

NORTHEAST

ENERGY SYSTEMS

Power Systems Specialists

Table of Contents

Cooling Components

SmithCo Radiator	4	Horizontal Remote Dual Core Radiator Model F14-093-1 Design: 110 Deg F @ 500 Ft., Vibration Switch, 85 Dba @ 3 FT
H/T Radiator Braid	8	4.0" ASA x 4.0" S/S Braid x 4.0" ASA x 16" Long
L/T Radiator Braid	8	3.0" ASA x 3.0" S/S Braid x 3.0" ASA x 12" Long
Radiator Disconnect Switch	4	60-Amp ERS3060UX Non-Fused Disconnect
Vibration Switch	4	Murphy VS-2 - Included with Radiator
Expansion Tank - H/T	4	60 Gallon - # JAER-23907
Expansion Tank - L/T	4	24 Gallon - # JAER-23903
Pressure Relief Valve	8	Kunkle Model 20
Air Eliminator	8	Model 13WS
Pressure Switch	8	Model J-402-156
Flow Switch	8	Flow Switch Model - V7
Air Purge Valve - H/T	4	Amtrol 4.0" Model 449
Air Purge Valve - L/T	4	Amtrol 3.0" Model 448
L/T Pump	4	Aurora 344-1.5x2.5x9B 5 HP 110 GPM
L/T Pump -Suction Braid	4	2.0" ASA x 2.0" S/S Braid x 3.0" ASA x 12" Long
L/T Pump - Discharge Braid	4	1.5" ASA x 2.0" S/S Braid x 3.0" ASA x 12" Long
L/T Pump Disconnect	4	16-Amp ERS3016UX Non-Fused Disconnect
L/T Thermostatic Valve	4	FPE 2.0" 3-Way Valve Model AF2012-140
Strainer - H/T Circuit	4	Watts 3.0"-77F-DI-FDA-125
Butterfly Valve - H/T Circuit	8	Watts 3.0" BF03-11115

SMITHCO Engineering Inc.

P.O. Box 571330 Tulsa, OK 74157
Ph. (918) 446-4406 FAX (918) 445-2857

AIR COOLED EXCHANGER SPECIFICATION SHEET

Date Fri* 9:39 am* 9-SEP-11
Proposal/Job No. 081-01HL
Reference NELSON GARDENS
Item No. EJW

1	Customer	NES	Ult. Customer:	UNKNOWN
2	Plant Location	SAN ANTONIO, TX		
3	Service	JGS320C82@1059KW HT		
4	Model	1 F14-093-1	Type	FORCED
5	Surface per Unit-Finned Tube	11,920	Ft ²	No. of Bays 1
6	Heat Exchanged	2,649,000	BTU/Hr	Bare Tubes 500.7 Ft ²
7	Transfer Rate-Finned Tube	5.09	Bare Tube, Service	121.28 BTU/Hr. MTD (Eff.) 43.63 (Crossflow) °F

PERFORMANCE DATA-TUBE SIDE

9	Fluid Name	40% GLYCOL		Lethal Service	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	IN	OUT
10	Total Fluid Entering	Lb/Hr	77,100	Density	Lb/Ft ³		64.1	64.1
11				Specific Heat (Liq/Vap)	BTU/Lb°F		.862 /	.862 /
12	Temperature	°F	194.9	Cond. avg (Liq/Vap)	BTU/HrFt ² °F		.238 /	
13	Liquid	Lb/Hr	77,100	Pour/Freeze Point	°F			
14	Vapor	Lb/Hr (MW)		Bubble Point	°F			
15	Nocond	Lb/Hr (MW)		Latent Heat	BTU/Lb			
16	Steam	Lb/Hr		Pressure	Psia		20.00	
17	Water	Lb/Hr		Pressure Drop Allow/Calc	Psi		6.00 / 3.20	
18	Viscosity (Liq/Vap)	Cp	.7700 /	Fouling resist, Inside	ft ² hr °F/BTU		0.00100	

PERFORMANCE DATA-AIR SIDE

20	Air Quantity	SCFM	85,560	Lb/Hr	385,000	Altitude	Ft	500
21	Air Quantity/Fan	ACFM	107,800	Temperature In	°F	110.0		
22				Temperature Out	°F	138.5		

DESIGN - MATERIAL - CONSTRUCTION

25	Design Pressure	100	Psig	Test Pressure	130	Psig	Design Temperature	250 / MDMT -20	°F	
26	TUBE BUNDLE	HEADER, Type PLUG BOX				TUBE Material SA-214 WLD				
27	Size	8.0 x 14.0		Material	SA-516 GR-70					
28	No. 1	No. Tube Rows	4	No. Passes	4	Slope	0.0000	In/Ft	OD 0.750 In Min. Thick 0.0600 In	
29	Bays	1	In Parallel	In Series	Plug	A1051818		No./Bundle 182	Length 14.0 Ft	
30	Bundles	1	In Parallel	In Series	Gasket	CS1813		Pitch 2.0625	InΔ	
31	Pass Arrangement (Top to Bottom)	Corrosion Allowance 0.0625				In	FIN Type L-TENSION			
32	Rows / Pass	4 / 4		Size In Nozzle (1)	4.00	SCH XS SA-106B	In	Material	ALUM	
33	Turbulators	NO		Size Out Nozzle (1)	4.00	SCH XS SA-106B	In	OD 2.000 In	Stock Thick 0.016 In	
34	Steam Coil	NO		Rating & Facing	150 -RF SA-105		No/In 10	Support Chan. / Staple		
35	Hailscreens	YES		Vent (3)	1-3000	Drain (1)	1-3000	Code-ASME VIII, Div 1	YES Stamp ASME	
36	Louvers	NONE (0)		TI	PI		Radiograph N	Heat Treat N		
37	Frame Finish	HTC 1 Coat Galvanize		Header Finish	WMSB 1 Coat Metalize		Tube Hole Grooving	YES		

MECHANICAL EQUIPMENT

39	FAN Mfg & Model	COFIMCO	40 5000	DRIVER Type	ELECTRIC MOTOR		SPEED REDUCER Type V-BELT		
40	No./Bay	1	RPM	389	S.F.	1.15	Insul/TR CLASS F / B	BELTS (5) 3VX -1120. SHEAVES 25.0/5.6	
41	Dia.	8.0	Ft.	No. Blades	5	No./Bay	1	Frame	256T HP 20.0
42	Pitch	ADJUSTABLE	Angle°	13.	RPM (1)	1750	Duty	CHEM	HP Rating 37.1 Ratio 4.50
43	Matl, Blade	ALUMINUM	Hub	EXT ALUM	Enclosure	TEFC (H.E.)	V & D V&D	Support: SUSPENDED FROM STRUCTURE	
44	HP/Fan, Des.	16.8	DBA	85. @ 3'	V/P/C	460/3/60	Space Heater	NO	Vibration Switch NONE

STRUCTURE

45	Mounting	GRADE	Inlet Header	in. None
46	Windload - PSF	30.0	Seismic	None
47	Finish	HTC 1 Coat Galvanize	Outlet/Return	in. None
			Drive Access	in. None

WALKWAYS

NOTES

48	Items combined:	EJW	AUX
49	Coil Volume (ft ³):	8.	
50	Assembled Drive, Structure & Bundles (Within Shipping Restrictions)		
51			
52			
53			
54			
55	Plot Area	9.3 x 14.0 ft	Weight Bundle 3,841 Lbs
			Total Shipping 10,240 Lbs

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AIR COOLED EXCHANGER SPECIFICATION SHEET

Date	Fri* 9:39 am* 9-SEP-11
Proposal/Job No.	081-02HL
Reference	NELSON GARDENS
Item No.	AUX

1	Customer	NES	Ult. Customer:	UNKNOWN		
2	Plant Location	SAN ANTONIO, TX				
3	Service	JGS320C82@1059KW LT				
4	Model	Type	FORCED	No. of Bays	1	
5	Surface per Unit-Finned Tube	2,019	Ft ²	Bare Tubes	95.37	Ft ²
6	Heat Exchanged	186,000	BTU/Hr	MTD (Eff.)	23.0 (Counter Flow)	°F
7	Transfer Rate-Finned Tube	4.01	Bare Tube, Service	84.84	BTU/Hr. Ft ²	°F

PERFORMANCE DATA-TUBE SIDE

9	Fluid Name	40% GLYCOL		Lethal Service	Yes	No	<input checked="" type="checkbox"/>	IN	OUT
10	Total Fluid Entering	Lb/Hr	57,200	Density	Lb/Ft ³			64.9	64.9
11		IN		Specific Heat (Liq/Vap)	BTU/Lb°F			.845 /	.845 /
12	Temperature	°F	143.9	Cond. avg (Liq/Vap)	BTU/HrFt ² °F			.241 /	
13	Liquid	Lb/Hr	57,200	Pour/Freeze Point	°F				
14	Vapor	Lb/Hr (MW)		Bubble Point	°F				
15	Nocond	Lb/Hr (MW)		Latent Heat	BTU/Lb				
16	Steam	Lb/Hr		Pressure	Psia			20.00	
17	Water	Lb/Hr		Pressure Drop Allow/Calc	Psi			6.00 / 2.20	
18	Viscosity (Liq/Vap)	Cp	1.300 /	Fouling resist, Inside	ft ² hr °F/BTU			0.00100	

PERFORMANCE DATA-AIR SIDE

20	Air Quantity	SCFM	13,120	Lb/Hr	59,030	Altitude	Ft	500
21	Air Quantity/Fan ACFM	.0		Temperature In	°F	110.0		
22				Temperature Out	°F	123.1		
23								

DESIGN - MATERIAL - CONSTRUCTION

25	Design Pressure	100	Psig	Test Pressure	130	Psig	Design Temperature	250 / MDMT -20	°F						
26	TUBE BUNDLE	HEADER, Type			PLUG BOX	TUBE Material				SA-214 WLD					
27	Size	1.4 x 14.0			Material	SA-516 GR-70									
28	No. 1	No. Tube Rows	4	No. Passes	2	Slope	0.0000	In/Ft	OD	1.000	In	Min. Thick	0.0600	In	
29	Bays	1	In Parallel	In Series	Plug	A1051818				No./Bundle	26	Length	14.0	Ft	
30	Bundles	1	In Parallel	In Series	Gasket	CS1813				Pitch	2.3125	InΔ			
31	Pass Arrangement (Top to Bottom)				Corrosion Allowance	0.0625	In	FIN Type	L-TENSION						
32	Rows / Pass	4 / 2			Size In Nozzle (1)	3.00	SCH XS	SA-106B	In	Material	ALUM				
33	Turbulators	NO			Size Out Nozzle (1)	3.00	SCH XS	SA-106B	In	OD	2.250	In	Stock Thick	0.016	In
34	Steam Coil	NO			Rating & Facing	150 -RF SA-105			No./In	10	Support Chan. / Staple				
35	Hailscreens	YES			Vent (3)	1-3000	Drain (1)	1-3000	Code-ASME VIII, Div 1	YES	Stamp	ASME			
36	Louvers	NONE (0)			TI	PI			Radiograph	N	Heat Treat	N			
37	Frame Finish	HTC 1 Coat Galvanize			Header Finish	WMSB 1 Coat Metalize			Tube Hole Grooving	YES					

MECHANICAL EQUIPMENT

39	FAN Mfg & Model	DRIVER Type			SPEED REDUCER Type		
40	No./Bay	RPM	S.F.	Insul/TR			
41	Dia.	Ft.	No. Blades	No./Bay	Frame	HP	No./Bay
42	Pitch	Angle°	RPM	Duty	HP Rating	Ratio	
43	Matl, Blade	Hub	Enclosure	V & D	Support:		
44	HP/Fan, Des.	DBA	V/P/C	Space Heater	Vibration Switch		

STRUCTURE

45	Mounting	Inlet Header	in.	
46	Windload - PSF	Seismic	Outlet/Return	in.
47	Finish	Drive Access	in.	

WALKWAYS

NOTES

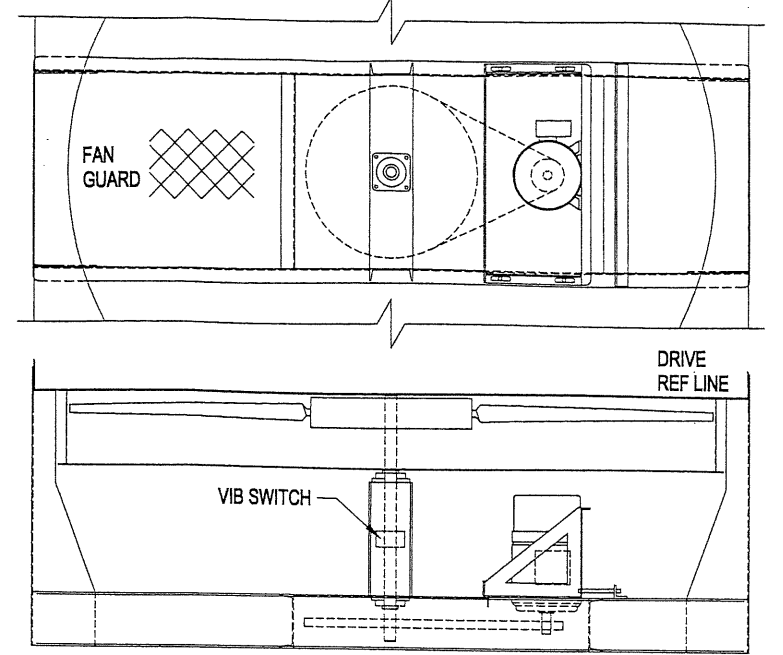
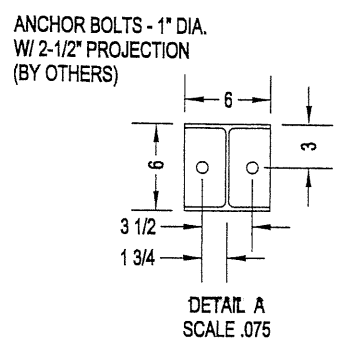
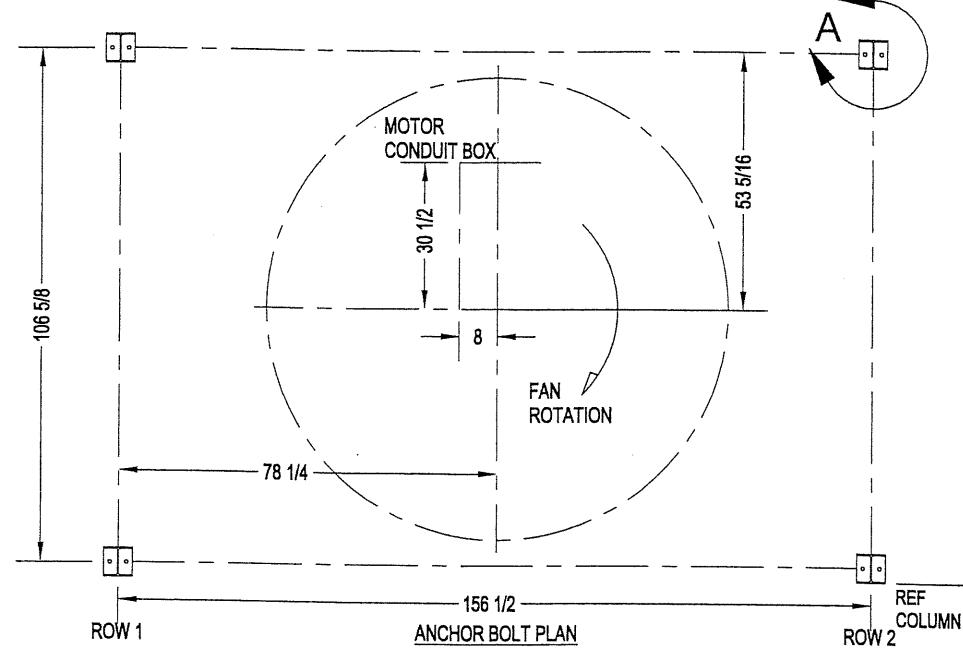
48	Coil Volume (ft ³):	2.						
49								
50								
51								
52								
53								
54								
55	Plot Area	ft	Weight Bundle	970.0	Lbs	Total Shipping	10,240	Lbs

DRY WGT	8900	WIND	30 PSF / 100 MPH	SEISMIC	0	PLATFORM	0 LBS / SQ-FT LIVE				
COLUMN LOAD KIPS	DRY DEAD	WET DEAD	WIND VERT	WIND HORIZ	SEIS VERT	SEIS HORIZ	SNOW	PLAT	NOZZ VERT	NOZZ HORIZ	TOTAL
ROW 1 / COLUMN	2.1	2.3	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	3.2
ROW 2 / COLUMN	2.1	2.3	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	3.2

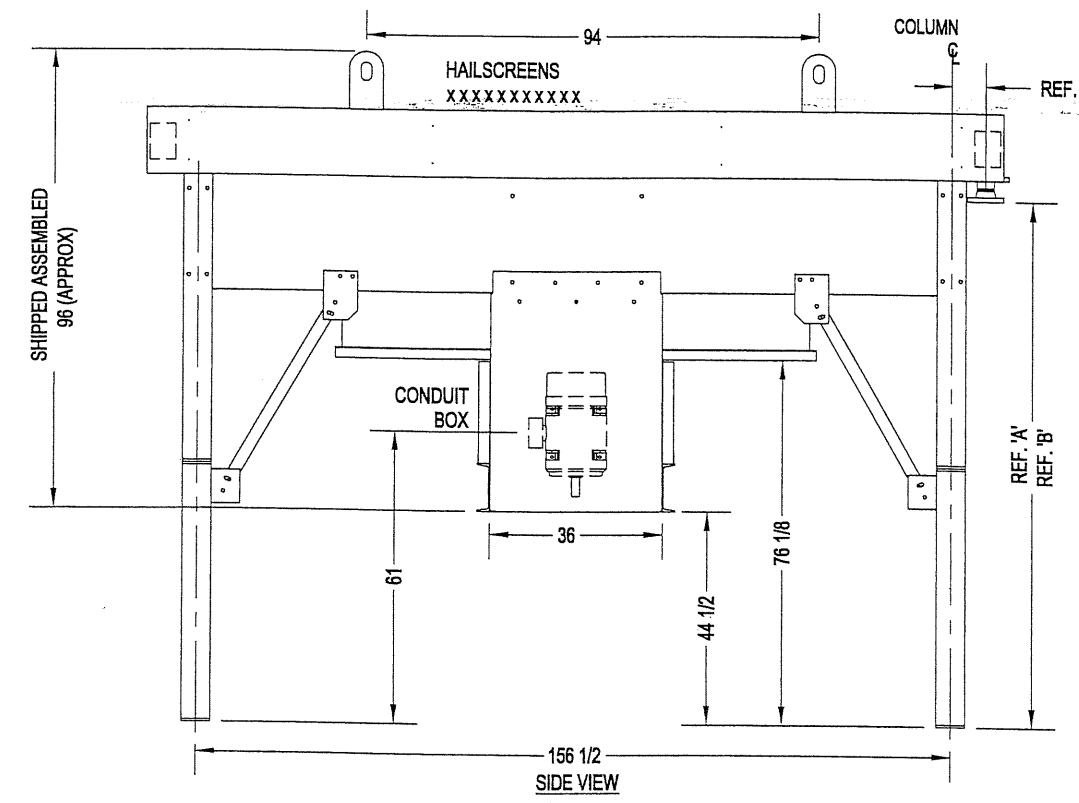
FAN MOORE 40 5000
 96 IN. DIAMETER 5 BLADE
 108000 ACFM 13.0 DEG.
 DRIVE REDUCER
 BELTS (5) 3VX-1120
 SHEAVES FAN 25.0 MOTOR 5.6
 BEARINGS 2.1875 IN.
 SHAFTS 2.1875 IN. X 31.5 IN. LG.

MOTOR HP 20 RPM 1750
 256T TEFC VENT & DRAIN
 INSULATION CLASS F / B TEMP RISE
 460 / 3 / 60 SINGLE WINDING VARIABLE TORQUE
 AMPS (± 10%) FLA 26 LRA 145
 VIBRATION SWITCH MURPHY VS-2EX
 VOLTS 480.0 AMPS 5.0 CONTACTS (2)SPDT

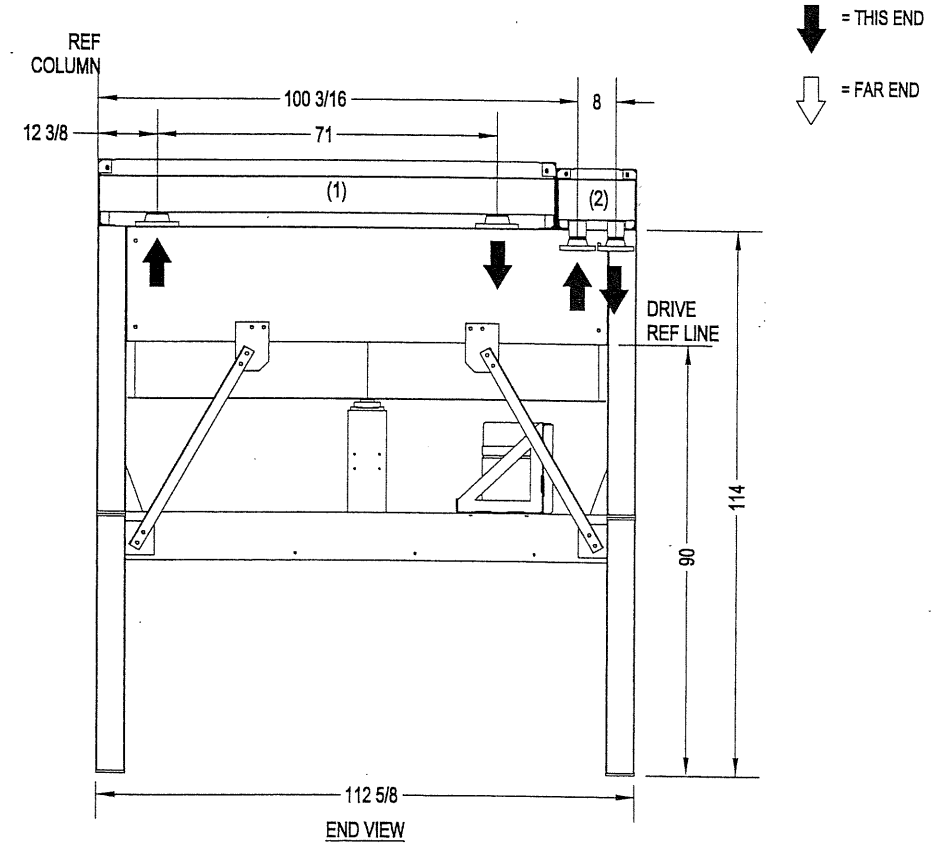
SHOP RUN IN TEST



FAN & DRIVE DETAIL



SIDE VIEW



END VIEW

1 OF 4 UNITS PROVIDED

ITEM	SERVICE	NOZZLES INLET	OUTLET	REFERENCE DIMENSIONS				BUNDLE WEIGHT	COUPLINGS		SHUTTER OPERATOR	HAIL SCR. CODE	DESIGN PRESS.
				A	B	C	D		V&D	TEMP			
1	EJW	JGS320C82@1059KW HT	(1) 4 - 150 # RF SCH XS	114.000	114.000	7.375		3800	1-3000			YES	ASME 100
2	AUX	JGS320C82@1059KW LT	(1) 3 - 150 # RF SCH XS	109.625	109.625	7.000		1000	1-3000			YES	ASME 100

TOLERANCES: (ALL DIMENSIONS IN INCHES)
 MECHANICAL EQUIPMENT: ± 1/8" PER 10'-0"
 NOZZLE: ± 1/8"
 STRUCTURAL - HAND TOOL CLEAN WITH 1 COAT GALVANIZE
 FRAME - HAND TOOL CLEAN WITH 1 COAT GALVANIZE
 HEADER - WHITE METAL BLAST CLEAN WITH 1 COAT METALIZE

CUSTOMER: NORTHEAST ENERGY SYSTEMS
 LOCATION: SAN ANTONIO, TX
 REFERENCE: BL649432

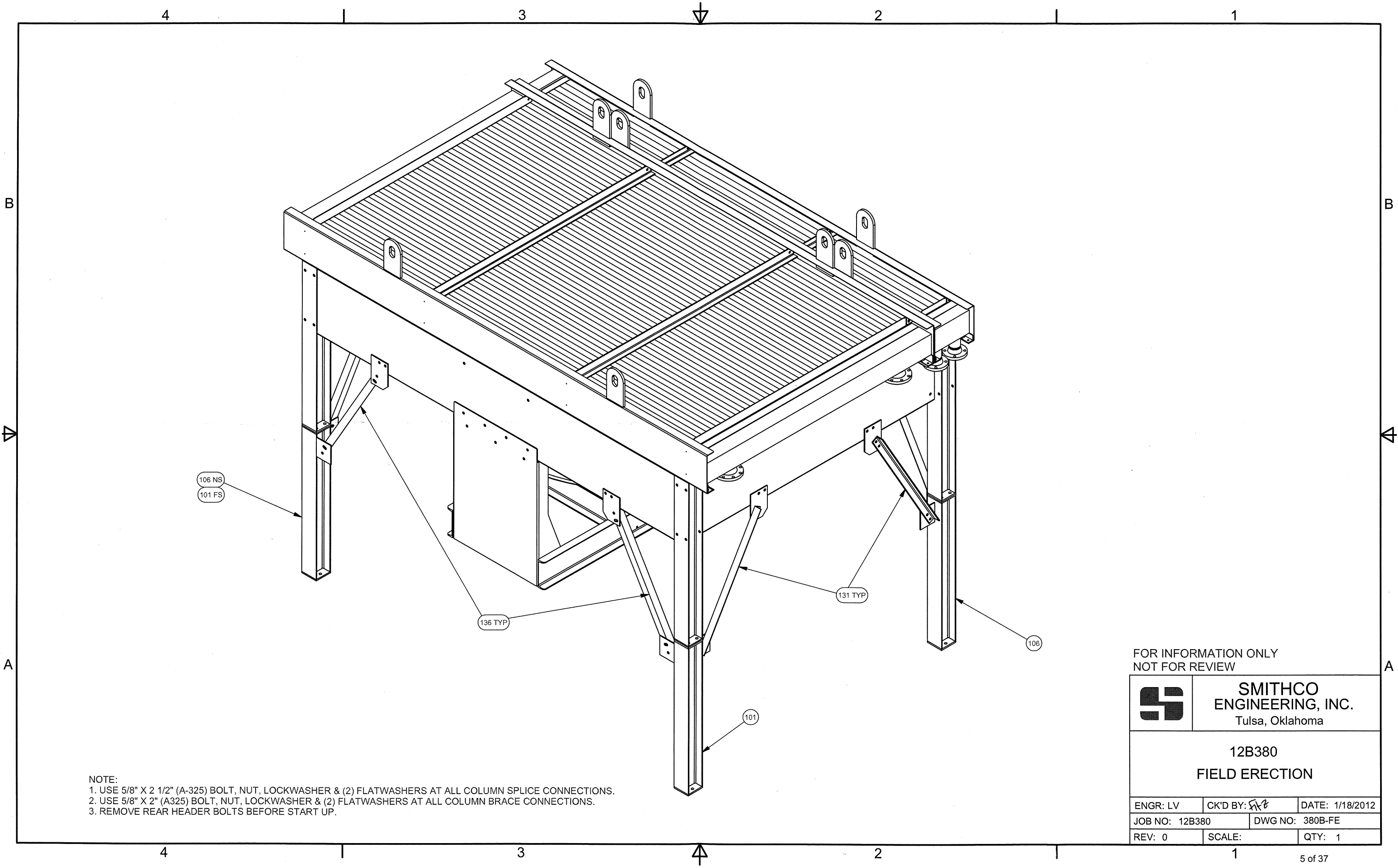


PIPING, EQUIPMENT OUTLINE & ANCHOR BOLT PLAN
 MODEL 1 F 14 - 93 - 1 QUANTITY 4

DWN: LV CKD: DATE: 2/23/2011


REV 0: ISSUED FOR APPROVAL LV 1/18/12

CERTIFIED BY: CERT DATE: REV: 0 JOB: 2012B380 - A

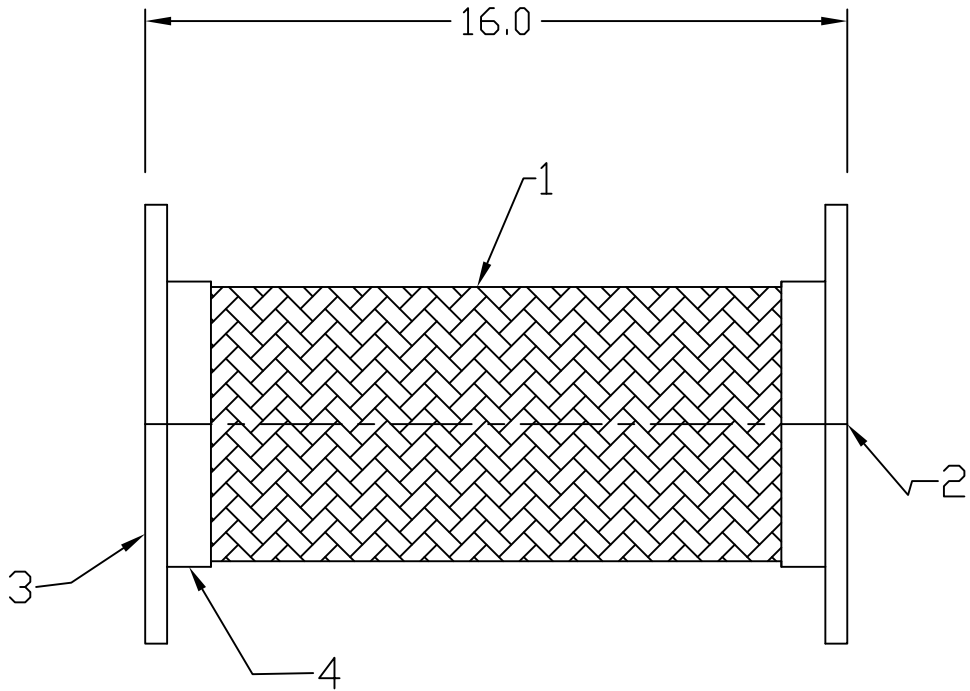


NOTE:
 1. USE 5/8" X 2 1/2" (A-325) BOLT, NUT, LOCKWASHER & (2) FLATWASHERS AT ALL COLUMN SPLICE CONNECTIONS.
 2. USE 5/8" X 2" (A325) BOLT, NUT, LOCKWASHER & (2) FLATWASHERS AT ALL COLUMN BRACE CONNECTIONS.
 3. REMOVE REAR HEADER BOLTS BEFORE START UP.

FOR INFORMATION ONLY
 NOT FOR REVIEW

 SMITHCO ENGINEERING, INC. Tulsa, Oklahoma		12B380 FIELD ERECTION	
		ENGR: LV	CK'D BY: <i>[Signature]</i>
JOB NO: 12B380		DWG NO: 380B-FE	
REV: 0	SCALE:	QTY: 1	

ALL DIMENSIONS IN INCHES



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

THIS DOCUMENT IS THE PROPERTY OF DME INC., AND CAN NOT BE DISTRIBUTED WITHOUT DME'S AUTHORIZATION

GENERAL NOTES:

A. DESIGN:
 PRESSURE = 100 PSIG
 TEMPERATURE = 250°F

B. ALL WELDING SHALL BE IN ACCORDANCE WITH:
 ASME SECTION IX

APPROVED BY:.....

DATE:.....PO#:.....

RADIATOR BRAID
 H/T CIRCUIT INLET/OUTLET.
 QTY = TWO PER RADIATOR.

ITEM	QTY	DESCRIPTION	MATERIAL
4	2	BRAID COLLAR	A 240 T304
3	1	FLANGE, 4.0"-125/150# x 1/2" THK.	A 36
2	1	FLANGE, 4.0"-125/150# x 1/2" THK.	A 36
1	1	SINGLE BRAIDED HOSE, 4.0" I.D.	A 240 T321

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE :	
.XXX ± .010"	FRACTIONS: ± 1/8"
.XX ± .030"	EXPANSION JOINT OAL: ± 1/8"
.X ± .060"	
ANGLES ± 1/2°	
CUST: BOULDEN ENERGY JOB#	

DME INCORPORATED
 14001 MARQUARDT AVE, SANTA FE SPRINGS, CA 90670
 TEL: (562) 921 - 0464
 FAX: (562) 802 - 7489

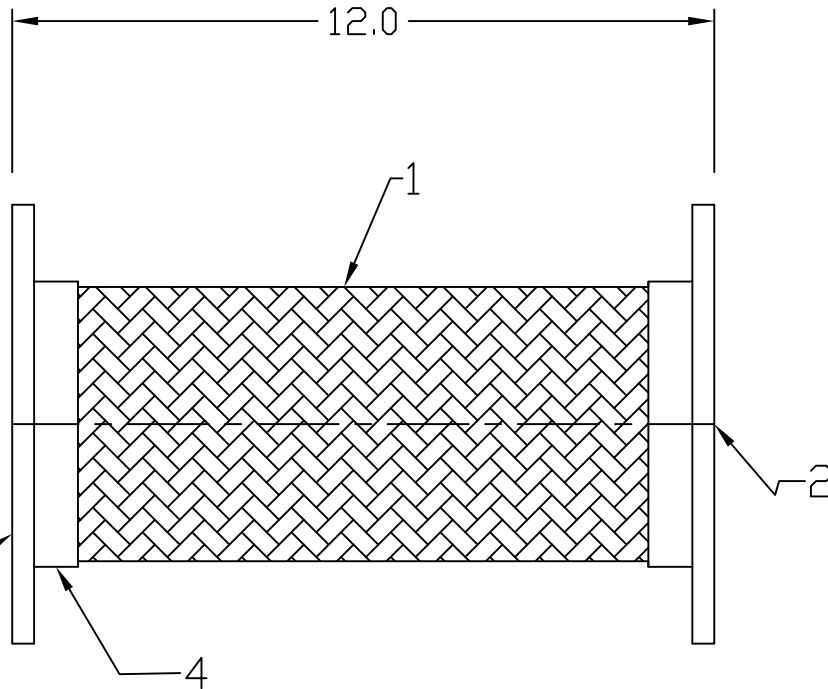
FLANGED BRAIDED HOSE ASSY.

BILL OF MATERIAL

DESIGN: DJM	2-25-92	SIZE	DWG NO. 500-0400-16	REV
APPROVED BY: DJM	2-25-92	SCALE NONE	DATE 9-20-01	SHEET
DWG: P.K.	9-19-01			

MAXX

ALL DIMENSIONS IN INCHES



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

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RADIATOR BRAID
 L/T CIRCUIT INLET/OUTLET.
 QTY = TWO PER RADIATOR.

ITEM	QTY	DESCRIPTION	MATERIAL
4	2	BRAID COLLAR	A 240 T304
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2	1	FLANGE, 3.0"-125/150# x 1/2" THK.	A 36
1	1	SINGLE BRAIDED HOSE, 3.0" I.D.	A 240 T321

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.XXX ± .010"	FRACTIONS: ± 1/8"
.XX ± .030"	EXPANSION JOINT OAL: ± 1/8"
.X ± .060"	
ANGLES ± 1/2°	
CUST: BOULDEN ENERGY	
JOB#	

DME INCORPORATED
 14001 MARQUARDT AVE, SANTA FE SPRINGS, CA 90670
 TEL: (562) 921 - 0464
 FAX: (562) 802 - 7489

FLANGED BRAIDED HOSE ASSY.

DESIGN: DJM	2-25-92	SIZE	DWG NO. 500-0300-12	REV
APPROVED BY: DJM	2-25-92	SCALE NONE	DATE 9-20-01	SHEET
DWG: P.K.	9-19-01			

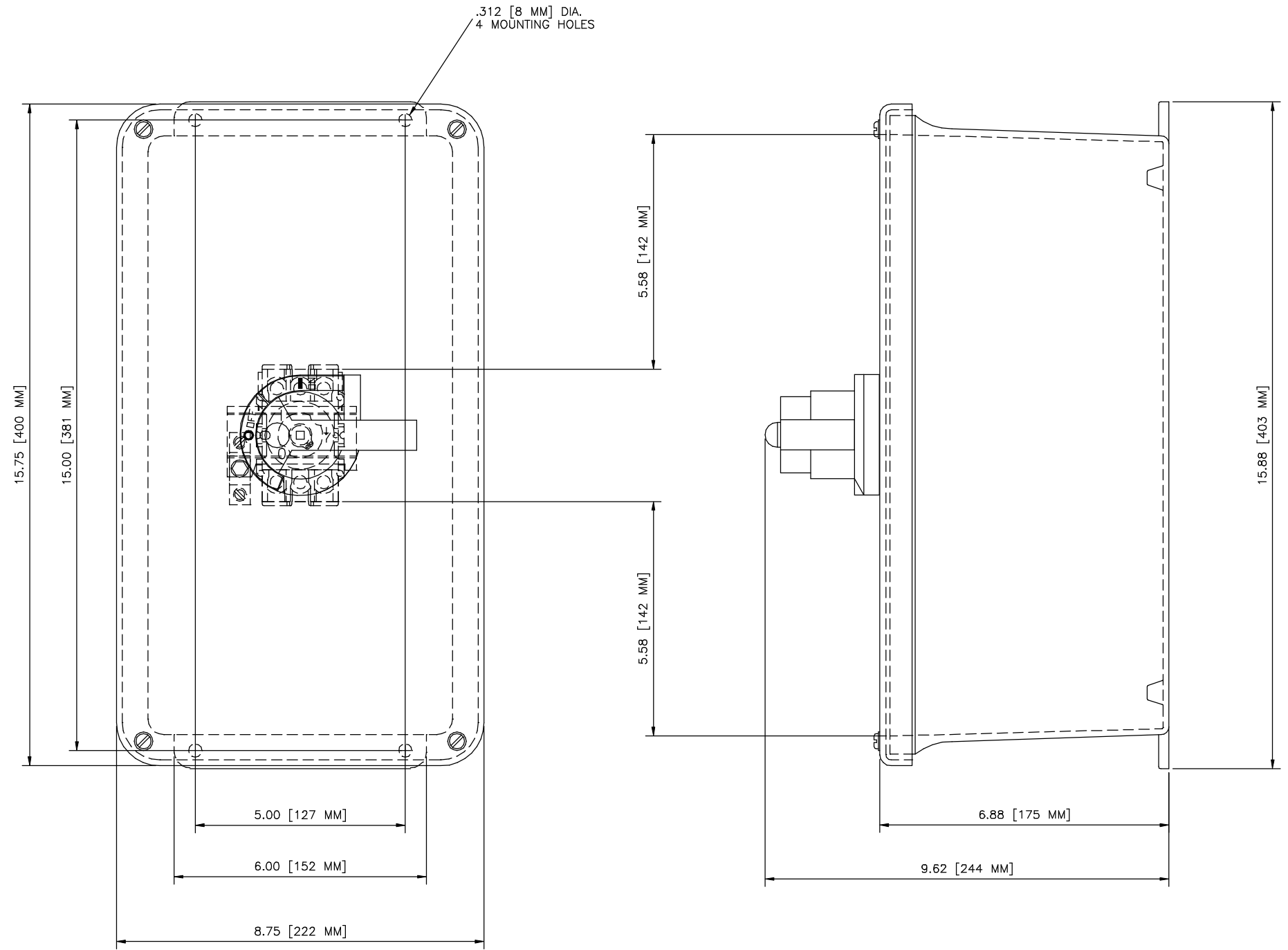
BILL OF MATERIAL

MAXX

8 7 6 5 4 3 2 1

D
C
B
A

D
C
B
A



P/N ER53060UX - 60 AMP RADIATOR DISCONNECT SWITCH.

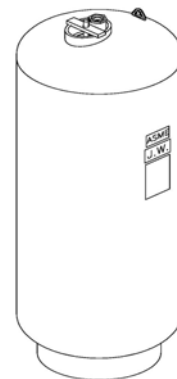
NOTE:
1. WIRE RANGE OF SWITCH LUGS IS #1-#14 COPPER.
WIRE RANGE OF GROUND LUGS IS #2-#14 COPPER OR ALUMINUM.

REVISION DS0468	THE INFORMATION ON THIS DRAWING IS THE PROPERTY OF EATON CORPORATION. IT IS DISCLOSED IN CONFIDENCE AND IS NOT TO BE REPRODUCED, USED, OR DISCLOSED EXCEPT FOR THE PURPOSE FOR WHICH IT IS FURNISHED.		DRAWN BY WARREN SIPE	DATE 6/11/01	CUTLER-HAMMER CLEVELAND, TENNESSEE	EATON
	FILENAME 95-1559.DWG		APPD. D.R. BENDER	DATE 6/11/01		
	FEDERAL ID NUMBER		DSPEC (PROJECT NO.)	SCALE 1=1.5	TYPE	
	PRODUCT CODE	REVISION NEW	G.O.	SIZE D	DRG. NO. 95-1559	SHEET NO. 1 OF 1

Job Name:		
Job No:	JWC Representative:	
Tag No.:	Submitted By:	Date:
Engineer:	Approved By:	Date:
Contractor:	Order No.:	Date:

JAER Series, Type IV

- ASME Expansion Tanks
- Replaceable Bladder Type
- Not For Potable Water



APPLICATION

- JAER Series pre-charged bladder type expansion tanks are designed to absorb the expansion forces of heating or cooling system water to maintain the proper system pressurization.
- By holding the system water in the replaceable bladder, the JAER Series tanks eliminate problems such as tank corrosion and water-logging.

DESIGN PRESSURE AND TEMPERATURE

- Maximum design pressure:
 JAER-23-601 to 607: 150 PSI (1035 kPa)
 JAER-23-608 to 610: 125 PSI (862 kPa)
- Maximum design temperature: 240°F (115°C)

SPECIFICATIONS

- Designed and built in accordance with the ASME Code Section VIII, Division I
- Installation: vertical or horizontal
- Shell: carbon steel with exterior gray primer finish
- System connection: top-mounted with Carbon Steel wetted parts
- Replaceable bladder: high quality butyl rubber
- Full acceptance design
- Air charge valve: 1/4" Schrader charging valve top-mounted with protective guard
- Air pre-charge range: 12 PSI minimum / 80 PSI maximum
- Standard factory pre-charge: 12 PSI

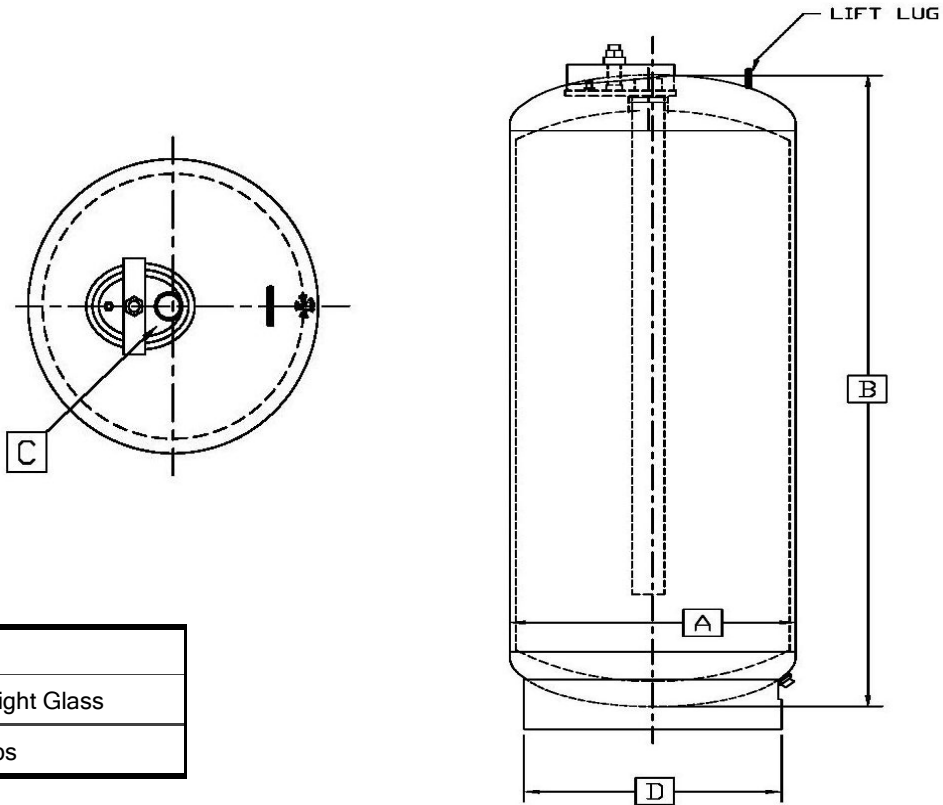
TYPICAL DESIGN SPECIFICATION

Furnish and install as shown on plans John Wood Model No. JAER-23-_____ (_____ gallon / _____ liter) ASME pre-charged vertical / horizontal steel expansion tank with replaceable heavy-duty butyl rubber bladder. The tank shall have a top-mounted _____" NPT system connection and a charging valve connection (Schrader valve) with full guard to facilitate on-site charging of the tank to meet system requirements. The tank shall be fitted with lifting rings and a base designed for vertical installation or saddles for horizontal installation. The tank must be designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code Section VIII, Division I, with a stamped MAWP of _____ PSI (_____ kPa) and a maximum design temperature of 240°F (115°C).

ASME Bladder-type Expansion Tanks JAER Series, Type IV

SUBMITTAL

Form 620.1



OPTIONS	
<input type="checkbox"/>	California Sight Glass
<input type="checkbox"/>	Seismic Clips

MODEL NUMBER	MAWP	TANK VOLUME		A DIAMETER		B HEIGHT		C SYS CONN	D BASE DIAMETER		SHIPPING WEIGHT	
		PSIG	GAL	L	IN	MM	IN		MM	INCH (NPT)	IN	MM
JAER-23-601	150	10	40	12	305	22	559	1	8 $\frac{5}{8}$	219	50	23
JAER-23-602	150	15	60	12	305	33 $\frac{1}{2}$	851	1	8 $\frac{5}{8}$	219	65	29
JAER-23-603	150	24	90	12	305	52	1321	1	8 $\frac{5}{8}$	219	90	41
JAER-23-604	150	30	110	14	356	48	1219	1	8 $\frac{5}{8}$	219	90	41
JAER-23-605	150	35	130	14	356	55 $\frac{1}{2}$	1410	1	8 $\frac{5}{8}$	219	100	45
JAER-23-606	150	40	150	14	356	63	1600	1	8 $\frac{5}{8}$	219	115	52
JAER-23-607	150	60	230	16	406	72 $\frac{3}{8}$	1838	1 $\frac{1}{2}$	11 $\frac{1}{2}$	292	155	70
JAER-23-608	125	80	300	20	508	63 $\frac{1}{4}$	1607	1 $\frac{1}{2}$	18	457	175	79
JAER-23-668	125	105	400	24	610	56	1422	1 $\frac{1}{2}$	18	457	209	95
JAER-23-609	125	120	450	24	610	66	1676	1 $\frac{1}{2}$	18	457	226	103
JAER-23-610	125	135	511	24	610	72	1829	1 $\frac{1}{2}$	18	457	255	116

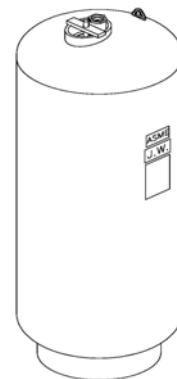


THE JOHN WOOD COMPANY
 AN ALCO INDUSTRIES COMPANY
 98 Highland Avenue, Oaks, PA 19456-1052
 Tel: 610-666-1220 • 800-537-5581
 Fax: 610-666-0193

Job Name:		
Job No:	JWC Representative:	
Tag No.:	Submitted By:	Date:
Engineer:	Approved By:	Date:
Contractor:	Order No.:	Date:

JAER Series, Type IV

- ASME Expansion Tanks
- Replaceable Bladder Type
- Not For Potable Water



APPLICATION

- JAER Series pre-charged bladder type expansion tanks are designed to absorb the expansion forces of heating or cooling system water to maintain the proper system pressurization.
- By holding the system water in the replaceable bladder, the JAER Series tanks eliminate problems such as tank corrosion and water-logging.

SPECIFICATIONS

- Designed and built in accordance with the ASME Code Section VIII, Division I
- Installation: vertical or horizontal
- Shell: carbon steel with exterior gray primer finish
- System connection: top-mounted with Carbon Steel wetted parts
- Replaceable bladder: high quality butyl rubber
- Full acceptance design
- Air charge valve: 1/4" Schrader charging valve top-mounted with protective guard
- Air pre-charge range: 12 PSI minimum / 80 PSI maximum
- Standard factory pre-charge: 12 PSI

DESIGN PRESSURE AND TEMPERATURE

- Maximum design pressure:
 JAER-23-601 to 607: 150 PSI (1035 kPa)
 JAER-23-608 to 610: 125 PSI (862 kPa)
- Maximum design temperature: 240°F (115°C)

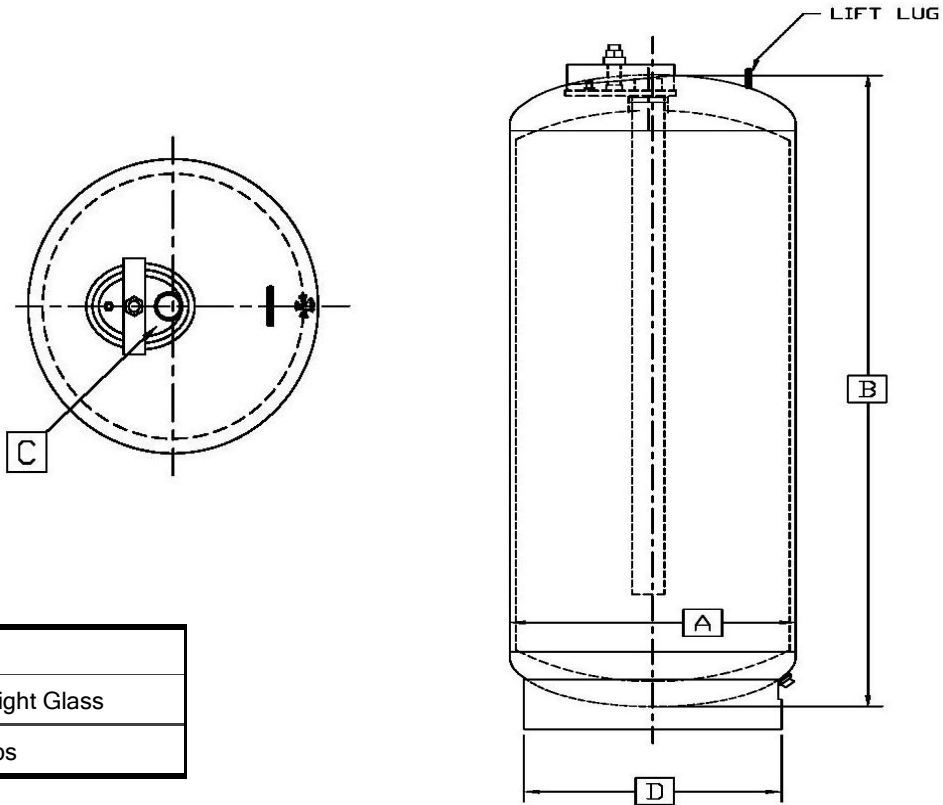
TYPICAL DESIGN SPECIFICATION

Furnish and install as shown on plans John Wood Model No. JAER-23-_____ (_____ gallon / _____ liter) ASME pre-charged vertical / horizontal steel expansion tank with replaceable heavy-duty butyl rubber bladder. The tank shall have a top-mounted _____" NPT system connection and a charging valve connection (Schrader valve) with full guard to facilitate on-site charging of the tank to meet system requirements. The tank shall be fitted with lifting rings and a base designed for vertical installation or saddles for horizontal installation. The tank must be designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code Section VIII, Division I, with a stamped MAWP of _____ PSI (_____ kPa) and a maximum design temperature of 240°F (115°C).

ASME Bladder-type Expansion Tanks JAER Series, Type IV

SUBMITTAL

Form 620.1



OPTIONS	
<input type="checkbox"/>	California Sight Glass
<input type="checkbox"/>	Seismic Clips

MODEL NUMBER	MAWP	TANK VOLUME		A DIAMETER		B HEIGHT		C SYS CONN	D BASE DIAMETER		SHIPPING WEIGHT	
		GAL	L	IN	MM	IN	MM		INCH (NPT)	IN	MM	LBS
JAER-23-601	150	10	40	12	305	22	559	1	8 $\frac{5}{8}$	219	50	23
JAER-23-602	150	15	60	12	305	33 $\frac{1}{2}$	851	1	8 $\frac{5}{8}$	219	65	29
JAER-23-603	150	24	90	12	305	52	1321	1	8 $\frac{5}{8}$	219	90	41
JAER-23-604	150	30	110	14	356	48	1219	1	8 $\frac{5}{8}$	219	90	41
JAER-23-605	150	35	130	14	356	55 $\frac{1}{2}$	1410	1	8 $\frac{5}{8}$	219	100	45
JAER-23-606	150	40	150	14	356	63	1600	1	8 $\frac{5}{8}$	219	115	52
JAER-23-607	150	60	230	16	406	72 $\frac{3}{8}$	1838	1 $\frac{1}{2}$	11 $\frac{1}{2}$	292	155	70
JAER-23-608	125	80	300	20	508	63 $\frac{1}{4}$	1607	1 $\frac{1}{2}$	18	457	175	79
JAER-23-668	125	105	400	24	610	56	1422	1 $\frac{1}{2}$	18	457	209	95
JAER-23-609	125	120	450	24	610	66	1676	1 $\frac{1}{2}$	18	457	226	103
JAER-23-610	125	135	511	24	610	72	1829	1 $\frac{1}{2}$	18	457	255	116



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KUNKLE PRESSURE RELIEF VALVES

Installation and Operating Instructions

Pre-Installation Handling

This pressure relief valve is designed to protect equipment from overpressure. The valve should be handled with care, not subjected to heavy shock loads, and protected to prevent contamination from getting inside. It should be installed correctly per A.S.M.E. Boiler & Pressure Vessel Code requirements. Failure to do so could result in property damage or serious injury to personnel. When hoisting the valve into position for installation, care should be exercised so that lifting straps do not contact the valve lift lever.

Installation

Always wear proper safety equipment, including safety glasses and ear protection.

1. Mount the valve in a vertical position so that the valve body is self-draining. If a body drain port is provided, make sure it is open when required by the ASME code. Do not plug any bonnet vent openings. The inlet piping should be as short as possible, with no elbows, and equal to or greater than the size of the pressure relief valve inlet connection. This will help to limit the inlet pressure drop to 3% or less when the valve is relieving.
2. When discharge piping is connected to valve outlet, make sure it is self draining if a body drain port is not used. The valve should not be connected to any discharge pipe that contains pressure before the valve opens or to any pipe where the pressure build-up is greater than 10% of the set pressure when the valve is open and relieving.

Discharge piping, other than a short tailpipe, must be supported. For steam service, a drip pan elbow or flexible connection between the valve and the pipe should be used to prevent excessive pipe stress, due to thermal expansion, from being imposed on the valve body.

3. For threaded valves, to prevent sealing compound from entering and damaging the valve, apply a small amount of pipe thread sealing compound to external threads only. Do not put any sealing compound on the first thread or on any internal threads. To do so may cause the sealing compound to enter the valve and cause seat leakage.

Do not use the valve body or bonnet for installing the valve in threaded connections. Use the wrench flats provided to tighten the valve to the connecting pipe, and do not overtighten. To do so may cause valve leakage.

4. For flanged valves, use new gaskets and tighten the mounting studs evenly.

Operation

1. Maintain a system operating pressure at least 5 psig or 10% below the set pressure of the valve, whichever is greater. Operating too close to the valve set pressure will cause seat leakage and will shorten the time between valve maintenance.
2. Do not use the safety valve as a control valve to regulate system operating pressure. Excessive operation will cause the seat to leak and will require more frequent valve maintenance.
3. ASME Section I and VIII valves equipped with lift levers are designed to be operated only when the system pressure is 75% of set pressure or greater. ASME Section IV valves may be operated at any set pressure. When hand operating the valve, hold it open long enough to purge any foreign matter from the seat area. If a cable or wire is attached to the lift lever for remote actuation, make sure the direction of pull is the same as it would be if the lever were pulled directly by hand.

Maintenance

Maintenance should be performed on a regular basis. An initial inspection interval of 12 months is recommended. Depending on the service conditions and the condition of the valve, the inspection interval may be decreased or increased. Use only Kunkle parts for repair. Depending on the local jurisdictional requirements where the valve is installed, repairs may have to be made by a repair facility holding a VR stamp.

WARNING!

Removal of the seal wires or any attempt to adjust, repair or modify this product by non-qualified or non-authorized persons voids the product guarantee and may cause serious damage to equipment, personal injury, and death. Kunkle Valve is not liable for any damage resulting from misuse or misapplication of its products.

spirax sarco®

Air Eliminators

13WS, 13WHS

13WS and 13WHS Air Eliminators improve the circulation of pressurized liquids by eliminating air and other non-condensable gases which may collect at high points in the system. The EPDM valve head ensures tight shut-off.

Model ⇄	13WS	13WHS
PMO	150 psig	300 psig
Sizes	3/4" x 3/8", 1" x 3/8"	3/4" x 3/8"
Connections	NPT	
Construction	Cast Iron Body Stainless Steel internals w/ EPDM valve head	
Options	Brass Body; Stainless Steel Body	

LIMITING OPERATING CONDITIONS

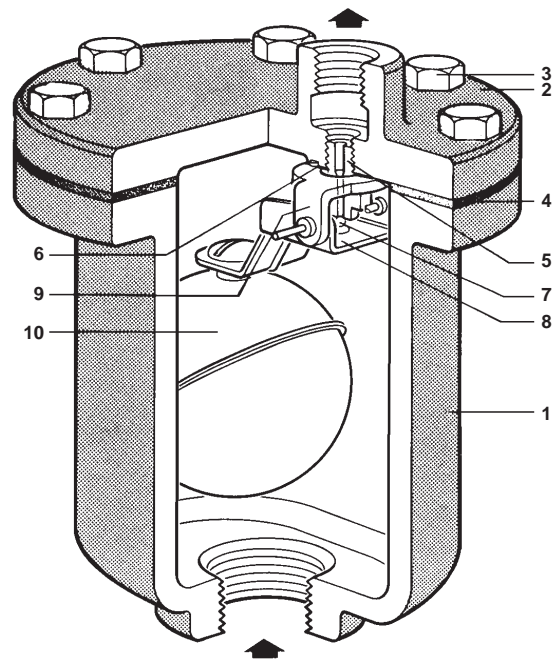
Max. Operating Pressure (PMO) 13WS: 150 psig (10 barg)
13WHS: 300 psig (21 barg)

Max. Operating Temperature 13WS & 13WHS: 338°F (170°C)

PRESSURE SHELL DESIGN CONDITIONS

PMA 13WS: 150 psig/0-353°F 10 barg/0-178°C
Max. allowable pressure 13WHS: 300 psig/0-317°F 21 barg/0-158°C

TMA 13WS: 450°F/0-125 psig 232°C/0-9 barg
Max. allowable temperature 13WHS: 450°F/0-250 psig 232°C/0-17 barg



CONSTRUCTION MATERIALS

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
		Optional 13WS Brass	ASTM B62
		Stainless Steel	Type 304
2	Cover	Cast Iron	ASTM A126 CL B
		Optional 13WS Brass	ASTM B62
		Stainless Steel	Type 304
3	Cover Bolts	Steel	ASTM A449
4	Cover Gasket	Graphite	
5	Valve Seat	Stainless Steel	Type 303
6	Seat Gasket	Stainless Steel	Type 304
7	Valve Head	EPDM	
8	Float Arm	Stainless Steel	Type 304
9	Bracket	Stainless Steel	Type 301
10	Float	Stainless Steel	Type 304

TYPICAL APPLICATIONS

Air vents can be used on both hot and cold liquid services. Typical applications are cold water lines, suction lines to pumps, mixing tanks, condensate return lines, cooling water lines on air compressors, and water storage tanks.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interests of development and improvement of the product, we reserve the right to change the specification.

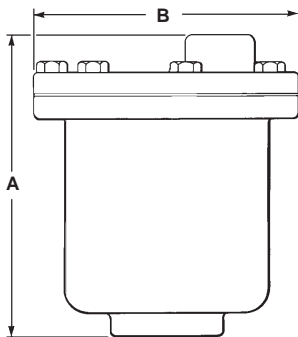
TIS 4.006 US 01.97
14 of 37

Air Eliminators 13WS, 13WHS

AIR CAPACITY (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60°F. For dm³/s multiply by .4719.

Type	Inlet Pressure								
	psi bar	25	50	75	100	150	200	250	300
13WS		1.6	2.7	3.7	4.8	6.9	–	–	–
13WHS		1.1	1.8	2.5	3.2	4.6	6.0	7.4	8.8



DIMENSIONS (NOMINAL) IN INCHES AND MILLIMETERS

Size		A	B	Weight
3/4"	13WS	5.1	4.4	4.75 lb
		129	111	2.2 kg
1"	13WS	5.1	4.4	4.75 lb
		129	111	2.2 kg
3/4"	13WHS	6.0	4.75	5.0 lb
		152	121	2.3 kg

INSTALLATION

An air vent is required at all high points of a liquid system, on terminal equipment and wherever air can collect. The air vent must be installed vertically above the pipe or equipment with the inlet at the bottom. The inlet piping should be the same size as the body piping connection, and a full-port isolating valve should be installed to permit servicing. The discharge must be piped to drain or other safe place to prevent damage if the air vent should malfunction.

MAINTENANCE

This product can be maintained without disturbing the inlet piping connection. Complete isolation is required before any servicing is performed.

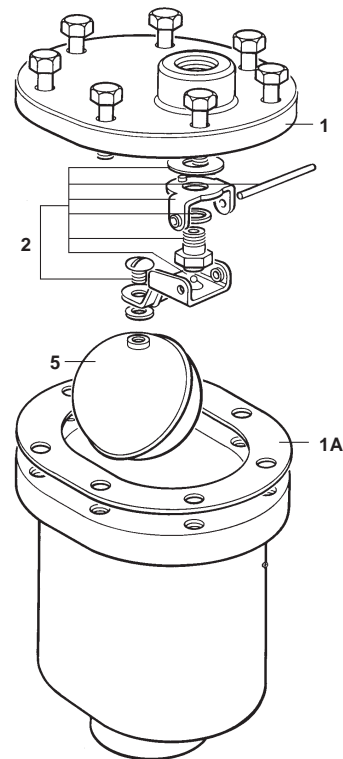
The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat and operating mechanism. Worn or damaged parts should be replaced using a complete valve mechanism assembly and new cover gasket.

Complete installation and maintenance instructions are given in IMI 4.006, which accompanies the product.

SAMPLE SPECIFICATION

Automatic Air Eliminators shall be mounted at high points to provide for immediate removal of contained air or other non-condensable gases in liquid piping systems. They shall be of the float type design, having cast iron (brass or stainless steel) bodies with threaded connections. Valve head shall be of EPDM material to provide positive shut-off. All other internals to be stainless steel. Air vent shall have minimum venting capacity of 4.8 SCFM at 100 psig. Spirax Sarco model 13WS for 150 psig service and model 13WHS for 300 psig service.

SPARE PARTS



Cover w/Gasket	_____	1
Gasket Kit (set of 3)	_____	1A
Valve Mechanism Kit	_____	2
Float Kit	_____	5

SPECIFICATIONS

STORAGE TEMPERATURE	-65 to 160°F (-54 to 71°C)
AMBIENT TEMPERATURE LIMITS	-40 to 160°F (-40 to 71°C); set point typically shifts less than 1% of range for a 50°F (28°C) ambient temperature change
SET POINT REPEATABILITY	Temperature models: ± 2% of adjustable range Pressure: models 126-376, 520-535, 540-547, 570-572, S126B-S164B: ± 2% of adjustable range; models 440-457, 550-559: ± 1% of adjustable range; models 610-614: ± 3% of adjustable range
SHOCK	Set point repeats after 15 G, 10 millisecond duration
VIBRATION	Set point repeats after 2.5 G, 5-500 Hz
ENCLOSURE	Die cast aluminum, epoxy powder coated, gasketed, captive cover screws
ENCLOSURE CLASSIFICATION	Designed to meet enclosure type 4X requirements
SWITCH OUTPUT	One, two or three SPDT switches, may be separated up to 100% of range except models 521-524, 531-534: 50%; models 520, 525, 530, 535, 570-572: 30%; switches may be wired "normally open" or "normally closed"
ELECTRICAL RATING	15 A 125/250/480 VAC resistive. Electrical switches have limited DC capabilities. Consult factory for additional information.
WEIGHT	Approx. 3 to 7.5 lbs.; varies with model
ELECTRICAL CONNECTION	One 3/4" NPT and two 7/8" diameter knockouts
PRESSURE CONNECTION	All models 1/4" NPT (female) except models S126B-S164B, 520-535: 1/2" NPT (female); models 540-547: 1/8" NPT (female)
TEMPERATURE ASSEMBLY	'E' types use the same assemblies as 'F' types, however, range spans are limited due to use of reference dials Bulb and capillary: 6 feet 304 stainless steel Immersion stem: models 120 & 121: nickel-plated brass; optional 316L stainless steel available
FILL	Temperature Models: Model 1BS: solvent filled; models 2-8: non-toxic oil filled
TEMPERATURE DEADBAND	Type F typically 1% and type E, B & C typically 2% of range under laboratory conditions (70°F ambient circulating bath at rate of 1/2°F per minute change)
DIFFERENTIAL PRESSURE INDICATOR (OPTION M210)	Differential pressure indication available J400K, J402K models 147-S157B; accuracy approximately 1-1/2% mid 50% of range, 3% at ends; window is plexiglass and gasketed; indicator may be field adjusted for approximately ±1% accuracy at any set point within range



PRESSURE MODEL CHART

Type J400, single switch output with internal hex adjustment

Type J402, dual switch output with internal hex adjustment

Type J403, triple switch output with internal hex adjustment

Model	Adjustable Set Point Range		Deadband		Over Range Pressure*		Proof Pressure**	
	psi (unless noted)	bar (unless noted)	psi	bar	psi (unless noted)	bar	psi	bar
Brass bellows with nickel-plated brass 1/4" NPT (female) pressure connection; Models 126 and 134 have zinc-plated steel spring exposed to media								
126	30 "Hg Vac to 0	-1 to 0	0.2" to 0.9 "Hg	-6,8 to 30,5 mbar	3	0,2	5	0,3
134	30 "Hg Vac to 20 psi	-1 to 1,4	0.2" to 1.2 "Hg	-6,8 to 40,6 mbar	20	1,4	25	1,7
137	0 to 80 "wc	0 to 199,1mbar	2 to 6 "wc	5 to 14,9 mbar	80 "wc	199,1 mbar	5	0,3
144	0 to 20	0 to 1,4	0.1 to 0.5	6,9 to 34,5 mbar	20	1,4	25	1,7
146	0 to 30	0 to 2,1	0.1 to 0.6	6,9 to 41,4 mbar	30	2	40	2,8
156	0 to 100	0 to 6,9	0.2 to 0.8	13,8 to 55,2 mbar	100	6,9	125	8,6
164	0 to 200	0 to 13,8	0.3 to 2	20,7 to 137,9 mbar	200	13,8	200	13,8
Phosphor bronze bellows with nickel-plated brass 1/4" NPT (female) pressure connection								
270	0 to 200	0 to 13,8	1.5 to 8	0,1 to 0,6	200	13,8	250	17,2
274	0 to 300	0 to 20,7	2 to 10	0,1 to 0,7	300	20,7	350	24,1
Buna-N diaphragm and O-Ring with aluminum 1/4" NPT (female) pressure connection and cap								
440††	0 to 2 "wc	0 to 5 mbar	0.07 to 0.25 "wc	0,2 to 0,6 mbar	3	0,2	225	15,5
441†††	0 to 10 "wc	0 to 24,9 mbar	0.15 to 0.3 "wc	0,4 to 0,7 mbar	3	0,2	225	15,5
442	0 to 20 "wc	0 to 49,8 mbar	0.2 to 0.5 "wc	0,5 to 1,2 mbar	3	0,2	225	15,5
443	0 to 80 "wc	0 to 199,1 mbar	0.5 to 1.8 "wc	1,2 to 4,5 mbar	3	0,2	225	15,5
448	80 Vac to 0 "wc	-199,1 to 0 mbar	1 to 3 "wc	2,5 to 7,5 mbar	3	0,2	225	15,5
449†††	0 to 20 "wc	0 to 49,8 mbar	1 to 2 "wc	2,5 to 5,0 mbar	3	0,2	225	15,5
450	30 "Hg Vac to 0	-1 to 0	0.1 to 0.4 "Hg	-3,4 to 13,5 mbar	3	0,2	225	15,5
451	0 to 80 "wc	0 to 199,1 mbar	1 to 3 "wc	2,5 to 7,5 mbar	3	0,2	225	15,5
452	30 "Hg Vac to 20 psi	-1 to 1,4	0.2 to 1 "Hg	-6,8 to 33,9 mbar	20	1,4	225	15,5
453	0 to 20	0 to 1,4	0.05 to 0.2	3,4 to 13,8 mbar	20	1,4	225	15,5
454	0 to 30	0 to 2,1	0.05 to 0.3	3,4 to 20,7 mbar	30	2,1	225	15,5
Teflon® diaphragm and O-Ring with 316L stainless steel 1/4" NPT (female) pressure connection and cap								
550	30 "Hg Vac to 0	-1 to 0	0.1 to 0.6 "Hg	-3,4 to 20,3 mbar	3	0,2	225	15,5
551	0 to 80 "wc	0 to 199,1 mbar	1.5 to 3.5 "wc	3,7 to 8,7 mbar	80"wc	199,1 mbar	225	15,5
552	30 "Hg Vac to 20 psi	-1 to 1,4	0.2 to 1 "Hg	-6,8 to 33,9 mbar	20	1,4	225	15,5
553	0 to 20	0 to 1,4	0.05 to 0.3	3,4 to 20,7 mbar	20	1,4	225	15,5
554	0 to 30	0 to 2,1	0.1 to 0.4	6,9 to 27,6 mbar	30	2,1	225	15,5
555	0 to 100	0 to 6,9	0.25 to 0.75	17,2 to 51,7 mbar	100	6,9	225	15,5

Teflon® is a registered trademark of E.I. DuPont.

†† Model not available on types J402 and J403

††† Model not available on type J403

HOW TO ORDER

BUILDING A PART NUMBER

Select a **Type**

Refer to the "Type" section below.

Determine type number based on switch output, enclosure, adjustment and reference.

Fill in the type portion of your part number with the corresponding number.

Select a **Model**

Refer to the "Model Charts".

Determine model based on adjustable range, deadband and proof pressure.

Fill in the model portion of your part number with the corresponding number.

Select an **Option**

Refer to the "Options" section.

Determine option number based on switch output, optional materials or other product enhancements.

Fill in the option portion of your part number with the corresponding number.

Leave "option" portion blank if no options are needed.

FOR MULTIPLE OPTIONS: Call United Electric Controls.

TYPE

DESCRIPTION

PRESSURE

Type J400 - One SPDT output; internal adjustment with no reference dial

Type J402 - Two SPDT outputs; internal adjustment with no reference dial

Type J403 - Three SPDT outputs; internal adjustment with no reference dial

Type H400 - One SPDT output; internal adjustment with reference dial

Type H402 - Two SPDT outputs; internal adjustment with reference dial

Type H403 - Three SPDT outputs; internal adjustment with reference dial

DIFFERENTIAL PRESSURE

Type J400K - One SPDT output; internal adjustment with no reference dial

Type J402K - Two SPDT outputs; internal adjustment with no reference dial

Type H400K - One SPDT output; internal adjustment with reference dial

Type H402K - Two SPDT outputs; internal adjustment with reference dial

TEMPERATURE

Type B400 - Immersion stem; one SPDT output; internal adjustment with reference dial

Type B402 - Immersion stem; two SPDT outputs; internal adjustment with reference dial

Type B403 - Immersion stem; three SPDT outputs; internal adjustment with reference dial

Type C400 - Immersion stem; one SPDT output; internal adjustment with no reference dial

Type C402 - Immersion stem; two SPDT outputs; internal adjustment with no reference dial

Type C403 - Immersion stem; three SPDT outputs; internal adjustment with no reference dial

Type E400 - Bulb and capillary; one SPDT output; internal adjustment with reference dial

Type E402 - Bulb and capillary; two SPDT outputs; internal adjustment with reference dial

Type E403 - Bulb and capillary; three SPDT outputs; internal adjustment with reference dial

Type F400 - Bulb and capillary; one SPDT output; internal adjustment with no reference dial

Type F402 - Bulb and capillary; two SPDT outputs; internal adjustment with no reference dial

Type F403 - Bulb and capillary; three SPDT outputs; internal adjustment with no reference dial

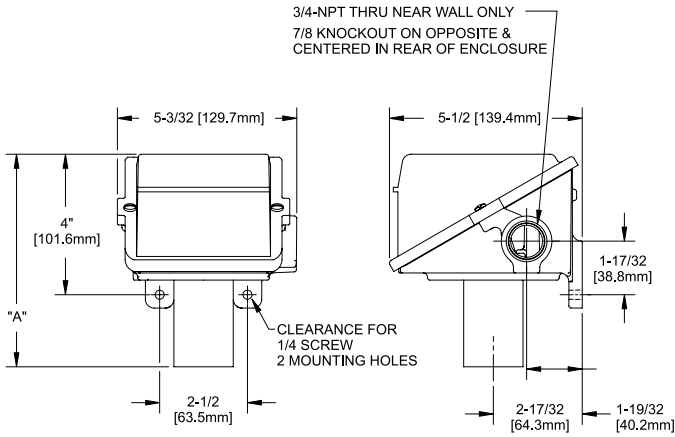
DIMENSIONAL DRAWINGS

Internal Set Point Adjustment

Types J400, J402, J403, J400K, J402K, C400, C402, C403, F400, F402, F403

Set Point Adjustment via Reference Dial

Types H400, H402, H403, H400K, H402K, B400, B402, B403, E400, E402, E403

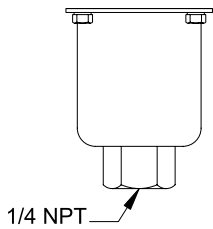


Dimension A

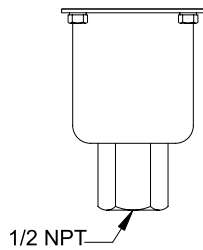
Models	Inches	mm	NPT
PRESSURE			
126-164	5.50	139,7	1/4
S126B-S164B	5.91	150,0	1/2
270-376	5.50	139,7	1/4
440-443, 449			
451, 453, 454	4.25	108,74	1/4
448, 450, 452	5.03	127,79	1/4
520-525	8.25	209,5	1/2
530-535	8.12	206,20	1/2
551, 553-555	4.56	115,88	1/4
550, 552	5.03	127,79	1/4
570-572	4.56	115,8	1/4
610-614	6.31	160,30	1/4
DIFFERENTIAL PRESSURE			
147-157	6.13	155,57	1/4
S147B-S157B	6.13	155,57	1/2
455-559	7.00	178,05	1/4
540-543	7.97	202,4	1/8
544-547	8.03	204,0	1/8
TEMPERATURE			
120, 121	7.38	187,3	Immersion Stem
1BS-8BS	6.72	170,7	Bulb & Capillary

Pressure Sensors *All dimensions stated in inches (millimeters)*

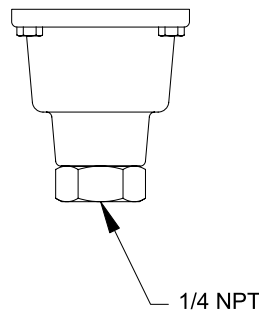
Models 126-164



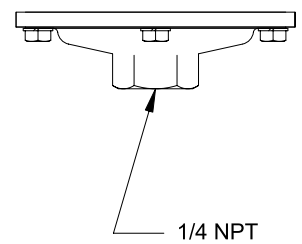
Models S126B-S164B



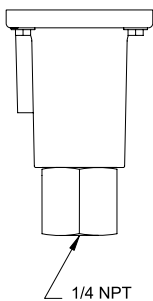
Models 270-376



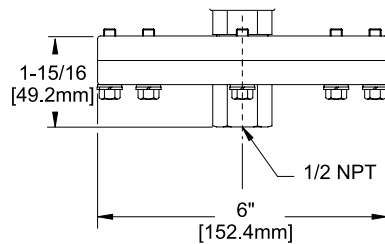
Models 440-454,
550-555, 570-572



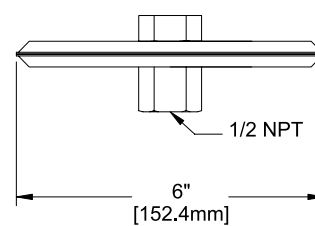
Models 610-614

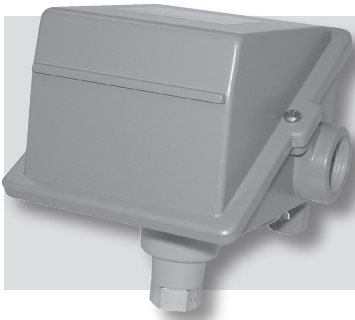


Models 520-525



Models 530-535





400 Series Pressure and Differential Pressure Switches

Types: **H400, H402, H403, H400K, H402K, J400, J402, J403, J400K, J402K**




UNITED ELECTRIC CONTROLS


Installation and Maintenance Instructions

Please read all instructional literature carefully and thoroughly before starting. Refer to the final page for the listing of Recommended Practices, Liabilities and Warranties.

GENERAL

 BEFORE INSTALLING, CHECK THE SENSOR MODEL SELECTED FOR COMPATIBILITY TO THE PROCESS MEDIA IN CONTACT WITH THE SENSOR AND WETTED PARTS.

The 400 Series pressure and differential pressure switches are activated when a bellows, diaphragm or piston sensor responds to a pressure change. This response, at a pre-determined set point, actuates one, two or three snap-acting switch(es), converting the pressure signal into an electrical signal. Control set point may be varied by turning the internal knob and pointer (H types) or internal screw (J types). (See Adjustment -PART II)

 PROOF PRESSURE* LIMITS STATED IN THE LITERATURE AND ON NAMEPLATES MUST NEVER BE EXCEEDED, EVEN BY SURGES IN THE SYSTEM. OCCASIONAL OPERATION OF UNIT UP TO PROOF PRESSURE IS ACCEPTABLE (E.G., START-UP, TESTING). CONTINUOUS OPERATION SHOULD NOT EXCEED THE DESIGNATED OVER RANGE PRESSURE.

*PROOF PRESSURE THE MAXIMUM PRESSURE TO WHICH A PRESSURE SENSOR MAY BE OCCASIONALLY SUBJECTED, WHICH CAUSES NO PERMANENT DAMAGE (E.G., START-UP, TESTING). THE UNIT MAY REQUIRE RE-GAPPING.


 THESE PRODUCTS DO NOT HAVE ANY FIELD REPLACEABLE PARTS.

Part I - Installation

Tools Needed

- Screwdriver
- Hammer (for alternate wire knockouts)
- Adjustable wrench


MOUNTING

 INSTALL UNIT WHERE SHOCK, VIBRATION AND TEMPERATURE FLUCTUATIONS ARE MINIMAL. ORIENT UNIT SO THAT MOISTURE IS PREVENTED FROM ENTERING THE ENCLOSURE. IF UNIT IS BEING INSTALLED WHERE HEAVY CONDENSATION IS EXPECTED, VERTICAL MOUNTING (PRESSURE CONNECTION DOWN) IS REQUIRED. DO NOT MOUNT UNIT IN AMBIENT TEMPERATURES EXCEEDING PUBLISHED LIMITS.


400 Series pressure controls can be mounted in any position, provided the electrical conduit is not facing up. The preferred mounting position is vertical (pressure connection down).


A 3/4" NPT E/C is provided on the right side of the enclosure in addition to the Two (2) cast-in knockouts for 1/2" electrical conduit that are located on the left side and rear of the enclosure. These can easily be knocked out by placing the blade of a screwdriver in the groove and tapping sharply with a hammer.

Mount the unit via the (2) 1/4" screw clearance holes on the enclosure. See Dimensions. Units may also be mounted via the NPT pressure connection.

 ALWAYS HOLD A WRENCH ON THE PRESSURE HOUSING HEX WHEN MOUNTING UNIT. DO NOT TIGHTEN BY TURNING ENCLOSURE. THIS WILL DAMAGE SENSOR AND WEAKEN SOLDER OR WELDED JOINTS.


WIRING

 DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING UNIT. WIRE UNITS ACCORDING TO NATIONAL AND LOCAL ELECTRICAL CODES. MAXIMUM RECOMMENDED WIRE SIZE IS 14 AWG. THE RECOMMENDED TIGHTENING TORQUE FOR FIELD WIRING TERMINALS IS 7 TO 17 IN-LBS.

 ELECTRICAL RATINGS STATED IN LITERATURE AND ON NAMEPLATE SHOULD NEVER BE EXCEEDED. OVER-LOAD ON A SWITCH CAN CAUSE FAILURE ON THE FIRST CYCLE.

Connect conduit to the case and wire directly to the switch terminals according to local and national electrical codes. Bring the wires up to terminals from the rear of the case. (See fig. 1.) If manual reset switch or DPDT options are used, lead wires are supplied, color coded as follows:

	Switch 1	Switch 2
Common	Violet	Yellow
Normally Open	Blue	Orange
Normally Closed	Black	Red

 ALLOW ENOUGH SLACK SO AS NOT TO AFFECT SWITCH MOVEMENT WHEN MAKING SETTING ADJUSTMENTS AND ENSURE THAT THE WIRES ARE NOT TOUCHING THE COVER WHEN INSTALLED.

NOTE: For larger wire gauges, a one time shift may be experienced or expected due to space limitations within the enclosure. Verify setpoint after installation.

NOTE: The middle switch assembly is omitted for dual switch controllers. The outer switch assemblies are omitted for single switch controllers. Type "J" controls have internal screw adjustments and type "H" have cam assemblies for internal calibrated adjustments.

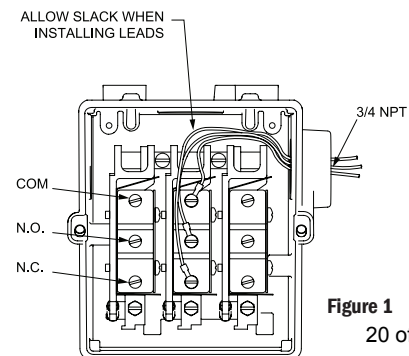


Figure 1
20 of 37

Special Instructions For Vacuum Ranges

On vacuum ranges, the C-NO circuit is closed at sea level conditions. Therefore, increasing vacuum will cause the C-NC circuit to close while decreasing vacuum will cause the C-NO circuit to close. Please make a note of this and wire/adjust the unit accordingly.

Option M100 Terminal Block

Types with Terminal block option M100 only available with single and dual switches. Not available with all options.

Part II - Adjustments (See Figure 2)

Tools Needed

Screwdriver

NOTE: For set point adjustments and re-calibration, connect control to a calibrated pressure gauge.

Type J400 & J400K

Remove cover. Switch has screw adjustments inside enclosure. Increase gauge pressure until switch transfers. To RAISE the pressure setting turn the screw clockwise (right). To LOWER the pressure setting turn the screw counter-clockwise (left). When making adjustments, do not exceed the proof pressure* rating on nameplate.

*Subjecting the switch to proof pressure may cause a shift in set point

Types J402, J403 & J402K

Remove cover, follow same procedure as paragraph above. Switches may be set together or apart, up to 100% of range (maximum separation on models 520-535 and 570-572 is defined in Table 1). On dual switch, either switch may be set high. On triple switch models, the third (middle) switch has no over-travel mechanism and must always be set to the highest pressure when switches are set apart. Altering the setting of one switch will usually have little effect on the other(s), however re-calibration may be desired at a critical pressure setting.

Table 1

Model & Range	Switch Separation (% of Range Span)
520, 530 (-300 to 0 VAC)	30%
521, 531 (-10 to 10 "wc)	50%
522, 532 (-50 to 50 "wc)	50%
523, 533 (0.5 to 5 "wc)	50%
524, 534 (2.5 to 50 "wc)	50%
525, 535 (10 to 250 "wc)	30%
570-572 (0 up to 100 psi)	30%

Re-Calibration Adjustment

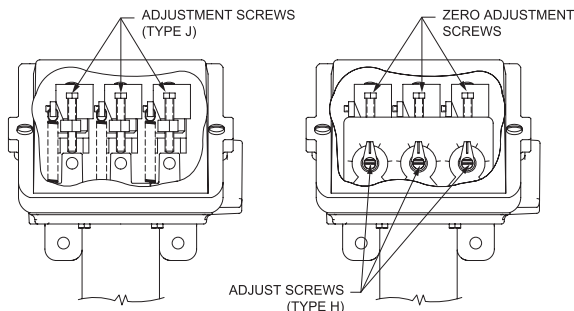


Figure 2

Special Instructions for Models 520-535 (see Figure 3)

When making set point adjustments, or re-calibrating the Models 520-535, Switch #2 should be set first, and to the highest pressure setting. Switch #1 should be set to a lower or equal setting than switch #2.

Switch #2 can be adjusted using a screwdriver to turn the slotted adjustment screw (see Figure 3) clockwise (to raise the pressure setting), or counter-clockwise (to lower the pressure setting). Once desired set point is achieved for switch #2, switch #1 can be set lower or equal to switch #2 set point, following the procedure outlined for switch #2. Maximum separation between switch #1 and #2 is defined in Table 1.

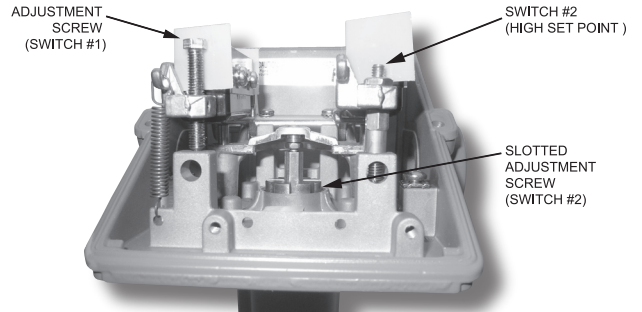


Figure 3

Types H400, H402, H403, H400K & H402K

Remove cover, switch has knob and pointer adjustment inside enclosure. Controls are factory calibrated for maximum accuracy at the dial midpoint. Switches may be set together or apart up to 100% of the range scale. On dual switch models either switch may be set high. On triple switch models, the third (middle) switch has no over-travel mechanism and must always be set to the highest pressure when the switches are set apart. Altering the setting of one switch will usually have little effect on the other(s), however re-calibration may be desired at a critical setting.

To re-calibrate, turn pointer to desired set point and add gauge pressure until switch transfers. If gauge pressure and set point pressure do not agree, turn zero adjust screw clockwise to raise and counter clockwise to lower pressure setting (See Figure 2).

Types with Manual Reset (Option 1530)

These optional models incorporate a snap switch that, when actuated, remains tripped until pressure decreases and the reset button is manually depressed to the reset position.

Types with Adjustable Deadband Switch (Option 1520)

This microswitch has an integral adjustment wheel. Turning this wheel raises and lowers the pressure rise set point. The fall set point remains constant. Consult factory for additional information.

Types J400K & J402K with Option M210 (see Figure 4)

(Indicator models 147, 157, S147B, S157B only)

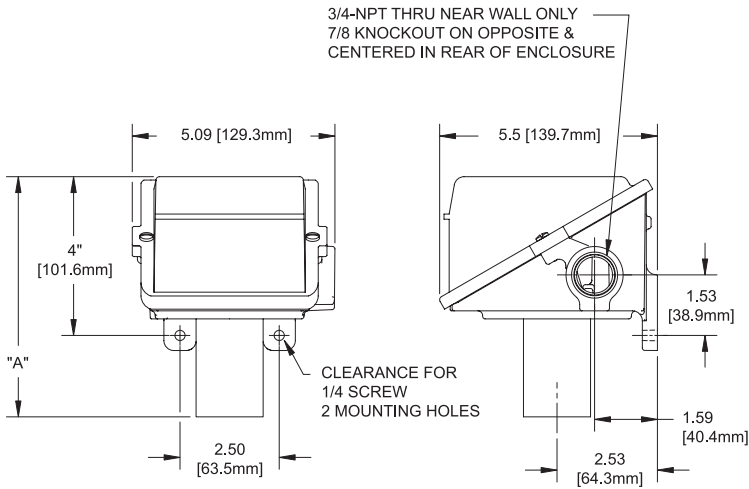
To adjust for maximum accuracy at any desired set point, follow steps 1 - 4 below:

Span Adjustment

- 1) Remove front window and gasket (four screws) to gain access to span adjustment.
- 2) Connect control to calibrated pressure source and set to required differential pressure.
- 3) Using a screwdriver, carefully turn span adjustment. (See Figure 4) to obtain required indication.
- 4) Re-mount front gasket and window.

Dimensions

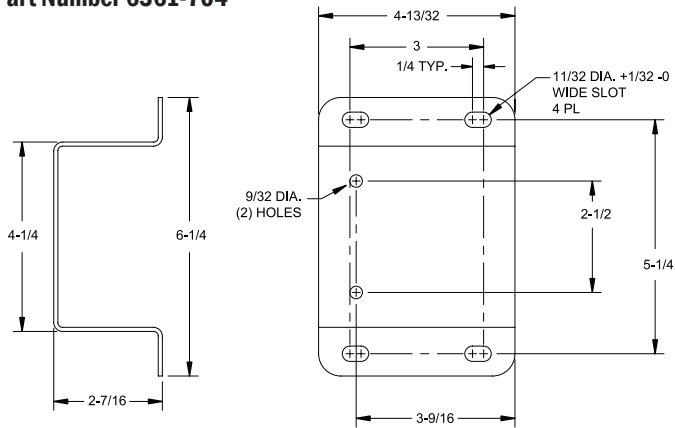
Dimensional drawings for all models may be found at www.UEonline.com



Dimension A

Models	Inches	mm	NPT
Pressure			
126-164	5.50	139.7	1/4
S126B-S164B	5.91	150.1	1/2
270-376	5.50	139.7	1/4
440-443, 449			
451, 453, 454	4.28	108.7	1/4
448, 450, 452	5.03	127.8	1/4
520-525	8.25	209.6	1/2
530-535	8.13	206.5	1/2
551, 553-555	4.56	115.8	1/4
550, 552	5.03	127.8	1/4
570-572	4.56	115.8	1/4
610-614	6.31	160.3	1/4
Differential Pressure			
147-157	6.13	155.7	1/4
S147B-S157B	6.13	155.7	1/2
455-559	7.00	177.8	1/4
540-543	7.97	202.4	1/8
544-547	8.03	204.0	1/8

Surface Mounting Hardware Part Number 6361-704



Option M210 - Differential Pressure Indication

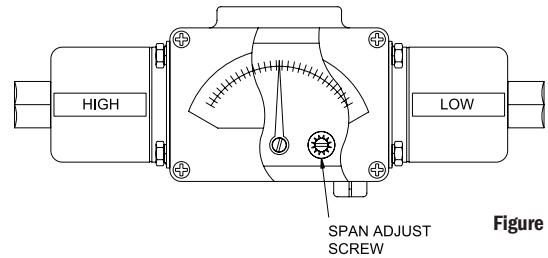
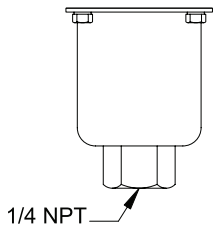


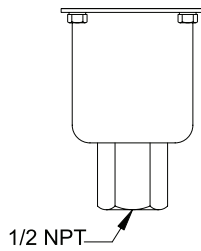
Figure 4

Pressure Sensors

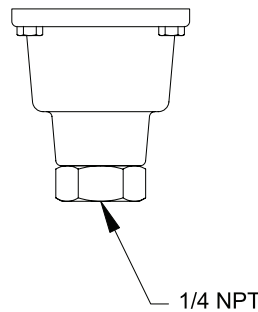
Models 126-164



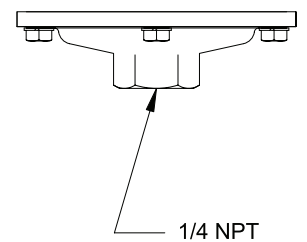
Models S126B-S164B



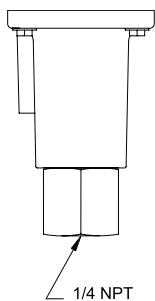
Models 270-376



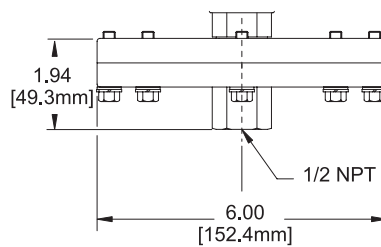
Models 440-454,
550-555, 570-572



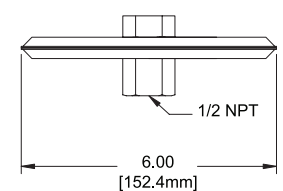
Models 610-614



Models 520-525

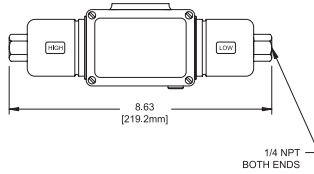


Models 530-535

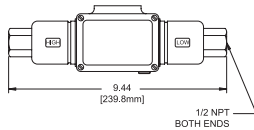


Differential Pressure Sensors

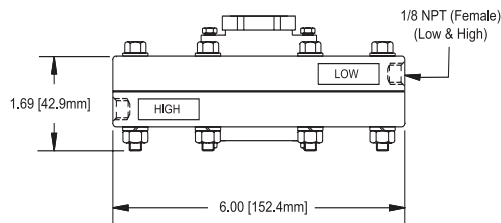
Models 147-157



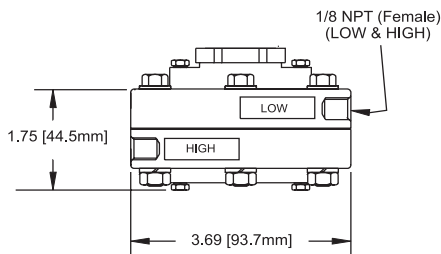
Models S147B-S157B



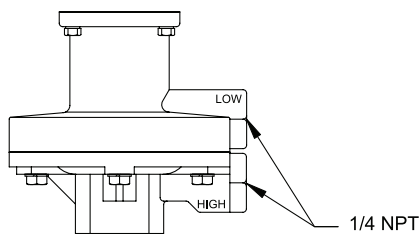
Models 540-543



Models 544-547



Models 455-559



RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum pressure or temperature is acceptable on a limited basis (e.g., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum pressure or temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. When applicable, orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts. INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 24 months from the date of manufacture by the Seller. Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF SELLER'S LIABILITY

Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be imputed to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.



UNITED ELECTRIC
CONTROLS

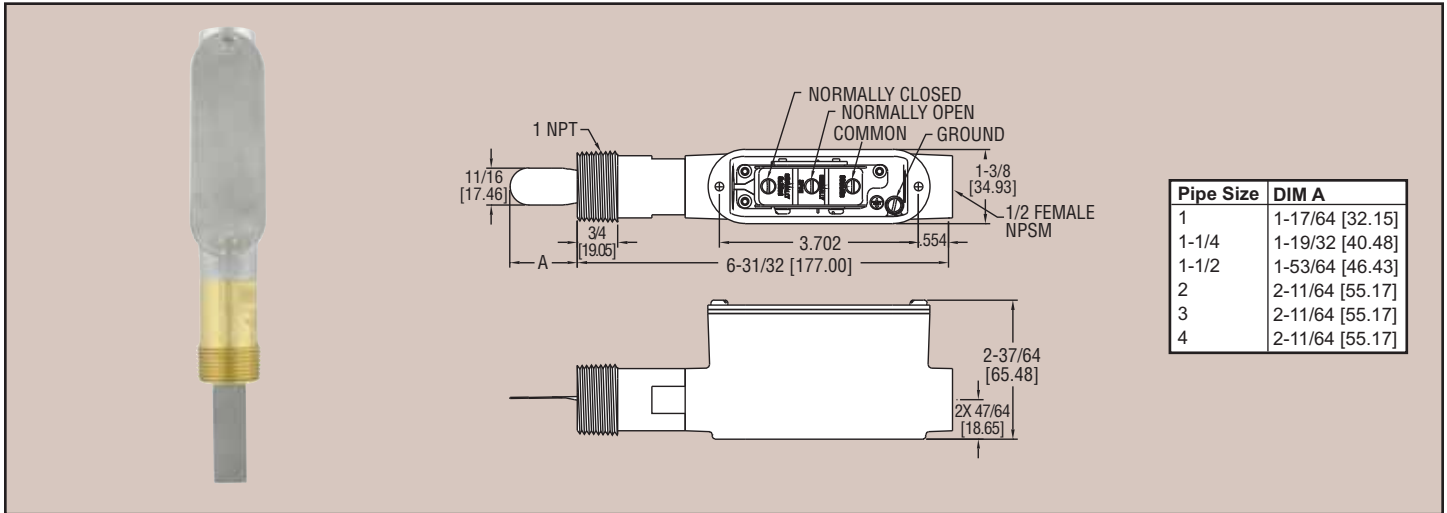
180 Dexter Avenue, P.O. Box 9143
Watertown, MA 02471-9143 USA
Telephone: 617 926-1000 Fax: 617 926-2568
<http://www.ueonline.com>



Series
V7

FLOTECT® Vane Operated Flow Switch

Magnetic Linkage



Pipe Size	DIM A
1	1-17/64 [32.15]
1-1/4	1-19/32 [40.48]
1-1/2	1-53/64 [46.43]
2	2-11/64 [55.17]
3	2-11/64 [55.17]
4	2-11/64 [55.17]

The Series V7 FloTECT® Flow Switch is an inexpensive switch for use with compatible liquids to start or stop electronic operated equipment when flow or no-flow conditions occur. Magnetic operation is simple and dependable with no mechanical linkages or seals to wear or leak. Lower body is machined solid metal bar stock assuring no leak points, no matter how long the unit is in service. Design is standard weatherproof, meeting NEMA 4X, for application versatility. Robust vane design is rigid and field trimmable for set point adjustment.

Example	V7	W	B	S	3	0	N	ST	V7-WBS-30N-ST
Series	V7								V7 Flow Switch
Construction		W							Weatherproof
Lower Body			B	S					Brass 316 SS
Circuit Type				S					SPDT
Connection Size					3				1"
Vane Size						0			Full length vane with template
Tee & Tee Material							N		No Tee
Options								ST RV	SS tag Reinforced vane

SPECIFICATIONS

Service: Liquids compatible with wetted materials that are non-coating and non-crystallizing.

Wetted Materials: Vane: 301 SS; Process connection: Brass or 316 SS; Magnet: Ceramic; Other: 301, 302 SS.

Upper Body Material: Die cast aluminum.

Temperature Limits: -40 to 250°F (-40 to 121°C).

Pressure Limits: 250 psi (17.2 bar).

Enclosure Rating: Weatherproof, meets NEMA 4X (IP66).

Switch Type: SPDT snap switch.

Electrical Rating: 10A @ 125, 250, 480 VAC; 1/8 hp @ 125 VAC, 1/4 hp @ 250 VAC.

Electrical Connections: 3 screw type, common, normally open and normally closed.

Conduit Connection: 1/2" NPSM.

Process Connection: 1" male NPT. Contact factory for optional tees.

Pipe Size: 1 to 4 inch.

Mounting Orientation: Horizontal or vertical (actuation flow rates are based on horizontal pipe runs in the vertical position). Will not work in vertical pipe with down flow.

Set Point Adjustment: Vane is trimmable, see set point chart.

Weight: 1 lb 2 oz (500 g).

Agency Approvals: CE, UL353.

Pipe Size	Actuate	Deactuate
1"	7.5 (28.4)	6.8 (25.7)
1-1/4"	8.1 (30.8)	7.6 (28.9)
1-1/2"	11.7 (44.1)	10.9 (41.3)
2"	16.9 (64.0)	15.6 (59.1)
2-1/2"	19.6 (74.2)	18.1 (68.5)
3"	31.6 (120)	29.6 (112)
4"	58.0 (218)	52.0 (197)

Contact the factory for different actuation-deactuation rates.

NEW PRODUCT!

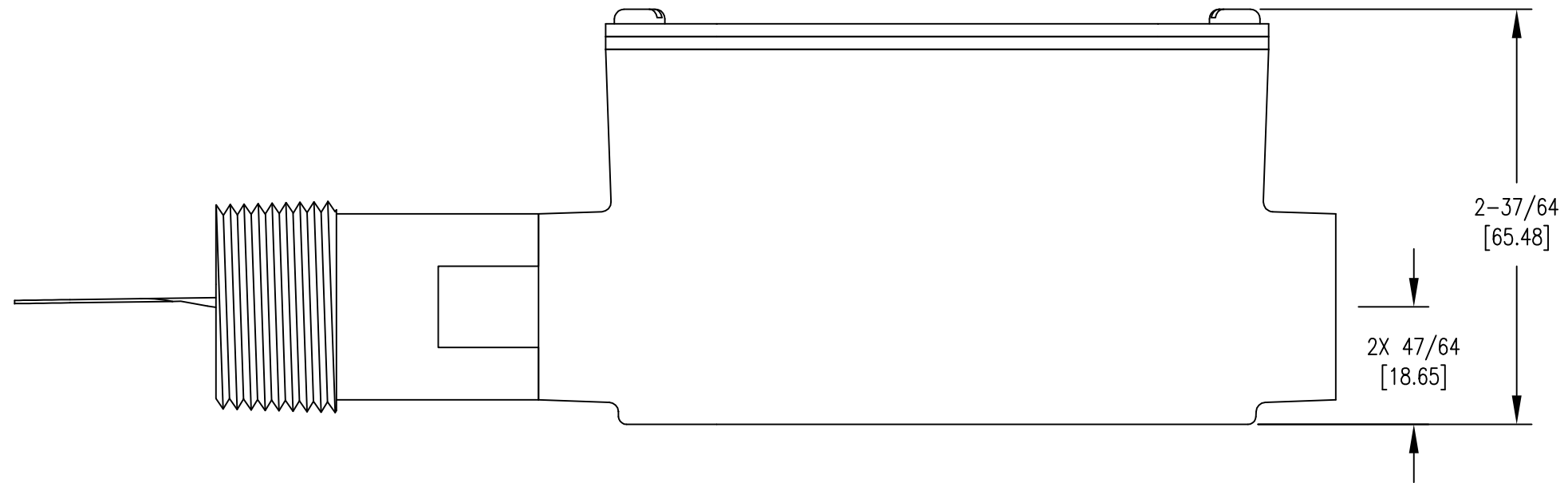
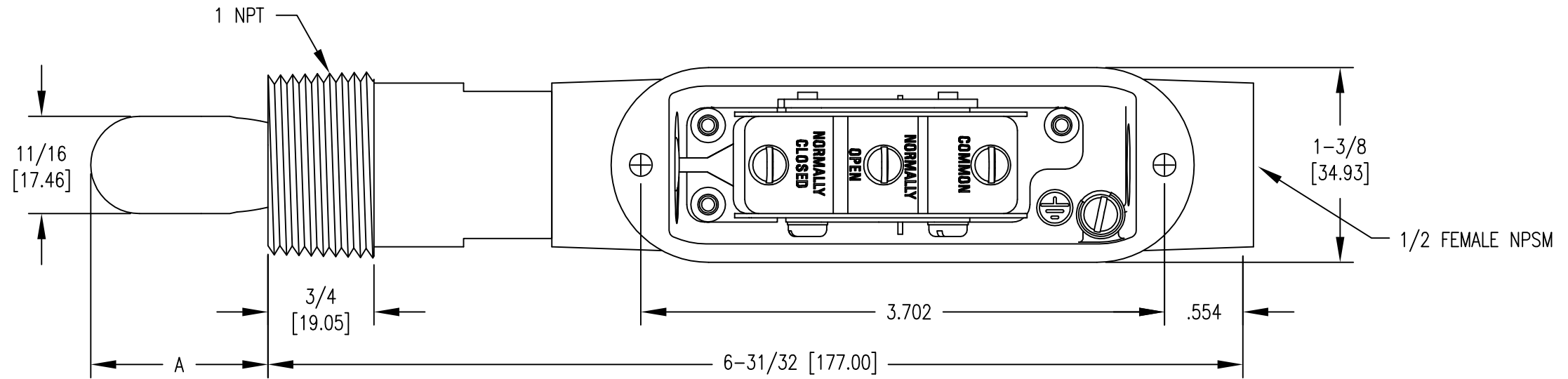


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FLOW

Flow Switches, Paddle

PIPE SIZE	DIM A
1	1-17/64 [32.15]
1-1/4	1-19/32 [40.48]
1-1/2	1-53/64 [46.43]
2	2-11/64 [55.17]
3	2-11/64 [55.17]



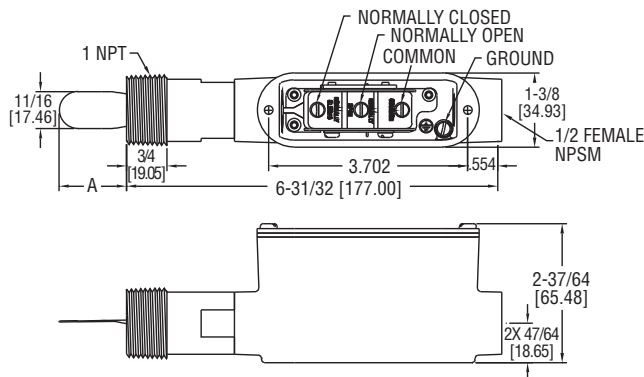
Ⓢ = CRITICAL DIMENSION
 STANDARD TOLERANCES UNLESS NOTED:
 ALL DECIMAL DIMENSIONS ± .005
 ALL ANGLES ± 1°

NO.	CHANGES	BY/DATE	DATE	NAME	MATERIAL
				V7 SERIES VANE OPERATED FLOW SWITCH	FINISH
			DWN BY		DWYER INSTRUMENTS, INC. MICHIGAN CITY, INDIANA 46360 U.S.A.
			CHKD		
			APPD		FR. NO.
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Series V7 **FLOTECT**® Vane Operated Flow Switch

Specifications - Installation and Operating Instructions



Pipe Size	DIM A
1	1-17/64 [32.15]
1-1/4	1-19/32 [40.48]
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4	2-11/64 [55.17]

The Series V7 Flotect® Flow Switch is an inexpensive switch for use with compatible liquids to start or stop electronic operated equipment when flow or no-flow conditions occur. Magnetic operation is simple and dependable with no mechanical linkages or seals to wear or leak. Lower body is machined solid metal bar stock assuring no leak points, no matter how long the unit is in service. Design is standard weatherproof, meeting NEMA 4X, for application versatility. Robust vane design is rigid and field trimmable for set point adjustment.

Example	V7	W	B	S	3	0	N	ST	V7-WBS-30N-ST
Series	V7								V7 Flow Switch
Construction		W							Weatherproof
Lower Body			B	S					Brass 316 SS
Circuit Type				S					SPDT
Connection Size					3				1"
Vane Size						0			Full length vane with template
Tee & Tee Material							N		No Tee
Options								ST RV	SS tag Reinforced vane

SPECIFICATIONS

Service: Liquids compatible with wetted materials that are non-coating and non-crystallizing.

Wetted Materials: Vane: 301 SS, Process Connection: brass or 316 SS, Magnet: ceramic, Other: 301, 302 SS.

Upper Body Material: Die cast aluminum.

Process Temperature Limits: -40 to 250°F (-40 to 121°C).

Maximum Ambient Temperature: 181°F (83°C).

Pressure Limits: 250 psi (17.2 bar).

Enclosure Rating: Weatherproof, meets NEMA 4X (IP66).

Switch Type: SPDT snap switch.

Electrical Rating: 10A @ 125, 250, 480 VAC; 1/8 hp @ 125 VAC, 1/4 hp @ 250 VAC.

Electrical Connections: 3 screw type, common, normally open and normally closed.

Conduit Connection: 1/2" NPSM.

Process Connection: 1" male NPT. Contact factory for optional tees.

Pipe Size: 1 to 4 inch.

Mounting Orientation: Horizontal or vertical (actuation flow rates are based on horizontal pipe runs in the vertical position). Will not work in vertical pipe with down flow.

Set Point Adjustment: Vane is trimmable, see set point chart.

Weight: 1 lb 2 oz (500 g).

Approvals: UL353.

OPERATING PRINCIPLE

The flow switch is installed in a pipe to indicate flow/no-flow status. The paddle or vane moves against a spring mechanism in the direction of flow with respect to the amount of flow in the pipe. A magnet is located on the end of the vane inside the lower housing. A second magnet located inside the upper housing moves from magnetic attraction with the magnet attached to the vane. This upper magnet is attached to a lever arm that activates a snap switch. The upper housing and lower housing are separated by solid metal with no linkages or mechanisms to fail or wear creating leaks. The spring mechanism returns the vane to the original position as flow decreases.

INSTALLATION

Unpacking

Remove the V7 from the shipping carton and remove any packaging material. Inspect for damage. If damage is found, notify the carrier immediately.

Set Point

The switch can be installed in any position but the actuation/deactuation flow rates are based on horizontal pipe runs and are nominal values. The V7 enables the installer to choose the approximate actuation/deactuation flow rates by trimming the full size vane according to the template on the vane as shown in Figure 1. Flows in the following chart are based on installation in standard tees, except the four inch which is in a 4" x 1" pipe saddle.

Approximate Actuation-Deactuation Flow Rates for Cold Water

Actuate GPM [lpm]/Deactuate GPM [lpm]

Vane	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	3" NPT	4" NPT
a (full vane)				12.8 [48.5]/ 12.1 [45.8]	31.6 [119.6]/ 29.6 [112]	58 [218]/ 52 [197]
b			7.5 [28.4]/ 6.7 [25.4]	12.7 [48.1]/ 12 [45.4]		
c			8.3 [31.5]/ 7.7 [29.1]	14 [53]/ 13.6 [51.5]		
d			8.3 [31.4]/ 7.5 [28.4]	13.7 [51.8]/ 13.4 [50.7]		
e			9.8 [37.1]/ 9.2 [34.8]	16.9 [64]/ 15.6 [59.1]		
f		8.13 [30.8]/ 7.63 [28.9]	11.65 [44.1]/ 10.9 [41.3]			
g						
h						
i						
j	7.5 [28.4]/ 6.8 [25.7]					
k						
l						
m						
n						
o						

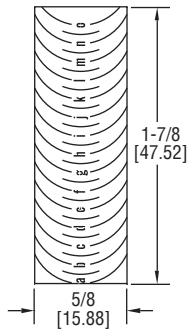


FIGURE 1

Mounting

Location

- The process pressure and temperature, and ambient temperature must be within specified limits.
- Make sure the cover is easily accessible to allow for wiring.

Install unit into piping with 1" NPT bushing with housing cover facing perpendicular to flow, see Figure 2 below. When bushings are used they must be back drilled to allow proper clearance. Bore the I.D. to 1" (25 mm). The depth of the bore must leave internal threads 9/16" (14 mm) high for proper engagement between lower housing of the switch and the bushing. When threading into pipe use wrench on flats on lower housing only. Check proper vane travel and switch operation after mounting.

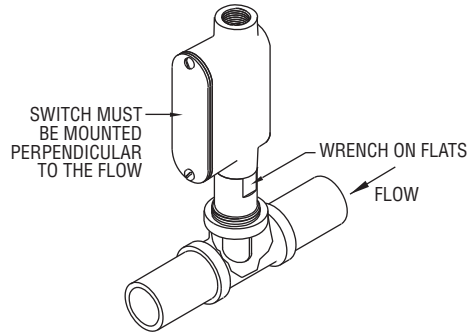


FIGURE 2

ELECTRICAL CONNECTIONS



Installation must be made in accordance with local codes and regulations. Wire according to switch action required. The N.O. (normally open) contacts will close and N.C. (normally closed) contacts will open when flow increases to the actuation point. The contacts will return to "normal condition" when flow decreases to the deactuation point.

The conduit connection must be made such that condensation is not allowed to enter the switch housing. If necessary install a conduit breather in a separate conduit body to prevent buildup of moisture. If nonmetallic conduit is used the protective ground may be connected to the internal ground connection screw. Use 90°C copper conductors only.

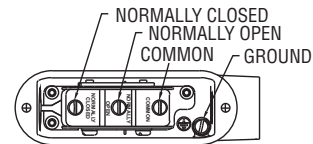


FIGURE 3

MAINTENANCE & REPAIR

Inspect and clean wetted parts at regular intervals. The cover should be in place at all times to protect the internal components from dust, dirt and weather. Disassembly or modifications made by the user will void the warranty and could impair the continued safety of the product. If repair is required obtain a Return Goods Authorization (RGA) number and send the unit, freight prepaid, to the address below. Please indicate a detailed description of the problem and conditions under which the problem was encountered.

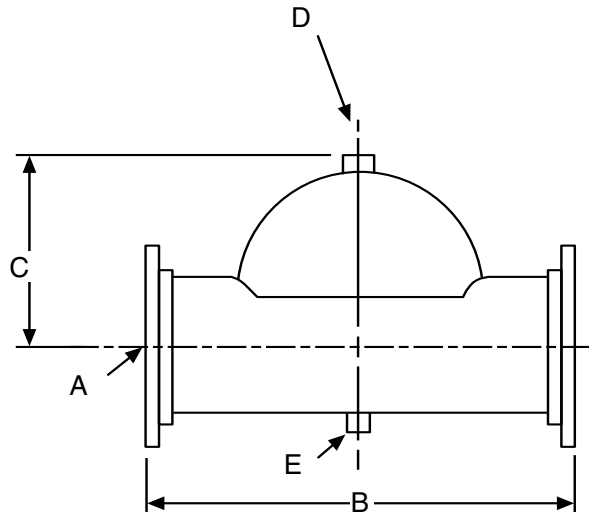
Dwyer Instruments, Inc.
 Attn: Repair Department
 102 Indiana Highway 212
 Michigan City, IN 46360



Air Elimination Equipment

4" to 18" Air Purgers (Non-ASME)

125 PSIG Working Pressure



Dimensions/Specifications

Model Number	"A" Dimension*		"B" Dimension		"C" Dimension		"D" Dimension (Vent Tapping) (NPT) Ins.	"E" Dimension (Drain Tapping) (NPT) Ins.	Weight	
	Ins.	mm	Ins.	mm	Ins.	mm			Lbs.	kg
449	4	102	12	305	5	127	3/4	1/2	56	25
461	5	127	20	508	7 1/2	191	1 1/4	1 1/2	60	27
462	6	152	24	610	8 1/2	216	1 1/4	1 1/2	65	29
463	8	203	32	813	11 1/4	286	1 1/4	1 1/2	113	51
464	10	254	40	1016	14	356	1 1/4	1 1/2	174	79
465	12	305	48	1219	16 3/4	425	1 1/4	1 1/2	330	150
466	14	356	56	1422	19 3/8	492	1 1/4	1 1/2	500	227
467	16	406	48	1219	20	508	1 1/4	1 1/2	331	150
468	18	457	72	1829	23 1/2	597	1 1/4	1 1/2	573	260

*150 Lb. ASA Flanges

Maximum Operating Conditions

Description	Standard Construction
449	125 PSIG (8.8 bar)
461-468	150 PSIG (10.5 bar)

NOTE: Models 467 & 468 have Butt Weld Ends.

Materials of Construction

Description	Standard Construction
No. 449	Cast Iron
No. 461-468	Steel

All dimensions and weights are approximate.

Job Name _____

Contractor _____

Location _____

Contractor P.O. No. _____

Sales Representative _____

Model No. Ordered _____

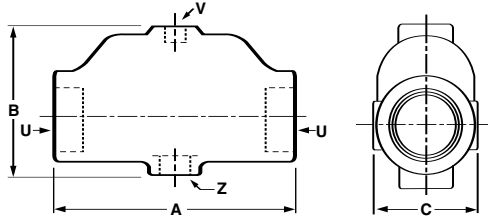
Engineer _____



Air Elimination Equipment

1" to 3" Air Purgers (Non-ASME)

125 PSIG Working Pressure



Dimensions/Specifications for 443-448

Model Number	Size Ins.	"A" Dimension		"B" Dimension		"C" Dimension		"U" Tappings (NPT) Ins.	"V" Tappings (NPT) Ins.	"Z" Tappings (NPT) Ins.	Ship. Wt.	
		Ins.	mm	Ins.	mm	Ins.	mm				Lbs.	kg.
443	1	6	152	4	102	2½	64	1	⅛	½	4	1.8
444	1¼	6	152	4	102	2½	64	1¼	⅛	½	5	2.3
445	1½	8	203	5	127	3½	89	1½	⅛	½	9	4.0
446	2	8	203	5	127	3½	89	2	½	½	10	4.5
447	2½	10	254	6	152	5	127	2½	¾	½	19	8.6
448	3	10	254	6	152	5	127	3	¾	½	20	9.0

Specifications

Description	Standard Construction
Working Pressure	125 PSIG (8.8 bar)
Materials of Construction	Cast Iron

All dimensions and weights are approximate.

Job Name _____

Contractor _____

Location _____

Contractor P.O. No. _____

Sales Representative _____

Model No. Ordered _____

Engineer _____

Company: Boulden Energy Systems
 Name:
 Date: 1/17/2012



Pump: **Search Criteria:**

Size: 1.5x2x9B Type: 340 1 STG ENDSUC Synch speed: 1800 rpm Curve: PC116277 Specific Speeds: Dimensions:	Speed: 1750 rpm Dia: 8.25 in Impeller: Ns: 670 Nss: 5578 Suction: 2 in Discharge: 1.5 in
Flow: 110 US gpm Head: 70 ft	
Fluid: Water Temperature: 60 °F Density: 62.25 lb/ft ³ Vapor pressure: 0.2563 psi a Viscosity: 1.105 cP Atm pressure: 14.7 psi a NPSHa: ---	
Motor: Standard: NEMA Size: 5 hp Enclosure: TEFC Speed: 1800 Frame: 184T Sizing criteria: Max Power on Design Curve	

Pump Limits:

Temperature: 300 °F Pressure: 175 psi g Sphere size: 0.438 in	Power: --- Eye area: ---	
---	-----------------------------	--

---- Data Point ----

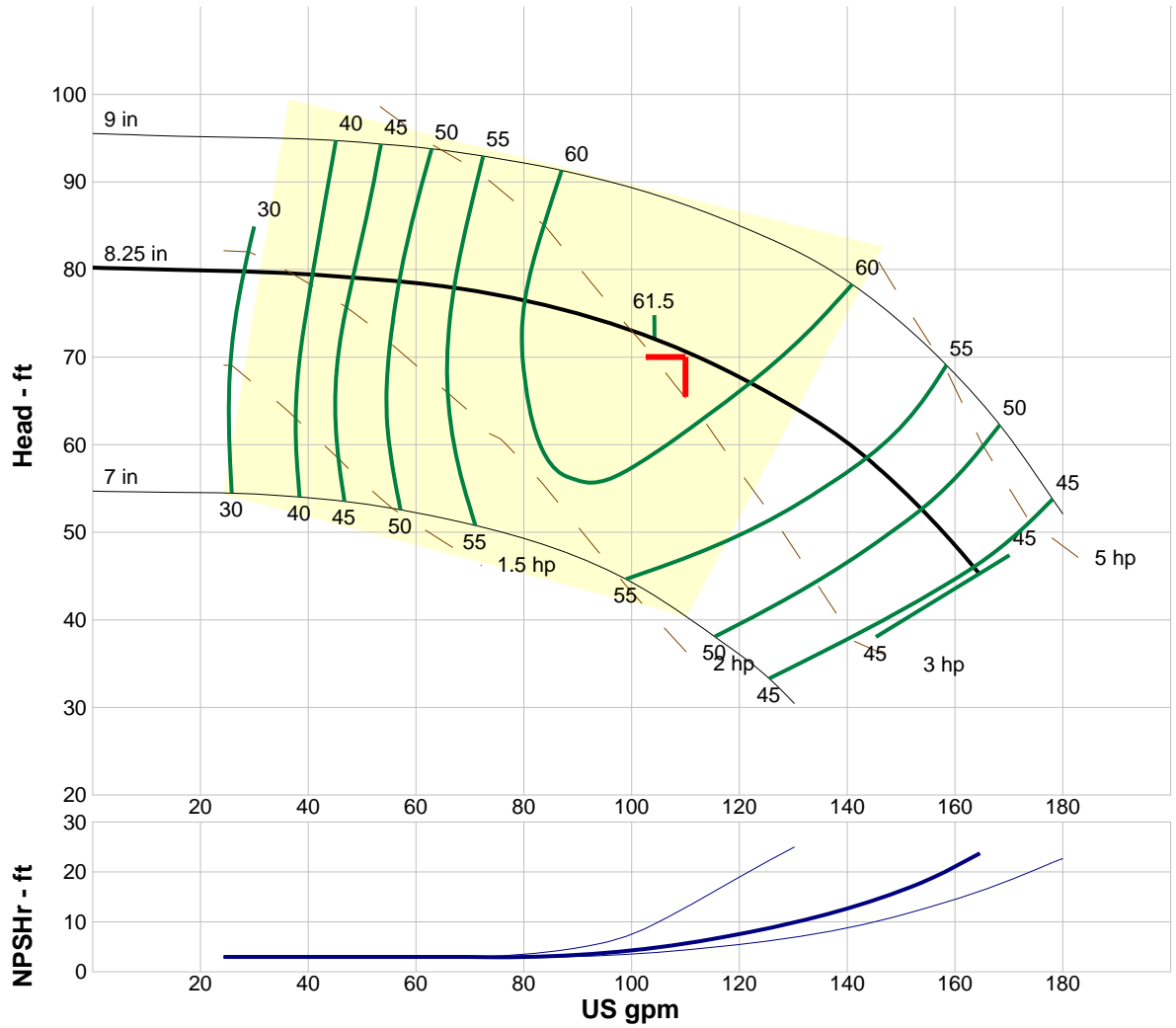
Flow:	110 US gpm
Head:	70.4 ft
Eff:	61%
Power:	3.2 hp
NPSHr:	5.86 ft

---- Design Curve ----

Shutoff head:	80.2 ft
Shutoff dP:	34.7 psi
Min flow:	---
BEP:	62% @ 104 US gpm
NOL power:	4.22 hp @ 163 US gpm

-- Max Curve --

Max power:	5.37 hp @ 178 US gpm
------------	----------------------

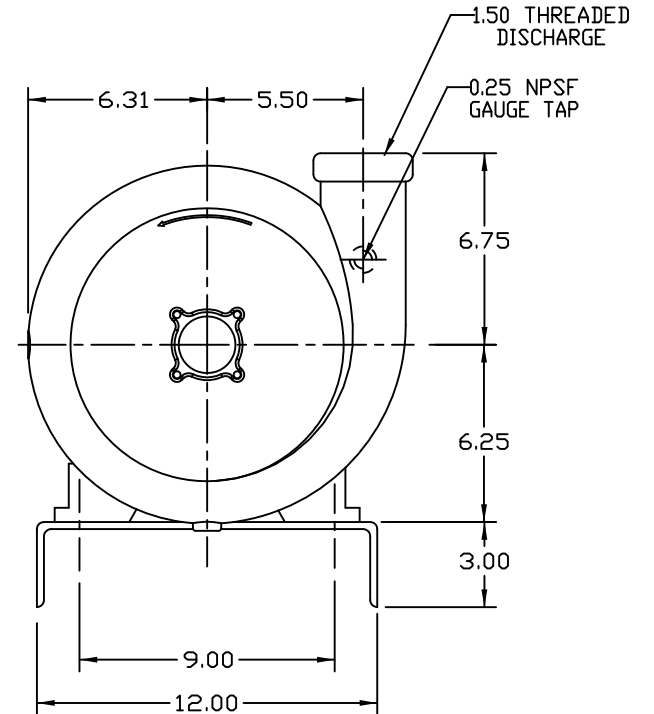
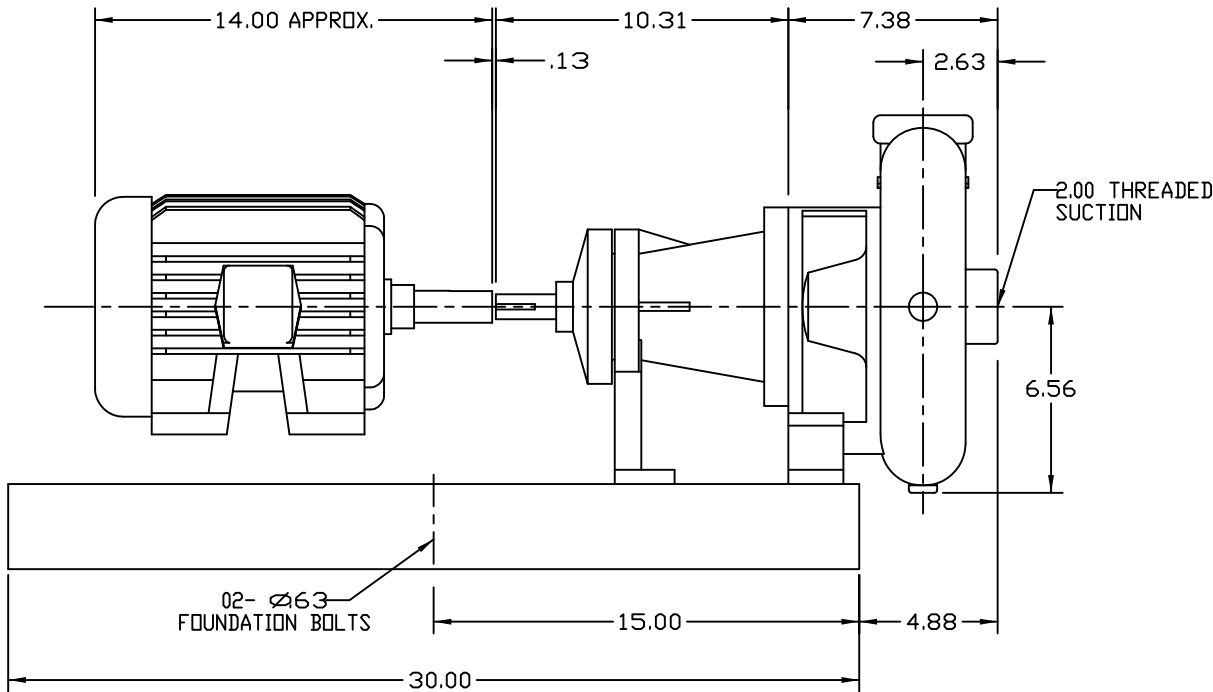
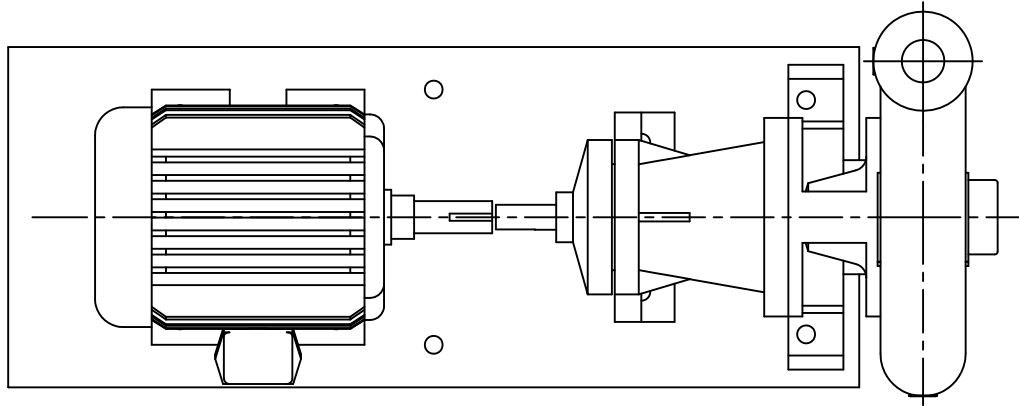


Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
132	1750	63.1	58	3.63	10.7
110	1750	70.4	61	3.2	5.86
88	1750	75	61	2.74	3.58
66	1750	78	54	2.38	3
44	1750	79.3	42	2.09	3

PART NUMBER
344A-5X2X9P1R11HDF5184T

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	184T_MOTOR	
2	1	341A_1-5X2X9	
3	1	FRAME_1_CB-9	
4	1	FS_BASE_12X30X3	



- NOTES:
1. ALL DIMENSIONS IN INCHES.
 2. DIMENSIONS MAY VARY ±.25
 3. COUPLING GAP MAY VARY .13 TO 1

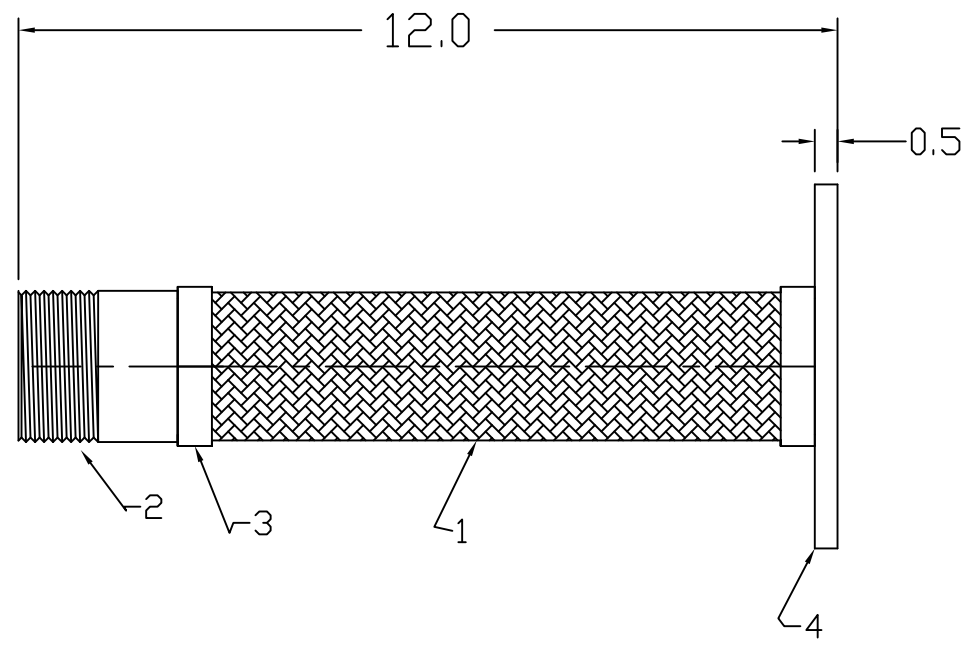
REV	ZONE	DATE	REVISION DESCRIPTION	BY	CK'D

MATERIAL:	-	
ap AURORA PUMP GROUP		
COMPANY CONFIDENTIAL. Information contained herein is confidential. It is the property of Aurora Pump. It is to be used solely for the purpose provided and it is not to be disclosed to others without prior written consent of Aurora Pump.		
DO NOT SCALE DRAWING	344A PUMPS ON FORMED STEEL BASE	
PLOT SCALE 0.300	DRAWN BY DS	DATE 05/24/04
	CHECKED BY JLF	APPROVED BY CSJ
	PATTERN NUMBER -	SIZE C
	PART NUMBER 344A1-5X2X9P1R11HDF5184T	REV -

4 | 3 | 2 | 1
 ALL DIMENSIONS IN INCHES

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

THIS DOCUMENT IS THE PROPERTY OF DME INC., AND CAN NOT BE DISTRIBUTED WITHOUT DME'S AUTHORIZATION



GENERAL NOTES:

A. DESIGN:
 PRESSURE = 100 PSIG
 TEMPERATURE = 250°F

B. ALL WELDING SHALL BE IN ACCORDANCE WITH:
 ASME SECTION IX

APPROVED BY:.....

DATE:.....PO#:.....

PUMP BRAID - SUCTION.
 QUANTITY: ONE PER GEN-SET.

GENERAL NOTES:
 A. ALL WELDING T.I.G. METHOD IN ACCORDANCE WITH:
 ASME SECTION IX.
 B. PRESSURE TEST ASSEMBLIES TO 50 PSIG AFTER FABRICATION

ITEM	QTY	DESCRIPTION	MATERIAL
5	1	2.0" O.D. TUBE, .065" WALL	C.S.
4	1	2"x3"-125/150# x 1/2" REDUCING FLANGE.	A 36
3	1	BRAID SLEEVE	A 240 T304
2	1	PIPE FITTING, 2.0" SCH. 40 MALE NPT.	A 234 GR. WPB
1	1	2.0" I.D. x SINGLE BRAIDED HOSE	A 240 T304

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE :	
.XXX ± .010"	FRACTIONS: ± 1/8"
.XX ± .030"	EXPANSION JOINT OAL: ± 1/8"
.X ± .060"	ANGLES ± 1/2°
CUST: BOULDEN ENERGY JOB#	

DME INCORPORATED
 14001 MARQUARDT AVE, SANTA FE SPRINGS, CA 90670
 TEL: (562) 921 - 0464
 FAX: (562) 802 - 7489

MNPT x T304 S/S HOSE x ASA FLANGE

ITEM	QTY	DESCRIPTION	MATERIAL
------	-----	-------------	----------

BILL OF MATERIAL

DESIGN: DJM	SIZE	DWG NO.	REV
APPROVED BY: DJM	SCALE NONE	DATE 9-4-01	SHEET
DWG: P.K.	9-4-01		

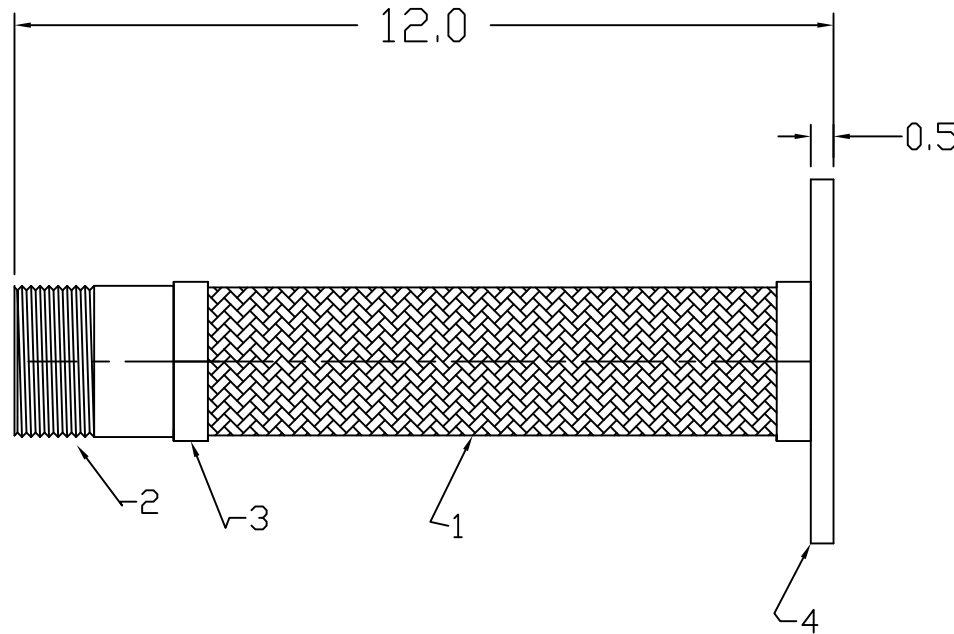
4 | 3 | 2 | 1

MAXX

ALL DIMENSIONS IN INCHES

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

THIS DOCUMENT IS THE PROPERTY OF DME INC., AND CAN NOT BE DISTRIBUTED WITHOUT DME'S AUTHORIZATION



GENERAL NOTES:

A. DESIGN:
 PRESSURE = 100 PSIG
 TEMPERATURE = 250°F

B. ALL WELDING SHALL BE IN ACCORDANCE WITH:
 ASME SECTION IX

APPROVED BY:.....

DATE:.....PO#:.....

PUMP BRAID - DISCHARGE.
 QUANTITY: ONE PER GEN-SET.

GENERAL NOTES:

A. ALL WELDING T.I.G. METHOD IN ACCORDANCE WITH:
 ASME SECTION IX.

B. PRESSURE TEST ASSEMBLIES TO 50 PSIG AFTER FABRICATION

UNLESS OTHERWISE SPECIFIED
 TOLERANCES ARE :

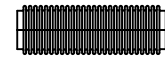
.XXX ± .010"
 .XX ± .030"
 .X ± .060"
 ANGLES ± 1/2°

FRACTIONS:
 ± 1/8"

EXPANSION JOINT
 OAL: ± 1/8"

DME INCORPORATED

14001 MARQUARDT AVE, SANTA FE SPRINGS, CA 90670



TEL: (562) 921 - 0464
 FAX: (562) 802 - 7489

CUST: BOULDEN ENERGY
 JOB#

**MNPT x T304 S/S HOSE x ASA
 FLANGE**

ITEM	QTY	DESCRIPTION	MATERIAL
5	1	2.0" O.D. TUBE, .065" WALL	C.S.
4	1	2"x3"-125/150# x 1/2" REDUCING FLANGE.	A 36
3	1	BRAID SLEEVE	A 240 T304
2	1	PIPE FITTING, 1.5" SCH. 40 MALE NPT.	A 234 GR. WPB
1	1	2.0" I.D. x SINGLE BRAIDED HOSE	A 240 T304

DESIGN:	SIZE	DWG NO.	REV
DJM			
APPROVED BY:	SCALE	DATE	SHEET
DJM	NONE	9-4-01	
DWG:			
P.K.	9-4-01		

BILL OF MATERIAL

MAXX

8

7

6

5

4

3

2

1

D

D

C

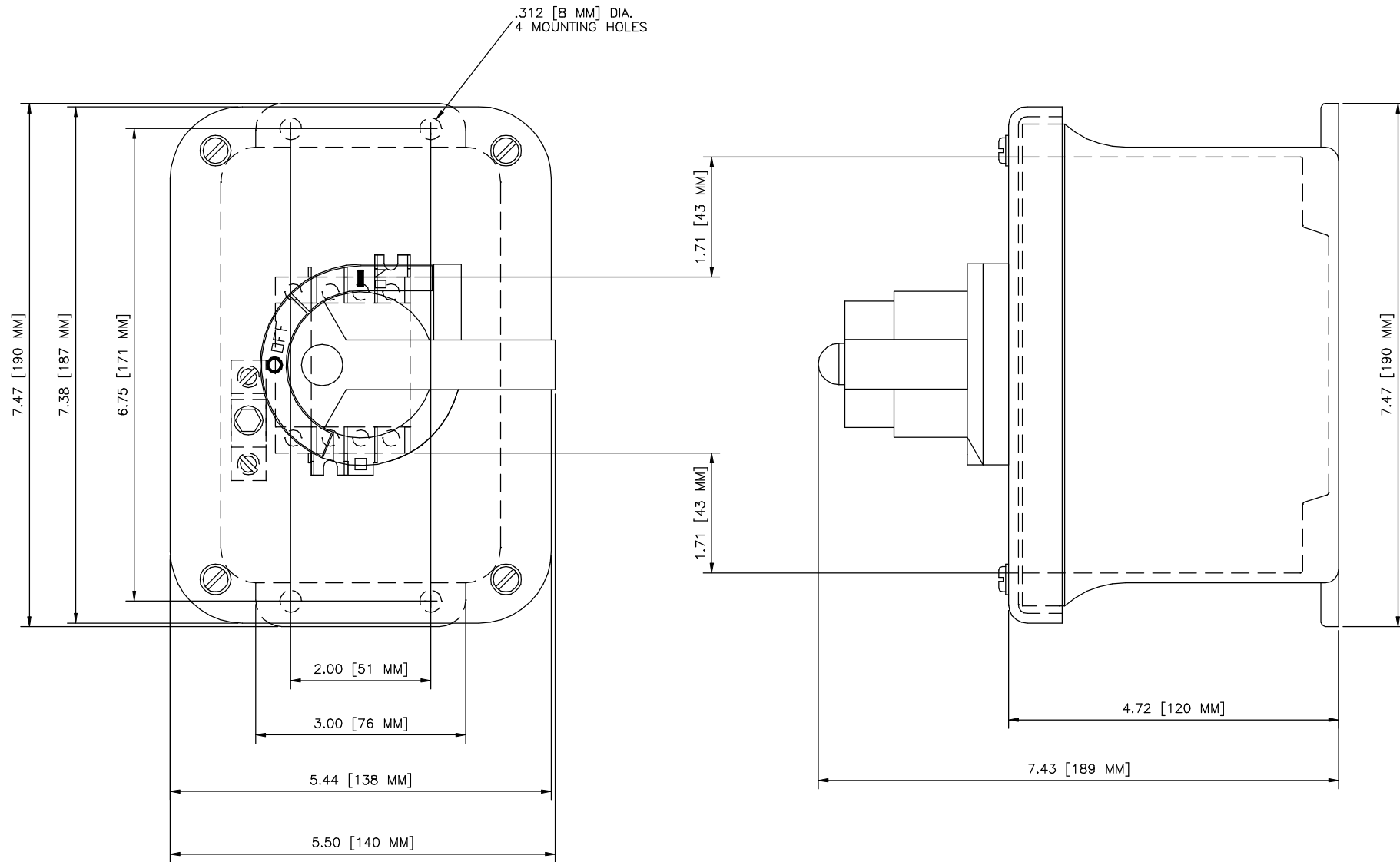
C

B

B

A

A



P/N ER53016UX - 16 AMP L/T PUMP DISCONNECT SWITCH.

NOTE:
1. WIRE RANGE OF SWITCH LUGS IS #6-#10 COPPER.
WIRE RANGE OF GROUND LUGS IS #2-#14 COPPER OR ALUMINUM.

REVISION DS0468	THE INFORMATION ON THIS DRAWING IS THE PROPERTY OF EATON CORPORATION. IT IS DISCLOSED IN CONFIDENCE AND IS NOT TO BE REPRODUCED, USED, OR DISCLOSED EXCEPT FOR THE PURPOSE FOR WHICH IT IS FURNISHED.		DRAWN BY WARREN SIPE	DATE 6/8/01	CUTLER-HAMMER CLEVELAND, TENNESSEE	EATON
	APPD. D.R. BENDER		DATE 6/8/01	TITLE DIMENSION SHEET ROTARY SWITCH		
	FILENAME 95-1551.DWG		APPD.	DATE	TYPE	16-25 AMP TYPE 4X NON-METALLIC
	FEDERAL ID NUMBER		DISPEC (PROJECT NO.)	SCALE 1=1		
PRODUCT CODE		REVISION NEW	G.O.	SIZE D	DRG. NO. 95-1551	SHEET NO. 1 OF 1

Model 2012 & 2013

Three-Way Thermostatic Valve (T Style)



2012-1	1 1/2" NPT
2012	2" NPT
2012J24	1 1/2" SAE O-ring
2012J32	2" SAE O-ring
2012M	2" NPT with Manual Override
F2012	2" Flange
F2012M	2" Flange with Manual Override

With Bulkhead Mounting Provisions

2013-1	1 1/2" NPT
2013	2" NPT
2013J24	1 1/2" SAE O-ring
2013J32	2" SAE O-ring
2013M	2" NPT with Manual Override

Fluid Power Energy (FPE) Thermostatic Valves utilize the principle of expanding wax, which in the semi-liquid state undergoes large expansion rates within a relatively narrow temperature range. The self-contained element activates a stainless steel sleeve, which directs flow. All FPE Thermostatic Valves are factory set at predetermined temperatures: no further adjustments are necessary. A wide range of temperatures are available for water and oil temperature control applications.

When used in a diverting application, on start-up the total fluid flow is routed back to the main system. As fluid temperature rises to the control range, some fluid is diverted to the cooling system. As fluid temperature continues to increase, more flow is diverted. When the thermostat is in a fully stroked condition, all fluid flow is directed to the cooling system. FPE Thermostatic Valves may also be used in a mixing application.

In a mixing application, hot fluid enters the "B" port and colder fluid enters the "C" port. The flows mix and the thermostat adjusts to reach the desired temperature, exiting the "A" port.

Standard FPE thermostatic valve housings are made from aluminum and grey iron castings, however, ductile iron, bronze, steel and stainless steel housings are available.

Optional features: High over temperature element, plated element, manual override.

Features

Designed for Hydraulic
Power Units

Optional Mounting Rails

Wide Range of Temperatures

Self-Contained

Replaceable Element

Non Adjustable

Rugged Construction

Tamper-Proof

Compact Operate in Any Position

Extra Heavy Casting



FLUID POWER ENERGY, INC.

W229 N591 Foster Court • Waukesha, WI 53186

262 • 548 • 6220 Fax 262 • 548 • 6239

www.fpevalves.com

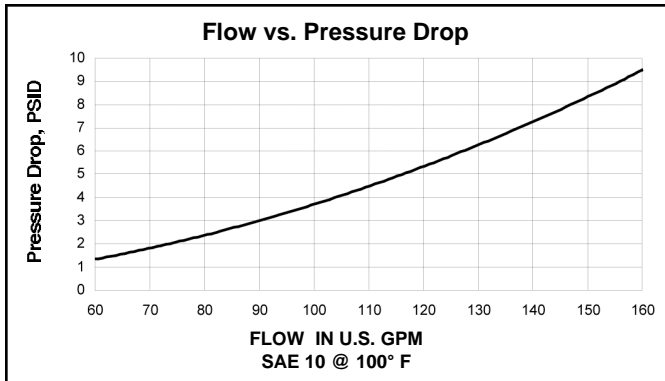
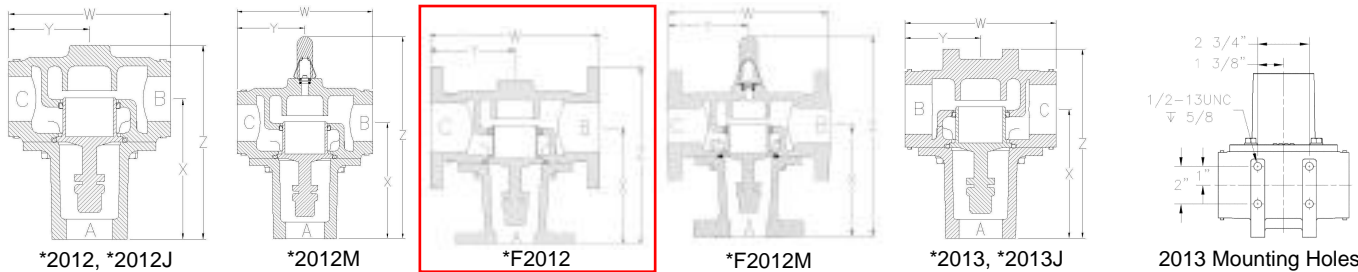


Model 2012 & 2013

MODEL NUMBER	BODY MATERIAL (*)	NOMINAL PIPE SIZE	PRINCIPAL DIMENSIONS (UNITS in. & (mm))				MAX WIDTH IN THE OTHER PLANE	FLANGE DRILLING			NO. OF ELEMENTS	APPROX. SHIPPING WEIGHT	NOTES OR NUMBERED ENDNOTES
			"X"	"Y"	"W"	"Z"		NO. OF HOLES	DIA. OF HOLES	BOLT CIRCLE			
*2012-1	A, B, D, S, SS	1 1/2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=26# S & SS=25#	
*2012	A, B, D, S, SS	2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012J24	A, B, D, S, SS	SAE 24 1 1/2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012J32	A, B, D, S, SS	SAE 32 2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012M	A, B, D, S, SS	2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	Manual Override
*F2012	A, B, D	2" 125# FF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	9 (228.60)	6 (152.40)	4 (19.05)	3/4 (19.05)	4 3/4 (120.65)	1	A=24#, B=26# D=20#	
	S, SS	2" 150# RF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	9 (228.60)	6 (152.40)	4 (19.05)	3/4 (19.05)	4 3/4 (120.65)	1	S & SS=24#	
*F2012M	A, B, D	2" 125# FF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	11 (279.40)	6 (152.40)	4 (19.05)	3/4 (19.05)	4 3/4 (120.65)	1	A=24#, B=26# D=20#	Manual Override
	S, SS	2" 150# RF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	11 (279.40)	6 (152.40)	4 (19.05)	3/4 (19.05)	4 3/4 (120.65)	1	S & SS=24#	Manual Override
*F2012X	S, SS	2" 300# RF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	9 7/16 (239.71)	6 1/2 (165.10)	8 (19.05)	3/4 (19.05)	5 (127.00)	1	S & SS=24#	
*2013-1	A, B, D, S, SS	1 1/2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs
*2013	A, B, D, S, SS	2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs
*2013J24	A, B, D, S, SS	SAE 24 1 1/2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs
*2013J32	A, B, D, S, SS	SAE 32 2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs

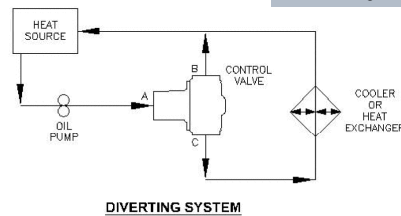
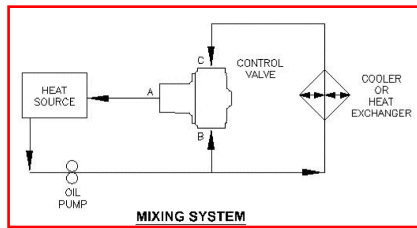
PRESSURE RATINGS	
MATERIAL	PSI
A, B	150
D	250
S, SS	500
SF, SSF	275
SFX, SSFX	720

(* Replace * with body material type; A=Cast Iron, B=Bronze, D=Ductile, S=Steel, SS=Stainless Steel)



Recommended Pressure Drop is 2 to 7 PSI

APPLICATION CHARTS



PART #	DESCRIPTION
*2012	VALVE BODY (*See table for material)
*2013	VALVE BODY W/MOUNTING HOLES
*2020	VALVE COVER (*See table for material)
2071	LIP SEAL
2050-Temp	THERMOSTAT (Temp to follow dash)
1604	HEX BOLT
1605	LOCK WASHER
1570**	O-RING (Standard material is Buna-N)
1590	NAMEPLATE

FPE Model 2000** Replacement Kit (Includes the following):

1570**	O-RING (Standard material is Buna-N)
2071	LIP SEAL
2050-Temp	THERMOSTAT (Temp to follow dash)

(For Viton® (V) or Neoprene (E) O-Ring material, replace ** with V or E)

Viton® is a registered trademark of Dupont Dow Elastomers

**FPE MODEL AF2012-140
L/T CIRCUIT MIXING VALVE**

To Order

Specify Model Number, nominal temperature desired, and housing material. For Model coding information, visit our website or consult your factory representative.



FLUID POWER ENERGY, INC.

W229 N591 Foster Court • Waukesha, WI 53186

262•548•6220 Fax 262•548•6239

www.fpevalves.com

For Commercial and Institutional Applications

Job Name _____

Contractor _____

Job Location _____

Approval _____

Engineer _____

Contractor's P.O. No. _____

Approval _____

Representative _____

Series 77F-DI-125, 77F-DI-FDA-125

Flanged, Wye Pattern, Cast Iron Strainers

Sizes: 2" – 12" (50 – 300mm)

Series 77F-DI-125, 77F-DI-FDA-125 Flanged, Wye Pattern, Cast Iron Strainers feature 304 stainless steel perforated screens, a cast iron flanged retainer cap and a drain/blow-off connection furnished with a closure plug. Model 77F-DI-FDA-125 also features a double coated, heat fused epoxy coating on the interior and exterior for FDA approved sanitary applications.



77F-DI-FDA-125

Features

- Flanges conform to American Cast Iron Flange Standard, Class 125 (ANSI B16.1) and MIL-S 16293 Type II
- Cast iron body
- 304 Stainless steel perforated screens
- Cast iron flanged retainer cap with gasket tapped for closure plug
- Drain/Blow-off connection furnished with closure plug
- 77F-DI-FDA-125 model comes with heat fused FDA approved epoxy coating (interior and exterior)

Models

77F-DI-125 — 2" – 12" (50 – 300mm) with flanged connections for water and steam service

77F-DI-FDA-125 — 2" – 12" (50 – 300mm) with flanged connections and double coated, heat fused FDA approved epoxy coating (interior and exterior) for water service only

Specifications (77F-DI-125)

A flanged, wye pattern, cast iron strainer to be installed as indicated on the plans. The strainer must have flanges that conform to American Cast Iron Flange Standard, Class 125, 304 stainless steel perforated screens and a drain/blow-off connection furnished with a closure plug. Pressure rating no less than 200psi (13.8 bars) WOG non-shock and 125psi (8.6 bars) WSP. Strainer shall be a Watts Regulator Company Series 77F-DI-125.

Pressure – Temperature

Maximum Operating Pressure:

200psi (13.8 bars) WOG, non-shock, @ 210° F (99° C)

125psi (8.6 bars) WSP @ 353° F (178° C)

Standard Screens

2" – 5" (50 – 125mm): 1/16" perforation

6" – 8" (150 – 200mm): 1/8" perforation

10" – 12" (250 – 300mm): 3/16" perforation

Screen Options

Wire Mesh Liners: 304 stainless steel (#20, #40, #60, #80, #100)

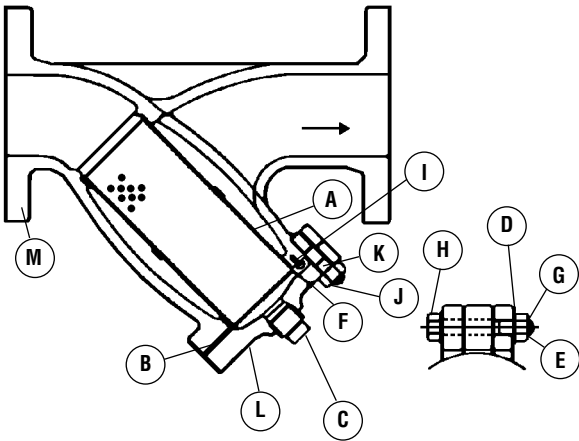
Perforated Screens: 304 stainless steel (3/64", 1/16", 1/8", 3/16")

Specifications (77F-DI-FDA-125)

A flanged, wye pattern, cast iron strainer with a double coated, heat fused, FDA approved epoxy coating on the interior and exterior surfaces for FDA sanitary applications. Flanges to conform to ANSI B16.1 Class 125, 304 stainless steel perforated screens, and a drain/blow-off connection furnished with a closure plug. Pressure rating no less than 200psi (13.8 bars) CWP. Strainer shall be Watts Regulator Company Series 77F-DI-FDA-125.



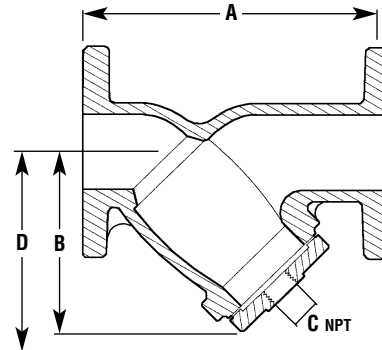
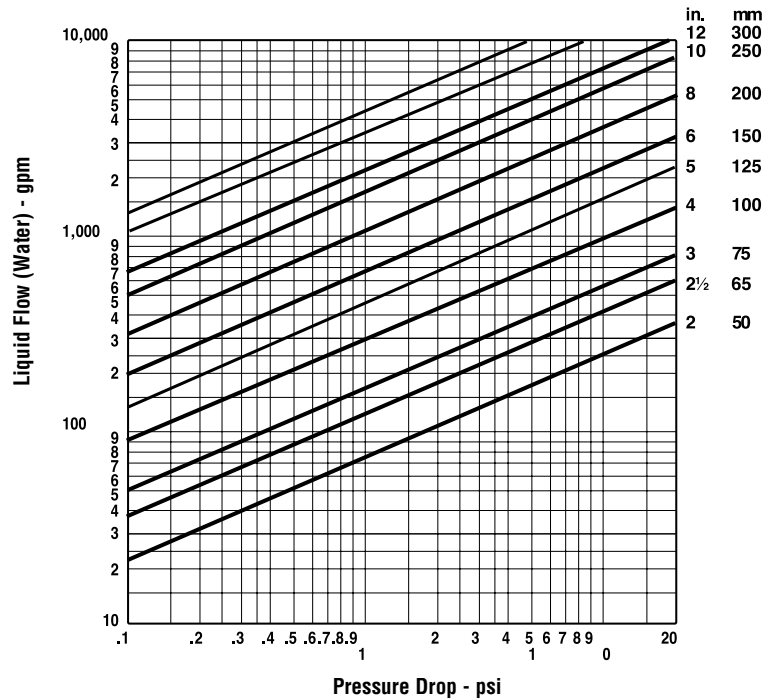
Materials



A.	Screen	AISI 304SS
B.	Cover Gasket	Non-Asbestos
C.	Plug	*ASTM A47
D.	Washer	ASTM A6
E.	Cotter Pin	ASTM A112
F.	Plate	*ASTM A6
G.	Bolt Nut	ASTM A6
H.	Bolt	ASTM A6
I.	Set Screw	ASTM B16
J.	Cover Bolt Nut	ASTM A6
K.	Cover Bolt	ASTM A6
L.	Cover	*ASTM A-126 Cl.B
M.	Body	*ASTM A-126 Cl.B

Note:* 77F-DI-FDA component parts epoxy coated internally and externally.

Flow/Pressure Drop Chart



Dimensions – Weights

SIZE (DN)		DIMENSIONS								WEIGHT		
		A		B		C(NPT)		D*		Screen Area		
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	sq.in.	lbs.	kgs.
2	50	7 $\frac{7}{8}$	200	5 $\frac{1}{4}$	133	$\frac{1}{2}$	13	7	178	36	18	8
2 $\frac{1}{2}$	65	10	254	6 $\frac{1}{2}$	165	1	25	9 $\frac{3}{4}$	248	56	28	13
3	75	10 $\frac{1}{8}$	257	7	178	1	25	10	254	75	34	15
4	100	12 $\frac{1}{8}$	308	8 $\frac{3}{4}$	210	1 $\frac{1}{2}$	38	12	305	121	60	27
5	125	15 $\frac{1}{8}$	397	11 $\frac{1}{4}$	286	2	51	17	432	210	95	43
6	150	18 $\frac{1}{2}$	470	13 $\frac{1}{2}$	343	2	51	20	508	278	133	60
8	200	21 $\frac{1}{8}$	551	15 $\frac{1}{2}$	394	2	51	22 $\frac{3}{4}$	578	387	247	112
10	250	26	660	18 $\frac{1}{2}$	470	2	51	28	711	577	370	168
12	300	29 $\frac{1}{8}$	759	21 $\frac{3}{4}$	552	2	51	30	762	795	579	262

* D dimension is minimum clearance for screen removal.

P/N 3.0" 77F-DI-FDA-125



USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.wattsreg.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscanada.ca

For HVAC, Irrigation, OEM, Commercial and Institutional Applications

Job Name _____

Contractor _____

Job Location _____

Approval _____

Engineer _____

Contractor's P.O. No. _____

Approval _____

Representative _____

LEAD FREE*

Butterfly Valves

Series BF-03-M2 Full Lug and BF-04-M2 Wafer

Sizes: 2" – 12" (50 – 300mm)

200psi (13.8 bars)

14" – 24" (350 – 600mm) 150psi (10.3 bars)

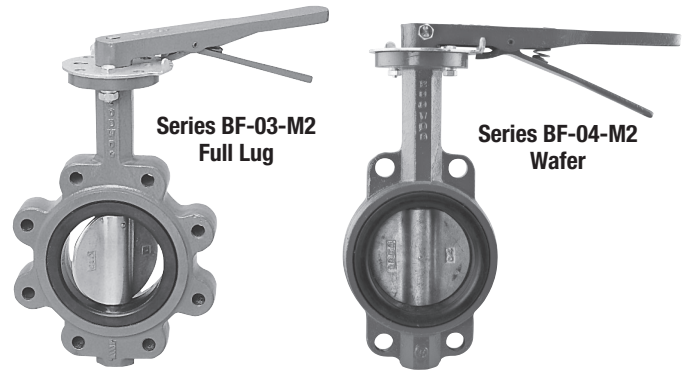
Watts Series BF resilient seated butterfly valve is available in sizes 2" – 24" (50 – 600mm) in wafer or lug body design. Wafer body design features lifting lugs while lug body design features dead-end service. Incorporating a 200psi (13.8 bar) pressure rating for 2" – 12" (50 – 300mm) and a 150psi (10.3 bar) pressure rating 14" – 24" (350 – 600mm), the BF series butterfly is standardly constructed of a ductile iron body with a choice of either ductile iron, aluminum bronze, or 316 stainless steel discs and 416 stainless steel or 316 stainless steel shaft. A phenolic-backed seat (2"-12", 50-300mm) or aluminum-backed seat (14" – 24", 350-600mm) prevents the seat from collapsing or dislodging. Standard seat materials available include EPDM, Buna-N and Viton. The BF Series mounting pad is designed to ISO 5211 standard to accommodate lever handles, gear operators, or actuation.

The Watts Series BF butterfly valves are designed and manufactured for use with ANSI 125 or 150 Class flanges and comply with API 609 and MSS-SP 67 standards to meet the stringent requirements of HVAC, Irrigation, OEM, Commercial, Institutional, and Industrial applications.

Features

- **Body** – Available in Full Lug (BF-03-M2) and Wafer (BF-04-M2) styles designed for use between ANSI 125 and 150 flanges. Face-to-face dimensions comply with API 609 and MSS-SP-67. All valves are designed to accommodate 2" of insulation. The mounting pad is designed to ISO 5211 standard. The body material is ASTM A-536 ductile iron.
- **Disc** – Disc edge is machined and polished 360 degrees to assure leak-tight shutoff while minimizing operating torque. Positive, disc-to-shaft connection is provided by stainless steel precision taper pins. Discs are available in ductile iron, aluminum bronze, or 316 stainless steel.

*The wetted surface of this product contacted by consumable water contains less than one quarter of one percent (0.25%) of lead by weight.



- **Seat** – Phenolic or aluminum backed, non-collapsible, resilient seat is mechanically secured to provide dead-end service to the full pressure rating in lug style valves. Full 360 degrees sealing isolates the body components from the media and provides the primary shaft seal. Seats are available in EPDM, Buna-N, and Viton.
- **Shaft** – One-piece shaft delivers positive disc-to-seat location with maximum strength. 416SS is standard shaft with ductile iron and aluminum bronze disc. 316SS shaft is standard with 316SS disc models.
Three shaft bushings provide shaft support for proper alignment and minimal shaft deflection. Bi-directional shaft seals prevent external contamination of the stem area and provide backup for the primary shaft seal formed by the disc/seat interface.
- **Handle** – ISO 5211 top work design allows for standard 10 position handle 2" – 6" (50 – 150mm) and manual, worm gear operators for 8" – 24" (200 – 600mm) sizes. An infinite positioning locking handle is an available option on 2" – 12" (50 – 300mm) valves. The posi-lok handle provides an infinite position stop, a memory stop, and a pad-locking device in the fully closed position.

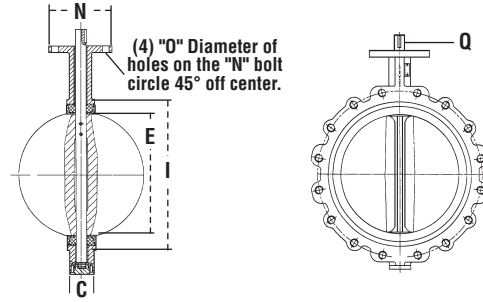
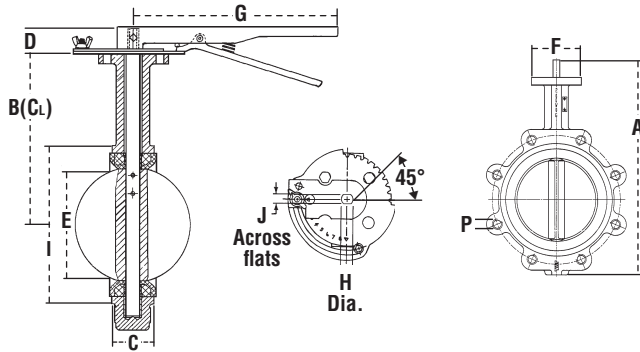
Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior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

WATTS®

P/N 3.0" BF03-11115

Dimensions

2" through 24"



Size																				
in.	A	B	C	D	E	F	G	H	I	J										
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm									
2	10 ⁹ / ₁₆	273	6 ³ / ₁₆	161	1 ¹ / ₂	42	1 ¹ / ₂	32	2 ¹ / ₂	54	3 ³ / ₁₆	77	10 ¹ / ₂	267	1 ¹ / ₂	13	3 ³ / ₁₆	95	3 ¹ / ₂	9
2 ¹ / ₂	11 ¹ / ₂	295	6 ¹ / ₂	175	1 ³ / ₄	45	1 ¹ / ₂	32	2 ¹ / ₂	64	3 ¹ / ₁₆	77	10 ¹ / ₂	267	1 ¹ / ₂	13	4 ¹ / ₄	108	3 ¹ / ₂	9
3	12 ¹ / ₂	308	7 ¹ / ₂	181	1 ³ / ₄	45	1 ¹ / ₂	32	3 ¹ / ₄	79	3 ¹ / ₁₆	77	10 ¹ / ₂	267	1 ¹ / ₂	13	4 ³ / ₄	120	3 ¹ / ₂	9
4	13 ¹ / ₂	346	7 ¹ / ₂	200	2	52	1 ¹ / ₂	32	4 ¹ / ₈	105	3 ³ / ₁₆	92	10 ¹ / ₂	267	3	16	6 ¹ / ₁₆	154	7 ¹ / ₂	11
5	14 ¹ / ₂	372	8 ¹ / ₂	213	2 ¹ / ₈	56	1 ¹ / ₂	32	4 ¹ / ₂	124	3 ³ / ₁₆	92	10 ¹ / ₂	267	3 ¹ / ₄	19	7 ¹ / ₂	181	1 ¹ / ₂	13
6	15 ¹ / ₂	397	8 ¹ / ₂	226	2 ¹ / ₈	56	1 ¹ / ₂	32	6 ¹ / ₈	156	3 ³ / ₁₆	92	10 ¹ / ₂	267	3 ¹ / ₄	19	8 ¹ / ₁₆	208	1 ¹ / ₂	13
8	18 ¹ / ₂	479	10 ¹ / ₂	260	2 ³ / ₈	60	1 ¹ / ₂	32	8	202	5	125	14	356	1	22	10 ¹ / ₂	260	3	16
10	21 ¹ / ₂	540	11 ¹ / ₂	292	2 ³ / ₈	66	1 ¹ / ₂	45	9 ¹ / ₂	251	5	125	14	356	1	29	12 ¹ / ₂	320	3 ¹ / ₂	21
12	24 ¹ / ₂	626	13 ¹ / ₂	337	3	76	1 ¹ / ₂	45	11 ¹ / ₂	301	6	150	14	356	1	32	14 ¹ / ₂	375	--	--
14	26 ¹ / ₂	679	14 ¹ / ₂	368	3	76	1 ¹ / ₂	45	13 ¹ / ₂	333	6	150	--	--	1	32	15 ¹ / ₂	405	--	--
16	30	762	15 ¹ / ₂	400	3 ¹ / ₂	87	2	50	15 ¹ / ₂	391	6 ¹ / ₈	175	--	--	1	33	18 ¹ / ₂	470	--	--
18	31 ¹ / ₂	800	16 ¹ / ₂	422	4 ¹ / ₈	105	2	50	17 ¹ / ₂	442	6 ¹ / ₈	175	--	--	1	38	20 ¹ / ₂	525	--	--
20	35 ¹ / ₂	897	18 ¹ / ₂	480	5 ¹ / ₂	130	2 ¹ / ₈	53	19 ¹ / ₂	493	8 ¹ / ₄	210	--	--	1	41	22 ¹ / ₂	565	--	--
24	42 ¹ / ₂	1088	22 ¹ / ₂	562	6	152	2 ¹ / ₄	58	23 ¹ / ₂	594	8 ¹ / ₄	210	--	--	2	50	27 ¹ / ₂	693	--	--

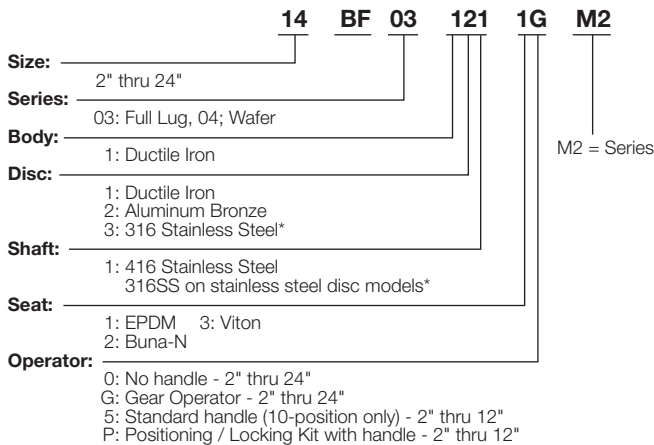
SEATING TORQUE Buna-N, EPDM		
Size	Normal Conditions	
in.	Wet lbs.	Dry lbs.
2	134	214
2 ¹ / ₂	190	289
3	250	387
4	390	644
5	600	959
6	907	1,542
8	1,697	2,919
10	2,500	4,857
12	3,300	7,071
14	3,500	7,305
16	5,500	10,027
18	8,200	13,437
20	10,000	17,925
24	18,680	28,020

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL									
Valve Size	Depth	Width	CL to			Turns Open/Close	Unit		
			HW.	Dia.	Height				
in.	A	B	C	D	E	F	lbs.		
2, 2 ¹ / ₂ , 3	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0	
4	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0	
5, 6	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0	
8	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5	
10	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5	
12, 14	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0	
16	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5	
18	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5	
20	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5	
24	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0	

Size	TOP PLATE DRILLING		TAPPED LUG DATA		KEY WAY		WEIGHT lbs. †		C _v RATING (Full Open)					
	N	O	BOLT CIRCLE	NO. HOLES	BOLT P	Q	88	87	Size	C _v Rating				
in.	in.	mm	in.	mm	in.	mm			in.					
2	2	50	1/4	7	4/4	121	4	3/8"-11UNC x 1 1/8"	--	--	8	6	2	135
2 1/2	2	50	1/4	7	5 1/2	140	4	3/8"-11UNC x 1 1/4"	--	--	10	7	2 1/2	220
3	2	50	1/4	7	6	150	4	3/8"-11UNC x 1 1/4"	--	--	10	7	3	302
4	2 3/4	70	3/8	10	7 1/2	191	8	3/8"-11UNC x 2"	--	--	17	12	4	600
5	2 3/4	70	3/8	10	8 1/2	216	8	3/4"-10UNC x 2 1/2"	--	--	25	16	5	1,022
6	2 3/4	70	3/8	10	9 1/2	241	8	3/4"-10UNC x 2 1/2"	--	--	27	20	6	1,579
8	4	102	1/2	13	11 3/4	298	8	3/4"-10UNC x 2 3/8"	--	--	40	29	8	3,136
10	4	102	1/2	13	14 1/4	362	12	1/2"-9UNC x 2 3/4"	--	--	63	48	10	5,340
12	5	125	1/2	13	17	432	12	7/8"-9UNC x 3"	1/4 x 1 1/4	6 x 32	107	78	12	8,250
14	5	125	1/2	13	18 3/4	476	12	1"-8UNC x 3"	1/4 x 1 1/4	6 x 32	156	99	14	11,917
16	5 1/2	140	1/2	18	21 1/4	540	16	1"-8UNC x 3 3/8"	3/8 x 1 1/2	8x46	203	140	16	16,388
18	5 1/2	140	1/2	18	22 3/4	578	16	1 1/8"-7UNC x 4 1/8"	3/8 x 1 1/2	10x40	269	188	18	21,705
20	5 1/2	165	3/4	22	25	635	20	1 1/8"-7UNC x 5 1/8"	3/8 x 1 1/2	10x40	392	248	20	27,908
24	5 1/2	165	3/4	22	29 1/2	750	20	1 1/4"-7UNC x 6"	1/2 x 2 3/8	13x60	593	450	24	43,116

†Weights are for valves with ductile iron or aluminum bronze discs. 2" - 12" have levers; 14" - 24" have bare shafts. Refer to Watts F-CDBF for gear operator weights.

How to Order Watts Series BF-M2



Materials

- Body:** ASTM A-536 Ductile Iron.
- Bushing:** Duralon(3): Teflon® - Dacron inner liner bonded to fiberglass - epoxy resin outer shell 2"-12" (50-300mm), Bronze 14"-24" (350-600mm)
- Stem O-rings:** Buna-N
- Disc:** ASTM A-395 Ductile Iron / Electroless Nickel Plated
ASTM A-148 Aluminum Bronze
ASTM A-351 316 Stainless Steel
- Shaft:** 416 Stainless Steel
316 Stainless Steel on 316SS Disc Models
- Seat:** EPDM: +5°F to 248°F (-15°C to +120°C)
Buna-N: +14°F to 176°F (-10°C to +80°C)
Viton: -4°F to 302°F (-20°C to +150°C)
- Note:** Do not use EPDM when hydrocarbons are present.



A Watts Water Technologies Company



ISO 9001-2000 CERTIFIED