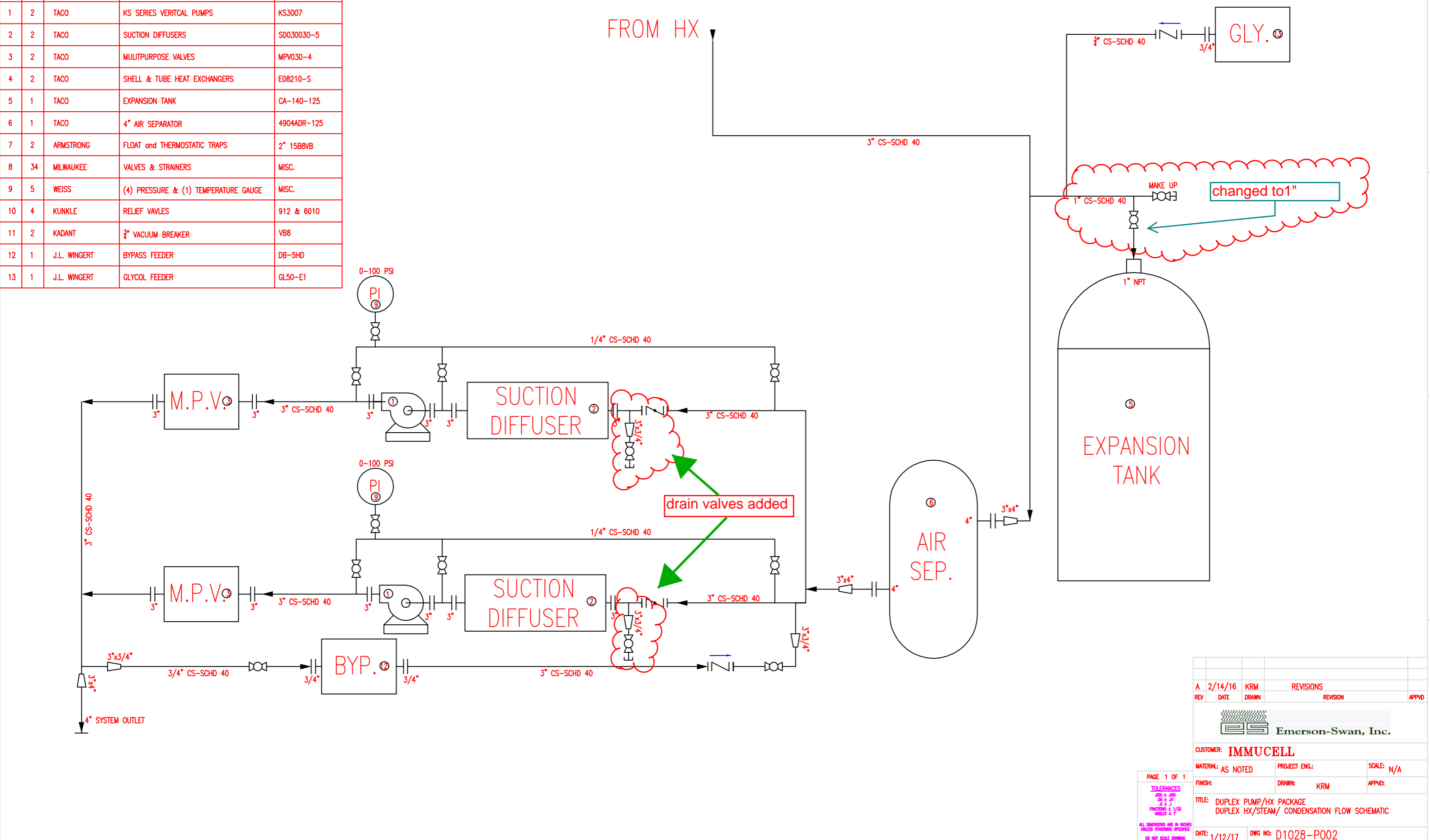
MANUFACTURING: Mixers, Bypass Feeders, Filter Feeders, Bromine Feeders, Sample Coolers, Sludge Traps, Separators, Separator Systems, Tank Stands, Tank Package Systems, Glycol Feed Systems, Coupon Racks, Control Stations, NEMA Enclosures, Custom Packaged Systems and Specialty Welding

P.O. Box 6207 | Garden Grove, CA 92846-6207 / 11800 Monarch St. | Garden Grove, CA 92841-2113 | Phone (714) 379-5519 | Fax (714) 379-5549
 Northern California Region | Phone (510) 487-5310 | Southwest Region | Phone (602) 470-1015 | Email: customerservice@jlwingert.com

www.jlwingert.com

THIS PRINT AND THE INFORMATION CONTAINED ARE THE PROPERTY OF TROCA-SERVO CORPORATION, USA. THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND CONFIDENTIAL. ONE MUST BE TAKEN THAT THIS INFORMATION REMAINS SO AND IS MADE AVAILABLE WITH FULL UNDERSTANDING OF THE LIMITS OF ITS USAGE. THIS PRINT IS LOANED, SUBJECT TO RETURN, UNDER THE CONDITION THAT IT SHALL NOT BE COPIED OR REPRODUCED AND USED IN ANY WAY OTHER THAN AUTHORIZED BY TROCA-SERVO CORPORATION.

ITEM	QTY	MANUFACTURER	DESCRIPTION	PART NUMBER
1	2	TACO	KS SERIES VERTICAL PUMPS	KS3007
2	2	TACO	SUCTION DIFFUSERS	SD030030-5
3	2	TACO	MULTIPURPOSE VALVES	MPV030-4
4	2	TACO	SHELL & TUBE HEAT EXCHANGERS	E08210-S
5	1	TACO	EXPANSION TANK	CA-140-125
6	1	TACO	4" AIR SEPARATOR	4904ADR-125
7	2	ARMSTRONG	FLOAT and THERMOSTATIC TRAPS	2" 15B8VB
8	34	MILWAUKEE	VALVES & STRAINERS	MISC.
9	5	WEISS	(4) PRESSURE & (1) TEMPERATURE GAUGE	MISC.
10	4	KUNKLE	RELIEF VALVES	912 & 6010
11	2	KADANT	3/4" VACUUM BREAKER	VB8
12	1	J.L. WINGERT	BYPASS FEEDER	DB-5HD
13	1	J.L. WINGERT	GLYCOL FEEDER	GL50-E1



REV	DATE	DRAWN	REVISIONS	APPVD
A	2/14/16	KRM		

Emerson-Swan, Inc.

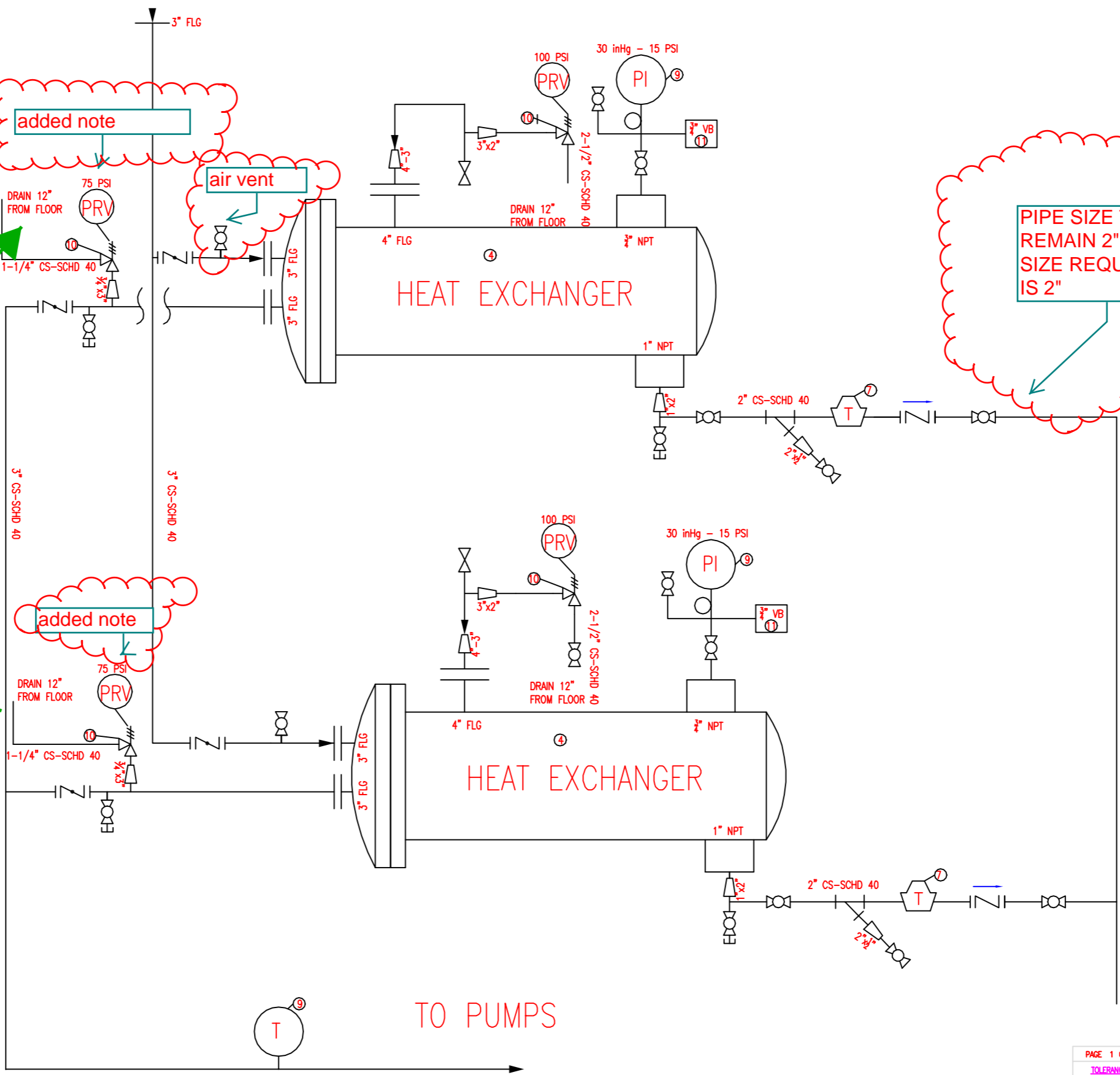
CUSTOMER: IMMUCELL	MATERIAL: AS NOTED	PROJECT ENG:	SCALE: N/A
FINISH:	DRAWN: KRM	APPVD:	
TITLE: DUPLEX PUMP/HX PACKAGE DUPLEX HX/STEAM/ CONDENSATION FLOW SCHEMATIC			
DATE: 1/12/17	DWG NO: D1028-P002		

PAGE 1 OF 1
 TOLERANCES
 .000 ± .005
 .00 ± .01
 .01 ± .01
 FRACTIONS ± 1/32
 ANGLES ± 1°
 ALL DIMENSIONS ARE IN INCHES
 UNLESS OTHERWISE SPECIFIED
 DO NOT SCALE DRAWING

THIS PRINT AND THE INFORMATION CONTAINED ARE THE PROPERTY OF TROCA-SERVO CORPORATION, USA. THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND CONFIDENTIAL. ONE MUST BE TAKEN THAT THIS INFORMATION REMAINS SO AND IS MADE AVAILABLE WITH FULL UNDERSTANDING OF THE LIMITS OF ITS USAGE. THIS PRINT IS LOANED, SUBJECT TO RETURN, UNDER THE CONDITION THAT IT SHALL NOT BE COPIED OR REPRODUCED AND USED IN ANY WAY OTHER THAN AUTHORIZED BY TROCA-SERVO CORPORATION.

ITEM	QTY	MANUFACTURER	DESCRIPTION	PART NUMBER
1	2	TACO	KS SERIES VERTICAL PUMPS	KS3007
2	2	TACO	SUCTION DIFFUSERS	SD030030-5
3	2	TACO	MULTIPURPOSE VALVES	MPV030-4
4	2	TACO	SHELL & TUBE HEAT EXCHANGERS	E08210-S
5	1	TACO	EXPANSION TANK	CA-140-125
6	1	TACO	4" AIR SEPARATOR	4904ADR-125
7	2	ARMSTRONG	FLOAT and THERMOSTATIC TRAPS	2" 15B8VB
8	34	MILWAUKEE	VALVES & STRAINERS	MISC.
9	5	WEISS	(4) PRESSURE & (1) TEMPERATURE GAUGE	MISC.
10	4	KUNKLE	RELIEF VALVES	912 & 6010
11	2	KADANT	3/4" VACUUM BREAKER	VB8
12	1	J.L. WINGERT	BYPASS FEEDER	DB-5HD
13	1	J.L. WINGERT	GLYCOL FEEDER	GL50-E1

3" SYSTEM RETURN



GMU unit does not have OPENING to accomodate releif valve piping. Relief valve to follow common practice and pipe to floor

PIPE SIZE TO REMAIN 2": TRAP SIZE REQUIRED IS 2"

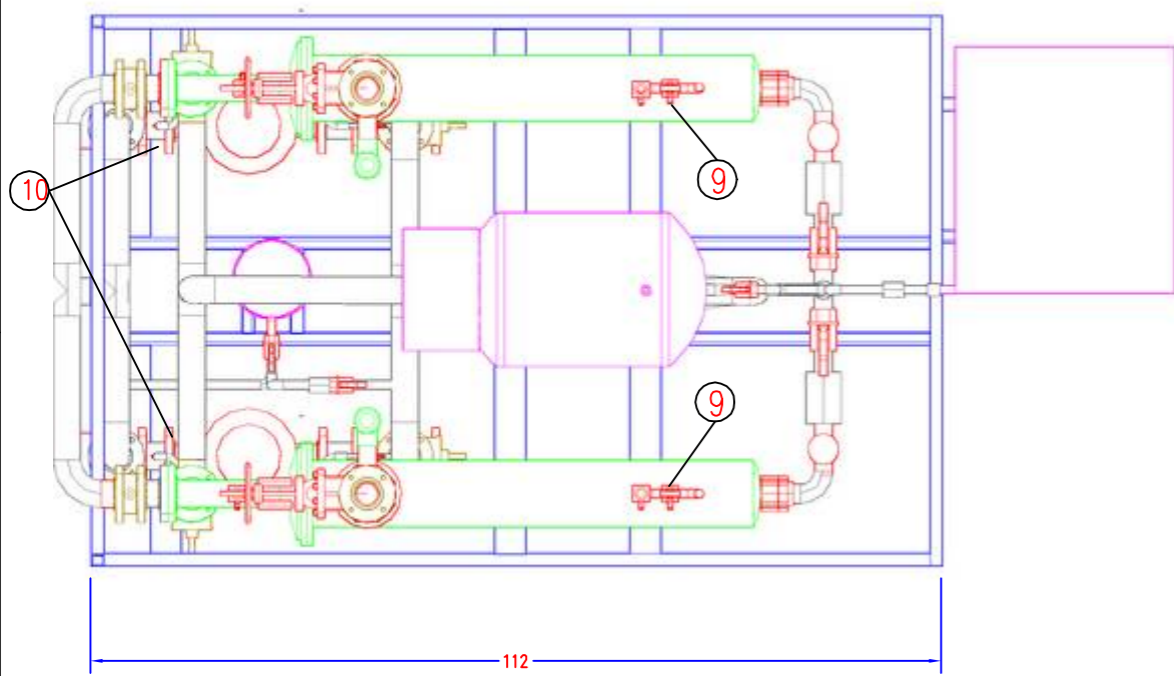
REV	DATE	DRAWN	REVISION	APPVD
A	2/14/17	KRM	REVISIONS A	

Emerson-Swan, Inc.

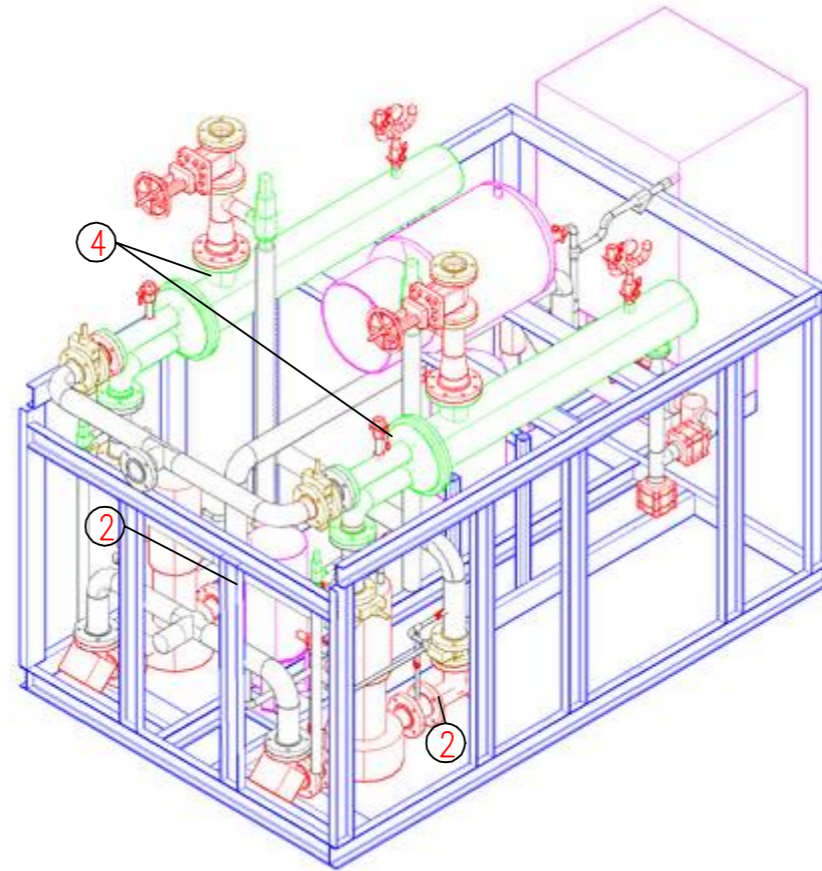
CUSTOMER:	IMMUCELL
MATERIAL:	AS NOTED
PROJECT ENG.:	
SCALE:	N/A
FINISH:	
DRAWN:	KRM
APPVD:	
TITLE:	DUPLEX PUMP/HX PACKAGE DUPLEX HX/STEAM/ CONDENSATION FLOW SCHEMATIC
DATE:	1/12/17
DWG NO.:	D1028-P001-1

PAGE 1 OF 1
 TOLERANCES
 .000 ± .005
 .00 ± .01
 .0 ± .1
 FRACTIONS ± 1/32
 ANGLES ± 1°
 ALL DIMENSIONS ARE IN INCHES
 UNLESS OTHERWISE SPECIFIED
 DO NOT SCALE DRAWING

THIS PRINT AND THE INFORMATION CONTAINED ARE THE PROPERTY OF TROCA-SERVO CORPORATION, USA. THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND CONFIDENTIAL. ONE MUST BE TAKEN THAT THIS INFORMATION REMAIN SO AND IS MADE AVAILABLE WITH ALL UNDERSHOULDINGS OF THE LINES OF ITS USAGE. THIS PRINT IS LOANED, SUBJECT TO RETURN, UNDER THE CONDITION THAT IT SHALL NOT BE COPIED OR REPRODUCED AND USED IN ANY WAY OTHER THAN AUTHORIZED BY WRITING OF TROCA-SERVO CORPORATION.

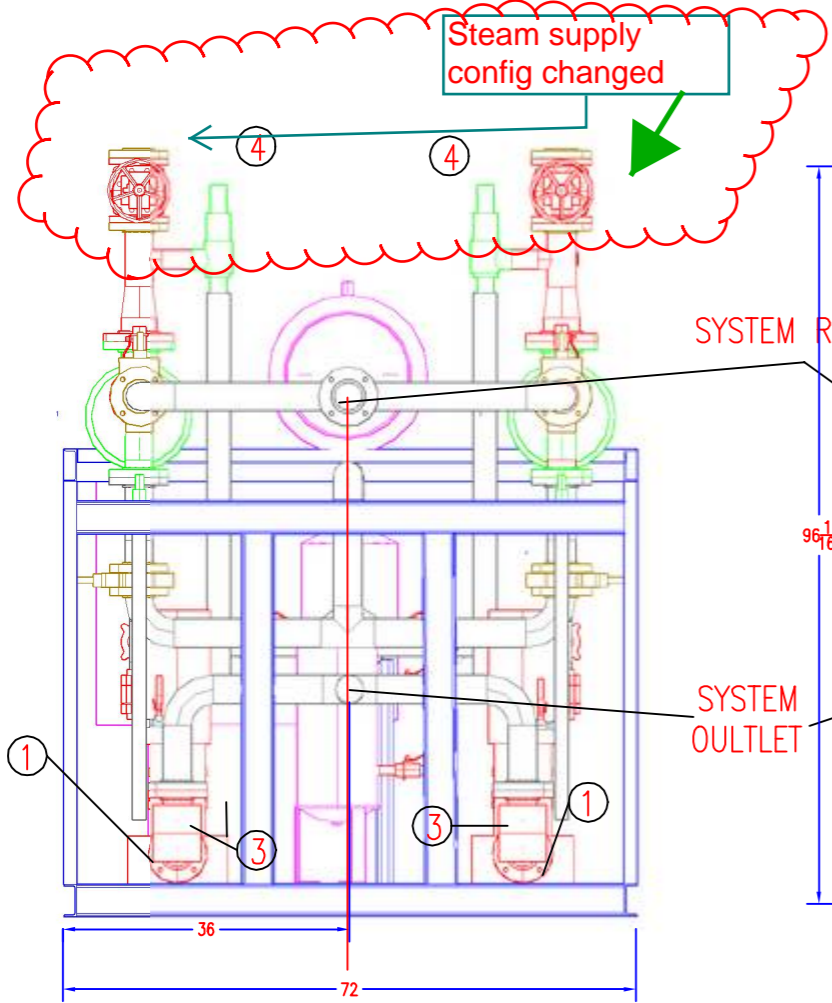


TOP VIEW

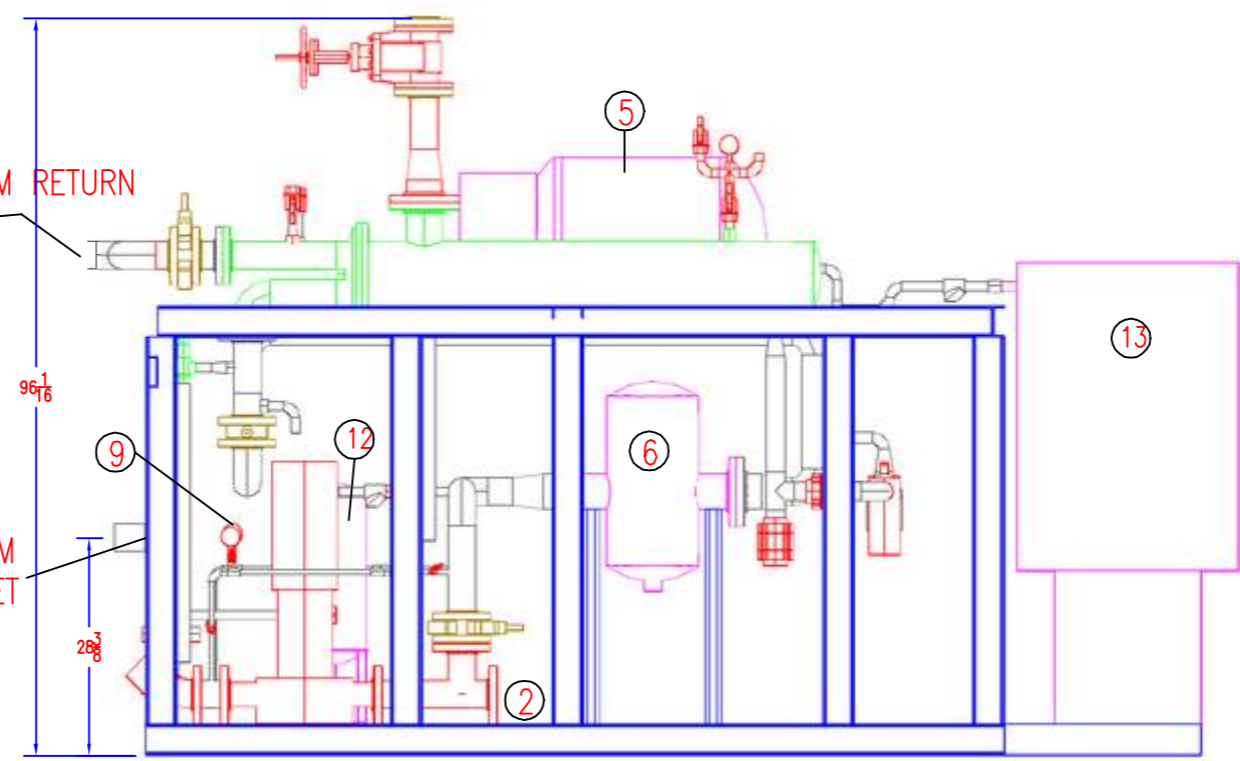


NOTES:
1. ALL DIMENSIONS ARE IN INCHES.

ITEM	QTY	MANUFACTURER	DESCRIPTION	PART NUMBER
1	2	TACO	KS SERIES VERTICAL PUMPS	KS3007
2	2	TACO	SUCTION DIFFUSERS	SD030030-5
3	2	TACO	MULTIPURPOSE VALVES	MPV030-4
4	2	TACO	SHELL & TUBE HEAT EXCHANGERS	E08210-S
5	1	TACO	EXPANSION TANK	CA-140-125
6	1	TACO	4" AIR SEPARATOR	4904ADR-125
7	2	ARMSTRONG	FLOAT and THERMOSTATIC TRAPS	2" 15B8VB
8	34	MILWAUKEE	VALVES & STRAINERS	MISC.
9	5	WEISS	(4) PRESSURE & (1) TEMPERATURE GAUGE	MISC.
10	4	KUNKLE	RELIEF VALVES	912 & 6010
11	2	KADANT	3/4" VACUUM BREAKER	VB8
12	1	J.L. WINGERT	BYPASS FEEDER	DB-5HD
13	1	J.L. WINGERT	GLYCOL FEEDER	GL50-E1



FRONT VIEW



SIDE VIEW

REV	DATE	DRAWN	REVISION	APPVD
A	2/14/17	KRM	REVISION	
CUSTOMER: IMMUCELL				
MATERIAL: AS NOTED		PROJECT ENG:		SCALE: N/A
FINISH:		DRAWN: KRM		APPVD:
TITLE: DUPLEX PUMP PACKAGE GENERAL LAYOUT				
DATE: 1/13/17		DWG NO: D1028-L001		

PAGE 1 OF 1
TOLERANCES
XXX ± .005
XX ± .01
X ± .03
FRACTIONS ± 1/32
ANGLES ± 1°
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING