LETTER OF TRANSMITTAL

Parkson™ Treating Water Right

Transmittal Date: 7/15/16

Project Name: Wichita Reuse WSC, KS			**Job #**	**7127**	**Parkson**	
			PO#	**4552**	Project #	P02600585
					Description	MaximOS - SCH-100
Customer/Contractor: Wildcat Construction					Spec Section	46 33 13 / 46 41 17
Address: 3219 W May					Engineer	Chinmay Vaze
Wichita KS 67213					Email	ChinmayV@parkson.com
					Project #	
Attn:	Tyler Dehn		**e-mail**	tyler.dehn@wildcat.net	Description	
Phone:	316 945 9408	**Fax:**			Spec Section	
Engineer					Engineer	
Address:					Email	
					Project #	
					Description	
					Spec Section	
					Engineer	
Attn:			**e-mail**		Email	
Phone:		**Fax:**				

We are transmitting the following:

	No. Copies	Approval	Your Use	Review & Comment	As Requested
Submittal Package	1 (Electronic)	X		X	
Re-Submittal					
Certified Drawings					
IOM Manuals					

1. Hayward true union valves are specified. Spears was not requested as an "Engineer approved equal" (Typical 5 places)
2. Spears utility ball valves are not allowed. Hayward true union valves are specified.
3. Incorrect ion exchange resin highlighted on NSF resin list.
4. Can the Brine pump be located under the salt transfer auger?
5. How does staff check salt level in brinemaker? No inspection port has been provided.
6. Can the softener be changed to a Culligan softener be used instead of the Kenetico unit submitted?
7. Provide 208V, 3-phase tankless water heater. Provide with 60A disconnect switch and wire with (3)-#4, #8 ground, in 1" conduit. Provide 70 amp, 3 pole circuit breaker in panel PSL.
8. Coordinate with Electrical Contractor to provide 15 amp circuit breaker for brine pump and NEMA 4x disconnect switch at brine pump.
9. Coordinate with Electrical Contractor to provide 120 volt, 20 amp circuit to pressure sensor control box.

RETURN (1) COPY of this TRANSMITTAL TO:

Project Manager: **Julie Davis**
JDavis@parkson.com

Parkson Address: **Parkson Corporation**
1401 W Cypress Creek Rd, Suite 100
Fort Lauderdale, FL 33309-1721
(954) 974-6610

APPROVAL REQUIRED NO LATER THAN:

Estimated Shipping date _____ **weeks After Drawing Approval (ADA)**

PLEASE NOTE: Although every attempt will be made to ship within our quoted lead times, our estimated ship date. is subject to final approval and fabricator workload at the time final approval is received by Parkson. Commencement of performance, including this submittal transmission, shall not constitute acceptance of the order. Only a signed contract, containing mutually agreeable terms and conditions, shall act as an acceptance.

MKEC ENGINEERING, INC.
411 North Webb Road – Wichita, KS 67206

☐ **Reviewed** ☐ **Reviewed As Noted**
☑ **Revise and Resubmit** ☐ **Rejected**
☐ **Not Required by the Contract Documents**

Reviewed for conformance with the design concept of the project and compliance with the information given in the contract documents. Contractor is responsible for: dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication process or to techniques of construction; and coordination of work of all other trades. If "Resubmit" or "Rejected" are not checked resubmission is neither desired or required.

By: Keith Scarberry Date: 07/22/2016

DISTRIBUTION

	Contractor	Fluid Equipment (Dave McClure)	**Rep 1**		**File**
	Engineer		**Rep 2**		**Service**

Rev Date 7/16/2014.
CC: Project Manager

1401 West Cypress Creek Road Suite 100
Fort Lauderdale FL 33309-1969

Phone 1.888.PARKSON
Fax 954.974.6182

Letter of Clarification – Wichita Reuse WSC, KS

July 15, 2016

Dear Tyler Dehn:

Enclosed please find the submittal package for the Parkson project #P02600585. We would like to make below Clarifications.

1. Brine Tank: Controls and Salt Transfer from Bulk Bag Feed System to Brine Tank is not by Parkson. All items in the drawing # P0260058511 are ship loose items.

2. Solution Storage Tank: Please refer to drawing #P0260058510 for orientations, size & location of nozzles/fittings and confirm the location of 4" flanged fitting. Only 4" flanged fitting will be assembled on the tank, all other fittings are ship loose.

   Please note: 4" flanged fitting is not required for this system - Parkson MaximOS system uses a passive venting system. 4" fitting is a requirement only for forced ventilation fan system

3. Seismic Calculations: As agreed with Customer/Engineer, Seismic calculations are not included in this submittal booklet & will be submitted later.

4. OSG Alternator Control Panel is not included in this submittal booklet & will be submitted later.

Please feel free to contact me or Luc LaHaie (LLahaie@parkson.com, 873-200-1408) directly with any questions or concerns.

Chinmay Vaze
Chinmayv@parkson.com
O: +91-20-40147770

Project Engineer
Parkson Corporation

SUBMITTAL BOOKLET
TABLE OF CONTENTS

- Brine Collection Manifold
- Flexible Hose
- Hose Clamp

SECTION IV BRINE PRESSURE BOOSTING

- General Arrangement Drawing
- March Centrifugal Pumps
- Plast-O-Matic Back Pressure Valve
- Wika Bourdon Tube Pressure Gauges
- Marquest Gauge Isolators
- Spears True Union Standard Ball Valves
- Spears True Union Standard Check Valves

SECTION V SOLUTION STORAGE

➢ SECTION V. A Solution Tank

- General Arrangement Drawing
- Hydrogen Vent & Drop Tube Assy.
- 2000 Gallon Vertical Tank
- Flexible Interconnect Assy.
- Spears True Union Standard Ball Valve
- Spears True Union 3-Way Ball Valve

➢ SECTION V. B Solution Tank Level Measurement

- General Arrangement Drawing
- George Fisher Signet Pressure Transducer
- Spears True Union Standard Ball Valve

SECTION VI OSG ALTERNATOR BOX
(TO BE SUBMITTED LATER)

SECTION VII HYDROGEN GAS MONITOR

- Hydrogen Gas Sensor
- Hydrogen Gas Controller

SECTION VIII STATTIC MIXER

SECTION IX SPARE PARTS

---------- WATER QUALITY

---------- WATER TEMPERATURE GUIDELINES

---------- SALT GUIDELINES

---------- HYDROGEN SAFETY

---------- MATERIAL SAFETY DATA SHEETS

10-3-11 SAR

Limited Mechanical Warranty Policy
For the MaximOS™ Equipment

Parkson's Equipment is limitedly warranted to be free from defective material and workmanship, under normal use and service and when installed, operated and maintained in accordance with installation instructions, this policy and maintenance/operating procedures as follows: a. On-site generator enclosure shall carry a warranty of two years from the date of original manufacture; b. Electrolytic cell shall carry a warranty of five years from the date of original manufacture; and c. All other items shall carry a warranty of one year from date of shipment.

To make claim under this Warranty, Buyer must notify Parkson within ten (10) business days after the date of discovery of any nonconformity and make the affected Equipment immediately available for inspection by Parkson or its service representative. Parkson Equipment may be deemed nonconforming only by an authorized Parkson representative. **Returns will not be accepted unless Parkson has authorized said return in writing.** If Parkson's inspection indicates nonconforming materials and/or workmanship, the Equipment will, at Parkson's option, either be repaired or replaced without charge. Upon receipt of Parkson's written consent, Equipment may be promptly returned to Parkson, F.O.B. its factory. However, under certain circumstances, Parkson may decide, in its sole discretion, to repair or replace the Equipment at the Project site. Buyer hereby agrees to provide Parkson, its employees and/or representatives, free of charge, on-site access to the Project site, and any necessary utilities and plant personnel needed by Parkson for the purpose of repairing and/or replacing nonconforming Equipment per this Warranty.

The following will void this Warranty:

(A) Equipment is used for purposes other than those for which it was designed;
(B) Equipment is not used in accordance with generally approved practices;
(C) Disasters, whether natural or manmade, such as fire, flood, wind, earthquake, cave-in, lightning, war, or vandalism;
(D) Unauthorized alterations to or modifications of the Equipment not approved by Parkson, in writing;
(E) Abuse, neglect or misuse of Equipment, including without limitation, operation of Equipment after a defect is discovered;
(F) Operation of Equipment by persons not properly trained for that purpose;
(G) Failure to operate the Equipment in accordance with Parkson's specifications, O&M manuals or other written guidelines; and/or
(H) Failure to perform regular cleaning, inspection, adjustment and/or preventative maintenance.

Notes:

(1) Parkson is not liable for any corrective work or expenditure that has not been authorized by Parkson in writing prior to the commencement of such work and prior to committing to such expenditures.
(2) Inspection service calls, requested by Buyer, where no evidence of nonconforming materials and/or workmanship is found, will be invoiced to the Buyer at Parkson's current per diem, plus all travel and living expenses.
(3) Onsite labor and freight are not covered by this Warranty.
(4) This Warranty does not cover normal wear and tear.
(5) Following a Warranty claim, verification of proper operation and maintenance is required.
(6) Physical damage due to external forces and/or accident is not covered by this Warranty.
(7) The effects of corrosion and unforeseeable influent characteristics are excluded from this Warranty.
(8) Actions by 3rd parties in causing nonconformity of the Equipment are not covered under this Warranty.

THE FOREGOING LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER GUARANTEES AND WARRANTIES OF ANY KIND WHATSOEVER, WRITTEN, ORAL OR IMPLIED; ALL OTHER WARRANTIES INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED.

PARKSON SHALL HAVE NO OBLIGATION OR LIABILITY, WHETHER ARISING IN CONTRACT (INCLUDING WARRANTY), TORT (INCLUDING ACTIVE, PASSIVE, OR IMPUTED NEGLIGENCE AND STRICT LIABILITY), OR OTHERWISE, FOR DAMAGE TO THE EQUIPMENT, PROPERTY DAMAGE, LOSS OF USE, REVENUE OR PROFIT, COST OF CAPITAL, COST OF SUBSTITUTE EQUIPMENT, ADDITIONAL COSTS INCURRED BY BUYER (FOR CORRECTION OR OTHERWISE) OR ANY OTHER INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM NONDELIVERY OR FROM THE USE, MISUSE OR INABILITY TO USE THE EQUIPMENT. This exclusion applies even if the Warranty fails of its essential purpose and regardless of whether such damages are sought for breach of warranty, breach of contract, negligence, or strict liability in tort or under any other legal theory.

This document constitutes the sole Warranty in its entirety and no other provisions express or implied exist. Any modification of this Warranty must be in writing and signed by an authorized representative of Parkson. An adjustment made per this Warranty does not void the Warranty, nor does it imply an extension of the Warranty Period. Equipment repaired during the Warranty Period carries the un-expired portion of this original Warranty only. This Warranty is governed by the laws of the state of Florida.

Parkson™
Treating Water Right

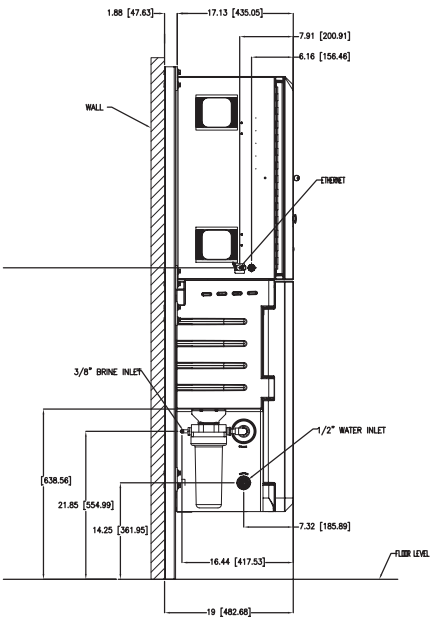
MaximOS™

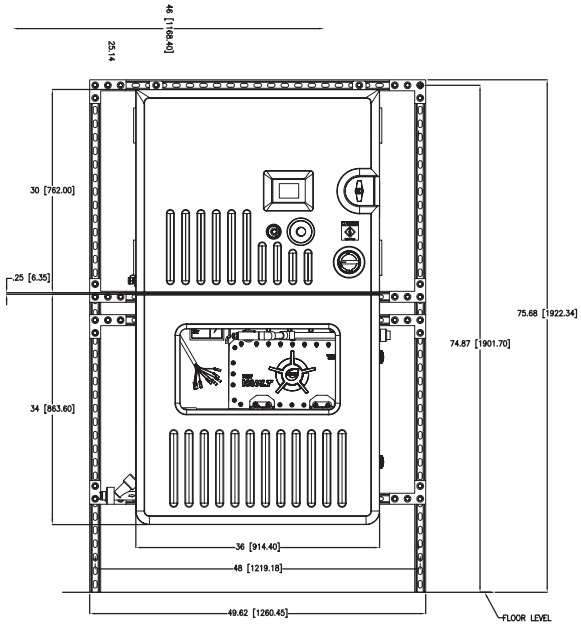
Small Series Sodium Hypochlorite (HYPO) Self Cleaning Product Data Sheet

The Small Series on-site generator is designed for high efficiency, low lifecycle cost, durability and reliability. Available as skid-mounted or stand-alone system. The self-cleaning Small Series with self-adjusting flow control is virtually maintenance free. With over 40% improved salt and energy efficiencies and a new self-cleaning system, the Small Series is built for cost-effective, problem-free operation. The Small Series features an easy-to-upgrade cell to convert between sodium hypochlorite (HYPO) and advanced Mixed Oxidant Solution (MOS) with expandable capacity for ultimate flexibility. Using just salt and power to generate a dilute chlorine-based solution eliminates the storage and handling of hazardous disinfection chemicals while providing chlorine residual.

	SCH-25	SCH-50	SCH-75	SCH-100
Rated FAC Capacity	25 lbs/day 11.3 kg/day	50 lbs/day 22.7 kg/day	75 lbs/day 34 kg/day	100 lbs/day 45.4 kg/day
Salt Conversion (SCE)*	3.0 lb salt/lb FAC / 3.0 kg salt/kg FAC			
Energy Conversion (ECE)*	2.0 kW-hr/lb FAC / 4.4 kW-hr/kg FAC			
FAC Concentration*	6,500 mg/L (+/- 500)			
Flow Rate	22.5 gph (+/- 15%) 85.2lph (+/- 15%)	45 gph (+/- 15%) 170.4 lph (+/- 15%)	67.5 gph (+/- 15%) 255.6 lph (+/- 15%)	90 gph (+/- 15%) 340.8 lph (+/- 15%)
Electrical Service Requirement (OSG Only)	200-240 VAC, 1 ph, 30A, 50/60 hertz	200-240 VAC, 1 ph, 60A, 50/60 hertz	200-240 VAC, 1 ph, 90A, 50/60 hertz	200-240 VAC, 1 ph, 120A, 50/60 hertz
Nominal Energy to Unit	13 A / 3 KVA	26 A / 6 KVA	39 A / 9 KVA	52 A / 12 KVA
Air Temperature Required	45° to 110° F / 7.2° to 43° C			
Internal Vent Energy Added	0.7 kW	1.4 kW	2.1 kW	2.8 kW
Recommended Feed Water Temperature*	50° to 80° F / 10° to 26.7° C			
Allowable Feed Water Temperature*	40° to 95° F / 5° to 35° C			
Feed Water Pressure	25 to 100 psi / 172 to 689 kPa			
Self Cleaning	YES			
Flow Control	YES			
Approximate Dimensions (WxDxH)	36 x 17.4 x 65.5 inches / 91.44 x 44.2 x 166.37 cm			

*Performance may vary depending on salt quality, water quality, and water temperature.





Parkson
Treating Water Right

50 YEARS 2010

Fort Lauderdale
Chicago
Montreal
Kansas City

1.888.PARKSON
technology@parkson.com
www.parkson.com

SECTION I
SODIUM HYPOCHLORITE ON-SITE GENERATOR SCH-100

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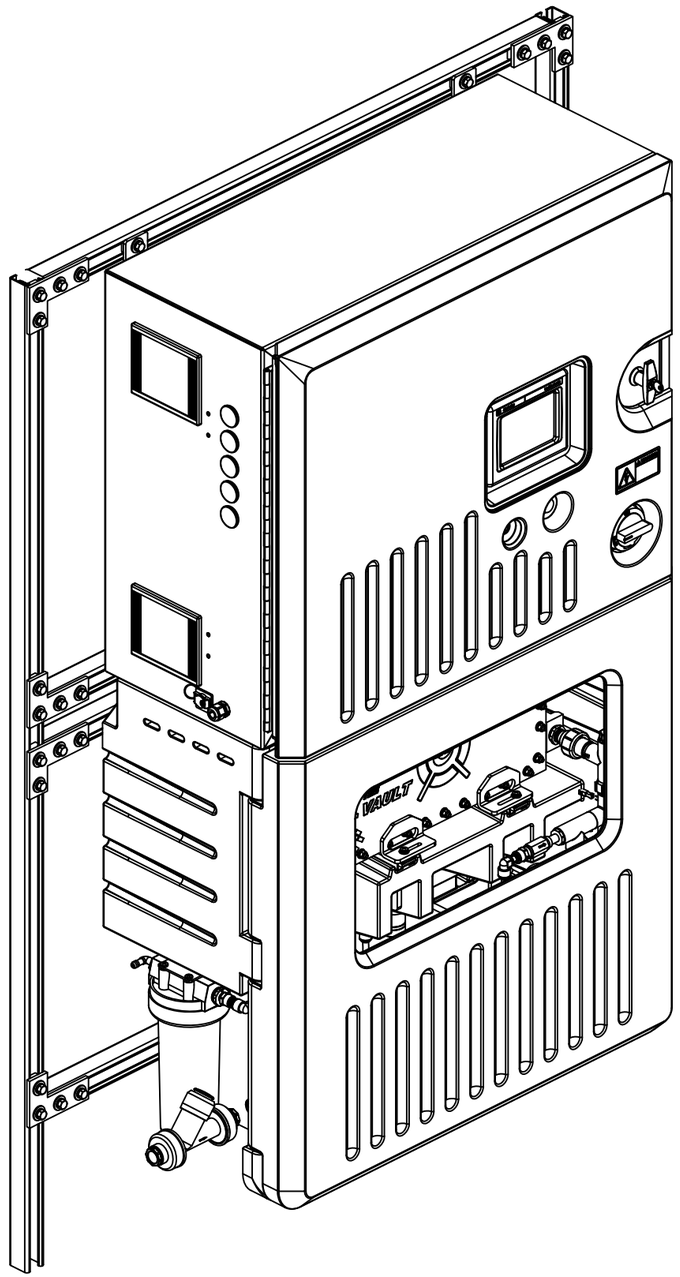
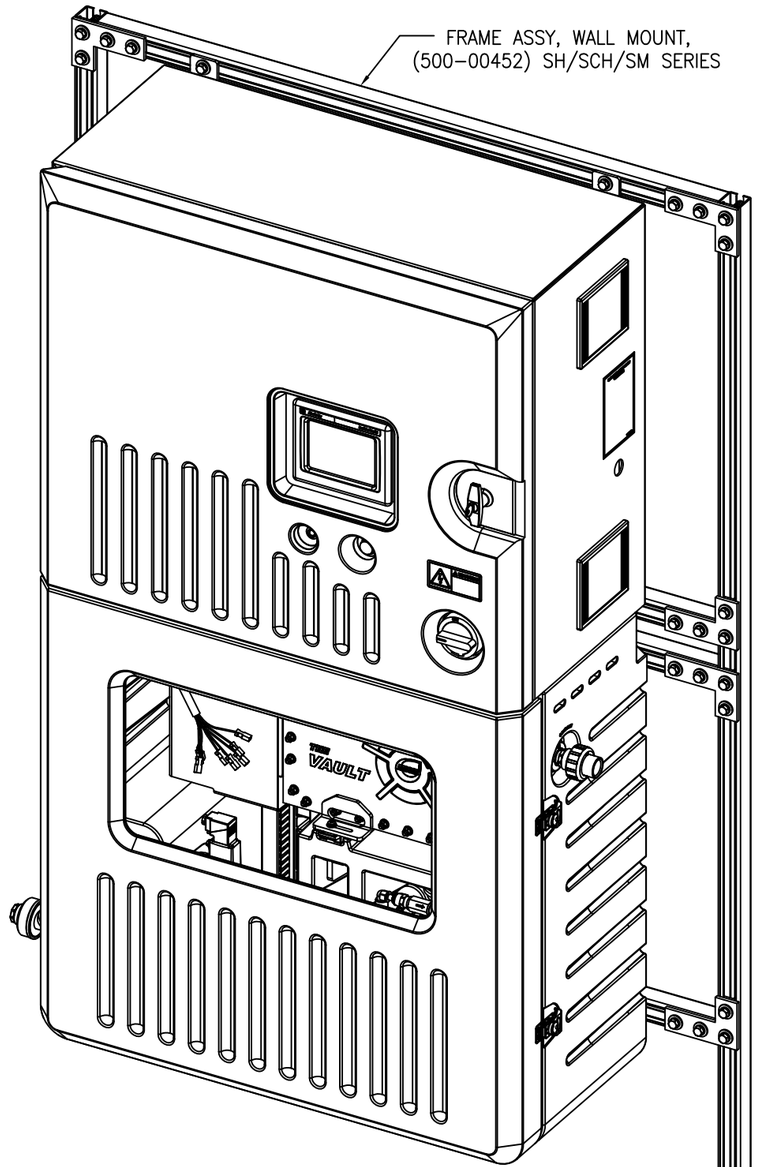
Flow Control	YES			
Approximate Dimensions (WxDxH)	36 x 17.4 x 65.5 inches 91.44 x 44.2 x 166.37 cm			

*Performance may vary depending on salt quality, water quality, and water temperature.

NOTES:

1. UNISTRUT INSTALLATION KIT INCLUDES:
   FRAME ASSY, WALL MOUNT, SH/SCH/SM SERIES (500-00452).
   FOR ATTACHMENT TO APPROPRIATE 48" CENTERED WALL CONSTRUCTION.
2. MINIMUM DISTANCE REQUIRED FOR FILTER HOUSING REMOVAL.
3. WATER PRESSURE REQUIREMENTS PER UNIT 30 PSI MINIMUM.
4. ELECTRIC SERVICE REQUIREMENTS:
   A. 220 VAC 1-PHASE, 30 A - M15/H25
      220 VAC 1-PHASE, 60 A - M30/H50
      220 VAC 1-PHASE, 90 A - M45/H75
      220 VAC 1-PHASE, 120 A - M60/H100
   B. INTERNATIONAL POWER OPTIONS AVAILABLE. CONTACT PARKSON CORP FOR DETAILS.
   C. **GROUND CONNECTION MANDATORY.
5. POWER TO CABINET PROVIDED BY OTHERS.
6. BRINE AND OXIDANT TANK SIZES VARY WITH INSTALLATION. CONTACT PARKSON CORP.FOR DETAILS.
7. POWER SUPPLIES TO ELECTROLYTIC CELL AND CONTROLLER ARE INTERNAL TO MAXIMOS SERIES SYSTEMS AND ARE SHIPPED WIRED.
8. DIMENSIONS IN PARENTHESIS () ARE METRIC EQUIVALENT (MM).
9. ADD 1X 300-02552, 3/4" "Y" STRAINER TO WATER INLET PLUMBING LINE.
10. APPROXIMATE UNIT WEIGHTS / FLOW RATES:
    H25/M15 : 230 lbs. / 22/19 (GPH)
    H50/M30 : 260 lbs. / 44/38 (GPH)
    H75/M45 : 290 lbs. / 66/57 (GPH)
    H100/M60 : 320 lbs. / 88/76 (GPH)
11. CUSTOMER HOOK UP:
    HARD PLUMBING, SOFT PLUMBING AND Y-STRAINER HOOK UP COMPONENTS ARE SHOWN IN DETAIL VIEWS E & F, THESE COMPONENTS ARE SUPPLIED BY PARKSON IN THE OPERATIONS KIT 500-00449.
12. Y-STRAINER LOCATION AND ORIENTATION TO BE DETERMINED AT INSTALLATION.





REV	DESCRIPTION	DATE	BY
04	UPDATED SH/SCH/SM ASSY. UPDATED THE FRAME ASSY.	2/25/15	RY
03	ADDED WALL MOUNT FRAME ASSY	08/03/10	RMG
02	REPLACED ELEC BOX ASSY AND PLUMB BOX ASSY WITH THE CURRENT DESIGN OF ASSY'S.	03/10/10	RMG
01	ORIGINAL ISSUE	10/07/09	RMG

__PRELIMINARY X APPROVAL
__INFORMATION __CERTIFIED

THIS DRAWING IS LIMITED TO FUNCTIONAL DESIGN, GENERAL ARRANGEMENT AND CLEARANCE. NO RESPONSIBILITY IS ACCEPTED BY PARKSON CORPORATION FOR OTHER DIMENSIONS, QUANTITIES, OR COORDINATION WITH OTHER EQUIPMENT OR DRAWINGS EXCEPT AS STATED IN PURCHASE ORDER.

DRAWN BY	RMG
DATE	10/07/09
CHECKED BY	RMG
DATE	10/07/09
SCALE	1/2"=1"
SIZE	B

Parkson™

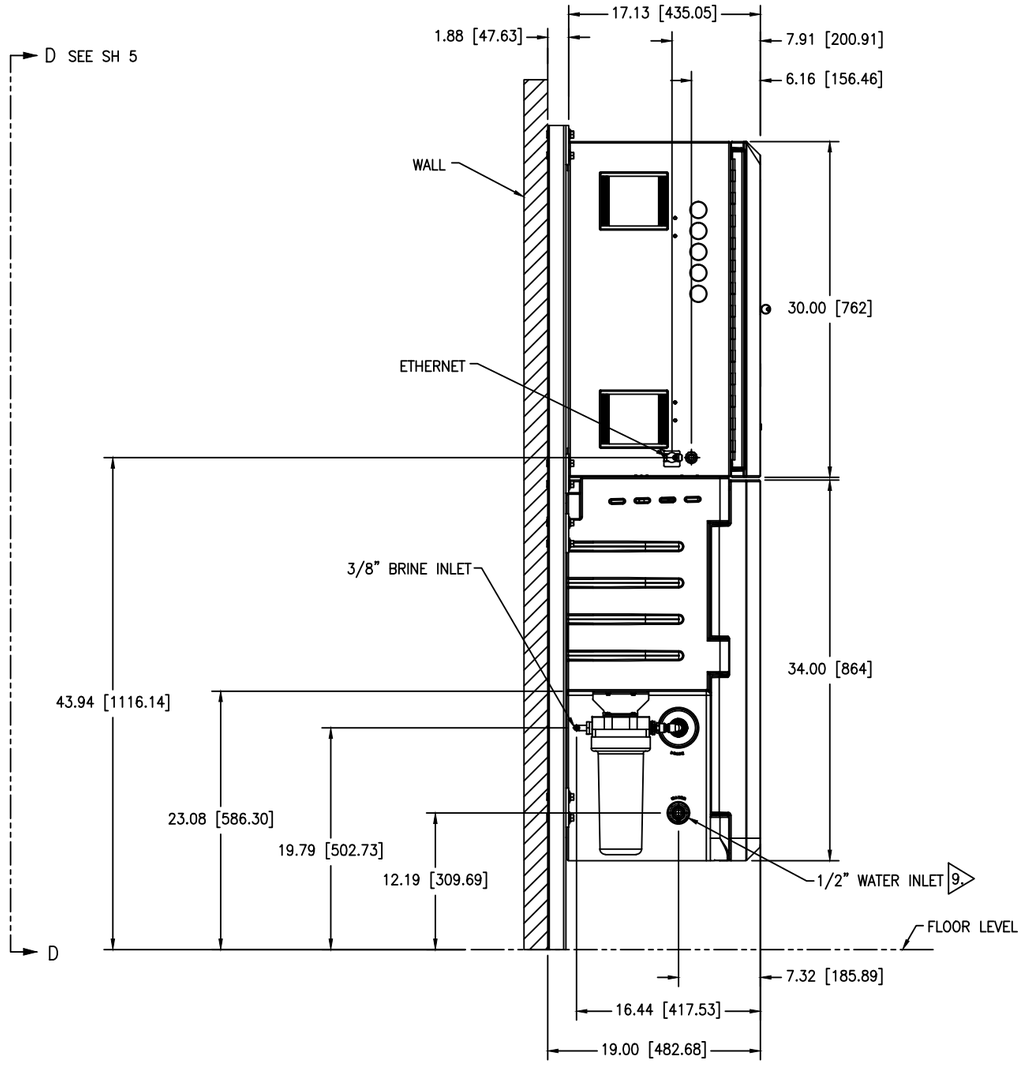
PROJECT NAME

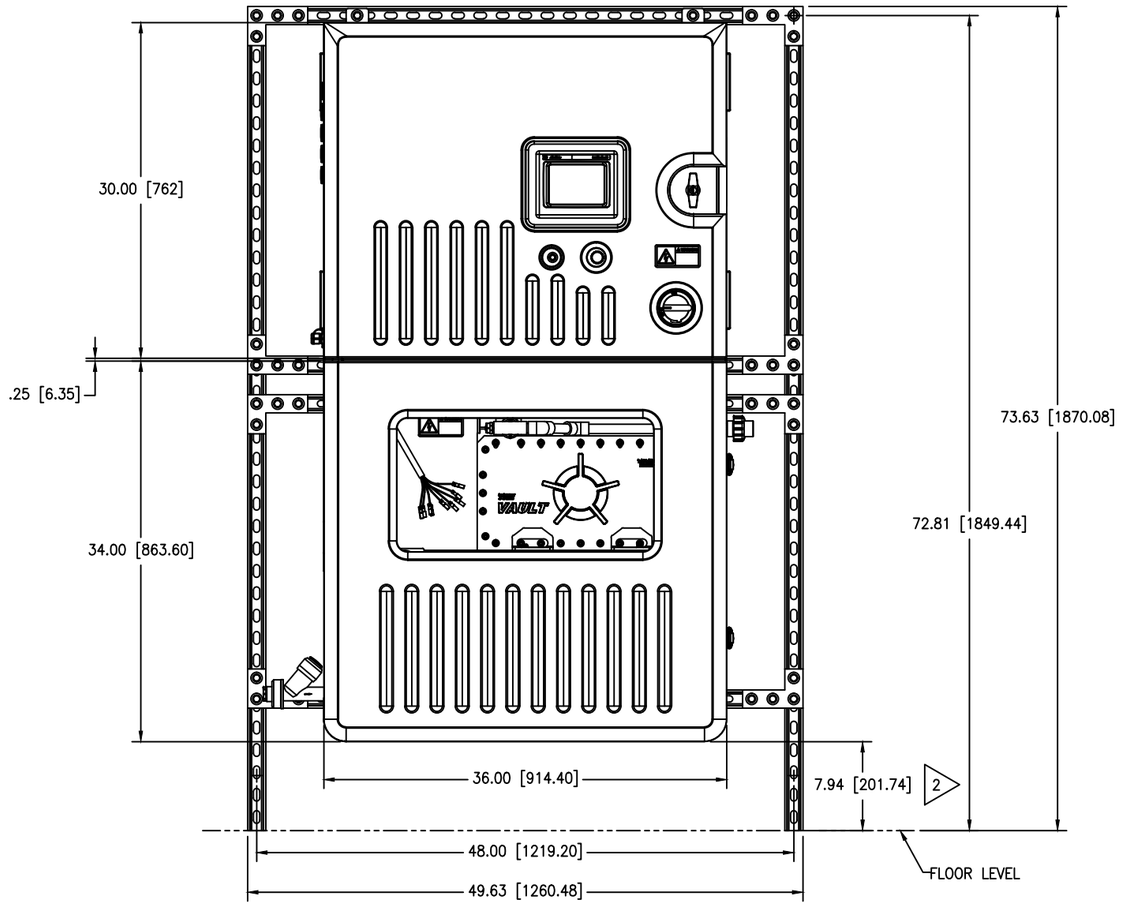
TITLE
GENERAL ARRANGEMENT
WALL MOUNT
SH/SCH/SM SERIES

REFERENCE INFORMATION

DRAWING NO
112-00001
SHEET 1 OF 7

REV
4





UNISTRUT MOUNTING, CONTROL & PLUMBING ENCLOSURES LOCATION

REV	DESCRIPTION	DATE	BY

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DRAWN BY	DATE
RMG	10/07/09
CHECKED BY	DATE
RMG	10/07/09
SCALE	SIZE
3/8"=1"	B

Parkson™

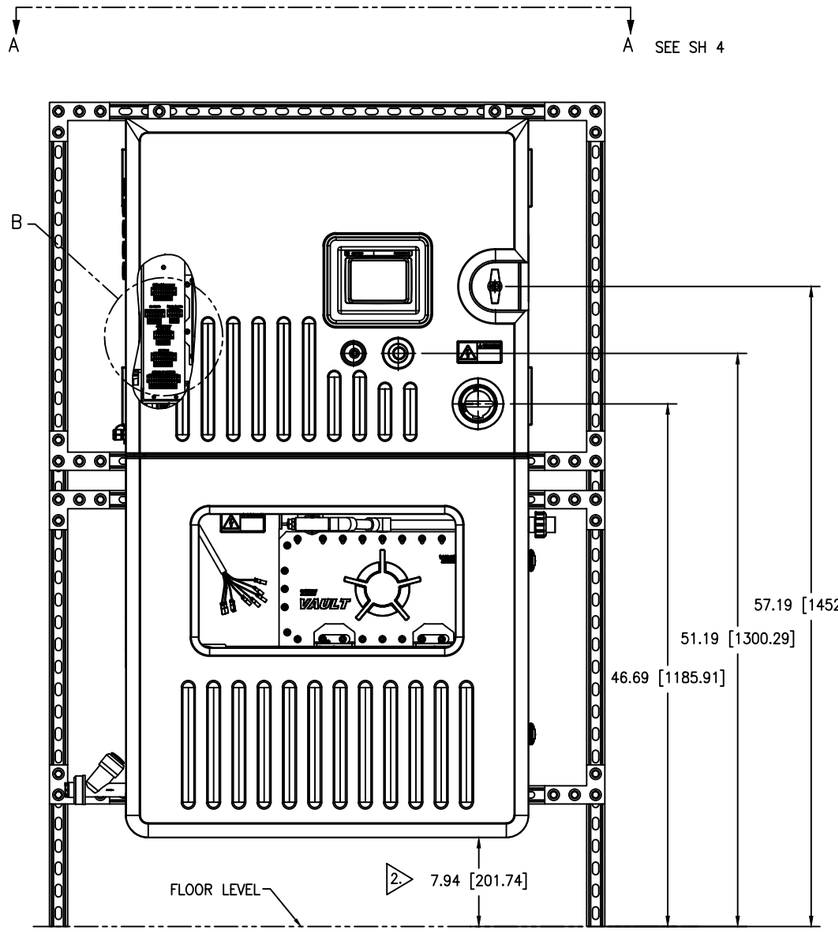
PROJECT NAME

REFERENCE INFORMATION

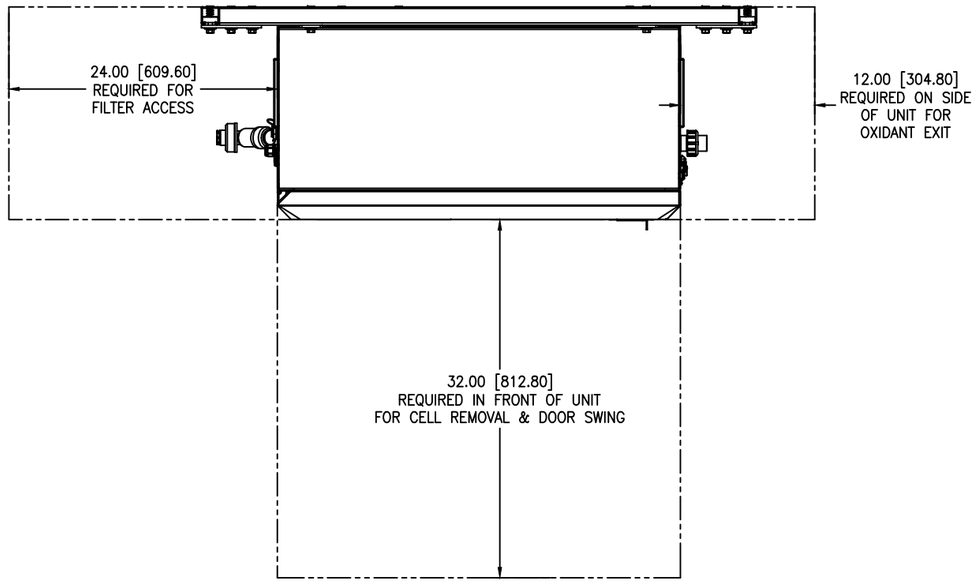
TITLE
GENERAL ARRANGEMENT
WALL MOUNT
SH/SCH/SM SERIES

DRAWING NO
112-00001
SHEET 2 OF 7

REV
4



FRONT ELEVATION VIEW
(SOME COMPONENTS HIDDEN FOR CLARITY)



VIEW A–A
SCALE 1 : 5
(PLAN VIEW)
(SOME COMPONENTS HIDDEN FOR CLARITY)

REV	DESCRIPTION	DATE	BY

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RMG	10/07/09
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SCALE	SIZE
3/8"=1"	B

Parkson

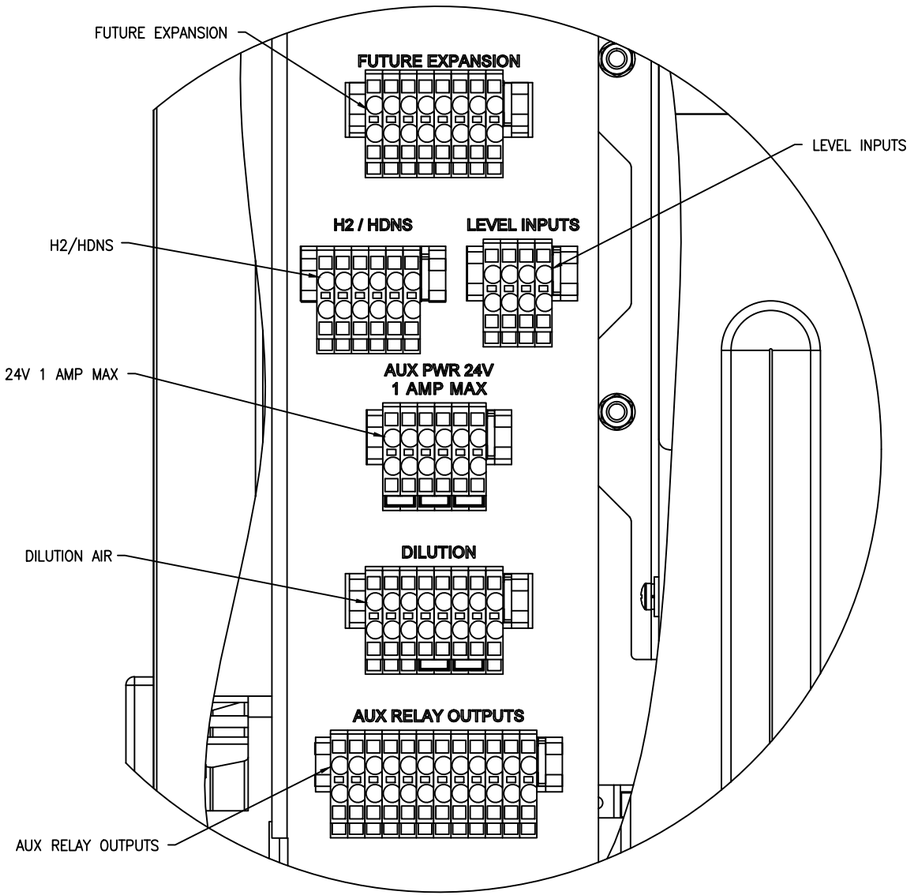
PROJECT NAME

TITLE
GENERAL ARRANGEMENT
WALL MOUNT
SH/SCH/SM SERIES

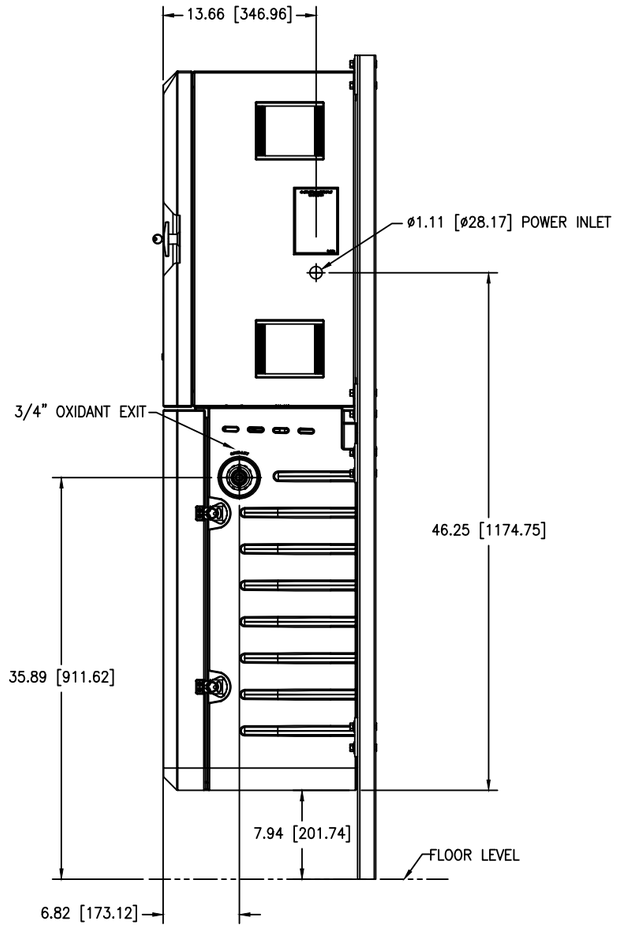
REFERENCE INFORMATION

DRAWING NO
112–00001
SHEET 3 OF 7

REV
4



DETAIL B
SCALE 1.5 : 1



VIEW C–C
SCALE 1 : 5

REV	DESCRIPTION	DATE	BY

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RMG	10/07/09
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SCALE	SIZE
3/8"=1"	B

Parkson

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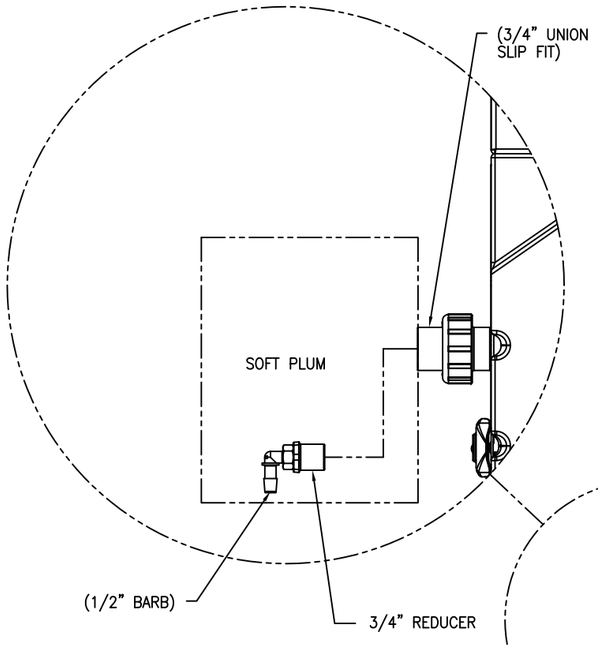
TITLE
GENERAL ARRANGEMENT
WALL MOUNT
SH/SCH/SM SERIES

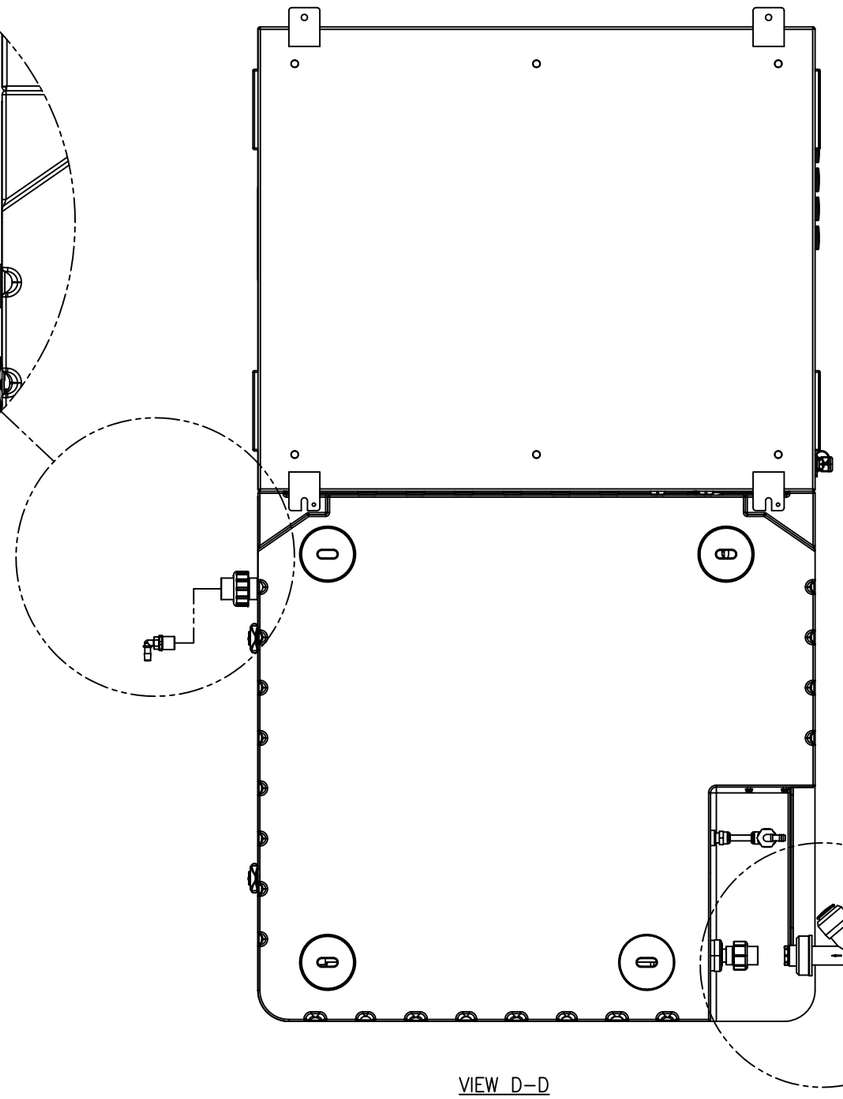
REFERENCE INFORMATION

DRAWING NO
112–00001
SHEET 4 OF 7

REV
4



11 DETAIL E
SCALE 2 : 5



VIEW D–D
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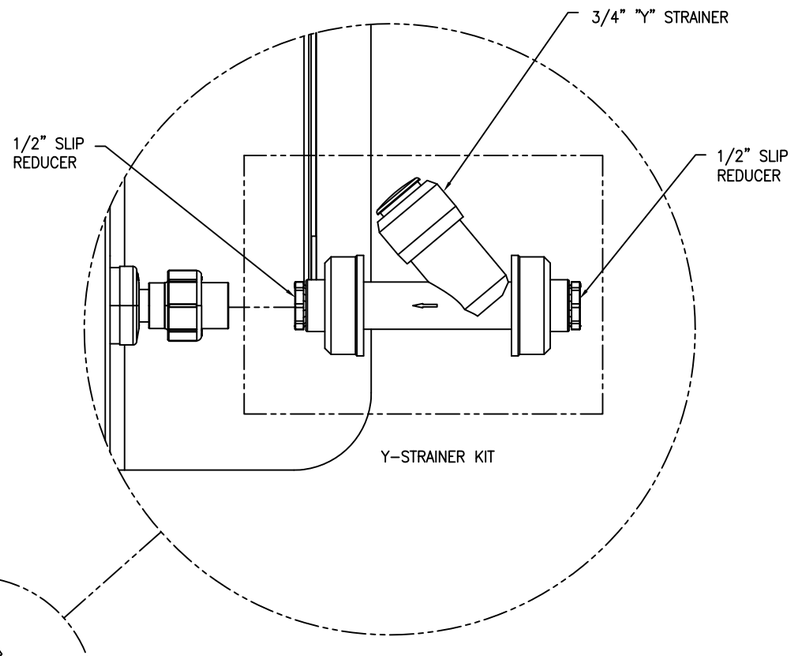

DETAIL F
SCALE 1 : 2
11 12

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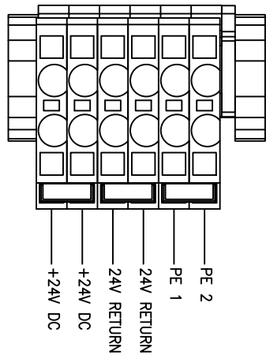
AUXILIARY POWER CONN

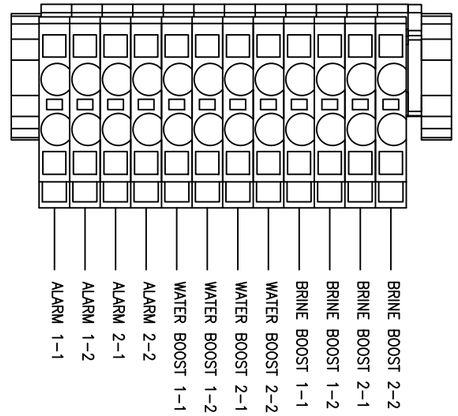
THE AUXILIARY POWER CONNECTOR PROVIDES FIELD CONNECTION POINTS TO SUPPLY POWER FOR A HYDROGEN DETECTOR OR TO PROVIDE 24V POWER TO AUXILARY RELAYS. CURRENT IS LIMITED TO 1 AMP AND IS FUSED INTERNALLY.



CONNECTION NAME	CONNECTION DESCRIPTION
+24V DC	24 VOLTS DC POWER
24V RETURN	RETURN CONNECTION FOR 24VDC POWER
PE	PHYSICAL EARTH CONNECTION

AUXILIARY RELAY CONN

THE AUXILIARY RELAY CONNECTOR PROVIDES FIELD CONNECTION POINTS FOR THE AUXILIARY RELAY CONTACTS. THERE ARE THREE AUXILIARY RELAYS: ALARM, WATER BOOST AND BRINE BOOST. EACH RELAY HAS TWO SETS OF NORMALLY OPEN CONTACTS. THE RELAY CONTACTS ARE RATED FOR 277V AC @ 15 AMPS OR 28 V DC @15 AMPS.



CONNECTION NAME	CONNECTION DESCRIPTION
ALARM	CONTACT CLOSE WHEN SYSTEM SHUTS DOWN FOR A HARD FAULT
WATER BOOST	CONTACTS CLOSE WHEN SYSTEM STARS UP (RUNNING)
BRINE BOOST	CONTACTS CLOSE WHEN SYSTEM STARTS UP (RUNNING)

REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL

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DRAWN BY	DATE
RMG	10/07/09
CHECKED BY	DATE
RMG	10/07/09
SCALE	SIZE
1/2"=1"	B

Parkson™

PROJECT NAME

TITLE: GENERAL ARRANGEMENT WALL MOUNT SH/SCH/SM SERIES

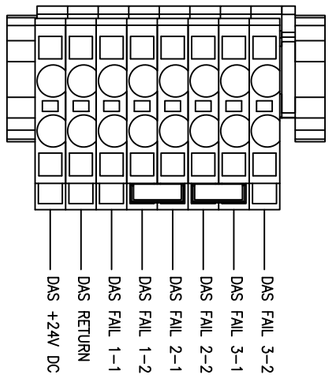
REFERENCE INFORMATION

DRAWING NO: 112-00001 SHEET 6 OF 7

REV: 4

DILUTION AIR CONN

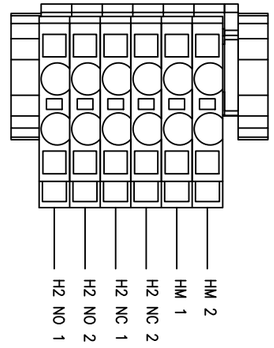
THE AUXILIARY RELAY CONNECTOR PROVIDES FIELD CONNECTION POINTS FOR AN AUXILIARY DILUTION AIR SYSTEM AND/OR ASSOCIATED EXTERNAL DILUTION AIR SYSTEM SENSORS. THE CONNECTIONS SUPPORTED ARE PARKSON EXTERNAL DILUTION AIR SYSTEM ENABLE AND PARKSON EXTERNAL DILUTION AIR SYSTEM FAILURE INPUT. TWO OTHER FAILURE INPUTS CAN BE CONNECTED TO EXTERNAL DIFFERENTIAL PRESSURE SWITCHES OR AN EXTERNAL FLOW SWITCH.



CONNECTION NAME	CONNECTION DESCRIPTION
DAE +24V DC	24V DC, ENABLE FOR PARKSON EXTERNAL DA SYSTEM, TURNS ON AT START UP
DAE RETURN	RETURN FOR ENABLE
DAS FAIL 1-1	FAILURE INPUT (24V DC OK -OVER DC FAIL)
DAS FAIL 1-2	POS +24V DC (SOURCE OF FAILURE INPUT 1)
DAS FAIL 2-1	FAILURE INPUT (24V DC OK -OVER DC FAIL)
DAS FAIL 2-2	POS +24V DC (SOURCE OF FAILURE INPUT 2)
DAS FAIL 3-1	FAILURE INPUT (24V DC OK -OVER DC FAIL)
DAS FAIL 3-2	POS +24V DC (SOURCE OF FAILURE INPUT 3)

H2 / HARDNESS CONN

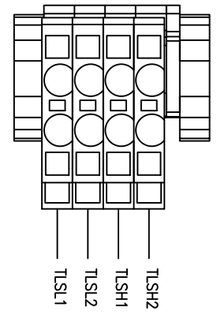
THE H2 / HARDNESS CONNECTOR PROVIDES FIELD CONNECTION POINTS FOR AN EXTERNAL HARDNESS MONITOR AND/OR AN EXTERNAL HYDROGEN MONITOR. THE HYDROGEN MONITOR INPUTS REQUIRE BOTH NORMALLY CLOSED AND NORMALLY OPEN CONTACTS. THE HARDNESS MONITOR INPUT ONLY REQUIRES NORMALLY CLOSED DRY CONTRCTS.



CONNECTION NAME	CONNECTION DESCRIPTION
H2 NO 1	NORMALLY OPEN INPUTS
H2 NO 2	NORMALLY OPEN INPUTS
H2 NC 1	NORMALLY CLOSED INPUTS
H2 NC 2	NORMALLY CLOSED INPUTS
HM 1	HARDNESS MONITOR INPUT
HM 2	+24V DC SOURCE OF HRDS MON INPUT

LEVEL INPUT CONN

THE LEVEL INPUT CONNECTOR PROVIDES FIELD CONNECTION POINTS FOR EXTERNAL FLOATS. THE DRY CONTACT OUTPUTS OF A TANK LEVEL CONTROLLER, OR THE DRY CONTACT OUTPUTS OF A PLANT PLC OR OTHER CONTROLLER DEVICE.



CONNECTION NAME	CONNECTION DESCRIPTION
TLS1	LOWER TANK LEVEL INPUT
TLSL2	+24V DC SOURCE OF LOWER TANK LEVEL INPUT
TLSH1	UPPER TANK LEVEL INPUT
TLSH2	+24V DC SOURCE OF UPPER TANK LEVEL INPUT

REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL

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DRAWN BY: RMG	DATE: 10/07/09
CHECKED BY: RMG	DATE: 10/07/09
SCALE: 1/2"=1"	SIZE: B

Parkson™

PROJECT NAME:

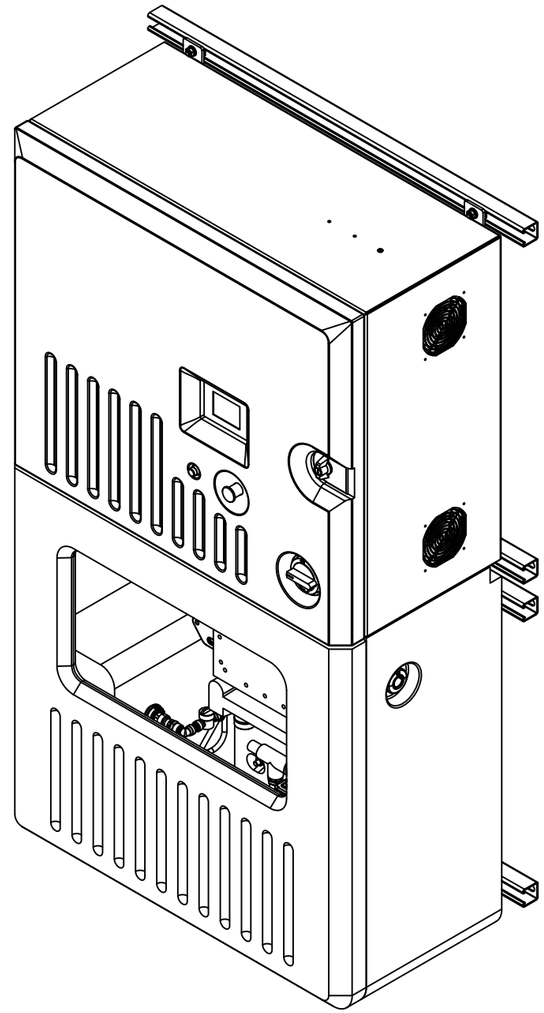
REFERENCE INFORMATION:

TITLE: GENERAL ARRANGEMENT WALL MOUNT SH/SCH/SM SERIES

DRAWING NO: 112-00001 SHEET 7 OF 7

REV: 4

MAXIMOS SODIUM HYPOCHLORITE GENERATION EQUIPMENT



INDEX

REV	DESCRIPTION	DATE	BY

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DRAWN BY: chinmayv	DATE: 06/24/16
CHECKED BY: Luc L	DATE: 06/29/16
SCALE: NTS	SIZE: B

Parkson™

PROJECT NAME: P02600585 WICHITA REUSE WSC, KS

REFERENCE INFORMATION:

TITLE: MAXIMOS SERIES ON-SITE GENERATOR SCH-100 TITLE PAGE & INDEX

DRAWING NO: P0260058502-01 SHEET 1 OF 7

REV: —

PROCESS & INSTRUMENTATION DIAGRAM SYMBOLOGY

VALVE SYMBOLS

- BALL
- GATE
- BUTTERFLY
- GLOBE
- PLUG
- DIAPHRAGM
- PINCH
- NON SPECIFIC
- MANUAL THROTTLING
- NEEDLE
- 3 WAY
- 4 WAY
- ANGLE
- SAMPLE TAP
- KNIFEGATE
- CHECK
- WEIGHTED CHECK
- BALL CHECK
- SAFETY RELIEF
- FLOAT ACTUATED
- SAFETY RELIEF 3-WAY VALVE

PIPING NOMENCLATURE/MATERIAL

ACH	=	HYDROCHLORIC ACID
AB	=	AIR BLOW/AIR BURST
BR	=	BRASS
BW	=	BACKWASH
CA	=	CAUSTIC
CI	=	CAST IRON
CO	=	COAGULANT
CPVC	=	CHLORINATED POLY VINYL CHLORIDE
CS	=	CARBON STEEL
CU	=	COPPER
CW	=	CITY WATER
DE	=	DIATOMACEOUS EARTH
DI	=	DUCTILE IRON
FA	=	FERRIC ACID H2FE04
FLOC	=	FLOCULANT
FRP	=	FIBERGLASS
GCS	=	GALVANIZED CARBON STEEL
PAC	=	POWDERED ACTIVATED CARBON
PE	=	POLYETHYLENE
PVC	=	POLY VINYL CHLORIDE
PYS	=	POLYMER SLURRY
RW	=	RAW WATER
SL	=	SLUDGE
SH	=	SODIUM HYPOCHLORITE
SS	=	STAINLESS STEEL
TR	=	TREATED WATER
UTW	=	UNTREATED WATER
WAS	=	WASTE ACTIVATED SLUDGE
WS	=	WASTE SUPPLY
WW	=	WASTE WATER

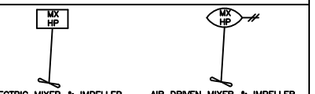
PROCESS COMPONENTS

- Y STRAINER
- DIFFUSER
- STATIC MIXER
- PRIMING BULB
- WEIR
- VENT W/SCREEN
- DIAPHRAGM SEAL
- RUPTURE DISK
- VENTURI
- PULSATION DAMPENER
- FLOW ORIFICE
- FLOW NOZZLE
- SPRAY NOZZLE
- PRESSURE INDICATOR
- AIR FILTER
- PRESSURE REGULATOR
- FILTER/STRAINER
- CALIBRATION COLUMN
- OPEN DRAIN

PIPING CONNECTIONS/COMPONENTS

- FLANGE
- TEE
- COUPLING
- WELDED JOINT
- BLIND FLANGE
- REDUCER
- UNION
- FLEXIBLE

MISC. COMPONENTS



ELECTRIC MIXER & IMPELLER

AIR DRIVEN MIXER & IMPELLER

AIR COMPRESSOR

VALVE ACTUATORS & SYMBOLS

- ELECTRICALLY ACTUATED SOLENOID
- AIR ACTUATED SOLENOID
- AIR ACTUATED DIAPHRAGM
- SINGLE AIR ACTUATED
- DUAL AIR ACTUATED W/POSITION INDICATOR
- MOTORIZED
- MANUAL THROTTLED
- ENERGIZED/DE-ENERGIZED FLOW PATH

EX	DE-ENERGIZED FLOW PATH
NC	NORMALLY CLOSED NON ACTUATED
NO	NORMALLY OPEN NON ACTUATED
FC	FAILED CLOSED
FO	FAILED OPEN

PUMP SYMBOLS

HORIZONTAL CENTRIFUGAL

VERTICAL LIFT

VERTICAL CENTRIFUGAL

VERTICAL INLINE

DIAPHRAGM CHEMICAL DOSING

SUMP

PROGRESSIVE CAVITY

NON SPECIFIC PUMP

AIR ACTUATED DIAPHRAGM

POSITIVE DISPLACEMENT

PUMPS, BLOWERS & OTHER SYMBOLS

PERISTALTIC PUMP

CENTRIFUGAL BLOWER

POSITIVE DISPLACEMENT BLOWER

HEATER

CHILLER

ELECTRIC MOTOR

AIR MOTOR

AC VARIABLE FREQUENCY

DC FREQUENCY INVERTER

MECHANICAL SPEED ADJUST

INSTRUMENT/CONTROL ABBREVIATIONS

AS	=	AIR SUPPLY
C	=	CURRENT (AMPS)
COND	=	CONDUCTIVITY
DP	=	DELTA PRESSURE
HOA	=	HAND/OFF/AUTO
I/P	=	CURRENT TO PRESSURE
IS	=	INSTRUMENT AIR
O/I	=	ON/OFF
ORP	=	OXIDATION REDUCTION POTENTIAL
RES	=	RESISTIVITY
TURB	=	TURBIDITY
ZSC	=	LIMIT SWITCH CLOSED
ZSO		LIMIT SWITCH OPEN

PIPE LINE NOMENCLATURE

LINE SIZE – PIPE MATERIAL – PROCESS

EXAMPLE: 2"– SS – WS

2" STAINLESS STEEL WATER SUPPLY

DIVIDERS & EXTENSIONS

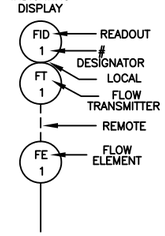
PARKSON/OTHERS	FROM TO LINE
SUPPLIED BY DIVIDER	DENOTES LINE EXTENSIONS

INSTRUMENTATION IDENTIFIERS

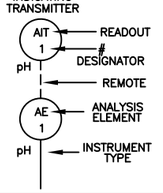
	FIELD MOUNTED DEVICE LOCAL	FRONT ENC. DEVICE NORMALLY ACCESSIBLE	INSIDE ENC. DEVICE NORMALLY INACCESSIBLE
DISCRETE INSTRUMENTS I.E.. SWITCHES, SENSORS, INDICATORS	○	⊖	⊖
INDICATING LIGHTS ALARMS, & SIREN	◯	⊖	⊖
DISTRIBUTED CONTROL/SHARED DISPLAY OR SCREEN	◯	⊖	⊖
PROGRAMMABLE LOGIC CONTROLLER. DISCRETE, ANALOG, INPUTS OUTPUT POINTS	◇	◇	◇
COMPUTER CONTROLLED FUNCTION. SUPERVISORY CONTROL AND DATA ACQUISITION	⬡	⬡	⬡

EXAMPLES

ANALOG FLOW INDICATING DISPLAY



ANALOG INDICATING TRANSMITTER



INSTRUMENTATION EXAMPLES

LETTERS	FIRST LETTER: MEASURED OR INITIATING VARIABLE	FIRST LETTER: MODIFIER (FIRST LETTER)	SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION	SUCCEEDING LETTERS: OUPUT FUNCTION	SUCCEEDING LETTERS: MODIFIER (OR OUTPUT FUNCTION)
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER CHOICE	USER CHOICE	
C	USER CHOICE	CONTROL		CONTROL	
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT/SENSOR		
F	FLOW RATE	RATIO (FRACTION)			
G	USER CHOICE		GLASS/VIEWING		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE, HUMIDITY	MOMENTARY			MIDDLE/INTERMEDIATE
N	HYDROGEN		INDICATE	USER CHOICE	USER CHOICE
O	OPTICAL		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT, CONNECTION		
Q	QUANTITY, EVENT	INTEGRATE, TOTALIZE			
R	RADIATION	RELIEF, REDUCING	RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, VISCOSITY	VACUME		VALVE, DAMPER, OR	
W	WEIGHT		WELL	LOUVER	
X	UNCLASSIFIED	X-AXIS	ASME TURBINE TEST	UNCLASSIFIED	UNCLASSIFIED
Y	PRESENCE, STATE	Y-AXIS		RELAY,COMPUTE, FINAL	
Z	POSITION	Z-AXIS		CONTROL ELEMENT	

LEGEND

- PARKSON PROVIDED PLUMBING/CONNECTIONS
- FIELD INSTALLED PLUMBING BY OTHERS
- PARKSON PROVIDED BOUNDARIES
- PRESSURIZED AIR SUPPLY LINES
- REMOTE ELECTRICAL CONNECTION
- DOUBLE CONTAINMENT PIPE BY OTHERS
- SOFTWARE LINK OR DATA LINK

REV	DESCRIPTION	DATE	BY

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DRAWN BY: chinmayv	DATE: 06/24/16
CHECKED BY: Luc L	DATE: 06/29/16
SCALE: NTS	SIZE: B

Parkson™

PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

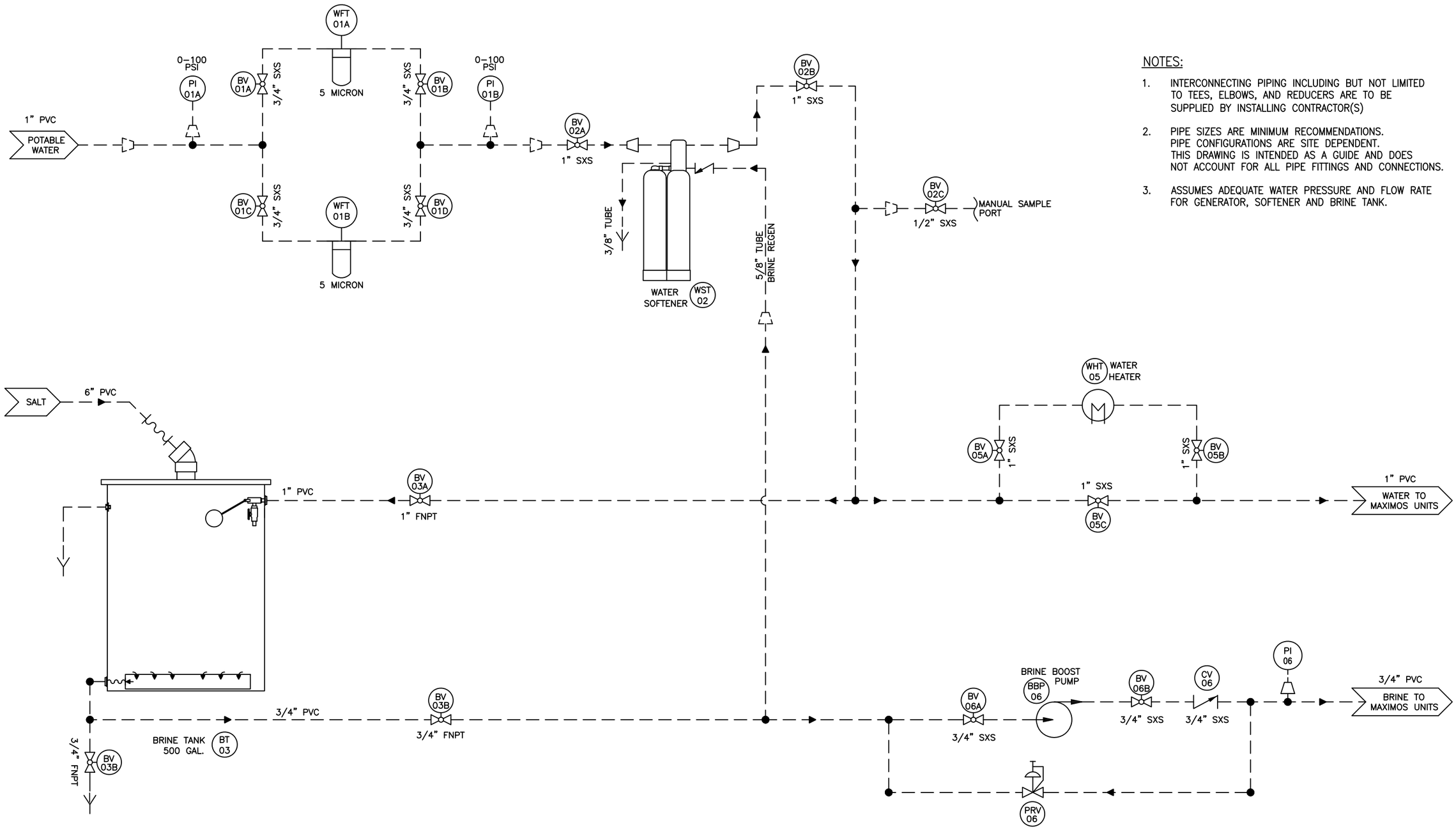
REFERENCE INFORMATION

TITLE
MAXIMOS SERIES ON-SITE GENERATOR
SCH-100
LEGEND AND SYSMBOLS

DRAWING NO P0260058502-02

SHEET 2 OF 7

REV —



NOTES:

1. INTERCONNECTING PIPING INCLUDING BUT NOT LIMITED TO TEES, ELBOWS, AND REDUCERS ARE TO BE SUPPLIED BY INSTALLING CONTRACTOR(S)
2. PIPE SIZES ARE MINIMUM RECOMMENDATIONS. PIPE CONFIGURATIONS ARE SITE DEPENDENT. THIS DRAWING IS INTENDED AS A GUIDE AND DOES NOT ACCOUNT FOR ALL PIPE FITTINGS AND CONNECTIONS.
3. ASSUMES ADEQUATE WATER PRESSURE AND FLOW RATE FOR GENERATOR, SOFTENER AND BRINE TANK.

REV	DESCRIPTION	DATE	BY

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CHECKED BY: Luc L	DATE: 06/29/16
SCALE: NTS	SIZE: B

Parkson™

PROJECT NAME: P02600585 WICHITA REUSE WSC, KS

REFERENCE INFORMATION:

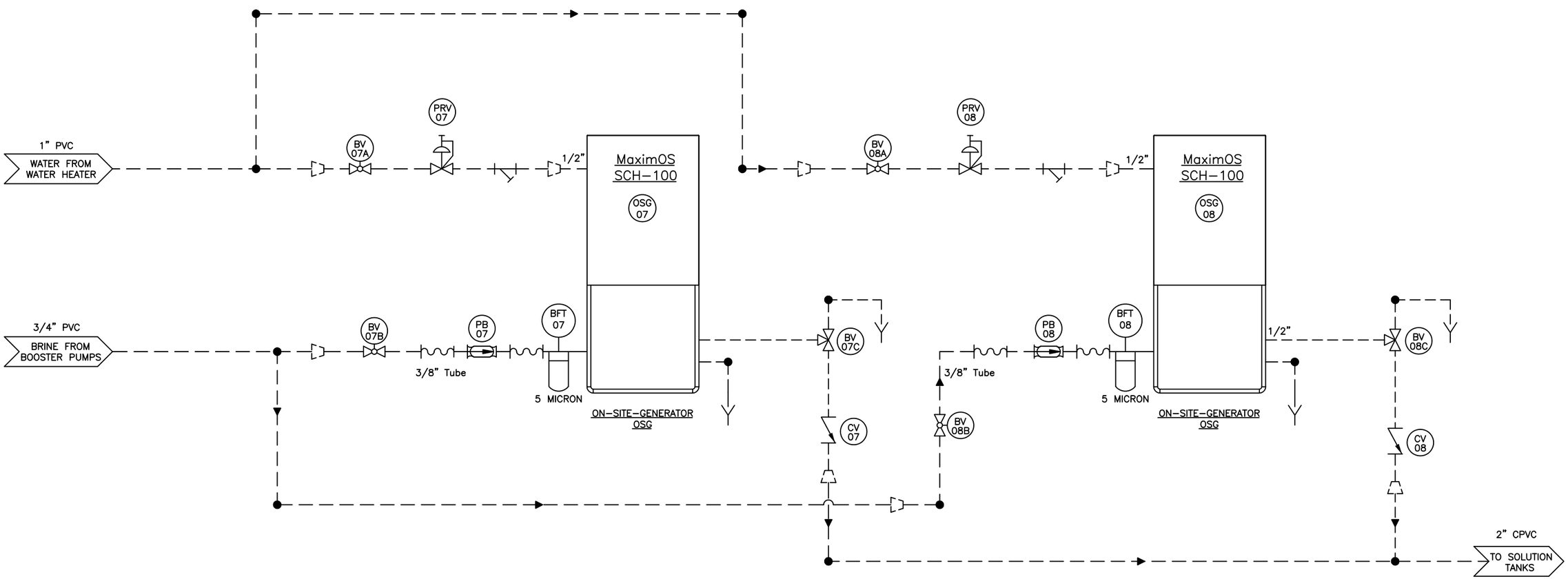
TITLE: MAXIMOS SERIES ON-SITE GENERATOR SCH-100 PROCESS & PIPING DIAGRAM – 1

DRAWING NO: P0260058502-03 SHEET 3 OF 7

REV: —

NOTES:

1. INTERCONNECTING PIPING INCLUDING BUT NOT LIMITED TO TEES, ELBOWS, AND REDUCERS ARE TO BE SUPPLIED BY INSTALLING CONTRACTOR(S)
2. PIPE SIZES ARE MINIMUM RECOMMENDATIONS. PIPE CONFIGURATIONS ARE SITE DEPENDENT. THIS DRAWING IS INTENDED AS A GUIDE AND DOES NOT ACCOUNT FOR ALL PIPE FITTINGS AND CONNECTIONS.
3. ASSUMES ADEQUATE WATER PRESSURE AND FLOW RATE FOR GENERATOR, SOFTENER AND BRINE TANK.



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chinmayv	06/24/16
CHECKED BY	DATE
Luc L	06/29/16
SCALE	SIZE
NTS	B

Parkson™

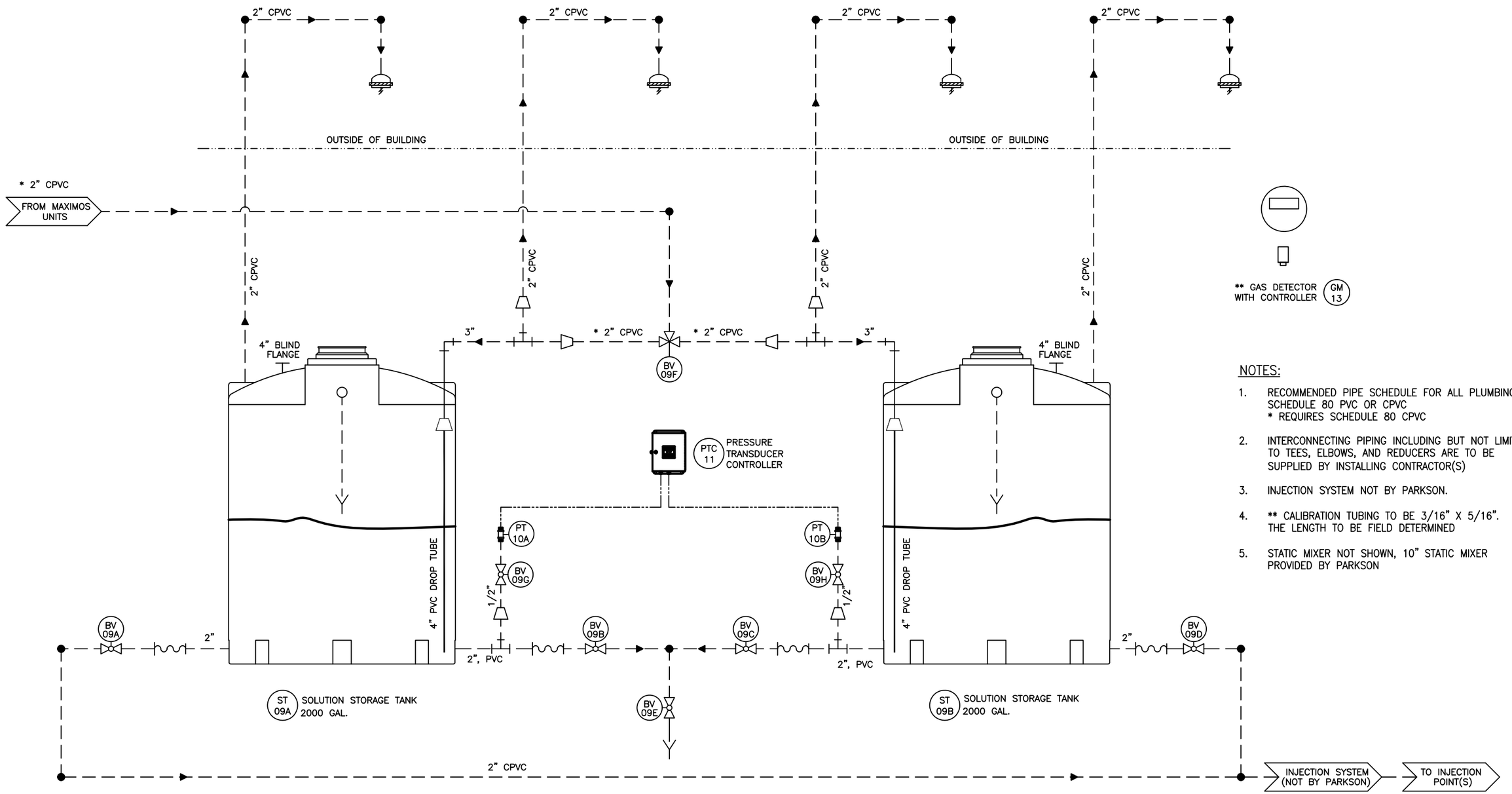
PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

REFERENCE INFORMATION

TITLE
MAXIMOS SERIES ON-SITE GENERATOR
SCH-100
PROCESS & PIPING DIAGRAM – 2

DRAWING NO. P0260058502-04
SHEET 4 OF 7

REV —



NOTES:

1. RECOMMENDED PIPE SCHEDULE FOR ALL PLUMBING:
   SCHEDULE 80 PVC OR CPVC
   * REQUIRES SCHEDULE 80 CPVC
2. INTERCONNECTING PIPING INCLUDING BUT NOT LIMITED TO TEES, ELBOWS, AND REDUCERS ARE TO BE SUPPLIED BY INSTALLING CONTRACTOR(S)
3. INJECTION SYSTEM NOT BY PARKSON.
4. ** CALIBRATION TUBING TO BE 3/16" X 5/16". THE LENGTH TO BE FIELD DETERMINED
5. STATIC MIXER NOT SHOWN, 10" STATIC MIXER PROVIDED BY PARKSON

REV	DESCRIPTION	DATE	BY

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chinmayv	06/24/16
CHECKED BY	DATE
Luc L	06/29/16
SCALE	SIZE
NTS	B

Parkson™

PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

REFERENCE INFORMATION

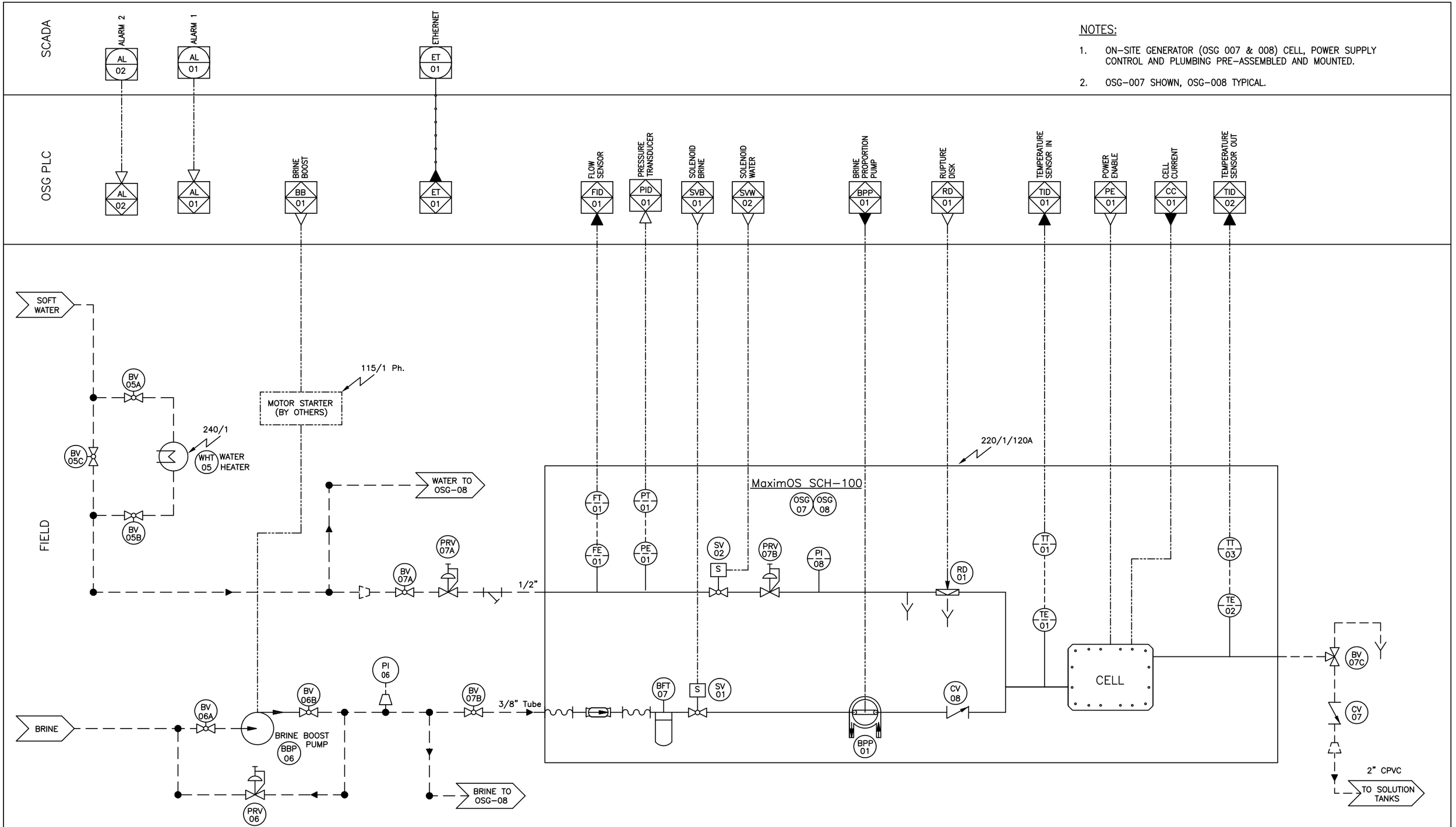
TITLE
MAXIMOS SERIES ON-SITE GENERATOR
SCH-100
PROCESS & PIPING DIAGRAM – 3

DRAWING NO P0260058502-05
SHEET 5 OF 7

REV —

NOTES:

1. ON-SITE GENERATOR (OSG 007 & 008) CELL, POWER SUPPLY CONTROL AND PLUMBING PRE-ASSEMBLED AND MOUNTED.
2. OSG-007 SHOWN, OSG-008 TYPICAL.



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DRAWN BY	DATE
chinmayv	06/24/16
CHECKED BY	DATE
Luc L	06/29/16
SCALE	SIZE
NTS	B

Parkson

PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

TITLE
MAXIMOS SERIES ON-SITE GENERATOR
SCH-100
PROCESS & INSTRUMENTATION DIAGRAM – 1

REFERENCE INFORMATION

DRAWING NO. P0260058502-06
SHEET 6 OF 7

REV —

SCADA

OSG PLC

FIELD

ETHERNET ET 01

ET 01

TANK LEVEL HI TLS 02

TANK LEVEL LO TLS 01

HYDROGEN MONITOR H2N 01

HYDROGEN SENSOR FAIL H2N 02

HYDROGEN MONITOR H2N 01

120/1

GM 13 GAS DETECTOR WITH CONTROLLER

FROM MAXIMOS UNITS

OUTSIDE OF BUILDING

OUTSIDE OF BUILDING

BV 09F

PRESSURE TRANSDUCER CONTROLLER PTC 11

120/1

PT 10A

PT 10B

BV 09G

BV 09H

DROP TUBE

DROP TUBE

BV 09A

BV 09B

BV 09C

BV 09D

BV 09E

ST 09A SOLUTION STORAGE TANK 2000 GAL.

ST 09B SOLUTION STORAGE TANK 2000 GAL.

INJECTION SYSTEM (NOT BY PARKSON)

TO INJECTION POINT(S)

NOTES:

1. INTERCONNECTING PIPING INCLUDING BUT NOT LIMITED TO TEES, ELBOWS, AND REDUCERS ARE TO BE SUPPLIED BY INSTALLING CONTRACTOR(S)
2. INJECTION SYSTEM NOT BY PARKSON.

REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL

__INFORMATION __CERTIFIED

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DRAWN BY	DATE
chinmayv	06/24/16
CHECKED BY	DATE
Luc L	06/29/16
SCALE	SIZE
NTS	B

Parkson™

PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

REFERENCE INFORMATION

TITLE
MAXIMOS SERIES ON-SITE GENERATOR
SCH-100
PROCESS & INSTRUMENTATION DIAGRAM – 2

DRAWING NO P0260058502-07
SHEET 7 OF 7

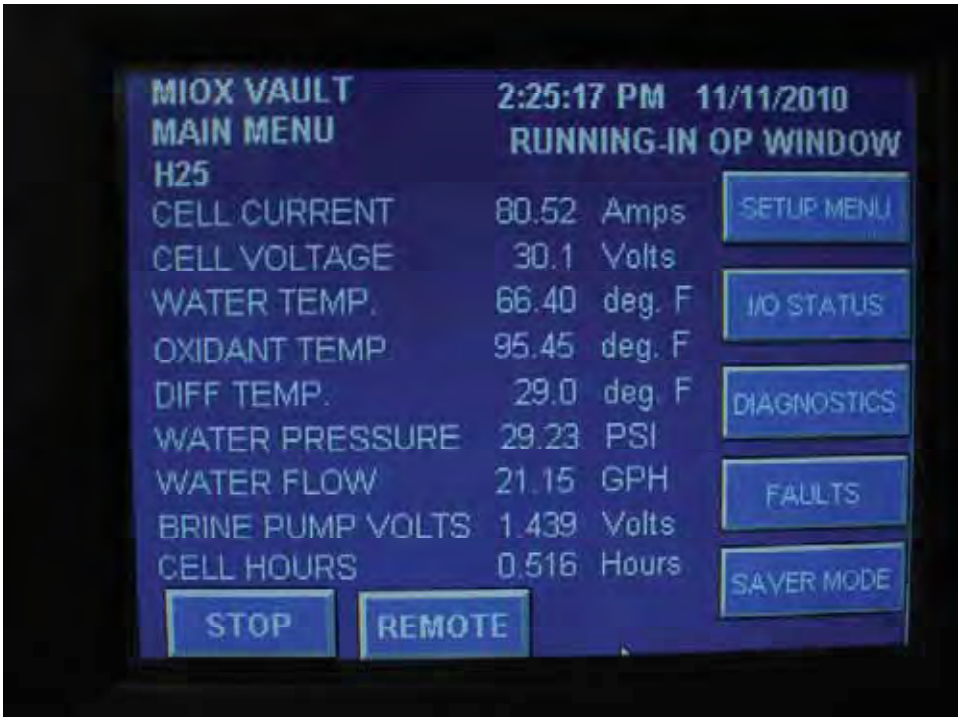
REV —

MaximOS Controls

The MaximOS Series on-site generator cabinet houses the Process Controller, Operator Interface, Ethernet Interface, and I/O Interface Module.

The MaximOS Series PLC is an Allen Bradley MicroLogix 1400 Programmable Logic Controller with a 4-Channel Analog Input card included. The control enclosure is located in the upper cabinet behind the color touch-screen interface. The power supply for this equipment is also located in the upper cabinet and all is accessible by opening the hinged enclosure door.

If multiple OSG's are to be used in a single installation, various operating configurations are possible. Individual OSG's can be selected for alternating operation by using the touch-screen interface.



MaximOS System Status Parameters

ALL MaximOS systems provide an Ethernet interface to Plant control systems. The interface is designed for **monitoring** of the MaximOS system status **only**.

The following system parameters can be read:

PARAMETER	DATA TYPE	RANGE OR STATUS
CELL CURRENT	ANALOG	0-999.9
CELL VOLTAGE	ANALOG	0-99.9
BRINE PUMP VOLTS	ANALOG	0-4.999
SYSTEM HOURS	ANALOG	0-999999.9
WATER PRESSURE	ANALOG	0-999.9
CELL HOURS	ANALOG	0-999999.9
WATER TEMPERATURE	ANALOG	0-999.9
OXIDANT TEMPERATURE	ANALOG	0-999.9
OPERATION WINDOW	DIGITAL	1=OP WINDOW
UPPER LEVEL SWITCH	DIGITAL	0= UP; 1= DOWN
LOWER LEVEL SWITCH	DIGITAL	0= UP; 1= DOWN
WATER PRESSURE SWITCH	DIGITAL	0= NOT OK; 1 = OK

Soft Faults – The system shuts down if a soft fault condition is present and will return to function normally without manual intervention when the soft fault input returns to the non-fault state. Exception- the Run/Stop switch must be manually operated.

The following soft fault conditions can be monitored remotely:

SOFT FAULT TYPE	CAUSE
RUN/STOP	RUN/STOP SWITCH IS IN THE STOP POSITION.
OXIDANT TANK FULL	TANK IS FULL.
UNDEFINED TANK LEVEL INPUTS	TANK LEVEL INPUTS ARE INVALID.
HARDNESS MONITOR	OPTIONAL EXTERNAL HARDNESS MONITOR INDICATES SOFTENER FAILURE.
HYDROGEN MONITOR	OPTIONAL EXTERNAL HYDROGEN MONITOR INDICATES HYDROGEN IN SENSOR AREA.

Hard Faults – The system shuts down if a hard fault condition occurs and will require manual intervention (power cycle) to reset the fault.

The following hard fault conditions can be monitored remotely:

HARD FAULT TYPE	CAUSE
VERY HIGH CURRENT	CURRENT REACHED AN EXCESSIVE LEVEL.
LOW CELL VOLTAGE	CELL VOLTAGE IS TOO LOW.
VERY HIGH OX TEMP	OXIDANT TEMPERATURE IS TOO HIGH.
HIGH PUMP VOLTAGE	PUMP CANNOT MEET DEMAND FOR BRINE.
HIGH CELL CURRENT	CURRENT PERSISTS AT AN ELEVATED LEVEL.
LOW WATER PRESSURE	INLET WATER PRESSURE IS TOO LOW.
LOW FEED WATER TEMP	INLET WATER TEMPERATURE IS TOO LOW.
CURRENT VARIATION	CURRENT IMBALANCE EXISTS IN CELL.

MicroLogix 1400

Small Programmable Logic Controller

Allen-Bradley

Features and Benefits

- Expand your application capabilities with up to 7 expansion I/O modules for a maximum of 256 discrete I/O
- Up to 6 embedded 100 kHz highspeed counters (on controllers with dc inputs)
- 2 Serial ports with DF1/ DH485/ Modbus RTU/DNP3/ASCII protocol support
- Ethernet port provides you with EtherNet/IP, DNP3 over IP and Modbus TCP/IP protocol support as well as web server and email capabilities
- Built-in LCD with backlight allows you to view controller and I/O status, and provides a simple interface for messages, bit / integer monitoring and manipulation

Product Description

The Allen-Bradley® MicroLogix™ 1400 from Rockwell Automation complements the existing MicroLogix family of small programmable logic controllers. MicroLogix 1400 combines the features you demand from MicroLogix 1100, such as EtherNet/IP, online editing, and a built-in LCD, plus provides you with enhanced features, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities

Take advantage of the built-in LCD with back lighting to set the Ethernet network configuration, display floating point values on a user configurable display, display OEM logos at startup and read or write any binary, integer and long file elements in the data table.

Three embedded communication ports provide you with excellent communications capabilities. MicroLogix 1400 offers an isolated RS232C/ RS485 combination port; a non-isolated RS232C port; and an RJ-45 port for 10/100 Mbps EtherNet/IP peer-to-peer messaging, DNP3 over IP and Modbus TCP/IP protocol.

Similar to the rest of the MicroLogix family, MicroLogix 1400 is programmed with RSLogix 500 programming software (Version 8.1 and above) as well as RSLogix Micro programming software.

Product Specifications

MicroLogix	1766-L32BWA	1766-L32AWA	1766-L32BXB	1766-L32BWAA	1766-L32AWAA	1766-L32BXBA
Input Power	120/240 V AC		24V DC	120/240 V AC		24V DC
Memory	non-volatile battery backed RAM					
User Program / User Data Space	10K / 10K configurable					
Data Logging / Recipe Storage	128 K (without Recipe) / up to 64 K (after subtracting Data Logging)					
Battery Back-up	Yes					
Back-up Memory Module	Yes					
Digital Inputs	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC
Digital Outputs	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC
Analog Inputs / Outputs	None			(4) Voltage Inputs / (2) Voltage Outputs		
Serial Ports	(1) RS232C/RS485* , (1) RS232C**					
Serial Protocols	DF1 Full Duplex, DF1 Half Duplex Master/Slave, DF1 Radio Modem, DH-485, Modbus RTU Master/Slave, ASCII, DNP 3 Slave					
Ethernet Ports	(1) 10/100 EtherNet/IP port					
Ethernet Protocols	EtherNet/IP messaging, DNP3 over IP and Modbus TCP/IP					
Trim Potentiometers	2 Digital					
High-Speed Inputs	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz
Real Time Clock	Yes, embedded					
PID	Yes (limited by loop and stack memory)					
PWM /PTO	N/A		3 channel PTO (100kHz)\PWM (40kHz)	N/A		3 channel PTO (100kHz)\PWM (40kHz)
Embedded LCD	Yes					
Floating Point Math	Yes					
Online Editing	Yes					
Operating Temperature	-20°C...+60°C					
Storage Temperature	-40°C (or -30°C)...+85°C					

* Isolated. RS232/RS485 combo port. Same as MicroLogix 1100 Comm 0

** Non-isolated RS232. standard D-sub connector.

Rockwell Automation is an official ENERGY STAR® Industrial Service and Product Provider. It has proven it provides energy efficiency services and/or products to commercial buildings and industrial manufacturing plants in the United States by collaborating with an ENERGY STAR Industrial Partner to submit a teaming profile that outlines the scope and resulting savings from energy efficiency-driven projects. For more information, visit ENERGY STAR for Industry at **www.energystar.gov/index.cfm?c=industry.bus_industry**

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Publication 1766-PP001C-EN-P – October, 2010
Supercedes Publication 1766-PP001B-EN-P February, 2010

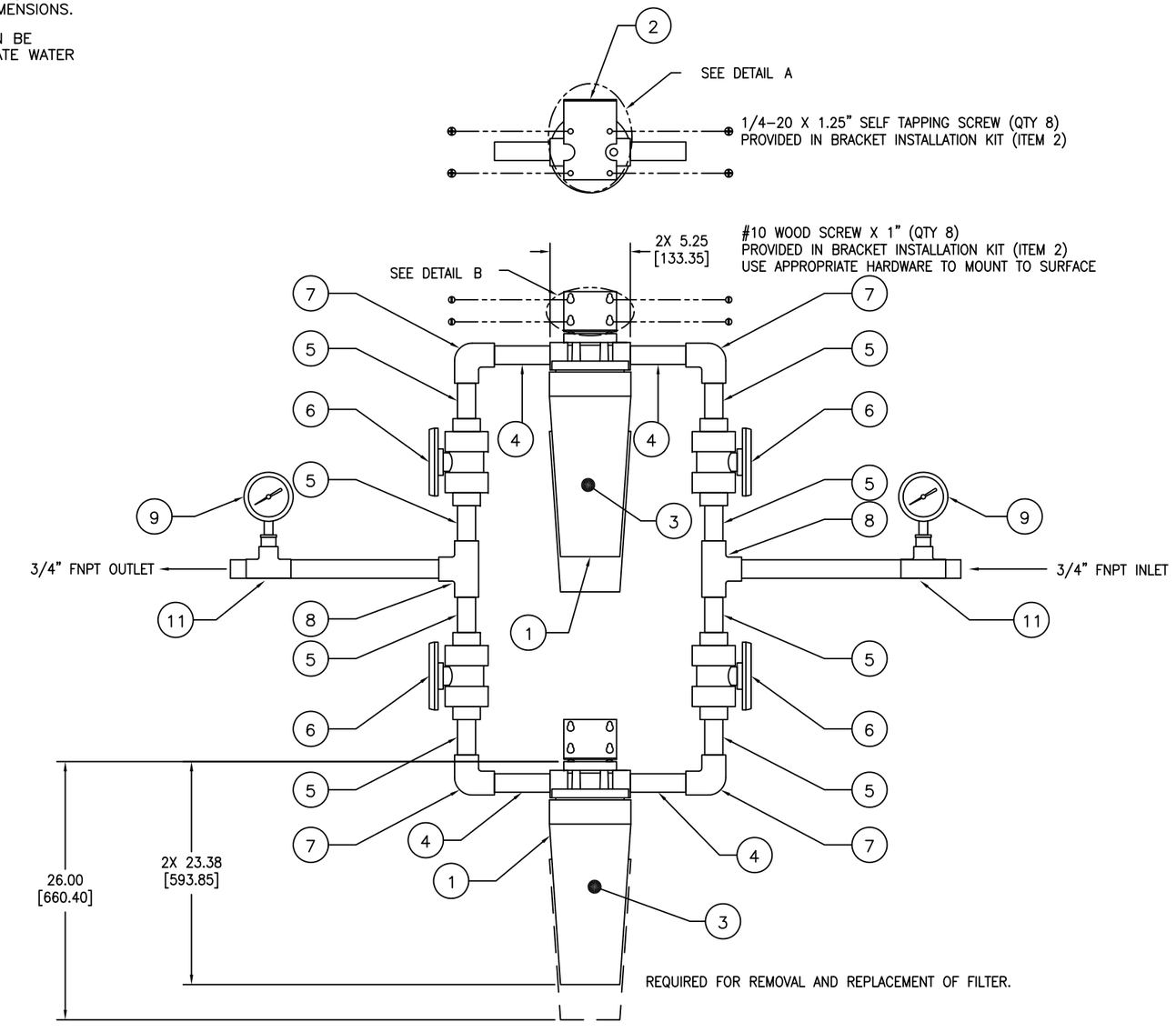
SECTION II
WATER CONDITIONING

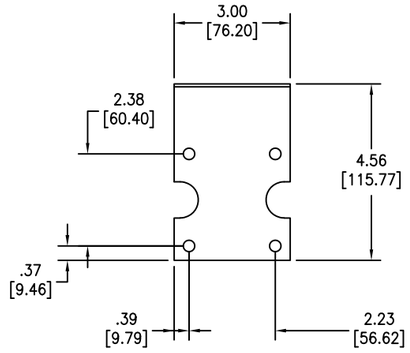
Water Filtration

NOTES:

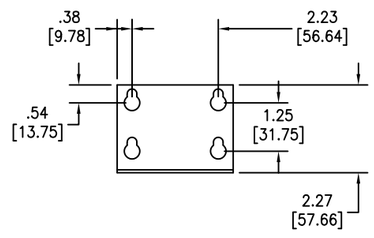
1. ITEMS 1, 2, 3, 6 AND 9 ARE PROVIDED BY PARKSON CORP. ALL OTHER PIPING AND FITTINGS ARE FIELD FIT AND PROVIDED BY OTHERS.
2. ALL DIMENSIONS ARE IN INCHES, [ ] INDICATE (MM) METRIC DIMENSIONS.
3. FILTER HOUSING (ITEM 1) CAN BE ROTATED 180° TO ACCOMMODATE WATER INLET/OUTLET DIRECTIONS.

1	2	HOUSING, FILTER, 20" STANDARD, CLEAR	STYRENE-ACRYLONITRILE	
2	2	KIT, FILTER MOUNTING	MTRL	
3	2	CARTRIDGE, FILTER, 5 MICRON, 20"	MTRL	
4	2	3/4" x 6 MTxMT PVC (CUT)	PVC	
5	8	3/4" NIPPLE S X S	PVC	
6	4	3/4" TRUE UNION BALL VALVE	PVC	
7	4	3/4" ELL	PVC	
8	2	3/4" TEE	PVC	
9	2	1/4" PRESSURE GUAGE 0-100PSI	MTRL	
11	2	3/4" TEE	PVC	





DETAIL A
BRACKET HOLE LOCATIONS



DETAIL B
BRACKET HOLE LOCATIONS

REV	DESCRIPTION	DATE	BY
1	REMOVED GAGE ISOLATORS	08/22/12	chinmayv

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__INFORMATION __CERTIFIED

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DRAWN BY	DATE 09/10/2009
CHECKED BY	DATE 09/10/2009
SCALE 1/8"=1"	SIZE B

Parkson™

PROJECT NAME

REFERENCE INFORMATION

TITLE
3/4" INLET / OUTLET
FILTER, DUAL, 20" STD
GA DRAWING

DRAWING NO 500-00161

SHEET 1 OF 1

REV 1

STANDARD FILTER HOUSINGS

- **Ideal for a wide range of applications, including residential, commercial and industrial**
- **Available in 10" and 20" lengths**
- **Optional pressure-relief/bleed button on inlet side of cap**
- **Thick walls for increased strength**
- **Leak-proof sealing with top-seated Buna-N O-ring**
- **Available with clear or opaque sumps**

Standard filter housings are manufactured of a durable polypropylene or clear FDA-compliant Styrene-Acrylonitrile (SAN). All are equipped with 3/4" NPT inlet and outlet ports. Standard filter housings are available in both 10" and 20" lengths and will accommodate a wide range of 2½" to 2⅞" diameter cartridges. The reinforced polypropylene cap and offers an optional pressure-relief button on the inlet side to relieve pressure inside the housing when changing filter cartridges.

Reinforced polypropylene housings have excellent chemical resistance and are ideal for many residential, commercial and industrial applications. Clear sumps offer on-site examination of the cartridge.

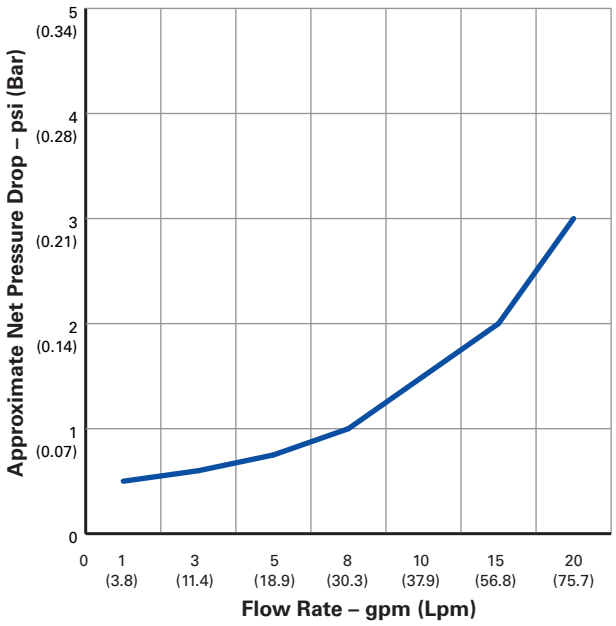
Opaque Standard Filter Housings are molded from rugged reinforced polypropylene. They offer outstanding chemical compatibility and are ideal for use in a variety of low-flow applications. These applications include under-sink and countertop residential filtration, pre- and post-reverse osmosis filtration, recreational vehicle filtration, food service and humidifying systems.

Clear Standard Filter Housings offer on-site examination of flow, performance, and cartridge life. They are also ideal for a variety of applications.

Manufactured of clear, Styrene-Acrylonitrile (SAN), the sumps are annealed to relieve stress, adding clarity and strength.

PENTEK®
Pentair Water

STANDARD
Filter Housings



NSF COMPONENT

The 150001, 150002, 150067, 150068, 150071, 150072, 150435 and 150436 are Tested and Certified by NSF International to NSF/ANSI Standard 42 for material and structural integrity requirements.

Housing Specifications and Performance Data

Model	Maximum Dimensions	Initial ΔP (psi) @ Flow Rate (gpm)
#10 Opaque	12¼" x 5⅛" (311 mm x 130 mm)	1 psi @ 10 gpm (0.1 bar @ 38 Lpm)
#10 Clear	12⅝" x 5¼" (321 mm x 133 mm)	1 psi @ 10 gpm (0.1 bar @ 38 Lpm)
#20 Opaque	22⅜" x 5⅛" (568 mm x 130 mm)	1 psi @ 10 gpm (0.1 bar @ 38 Lpm)

Materials of Construction

Housing	Polypropylene (Opaque) or Styrene Acrylonitrile (Clear)
Cap	Reinforced Polypropylene
Button Assembly	300-series Stainless Steel, EPDM, and Polypropylene
O-Ring	Buna-N
Maximum Temperature	125°F (51.7°C)
Maximum Pressure	125 psi (8.62 bar)

CAUTION: Protect against freezing to prevent cracking of the filter and water leakage.

PENTEK
Pentair Water

ISO-9001 REGISTERED MANUFACTURER

502 Indiana Avenue • P.O. Box 1047 • Sheboygan, Wisconsin 53082-1047
Customer Service: 800.645.0267 • Fax: 888.203.7361 • supportspecialist@pentekfiltration.com
International: 920.457.9435 • Fax: 920.457.2417 • international@pentekfiltration.com
www.pentekfiltration.com

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FSI

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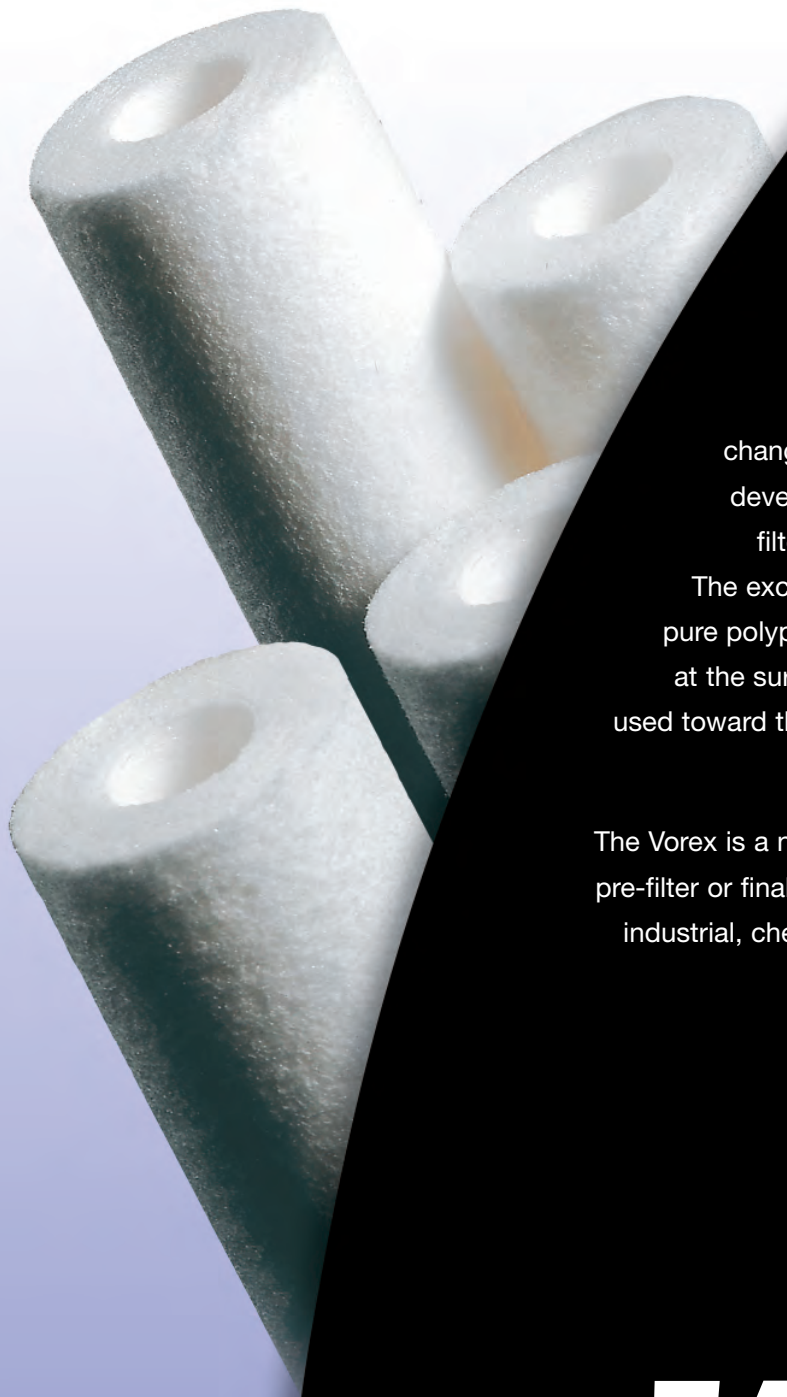


The New Vorex
FILTER CARTRIDGE

The new and improved VOREX FILTER CARTRIDGE is designed for higher efficiency and fewer changeouts. The extensive research invested in the development of this filter has resulted in a superior filter cartridge that works better and lasts longer. The exclusive manufacturing process thermally bonds pure polypropylene microfibers. Lower density fibers are at the surface and sequentially higher density fibers are used toward the center, therefore particles are trapped more evenly throughout the entire cross section.

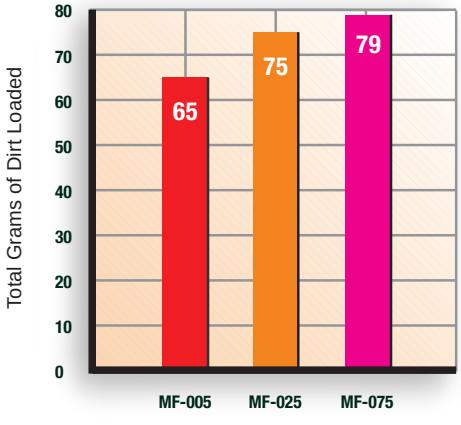
The Vorex is a nominally rated filter that works well as either a pre-filter or final filter in a wide range of applications including industrial, chemical process, food/beverage, cosmetics and water applications. *Meets FDA requirements.

Vorex
FILTER CARTRIDGE

The Vorex Advantage

- *Greater dirt holding—longer life*
- *Fewer filter changeouts*
- *No fiber migration*
- *100% polypropylene*
- *High flow rates with lower pressure drops*
- *Easy disposal (incinerates to non-volatile trace ash)*
- *Supports a wide range of industrial and chemical applications*
- *Very competitive economical pricing*

Dirt Holding Capacity

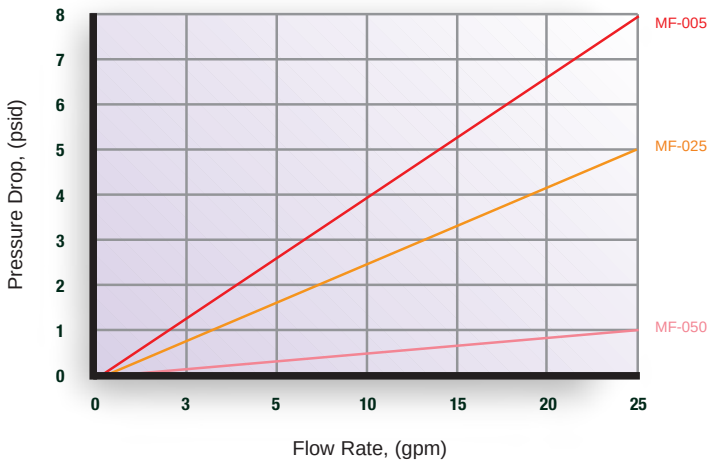


Many factors can influence cartridge life, like the type of solids loading, viscosity, etc,. For specific applications contact a FSI representative.

Vorex Filters trap contaminants throughout the entire cross section for improved dirt holding capacity and longer life.

Standard microfiber cartridges offer less volume for holding contaminants.

Clear Water Pressure Drop



This chart shows the Vorex filter cartridge life span as related to pressure drop. Results may vary in actual service.

Vorex Filter Cartridges

Example **CM MF 025 2925**
1 2 3 4

1 Type of Filter
CM = Meltblown Cartridge

2 Material
MF = Microfiber
MFGF = Microfiber, glazed finish

3 Micron Rating
001, 003, 005, 010, 025, 050, 075, 100, 150

4 Cartridge Length
9.75", 10", 19.5", 19.75", 20", 29.25", 30", 39", 39.5", 40"
*Standard lengths listed. Custom lengths available.

I.D. 1.06" O.D. 2.5"

FDA Compliant, NSF Certified Materials The Vorex filter cartridge complies with the appropriate U.S. Food and Drug Administration guidelines, as outlined in the Code of Federal regulations,Title 21, Sections 177.1520 (a), (1) and Section 177.1520 (c), (1.1). This filter is certified by NSF International under ANSI/NSF Standard 42.

The Vorex filter cartridge meets the requirements of a USP Plastic Class VI as demonstrated by USP Biological Reactivity Tests, In Vivo.

There are no expressed or implied warranties given with respect to this product and/or claims of performance. All test results are conducted under standard industry conditions, and actual results may very based on specific applications.

Filter Specialists, Inc. is a leader in filtration products. FSI offers custom cartridge design and manufacturing.

For more information on other products and services visit **www.fsifilters.com** or email **sales@fsifilters.com**

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MANUFACTURED IN THE USA

ISO 9001 Certified

Bourdon Tube Pressure Gauges

Stainless Steel Case / Copper Alloy Wetted Parts

Industrial Series Liquid Fillable • Type 21X.53

Pressure Gauges

Application
Suitable for environments compatible with copper alloy wetted parts where vibration or pressure pulsation occur and for gaseous or liquid media that will not obstruct the pressure system.

Sizes (All sizes not stocked)
2", 2½", 4" (50, 63, and 100 mm)

Accuracy
± 1.5% of span

Ranges (All ranges not stocked)
Vacuum / Compound to 30"HG / 0 / 200 PSI
Pressure from 15 PSI to 10,000 PSI - 2"
Pressure from 10 PSI to 15,000 PSI - 2½",4"
or other equivalent units of pressure or vacuum

Working Range

2" & 2½"	Steady:	3/4 of full scale value
	Fluctuating:	2/3 of full scale value
	Short time:	full scale value
4" & 6"	Steady:	Full scale value
	Fluctuating:	0.9 x full scale value
	Short time:	1.3 x full scale value

Operating Temperature
Ambient: -40°F to 160°F (-40°C to 71°C) NOTE1
Media: max. 140°F (+60°C)

Temperature Error
Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% for every 18°F (10°C) rising or falling. Percentage of span.

Standard Features

Connection
Material: copper alloy
Lower mount (LM)
Center back mount (CBM) - 2" & 2½"
Lower back mount (LBM) - 4"
1/4" or 1/2" NPT limited to wrench flat area
(7/16"-20" SAE thread for **Type 213.53S**)

Bourdon Tube
Material: copper alloy
30"Hg (Vac) to 1000 PSI C-type - 2", 2½"
30"Hg (Vac) to 1000 PSI C-type - 4"
1500 PSI to 15,000 PSI helical type - 2", 2½"
1500 PSI to 15,000 PSI helical type - 4"

Movement
Copper alloy

Dial
White ABS with stop pin and black lettering

Pointer
Black aluminum (external "zero" adjust screw-optional)

Case
304 stainless steel with vent plug and stainless steel crimp ring.

O-ring (case/connection sealing):
EPDM for standard stocked glycerine filled gauges. Viton for standard stocked dry gauges, suitable for glycerine, silicone or fluoroube case filling

Weather Protection
Weather resistant (NEMA 3 / IP 54) - dry case
Weather tight (NEMA 4X / IP 65) - liquid-filled case

Standard Scale
PSI
PSI, PSI/KG/CM², PSI/BAR (2½")

Window Gasket
Buna-N

Window
Polycarbonate
Acrylic (4")

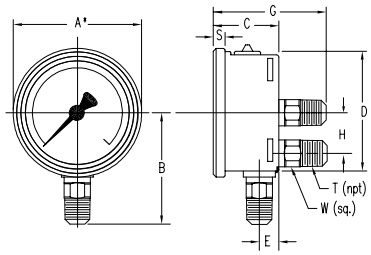
Case Filling
212.53 - None
213.53 - Glycerine

Order Options (min. order may apply)
Other pressure connections limited to wrench flat area
Stainless steel polished front flange
Stainless steel rear flange- 2½" & 4"
Brass threaded or press-fit restrictor
Pressure compensating membrane window for filled gauges
Dry case (**212.53**)
Steel zinc plated u-clamp bracket (field installable)
Stainless steel u-clamp bracket (field installable)
DIN standards
External zero adjustment (2½" only)
Externally adjustable red drag pointer (max. hand)
Externally adjustable red mark pointer (set pointer)
Other pressure scales available:
Bar, kPa, MPa, Kg/cm² and dual scale
Custom dial layout
Silicone or fluorolube case filling **(Type 213.53)**

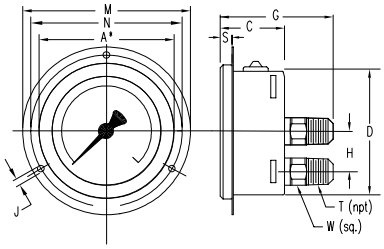
Note 1 Temperature Ranges (Liquid filled gauges)

Glycerine:	-4°F to 140°F (-20°C to 60°C)
Silicone:	-40°F to 140°F (-40°C to 60°C)

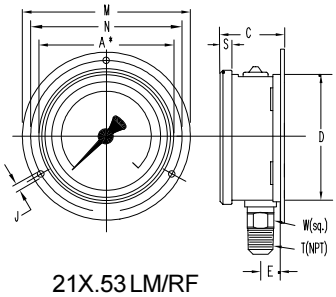
Dimensions:



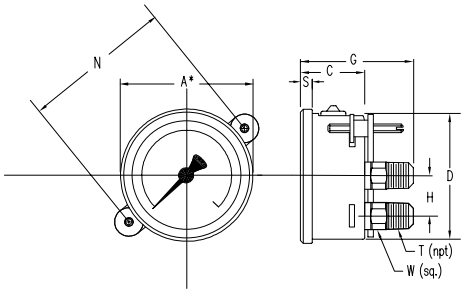
21X.53 LM/CBM/LBM



21X.53 CBM/LBM/FF



21X.53 LM/RF



21X.53 CBM/LBM/UC

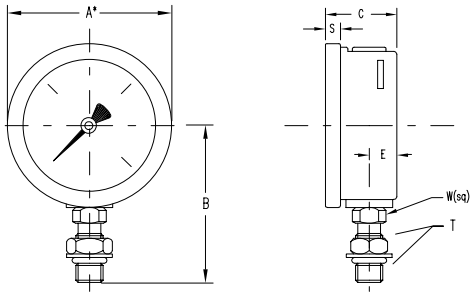
A* NOMINAL SIZE

TYPE/SIZE	WEIGHT	KEY	A*	B	C	D	E	G	H	J	L	M	N	S	T	W
21X.53 2"	0.27 lbs. + 0.06 lbs. if filled	mm	50	48	30	50	12	53	--	3.6	6.5	71	60	5.5	--	14
		in	2	1.89	1.18	1.97	0.47	2.09		0.14	0.26	2.80	2.36	0.22	1/4"	0.55
21X.53 2.5"	0.36 lbs. + 0.08 lbs. if filled	mm	63	54	32	62	13	54	--	3.6	7.5	85	75	6.5	--	14
		in	2.5	2.13	1.26	2.44	0.51	2.13		0.14	0.30	3.35	2.95	0.26	1/4"	0.55
21X.53 4"	1.10 lbs. + 0.66 lbs. if filled	mm	100	87	48	100	15.5	79.5	30	4.8	9	132	116	8	--	22
		in	4	3.43	1.89	3.94	0.61	3.13	1.18	0.19	0.35	5.20	4.57	0.31	1/2"	0.87

NOTE: For 1/4" NPT connections on 3" and 4" gauges, reduce B* dimension by 5 mm / 0.2 in.

Recommended panel cut-out: D + 1mm

Optional Type 213.53S- 7/16" - 20" SAE Connection



A* NOMINAL SIZE

TYPE/SIZE	WEIGHT	KEY	A*	B	C	E	S	W
213.53S 2.5"	0.51 lbs.	mm	63	61.2	31	13	6	14
		in	2.5	2.41	1.23	.51	.24	.55

T = 7/16-20" SAE Connection
supplied with Nitrile o-ring, hex nut, and washer

THE MEASURE OF
Total Performance™

Ordering Information:
State computer part number (if available) / type number / size / range / connection size and location / options required.

05/01

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, Georgia 30043-5868
Tel: 770-513-8200 Fax: 770-338-5118
http://www.wika.com e-mail: info@wika.com

PVC & CPVC TRUE UNION 2000 VALVES

TU2000-2-0605

One of the Most Versatile, Compact Valve Designs Available

Spears® True Union 2000 Ball Valves, 3-Way Ball Valves and Ball Check Valves provide maximum versatility with fully interchangeable valve cartridges. Provides for easier system design modifications and upgrades in multiphase projects, or anywhere changes in valve types are desired. Simply exchange any True Union 2000 valve in-line using existing union nuts. Also mates with Spears® new Schedule 80 Unions and Diaphragm Valves. All True Union 2000 valves feature a low profile, compact design for minimal space requirements. Available in PVC or CPVC with choice of EPDM or Dupont Dow Genuine Viton® O-ring seals and socket, flanged, or optional Spears® patented Special Reinforced (SR) threaded end connectors. Additionally, Spears® offers valve Retrofit Kits for easy in-line replacement of other valves and factory installed Actuation Packages. Assembled with silicone-free lubricant.

True Union 2000 Industrial Ball Valve

- Multi-featured Industrial Grade
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or SR Threaded End Connectors

True Union 2000 Industrial 3-Way Valve

- Industrial Grade, Multiport, Diverter, L-Pattern & T-Pattern configurations Vertical 3-Way or Horizontal Diverter (shown)
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors

MADE IN THE U.S.A. WITH PRIDE

PROGRESSIVE PRODUCTS FROM SPEARS®
INNOVATION & TECHNOLOGY

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www.spearsmfg.com

LPCB — NATIONAL ACCREDITATION OF CERTIFICATION BODIES

Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

True Union 2000 Industrial Ball Check Valve

- Industrial Grade
- Flow-Tested for Minimum Turbulence
- Fully Serviceable, Replaceable Components, uses Standard O-ring Seat
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Easily Converted to Foot Valve
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or optional SR Threaded End Connectors
- Also available in PVC White

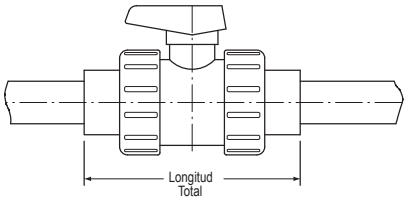
Check Valve Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
C_V	**6.3**	**17**	**25**	**65**	**86**	**130**	**200**	**275**	**500**	**800**

Economical True Union 2000 Standard Ball Valve

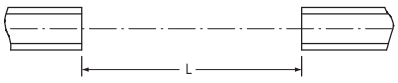
- High quality Standard Ball Valve
- Allows future system upgrade
- Excellent for OEM Applications
- Replaceable Seats
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Spears® Safe-T-Shear® Stem
- Self Adjusting Floating Seat
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors
- Also available in PVC White

True Union 2000 Retrofit Valves or Kits

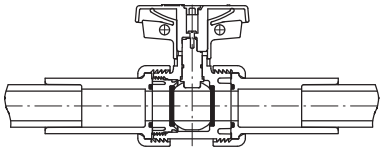
Easily converts any system over to all True Union 2000 style valves for consistent valve type and uniform maintenance. Special extended socket style End Connectors (2) allow retrofit replacement of other brand valves in existing piping systems with a new True Union 2000 valve. Simply cut out old valve according to specified dimension and install retrofit end connectors. End connectors are provided with either EPDM or genuine Viton® O-rings. Can be ordered as End Connector Kit or fully assembled Retrofit Valve.



BALL VALVE FOR REPLACEMENT



PIPE LAYING LENGTH AFTER CUTTING



TRUE UNION 2000 BALL VALVE INSTALLED WITH RETROFIT KIT

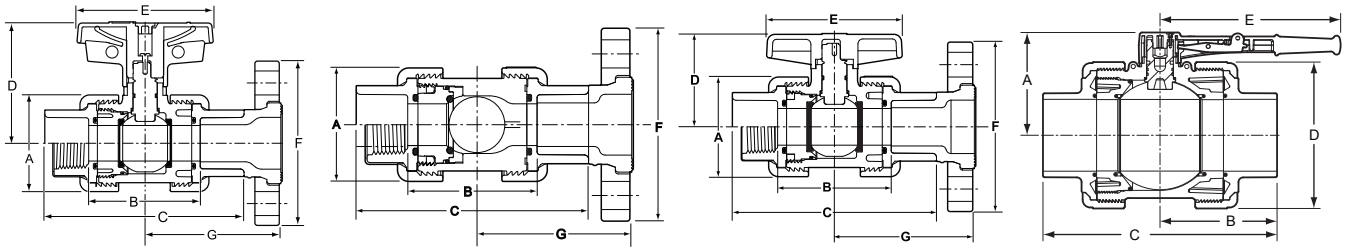
Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
L	4-29/32	5-7/16	6-3/32	7-1/4	7-1/2	8-17/32	10-3/4	11-7/16	14-5/16	N/A

L ± 1-1/16

Contact Spears® for Special Kits/Valves to replace older Spears® Regular True Union Ball Valves

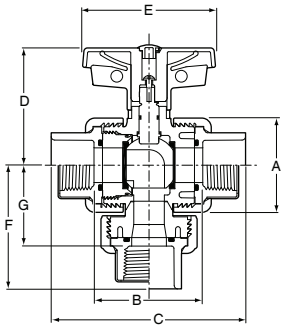
True Union 2000 Valve Dimensional Data

Industrial Ball Valve, Ball Check Valve, Standard Ball Valve & 6" Industrial Lever Handle



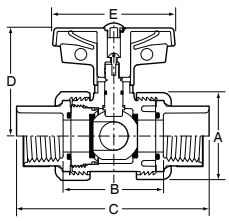
Nominal Size	A	Dimensions Reference (inches, ±1/16)										
		B		C			D		E		F	G
		Soc/Thd	Spigot	Socket	Thread	Spigot	Industrial	Standard	Industrial	Standard		
1/2	1-7/8	2-3/8	2-7/8	4-3/16	3-3/16	4-5/8	2-9/16	1-5/8	2-13/16	2-1/2	3-1/2	2-31/32
3/4	2-1/4	2-3/4	3-1/4	4-3/4	4-1/4	5-1/4	2-7/8	2	3-3/8	3	3-7/8	3-5/16
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	2-5/16	3-7/16	3-7/16	4-1/2	3-5/8
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	2-13/16	3-7/8	3-9/16	4-5/8	3-31/32
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	3-1/16	4-3/16	3-7/8	5	4-3/8
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	3-3/4	5-1/8	5	6	5-1/4
2-1/2	5-3/8	6-7/8	7-13/16	10-7/16	9-11/16	11-3/8	5-1/8	5-7/8	6-1/4	7-5/8	7-1/2	6
3	6-3/16	7	7-13/16	10-11/16	9-7/8	11-9/16	5-7/8	5-7/8	7-5/8	7-5/8	7-1/2	6-13/16
4	7-5/8	7-5/16	8-1/4	11-7/8	10-1/4	12-3/4	6-3/4	6-3/4	9-3/16	6-3/4	9	7-1/2
6	11-5/8	11-1/16	13	17-1/16	15-3/4	18-1/2	8-1/8	---	14-5/16	---	11-1/4	10-3/16

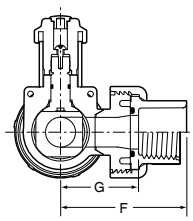
Industrial 3-Way Ball Valve



Nominal Size	A	Vertical 3-Way Ball Valves[3]												Oper.[2] Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-7/8	2-7/16	2-15/16	4-1/4	3-27/32	4-3/4	2-9/16	2-13/16	2-3/4	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

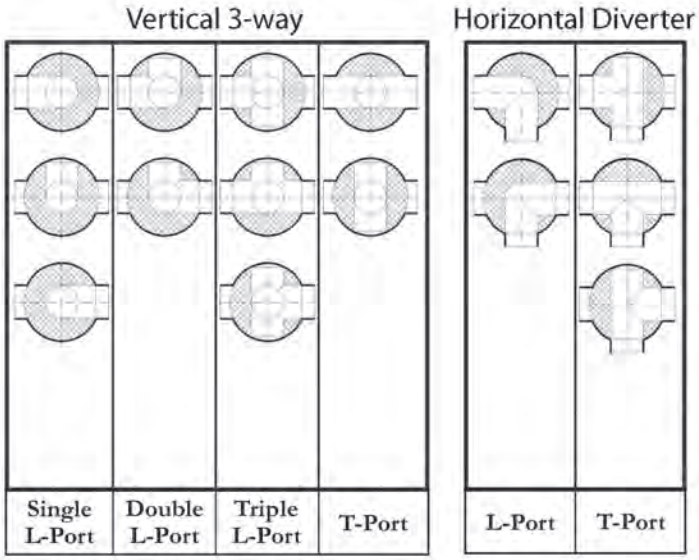




Nominal Size	A	Horizontal Diverter Ball Valves[3]												Oper.2 Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-3/16	2-7/16	2-15/16	4-3/16	3-13/16	4-3/4	2-9/16	2-13/16	2-9/16	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

3-Way Port Options



True Union 2000 Actuated Valves

Universal ISO Actuator Mounting Pattern Option

Spears® offers optional actuator mounting with standard ISO Mounting Pattern for user actuation of True Union 2000 Ball Valves.

Factory Actuated Valve Packages

Spears® Electric or Pneumatic Actuation Packages eliminate customer's having to determine proper valve and actuator mating. Pre-matched packages insure proper torque, coupling and mount for optimum performance - all factory installed and tested for proper alignment and operation. Actuation packages can be custom built to user specifications from Spears® wide selection of options, voltages and accessories. Contact Spears® for additional information.

Foot Valve Screens

- Easily converts Ball Check Valve to a Foot Valve.
- Standard IPS spigot connection fits slip-socket valve end connector.
- Enlarged screen provides open area equivalent to valve for optimum flow characteristics.
- Chemical and corrosion resistant PVC or CPVC construction.

Typical Application (VALVE NOT INCLUDED)

Split Nut Kit for True Union 2000 Valves & Union 2000 Schedule 80 Fittings

Split Nut Kits are designed to replace broken union nuts on Spears® True Union 2000 Ball Valves and Union 2000 Schedule 80 Unions. Kit includes SS316 Gear Clamp and 2-Split Nut halves. Can also be used if nut was not in place during end connector installation. Split Nut is fully serviceable to original valve pressure rating.

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic products to transport or store compressed air or gas.

Viton® is a registered trademark of DuPont Dow Elastomers

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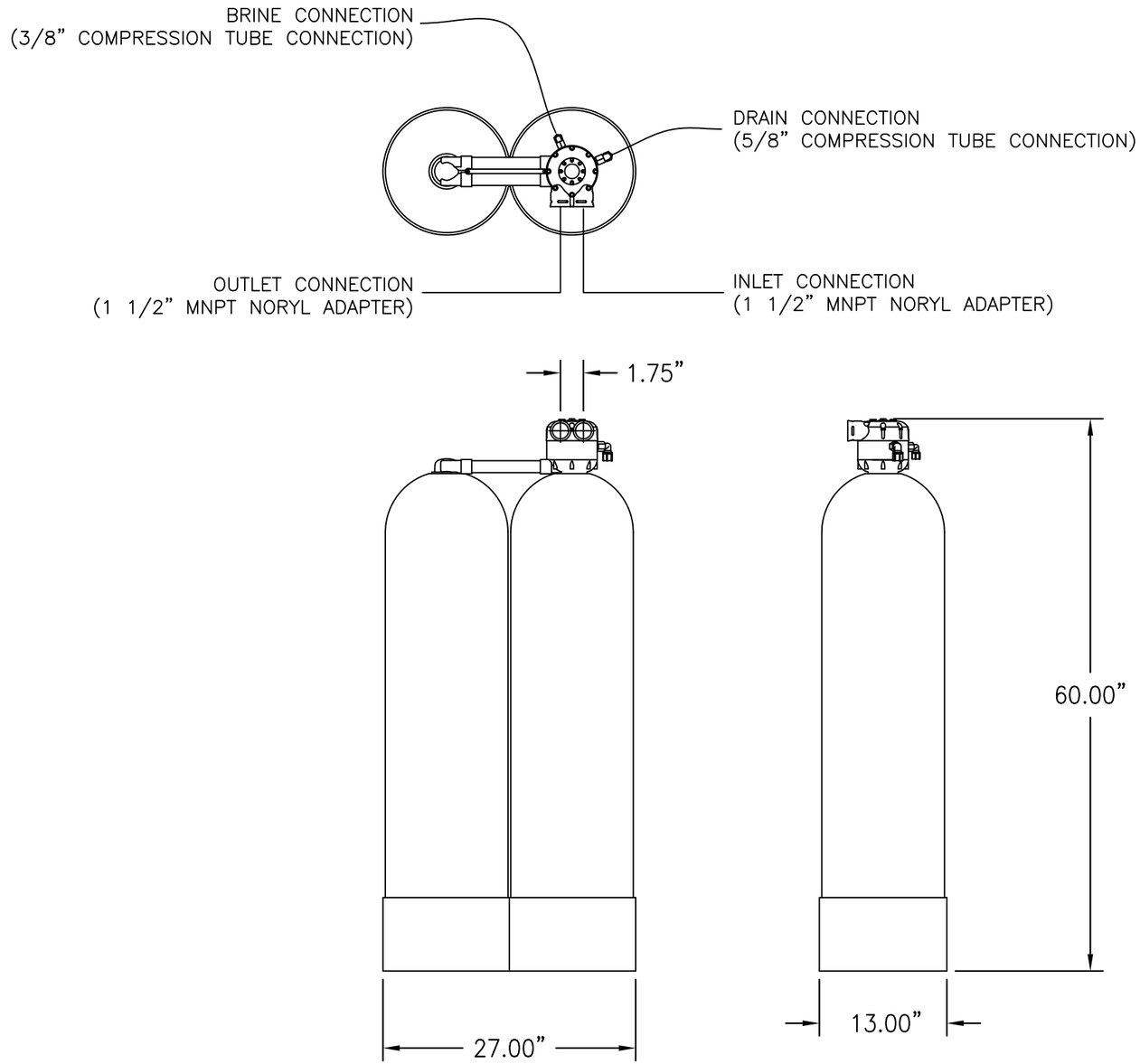
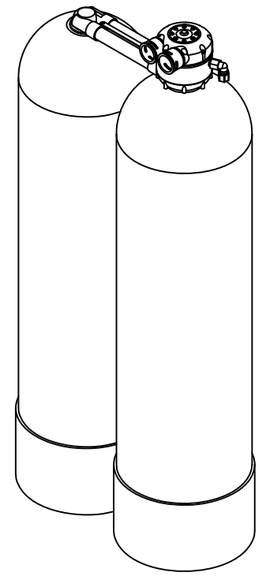
Water Softener





REV	DESCRIPTION	DATE	BY

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__INFORMATION X CERTIFIED

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CHECKED BY: TDE	DATE: 05/15/13
SCALE: 3/32"=1"	SIZE: B

Parkson™

PROJECT NAME:

REFERENCE INFORMATION:

TITLE: WATER SOFTENER
KINETICO CP213S
GENERAL ARRANGEMENT

DRAWING NO: 500-01741-A
SHEET 1 OF 1

REV: 0

CP SERIES WATER SOFTENERS

CP208s • CP210s • CP213s • CP216s

Kinetico's commercial softeners are highly advanced in design to offer flexibility in both set-up and operation. This flexibility enables the systems to operate in either an Overdrive configuration, for maximum flow, or in an Alternating configuration, for maximum efficiency.

How are the CP Series Water Softeners different?

- **Non-Electric.** Powered by the kinetic energy of moving water. Reliable, no timers or computers to set, adjust, repair or replace.
- **Metered Regeneration.** Eliminates guesswork and regenerates based on actual water usage resulting in minimal salt use and maximum water efficiency.
- **Twin Tank Design.** Continuous and uninterrupted supply of soft water even during regeneration.
- **Countercurrent Regeneration.** Recognized as the most efficient regeneration method. Conserves water and salt, while eliminating hardness breakthrough.
- **Soft Water Regeneration.** Operates only with 100% soft water which prolongs the life of the system.
- **Optimal Salt and Water Efficiency.** Low water consumption. Less money spent on salt.
- **Corrosion-Resistant Valve and Tanks.** Long lasting and can endure even the harshest environments.

- Over 40 Years Experience
- Non-Electric
- Metered Regeneration
- Twin Tank Design
- Countercurrent Regeneration
- Soft Water Regeneration
- Optimal Salt and Water Efficiency
- Corrosion-Resistant Valve and Tanks

Kinetico®
commercial water systems

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commercial water systems

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Kinetico Canada 1-866-351-8722
Website: www.kineticocommercial.com

CP SERIES WATER SOFTENERS

CP208s • CP210s • CP213s • CP216s



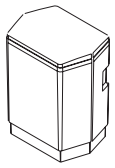

Alternating Systems

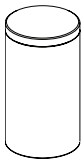
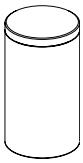
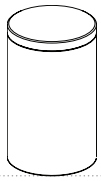
Specifications	CP208s	CP210s	CP213s	CP216s
Tank Size	8” x 40”	10” x 54”	13” x 54”	16” x 65”
System Size (width x depth x height)	17” x 8” x 46”	21” x 10” x 60”	27” x 13” x 60”	33” x 16” x 71”
Resin Volume per Tank	.70 ft^3	1.5 ft^3	2.5 ft^3	4.0 ft^3
Regeneration Time / Volume	45 min / 35 gal	90 min / 102 gal	90 min / 142 gal	90 min / 160 gal
Flow Range (15 / 30 psig)	11.5 -18.0 gpm	12-19 gpm	20-30 gpm	23 -30 gpm
Maximum Hardness	66 gpg	107 gpg	51 gpg	49 gpg

Overdrive Systems

Specifications	CP208s OD	CP210s OD	CP213s OD	CP216s OD
Tank Size	8” x 40”	10” x 54”	13” x 54”	16” x 65”
System Size (width x depth x height)	17” x 8” x 46”	21” x 10” x 60”	27” x 13” x 60”	33” x 16” x 71”
Resin Volume per Tank	.70 ft^3	1.5 ft^3	2.5 ft^3	4.0 ft^3
Regeneration Time / Volume	45 min / 35 gal	90 min / 102 gal	90 min / 142 gal	90 min / 160 gal
Flow Range (15 / 30 psig)	20.5-30.0 gpm	21- 31 gpm	28 - 40 gpm	35-47 gpm
Maximum Hardness	29 gpg	57 gpg	40 gpg	40 gpg

Brine Tank Options



Tank Description	12” x 16 x 20”	12” x 40”	K Spray	18” x 35”	24” x 40”
Material	HDPE	HDPE	HDPE	HDPE	HDPE
Salt Capacity	50 lbs	100 lbs	200 lbs	250 lbs	500 lbs
Systems	CP208s	CP208s CP210s	CP208s CP210s	CP208s CP210s	CP213s CP216s

03/2013
Part No. 15172
Printed in U.S.A.

Poly Glass™ Vessels

Product Features
- For residential and light commercial water softener/filtration applications
- Slim diameter with capacities from 2 to 49 gallons
- Unmatched for strength and chemical resistance
- 10-year warranty for 6" - 13" vessels
- 5-year warranty for 14" - 16" vessels

Material of Construction
- Inner shell of polyethylene
- Threaded inlet in various sizes

Operating Parameters
- Maximum operating pressure: 150 psi
- Maximum operating temperature: 120°F

Pentair Design Parameters
- Safety factor: 4:1
- Minimum burst at 600 psi
- Tested to 250,000 cycles without leakage

NSF Design Parameters
- Safety factor: 4:1
- Minimum burst at 600 psi
- Tested to 100,000 cycles without leakage

Part no. 40845
Rev 9/05

Specifications

	Part No.	Description	Size (Inches)	System Connection	Height w/ Base Inches / mm	Height w/o Base Inches / mm	Capacity Gallons / Liters	Cubic Feet
6" Dia.	30109	0613 PG 2.5"T	06 x 13	2.5" Threaded	13.2 / 335	12.6 / 320	1.1 / 4.2	0.15
	30127	0618 PG 2.5"T	06 x 18	2.5" Threaded	18.6 / 472	18.0 / 457	1.8 / 6.8	0.24
	30151	0635 PG 2.5"T	06 x 35	2.5" Threaded	35.8 / 909	35.2 / 894	3.8 / 14.4	0.51
7" Dia.	30190	0735 PG 2.5"T	07 x 35	2.5" Threaded	35.6 / 904	35.3 / 897	5.2 / 19.7	0.7
	30213	0744 PG 2.5"T	07 x 44	2.5" Threaded	43.7 / 1110	43.4 / 1102	6.7 / 25.4	0.9
8" Dia.	31835	0818 PG 2.5"T	08 x 18	2.5" Threaded	18.8 / 478	18.5 / 470	3.28 / 12.0	0.44
	31836	0830 PG 2.5"T	08 x 30	2.5" Threaded	30.43 / 772	30.13 / 765	5.4 / 2.04	0.72
	30264	0835 PG 2.5"T	08 x 35	2.5" Threaded	35.6 / 904	35.3 / 897	6.6 / 25.0	0.88
	30286	0840 PG 2.5"T	08 x 40	2.5" Threaded	40.2 / 1021	39.9 / 1013	7.8 / 29.5	1.04
	30305	0844 PG 2.5"T	08 x 44	2.5" Threaded	44.4 / 1128	44.1 / 1120	8.7 / 32.9	1.16
9" Dia.	30317	0918 PG 2.5"T	09 x 18	2.5" Threaded	18.6 / 472	18.0 / 457	3.9 / 14.8	0.52
	30347	0935 PG 2.5"T	09 x 35	2.5" Threaded	35.6 / 904	35.3 / 897	8.3 / 31.4	1.11
	30360	0940 PG 2.5"T	09 x 40	2.5" Threaded	40.2 / 1021	39.9 / 1013	9.5 / 31.4	1.27
	30367	0942 PG 2.5"T	09 x 42	2.5" Threaded	42.4 / 1077	42.1 / 1069	10.9 / 41.2	1.46
	30383	0948 PG 2.5"T	09 x 48	2.5" Threaded	48.2 / 1224	47.9 / 1217	11.8 / 44.7	1.58
10" Dia.	30460	1035 PG 2.5"T	10 x 35	2.5" Threaded	35.6 / 904	35.3 / 897	10.2 / 38.6	1.36
	32266	1035 PG 2.5"T 1.25"TDH LOC A	10 x 35	2.5" Threaded 1.25 TDH	35.6 / 904	35.3 / 897	10.2 / 38.6	1.36
	32346	1035 PG 2.5"T 1.25"TDH LOC B	10 x 35	2.5" Threaded 1.25 TDH	35.6 / 904	35.3 / 897	10.2 / 38.6	1.36
	33018	1035 PG 2.5"T 1.25"TDH LOC C	10 x 35	2.5" Threaded 1.25 TDH	35.6 / 904	35.3 / 897	10.2 / 38.6	1.36
	30491	1040 PG 2.5"T	10 x 40	2.5" Threaded	40.3 / 1024	40.1 / 1018	11.5 / 43.5	1.54
	32150	1040 PG 2.5"T 1.25"TDH LOC A	10 x 40	2.5" Threaded 1.25 TDH	40.3 / 1024	40.1 / 1018	11.5 / 43.5	1.54
	32347	1040 PG 2.5"T 1.25"TDH LOC B	10 x 40	2.5" Threaded 1.25 TDH	40.3 / 1024	40.1 / 1018	11.5 / 43.5	1.54
	32992	1040 PG 2.5"T 1.25"TDH LOC C	10 x 40	2.5" Threaded 1.25 TDH	40.3 / 1024	40.1 / 1018	11.5 / 43.5	1.54
	30523	1044 PG 2.5"T	10 x 44	2.5" Threaded	44.6 / 1133	44.4 / 1128	13.1 / 49.6	1.75
	32993	1044 PG 2.5"T 1.25"TDH LOC A	10 x 44	2.5" Threaded 1.25 TDH	44.6 / 1133	44.4 / 1128	13.1 / 49.6	1.75
	32994	1044 PG 2.5"T 1.25"TDH LOC B	10 x 44	2.5" Threaded 1.25 TDH	44.6 / 1133	44.4 / 1128	13.1 / 49.6	1.75
	32995	1044 PG 2.5"T 1.25"TDH LOC C	10 x 44	2.5" Threaded 1.25 TDH	44.6 / 1133	44.4 / 1128	13.1 / 49.6	1.75
	30546	1047 PG 2.5"T	10 x 47	2.5" Threaded	47.4 / 1204	46.9 / 1191	15.1 / 57.0	2.02
	30579	1054 PG 2.5"T	10 x 54	2.5" Threaded	54.8 / 1392	54.6 / 1387	16.4 / 62.0	2.19
	32065	1054 PG 2.5"T 1.25"TDH LOC A	10 x 54	2.5" Threaded 1.25 TDH	54.8 / 1392	54.6 / 1387	16.4 / 62.0	2.19
	32345	1054 PG 2.5"T 1.25"TDH LOC B	10 x 54	2.5" Threaded 1.25 TDH	54.8 / 1392	54.6 / 1387	16.4 / 62.0	2.19
	32997	1054 PG 2.5"T 1.25"TDH LOC C	10 x 54	2.5" Threaded 1.25 TDH	54.8 / 1392	54.6 / 1387	16.4 / 62.0	2.19
12" Dia.	30615	1242 PG 2.5"T	12 x 42	2.5" Threaded	42.8 / 1087	42.2 / 1072	19.1 / 72.0	2.55
	30617	1242 PG 4.5"T (BTRS)	12 x 42	4.5" Threaded (BTRS)	42.8 / 1087	42.2 / 1072	19.1 / 72.0	2.55
	30646	1248 PG 2.5"T	12 x 48	2.5" Threaded	48.8 / 1240	48.4 / 1229	20.6 / 78.0	2.75
	30666	1252 PG 2.5"T	12 x 52	2.5" Threaded	52.9 / 1344	52.4 / 1331	22.2 / 84.0	2.97
	30669	1252 PG 4"T	12 x 52	4.0" Threaded	52.9 / 1344	52.4 / 1331	22.2 / 84.0	2.97
	32127	1252 PG 4.5"T (BTRS) New	12 x 52	4.5" Threaded (BTRS)	52.9 / 1344	52.4 / 1331	22.2 / 84.0	2.97
13" Dia.	30721	1354 PG 2.5"T	13 x 54	2.5" Threaded	54.6 / 1387	53.9 / 1369	27.5 / 104.0	3.68
	30724	1354 PG 4"T	13 x 54	4.0" Threaded	54.6 / 1387	53.9 / 1369	27.5 / 104.0	3.68
	32890	1354 PG 2.5"T 1.25"TDH LOC A	13 x 54	2.5" Threaded 1.25 TDH	54.6 / 1387	53.9 / 1369	27.5 / 104.0	3.68
	32891	1354 PG 2.5"T 1.25"TDH LOC B	13 x 54	2.5" Threaded 1.25 TDH	54.6 / 1387	53.9 / 1369	27.5 / 104.0	3.68
	32892	1354 PG 2.5"T 1.25"TDH LOC C	13 x 54	2.5" Threaded 1.25 TDH	54.6 / 1387	53.9 / 1369	27.5 / 104.0	3.68
14" Dia.	30745	1447 PG 4"T	14 x 47	4.0" Threaded	46.5 / 1181	46.0 / 1168	27.5 / 104.0	3.68
	31389	1447 PG 2.5"T	14 x 47	2.5" Threaded	46.5 / 1181	46.0 / 1168	27.5 / 104.0	3.68
	32006	1447 PG 4.5"T (BTRS) New	14 x 47	4.5" Threaded (BTRS)	46.5 / 1181	46.0 / 1168	27.5 / 104.0	3.68
	30783	1465 PG 2.5"T	14 x 65	2.5" Threaded	64.6 / 1641	64.3 / 1633	40.6 / 154.0	5.43
	30785	1465PG 4"T	14 x 65	4.0" Threaded	64.6 / 1641	64.3 / 1633	40.6 / 154.0	5.43
16" Dia.	30912	1665 PG 4"T	16 x 65	4.0" Threaded	64.6 / 1641	64.3 / 1633	49.0 / 185.0	6.55
	31627	1665 PG 2.5"T	16 x 65	2.5" Threaded	64.6 / 1641	64.3 / 1633	49.0 / 185.0	6.55

Color Options: AL - Almond BL - Blue BK - Black GR - Gray NA - Natural

Requirements for POE Water Softeners under *NSF/ANSI 44*

By Rick Andrew

Cation exchange water softening is a well-known, well-understood technology that is successfully employed in many hard-water regions of North America as well as internationally. There is an American National Standard for testing and certification of these products—*NSF/ANSI 44*. Many readers may be familiar with the concepts of softening capacity, pressure drop, accuracy of the brining system and other requirements of this standard. But do you know the details?

This column will help to provide those details, including the conservative testing requirements and nuances of scope present in the standard. As you will see, the requirements are well thought out based on the considerations involved with the safety and operation of residential water softeners.

A question of scope

NSF/ANSI 44 defines a residential softener as a regenerable cation exchange system with conventional plumbing fittings not exceeding 1.25-inch (31.75 mm) NPS (nominal pipe size). Any softener with an inlet exceeding 1.25 inches is not considered residential, at least for purposes of *NSF/ANSI 44* and falls outside the scope of the standard.

Notice that the definition is not related to resin tank size, amount of cation exchange resin or system salt settings, but is based solely on the inlet size of the control valve. Also note that any physical or magnetic water conditioning systems are outside the scope of *NSF/ANSI 44*, because the standard is limited to cation exchange systems.

Disposable cartridge filters containing cation exchange resin fall outside the scope of the standard. This is because, although some do use cation exchange technology, they are not regenerable.

POE systems under NSF/ANSI 61

In late 2007, the scope of *NSF/ANSI 61* was revised to include POE systems and components. This means that water softeners can be certified either to *NSF/ANSI 44*, *NSF/ANSI 61* or both.

The main difference is that *NSF/ANSI 61* requires only conformance to the material safety requirements. *NSF/ANSI 44* requires conformance to material safety, structural integrity, pressure drop, softening capacity, softening performance, brine accuracy and product literature requirements.

Obviously, *NSF/ANSI 44* is a much more comprehensive standard for POE water softeners than *NSF/ANSI 61*. For this reason, NSF recommends that POE softeners be certified to *NSF/ANSI 44*.

A multitude of tests

A summary of the testing requirements of *NSF/ANSI 44* is included in Figure 1. A formulation review for all materials in contact with drinking water and material extraction test is required to establish that no contaminants leach from the softener at concentrations of toxicological concern.

A total of 100,000 cyclic and 15-minute hydrostatic tests are required to establish the long-term durability of the system as well as its resistance to pressure spikes. A pressure drop test confirms that the softener will not cause a drop of more than 15 psi in line pressure when operated at the manufacturer's rated service flow.

Softener capacity is determined by testing at one half of the manufacturer's rated service flow. The feed water must have a hardness of 20 ± two grains per gallon. Capacity testing is required at the lowest and highest salt settings and the setting closest to the midpoint of the range of salt settings.

Capacity for other non-tested salt settings is interpolated from the three measured capacities. Extrapolation is not allowed, so testing at the low and high salt settings is critical. Each test of capacity is conducted by first regenerating with a precisely measured amount of saturated brine. The softener's brine system is not utilized due to potential variation in the amount of regenerant salt.

The endpoint of the test is defined as one grain per gallon breakthrough in the softened water. The hardness leakage

Figure 1. NSF/ANSI 44 test descriptions

Requirement	Test description
Material safety	Formulation review for all wetted materials + extraction testing
Structural integrity	100,000 cyclic and 15-minute hydrostatic pressure testing
Pressure drop	Differential pressure between inlet and outlet may not exceed 15 psig at rated service flow
Exchange capacity	Softener challenged at one half of rated service flow with 20 grain per gallon feed water, endpoint when treated water reaches one grain per gallon
Rinse effectiveness	Net chloride in softened water must not exceed 100 mg/L after regeneration
Softening performance	System must produce soft water at rated service flow for 10 minutes after regeneration
Accuracy of the brine system	Salt used for regeneration must be within 15 percent of nominal salt setting

throughout the run is subtracted off when the capacity is determined, so that capacity is reflective of the exact amount of hardness removed. Three successive runs within 10 percent of the average of the three runs are required, with the average value being considered the official capacity at that salt setting. See Figure 2 for a graph of an example capacity run.

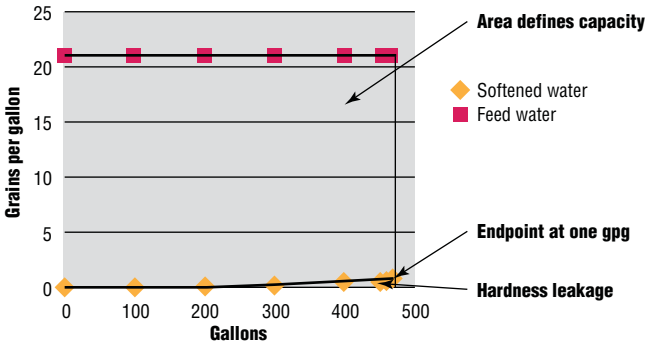
During capacity testing, the amount of residual chloride in the softened water is measured after regeneration. The net increase in chloride concentration from the softener may not exceed 100 mg/L. This indicates that the rinse is sufficient to rid the softened water of excess salt.

A separate test known as 'softening performance' is required. This test involves regeneration of the softener at the lowest salt setting and operation at the manufacturer's rated service flow. Samples of product water are taken each minute for 10 minutes and the hardness of the water may not exceed one grain per gallon for any of these samples.

Because the brine system is not used when conducting capacity testing, accuracy of the brine system must be determined through a separate test. This testing is conducted at the lowest and highest salt settings and the setting closest to the midpoint of the range. It involves weighing the brine tank before and after regenerations and three successive runs within 15 percent of the nominal salt setting must be achieved.

For example, a 10-pound salt setting successful brine accuracy test would require the weight of the brine tank to decrease by 8.5 to 11.5 pounds after each regeneration, for a series of three regenerations. There is an alternate procedure that may be used for time-controlled brine systems, involving calculations based on saturated brine.

Figure 2. Typical capacity test



Softener efficiency

In this day and age of potential bans on water softeners due to concerns about salinity, efficiency is a very hot topic. Although efficiency is not required for certification to *Standard 44*, it may be required by state or local regulations.

This is true especially in western states like California that have water salinity problems. And states that currently do not have efficiency requirements for softeners may be moving in that direction.

Efficiency is based on the amount of hardness capacity per amount of regenerant salt and per volume of regenerant water. Efficient softeners require less salt and/or regenerant water to achieve the same amount of softening capacity as less efficient softeners. This results in less water consumption and less salinity added to the environment.

The efficiency of softeners varies with the amount of salt used for regeneration. The higher the salt dosage, the lower the salt efficiency. There are diminishing returns in terms of softening capacity for regenerating with more and more salt. In fact, there is a point at which additional salt used in regeneration will not achieve any more softening

capacity and will simply be rinsed out of the system.

Efficiency is calculated from data measured and recorded during capacity testing. The requirements for efficiency are included in Figure 3. Only demand initiated regeneration (DIR) softeners may claim efficiency. A softener must achieve both salt efficiency and water efficiency in order to be 'efficiency rated.'

Figure 3. NSF/ANSI 44 efficiency requirements for DIR softeners only

Parameter	Efficiency requirement
Salt efficiency	At least 3,350 grains of capacity per pound of regenerant salt
Water efficiency	At least 1,000 grains of capacity per five gallons of regeneration water

Also any efficiency specifications or statements must refer to the salt setting at which the efficiency was achieved. The State of California has a more stringent requirement for salt efficiency ratings than does *Standard 44*, requiring at least 4,000 grains of capacity per pound of regenerant salt.

Conformance by calculation—certification of families of softeners

Standard 44 includes procedures to calculate pressure drop, capacity and efficiency for softeners that are similar to the test unit. There are specific requirements for softeners to be considered 'similar,' including:

- same control valve
- same distributor (length of distributor tube can vary with size of resin tank)
- limitations on variation in cation exchange resin specifications
- limitations on amounts of resin
- limitations on resin tank size
- limitations on regeneration volumes
- limitations on flow rates
- limitations on salt dosages

The concept is that a line of softeners built with the same control valve can be certified based on testing one or a few of them and then using calculations included in the standard to calculate pressure drop, capacity and efficiency for the non-tested models. The limitations are designed to keep only softeners that function similarly in the same family.

The equations used for calculations have proven accurate in practice. Conformance by calculation allows manufacturers to certify broad lines without unnecessarily testing each one of many very similar softeners.

A comprehensive standard

As you can see from this brief overview, *Standard 44* requires testing all relevant aspects of water softeners, from material safety to accuracy of the brine system. This means that a number of tests are required, each one designed to evaluate different aspects.

This is in contrast to *Standard 61*, which requires an evaluation for material safety only. Although POE softeners may be evaluated under and certified to either one, the comprehensiveness of *Standard 44* makes it the clear choice.

About the author

Rick Andrew is the Operations Manager of the NSF Drinking Water Treatment Units Program for certification of POE and POU systems and components. Prior to joining NSF, his previous experience was in the area of analytical and environmental chemistry consulting. Andrew has a Bachelor's Degree in chemistry and an MBA from the University of Michigan. He can be reached by phone at 1-800-NSF-MARK or by email at Andrew@nsf.org.

DOWEX™ HCR-S

A High Capacity Cation Exchange Resin for Softening and Demineralization Applications

Product	Type	Matrix	Functional group
DOWEX™ HCR-S	Strong acid cation	Styrene-DVB gel	Sulfonic acid

Guaranteed Sales Specifications		Na^+ form	H^+ form
Total exchange capacity, min.	eq/L	2.0	1.8
	kgr/ft³ as $CaCO_3$	43.7	39.3
Bead size distribution range† 300 - 1,200 µm, min. (50 mesh - 16 mesh)	%	90	90
Acidity range	pH	7.0 - 10.5	—
Color throw, as packaged, max.	APHA	20	—

Typical Physical and Chemical Properties		Na^+ form	H^+ form
Water content	%	44 - 48	50 - 56
Whole uncracked beads	%	90 - 100	90 - 100
Total swelling ($Na^+ \rightarrow H^+$)	%	8	8
Particle density	g/mL	1.28	1.22
Shipping weight	g/L	820	780
	lbs/ft³	51	49

Recommended Operating Conditions

- Maximum operating temperature: 120°C (250°F)
- pH range 0 - 14
- Bed depth, min. 800 mm (2.6 ft)
- Flow rates:
  - Service/fast rinse 5-50 m/h (2-20 gpm/ft²)
  - Backwash See figure 1
  - Co-current regeneration/displacement rinse 1-10 m/h (0.4-4 gpm /ft²)
- Total rinse requirement 3 - 6 Bed volumes
- Regenerant: 1-8% H_2SO_4, 4-8% HCl or 8-12% NaCl

† For additional particle size information, please refer to Particle Size Distribution Cross Reference Chart (Form No. 177-01775).

Typical Properties and Applications

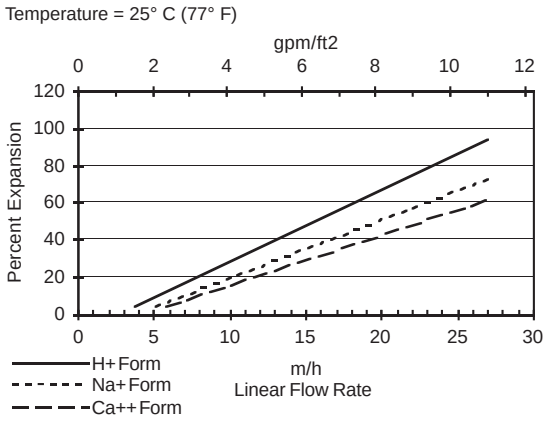
DOWEX™ HCR-S cation exchange resin is a high capacity resin with excellent kinetics and good physical, chemical and thermal stability.

DOWEX HCR-S cation exchange resin is well suited for industrial water softening and demineralization in the co-current mode of regeneration.

Packaging

25 liter bags or 5 cubic feet fiber drums

Figure 1. Backwash Expansion Data

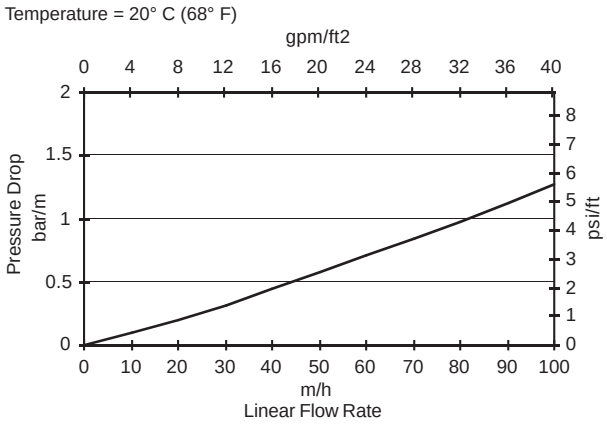


For other temperatures use:

$F_T = F_{77°F}$ [1+ 0.008 ($T_{°F}$ -77)], where F ≡ gpm/ft^2

$F_T = F_{25°C}$ [1+ 0.008 (1.8$T_{°C}$ - 45)], where F ≡ m/h

Figure 2. Pressure Drop Data



For other temperatures use:

$P_T = P_{20°C}$ / (0.026 $T_{°C}$ + 0.48), where P ≡ bar/m

$P_T = P_{68°F}$ / (0.014 $T_{°F}$ + 0.05), where P ≡ psi/ft

Note: These resins may be subject to drinking water application restrictions in some countries: please check the application status before use and sale.

DOWEX™ Ion Exchange Resins
For more information about DOWEX resins, call the Dow Water Solutions business:

North America:	1-800-447-4369
Latin America:	(+55) 11-5188-9222
Europe:	(+32) 3-450-2240
Pacific:	+60 3 7958 3392
Japan:	+813 5460 2100
China:	+86 21 2301 9000

http://www.dowex.com

Form No. 177-01583-0407

The Dow Chemical Company
U.S.A.

Effective Date: December 20, 2007
Supersedes: August 28, 2007

FOOD ADDITIVE STATUS

Product	**Product Code**
DOWEX™ 50WX4 20-50 Mesh (Na) Cation Exchange Resin	23030
DOWEX 88 (Na) Cation Exchange Resin	37067
DOWEX 88MB (Na) Cation Exchange Resin	23073
DOWEX CM-15 (Na) Cation Exchange Resin	03780
DOWEX HCR-S (Na) Cation Exchange Resin	63145
DOWEX HCR-SL (Na) Cation Exchange Resin	10193
DOWEX HCR-S/S (Na) Cation Exchange Resin	03789
DOWEX HCR-S/S CR (Na) Cation Exchange Resin	05305
DOWEX HGR (Na) Cation Exchange Resin	63151
DOWEX MARATHON™ C (Na) Cation Exchange Resin	39935
DOWEX MARATHON C-10 (Na) Cation Exchange Resin	69048
DOWEX MARATHON MSC (Na) Cation Exchange Resin	63028
DOWEX MONOSPHERE™ C-350 Cation Exchange Resin	08530
DOWEX MONOSPHERE C-400 Cation Exchange Resin	08531
DOWEX MONOSPHERE 88 (Na) Cation Exchange Resin	30267
DOWEX MONOSPHERE C-600 B Cation Exchange Resin	43966
DOWEX N278 (Na) Cation Exchange Resin	52155
DOWEX N279 (Na) Cation Exchange Resin	52156
DOWEX UPCORE™ Mono C-600 (Na) Cation Exchange Resin	52221
XUS 43595.00 Developmental Cation Exchange Resin	80065
XUS 43598.00 Developmental Cation Exchange Resin	148757

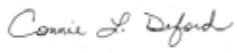
Food and Drug Administration (FDA)

These products comply with the U.S. Food and Drug Administration's Food Additive Regulation 21 CFR § 173.25(a)(1).

Use of this product is subject to good manufacturing practices and any limitations which are part of the regulations. The regulations should be consulted for complete details.

If you have any questions or require further information, please contact us via our web site at www.dow.com/perfchem.

Sincerely,



Connie Deford
Global Director for Product Regulatory Management
The Dow Chemical Company
www.dow.com/perfchem (Dow Answer Center)

694 SERIES CHECK VALVE

Maximum Operating Pressure - 125 psi
Maximum Operating Temperature - 140 Degrees F
Seat Area Open Diameter - .438

694 Poppet Check Valve Design Considerations

The 687 Series Poppet Check Valve incorporates a thin elastomer disc supported by a poppet that seals on the seat. Pressure in the flow direction moves the seal off the seat first before pressure builds enough to move the poppet away from the seat. The 687 Series Check Valve maximum operating pressure of 125 psi covers a wide range of air and fluid applications. The 687 Check is a compact design with a light cracking pressure, high flow rate, and a positive seal at very low back pressure or slight vacuum. For higher cracking pressure applications, an embedded o-ring poppet is substituted for the standard elastomer disc poppet.

Example:

Body Material	Inlet End	Outlet End	Seal	Spring
White Filled Poly	1/4 FNPT	1/4 FNPT	Viton®	1 psi, O-ring

SMC Part Number: WFP CHK 694-4F4F-F,1# O-Ring

The flow arrow on the body will point from Inlet to Outlet. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.
Example: WFP CHK 694-4F4F-F,1# O-Ring = 1/4 FNPT Inlet x 1/4 FNPT Outlet

694 Series Options

Material Options Black Polypropylene Body & Poppet
White Polypropylene Body & Poppet

Seal Options Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®)

End Options 1/4 Female NPT X 1/4 Female NPT

Cracking Pressure 302 Stainless Spring - 1/3 psi (Standard), 1, 7 psi

SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

Water Heater

- One (1) Qnty. of Hubbell # HX018-2S Water Heater
- Three (3) Qnty. of 1”, PVC True-Union Ball Valve
- Two (2) Qnty. of Flexible Water Heater Connectors

Hubbell™

Model HX/TX Tankless

Tankless Electric Water Heater

Available up to 54 KW in Single or Three Phase Voltages

Features

- **Heavy Duty Construction**
  - √ Constructed with high grade materials to ensure long operating life
  - √ Simple to specify and easy to install and operate
  - √ Factory packaged heater provides trouble-free installation and operation
- **Reliability**
  - √ Engineered for your specific application to ensure reliable operation
  - √ Wide selection of sizes to meet the needs of even the most demanding application
- **High Efficiency**
  - √ On demand heating eliminates costly and cumbersome storage tanks
  - √ Instantaneous design reduces stand-by heat loss and significantly lowers operating costs compared to traditional storage systems

Applications

- Process Systems
- Wash Downs
- Heat Pump Back-Up
- Boiler Systems
- Emergency Safety Wash Systems
- Freeze Protection
- Heat Transfer Systems
- Supplemental Heat
- Point-of-Use Hot Water

Model HX/TX Tankless

CLASSIFIED UL EPH ANSI/NSF 5

c UL us LISTED

The Model HX / TX Tankless is a compact wall mounted electric tankless water heater that is 98% + efficient and is easily installed and operated.

Tankless Water Heater For Commercial and Industrial Use

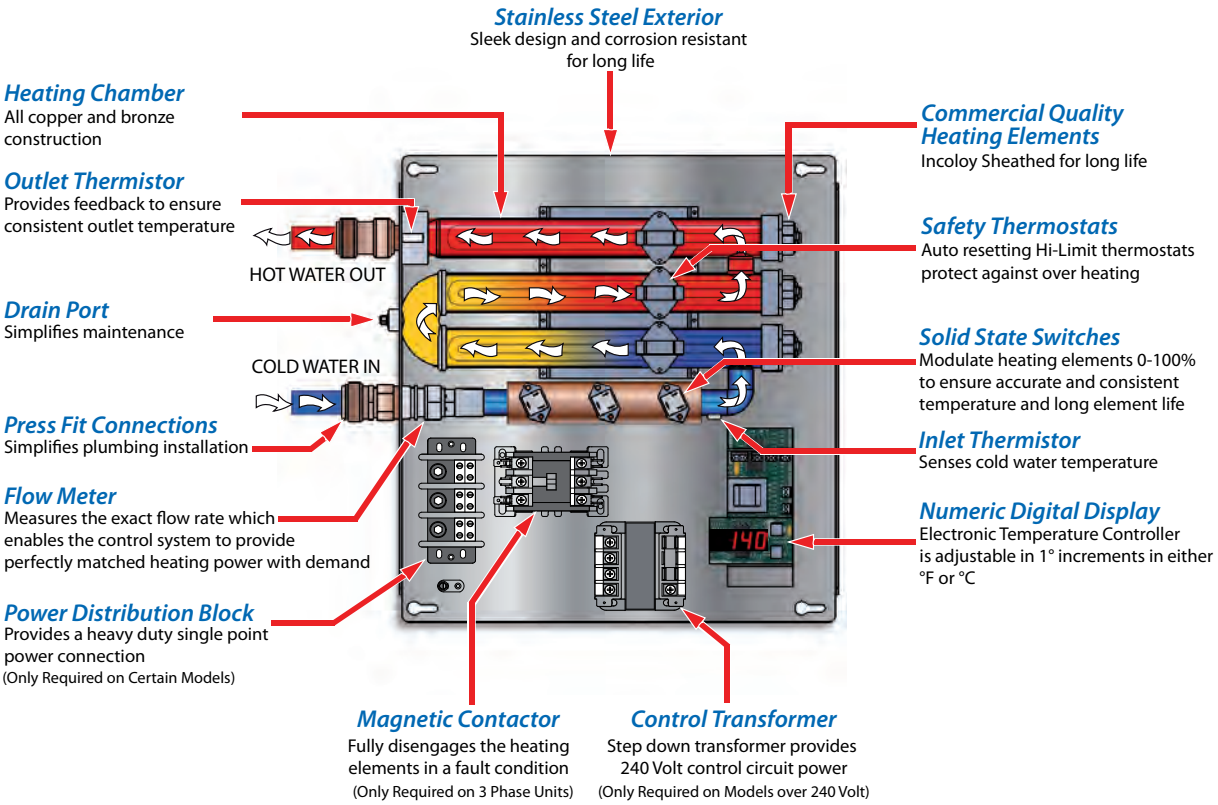
The Hubbell model HX / TX Tankless electric water heater is a highly reliable and easily maintained heater designed for operation in a commercial or industrial application. The Hubbell HX / TX Tankless heater is compact, extremely efficient, takes up minimal space, and reduces operating costs. Hubbell's vast experience, meticulous engineering, and advanced technology ensure that you can rely on the model HX / TX for your water heating needs in even the most demanding and critical applications. The Hubbell Tankless is the right choice for your water heating requirements, as you will be providing your customer with a quality product that is long lasting, trouble-free, and energy efficient.

Hubbell Tankless Features

How It Works

The Hubbell Model HX / TX electric tankless water heater contains high powered heating elements that heat water only when there is demand for hot water. When hot water is needed, a built in flow sensor measures the exact flow rate, and that data combined with temperature readings at the heater's inlet and outlet are processed by the electronic temperature controller. This data is continuously transmitted to the temperature controller, which constantly calculates the precise amount of power (kW) needed to achieve the desired temperature. A zero cross over firing signal is sent to the fast acting triacs in order to modulate the heating elements to the precise level needed to meet demand. The Hubbell tankless heater uses only as much power as is needed, while delivering accurate and consistent hot water temperature.

Heater Overview - *3 Element Model Shown*



Tankless Model HX/TX Standard Specifications

Heating Chamber:	Copper and Bronze	**Thermostat Range:**	32 -194°F / 0-90°C
Capacities:	8 thru 54 kW	**Hi-Limit:**	200°F (Fixed Temperature)
Orientation:	Wall Mounted	**Design WP:**	150 psi
Voltages:	208 thru 600 Volt 50/60 Hz	**Design TP:**	300 psi
Phase:	1 Φ and 3 Φ (balanced)	**Elements:**	Incoloy 800
Power Factor:	0.999	**Standby Power:**	< 3 Watts
Thermal Efficiency:	98% +	**Heating Chamber Warranty:**	5 Year
Inlet/Outlet Size:		**Electrical Warranty:**	1 Year
TX:	3/4" Press Fit		
HX:	1" ~~Press Fit~~ NPT		
Min/Max Flow:		**Enclosure:**	304 Stainless Steel Brushed Finish
TX:	0.2 GPM Min, 8.0 GPM Max		
HX:	0.5 GPM Min, 40 GPM Max	**Approvals:**	cULus, UL EPH ANSI/NSF 5

Technical Features

Temperature Controller

A sophisticated electronic temperature controller with LED digital display provides the user interface. The temperature controller processes all flow and temperature data and calculates the precise amount of power needed to meet demand.

Operator Control Capabilities		
✓	***Power Limiting:***	Allows the operator to reduce the power consumption by any percentage to provide installation and operational flexibility and savings.
✓	***Diagnostics:***	Display inlet and outlet temperatures, flow rate and error codes to assist in troubleshooting.
✓	***Cost Calculator:***	Determine the exact cost of operating the heater. Input your cost per KW·Hr and the controller displays total KW·HRs consumed, total cost of operation, and total hot water usage (shown in gallons or liters).
✓	***Temperature Control:***	Set the digital display to the desired water temperature in °F or °C. Fully adjustable in 1° increments from 32-194°F (0-90°C). A user adjustable +/- 3° calibration feature provides additional control for superior accuracy.

Full Heater Modulation

Each heating element is switched on/off using a fast acting solid state triac with zero cross over firing control. This switching schema provides full modulation of each heating element, ensuring that the precise amount of heat is added to meet demand. To improve operating efficiency and component longevity, each triac is mounted to a heat sink located on the incoming supply piping so that heat generated by the triac during the switching process is dissipated into the water.

Proper Power Integrity

All Hubbell tankless water heaters, including all 3 phase models, are engineered to operate as a balanced load and operate at 0.999 Power Factor. All Hubbell 3 phase models are designed for 3 wire (3 live, 1 ground) and 4 wire power systems and draw equal current across all conductors to maintain the power integrity of the users electrical system. Hubbell does not recommend the use of heaters that operate as an unbalanced load, as is common with staged heaters designed for star systems (3 live, 1 neutral, 1 ground) that require use of the neutral leg. All load switching in Hubbell tankless models is performed as zero cross over, eliminating phase angle firing interference and associated EMI issues.

Full Resource Staging

The Hubbell tankless control schema ensures that usage is equalized across all heating circuits. To achieve this, once the controller has calculated the precise amount of kW required, all circuits are energized in a staggered fashion such that each circuit is proportionally and independently energized and then time staggered between circuits. This Full Resource Staging Schema reduces EMI output, increases component longevity, and provides highly accurate and consistent hot water temperatures. For three phase models, all circuits are fully modulated and synchronized to operate as a balanced load.

Building Management Integration

Remote Control: Ability to remotely enable or inhibit the heating operation of the unit using one of the following two methods:

1. Customer supplied 24VDC signal is user configured for either Inhibit Mode or Normal Operation Mode.
2. Customer supplied volt free contact is user configured for either Inhibit Mode or Normal Operation Mode.

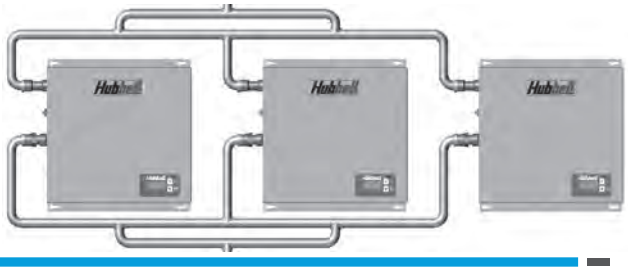
Priority Control: An integrated SPDT potential free dry contact (NO/NC 10A @ 240VAC) energizes when the unit is heating and de-energizes when not heating. This feature is useful when it is desirable to give the water heater priority over another electrical load to ensure that both are not operational at the same time.

Options

- ☐ A. High flow construction specify model HX for up to 40 GPM flow (min 0.5 GPM actuation).
- ☐ B. Type 316L stainless steel heating chamber for added corrosion resistance.
- ☐ C. Special construction features. Please consult factory.
- ☐ D. Inlet and Outlet Valve assembly simplifies installation and includes unions, shut offs, check valve,drain ports and relief valve port.
- ☐ E. Heating chamber built to ASME Section VIII and "UM" stamped.
- ☐ F. Remote Control Display allows the heater to be installed in a remote location. The 3" x 5" NEMA 4 display enclosure can be located up to 250' from the heater and gives the operator full remote control and monitoring capabilities.
- ☐ G. NEMA 4x construction when heater is located in a wet environment. Overall dimensions 24" x 20" x 6"
- ☐ H. Additional heater control features to meet UL834 Electric Boiler requirements. Please specify base model CR.
- ☐ I. Factory supplied manifold single point connection for redundancy and high demand applications.

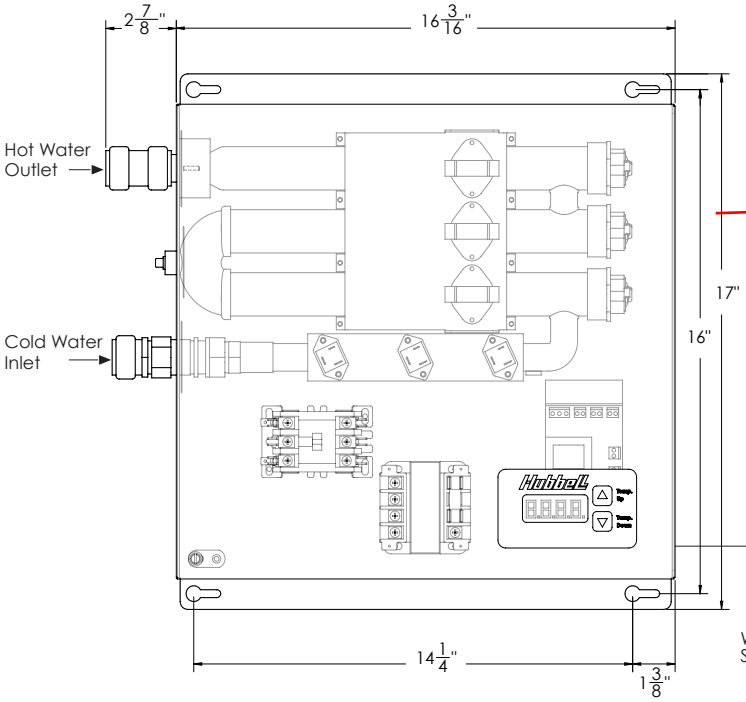
Manifold Assembly Option

Single point connection for redundancy and high demand applications.



Outline Dimensions and Model Selection

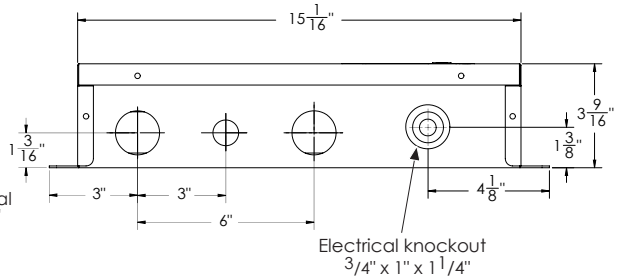
8-27 KW Models (2 and 3 Element)



KW Selection Chart						
KW	3 Phase Voltages				1 Phase Voltages	
	208V	240V	480V	600V	208V	240V
8					✓ (2)	
11	✓ (3)					✓ (2)
12	✓ (3)				✓ (2)	
14		✓ (3)			✓ (2)	✓ (2)
16	✓ (3)	✓ (3)			✓ (3)	✓ (2)
18	✓ (3)		✓ (3)		✓ (3)	✓ (2)
20	✓ (3)				✓ (3)	
21		✓ (3)	✓ (3)	✓ (3)		✓ (3)
24		✓ (3)	✓ (3)	✓ (3)		✓ (3)
27		✓ (3)	✓ (3)	✓ (3)		✓ (3)

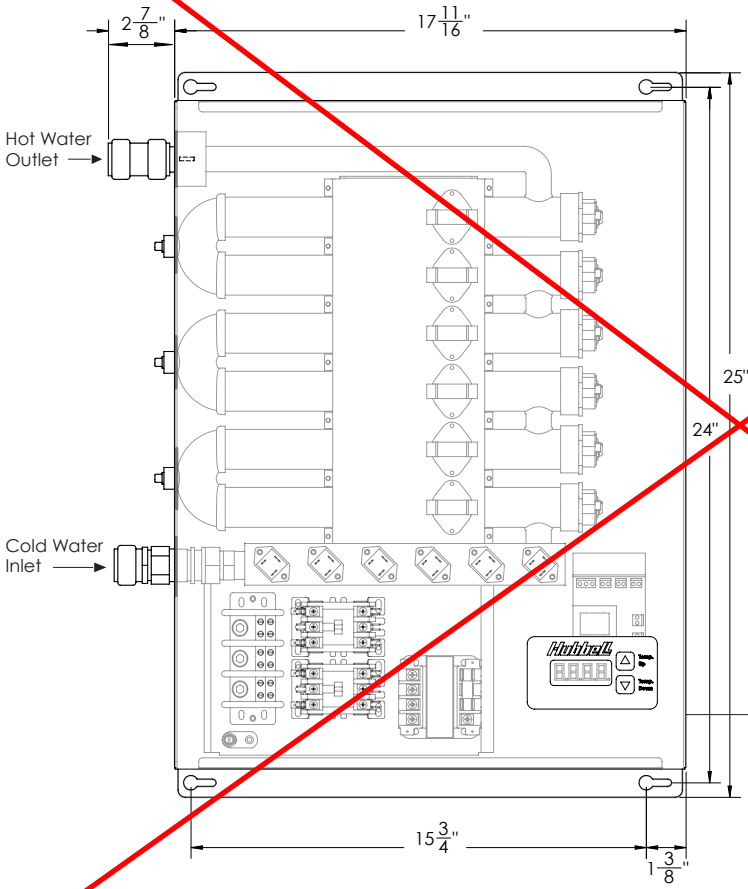
Note: Chart indicates three element (3) and two element (2) model types

Side View



Pressure Drop: 3 psi @ 8 GPM *Dry Weight: 21 Lbs* *Wet Weight: 21.5 Lbs* *Shipping Weight: 24 Lbs*

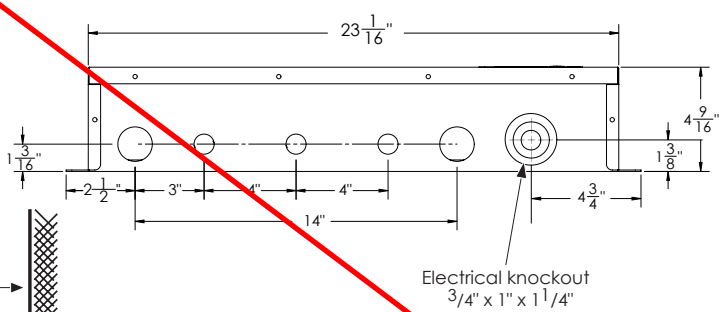
24-54 KW Models (6 Element)



KW Selection Chart						
KW	3 Phase Voltages				1 Phase Voltages	
	208V	240V	480V	600V	208V	240V
24	✓ (6)				✓ (6)	
31	✓ (6)				✓ (6)	
33		✓ (6)				✓ (6)
36	✓ (6)		✓ (6)		✓ (6)	
40	✓ (6)				✓ (6)	
42		✓ (6)	✓ (6)	✓ (6)		✓ (6)
48	✓ (6)	✓ (6)	✓ (6)	✓ (6)	✓ (6)	✓ (6)
54		✓ (6)	✓ (6)	✓ (6)		✓ (6)

Note: All models shown in this chart are six element (6) model types

Side View



Pressure Drop: 4 psi @ 8 GPM *Dry Weight: 38 Lbs* *Wet Weight: 39 Lbs* *Shipping Weight: 42 Lbs*

Heating Capacity and Amperage Chart

KW Rating	Heating Capability in GPM at °F Temperature Rise (°FΔT)										MAX Amps (at 100% heater output)					
											3 Phase Voltages				1 Phase Voltages	
	20° ΔT	30° ΔT	40° ΔT	60° ΔT	70° ΔT	80° ΔT	100° ΔT	110° ΔT	120° ΔT	140° ΔT	208V	240V	480V	600V	208V	240V
8	2.73	1.82	1.36	0.91	0.78	0.68	0.55	0.50	0.45	0.39	–	–	–	–	38	–
11	3.75	2.50	1.88	1.25	1.07	0.94	0.75	0.68	0.63	0.54	31	–	–	–	–	46
12	4.09	2.73	2.05	1.36	1.17	1.02	0.82	0.74	0.68	0.58	33	–	–	–	58	–
14	4.78	3.18	2.39	1.59	1.36	1.19	0.96	0.87	0.80	0.68	–	34	–	–	67	58
16	5.46	3.64	2.73	1.82	1.56	1.36	1.09	0.99	0.91	0.78	44	39	–	–	77	67
18	6.14	4.09	3.07	2.05	1.75	1.54	1.23	1.12	1.02	0.88	50	–	22	–	87	75
20	6.82	4.55	3.41	2.27	1.95	1.71	1.36	1.24	1.14	0.97	56	–	–	–	96	–
21	7.17	4.78	3.58	2.39	2.05	1.79	1.43	1.30	1.19	1.02	–	51	25	20	–	88
24	8.19	5.46	4.09	2.73	2.34	2.05	1.64	1.49	1.36	1.17	67	58	29	23	115	100
27	9.21	6.14	4.61	3.07	2.63	2.30	1.84	1.67	1.54	1.32	–	65	33	26	–	113
31	10.58	7.05	5.29	3.53	3.02	2.64	2.12	1.92	1.76	1.51	86	–	–	–	149	–
33	11.26	7.51	5.63	3.75	3.22	2.81	2.25	2.05	1.88	1.61	–	79	–	–	–	138
36	12.28	8.19	6.14	4.09	3.51	3.07	2.46	2.23	2.05	1.75	100	–	43	–	173	–
40	13.65	9.10	6.82	4.55	3.90	3.41	2.73	2.48	2.27	1.95	111	–	–	–	192	–
42	14.33	9.55	7.17	4.78	4.09	3.58	2.87	2.61	2.39	2.05	–	101	51	41	–	175
48	16.38	10.92	8.19	5.46	4.68	4.09	3.28	2.98	2.73	2.34	133	116	58	46	230	200
54	18.42	12.28	9.21	6.14	5.26	4.61	3.68	3.35	3.07	2.63	–	130	65	52	–	225

Note: *• Unshaded flows specify Base Model TX, shaded flows must specify Base Model HX due to high flow rate.*
• Alternate voltages including 277, 380, 415, 440 and 575 volt available. Please consult factory for exact KW availability in these voltages.

Sizing Formulas

Step 1
Solve for the unknown using formulas below.

Variables To Solve For:

KW Requirement:

_____ GPM x _____ °FΔT x 0.1465 = _____ KW

Temperature Rise:

_____ KW x 6.824 ÷ _____ GPM = _____ °FΔT

Flow Rate:

_____ KW x 6.824 ÷ _____ °FΔT = _____ GPM

Step 2
Choose the Tankless model with the KW rating which meets the peak demand (GPM) and required temperature rise (°FΔT) for your application.

Step 3
Choose the voltage and phase power supply available. Note the total amperage draw of the unit and verify availability.

Voltage De-Rating Factors

Rated Voltage	Applied Voltage	De-Rating Factor
600 V	575 V	92%
600 V	550 V	84%
480 V	460 V	92%
480 V	440 V	84%
240 V	230 V	92%
240 V	220 V	84%
240 V	208 V	75%

When the actual supply voltage (applied voltage) is different than the design voltage (rated voltage) the resulting KW output will be affected. Please see the chart for typical voltage de-rating factors, or use the following formula.

$$\frac{\text{Applied Voltage}^2}{\text{Rated Voltage}^2} \text{ X Rated KW = KW output at applied voltage}$$

Model Number Designation

~~TX~~ | **018** | – | **2** | **S**

Step 1 — Base Model No.
TX = 8 GPM Max
HX = 40 GPM Max

Step 2 — KW Rating:
8 thru 54KW
(008 - 054)

Step 3 — Number of Heating Elements:
2
3
6

Step 4 — Voltage / Phase / Hz:
RS = 208-1-60
R = 208-3-60
S = 240-1-60
T = 240-3-60
T3 = 380-3-50/60
T7 = 415-3-50/60
T5 = 440-3-60
T4 = 480-3-60
T6 = 600-3-60

Example: TX024-3T4

A Hubbell tankless electric water heater rated at 24 KW with 3 heating elements and powered with 480 volt, three phase, 60 Hz.

Option Note

Any and all optional equipment for a tankless model heater must be called out in the written specifications. A model number in and of itself does not reflect any optional equipment selected.

Master Specification: Model HX / TX Tankless

JOB NAME _____ ENGINEER _____

REPRESENTATIVE _____ CONTRACTOR _____

GENERAL

Provide a quantity of _____ packaged type instantaneous electric tankless water heater(s) Model No. **TX**_____ as manufactured by HUBBELL Electric Heater Co., Stratford, CT. The entire unit is packaged ready for plumbing and electrical service connections and shall bear the cULus listing mark certifying the entire unit to UL499, UL EPH Sanitation listed to ANSI/NSF Standard 5 and CSA C22.2 No. 64-M91 (single phase units) and CSA C22.2 No. 88 (three phase units).

HEATING CHAMBER

The heating chamber shall be all Sil-brazed copper and bronze construction. (☐ **Optional Specification:** Type 316L Stainless Steel). A plastic heating chamber shall not be acceptable. Water heater heating chamber shall be rated for a maximum allowable working pressure of 150psi. The heating chamber and all electrical controls shall be completely enclosed in a heavy gauge Type 304 stainless steel case.

HEATING CAPACITY

The tankless heater shall be rated at _____ KW which will heat _____ GPM of water at _____ °F rise (_____ ° to _____ °F). Heaters that restrict hot water flow in any way shall not be acceptable.

ELECTRICAL

The tankless heater shall be designed to operate at _____ volts, _____ phase, 50/60Hz balanced power and shall draw equal amperage across all phases at all times. For 3 phase heaters, power shall be a 3 wire (3 live, 1 ground) or a 4 wire (3 live, 1 neutral, 1 ground) system that does not require a neutral leg. The heater will draw _____ amps only when operating at full power. The immersion heating elements shall be high quality incoloy sheathed and sized to obtain the rated capacity. Each element is to be operated using zero cross over solid state controls. The heating elements shall be fully modulated from 0-100% to provide precise temperature control through the full range of flows. A Hi-Limit thermostat with automatic reset shall be factory installed to disconnect each heating element in the event of an over-temperature condition. An electronic digital display temperature controller shall be user adjustable in 1° increments in either °F or °C and shall display flow rate, outlet temperature, inlet temperature and provide error indication. A turbine-type flow meter shall be factory installed to provide precise temperature control for water flows as low as 0.2 GPM up to a maximum flow of 8 GPM. Heaters that require greater than 0.2 GPM flow for actuation or restrict flow shall not be acceptable. (☐ **Optional Specification:** High Flow Model HX, provides up to 40 GPM flow with minimum actuation at 0.5 GPM).

WARRANTY

Hubbell shall warranty all electrical components against defects in workmanship and material for a period of one (1) year from date of start-up, and the heating chamber for a full five (5) years from date of start-up, provided that the unit is started within three (3) months of date of shipment and installed and operated within the scope of the heater's design and operating capability. Labor is not covered under warranty. Each heater shall be shipped with a complete set of installation and operating instructions including spare parts list and approved drawings. All fabrication and assembly shall be performed in the U.S.A.

OPTIONS

In addition, the tankless electric water heater shall be supplied with the following options:

☐ **Option** _____

☐ **Option** _____

☐ **Option** _____

ISO 9001:2008

Committed to continuous improvement...

Continuing research results in product improvement; therefore specifications are subject to change without notice. For the most updated information, consult the factory directly.

Made in the U.S.A.

Hubbell™

The Electric Heater Company ■ P.O. Box 288 ■ Stratford, CT 06615-0288 ■ Phone: 203-378-2659 ■ Fax: 203-378-3593
info@hubbellheaters.com ■ ***www.hubbellheaters.com***

PVC & CPVC TRUE UNION 2000 VALVES

TU2000-2-0605

One of the Most Versatile, Compact Valve Designs Available

Spears® True Union 2000 Ball Valves, 3-Way Ball Valves and Ball Check Valves provide maximum versatility with fully interchangeable valve cartridges. Provides for easier system design modifications and upgrades in multiphase projects, or anywhere changes in valve types are desired. Simply exchange any True Union 2000 valve in-line using existing union nuts. Also mates with Spears® new Schedule 80 Unions and Diaphragm Valves. All True Union 2000 valves feature a low profile, compact design for minimal space requirements. Available in PVC or CPVC with choice of EPDM or Dupont Dow Genuine Viton® O-ring seals and socket, flanged, or optional Spears® patented Special Reinforced (SR) threaded end connectors. Additionally, Spears® offers valve Retrofit Kits for easy in-line replacement of other valves and factory installed Actuation Packages. Assembled with silicone-free lubricant.

True Union 2000 Industrial Ball Valve

- Multi-featured Industrial Grade
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or SR Threaded End Connectors

True Union 2000 Industrial 3-Way Valve

- Industrial Grade, Multiport, Diverter, L-Pattern & T-Pattern configurations Vertical 3-Way or Horizontal Diverter (shown)
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors

MADE IN THE U.S.A. WITH PRIDE

PROGRESSIVE PRODUCTS FROM SPEARS®
INNOVATION & TECHNOLOGY

Visit our web site:
www.spearsmfg.com

LPCB — NATIONAL ACCREDITATION OF CERTIFICATION BODIES

Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

True Union 2000 Industrial Ball Check Valve

- Industrial Grade
- Flow-Tested for Minimum Turbulence
- Fully Serviceable, Replaceable Components, uses Standard O-ring Seat
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Easily Converted to Foot Valve
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or optional SR Threaded End Connectors
- Also available in PVC White

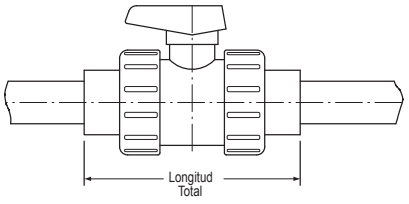
Check Valve Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
C_V	**6.3**	**17**	**25**	**65**	**86**	**130**	**200**	**275**	**500**	**800**

Economical True Union 2000 Standard Ball Valve

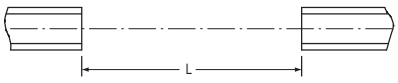
- High quality Standard Ball Valve
- Allows future system upgrade
- Excellent for OEM Applications
- Replaceable Seats
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Spears® Safe-T-Shear® Stem
- Self Adjusting Floating Seat
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors
- Also available in PVC White

True Union 2000 Retrofit Valves or Kits

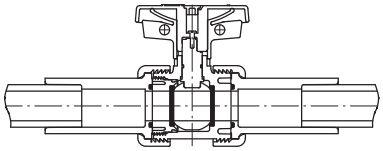
Easily converts any system over to all True Union 2000 style valves for consistent valve type and uniform maintenance. Special extended socket style End Connectors (2) allow retrofit replacement of other brand valves in existing piping systems with a new True Union 2000 valve. Simply cut out old valve according to specified dimension and install retrofit end connectors. End connectors are provided with either EPDM or genuine Viton® O-rings. Can be ordered as End Connector Kit or fully assembled Retrofit Valve.



BALL VALVE FOR REPLACEMENT



PIPE LAYING LENGTH AFTER CUTTING



TRUE UNION 2000 BALL VALVE INSTALLED WITH RETROFIT KIT

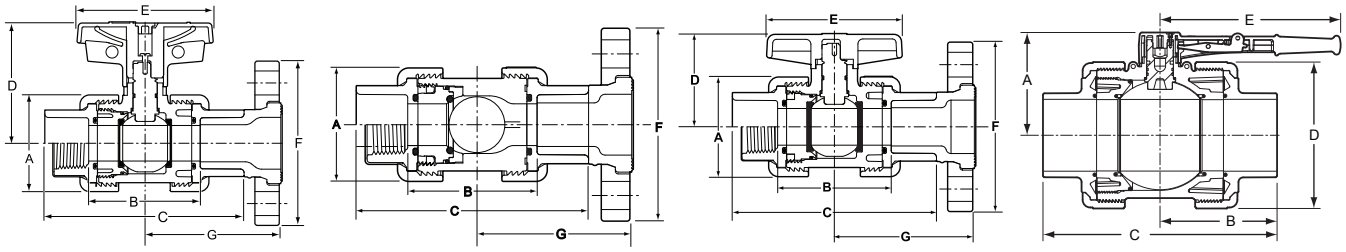
Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
L	4-29/32	5-7/16	6-3/32	7-1/4	7-1/2	8-17/32	10-3/4	11-7/16	14-5/16	N/A

L ± 1-1/16

Contact Spears® for Special Kits/Valves to replace older Spears® Regular True Union Ball Valves

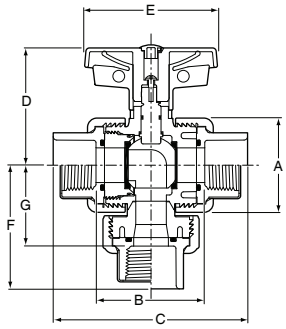
True Union 2000 Valve Dimensional Data

Industrial Ball Valve, Ball Check Valve, Standard Ball Valve & 6” Industrial Lever Handle



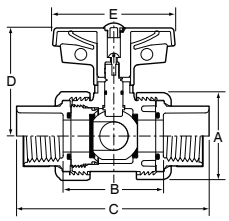
Nominal Size	A	Dimensions Reference (inches, ±1/16)										
		B		C			D		E		F	G
		Soc/Thd	Spigot	Socket	Thread	Spigot	Industrial	Standard	Industrial	Standard		
1/2	1-7/8	2-3/8	2-7/8	4-3/16	3-3/16	4-5/8	2-9/16	1-5/8	2-13/16	2-1/2	3-1/2	2-31/32
3/4	2-1/4	2-3/4	3-1/4	4-3/4	4-1/4	5-1/4	2-7/8	2	3-3/8	3	3-7/8	3-5/16
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	2-5/16	3-7/16	3-7/16	4-1/2	3-5/8
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	2-13/16	3-7/8	3-9/16	4-5/8	3-31/32
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	3-1/16	4-3/16	3-7/8	5	4-3/8
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	3-3/4	5-1/8	5	6	5-1/4
2-1/2	5-3/8	6-7/8	7-13/16	10-7/16	9-11/16	11-3/8	5-1/8	5-7/8	6-1/4	7-5/8	7-1/2	6
3	6-3/16	7	7-13/16	10-11/16	9-7/8	11-9/16	5-7/8	5-7/8	7-5/8	7-5/8	7-1/2	6-13/16
4	7-5/8	7-5/16	8-1/4	11-7/8	10-1/4	12-3/4	6-3/4	6-3/4	9-3/16	6-3/4	9	7-1/2
6	11-5/8	11-1/16	13	17-1/16	15-3/4	18-1/2	8-1/8	---	14-5/16	---	11-1/4	10-3/16

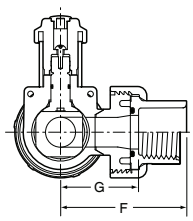
Industrial 3-Way Ball Valve



Nominal Size	A	Vertical 3-Way Ball Valves[3]												Oper.[2] Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-7/8	2-7/16	2-15/16	4-1/4	3-27/32	4-3/4	2-9/16	2-13/16	2-3/4	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

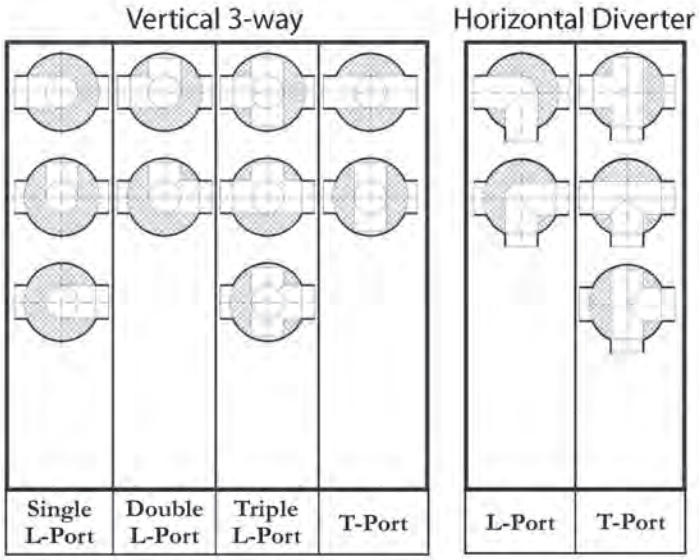




Nominal Size	A	Horizontal Diverter Ball Valves[3]												Oper.2 Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-3/16	2-7/16	2-15/16	4-3/16	3-13/16	4-3/4	2-9/16	2-13/16	2-9/16	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

3-Way Port Options



True Union 2000 Actuated Valves

Universal ISO Actuator Mounting Pattern Option

Spears® offers optional actuator mounting with standard ISO Mounting Pattern for user actuation of True Union 2000 Ball Valves.

Factory Actuated Valve Packages

Spears® Electric or Pneumatic Actuation Packages eliminate customer's having to determine proper valve and actuator mating. Pre-matched packages insure proper torque, coupling and mount for optimum performance - all factory installed and tested for proper alignment and operation. Actuation packages can be custom built to user specifications from Spears® wide selection of options, voltages and accessories. Contact Spears® for additional information.

Foot Valve Screens

- Easily converts Ball Check Valve to a Foot Valve.
- Standard IPS spigot connection fits slip-socket valve end connector.
- Enlarged screen provides open area equivalent to valve for optimum flow characteristics.
- Chemical and corrosion resistant PVC or CPVC construction.

Typical Application (VALVE NOT INCLUDED)

Split Nut Kit for True Union 2000 Valves & Union 2000 Schedule 80 Fittings

Split Nut Kits are designed to replace broken union nuts on Spears® True Union 2000 Ball Valves and Union 2000 Schedule 80 Unions. Kit includes SS316 Gear Clamp and 2-Split Nut halves. Can also be used if nut was not in place during end connector installation. Split Nut is fully serviceable to original valve pressure rating.

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic products to transport or store compressed air or gas.

Viton® is a registered trademark of DuPont Dow Elastomers

SPEARS® MANUFACTURING COMPANY • CORPORATE OFFICE
15853 Olden St., Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
(818) 364-1611 • www.spearsmfg.com

For Commercial & Residential Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

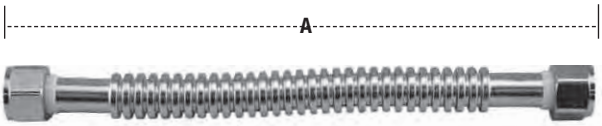
Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

Corrugated Water Heater Connectors

Features

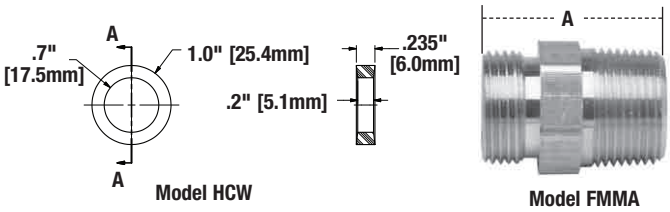
- Available in 12", 15", 18" and 24" (305, 381, 457 and 610mm) lengths
- IAPMO Listed
- Certified by NSF to NSF/ANSI Standard 61



Series FFSS and IFFSS **Female Nut x Female Nut**

Pressure — Temperature

Max Pressure: 125psi / 8.62 bar
Max Temp: 180°F / 82.22°C



Model HCW

Model FMMA

	MODEL	✓ TO SUBMIT	DESCRIPTION	DIMENSIONS A in	DIMENSIONS A mm
LEAD FREE*	FFSS12		¾" x ¾" female, stainless steel	12	305
LEAD FREE*	FFSS15		¾" x ¾" female, stainless steel	15	381
LEAD FREE*	FFSS18		¾" x ¾" female, stainless steel	18	457
LEAD FREE*	FFSS24		¾" x ¾" female, stainless steel	24	610
LEAD FREE*	1FFSS12		1" x 1" female, stainless steel	12	305
LEAD FREE*	1FFSS15		1" x 1" female, stainless steel	15	381
LEAD FREE*	1FFSS18		1" x 1" female, stainless steel	18	457
LEAD FREE*	1FFSS24		1" x 1" female, stainless steel	24	610
LEAD FREE*	121SS12		¾" x 1" female, stainless steel	12	305
LEAD FREE*	121SS15		¾" x 1" female, stainless steel	15	381
LEAD FREE*	121SS18		¾" x 1" female, stainless steel	18	457
LEAD FREE*	121SS24		¾" x 1" female, stainless steel	24	305
	FMMA		¾" male x ¾" male adapter	1⅝	41
LEAD FREE*	HCW		¾" washer only	See Line Drawing	

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

ISO 9001-2008 CERTIFIED

U.S. GREEN BUILDING COUNCIL MEMBER

WATTS®

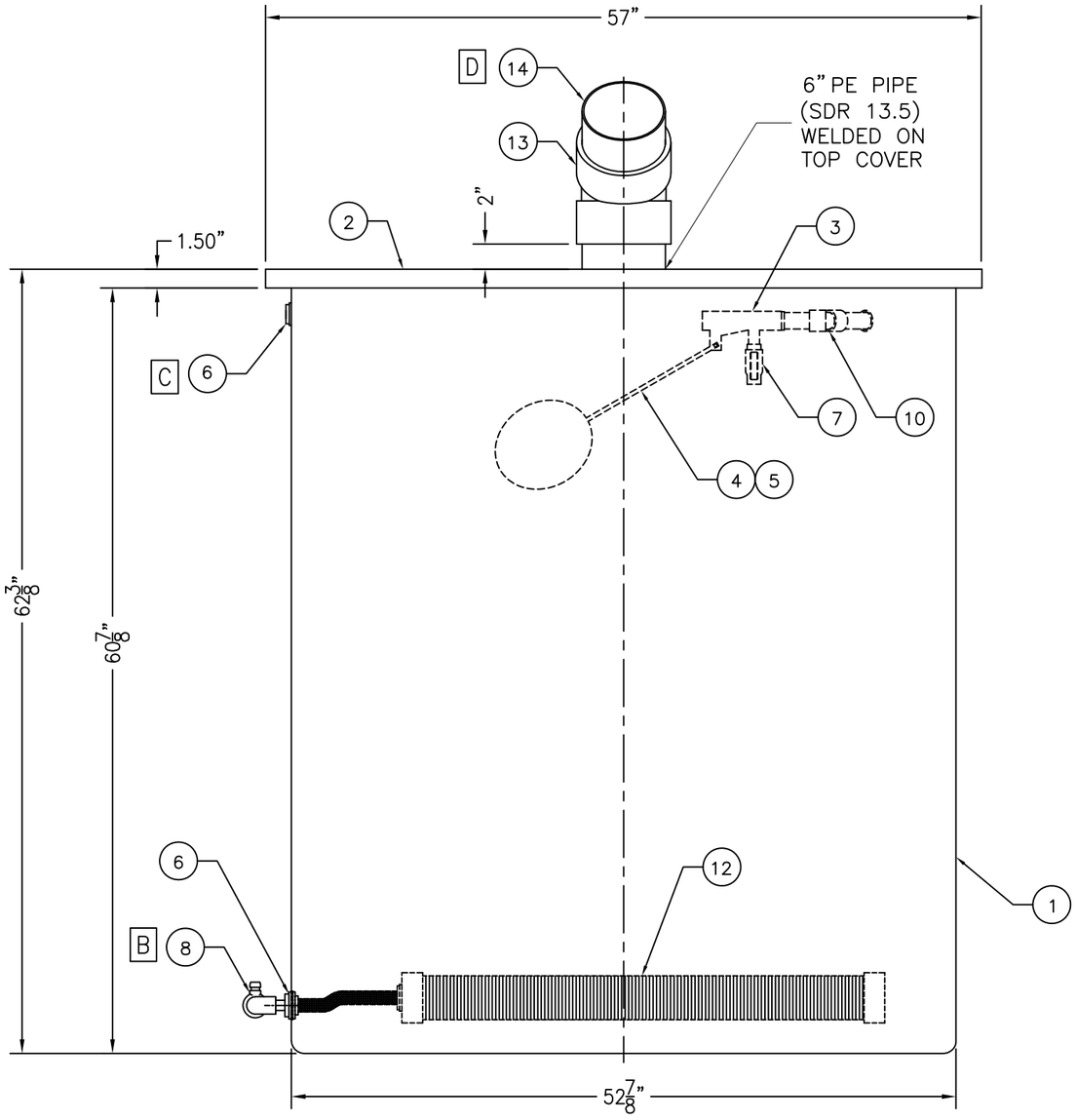
A Watts Water Technologies Company

USA: No. Andover, MA • Tel. (978) 688-1811 • Fax: (978) 794-1848 • www.watts.com
Canada: Burlington, ON • Tel. (905) 332-4090 • Fax: (905) 332-7068 • www.wattscanada.ca

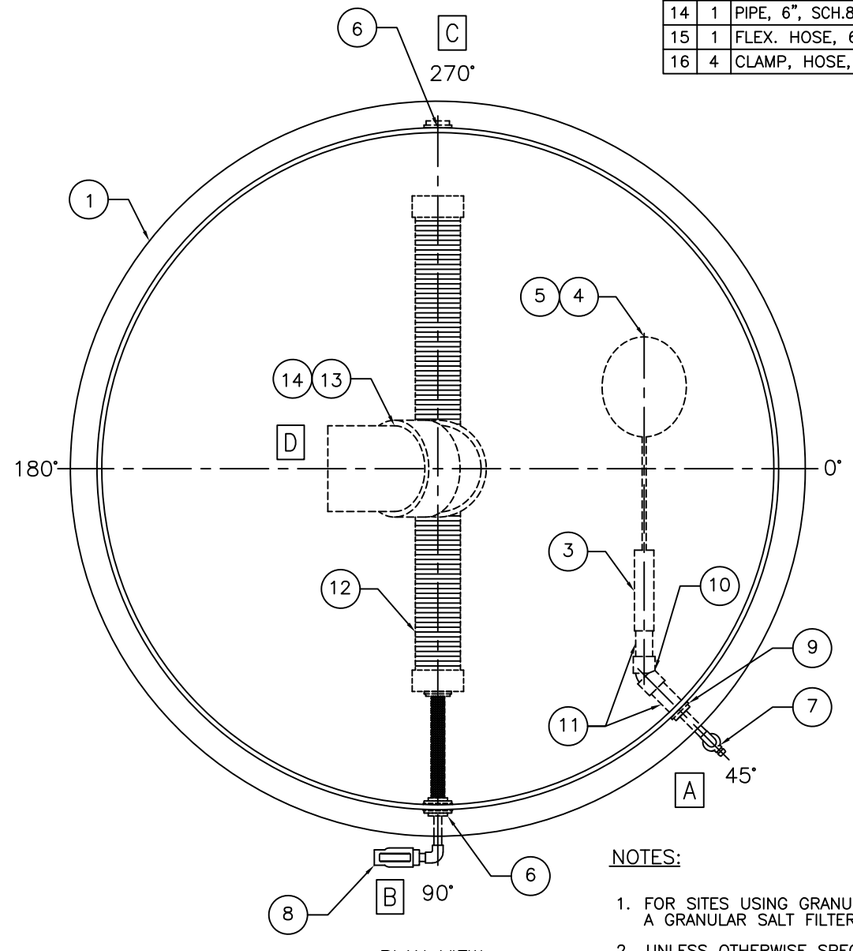
SECTION III
BRINE GENERATION

NOZZLE SCHEDULE				
SERVICE	LTR.	ORIENTATION	ELEVATION	SIZE.
WATER INLET	A	45°	57"	1"
BRINE OUTLET	B	90°	3"	3/4"
OVERFLOW	C	270°	56"	3/4"
SALT INLET	D	TOP OF COVER	TOP OF COVER	6"

NO.	QTY	DESCRIPTION	MATERIAL
1	1	500 GAL. TANK	POLYETHYLENE
2	1	TANK COVER/BOLTED	POLYETHYLENE
3	1	FLOAT VALVE, 1/2", #PS100SS	PVC
4	1	FLOAT, BALL 8", #PF08	POLYETHYLENE
5	1	ROD, 12" X 1/4", #SR12	SST
6	2	BULK HEAD FITTING, 3/4"	PVC
7	2	VALVE, BALL 1" FNPT	PVC
8	1	VALVE, BALL 3/4" FNPT	PVC
9	1	BULK HEAD FITTING, 1"	PVC
10	1	ELBOW 45°, 1" T X T, SCH.80	PVC
11	2	NIPPLE, 1" TBE, SCH.80	PVC
12	1	BRINE COLLECTION MANIFOLD	PVC
13	1	ELBOW 45°, 6" S X S, SCH.80	PVC
14	1	PIPE, 6", SCH.80, 12" LG. (CUT AS REQD.)	PVC
15	1	FLEX. HOSE, 6" X 25' LG. (NOT SHOWN)	PVC
16	4	CLAMP, HOSE, 6" (NOT SHOWN)	ZP CS



ELEVATION VIEW
REFER PLAN VIEW FOR ORIENTATIONS



PLAN VIEW

NOTES:

1. FOR SITES USING GRANULAR OR FOOD GRADE SALT, A GRANULAR SALT FILTER MUST BE USED.
2. UNLESS OTHERWISE SPECIFIED IN BOM, ALL PIPING AND PIPING CONNECTIONS/FITTINGS PROVIDED BY OTHERS.
3. ALL ITEMS INCLUDING BULKHEAD FITTINGS ARE SHIP LOOSE ITEMS AND TO BE ASSEMBLED BY CONTRACTOR.

REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL
__INFORMATION __CERTIFIED

THIS DRAWING IS LIMITED TO FUNCTIONAL DESIGN, GENERAL ARRANGEMENT AND CLEARANCE. NO RESPONSIBILITY IS ACCEPTED BY PARKSON CORPORATION FOR OTHER DIMENSIONS, QUANTITIES, OR COORDINATION WITH OTHER EQUIPMENT OR DRAWINGS EXCEPT AS STATED IN PURCHASE ORDER.

DRAWN BY: chinmayv	DATE: 07/11/16
CHECKED BY: Luc L	DATE: 07/11/16
SCALE: 1"=1'-0"	SIZE: B

Parkson™

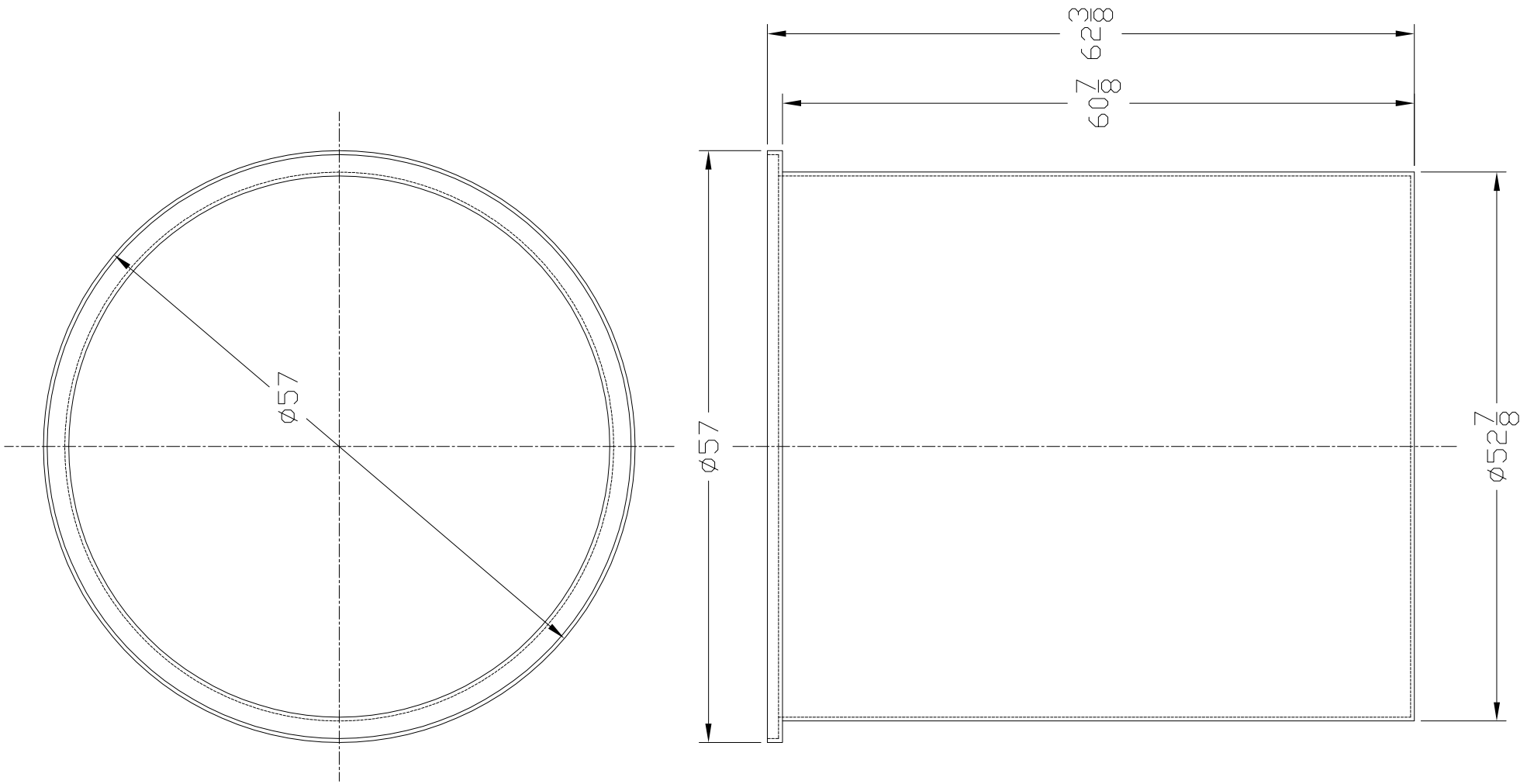
PROJECT NAME: P02600585 WICHITA REUSE WSC, KS

TITLE: OPEN TOP BRINE TANK, PE 500 GALLON WITH LID GENERAL ARRANGEMENT DRAWING

REFERENCE INFORMATION

DRAWING NO: P0260058511 SHEET 1 OF 1

REV: —



Rev. 0	Date 09/13/00	File Name TC5260-5

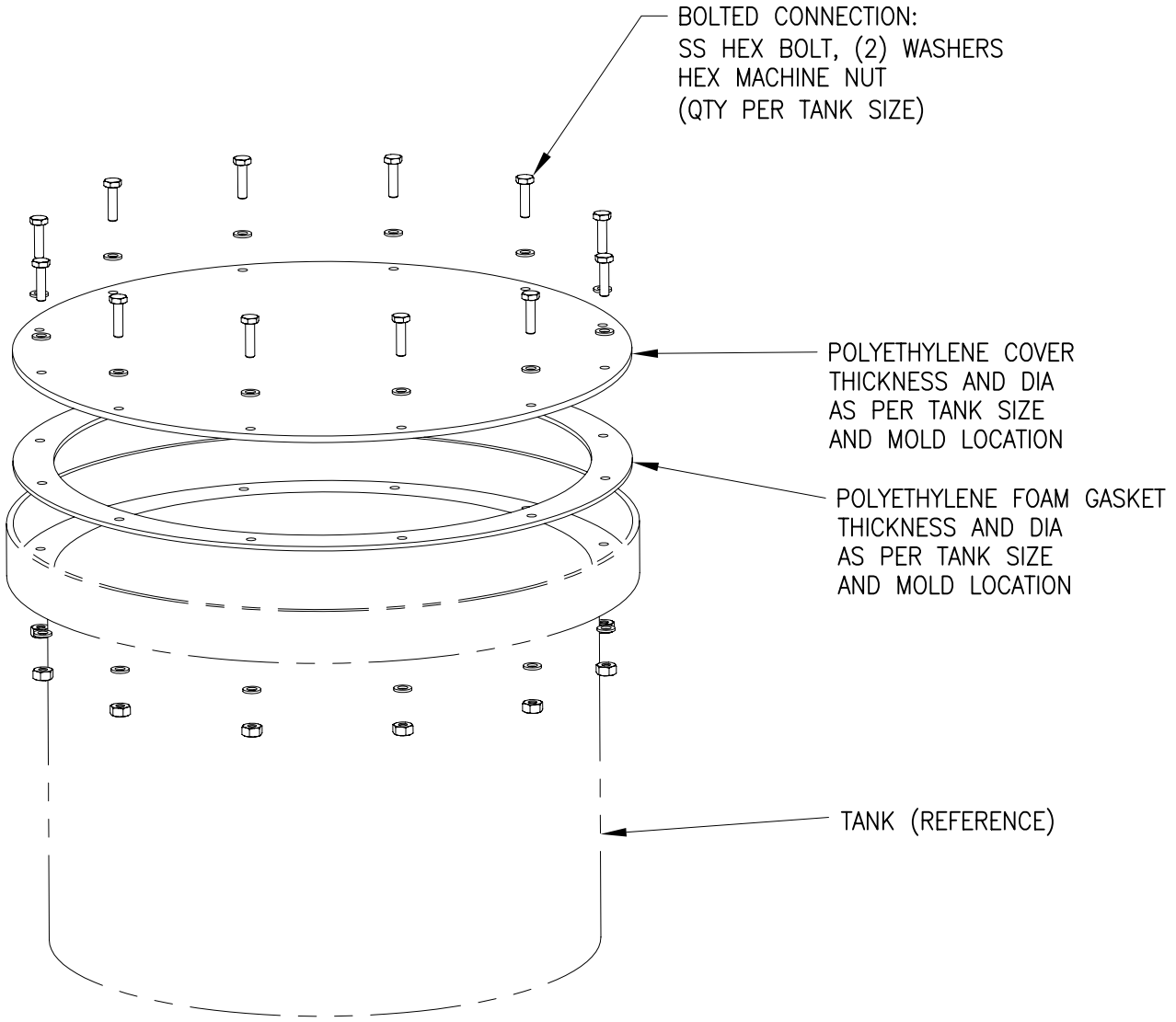
CHEM-TAINER Industries Inc.
361 Neptune Ave. W.Babylon, NY 11704
(631) 661-8300 Fax: (631) 661-8209

Date 09/13/00	Mold Location CA
Drawn By: IIA	Cust. Rep.

TITLE 500 GAL. OPEN TOP, FLAT BOTTOM CYLINDRICAL TANK

Part # TC5260AA/AB	Dwg. # C-5260-15

ALL DIMENSIONS SHOWN ARE OUTSIDE PART DIMENSIONS IN INCHES, AND VARY BY THE STANDARD ROTATIONAL MOLDING TOLERANCE OF +2;-3%.



ASSEMBLY DIAGRAM FOR ANY CYLINDRICAL TANK

ALL DIMENSIONS SHOWN ARE OUTSIDE PART DIMENSIONS IN INCHES, AND VARY BY THE STANDARD ROTATIONAL MOLDING TOLERANCE OF ±2%

CHEM-TAINER INDUSTRIES INC.
361 NEPTUNE AVE. W. BABYLON N.Y. 11704

REV.	DATE:
DRAWN BY: A.R.	DATE: 6/11/05
APP'D:	MOLD LOC.

TITLE: EF BOLTED POLYETHYLENE COVER, UNIVERSAL PRINT

PART # TC XXXX EF

PVC FLOAT VALVES, BALLS, AND RODS

Corrosion Resistant

PVC

INCORPORATED

KerickValve

MANUFACTURER OF FLOAT VALVES AND ACCESSORIES

Phone: 904-732-2258 Website: www.floatvalve.com

Kerick Valve

"M" Series Float Valves

Kerick's "M" series float valves are available in two different styles. The adjustable arm style "MA" and the fixed arm style "M". Both are tank (bulkhead) mountable.

M252 - 1/4″ tubing inlet, fixed arm*

MA252 - 1/4″ tubing inlet, adjustable arm*

M382 - 3/8″ tubing inlet, fixed arm*

MA382 - 3/8″ tubing inlet, adjustable arm*

M052 - 1/2″ pipe thread inlet, fixed arm**

MA052 - 1/2″ pipe thread inlet, adjustable arm **

MB22 - 1/4″ barb inlet, fixed arm

MAB22 - 1/4″ barb inlet, adjustable arm

M2S2 - 1/4″ pipe thread inlet, fixed arm

MA2S2 - 1/4″ pipe thread inlet, adjustable arm

M2P2 - 1/4″ extended pipe thread inlet, fixed arm***

MA2P2 - 1/4″ extended pipe thread inlet, adjustable arm ***

M3P2 - 3/8″ pipe thread inlet, fixed arm

MA3P2 - 3/8″ pipe thread inlet, adjustable arm

*Tubing inlet models utilize JACO compression nuts for plastic tubing
**1/2″ valves can be tapped with 1/4″ female pipe thread
***Optional bulkhead nut

Kerick Valve

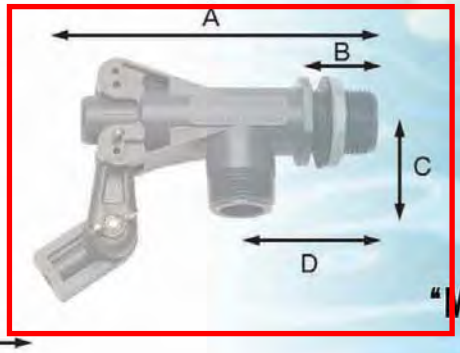
"M" Series Float Valves

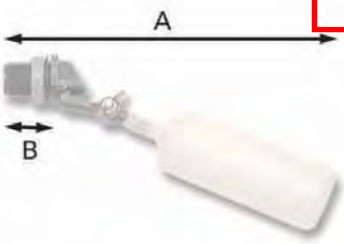
Kerick Valve offers a non-corrosive, heavy duty, high-quality PVC alternative for fluid level control. Kerick's patented design utilizes the latest materials for increased performance, reliability, and economy. Our PVC float valves are the cost-effective alternative to stainless steel and the non-corrosive alternative to brass float valves.

- All "M" series valves have a .093 orifice with a free flow outlet. Estimated flow rate is 1.3 GPM @ 40 PSI and 1.5 GPM @ 60 PSI and all have been tested to 100 PSI
- Standard valves are made with NSF approved PVC
- Seals are made of long-wearing and chemical resistant Satnoprene® rubber
- Standard hardware is made of 18-8 stainless steel
- Valves come complete with jam nut, sealing washer, and polyethylene float attached
- "MA" models can be mounted vertically

APPROXIMATE DIMENSIONS IN INCHES

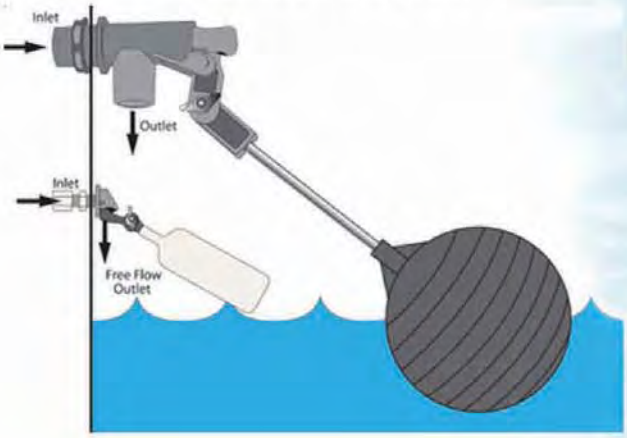
MODEL	A	B	C	D
M052	6.7	1	N/A	N/A
M252	6.7	1	N/A	N/A
M382	6.7	1	N/A	N/A
MA052	7.5	1	N/A	N/A
MA252	7.5	1	N/A	N/A
MA382	7.5	1	N/A	N/A
PS75SS	4.8	N/A	1.5	1.5
PT75SS	5.25	1.15	1.5	2
PS75LS	4.8	N/A	1.5	1.5
PT75LS	5.25	1.15	1.5	2
PX75SS	5.25	N/A	1.5	2
PS100SS	6	N/A	1.8	1.8
PT100SS	7	1.3	1.8	2.7
PS125SS	9	N/A	2.7	2.7
PS150SS	9	N/A	2.7	2.7





"M" SERIES VALVES CAN BE CUSTOMIZED TO MEET OEM REQUIREMENTS
SEE PAGE 7 FOR FLOAT OPTIONS

Installation Diagram

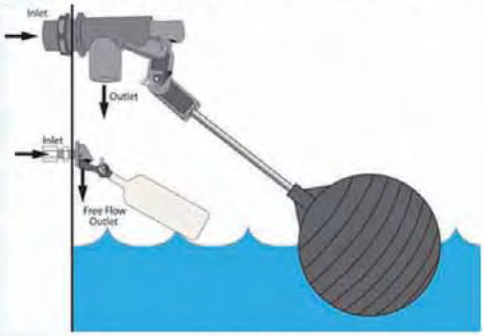


Kerick Valve

3/8″ & 1/2″ HEAVY DUTY NON CORROSIVE PVC FLOAT VALVES

Kerick's 3/8″ and 1/2″ valves are available with three different orifice sizes: .187″, .25″, and .312″ in order to match required flow range.

Installation Diagram



- Standard valves are made with NSF approved PVC
- Hardware made with 18-8 stainless steel
- Replaceable seals are made of long-wearing and chemical resistant Santoprene® rubber
- Use with 3″ or 6″ rod and 4x5″ or 2x2x4″ float
  *see page 7 for float options
- .187" orifice has an estimated flow rate of 4.4 GPM @ 20 PSI and 7.2 GPM @ 60 PSI
- .25" orifice has an estimated flow rate of 7.7 GPM @ 20 PSI and 12.5 GPM @ 60 PSI
- .312" orifice has an estimated flow rate of 8 GPM @ 20 PSI and 15 GPM @ 60 PSI

PS3838xxx* - Standard mount
- 3/8″ pipe thread inlet and outlet

PT3838xxx* - Tank (bulkhead) mount
- 3/8″ pipe thread inlet and outlet
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

PS0505xxx* - Standard mount
- 1/2″ pipe thread inlet and outlet

PT0505xxx* - Tank (bulkhead) mount
- 1/2″ pipe thread inlet and outlet
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

* Replace "xxx" with desired orifice size to determine part number.
Ex: PS3838xxx with .187″ orifice is part number PS3838187.

Kerick Valve

3/4" HEAVY DUTY NON-CORROSIVE PVC FLOAT VALVES

- Standard valves are made with NSF approved PVC
- Hardware made with 18-8 stainless steel
- Replaceable seals are made of long-wearing and chemical resistant Santoprene® rubber

PS75SS - Standard mount
- .48" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 27.5 GPM @ 30 PSI and 37 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 6" float

PT75SS - Tank (bulkhead) mount
- .48" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 27.5 GPM @ 30 PSI and 37 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 6" float
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

PS75LS - Standard mount
- .30" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 13 GPM @ 30 PSI and 16.5 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 4x5" float
- Size of rod may be reduced when using less than maximum pressure

PT75LS - Tank (bulkhead) mount
- .30" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 13 GPM @ 30 PSI and 16.5 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 4x5" float
- Size of rod may be reduced when using less than maximum pressure
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

PX75SS - Standard mount extended inlet
- .48" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 27.5 GPM @ 30 PSI and 37 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 6" float

Kerick Valve

1" TO 1.5" HEAVY DUTY NON CORROSIVE PVC FLOAT VALVES

Kerick's 1" through 1.5" float valves have lever brackets on both sides so they can be used upside-down. Two fulcrum positions on the lever add further flexibility to accomodate different pressures and flow rates.

- Standard valves are made of NSF approved PVC
- Hardware made with 18-8 stainless steel
- Replaceable seals are made of long-wearing and chemical resistant Santoprene® rubber

PS100SS - Standard Mount
- 1" inlet and outlet
- .69" orifice
- Estimated flow rates of 42 GPM @ 30 PSI and 56 GPM @ 60 PSI*
- Estimated flow rates of 51 GPM @ 30 PSI and 69 GPM @ 60 PSI**
- Use with 12"x1/4" stainless steel rod and 6" or 8" float ball

PT100SS - Tank (bulkhead) mount
- 1" inlet and outlet
- .69" orifice
- Estimated flow rates of 42 GPM @ 30 PSI and 56 GPM @ 60 PSI*
- Estimated flow rates of 51 GPM @ 30 PIS and 69 GPM @ 60 PSI**
- Use with 12"x1/4" stainless steel rod and 6" or 8" float ball
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

PT100LS - Tank (bulkhead) mount
- 1" inlet and outlet
- .38" orifice
- Estimated flow rates of 12 GPM @ 30 PSI and 16 GPM @ 60 PSI*
- Estimated flow rates of 19 GPM @ 30 PSI and 26 GPM @ 60 PSI**
- Use with 12"x1/4" stainless steel rod and 6" or 8" float ball
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

PS125SS - Standard mount
- 1.25" inlet and outlet
- 1.0" orifice
- Estimated flow rates of 85 GPM @ 20 PSI and 124 GPM @ 50 PSI*
- Estimated flow rates of 90 GPM @ 20 PSI and 145 GPM @ 50 PSI**
- Use with 5/16" threaded stainless steel rod in 14", 16", or 18" length and an 8" float ball

PS150SS - Standard mount
- 1.25" inlet and outlet
- 1.0" orifice
- Estimated flow rates of 85 GPM @ 20 PSI and 124 GPM @ 50 PSI*
- Estimated flow rates of 90 GPM @ 20 PSI and 145 GPM @ 50 PSI**
- Use with 5/16" threaded stainless steel rod in 14", 16", or 18" length and an 8" float ball

***Position # 1 (Low Flow)**
****Position # 2 (High Flow)**

Kerick Valve

FLOAT BALLS AND RODS

PF45 - This 4x5″ float ball works well with the low flow valves that have a .30″ orifice such as the PS75LS and PT75LS. This float also works well with the PS3838xxx, PT3838xxx, PS0505xxx, and PT0505xxx float valves.

PF224 - This 2x2x4″ rectangle float works well with the PS3838xxx, PT3838xxx, PS0505xxx, and PT0505xxx float valves.

PF06 - This 6″ polyethylene float ball resists corrosion, has no seams to leak, and is resistant to sunlight deterioration. It has a 1/4″ self-tapping connection for use with all of the 3/4″ and 1″ valves. Connection can be enlarged for 5/16″ rods.

PF444 - This 4x4x4″ square float works well with the low flow valves that have a .30″ orifice such as the PS75LS and the PT75LS. This float also works well with the PS3838xxx, PT3838xxx, PS0505xxx, and PT0505xxx float valves.

PF08 - This 8″ polyethylene float ball resists corrosion, has no seams to leak, and is resistant to sunlight deterioration. It has a 5/16″ self-tapping connection for use with the PS125SS and PS150SS valves. A 1/4″ connection is also available for use with the PS100SS and PT100SS float valves.

"M" SERIES POLYETHYLENE FLOAT OPTIONS

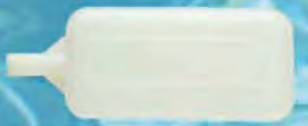
PF152 - 1.5x2″ cylindar

PF153 - 1.5x3″ cylinder

PF154 - 1.5x4″ cylinder
*comes standard

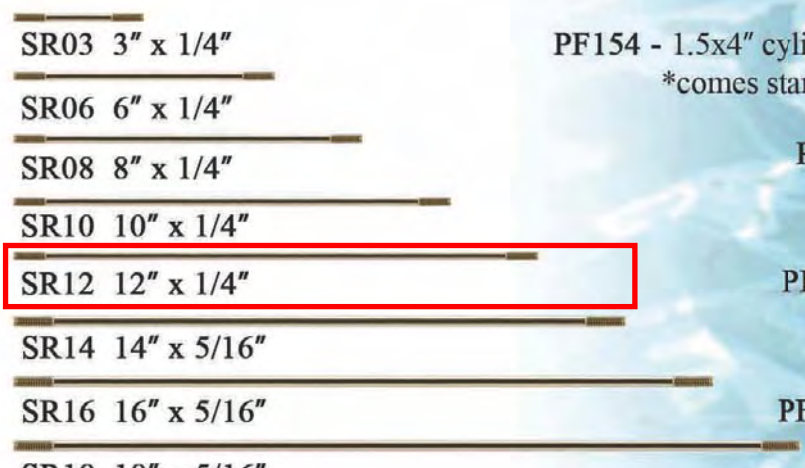
PF1753 - 1.75x3″ cylinder

PF224 - 2x2x4″ rectangle



PF222 - 2x2x2″ square

RODS



SR03 3″ x 1/4″

SR06 6″ x 1/4″

SR08 8″ x 1/4″

SR10 10″ x 1/4″

SR12 12″ x 1/4″

SR14 14″ x 5/16″

SR16 16″ x 5/16″

SR18 18″ x 5/16″

PARTS LIST

									
	Lever	Arm	Cotter Pin	Carriage Bolt	Wing Nut	Bulkhead Gasket	Bulkhead Nut	Disk Seal	Compression Nut
Model #	Part #	Part #	Part #	Part #	Part #	Part #	Part #	Part #	Part #
M252	LVM2	None	CPM	None	None	BGM25	BNM25	DSM	CNM25
MA252	LVMA2	AMMA2	CPM	CBMA	WNMA	BGM25	BNM25	DSM	CNM25
M052	LVM2	None	CPM	None	None	BGM05	BNM05	DSM	None
MA052	LVMA2	AMMA2	CPM	CBMA	WNMA	BGM05	BNM05	DSM	None
M382	LVM2	None	CPM	None	None	BGM38	BNM38	DSM	CNM38
MA382	LVMA2	AMMA2	CPM	CBMA	WNMA	BGM38	BNM38	DSM	CNM38
MB22	LVM2	None	CPM	None	None	BGM25	BNM25	DSM	None
MAB22	LVMA2	AMMA2	CPM	CBMA	WNMA	BGM25	BNM25	DSM	None
M2S2	LVM2	None	CPM	None	None	None	None	DSM	None
MA2S2	LVMA2	AMMA2	CPM	CBMA	WNMA	None	None	DSM	None
M2P2	LVM2	None	CPM	None	None	None	BN25*	DSM	None
MA2P2	LVMA2	AMMA2	CPM	CBMA	WNMA	None	BN25*	DSM	None
M3P2	LVM2	None	CPM	None	None	None	None	DSM	None
MA3P2	LVMA2	AMMA2	CPM	CBMA	WNMA	None	None	DSM	None

*Optional parts

										
	Lever	Arm	Cotter Pin	Carriage Bolt	Wing Nut	Bulkhead Gasket	Bulkhead Nut	Disk Seal	Cup Seal	Piston
Model #	Part #	Part #	Part #	Part #	Part #	Part #	Part #	Part #	Part #	Part #
PS3838xxx	LV05	AM05	CP05	CBMA	WNMA	None	None	DS05	CS05	PT05
PT3838xxx	LV05	AM05	CP05	CBMA	WNMA	BGM38	BN38	DS05	CS05	PT05
PS0505xxx	LV05	AM05	CP05	CBMA	WNMA	None	None	DS05	CS05	PT05
PT0505xxx	LV05	AM05	CP05	CBMA	WNMA	BGM05	BNM05	DS05	CS05	PT05
PS75SS	LV75	AM75	CP75	CB75	WN75	None	None	DS75	CS75	PT75
PT75SS	LV75	AM75	CP75	CB75	WN75	BG75	BN75	DS75	CS75	PT75
PS75LS	LV75	AM75	CP75	CB75	WN75	None	None	DS75	CS75	PT75
PT75LS	LV75	AM75	CP75	CB75	WN75	BG75	BN75	DS75	CS75	PT75
PX75SS	LV75	AM75	CP75	CB75	WN75	None	None	DS75	CS75	PT75
PS100SS	LV100	AM100	CP100	CB75	WN75	None	None	DS100	CS100	PT100
PT100SS	LV100	AM100	CP100	CB75	WN75	BG100	BN100	DS100	CS100	PT100
PT100LS	LV100	AM100	CP100	CB75	WN75	BG100	BN100	DS100	CS100	PT100
PS125SS	LV150	AM150	CP150	CB150	WN150	None	None	DS150	CS150	PT150
PS150SS	LV150	AM150	CP150	CB150	WN150	None	None	DS150	CS150	PT150

Phone: 904-732-2258 Website: www.floatvalve.com

PVC & CPVC UTILITY BALL VALVES

UT-2-1101

Economy, Utility and Quality

A high quality, economical, quarter-turn shut off valve designed for irrigation, pool and spa applications. Available in IPS sizes 1/2" through 4", with choice of either socket or threaded end connectors, plus 6" socket.

PVC or CPVC Construction
Excellent companion for PVC systems such as lawn sprinklers, pools, spas, water gardens and other light-duty applications.

One-Piece Sealed Unit
Never requires adjustment.

Teflon® Ball Seats
Smooth operating PTFE floating seat design reduces wear.

EPDM O-ring Seals
High grade, abrasion resistant EPDM elastomer O-rings.

Full Schedule 80 Bore
In full open position, full bore virtually eliminates pressure drop, providing optimum flow.

High Impact Polypropylene Handle
Features double-stop engagement.

Safe-T-Shear® Stem
Developed to help prevent line fluids from leaking out in the event of ball valve stem damage. Engineered for high strength, the stem incorporates a special shear point to control accidental breakage. Over-torquing breaks occur above the stem O-ring leaving the seal intact until replacement can be made.

150 psi Pressure Rating
Maximum Internal Pressure at 73°F for a variety of applications.

Certified by NSF for Potable Water
All Utility Ball Valves are Certified by NSF International for potable water use.

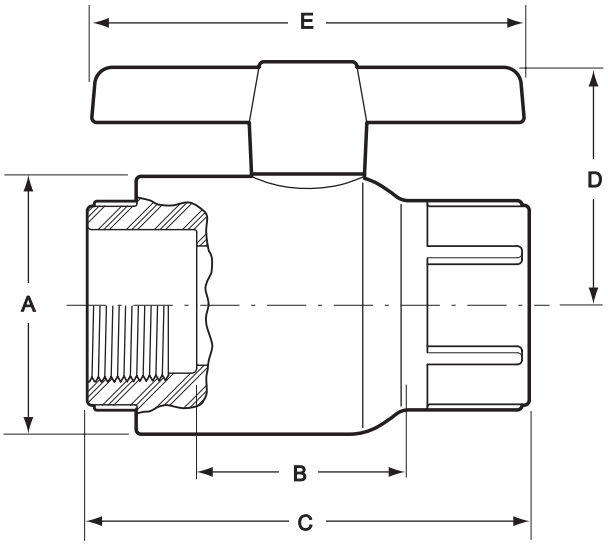
For additional information, please refer to Spears® THERMOPLASTIC VALVES & ACCESSORIES PRODUCT GUIDE & ENGINEERING SPECIFICATIONS, V-4 and THERMOPLASTIC VALVES & ACCESSORIES Price Schedule V-1.

Sample Engineering Specifications
All thermoplastic ball valves shall be Utility sealed unit type constructed from PVC Type I Cell Classification 12454 or CPVC Type IV Cell Classification 23447. All O-rings shall be EPDM. All valves shall have Safe-T-Shear® stem and double stop Polypropylene handle. All valves shall be listed by NSF for use in potable water service. All valves shall be pressure rated at 150 psi for water at 73°F, as manufactured by Spears® Manufacturing Company.

Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

PROGRESSIVE PRODUCTS FROM SPEARS® INNOVATION & TECHNOLOGY

Visit our web site: www.spearsmfg.com



Dimensions, Weights & C_v Values

Nominal Size	Dimension Reference (inches, ± 1/16)					Approx. Wt. (Lbs.)		C_v[2] Values
	A	B[1]	C	D	E[3]	PVC	CPVC	
1/2	1-9/16	1-5/16	2-3/4	1-9/16	2-11/16	.17	.20	46
3/4	1-15/16	1-9/16	3-1/16	2	3-3/16	.28	.31	91
1	2-3/16	1-15/16	3-9/16	2-5/16	3-1/2	.40	.43	160
1-1/4	2-5/8	2-1/8	4-1/32	2-11/16	3-3/4	.60	.63	306
1-1/2	3-1/32	2-1/2	4-11/16	3-1/8	4-1/4	.93	.95	429
2	3-7/8	3-3/32	5-3/8	3-3/4	4-11/16	1.87	1.90	755
2-1/2	4-5/16	3-17/32	7-1/32	4-5/32	5-9/16	2.31	---	1126
3	6	5-1/8	8-5/8	5-3/4	9-7/8	5.92	---	1660
4	7-3/8	6-5/32	10-5/32	6-5/8	10-27/32	9.50	---	3129
6	9-29/32	8-3/32	14-3/16	6-15/32	10-13/16	21.48	---	7942

1: Valve Lay Length
2: Gallons per minute at 1 psi pressure drop. Values calculated from valve laying length, based on derivative of Hazen-Williams equation with surface roughness factor of C=150.
3: 6" Valve has lever handle, dimension is from valve stem centerline (not illustrated).

Temperature Pressure Rating

System Operating Temperature °F (°C)		73 (23)	100 (38)	110 (43)	120 (49)	130 (54)	140 (60)	150 (66)	160 (71)	170 (77)	180 (82)	190 (88)
Valve Pressure Rating psi (MPa)	PVC	150 (1.03)	124 (.85)	100 (.69)	75 (.52)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)
	CPVC	150 (1.03)	140 (.97)	130 (.90)	120 (.83)	110 (.76)	100 (.69)	90 (.62)	80 (.55)	70 (.48)	60 (.41)	-0- (-0-)

NOT FOR USE WITH COMPRESSED AIR OR GASES

SPEARS® MANUFACTURING COMPANY
CORPORATE OFFICE
15853 Olden St., Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
(818) 364-1611 • www.spearsmfg.com

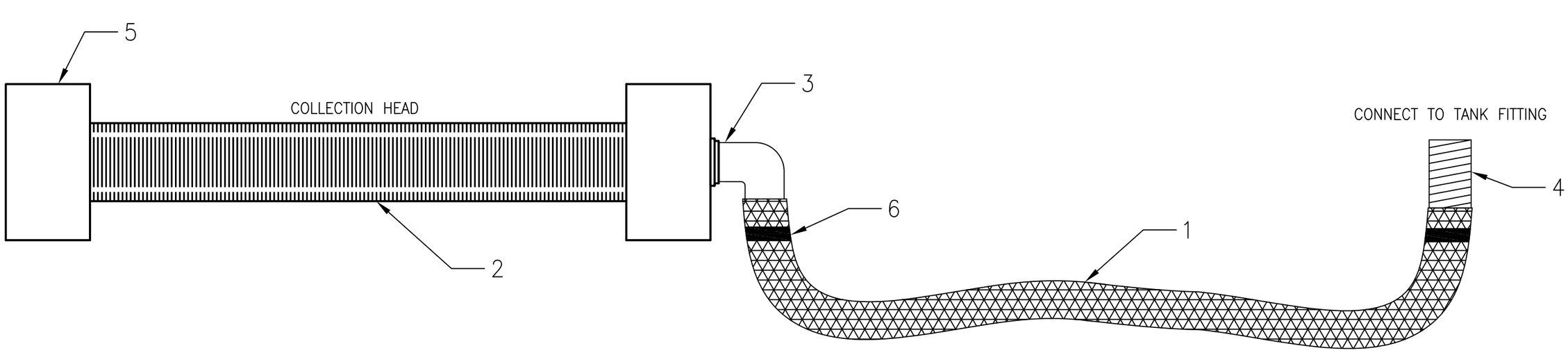
NOTES:

1. A REDUCER/BUSHING MAY BE REQUIRED IF THE DISCHARGE CONNECTION/FLANGE ON THE TANK IS SMALLER/LARGER THAN THE PROVIDED MATERIAL. REDUCER/BUSHING IS PROVIDED BY OTHERS.

2. PRE–ASSYMBLED AND SHIPS COMPLETE.

3. LENGTH OF COLLECTION HEAD AND FLEXIBLE HOSE ARE DEPENDENT ON SIZE OF THE TANK. PREFERRED LOCATION OF THE HEAD IS IN THE CENTER OF THE TANK.

BRINE GUARD ASSEMBLY		
ITEM	DESCRIPTION	QTY
1	¾" FLEXIBLE HOSE	1
2	3"D BRINE COLLECTION HEAD	1
3	90 DEG ELBOW ASSEMBLY	1
4	THREADED NIPPLE	1
5	END BLOCK & SUPPORT	2
6	HOSE CLAMP	2



REV	DESCRIPTION	DATE	BY

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X INFORMATION __CERTIFIED

DRAWN BY	DATE
TEDWARDS	02/15/16
CHECKED BY	DATE
–	–
SCALE	SIZE
NTS	B

SUPERIOR WATER TECHNOLOGIES

DISINFECTION AND MANAGEMENT SYSTEMS FOR THE MUNICIPAL WATER INDUSTRY

WWW.SUPERIORWATERTECHNOLOGIES.COM

PROJECT NAME
–
–

REFERENCE INFORMATION

TITLE
BRINE GUARD
BRINE COLLECTION SYSTEM
GENERAL ARRANGEMENT DRAWING

DRAWING NO
333–6160
SHEET 1 OF 1

REV
1

HI-TECH DURAVENT
Flexible Hose & Ducting

CVD

Physical Characteristics, Pressure & Flex Values

ID	Working Pressure	Vacuum	CL Bend Radius	Compress Ratio	OD Nominal	Wall Thickness	Weight
(in.)	(psi)	(inHg)	(in.)		(in.)	(in.)	(lbs./ft.)
1.00	25	29	1.25	1ft/4in	1.15	.020	.10
1.25	20	27	1.50	1ft/4in	1.40	.020	.13
1.50	15	26	1.75	1ft/4in	1.68	.020	.19
2.00	36	30	2.75	1ft/5in	2.27	.030	.30
2.50	28	25	3.25	1ft/6in	2.77	.030	.33
3.00	24	22	4.25	1ft/6in	3.27	.030	.38
3.50	13	18	4.75	1ft/6in	3.77	.030	.49
4.00	11	17	5.50	1ft/5in	4.29	.030	.68
4.50	10	15	6.25	1ft/5in	4.79	.030	.73
5.00	10	14	6.75	1ft/5in	5.29	.030	.81
6.00	8	10	7.50	1ft/5in	6.29	.030	1.10
7.00	7	7	9.75	1ft/7in	7.35	.030	1.29
8.00	7	6	10.50	1ft/7in	8.35	.030	1.42
10.00	7	5	11.75	1ft/5in	10.38	.030	1.43
12.00	6	4	12.50	1ft/5in	12.38	.030	2.33
14.00	2	2	15.25	1ft/5in	14.48	.030	2.88
16.00	1	1	18.50	1ft/5in	16.48	.030	3.37
18.00	1	1	20.50	1ft/5in	18.48	.030	3.95

Pressure and Vacuum data based on straight lengths of hose at ambient temperature 72° F.

Construction: Polyvinylchloride reinforced with a wire helix
Temperature range: -20° F to 180° F
Standard color: Clear or Blue
Standard lengths: 25', 50'

smiths

www.hitechduravent.com

528 Carwellyn Road, Abbeville, SC 29620 • 1177 Markley Drive, Plymouth, IN 46563 • Tel: 800-348-6500
4610 Eastgate Parkway, Unit 3, Mississauga, Ontario, Canada L4W 3W6 • Tel: 905-602-9660 • Fax: 800-348-6599

Tiger Clamp™ Spiral Double Bolt Clamps

Zinc Plated Carbon Steel Spiral Double Bolt Clamp (For Counterclockwise Spiral Hoses) Designed for Tigerflex™ PVC Suction Hoses

Part Number	Size (in.)	Torque (ft. lbs.)	Weight Each (lbs.)	Standard Carton
SDBC-1.5	1 1/2	6	0.18	100
SDBC-2	2	6	0.36	100
SDBC-2.25	2 1/4	6	0.40	100
SDBC-2.5	2 1/2	8	0.48	100
SDBC-3	3	8	0.66	70
SDBC-3.5	3 1/2	8	0.70	70
SDBC-4	4	24	1.02	40
SDBC-5	5	24	1.76	30
SDBC-6	6	30	2.00	20
SDBC-8	8	30	2.76	10
SDBC-10	10	30	3.46	10
SDBC-12	12	30	4.14	10

Stainless Steel 304 Spiral Double Bolt Clamp (For Counterclockwise Spiral Hoses) Designed for Tigerflex™ PVC Suction Hoses

Part Number	Size (in.)	Torque (ft. lbs.)	Weight Each (lbs.)	Standard Carton
SDBC-SS-1.5	1 1/2	6	0.20	100
SDBC-SS-2	2	6	0.40	100
SDBC-SS-3	3	8	0.73	70
SDBC-SS-4	4	24	1.12	40
SDBC-SS-5	5	24	1.94	30
SDBC-SS-6	6	30	2.20	20
SDBC-SS-8	8	30	3.04	10
SDBC-SS-10	10	30	3.81	10
SDBC-SS-12	12	30	4.55	10

Zinc Plated Carbon Steel Spiral Double Bolt Clamp (For Clockwise Spiral Hoses) Designed for Tigerflex™ Tiger-TR1™ Hoses

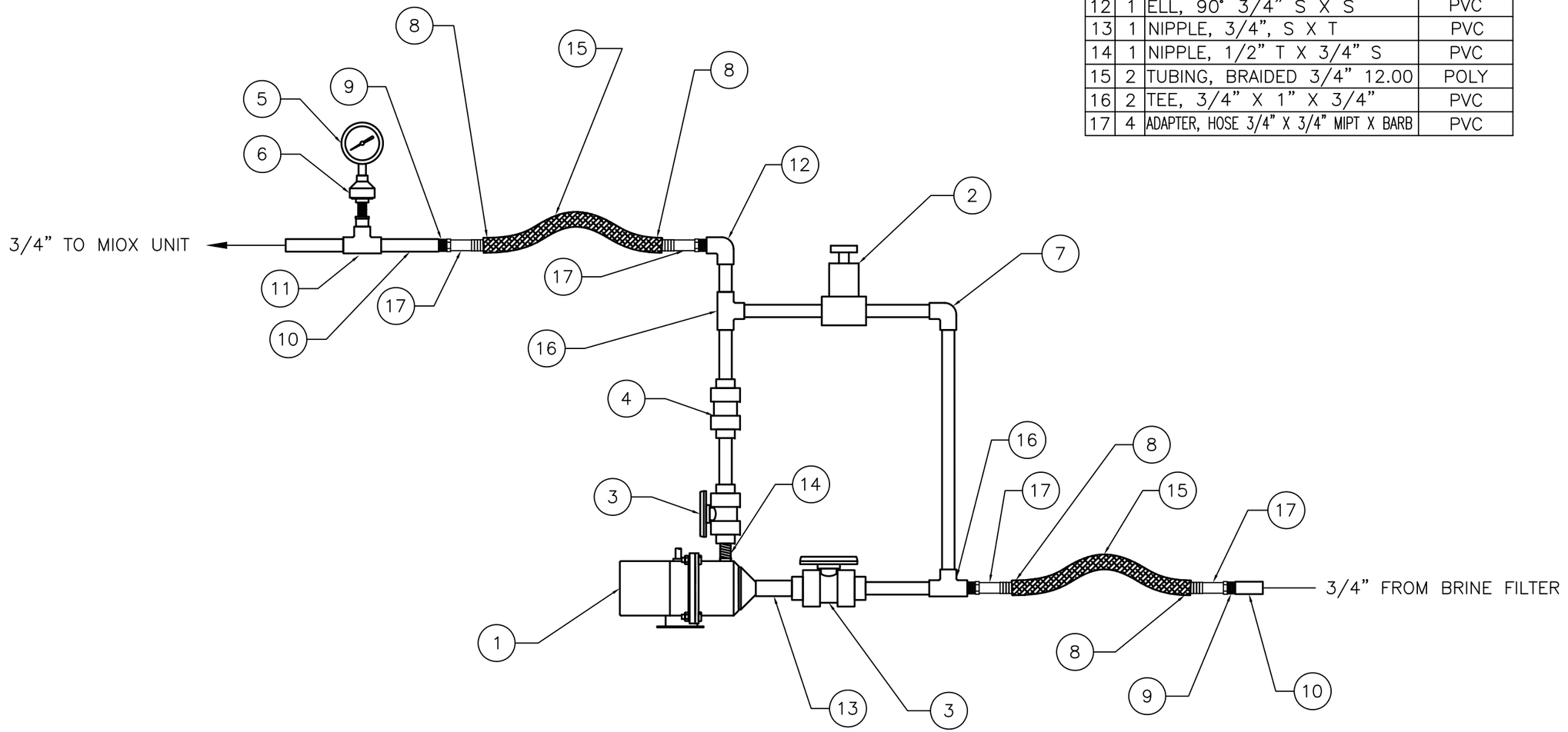
Part Number	Size (in.)	Torque (ft. lbs.)	Weight Each (lbs.)	Standard Carton
SDBCR-2	2	6	0.36	100
SDBCR-3	3	8	0.66	70
SDBCR-4	4	24	1.02	40
SDBCR-5	5	24	1.76	30
SDBCR-6	6	30	2.00	20
SDBCR-8	8	30	2.76	10

SECTION IV
BRINE PRESSURE BOOSTING

NOTES:

1. ITEMS 1, 2, 3, 4, 5 AND 6 ARE PROVIDED BY PARKSON CORP. ALL OTHER PIPING AND FITTINGS ARE FIELD FIT AND PROVIDED BY OTHERS.
2. PLUMBING RUNS AND CONNECTIONS SHOWN, ARE AN EXAMPLE OF ONE INSTALLATION CONFIGURATION. CAN BE INSTALLED IN VARIOUS TYPES OF CONFIGURATIONS.
3. ONE BRINE PUMP IS FOR SHELF SPARE.

1	2	CENTRIFUGAL PUMP BC-3CP-MD	MTRL
2	1	PRESSURE RELIEF BYPASS, BK, 1"	MTRL
3	2	VALVE, TRUE UNION BALL 3/4" S X S	PVC
4	1	VALVE, DIAPH, 3/4" SXS	PVC
5	1	1/4" PRESSURE GAUGE, 0-30 PSI	BRASS
6	1	ISOLATOR, GAUGE	
7	1	ELL, 90° 1" T X T	PVC
8	4	HOSE, CLAMP	SSTL
9	2	ADAPTER, FEMALE 3/4" S X T	PVC
10	AR	PIPE, 3/4" S X S	PVC
11	1	TEE, 3/4" X 1/2" X 3/4"	PVC
12	1	ELL, 90° 3/4" S X S	PVC
13	1	NIPPLE, 3/4", S X T	PVC
14	1	NIPPLE, 1/2" T X 3/4" S	PVC
15	2	TUBING, BRAIDED 3/4" 12.00	POLY
16	2	TEE, 3/4" X 1" X 3/4"	PVC
17	4	ADAPTER, HOSE 3/4" X 3/4" MIPT X BARB	PVC



REV	DESCRIPTION	DATE	BY

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__INFORMATION __CERTIFIED

THIS DRAWING IS LIMITED TO FUNCTIONAL DESIGN, GENERAL ARRANGEMENT AND CLEARANCE. NO RESPONSIBILITY IS ACCEPTED BY PARKSON CORPORATION FOR OTHER DIMENSIONS, QUANTITIES, OR COORDINATION WITH OTHER EQUIPMENT OR DRAWINGS EXCEPT AS STATED IN PURCHASE ORDER.

DRAWN BY: chinmayv	DATE: 07/04/16
CHECKED BY: Luc L	DATE: 07/15/16
SCALE: 1/16"=1"	SIZE: B

Parkson™

PROJECT NAME:

TITLE: BRINE PRESSURE BOOST GENERAL ARRANGEMENT

REFERENCE INFORMATION:

DRAWING NO: 999-01556

SHEET 1 OF 1

REV: 0

model AC-3CP-MD-AM

model LC-3CP-MD

model AC-3CP-MD or BC-3CP-MD

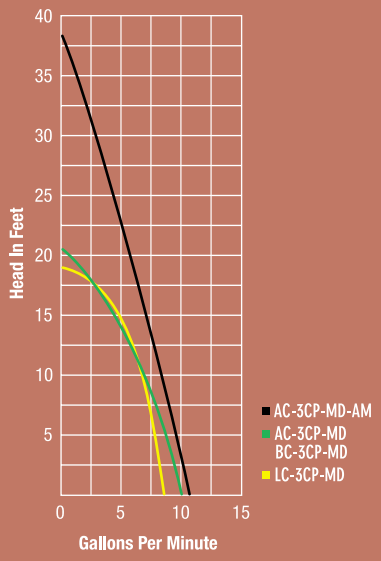
SERIES 3

10 gpm

Simple, versatile and reliable, March Series 3 pumps feature an “orbital” magnetic drive and leak-proof design. They are rated up to 10 GPM (33 LPM) flow and for heads up to 20.5 ft (4.5 m) (39 ft. [13 m] when driven by an air motor). Typical applications include film processors, ice makers, laboratory and medical equipment, vapor degreasers and marine air conditioning systems.

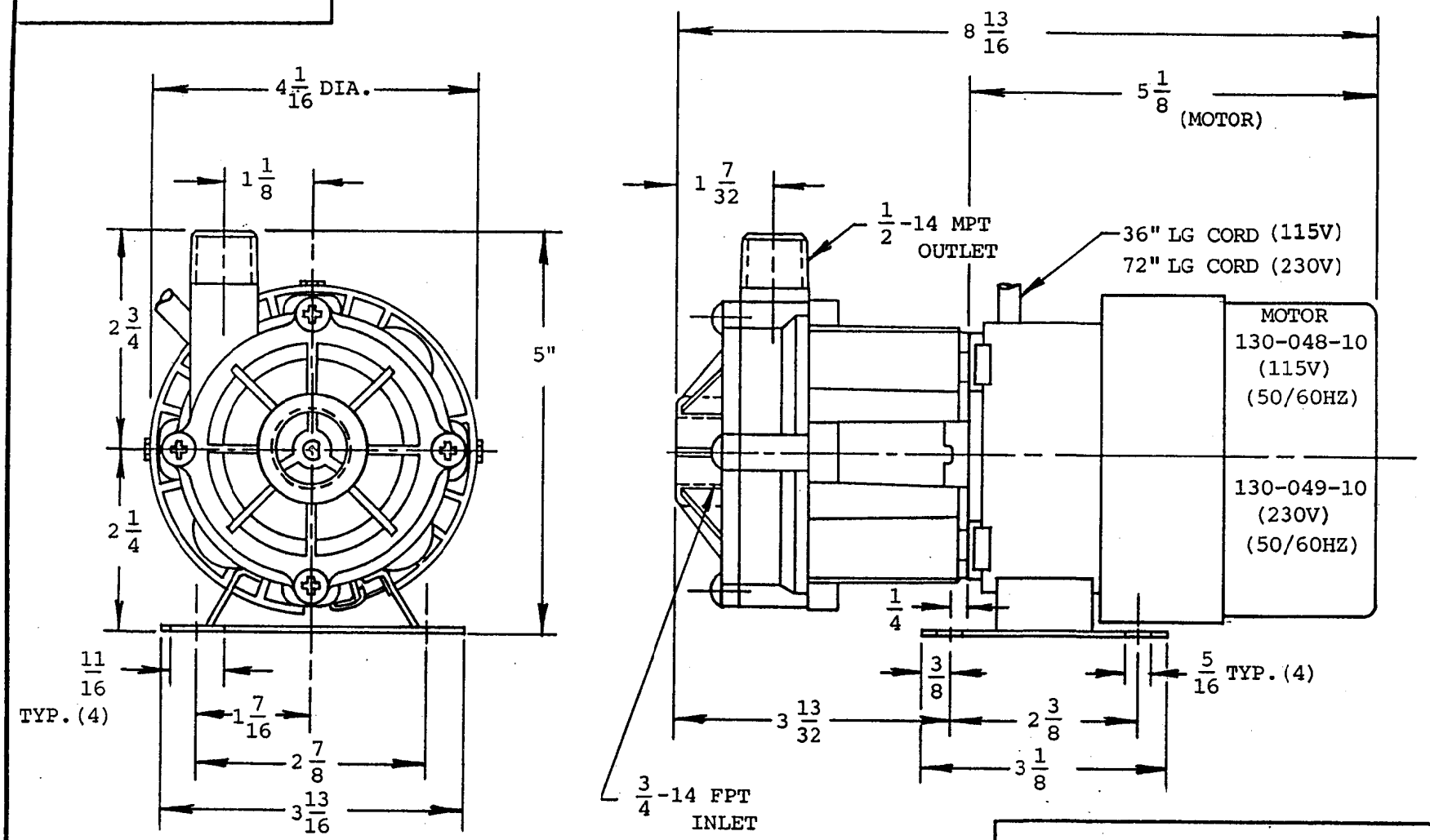
Series 3 pumps are available in both open air and epoxy clad submersible models. A variety of materials of construction ensure compatibility with almost any solution: polypropylene, Delrin®, Viton®, nylon, Buna N rubber, ceramic, and polysulfil plastic (submersible models). Port options are 3/4" FPT inlet with a 1/2" (12.7 mm) MPT outlet or a 3/4" (19 mm) O.D. smooth inlet with a 3/4" (19 mm) O.D. smooth outlet.

Series AC 3 pumps are driven by 1/15 HP (.018 kw), 3200 (60 Hz, air cooled). Series BC 3 are 3450 rpm (50/60 Hz, blast-cooled), all motors are ball bearing motors, epoxy submersible motors are 1/20 HP (.037 kw), 3200 rpm (maroon in color). Air motors rated at 1/8 HP (.093 kw) are also available for certain environments. The 230-volt motors are all rated 50/60 Hz, submersible motors are rated 60Hz or 50 Hz. Specify which voltage and Hz when ordering the submersible models.



SERIES 3		AIR MOTORS				ELECTRIC MOTORS				
		AC-3CP-MD-AM	AC-3AP-MD-AM	BC-3CP-MD-AM	BC-3AP-MD-AM	LC-3CP-MD★	AC-3CP-MD	AC-3AP-MD	BC-3CP-MD	BC-3AP-MD
max. flow	gpm	10.5	10.5	10.5	10.5	8.5	10	10	10	10
	lpm	42	42	42	42	31	33	33	33	33
max. head	ft.	39	39	39	39	19	20.5	20.5	20.5	20.5
	m	13	13	13	13	4.3	4.5	4.5	4.5	4.5
inlet		3/4" FPT	3/4" OD	3/4" FPT	3/4" OD	3/4" FPT	3/4" FPT	3/4" OD	3/4" FPT	3/4" OD
outlet		1/2" MPT	3/4" OD	1/2" MPT	3/4" OD	1/2" MPT	1/2" MPT	3/4" OD	1/2" MPT	3/4" OD
hp		1/8	1/8	1/8	1/8	1/20	1/15	1/15	1/15	1/15
kw		.093	.093	.093	.093	.037	.049	.049	.049	.049
rpm ◎	us	3150	3150	3150	3150	3200	3200	3200	3450	3450
	metric	3150	3150	3150	3150	2450	2850	2850	2825	2825
volts ⊛	us	–	–	–	–	115	115	115	115	115
	metric	–	–	–	–	230	230	230	230	230
ph		–	–	–	–	1	1	1	1	1
max. air pressure	psi	29	29	29	29	–	–	–	–	–
	bar	3.4	3.4	3.4	3.4	–	–	–	–	–
max. CFM req'd		4	4	4	4	–	–	–	–	–
hz		–	–	–	–	60	60	60	50/60	50/60
watts	us	–	–	–	–	120	150	150	120	120
	metric	–	–	–	–	100	78	78	78	78
amp	us	–	–	–	–	2.0	2.1	2.1	1.7	1.7
	metric	–	–	–	–	1.0	.37	.37	.37	.37
motor type		AM	AM	AM	AM	TE/SUB Maroon ★	AC	AC	BC	BC
electrical connection		–	–	–	–	6 ft. (1.8M) SJT	3 ft (.9M) SJO	3 ft (.9M) SJO	3 ft (.9M) SJO	3 ft (.9M) SJO
max. int. pressure	psi	50	50	50	50	25	50	50	50	50
	bar	3.4	3.4	3.4	3.4	1.7	3.4	3.4	3.4	3.4
max. liquid temp.	°f	190	190	190	190	130	190	190	190	190
	°c	87	87	87	87	54	87	87	87	87
weight packed	lbs.	4 1/2	4 1/2	4 1/2	4 1/2	8 1/2	7	7	8	8
	kg.	2	2	2	2	3.8	3.1	3.1	3.8	3.8
materials in contact with solution ⊛		Polypropylene, Cermamic magnet, Ceramic, Buna N		Polypropylene, Ceramic, Viton®		Polypropylene, Epoxy Cupric Nickel, Buna N, Ceramic; when submerged, Sulfil	Polypropylene, Ceramic magnet, Ceramic, Buna N		Polypropylene, Ceramic, Viton®	

⊛ Other materials and voltages available on special order.
◎ RPM at wide open flow and 0 head, RPM increases as head is increased.
★ Maroon color epoxy indicates pump can be run in open air or submerged.
★ Stainless steel cooling tube available on special order.



ASSEMBLY No.	MODEL
(115V) 130-018-03	BC-3CP-MD
(230V) 130-018-06	BC-3CP-MD

D REDRAWN 6-14-93 J.T.

E ADDED 72"LG CORD (230V) 8-8-94 J.T.

QTY.	USED ON ASSEM.

MARCH MFG. INC.

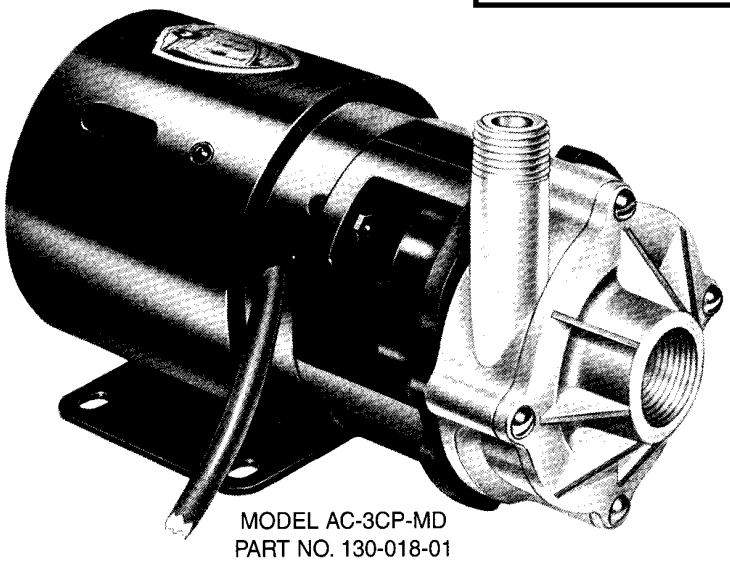
1819 PICKWICK AVE. GLENVIEW, IL.

PART NAME PUMP ASSEMBLY BC-3CP-MD		
MOTOR: UNIVERSAL		
HEAT TRMT.	SCALE 1/2"=1"	QTY. REQ. 1
FINISH	DRAWN JT/HZ	DATE 6-14-93
UNLESS OTHERWISE NOTED TOLERANCE ON FRACTIONS ± TOLERANCE ON DECIMALS ±	CHECKED	
	APPROVED	
PART NUMBER 130 SERIES		

MARCH

INSTRUCTIONS AND REPAIR PARTS

FOR MODEL AC & BC-3CP-MD



MODEL AC-3CP-MD
PART NO. 130-018-01

PUMP CONSTRUCTION & SERVICING

March "Orbital" Magnetic Drive Pumps eliminate the conventional shaft seals found in most pumps. This means that there is no rotating seal to wear and allow the liquid being pumped to leak out. The pumping action may eventually fail, however the liquid can never leak out. The Model AC & BC-3C-MD have blast cooled, moisture protected motors, with sealed ball bearings, thermal overload protected, allowing the pumps to be run continuously. Also can be supplied with a super cool capacitor motor for applications where heat is an important factor.

All pumps can be serviced with the use of screwdriver. The only moving part in the pump other than the motor, is the impeller-magnet assembly. This assembly rotates on a stationary spindle and up against a thrust washer. These are the only parts that can wear, and may need to be replaced. See the Repair Parts List for replacement parts.

ELECTRICAL CONNECTIONS AND RUNNING DRY

All models are standard in 115 volt, 50/60 cycle, 1 phase, A.C. The motors are thermal overload protected, and the motor and overload combinations are U.L. and C.S.A. listed. All cord sets are U.L. approved 18/3 wire, SJO or SJT cords. The AC style pumps have 3 foot long cords with no plug attached.

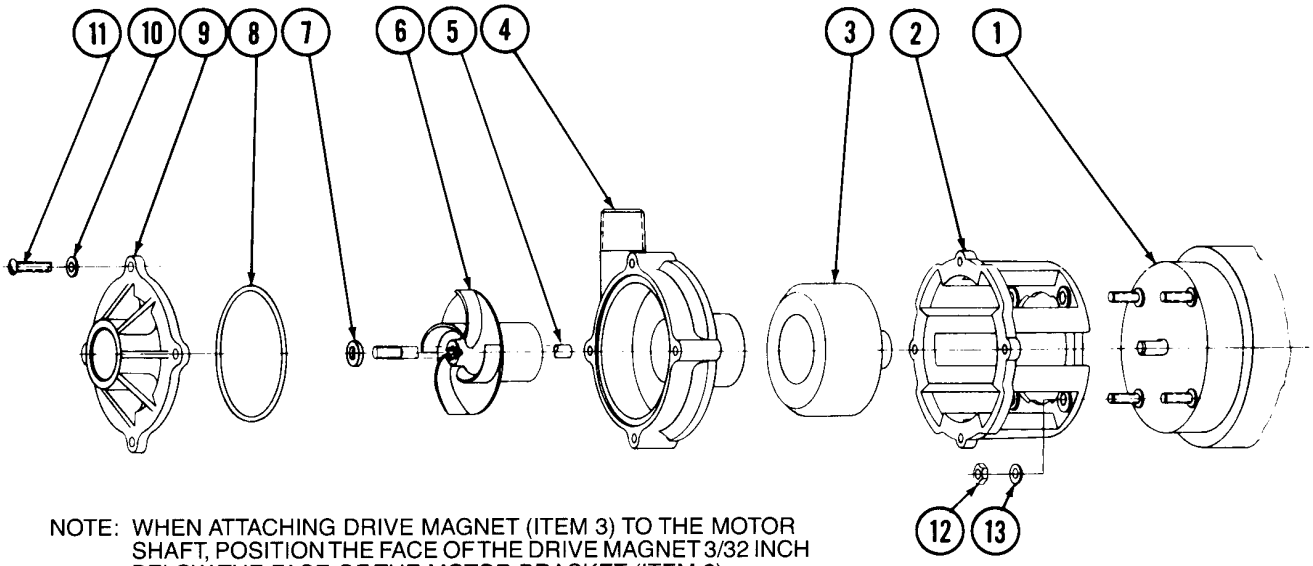
We rely on the liquid being pumped to lubricate the impeller-magnet assembly spinning on the stationary spindle. If the pump is run dry for longer than 10 minutes, the plastic may "freeze" onto the spindle. Bronze, Teflon, and Carbon bushings are available if needed. Contact the factory for special applications, and dry running.

PUMP MATERIALS

All screws are type 18-8 stainless.
The "O" ring gasket is Buna-N rubber on AC and Viton "A" on BC
All stationary spindles are ceramic.
All plastic parts are Glass Filled Polypropylene Plastic.
The thrust washer is ceramic.
The Impeller Magnet is encased in Polypropylene on the BC Model.
Other materials are available, contact the factory for other than standard parts.

RATINGS AND SPECIFICATIONS

MODEL NO.	CONNECTORS		ELECTRICAL			G.P.H. AT LISTED HEAD						PSI	DIMENSIONS			PACK
	INLET	OUTLET	HP	WATTS	AMPS	1 FT.	3 FT.	6 FT.	12 FT.	18 FT.	21 FT.	GAGE	HT.	WD.	LG.	WT.
~~AC-3CP-MD~~	~~3/4" FPT~~	~~1/2" MPT~~	~~1/14~~	~~150~~	~~2.1~~	~~630~~	~~582~~	~~528~~	~~390~~	~~180~~	~~0~~	~~8.9~~	~~4-1/4~~	~~4~~	~~9~~	~~6 1/2 lbs.~~
BC-3CP-MD	3/4" FPT	1/2" MPT	1/15	120	1.7	630	582	528	390	180	0	8.9	4-1/4	4	9	7 lbs.



NOTE: WHEN ATTACHING DRIVE MAGNET (ITEM 3) TO THE MOTOR SHAFT, POSITION THE FACE OF THE DRIVE MAGNET 3/32 INCH BELOW THE FACE OF THE MOTOR BRACKET (ITEM 2).

ITEM	DESCRIPTION	PART NUMBER	QUANT. REQ'D.
1a.	AC Motor, 115 Volt, 60 Hz	130-022-10	1
b.	BC Motor, 115 Volt, 50/60 Hz	130-048-10	1
c.	AC or BC Motor, 230 Volt, 50/60 Hz	130-049-10	1
2	Motor Connecting Bracket	130-066-10	1
3	Drive Magnet Assembly	130-043-02	1
4	Pump Housing	130-018-10	1
5	Impeller Shaft	130-024-10	1
6a.	AC Impeller & Magnet Assembly	130-020-01	1
b.	BC Encapsulated Impeller Assembly	130-069-02	1
7	Thrust Washer (Ceramic)	130-028-10	1
8a.	2-5/8 I.D. x 3/32 Thick "O" Ring BUNA N	130-011-10	1
8b.	2-5/8 I.D. x 3/32 Thick "O" Ring VITON	130-033-10	1
9	Pump Housing Cover	130-021-10	1
10	#10 I.D. Washer	150-051-10	4
11	#10-32 x 1-3/8 Lg. Rd. Hd. Screw	823-008-10	4
12	#10 I.D. Lock Washer	821-038-10	4
13	#10-32 Hex Nut	802-008-10	4

Contact factory for other materials/or parts not listed on standard pumps.

LIMITED WARRANTY

March pumps are guaranteed only against defects in workmanship or materials for a period of one year from date of manufacture pumping water. On all other solutions contact factory for written warranty. See Warranty Card F4109 for full warranty.

MARCH MFG., INC.
1819 PICKWICK AVE. • GLENVIEW, ILLINOIS 60025-5793, U.S.A.
PHONE (847) 729-5300 • FAX (847) 729-7062

March Chemical Chart

**A-Recommended **B-Questionable **C-Not Recommended

SP. GR. AT 100% CONC.	CHEMICAL SOLUTION	FORMULA	% Conc.	Plastics						Metals		"O"Rings				Bushings			
				Ryton	Polypropylene	Delrin	Kynar	Cycolac	Nylon	Hastelloy "C"	St "Less 316	Viton	Buna "N"	Teflon	Ceramic Magnet	Carbon	Ceramic	Mica Fill Teflon	Ryton-Teflon
	ACETIC ACID (Glacial)	CH_3COOH	97	A	A	C	A	C	C	A	A	C	C	A	A	A	A	A	A
1.05	ACETIC ACID	CH_3COOH	50	A	A	B	A	B	C	A	A	A	C	A	A	A	A	A	A
1.08	ACETIC ANHYDRIDE	$(CH_3CO)_2O$	100	A	A	B	C	C	C	A	A	C	C	A		A	A		A
0.80	ACETONE	CH_3COCH_3	100	A	A	B	C	C	A	A	A	C	C	A	A	A	A	A	A
1.03	ACETOPHENONE	$C_6H_5COCH_3$	100	A	B		C	C	B	A	A	C	C	A		A	A		A
1.10	ACETYL CHLORIDE	CH_3COCl	100	A	B		A	C	C		A	A	C	A		A			A
2.44	ALUMINUM CHLORIDE	$AlCl_3$		A	A	B	A		C	A	B	A	A	A	B	A	A	A	A
2.88	ALUMINUM FLUORIDE	AlF_3			A	B	A		C	A	B	A	A	A	B	A	A		
2.70	ALUMINUM SULFATE (Alum)	$Al_2(SO_4)_3$		A	A	B	A	A	A	A	A	A	A	A	B	A	A		A
	AMMONIA (Aqueous)	NH_4OH	10	A	A	C	C	C		A	A	A	A	A	A	A	A	A	A
	AMMONIUM CARBONATE	$(NH_4)_2CO_3$	SAT.		A	C	A	A	A	A	B	A	C	A	A	A	A	A	
1.50	AMMONIUM CHLORIDE	NH_4Cl	SAT.	A	A	B	A		A	A	B	A	A	A	A	A	A	A	A
1.30	AMMONIUM FLUORIDE	NH_4F	20	C	A	B	A	C		A	C	C	C	A		A	A		C
	AMMONIUM HYDROXIDE	NH_4OH	10	A	A	C	A	A	A	A	A	B	A	A	A	A	A		A
1.70	AMMONIUM NITRATE	NH_4NO_3	SAT.	A	A	B	A		C	A	A	C	A	A		A	A		A
2.00	AMMONIUM PERSULFATE	$(NH_4)_2S_2O_8$	SAT.		A	C	C		C	A	A	A	A	A	A	A	A		
1.80	AMMONIUM SULFATE	$(NH_4)_2SO_4$	SAT.	A	A	A	A		C	A	B	C	A	A	A	A	A		A
	AMMONIUM SULFIDE	$(NH_4)_2S$	SAT.		A		A	A		A	A	C	A	A		A	A		
1.30	AMMONIUM THIOCYANATE	NH_4SCN	SAT.		A	A	A	A		A	A	A	A	A		A	A		
0.86	AMYL ACETATE	$CH_3CO_2C_5H_{11}$	100	A	C	A	A	C	B	A	A	C	C	A		A	A	A	A
0.80	AMYL ALCOHOL	$C_5H_{11}OH$	100	A	A	A	A	A	A	A	A	C	A	A		A	A	A	A
0.80	AMYL CHLORIDE	$CH_3(CH_2)_3CH_2Cl$	100	A	C	A	A	C	C	A	A	B	C	A		A	A		
1.02	ANILINE	$C_6H_5NH_2$	100	A	A	B	A	C	C	A	A	C	C	A		A	A	A	A
	AQUA REGIA			C	C	C	C	C	C	C	C	B	C	A	C	C	B		C
4.30	BARIUM CARBONATE	$BaCO_3$	SAT.	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A
3.10	BARIUM CHLORIDE	$BaCl_2$	SAT.	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A
2.20	BARIUM HYDROXIDE	$Ba(OH)_2$		A	A	B	A	A	A	A	A	A	A	A	A	A	A		A
4.40	BARIUM SULFATE	$BaSO_4$	SAT.	A	A	A	A	A	A	A	A	A	A	A		A	A		A
4.30	BARIUM SULFIDE	BaS	SAT.	A	A	A	A	A	A	B	B	A	A	A		A	A		A
	BEER				A	A	A	A	B	A	A	A	A	A	A	A	A		
1.05	BENZALDEHYDE	C_6H_5CHO	100	C	A	A	C	C	C	A	A	C	C	A		A	A	A	C
0.90	BENZENE	C_6H_6	100	B	C	A	A	C	A	A	A	A	C	A	A	A	A	A	B
	BENZENE SULFONIC ACID	$C_6H_5SO_3H$	100	A	B		A		C	A	A	A	C	A		A	A	A	A
1.30	BENZOIC ACID	C_6H_5COOH		A	A	B	A	A	C	A	A	A	C	A		A	A	A	
1.05	BENZYL ALCOHOL	$C_6H_5CH_2OH$	100	A	A	A	A	C			A	A	C			A	A	A	A
1.10	BENZYL CHLORIDE	$C_6H_5CH_2Cl$		A	A		A	C			A	B	C						
6.80	BISMUTH CARBONATE	$(BiO)_2CO_3$	SAT.		A	A	A	A					C	A		A	A		
1.40	BORIC ACID	H_3BO_3			A	A	A		B	A	A	A	A	A		A	A	A	
	BRINE		SAT.	A	A	A	A	A		A		A	A	A	A	A	A		A
3.10	BROMINE LIQUID	Br	100	C	C	C	B	C	C	A	C	B	C	A	A	A	A		C

PLAST-O-MATIC

PRODUCT DATA

CATALOG RVDT

New! Teflon® Diaphragm Relief, By-Pass, Back Pressure, Anti-Siphon Valves...

for Smooth, Sensitive Operation and the Ultimate in Corrosion Resistance... with No Wetted Elastomers!

Features:

- One valve design functions as a relief valve, by-pass valve, back-pressure valve and anti-siphon valve.
- *Relief:* protects systems and equipment from over-pressure/ pressure surges. *By-Pass:* prevents pumps from "dead heading". *Back-Pressure:* maintains necessary reverse pressure in closed loop systems. *Anti-Siphon:* prevents unwanted chemical siphoning, if city water pressure drops to zero, and changes in elevation create negative pressure.
- Unique Teflon Diaphragm is excellent for use with highly aggressive liquids... and also provides the ultimate in contamination-free sealing.
- Rugged thermoplastic construction is ideal for a broad range of industrial applications.
- Large diaphragm area delivers more sensitivity and less pressure drop under flow conditions.
- Patented Fail-Dry® safety feature provides visual warning of seal malfunction and permits the valve to continue operation until a scheduled maintenance can be planned thereby avoiding a costly shutdown.
- Non-leaching feature of Teflon makes it also ideal for use with ultra-pure water and concentrated etchants, as in the semiconductor industry.
- Available in 1/4", 1/2", 3/4", 1", 1 1/2" & 2" sizes. Others on request.

MATERIALS OF CONSTRUCTION:

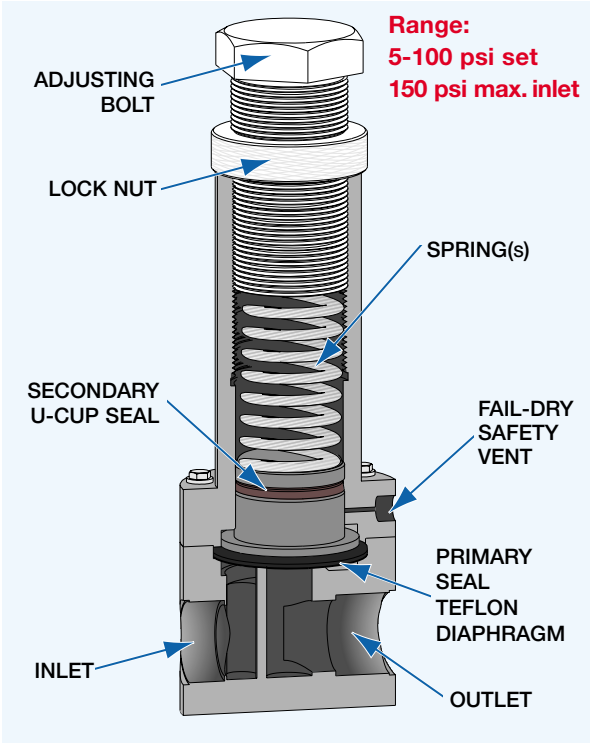
Series RVDT relief valves are available in PVC, Polypropylene, PVDF (Kynar®) and Teflon® body materials. The wetted diaphragm is Teflon energized by a non-wetted Viton® diaphragm. Springs (not in wetted area) are zinc-plated steel, fasteners are stainless steel and adjusting screw is high-density polyethylene.

TRUE BLUE™

PLAST-O-MATIC VALVES, INC.
1384 Pompton Avenue, Cedar Grove, New Jersey 07009-1095
(973) 256-3000 • Fax (973) 256-4745 • www.plastomatic.com

SERIES RVDT • Teflon® Diaphragm Design

the ultimate in corrosion resistance with no wetted metals or elastomers!

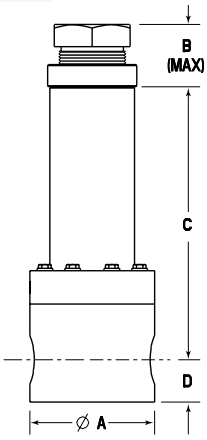


Features:

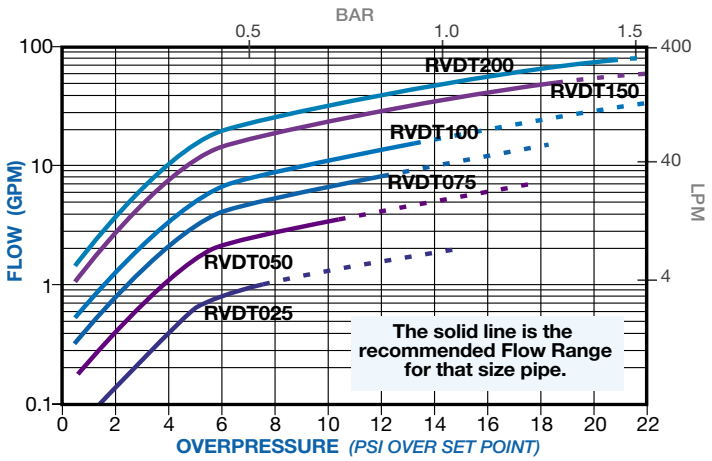
- One valve design functions as a relief valve, by-pass valve, back-pressure valve and anti-siphon valve.
- Teflon diaphragm – no wetted metal or elastomeric parts.
- Unique Teflon diaphragm is excellent for use with highly aggressive liquids... and also provides the ultimate in contamination-free sealing.
- Rugged thermoplastic construction is ideal for a broad range of industrial applications.
- Large diaphragm area delivers more sensitivity and less pressure drop under flow conditions.
- Patented Fail-Dry® safety feature provides visual warning of seal malfunction and permits the valve to continue operation until a scheduled maintenance can be planned.
- Non-leaching feature of Teflon makes it ideal for use with ultra-pure water and concentrated etchants, as in the semiconductor industry.
- Available in 1/4", 1/2", 3/4", 1", 1 1/2" and 2" sizes.

Design:

Series RVDT in-line pressure relief valves feature a wetted flat Teflon diaphragm to resist both chemical attack and salt crystallization problems. A large active diaphragm area provides for smooth, chatter-free operation. Relief setting is infinitely adjustable from 5 psi to 100 psi. Maximum inlet pressure 150 psi. Series RVDT is available in 1/4", 1/2", 3/4", 1", 1 1/2" and 2" pipe sizes.



Series RVDT Typical Flow Characteristic



Materials of Construction:

Series RVDT relief valves are available in PVC, Polypropylene, PVDF (Kynar®) and Teflon body materials. The wetted diaphragm is Teflon energized by a non-wetted Viton® diaphragm. Springs (not in wetted area) are plated steel and fasteners are stainless steel. Standard spring housing is PVC, and adjusting screw is high-density polyethylene.

Series RVDT Dimensions

PIPE SIZE NPT	A		B		C		D	
	in.	mm.	in.	mm.	in.	mm.	in.	mm.
1/4	2.0	50	1.38	35	4.30	109	.470	11
1/2	2.5	63	1.48	37	4.41	112	.687	17
3/4	3.0	76	2.81	71	5.39	137	.780	19
1	3.5	83	3.00	76	7.65	194	1.187	30
1 1/2	5.0	127	3.50	89	7.00	178	1.500	38
2	6.0	153	2.80	71	8.13	207	1.750	45

Series RVDT Model Numbers

PIPE SIZE	PVC Model No.	POLYPRO* Model No.	PVDF Model No.	TEFLON Model No.
1/4	RVDT025V-PV	RVDT025V-PP	RVDT025V-PF	RVDT025V-TF
1/2	RVDT050V-PV	RVDT050V-PP	RVDT050V-PF	RVDT050V-TF
3/4	RVDT075V-PV	RVDT075V-PP	RVDT075V-PF	RVDT075V-TF
1	RVDT100V-PV	RVDT100V-PP	RVDT100V-PF	RVDT100V-TF
1 1/2	RVDT150V-PV	RVDT150V-PP	RVDT150V-PF	Consult Factory
2	RVDT200V-PV	RVDT200V-PP	RVDT200V-PF	

*Natural Polypropylene

PLAST-O-MATIC VALVES, INC. 1384 Pompton Ave., Cedar Grove, NJ 07009 • (973) 256-3000 • Fax (973) 256-4745 • www.plastomatic.com • info@plastomatic.com

Bourdon Tube Pressure Gauges

Stainless Steel Case / Copper Alloy Wetted Parts

Industrial Series Liquid Fillable • Type 21X.53

Pressure Gauges

Application
Suitable for environments compatible with copper alloy wetted parts where vibration or pressure pulsation occur and for gaseous or liquid media that will not obstruct the pressure system.

Sizes (All sizes not stocked)
2", 2½", 4" (50, 63, and 100 mm)

Accuracy
± 1.5% of span

Ranges (All ranges not stocked)
Vacuum / Compound to 30"HG / 0 / 200 PSI
Pressure from 15 PSI to 10,000 PSI - 2"
Pressure from 10 PSI to 15,000 PSI - 2½",4"
or other equivalent units of pressure or vacuum

Working Range

2" & 2½"	Steady:	3/4 of full scale value
	Fluctuating:	2/3 of full scale value
	Short time:	full scale value
4" & 6"	Steady:	Full scale value
	Fluctuating:	0.9 x full scale value
	Short time:	1.3 x full scale value

Operating Temperature
Ambient: -40°F to 160°F (-40°C to 71°C) NOTE1
Media: max. 140°F (+60°C)

Temperature Error
Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% for every 18°F (10°C) rising or falling. Percentage of span.

Standard Features

Connection
Material: copper alloy
Lower mount (LM)
Center back mount (CBM) - 2" & 2½"
Lower back mount (LBM) - 4"
1/4" or 1/2" NPT limited to wrench flat area
(7/16"-20" SAE thread for **Type 213.53S**)

Bourdon Tube
Material: copper alloy
30"Hg (Vac) to 1000 PSI C-type - 2", 2½"
30"Hg (Vac) to 1000 PSI C-type - 4"
1500 PSI to 15,000 PSI helical type - 2", 2½"
1500 PSI to 15,000 PSI helical type - 4"

Movement
Copper alloy

Dial
White ABS with stop pin and black lettering

Pointer
Black aluminum (external "zero" adjust screw-optional)

Case
304 stainless steel with vent plug and stainless steel crimp ring.

O-ring (case/connection sealing):
EPDM for standard stocked glycerine filled gauges. Viton for standard stocked dry gauges, suitable for glycerine, silicone or fluoroube case filling

Weather Protection
Weather resistant (NEMA 3 / IP 54) - dry case
Weather tight (NEMA 4X / IP 65) - liquid-filled case

Standard Scale
PSI
PSI, PSI/KG/CM², PSI/BAR (2½")

Window Gasket
Buna-N

Window
Polycarbonate
Acrylic (4")

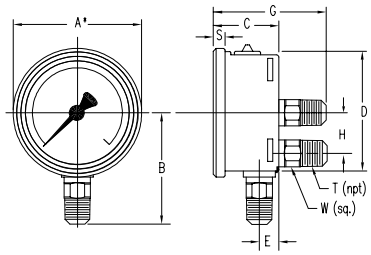
Case Filling
212.53 - None
213.53 - Glycerine

Order Options (min. order may apply)
Other pressure connections limited to wrench flat area
Stainless steel polished front flange
Stainless steel rear flange- 2½" & 4"
Brass threaded or press-fit restrictor
Pressure compensating membrane window for filled gauges
Dry case (**212.53**)
Steel zinc plated u-clamp bracket (field installable)
Stainless steel u-clamp bracket (field installable)
DIN standards
External zero adjustment (2½" only)
Externally adjustable red drag pointer (max. hand)
Externally adjustable red mark pointer (set pointer)
Other pressure scales available:
Bar, kPa, MPa, Kg/cm² and dual scale
Custom dial layout
Silicone or fluorolube case filling **(Type 213.53)**

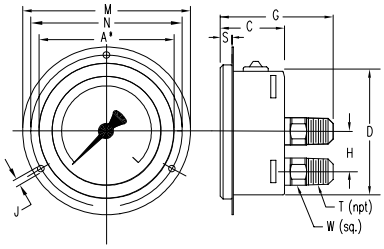
Note 1 Temperature Ranges (Liquid filled gauges)

Glycerine:	-4°F to 140°F (-20°C to 60°C)
Silicone:	-40°F to 140°F (-40°C to 60°C)

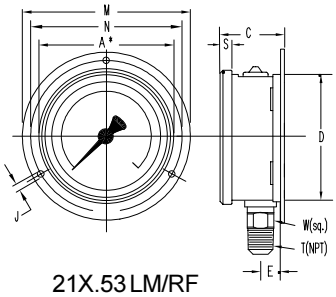
Dimensions:



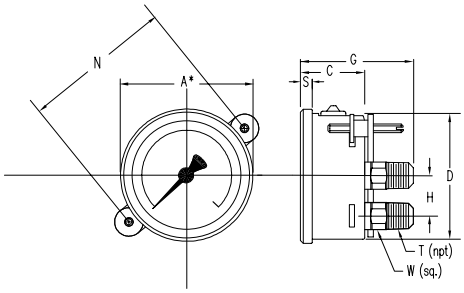
21X.53 LM/CBM/LBM



21X.53 CBM/LBM/FF



21X.53 LM/RF



21X.53 CBM/LBM/UC

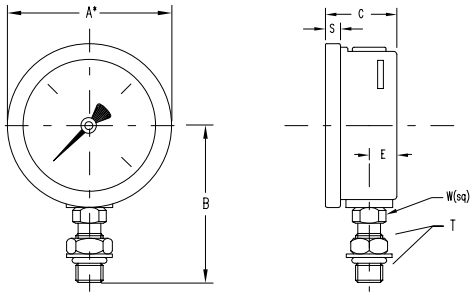
A* NOMINAL SIZE

TYPE/SIZE	WEIGHT	KEY	A*	B	C	D	E	G	H	J	L	M	N	S	T	W
21X.53 2"	0.27 lbs. + 0.06 lbs. if filled	mm	50	48	30	50	12	53	--	3.6	6.5	71	60	5.5	--	14
		in	2	1.89	1.18	1.97	0.47	2.09		0.14	0.26	2.80	2.36	0.22	1/4"	0.55
21X.53 2.5"	0.36 lbs. + 0.08 lbs. if filled	mm	63	54	32	62	13	54	--	3.6	7.5	85	75	6.5	--	14
		in	2.5	2.13	1.26	2.44	0.51	2.13		0.14	0.30	3.35	2.95	0.26	1/4"	0.55
21X.53 4"	1.10 lbs. + 0.66 lbs. if filled	mm	100	87	48	100	15.5	79.5	30	4.8	9	132	116	8	--	22
		in	4	3.43	1.89	3.94	0.61	3.13	1.18	0.19	0.35	5.20	4.57	0.31	1/2"	0.87

NOTE: For 1/4" NPT connections on 3" and 4" gauges, reduce B* dimension by 5 mm / 0.2 in.

Recommended panel cut-out: D + 1mm

Optional Type 213.53S- 7/16" - 20" SAE Connection



A* NOMINAL SIZE

TYPE/SIZE	WEIGHT	KEY	A*	B	C	E	S	W
213.53S 2.5"	0.51 lbs.	mm	63	61.2	31	13	6	14
		in	2.5	2.41	1.23	.51	.24	.55

T = 7/16-20" SAE Connection
supplied with Nitrile o-ring, hex nut, and washer

THE MEASURE OF
Total Performance™

Ordering Information:
State computer part number (if available) / type number / size / range / connection size and location / options required.

05/01

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, Georgia 30043-5868
Tel: 770-513-8200 Fax: 770-338-5118
http://www.wika.com e-mail: info@wika.com

MARQUEST SCIENTIFIC™

GAUGE ISOLATORS

Model GI

FEATURES

- Protects and isolates pressure sensing instruments
- Total isolation from system media
- Low profile design eliminates dead volume
- Convoluted diaphragm allows accurate transmission of system pressure
- Optimum pressure containment spherical design
- Low in original cost and maintenance
- Simple installation

SCOPE

- The Marquest Gauge Isolator provides two fluid chambers separated by an impermeable membrane. The upper chamber (instrument side) is normally filled with a stabilized liquid. The lower chamber receives the media under pressure.
- Most pressure sensing devices are compatible with 1/4" FNPT outlet. The inlet is standard 1/2" FNPT or 1/4" FNPT.
- Chemical resistance and purity levels are as recommended for the base materials.
- No metals or lubricants are used in construction, internally or externally.
- Custom membranes may be supplied upon request.

MATERIALS OF CONSTRUCTION

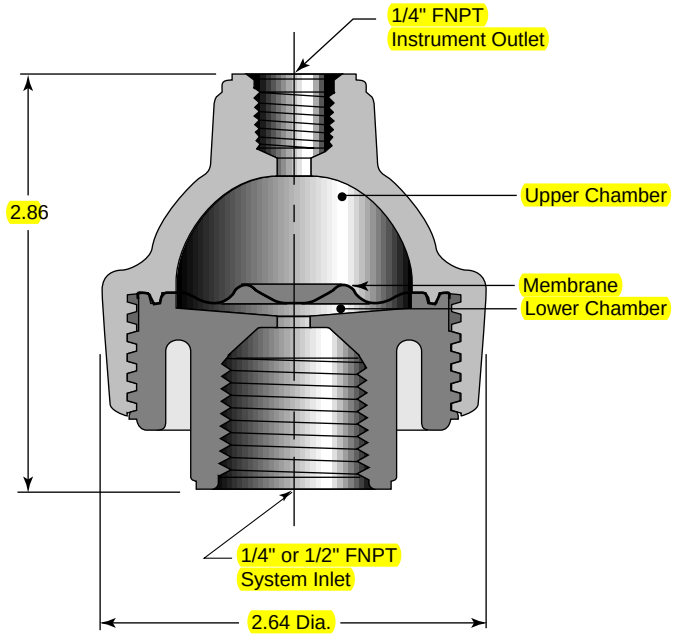
Body

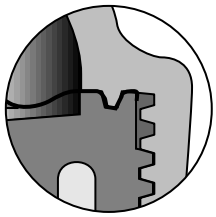
- PVC: Polyvinyl Chloride
- CPVC: Chlorinated Polyvinyl Chloride
- PP: Polypropylene homopolymer, glass & mineral reinforced

Membrane

- Standard: PTFE, Teflon®, also available in:
- FPM: Viton®, Fluorine elastomer
- EPDM: Ethylene Propylene elastomer

DIMENSIONAL DATA





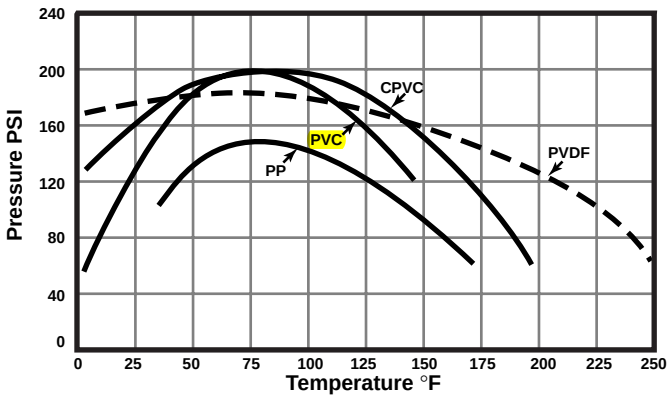
Positive sealing of membrane

Protection against chemical and physical reaction on pressure sensing devices.

System fluids, gas or liquid are dependably separated from sensitive components by an impermeable membrane.

Corrosive media are effectively contained and high purity media are protected from contamination.

PRESSURE/TEMPERATURE



HOW TO ORDER

Model No.	Gauge Side	Inlet Side	Membrane Material	Gauge	-	Body Material
GI	–				-	

- Body Material: PVC = Polyvinyl Chloride; CPV = Chlorinated Polyvinyl Chloride; PPR = Polypropylene, homopolymer glass & mineral reinforced
- Gauge: xxx = None; 000 = 0-30" HG; 015 = 0-15 psi; 030 = 0-30 psi; 060 = 0-60 psi; 100 = 1-100 psi; 160 = 0-160 psi; 200 = 0-200 psi
- Membrane Material: T = PTFE; E = EPDM; V = Viton
- Inlet Side: 2 = 1/4" FNPT; 5 = 1/2" FNPT
- Gauge Side: 2 = 1/4" FNPT
- Model No.: Low Profile Gauge Isolator

Example Part Number **GI-25T060-PVC**

Gauge Isolator with 1/4" FNPT outlet, 1/2" FNPT inlet, PTFE Membrane, 0-60 psi gauge and a Polyvinyl Chloride Body

MARQUEST SCIENTIFIC™

1702 East Via Burton Anaheim, CA 92806
714.491.9191 Fax: 714.491.9199
www.marquestscientific.com
sales@marquestscientific.com

Bulletin No. GI 0399

PVC & CPVC TRUE UNION 2000 VALVES

TU2000-2-0605

One of the Most Versatile, Compact Valve Designs Available

Spears® True Union 2000 Ball Valves, 3-Way Ball Valves and Ball Check Valves provide maximum versatility with fully interchangeable valve cartridges. Provides for easier system design modifications and upgrades in multiphase projects, or anywhere changes in valve types are desired. Simply exchange any True Union 2000 valve in-line using existing union nuts. Also mates with Spears® new Schedule 80 Unions and Diaphragm Valves. All True Union 2000 valves feature a low profile, compact design for minimal space requirements. Available in PVC or CPVC with choice of EPDM or Dupont Dow Genuine Viton® O-ring seals and socket, flanged, or optional Spears® patented Special Reinforced (SR) threaded end connectors. Additionally, Spears® offers valve Retrofit Kits for easy in-line replacement of other valves and factory installed Actuation Packages. Assembled with silicone-free lubricant.

True Union 2000 Industrial Ball Valve

- Multi-featured Industrial Grade
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or SR Threaded End Connectors

True Union 2000 Industrial 3-Way Valve

- Industrial Grade, Multiport, Diverter, L-Pattern & T-Pattern configurations Vertical 3-Way or Horizontal Diverter (shown)
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors

MADE IN THE U.S.A. WITH PRIDE

PROGRESSIVE PRODUCTS FROM SPEARS®
INNOVATION & TECHNOLOGY

Visit our web site:
www.spearsmfg.com

LPCB — NATIONAL ACCREDITATION OF CERTIFICATION BODIES

Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

True Union 2000 Industrial Ball Check Valve

- Industrial Grade
- Flow-Tested for Minimum Turbulence
- Fully Serviceable, Replaceable Components, uses Standard O-ring Seat
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Easily Converted to Foot Valve
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or optional SR Threaded End Connectors
- Also available in PVC White

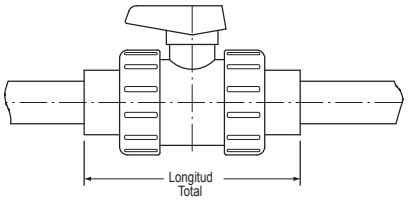
Check Valve Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
C_V	**6.3**	**17**	**25**	**65**	**86**	**130**	**200**	**275**	**500**	**800**

Economical True Union 2000 Standard Ball Valve

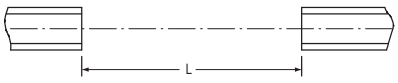
- High quality Standard Ball Valve
- Allows future system upgrade
- Excellent for OEM Applications
- Replaceable Seats
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Spears® Safe-T-Shear® Stem
- Self Adjusting Floating Seat
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors
- Also available in PVC White

True Union 2000 Retrofit Valves or Kits

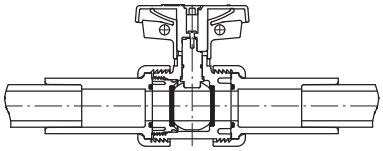
Easily converts any system over to all True Union 2000 style valves for consistent valve type and uniform maintenance. Special extended socket style End Connectors (2) allow retrofit replacement of other brand valves in existing piping systems with a new True Union 2000 valve. Simply cut out old valve according to specified dimension and install retrofit end connectors. End connectors are provided with either EPDM or genuine Viton® O-rings. Can be ordered as End Connector Kit or fully assembled Retrofit Valve.



BALL VALVE FOR REPLACEMENT



PIPE LAYING LENGTH AFTER CUTTING



TRUE UNION 2000 BALL VALVE INSTALLED WITH RETROFIT KIT

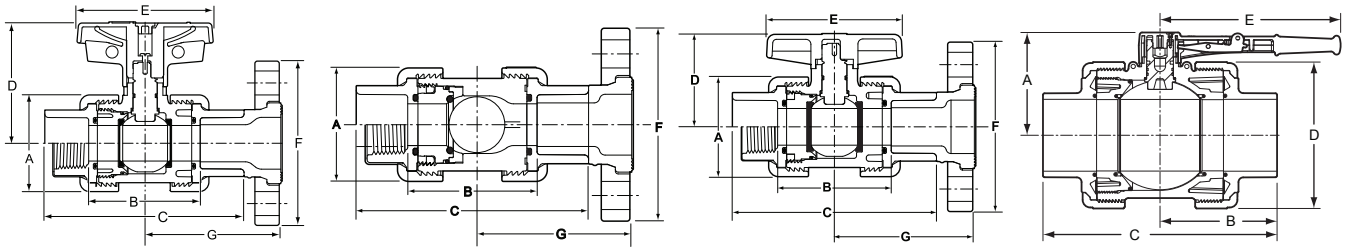
Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
L	4-29/32	5-7/16	6-3/32	7-1/4	7-1/2	8-17/32	10-3/4	11-7/16	14-5/16	N/A

L ± 1-1/16

Contact Spears® for Special Kits/Valves to replace older Spears® Regular True Union Ball Valves

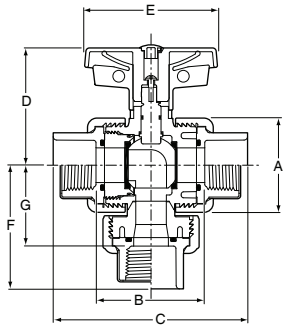
True Union 2000 Valve Dimensional Data

Industrial Ball Valve, Ball Check Valve, Standard Ball Valve & 6" Industrial Lever Handle



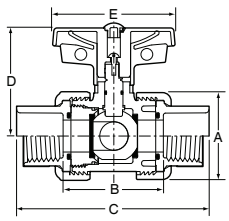
Nominal Size	A	Dimensions Reference (inches, ±1/16)										
		B		C			D		E		F	G
		Soc/Thd	Spigot	Socket	Thread	Spigot	Industrial	Standard	Industrial	Standard		
1/2	1-7/8	2-3/8	2-7/8	4-3/16	3-3/16	4-5/8	2-9/16	1-5/8	2-13/16	2-1/2	3-1/2	2-31/32
3/4	2-1/4	2-3/4	3-1/4	4-3/4	4-1/4	5-1/4	2-7/8	2	3-3/8	3	3-7/8	3-5/16
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	2-5/16	3-7/16	3-7/16	4-1/2	3-5/8
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	2-13/16	3-7/8	3-9/16	4-5/8	3-31/32
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	3-1/16	4-3/16	3-7/8	5	4-3/8
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	3-3/4	5-1/8	5	6	5-1/4
2-1/2	5-3/8	6-7/8	7-13/16	10-7/16	9-11/16	11-3/8	5-1/8	5-7/8	6-1/4	7-5/8	7-1/2	6
3	6-3/16	7	7-13/16	10-11/16	9-7/8	11-9/16	5-7/8	5-7/8	7-5/8	7-5/8	7-1/2	6-13/16
4	7-5/8	7-5/16	8-1/4	11-7/8	10-1/4	12-3/4	6-3/4	6-3/4	9-3/16	6-3/4	9	7-1/2
6	11-5/8	11-1/16	13	17-1/16	15-3/4	18-1/2	8-1/8	---	14-5/16	---	11-1/4	10-3/16

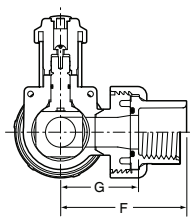
Industrial 3-Way Ball Valve



Nominal Size	A	Vertical 3-Way Ball Valves[3]												Oper.[2] Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-7/8	2-7/16	2-15/16	4-1/4	3-27/32	4-3/4	2-9/16	2-13/16	2-3/4	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

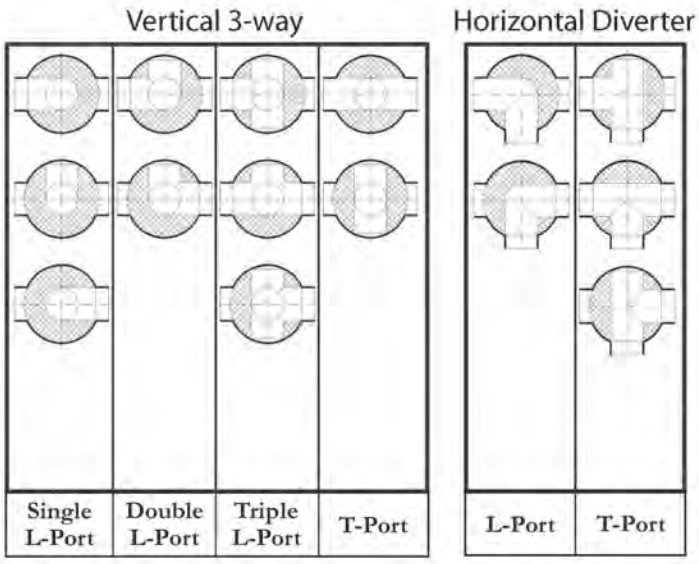




Nominal Size	A	Horizontal Diverter Ball Valves[3]												Oper.2 Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-3/16	2-7/16	2-15/16	4-3/16	3-13/16	4-3/4	2-9/16	2-13/16	2-9/16	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

3-Way Port Options



True Union 2000 Actuated Valves

Universal ISO Actuator Mounting Pattern Option

Spears® offers optional actuator mounting with standard ISO Mounting Pattern for user actuation of True Union 2000 Ball Valves.

Factory Actuated Valve Packages

Spears® Electric or Pneumatic Actuation Packages eliminate customer's having to determine proper valve and actuator mating. Pre-matched packages insure proper torque, coupling and mount for optimum performance - all factory installed and tested for proper alignment and operation. Actuation packages can be custom built to user specifications from Spears® wide selection of options, voltages and accessories. Contact Spears® for additional information.

Foot Valve Screens

- Easily converts Ball Check Valve to a Foot Valve.
- Standard IPS spigot connection fits slip-socket valve end connector.
- Enlarged screen provides open area equivalent to valve for optimum flow characteristics.
- Chemical and corrosion resistant PVC or CPVC construction.

Typical Application (VALVE NOT INCLUDED)

Split Nut Kit for True Union 2000 Valves & Union 2000 Schedule 80 Fittings

Split Nut Kits are designed to replace broken union nuts on Spears® True Union 2000 Ball Valves and Union 2000 Schedule 80 Unions. Kit includes SS316 Gear Clamp and 2-Split Nut halves. Can also be used if nut was not in place during end connector installation. Split Nut is fully serviceable to original valve pressure rating.

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic products to transport or store compressed air or gas.

Viton® is a registered trademark of DuPont Dow Elastomers

SPEARS® MANUFACTURING COMPANY • CORPORATE OFFICE
15853 Olden St., Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
(818) 364-1611 • www.spearsmfg.com

NEW PRODUCTS

V-1V-0503
Effective May 13, 2003

True Union 2000 Industrial Ball Check Valves

Sizes 1/2" - 2" Now Includes Both Socket & Threaded End Connectors With Each Valve

- Pressure Rating @ 73°F, Water: 1/2" - 2" 235 psi
- Maximum Service Temperature: PVC = 140°F CPVC = 200°F (Pressure Deratings Apply)
- Rated for Vacuum Service
- All Valves assembled with Silicone-Free, Water Soluble Lubricant

PVC Industrial

Size	EPDM	Viton®	Std Pk	Mstr Ctn	Disc Code
1/2	4529-005	4539-005	1	18	604
	34.99	39.43			
3/4	4529-007	4539-007	1	18	604
	41.72	44.04			
1	4529-010	4539-010	1	18	604
	49.61	55.31			
1-1/4	4529-012	4539-012	1	12	604
	72.46	81.31			
1-1/2	4529-015	4539-015	1	8	604
	83.22	92.35			
2	4529-020	4539-020	1	8	604
	113.61	126.33			

CPVC Industrial

Size	EPDM	Viton®	Std Pk	Mstr Ctn	Disc Code
1/2	4529-005C	4539-005C	1	18	606
	51.71	57.57			
3/4	4529-007C	4539-007C	1	18	606
	61.90	68.78			
1	4529-010C	4539-010C	1	18	606
	73.03	81.14			
1-1/4	4529-012C	4539-012C	1	12	606
	125.77	139.63			
1-1/2	4529-015C	4539-015C	1	8	606
	125.77	139.63			
2	4529-020C	4539-020C	1	8	606
	168.00	187.19			

See Spears Thermoplastic Valves, Strainers & Accessories Price Schedule V-1 for Flanged & Stainless Steel Reinforced Threaded End Connectors, additional sizes and valve accessories.

See Spears Thermoplastic Valve & Accessories Product Guide & Engineering Specifications, Publication V-4 for dimensions and additional technical information.

Not for Use With Compressed Air or Gas

Prices subject to change without notice. Possession of this price schedule shall not be construed as an offer to sell the products listed. Product drawing(s) and/or photograph(s) are representative and may not fully reflect product configuration.

Viton® is a registered trademark of DuPont Dow Elastomers.

Progressive Products From Spears Innovation & Technology

SPEARS® MANUFACTURING COMPANY
Corporate Office
15853 Olden Street , Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
(818) 364-1611 • Visit our website: www.spearsmfg.com

SECTION V
SOLUTION STORAGE

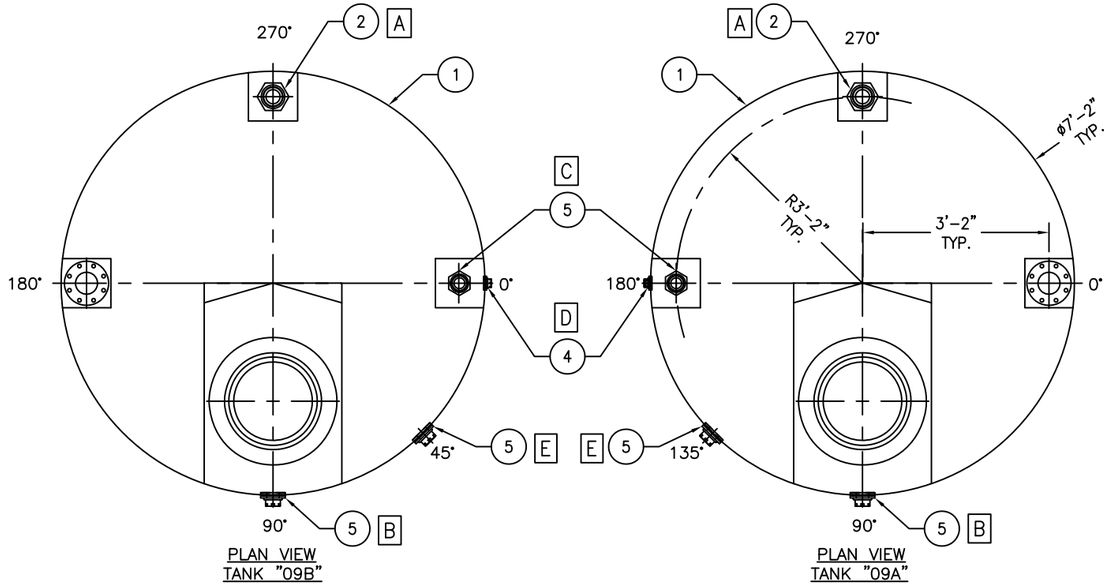
Solution Tank

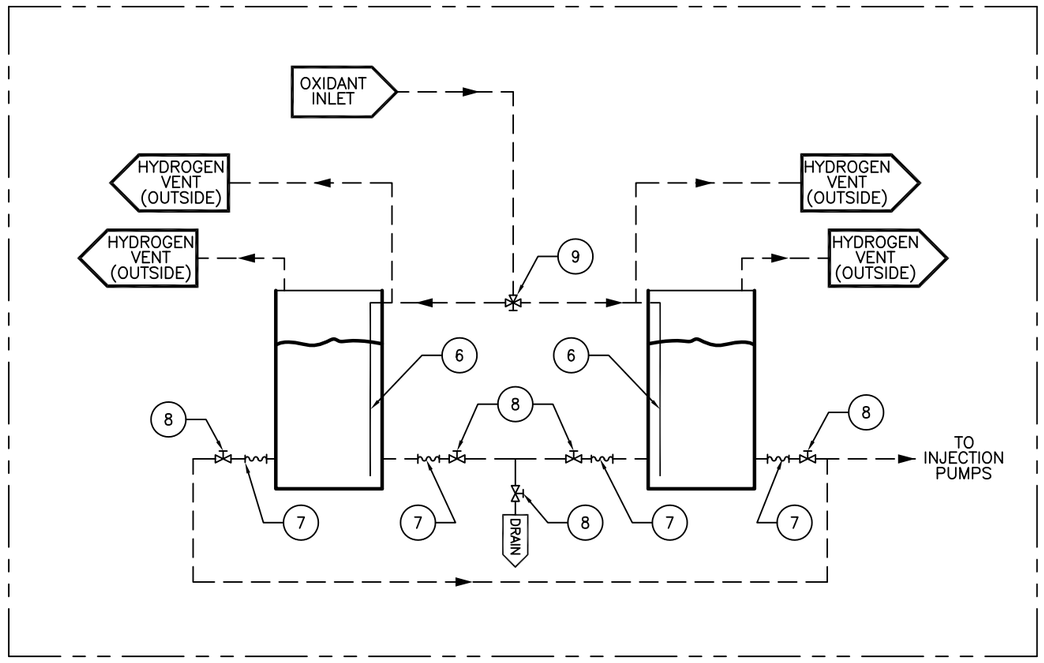
NOZZLE SCHEDULE & ACCESSORIES					
SERVICE	LTR.	SIZE	DEG. "09A"	DEG. "09B"	ELEV
INLET FROM OSG	A	3"	270°	270°	DOME FLAT
OUTLET TO CHEM. INJ. PUMPS	B	2"	90°	90°	5"
VENT	C	2"	180°	0°	DOME FLAT
OVERFLOW	D	1"	180°	0°	80"
EQUALIZATION	E	2"	135°	45°	5"
DILUTION AIR (CLOSED)	F	4"	0°	180°	DOME FLAT

NOTES:

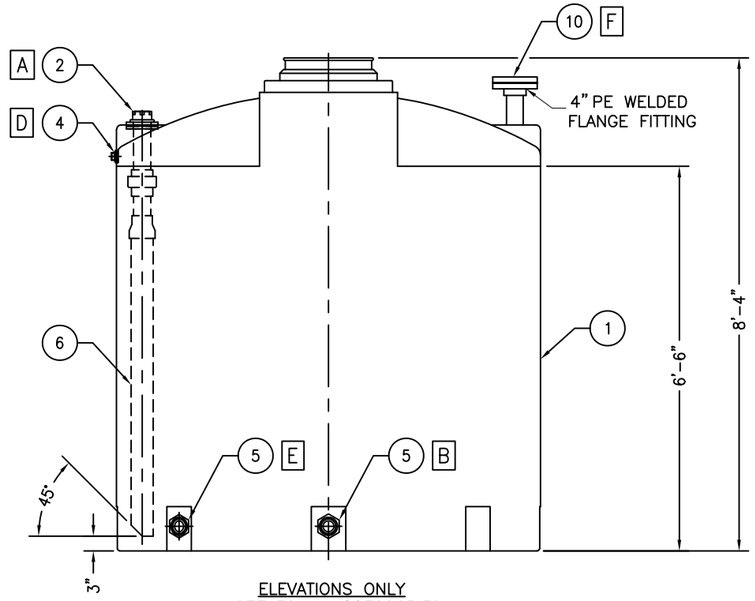
1. OXIDANT INLET, HYDROGEN VENT, AND OUTLET ASSEMBLY PLUMBING SIZE:
   A. (2) SCH–100 SERIES: 3" INLET, 2" HYDROGEN VENT, 2" OUTLET.
2. FOR HYDROGEN VENT & DROP TUBE ASSEMBLY DETAILS, SEE SHEET 2.
3. DROP TUBE ASSEMBLY PIPING SIZE = 4"
4. UNLESS OTHERWISE SPECIFIED IN BOM, ALL PIPING AND PIPING CONNECTIONS PROVIDED BY OTHERS.
5. ALL BULKHEAD FITTINGS ARE SHIP LOOSE ITEMS EXCEPT ITEM #3 AND TO BE ASSEMBLED BY CONTRACTOR

		MATERIAL LIST	
ITEM	QNT.	DESCRIPTION	MATL.
1	2	2000 GALLON TANK	HDPE
2	2	ADAPTER, BULKHEAD 3" S X T	CPVC
4	2	ADAPTER, BULKHEAD 1" S X T	PVC
5	6	ADAPTER, BULKHEAD 2" S X T	PVC
6	2	VENT & DROP TUBE ASSEMBLY	PVC
7	4	FLEXIBLE INTERCONNECT ASSY., 2" X 2 FT LG.	PVC
8	5	VALVE, UNION W/VITON SEALS 2"	PVC
9	1	VALVE, 3–WAY. UNION W/VITON SEALS 2"	CPVC
10	1	BLIND FLANGE W/ EPDM GASKET & SST HARDWARE, 4"	PE





DUAL TANK PIPING SCHEMATIC



ELEVATIONS ONLY
NOZZLES & ACCESSORIES FOR TRUE ORIENTATION SEE PLAN VIEW

REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL

__INFORMATION __CERTIFIED

THIS DRAWING IS LIMITED TO FUNCTIONAL DESIGN, GENERAL ARRANGEMENT AND CLEARANCE. NO RESPONSIBILITY IS ACCEPTED BY PARKSON CORPORATION FOR OTHER DIMENSIONS, QUANTITIES, OR COORDINATION WITH OTHER EQUIPMENT OR DRAWINGS EXCEPT AS STATED IN PURCHASE ORDER.

DRAWN BY	DATE
chinmayv	07/05/16
CHECKED BY	DATE
Luc L	07/06/16
SCALE	SIZE
3/8"=1'-0"	B

Parkson™

PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

TITLE
2000 GALLON SOLUTION TANKS
GENERAL ARRANGMENT

REFERENCE INFORMATION

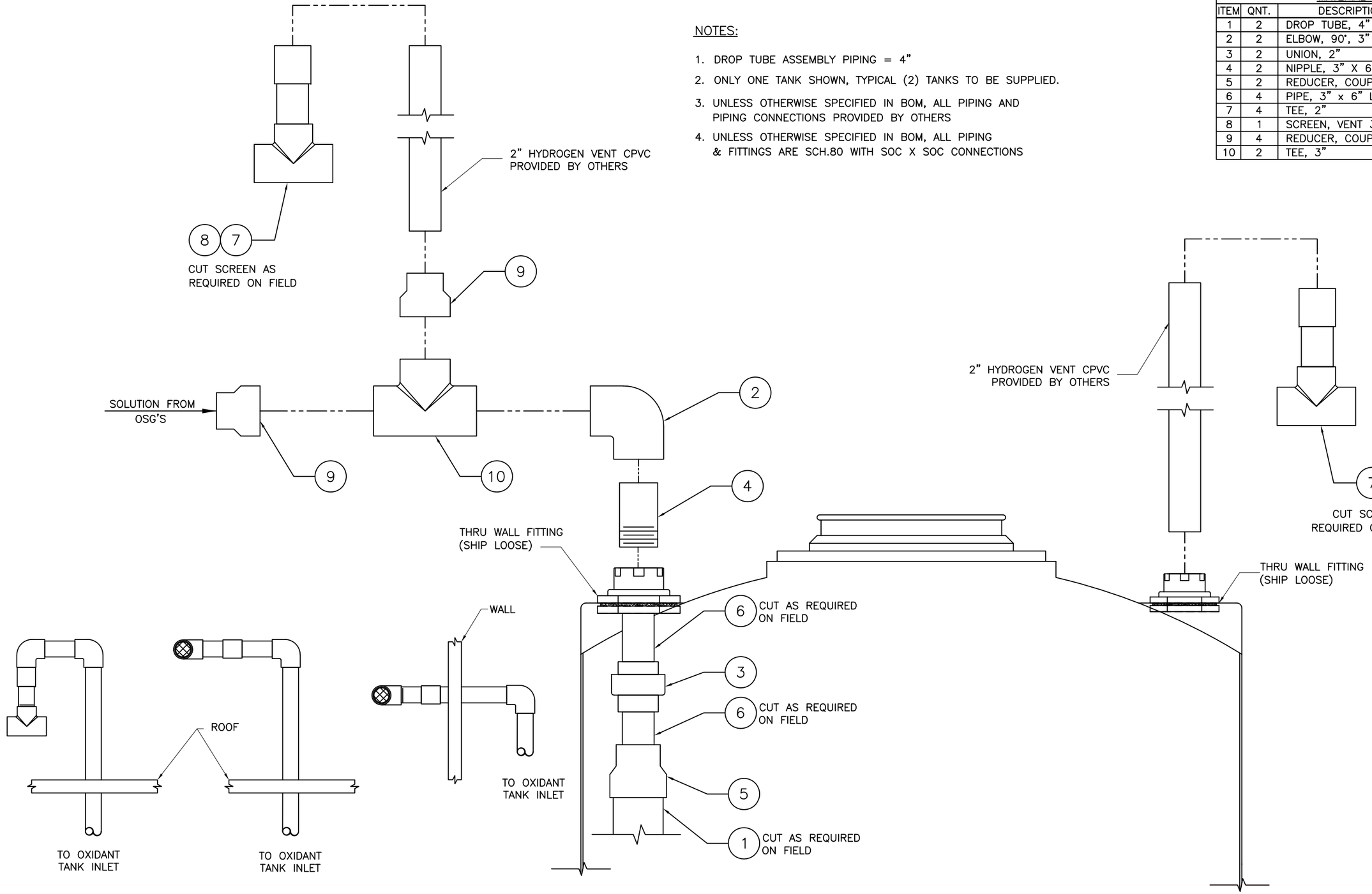
DRAWING NO P0260058510–01
SHEET 1 OF 2

REV —

MATERIAL LIST			
ITEM	QNT.	DESCRIPTION	MATL.
1	2	DROP TUBE, 4" X 80" Lg.	PVC
2	2	ELBOW, 90°, 3"	CPVC
3	2	UNION, 2"	CPVC
4	2	NIPPLE, 3" X 6" Lg.	CPVC
5	2	REDUCER, COUPLING, 4" X 2"	CPVC
6	4	PIPE, 3" x 6" LG.	CPVC
7	4	TEE, 2"	CPVC
8	1	SCREEN, VENT 3' X 3'	NYLON
9	4	REDUCER, COUPLING, 3" X 2"	CPVC
10	2	TEE, 3"	CPVC

NOTES:

1. DROP TUBE ASSEMBLY PIPING = 4"
2. ONLY ONE TANK SHOWN, TYPICAL (2) TANKS TO BE SUPPLIED.
3. UNLESS OTHERWISE SPECIFIED IN BOM, ALL PIPING AND PIPING CONNECTIONS PROVIDED BY OTHERS
4. UNLESS OTHERWISE SPECIFIED IN BOM, ALL PIPING & FITTINGS ARE SCH.80 WITH SOC X SOC CONNECTIONS



REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL

__INFORMATION __CERTIFIED

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DRAWN BY	DATE
chinmayv	07/05/16
CHECKED BY	DATE
Luc L	07/06/16
SCALE	SIZE
1"=1'-0"	B

Parkson™

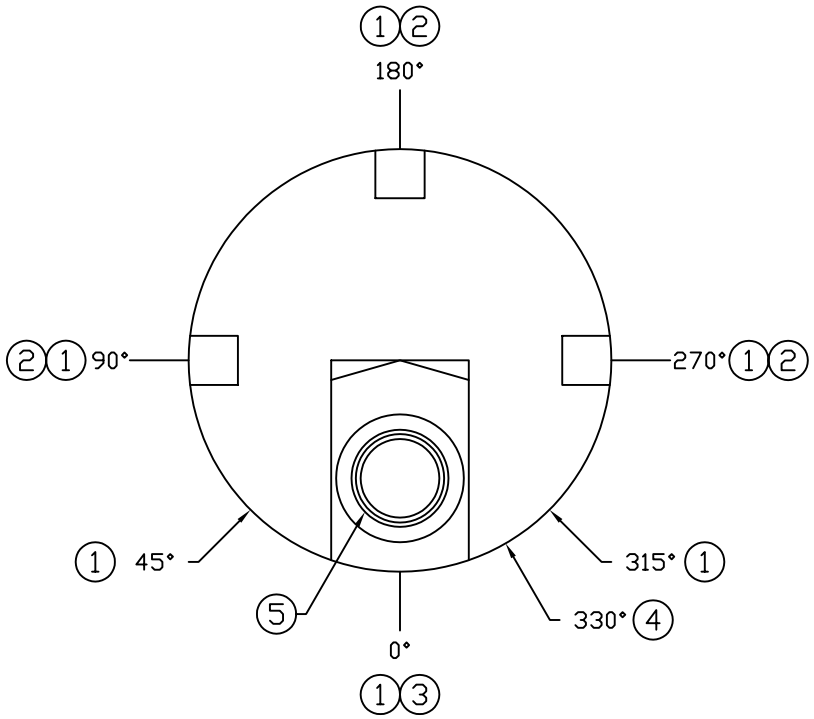
PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

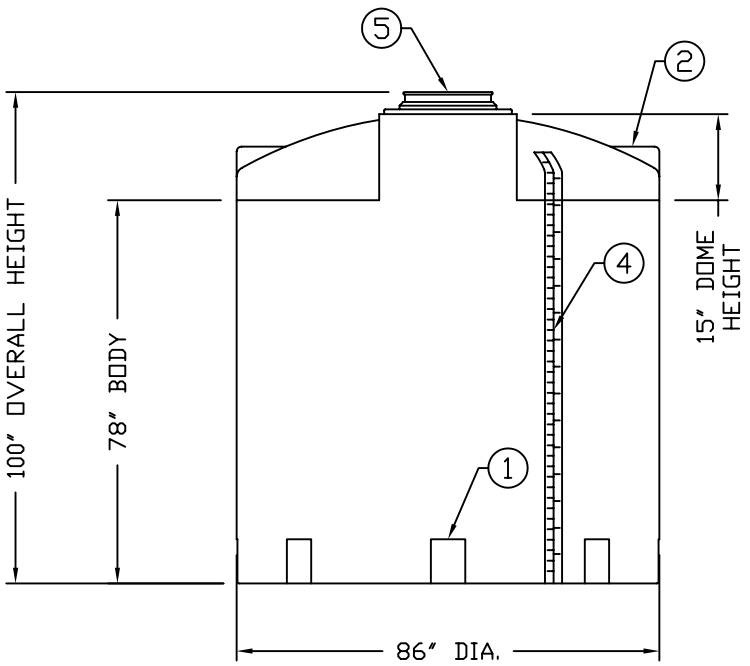
REFERENCE INFORMATION

TITLE
2000 GALLON SOLUTION TANKS
HYDROGEN VENT & DROP TUBE ASSEMBLY

DRAWING NO. P0260058510-02
SHEET 2 OF 2

REV —





ACCESSORIES					
MK	SIZE	DESCRIPTION	DEG	ELEV	DOME

NOTES:
1 7" x 9" LOWER FLATS (6 PLACES)
2 10" x 10" DOME FLATS (3 PLACES)
3 28" x 43" DOME FLAT
4 MOLDED IN GALLON MARKER (50 GAL. INCREMENTS)
5 16" MANWAY W/ LEVER LOCK COVER

21"

REV	REVISION DESCRIPTION	REV DATE
A	1 REVISED MOLDED IN GALLON MARKER 2 UPDATE TITLE BLOCK	12/1/05dam

Assmann CORPORATION OF AMERICA
300 N TAYLOR ROAD
GARRETT, IN 46738
PHONE: (260) 357-3181
FAX: (260) 357-3738

RESIN USED:
–
–
POLYETHYLENE

TANK DESIGNED SPECIFIC GRAVITY – SP.G. MAX

TANK WEIGHT LBS.

TANK COLOR –

TITLE ICT 2000 GALLON VERTICAL STORAGE TANK

DRAWN BY:	DRAWN DATE:	SALES ORDER#
D. CRAGER	11/15/95	

ASSMANN CORPORATION

ALL DIMENSIONS ARE IN INCHES AND ARE ±3%

DWG NUMBER: ICT 2000 REV A

CORPORATION OF AMERICA
300 NORTH TAYLOR ROAD GARRETT, IN 46738 TEL-888-357-3181 FAX (260) 357-3738

Vertical Tank Gallonage Chart

Tank Dia.	86
Body Height	78
Wall Thickness	0.41
Specific Gravity	1.9

ICT 2000

ACA Model # ICT2000X19

Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons
1	24.67	30	740.05	59	1455.43						
2	49.34	31	764.72	60	1480.10						
3	74.01	32	789.39	61	1504.77						
4	98.67	33	814.06	62	1529.44						
5	123.34	34	838.72	63	1554.11						
6	148.01	35	863.39	64	1578.78						
7	172.68	36	888.06	65	1603.44						
8	197.35	37	912.73	66	1628.11						
9	222.02	38	937.40	67	1652.78						
10	246.68	39	962.07	68	1677.45						
11	271.35	40	986.73	69	1702.12						
12	296.02	41	1011.40	70	1726.79						
13	320.69	42	1036.07	71	1751.45						
14	345.36	43	1060.74	72	1776.12						
15	370.03	44	1085.41	73	1800.79						
16	394.69	45	1110.08	74	1825.46						
17	419.36	46	1134.74	75	1850.13						
18	444.03	47	1159.41	76	1874.80						
19	468.70	48	1184.08	77	1899.46						
20	493.37	49	1208.75	78	1924.13						
21	518.04	50	1233.42								
22	542.70	51	1258.09								
23	567.37	52	1282.75								
24	592.04	53	1307.42								
25	616.71	54	1332.09								
26	641.38	55	1356.76								
27	666.05	56	1381.43								
28	690.71	57	1406.10								
29	715.38	58	1430.77								

Polyethylene Welded Connections for Linear Tanks

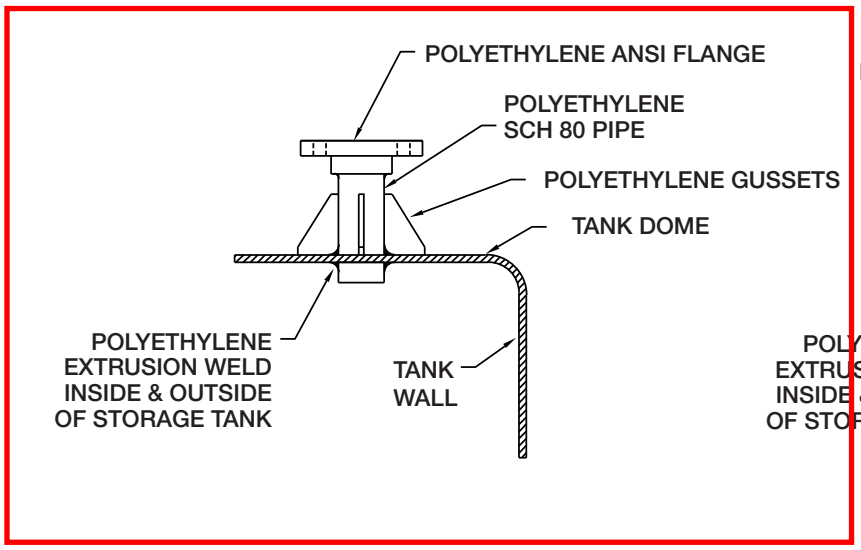
FDA compliant welded polyethylene fittings are suitable for use in food, cosmetic, and pharmaceutical industries. Certified welders provide a variety of custom welded accessories. Polyethylene welded fittings and some welded accessories may only be welded to 1.9 specific gravity or higher tanks.

Polyethylene Full Female Couplers Available Sizes (inches)					
Size	¾	1	1½	2	3

Polyethylene Flange Connections Available Sizes (inches)								
Size	1	2	3	4	6	8	10	12

Polyethylene Pipe Support Brackets Available Sizes (inches)			
Size	1-3	4-6	8-12

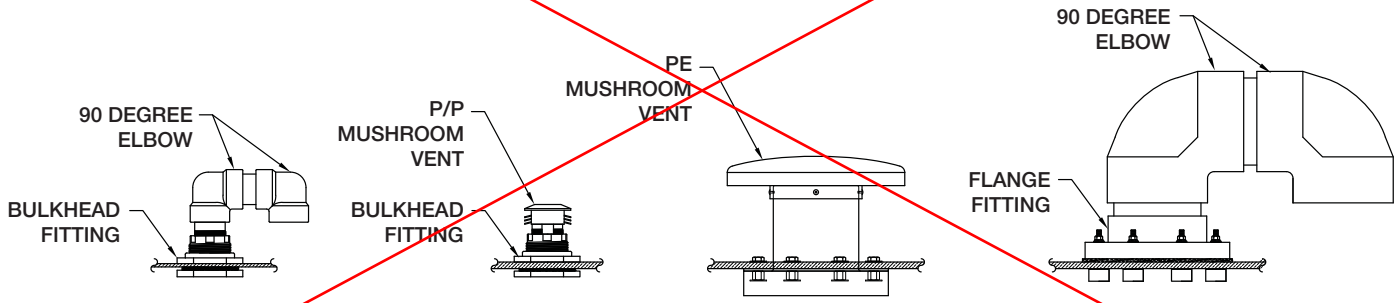
Polyethylene Sch 80 Pipe Per Foot Available Sizes (inches)								
Size	1	2	3	4	6	8	10	12



Vent Assemblies

Vent assemblies are available in sizes from 2-inch to 6-inch. Vent gasket and bolts (where applicable) must be ordered separately. Stainless steel screens are optional and must be ordered separately.

Vent Assembly Sizes (inches)				
Sizes	2	3	4	6



Assmann Corporation of America

Phone: 888-357-3181 • Fax: 888-Tank Fax (826-5329)
Phone: 260-357-3181 • Fax: 260-357-3738
E-mail: info@assmann-usa.com • www.assmann-usa.com

CAUTION

- NO SMOKING, OPEN FLAMES, OR ANY OTHER IGNITION SOURCES IN THE VICINITY OF THIS TANK OR VENT
- PERMIT REQUIRED CONFINED SPACE, USE CONFINED SPACE PROCEDURES PER OSHA STANDARD 1910.146
- DO NOT ADD OTHER CHEMICALS TO THE TANK OR VENT
- REFER TO MIOX OPERATOR'S MANUAL FOR OTHER SAFETY RELATED PRECAUTIONS

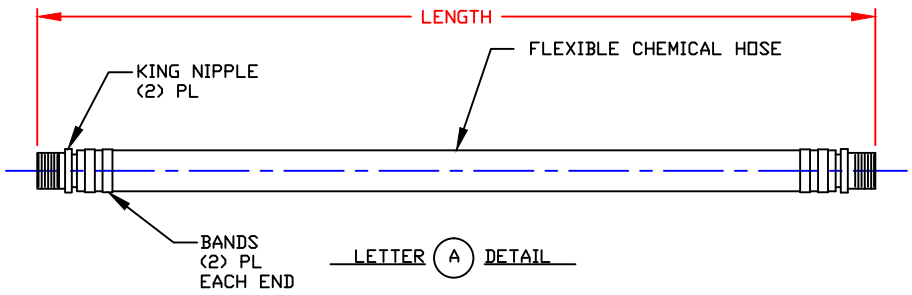
This Tank or Vent May Contain	**Statement of Hazards**
• Hydrogen Gas with a Hazard Rating Identification of (0-4-0-Null)	• Flammable Gas present • Fire & Explosion Hazard present • Simple Asphyxiate Gas present
• Dilute (<1% by volume) Sodium Hypochlorite Solution with a Hazard Rating Identification of (2-0-1-Null)	• Moderate Health Hazard present • Incompatible and/or hazardous reactions can occur with addition of other chemicals, such as strong acids, strong reducing agents, amines, ammonium salts, metals, methanol, phenylacetonitrile, formic acid, and ammonia

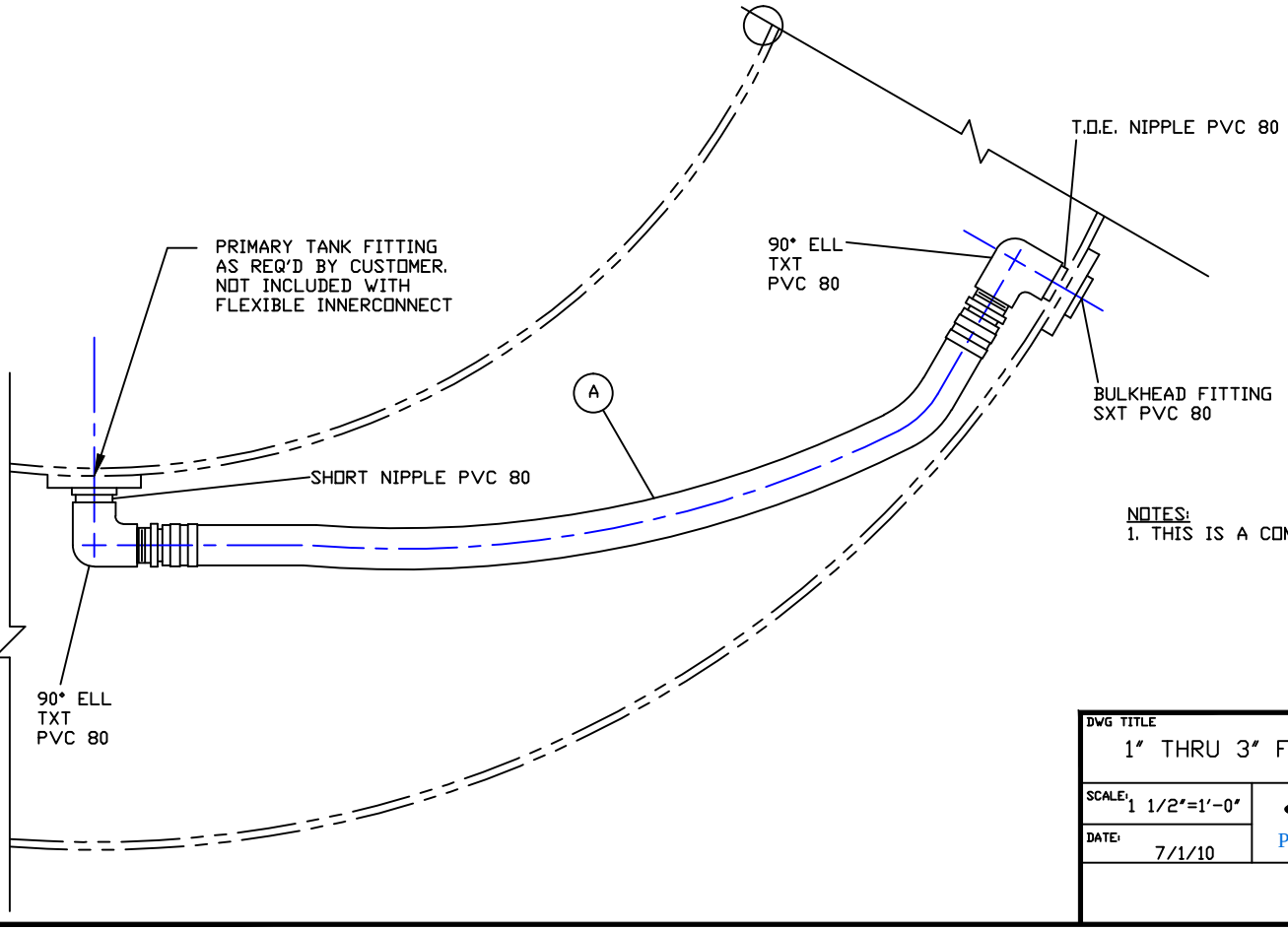
NON-CONTROLLED COPY

INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE

VERIFY REV LEVEL OF PAPER COPY WITH REV LEVEL ON PPC WEB SITE

Fitting Size:
2"
Hose Length:
24"





NOTES:

1. THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE BY HAND.

DWG TITLE			
1" THRU 3" FLEXIBLE INNERCONNECT ASSEMBLY/PVC			
SCALE: 1 1/2"=1'-0"	POLYPROCESSING COMPANY LLC Central Region P.O. Box 4150 (71201) 2501 Old Sterlington Rd. Monroe, LA 71203 (318) 343-7369 FAX (318) 343-8795		DR: S. NEWBURY
DATE: 7/1/10			CK: J. BRANTLEY
	SHEET 1 OF 1	COMPUTER FILE FLXINTPVCM	REV -

B1-5

PVC & CPVC TRUE UNION 2000 VALVES

TU2000-2-0605

One of the Most Versatile, Compact Valve Designs Available

Spears® True Union 2000 Ball Valves, 3-Way Ball Valves and Ball Check Valves provide maximum versatility with fully interchangeable valve cartridges. Provides for easier system design modifications and upgrades in multiphase projects, or anywhere changes in valve types are desired. Simply exchange any True Union 2000 valve in-line using existing union nuts. Also mates with Spears® new Schedule 80 Unions and Diaphragm Valves. All True Union 2000 valves feature a low profile, compact design for minimal space requirements. Available in PVC or CPVC with choice of EPDM or Dupont Dow Genuine Viton® O-ring seals and socket, flanged, or optional Spears® patented Special Reinforced (SR) threaded end connectors. Additionally, Spears® offers valve Retrofit Kits for easy in-line replacement of other valves and factory installed Actuation Packages. Assembled with silicone-free lubricant.

True Union 2000 Industrial Ball Valve

- Multi-featured Industrial Grade
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or SR Threaded End Connectors

True Union 2000 Industrial 3-Way Valve

- Industrial Grade, Multiport, Diverter, L-Pattern & T-Pattern configurations Vertical 3-Way or Horizontal Diverter (shown)
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors

MADE IN THE U.S.A. WITH PRIDE

PROGRESSIVE PRODUCTS FROM SPEARS®
INNOVATION & TECHNOLOGY

Visit our web site:
www.spearsmfg.com

LPCB — Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

True Union 2000 Industrial Ball Check Valve

- Industrial Grade
- Flow-Tested for Minimum Turbulence
- Fully Serviceable, Replaceable Components, uses Standard O-ring Seat
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Easily Converted to Foot Valve
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or optional SR Threaded End Connectors
- Also available in PVC White

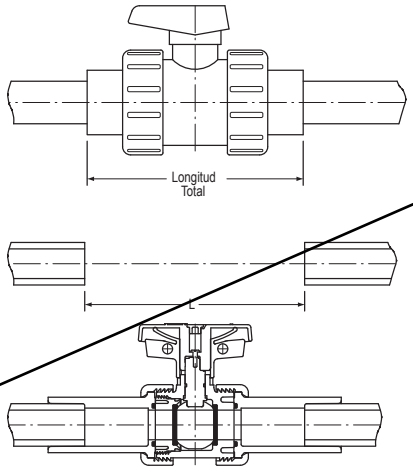
Check Valve Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
C_V	**6.3**	**17**	**25**	**65**	**86**	**130**	**200**	**275**	**500**	**800**

Economical True Union 2000 Standard Ball Valve

- High quality Standard Ball Valve
- Allows future system upgrade
- Excellent for OEM Applications
- Replaceable Seats
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Spears® Safe-T-Shear® Stem
- Self Adjusting Floating Seat
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors
- Also available in PVC White

True Union 2000 Retrofit Valves or Kits

Easily converts any system over to all True Union 2000 style valves for consistent valve type and uniform maintenance. Special extended socket style End Connectors (2) allow retrofit replacement of other brand valves in existing piping systems with a new True Union 2000 valve. Simply cut out old valve according to specified dimension and install retrofit end connectors. End connectors are provided with either EPDM or genuine Viton® O-rings. Can be ordered as End Connector Kit or fully assembled Retrofit Valve.



BALL VALVE FOR REPLACEMENT

PIPE LAYING LENGTH AFTER CUTTING

TRUE UNION 2000 BALL VALVE INSTALLED WITH RETROFIT KIT

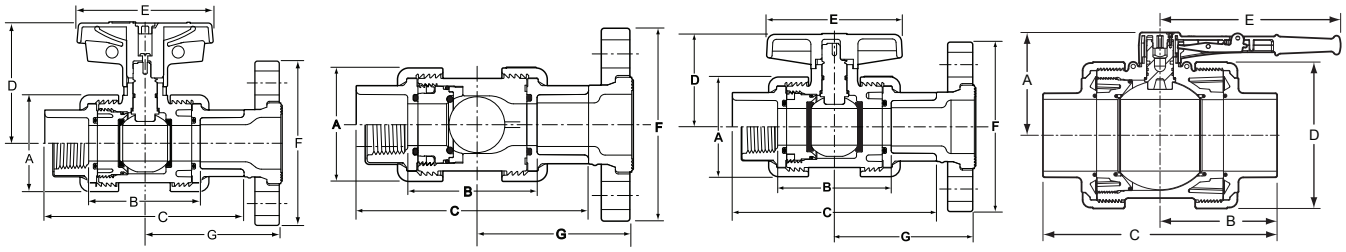
Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
L	4-29/32	5-7/16	6-3/32	7-1/4	7-1/2	8-17/32	10-3/4	11-7/16	14-5/16	N/A

L ± 1-1/16

Contact Spears® for Special Kits/Valves to replace older Spears® Regular True Union Ball Valves

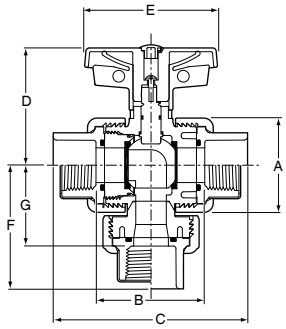
True Union 2000 Valve Dimensional Data

Industrial Ball Valve, Ball Check Valve, Standard Ball Valve & 6” Industrial Lever Handle



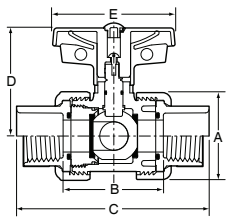
Nominal Size	A	Dimensions Reference (inches, ±1/16)										
		B		C			D		E		F	G
		Soc/Thd	Spigot	Socket	Thread	Spigot	Industrial	Standard	Industrial	Standard		
1/2	1-7/8	2-3/8	2-7/8	4-3/16	3-3/16	4-5/8	2-9/16	1-5/8	2-13/16	2-1/2	3-1/2	2-31/32
3/4	2-1/4	2-3/4	3-1/4	4-3/4	4-1/4	5-1/4	2-7/8	2	3-3/8	3	3-7/8	3-5/16
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	2-5/16	3-7/16	3-7/16	4-1/2	3-5/8
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	2-13/16	3-7/8	3-9/16	4-5/8	3-31/32
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	3-1/16	4-3/16	3-7/8	5	4-3/8
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	3-3/4	5-1/8	5	6	5-1/4
2-1/2	5-3/8	6-7/8	7-13/16	10-7/16	9-11/16	11-3/8	5-1/8	5-7/8	6-1/4	7-5/8	7-1/2	6
3	6-3/16	7	7-13/16	10-11/16	9-7/8	11-9/16	5-7/8	5-7/8	7-5/8	7-5/8	7-1/2	6-13/16
4	7-5/8	7-5/16	8-1/4	11-7/8	10-1/4	12-3/4	6-3/4	6-3/4	9-3/16	6-3/4	9	7-1/2
6	11-5/8	11-1/16	13	17-1/16	15-3/4	18-1/2	8-1/8	---	14-5/16	---	11-1/4	10-3/16

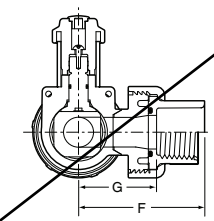
Industrial 3-Way Ball Valve



Nominal Size	A	Vertical 3-Way Ball Valves[3]												Oper.[2] Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-7/8	2-7/16	2-15/16	4-1/4	3-27/32	4-3/4	2-9/16	2-13/16	2-3/4	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch





Nominal Size	A	Horizontal Diverter Ball Valves[3]												Oper.2 Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-3/16	2-7/16	2-15/16	4-3/16	3-13/16	4-3/4	2-9/16	2-13/16	2-9/16	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

PVC & CPVC TRUE UNION 2000 VALVES

TU2000-2-0605

One of the Most Versatile, Compact Valve Designs Available

Spears® True Union 2000 Ball Valves, 3-Way Ball Valves and Ball Check Valves provide maximum versatility with fully interchangeable valve cartridges. Provides for easier system design modifications and upgrades in multiphase projects, or anywhere changes in valve types are desired. Simply exchange any True Union 2000 valve in-line using existing union nuts. Also mates with Spears® new Schedule 80 Unions and Diaphragm Valves. All True Union 2000 valves feature a low profile, compact design for minimal space requirements. Available in PVC or CPVC with choice of EPDM or Dupont Dow Genuine Viton® O-ring seals and socket, flanged, or optional Spears® patented Special Reinforced (SR) threaded end connectors. Additionally, Spears® offers valve Retrofit Kits for easy in-line replacement of other valves and factory installed Actuation Packages. Assembled with silicone-free lubricant.

True Union 2000 Industrial Ball Valve

- Multi-featured Industrial Grade
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or SR Threaded End Connectors

True Union 2000 Industrial 3-Way Valve

- Industrial Grade, Multiport, Diverter, L-Pattern & T-Pattern configurations Vertical 3-Way or Horizontal Diverter (shown)
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors

MADE IN THE U.S.A. WITH PRIDE

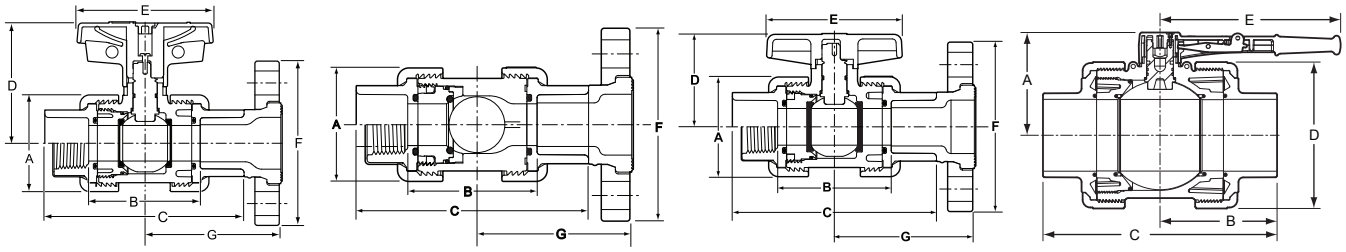
PROGRESSIVE PRODUCTS FROM SPEARS®
INNOVATION & TECHNOLOGY

Visit our web site:
www.spearsmfg.com

LPCB — Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

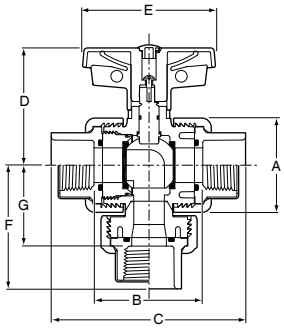
True Union 2000 Valve Dimensional Data

Industrial Ball Valve, Ball Check Valve, Standard Ball Valve & 6" Industrial Lever Handle



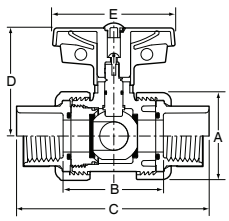
Nominal Size	A	Dimensions Reference (inches, ±1/16)										
		B		C			D		E		F	G
		Soc/Thd	Spigot	Socket	Thread	Spigot	Industrial	Standard	Industrial	Standard		
1/2	1-7/8	2-3/8	2-7/8	4-3/16	3-3/16	4-5/8	2-9/16	1-5/8	2-13/16	2-1/2	3-1/2	2-31/32
3/4	2-1/4	2-3/4	3-1/4	4-3/4	4-1/4	5-1/4	2-7/8	2	3-3/8	3	3-7/8	3-5/16
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	2-5/16	3-7/16	3-7/16	4-1/2	3-5/8
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	2-13/16	3-7/8	3-9/16	4-5/8	3-31/32
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	3-1/16	4-3/16	3-7/8	5	4-3/8
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	3-3/4	5-1/8	5	6	5-1/4
2-1/2	5-3/8	6-7/8	7-13/16	10-7/16	9-11/16	11-3/8	5-1/8	5-7/8	6-1/4	7-5/8	7-1/2	6
3	6-3/16	7	7-13/16	10-11/16	9-7/8	11-9/16	5-7/8	5-7/8	7-5/8	7-5/8	7-1/2	6-13/16
4	7-5/8	7-5/16	8-1/4	11-7/8	10-1/4	12-3/4	6-3/4	6-3/4	9-3/16	6-3/4	9	7-1/2
6	11-5/8	11-1/16	13	17-1/16	15-3/4	18-1/2	8-1/8	---	14-5/16	---	11-1/4	10-3/16

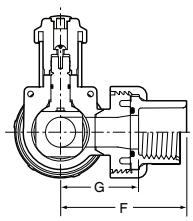
Industrial 3-Way Ball Valve



Nominal Size	A	Vertical 3-Way Ball Valves[3]												Oper.[2] Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-7/8	2-7/16	2-15/16	4-1/4	3-27/32	4-3/4	2-9/16	2-13/16	2-3/4	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

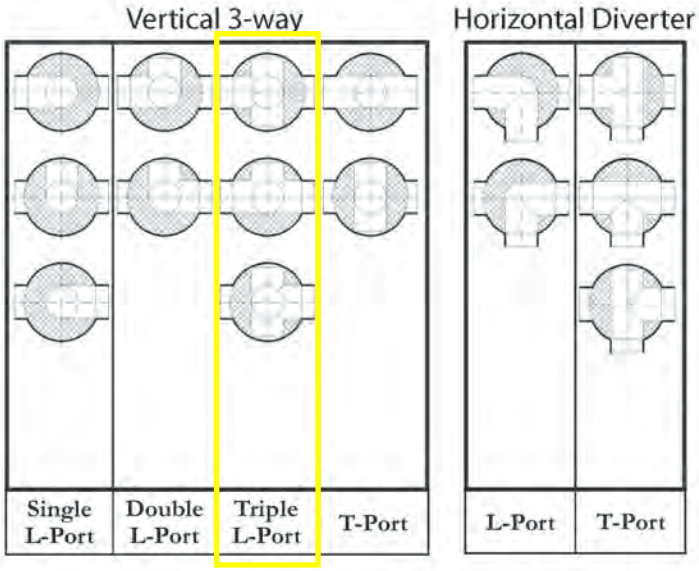




Nominal Size	A	Horizontal Diverter Ball Valves[3]												Oper.2 Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-3/16	2-7/16	2-15/16	4-3/16	3-13/16	4-3/4	2-9/16	2-13/16	2-9/16	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

3-Way Port Options



True Union 2000 Actuated Valves

Universal ISO Actuator Mounting Pattern Option

Spears® offers optional actuator mounting with standard ISO Mounting Pattern for user actuation of True Union 2000 Ball Valves.

Factory Actuated Valve Packages

Spears® Electric or Pneumatic Actuation Packages eliminate customer's having to determine proper valve and actuator mating. Pre-matched packages insure proper torque, coupling and mount for optimum performance - all factory installed and tested for proper alignment and operation. Actuation packages can be custom built to user specifications from Spears® wide selection of options, voltages and accessories. Contact Spears® for additional information.

Foot Valve Screens

- Easily converts Ball Check Valve to a Foot Valve.
- Standard IPS spigot connection fits slip-socket valve end connector.
- Enlarged screen provides open area equivalent to valve for optimum flow characteristics.
- Chemical and corrosion resistant PVC or CPVC construction.

Typical Application (VALVE NOT INCLUDED)

Split Nut Kit for True Union 2000 Valves & Union 2000 Schedule 80 Fittings

Split Nut Kits are designed to replace broken union nuts on Spears® True Union 2000 Ball Valves and Union 2000 Schedule 80 Unions. Kit includes SS316 Gear Clamp and 2-Split Nut halves. Can also be used if nut was not in place during end connector installation. Split Nut is fully serviceable to original valve pressure rating.

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic products to transport or store compressed air or gas.

Viton® is a registered trademark of DuPont Dow Elastomers

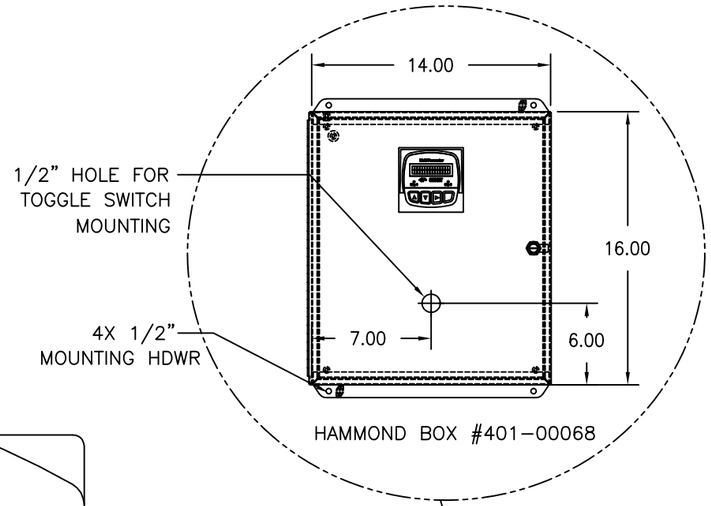
SPEARS® MANUFACTURING COMPANY • CORPORATE OFFICE
15853 Olden St., Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
(818) 364-1611 • www.spearsmfg.com

Solution Tank Level Measurement

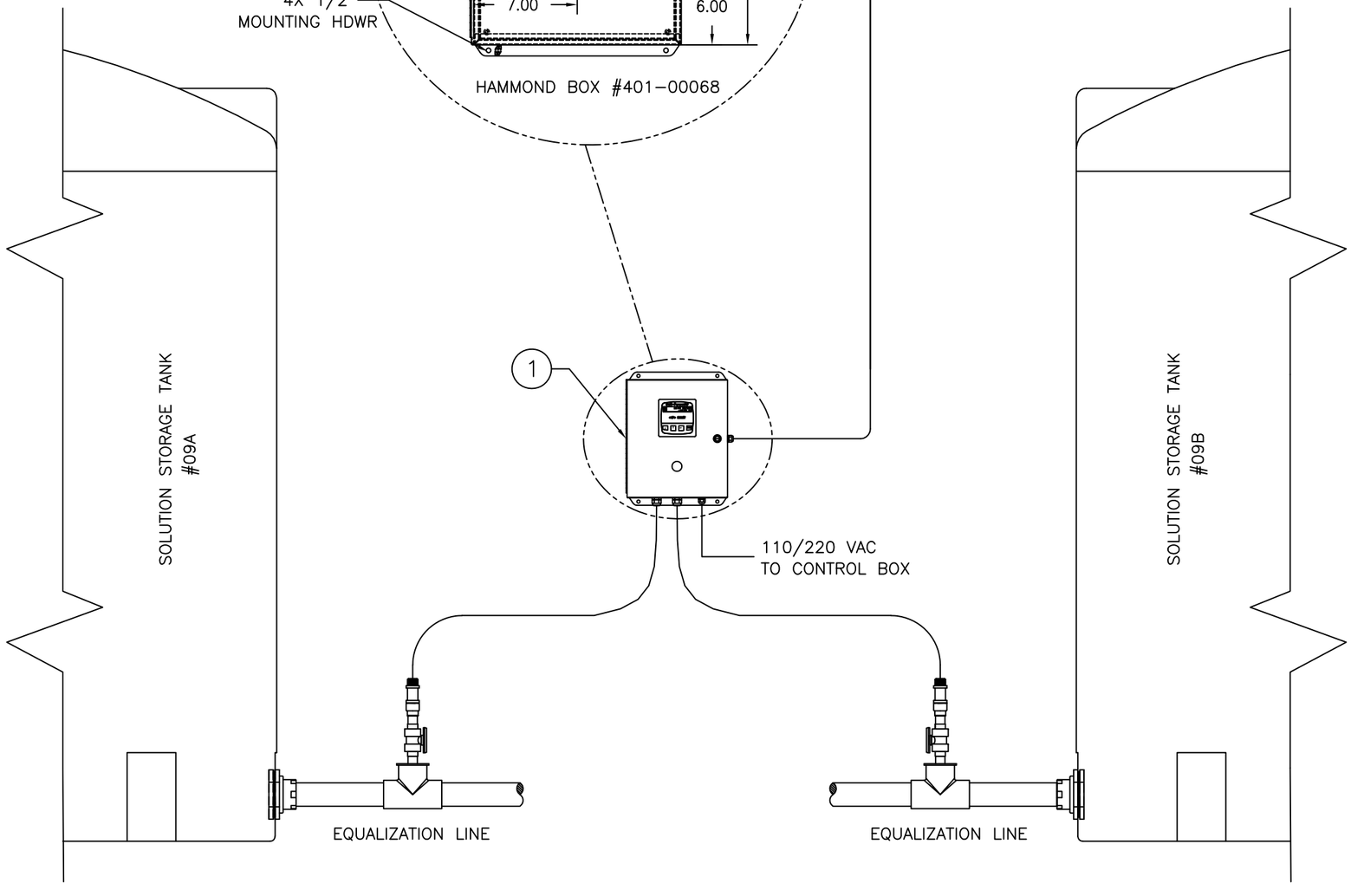
NOTES:

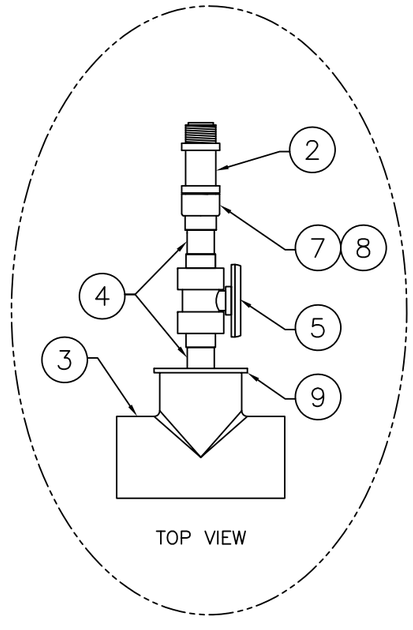
1. PRESSURE SENSOR CONTROL BOX MAY BE AT ANY INDOOR LOCATION UP TO 75 FEET FROM SOLUTION STORAGE TANKS.
2. ALL EXTERNAL WIRING FROM CONTROL BOX TO INCLUDE THE PRESSURE SENSORS, PROVIDED BY OTHERS. CONDUIT OR CORDAGE MAY BE USED.
3. CONTROL BOX REQUIRES 110/220 VAC.
4. UNLESS OTHERWISE SPECIFIED IN BOM, ALL FITTINGS ARE SCH.80, PVC

ITEM	QTY	DESCRIPTION
1	1	LEVEL CONTROLLER KIT
2	2	PRESSURE SENSOR
3	2	2", TEE
4	2	1/2" NIPPLE
5	2	1/2" TU BALL VALVE
7	2	1/2" UNION NUT
8	2	1/2" CONNECTOR
9	2	2" X 1/2" SPIG X FIPT, REDUCER BUSHING



HAMMOND BOX #401-00068





TOP VIEW

REV	DESCRIPTION	DATE	BY

__PRELIMINARY X APPROVAL

__INFORMATION __CERTIFIED

THIS DRAWING IS LIMITED TO FUNCTIONAL DESIGN, GENERAL ARRANGEMENT AND CLEARANCE. NO RESPONSIBILITY IS ACCEPTED BY PARKSON CORPORATION FOR OTHER DIMENSIONS, QUANTITIES, OR COORDINATION WITH OTHER EQUIPMENT OR DRAWINGS EXCEPT AS STATED IN PURCHASE ORDER.

DRAWN BY	DATE
chinmayv	07/08/16
CHECKED BY	DATE
chinmayv	07/08/16
SCALE	SIZE
NTS	B

Parkson™

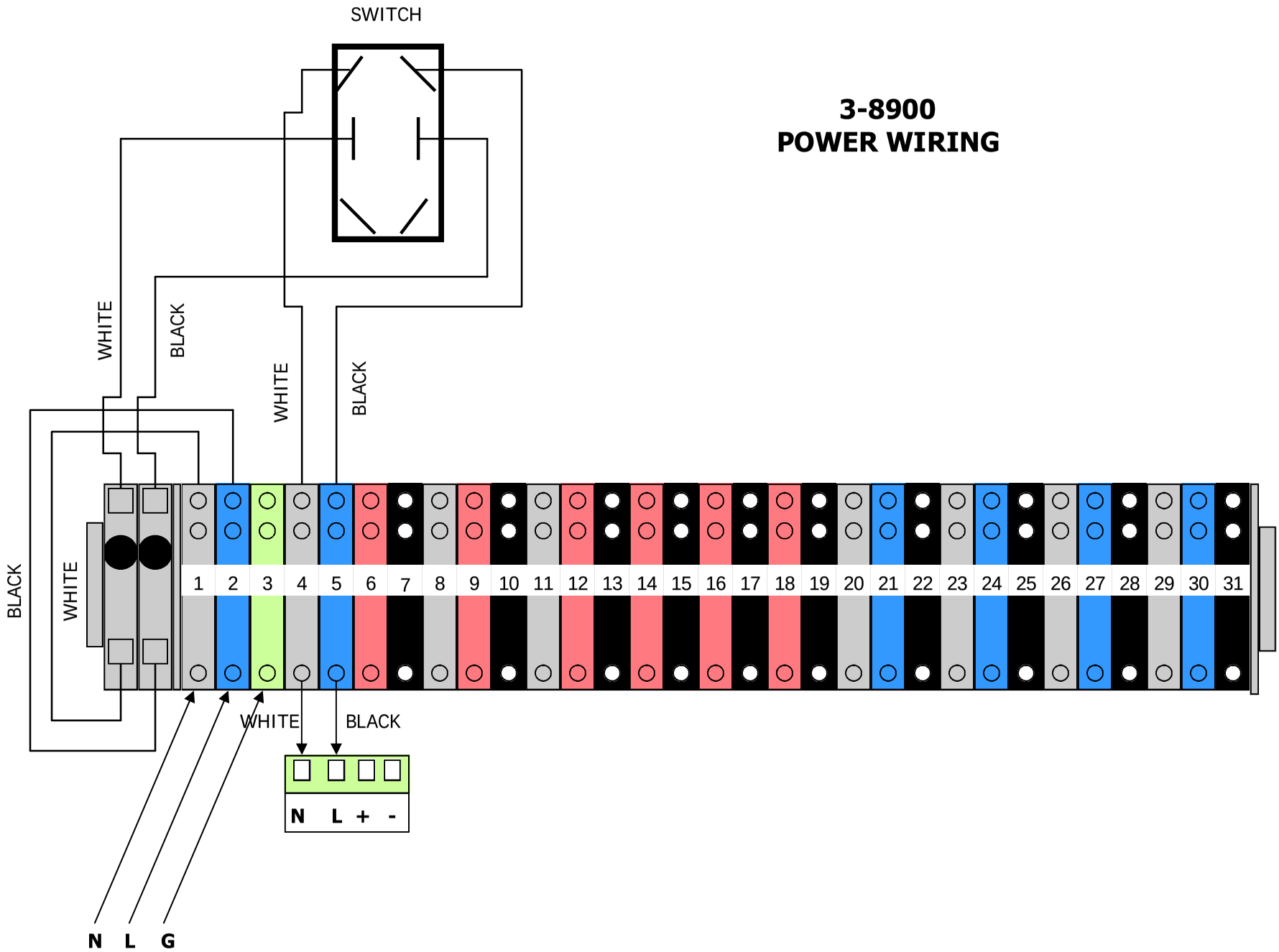
PROJECT NAME
P02600585
WICHITA REUSE WSC, KS

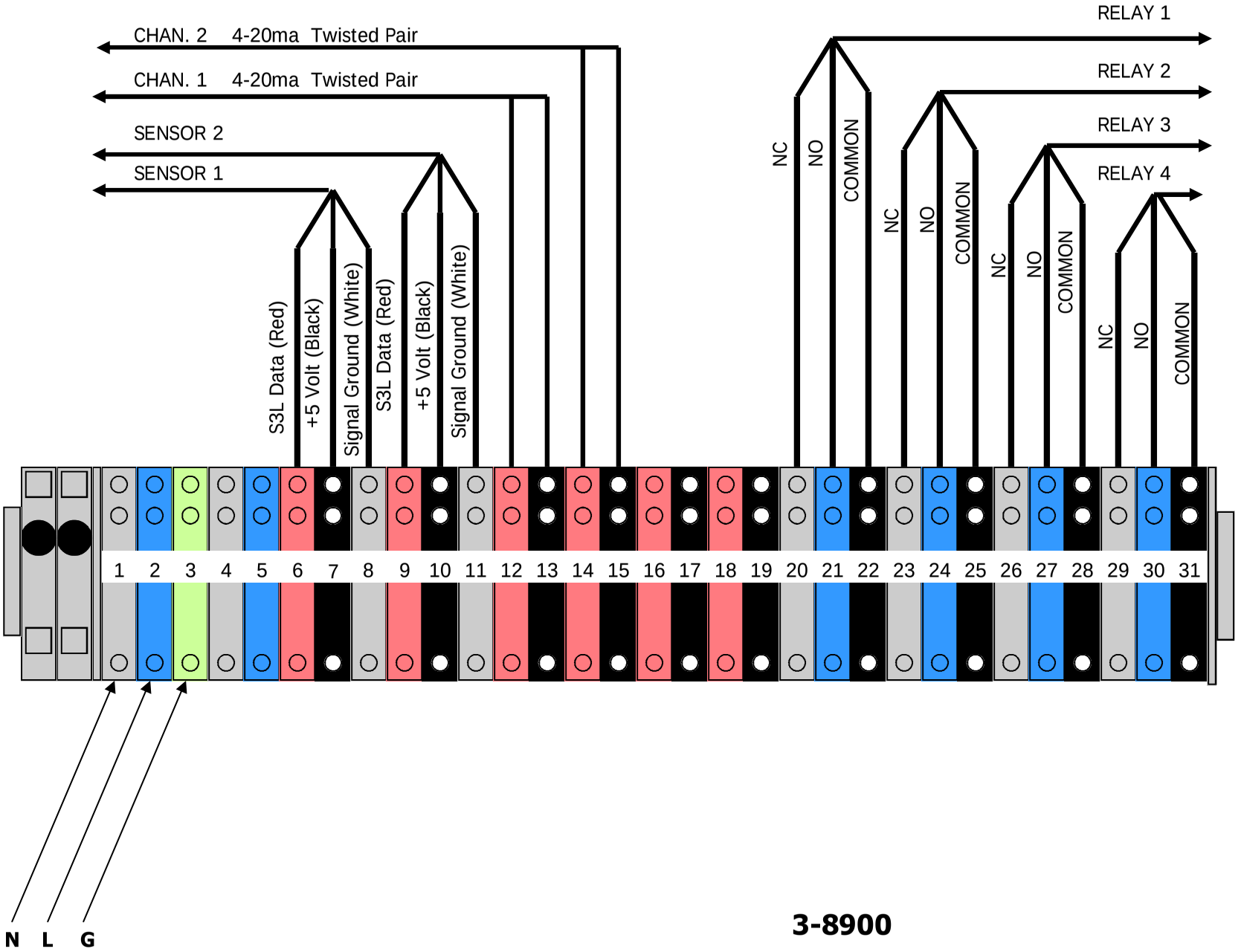
TITLE
GF SIGNET PRESSURE SENSOR
DUAL TANK
GENERAL ARRANGEMENT DRAWING

REFERENCE INFORMATION

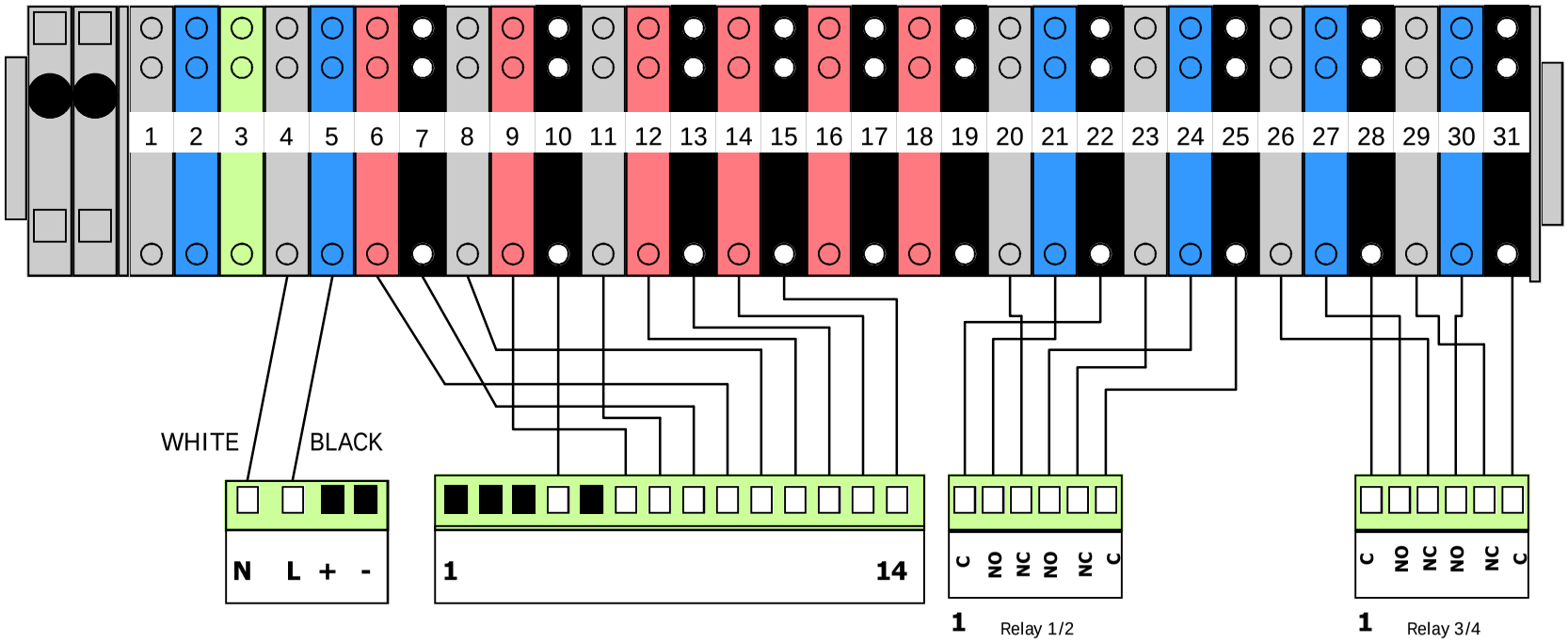
DRAWING NO
P0260058512
SHEET 1 OF 1

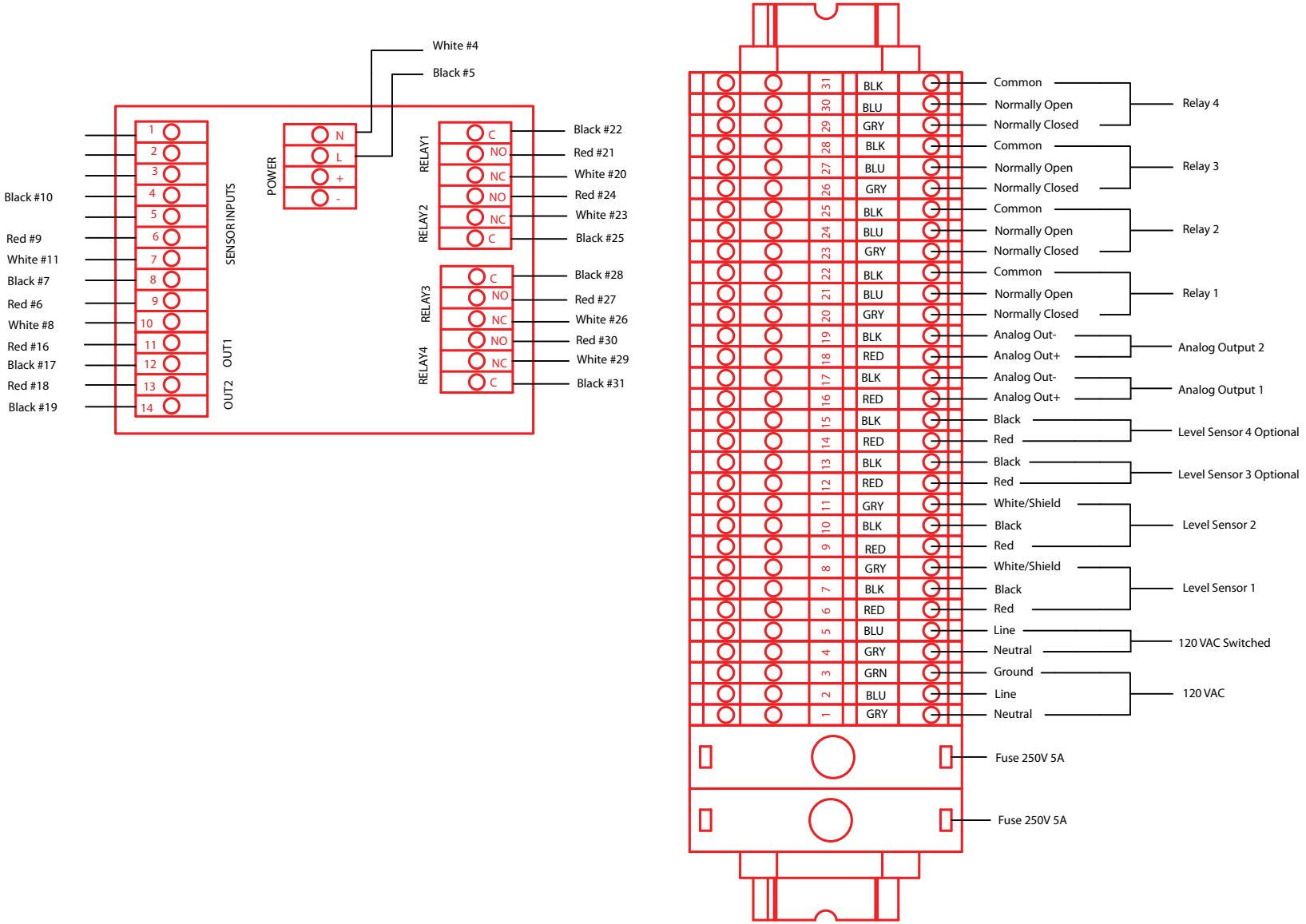
REV
0


SWITCH
3-8900
POWER WIRING
WHITE
BLACK
WHITE
BLACK
BLACK
WHITE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
WHITE
BLACK
N L + -
N L G


CHAN. 2 4-20ma Twisted Pair
CHAN. 1 4-20ma Twisted Pair
SENSOR 2
SENSOR 1
S3L Data (Red)
+5 Volt (Black)
Signal Ground (White)
S3L Data (Red)
+5 Volt (Black)
Signal Ground (White)
RELAY 1
RELAY 2
RELAY 3
RELAY 4
NC
NO
COMMON
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
N L G
3-8900

3-8900
CONNECTOR WIRING





GF Signet 8900 Level Controller Wiring

GF Piping Systems Datasheet

valid from 7/21/09

Temperature/Pressure Sensors

Type 2450 Pressure Sensor
1/2 inch male union

Temperature/Pressure:

- Wetted Materials: PVDF, ceramic, FPM
- Additional features: Level and depth measurement capability
- In-line Mounting styles: 3/4 inch NPT or 1/2 inch male union
- Submersible mounting: 3/4 inch NPT
- Operating Temperature:** 15° to 85°C (5° to 185°F)
- Operating Pressures:**
  -XU Ultra Low: 0 to 0.7 bar (0 to 10 psi)
  -XL Low: 0 to 3.4 bar (0 to 50 psi)
  -XH High: 0 to 17 bar (0 to 250 psi)
- Level Ranges:*
  -XU Ultra Low: 0 to 7.03 m (0 to 23.06 ft)
  -XL Low: 0 to 35.15 m (0 to 115.32 ft)
  -XL High: 0 to 176 m (0 to 576 ft)
- Compatibility: 8250, 8450 and 8900
- *Level ranges calculated using specific gravity of water. Maximum ranges may vary for other liquids
- **check operating temperature/pressure graphs in catalog for derating information

MFR #	Output	Maximum Operation	Cable Length	Part No.	
3-2450-3U	Digital (S³L)	0.7 bar (10 psi)	4.6m (15 ft.)	**159 000 683**	
3-2450-3L	Digital (S³L)	3.4 bar (50 psi)	4.6m (15 ft.)	**159 000 682**	
3-2450-3H	Digital (S³L)	17 bar (250 psi)	4.6m (15 ft.)	**159 000 681**	
3-2450-4U	Digital (S³L)	0.7 bar (10 psi)	15.2 cm (6 in.)	**159 000 686**	
3-2450-4L	Digital (S³L)	3.4 bar (50 psi)	15.2 cm (6 in.)	**159 000 685**	
3-2450-4H	Digital (S³L)	17 bar (250 psi)	15.2 cm (6 in.)	**159 000 684**	
3-2450-7U	4-20 mA	0.7 bar (10 psi)	4.6m (15 ft.)	**159 000 906**	
3-2450-7L	4-20 mA	3.4 bar (50 psi)	4.6m (15 ft.)	**159 000 908**	
3-2450-7H	4-20 mA	17 bar (250 psi)	4.6m (15 ft.)	**159 000 910**	

Georg Fischer Rohrleitungssysteme AG, Postfach, CH-8201 Schaffhausen/Switzerland

GF Piping Systems Datasheet

valid from:
3/24/08

Rotameters

Rotameter Parts
PVDF Threaded End Connectors

d [mm]	Size [inch]	PVDF (FNPT) Part No.
20	½	**198 203 611**
32	1	**198 203 612**
50	1 ½	**198 203 614**
63	2	**198 203 615**

The technical data are not binding and not expressly warranted characteristics of the goods. They are subject to change. Our General Conditions of Sale apply.

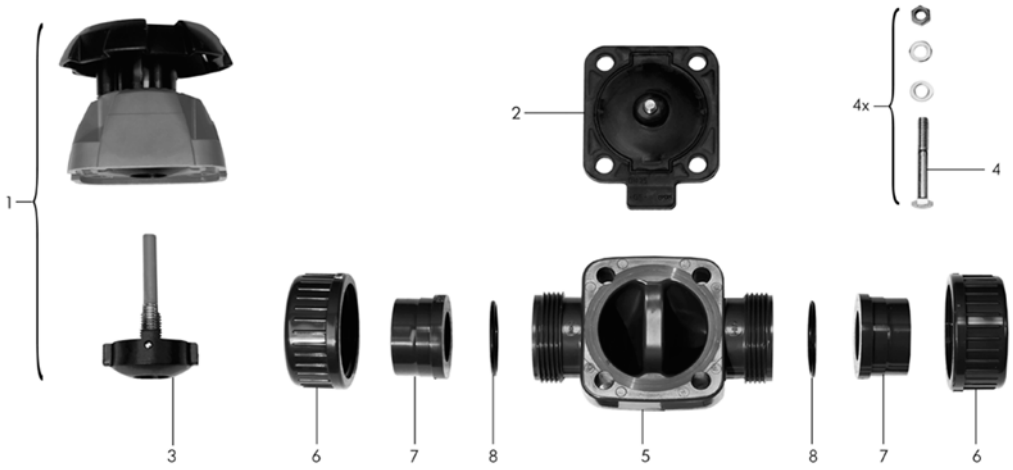
Georg Fischer Rohrleitungssysteme AG, Postfach, CH-8201 Schaffhausen/Switzerland

GF Piping Systems Datasheet

valid from
11/25/08

Spare parts diaphragm valves

Spare parts diaphragm valve type 314



Union nut

d [mm]	Size	DN [inch]	PVC Part No.	PP Part No.	PVDF Part No.	
20	½	0.59	**721 690 006**	**727 690 406**	**735 690 406**	
25	¾	0.79	**721 690 007**	**727 690 407**	**735 690 407**	
32	1	0.98	**721 690 008**	**727 690 408**	**735 690 408**	
40	1 ¼	1.26	**721 690 009**	**727 690 409**	**735 690 409**	
50	1 ½	1.57	**721 690 010**	**727 690 410**	**735 690 410**	
63	2	1.97	**721 690 011**	**727 690 411**	**735 690 411**	

Georg Fischer Rohrleitungssysteme AG, Postfach, CH-8201 Schaffhausen/Switzerland

8900 Multi-Parameter Controller

Member of the ProcessPro® Family of Instruments

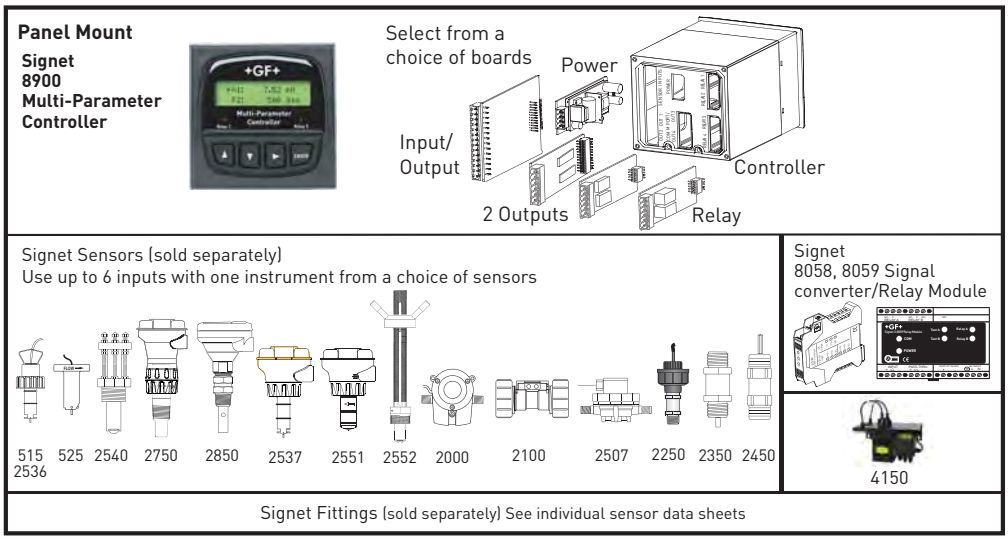
Customize the unit to suit any process requirement.

Description

The Signet 8900 Multi-Parameter Controller takes the concept of modularity to the extreme. Each 8900 is field commissioned with the users specified combination of inputs, outputs, and relays using simple-to-install modular boards into the base unit. Configure the system selecting either two, four, or six input channels which accepts any of the Signet sensors listed below, and/or other manufacturer's sensors via a 4 to 20 mA signal converter (Signet Model 8058).
To complete your unit, choose a power module with universal AC line voltage or 12 to 24 VDC ±10%, regulated.
If more features are needed, analog output and relay modules are available and easily installed. Plus, the 8900 will support up to four additional relays via an external relay module.

There are other notable features that the 8900 offers. For instance, digital input to the 8900 enables longer cable runs and simplified wiring with minimal noise interference. Advanced relay logic allows users to select up to 3 measurement sources to trigger 1 relay. Derived measurements include difference, sum, ratio, percent recovery, percent rejection, percent passage and BTU. The menu system can be programmed to display in multi-languages including English, German, French, Spanish, Italian, and Portuguese.

System Overview



Features

- **Measures Flow, pH, ORP, Conductivity, Pressure, Level and Temperature**
- **Multi-language display**
- **¼ DIN enclosure**
- **Up to 4 analog outputs**
- **Up to 8 relays**
- **12 to 24 VDC or 100 to 240 VAC ±10%, regulated power**
- **Digital communication allows for extended cable lengths and easy wiring**
- **Accepts 3rd party 4 to 20 mA output devices when used with 8058 signal converter**
- **Available with 1 to 6 channels**
- **Two BTU calculations**

Applications

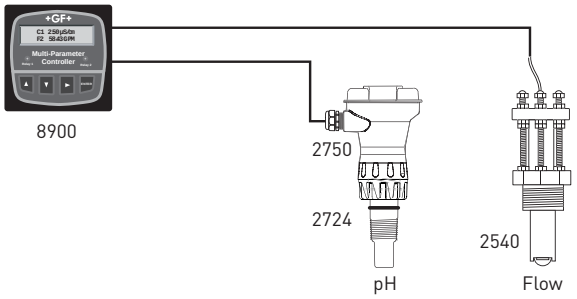
- **RO/DI System Control**
- **Media Filtration**
- **Pure Water Production**
- **Demineralizers**
- **Chemical Processing**
- **Metal & Plastics Finishing**
- **Fume Scrubbers**
- **Proportional Chemical Addition**
- **Cooling Tower & Boiler Protection**
- **Wastewater Treatment**
- **Aquatic Animal Life Support Systems**
- **Rinse Tank**

CE c UL us LISTED MEASURING EQUIPMENT 77CJ LEAD FREE Pb RoHS COMPLIANT

System Overview (continued)

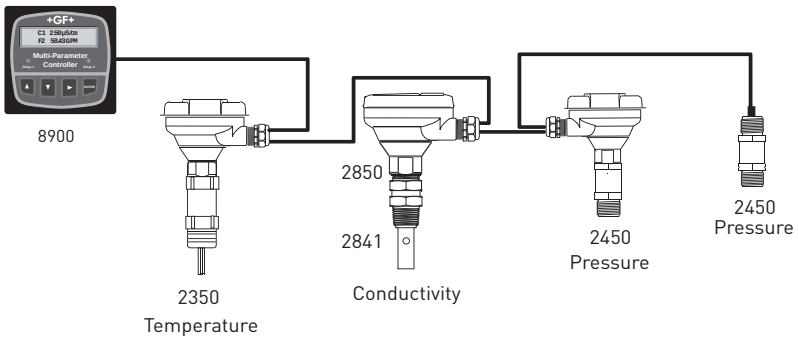
There are hundreds of system types that can be set up with the 8900. The examples below illustrate various sensors in different installation schemes. Wiring topology for point-to-point, daisy-chain, multi-drop, or a combination of these are listed in each example. Digital sensor outputs allow for long cable runs with high noise immunity. See Wiring section for allowable cable lengths.

Example 1
- 8900 input module: Two inputs
- Sensors connected: Signet 2750 with 2724 pH sensors and 2540 flow (frequency)
- Wiring configuration: Point-to-point

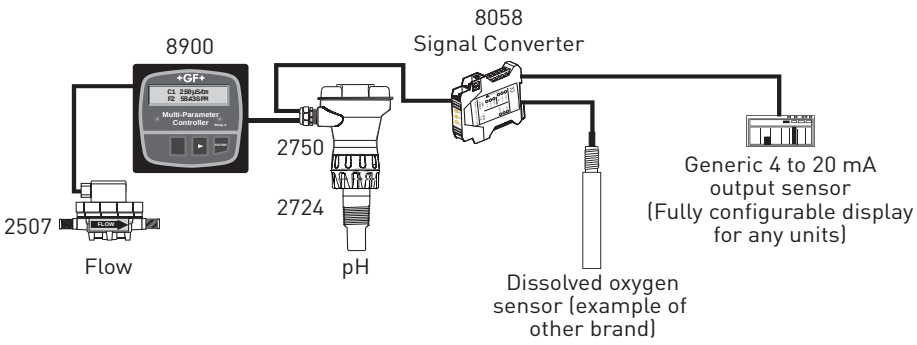


Notes
1. External relays can be used with any input module and does not consume a sensor input channel (Model 8059)
2. Model 8058 Signal Converter can be used with any input module.

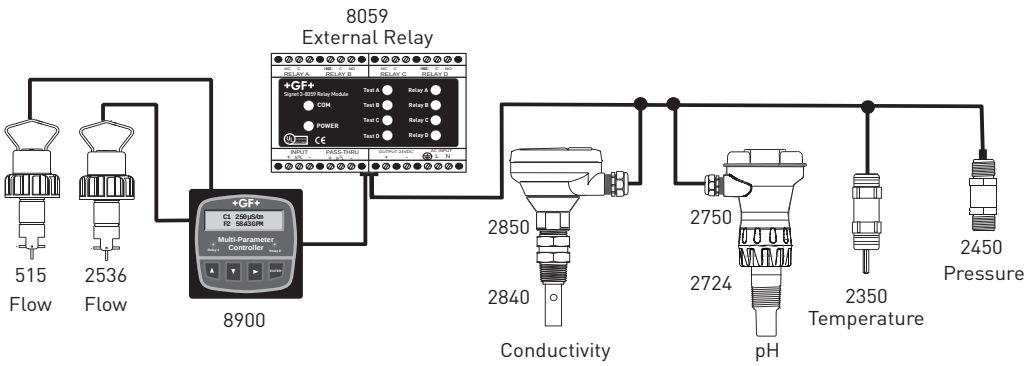
Example 2
- 8900 input module: Four inputs
- Sensors connected: Signet 2350 temperature sensor, 2850 with 2841 conductivity, and two 2450 pressure sensors
- Wiring configuration: Daisy-chain



Example 3
- 8900 input module: Four inputs
- Sensors connected: Signet 2507 flow (frequency) and 2750 with 2724 pH sensors; Other manufacturers dissolved oxygen and level sensors with 4 to 20 mA output
- External Devices: Signet 8058 signal converter - 4 to 20 mA to digital (S^3L)
- Wiring configuration: Combination of point-to-point and daisy-chain



Example 4
- 8900 input module: Six inputs
- Sensors connected: Signet 2350 temperature sensor, 2850 with 2840 conductivity, 2450 pressure, 2750 with 2724 pH, and 515 and 2536 flow (frequency) sensors
- External Devices: Signet 8059 external relay module
- Wiring configuration: Combination of Point-to-point and Multi-drop



Wiring Options
- **Point-to-point** wiring is direct wiring of individual devices into the controller. This wiring topology is applicable for all inputs.
- **Daisy-chain** wiring allows sequential connection from one device to the next by using junction boxes. This wiring topology is applicable for digital (S^3L) inputs only.
- **Multi-drop** wiring allows drops from a single bus cable. Junction boxes can be used for the 3-way junctions that are formed with this wiring scheme. This wiring topology is applicable for digital (S^3L) inputs only.

Specifications

General

Configurability: Modular (completely field-commissionable)
No. of Input Channels: 2, 4, or 6
Compatible Sensors: See System Overview
Input Signal Types:

- Digital (S^3L): Serial ASCII, TTL level 9600 bps
- Frequency: 0 to 1500 Hz
  Accuracy: 0.5% of reading

Measurement Types:
Flow, pH, ORP, Conductivity/Resistivity, Pressure, Temperature, Level, or 3rd party devices with a 4 to 20 mA output
Derived Measurements:
Sum, difference, ratio, % recovery, % reject, % passage, power (BTU)
No. of Relays Supported:
Available: 2, 4, 6 or 8 (8 dry-contact or 4 solid state and 4 dry- contact)
No. of Analog Outputs:
Available in pairs: 2 or 4 (active and/or passive 4 to 20 mA; and/or 0 to 5/10 VDC)

Enclosure and Display

- Enclosure Rating:
  NEMA 4X/IP65 (front face only)
- Case Material: PBT
- Panel Gasket: Silicone Sponge
- Window:
  Self-healing polyurethane-coated polycarbonate
- Keypad:
  4-buttons, highly tactile and audible injection-molded silicone rubber seal

Display:

- Alphanumeric 2 x 16 back-lit LCD
- Update Rate:1 second
- Accuracy: Sensor dependent
- LCD Contrast: 4 settings
- Languages Available:
  English, French, Spanish, German Italian and Portuguese

Display Ranges (see sensor specifications for actual measurement limits):

- pH: -2.00 to 15.00 pH
- pH Temp.:
  -40 °C to 150 °C (-40 °F to 302 °F)
- ORP: -9999 to +9999 mV
- Flow Rate:
  0.0000 to 999999 units per second, minute, hour or day
- Totalizer: 0.00 to 99999999 units
- Conductivity:
  0.0000to 999999 µS, mS, PPM & PPB (TDS), kΩ, MΩ
- Conductivity Temperature:
  -99.9 °C to 250 °C (-148 °F to 482 °F)
- Temperature:
  -99.9 °C to 999.9 °C (-148 °F to 999.9 °F)
- Pressure: -99.99 to 9999 psi, kPa, bar

Display Ranges (continued)

- Level:
  -99999 to 99999 m, cm, ft, in., %
- Volume:
  -99999 to 999999 m^3, ft^3, in^3, cm^3, gal, L, kg, lb, %
- Other (4 to 20 mA):
  -99999 to 999999 user selectable units

Environmental

Ambient Operating Temperature:

- Back-lit LCD:
  -10 °C to 55 °C (14 °F to 131 °F)

Storage Temp.:
-15 °C to 80 °C (5 °F to 176 °F)
Relative Humidity:
0 to 95%, non-condensing
Maximum Altitude:

- 2,000 m (6,560 ft)
- 4,000 m (13,123 ft); use only DC power supply and, if applicable, solid state relays to maintain UL safety standard up to this altitude.

Electrical

Power Requirements (AC or DC via Power Modules)

- Universal AC: 100 to 240 VAC ±10%, regulated
  50-60 Hz, 24 VA max.
- DC: 12 to 24 VDC, ±10%, regulated recommended, 7 Watts max.

Output Power to Sensors:
5 VDC up to 40 mA total
Terminal type:
Screw-clamp, removable via plug-in modules.

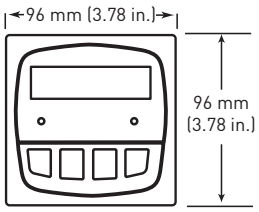
Analog Outputs (via I/O Modules and Output Modules) All analog outputs are freely assignable to any channel.

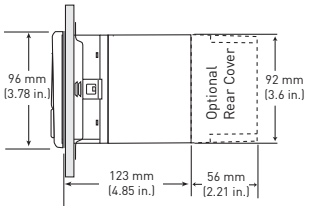
4 to 20 mA Output:
Endpoints are adjustable and reversible:

- Minimum default
  4.0 mA; user adjustable from 3.8 to 5.0 mA
- Maximum default
  20.00 mA; user adjustable from 19.0 to 21.0 mA

Test Mode:
Produces an adjustable 4 to 20 mA signal for functional verification of each output circuit
Isolation: Up to 48 VAC/DC
Error Condition:
22.1 mA (default state when output source not configured)
Update Rate: 100 ms
Accuracy:
±32 µA over entire operating temperature range

Dimensions





Specifications (continued)

Analog Outputs (continued)

Passive 4 to 20 mA

- Voltage: 12 to 24 VDC, ±10%, regulated
- Max. Impedance:
  250 Ω @ 12 VDC
  500 Ω @ 18 VDC
  750 Ω @ 24 VDC
- Active 4 to 20 mA
- Max. Impedance: 650 Ω

0 to 5/10 VDC Output:
Output Range:
0 to 5 VDC or 0 to 10 VDC, software selectable
Endpoints are adjustable and reversible:

- Minimum default:
  0 VDC; user programmable from 0 to 0.5 VDC
- Maximum default:
  5 VDC; user programmable from 4.5 to 5.5 VDC, or 9.5 to 10.5 VDC

Output Load: 10 kΩ minimum
Test Mode:
Produces an adjustable signal for functional verification of each output circuit
Isolation: Up to 48 VAC/DC
Error Condition:
0 VDC (default state when output source not configured)
Update Rate: 100 mS
Accuracy:
±20 mV over entire operating temperature range
Resolution: 5 mV
Power Supply Rejection: 0.5 mV/V

Relay Modules

All relays are freely assignable to any channel.

- Internal relay modes of operation:
  Off, Low, High, Window, Proportional Pulse, Pulse Width Modulation, USP, Volumetric, Pulse, Totalizer Volume, Advanced, % Rejection, % Recovery, % Passage

- External relay modes of operation:
  Off, Low, High, Window, USP, Totalizer Volume, Advanced, % Rejection, % Recovery, % Passage

Hysteresis: User adjustable
Time Delay: 0 to 6400 seconds

- Advanced Relay:
  Use "AND/OR" logic along with relay sources to trigger a relay.
  High/Low modes available for each of the 3 sources.

- Solid State Relays: (non-mechanical switches)

Normally Open/Closed Operation:
Software selectable
Maximum Voltage Rating:
30 VDC or 42 VAC p-p
Current Rating:
50 mA DC or 50 mA AC RMS
On-state Impedance: 30 Ω or less
Off-state Leakage: 400 nA or less, AC or DC
Isolation: Up to 48 VAC/DC
Transient Protection:
Embedded, up to 48 V over-voltage

- Dry-contact Relays: (mechanical contacts)
  Type: SPDT
  Form: C

Maximum Pulse Pate:

- 600 pulses/min. (volumetric pulse & PWM modes)
- 400 pulses/min. (prop. pulse mode)

Maximum Voltage Rating:
30 VDC or 250 VAC
Current Rating: 5 A

Shipping Weight

• Base Unit:	1.00 kg	2.25 lb
• Power Module:	0.12 kg	0.25 lb
• I/O Module:	0.12 kg	0.25 lb
• Output Module:	0.12 kg	0.25 lb
• Relay Module:	0.12 kg	0.25 lb

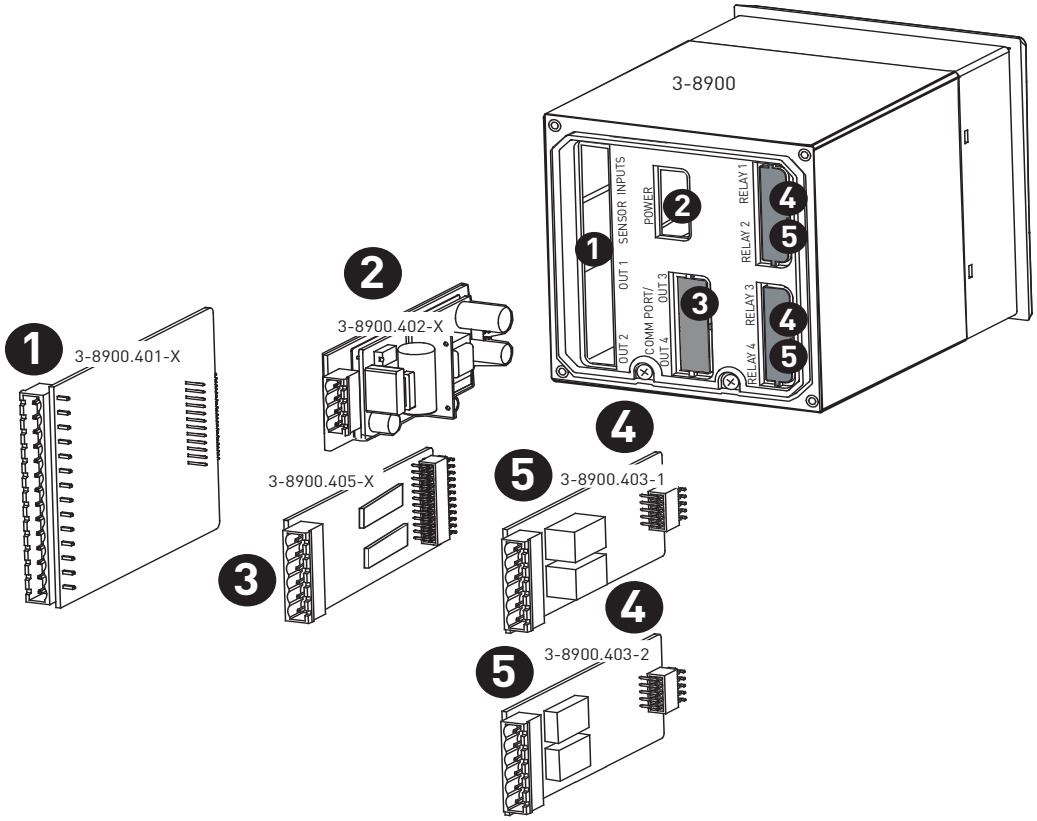
Standards and Approvals

- CE, UL
- RoHS compliant
- Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management

Installation of Modules with the base unit

3-8900

One base unit is required to build a functional 8900. It is offered with a backlit LCD display. Programming the unit is done simply via the push-button keypad. The unit can be tailored to display in English, German, French, Spanish, Italian, and Portuguese. The two line display allows for easy programming, navigation, and viewing of each channel.



1. I/O module

One I/O module is required to build a functional 8900. I/O modules are offered for 2, 4, or 6 sensor inputs with or without 2 mA or voltage outputs. Users can select two additional outputs via the output module.

2. Power module

One power module is required to build a functional 8900. The power module is offered for universal 100/240 VAC or 12 to 24 VDC (This module can be powered by optional external relays (see ordering information for more details).

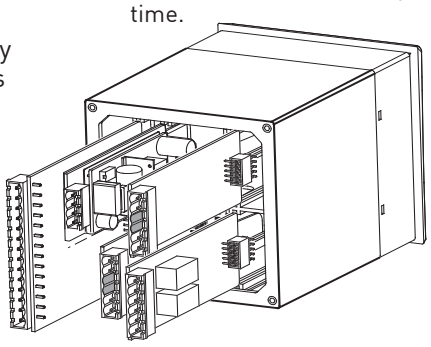
3. Output module

Output modules are optional when building an 8900. This module can be used in addition to other outputs that are available in the I/O modules. Active current and voltage outputs are powered by the 8900. Passive outputs require an outside 12 to 24 VDC power supply. All outputs are assignable to any input channel.

4 & 5 Relay modules

Relay modules are optional when building an 8900. Relay modes of operation include off, low, high, window, USP, totalizer volume, advanced, proportional pulse, pulse width modulation, volumetric pulse, % reject, % recovery and % passage. The advanced relay option for "AND/OR" logic is used for up to 3 conditions. For instance, a relay will go to high/low if "a" is true and "b" or "c" is false. One or two relay modules can be installed into the 8900. One additional external relay module can also be used at the same time (See optional external relay ordering information.) All relays are assignable to any input channel.

Installation of Modules: Modules simply plug in by sliding into the base unit on rails. They are held securely in place by the rear cover. Changes and upgrades can be made in the field at any time.



Model 8900
Ordering Notes

1) Building a functional unit requires a base unit, I/O module, and power module.
2) Output options are available on I/O modules and additional output modules can be used. The 8900 can support up to four outputs.
3) The 8900 can support up to eight relays. Up to two internal relay modules can be used simultaneously; additional external relays can also be used.
4) A maximum total of two frequency sensors can be used with any input card.
5) A total of six digit inputs or four digital inputs with two frequency inputs can be used.
6) The 8900 boards are field replaceable.
7) The 8900 can be reconfigured with new sensor types by simple reprogramming.

Please refer to Wiring, Installation, and Accessories sections for more information.

Ordering Information

To build a functional 8900 controller, choose the base unit, power module, and input/output (I/O) module. Additional outputs and relays are available, if needed.

Base Units, Required; Choose One		
3-8900	159 000 868	Base unit with back-lit LCD
I/O (input/output) Modules, Required; Choose One		
3-8900.401-1	159 000 870	Dual (2) Input (no outputs)
3-8900.401-2	159 000 871	Dual (2) Input with Two Passive* Loop Outputs
3-8900.401-3	159 000 872	Dual (2) Input with Two Active Loop Outputs
3-8900.401-4	159 000 873	Dual (2) Input with Two Voltage Outputs
3-8900.401-5	159 000 874	Quad (4) Input (no outputs)
3-8900.401-6	159 000 875	Quad (4) Input with Two Passive* Loop Outputs
3-8900.401-7	159 000 876	Quad (4) Input with Two Active Loop Outputs
3-8900.401-8	159 000 877	Quad (4) Input with Two Voltage Outputs
3-8900.401-9	159 000 968	Six Inputs (no outputs)
3-8900.401-10	159 000 969	Six Inputs with Two Passive* Loop Outputs
3-8900.401-11	159 000 970	Six Inputs with Two Active Loop Outputs
3-8900.401-12	159 000 971	Six Inputs with Two Voltage Outputs
Power Modules, Required; Choose One		
3-8900.402-1	159 000 878	110/220 VAC Power Module, ±10%, regulated
3-8900.402-2	159 000 879	12 to 24 VDC Power Module, ±10%, regulated
Optional Output Modules - Choose One		
3-8900.405-1	159 000 883	Two Passive* Current Loop Outputs
3-8900.405-2	159 000 884	Two Active Current Loop Outputs
3-8900.405-3	159 000 885	Two 0 to 5 and/or 0 to 10 VDC Outputs
Optional Relay Modules - Choose One or Two		
3-8900.403-1	159 000 880	Two Dry Contact Relays
3-8900.403-2	159 000 881	Two Solid State Relays
Optional External Relays - Choose One**		
3-8059-2	159 000 770	Two dry-contact relays; requires 12 to 24 VDC ±10%, regulated
3-8059-2AC	159 000 771	Two dry-contact relays; requires 100 to 240 VAC ±10%, regulated; supplies power to the 12 to 24 VDC power module, ±10%, regulated
3-8059-4	159 000 772	Four dry-contact relays; requires 12 to 24 VDC ±10%, regulated
3-8059-4AC	159 000 773	Four dry-contact relays; requires 100 to 240 VAC ±10%, regulated; supplies power to the 12 to 24VDC ±10%, regulated power host device

* Passive outputs require an external power source
** See individual product page for the 8059 External Relay Modules.

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Mounting		
3-8050.392	**159 000 640**	¼ DIN retrofit adapter
3-8050.395	**159 000 186**	Splashproof rear cover
3-0000.596-1	**159 000 892**	¼ DIN wall mount bracket, 6½ in. (use if no rear cover is installed)
3-0000.596-2	**159 000 893**	¼ DIN wall mount bracket, 9 in. (use if rear cover is installed)
3-5000.399	**198 840 224**	Panel adapter, 5 x 5 in. to ¼ DIN
3-5000.598	**198 840 225**	Surface mount bracket
Power Supplies		
7300-7524	**159 000 687**	24 VDC power supply 7.5W, 300 mA
7300-1524	**159 000 688**	24 VDC power supply 15W, 600 mA
7300-3024	**159 000 689**	24 VDC power supply 30W, 1.3 A
7300-5024	**159 000 690**	24 VDC power supply 50W, 2.1 A
7300-1024	**159 000 691**	24 VDC power supply 100W, 4.2 A
Miscellaneous		
3-8050.396	**159 000 617**	RC filter kit (for relay use), 2 per kit

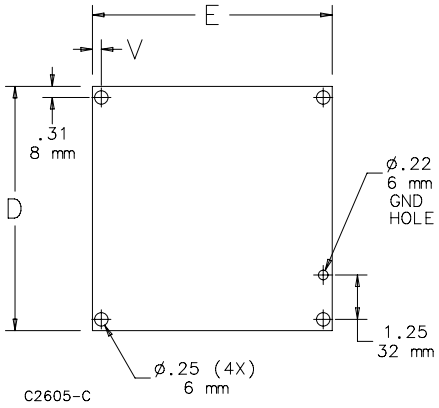
3-8900.099 Rev B (07/10)

3401 Aerojet Avenue, El Monte, CA 91731-2882 U.S.A. • Tel. (626) 571-2770 • Fax (626) 573-2057 • www.gfsignet.com • e-mail: signet.ps@georgfischer.com

Panels for Enclosures

Panels for Junction Boxes

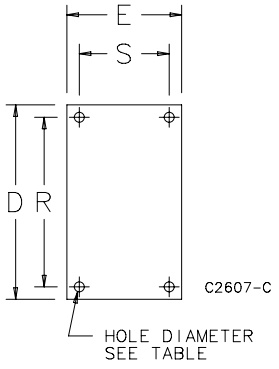
Steel panels are 14 gauge, finished with white polyester powder paint or with a conductive, corrosion-resistant coating. Stainless steel panels are 14 gauge Type 304 and have a commercial #2B finish which is protected on one side with a plastic film. Aluminum panels are 5052-H32 aluminum alloy 0.080 in. (2mm) thick and protected on one side with a plastic film. Panel mounting hardware is furnished with all enclosures which accept these panels.



Catalog Number Painted	Catalog Number Conductive	Catalog Number Stainless Steel	Catalog Number Aluminum	Panel Size D x E (in.)	Panel Size D x E (mm)	V (in.)	V (mm)
A6P4	A6P4G	A6P4SS	A6P4AL	4.88 x 2.88	124 x 73	0.31	8
A6P6	A6P6G	A6P6SS	A6P6AL	4.88 x 4.88	124 x 124	0.31	8
A8P6	A8P6G	A8P6SS	A8P6AL	6.75 x 4.88	171 x 124	0.25	6
A8P8	—	—	—	6.75 x 6.88	171 x 175	0.25	6
A10P8	A10P8G	A10P8SS	A10P8AL	8.75 x 6.88	222 x 175	0.25	6
A10P10	A10P10G	—	—	8.75 x 8.88	222 x 226	0.25	6
A12P6	A12P6G	—	—	10.75 x 4.88	273 x 124	0.25	6
A12P10	A12P10G	A12P10SS	A12P10AL	10.75 x 8.88	273 x 226	0.25	6
A12P12	A12P12G	A12P12SS	—	10.75 x 10.88	273 x 276	0.25	6
A14P8	A14P8G	—	—	12.75 x 6.88	324 x 175	0.25	6
A14P12	A14P12G	A14P12SS	A14P12AL	12.75 x 10.88	324 x 276	0.25	6
A16P10	A16P10G	—	—	14.75 x 8.88	375 x 226	0.25	6
A16P14	A16P14G	A16P14SS	A16P14AL	14.75 x 12.88	375 x 327	0.25	6
A18P16	A18P16G	A18P16SS	A18P16AL	16.75 x 14.88	425 x 378	0.25	6

Composite Panels for Junction Boxes and Small Wall-Mount Enclosures

Manufactured from light brown reinforced phenolic laminate sheet stock. This material has exceptional strength and chemical resistance, which makes it ideally suited for the most corrosive environments. Composite panels are intended for use in corrosion resistant enclosures. Panel sizes are available for junction boxes and small wall-mount enclosures. Composite panels may be drilled and tapped but work equally as well with self-threading or thread cutting screws. Refer to the table for recommended mounting specifications.



Catalog Number	Panel Size D x E (in.)	Panel Size D x E (mm)	R (in.)	R (mm)	S (in.)	S (mm)	Hole Dia. (in.)	Hole Dia. (mm)	Panel Thickness (in.)	Panel Thickness (mm)
A6P4C	4.88 x 2.88	124 x 73	4.25	108	2.25	57	0.25	6	0.12	3
A6P6C	4.88 x 4.88	124 x 124	4.25	108	4.25	108	0.25	6	0.12	3
A8P6C	6.75 x 4.88	171 x 124	6.25	159	4.25	108	0.25	6	0.12	3
A10P8C	8.75 x 6.88	222 x 175	8.25	210	6.25	159	0.25	6	0.12	3
A12P10C	10.75 x 8.88	273 x 226	10.25	260	8.25	210	0.25	6	0.19	5
A14P12C	12.75 x 10.88	324 x 276	12.25	311	10.25	260	0.25	6	0.19	5
A16P14C	14.75 x 12.88	375 x 327	14.25	362	12.25	311	0.25	6	0.19	5
A18P16C	16.75 x 14.88	425 x 379	16.25	413	14.25	362	0.25	6	0.19	5
A20P16C	17.00 x 13.00	432 x 330	15.25	387	11.25	286	0.50	13	0.19	5
A20P20C	17.00 x 17.00	432 x 432	15.25	387	15.25	387	0.50	13	0.19	5
A24P20C	21.00 x 17.00	533 x 432	19.25	489	15.25	387	0.50	13	0.19	5
A24P24C	21.00 x 21.00	533 x 533	19.25	489	19.25	489	0.50	13	0.19	5
A30P24C	27.00 x 21.00	686 x 533	25.25	641	19.25	489	0.50	13	0.19	5

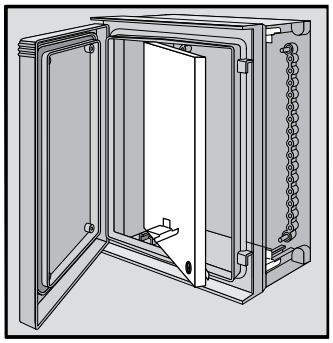
Panels for Enclosures

QLINE® I Swing Panel

Adjustable-depth aluminum swing panels, for use in QLINE I polycarbonate enclosures, provide a convenient way to install controls and instruments near enclosure body opening while providing access and security. Suitable applications include water, pulp and paper, petroleum and chemical processing, food, packaging, and pharmaceutical applications.

Catalog Number	Fits Enclosure Size A x B (mm)	Fits Enclosure Size A x B (in.)	Hinged Side of Enclosure	Panel Dimension D x E (mm)	Panel Dimension D x E (in.)
QIHFP22A	200 x 200	7.87 x 7.87	200	186 x 186	7.32 x 7.32
QIHFP23A	300 x 200	11.81 x 7.87	200	280 x 186	11.02 x 7.32
QIHFP32A	300 x 200	11.81 x 7.87	300	286 x 180	11.26 x 7.09
QIHFP33A	300 x 300	11.81 x 11.81	300	286 x 280	11.26 x 11.02
QIHFP42A	400 x 200	15.75 x 7.87	400	386 x 180	15.20 x 7.09
QIHFP43A	400 x 300	15.75 x 11.81	400	386 x 280	15.20 x 11.02
QIHFP63A	600 x 300	23.62 x 11.81	600	586 x 280	23.07 x 11.02
QIHFP64A	600 x 400	23.62 x 15.75	600	586 x 380	23.07 x 14.96

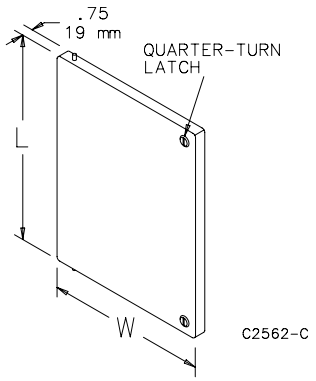
ULTRX® Swing-Out Panel



Swing-Out Panel (14 or 16 gauge) installs front-mounted panels in ULTRX fiberglass enclosures. Developed primarily to complement window door units, the front-mounted swing panel is suited for any application that requires a display of gauges, dials, or any type of control equipment monitor. Easy installation; no drilling required. Fully adjustable front to rear. Panel and mounting hardware included.

NOTE: Swing-out panel will not slide all the way forward in 400mm deep enclosures. Consult factory for more information.

Catalog Number	Fits Enclosure A x B (mm)	L (mm)	L (in.)	W (mm)	W (in.)
UU5040SP	496 x 395	432	17.01	330	12.99
UU6050SP	608 x 496	536	21.10	432	17.00
UU6060SP	608 x 595	533	20.98	533	20.98
UU7560SP	758 x 595	686	27.01	533	20.98
UU10080SP	1008 x 808	935	36.80	737	29.00



Panels for WiFi Cabinets and Small Wall-Mount Enclosures

Panels are available in both steel and wood. Steel panels are 14 gauge steel with a white polyester powder paint finish. Wood panels are 3/4 in. plywood and are unfinished. Wood panels are supplied with DataCom Fiberglass Hinged Cover Type 4X WiFi Cabinets.

Catalog Number	Material	Panel Size D (in.)	Panel Size D (mm)	Panel Size E (in.)	Panel Size E (mm)	Panel Size V (in.)	Panel Size V (mm)
A6P6	Steel	4.88	124	4.88	124	0.31	8
A6P6WD	Wood	4.88	124	4.88	124	0.31	8
A16P14	Steel	14.75	375	12.88	327	0.25	6
A16P14WD	Wood	14.75	375	12.88	327	0.25	6
A18P16	Steel	16.75	425	14.88	378	0.25	6
A18P16WD	Wood	16.75	425	14.88	378	0.25	6

PVC & CPVC TRUE UNION 2000 VALVES

TU2000-2-0605

One of the Most Versatile, Compact Valve Designs Available

Spears® True Union 2000 Ball Valves, 3-Way Ball Valves and Ball Check Valves provide maximum versatility with fully interchangeable valve cartridges. Provides for easier system design modifications and upgrades in multiphase projects, or anywhere changes in valve types are desired. Simply exchange any True Union 2000 valve in-line using existing union nuts. Also mates with Spears® new Schedule 80 Unions and Diaphragm Valves. All True Union 2000 valves feature a low profile, compact design for minimal space requirements. Available in PVC or CPVC with choice of EPDM or Dupont Dow Genuine Viton® O-ring seals and socket, flanged, or optional Spears® patented Special Reinforced (SR) threaded end connectors. Additionally, Spears® offers valve Retrofit Kits for easy in-line replacement of other valves and factory installed Actuation Packages. Assembled with silicone-free lubricant.

True Union 2000 Industrial Ball Valve

- Multi-featured Industrial Grade
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or SR Threaded End Connectors

True Union 2000 Industrial 3-Way Valve

- Industrial Grade, Multiport, Diverter, L-Pattern & T-Pattern configurations Vertical 3-Way or Horizontal Diverter (shown)
- Built-in Handle Lockout
- Fully Serviceable, Replaceable Components
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- ISO Pattern Actuation Mounting Option
- Spears® Dual O-ring Safe-T-Shear® Stem
- Self Adjusting PTFE Floating Seat Design
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors

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True Union 2000 Industrial Ball Check Valve

- Industrial Grade
- Flow-Tested for Minimum Turbulence
- Fully Serviceable, Replaceable Components, uses Standard O-ring Seat
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Easily Converted to Foot Valve
- NSF Certified for Potable Water Use
- Also Available in **SPEARS® LXT™** High Purity, Low Extractable PVC Material
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 6" and all flanged to 150 psi @ 73°F
- Produced in IPS sizes 1/2" - 6" with Socket, Flanged or optional SR Threaded End Connectors
- Also available in PVC White

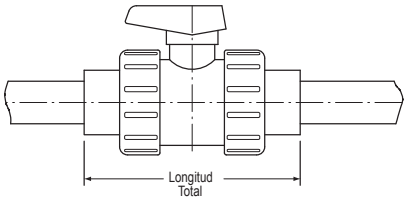
Check Valve Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
C_V	**6.3**	**17**	**25**	**65**	**86**	**130**	**200**	**275**	**500**	**800**

Economical True Union 2000 Standard Ball Valve

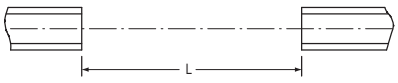
- High quality Standard Ball Valve
- Allows future system upgrade
- Excellent for OEM Applications
- Replaceable Seats
- Safe-T-Blocked® Seal Carrier - Full Rated Pressure
- Spears® Safe-T-Shear® Stem
- Self Adjusting Floating Seat
- Sizes 1/2" - 2" pressure rated to 235 psi @ 73°F, sizes 2-1/2" - 4" and all flanged to 150 psi @ 73°F
- NSF Certified for Potable Water Use
- Produced in IPS sizes 1/2" - 4" with Socket, Flanged or SR Threaded End Connectors
- Also available in PVC White

True Union 2000 Retrofit Valves or Kits

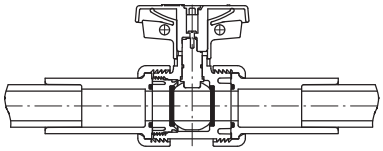
Easily converts any system over to all True Union 2000 style valves for consistent valve type and uniform maintenance. Special extended socket style End Connectors (2) allow retrofit replacement of other brand valves in existing piping systems with a new True Union 2000 valve. Simply cut out old valve according to specified dimension and install retrofit end connectors. End connectors are provided with either EPDM or genuine Viton® O-rings. Can be ordered as End Connector Kit or fully assembled Retrofit Valve.



BALL VALVE FOR REPLACEMENT



PIPE LAYING LENGTH AFTER CUTTING



TRUE UNION 2000 BALL VALVE INSTALLED WITH RETROFIT KIT

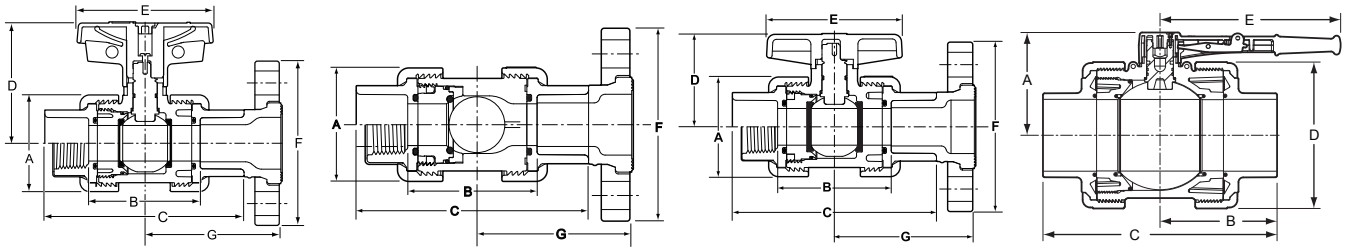
Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
L	4-29/32	5-7/16	6-3/32	7-1/4	7-1/2	8-17/32	10-3/4	11-7/16	14-5/16	N/A

L ± 1-1/16

Contact Spears® for Special Kits/Valves to replace older Spears® Regular True Union Ball Valves

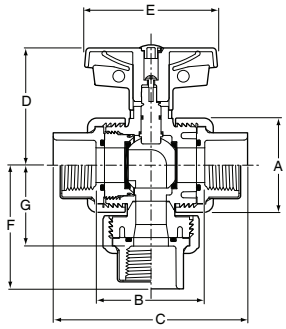
True Union 2000 Valve Dimensional Data

Industrial Ball Valve, Ball Check Valve, Standard Ball Valve & 6" Industrial Lever Handle



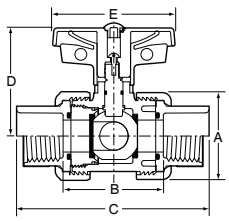
Nominal Size	A	Dimensions Reference (inches, ±1/16)										
		B		C			D		E		F	G
		Soc/Thd	Spigot	Socket	Thread	Spigot	Industrial	Standard	Industrial	Standard		
1/2	1-7/8	2-3/8	2-7/8	4-3/16	3-3/16	4-5/8	2-9/16	1-5/8	2-13/16	2-1/2	3-1/2	2-31/32
3/4	2-1/4	2-3/4	3-1/4	4-3/4	4-1/4	5-1/4	2-7/8	2	3-3/8	3	3-7/8	3-5/16
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	2-5/16	3-7/16	3-7/16	4-1/2	3-5/8
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	2-13/16	3-7/8	3-9/16	4-5/8	3-31/32
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	3-1/16	4-3/16	3-7/8	5	4-3/8
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	3-3/4	5-1/8	5	6	5-1/4
2-1/2	5-3/8	6-7/8	7-13/16	10-7/16	9-11/16	11-3/8	5-1/8	5-7/8	6-1/4	7-5/8	7-1/2	6
3	6-3/16	7	7-13/16	10-11/16	9-7/8	11-9/16	5-7/8	5-7/8	7-5/8	7-5/8	7-1/2	6-13/16
4	7-5/8	7-5/16	8-1/4	11-7/8	10-1/4	12-3/4	6-3/4	6-3/4	9-3/16	6-3/4	9	7-1/2
6	11-5/8	11-1/16	13	17-1/16	15-3/4	18-1/2	8-1/8	---	14-5/16	---	11-1/4	10-3/16

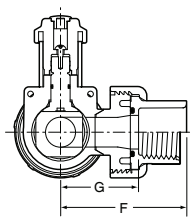
Industrial 3-Way Ball Valve



Nominal Size	A	Vertical 3-Way Ball Valves[3]												Oper.[2] Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-7/8	2-7/16	2-15/16	4-1/4	3-27/32	4-3/4	2-9/16	2-13/16	2-3/4	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

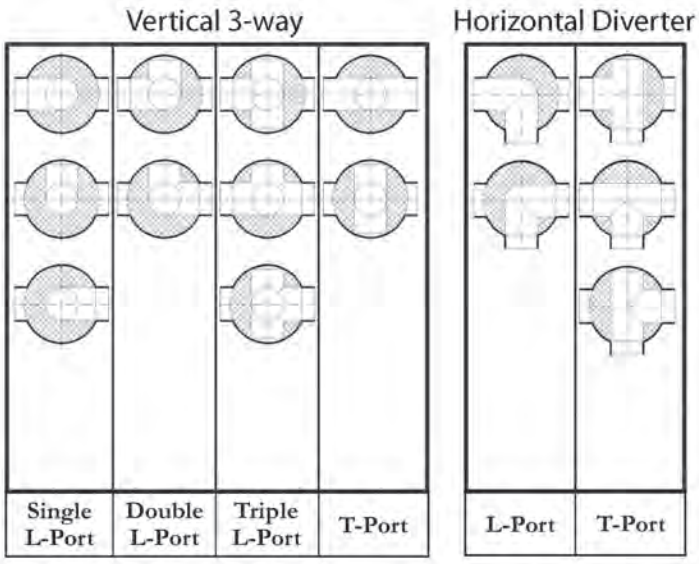




Nominal Size	A	Horizontal Diverter Ball Valves[3]												Oper.2 Torque (in.lbs.)
		B[1]		C			D	E	F			G		
		Soc/SR	Spig	Soc	SR	Spig			Soc	SR	Spig	Soc/SR	Spig	
1/2	1-3/16	2-7/16	2-15/16	4-3/16	3-13/16	4-3/4	2-9/16	2-13/16	2-9/16	2-3/8	2-13/16	1-11/16	2	12
3/4	2-1/4	2-3/4	3-5/16	4-3/4	4-1/4	5-3/8	2-7/8	3-5/16	3	2-3/4	3-5/16	2	2-5/16	12
1	2-1/2	2-7/8	3-1/2	5-1/8	4-11/16	5-3/4	3-1/8	3-7/16	3-1/4	3	3-9/16	2-1/8	2-7/16	20
1-1/4	3-1/16	3-1/4	3-13/16	5-3/4	5-3/16	6-5/16	3-5/8	3-13/16	3-3/4	3-3/8	4-1/16	2-3/8	2-13/16	25
1-1/2	3-1/2	3-1/2	4	6-1/4	5-7/16	6-3/4	4	4-3/16	4-3/16	3-13/16	4-1/2	2-3/16	3-1/8	40
2	4-1/4	4-3/4	5-3/16	7-3/4	6-3/4	8-1/4	4-1/2	5-1/8	5	4-1/2	5-5/16	3-1/2	3-3/4	67
2-1/2	5-3/8	5-7/8	7-13/16	9-5/16	8-1/2	11-3/8	5-1/8	6-1/4	5-7/8	5-1/2	6-7/16	4-1/8	5-5/16	120
3	6-3/16	6-7/8	7-13/16	10-11/16	9-3/4	11-9/16	5-7/8	7-5/8	6-11/16	6-3/16	7-3/16	4-3/4	5-5/16	120
4	7-1/2	7-1/4	8-1/4	11-13/16	10-1/4	12-13/16	6-3/4	9-3/16	7-1/8	6-3/4	8-3/4	5-7/8	6-1/2	336

1: Valve Lay Length
2: Torque required at valve maximum internal pressure rating, 5ft/sec. Flow velocity; due to adjustment differences during installation, actual values may vary.
3: Diverter style valve, no shutoff on branch

3-Way Port Options



True Union 2000 Actuated Valves

Universal ISO Actuator Mounting Pattern Option

Spears® offers optional actuator mounting with standard ISO Mounting Pattern for user actuation of True Union 2000 Ball Valves.

Factory Actuated Valve Packages

Spears® Electric or Pneumatic Actuation Packages eliminate customer's having to determine proper valve and actuator mating. Pre-matched packages insure proper torque, coupling and mount for optimum performance - all factory installed and tested for proper alignment and operation. Actuation packages can be custom built to user specifications from Spears® wide selection of options, voltages and accessories. Contact Spears® for additional information.

Foot Valve Screens

- Easily converts Ball Check Valve to a Foot Valve.
- Standard IPS spigot connection fits slip-socket valve end connector.
- Enlarged screen provides open area equivalent to valve for optimum flow characteristics.
- Chemical and corrosion resistant PVC or CPVC construction.

Typical Application (VALVE NOT INCLUDED)

Split Nut Kit for True Union 2000 Valves & Union 2000 Schedule 80 Fittings

Split Nut Kits are designed to replace broken union nuts on Spears® True Union 2000 Ball Valves and Union 2000 Schedule 80 Unions. Kit includes SS316 Gear Clamp and 2-Split Nut halves. Can also be used if nut was not in place during end connector installation. Split Nut is fully serviceable to original valve pressure rating.

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic products to transport or store compressed air or gas.

Viton® is a registered trademark of DuPont Dow Elastomers

SPEARS® MANUFACTURING COMPANY • CORPORATE OFFICE
15853 Olden St., Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
(818) 364-1611 • www.spearsmfg.com

SECTION VI
OSG ALTERNATOR BOX
(TO BE SUBMITTED LATER)

SECTION VII
HYDROGEN GAS MONITOR

- One (1) Qnty. of # 72-2110RK: Beacon 110, Single Channel Controller
- One (1) Qnty. of # 61-1001RK-04: Hydrogen Gas (LEL) Sensor W/ Explosion Proof J-Box
- One (1) Qnty. of # 81-F004RK-LV: Calibration Kit

SINGLE CHANNEL WALL MOUNT CONTROLLER

Gas Detection For Life — **Beacon™ 110 Model**

Features

- Low cost versatile solution
- Compact, weatherproof, NEMA 4X enclosure
- 115/220 VAC or 24 VDC operation
- Long life sensors (2+ years typical)
- Accepts RKI LEL/O_2/CO2/toxic direct connect sensors
- Accepts any 4-20 mA transmitter
- Audible alarm with reset button
- Two programmable alarm levels
- Built-in trouble alarm with relay
- Relay rating 10 amps, form C
- Provides 4-20 mA output
- Optional Strobe

Industry Applications

- Petrochemical plants
- Refineries
- Water & wastewater treatment plants
- Pulp & paper mills
- Gas, telephone, & electric utilities
- Parking garages
- Manufacturing facilities
- Steel
- Automotive
- HVAC

Gas detection should not be complicated. The Beacon 110 is gas detection simplified.

The Beacon 110 is a powerful, low cost fixed system controller for one point of gas detection. It is microprocessor controlled, simple to install and operate, and priced to be the industry's best value single gas detection controller. It is capable of accepting RKI sensors directly for LEL level combustibles, oxygen, CO2, and toxic gas sensors. The Beacon 110 can also accept any 4-20 mA transmitter (2 or 3 wire, 24 VDC). Sensors can be mounted directly at the Beacon 110 housing, or can be wired remote from the controller.

The 10 amp rated relay contacts allow direct control of external alarms and horns. The digital display has backlighting and simultaneous readout of the gas type and concentration.

The Beacon 110 is also housed in a NEMA 4X rated case for a weather tight seal. This case design complies with lock out / tag out standards and can be fully secured. An external reset switch allows the alarm to be silenced from outside of the controller housing. The Beacon 110 ships complete with a wall mounting kit for easy installation.

RKI offers the industry's widest selection of standard and toxic gas detection sensors, all of which can be utilized with the Beacon 110, providing gas monitoring protection for almost any application.

RKI Instruments, Inc. • 33248 Central Ave. Union City, CA 94587 • Phone (800) 754-5165 • (510) 441-5656 • Fax (510) 441-5650

Beacon™ 110 Model

Physical	
Dimensions	Height: 8.5” 216 mm Width: 7.0” 178 mm Depth: 4.3” 109 mm
Enclosure	Wall mounting grey fiberglass with hinged cover
Conduit Connection	3/4” NPT conduit hubs, 2 provided. 1 for sensor wiring and 1 for power & relay wiring
Wiring Termination	Screw type terminal block, 14 gauge max.
Power	Universal 115 VAC & 220 VAC, or 24 VDC nominal, battery backup option available
Controls	3 internal push buttons for setup, programming, and calibration. 1 external push button for alarm reset.
Environmental	
Operating Temperature	-4°F to 122°F (-20°C to 50°C)
Storage Temperature	-4°F to 158°F (-20°C to 70°C)
Enclosure Rating	NEMA-4X enclosure, chemical, and weather resistant. Suitable for indoor and outdoor installations.
Inputs	
Direct Wired Sensors	LEL, Oxygen, Carbon Dioxide, and toxic gas sensors. Remote amp not required for less than 500 feet
4-20 mA Sensors	Accepts any 4-20 mA transmitter (24 VDC, 2 or 3 wire). A wide variety of RKI/Riken sensors are available with 4-20 mA signals. Wiring distances up to 8,000 feet
Sampling Methods	Diffusion and sample draw heads available
Outputs	
Relays	Three relays - 10 amp rating (at 115 VAC), SPDT isolated contacts. 2 relays for gas alarms and 1 trouble relay. Relays fully programmable for: increasing or decreasing alarm, latching or self reset, normally energized or normally de-energized, time delay for alarm on and alarm off.
4-20 mA	Signal output, 4-20 mA (maximum load impedance 500 ohms), per channel
24 VDC	24 VDC (400 mA max) output provided to operate sample drawing adapters or other accessories
Display	2 x 8 Alphanumeric display with backlighting
Audible	Built-in audible alarm, 94 dB, mounted on enclosure Coded output: pulsing = gas alarm, steady = fail
Visual	3 LED’s on the front cover for alarm status indication, and malfunction. Optional top-mount strobe
Approvals	CSA Certified to CSA C22.2 No. 1010 and UL 61010-1
Warranty	One year materials and workmanship

Specifications subject to change without notice.

Made in the USA

RKI INSTRUMENTS

10000363 UL REGISTERED FIRM ISO 9001

Toll Free: (800) 754-5165 • Phone: (510) 441-5656
Fax: (510) 441-5650 • www.rkiinstruments.com

Authorized Distributor:

DIRECT CONNECT SENSORS

RKI INSTRUMENTS

- **Available gases include**
  - **LEL, H2S, CO, & CO2**
  - **Toxic sensors include NH3, AsH3, Cl2, HCN, PH3, and SO2**
- **Infrared sensor for combustibles and CO2**
- **Patented water repellent sensor coating**
- **Explosion proof construction**
- **Optional stainless steel junction box**

The RKI Direct Connect series gas sensors are highly reliable and very cost effective for the detection of common gas hazards. The direct connect series are available for LEL, H2 Specific LEL, LEL IR, Oxygen, H2S, CO, CO2, and for a variety of toxic gases. The sensors for LEL, H2, Oxygen, H2S, CO2, and Carbon Monoxide are explosion-proof with flame arrestors, and approved for use in hazardous areas (Class I, Div. 1 Groups B, C, D). An optional non-explosion proof version is available for oxygen, H2S, CO, and CO2 for use in non-hazardous atmospheres.

The Direct Connect sensors can be used in two different ways. The sensors can be mounted directly to the controllers as a complete stand alone system, or they can be mounted to explosion proof junction boxes for remote detection.

The toxic sensors are electrochemical type plug-in sensors, which provide high specificity, fast response, and long life. The plug-in design allows quick replacement in the field with no tools required. Toxic sensors are designed for use in Class I, Div. 2 hazardous locations. Sensors are available for CL2, NH3, SO2, PH3, AsH3, and HCN.

The Direct Connect sensors can be used either indoors or outdoors. The flame arrestors for the explosion-proof versions utilize a patented coating which make them water repellent. Also, splash guards are available for use in very wet environments. An optional stainless steel junction box is available for corrosive environments.

All of the Direct Connect sensors are designed to specifically interface with RKI Beacon 110, 200, and 410 controllers.

RKI Instruments, Inc. | 33248 Central Ave. Union City, CA 94587 | Phone (800) 754-5165 | (510) 441-5656 | Fax (510) 441-5650

www.rkiinstruments.com

Explosion Proof

	LEL General Purpose	LEL H2 Specific	O2 Oxygen	H2S Hydrogen Sulfide	CO Carbon Monoxide	CH4 Methane	HC Hydrocarbons	CO2 Carbon Dioxide
 **Sensor With J-Box**	61-1000RK 61-1000RK-05	61-1001RK	65-2515RK	65-2427RK-05	65-2437RK-05	61-1003RK-CH4	61-1003RK-HC	61-1004RK-02 61-1004RK-03 61-1004RK-05 61-1004RK-10
Sensors	Catalytic		Galvanic cell	Electrochemical		Infrared		
 **Sensor Only**	61-0140RK (UL) 61-0140RK-05 (CSA)	LEL H2 - NC-6205-01	65-2514RK	65-2423RK-05	65-2433RK-05	61-0190RK-CH4	61-0190RK-HC	61-0191RK-02 61-0191RK-03 61-0191RK-05 61-0191RK-10
Measuring Range	0-100% LEL		0-25% Vol.	0-100 ppm	0-300 ppm	0-100% LEL	0-100% LEL	-02 0 - 5000 ppm -03 0 - 5.0% Vol. -05 0 - 50% Vol. -10 0 - 100% Vol.
Lower Detectable Limit (LDL)	2% of full scale		0.1% Vol.	2% of full scale				
Response Time (T-90)	LEL - 30 Seconds	LEL H2 - 20 Seconds	20 Seconds	35 Seconds		30 Seconds	30 Seconds	30 Seconds
Accuracy	+/- 5% of full scale (0.5% volume for oxygen)							
Life Expectancy	2 to 3 years with normal service	3 to 5 years with normal service	2 to 3 years with normal service			5 years plus with normal service		
Operating Environment								
Location	Indoor or outdoor. Explosion proof for Class I, Groups B, C, and D atmospheres.							
Temperature	-40°F to 167°F -40°C to 75°C		-4°F to 113°F -20°C to 45°C	-40°F to 104°F -40°C to 40°C	23°F to 104°F -5°C to 40°C	-4°F to 122°F -20°C to 50°C		
Humidity	0 - 99% RH non condensing							
Housing								
Housing J-Box	Cast aluminum, explosion-proof, optional stainless steel J-box available							
Sensor	Stainless steel, explosion-proof							
Approvals	61-1000RK UL 61-1000RK-05 CSA	61-1001RK UL	CSA NRTL			$_{C}$ UL $_{US}$		
Controllers	Compatible with the following controllers: Beacon 110, Beacon 200, and Beacon 410							
Warranty	One year materials and workmanship							

Non Explosion Proof

	O2 Oxygen	H2S Hydrogen Sulfide	CO Carbon Monoxide	Toxics	CO2 Carbon Dioxide
 **Sensor With J-Box**	65-2497RK *65-2502RK	65-2498RK	65-2499RK	See Chart Below	61-1007RK-02 61-1007RK-03 61-1007RK-05 61-1007RK-10
Sensors	Galvanic cell	Electrochemical			Infrared
 **Sensor Only**	65-2494RK *65-2510RK	65-2495RK	65-2496RK	See Chart Below	61-0198RK-02 61-0198RK-03 61-0198RK-05 61-0198RK-10
Measuring Range	0-25% Vol.	0-100 ppm	0-300 ppm		0 - 5000 ppm 0 - 5.0% Vol. 0 - 50% Vol. 0 - 100% Vol.
Lower Detectable Limit (LDL)	0.1% Vol.	2% of full scale			
Response Time (T-90)	20 seconds or less	35 seconds or less		60 seconds or less	30 seconds or less
Accuracy	+/- 5% of full scale (0.5% volume for oxygen)				
Life Expectancy	2 years with normal service	2 to 3 years with normal service			5 years plus with normal service
Operating Environment					
Location	Indoor or outdoor, Class I, Div. 2				
Temperature	-4°F to 122°F -20°C to 50°C			14°F to 104°F -10°C to 40°C	-4°F to 122°F -20°C to 50°C
Humidity	0 - 99% RH non condensing				
Housing					
Housing J-Box	Cast aluminum, explosion-proof				
Sensor	Stainless steel, explosion-proof				
Controllers	Compatible with the following controllers: Beacon 110, Beacon 200, and Beacon 410				
Warranty	One year materials and workmanship				

* Partial pressure sensor for helium (He) applications. Consult factory for details.

Toxic Sensor Transmitter Ordering Information (includes junction box)			
Part Number With J-Box	**Part Number Without J-Box**	**Gas**	**Range**
65-2301RK-AsH3	65-2300RK-AsH3	Arsine (AsH3)	0 - 1.5 ppm
65-2301RK-NH3	65-2300RK-NH3	Ammonia (NH3)	0 - 75.0 ppm
65-2301RK-Cl2	65-2300RK-Cl2	Chlorine (Cl2)	0 - 3.00 ppm
65-2301RK-HCN	65-2300RK-HCN	Hydrogen Cyanide (HCN)	0 - 15 ppm
65-2301RK-PH3	65-2300RK-PH3	Phosphine (PH3)	0 - 1.00 ppm
65-2301RK-SO2	65-2300RK-SO2	Sulfur Dioxide (SO2)	0 - 6.00 ppm

DIRECT CONNECT SENSORS

A 

B 

C 

D 

Available Accessories

A. Calibration adaptors

B. Flow through adaptors

C. Remote horns & lights

D. Calibration kits

E. Battery backups

F. Splash guards

G. Air aspirator adaptors / panels

H. Dataloggers

Direct Interface with Beacon 110 / 200 / 410 Controllers

Direct Connect Wiring Matrix		
Sensor	Number of Wires to Controller	Maximum Distance to Controller 18 AWG wire min.
LEL / CO2	4	500 ft.
Oxygen	2	500 ft.
H2S	2	500 ft.
CO	2	500 ft.
Toxics	2	500 ft.

Made in the USA

Authorized Distributor:

10000363 ISO 9001

Gas Detection For Life

SECTION VIII
STATTIC MIXER

WESTFALL MANUFACTURING CO.

HEADLOSS CHART

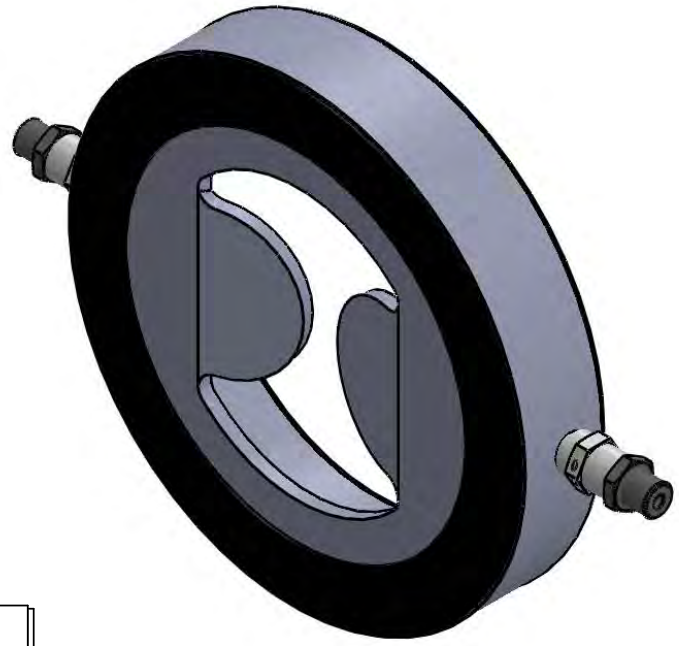
pipe ID ***10.02*** ***inches***

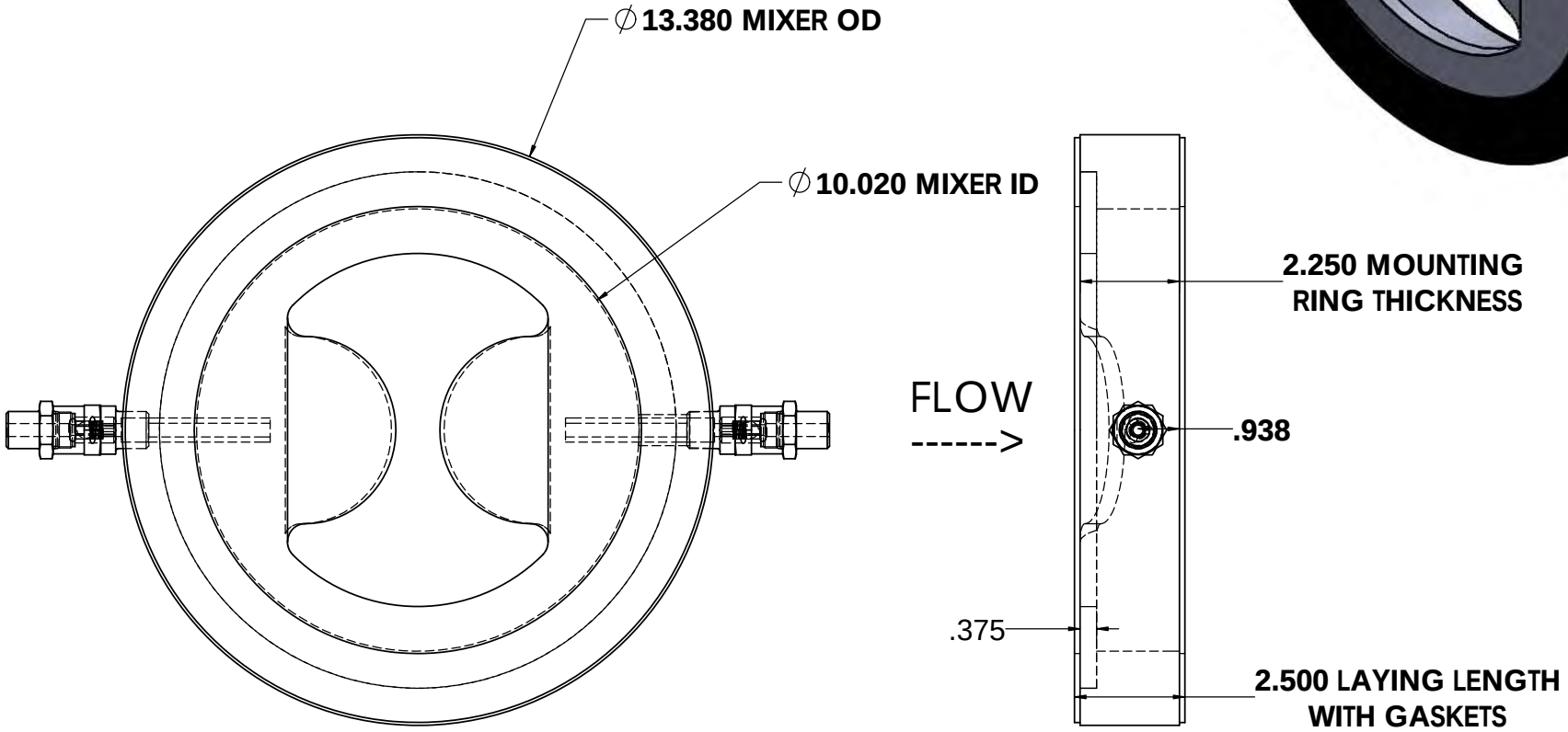
Pipe area 0.5476 ft2

GPM	CFS	ft/s	MODEL 2800 0.7 BETA psi Head loss	MODEL 2800 0.8 BETA psi Head loss	MODEL 2800 0.9 BETA psi Head loss	MODEL 3050 SINGLE psi Head loss	MODEL 3050 DOUBLE psi Head loss	MODEL 3050 TRIPLE psi Head loss
245.8	0.548	1.00	**0.22**	0.09	0.05	0.004	0.008	0.011
491.6	1.095	2.00	**0.88**	0.37	0.18	0.015	0.030	0.044
737.3	1.643	3.00	**1.97**	**0.82**	0.41	0.034	0.068	0.099
983.1	2.190	4.00	3.51	**1.47**	0.73	0.060	0.122	0.176
1228.9	2.738	5.00	5.48	**2.29**	1.14	0.094	0.190	0.276
1474.7	3.286	6.00	7.89	**3.30**	1.64	0.135	0.274	0.397
1720.5	3.833	7.00	10.74	**4.49**	2.24	0.184	0.372	0.540
1966.2	4.381	8.00	14.03	**5.87**	**2.92**	0.240	0.486	0.706
2212.0	4.928	9.00	17.75	7.42	**3.69**	0.303	0.616	0.893
2457.8	5.476	10.00	21.92	9.17	**4.56**	0.375	0.760	1.103
2703.6	6.024	11.00	26.52	11.09	**5.52**	0.453	0.920	1.335
2949.4	6.571	12.00	31.56	13.20	**6.57**	0.539	1.094	1.588

10" WESTFALL STATI CMIXER MODEL 2800
CPVC MOUNTING RING
(1) .8 BETA CPVC MIXING PLATE
(2) 1/2" NPT PORTS
(2) 1/8" VITON GASKETS

SHOWN WITH:
(2) 1/2" CPVC QUILL WITH CHECK VALVE





CLIENT APPROVAL:
APPROVED BY: DATE:

PRINT NAME: TITLE:

COMPANY:

WESTFALL

WESTFALL MANUFACTURING COMPANY
15 BROAD COMMON ROAD, BRISTOL RI 02809 U.S.A
P: 401-253-3799 F: 401-253-6530 www.westfallmfg.com

WESTFALL STATIC MIXER
MODEL 2800 - 10"

DIMENSIONS ARE IN INCHES (UNLESS OTHERWISE NOTED)

SCALE	DATE	PROJECT
	1.21.2013	EQUIPMENT
DRAWN BY: SAO	CHECKED BY	PLANT
	APPROVED BY	SHEET
		DWG. NO. 10-2800-B

SECTION IX
SPARE PARTS

1401 West Cypress Creek Road
Suite 100
Fort Lauderdale FL 33309-1969

Phone 1.888.PARKSON
Fax 954.974.6182

SERVICE and SPARE PARTS

For service please call 1-888-PARKSON (727-5766)
Contact: Customer Service Manager

For spare parts please call 1-888-PARKSON (727-5766)
Contact: Spare Parts Manager
Spare Parts Coordinator

Fax 954-974-6182

Spare Parts List – Part #500-00448-A

	ITEM NUMBER	DESCRIPTION	QTY
1	301-00207	BRINE PUMP GEAR TYPE, MAGNETICALLY COUPLED	1
2	300-02545	SENSOR FLOW LOW PVDF BODY, FPM O-RING	1
3	300-01866	ADAPTER ELL 3/4 MT X 3/8 BARB PVDF	1
4	300-01354	ADAPTER PUSH 1/4 MT X 3/8 TB PVDF	1
5	300-01644	FILTER CARTRIDGE, 9.75” 5 MIC GRADED, DENSITY PP	12

Parkson
Treating Water Right

MaximOS™

Water Quality

For

On-Site Generators

1 Water Quality

The factors listed below can affect the oxidant demand of each individual water system, the oxidant production of the Parkson OSG, or the life of the cell itself. It is important to use "worst case" measures since water quality can vary from season to season. Concentrations or measurements in brine feed water and/or treated water that are less than the stated limits are not anticipated to have an impact.

			WHAT IS IMPACTED		
	MEASURE	LIMIT	Oxidant Demand	Chlorine Production	Cell Life
Total Hardness**	mg/L (or grains/gal)	< 17.1 mg/L (1 grain/gallon)		✓	✓
Iron (Fe)†**	mg/L	< 1 mg/L	✓		✓
Manganese (Mn)**	µg/L	< 50 mg/L	✓	✓	✓
Fluoride (Fl)	mg/L	< 1 mg/L			✓
Silica (SiO_2)	mg/L	< 80 mg/L		✓	✓
Bromide	mg/L	< 50 mg/L			✓
Cyanide	mg/L	< 1 mg/L			✓
Lead	mg/L	< 2 mg/L			✓
Dissolved Sulfides (as H_2S)	mg/L	***	✓		
Ammonia Nitrogen (NH_3-N)	mg/L	***	✓		
Organic Nitrogen (Org - N)	mg/L	***	✓		
Total Organic Carbon (TOC)	mg/L	***	✓		
pH	-	5-9		✓	✓
Water Temperature Range	°C °F	>4.4°C <35°C**** >40°F <95°F****		✓	✓

** Caution water softeners will remove these components up to a limit. See references to maximum ferrous iron and manganese in water softener documentation. Total hardness affects cell life only in that higher hardness requires acid washing to remove carbonate deposits from the cell. Use of water softened < 1 grain hardness should not require acid washing of the cell.

*** Oxidant demand is affected by any level of H2S, ammonia or organic nitrogen, or TOC.

**** Between 40˚F and 50˚F salt usage will go up ≈ 20-25% and power usage will go down ≈ 10%. Between 80˚F and 95˚F salt usage will go down ≈ 10% and power usage will go up ≈ 10%

† Iron may deposit Fe(OH3) on the anode, causing an electrical "blind", which would increase the brine proportion pump signal voltage (brine proportion pump speed) needed for the system to reach the operating window. Chlorine production would remain the same, but salt conversion efficiency will decrease. The same effect is true of silica on the cathode.

Water Temperature Guidelines For On-Site Generators

1 Water Temperature Guidelines

Supply feed water do impact the salt and power efficiencies of Parkson On-Site Generation Equipment. Temperatures are monitored with temperature probes (thermowells) in order to protect the system from temperature extremes.

Parkson has a recommended supply water temperature range which will keep the On-site Generation Equipment within the industry standard of salt and power consumption rates.

Salt and power consumption rates do have a direct impact of the overall operationally cost of On-Site Generation Equipment. In some scenarios, allowing a wider range of supply water temperatures will allow for a more overall cost-effective operational cost by reducing the capital cost and maintenance cost of a chilling or heater system.

1.1 Recommended Temperature Ranges

50°F to 80°F (10°C to 26.67°C)

1.2 Lower Allowable Temperature Ranges

40°F to 50°F (4.44°C to 10°C)

- Salt Efficiencies: Increased between ~20% to ~25%
- Power Efficiencies: Decreased 10%

Supply feed water temperatures below 40°F (4.44°C) will cause damage to the anodes in the electrolytic cell.

1.3 Upper Allowable Temperature Ranges

80°F to 95°F (26.67°C to 35°C)

- Salt Efficiencies: Increased between ~20% to ~25%
- Power Efficiencies: Decreased 10%

Supply feed water inlet temperatures in excess of 95°F (35°C) will cause reduced production of chlorine.

Series		Below 40 °F to 50 °F	Recommended 50 °F to 80 °F	Above 80 °F to 95 °F
AE	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~3.15	3.50	~4.00
SM	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~2.70	3.00	~3.45
MM	Salt (lb Salt/lb FAC)	~3.13	2.50	~2.25
	Power (kW-hr/lb FAC)	~3.15	3.50	~4.00
LM	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~2.70	3.00	~3.45
SH	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~1.80	2.00	~2.30
SCH	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~1.80	2.00	~2.30
MH	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~1.80	2.00	~2.30
MH-SC	Salt (lb Salt/lb FAC)	~3.13	2.50	~2.25
	Power (kW-hr/lb FAC)	~3.15	3.50	~4.00
LH	Salt (lb Salt/lb FAC)	~3.75	3.00	~2.70
	Power (kW-hr/lb FAC)	~1.80	2.00	~2.30

Table 1 - Degrees Fahrenheit

Series		Below 4.44 °C to 10 °C	Recommended 10 °C to 26.67 °C	Above 26.67 °C to 35 °C
AE	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~6.93	7.70	~8.86
SM	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~5.94	6.60	~7.59
MM	Salt (kg Salt/kg FAC)	~3.13	2.50	~2.25
	Power (kW-hr/kg FAC)	~6.93	7.70	~8.86
LM	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~5.94	6.60	~7.59
SH	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~3.96	4.40	~5.06
SCH	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~3.96	4.40	~5.06
MH	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~3.96	4.40	~5.06
MH-SC	Salt (kg Salt/kg FAC)	~3.13	2.50	~2.25
	Power (kW-hr/kg FAC)	~6.93	7.70	~8.86
LH	Salt (kg Salt/kg FAC)	~3.75	3.00	~2.70
	Power (kW-hr/kg FAC)	~3.96	4.40	~5.06

Table 2 - Degrees Celsius

Parkson
Treating Water Right

MaximOS™

Salt Guidelines
For
On-Site Generators

Content

1 General Information

Parkson Corporation places importance on the quality of salt used in operating on-site generation equipment. High quality salt minimizes expense and customer equipment maintenance issues while maximizing the quality of the water treated using Parkson equipment. Parkson recommends food grade salt to help optimize the MaximOS™ system(s) performance. Because contaminants can vary widely, even within the same mine, it is vital to request the most recent site specific contaminant analysis. The contaminant analysis should document the date that quality control was performed and the physical location where the salt was mined and processed. Parkson recommends that our customers regularly request salt product data sheets from the manufacturer to ensure consistent quality control. A reputable supplier will include the date of the quality analysis on the specification sheet in addition to the salt mine location. Please note, higher quality salt alone will not ensure reduced maintenance. Water used by the MaximOS™ system must be softened adequately as well.

2 Warranty

Parkson continually strives to review and address all warranty claims in an equitable manner. It is important for our customers to understand that the use of poor quality salt may impact warranty claims. Parkson does not accept liability for any salt selected by the customer for use in MaximOS™ equipment. Parkson reserves the right to deny any claims that could be considered under warranty if the equipment or electrolytic cell is performing below specification or is damaged due to contamination caused by, but not limited to, calcium, magnesium and insoluble material in a salt selected by the customer. NOTE: self-cleaning MaximOS™ systems require the use of salt with a purity of 99.5% NaCl or greater (typically food grade) as described in the "Salt Purity" section below or the warranty is void.

3 Salt Purity

For all **self-cleaning systems**, only salt with a purity greater than 99.5% may be used (typically food grade) or the warranty is void. For all **non-self-cleaning systems**, Parkson recommends salt with a purity level of 99.5% NaCl or greater. Table 1 depicting what Parkson recommends for **non-self-cleaning systems** and what Parkson requires to keep the warranty intact for **self-cleaning systems**. Cationic, anionic, or non-ionic organic polymers are often added as flocculant aids to increase the density and "toughness" of slow-settling floc. In waters of exceptionally high turbidity due to colloidal clays (as is seen often in the Midwest), some treatment plants are able to destabilize the colloidal clays using flocculant aids alone without the primary coagulant chemicals.

Component	Percent Minimum
NaCl (dry)	99.5%
Impurity	**Percent Maximum**
Calcium (in all forms)	0.01%
Magnesium (in all forms)	0.01%
Manganese	0.00002%
Iron (as Fe)	0.0005%
Insoluble	0.005%

Table 1

For several reasons, salt quality is highly variable and Parkson cannot control the quality processes at salt manufacturing sites. Typically, salts with fewer contaminants are more expensive because of additional purification steps during processing. Salt manufacturers usually provide salt product data sheets that list contaminants of concern in each type of salt they sell. Customers assume that the delivered salt will meet the specifications provided by the manufacturers. However, not all contaminants of concern for a specific application will be listed. For example, bromide in salt used for electrolysis can elevate the concentration of bromate in the treated water. Bromate is a water quality concern in drinking water applications, but not necessarily industrial applications.

There are three primary contaminants commonly listed in a salt product data sheet that impact the electrolytic cell; calcium (Ca), magnesium (Mg) and insoluble material. High calcium and magnesium salt concentrations cause accumulation of calcium/magnesium carbonate and magnesium hydroxide in the electrolytic cell. Fouling by these deposits in the cell is the single largest cause of maintenance issues. Insoluble material or solids present in the salt that do not dissolve in water can also deposit in the cell along with carbonates. This co-deposition tends to reduce the effectiveness of acid to remove the carbonates. As a result, longer acid wash times and sometimes physical scrubbing of the cell plates is required to remove the deposit. Other contaminants, such as manganese (Mn) and iron (Fe), are known to affect cell performance by producing an oxide layer that increases the degradation rate of the plates. Parkson recommends that the manganese and iron concentrations in salt not exceed 20 parts per billion in the electrolyte solution entering the cell. Manganese and iron are not included in Parkson's salt specification maintenance worksheet because they are not often reported on salt product data sheets. However, low concentrations of Mg and Ca are associated with low concentrations of Mn and Fe.

MaximOS's Salt Specification Maintenance Worksheet versus Salt Manufacturer's Product Data Sheets.

Although Parkson makes recommendations on the ideal salt for use in the on-site generation process, it is the customer's responsibility to obtain a salt quality analysis (salt specification or product data sheet) from the supplier and determine its suitability for their situation, region and application.

The salt manufacturer's product data sheet should contain information regarding the amount of calcium, magnesium and insoluble material in the salt at a minimum. Parkson and its customers use this standard information to estimate the amount of maintenance that is associated with these contaminants. This salt specification maintenance table is shown in Table 2.

	Lower Limit	Upper Limit	Maintenance
Calcium (Ca) (%)	0.000%	0.020%	Acid wash for 20 minutes at 3,000 hrs / quarterly
	0.020%	0.05%	Acid wash for 20 minutes at 750 hrs / monthly
	0.050%	0.08%	Acid wash twice for 20 minutes each at 24 hrs / daily
	0.080%	---	Calcium Too High
Magnesium (Mg) (%)	0.000%	0.020%	Acid wash for 20 minutes at 3,000 hrs / quarterly
	0.020%	0.05%	Acid wash for 20 minutes at 750 hrs / monthly
	0.05%	0.08%	Acid wash twice for 20 minutes each at 24 hrs / daily
	0.08%	---	Magnesium Too High
Insolubles (%)	0.000%	0.01%	Change brine filter at 750 hrs / monthly
	0.010%	0.05%	Change brine filter at 325 hrs / biweekly
	0.050%	0.1%	change brine filter at 24 hrs / daily
	0.10%	---	Insolubles Too High

Table 2

Please note that the manufacturer's product data sheets do not always give these contaminant concentrations in a standard form and the listing may refer to a brand of salt sourced from different salt mines. Different salt mines have different quality parameters. Be sure to request the salt product data sheet that is specific to the salt you will use in the MaximOS™ system, including the mine location. For drinking water applications, the amount of bromide that may be present in certain salts should be evaluated because bromide can be converted to bromate in the cell.

4 Additives

Most salts have four basic types of additives:

- Hardening agent (Sodium Hexametaphosphate or SHMP)
- Cleanser (Citric Acid based)
- Free flowing/anti-caking agent (Yellow Prussiate of Soda or YPS)
- Detergents/surfactants

Parkson does not recommend the use of salt with additives. However, some customers have successfully used salts with these additives. Note that detergents/surfactants in the salt may cause foaming in the oxidant tank and reduce the effectiveness of the hydrogen venting system due to foam. It may be necessary to increase the vent pipe size. Organic additives such as citric acid can also be a source for additional trihalomethanes and haloacetic acids.

5 Physical Salt Size

Salt that is coarse or extra coarse is preferred. Granular or pelletized salt can be used equally well but requires some extra attention. Pellets that are larger than about ½ inch in size dissolve slowly and can contribute to poor brine concentration in the brine tank, particularly when the salt level is low in the tank. For this reason, it is important to keep the brine generator filled at all times. Also, pelletized salt is too heavy to be pneumatically blown into large bulk brine generators.

6 Brine Filtration

Higher purity salt is often table quality, or food grade salt, in granular form. While this salt will work well, it requires an adaptation for both types of brine generators sold by Parkson, including the ton-sized bulk brine generators and the smaller brine generators with up to 1,000 gallons capacity. The large bulk brine generators must be filled with a two-layer washed quartz rock bed to avoid clogging of the brine intake port. The bottom layer should be 7 inches of quartz rock deep, using rock sizes between ¼ and ½ inch. The top layer should be 5 inches of quartz rock deep, using rock sizes between 1/8 and ¼ inch in size.

For smaller brine generators that utilize granular (fine grain) salt, a special in-tank roughing filter assembly must be used. Contact Parkson for details on this filter assembly. External to the brine generator and prior to the MaximOS™ on-site generator cabinet, a 5-micron filter is required. This usually takes the form of a 10-inch standard filter housing with a 5-micron pleated filter cartridge element. A dual filter housing arrangement is also available to facilitate filter change-out while the systems are operational.

7 NSF Standard 60 Salt

Several state regulatory agencies are now requiring that the source material feeding on-site generators (i.e., salt) must be NSF-60 listed to ensure that no hazardous materials ultimately enter the drinking water supply. NSF-60 ensures that chemicals in contact with drinking water are safe and non-toxic to the drinking water supply. For a list of salt suppliers that offer NSF-60 listed salt, refer to the NSF web site at www.nsf.org. Product and service listings may be found at www.nsf.org/business/search_listings/

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Hydrogen Safety White Paper

Table of Contents

1. INTRODUCTION – GENERAL HYDROGEN SAFETY PRECAUTIONS

A. Introduction

All electrolytic cells that utilize water as a component of the electrolyte generate hydrogen gas in the cell. Parkson manages the risk associated with this hydrogen by engineering safety barriers into all phases of equipment design. These multiple safety barriers have been proven to significantly reduce hydrogen risk and ensure safety, reliability and cost-effectiveness. This document details the advantages of the engineered safety barriers designed to mitigate hydrogen by system component.

Parkson has an outstanding hydrogen safety record, and has been recognized by Hydrogen Safety, LLC as the leader in hydrogen safety for the On-Site Generator (OSG) market.

B. General Hydrogen Safety Precautions

- HYDROGEN GAS IS PRODUCED IN ANY ELECTROLYTIC PROCESS AND SHOULD BE ASSUMED TO BE PRESENT IN THE OXIDANT TANK AND ROOM WHERE THE OXIDANT GENERATOR IS LOCATED.
- NO SMOKING OR IGNITION SOURCES IN VICINITY OF THE OXIDANT TANK.
- REMOVE THE OXIDANT TANK LID AND VENT THE TANK AT LEAST ONE HOUR PRIOR TO TANK MAINTENANCE. ENSURE ADEQUATE FACILITY VENTILATION.
- USE OSHA CONFINED SPACE PROCEDURES WHEN ENTERING ANY OXIDANT TANK.
- VERIFY INTEGRITY OF THE LIQUID BARRIER, DILUTION AIR, OR STANDPIPE SYSTEMS TO THE OUTSIDE OF BUILDING.
- THE DROP TUBE SYSTEM INSIDE THE OXIDANT TANK(S) MUST BE IN PLACE PRIOR TO SYSTEM OPERATION.
- HYDROGEN VENT PIPING SHALL HAVE NO VALVES, DROP LEGS (FOR ACCUMULATION OF LIQUID) OR OTHER BLOCKAGE AND SHALL BE ADEQUATELY SIZED TO AVOID BACKPRESSURE.
- IF THE ON-SITE GENERATOR IS MODIFIED OR EXPANDED, CONSULT PARKSON OR TECHNICAL EXPERT TO ENSURE TANK VENT MEETS NEW SYSTEM CAPACITY.
- FOR MULTIPLE OXIDANT TANK SYSTEMS, ENSURE THE LIQUID BARRIER HYDROGEN VENT SYSTEM IS NOT CROSS VENTILATED BETWEEN TANKS .
- FOR THE DILUTION AIR VENTILATION SYSTEM, CROSS VENTILATION, OR SERIES VENTILATION, IS ACCEPTABLE. HOWEVER, DO NOT CROSS CONNECT THE LIQUID BARRIER VENT SYSTEM WITH THE DILUTION AIR SYSTEM. THE VENT SYSTEMS MUST BE VENTED SEPARATELY TO THE OUTSIDE OF THE FACILITY.
- DO NOT ADD CHEMICALS OTHER THAN OXIDANT TO THE OXIDANT TANK.
- ENSURE INSTALLATION AND FACILITY DESIGN IS IN CONFORMANCE WITH STATE AND NATIONAL BUILDING AND SAFETY CODES.

2. GENERAL HYDROGEN FACTS

Hydrogen has flammability limits which are considerably wider than for most other flammable gasses. The lower explosive limit (LEL) of hydrogen is 4.1% by volume in air. A concentration of hydrogen in air less than 4.1% will not be explosive because it is too “lean” in fuel. Likewise, the upper explosive limit (UEL) of hydrogen is 74.2% by volume in air. Therefore a mixture of air containing greater than 74.2% hydrogen will not be explosive, it is too “rich” in fuel. The energy to ignite hydrogen in air is also very low at .017 mJ.

Hydrogen gas (H2) is the lightest of the gases with a vapor density of 0.069 (relative to that of air taken to be 1.0), and smallest in molecular size, making hydrogen gas difficult to contain. As such, hydrogen gas will tend to rise rapidly in a normal room atmosphere, seek the highest point in a room or container, and tend to diffuse through most materials of building construction.

For an electrolytic cell, the calculated hydrogen generation rate is 6.96 milliliter per amp-minute for each active anode electrode at standard temperature (0 ^{o}C) and pressure (1 atmosphere pressure).

3. MAXIMOS™ CELL DESIGN MITIGATES HYDROGEN RISK

Parkson Corporation’s electrolytic cells are designed for minimum cell dead volume. Excess space in the cell provides space for hydrogen gas to accumulate. By keeping the available gas volume to a minimum, the risk of creating an explosive condition is minimized. Figure 1 shows the relative gas volumes available in the MaximOS™ cells versus conventional circular cell design configurations.

All MaximOS™ cells are designed for low rupture pressure. The cells are typically operated at 15 psi or less and each cell is leak tested to 25 psi. By keeping the rupture pressure of the cell relatively low, less pressure can develop before a cell breach occurs should a hydrogen incident happen. To ensure a low pressure system, a rupture disk is located on the cell inlet. When cell pressure exceeds 28 psi the rupture disk will fail and the system will fault. This failure provides a release path for built up pressure in the cell, greatly decreasing the severity of an overpressure event in the cell.

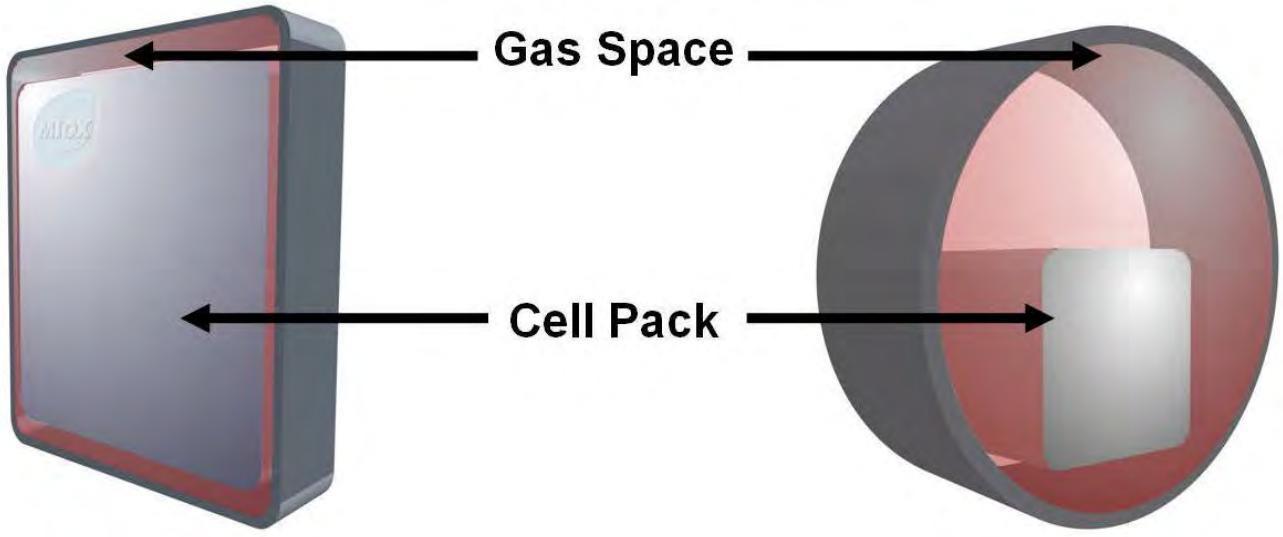


Figure 1 Gas Volume in MaximOS™ Cell vs. Conventional Cells

4. MAXIMOS™ OSG ENCLOSURES LOWER HYDROGEN RISK

A. The MM, MH and MH-SC systems

To protect operators from a hydrogen or pressure event that may occur within the cell, the larger MaximOS™ systems (whether mixed-oxidant or sodium hypochlorite generators) are housed in an aluminum frame structure combined with rotational-molded, double-walled, linear polyethylene close-out panels that are attached on all sides using ¼-20 stainless-steel fasteners as shown in Figure 2. No latches are employed on the cell compartment access panels. The cell is positioned on a rotational-molded tray that provides downward impact resistance due to the material flexibility. The panels are configured to be hollow with 1/8 inch thick wall sections that are spaced variously (wall to wall spacing) up to 3.00 inches providing flexibility and overpressure expansion allowance to contain any loose components that may be ejected from a ruptured cell. The panels not only provide double wall flexible impact resistance, but the windows in the cell compartment are polycarbonate (Lexan) to provide additional flexibility and safety, and are adhesive bonded to the inner window frame section. The upper cell close-out panel includes a vented window that is attached from the outside with nylon cap-head screws to provide an immediate blow-out path. The removable panels incorporate vent holes within the panels to exhaust gases that may be ejected in a cell detonation event. To verify the integrity of this design concept, the system was rigorously safety tested.

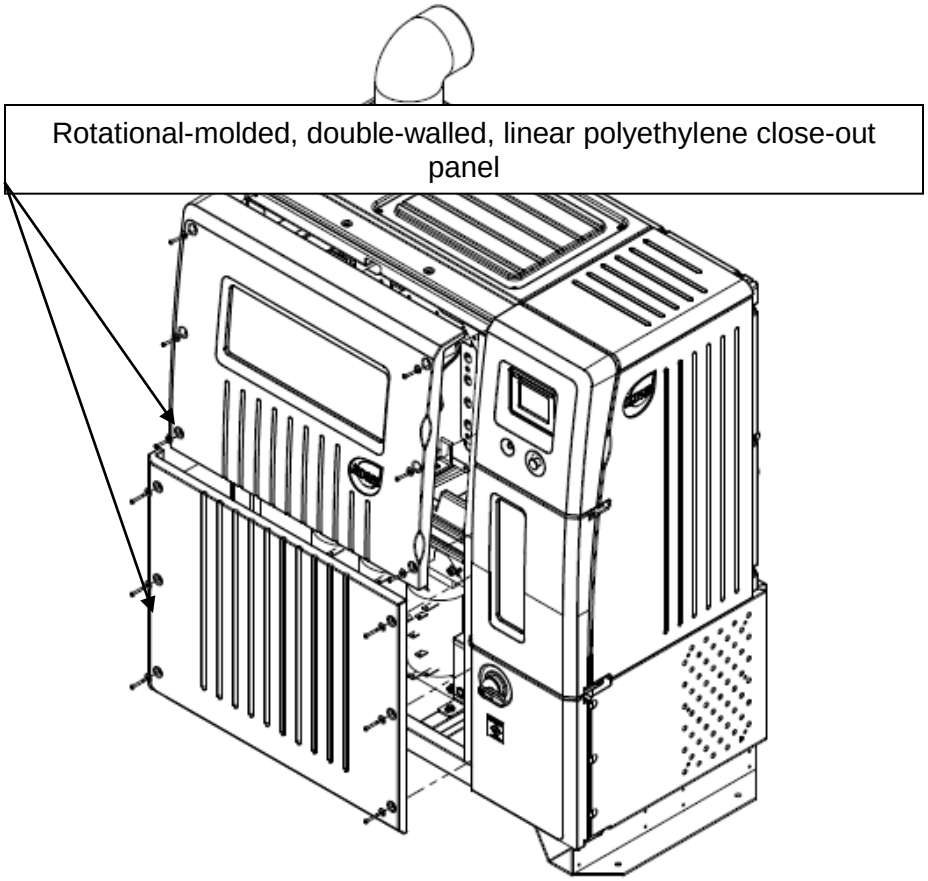


Figure 2

5. LIQUID BARRIER HYDROGEN VENT SYSTEM

The Liquid Barrier Hydrogen Vent (LBS) system (see Figure 3) uses a gas trap system to prevent hydrogen gas produced during the electrolysis process from entering the oxidant storage tank. Each oxidant tank is equipped with a drop tube in the oxidant tank that hydraulically locks the oxidant solution similar to a “P-trap” system in household plumbing. The hydraulic lock creates a liquid barrier preventing hydrogen gas from entering the oxidant storage tank.

The materials of construction for Oxidant Tank Vent and the Liquid Barrier Hydrogen Vent must be CPVC piping as specified by Parkson, and they should be run at least 12” clear of any heat or electrical sources, such as overhead lights or control boxes. No metal piping material may be used for these vents.

The generally accepted limit for hydrogen accumulation is 25% of the LEL, or 1% hydrogen by volume. These limits are easily maintained with the Liquid Barrier Hydrogen Vent System, and have been validated through rigorous testing.

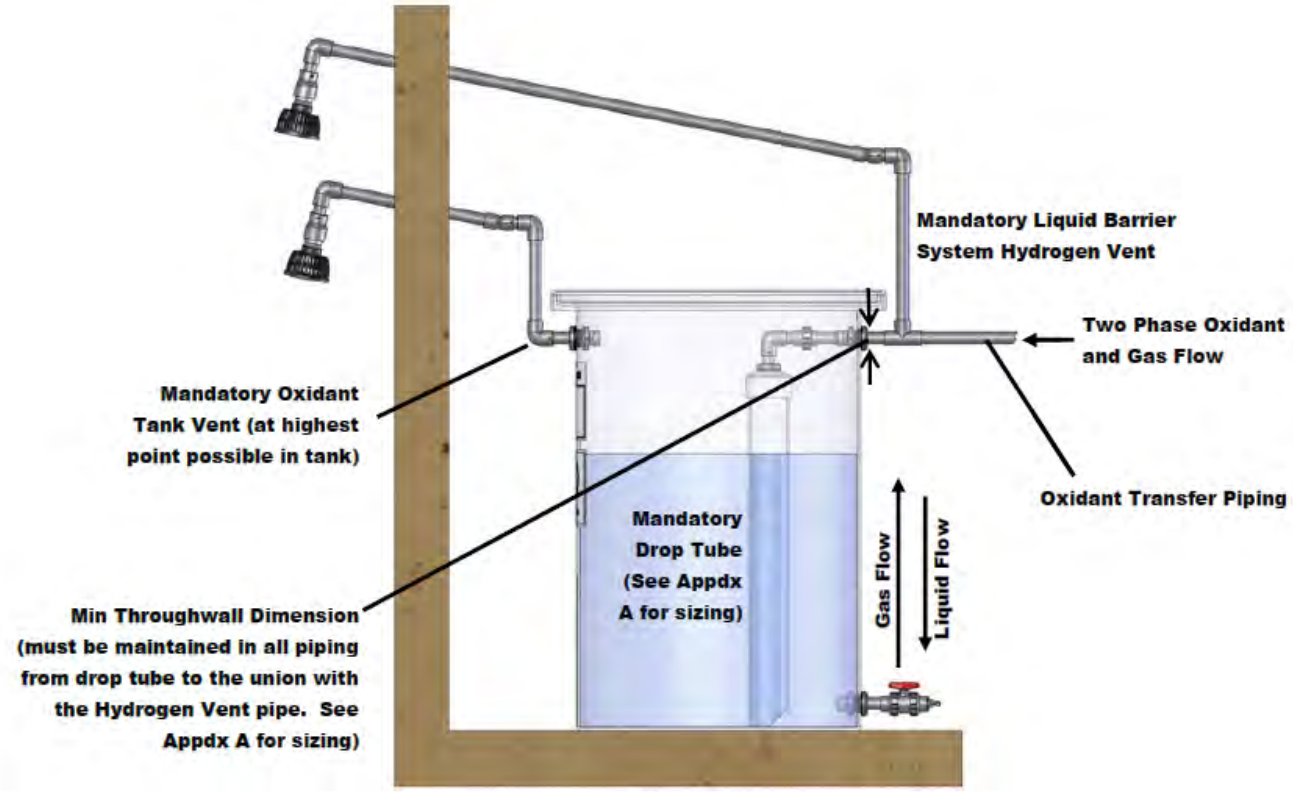


Figure 3 Liquid Barrier Hydrogen Vent System

A. Drop Tubes

The drop tubes are sized for each system to ensure hydrogen gas separation. The drop tube diameter must be of adequate volume to ensure that the downward velocity of fluid is slower than the upward flow of bubbles in the liquid stream (See APPENDIX A for proper sizing). Additional new oxidant generation capacity will increase the volume of fluid entering the drop tube. This may require that the drop tube diameter be increased to ensure effectiveness of the

system. The drop tube in the oxidant tank rests on the bottom of the tank. The bottom of the drop tube requires a notch with a 45 degree cut half way to the center of the pipe. The highest point in the drop tube notch must not extend more than 3 to 4 inches above the bottom of the tank to ensure that hydraulic “lock” occurs at a low liquid level in the bottom of the oxidant tank. The drop tube diameter should be maintained within the oxidant tank, through the penetration in the tank and just to the outside of the tank. The oxidant feed line from the on-site generator, as well as the liquid barrier system hydrogen vent lines, need to be plumbed into the larger diameter drop tube piping on the outside of the oxidant tank. This design allows the larger diameter drop tube piping external to the oxidant tank to act as a stagnation chamber for better separation of the liquid oxidant from the hydrogen gas. Most of the hydrogen gas will be trapped and vented through the liquid barrier system hydrogen vent that discharges external to the building.

B. Oxidant Tank Vent

During initial startup the drop tube system will not be hydraulically “locked” until the bottom of the drop tube is sufficiently covered by liquid. During this period, some residual hydrogen may enter the oxidant tank. Also, a very small amount of hydrogen will be dissolved in the oxidant solution; the amount is a function of the temperature of the oxidant. Over time, this dissolved hydrogen will evolve from the solution into the oxidant tank space. For these reasons, a separate oxidant tank vent connected to the oxidant tank at the highest point in the tank is required. This oxidant tank vent line should be routed separately to the outside of the facility to avoid any possibility of cross ventilation between the drop tube and hydrogen vent systems. On multiple oxidant tank systems, the vent systems from each tank should be routed separately to the outside of the facility. In this manner, a tank that has been drained for service or cleaning will not have a common hydrogen vent header that could possibly allow hydrogen from the active oxidant tank to be transferred through common vent piping to the tank that is drained for service.

In general, the oxidant transfer piping between the on-site generator and the oxidant storage tank must be adequately sized to maintain a reasonably low velocity of the two-phase flow of fluid and gas within the piping to the oxidant storage tank. The piping diameter must be adequately sized for the flow from all of the cell modules tied to the manifold, whether or not all of the cell modules are intended to be operated at the same time (see APPENDIX A for details). Improperly sized oxidant transfer piping can cause backpressure in the system that can adversely affect the pressure within the cell as well as the proper flow rate in the cell. This can lead to cell damage. Improper oxidant transfer piping size can also cause high velocities within the piping that can entrain liquids into the hydrogen vent piping. The result is that liquid is carried out of the hydrogen vent piping which can cause oxidation damage to facilities and/or vegetation where the liquid drips from the end of the hydrogen vent piping outside the facility. This problem is particularly evident when water softener salt pellets are used in the system bring generator. Water softener salt pellets typically contain surfactants that can cause bubbles in the oxidant piping.

C. Oxidant Transfer Piping

It is usually desirable to have a sample port in the oxidant transfer piping in order to obtain oxidant samples for analysis. Parkson provides special OPEN-CENTER three-way ball valves with each cell module for this purpose. In addition, special Viton seat diaphragm check valves are supplied with all of the larger cell modules (25 pound per day production and greater) to prevent back flow of oxidant to the cell module when the specific cell module is in standby and other cell modules on the same oxidant manifold are operational.

To avoid shutoff of oxidant from the electrolytic cell during operation, it is important that no two-way valves or dead center three-way valves be installed in any portion of the oxidant transfer piping. This includes air or solenoid operated valves. Inadvertent closure of these valves during cell operation can cause immediate cell damage. Special open-center three way valve configurations can be assembled to allow selective transfer of oxidant from the oxidant manifold to any of several oxidant tanks. Consult Parkson Corporation for details.

D. Liquid Barrier System Hydrogen Vent

Liquid Barrier Hydrogen Vent piping (See Figure 3) must be properly sized to prevent high velocity liquid flow within the piping (See APPENDIX A). High velocity flow will prevent gas from separating from liquid in the drop tube, reducing the efficacy of the Liquid Barrier system. High velocities within the vent piping can cause backpressure and can decrease the effectiveness of the overall system. Liquid Barrier Hydrogen Vent piping must not incorporate any restrictions to flow in the pipe or flow restrictions at the discharge of the pipe (See Figure 4 and Figure 5). No valves of any type are permitted in the vent piping. In addition, the hydrogen or dilution air vent piping must be routed to avoid any liquid traps in the plumbing. If the piping includes low points, liquid can accumulate in the low points and act as a hydraulic lock to prevent free flow of gases. Under cold weather conditions oxidant vapor or liquid in the vent pipe could freeze and block flow. In freezing climates, the exit of the vent stack outside the facility should be evaluated to ensure that it is not subject to blockage from cold weather conditions. Vent piping should be routed straight up out of the facility or at a high point through a wall. The hydrogen vent piping should slope back towards the oxidant tank so that liquids can run back to the oxidant tanks.

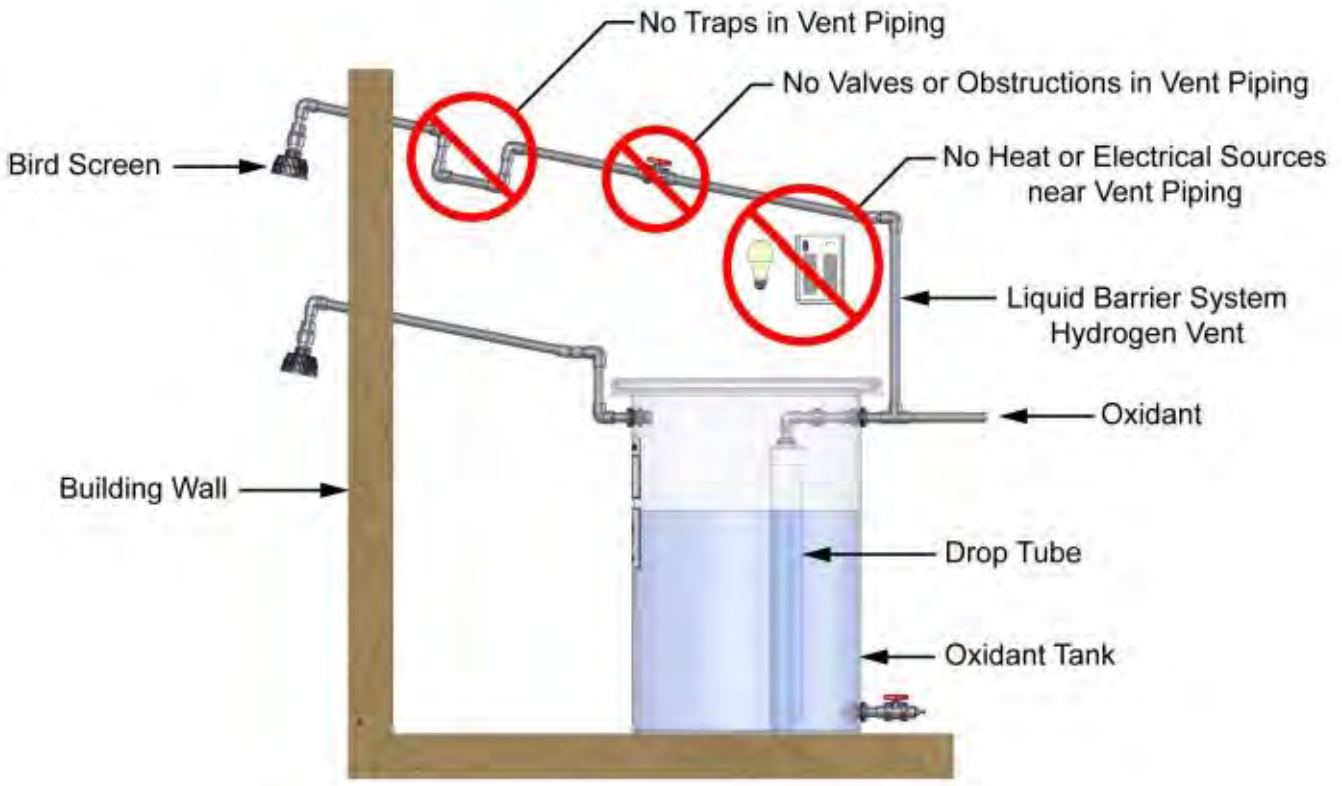


Figure 4 Liquid Barrier Hydrogen Vent Piping "Don'ts"

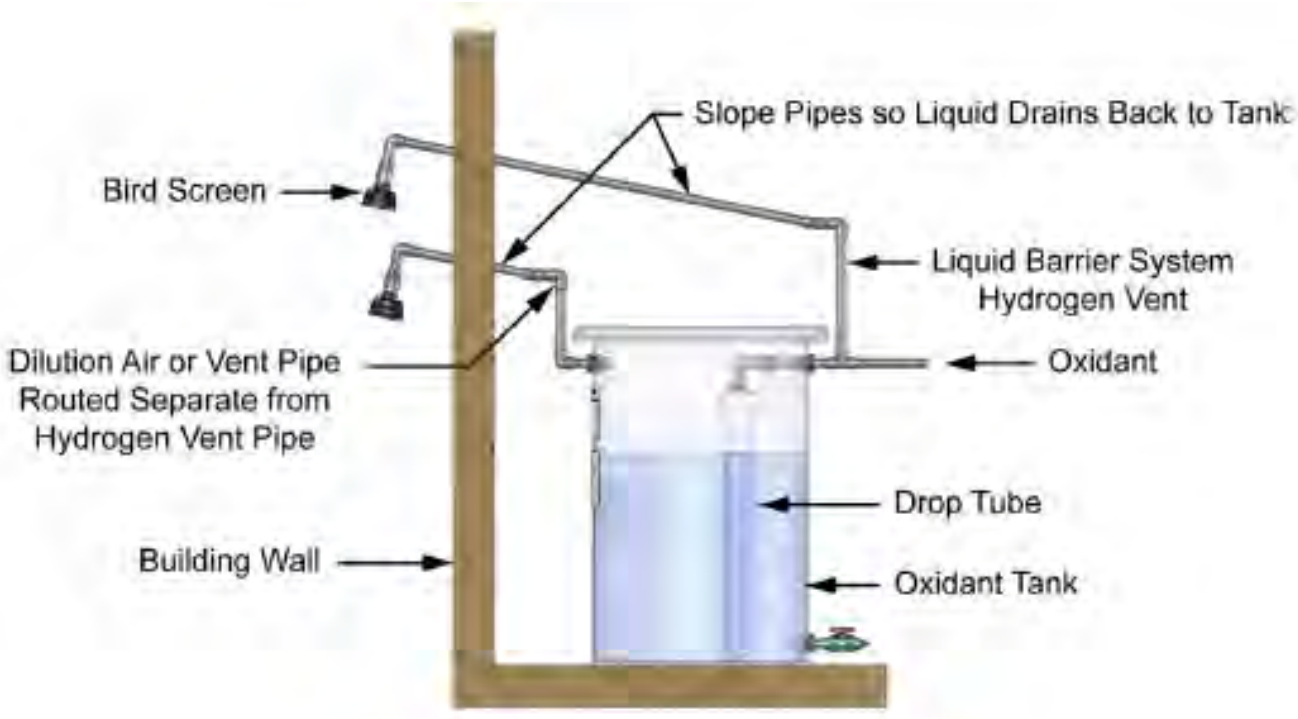


Figure 5 Liquid Barrier Hydrogen Vent Piping "Do's"

6. DILUTION AIR VENTILATION SYSTEMS

A. Dilution Air Vent System Principles

Dual fan-driven Dilution Air Ventilation systems are offered as a supplement to the standard Liquid Barrier Hydrogen vent system. All dilution air systems utilize redundant fans which blow air into the oxidant tank. The flow of the air into and out of the oxidant tank is enough to dilute the hydrogen concentration in the oxidant tank below 25% of the LEL. Thus, the gas in the oxidant tank would not ignite even in the presence of an ignition source. To provide discharge ventilation for the dilution air system, the oxidant tank incorporates a separate vent pipe (separate from the drop tube hydrogen vent pipe) at the top of the oxidant tank that is routed separately to the outside of the building.

By necessity, all dilution air vent systems operate under positive air pressure within the oxidant tank. Due to these conditions, the oxidant tank must be sealed. Many oxidant tanks come with vented covers. These vents must be sealed to prevent dilution air from exiting the oxidant tank. In addition, oxidant tanks may incorporate oxidant overflow ports. These ports may represent a source of dilution air discharge from the oxidant tank. To avoid this situation and still maintain the overflow, the overflow piping can incorporate a drop tube inside the oxidant tank. Internal to the oxidant tank, the overflow port should be plumbed with an elbow fitting and pipe extending down to the bottom of the oxidant tank. The end of the drop pipe should have a 45 degree angle cut in order to allow free flow of liquid in the pipe.

B. External Dilution Air Ventilation System

The External Dilution Air Ventilation system is configured as a dual fan system with check valves and an air flow switch to provide indication of loss of air flow, and alternate backup fan. The air flow switch is installed in the discharge piping downstream for the oxidant storage tanks just before the piping exits the facility. With the air flow switch located downstream, a leak in the oxidant tank or piping (such as a tank cover being removed) is indicated, and the system will shut down to prevent hydrogen accumulation inside the facility.

The external air vent system utilizes a separate air fan duct and plenum located external to the oxidant tank and low to the ground. The fan is a normal industrial fan that can be configured in most common electrical power arrangements. With the fan low to the ground and external to the duct, the possibility of introducing an electrical arc as an ignition source for hydrogen in the oxidant tank is minimized. The dilution air duct runs up the side of the oxidant tank and enters the oxidant tank near the top edge of the tank or on a “flat” on the top dome of the tank, or in the case of FRP tanks, in to the appropriate flange connection on the top of the tank. Information regarding Dilution Air Sizing can be found in APPENDIX B.

Dilution Air Ventilation systems are sized for the size of the installation, and therefore are available in a variety of ductwork pipe diameters. The duct size for the dilution air blower system is a function of pressure loss in the ductwork. As backpressure increases, blower output volume decreases. As such, backpressure must be minimized in order to maintain flow volume. An on-

line program that can calculate the pressure loss in PVC ducting is located at: http://www.freecalc.com/gasfram.htm

Parkson Corporation has selected the minimum size duct based on the appropriate flow rate and assumes 100 feet (33m) of duct piping, 6 long sweep ells, and air flow check valves. More complex duct routing systems may need to be evaluated for the specific application. A graphical representation of both the Liquid Barrier Vent System and External Dilution Air vent system is shown in Figure 6.

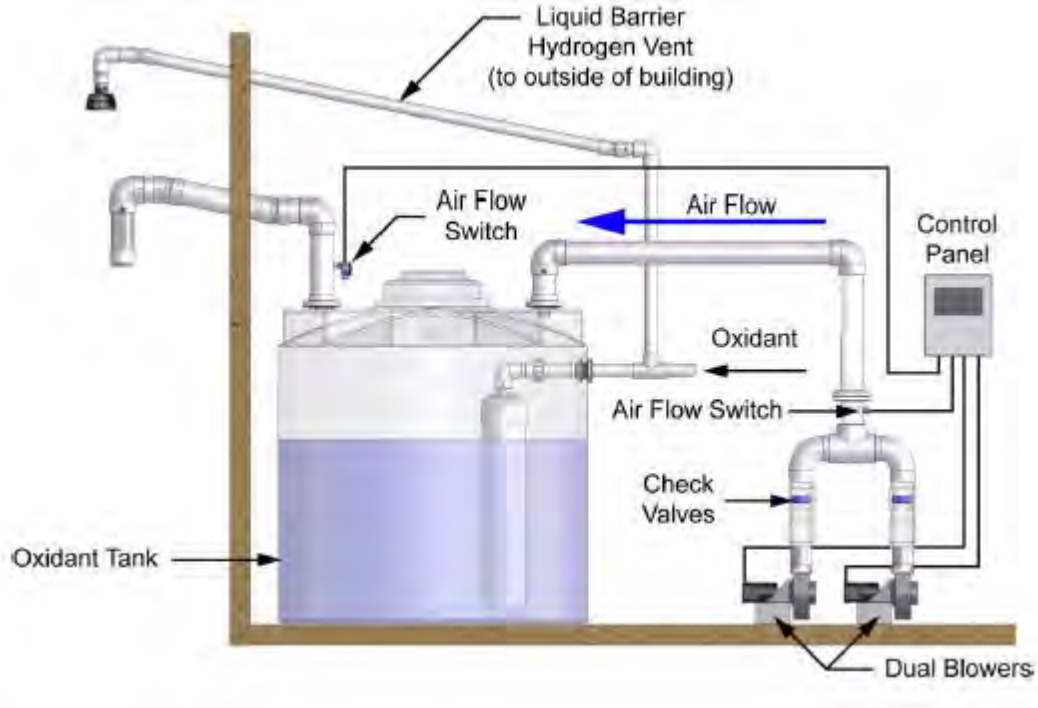


Figure 6

C. External Dilution Air Vent Controls

The Parkson external dilution air control system consists of a stainless steel control cabinet and a separate blower manifold with dual blowers. The control cabinet is designed to be utilized for all size systems. Slightly different versions of the control cabinet are available for different fan motor voltages. Models available include 110VAC 1phase, 240VAC 3 phase and 480 3 phase. The dilution air system blower and duct sizes are chosen based upon the size and configuration of the particular system.

The control panel incorporates the following functions:

- On first time power up, it performs a test to determine if each blower is operational. Also, during operation the control panel monitors the selected blower. If a blower fails, it is deactivated and the other blower is selected. Failure is detected by the absence of flow from a flow switch installed in the blower manifold.
- Upon detection of a failed blower, a fail light is lit on the front panel of the control panel for the corresponding blower. If both blowers fail both fail indicator lights will flash off and on.

- In addition to the fail indication lights, two relay outputs are provided, one that cycles off and on to indicate a single blower failure or on continuously indicating both blowers failed. This output could be used to drive a two tone buzzer or switch a remote light. The other relay turns on only when both blowers have failed. It could be used to shut down the on-site generator in the event of a double failure or switch a light or alarm. Alternatively these signals could be connected to a SCADA system for remote monitoring. The MaximOS™ systems supports direct connectivity to the external Dilution air control system and will automatically suspend operation if a failure is detected. The MaximOS™ MH and MM systems provides the run command and three failure inputs, one for the dilution air controller and two optional inputs to support other vent system sensors where required.
- All alarm outputs have dual relay contacts and normally open and normally closed contacts to support different system interface requirements.
- The blower is turned on by applying 24v to the run input.
- The control panel has additional terminal block capacity to support a single point connection to SCADA from other possible hydrogen vent system sensors (i.e. flow switches, etc… as required)
- The system controller has a dip switch with selectable blower shutdown delay from 0 minutes to 45 minutes in 3 minute intervals. This allows the blowers to continue to run after the on-site generator is shut down to assure all hydrogen is purged from the oxidant tanks. The default setting is 15 minutes. The switch is located inside the system controller box.
- The control system randomly selects which blower to turn on each time the command to run is received, to prevent one blower from wearing faster than the other.
- The system incorporates a manual override for maintenance and service functions. This override allows the user to select a blower. In manual mode the control module is bypassed so alarm outputs are inactive.

7. STANDPIPE HYDROGEN MITIGATION SYSTEM

For larger installations (see APPENDIX C for specific installation sizes), Parkson requires a Standpipe Hydrogen Mitigation System. A depiction of this system is shown below in Figure 7. In this configuration, a relatively small external standpipe to the oxidant tank is utilized similar to the drop tube in a Liquid Barrier system. Hydrogen gas is separated from oxidant in the standpipe, and then is diluted below its lower explosive limit with a Dilution Air Blower and blown outside the building. Contact Parkson for more details on this system.

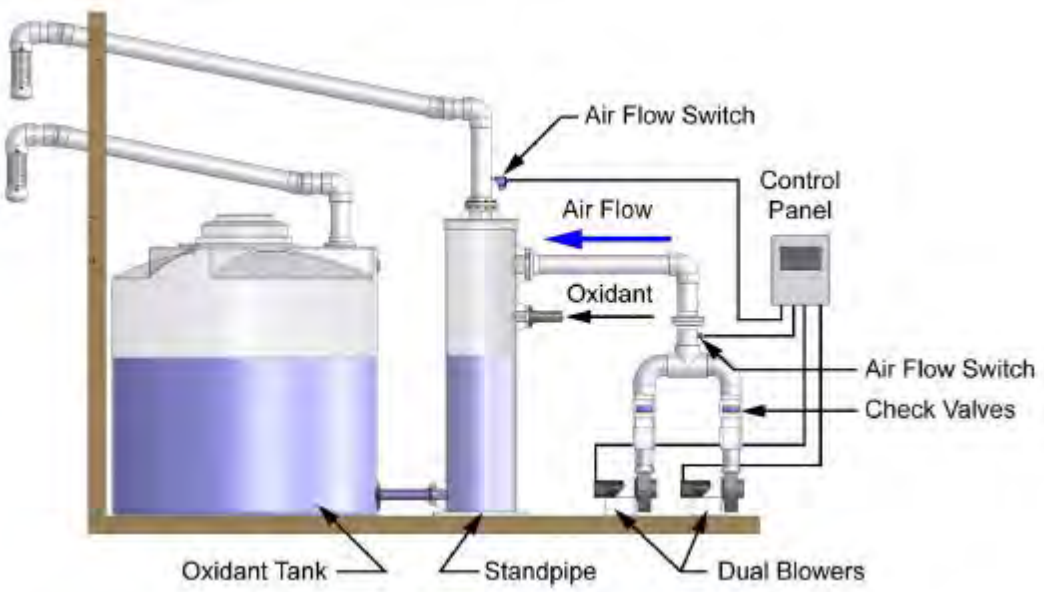


Figure 7 Dilution Air Vent System with Liquid Barrier System

8. MICRO ZUNI SERIES - LIQUID BARRIER HYDROGEN VENT SYSTEM

In 2011, Parkson began to offer for sale the Micro Zuni series of On-Site Generators. On a relative basis, the Micro Zuni series of On-Site Generators generate a small amount of hydrogen. Thus, it is approved to route and connect the Oxidant Tank Vent to the Liquid Barrier System Hydrogen Vent. This is only approved on single Micro Zuni On-Site generator feeding single oxidant tank systems. In the case of multiple oxidant tank and/or multiple on-site generator systems, each tank must be vented independently. In all cases, all other requirements described in earlier in the section “LIQUID BARRIER HYDROGEN VENT SYSTEM” must be met.

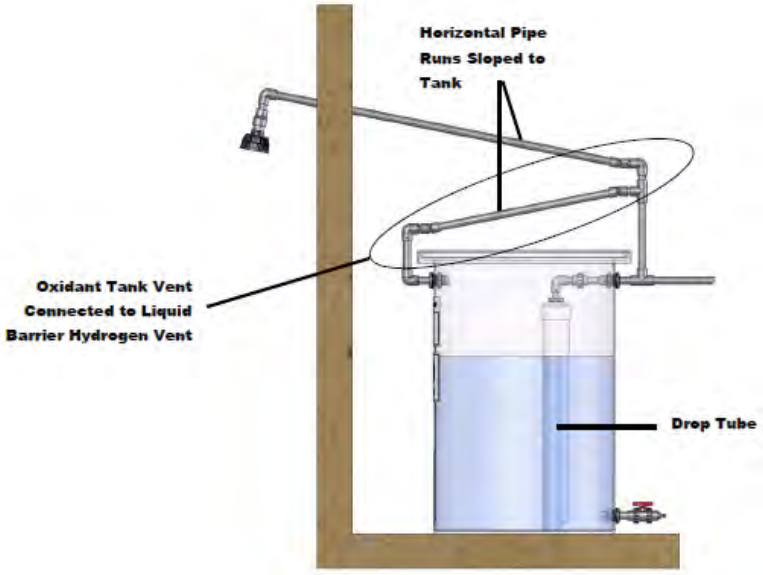


Figure 8 Liquid Barrier Hydrogen Vent System Approved for Single Micro Zuni Single Oxidant Tank Installations.

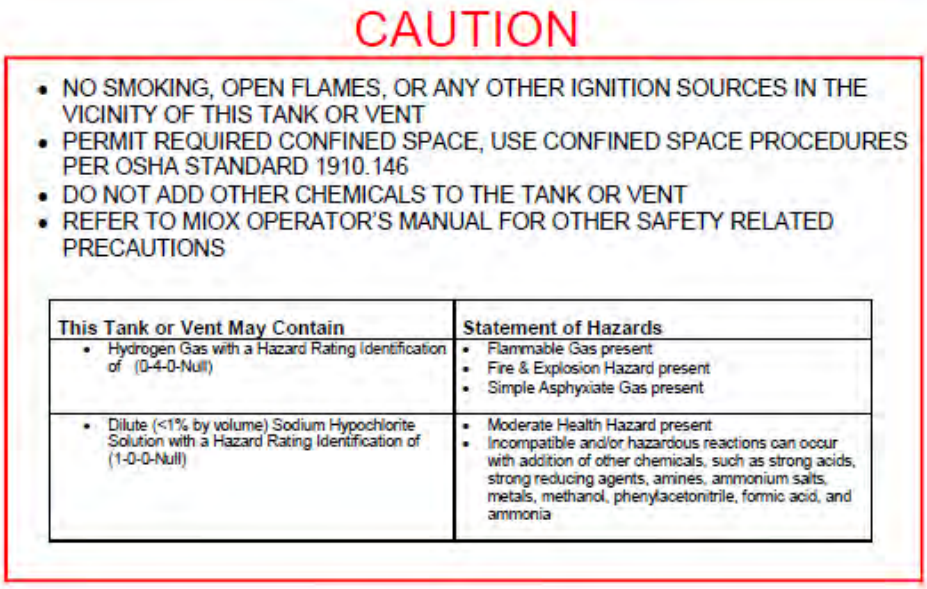
9. ADDITIONAL HYDROGEN RISK MITIGATION OPTIONS

A. Hydrogen Monitor

Parkson Corporation offers hydrogen monitors as an optional accessory to detect and alarm the presence of hydrogen within the facility. These systems provide contact closure or 4-20 ma outputs to SCADA or other monitoring systems depending on the desired control configuration. The sensor component of the hydrogen monitor should be mounted high in the facility ceiling in an area where hydrogen gas could be trapped.

10. LABELING REQUIREMENTS

Safety labels and No Smoking Signs are required ON ALL OXIDANT TANKS as well as ALL HYDROGEN VENTS (Liquid Barrier Hydrogen Vents, Dilution Air Vents, and Oxidant Tank Vents) OPENINGS external to the building. These labels identify safety issues specific to on-site generated solution, as well as no smoking signs. These labels are available from Parkson Corporation, but examples are shown below in figure 9. Oxidant Tanks and Hydrogen Vents must be labeled such that the labels are clearly visible in all directions. More details on this requirement can be found in the installation guide.



11. CODE COMPLIANCE

All on-site generation equipment produces hydrogen gas which is normally contained in the piping and vent systems. Classification of facilities housing on-site generation equipment is determined by the authority having jurisdiction (AHJ). The AHJ may be a state, county, or city agency responsible for safety issues in the community. **Parkson Corporation does not make a determination of the classification for any particular installation**. This is the responsibility of the local authority having jurisdiction. Local engineering firms familiar with the codes and standards in their region are responsible for being sure that local codes are followed in their designs. Selected excerpts from The National Electrical Code, 2008 Edition are included below:

500.5 Classifications of Locations.

(A) Classification of Locations:

Locations shall be classified depending on the properties of the flammable gas, flammable liquid-produced vapor, combustible-liquid produced vapors, combustible dusts ,or fibers/flyings that may be present, and the likelihood that a flammable or combustible concentration or quantity is present…

(2) Class I, Division 2. *A Class I, Division 2 location is a location*

(1) In which volatile flammable gases, flammable liquid-produced vapors, or combustible liquid-produced vapors are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems or in case of abnormal operation of equipment, or

(2) In which ignitable concentrations of flammable gases, flammable liquid-produced vapors, or combustible liquid-produced vapors are normally prevented by positive mechanical ventilation and which might become hazardous through failure or abnormal operation of the ventilating equipment, or ……..

FPN No. 1: This classification usually includes locations where volatile flammable liquids or flammable gases or vapors are used but that, in the judgment of the authority having jurisdiction, would become hazardous only in case of an accident or of some unusual operating condition. The quantity of flammable material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that merit consideration in determining the classification and extent of each location.

12. ADDITIONAL INFO

A. Upsizing Capacity

Since the Liquid Barrier Hydrogen vent, Dilution Air vent, and Stand-Pipe systems are sized based on the capacity of the on-site generator system, the size of the hydrogen containment systems, liquid barrier or dilution air, need to be re-evaluated if modifications are made to the system, particularly if system capacity is increased either by scaling up the electrolytic cell size or adding additional cell modules to the system.

B. Oxidant Tanks

It is mandatory that the engineering parameters defined in this document in terms of hydrogen vent piping be complied with by customers and/or contractors during installation of oxidant storage tanks to ensure personnel safety.

Safety labels are also required on all oxidant tanks and vents (see above section) in addition to the labels normally provided by the tank suppliers. These labels identify safety issues specific to on-site generated solution, as well as no smoking signs. These labels are available from Parkson Corporation.

C. Oxidant Tank Maintenance

Periodically, oxidant tanks may need to be cleaned out, or the tank may need maintenance for leaks. Do not use any cleaning or pumping devices that can act as an ignition source to gases that may be in the oxidant tank. When tank entry is required, comply with requirements for Occupational Safety and Health Administration (OSHA) section 1910.146, Permit-required Confined Space. OSHA Section 1910.146, Appendix A has a decision tree for the requirements for entry into confined spaces. Refer to the OSHA web site: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9797

13. APPENDIX A - VENT SYSTEM PIPING DIAMETERS FOR DROP TUBES, OXIDANT TRANSFER, AND OXIDANT TANK VENT PIPES

A. Mixed Oxidant

System	QTY	Min Oxidant Transfer Pipe Diameter (in)	Min LBS Vent Pipe (in) and Oxidant Tank Vent Pipe (Notes1&2)	Min Tank Throughwall to Vent pipe (in)	Min Drop Tube Pipe (in)
Micro Zuni - 1.0	1	0.025	0.025	0.025	0.38
Micro Zuni - 2.0	1	0.025	0.025	0.025	0.38
AE-4	1	0.38	1	1	2
AE-6	1	0.38	1	1	2
AE-8	1	0.38	1	1	2
SM-15	1	2	2	1	4
	2	2	2	2	4
	3	2	2	2	4
	4	2	2	2	4
SM-30	1	2	2	2	4
	2	2	2	2	4
	3	2	2	2	4
	4	2	2	3	4
SM-45	1	2	2	2	4
	2	2	2	2	4
	3	2	2	3	4
	4	2	2	3	4
SM-60	1	2	2	2	4
	2	2	2	3	4
	3	2	2	3	4
	4	2	3	4	4
MM-60	1	1	2	2	4
	2	1	2	3	4
	3	1	2	3	4
	4	1	2	4	4
MM-120	1	2	2	3	4
	2	2	2	4	4
	3	2	2	4	4
	4	2	2	5	6
MM-180	1	2	3	3	6
	2	2	3	4	6
	3	2	3	5	6
	4	2	3	6	6
MM-240	1	2	3	4	6
	2	2	3	5	6
	3	4	3	6	6
	4	4	3	6	6
MM-300	1	4	4	4	8
	2	4	4	5	8
	3	4	4	8	8
	4	4	4	8	8
LM-1000	1	4	4	8	8
	2	4	4	8	8
	3	4	N/A	N/A	N/A

Note 1: If Dilution Air System is being used, the Oxidant Tank Vent Pipe must be larger than specified on this table. Contact Parkson for details.

Note2: See section on Liquid Barrier Vent System for more details.

B. Sodium Hypochlorite

System	QTY	Min Oxidant Transfer Pipe Diameter (in)	Min LBS Vent Pipe (in) and Oxidant Tank Vent Pipe(Notes1&2)	Min Tank Throughwall to Vent pipe (in)	Min Drop Tube Pipe (in)
SH-25	1	2	2	1	4
	2	2	2	2	4
	3	2	2	2	4
	4	2	2	2	4
SH-50	1	2	2	2	4
	2	2	2	2	4
	3	2	2	3	4
	4	2	2	3	4
SH-75	1	2	2	2	4
	2	2	2	3	4
	3	2	2	3	4
	4	2	2	3	4
SH-100	1	2	2	2	4
	2	2	2	3	4
	3	2	2	3	4
	4	2	2	4	4
SCH-25	1	2	2	1	4
	2	2	2	2	4
	3	2	2	2	4
	4	2	2	2	4
SCH-50	1	2	2	2	4
	2	2	2	2	4
	3	2	2	3	4
	4	2	2	3	4
SCH-75	1	2	2	2	4
	2	2	2	3	4
	3	2	2	3	4
	4	2	2	3	4
SCH-100	1	2	2	2	4
	2	2	2	3	4
	3	2	2	3	4
	4	2	2	4	4
MH-SC-60	1	1	2	2	4
	2	1	2	3	4
	3	1	2	3	4
	4	1	2	4	4
MH-SC-120	1	2	2	3	4
	2	2	2	4	4
	3	2	2	4	4
	4	2	2	5	6
MH-SC-180	1	2	3	3	6
	2	2	3	4	6
	3	2	3	5	6
	4	2	3	6	6
MH-SC-240	1	2	3	4	6
	2	2	3	5	6
	3	4	3	6	6
	4	4	3	6	6
MH-SC-300	1	4	4	4	8
	2	4	4	5	8
	3	4	4	8	8
	4	4	4	8	8

MH-100	1	1	2	2	6
	2	1	2	3	6
	3	2	2	3	6
	4	2	2	4	6
MH-200	1	2	2	3	6
	2	2	2	4	6
	3	3	3	4	6
	4	3	3	5	8
MH-300	1	3	3	3	6
	2	3	3	4	6
	3	3	3	5	6
	4	4	3	6	6
MH-400	1	4	3	4	6
	2	4	3	5	6
	3	4	3	6	6
	4	4	4	8	6
MH-500	1	4	4	4	6
	2	4	4	5	6
	3	4	4	6	6
	4	4	4	7	8
LH-1550	1	4	4	7	8
	2	4	4	8	8
	3	4	N/A	N/A	N/A
	4	4	N/A	N/A	N/A

Note 1: If Dilution Air System is being used, the Oxidant Tank Vent Pipe must be larger than specified on this table. Contact Parkson for details.

Note2: See section on Liquid Barrier Vent System for more details.

14. APPENDIX B - DILUTION AIR BLOWER REQUIREMENTS

A. Mixed Oxidant

System	QTY	Gas Flow Generated (cfm)	Minimum Dilution Air Blower Requirement (cfm)
Micro Zuni - 1.0	1	0.0074	0.078
Micro Zuni - 2.0	1	0.0147	1.6
AE-4	1	0.0172	3
AE-6	1	0.0295	4
AE-8	1	0.0442	5
SM-15	1	0.09	10
	2	0.18	20
	3	0.28	31
	4	0.37	41
SM-30	1	0.18	20
	2	0.37	41
	3	0.55	61
	4	0.74	82
SM-45	1	0.28	31
	2	0.55	61
	3	0.83	92
	4	1.11	123
SM-60	1	0.37	41
	2	0.74	82
	3	1.11	123
	4	1.47	164
MM-60	1	0.34	36
	2	0.69	72
	3	1.03	109
	4	1.38	145
MM-120	1	0.69	72
	2	1.38	145
	3	2.06	217
	4	2.75	290
MM-180	1	1.03	109
	2	2.06	217
	3	3.1	326
	4	4.13	435
MM-240	1	1.38	145
	2	2.75	290
	3	4.13	435
	4	5.51	580
MM-300	1	1.72	181
	2	3.44	362
	3	5.16	543
	4	6.88	724
LM-1000	1	5.51	580
	2	11.1	1,223
	3	16.52	1,835

Note: The Minimum Dilution Air Blower Requirement is as measured at the exit of the Dilution Air Vent Pipe from the building. This requirement must be met regardless of the backpressure in the Dilution Air System, and duct sizes must be sized accordingly.

B. Sodium Hypochlorite

System	QTY	Gas Flow Generated (cfm)	Minimum Dilution Air Blower Requirement (cfm)
SH-25	1	0.13	14
	2	0.26	29
	3	0.39	43
	4	0.52	57
SH-50	1	0.26	29
	2	0.52	57
	3	0.77	86
	4	1.03	115
SH-75	1	0.39	43
	2	0.77	86
	3	1.16	129
	4	1.55	172
SH-100	1	0.52	57
	2	1.03	115
	3	1.55	172
	4	2.06	229
SCH-25	1	0.13	14
	2	0.26	29
	3	0.39	43
	4	0.52	57
SCH-50	1	0.26	29
	2	0.52	57
	3	0.77	86
	4	1.03	115
SCH-75	1	0.39	43
	2	0.77	86
	3	1.16	129
	4	1.55	172
SCH-100	1	0.52	57
	2	1.03	115
	3	1.55	172
	4	2.06	229
MH-SC-60	1	0.34	36
	2	0.69	72
	3	1.03	109
	4	1.38	145
MH-SC-120	1	0.69	72
	2	1.38	145
	3	2.06	217
	4	2.75	290
MH-SC-180	1	1.03	109
	2	2.06	217
	3	3.1	326
	4	4.13	435
MH-SC-240	1	1.38	145
	2	2.75	290
	3	4.13	435
	4	5.51	580
MH-SC-300	1	1.72	181
	2	3.44	362
	3	5.16	543
	4	6.88	724

MH-100	1	0.55	61
	2	1.11	123
	3	1.66	184
	4	2.21	246
MH-200	1	1.11	123
	2	2.21	246
	3	3.32	369
	4	4.42	492
MH-300	1	1.66	184
	2	3.32	369
	3	4.98	553
	4	6.64	737
MH-400	1	2.21	246
	2	4.42	492
	3	6.64	737
	4	8.85	983
MH-500	1	2.77	307
	2	5.53	614
	3	8.3	922
	4	11.06	1,229
LH-1550	1	8.85	983
	2	17.7	1,966
	3	26.54	2,949
	4	35.39	3,932

Note: The Minimum Dilution Air Blower Requirement is as measured at the exit of the Dilution Air Vent Pipe from the building. This requirement must be met regardless of the backpressure in the Dilution Air System, and duct sizes must be sized accordingly.

15. APPENDIX C - MAXIMUM NUMBER OF ON-SITE GENERATORS ROUTED INTO A SINGLE OXIDANT TANK NOT REQUIRING A STANDPIPE SYSTEM

Mixed Oxidant		
System	Max Number of On-Site Generators	Capacity (lb/day)
AE-4	400	1600
SM-15	125	1875
SM-30	60	1800
SM-45	40	1800
SM-60	30	1800
MM-60	32	1920
MM-120	16	1920
MM-180	10	1800
MM-240	8	1920
MM-300	6	1800
LM-1000	2	2000

Hypochlorite		
System	Max Number of On-Site Generators	Capacity (lb/day)
SH-25	100	2500
SH-50	50	2500
SH-75	35	2625
SH-100	25	2500
SCH-25	100	2500
SCH-50	50	2500
SCH-75	35	2625
SCH-100	25	2500
MH-SC-60	32	1920
MH-SC-120	16	1920
MH-SC-180	10	1800
MH-SC-240	8	1920
MH-SC-300	6	1800
MH-100	32	3200
MH-200	16	3200
MH-300	10	3000
MH-400	8	3200
MH-500	6	3000
LH-1550	2	3100

MIOX Corporation
5601 Balloon Fiesta Parkway
Albuquerque, New Mexico 87113

Material Safety Data Sheet

SECTION 1 – CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: On-Site Generated Mixed Oxidant Solution or
On-Site Generated Sodium Hypochlorite Solution

Synonyms: Hypochlorite Solution, Mixed Oxidant Solutions,
Part Number: none **Chemical Family**: Sodium Hypochlorite < 0.9%
Manufacturer's Name: MIOX Corporation **Address**: 5601 Balloon Fiesta Parkway
Product Information Phone Number: 1-866-MIOX-HLP (866-646-9457) **Revision Date**: 1/24/2011

SECTION 2 – COMPOSITION INFORMATION

Chemical Name	Percent by Weight	CAS#
Water	> 96.1%	7732-18-5
Sodium chloride	< 3.0%	7647-14-5
Sodium hypochlorite	< 0.9%	7681-52-9
Other Oxidant Species	trace	N/A

SECTION 3 – HAZARDS IDENTIFICATION

Appearance & Odor: Colorless to light yellow-green liquid with chlorine-like odor.
Emergency Overview: Information reported in this MSDS is based on the presence of sodium hypochlorite in the solution. Although concentrated sodium hypochlorite is a corrosive chemical, a <0.9% solution (as Free Available Chlorine (mass/volume)) is not expected to cause more than mild irritation to normal, undamaged skin but severe irritation to eyes, respiratory tract, and digestive system. Acid contamination will produce irritating chlorine fumes.
Fire & Explosion Hazards: This product is non-flammable and non-combustible. Vigorous reaction is possible with organic materials or strong reducing agents that may result in fire.
Primary Route(s) of Exposure: skin and eye contact, ingestion, inhalation of vapors
Inhalation – Acute Effects: Inhalation of vapors causes coughing and choking, burning sensation, labored breathing, shortness of breath, severe respiratory tract irritation, and pulmonary edema.
Skin Contact – Acute Effects: Skin contact may cause severe irritation, redness, blisters and dermatitis.
Eye Contact – Acute Effects: Eye contact causes severe irritation with redness and pain.
Ingestion – Acute Effects: Ingestion may cause pain and inflammation of the digestive tract; erosion of mucous membranes; vomiting; cold and clammy skin; shallow respiration; confusion; delirium and coma. See Section 11 for additional information.
Other Hazards: Hazards associated with On-Site Generation of chemicals are largely associated with the hydrogen gas that is generated during the electrolytic process. Please consult MIOX for more information on hydrogen safety, as it is outside of the scope of this document.

SECTION 4 – FIRST AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, provide oxygen. Get medical attention immediately.
Ingestion: If swallowed, do not induce vomiting. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact: Immediately remove clothing from affected area and wash skin for 15-20 minutes with flowing water .Clothing should be discarded or washed before reuse. Obtain medical attention if irritation occurs. Do Not instruct person to neutralize affected skin area.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, while holding eyes open. Contacts should be removed before or during flushing. Do not instruct person to neutralize. Get medical attention immediately.
Note to Physician: Sodium hypochlorite is an alkaline corrosive. For exposure by ingestion do not use emesis, lavage or acid antidotes. Dilute immediately by giving milk, melted ice cream, beaten egg white, starch paste or antacids such as milk of magnesia, aluminum hydroxide gel, or magnesium trisilicate gel. Avoid sodium bicarbonate because of carbon dioxide release. Sodium thiosulfate solution may prove beneficial by reducing unreacted material.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point/Method: N/A **Auto Ignition Temperature:** N/A
Upper/Lower Explosion Limits: N/A.
Extinguishing Media: Use media appropriate for surrounding fire.
Fire Fighting Procedures: Use self-contained breathing apparatus and full protective equipment. Acid contamination will produce irritating chlorine-like fumes.
Fire & Explosion Hazards: This product is non-flammable and non-combustible. Vigorous reaction is possible with organic materials or strong reducing agents that may result in fire.
Hazardous Products of Decomposition and/or Combustion: Oxygen and chlorine are hazardous products of decomposition of sodium hypochlorite.
Special Information: Hazards associated with On-Site Generated Mixed Oxidant Solution or On-Site Generated Sodium Hypochlorite Solution are largely associated with the hydrogen gas that is generated during the electrolytic process. Please consult MIOX for more information about hydrogen safety, as it is outside of the scope of this document.
NFPA Ratings: Health-1 Flammability-0 Reactivity-0 Other-None

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Collect liquid in an appropriate container or absorb with an inert material (e. g., dry sand, vermiculite, earth). Ventilate area of leak or spill, and prevent contact with incompatibles. Clean up spills immediately and wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible, and dispose of in compliance with all Federal, State, Local, and Provincial laws and regulations (Regulations may vary in different locations). Do not allow to enter streams, rivers, lakes, or other similar bodies of water. Waste characterization and compliance with applicable laws are the responsibility of the waste generator.

SECTION 7 – HANDLING AND STORAGE

Handling: Wear appropriate personal protective equipment. Avoid contact with materials that are incompatible or prone to corrosion. Avoid breathing vapor, mist, or gas. Prevent contact with eyes, on skin, or on clothing. Do not ingest or inhale. Use with adequate ventilation.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near chemicals that may react if spillage/leakage occurs. Keep container tightly closed.
Other Comments: This substance can decompose on heating or on contact with acids or reducing materials, producing corrosive gases including chlorine. This substance is a strong oxidant.

SECTION 8 –PERSONAL PROTECTION/ EXPOSURE CONTROL

Personal Respirator: None required under normal use conditions. Use NIOSH/MSHA approved organic vapor-acid-gas respirator with filter (qualified to wear respirator) during large spill clean-up or other conditions that might produce irritating chlorine-like fumes (e.g., reactions with incompatibles).
Skin Protection: Wear latex, neoprene, or rubber gloves and other protective clothing as appropriate to prevent skin contact.
Eye Protection: Safety glasses with face shield is recommended.
Ventilation Protection: Use local exhaust at points of vapor emission.
Other Protection: Safety showers and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water should be readily available in all areas where this material is handled or stored.
Exposure Limits: No exposure limits have been developed for sodium chloride or sodium hypochlorite.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Colorless to light yellow-green liquid with chlorine-like odor.

Vapor Pressure and Density: not determined	**Boiling Point**: decomposes above 110°C
Melting Point: N/A	**Specific Gravity**: 1.03 @ 20°C
Solubility in Water: complete	**Volatile Percentage**: not determined
pH: 8 – 10.0	**Flash Point/method**: N/A
Auto Ignition Temperature: N/A	**Upper/Lower Explosion Limits**: N/A

SECTION 10 – STABILITY AND REACTIVITY

Stability: Stable under normal pressures and temperatures. Slowly decomposes on contact with air. Decomposition rate increases with concentration, decreased pH, and elevated temperature. Exposure to sunlight and heavy metals also accelerate decomposition.
Hazardous Decomposition Products: Oxygen and Chlorine Gas.
Hazardous Polymerization: Not Expected
Incompatibilities: This material is incompatible with strong oxidizing agents, acids, heavy metals, reducing agents, organics, ether, and ammonia.
Conditions to Avoid: Avoid using combustible materials to absorb large spills. Avoid excessive heat or light exposure and contact with incompatibles.

SECTION 11 – TOXICOLOGICAL INFORMATION

Inhalation – Acute: Inhalation of vapors causes coughing and choking, burning sensation, labored breathing, shortness of breath, severe respiratory tract irritation, and pulmonary edema.
Inhalation – Chronic: No chronic inhalation effects of this product are known.
Skin Contact – Acute: Skin contact may cause severe irritation, redness, blisters and dermatitis.
Skin Contact – Chronic: Repeated or prolonged skin contact may cause skin sensitization.

Eye Contact – Acute: Eye contact causes severe irritation with redness and pain.
Ingestion – Acute: Ingestion may cause pain and inflammation of the mouth, pharynx, esophagus, and stomach; erosion of mucous membranes; vomiting; hemorrhage; circulatory collapse; cold and clammy skin; cyanosis and shallow respiration; confusion; delirium; coma; edema of pharynx, glottis and larynx with stridor and obstruction; and perforation of esophagus or stomach.
Ingestion – Chronic: No chronic ingestion effects of this product are known.
Carcinogenicity/Mutagenicity: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Reproductive Effects: No reproductive effects for this product are known
Neurotoxicity: None are known.
Other Effects: None are known.
Target Organs: skin, eyes, respiratory tract, and digestive system

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SECTION 12 – ECOLOGICAL INFORMATION
This product is toxic to aquatic organisms. Do not allow to enter streams, lakes, etc.

SECTION 13 – DISPOSAL CONSIDERATIONS
Material that cannot be used or reprocessed for use, and empty containers should be disposed of in accordance with all applicable Federal, State, Local, and Provincial regulations. Product containers should be thoroughly emptied before disposal. NOTE: State and local regulations may be more stringent than federal regulations.

SECTION 14 – TRANSPORTATION INFORMATION
DOT Shipping Description: See product label and Bill of Lading.

SECTION 15 – REGULATORY INFORMATION

CERCLA SECTION 103 (40CFR302.4): yes CAS# 7681-52-9 RQ: 100 lbs.
SARA SECTION 302 (40CFR355.30): no
SARA SECTION 304 (40CFR355.40): no
SARA SECTION 313 (40CFR372.65): no
OSHA PROCESS SAFETY (29CFR1910.119): no
CALIFORNIA PROPOSITION 65: no

SECTION 16 – OTHER INFORMATION
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