filed electronically in docket office on 07/03/18

BEFORE THE TENNESSEE PUBLIC UTILITY COMMISSION
NASHVILLE, TENNESSEE

IN RE:	)	
	)	
PETITION OF INTERGRATED	)	**DOCKET NO. 18-00063**
RESOURCE MANAGEMENT, INC.	)	
FOR A CERTIFICATE OF	)	
CONVENIENCE AND NECESSITY	)	

PETITIONER'S RESPONSE TO TENNESSEE PUBLIC UTILITIES COMMISSION'S DATA REQUEST

Comes now Integrated Resource Management, Inc. ("Petitioner" or "IRM"), by and through its counsel and would respectfully file this response to the data request from Tennessee Public Utilities Commission ("TPUC") dated June 27, 2018 regarding the Petition for a Certificate of Convenience and Necessity to provide wastewater utility services to Waterside Douglas Lake Subdivision ("the Development") filed by IRM on May 22, 2018.

Petitioner respectfully responds as follows:

Item #1:
5 of the Utilities Service Agreement (USG) includes a provision for a 10% fee of construction costs to be paid to the Utility for services. Please indicate the regulated revenue account that these amounts will be booked.

Response:
This amount is not booked to the revenue account of the regulated Utility. As previous practice dictates, this is a pass-through to the Utility affiliate which has authorized personnel with proper Tennessee Certified BNS Operators and Tennessee Certified Collection Systems Operators to perform the inspections according to the Specifications of the Utility. Therefore, this is not treated as revenue or an expense and does not affect customer rates.

Item #2:
9 of the Utilities Service Agreement (USG) includes a provision for funds to be turned over to IRM by the Developer from third parties for the purpose of operating the system? Please identify the specific types of funds this includes and provide the revenue account these funds will be booked.

Response:
Article #9 is included as part of the form USG template and applies to customers that have an existing system for which the utility assumes ownership and/or control. For instance, in an event that a Home Owner's Association or a Property Owner's Association has existing funds in reserve collected for a system of which the Utility assumes ownership and/or control and these funds would be available for upgrades to the system. Article #9 does not apply to the subject Petition and should have been omitted from this USG and is to be redacted.

Item #3:
Please provide the size of the system and what kind of system that will be built, e.g. GPD flow, Sand Filter, Lagoon, Bioclear.

Response:
The system is a Bioclere Fixed Film Media Filter System with recirculation that is designed for treating 41,000 to 42,000 GPD. This information is provided in more detail in Item #5 below.

Item #4:
Provide a proposed tariff page indicating the new rates to be charged.

Response:
The rates to be charged will be in compliance to the rate case approved February 2016 in Docket # 15-00130. Please see Exhibit A attached; revised, proposed rate sheet.

Item #5:
Provide a copy of the TDEC application along with copies of the design and specs provided to TDEC.

Response:
Please see attached files in a .pdf format labeled Exhibit B, Part-1, Part-2 and Part-3. Do to the volume, a flash-drive will be provided.

Item #6:
Identify the documents the developer will provide at the time of conveyance of system to Utility, e.g. Deed, Bill of Sale, Survey, Title insurance.

Response:
Please see attached Exhibit C for a sample draft. These documents have not been finalized as of this time due to the fact the system has not been installed or completed. Components of the transfer will be completely determined in the as-built plans.

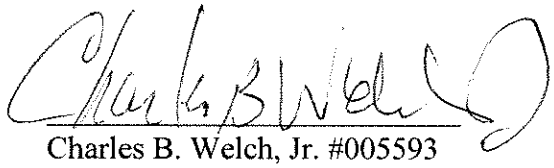
Item #7:
Provide a copy of the developer's deed(s) to the land on which the system will be built.

Response:
These items as recorded in the Jefferson County Courthouse are included as Exhibit D.

Item #8:
Provide a copy of the bond from the Developer as stated in the contract.

Response:
The bond has not been prepared at present. The total value of the materials is currently being bid and the amounts will be based on the bids. It is anticipated all funds will be deposited into an escrow account to be maintained for the "Surety" of adequate funding with a proper "Escrow Agent". This will be finalized and available prior to the date of the July TPUC Conference.

Respectfully submitted,



Charles B. Welch, Jr. #005593
Farris Bobango PLC
414 Union St., Suite 1105
Nashville, TN 37219
615-726-1200
cwelch@farris-law.com

Prepared by and Return to:
Charles B. Welch, Jr.
Farris Bobango, PLC
414 Union Street – Suite 1002
Nashville, Tennessee 37219

STATE OF TENNESSEE)
COUNTY OF _____)

THE ACTUAL CONSIDERATION OR VALUE WHICHEVER IS GREATER, FOR THIS TRASACTION IS $ _____.

_____
Affiant

SUBSCRIBED AND SWORN TO BEFORE ME, THIS THE _____ DAY OF _____, 20_____.

_____
Notary Public

My Commission Expires:_____

PERPETUAL EASEMENT AND GRANT OF ACCESS AND ENTRY

I, _____, of this County of _____, State of Tennessee, record owner of real property legally described in **Exhibit A** and attached hereto and incorporated herein by this reference (the "Grantor") in consideration of _____, the receipt and sufficiency of which is hereby acknowledged, hereby grant, sell, and convey unto Integrated Resource Management, Inc. d/b/a IRM Utility, Inc., a duly authorized Tennessee corporation located in the County of Jefferson, (the "Grantee"), a perpetual easement and right to construct, alter, and maintain a wastewater treatment system and all necessary laterals across said property for ingress and egress, being the real property conveyed to Grantor illustrated preliminarily on this plat in **Exhibit B** and as of record in Large Map_____, Page _____, in the Register's office for _____ County, Tennessee, together with the free right to enter and depart over and across such property, insofar as such right to enter and depart over and across such property insofar as such right to enter and depart is necessary to the proper use of any other right granted in this instrument.

[SIGNATURE ON THE FOLLOWING PAGE]

Witness my hand this _____ day of _____, 20_____.

Company: _____

By: _____

Name: _____

Title: _____

STATE OF TENNESSEE)
)
COUNTY OF _____)

On _____, before me, the undersigned, a notary public in and for said county, personally appeared _____, personally known to me, or proven to me on the basis of satisfactory evidence, to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature on the instrument, the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

Witness my hand and seal this _____ day of _____, 20_____.

_____
Notary Public

My Commission Expires: _____

Tax Identification Number:
CLT # Tax Map 71, Parcel 015.00.

Owner and Responsible Taxpayer:
Douglas Land, LLC, a North
Carolina limited liability company
200 North Harbor Place, Suite D
Davidson, NC 28036

WARRANTY DEED

THIS WARRANTY DEED is made effective as of the 12th day of January, 2018, is by and between PEDERSEN REAL ESTATE, LLC, a Tennessee limited liability company ("Grantor"), and DOUGLAS LAND, LLC, a North Carolina limited liability company ("Grantee"), as assignee of BWE Land, LLC, a Tennessee limited liability company.

WITNESSETH:

That Grantor, for and in consideration of the sum TEN AND NO/100 DOLLARS ($10.00) and for other good and valuable considerations in hand paid by Grantee, the receipt whereof is hereby acknowledged, does grant, bargain, sell, and convey unto Grantee, the real property situate in Jefferson County, Tennessee, described on **Exhibit A** attached hereto and made a part hereof ("Property"),

TOGETHER WITH all improvements, hereditaments, easements, rights-of-way, access rights, and all strips, gaps and gores appurtenant or adjacent thereto, and all other appurtenances thereto, and releasing all claims to homestead and dower therein.

TO HAVE AND TO HOLD said Property to the said Grantee, its successors and assigns forever.

And Grantor, for itself, its representatives, successors and assigns does hereby covenant with Grantee, its representatives, successors and assigns, (a) that Grantor is lawfully seized in fee simple of the Property herein conveyed; (b) that Grantor has full power, authority and right to convey the Property; (c) that the Property is free from all encumbrances except for those matters described on the attached **Exhibit B** attached hereto and made a part hereof; and (d) that Grantor will forever warrant and defend the title thereto against the lawful claims of all persons whomsoever.

IN WITNESS WHEREOF, Grantor has caused this instrument to be executed by its duly authorized officer, which instrument is effective as of the date first above written.

GRANTOR:

Pedersen Real Estate, LLC, a Tennessee limited liability company

By: Hannah H O'Neal
Hannah H. O'Neal, Chief Manager

This instrument prepared by:
WOOLF, MCCLANE, BRIGHT, ALLEN & CARPENTER, PLLC (djm)
P.O. Box 900, Knoxville, TN 37901 (865-215-1000)

3976125.1

STATE OF TENNESSEE)
COUNTY OF Warren)

Before me, a Notary Public in and for the state and county aforesaid, personally appeared Hannah H. O'Neal, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who, upon oath, acknowledged herself to be the Chief Manager of Pedersen Real Estate, LLC, a Tennessee limited liability company, the within named bargainor, and that she, as such Chief Manager, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the limited liability company by herself as Chief Manager.

Witness my hand and seal, this 8th day of January, 2018.

Notary Public

CHASE MCGEE
NOTARY PUBLIC
WARREN COUNTY

My Commission Expires:
10-24-20

I hereby swear or affirm that the actual consideration or true value of the property transferred hereby, whichever is greater, is $2,500,000.00.

Affiant

Subscribed and sworn to before me this 12 day of January, 2018.

Notary Public

My Commission Expires:
9-7-21

SHELLIE L. BILBREY
STATE OF TENNESSEE NOTARY PUBLIC
CUMBERLAND COUNTY

3976125.1

EXHIBIT A
LEGAL DESCRIPTION

TRACT 1:

SITUATE in the Fifth (5th) Civil District of Jefferson County, Tennessee, and more particularly described as follows:

BEGINNING on a concrete marker in the East property line of Interstate Highway 40, corner with property in the ownership of Buchanan (formerly Willis); thence running with the property line of Interstate 40 the following calls and distances: North 21 deg. 27 min. West, 55 feet to a concrete monument; thence South 78 deg. 34 min. West, 259 feet to a concrete monument; thence North 21 deg. 27 min. West, 175 feet to a concrete monument; thence North 25 deg. 36 min. West, 551 feet to a stake; thence North 21 deg. 27 min. West, 480 feet to a stake in the North property line of Interstate Highway 40, corner with Reneau; thence North 73 deg. East 332 feet to a stake, corner with Reneau; thence North 7 deg. West 443 feet to a stake, corner with Reneau; thence North 69 deg. West 504 feet to a stake, corner with Hall and Reneau; thence with Hall's line and a fence line, North 2 deg. East 795 feet to a fence intersection, a corner of the lands of Hall and Rinehart thence with Rinehart's line and a fence line, South 80 deg. East 99 feet to a stake; thence leaving the fence line, North 16 deg. East 264 feet to a stake; thence North 13 deg. East 322 feet to a stake; thence North 24 deg. East 275 feet to a stake; thence North 57 deg. East 413 feet to a Black Oak stump; thence North 70 deg. East 231 feet to a beech stump; thence South 87 deg. East 480 feet to a walnut stump; thence North 76 deg. East 130 feet to a black oak stump; thence North 24 deg. East 512 feet to a sycamore stump; thence North 28 deg. West 165 feet to a stake; thence North 53 deg. East 750 feet to a stake; thence North 83 deg. East 335 feet to a stake; thence North 68 deg. East 850 feet to a stone, which is located on the West bank of the French Broad River; thence running with the low water mark of the French Broad River as it meanders upstream approximately 3,880 feet to a stake in the edge of the French Broad River, corner with Buchanan (formerly Willis); thence with the line of Buchanan (formerly Willis) the following calls and distances to the point of beginning: thence South 54 deg. West, 57 feet to a stake; thence South 73 deg. West 61 feet to a stake; thence South 33 deg. West 55 feet to a stake; thence South 67 deg. West 725 feet to a stake; thence South 8 deg. East 215 feet to a stake; thence South 76 deg. West 465 feet to a stake; thence South 66 deg. West 600 feet to a stake; thence South 87 deg. West 68 feet to a 30 inch oak; thence South 74 deg. West 1,160 feet to a stake; thence South 19 deg. West 240 feet to a stake; thence North 63 deg. West 230 feet to the point of BEGINNING and containing 328 acres, more or less, of which 101 acres lies below elevation 1007 Mean Sea Level.

TRACT 2:

SITUATE in the Fifth (5th) Civil District of Jefferson County, Tennessee, and being more particularly described as follows:

BEGINNING on a post, corner with Eugene Taylor and in the Eastern boundary line of Interstate Highway 40; thence with the Eastern boundary line of Interstate Highway 40 North 21 deg. 27 min. West 2,067 feet to a concrete marker; thence North 60 deg. 44 min. East 257 feet to a concrete marker; thence North 21 deg. 27 min. West approximately 77 feet to a concrete

marker in the line of I. F. Miller; thence South 63 deg. East 230 feet to a post; thence North 19 deg. East 240 feet to a stake; thence North 74 deg. East 1,160 feet to a 30 inch oak; thence North 87 deg. East 68 feet to a stake; thence North 66 deg. East 600 feet to a stake; thence North 76 deg. East 465 feet to a stake; thence North 8 deg. West 215 feet to a stake; thence North 67 deg. East 725 feet to a stake; thence North 33 deg. East 55 feet to a stake; thence North 73 deg. East 61 feet to a stake; thence North 54 deg. East 57 feet to a stake in the edge of the French Broad River; thence with the French Broad River as the same meanders upstream 1280 feet, more or less, to a stake; thence South 70 deg. West 58 feet to a 6 inch ash; thence South 70 deg. West 205 feet to a 4 inch maple; thence South 5 deg., East 390 feet to a stake; thence South 40 deg. West 165 feet to a stake; thence South 60 feet to a 30 inch willow; thence South 39 deg. West 112 feet to a sycamore stump; thence South 49 deg. West 280 feet to a 30 inch elm; thence South 65 deg. West 199 feet to a stake; thence South 58 deg. West 158 feet to a stake; thence South 76 deg. West 256 feet to an 18 inch sycamore; thence South 82 deg. West 420 feet to a stake; thence West 585 feet to a 30 inch sycamore; thence South 51 deg. West 630 feet to a stone; thence South 9 deg. West 475 feet to a 24 inch oak; thence South 53 deg. West 437 feet to the POINT OF BEGINNING, and containing 139 acres, more or less, of which 61 acres, more or less, lie below the 1007 contour line of Douglas Lake.

BEING part of the same property conveyed to Pedersen Real Estate, LLC by Quitclaim Deed from Hannah H. Pedersen (aka Hannah H. Buchanan), dated October 13, 2003, recorded in Book 608, page 520, in the Register's Office for Jefferson County, Tennessee.

No new survey. Same description as prior deed of record.

THE PREPARER OF THIS DEED MAKES NO REPRESENTATION AS TO THE STATUS OF TITLE TO THE PROPERTY DESCRIBED HEREIN. THIS DEED HAS BEEN PREPARED SOLELY FROM INFORMATION FURNISHED TO THE PREPARER WHO MAKES NO REPRESENTATION WHATSOEVER OTHER THAN THAT IT HAS BEEN ACCURATELY TRANSCRIBED FROM THE INFORMATION.

EXHIBIT B
PERMITTED EXCEPTIONS

1. Any discrepancies or conflicts in boundary lines, any shortages in area, or any encroachment or overlapping of improvements.

2. Any facts, rights, or interest or claims which are not shown by the public record but which could be ascertained by an accurate survey of the land.

3. Matters depicted or disclosed on Plat Book 2, page 12 (Map Cabinet A-35), Register's Office, Jefferson County Tennessee. (Tract One).

4. Transmission Line Easement granted in Trust Book 35, page 206, Register's Office, Jefferson County. Tennessee. (Tract One).

5. Transmission Line Easement granted in Trust Book 35, page 214, Register's Office, Jefferson County, Tennessee. (Tract One).

6. Transmission Line Easement granted in Trust Book 35, page 216, Register's Office, Jefferson County, Tennessee. (Tract One).

7. Transmission Line Easement granted n Misc. Book 1, page 171, Register's Office, Jefferson County, Tennessee. (Tract One)

8. Grant of Easement to the United States of America, dated January 6, 1965, of record in Deed Book 131, page 239, Register's Office, Jefferson County, Tennessee. (Tract One).

9. Grant of Transmission Line Easement to the United States of America, dated August 21, 1974, of record in Deed Book 196, page 195, Register's Office, Jefferson County, Tennessee. (Tract One).

10. Grant of Flowage Easement to the United States of America, dated November 16, 1942, of record in Deed Book 90, page 489, Register's Office, Jefferson County, Tennessee. (Tract One).

11. Grant of Flowage Easement to the United States of America, dated November 7, 1942, of record in Deed Book 90, page 539, Register's Office, Jefferson County, Tennessee. (Tract One).

12. Grant of Flowage Easement to the United States of America, dated November 5, 1942, of record in Deed Book 90, page 542, Register's Office, Jefferson County, Tennessee. (Tract One).

13. Declaration of Taking by the United States of America, of record in Deed Book 91, page 78, Register's Office, Jefferson County, Tennessee. (Tract One).

14. Easements and matters set forth in Final Decree entered in the District Court of the United States for the Eastern District of Tennessee, of record in Deed Book 91, page 538, Register's Office, Jefferson County, Tennessee. (Tract One).

15. Title to any portion of property lying within the bounds of Old Tunnley Cemetery, as shown on TVA Land Map 20 MS 421 K 501-36, together with rights of ingress and egress. (Tract Two).

16. Transmission Line Easement granted to the United States of America, dated December 14, 1942, of record in Deed Book 88, page 245, Register's Office, Jefferson County, Tennessee. (Tract Two).

17. Grant of Easement to the United States of America, dated January 5, 1965, of record in Deed Book 131, page 237, Register's Office, Jefferson County, Tennessee. (Tract Two)

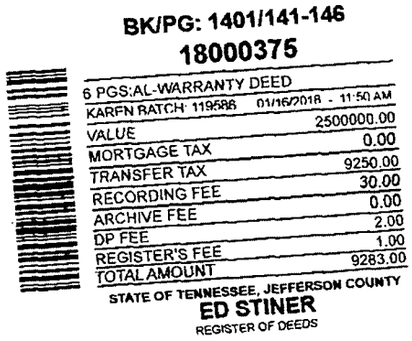
18. Easement to Southern Bell Telephone & Telegraph, of record in Misc. Book 2, page 486, Register's Office, Jefferson County, Tennessee. (Tract Two).

19. Grant of flowage easement to the United States of America, dated August 13, 1942, of record in Book 89, page 302, Register's Office, Jefferson County, Tennessee. (Tract Two).

20. Transmission Line Easement granted in Misc. Book 1, page 171, Register's Office, Jefferson County Tennessee. (Tract Two).

21. Judgment and Final Decree in favor of the State of Tennessee, of record in Deed Book 125, page 449, Register's Office, Jefferson County Tennessee (Tract Two).

22. Taxes and assessments for year 2018 and subsequent years not yet due nor payable.



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Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102
(615) 532-0625

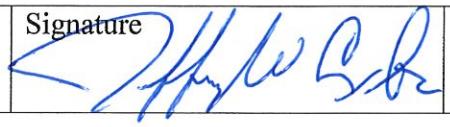
APPLICATION FOR A STATE OPERATION PERMIT (SOP)

Type of application: ☒ New Permit ☐ Permit Reissuance ☐ Permit Modification

Permittee Identification: (Name of city, town, industry, corporation, individual, etc., applying, according to the provisions of Tennessee Code Annotated Section 69-3-108 and Regulations of the Tennessee Water Quality Control Board.)	
Permittee Name (applicant):	**Integrated Resource Management, Inc. d/b/a IRM Utility, Inc.**
Permittee Address:	**P.O. Box 642** **White Pine, TN 37890**

Official Contact: Jeffrey W. Cox, Sr.	Title or Position: President		
Mailing Address:	City:	State:	Zip:
Phone number(s): 865-674-0828	E-mail: envsoilconsulting@charter.net		

Optional Contact: Jeffrey W. Cox, Jr.	Title or Position: Vice-President		
Address:	City:	State:	Zip:
Phone number(s): 865-712-4307	E-mail: jeffreywcox7@gmail.com		

Application Certification (must be signed in accordance with the requirements of Rule 0400-40-05-.05)		
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury		
Name and title; print or type Jeffrey W. Cox, Sr. President	Signature 	Date April 20, 2018

Permit Number: SOP-_____

Facility Identification: Waterside on Douglas Lake	**Existing Permit No.**
Facility Name: Same	County: Jefferson
Facility Address or Location: Not assigned yet. Deerwood Drive	Latitude: 36 D - 1M
	Longitude: 83 D -17M

Name and distance to nearest receiving waters: 2000' to Mile 59.5 of the French Broad/Douglas La.

If any other State or Federal Water/Wastewater Permits have been obtained for this site, list their permit numbers:
In process.

Name of company or governmental entity that will operate the permitted system: **IRM Utility, Inc.**

Operator address: **Jeffrey Cox - P.O. Box 645 – White Pine, TN 37890**

Has the owner/operator filed for a Certificate of Convenience & Necessity (CCN), or an amended CCN, with the Tennessee Regulatory Authority (TRA) (may be required for collection systems and land application treatment systems)? ■ Yes ☐ No ☐ N/A **Petition with TPUC is Currently Being Prepared**

If the applicant listed above does not yet own the facility/site or if the applicant will not be the operator, explain how and when the ownership will be transferred or describe the contractual arrangement and renewal terms of the contract for operations. **The treatment system will be transferred via Quite Claim after construction. A perpetual easement will be granted to IRM Utility, Inc. for Utility Easement.**

Complete the following information explaining the entity type, number of design units, and daily design wastewater flow:

Entity Type	Number of Design Units		Flow (gpd)
☐ City, town or county	No. of connections:		
■ Subdivision	No. of homes:	Avg. No. bedrooms per home:	**42,000**
☐ School	No. of students:	Size of cafeteria(s): No. of showers:	
☐ Apartment	No. of units:	No. units with Washer/Dryer hookups: No. units without W/D hookups:	
☐ Commercial Business	No. of employees:	Type of business:	
☐ Industry	No. of employees:	Product(s) manufactured:	
☐ Resort	No. of units:		
☐ Camp	No. of hookups:		
☐ RV Park	No. of hookups:	No. of dump stations:	
☐ Car Wash	No. of bays:		
☐ Other			

Describe the type and frequency of activities that result in wastewater generation.

Typical residential wastewaters.

Permit Number: SOP-_____

Engineering Report (required for collection systems and/or land application treatment systems):	☐ N/A
☐ Prepared in accordance with Rule 0400-40-05-.03 and Section 1.2 of the Tennessee Design Criteria (see website for more information) ■ Attached, or **Under Separate Cover from Engineer** ☐ Previously submitted and entitled: Approved? ☐ Yes. Date: ☐ No	

Wastewater Collection System:	☐ N/A
System type (i.e., gravity, low pressure, vacuum, combination, etc.): **Septic Tank Effluent Pumping Systems (STEP)**	
System Description: **STEP System w/ 2 feet/second velocity.**	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): **Timed dose pumps in STEP will allow freeboard in pump tank. Telemetry with battery back-up notifies operator.**	
In the event of a system failure describe means of operator notification: **Telemetry – Audible & Visual Alarms**	
List the **emergency** contact(s) (name/phone): **Jeffrey W. Cox, Sr. / 865-674-0828**	
For low-pressure systems, who is responsible for maintenance of STEP/STEG tanks and pumps or grinder pumps (list all contact information)? **IRM Utility, Inc. or Owner According to IRM's Tariff and Rules w/ TPUC.**	
Approximate length of sewer (excluding private service lateral): **11,800 feet in Phase I**	
Number/hp of lift stations: **1-2 // 1.5 hp** Number/hp of lift pumps **135 / ½ hp for STEP's**	
Number/volume of low pressure and or grinder pump tanks **135 / 1000-1500 gal** Number/volume septic tanks **135 / 1000-1500 gal**	
Attach a schematic of the collection system. ■ Attached **Under Separate Cover by Engineer**	
If this is a satellite sewer and you are tying in to another sewer system complete the following section, listing tie-in points to the sewer system and their location (attach additional sheets as necessary):	

Tie-in Point	Latitude (xx.xxxx°)	Longitude (xx.xxxx°)

Permit Number: SOP-_____

Land Application Treatment System:	☐ N/A
Type of Land Application Treatment System: ■ Drip ☐ Spray ☐ Other, explain:	
Type of treatment facility preceding land application (recirculating media filters, lagoons, other, etc.): **Equalization – Fixed Film Media (AquaPointe – Bioclere)**	
Attach a treatment schematic. ■ Attached	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): **Timed dose pumps in STEP will allow freeboard in pump tank. Telemetry with battery back-up notifies operator.**	
For New or Modified Projects: **Douglas Land, LLC** Name of Developer for the project: **c/o John Snow**	
Developer address and phone number: **P.O. Box 661- Murphy, NC Ph. 828-577-2080**	
For land application, list: Proposed acreage involved: **4 Acres** Inches/week gpd/sq.ft loading rate to be applied: **0.25gals/sq.ft./day**	
Is wastewater disinfection proposed? **Yes – But fencing and signage is proposed to eliminate the need for disinfection.**	
■ Yes Describe land application area access:	
☐ No Describe how access to the land application area will be restricted:	

Attach required additional Engineering Report Information (see website for more information)

■ Topographic map (1:24,000 scale presented at a six inch by six inch minimum size) showing the location of the project including quadrangle(s) name(s) GPS coordinates, and latitude and longitude in decimal degrees should also be included.

■ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, the proposed land application area(s), roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.

■ Soils information for the proposed land disposal area in the form of a Water Pollution Control (WPC) Soils Map per Chapter 16 and 17 State of Tennessee Design Criteria for Sewage Work. The soils information should include soil depth (borings to a minimum of 4 feet or refusal) and soil profile description for each soil mapped.

■ Topographic map of the area where the wastewater is to be land applied with no greater than ten foot contours presented at a minimum size of 24 inches by 24 inches.

■ Describe alternative application methods based on the following priority rating: (1) connection to a municipal/public sewer system, (2) connection to a conventional subsurface disposal system as regulated by the Division of Groundwater Protection, and/or (3) land application.

This Section is Under Separate Cover by Engineer

Permit Number: SOP-_____

This Section is Attached to the Application.

For Drip Dispersal Systems Only: Unless otherwise determined by the Department, sewage treatment effluent wells, i.e, large capacity treatment/drip dispersal systems after approval of the SOP Application, will be issued an UIC tracking number and will be authorized as Permit by Rule per UIC Rule 1200-4-6-.14(2) and upon issue of a State Operating Permit and Sewage System Construction Approval by the Department. Describe the following:	☐ N/A
The area of review (AOR) for each Drip Dispersal System shall, unless otherwise specified by the Department, consist of the area lying within a one mile radius or an area defined by using calculations under 1200-4-6-.09 of the Drip Dispersal System site or facility, and shall include, but not be limited to general surface geographic features, general subsurface geology, and general demographic and cultural features within the area. Attach to this part of the application a general characterization of the AOR, including the following: (This can be in narrative form)	
■ A general description of all past and present groundwater uses as well as the general groundwater flow direction and general water quality.	
■ A general description of the population and cultural development within the AOR (i.e. agricultural, commercial, residential or mixed)	
■ Nature of injected fluid to include physical, chemical, biological or radiological characteristics.	
☐ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems. Or supply map showing general location of publicly supplied water for the area (this can be obtained from the water provider)	
☐ If the proposed system is located within a wellhead protection area or source water protection area designated by Rule 1200-5-1-.34, show the boundary of the protection area on the facility site plan.	
■ Description of system, Volume of injected fluid in gallons per day based upon design flow, including any monitoring wells	
☐ Nature and type of system, including installed dimensions of wells and construction materials	

Pump and Haul:	■ N/A
Reason system cannot be served by public sewer:	
Distance to the nearest manhole where public sewer service is available:	
When sewer service will be available:	
Volume of holding tank: gal.	
Tennessee licensed septage hauler (attach copy of agreement):	
Facility accepting the septage (attach copy of acceptance letter):	
Latitude and Longitude (in decimal degrees) of approved manhole for discharge of septage:	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.):	

Holding Ponds (for non-domestic wastewater only):	■ N/A
Pond use: ☐ Recirculation ☐ Sedimentation ☐ Cooling ☐ Other (describe):	
Describe pond use and operation:	
If the pond(s) are existing pond(s), what was the previous use?	
Have you prepared a plan to dispose of rainfall in excess of evaporation? ☐ Yes ☐ No	
If so, describe disposal plan:	
Is the pond ever dewatered? ☐ Yes ☐ No	
If so, describe the purpose for dewatering and procedures for disposal of wastewater and/or sludge:	
Is(are) the pond(s) aerated? ☐ Yes ☐ No	
Volume of pond(s): gal. Dimensions:	
Is the pond lined (Note if this is a new pond system it must be lined for SOP coverage. Otherwise, you must apply for an Underground Injection Control permit.)? ☐ Yes ☐ No	
Describe the liner material (if soil liner is used give the compaction specifications):	
Is there an emergency overflow structure? ☐ Yes ☐ No	
If so, provide a design drawing of structure.	
Are monitoring wells or lysimeters installed near or around the pond(s)? ☐ Yes ☐ No	
If so, provide location information and describe monitoring protocols (attach additional sheets as necessary):	

Permit Number: SOP-_____

Mobile Wash Operations:	☒ N/A
☐ Individual Operator	☐ Fleet Operation Operator
Indicate the type of equipment, vehicle, or structure to be washed during normal operations (check all that apply):	
☐ Cars ☐ Trucks ☐ Trailers (Interior washing of dump-trailers, or tanks, is prohibited.) ☐ Other (describe):	☐ Parking Lot(s): sq. ft. ☐ Windows: sq. ft. ☐ Structures (describe):
Wash operations take place at (check all that apply):	
☐ Car sales lot(s) ☐ Private industry lot(s) ☐ County(ies), list:	☐ Public parking lot(s) ☐ Private property(ies) ☐ Statewide
Wash equipment description:	
☐ Truck mounted ☐ Rinse tank size(s) (gal.): ☐ Collection tank size(s) (gal.):	☐ Trailer mounted ☐ Mixed tanks size(s) (gal.): Number of tanks per vehicle:
Pressure washer: psi (rated) gpm (rated) ☐ gas powered ☐ electric	
Vacuum system manufacturer/model:	Vacuum system capacity: inches Hg
Describe any other method or system used to contain and collect wastewater:	
List the public sewer system where you are permitted or have written permission to discharge waste wash water (include a copy of the permit or permission letter):	
Are chemicals pre-mixed, prior to arriving at wash location? ☐ Yes ☐ No	

Describe all soaps, detergents, or other chemicals used in the wash operation (attach additional sheets as necessary):

Chemical name:	Manufacturer:	Primary CAS No. or Product No.

Drip Dispersal Systems, UIC Information

Supplement to SOP Application

Description of AOR

RE: Waterside at Douglas Lake – Jefferson County
SOP Permit Application

Items on Page 5 of the Permit Application:

. The Site is comprised of approximately139 acres of which 61 acres lie below the 1007 contour line of Douglas Lake. The topography is gently rolling to rolling slopes of 5 to 30 per cent. There are steep areas along the lake. The maximum relief is 160 to 220 feet. The property is a divide striking Southwest to Northeast with the under-laying geology. The ground water flow on the East side of the divide is to the East. West of the divide the flow is to the West and eventually turns North and West to the Lake. Roughly 50 percent of the Site is wooded and the 4-acre Drip Disposal Site (DDS) is cleared field used for the agricultural management of grassland forage crops.

Soils are mainly residual clayey soils with a terrace cap. Soils are of the Sequoia Series with a terrace cap. Please see the High Intensity Soil Map by, Kevin Davis for more details.

The major geologic influence of the Site was determined from the Geology Map of Tennessee, East Sheet by William H. Hardeman, 1966. From the map the Sevier Shale is the major influence mapped. This would imply non-karst features.

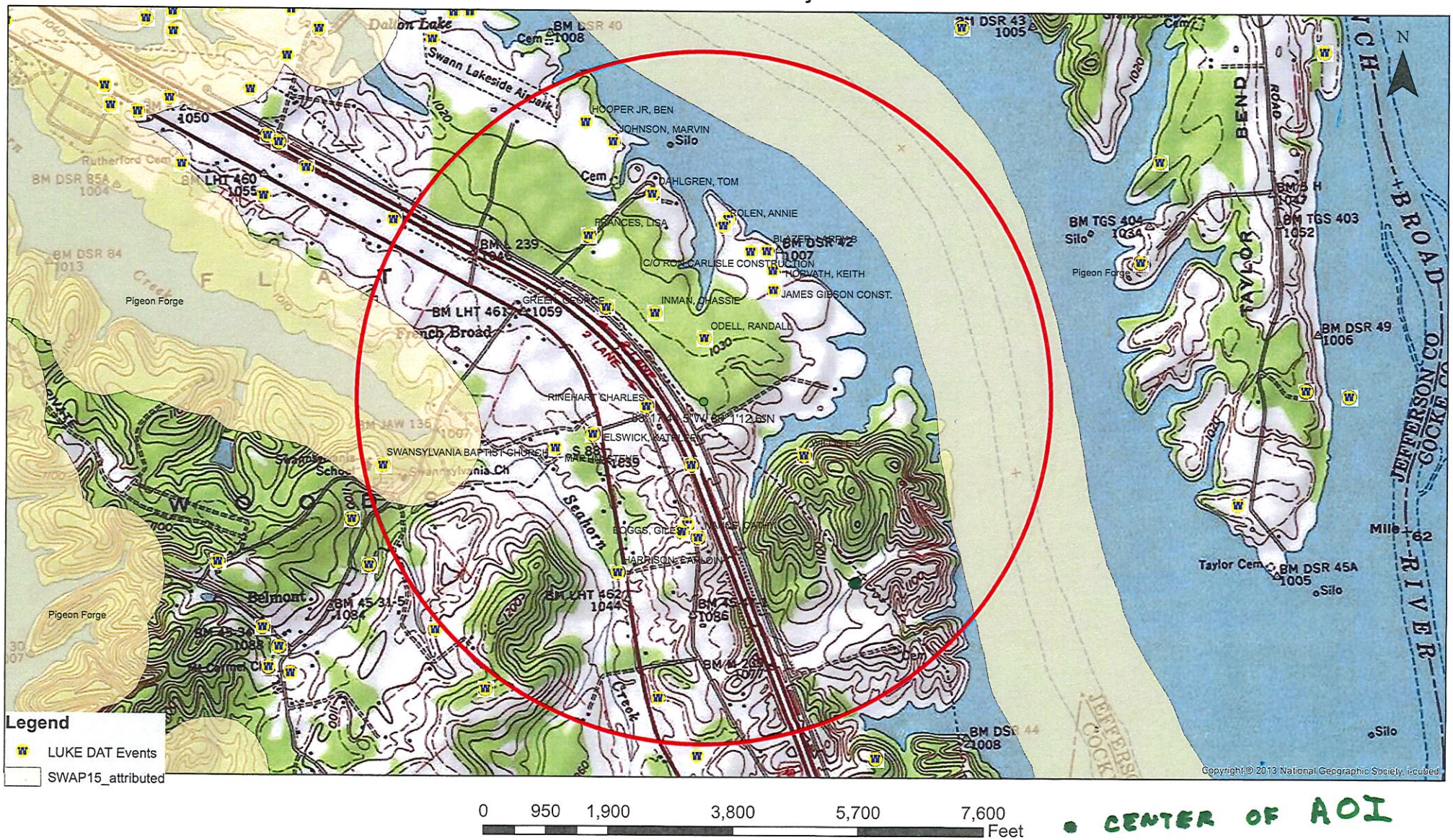
The demographics is that many sub-divisions are building along the lake. The area in the past was agricultural but is mixed residential and agricultural.

The wastewater being discharged through drip irrigation is typical treated domestic household sewage. The area is not in a wellhead protection area.

The amount of wastewater to be disposed of by drip irrigation is 42,000 gallons per day based with some buffer considerations.

The public supplied water is along the Deerwood Drive serving the recently built subdivisions.

Jefferson Co. Project



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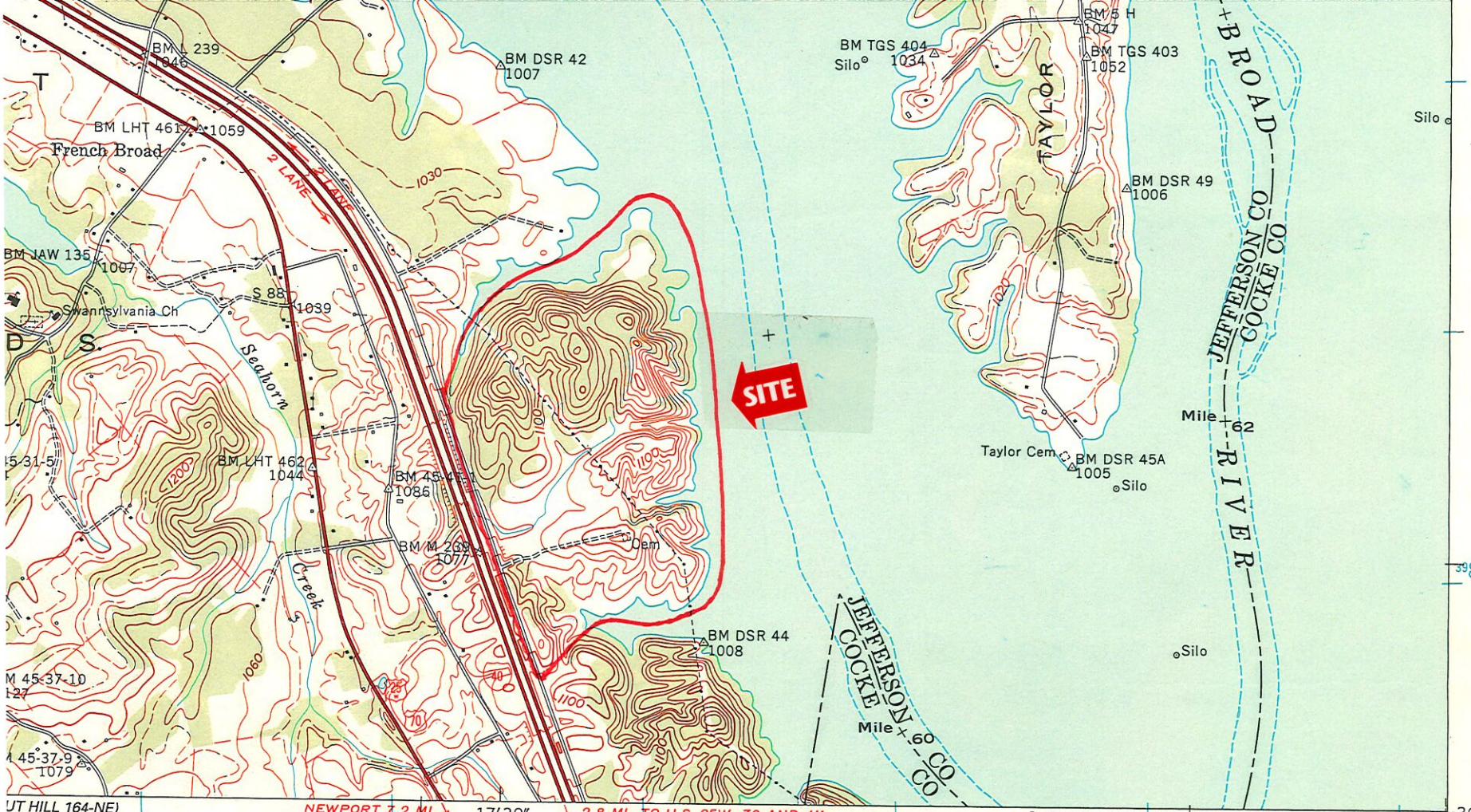


INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1989

(TVA 163-SE)

(NEWPORT 173-NW)
4355 I NW

UT HILL 164-NE)
355 IV NE

E 1:24000

0 1 MILE

3000 4000 5000 6000 7000 FEET

0 1 KILOMETER

ITERVAL 20 FEET

NT HALF-INTERVAL CONTOURS

VERTICAL DATUM OF 1929

TIONAL MAP ACCURACY STANDARDS

ER, COLORADO 80225, OR RESTON, VIRGINIA 22092

DIVISION OF GEOLOGY, NASHVILLE, TENN. 37219

THORITY, CHATTANOOGA, TENN. 37401

PS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty ..... Poor motor road .....

Medium-duty ..... Wagon and jeep track _ _ _ _

Light-duty ..... Foot trail .....

Interstate Route U. S. Route State Route

In developed areas, only through roads are classified

WHITE PINE, TENN.

36083-A3-TF-024

1961

DMA 4356 III SE — SERIES V841

KNOXVILLE BLUE PRINT & SUPPLY
622 LEROY AVENUE
KNOXVILLE, TN 37921
(615) 525-0463

Final Engineering Report

For Waterside At Douglas Lake Wastewater Treatment Plant and Drip Dispersal

Jeremy Fields, P.E.
6-21-2018

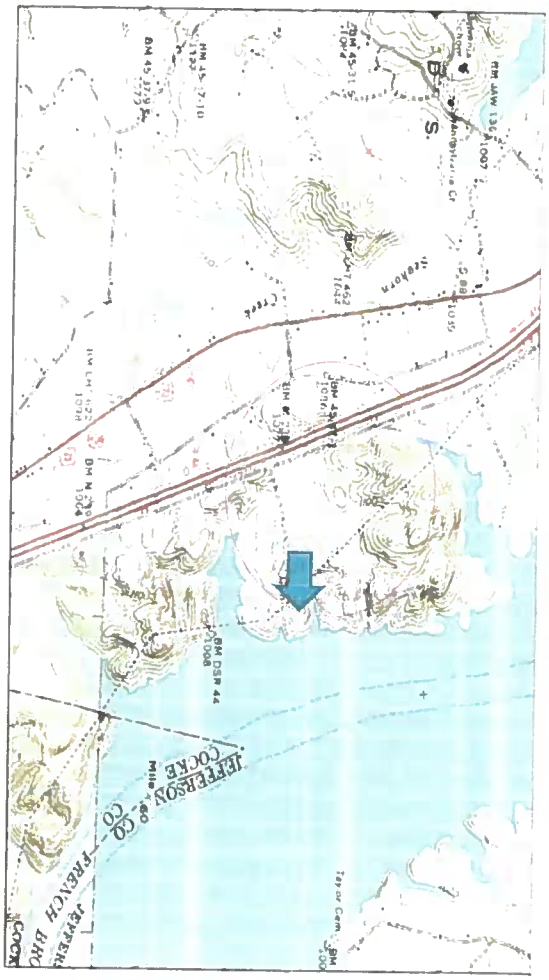
Table of Contents

1.0 SOP Permit Application

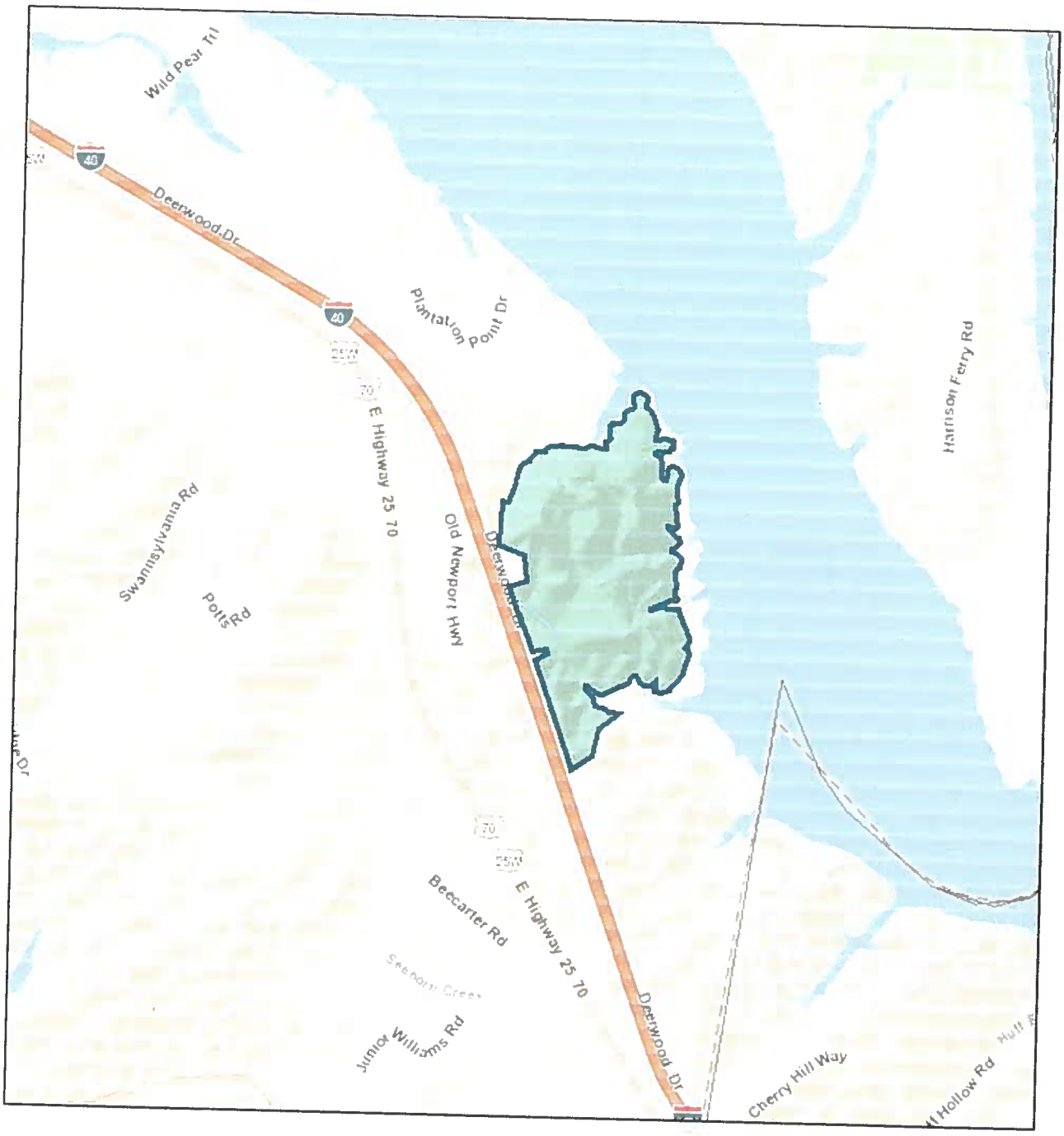
Applied for By IRM Utility.

2.0 Area of Review

Topo Map



Area of Review



Aerial Map


Deerwood Dr
Plantation Point Dr
Fain Rd
Old Newport Hwy
Flicker Ln
Taylor Ln
Creek Rd
Wells Ln
Taylor Hill Rd
Beecatter Rd

3.0 Groundwater General Description

The USGS maps indicates Waterside at Douglas Lake wastewater treatment area drainage flow path is to the east and discharged into Douglas Reservoir.

4.0 Population General Description

The majority of the Area of Review is forest (hardwoods) and pasture. See attached aerial map of property

5.0 Nature of Fluid

Waterside at Douglas Lake (~411 bedrooms (137 units)) residential homes will have a peak design discharge of approximately 41,100 gpd of domestic wastewater.

6.0 General Location of Publicly Supplied Water

Public water is within 1500' feet of subdivision entrance. Developer plans to extend service line and supply water to the proposed subdivision.

7.0 Description of System

Domestic wastewater will be treated though an Aqua Point Bioclere. Bioclere is a modified trickling filter over a clarifier that is designed to treat wastewater with varying organic and nutrient concentrations. Treated wastewater (~41,100 gpd) is pumped through ultra violet disinfection units and then distributed to HDPE drip lines with pressure compensating emitters. The drip lines are to be installed on 2-foot centers along the contours with the emitters spaced at 2-foot centers along the drip line. Drip lines are plowed into the soils that have been approved by TDEC and a licensed soil scientist and placed at an approximate depth of 8-12 inches below the

ground surface. Distribution of the treated wastewater is managed through solenoid valves and controlled by a programmable PLC.

Daily Flow

Number of Units	137
Daily Flow for 1 Bedroom	300 gpd/unit
Daily Flow	41,100 gpd

Land Application Area

Loading Rate (0.25 gal/sf)	41,100 gpd
Total Area Required	164,400 S.F.
or	3.77 acres

Number of Required Zones

Length per zone (@2' o.c.)	5,138 L.F.
Number of Zones	16.0 Zones

Drip Emmitter Tubing

Drip Zones	5,138 LF Per Zone
Total Zones	16.0 zones
Total Required Drip Tubing	82,208 L.F.

The sewage collection, treatment, and reuse system will be owned and operated by IRM Utility, Incorporated in Jefferson Co., TN.

Soils Information was completed by IWS, Inc. and reviewed by Billy Roach, TDEC Soil Scientist on February 2, 2018. The soils were Sequoia in the proposed drip site. Restrictive layers were not present within the upper 20". Most restrictive layer was a Clay texture with moderate blocky structure. Soil Map and descriptions are attached. These soils qualify for the .25 gpd/Sq.Ft. loading rate.

Alternative System Analyses:

Conventional drain fields were considered for this development. The soils for drain field approval were very limited. The majority of the site contains eroded shale and steep ravines and drainages. With the proposed intensity of the development, there are not enough soils to maintain enough approved soil for a primary and backup septic system.

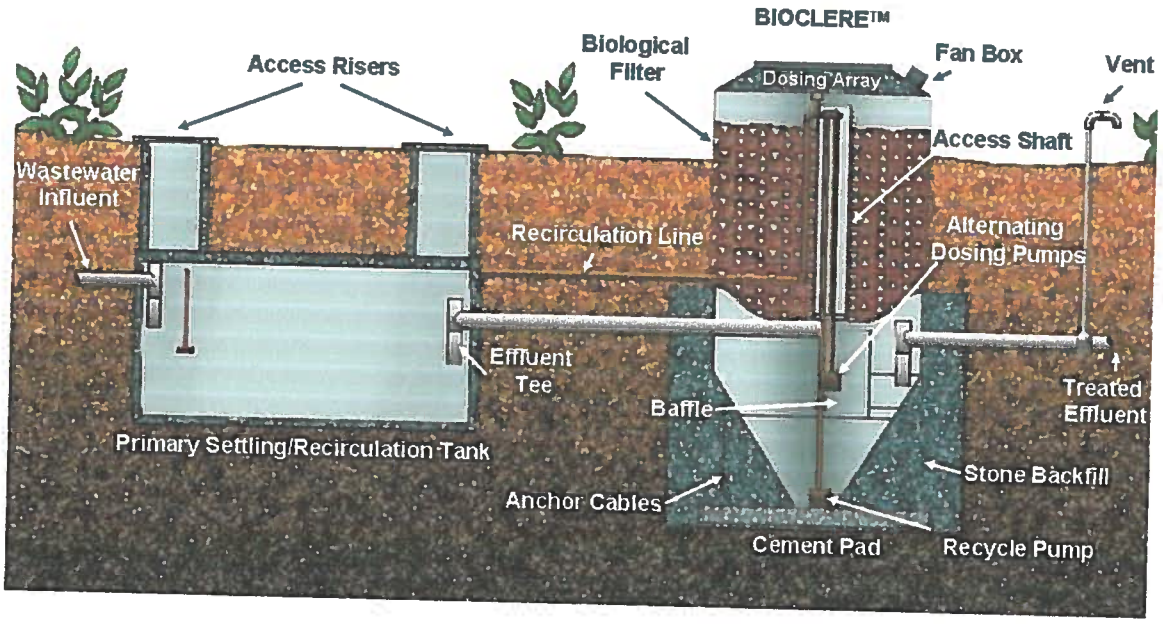
NPDES Permit for direct discharge is not a possibility for this site. TDEC does not allow private owned sewer discharges for subdivision approval.

Conventional sewer is not an option. Sewer from Dandridge is about 5 miles away and Interstate 40 would have to be crossed to access the site, and this is not a possibility.

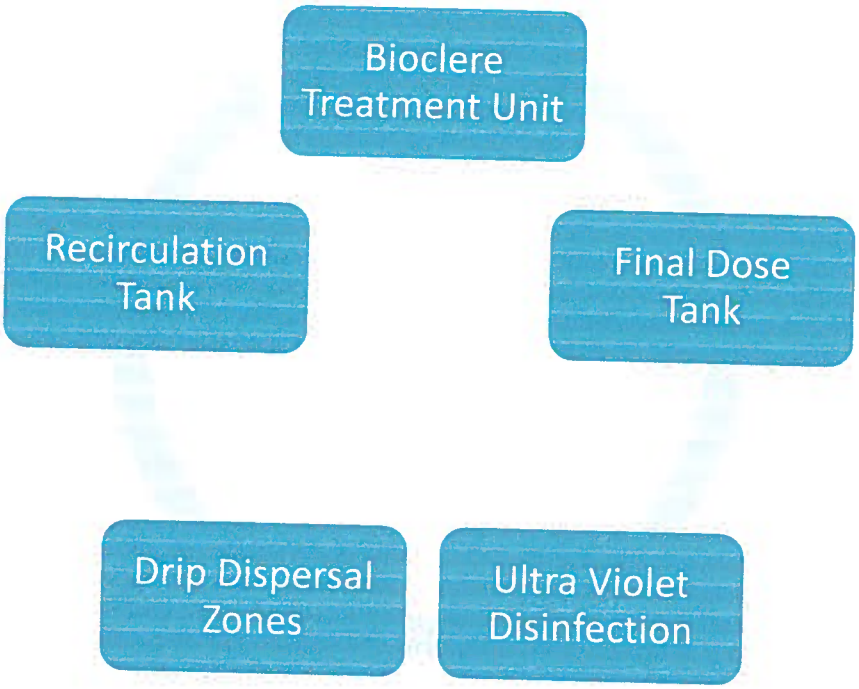
STEP, Treatment, Drip Irrigation is the selected option. This is the only option to complete the proposed subdivision. The permit will be controlled by the SOP and a Public Regulated Utility will control the maintenance and approval of the system.

8.0 Nature and Type of System

Treated wastewater from Waterside at Douglas Lake will first be pumped from numerous water tight septic tanks (STEP). Grey water is pumped from the septic via a pressure collection line to the Aqua Point Bioclere Treatment Unit. The wastewater will then be recirculated with the Bioclere Treatment Unit before discharging into the final dose tank. From the dose tank, the treated wastewater will be pumped through an ultra violet disinfection unit and then disposed through the drip dispersal lines within the approved soils site.



9.0 Flow Schematic



Section Index

1 General Information

Waterside at Douglas Lake
Jefferson County, Tn.

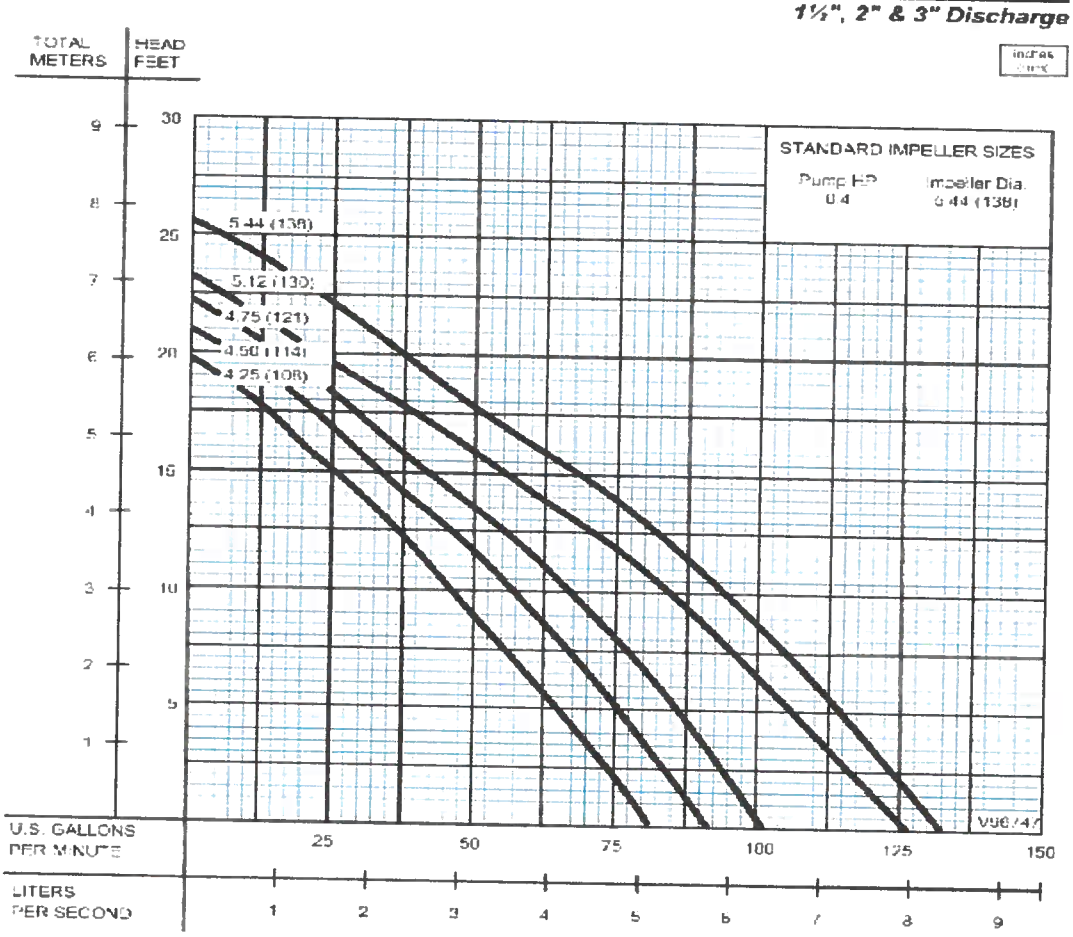
The proposed Waterside at Douglas Lake is located in the south east corner of Jefferson County off of Deerwood Drive. The proposed Waterside at Douglas Lake (~411 bedrooms (137 units)) residential homes will have a peak design discharge of approximately 41,100 gpd of domestic wastewater. The wastewater treatment will consist of a 1,500 g Step Tank with Simplex Timed Dosed Control Panel with 20 GPM Step Pump, 2" Collection Force Main, a 20,000 g Equalization Tank with Dosing Pumps, 13,000 g Recycle Tank, Splitter Box, (2) Model 36/30 Aqua Point Bioclere Treatment Units in parallel, final dosing tank, and dual Arkal Filters ultraviolet disinfection. The treated wastewater will be dispersed in a 16-zone, 5,138 L.F. per zone for a total of 82,208 LF drip dispersal field.

STEP tanks will be located at every home to achieve liquid solid separation. The wastewater will then be collected via a forcemain. The wastewater will first enter an EQ tank, then enter the Recycle Tank and pump into the Aqua Point Bioclere. After the wastewater circulates though the Aqua Point Bioclere, the wastewater will then be pumped through dual Arkal Filters then through ultra violet disinfection. After disinfection, the wastewater will be pumped into the drip dispersal field for land application for final treatment.

2 Pump Selection

BARNES®
www.cranepumps.com

Series SE
Performance Curve
.4HP, 1750RPM, 60Hz
1¼", 2" & 3" Discharge



Testing is performed with water, specific gravity 1.0 @ 68° F (20°C), other fluids may vary performance.

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PUMPS & SYSTEMS

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SECTION	1B
PAGE	3
DATE	6/04

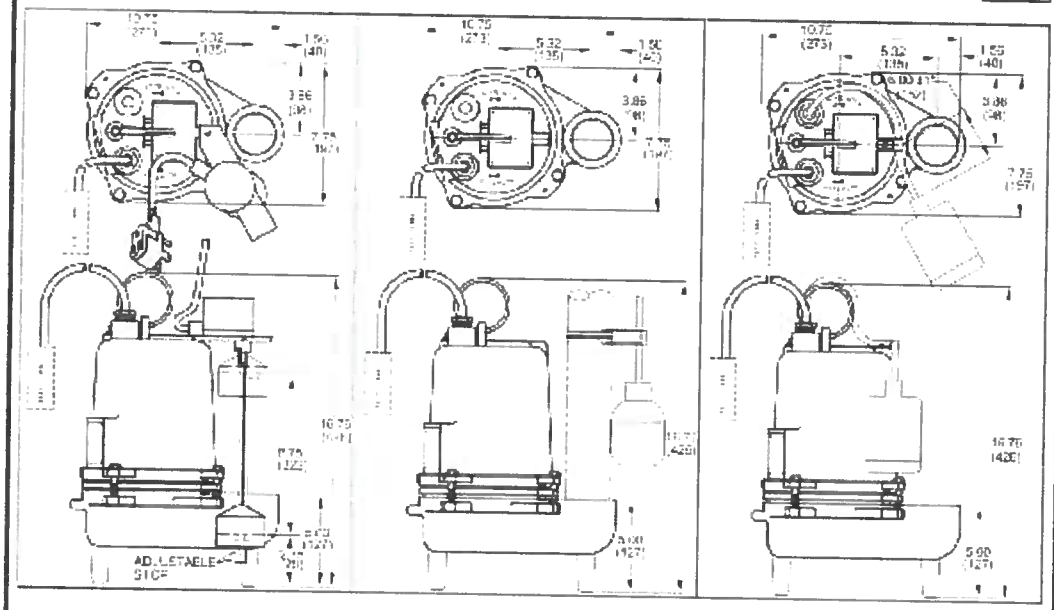
Series SE

2" Spherical Solids Handling
Manual & Automatic

BARNES
www.cranepumps.com

1½", 2" & 3" Discharge

SE411VF | **SE411 & SE421 (Less Float) SE411A** | **SE411AU, SE421AU**



MODEL NO	PART NO	HP	VOLT/PH	Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D Inch (mm)
SE411	095747	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE411A	095748	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE411AU	095749	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE411VF	105836	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE421	095750	0.4	230/1	60	1750	C	6.2	13.0	14/3	SJTOW	0.375 (9.5)
SE421AU	095751	0.4	230/1	60	1750	C	6.2	13.0	14/3	SJTOW	0.375 (9.5)

Mechanical Switch on SE-A, cord 18/2, SJOW, Piggy-Back Plug
Mechanical Switch on SE-AU, cord 14/2, SJOW, 0.370 (9.4mm) O.D.
Vertical Switch on SE-VF, cord 18/2, SJOW, 0.320 (8.1mm) O.D. Piggy-Back Plug

IMPORTANT !

1. PUMP MAY BE OPERATED DRY FOR EXTENDED PERIODS WITHOUT DAMAGE TO MOTOR AND/OR SEALS.
2. THIS PUMP IS APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION II HAZARDOUS LOCATIONS.
3. THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION I HAZARDOUS LOCATIONS.
4. INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER FEATURES, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.

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A Crane Co. Company

PUMPS & SYSTEMS

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BARNES®

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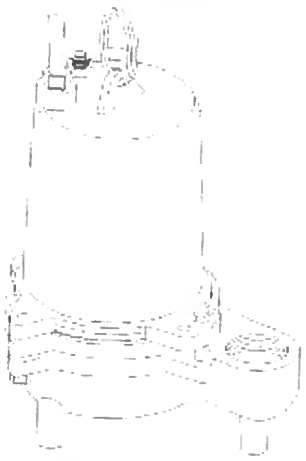
Series SE

2" Spherical Solids Handling
Manual & Automatic

1½", 2" & 3" Discharge

DISCHARGE		2" NPT, Female, Vertical
LIQUID TEMPERATURE		
	SE411	77°F (25°C) Continuous
	SE421	104°F (40°C) Continuous
VOLUTE		Cast Iron ASTM A-48, Class 30
MOTOR HOUSING		Cast Iron ASTM A-48, Class 30
SEAL PLATE		Cast Iron ASTM A-48, Class 30
IMPELLER:		
	Design	2 Vane, Open with pump out vanes on back side, Dynamically Balanced, ISO G6.3
	Material	Cast Iron ASTM A-48, Class 30
SHAFT		416 Stainless Steel
SQUARE RINGS		Buna-N
HARDWARE		300 Series Stainless Steel
PAINT		Air Dry Enamel
SEAL:	*Design*	Single Mechanical, Oil Filled Reservoir Secondary Exclusion Seal
	Material	Carbon/Ceramic/Buna-N Hardware - 300 Series Stainless
CORD ENTRY		15 ft. (5m) Quick Disconnect Cord with plug On 115Volt, Pressure Grommet for sealing and strain relief
SPEED		1750 RPM (Nominal)
UPPER BEARING		Single Row, Ball, Oil Lubricated
	Load	Radial
LOWER BEARING		Single Row, Ball, Oil Lubricated
	Load	Radial & Thrust
MOTOR:	*Design*	NEMA L Torque Curve, Oil Filled, Squirrel Cage Induction
	Insulation	Class B
SINGLE PHASE		Permanent Split Capacitor (PSC) Includes Overload Protection in Motor
LEVEL CONTROL		"A" - Wide Angle, PVC, Mechanical, 15 ft (5m) cord with Piggy-Back Plug, N/O "AU"- Wide Angle, Polypropylene, Mechanical, N/O, integral to pump ON and OFF Points are adjustable "VF" - Vertical Float, PVC, Snap Action, 15 ft (5m) cord, with Piggy Back plug OFF point ONLY is adjustable
OPTIONAL EQUIPMENT		Seal Material, Additional Cord



Series: SE (SE411 & SE421)
.4HP, 1750RPM, 60Hz

SWPA MEMBER

C SA R US
CSA 108
UL 778
LR16567

Sample Specifications, Section 1, Page 3

DESCRIPTION:

SUBMERSIBLE NON-CLOG SEWAGE PUMP DESIGNED FOR TYPICAL RAW SEWAGE APPLICATIONS

Orenco SYSTEMS

Technical Data Sheet

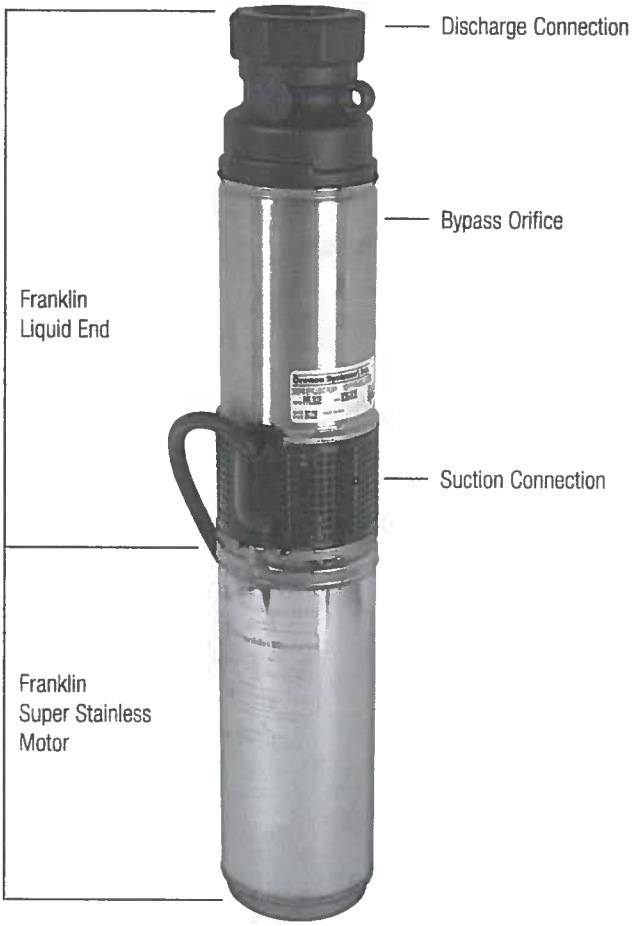
PF303012-30

PF Series 60-Hz, 4-inch (100-mm) Submersible Effluent Pumps

Applications

Our 4-inch (100-mm) Submersible Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic tanks or separate dosing tanks. All our pumps are constructed of lightweight, corrosion-resistant stainless steel and engineered plastics; all are field-serviceable and repairable with common tools; 60-Hz PF Series models are CSA certified to the U.S. and Canadian safety standards for effluent pumps, meeting UL requirements.

Orenco's Effluent Pumps are used in a variety of applications, including pressurized drainfields, packed bed filters, mounds, aerobic units, effluent irrigation, effluent sewers, wetlands, lagoons, and more. These pumps are designed to be used with a Biotube® pump vault or after a secondary treatment system.



C US
LR80980
LR2053896

Powered by Franklin Electric

Features/Specifications

To specify this pump for your installation, require the following:

- Minimum 24-hour run-dry capability with no deterioration in pump life or performance*
- Patented 1/8-inch (3-mm) bypass orifice to ensure flow recirculation for motor cooling and to prevent air bind
- Liquid end repair kits available for better long-term cost of ownership
- TRI-SEAL™ floating impeller design on 10, 15, 20, and 30 gpm (0.6, 1.0, 1.3, and 1.9 L/sec) models; floating stack design on 50 and 75 gpm (3.2 and 4.7 L/sec) models
- Franklin Electric Super Stainless motor, rated for continuous use and frequent cycling
- Type SOOW 600-V motor cable

** Not applicable for 5-hp (3.73 kW) models*

Standard Models

See specifications chart, pages 2-3, for a list of standard pumps. For a complete list of available pumps, call Orenco.

Product Code Diagram

PF [30] [30] [1] [2] [ ] - [30]

Cord length, ft (m):‡
Blank = 10 (3) 20 = 20 (6)
30 = 30 (9) 50 = 50 (15)

Check valve:
Blank = no internal check valve
CV = internal check valve†

Voltage, nameplate:
1 = 115* 200 = 200
2 = 230 4 = 460

Frequency:
1 = single-phase 60 Hz
3 = three-phase 60 Hz

Horsepower (kW):
03 = ⅓ hp (0.25) 05 = ½ hp (0.37)
07 = ¾ hp (0.56) 10 = 1 hp (0.75)
15 = 1½ hp (1.11) 20 = 2 hp (1.50)
30 = 3 hp (2.24) 50 = 5 hp (3.73)

Nominal flow, gpm (L/sec):
10 = 10 (0.6) 15 = 15 (1.0)
20 = 20 (1.3) 30 = 30 (1.9)
50 = 50 (3.2) 75 = 75 (4.7)

Pump, PF Series

* ½-hp (0.37kW) only
† Available for 10 gpm (0.6 L/sec), 1/2 hp (0.37 kW) only
‡ Note: 20-ft cords are available only for single-phase pumps through 1½ hp

Specifications

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material [1]	Length, in. (mm)	Min. liquid level, [2] in. (mm)	Weight, [3] lb (kg)	Rated cycles/day
PF100511	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100511CV	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100512	10 (0.6)	0.50 (0.37)	1	230	240	6.3	6.3	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF10053200	10 (0.6)	0.50 (0.37)	3	200	208	3.8	3.8	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100712 [4,5]	10 (0.6)	0.75 (0.56)	1	230	240	8.3	8.3	8	1 ¼ in. GFP	25.9 (658)	17 (432)	30 (14)	300
PF10073200 [4,5]	10 (0.6)	0.75 (0.56)	3	200	208	5.1	5.2	8	1 ¼ in. GFP	25.4 (645)	17 (432)	31 (14)	300
PF101012 [5,6]	10 (0.6)	1.00 (0.75)	1	230	240	9.6	9.6	9	1 ¼ in. GFP	27.9 (709)	18 (457)	33 (15)	100
PF10103200 [5,6]	10 (0.6)	1.00 (0.75)	3	200	208	5.5	5.5	9	1 ¼ in. GFP	27.3 (693)	18 (457)	37 (17)	300
PF102012 [5,6,7,8]	10 (0.6)	2.00 (1.49)	1	230	240	12.1	12.1	18	1 ¼ in. SS	39.5 (1003)	22 (559)	48 (22)	100
PF102032 [5,6,8]	10 (0.6)	2.00 (1.49)	3	230	240	7.5	7.6	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF10203200 [5,6,8]	10 (0.6)	2.00 (1.49)	3	200	208	8.7	8.7	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF150311	15 (1.0)	0.33 (0.25)	1	115	120	8.7	8.8	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF150312	15 (1.0)	0.33 (0.25)	1	230	240	4.4	4.5	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF200511	20 (1.3)	0.50 (0.37)	1	115	120	12.3	12.5	4	1 ¼ in. GFP	22.3 (566)	18 (457)	25 (11)	300
PF200512	20 (1.3)	0.50 (0.37)	1	230	240	6.4	6.5	4	1 ¼ in. GFP	22.5 (572)	18 (457)	26 (12)	300
PF20053200	20 (1.3)	0.50 (0.37)	3	200	208	3.7	3.8	4	1 ¼ in. GFP	22.3 (566)	18 (457)	26 (12)	300
PF201012 [4,5]	20 (1.3)	1.00 (0.75)	1	230	240	10.5	10.5	7	1 ¼ in. GFP	28.4 (721)	20 (508)	33 (15)	100
PF20103200 [4,5]	20 (1.3)	1.00 (0.75)	3	200	208	5.8	5.9	7	1 ¼ in. GFP	27.8 (706)	20 (508)	33 (15)	300
PF201512 [4,5]	20 (1.3)	1.50 (1.11)	1	230	240	12.4	12.6	9	1 ¼ in. GFP	34.0 (864)	24 (610)	41 (19)	100
PF20153200 [4,5]	20 (1.3)	1.50 (1.11)	3	200	208	7.1	7.2	9	1 ¼ in. GFP	30.7 (780)	20 (508)	35 (16)	300
PF300511	30 (1.9)	0.50 (0.37)	1	115	120	11.8	11.8	3	1 ¼ in. GFP	21.3 (541)	20 (508)	28 (13)	300
PF300512	30 (1.9)	0.50 (0.37)	1	230	240	6.2	6.2	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF30053200	30 (1.9)	0.50 (0.37)	3	200	208	3.6	3.6	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF300712	30 (1.9)	0.75 (0.56)	1	230	240	8.5	8.5	5	1 ¼ in. GFP	24.8 (630)	21 (533)	29 (13)	300
PF30073200	30 (1.9)	0.75 (0.56)	3	200	208	4.9	4.9	5	1 ¼ in. GFP	24.6 (625)	21 (533)	30 (14)	300
PF301012 [4]	30 (1.9)	1.00 (0.75)	1	230	240	10.4	10.4	6	1 ¼ in. GFP	27.0 (686)	22 (559)	32 (15)	100
PF30103200 [4]	30 (1.9)	1.00 (0.75)	3	200	208	5.8	5.8	6	1 ¼ in. GFP	26.4 (671)	22 (559)	33 (15)	300
PF301512 [4,5]	30 (1.9)	1.50 (1.11)	1	230	240	12.6	12.6	8	1 ¼ in. GFP	32.8 (833)	24 (610)	40 (18)	100
PF30153200 [4,5]	30 (1.9)	1.50 (1.11)	3	200	208	6.9	6.9	8	1 ¼ in. GFP	29.8 (757)	22 (559)	34 (15)	300
PF301534 [4,5]	30 (1.9)	1.50 (1.11)	3	460	480	2.8	2.8	8	1 ¼ in. GFP	29.5 (685)	22 (559)	34 (15)	300
PF302012 [5,6,7]	30 (1.9)	2.00 (1.49)	1	230	240	11.0	11.0	10	1 ¼ in. SS	35.5 (902)	26 (660)	44 (20)	100
PF30203200 [5,6]	30 (1.9)	2.00 (1.49)	3	200	208	9.3	9.3	10	1 ¼ in. SS	34.0 (864)	24 (610)	41 (19)	300
PF303012 [5,6,7,8]	30 (1.9)	3.00 (2.23)	1	230	240	16.8	16.8	14	1 ¼ in. SS	44.5 (1130)	33 (838)	54 (24)	100
PF303032 [5,6,8]	30 (1.9)	3.00 (2.23)	3	230	240	10.0	10.1	14	1 ¼ in. SS	44.3 (1125)	27 (686)	52 (24)	300
PF305012 [5,6,7,8]	30 (1.9)	5.00 (3.73)	1	230	240	25.6	25.8	23	1 ¼ in. SS	66.5 (1689)	53 (1346)	82 (37)	100
PF305032 [5,6,8]	30 (1.9)	5.00 (3.73)	3	230	240	16.6	16.6	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF30503200 [5,6,8]	30 (1.9)	5.00 (3.73)	3	200	208	18.7	18.7	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF500511	50 (3.2)	0.50 (0.37)	1	115	120	12.1	12.1	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500512	50 (3.2)	0.50 (0.37)	1	230	240	6.2	6.2	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500532	50 (3.2)	0.50 (0.37)	3	230	240	3.0	3.0	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF50053200	50 (3.2)	0.50 (0.37)	3	200	208	3.7	3.7	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500534	50 (3.2)	0.50 (0.37)	3	460	480	1.5	1.5	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500712	50 (3.2)	0.75 (0.56)	1	230	240	8.5	8.5	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF500732	50 (3.2)	0.75 (0.56)	3	230	240	3.9	3.9	3	2 in. SS	23.7 (602)	25 (635)	32 (15)	300

Specifications, cont.

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material [1]	Length, in. (mm)	Min. liquid level, [2] in. (mm)	Weight, [3] lb (kg)	Rated cycles/day
PF50073200	50 (3.2)	0.75 (0.56)	3	200	208	4.9	4.9	3	2 in. SS	23.1 (587)	26 (660)	32 (15)	300
PF500734	50 (3.2)	0.75 (0.56)	3	460	480	1.8	1.8	3	2 in. SS	34.8 (884)	25 (635)	31 (14)	300
PF501012	50 (3.2)	1.00 (0.75)	1	230	240	10.1	10.1	4	2 in. SS	27.0 (686)	26 (660)	35 (16)	100
PF50103200	50 (3.2)	1.00 (0.75)	3	200	208	5.7	5.7	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501034	50 (3.2)	1.00 (0.75)	3	460	480	2.2	2.2	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501512[4]	50 (3.2)	1.50 (1.11)	1	230	240	12.5	12.6	5	2 in. SS	32.5 (826)	30 (762)	41 (19)	100
PF50153200[4]	50 (3.2)	1.50 (1.11)	3	200	208	7.0	7.0	5	2 in. SS	29.3 (744)	26 (660)	35 (16)	300
PF503012 [4, 5, 7, 8]	50 (3.2)	3.00 (2.23)	1	230	240	17.7	17.7	8	2 in. SS	43.0 (1092)	37 (940)	55 (25)	100
PF50303200 [4, 5, 8]	50 (3.2)	3.00 (2.23)	3	200	208	13.1	13.1	8	2 in. SS	43.4 (1102)	30 (762)	55 (25)	300
PF503034 [4, 5, 8]	50 (3.2)	3.00 (2.23)	3	460	480	5.3	5.3	8	2 in. SS	40.0 (1016)	31 (787)	55 (25)	300
PF505012 [5,6,7,8]	50 (3.2)	5.00 (3.73)	1	230	240	26.2	26.4	13	2 in. SS	65.4 (1661)	55 (1397)	64 (29)	300
PF505032 [5,6,7,8]	50 (3.2)	5.00 (3.73)	3	230	240	16.5	16.5	13	2 in. SS	59.3 (1506)	49 (1245)	64 (29)	300
PF751012	75 (4.7)	1.00 (0.75)	1	230	240	9.9	10.0	3	2 in. SS	27.0 (686)	27 (686)	34 (15)	100
PF751512	75 (4.7)	1.50 (1.11)	1	230	240	12.1	12.3	4	2 in. SS	33.4 (848)	30 (762)	44 (20)	100

1 *GFP = glass-filled polypropylene; SS = stainless steel. The 1 ¼-in. NPT GFP discharge is 2 7/8 in. octagonal across flats; the 1 ¼-in. NPT SS discharge is 2 1/8 in. octagonal across flats; and the 2-in. NPT SS discharge is 2 7/8 in. hexagonal across flats. Discharge is female NPT threaded, U.S. nominal size, to accommodate Orenco® discharge hose and valve assemblies. Consult your Orenco Distributor about fittings to connect hose and valve assemblies to metric-sized piping.*

2 *Minimum liquid level is for single pumps when installed in an Orenco Biotube® Pump Vault or Universal Flow Inducer. In other applications, minimum liquid level should be top of pump. Consult Orenco for more information.*

3 *Weight includes carton and 10-ft (3-m) cord.*

4 *High-pressure discharge assembly required.*

5 *Do not use cam-lock option (Q) on discharge assembly.*

6 *Custom discharge assembly required for these pumps. Contact Orenco.*

7 *Capacitor pack (sold separately or installed in a custom control panel) required for this pump. Contact Orenco.*

8 *Torque locks are available for all pumps, and are supplied with 3-hp and 5-hp pumps.*

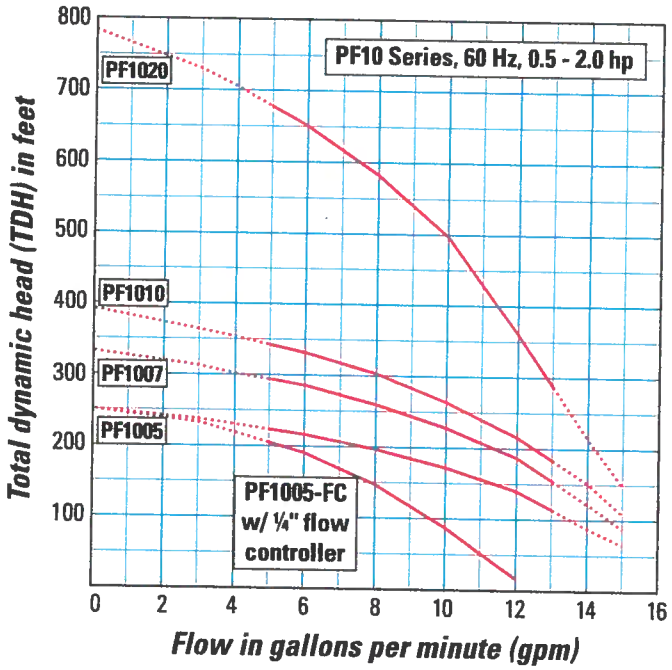
Materials of Construction

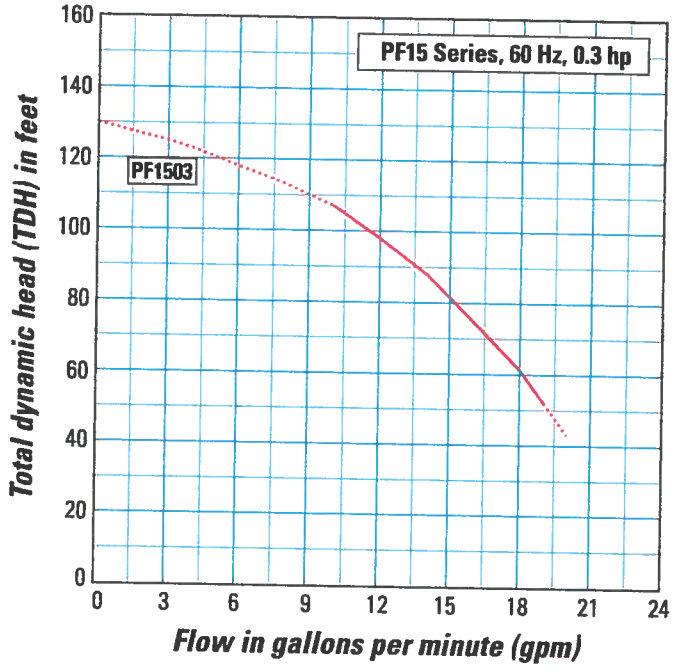
Discharge	Glass-filled polypropylene or stainless steel
Discharge bearing	Engineered thermoplastic (PEEK)
Diffusers	Glass-filled PPO (Noryl GFN3)
Impellers	Celcon® acetal copolymer on 10-, 20, and 30-gpm models; 50-gpm impellers are Noryl GFN3
Intake screen	Polypropylene
Suction connection	Stainless steel
Drive shaft	7/16 inch hexagonal stainless steel, 300 series
Coupling	Sintered stainless steel, 300 series
Shell	Stainless steel, 300 series
Motor	Franklin motor exterior constructed of stainless steel. Motor filled with deionized water and propylene glycol for constant lubrication. Hermetically sealed motor housing ensures moisture-free windings. All thrust absorbed by Kingsbury-type thrust bearing. Rated for continuous duty. Single-phase motors and 200 and 230 V 3-phase motors equipped with surge arrestors for added security. Single-phase motors through 1.5 hp (1.11 kW) have built-in thermal overload protection, which trips at 203-221° F (95-105° C).

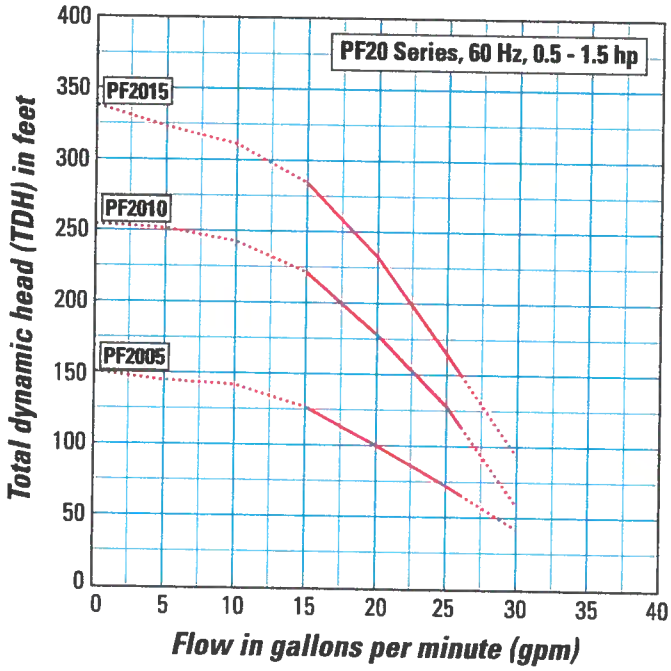
Using a Pump Curve

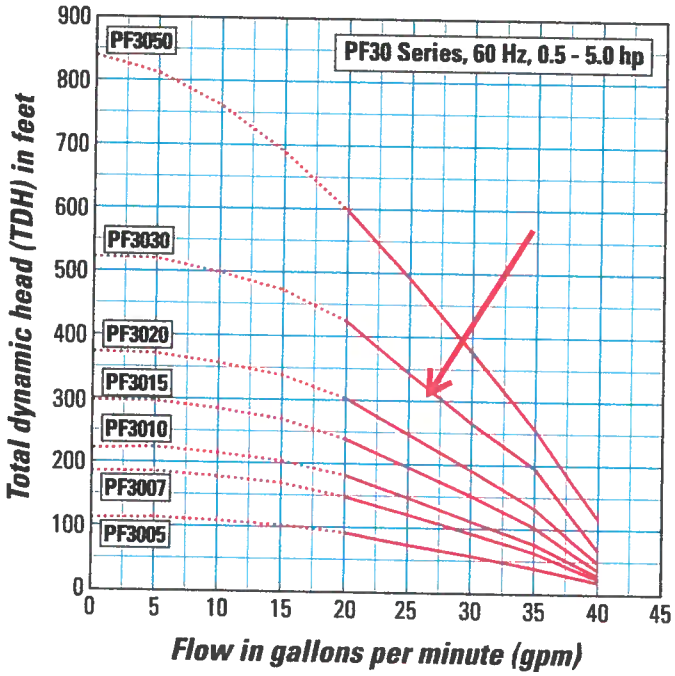
A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow and pressure (total dynamic head, or TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their nominal flow rate. These graphs show optimal pump operation ranges with a solid line and show flow rates outside of these ranges with a dashed line. For the most accurate pump specification, use Orenco's PumpSelect™ software.

Pump Curves









3 Effluent Disposal

The wastewater will first enter an EQ tank, then enter the Aqua Point Bioclere. After the wastewater circulates though the Aqua Point Bioclere, the wastewater will then be pumped through an ultra violet disinfection. After disinfection, the wastewater will be pumped into the drip dispersal field for land application for final treatment.

Daily Flow

Number of Units	137
Daily Flow for 1 Bedroom	300 gpd/unit
Daily Flow	41,100 gpd

Land Application Area

Loading Rate (0.25 gal/sf)	41,100 gpd
Total Area Required	164,400 S.F.
or	3.77 acres

Number of Required Zones

Length per zone (@2' o.c.)	
Number of Zones	16.0 Zones

Drip Emmitter Tubing

Drip Zones	
Total Zones	16.0 zones
Total Required Drip Tubing	82,200 L.F. (5138 Per Zone)

Zone	LF	#Laterals	Supply Length	Return Length	Elevation	Tank Elevation	Total Elevation Change on Supply	Total Emitters	GPH	GPMSupply	GPM Return	Total Flow
1	5138	16	371	409	1065	1083	-18	2569	1567.09	26	25.6	52
2	5138	17	336	326	1068	1083	-15	2569	1567.09	26	27.2	53
3	5138	19	306	294	1075	1083	-8	2569	1567.09	26	30.4	57
4	5138	23	274	239	1080	1083	-3	2569	1567.09	26	36.8	63
5	5138	29	245	235	1090	1083	7	2569	1567.09	26	46.4	73
6	5138	16	544	615	1062	1083	-21	2569	1567.09	26	25.6	52
7	5138	17	513	533	1066	1083	-17	2569	1567.09	26	27.2	53
8	5138	19	478	465	1072	1083	-11	2569	1567.09	26	30.4	57
9	5138	19	421	388	1076	1083	-7	2569	1567.09	26	30.4	57
10	5138	22	387	308	1084	1083	1	2569	1567.09	26	35.2	61
11	5138	29	358	220	1098	1083	15	2569	1567.09	26	46.4	73
12	5138	18	439	673	1078	1083	-5	2569	1567.09	26	28.8	55
13	5138	17	436	724	1085	1083	2	2569	1567.09	26	27.2	53
14	5138	17	394	632	1092	1083	9	2569	1567.09	26	27.2	53
15	5138	18	366	544	1100	1083	17	2569	1567.09	26	28.8	55
16	5138	22	333	462	1110	1083	27	2569	1567.09	26	35.2	61
Total	82208	318	6201	7067								

Zone	GPM FLOW	Total Pipe Length	FTHead/100'	Friction loss	Elevation Head	35 PSI Beginning	Fittings Loss	TDH	Exp. PSI
1	52	780	0.75	5.85	18	80.85	20.94	126	54.38961
2	53	662	0.75	4.965	15	80.85	20.163	121	52.37143
3	57	600	0.9	5.4	8	80.85	18.85	113	48.96104
4	63	513	1	5.13	3	80.85	17.796	107	46.22338
5	73	480	1.4	6.72	14	80.85	20.314	122	52.76364
6	52	1159	0.75	8.6925	21	80.85	22.1085	133	57.42468
7	53	1046	0.75	7.845	17	80.85	21.139	127	54.90649
8	57	943	1	9.43	11	80.85	20.256	122	52.61299
9	57	809	1	8.09	7	80.85	19.188	115	49.83896
10	61	695	1	6.95	5	80.85	18.56	111	48.20779
11	73	578	1.3	7.514	30	80.85	23.6728	142	61.48779
12	55	1112	0.75	8.34	5	80.85	18.838	113	48.92987
13	53	1160	0.75	8.7	18	80.85	21.51	129	55.87013
14	53	1026	0.75	7.695	18	80.85	21.309	128	55.34805
15	55	910	0.75	6.825	34	80.85	24.335	146	63.20779
16	61	795	1	7.95	54	80.85	28.56	171	74.18182

Hazen Williams Equation for Pressure Loss in Pipes

Imperial Units

	Waterside Dr.	Clear Sail Way	Gulls Cove	Sunrise Trail North	Sunrise Trail South	Pine View	Indian Ridge Lane
Specified Data							
l = length of pipe (ft)	2500	2020	1700	400	1010	500	4100
c = Hazen-Williams roughness constant	150	150	150	150	150	150	150
q = volume flow (gal/min)	25.5	30	23.5	21.5	25	23.5	23.5
dh = inside or hydraulic diameter (inches)	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Calculated Pressure Loss							
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.95	1.22	0.95	0.82	0.92	0.62	[illegible]
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.41	0.53	0.41	0.35	0.40	0.26	[illegible]
Head loss (ft H2O)	23.87	25.61	15.23	3.28	7.30	7.39	31.22
Head loss (psi)	10.27	11.10	5.96	1.41	3.17	3.18	13.41
Calculated Flow Velocity							
v = flow velocity (ft/s)	2.25	2.65	2.25	1.06	2.21	2.03	2.34

Worse Case Scenario using P-20-Plus Effluent Pump

gpm required discharged from Step Tank
Assuming the outlet elevation is same as the force main elevation, 1" discharge Assembly
50' of service line, and calculations of pump and discharge assemblies
TDH of 72.12

	Waterside Dr.	Clear Sail Way	Gulls Cove	Sunrise Trail North	Sunrise Trail South	Pine View	Indian Ridge Lane
Head Loss for Each Road	23.87	25.61	16.23	3.28	7.30	7.39	31.33
Maximum Elevation Head For each Road	25	50	33	5	34	15	37
	72.12	72.12	72.12	72.12	72.12	72.12	72.12
TDH (Worst Case Scenario)	120.99	147.93	125.35	80.40	113.48	99.51	140.72

SECTION — PRE EQUALIZATION TANK ASSEMBLY

PART 1 - GENERAL

Primary settled/screened wastewater shall flow by gravity or be pumped to the pre-equalization tank (pre-EQ) located ahead of the Aquapoint supplied aerobic treatment system. The purpose of the pre-EQ shall be to transfer the wastewater to the treatment system over a 24 hour period at a consistent flow rate. Installation and assembly of the components shall be completed by the general contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The pre-EQ system shall consist of a precast concrete tank (or equivalent) located after the primary settling tank(s). The following equipment shall be included in this tank: (2) submersible sewage pumps with stainless steel slide rail assemblies, associated piping, valving, controls and appurtenances.

B. The CSA and UL approved equalization pumps shall be solids handling submersible pumps. The pumps shall contain built in thermal protection and shall be rated for intermittent or continuous duty when fully submerged at 32°F-104°F. The pumps shall be controlled using a fully adjustable timer.

2.2 CONTROLS

A. The UL approved control panel shall be furnished with an audio and visual alarm for pump failure and tripped circuit breaker conditions, an exterior alarm silence button, and an on/off/test power/alarm toggle switch. Within the NEMA 4X enclosed fiberglass panel an equalization pump timer, pump elapsed time meters, relays, terminal strip, on/off/test switches, run lights, pump alternator, circuit breakers and current sensors shall be provided. The controls may be controlled using a PLC. Four control float switches located in the tank govern the following functions:

1. Low level Alarm float: The low level alarm float will act as a redundant pump shut off and will activate an audio/visual alarm signal when the float switch is in the extended position (open circuit).

2. Low level float: In the extended position this float switch shall create an open circuit and prevent operation of the pumps. When the circuit is closed the float switch shall allow activation of the timer and the pumps shall alternate between cycles, transferring wastewater to the downstream treatment reactor(s).

3. Mid level float: Upon closure the mid level float switch shall activate the lag pump and the two pumps shall draw down the liquid in the equalization tank until the mid level float is an open. Upon this occurrence, a counter shall be triggered to alert the operator that a high level condition has occurred and that the timer "on" setting may need adjusting.

4. High level float: The high level float switch shall activate the audio/visual alarm when the circuit is closed.

2.3 TIMER SETTINGS

A. The pre-EQ pumps shall be set for an "on/off" cycle using a fully adjustable timer in the control panel.

For example, if the timer is set for a cycle of 8 minutes on and 10 minutes off and the pump rate is 25 gpm, the maximum volume they will dose per day will be: **25 gpm * (8/18) minutes dosing * 24 hours * 60 minutes/hr = 16,000 gpd.** This volume must include recirculation from the associated treatment components.

2.4 MISCELLANEOUS

A. The pre-EQ pumps shall alternate between dosing cycles. However, if one pump fails the remaining pump will take over the failed pump's cycle and an audio/visual alarm will be activated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All materials and equipment shall be installed in a neat, workmanlike manner.

B. Installation of the treatment equipment supplied by Aquapoint or Aquapoint's representative shall be in accordance with written instructions provided by the manufacturer or approved representative.

3.2 CLEAN UP

A. Prior to start-up and field-testing, foreign matter shall be removed from all treatment system tanks.

3.3 FIELD TESTING

A. The system shall be field-tested by an Aquapoint representative using clean fresh water prior to acceptance. The system shall be operated to test the efficiency of all components. All systems, controls, and sequences shall be operated and demonstrated to operate as approved. The contractor shall be responsible for all necessary temporary connections, testing equipment and utilities and shall provide and dispose (if necessary) of all water used.

The following is a checklist for the design of an AquaPoint onsite wastewater treatment system that includes an **AquaPoint Flow Equalization System.** We recommend the following details be shown on the site plan to facilitate proper installation and operation.

- ☐ A primary screen, baffled primary settling tank or STEP/STEG collection system must precede the flow equalization chamber.

- ☐ The flow equalization equipment is typically housed in a contractor supplied concrete tank with AquaPoint supplied internals or an AquaPoint supplied FRP tank with AquaPoint supplied internals.

- ☐ The design engineer must specify the tank footings, subgrade and provide the necessary buoyancy calculations for the tank (if applicable).

- ☐ The tank must have a working volume (not a nominal capacity) in accordance with the specified flow equalization volume required for the project. Typical flow equalization tank capacities range from 25% to 50% of design flow rate.

- ☐ AquaPoint flow equalization systems incorporate duplex alternating pumps, (4) float switches with weights, S.S. lifting chains and controls. Slide rail assemblies and hoist and sockets are optional.

- ☐ All flow equalization system plumbing shall be installed in the field by the contractor and should include swing check valves for each pump, accessible unions for each pump shaft and a discharge manifold with two gate valves (one per pump) for flow throttling. AquaPoint recommends the unions and gate valves be installed within 18" of the top of the access riser to facilitate proper operation & maintenance.

- ☐ A 1/8" tell tail drain hole should be drilled in the side of each pumps' discharge pipe to promote drainage after a pump cycle and to break siphon.

- ☐ The flow equalization pumps should be installed under a minimum 30" x 30" square aluminum access hatch or a minimum 36" diameter manhole cover. Pump systems installed

in round risers should incorporate a flat plane bracket across the riser for anchoring slide rail assemblies and/or plumbing.

- ☐ Flow equalization tanks > 15,000 gallons in capacity require some form of agitation (mechanical mixing or aeration) to prevent sedimentation and stagnation (prevents odors) and to promote load equalization. In the event a submersible mixer or aspirator is used a (5^{th}) float switch and weight should be added to the flow equalization assembly.

- ☐ When possible, AquaPoint recommends a gravity overflow pipe from the flow equalization tank to the next process stage be incorporated for emergency overflow purposes.

- ☐ AquaPoint flow equalization systems require, a 115v or (230v/1ph or 3ph) or 460v/3ph electrical service.

- ☐ Flow equalization tanks incorporating chemical feed should have a 1.5" or 2.0" diameter PVC conduit, originating from the chemical storage facility to the inlet tee of the flow equalization tank. See AquaPoint's chemical feed design guidelines for additional information.

- ☐ Installation of the treatment equipment supplied by AquaPoint shall be in accordance with written instructions provided by AquaPoint and/or the manufacturer.

4 Effluent Storage

Tennessee Department of Environment and Conservation (TDEC) requires 24 hours of storage volume for drip dispersal.

REQUIRED STORAGE	
Single Family Residence	137 BR
Flow per EDU	300 gpd
Required Storage	41,100 gal.

PROVIDED STORAGE	
Equalization Tank	20,000 gal.
Recycle Tank	13,000 gal
Dose Tank	5,000 gal.
1000 G Step Tanks at each EDU	137,000 gal
Total Designed Storage	175,000 gal

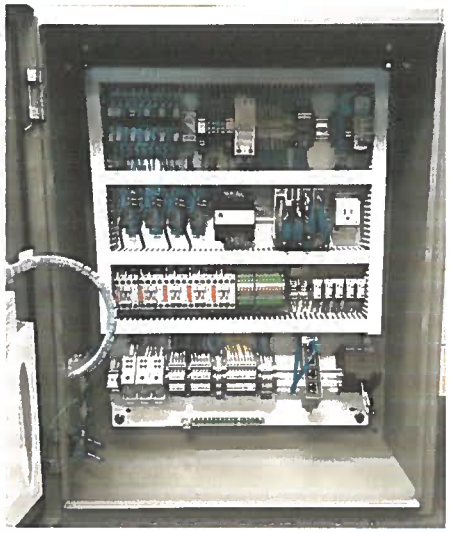
5 Reference Material and Specification

HAWK Control Panels

Adenus HAWK smart panels are powered by HAWKOS© and specifically designed with maintenance personnel and environmental protection in mind. When paired with a HAWK Monitoring System® subscription, users will maximize energy savings while ensuring proper treatment and discharge rates, enhancing the value of your maintenance schedule. The HAWKMS® subscription allows for maximum product support while troubleshooting operational and treatment issues from any location. Product lines include standard Fixed Film Reactor, Deep Cell Pond, BioClere Units, Drip Irrigation, Remote Telemetry Units, and Advantex Modules.

Technical Specifications

- Touch Screen interface
- PLC
- Supports multi-protocols
- Configuring using crimson 2.0 software
- Up to 5 RS-232/422/485 serial ports
- 10 base T/100 Base-TX Ethernet Port to Network Units, hose web pages and FTP server
- Remote web Access and control facility
- Configuration stored in non-volatile memory
- Compact Flash socket to increase memory and data logging
- NEMA 4X/ IP66 front panel
- TVSS protection
- Climate controlled
- Current Sensors
- Isolation Relays



FFRT-2R2D1S-15Z:

EX: Fixed Film Reactor Telemetry -2 Recirc., 2 Discharge, 1 Sludge Removal- 15 Drip Zones

- User friendly Touch Screen LCD
- Intricate data logging
- Non-Proprietary components
  - No printed Circuit boards
- UL type 4 Rated
- TVSS and isolation relays for protection
- Climate controlled
- Manual operation w/switched
- HAWKMS® Ready
  - Email alarms with Acknowledgement
  - Operate with any smart phone

Applications

Adenus HAWK Control Panels are used in large Recirculating Sand Filters, Lagoons, Drip Fields, Bioclere Units, and Advantex Modules to control all pumps, zone valves, and UV units. Monitor flow rates and recirculation schedules from any location.

849 Aviation Parkway
Smyrna, TN 37167

Office: 1+615.220.7200

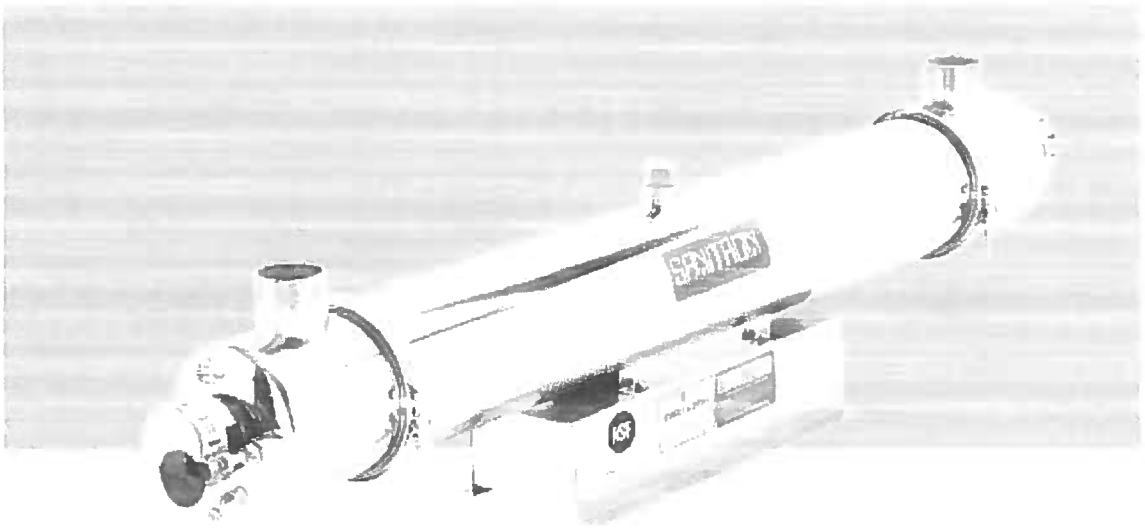
Chris.Phillips@adenus.com

HAWK MONITORING SYSTEM

Adenus

SANITRON®

ULTRAVIOLET WATER PURIFIERS



Model S2400C
40 GPM

NSF

Certified to
NSF/ANSI 61 & 372

SINCE 1963

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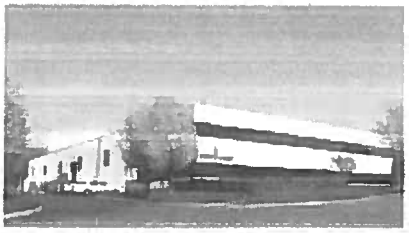
CORPORATION®



Since 1963, Atlantic Ultraviolet Corporation® has pioneered the discovery and development of beneficial uses of ultraviolet energy. Over the years, these efforts have led to the development of valuable, cost effective, and environmentally sound techniques and products now known and respected throughout the world.

The UV Application Specialists at Atlantic Ultraviolet Corporation® assist customers in the selection of germicidal lamps and equipment. Their specialized knowledge is a valuable resource in formulating effective and cost-conscious ultraviolet solutions. Extensive inventories and a dedicated staff enable Atlantic Ultraviolet Corporation® to fulfill its commitment to provide fast deliveries and responsive customer service.

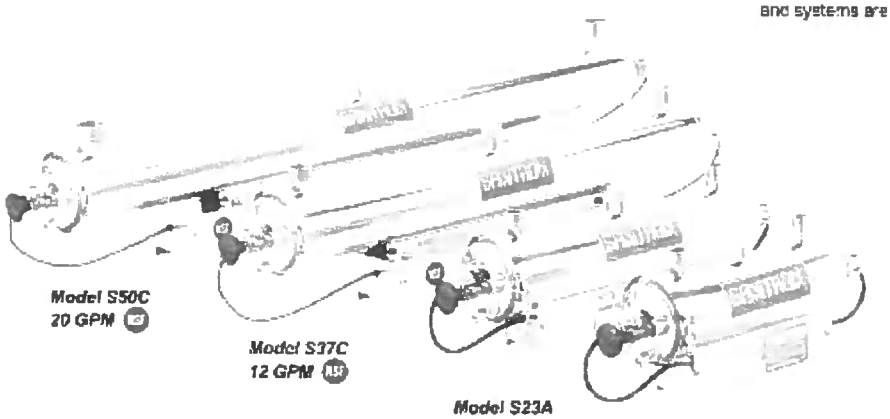
Ultraviolet water purification is a unique and rapid method of water disinfection without the use of heat or chemicals.

SANITRON® Ultraviolet Purifiers utilize germicidal ultraviolet lamps that produce short wave radiation lethal to bacteria, viruses and other microorganisms present in water.

Through the years ultraviolet technology has become well established as a method of choice for effective and economical water disinfection.

SANITRON® Ultraviolet Water Purifiers are the ideal solution for an ever growing range of water treatment applications.

Atlantic Ultraviolet Corporation® equipment and systems are manufactured in the USA.



Model S50C
20 GPM

Model S37C
12 GPM

Model S23A
5 GPM

Model S17A
3 GPM

Certified to NSF® / ANSI 61 & 372

(For larger flow rates, see page 9)

ADVANTAGES

Effective

Virtually all microorganisms are susceptible to SANITRON® ultraviolet disinfection

Economical

Hundreds of gallons are purified for each penny of operating cost

Safe

No danger of overdosing, no addition of chemicals

Fast

Water is ready for use as soon as it leaves the purifier – no further contact time required

Easy

Simple installation and maintenance—Compact units require minimum space

Automatic

Provides continuous disinfection without special attention or measurement

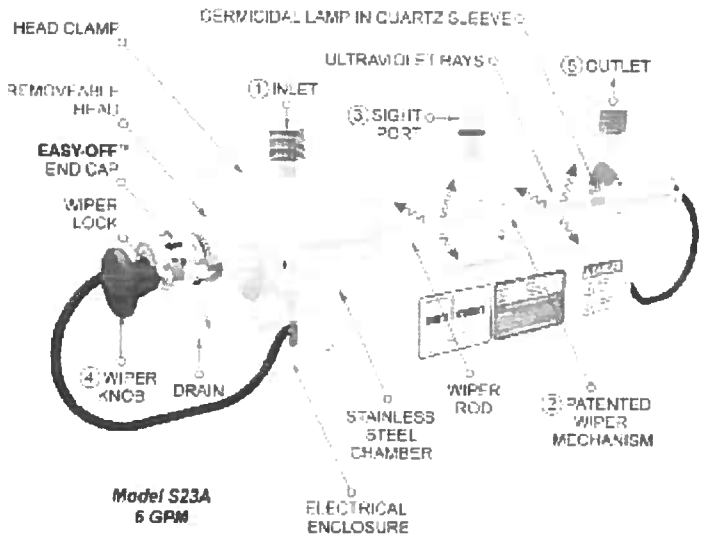
Chemical Free

No chlorine taste or corrosion problems

Versatile

Capacities available from 3 to 416 gallons per minute (GPM)

PRINCIPLE OF OPERATION



Model S23A
6 GPM

① The water enters the purifier and flows into the annular space between the quartz sleeve and the chamber wall.

② The wiper segments induce turbulence in the flowing liquid to assure uniform exposure of suspended microorganisms to the lethal ultraviolet rays.

③ Translucent sight port provides positive indication of germicidal lamp operation.

④ The wiper assembly facilitates periodic cleaning of the quartz sleeve without any disassembly or interruption of purifier operation.

⑤ Water leaving the purifier is instantly ready for use.

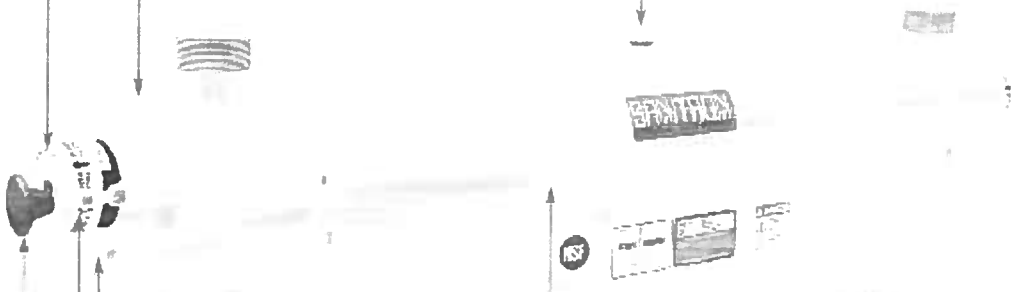
SPECIAL FEATURES

Quick Lamp Change
Exclusive **EASY-OFF™** End Cap enables effortless lamp replacement without shutdown of water pressure or drainage of tank. No tools required.

CRYSTAL CLEAR Quartz Sleeve
Ensures optimum lamp output at normal potable water temperatures. (See interior detail page 3.)

Removable Flanged Head
Units disassemble completely and easily in the event that repairs are necessary. No special tools or fixtures required. (Models S2400C and larger feature dual removable heads.)

Sight Port Plug
Visible glow provides positive indication of germicidal lamp operation.



Drain Plug
Convenient, in place drainage of purifier chamber.

Wiper Lock
Locks wiper mechanism in retracted position.

Patented Dual Action Wiper Mechanism
Facilitates periodic cleaning of quartz sleeve without interruption of purifier operation. No disassembly required. Complies with U.S Public Health Guidelines

Model S2400C
40 GPM

Type 316 Stainless Steel Construction
Chamber, head, and clamp are made from electropolished and passivated stainless steel for an attractive finish and dependable service.

STER-L-RAY® **Germicidal Lamp** (not shown)
Provides the utmost in quality, sustained output, and longevity.

INSTALLATION & MAINTENANCE

The purifier is installed horizontally as close as possible to the point of use. Connection of the inlet and outlet to water supply and insertion of power plug into 3-wire GFCI grounded outlet is all that is required.

Ordinary maintenance consists of cleaning the quartz sleeve with the manual wiper once monthly or more frequently where conditions dictate. Lamp replacement is recommended every 10,000 hours of operation (approximately 14 months of continuous service).

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CORPORATION

OPTIONAL ACCESSORIES

Promate™ Audio Alarm
Activated by the **SENTRY**™ or **GUARDIAN**™ and alerts user to any malfunction detected

Promate™
Elapsed Time Indicator
Real-time, non-resettable display of accumulated operating hours

Promate™
Solenoid Valve
Operates with the **GUARDIAN**™ or **SENTRY**™ and prevents flow during detected malfunctions

Promate™
Time Delay Mechanism
Operates with **GUARDIAN**™ or **SENTRY**™ and **Promate**™ solenoid valve to provide a 2-minute warm-up period for lamp to achieve full germicidal output

SureFLO™
Flow Control Valve
- Limits water flow to rated capacities
- Available in PVC and stainless steel

Promate™
Wall Mounting Kit
- Stainless steel material provides professional finish
- Pre-drilled and ready for quick and easy mounting of water purifier
- Optimizes free air circulation to cool ballast housing

QUANTUM™
Thermal Optimizer
Used to help regulate the water temperature inside the purifier's chamber

MONITORING OPTIONS

Good

The **STERALERT**™ Lamp Status Alarm monitors visible light emitted through the sight port plug of the water purifier and activates an audible alarm when visible light falls below acceptable levels.

- Easy installation, no tools required
- Mounts on the sight port plug
- Operates on a 9v battery
- Monitors the visible light emitted by the ultraviolet lamp (does not monitor the ultraviolet intensity)
- Produces a high frequency tone, pulsed at two to three cycles per second
- Warns of lamp or power failure
- Available with Remote Sounder
- Available with Dry Contact for Connection to PLC
- Optional 120v 60Hz Power Acapter available
- Available for use with all **MIGHTY★PURE**® and SANITRON® models

Better

The **SENTRY**™ Safety Sensor provides constant monitoring of the water purifier's ballast and germicidal lamp operation to give an indication of ballast and germicidal lamp status. The **SENTRY**™ Safety Sensor is capable of operating an optional audio alarm and/or solenoid valve.

- Easy installation
- Plug **SENTRY**™ into an electrical outlet, then plug water purifier into **SENTRY**™
- Operates optional Solenoid Valve and/or Audio Alarm
- Easily adaptable for use with other water purifier brands
- Warns of lamp failure
- Available for 120v 50/60Hz or 220v 50/60Hz (water purifiers operating with electronic ballasts)
- Available for use with most **Bio-Logic**®, **MINIPURE**®, **MIGHTY★PURE**® and SANITRON® models

Best

The **GUARDIAN**™ Ultraviolet Monitor visually indicates the level of germicidal ultraviolet energy that penetrates the quartz sleeve and the water within the disinfection chamber. The **GUARDIAN**™ Ultraviolet Monitor is capable of operating an optional Audio Alarm and Solenoid Valve. In addition, the **GUARDIAN**™ Ultraviolet Monitor will detect loss of ultraviolet due to lamp outage, component or power failure. Use of the Ultraviolet Monitor is recommended by the US Public Health Service "Criteria for the Acceptability of an Ultraviolet Disinfection Unit."

The **GUARDIAN**™ Ultraviolet Monitor will detect reduction of ultraviolet levels due to:

- Fouling or deposits on quartz sleeve.
- Poor ultraviolet transmission through the water. (Color, turbidity, organic or other impurities in the water can reduce or interfere with the transmission of ultraviolet rays.)
- Depreciation of lamp output due to usage or other cause. Lamp output gradually depreciates with use.
- Lamp replacement is recommended once each year
- Available for use with all **MIGHTYPURE**® and SANITRON® models

Options may be obtained when purchase of SANITRON® unit is made or added at a later date. For further details visit Ultraviolet.com and BuyUltraviolet.com.

ULTRAVIOLET DOSAGE

Germicidal lamps provide effective protection against microorganisms. A small cross-section is shown below.

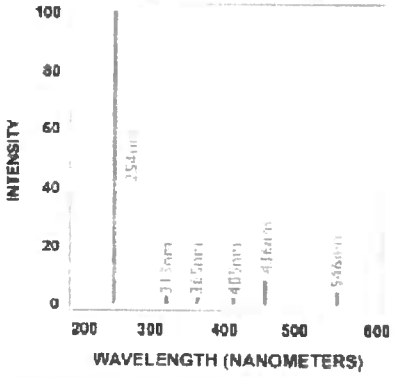
ORGANISM	ALTERNATE NAME	TYPE	DISEASE	DOSE*
Bacillus subtilis spores	*B. subtilis*	Bacteria	———	22,000
Bacteriophage	Phage	Virus	———	6,600
Coxsackie virus	———	Virus	Intestinal infection	6,300
Shigella spores	———	Bacteria	Bacterial Dysentery	4,200
Escherichia coli	*E. coli*	Bacteria	Food poisoning	6,600
Fecal coliform	———	Bacteria	Intestinal infection	6,600
Hepatitis A virus	Infectious Hepatitis virus	Virus	Hepatitis of the liver	8,000
Influenza virus	Flu virus	Virus	Influenza	6,600
Legionella pneumophila	———	Bacteria	Legionnaires' Disease	12,300
Salmonella typhi	———	Bacteria	Typhoid Fever	7,000
Staphylococcus aureus	Staph	Bacteria	Food poisoning, Toxic Shock Syndrome, etc	5,600
Streptococcus spores	Strep	Bacteria	Strep throat	5,800

When used as directed to disinfect clear water, STERILRAY® Water Purifiers provide an ultraviolet dosage in excess of 30,000 microwatt seconds per square centimeter (µWSec/cm2)

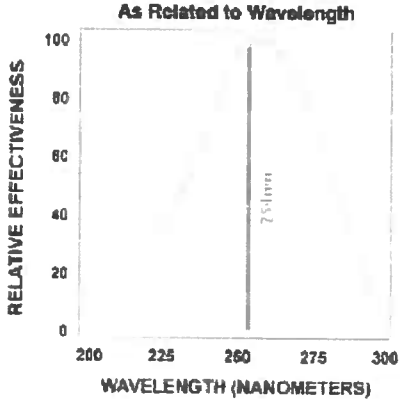
* Nominal Ultraviolet dosage (µWSec/cm2) necessary to inactivate better than 99% of specific microorganism. Consult factory for more complete listing

OPERATING CHARACTERISTICS

Relative Spectral Energy Distribution (Typical)



Germicidal Effectiveness As Related to Wavelength



Approximately 95% of the ultraviolet energy emitted from *STER-L-RAY*® germicidal lamps is at the mercury resonance line of 254 nanometers, the region of germicidal effectiveness most destructive to bacteria, mold, and virus

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GENUINE *STER-L-RAY*® GERMICIDAL LAMPS

STER-L-RAY® Germicidal Lamps are shortwave, low pressure mercury vapor discharge tubes that produce ultraviolet wavelengths lethal to microorganisms.

STER-L-RAY® Germicidal Lamps are well suited to applications requiring high ultraviolet intensity such as water purification.

STER-L-RAY® Instant Start Germicidal Lamps are instant starting and utilize a coil filament on each end which operates hot. Lamp life is governed by the life of the electrodes and is affected by the frequency of starting.

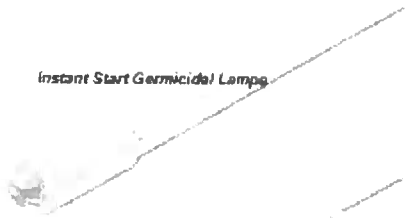
STER-L-RAY® Preheat Germicidal Lamps are operated by a preheat-start circuit that employs a compact and economical ballast. The preheat circuit requires four electrical connections per lamp and a slight to moderate delay is needed to start the lamp.

STER-L-RAY® GX Germicidal Lamps yield up to 2/3 more ultraviolet output than standard lamps of the same length.

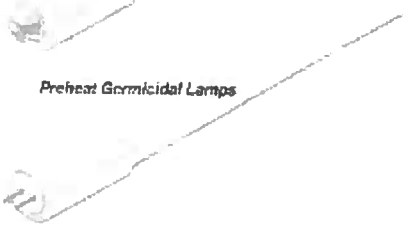
STER-L-RAY® and the *STER-L-RAY*® logo are trademarks of Atlantic Ultraviolet Corporation®

CAUTION: Exposure to direct or reflected germicidal ultraviolet rays will cause painful eye irritation and reddening of the skin. Persons subject to such exposure must wear suitable face shield, gloves and protective clothing.

Instant Start Germicidal Lamps



Preheat Germicidal Lamps



GX Germicidal Lamps

GERMICIDAL LAMP DATA

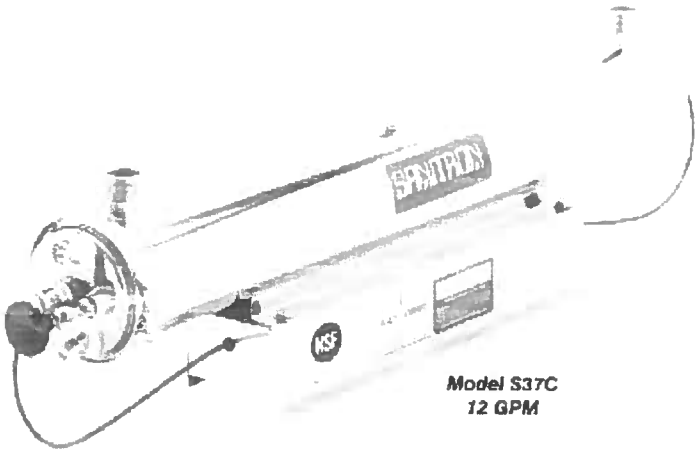
Lamp Number	Purifier Model No.	Nominal Lamp Length	Power Consumption ①	Ultraviolet Output ②	Rated Effective Life
05-1064-R	S17A	11½" (292mm)	14 Watts	4.0 Watts	10,000 Hrs
05-1097-R	S23A	17¾" (451mm)	21 Watts	7.3 Watts	10,000 Hrs
05-1343-R	S37C	33½" (860mm)	41 Watts	15.0 Watts	10,000 Hrs
05-1334-R	S50C	45½" (1165mm)	55 Watts	21.0 Watts	10,000 Hrs
05-1311-R ③	S2400C & Larger	48½" (1175mm)	110 Watts	46.0 Watts	10,000 Hrs

① Wattage is lamp watts only and does not include ballast loss (approximate)
② Maximum rated output at 254 nanometers.
③ Patented by Atlantic Ultraviolet Corporation®.

The lamps listed above have been especially developed and are recommended for use with SANITRON® Water Purifiers.

All *STER-L-RAY*® lamps used in SANITRON® units are low pressure type which afford the maximum efficiency in producing the required germicidal rays. In addition, has advantage of high efficiency and low power requirements.

STANDARD MODELS



Model S37C
12 GPM

WATER QUALITY RECOMMENDATIONS

Maximum Concentration Levels Before Ultraviolet

Turbidity	*5 NTU*
Suspended Solids	*10 mg/L*
Color	*None*
Iron	*0.3 mg/L*
Manganese	*0.05 mg/L*
pH	*6.5 – 9.5*
Hardness	*6 gpg*

Effectively treating water with higher concentration levels than listed above can be accomplished, but may require added measures to improve water quality to treatable levels.

Model	Gallons Per Minute	Gallons Per Hour	Inlet and Outlet ①	Replacement Lamps	Power Consumption ②	Unit Dimensions (Inches) Length	Width	Height	Shipping Data (lbs.) Gross Wt.	Net Wt.
S17A	3	180	3/4" (19mm) NPT	05-1098-R	18 Watts	17-3/8 (441 mm)	4-5/16 (110 mm)	5-3/16 (131 mm)	11	8
S23A	5	300	3/4" (19mm) NPT	05-1097-R	25 Watts	23-3/8 (594 mm)	4-5/16 (110 mm)	5-3/16 (200 mm)	13	12
NSF *S37C	12	720	1" (25mm) NPT	05-1343-R	48 Watts	37-3/8 (949 mm)	5-11/16 (144 mm)	9-1/2 (241 mm)	25	25
NSF S55C	20	1,200	1-1/2" (38mm) NPT	05-1334-R	65 Watts	50-3/8 (1280 mm)	5-11/16 (144 mm)	9-1/2 (241 mm)	34	29
NSF *S2400C	40	2,400	2" (51mm) NPT	05-1311-R	140 Watts	52-1/8 (1324 mm)	6-5/8 (168 mm)	11-1/8 (283 mm)	40	36

Note: When used as directed to disinfect clear water, SANITRON® Water Purifiers provide an ultraviolet dosage in excess of 30,000 microwatt seconds per square centimeter (μWsec/cm2).

① All inlets and outlets are male pipe threads.
② Total power consumption including ballast loss.

NSF Certified to NSF/ANSI 61 & 372
*CE compliant version available

- Maximum recommended operating pressure for all purifiers is 100 PSI.
- Pressure drop at maximum recommended flow rate is less than 5 PSI.
- Flow rates are based on Maximum Concentration Levels.
- 120 Volt and 220 Volt units are standard.
- 12 and 24 Volt units are also available for S17A, S23A and S37C.
- SANITRON® is available for operation on public power supplied throughout the world.
- Consult factory with specific power requirements.
- Model S2400C is available with alternate inlet/outlet fittings.

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Flexibility
System components are readily reconfigured to meet changing flow and process requirements.

Independent Monitoring
Single lamp chamber design enables separate output monitoring of each ultraviolet lamp.

Standby Capacity
Reserve chambers permit shutdown or replacement of individual components without interruption of service.

Special Options
- Sanitary and Custom Fittings for system compatibility (Use of Sanitary Fittings does not mean High-Purity Standards are met)
- Special Configurations for TOC and ozone reduction

(For larger capacities please refer to our **MEGATRON**™ Ultraviolet Water Disinfection catalog.)

Model S5,000C
83 GPM

Shown with supplied interconnect piping, optional **GUARDIAN**™ Digital Ultraviolet Monitors, **Promate** ™ Solenoid Valve, **SureFLO**™ Flow Control Valve and customer supplied piping, union and shut-off valve.

Model	Gallons Per Minute	Gallons Per Hour	Inlet and Outlet ⑥	Replacement Lamps	Power Consumption ⑦	Unit Dimensions (inches)			Shipping Data (lbs.)	
						Length	Width	Height	Gross Wt.	Net Wt.
*S5,000C ①	83	5,000	2" (51mm) NPT	05-1311-R (2)	280 Watts	52-1/8 (1324mm)	17 (432mm)	16 (406mm)	116	86
*S10,000C ②	166	10,000	2" (51mm) NPT	05-1311-R (4)	560 Watts	52-1/8 (1324mm)	21-1/8 (537mm)	34¾ (883mm)	267	188
*S15,000C ③	250	15,000	2" (51mm) NPT	05-1311-R (6)	840 Watts	52-1/8 (1324mm)	21-1/8 (537mm)	53¾ (1365mm)	400	263
*S20,000C ④	333	20,000	2" (51mm) NPT	05-1311-R (8)	1120 Watts	52-1/8 (1324mm)	21-1/2 (537mm)	71¾ (1822mm)	534	398
*S25,000C ⑤	416	25,000	2" (51mm) NPT	05-1311-R (10)	1400 Watts	52-1/8 (1324mm)	21-1/8 (537mm)	90¾ (2303mm)	670	520

Note: When used as directed to disinfect clear water, SANITRON® Water Purifiers provide an ultraviolet dosage in excess of 30,000 microwatt seconds per square centimeter (µWSec/cm2).

⑤ Two S2400C's connected in series, 1 inlet and 1 outlet.
⑥ Two S5,000C's connected in parallel, 2 inlets and 2 outlets.
⑦ Three S5,000C's connected in parallel, 3 inlets and 3 outlets.
⑧ Four S5,000C's connected in parallel, 4 inlets and 4 outlets.
⑨ Five S5,000C's connected in parallel, 5 inlets and 5 outlets.
⑩ All inlets and outlets are male pipe threads.
⑪ Total power consumption including ballast loss.

- Maximum recommended operating pressure for all purifiers is 150 PSI.
- Pressure drop at maximum recommended flow rate is less than 5 PSI.
- Flow rates are based on Maximum Ozone Reduction Levels, shown on page 8.
- 120 Volt and 220 Volt units are standard.
- SANITRON® is available for operation on public power supplied throughout the world.
- Consult factory with specific power requirements.
- Models S2400C through S25,000C are available with alternate inlet, outlet fittings.

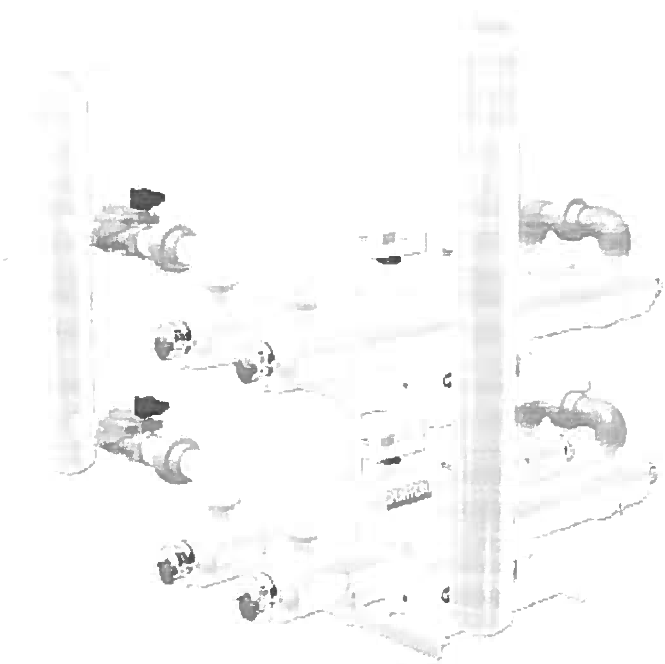
NSF Our S2400C water purifiers are certified to **NSF**®/ANSI Standard 61 & 372. They are used in modular form to build each of the models shown above.

* CE compliant versions available.

COMMERCIAL & INDUSTRIAL

Model S10,000C — 166 GPM

Shown with supplied interconnect Piping, optional **GUARDIAN**™ Digital Ultraviolet Monitors, Solenoid Valves, Flow Control Valves and customer supplied manifolds, piping, unions and shut-off valves.



élan Water Filters

Filters outperform conventional filters available for use with the SANITRON® S2400C and larger units

Call factory for more information

APPLICATIONS

- Amusement / Water Parks
- Restaurants
- Resorts / Hotels / Motels
- Ships / Yachts / Boats
- City / Well Water
- Fountains / Lakes / Ponds
- Laundry
- Apartment Complex
- Swimming Pools
- Nursing Homes
- Schools
- Institutions
- Hospitals / Veterinary Clinics
- RV Parks / Campgrounds
- Medical Facilities
- Laboratories
- [illegible]
- Burn Centers
- Water Vending
- Universities / [illegible]
- Cooling Tower
- Animal Husbandry / Farms / Ranches
- Fish Farms / Hatcheries
- Food / Dairy Processing
- Bottling Facilities
- [illegible]
- Pharmaceutical Mfg
- Electronic Production
- Cosmetic Production
- TOC Reduction
- Ozone Reduction
- [illegible] countless other facilities

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COMPARISON OF ATLANTIC ULTRAVIOLET WATER PURIFIERS

FEATURES [S] - Standard [O] - Optional [X] - Yes	Bio-Logic® Pure Water Pack™ 1.5 GPM	MINI PURE® 1 to 9 GPM	Ultimate® 4 to 9 GPM	MIGHTY•PURE® 3 to 20 GPM	SANITRON® 3 to 415 GPM	MEGATRON® 90 to 450 GPM
Chamber Material (Stainless Steel Type)	316	304	304	316	316	316
STER-L-RAY® Germicidal Ultraviolet Lamp with 10,000 Hours Rated Effective Life	S	S	S	S	S	S
Quick Lamp Change with the **EASY-OFF™** End Cap	S	S	–	S	S	S
CRYSTAL CLEAR™ Quartz Sleeve	S	S	S	S	S	S
Lamp Out Indicator Light(s)	S	S	–	–	–	S
Sight Port to View Lamp Operation	–	–	S	S	S	S
Drain Fitting	–	–	–	S	S	S
Dual Action Wiper Mechanism	–	–	–	–	Manual	Manual or Automatic
Suggested Mount Installation	Horizontal	Horizontal	Vertical	Horizontal	Horizontal	Horizontal
Removable or Rotatable Heads	S	–	–	–	S	S
Alternate Inlet/Outlet Fittings	–	–	–	–	O	O
Sediment and Carbon Filter	S	–	–	–	–	–
Promate™ Mounting Kit / Bracket	S	S	S	O	O ①	–
GUARDIAN™ Ultraviolet Monitor	–	–	–	O	O	S
SENTRY™ Safety Sensor	O	O	–	O	O	–
Promate™ Audio Alarm	S	S	S	O	O	–
Promate™ Solenoid Valve	–	O	–	O	O	–
SureFLO™ Flow Control Valve	–	O	S	O	O	–
Promate™ Elapsed Time Indicator	O	O	–	O	O	S
Promate™ Time Delay Mechanism	–	O	–	O	O	–
Residential Use	X	X	X	X	X	–
Commercial Use	–	–	–	X	X	X
Industrial Use	–	–	–	–	X	X
CE Certified Models ②	–	–	–	X	X	–
NSF Certified Models	–	–	–	X ③	X ④	–

① SANITRON® Model S10,000C through S25,000C come equipped with mounting rack.
② **MIGHTY•PURE®** VP36C and SANITRON® S37C, S2400C, S5000C, S10,000C, S15,000C, S20,000C, and S25,000C are available as CE Certified
③ **MIGHTY•PURE®** VP36C and MP49C are available with NSF/ANSI 55 for Disinfection Performance, Class B
④ SANITRON® Models S37C, S50C, and S2400C are certified to NSF/ANSI 61 & 372. Model S2400C is used in modular form to build larger models.

- **When used as directed to disinfect clear water, Atlantic Ultraviolet Corporation® water purifiers provide an ultraviolet dosage in excess of 30,000 micro-watt seconds per square centimeter (µWSec/cm2).**
- This list depicts options for 120v 50/60Hz operation. Consult factory for options with other power requirements.

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Document No. 95-1109 • January 2019

MADE IN THE USA

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Discharge Assemblies

Orenco Systems® Incorporated
800-348-9843

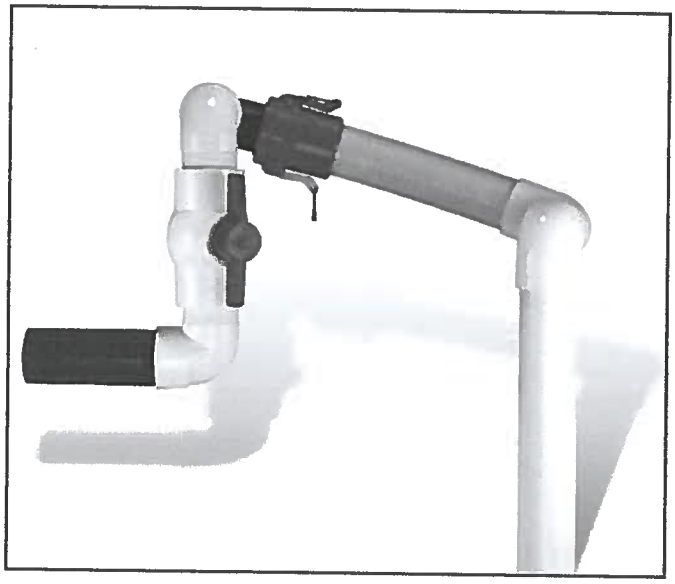
Applications

Orenco Discharge Assemblies are used to convey effluent from a pump to the exterior of a riser or pump basin. They come in the following configurations:

- High head, for use with submersible turbine pumps
- Low head, for use with common effluent pumps
- Drainback, for use with shallowly buried tanks and transport lines in cold climates

Two additional applications are available:

- The cold weather kit coupled with a high-head discharge assembly is intended for use with deeply buried tanks and transport lines in cold weather
- The external flex extension is recommended for installations where tank settling may occur to avoid line breakage during settling.



High head style shown with optional quick-disconnect

General

Orenco Discharge Assemblies are corrosion-resistant and adjustable for a proper fit. Discharge assemblies are composed of PVC valves and flexible hose that simplify installation and maintenance. The flexible hose damps vibrations from the pump and allows for easy installation. Cam-style quick-disconnect fittings are available on all configurations. All parts are either solvent welded or threaded and sealed with Teflon® paste.

Teflon® is a registered trademark of DuPont.

Standard Models

HV100, HV125, HV150, HV200

Nomenclatures

B S PR

HV 150 □ - □

Configuration:
Blank = field cut (high-head style)
H = high-head style pump
L = low-head style pump
DB = drainback (always field cut)

Options:
B = ball valve
C = check valve
FC = flow controller (1" diameter only)
AS = antisiphon
X = external flex hose
Q = quick disconnect
S = true-union ball check valve*
PR = high pressure

Discharge diameter:
100 = 1"
125 = 1-1/4"
150 = 1-1/2"
200 = 2"

Pump discharge assembly

**Available for 1-1/2" discharge only*

HV CW □□□ -KIT- □□□*

Drain hole:
Blank = 1/8" drain holein elbow
NDH = No drain hole

Kit

Discharge diameter:
100 = 1"
125 = 1-1/4"
150 = 1-1/2"
200 = 2"

Cold weather application

Pump discharge assembly

** Always ordered with high head discharge assembly*

HVX □□□-□□□

Discharge connection (inches):
Blank = same as discharge diameter
100 = 1"
125 = 1-1/4"
150 = 1-1/2"
200 = 2"

Discharge diameter (inches):
100 = 1"
125 = 1-1/4"
150 = 1-1/2"
200 = 2"

Flex extension

Pump discharge assembly

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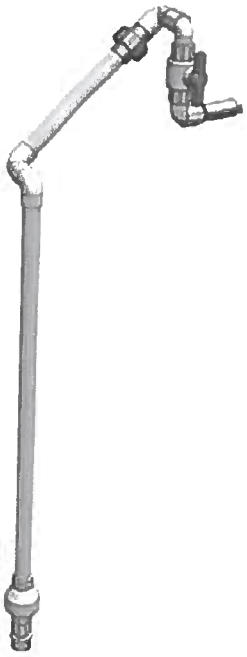
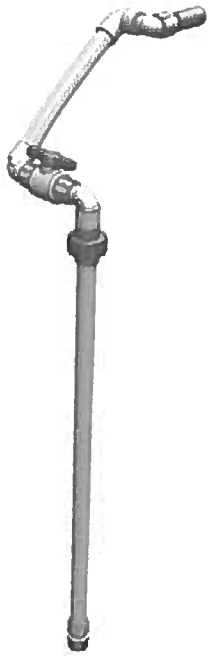
Discharge Assemblies (continued)

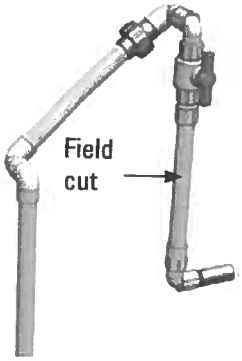


High head style



Drainback style

Low head style



High head style with cold weather kit installed

Cold weather kit

External flex extension

Component Working Pressure Ratings

True union ball check valve	200 psi (14 bar) at 73° F (23° C)
All other valves	150 psi (10 bar) at 73° F (23° C)
Unions	150 psi (10 bar) at 73° F (23° C)

Materials of Construction

Component	Material
Anti-siphon valve	Schedule 40 PVC
Ball valve	Schedule 40 PVC
Check valve	Schedule 40 PVC
Pipe and fittings	Schedule 40 PVC
Flexible hose	PVC
External flex hose	PVC
Flow control disc	Schedule 80 PVC
Gate valve	Schedule 80 PVC
Unions	Schedule 80 PVC
High-pressure flex hose	Special elastomer compound

Hose Specifications

Thickness and working pressures at 73° F (23°C)

Flexible hoses	Size (U.S. Nominal)	Wall thickness	Working pressure	Bursting pressure
(standard and external)	1 in.	0.11 in. (2.8 mm)	100 psi (7 bar)	355 psi (24 bar)
	1.25 in.	0.13 in. (3.3 mm)	80 psi (6 bar)	250 psi (17 bar)
	1.5 in.	0.13 in. (3.3 mm)	65 psi (4 bar)	200 psi (14 bar)
	2 in.	0.16 in. (4.1 mm)	60 psi (4 bar)	175 psi (12 bar)
Flexible hoses	**Size (U.S. Nominal)**	**Wall thickness**	**Working pressure**	**Bursting pressure**
(high-pressure)	1 in.	0.235 in. (6.0 mm)	250 psi (17 bar)	N/A
	1.25 in.	0.24 in. (6.1 mm)	250 psi (17 bar)	N/A
	1.5 in.	0.24 in. (6.1 mm)	250 psi (17 bar)	N/A
	2 in.	0.22 in. (5.6 mm)	200 psi (14 bar)	N/A

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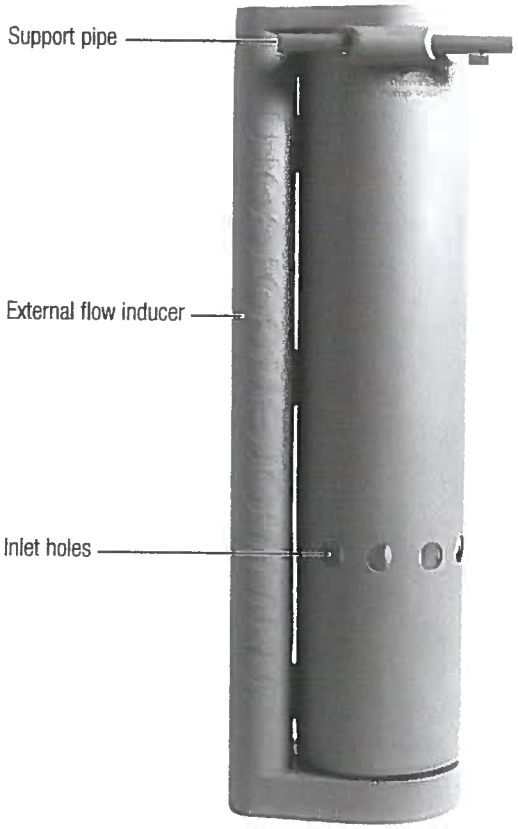
Orenco SYSTEMS **Technical Data Sheet** PVU95-3619-L

Universal Biotube® Pump Vaults

For use with Orenco® 4-inch (100-mm) Submersible Effluent Pumps

Applications

Orenco Biotube® Pump Vaults are used to filter effluent that is pumped from septic tanks or separate dosing tanks in STEP systems and onsite wastewater treatment systems. They remove two-thirds of suspended solids, on average. Pump vaults house a Biotube effluent filter and one or two Orenco high-head effluent pumps and can be used in single-compartment septic tanks with flows up to 40 gpm (2.5 L/sec). When flows are greater than 40 gpm (2.5 L/sec), a double-compartment septic tank or separate dosing tank is recommended.



Side view

General

The Orenco Biotube Pump Vault includes a molded polyethylene housing with an internal Biotube filter cartridge constructed of polypropylene and PVC. Schedule 80 PVC support pipes are included to suspend the vault in a tank opening. "Earless" 68-inch (1727-mm) vaults, which rest on the bottom of the tank instead of on support pipes, are also available. The filter cartridge can be removed without pulling the pump or the vault. Effluent enters through inlet holes around the perimeter of the Biotube vault and flows through the Biotubes to the external flow inducer. The external flow inducer accommodates one or two pumps. Orenco Biotube Pump Vaults are covered by U.S. patents #4,439,323 and 5,492,635.

Standard Models

PVU57-1819, PVU68-2419, PVU84-2419, PVU95-3625.

Product Code Diagram

PVU [ ] [95] - [36] [19] - [L]

- Support pipe length:
  - Blank = standard, for 24" (600 mm) riser
  - L = long, for 30" (750 mm) riser
  - NS = no support pipe bracket (earless)
- Inlet hole height, standard:
  - 13" (330 mm)
  - 19" (482 mm)
  - 25" (635 mm)
- Cartridge height, standard:
  - 18" (457 mm)
  - 24" (610 mm)
  - 36" (914 mm)
- Vault height:*
  - 57" (1448 mm)
  - 68" (1727 mm)
  - 72" (1829 mm)
  - 84" (2134 mm)
  - 95" (2413 mm)
  - or custom specification
- Biotube® filter mesh:
  - Blank = 1/8" (3.2 mm) mesh
  - P = 1/16" (1.6 mm) mesh
- Universal Pump Vault

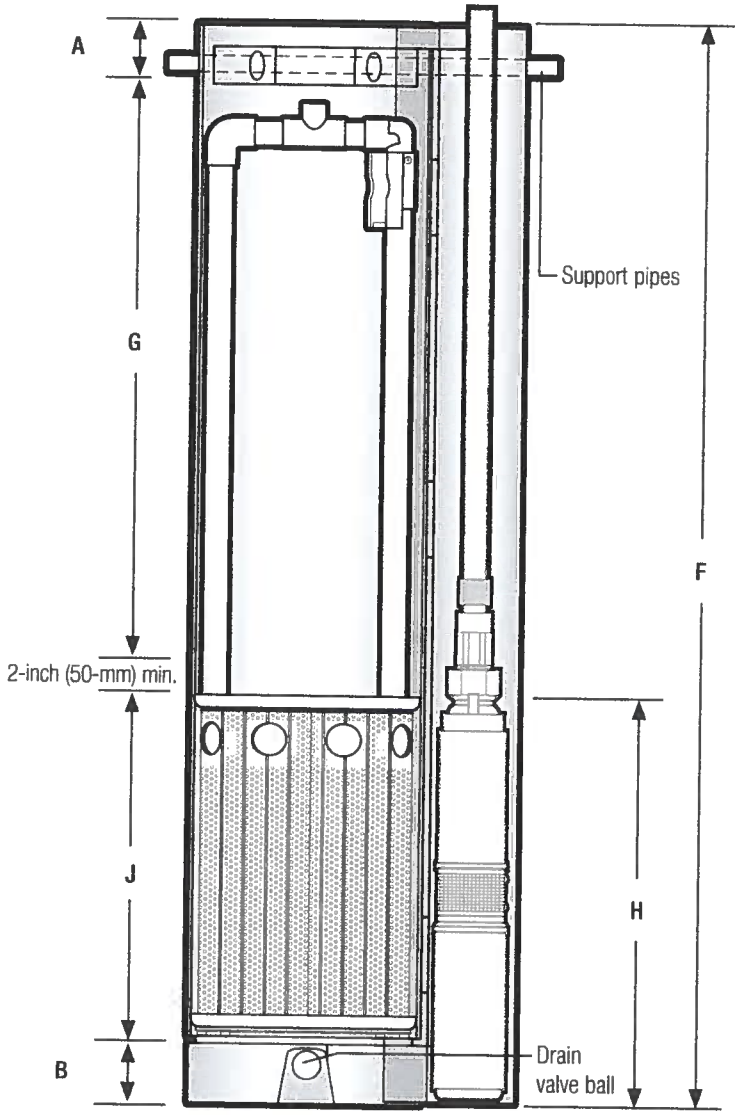
* Custom heights from 42" to 135" available

Tank Access and Riser Diameters

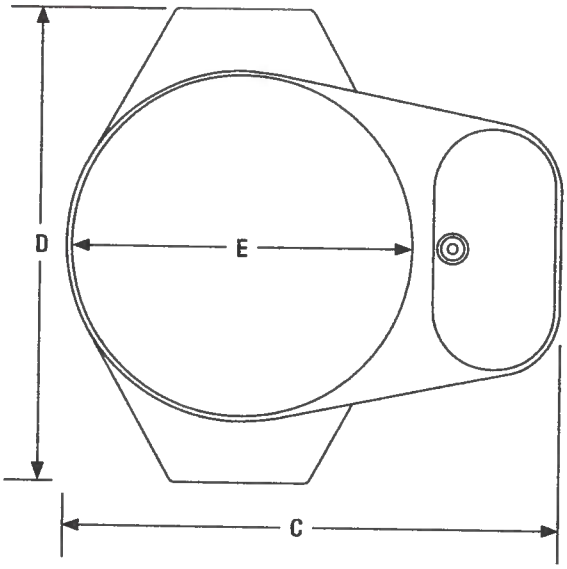
Diameter, in. (mm)	PVU with simplex pump	PVU with duplex pumps
Tank access, minimum	19 (483)	19 (483)
Tank access, recommended	20 (508)	20 (508)
Riser, minimum	24 (600)	30 (750)

Materials of Construction

Support pipe	Schedule 80 PVC
Biotube® vault	Polyethylene
Biotube filter cartridge	Polypropylene/PVC
Float stem	Schedule 40 PVC
Drain valve ball	Polypropylene



Side view cutaway



Top view

Dimensions

A, in. (mm)	3 (76)
B, in. (mm)	4 (102)
C, in. (mm)	17.3 (439)
D, in. (mm)	16.6 (422)
E, in. (mm)	12 (305)

Specifications

Model	PVU57-1819	PVU68-2419	PVU84-2419	PVU95-3619
F, vault height, in. (mm)	57 (1448)	68 (1727)	84 (1727)	95 (2413)
G, lowest float setting point, in. (mm)	29 (737)	35 (889)	51 (1295)	50 (1270)
H, inlet hole height, in. (mm)*	19 (483)	19 in. (483)	19 (482)	19 (635)
J, Biotube® cartridge height, in. (mm)	18 (457)	24 (610)	24 (610)	36 (914)
Biotube mesh opening, in. (mm)	0.125 (3)	0.125 (3)	0.125 (3)	0.125 (3)
Filter flow area, ft^2 (m^2)	4.4 (0.4)	5.9 (0.5)	5.9 (0.5)	9.0 (0.84)
Filter surface area, ft^2 (m^2)	14.5 (1.35)	19.7 (1.83)	19.7 (1.83)	30 (2.79)
Maximum flow rate, gpm (L/sec)	140 (8.8)	140 (8.8)	140 (8.8)	140 (8.8)

** May vary depending on the configuration of the tank.*

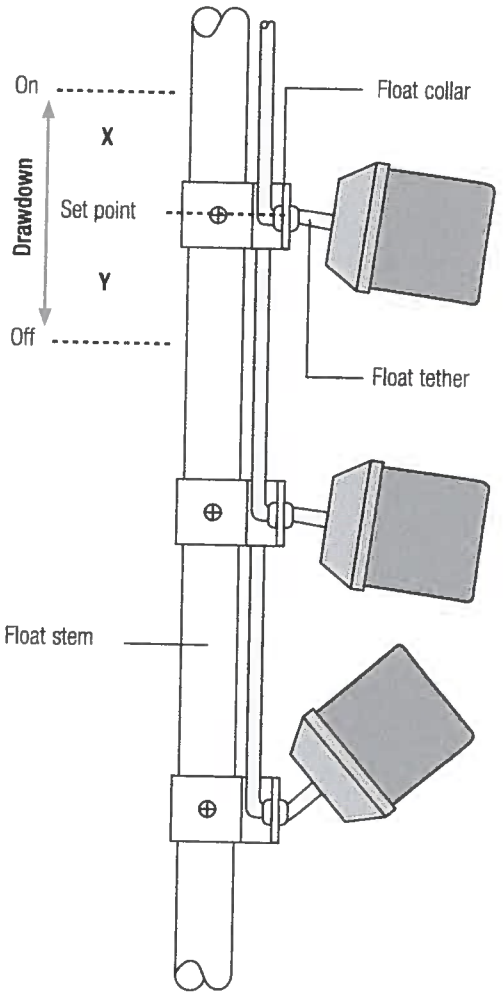
Orenco SYSTEMS

Technical Data Sheet MF4P-63FS-20

Float Switch Assemblies

Applications

Float switches are used to signal liquid level positions for alarm and pump control applications. Orenco float switch assemblies can be mounted in pump vaults, effluent screens, pump basins, and risers.



The "On" and "Off" positions describe normally open floats. For normally closed floats, the functions are reversed.

Materials of Construction

Float housing	Impact-resistant, noncorrosive PVC plastic for use in liquids up to 140° F (60° C)
Float cord, P and N models	Flexible 2-conductor (UL, CSA) SJOOW; Super Vu-Tron® Supreme, yellow
Float cord, All other models	Flexible 2-conductor (UL, CSA) SJOW; water-resistant (CPE); neoprene coating
Float collar	ABS

General

All models listed are UL listed and CSA certified for use in water or sewage. Non-mercury float switches (models B, C, N, and P) are used where components containing mercury are prohibited.

Float switches are typically ordered in assemblies that include one or more switches mounted on a 1-inch PVC float stem. ABS float collars are used to provide secure mounting that is easily adjustable.

Normally-open "P" float switches have a blue cap for easy identification; normally-closed "N" float switches have a red cap. "P" and "N" model float switches use Super Vu-Tron® electrical cords for superior chemical and water resistance.

Standard Models

B, C, G, N, P

MF 4 P - 63 FS - 20

- **MF** — Float switch assembly
- **4** — Number of float switches (when using multiples of the same float switch model): Blank = no multiples of the same float switch model
- **P** — Float switch models (listed in order from the top of the float stem down): B, C, G, N, P
- **63** — Float stem length: Blank = no float stem (floats and collars only); 19, 21, 27, 33, 37, 39, 45, 51, 57, 63 = stem length, in.; 5, 11 = stem length, in. (for elbow-style float brackets)
- **FS** — Application: FS = field set; PTL = elbow-style (base-inlet filters only); PB = pump basin; V = pump vault (standard float settings); STEP = Standard float settings for STEP; STEPRO = Standard float settings for STEP with redundant off; SVCOM = Standard float settings for VCOM simplex
- **20** — Cord length option: Blank = 10 ft (3 m), standard; 20 = 20 ft (6 m); 30 = 30 ft (9 m); 50 = 50 ft (15 m)

Product Code Diagram

When ordering float switch assemblies, remember to list float switches from the top of the float stem down. An "MFPBN-" nomenclature indicates one "P" switch at the top of the stem, one "B" in the middle of the stem, and one "N" switch at the bottom of the stem; an "MF2PN-" indicates "P" switches at the top and middle of the stem, and one "N" switch at the bottom of the stem.

Signal- and Motor-Rated Float Switch Matrix

Float	State[1]	Type	IR[2]	Volts	Amps	hp	Tether	X	Y	Drawdown[3]
Signal-rated mechanical floats[4] (for control switch applications)										
P Model[a]	Normally open	Mechanical	Yes	n/a	n/a	n/a	2.00 in.	1.50 in.	0.50 in.	2.00 in.
N Model[a]	Normally closed	Mechanical	Yes	n/a	n/a	n/a	2.00 in.	1.50 in.	0.50 in.	2.00 in.
Motor-rated floats[4] (for pump switch applications)										
B Model	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.[b]	2.50 in.	1.50 in.	4.00 in.
				240V	13A	1 hp	3.00 in.	3.00 in.	1.50 in.	4.50 in.
							4.00 in.	3.25 in.	1.50 in.	4.75 in.
C Model	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.	3.00 in.	2.50 in.	5.50 in.
				240V	15A	2 hp	3.00 in.[b]	3.50 in.	3.00 in.	6.50 in.
							4.00 in.	4.00 in.	3.50 in.	7.50 in.
							5.00 in.	4.50 in.	4.00 in.	8.50 in.
							6.00 in.	5.25 in.	4.25 in.	9.50 in.
G Model	Normally open	Mercury	Yes	120V	15A	3/4 hp	2.00 in.	1.50 in.	3.00 in.	4.50 in.
				240V	15A	2 hp	3.00 in.[b]	1.75 in.	3.00 in.	4.75 in.
							4.00 in.	2.00 in.	3.50 in.	5.50 in.

a. Suitable for use with VCOM and MVP.

b. Standard tether length

Notes

[1] ***State: normally open or normally closed***

The default state of a float — normally open or normally closed — refers to the contact positions in the float when the float is resting (down). Float switches have an internal contact. The terms "normally open" (N/O) and "normally closed" (N/C) refer to the state of the float switch contact in the down position. A normally open float switch has an open contact (off) in the down position and a normally closed float switch has a closed contact (on) in the down position. Different panel functions require different types of float switches. Most applications require float switches that are normally open. One notable exception is the redundant off and low-level alarm function that requires a normally closed float switch, except with MVP and VCOM panels.

[2] ***IR (intrinsically safe relay)***

Approved for use with intrinsically safe, Class I, Division 1 applications, where reliable float switch operation with very low current is required.

[3] ***Drawdown***

Drawdown (in inches) refers to the difference in liquid level between a float switch's activation and deactivation points. Drawdown can be altered by adjusting the tether length of the float switch cord. When selecting float switches, keep in mind that any float switch that can directly start and stop a pump (one that has no motor contactor in the control panel) should have a drawdown capability, to avoid rapid cycling of the pump.

[4] ***Signal-rated or motor-rated***

Every float has a maximum amount of current it can handle. Exceeding these limits may cause premature failure. Signal-rated or "control" floats are used to activate pump control panels and alarms. Only low-amperage signals pass through these float switches, hence the float switch is "signal-rated." All Orenco panels that use motor contactors can use signal-rated float switches. In some systems, a float switch is used to directly start and stop a pump. In this application, the current that is running the pump passes through the float switch as well, and the float switch must be "motor-rated." In most instances, a motor-rated float switch can be used as a signal float switch.

Orenco SYSTEMS

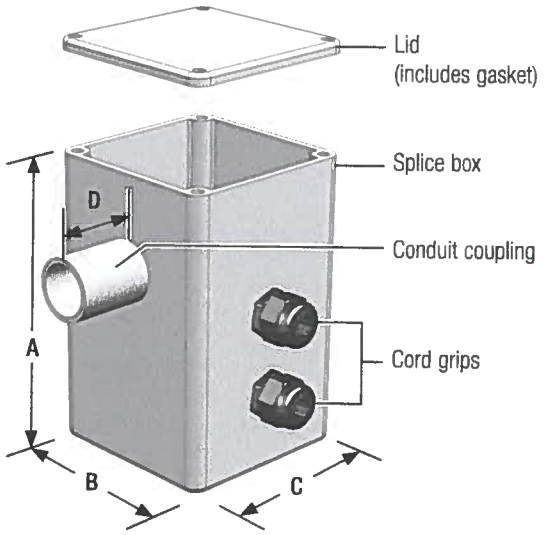
Technical Data Sheet

SB4
SB2-2G

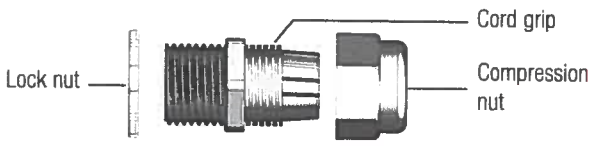
Internal Splice Boxes

Applications

Orenco® internal splice boxes* are used in risers to house spliced wire connections between an electrical control panel and such equipment as effluent pumps and float switches. They conform to UL 514C, CSA C22.2 No. 85 1968, and meet UL Type 4X rating. Cord grips can withstand temperatures of up to 212° F (100° C). Standard ½-in. (13-mm) cord grips can accommodate round cord diameters from 0.17 to 0.47 in. (4.3 to 12 mm). Large ¾-in. (19-mm) cord grips can accommodate round cord diameters from 0.45 to 0.70 in. (11 to 18 mm). Cord grips are also available to accommodate single- and three-phase CE-rated 1.5 × 3 flat cords.



Splice box, model SB4



*Heyco cord grip**, exploded view*

General

Orenco splice boxes come standard with one to six watertight cord grips. Included are waterproof wire nuts, a sealing gasket, and four stainless steel lid screws.

Splice boxes also come standard with ½-in. (13-mm) cord grips and a 1⅝-in. (41-mm) long conduit coupling. Large ¾-in. (19-mm) cord grips and 3¼-in. (83-mm) long conduit couplings (for square or round concrete risers) are available.

Standard Models

SB1, SB2, SB3, SB4, SB5, SB6.

Nomenclature

SB 2 2G

- **SB** — Splice box
- **2** — Number of cord grips: 1, 2, 3, 4, 5, or 6
- **2G** — Options:
  - A = Splice box factory-installed
  - LN = 3¼-in. (83 mm) conduit coupling, round concrete risers
  - C = 3¼-in. (83 mm) conduit coupling, square concrete risers
  - G = cord grip, ¾-in. (19 mm)
  - CE = cord grip for CE-rated 1.5 × 3 flat cable, 50 Hz

Materials of Construction

Lid	PVC per ASTM D-1784
Splice box	PVC per ASTM D-1784
Conduit coupling	PVC per ASTM D-1784
Cord grip	Nylon
Lock nut	Stainless steel
Sealing gasket (not shown)	Proprietary elastomer
Lid screws (not shown)	Stainless steel

Specifications

Model	SB1	SB2	SB3	SB4	SB5	SB6
A, in (mm)	6¼ (159)	6¼ (159)	6¼ (159)	6¼ (159)	6¼ (159)	6¼ (159)
B, in. (mm)	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)
C, in. (mm)	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)
D, standard size, in. (mm)	1⅝ (41)	1⅝ (41)	1⅝ (41)	1⅝ (41)	1⅝ (41)	1⅝ (41)
Conduit diameter, nominal, in. (DN)	¾ (20)	¾ (20)	¾ (20)	¾ (20)	1 (25)	1 (25)
Number of cord grips	1	2	3	4	5	6

*For information on Orenco® external splice boxes, see NTD-SBEX-1, External Splice Boxes

**Cord grips are listed under UL file number E-51579 and CSA file number LR-93876

ProSense® SPTD25 Series Pressure Transmitters

SPTD25-20-0300H

Part No. SPTD25-20-0100H

The ProSense SPTD25 pressure transmitter series is engineered to meet many industrial, commercial, and OEM pressure measurement applications. The all-stainless steel thin film sensing element provides very fast response time and can be used to sense any compatible media. With a robust design resistant to vibration, shock, and EMI/RFI, the SPTD25 series provides high accuracy over a wide compensated temperature range. Pressure sensing ranges from 100 to 5000 psig are available with a ¼ inch NPT male threaded process connection and a linear 4-20 mA output with an M12 quick-disconnect electrical connection.

Applications

- Process control & automation
- Pump & compressor control
- Hydraulic systems
- Pneumatic systems
- Engine monitoring
- Presses
- Machine tools

Features

- All-stainless steel sensing element
- Fast response time
- Pressure ranges from 100 to 5000 psig
- 1/4 inch NPT male threaded process connection
- 4-20 mA output
- M12 quick-disconnect electrical connection
- UL508 listed, CE marked
- 3-year warranty

RoHS c UL us CE 3 YEAR WARRANTY

NOTE: CHECK THE CHEMICAL COMPATIBILITY OF THE SENSOR'S WETTED PARTS WITH THE MEDIUM TO BE MEASURED.

ProSense SPTD25 Series Pressure Transmitters				
Part Number	**Description**	**Pcs/Pkg**	**Wt (lb)**	**Price**
SPTD25-20-0100H	Pressure transmitter, 4 to 20 mA output, 0 to 100 psig range, 1/4" NPT male port, M12 connector	1	0.1	
SPTD25-20-0200H	Pressure transmitter, 4 to 20 mA output, 0 to 200 psig range, 1/4" NPT male port, M12 connector	1	0.1	
SPTD25-20-0300H	Pressure transmitter, 4 to 20 mA output, 0 to 300 psig range, 1/4" NPT male port, M12 connector	1	0.1	
SPTD25-20-0500H	Pressure transmitter, 4 to 20 mA output, 0 to 500 psig range, 1/4" NPT male port, M12 connector	1	0.1	
SPTD25-20-1000H	Pressure transmitter, 4 to 20 mA output, 0 to 1000 psig range, 1/4" NPT male port, M12 connector	1	0.1	
SPTD25-20-3000H	Pressure transmitter, 4 to 20 mA output, 0 to 3000 psig range, 1/4" NPT male port, M12 connector	1	0.1	
SPTD25-20-5000H	Pressure transmitter, 4 to 20 mA output, 0 to 5000 psig range, 1/4" NPT male port, M12 connector	1	0.1	

ProSense SPTD25 Series General Specifications	
Housing Material	Stainless steel 316L (DIN 1.4404); Stainless steel 17-4PH (DIN 1.4542); Polyamide (PA)
Materials (wetted parts)*	Stainless steel 17-4PH (DIN 1.4542)
Operating Temperature	–40 to 194°F (–40 to 90°C)
Medium Temperature	–40 to 194°F (–40 to 90°C)
Storage Temperature	–40 to 212°F (–40 to 100°C)
Protection	IP 67 / IP 69K
Accuracy[1]	< ± 0.5% of full range
Linearity[2]	< ± 0.1% (BFSL) / < ± 0.2% (LS)
Hysteresis	< ± 0.2%
Repeatability[3]	< ± 0.05%
Long-Term Stability[4]	< ± 0.1%

** Not cleaned for oxygen service*
[1] Zero point and span error, non-linearity, hysteresis
[2] BFSL = Best fit straight line / LS = limit value setting
[3] With temperature fluctuations <10°C
[4] In % of the span / 6 months

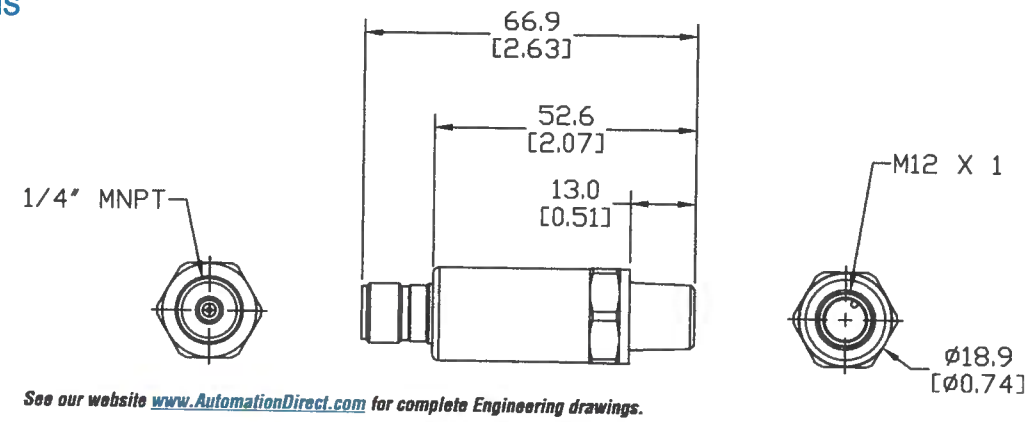
ProSense® SPTD25 Series Pressure Transmitters

ProSense SPTD25 Series General Specifications Continued	
Operating Voltage	8.5 to 36 VDC*
Analog Output	4 to 20 mA
Maximum Load	[(supply voltage - 8.5) / 21.5 mA]Ω | For example: [(24VDC - 8.5) / 0.0215] = 720Ω
IEC Protection Class	Class III
Step Response Time Analog Output	1 ms
Short-Circuit Proof	yes
Overload Protection	yes
Reverse Polarity Protection	yes
Insulation Resistance	> 100 MΩ: (500 VDC)
Shock Resistance	50g (DIN 60068-2-27, 11ms)
Vibration Resistance	20g (DIN 60068-2-6, 10 - 2000 Hz)
EN 61000-4-2 ESD	4 kV / 8 kV AD
EN 61000-4-3 HF Radiated	30 V/m
EN 61000-4-4 Burst	2kV
EN 61000-4-6 HF Conducted	10V
EC Pressure Equipment Directive 97/23/EC	Article 3, section 3: Group 2 Non-Hazardous, Non-flammable, Non-oxidizing
EMC	DIN EN 61000-6-2; DIN EN 61000-6-3
MTTF (Years)	784
Min. Pressure Cycles	60 million lifetime (at 1.2 times the nominal pressure)
Agency Approvals	cULus (E320431), CE, RoHS
* per EN50178, SELV, PELV	

WARNING! AVOID STATIC AND DYNAMIC OVERPRESSURE EXCEEDING THE GIVEN OVERLOAD PRESSURE. EXCEEDING THE BURSTING PRESSURE FOR EVEN A SHORT TIME CAN CAUSE DESTRUCTION OF THE UNIT AND POSSIBLE INJURIES!

Dimensions

mm [inches]



See our website www.AutomationDirect.com for complete Engineering drawings.

ProSense® SPTD25 Series Pressure Transmitters

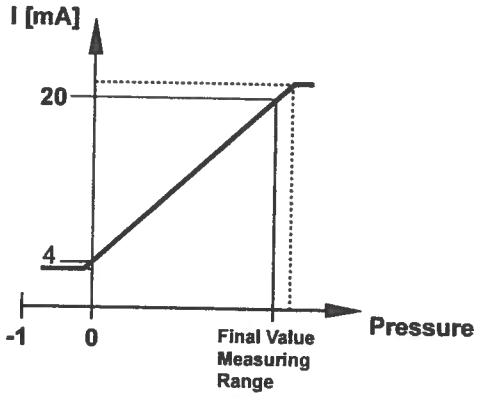
Pressure Ratings

Applications (Type of Pressure: Gauge Pressure, Liquids and Gases)			
Part Number	Final Value of the Measuring Range	Static Proof Pressure Resistance (Max. Permissible Pressure)	Bursting Pressure
	Psig	Psig	Psig
SPTD25-20-0100H	100	250	2900
SPTD25-20-0200H	200	580	6525
SPTD25-20-0300H	300	940	8700
SPTD25-20-0500H	500	1450	11600
SPTD25-20-1000H	1000	2500	13050
SPTD25-20-3000H	3000	7250	14500
SPTD25-20-5000H	5000	14500	24650

All SPTD25 series transmitters can withstand vacuum down to -14.5 psig

WARNING! AVOID STATIC AND DYNAMIC OVERPRESSURE EXCEEDING THE GIVEN OVERLOAD PRESSURE. EXCEEDING THE BURSTING PRESSURE FOR EVEN A SHORT TIME CAN CAUSE DESTRUCTION OF THE UNIT AND POSSIBLE INJURIES!

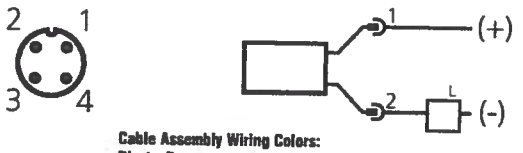
Current Output 4-20 mA



In the measuring range the output signal is between 4 and 20mA. If the system pressure is above or below the measuring range, the analog output performs as follows:

- System pressure above the measuring range: 20...25mA non-linear
- System pressure below the measuring range: 4...3mA non-linear

SPTD25-20 Wiring Diagrams



Cable Assembly Wiring Colors:
Pin 1 - Brown +
Pin 2 - White - Out
Pin 3 - Blue, not used
Pin 4 - Black, not used

See Proximity Sensor section for cable specs

Note: Wiring colors are based on AutomationDirect CD12L and CD12M 4-pole cable assemblies.

NETAFIM™
GROW MORE WITH LESS

OCTAVE®
ULTRASONIC WATER METER

PRECISE MEASUREMENT OF FLOW RATE

HIGHLY ACCURATE ULTRASONIC WATER METER WITH NO MOVING PARTS

PRODUCT ADVANTAGES

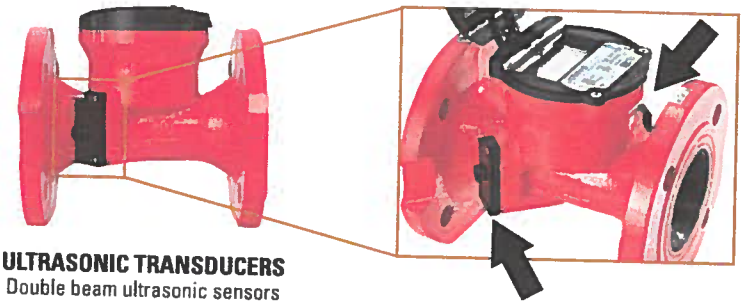
- Double-beam ultrasonic sensors provide highly accurate flow data and reliable operation.
- No impeller or moving parts in the flow path provides for unrestricted, low pressure loss flows.
- Reduced maintenance of wear-prone parts commonly found in other meters.
- Flow ranges from < 1 GPM to 5,500 GPM.
- Multi-line readout screen provides complete flow and volume information along with:
  - Leak detection
  - Flow direction
  - Output mode
  - Battery level
  - Alarms and errors
  - Active communication mode
- Vacuum sealed and tamper proof IP68 register provides durability and long-term performance.
- Lithium batteries provide a 10 year life expectancy.
- Each meter has a unique, unalterable bar-coded serial number for identification.
- Standard registers are programmed to log and display both forward and reverse flow. Physically reversing the meter will not decrease the forward flow totalizer.
- Each meter ships with a certificate verifying flow accuracy with a ± 1.5% accuracy for nominal flow rates.

SPECIFICATIONS

- Sizes: 2", 3", 4", 6", 8", 10" and 12"
- Body: Epoxy-coated cast iron with flange inlet and outlet
- Maximum Working pressure: 230 psi
- Fluid Temperature Range: 32° to 122° F (0.1° to 50° C)
- Connection: Flanges ANSI ISO for AWWA connection standard
- Power Source: 2 'D' Size non-replaceable Lithium batteries
- Environmental Protection: IP-68, Ambient operation temperature for display: -13 to 131° F (-25° to 55° C)
- Display Units: Multi-line, programmable 9 digit LCD display
- Output (optional): Programmable single/dual open collector pulse output or externally powered 4-20 mA loop

HOW OCTAVE WORKS

The Octave's measurement method is based on an ultrasonic, transit-time, dual-beam sensors that determines the length of time it takes an ultrasonic wave to travel the distance between the two sensors located in the meter's body. The sensors function as both sender and receiver, each one alternating these functions so that the ultrasonic wave travels both with and against the direction of the flow. Because the ultrasonic wave travels slower against the flow than with the flow, the time difference of the two waves allows the meter to determine the flow rate.



ULTRASONIC TRANSDUCERS
Double beam ultrasonic sensors

OCTAVE PROGRAMMING AND DIGITAL DISPLAY

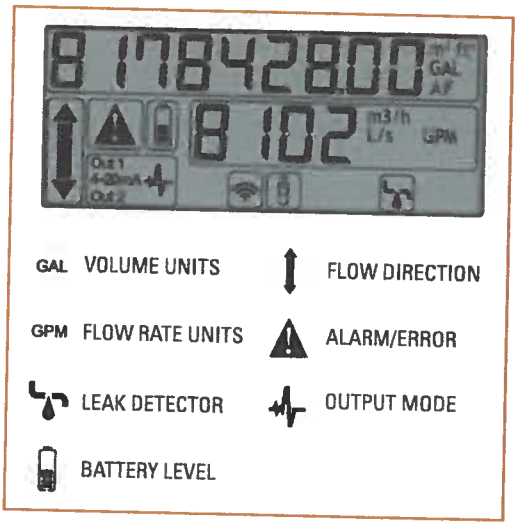
Multi-line digital LCD readout display provides immediate reporting and visual indicators for critical conditions. The 9 digit display is easy to read at a glance.

Each Octave Meter will be pre-programmed before shipment for an instantaneous flow rate in Gallons per Minute (GPM) and the specified user's requirements for:

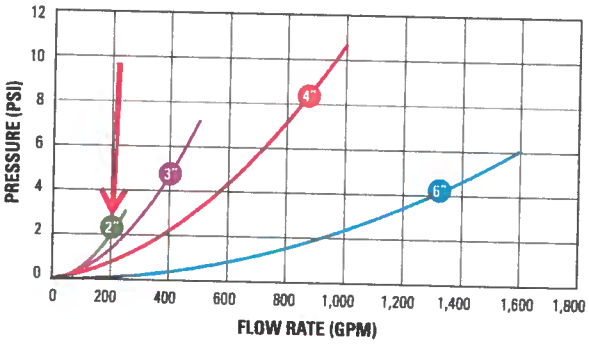
- Volume Totalizer Units (Gallons or Acre Feet)
- Output Resolution for Optional Pulsed Output

NOTE: Programming software is not available to the end user. Once the meter is programmed by Netafim prior to shipment, it can only be reset by Netafim.

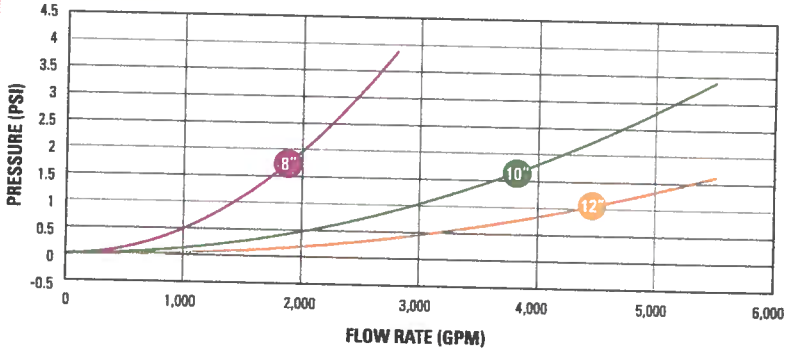
When changing between totalizer options (US Gallons to Acre Feet), the totalizer memory can not be reset so vital data will not be lost.



HEADLOSS CURVE - 2", 3", 4" AND 6"



HEADLOSS CURVE - 8", 10" AND 12"



PERFORMANCE DATA

SIZE	EXTENDED LOW FLOW @ ± 5% (GPM)	NOMINAL FLOW RANGE @ ± 1.5% (GPM)	SAFE MAX. FLOW RATE (GPM)	HEADLOSS @ MAX. FLOW RATE (PSI)
2"	0.25	1 - 200	250	3.1
3"	0.50	1 - 500	400	6.9
4"	0.75	1 - 1,000	650	10.25
6"	2.00	3 - 1,400	1,500	6.05
8"	3.50	4.5 - 2,250	3,000	3.95
10"	8.80	14 - 5,500	5,500	1.75
12"	8.80	14 - 5,500	5,500	3.4

OCTAVE'S UNRESTRICTED FLOW PATH

OCTAVE ORDERING GUIDELINES

Standard Features:

- Flow Rate Units: Gallons per Minute (G.P.M.)
- Flow Display: Forward and Reverse Volumes

Options for all Octave Water Meters:

- Pulsed Output Module - Specify the output resolution in U.S. Gallons or Acre Feet
- 4-20 mA Output Module (requires an externally powered loop)

The following Programming Options are available by special order only:

- Volume Units: m^3 and ft^3
- Flow Rate Units: m^3/h and L/s
- Flow Display Totalizer: Forward Flow Only and Net Flow (forward flow minus reverse flow)
- Acre Feet per Pulse Output: 1, 10, 100 and 1,000

ORDERING INFORMATION

360CT — SIZE — REGISTER — OUTPUT

360OCT02GAL1.0

SIZE		REGISTER	OUTPUT	
2"	= 02	GALLONS = GAL	NO OUTPUT (METER DISPLAY ONLY)	= NO
3"	= 03		0.1 GALLONS PER PULSE	= 0.1
4"	= 04		1.0 GALLONS PER PULSE	= 1.0
6"	= 06		10 GALLONS PER PULSE	= 10
8"	= 08		100 GALLONS PER PULSE	= 100
10"	= 10		1000 GALLONS PER PULSE	= 1000
12"	= 12		ANALOG OUTPUT 420mA	= 420
		ACRE FEET = AF	NO OUTPUT (METER DISPLAY ONLY)	= NO
			0.0001 AF PER PULSE (OR 32.6 GAL PER PULSE)	= 0.0001
			0.001 AF PER PULSE (OR 326 GAL PER PULSE)	= 0.001
			0.01 AF PER PULSE (OR 3,259 GAL PER PULSE)	= 0.01
			0.1 AF PER PULSE (OR 32,585 GAL PER PULSE)	= 0.1
			ANALOG OUTPUT 420mA	= 420

ORDERING EXAMPLE - GALLONS:

360CT04GAL0.1

4" Octave Water Meter, Volume in Gallons, Flow Rate in Gallons per Minute, Pulse Output 0.1 Gallons per Pulse

ORDERING EXAMPLE - ACRE FEET:

360CT10AF.0001

10" Octave Water Meter, Volume in Acre Feet, Flow Rate in Gallons per Minute, Pulse Output 0.0001 Acre Feet per Pulse (32.6 Gallons per Pulse)

NOTE: 1 AF = 325,851 Gallons

OCTAVE WITH OPTIONAL PULSED OUTPUT

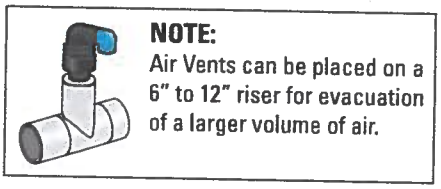
INSTALLATION GUIDELINES

The following examples are recommendations for achieving top performance.

- Two (2) diameters of straight pipe are required when installing a 90° elbow before or after the meter. (See Figure 1)
- Two (2) diameters of straight pipe are required when installing the meter upstream or downstream of a valve, tee connection or other source of significant turbulence. (See Figures 2 and 3)
  NOTE: The installation of the meter upstream of a pump or large valve is not recommended due to potential cavitation issues.
- Five (5) diameters of straight pipe downstream of a pump (before the meter) and Two (2) diameters of straight pipe downstream of the meter are required. (See Figure 4)
  NOTE: When the meter is downstream of the pump, Netafim recommends additional straight pipe to ensure accurate measurements.
- Meter can be installed horizontally or vertically with the water flowing up. It is not recommended for installation where the direction of flow is below the horizontal plane. (See Figure 5)
- To eliminate air in the pipeline and maintain accuracy, use of and proper placement of Air Vents is required. We recommend a Combination Air/Vacuum Release Air Vent or the Pro Air Vent.
- Recommended Air Vent placement: 3" and 4" meters place air vent 12" to 18" before the meter; 6" and 8" meters place the air vent 18" to 24" before the meter; 10" and 12" meters place the air vent 30" to 36" before the meter.
- Installing a Check Valve downstream of the meter creates back pressure to aid in the meter filling with water.

INSTALLATION EXAMPLES

The following illustrations are meter installation examples with Air Vent placement.



NOTE:
Air Vents can be placed on a 6" to 12" riser for evacuation of a larger volume of air.

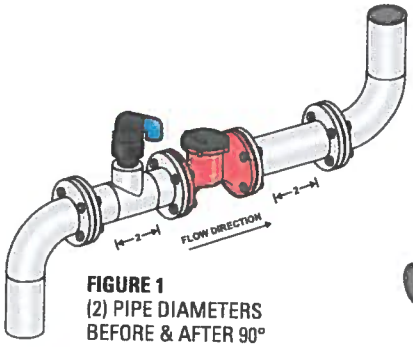


FIGURE 1
(2) PIPE DIAMETERS BEFORE & AFTER 90° ELBOWS

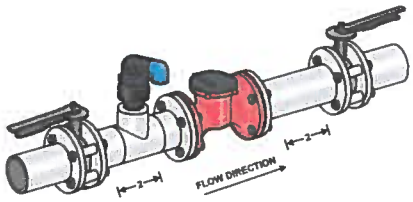


FIGURE 2
(2) PIPE DIAMETERS BEFORE & AFTER METER

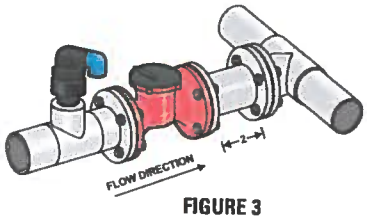


FIGURE 3
(2) PIPE DIAMETERS BEFORE TEE CONNECTION

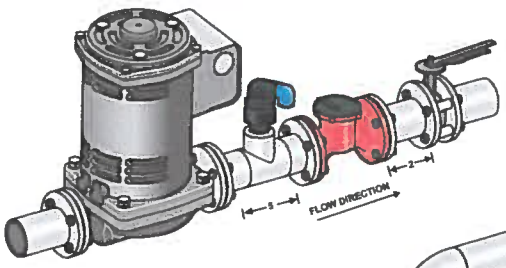


FIGURE 4
(5) PIPE DIAMETERS AFTER PUMP (BEFORE METER) & (2) PIPE DIAMETERS AFTER METER

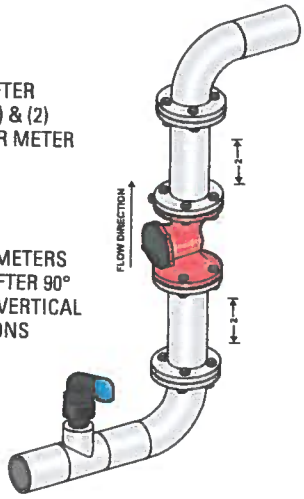
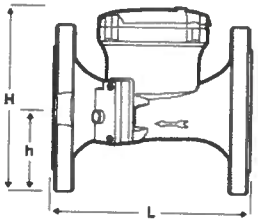
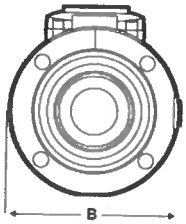


FIGURE 5
(2) PIPE DIAMETERS BEFORE & AFTER 90° ELBOWS IN VERTICAL INSTALLATIONS





DIMENSIONS & WEIGHT

SIZE	LENGTH (L)	WIDTH (B)	HEIGHT (H)	HEIGHT (h)	WEIGHT
2"	7.9"	6.5"	7.5"	1.6"	19.8 LBS.
3"	8.9"	7.9"	8.3"	3.5"	28.7 LBS.
4"	9.8"	8.7"	8.8"	4.1"	33.1 LBS.
6"	11.8"	11.2"	11.1"	5.5"	70.5 LBS.
8"	13.8"	13.4"	13.1"	6.5"	99 LBS.
10"	17.7"	15.9"	15.9"	8.0"	150 LBS.
12"	19.7"	19.2"	19.3"	9.6"	216 LBS.

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WASTEWATER DIVISION

NETAFIM™

BIOLINE® DRIPLINE

THE WORLD'S MOST ADVANCED CONTINUOUS SELF-CLEANING, PRESSURE COMPENSATING DRIPLINE SPECIFICALLY DESIGNED FOR WASTEWATER

CROSS SECTION OF BIOLINE DRIPLINE

Bioline dripper inlets are positioned in the center of flow where water is the cleanest

PRODUCT ADVANTAGES

- Pressure compensation - all drippers deliver equal flow, even on sloped or rolling terrain.
- Unique flow path - Turbonet technology provides more control of water and a high resistance to clogging.
- Continuous self-flushing dripper design - flushes debris, as it is detected - throughout operation, not just at the beginning or end of a cycle. Ensures uninterrupted dripper operation.
- Single hole dripper outlet from tubing:
  - Better protection against root intrusion
  - Allows the dripline to be used in subsurface applications without need for chemical protection
- Drippers capture water flow from the center of the tubing - ensures that only the cleanest flow enters the dripper.
- Built-in physical root barrier - drippers are protected from root intrusion without the need for chemical protection. Water exits dripper in one location while exiting the tubing in another.
- Three dripper flow rates - provides the broadest range of flow rates available. Allows the designer to match the dripline to any soil or slope condition.
- Bioline tubing is completely wrapped in purple - easily identifying it for non-potable use, regardless of how the tubing is installed.
- Anti-bacterial-impregnated drippers - prevents buildup of microbial slime.
- Can be used subsurface - Bioline can be installed on-surface, under cover or subsurface.
- No special storage requirements - does not degrade if stored outdoors.

APPLICATIONS

- Typically installed following a treatment process
- Can be used with domestic septic tank effluent with proper design, filtration and operation
- Reuse applications including municipally treated effluent designated for irrigation and other disinfected and non-disinfected water sources.

SPECIFICATIONS

- Dripper flow rates: 0.4, 0.6 or 0.9 GPH
- Dripper spacings: 12", 18" or 24" dripper spacings and blank tubing
- Pressure compensation range: 7 to 58 psi
- Maximum recommended system pressure: 58 psi
- Tubing diameter: 0.66" OD, 0.56" ID
- Tubing color: Purple color indicates non-potable
- Coil lengths: 500' or 1,000' (Blank tubing in 250')
- Recommended filtration: 120 mesh
- Bending radius: 7"
- UV resistant
- Tubing material: Linear low-density polyethylene

Additional spacing and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.

BIOLINE DRIPLINE

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 3.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 2.3 GPM REQUIRED PER LATERAL TO ACHIEVE 3 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	102	94	84	136	127	113	161	151	137
	25	151	136	118	203	184	161	245	223	197
	35	193	171	146	260	232	200	315	283	245
	40	211	186	158	286	254	218	347	311	267
	45	228	200	169	310	274	233	377	335	287
Flow per 100' (GPM / GPH)		0.57/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 3 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 2.0 GPM REQUIRED PER LATERAL TO ACHIEVE 2.5 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	128	115	100	172	155	136	205	187	165
	25	183	161	137	248	220	188	301	268	231
	35	229	198	166	310	272	229	379	333	283
	40	248	214	178	338	295	247	413	362	305
	45	266	229	190	364	316	263	447	389	327
Flow per 100' (GPM / GPH)		0.57/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 1.6 GPM REQUIRED PER LATERAL TO ACHIEVE 2.0 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	.9 GPH
INLET PRESSURE	15	161	141	119	217	191	164	263	233	201
	25	221	190	157	302	261	218	369	321	270
	35	269	229	187	370	316	260	455	391	324
	40	290	246	200	399	340	278	493	421	347
	45	310	261	212	427	362	296	527	449	369
Flow per 100' (GPM / GPH)		0.57/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 1.2 GPM REQUIRED PER LATERAL TO ACHIEVE 1.5 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	201	171	140	275	235	194	337	289	241
	25	266	222	179	366	308	251	453	383	313
	35	316	262	210	437	365	295	543	455	369
	40	337	280	223	469	391	313	583	487	393
	45	358	296	235	497	413	331	619	517	415
Flow per 100' (GPM / GPH)		0.57/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 0.8 GPM REQUIRED PER LATERAL TO ACHIEVE 1.0 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	248	205	163	344	285	228	427	355	285
	25	315	258	203	440	361	286	549	453	359
	35	367	299	234	513	419	331	643	527	417
	40	389	316	248	545	445	350	683	559	441
	45	409	332	260	574	468	367	721	589	463
Flow per 100' (GPM / GPH)		0.57/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 0.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 0.4 GPM REQUIRED PER LATERAL TO ACHIEVE 0.5 fps

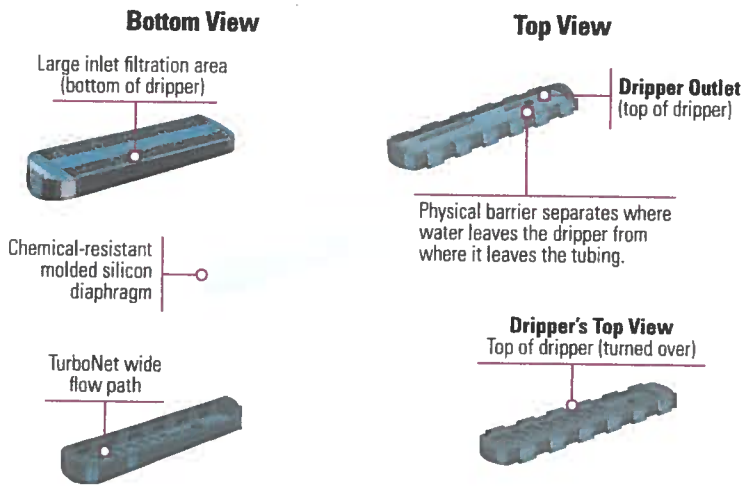
DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	301	242	188	422	341	265	531	429	335
	25	369	296	228	520	418	323	655	527	409
	35	421	337	260	595	476	368	749	603	467
	40	443	354	273	626	501	387	790	635	491
	45	464	371	285	656	524	404	829	665	513
Flow per 100' (GPM / GPH)		0.57/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 0.5 fps flushing/scouring velocity

Netafim recommends flushing velocities capable of breaking free any accumulated bioslimes and debris in the piping network.

Notes:
1. Refer to local regulations for information on flushing velocities that may be written into codes.
2. Netafim does not endorse a specific flushing velocity.
3. Flushing velocities should be determined based on regulations, quality of effluent, and type of flushing control.
4. Using a flushing velocity less than 1 fps does not provide turbulent flow as defined by Reynolds Number.
5. Higher flushing velocities provide more aggressive flushing.

EXPLODED VIEW OF BIOLINE DRIPPER



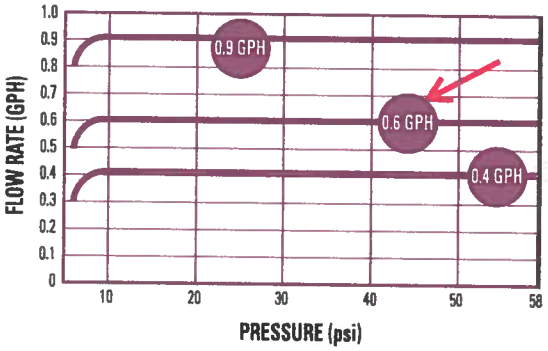
BIOLINE DRIPPER OPERATION

Bioline® drippers are pressure compensating - delivering the water uniformly into the soil for further treatment or for reuse by the landscape. These unique drippers allow the tubing to be installed on flat topography or steep slopes.

Bioline drippers are protected against microbial slime. Each dripper is impregnated with an antimicrobial agent to resist biological build-up.

Netafim drippers are continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog-free operation, year after year.

DRIPPER FLOW RATE VS. PRESSURE



Between 0 and 7 psi, the dripper functions as a turbulent flow emitter, ensuring that the nominal design flow is not exceeded at system start-up.

FLOW PER 100 FEET

DRIPPER SPACING	0.4 GPH DRIPPER		0.6 GPH DRIPPER		0.9 GPH DRIPPER	
	GPH	GPM	GPH	GPM	GPH	GPM
12"	40.0	0.67	61.0	1.02	92.0	1.53
18"	26.7	0.44	41.0	0.68	61.0	1.02
24"	20.0	0.34	31.0	0.51	46.0	0.77

08WRAM.6-24V

SPECIFYING INFORMATION

SAMPLE MODEL NUMBER

08WRAM.6-24 V

A — Bioline Dripline = 08WRAM

1 — DRIPPER FLOW RATE: 0.4 GPH = .4; 0.6 GPH = .6; 0.9 GPH = 1

2 — DRIPPER SPACING: 12" = 12; 18" = 18; 24" = 24

3 — COIL LENGTH: 500' = V500; 1,000' = V

BLANK Tubing Model Number: 250' = 08WRAM-250

ORDERING INFORMATION

FLOW RATE	DRIPPER SPACING	COIL LENGTH	MODEL NUMBER
0.4 GPH	12"	1,000'	08WRAM.4-12V
		500'	08WRAM.4-12V500
0.4 GPH	18"	1,000'	08WRAM.4-18V
		500'	08WRAM.4-18V500
0.4 GPH	24"	1,000'	08WRAM.4-24V
		500'	08WRAM.4-24V500
0.6 GPH	12"	1,000'	08WRAM.6-12V
		500'	08WRAM.6-12V500
0.6 GPH	18"	1,000'	08WRAM.6-18V
		500'	08WRAM.6-18V500
0.6 GPH	24"	1,000'	08WRAM.6-24V
		500'	08WRAM.6-24V500
0.9 GPH	12"	1,000'	08WRAM1-12V
		500'	08WRAM1-12V500
0.9 GPH	18"	1,000'	08WRAM1-18V
		500'	08WRAM1-18V500
0.9 GPH	24"	1,000'	08WRAM1-24V
		500'	08WRAM1-24V500
Blank Tubing 17mm		250'	08WRAM-250

BIOLINE FITTINGS

FITTING APPLICATIONS

- Fits Bioline Dripline

FITTING SPECIFICATIONS

- Barbed fittings for a secure fit
- Easy installation without glue or tools
- Allows for easy on-site inspection of proper fitting installation

TLCOUP
Insert Coupling

TLELL
Insert Elbow

TLTEE
Insert Tee

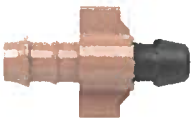
TLCROS
Insert Cross

TL050MA
½" Male Adapter

TL075MA
¾" Male Adapter

TL075FTEE
Combination Tee
Ins x Ins x ¾" FPT

TL2W075MA
2-Way Insert
¾" MPT x Insert



TLIAPE-B
Insert Adapter for 1" or Larger PE (Requires 11mm or 7/16" drill or punch)

TLIAPVC-B
Insert Adapter with Grommet
1½" or larger PVC Pipe

TDBIT16.5
Drill Bit for TLIAPVC Fitting (16.5mm or 21/32")

TLFIG8
Figure 8 Line End

TLS6
6" Soil Staple

FITTING DEFINITIONS

FPT = Female Pipe Thread
MPT = Male Pipe Thread
Ins x Ins = Insert by Insert

TLSOV
Shut-Off Valve
Ins x Ins

TLCV
Inline Check Valve

- Flow Range: 0.9 to 4.4 GPM
- Opening Pressure: 10.2 psi
- Closing Pressure: 5.8 psi
  (13.4 Feet Column of Water)

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32PRV2-435V2K

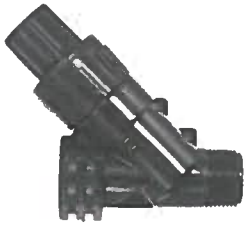
WASTEWATER DIVISION

NETAFIM™

PRESSURE REGULATORS

QUICK RESPONSE TO PRESSURE VARIATIONS ASSURES CONSTANT OUTLET PRESSURE

3/4' LOW FLOW



3/4"

1 1/2"

2" X 4

3" X 10

2" X 6

PRODUCT ADVANTAGES

- Instant response to variations in pressure assures outlet pressure will remain constant regardless of inlet pressure.
- Non-corrosive, high quality plastic and brass bodies withstand commonly used fertilizers and chemicals.
- Sealed regulating unit with stainless steel spring and a screw are field replaceable and easy to maintain.
- Built-in operating indicator visually shows when proper outlet pressure is achieved (except 3/4" low flow).
- No leakage due to tight seal from rubber diaphragm.
- Flow ranges from .25 to 175 GPM.

APPLICATIONS

- Drip dispersal systems

SPECIFICATIONS

- Maximum Operating Pressure: 145 psi
- Available Pre-Set Pressures:
  9, 12, 15, 20, 25, 30, 35, 43, 50, 57 and 65 psi
- 3/4" Low Flow Pre-Set Pressures:
  15, 20, 25, 35 and 42 psi
- Connections:
  3/4" - Female x Male Threaded
  1 1/2" - Male Threaded
  2" x 4 - Female Threaded
  2" x 6 - Female Threaded
  3" x 10 = Female Threaded
- 3/4" Low Flow Connections:
  Inline Female x Female Threaded
- 3/4" Low Flow Pressure Regulator:
  Sealed unit is non-replaceable

FLOW RANGE & REGULATING UNITS

MODEL	FLOW RANGE (GPM)	REGULATING UNITS
3/4" LOW FLOW	.25 - 4.4	-
3/4"	4.5 - 17.5	1
1 1/2"	11 - 35	2
2" X 4	22 - 70	4
2" X 6	33 - 105.6	6
3" X 10	35 - 175	10

PRESSURE REGULATING UNIT

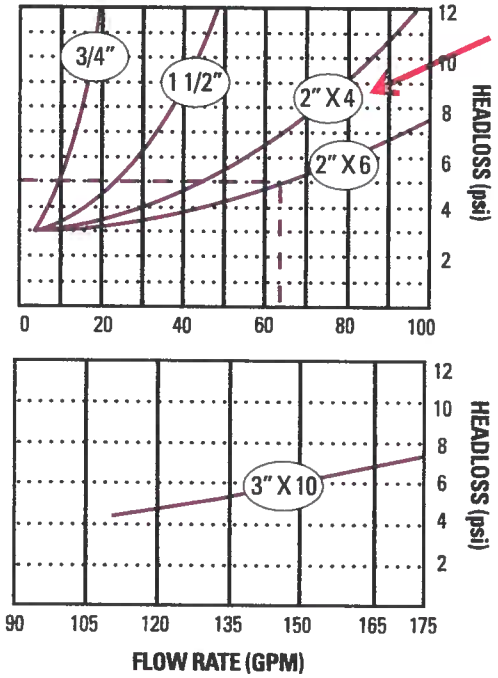
It's quick and simple to change pressures with a one-piece sealed pressure regulating unit. Each pressure option has a different regulating unit and each regulating unit can be used in any size pressure regulator body.

PRESSURE REGULATORS

ORDERING INFORMATION

PRESSURE	3/4" LOW FLOW MODEL NUMBERS	3/4" MODEL NUMBERS	1 1/2" MODEL NUMBERS	2" X 4 MODEL NUMBERS	2" X 6 MODEL NUMBERS	3" X 10 MODEL NUMBERS
9 psi	-	32PRV.75-09V2K	32PRV1.5-09V2K	32PRV2-409V2K	32PRV2-609V2K	32PRV3-1009V2K
12 psi	-	32PRV.75-12V2K	32PRV1.5-12V2K	32PRV2-412V2K	32PRV2-612V2K	32PRV3-1012V2K
15 psi	32PRV.75-LF15V2	32PRV.75-15V2K	32PRV1.5-15V2K	32PRV2-415V2K	32PRV2-615V2K	32PRV3-1015V2K
20 psi	32PRV.75-LF20V2	32PRV.75-20V2K	32PRV1.5-20V2K	32PRV2-420V2K	32PRV2-620V2K	32PRV3-1020V2K
25 psi	32PRV.75-LF25V2	32PRV.75-25V2K	32PRV1.5-25V2K	32PRV2-425V2K	32PRV2-625V2K	32PRV3-1025V2K
30 psi	-	32PRV.75-30V2K	32PRV1.5-30V2K	32PRV2-430V2K	32PRV2-630V2K	32PRV3-1030V2K
35 psi	32PRV.75-LF35V2	32PRV.75-35V2K	32PRV1.5-35V2K	32PRV2-435V2K	32PRV2-635V2K	32PRV3-1035V2K
43 psi	32PRV.75-LF42V2	32PRV.75-43V2K	32PRV1.5-43V2K	32PRV2-443V2K	32PRV2-643V2K	32PRV3-1043V2K
50 psi	-	32PRV.75-50V2K	32PRV1.5-50V2K	32PRV2-450V2K	32PRV2-650V2K	32PRV3-1050V2K
57 psi	-	-	32PRV1.5-57V2K	32PRV2-457V2K	32PRV2-657V2K	32PRV3-1057V2K
65 psi	-	32PRV.75-65V2K	32PRV.75-65V2K	32PRV2-465V2K	32PRV2-665V2K	32PRV3-1065V2K

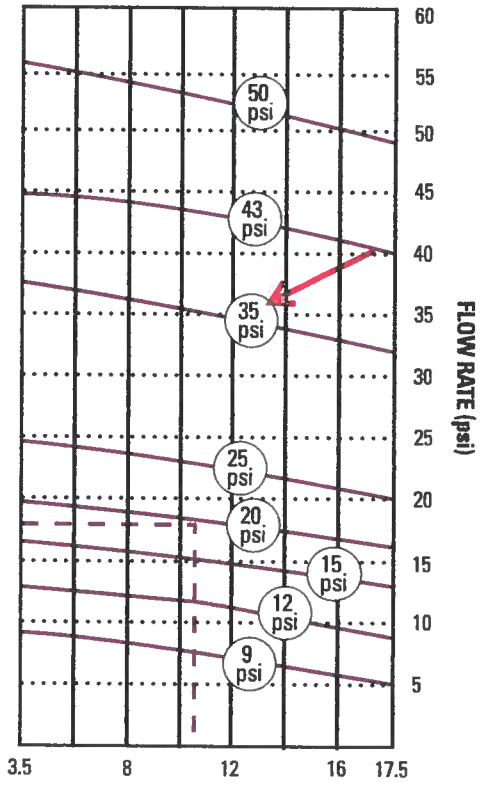
FLOW RATE VS. PRESSURE LOSS



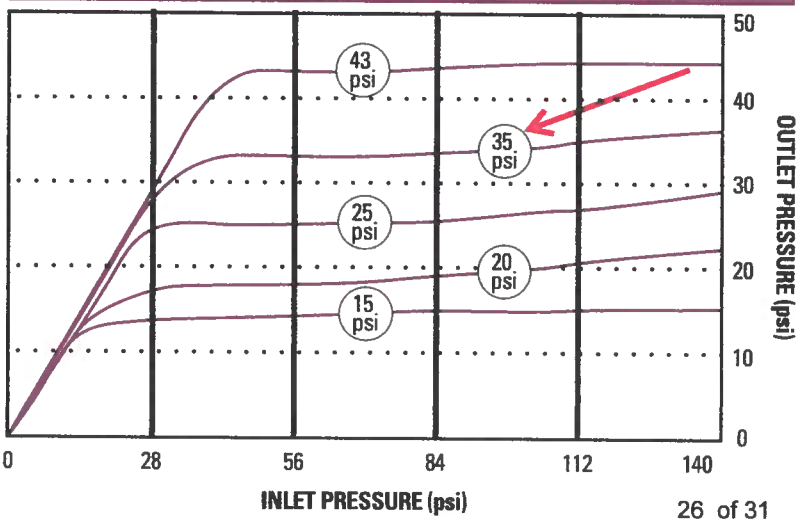
EXAMPLE FOR DETERMINING INLET PRESSURE

- Given Flow Rate = 63 GPM
  Nominal Required Pressure = 20 psi
- Using Pressure Regulator Model 2" x 6 will result in 10.5 GPM per regulating unit.
- 10.5 GPM per regulating unit will result in an output pressure of 18 psi. (See chart at right)
- Headloss of 2" x 6 Pressure Regulator at 63 GPM is 5 psi. (See chart at left)
- Design pressure at inlet of Pressure Regulator should be 18 ÷ 5 = 23 psi

REGULATED PRESSURE VS. FLOW RATE



3/4" LOW FLOW - OUTLET VS. INLET PRESSURE (@ 1.3 GPM)



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W067 01/13

LVET2GH2

SERIES 80 2-WAY ELECTRIC VALVES

PRODUCT ADVANTAGES

- Suitable for high pressure applications with quick reaction to opening and closing.
- Exceptionally low inrush and holding current allows the longest wire run from valve to controller.
- Quick reaction to opening and closing and a drip-tight seal for accurate irrigation.
- Stable solenoid to voltage fluctuations with low sensitivity to dirt - no diode solenoid.
- Integrated check valve ensures valve remains closed until the controller designates opening.
- Flow control stem allows manual control from full closure up to maximum capacity.

¾" & 1" GLOBE
SERIES 80 2-WAY

1 ½" & 2" GLOBE
SERIES 80 2-WAY

1 ½" & 2" ANGLE
SERIES 80 2-WAY

APPLICATIONS

- Ideal for mild corrosive and mild acidity levels in the water

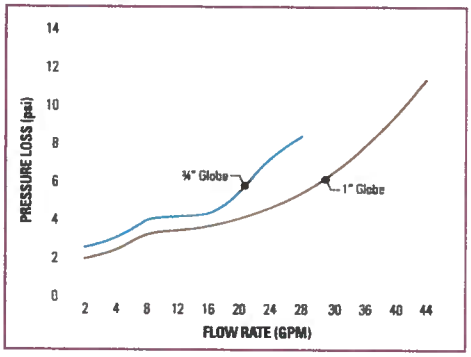
SPECIFICATIONS

- Recommended Flow Ranges:
  ¾" valve - .01 to 26 GPM
  1" valve - .01 to 44 GPM
  1 ½" valve - .25 to 110 GPM
  2" valve - .25 to 176 GPM
- Valve Configurations:
  ¾" & 1" valves - Globe
  1 ½" & 2" valves - Globe or Angle
- Minimum Operating Pressure: 7 psi
- Maximum Operating Pressure: 150 psi
- Maximum Water Temperature: 140° F
- Standard Solenoid Voltage: 24VAC ± 10% voltage
- Solenoid Inrush Current: .22A
- Solenoid Holding Current: .095A

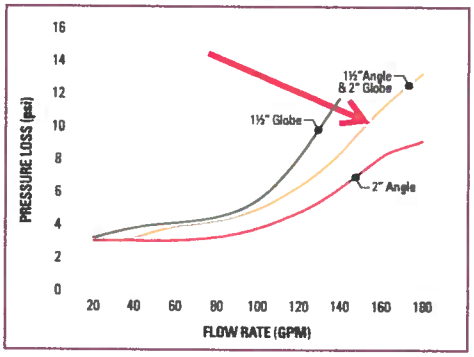
MATERIALS

- Body, Bonnet, Diaphragm Seat: Glass Reinforced Polyamide (GRP)
- Nuts, Bolts, Washers: Stainless Steel 304
- Spring: Stainless Steel AISI 302

¾" & 1" FLOW RATE VS. PRESSURE LOSS



1½" & 2" FLOW RATE VS. PRESSURE LOSS



DIMENSIONS & WEIGHT

SIZE	LENGTH	WIDTH	HEIGHT	WEIGHT
3/4" GLOBE	3 15/16"	3"	4 3/8"	.62 LBS
1" GLOBE	4 1/8"	3"	4 1/2"	.64 LBS
1 ½" GLOBE	6 9/16"	6 1/2"	6 3/8"	2 LBS
1 ½" ANGLE	3 1/2"	6 1/2"	6 13/16"	1.8 LBS
2" GLOBE	6 9/16"	6 1/2"	6 5/8"	2 LBS
2" ANGLE	3 1/2"	6 1/2"	6 13/16"	1.8 LBS

ORDERING INFORMATION
STANDARD 24VAC VALVES

VALVE SIZE	ITEM NUMBER	MODEL NUMBER
¾" GLOBE	00135-000995	LVET.75GH2
1" GLOBE	00135-001005	LVET1GH2
1 ½" GLOBE	00135-001015	LVET1.5GH2
1 ½" ANGLE	00135-001016	LVET1.5GH2-AN
2" GLOBE	00135-001025	LVET2GH2
2" ANGLE	00135-001026	LVET2GH2-AN

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65ARIA100

WASTEWATER DIVISION

NETAFIM™

AIR VENTS

COMBINATION AIR/VACUUM & CONTINUOUS ACTING AND GUARDIAN AIR/VACUUM AIR VENTS

PROVEN DESIGN PROVIDES MORE AIR RELEASE CAPACITY THAN OTHER VENTS OF SIMILAR SIZES

2" COMBINATION

2" COMBINATION
with Vacuum Guard

1" COMBINATION

¾" & 1" AUTOMATIC

¾" & 1" AUTOMATIC

¾" & 1" GUARDIAN

¾" & 1" GUARDIAN
with Shrader Valve

2" & 3" GUARDIAN

PRODUCT ADVANTAGES

- Ensures maximum protection of irrigation system with proper sizing and placement.
- Aerodynamic float design ensures vent closure as water fills the system, remains open when air pressure reaches 5-12 psi depending on model.
- Large capacity vents dampen water hammer preventing pipes and fittings from cracking or bursting.
- Unique rolling seal feature allows gradual opening, closing and self-cleaning.
- Made of corrosion-resistant reinforced UV protected nylon - no metal parts to rust or corrode, no need for spare parts.
- Guardian with shrader valve is ideal for measuring local line pressure.
- Five year warranty.

APPLICATIONS

- **1" & 2" COMBINATION AIR/VACUUM AND CONTINUOUS ACTING AIR VENTS**
  - For discharge and intake of large volumes of air at pump and filter stations, along mains and at the end of mainlines.
  - For continuous air release at high points in pipe network or upstream of manifolds.
  - Every 1,500 feet along mainlines.
- **2" COMBINATION AIR RELEASE/VACUUM GUARD & CONTINUOUS ACTING AIR VENT**
  - Releases air at pump priming and maintains the prime by not allowing air intake in long and/or undulating suction lines to pump stations.
  - Releases entrapped air while ensuring continuous prime at centrifugal pumps.
  - Builds up siphons with air release, maintains the siphon by continuously releasing air and not allowing air intake.
- **¾" & 1" AUTOMATIC CONTINUOUS ACTING AIR VENTS**
  - For high spots where air accumulates.
- **¾" & 1" CONTINUOUS ACTING/VACUUM GUARD AIR VENTS**
  - For release of entrapped air while ensuring continuous pump prime with no air intake in centrifugal pumps and pump suction lines.
  - Protects mechanical seals in vertical pumps by not allowing air to accumulate in the stuffing boxes.
  - Maintain siphons with continuous air release while not allowing air intake.
- **¾", 1", 2" & 3" GUARDIAN AIR/VACUUM RELIEF AIR VENTS**
  - Commonly used downstream of valves, primarily at manifolds, to break vacuum caused by system draining.
  - On sloping terrain to prevent collapsing of pipes caused by vacuum when pipe networks drain.
  - Upstream of valves for air discharge during system start-up.

AIR VENTS

COMBINATION AIR/VACUUM AND CONTINUOUS ACTING AIR VENT - STAGES OF OPERATION

1. During start-up, the air vent discharges large volumes of air and as the system builds pressure, the body fills with water, forcing the float upwards and closing the air vent.
2. While the system is pressurized, the "automatic" function continuously releases accumulated air.
3. At shutdown, the air vent's large opening allows air back into the system preventing the pipe and accessories from collapsing, and preventing suction of mud and debris.

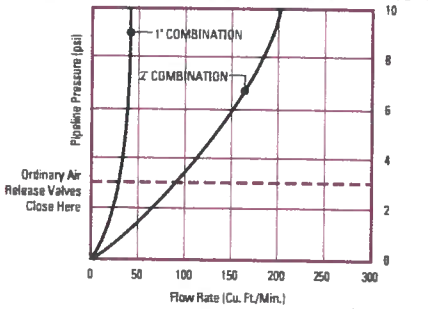
AUTOMATIC CONTINUOUS ACTING AIR VENT
STAGES OF OPERATION

1. While the system is pressurized, air accumulates in the body, systematically dropping the rolling seal mechanism releasing the trapped air.
2. After air is released, water again enters the body and forces the float to close the air vent.

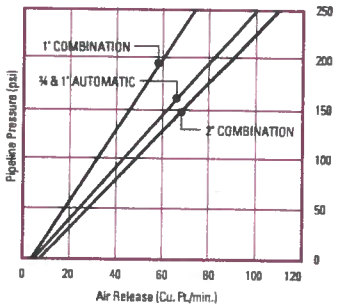
GUARDIAN AIR & VACUUM AIR VENTS
STAGES OF OPERATION

1. Discharges large quantities of air through an opening and as water enters, the float rises and forces the air vent to close.
2. During normal flow, while the line is under pressure, the air vent remains closed.
3. As the line empties, or during a drop in pressure, the float drops down and opens the air vent admitting air, breaking the vacuum created by the withdrawing water and prevents the collapse of pipelines and suction of soil into driplines.

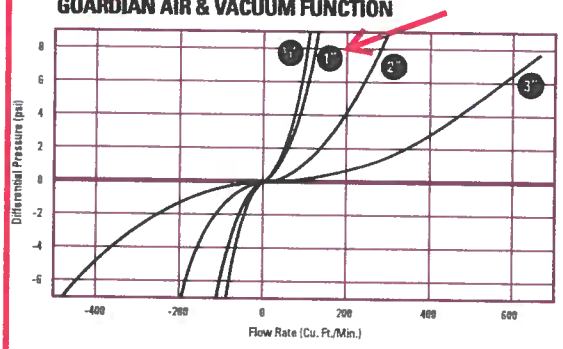
COMBINATION AIR & VACUUM FUNCTION



AUTOMATIC FUNCTION



GUARDIAN AIR & VACUUM FUNCTION



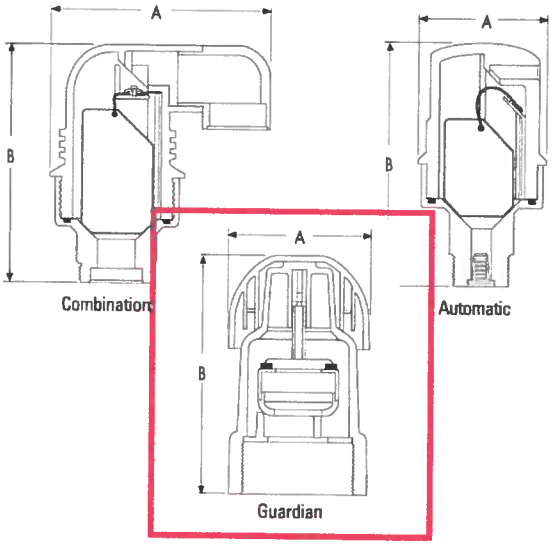
COMBINATION/AUTOMATIC ORDERING, DIMENSIONS & WEIGHT

MODEL NUMBER	SIZE/MATERIAL	CONNECTION	A	B	WEIGHT
65ARIB2	2" COMBO (N)	MPT	7.09"	8.23"	2.35 LBS.
65ARIB2-B	2" COMBO (NB)	MPT	7.09"	8.23"	4.75 LBS.
65ARIB2PP	2" COMBO (P)	MPT	7.09"	8.23"	1.90 LBS.
65ARIB2-BPP	2" COMBO (PBR)	MPT	7.09"	8.23"	3.80 LBS.
65ARIB2VM	2" COMBO (NV)	MPT	8.09"	8.23"	2.50 LBS.
65ARIB1	1" COMBO (N)	MPT	3.93"	5.51"	0.66 LBS.
65ARIB1-B	1" COMBO (NB)	MPT	3.93"	5.51"	1.54 LBS.
65ARIB1-B	1" COMBO (P)	MPT	3.93"	5.51"	0.65 LBS.
65ARIS075	¾" AUTO (N)	MPT	3.20"	5.51"	0.56 LBS.
65ARIS075VM	¾" AUTO (NV)	MPT	3.20"	5.51"	0.56 LBS.
65ARIS1	1" AUTO (N)	MPT	2.95"	5.51"	0.65 LBS.
65ARIS1VM	1" AUTO (NV)	MPT	3.20"	5.51"	0.66 LBS.

N = Nylon body NB = Nylon body, brass base NV = Nylon body, vacuum guard
P = Polypropylene body PBR = Polypropylene body, brass base

GUARDIAN ORDERING, DIMENSIONS & WEIGHT

MODEL NUMBER	SIZE	CONNECTION	A	B	WEIGHT
65ARIA075	¾"	MPT	2.36"	5.11"	0.22 LBS.
65ARIA075S	¾" SHRADER	MPT	2.55"	5.11"	0.44 LBS.
65ARIA100	1"	MPT	2.36"	4.79"	0.35 LBS.
65ARIA100S	1" SHRADER	MPT	2.55"	5.11"	0.44 LBS.
65ARIA2	2"	FPT	2.87"	4.79"	0.44 LBS.
65ARIA3	3"	FPT	4.10"	6.50"	1.30 LBS.



SPECIFICATIONS

- Maximum Operating Pressures:
  - 1", 2" Nylon Combination: 240 psi
  - 1", 2" Polypropylene Combination: 150 psi
  - ¾" & 1" Automatic: 240 psi
  - All Sizes Guardian: 150 psi
- Pressure for Vent to Remain Open:
  - ¾" & 1" Guardian: 5 psi
  - 2" Guardian: 10 psi
  - 3" Guardian: 8 psi
  - All Combination & Automatic: 12 psi

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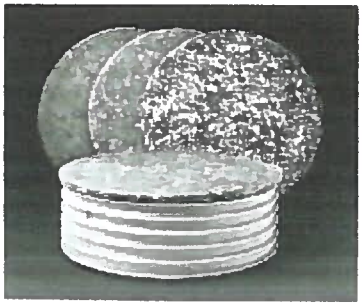
W060 3/14

Product Sheet

PVC Access Risers, Lids, & Accessories

Our PVC risers, fiberglass access lids, and other tank accessories allow access to tanks without excavation. They're adaptable to virtually any tank, both new and existing. Lids and accessories fit most types of ribbed PVC pipe, including Ultra-Rib, Ultra-Corr, KDF FLO, and Perma-Liner. Preassembled PVC risers and stock pipe lengths can be purchased from Orenco. Or stock lengths can be purchased locally and cut as needed. All components are designed to work well together.

Orenco's PVC risers, fiberglass access lids, and other accessories are superior in quality, strength, and durability, and lightweight as well.



In addition to standard green and brown lids, Orenco offers Landscape Lids in grass, rock, and river rock patterns. Landscape Lids are available in 12-, 21-, 24-, and 30-in. (460-, 535-, 610-, and 760-mm) sizes. Custom imprinting is available on quantity orders of 24- and 30-in. diameter lids (610- and 760 mm).

Standard Features & Benefits

- PVC risers and fiberglass access lids come in various diameters.
- PVC risers available in standard 6-in. (152-mm) increments.
- Custom risers can be cut in 1-3 in. (25-76 mm) increments depending on riser diameter.
- PVC risers can be cast right into a concrete tank.
- PVC risers can be installed onto a concrete tank with a bolt-down kit.
- Cast-in or bolt-down riser-tank adapters are available.
- PVC risers and fiberglass riser-tank adapters can be easily bonded to fiberglass tanks with a structural adhesive.
- Grade rings allow installers to stack extensions onto PVC risers in the field.
- Lids are easy to install with stainless steel, tamper resistant bolts (wrench included) that help prevent accidental entry.
- Lids are lightweight, watertight, non-skid, and non-corroding.
- Lid insulation and carbon filter vents are available options.
- Lids can withstand 2500-lb wheel loads (1100 kg), stronger than any other lid on the market.
- While not designed for vehicular traffic, lids have a breaking point of 8000 lbs (3600 kg).
- Lids are flat to allow placement of backyard furnishings. No unsightly domes, no tripping.
- Standard lids are an attractive green or brown and blend in with landscaping.
- Custom lid colors and custom lid imprinting are available on quantity orders.
- Additional accessories are available for PVC risers and lids, including adhesive, pipe grommets, cord grips, splice boxes, pipe cutting and drilling tools, insulation, vents, and fiberglass brackets.

To Order

Call your nearest Orenco Systems®, Inc. Distributor. For nearest Distributor, call Orenco at 800-348-9843 or visit www.orenco.com and click on "Distributor Locator."

Orenco SYSTEMS

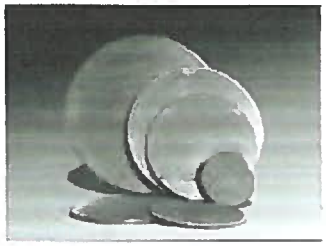
Orenco Systems® Inc., 814 Airway Ave., Sutherlin, OR 97479 USA
800-348-9843 • 541-459-4449 • www.orenco.com

Orenco SYSTEMS® Product Sheet

PVC Risers

Available in the following diameters: 12, 15, 24, and 30 in. (305, 460, 610, and 760 mm). Can be installed with adapters or cast into concrete tank. Lighter-duty PVC risers available in 8- and 15-in. diameters (205 and 380 mm).

Fiberglass Lids

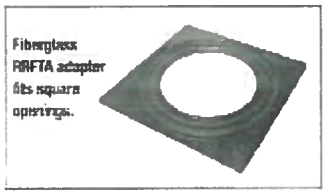


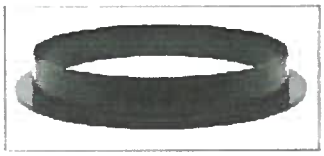
Standard lids (green and brown) are available in the following diameters: 12, 18, 21, 24, 30, 36, and 48 in. (305, 460, 610, 760, 915, 1220 mm). Lighter-duty lids available in 8-, 12-, and 15-in. diameters (200, 305, 380 mm). Landscape lids in grass, bark, and river rock patterns are available in 18-, 21-, 24-, and 30 in. (460-, 535-, 610- and 760-mm) diameters. Custom imprinting available on 24 in. and 30 in. lids (610 and 760 mm).

Bolt-Down Kits

For fastening tank adapter to tank. Kit includes stainless steel anchor bolts and butyl sealant.

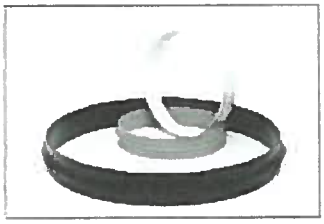
Tank Adapters





Available in 24- and 30-in. diameters (610 and 760 mm). Can be cast into or bolted to concrete tank.

Riser Extension Adapters (Grade Rings)

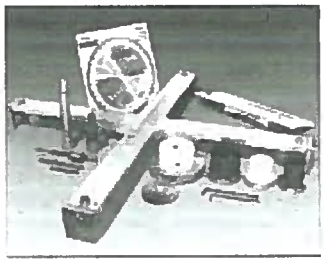


These easy-to-install adapters allow height adjustment of risers in the field.

Lid Fasteners

Self-tapping stainless steel bolt can be used on risers with and without bolt catches. Available about hex drive bits.

Cutting Jigs and Tools



For cutting Perma-Loc, Ultra-Rib, ADS FLO, and Ultra-Dain pipe in the field and preparing pipe for grommet/lid attachment.

Structural Adhesives

Adhesives are available for a variety of products that need bonding or sealing: PVC, ABS, fiberglass, concrete, and rubber.

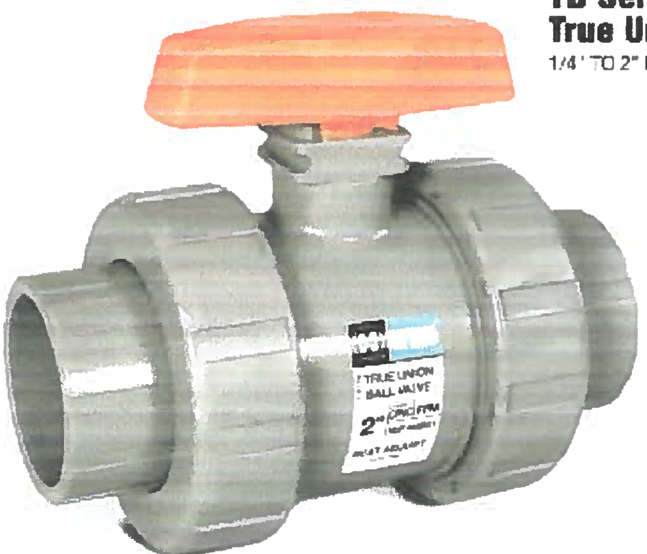
Distributed By:

Orenco Systems® Inc., 814 Airway Ave., Sutherlin, OR 97479 USA
800-348-9843 • 541-459-4449 • www.orenco.com

HAYWARD

TB Series
True Union Ball Valves

1/4" TO 2" PVC AND CPVC



NSF

Sizes 1/4" - 2"

KEY FEATURES

- PVC and CPVC
- Full Port Design
- Reversible PTFE Seats
- Double O-Ring Stem Seals
- Easily Actuated
- NSF / ANSI 61 Listed

OPTIONS

- Lockouts Available
- 2" Square Operating Nut
- Stem Extensions
- Pneumatic and Electric Actuated
- Spring Return Handle

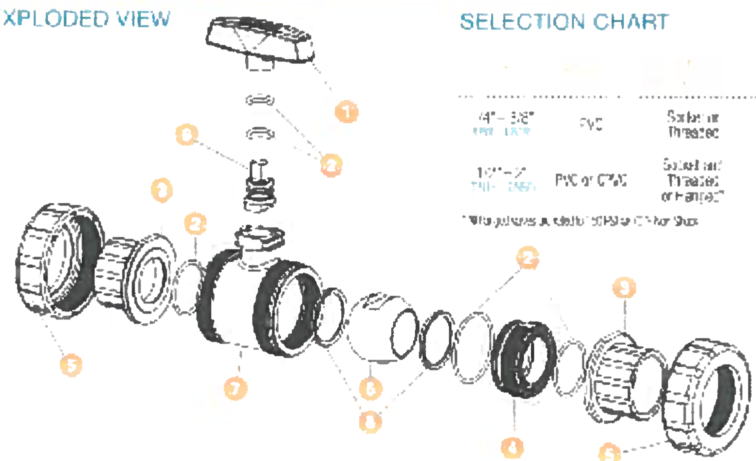
MATERIALS

- PVC Cell Class 12454 per ASTM D1784
- CPVC Cell Class 23447 per ASTM D1784
- FPM and EPDM O-Ring Seals

VALVES AND ACCESSORIES

TECHNICAL INFORMATION

EXPLODED VIEW

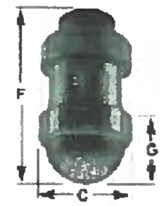


SELECTION CHART

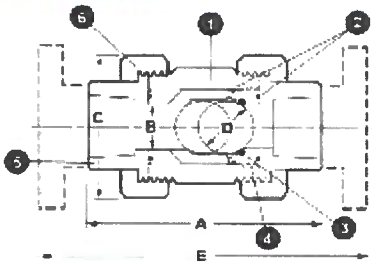
1/4" – 3/8" [illegible]	PVC	Socket or Threaded	FPM or EPDM	[illegible] Non-Shock
1/2" – 2" [illegible]	PVC or CPVC	Socket and Threaded or Flanged*		

* [illegible]

Technical Information



True Check with foot valve screen installed



Parts List True Union Ball Check Valves

1. Body
2. O-Ring Seals
3. Square Cut O-Ring Seat
4. Seal Retainer
5. End Connector
6. Union Nut

Dimensions - Inches / Millimeters

Size	A	B	C	D	E	F	G	Weight - (lb / kg) Socket/Threaded	Flanged
1/4"	3.05 / 78	0.31 / 8	1.38 / 35	0.53 / 13	N/A	N/A	N/A	0.13 / .06	N/A
3/8"	3.06 / 78	0.31 / 8	1.38 / 35	0.53 / 13	N/A	N/A	N/A	0.13 / .06	N/A
1/2" (20)*	4.63 / 118	0.50 / 13	2.25 / 57	0.75 / 19	6.75 / 171	4.88 / 124	2.32 / 59	0.75 / .34	1.00 / .45
3/4" (25)*	4.75 / 121	0.75 / 19	2.63 / 67	1.0 / 25	7.13 / 181	5.00 / 127	2.60 / 66	0.75 / .34	1.38 / .63
1" (32)*	5.25 / 133	1.00 / 25	3.00 / 76	1.25 / 32	7.75 / 197	5.88 / 149	2.88 / 73	1.25 / .57	2.13 / .97
1-1/4" (40)*	6.30 / 160	1.25 / 32	4.00 / 102	1.75 / 44	9.16 / 233	6.94 / 176	3.75 / 95	2.00 / .91	3.75 / 1.70
1-1/2" (50)*	6.75 / 171	1.50 / 38	4.00 / 102	1.75 / 44	9.78 / 248	7.06 / 179	3.75 / 95	2.00 / .91	3.75 / 1.70
2" (63)*	8.00 / 203	1.94 / 49	4.75 / 121	2.25 / 57	11.25 / 286	8.56 / 217	4.50 / 114	3.75 / 1.70	5.75 / 2.61
2-1/2"	10.68 / 271	2.88 / 73	6.56 / 167	3.25 / 83	14.38 / 365	11.25 / 286	2.50 / 64	10.00 / 4.54	14.00 / 6.35
3" (90)*	10.56 / 268	2.88 / 73	6.56 / 167	3.25 / 83	14.38 / 365	11.25 / 286	2.50 / 64	10.00 / 4.54	14.00 / 6.35
4" (110)*	12.94 / 329	4.00 / 102	8.56 / 217	4.25 / 108	17.00 / 432	14.63 / 372	4.25 / 108	17.00 / 7.72	25.00 / 11.35
6"	N/A	4.00 / 102	N/A	4.25 / 108	19.19 / 487	N/A	N/A	N/A	30.20 / 13.71

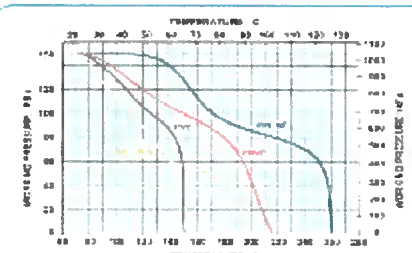
* Metric End Connections Available in: BSF – Straight Thread, BSP TR – Tapered Thread and Metric Socket

Selection Chart

Size	Material	End. Conn.	Seals	Pressure Rating
1/4" - 3/8" *	PVC	Socket or Threaded	EPM	150 PSI @70F Non-Shock
1/2" - 4"	PVC or CPVC	Socket, Threaded, or Flanged	FPM or EPDM	
1/2" - 2"	NAT PP**	Threaded	FPM	
6"***	PVC or CPVC	Flanged		

* Ball Check Design
** All Valve Versions to 6"
*** 2" Rated at 100 PSI

Operating Temperature/Pressure



Cv Factors

Pressure Loss Calculation Formula

$$\Delta P = \left[\frac{Q}{Cv}\right]^2$$

ΔP = Pressure Drop
Q = Flow in GPM
Cv = Flow Coefficient

Size	Factor	Size	Factor
1/4"	1.0	1-1/2"	45
3/8"	3.0	2"	130
1/2"	4.8	2 1/2"	170
3/4"	7.7	3"	250
1"	11	4"	400
1-1/4"	25	6"	340

HAYWARD
Flow Control

Hayward Industrial Products, Inc.
One Hayward Industrial Drive, Clemmons, NC 27012
Tel: 1-888-429-4635 (1-888-HAYINDL) • Fax: 1-888-778-6410
E-mail: hflow@haywardnet.com
Web Site: http://www.haywardindustrial.com

MSC-TU30 Rev E Printed in U.S.A.

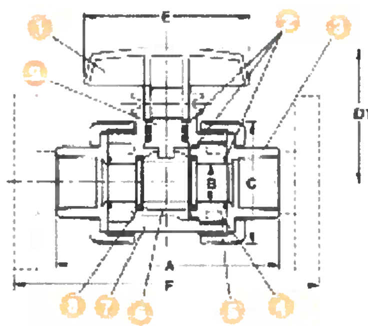
TB Series
True Union Ball Valves

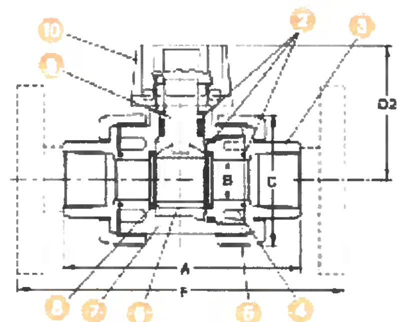
1/4" TO 2" PVC AND CPVC

TECHNICAL INFORMATION, *CONTINUED*

PARTS LIST

1. Handle
2. O-Ring Seals
3. End Connector
4. Seal Retainer
5. Union Nut
6. Ball
7. Body
8. PTFE Seat
9. Stem
10. Actuator Mounting Pad





DIMENSIONS – INCHES / MILLIMETERS

in / DN	in / mm	in / mm	in / mm	in / mm	in / mm	in / mm	in / mm	Lbs / kg	
1/4 / 8	4.77 / [illegible]	.50 / 13	2.25 / 57	2.81 / 71	2.63 / 67	3.50 / [illegible]	N/A	[illegible]	N/A
3/8 / [illegible]	4.77 / [illegible]	.50 / [illegible]	2.25 / [illegible]	2.81 / [illegible]	2.63 / 67	3.50 / 89	N/A	.75 / [illegible]	N/A
1/2 / 15	4.77 / [illegible]	.50 / 13	2.25 / [illegible]	2.81 / 71	2.63 / 67	3.50 / 89	6.75 / [illegible]	.75 / .34	1.00 / [illegible]
3/4 / 20	4.95 / [illegible]	[illegible]	2.63 / [illegible]	3.00 / [illegible]	2.81 / 71	3.50 / 89	7.13 / [illegible]	.75 / .34	1.00 / [illegible]
[illegible]	5.44 / [illegible]	.93 / 24	3.00 / [illegible]	3.26 / 83	3.06 / 77	[illegible]	[illegible]	[illegible]	[illegible]
1-1/4 / 32	6.03 / [illegible]	1.50 / [illegible]	4.00 / [illegible]	3.87 / [illegible]	3.46 / 88	[illegible]	[illegible]	[illegible]	3.50 / [illegible]
1-1/2 / [illegible]	6.85 / [illegible]	1.50 / [illegible]	4.00 / [illegible]	3.87 / [illegible]	3.46 / [illegible]	[illegible]	[illegible]	[illegible]	3.75 / [illegible]
2 / [illegible]	8.00 / [illegible]	1.94 / [illegible]	4.75 / [illegible]	4.41 / [illegible]	4.50 / [illegible]	5.50 / [illegible]	11.4 / [illegible]	3.90 / [illegible]	6.90 / [illegible]

[illegible]

[illegible]

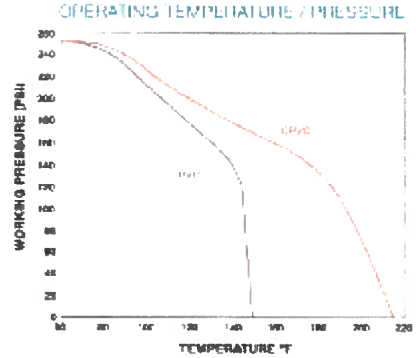
Cv VALUES

in / DN		in / DN	
1/4 / 8	1.0	1 / 25	29.0
3/8 / 10	2.8	1-1/4 / 32	75.0
1/2 / 15	8.0	1-1/2 / 40	90.0
3/4 / 20	15.0	2 / 50	150.0

$$\Delta P = \left[\frac{Q}{C_v}\right]^2$$

ΔP = Pressure Drop
Q = Flow in GPM
C_v = Flow Coefficient

OPERATING TEMPERATURE / PRESSURE



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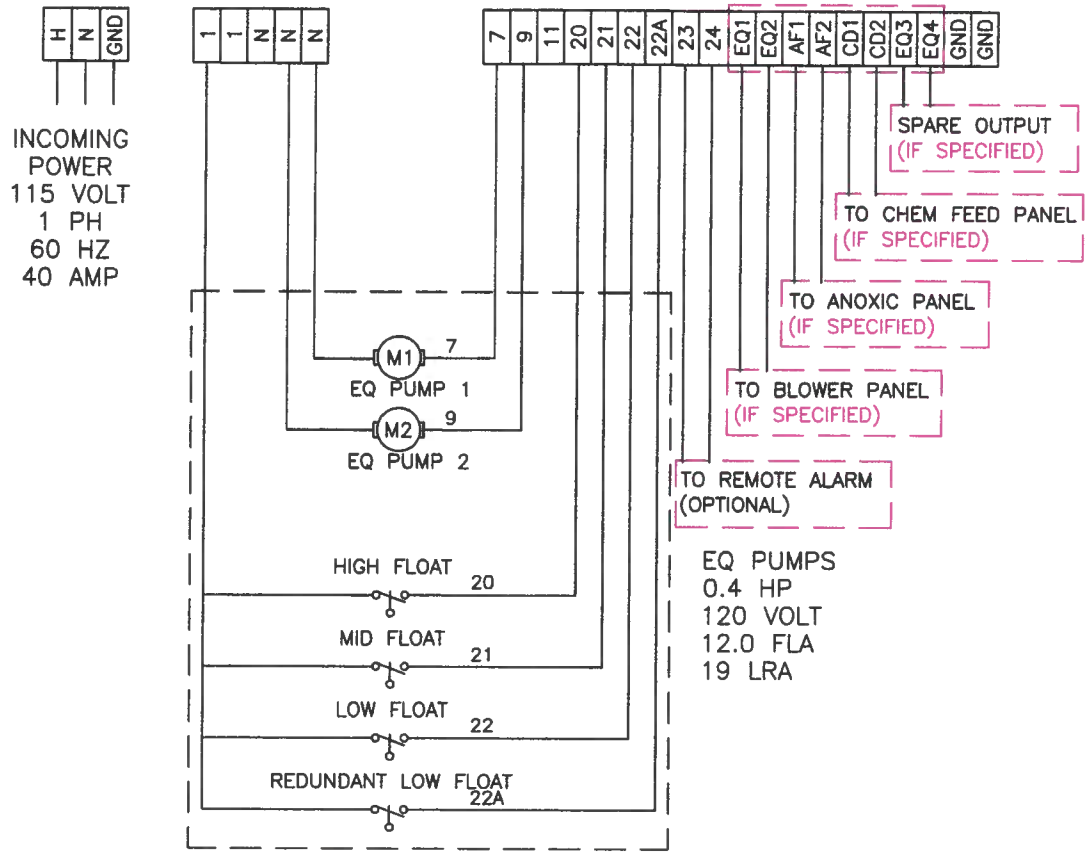

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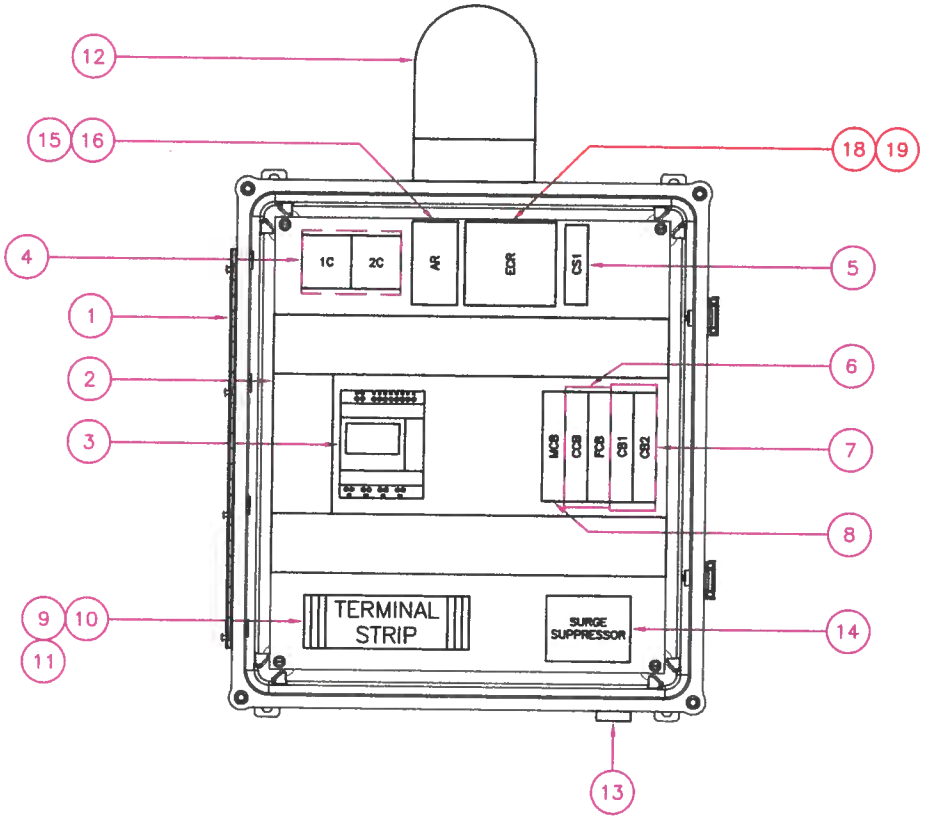
EQ PLR W/ BLOWER & CHEM SIGNAL

C

AWT3360

NOTE:



IF SPECIFIED

ITEM NO.	QTY	MANUFACTURE	DESCRIPTION	PART NO.
19	1	IDEC	4 POLE RELAY	RH4BUAC120
18	1	IDEC	4 POLE RELAY SOCKET	SH4B-05
17	1	IDEC	120V GREEN LIGHT	APW199G120
16	1	IDEC	2 POLE RELAY	RH2BUAC120
15	1	IDEC	2 POLE RELAY SOCKET	SH2B-05
14	1	SQUARE D	SURGE SUPPRESSOR	AS9003
13	1	FLOYD BELL	HORN	XC-09-201S
12	1	N. AMERICAN SIGNAL	ALARM BEACON	MIP-ACR120V RED
11	3	ENTRELEC	GROUND TERMINALS	16511316
10	22	ENTRELEC	TERMINALS	11511607
9	2	ENTRELEC	TERMINALS(H, N)	11511811
8	1	ABB	40 AMP CIRCUIT BREAKER	S201K40A
7	2	ABB	15 AMP CIRCUIT BREAKER	S201K15A
6	2	ABB	3 AMP CIRCUIT BREAKER	S201K3A
5	1	DIVERSIFIED	CURRENT SENSORS	CMG0100-20
4	2	AEG	CONTACTORS	LS07.10A0
3	1	CROUZET	PLR CD12	88974043
2	1	ALLIED	14 X 12 BACKPANEL	P164
1	1	ALLIED	14 X 12 ENCLOSURE	AM1648RL

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SIZE B | REVISION C | DRAWING NO. AWT3360

SCALE 1=1 | AWT 3360_B_revC | SHEET # 2 OF 8

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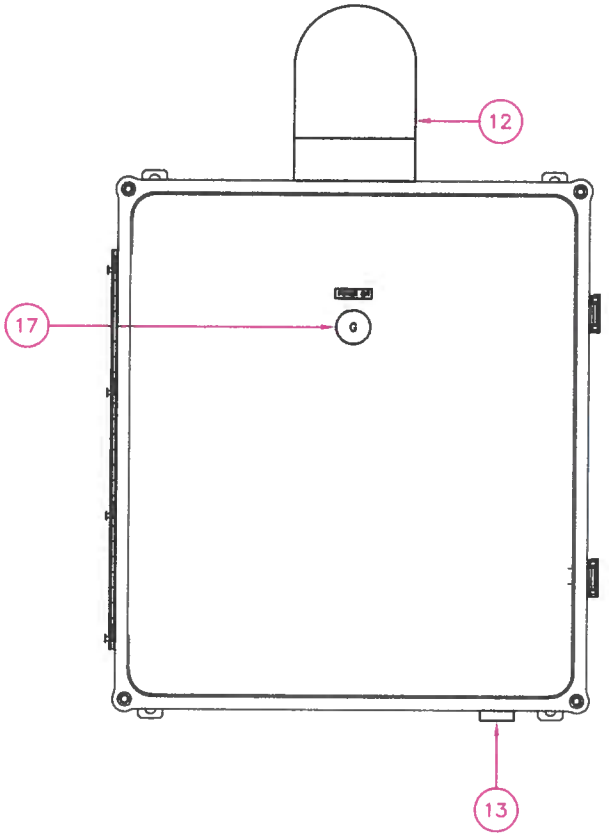

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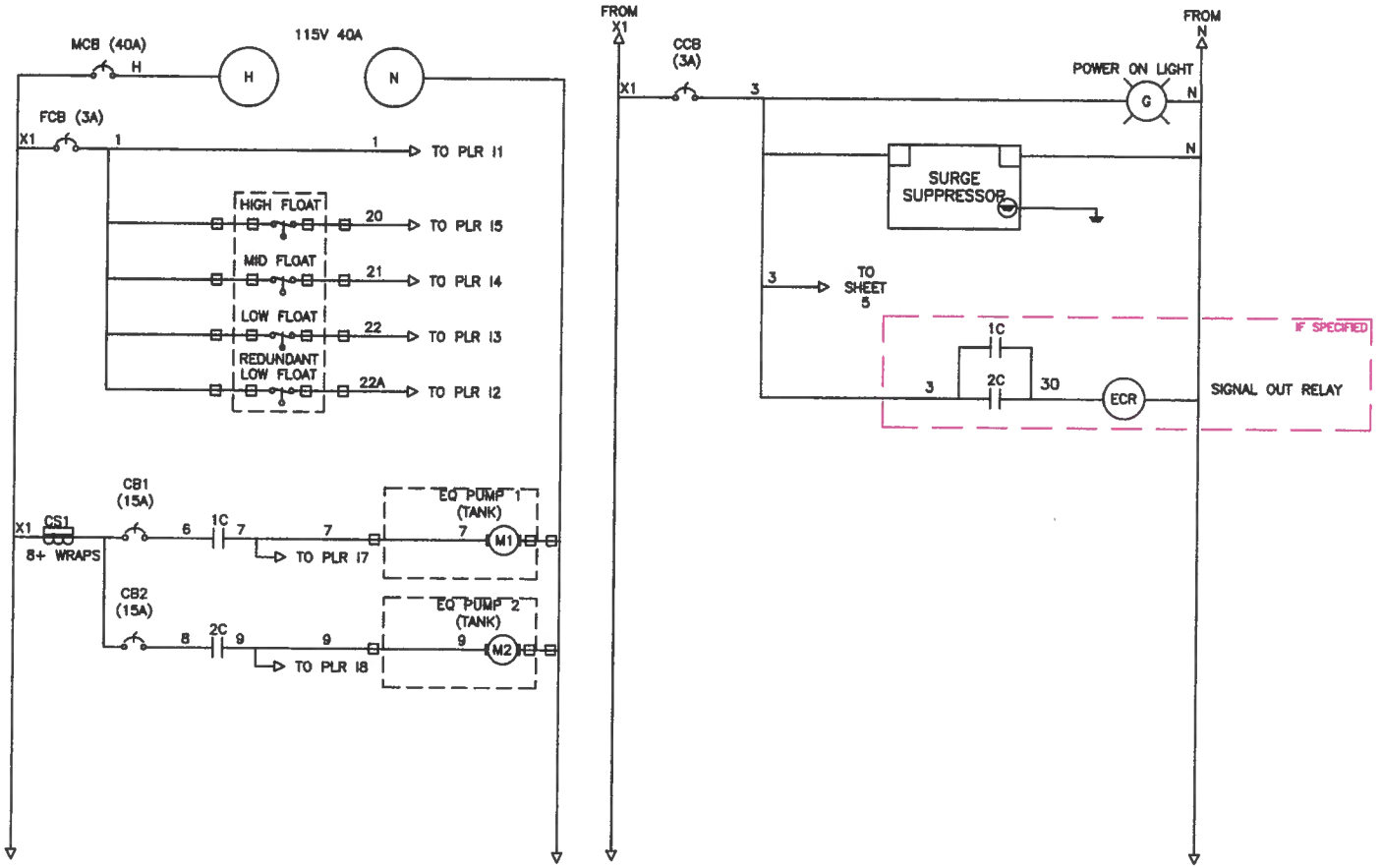
EQ PLR W/ BLOWER & CHEM SIGNAL

C | AWT3360

SHEET A 3 OF 8

NOTES:



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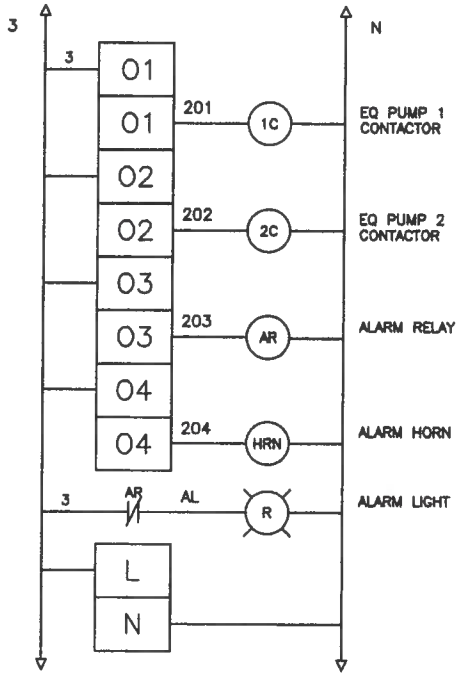
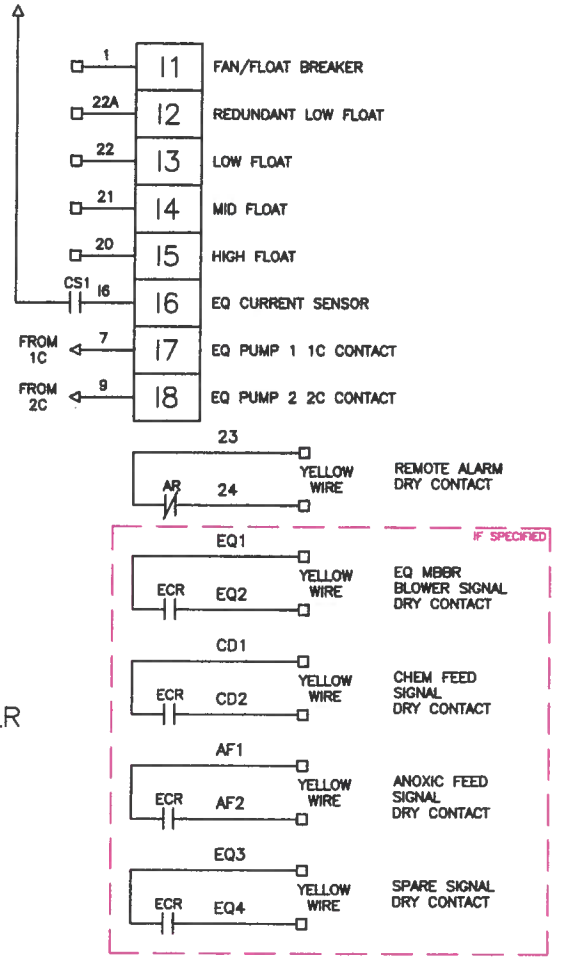
SIZE B | REVISION C | DRAWING NO.: AWT3360

SCALE: NONE | AWT 3360_A_revC | SHEET 4 OF 8

NOTES:



CROUZET CD12 SMART PLR
BASE UNIT 88974043



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EQ PLR W/ BLOWER & CHEM SIGNAL

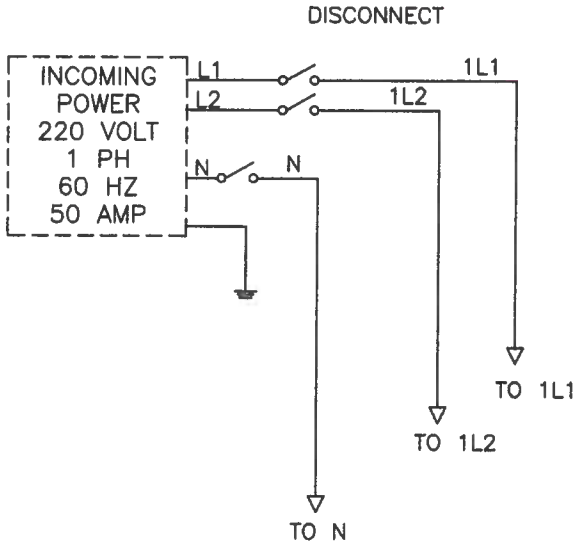
C

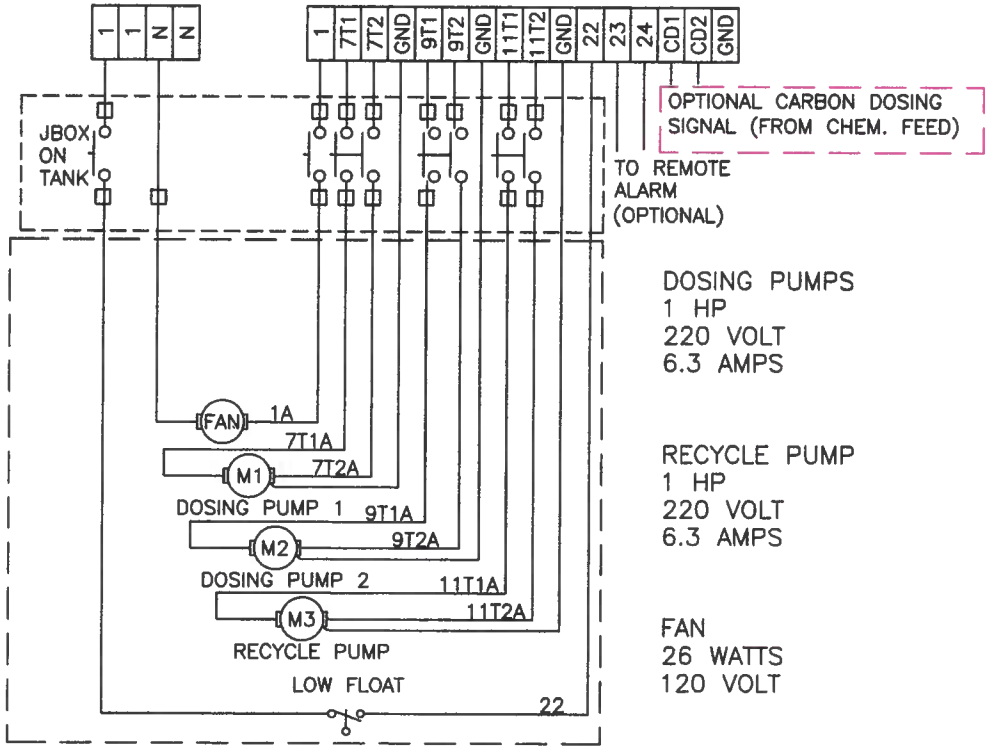
AWT3360

NOTES:

WIRE EACH SIDE, PREFIX WIRE NUMBERS WITH SIDE (A OR B)

(EXCEPT FOR THE DISCONNECT – ONE FEED FOR EACH SIDE (A AND B))





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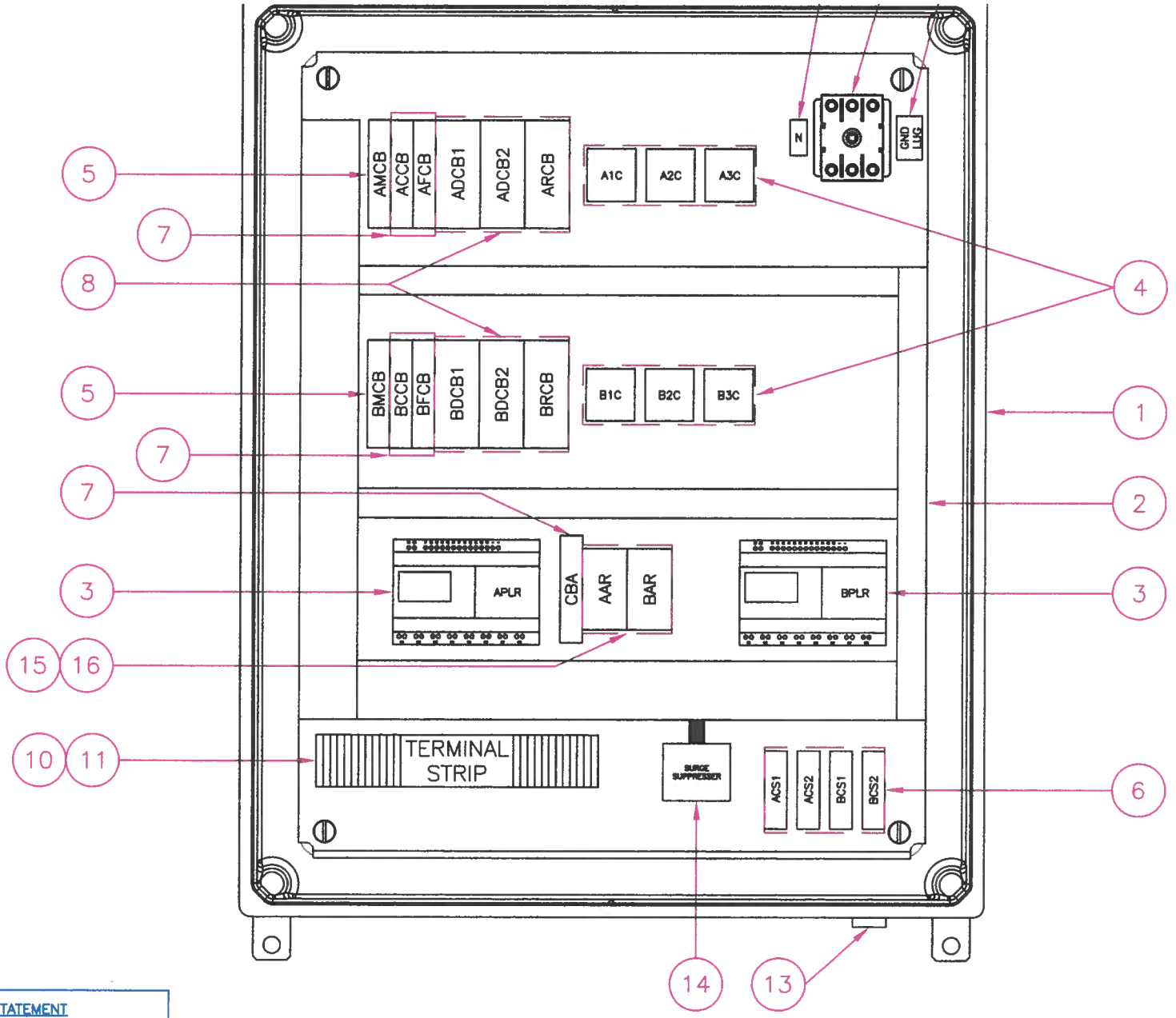
DOUBLE DOUBLE 36 PLR 220V

AWT3369



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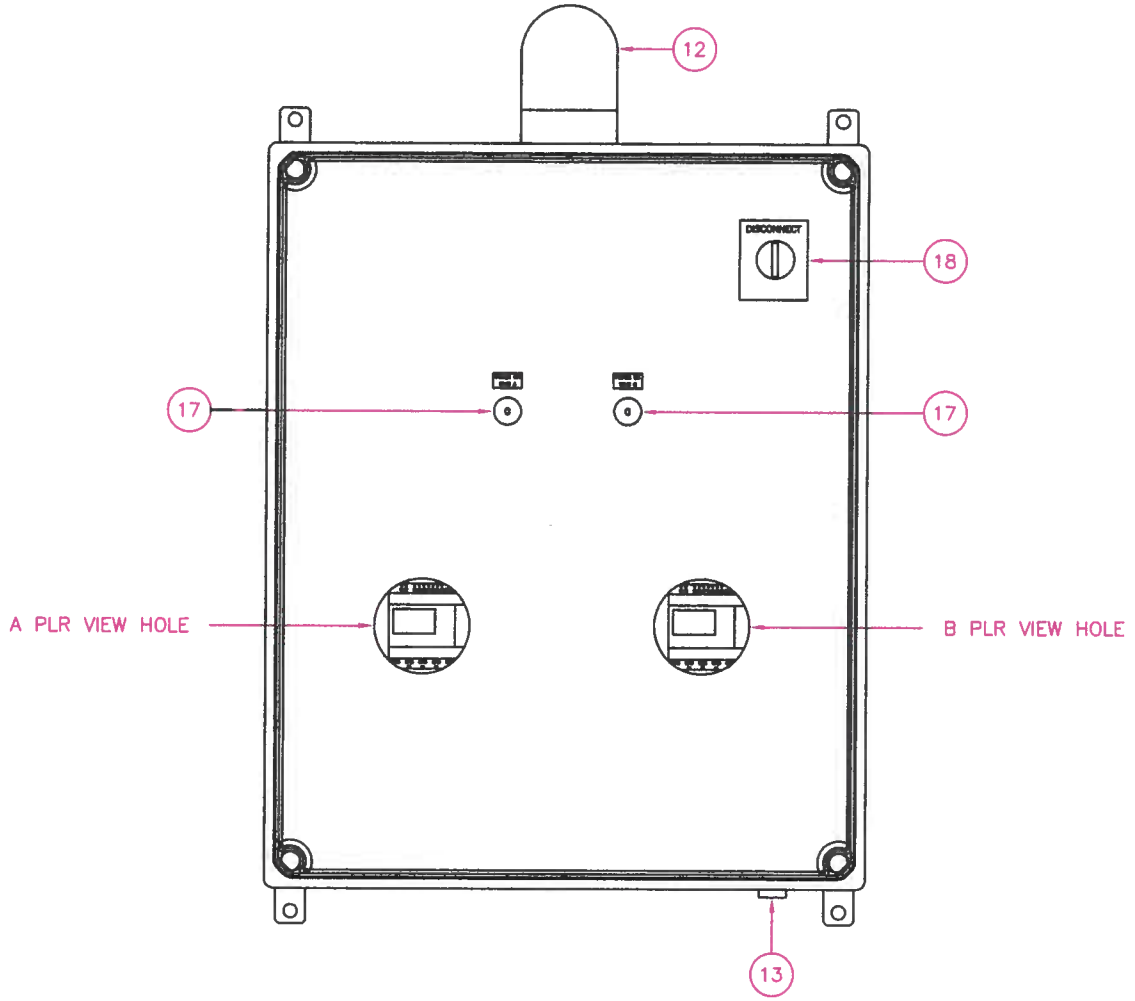

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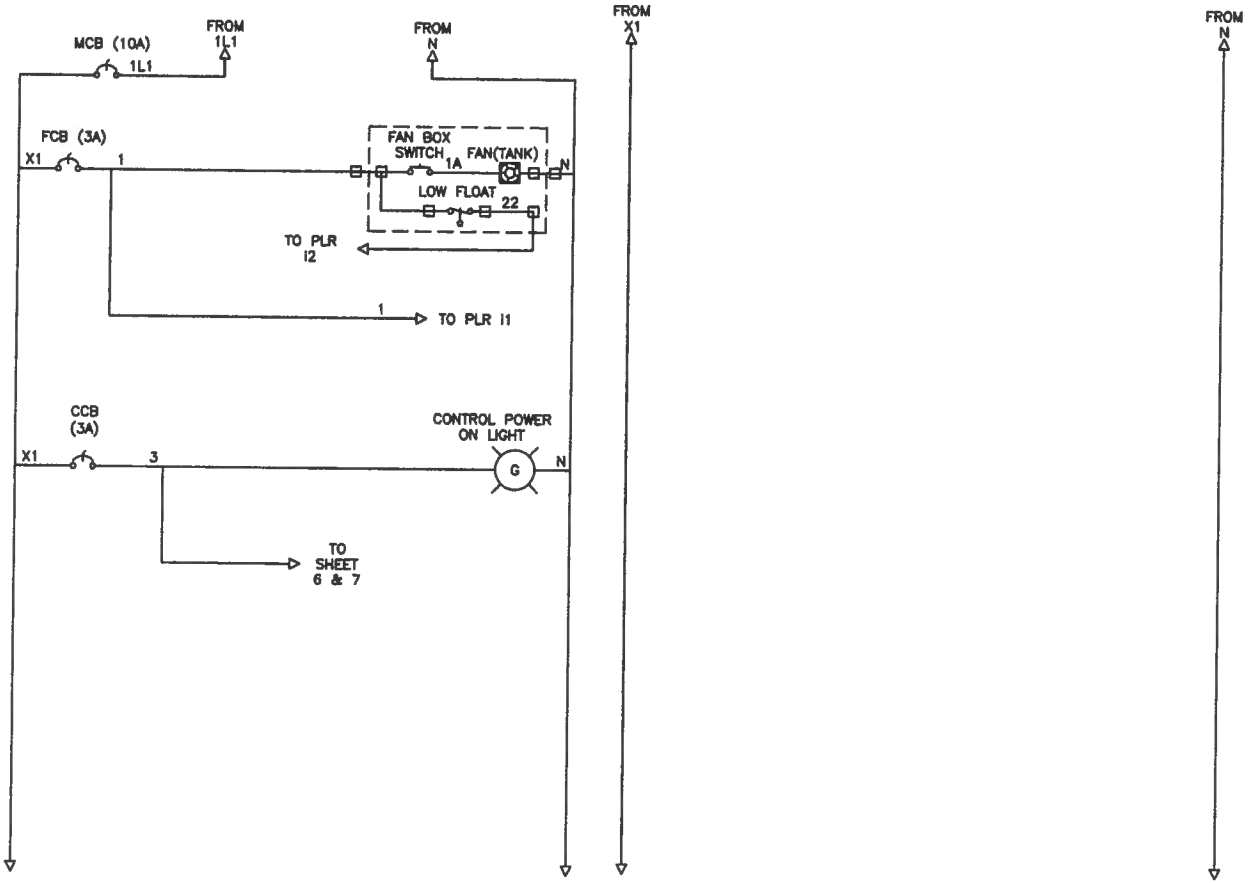
DOUBLE DOUBLE 36 PLR 220V

REVISION A DRAWING NO. AWT3369

SCALE 1=4 AWT 3369_3_revA SHEET # 3 OF 7

NOTES:

WIRE EACH SIDE, PREFIX WIRE NUMBERS WITH SIDE (A OR B)



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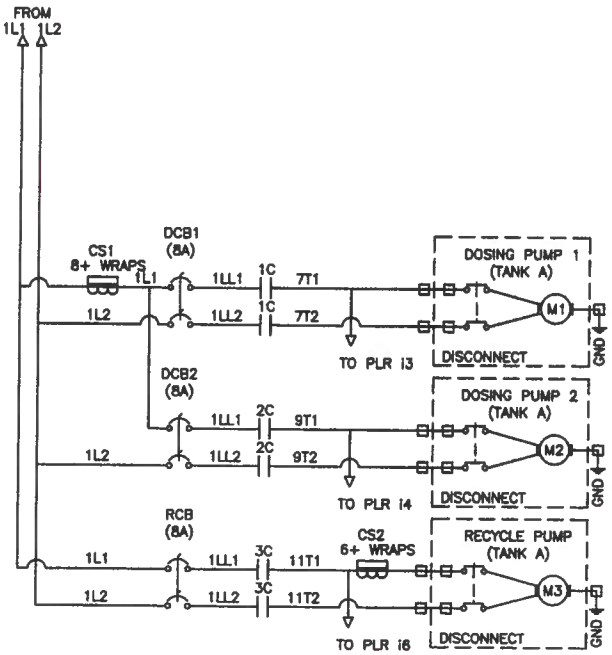
TITLE: DOUBLE DOUBLE 36 PLR 220V

SIZE: B | REVISION: A | DRAWING NO.: AWT3369

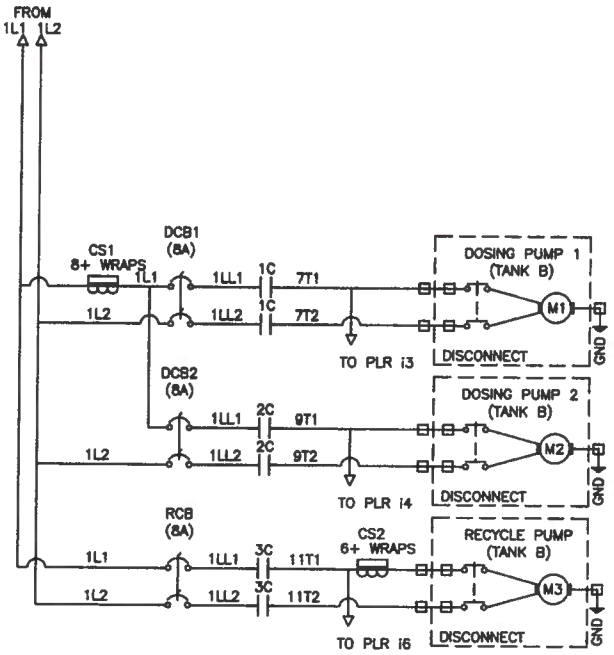
SCALE: NONE | DWG: AWT 3369_6_.dwg | SHEET 6 OF 7

NOTES:

SIDE, A PREFIX WIRE NUMBERS WITH A
(EXCEPT 1L1, 1L2 & GND)



SIDE, B PREFIX WIRE NUMBERS WITH B
(EXCEPT 1L1, 1L2 & GND)



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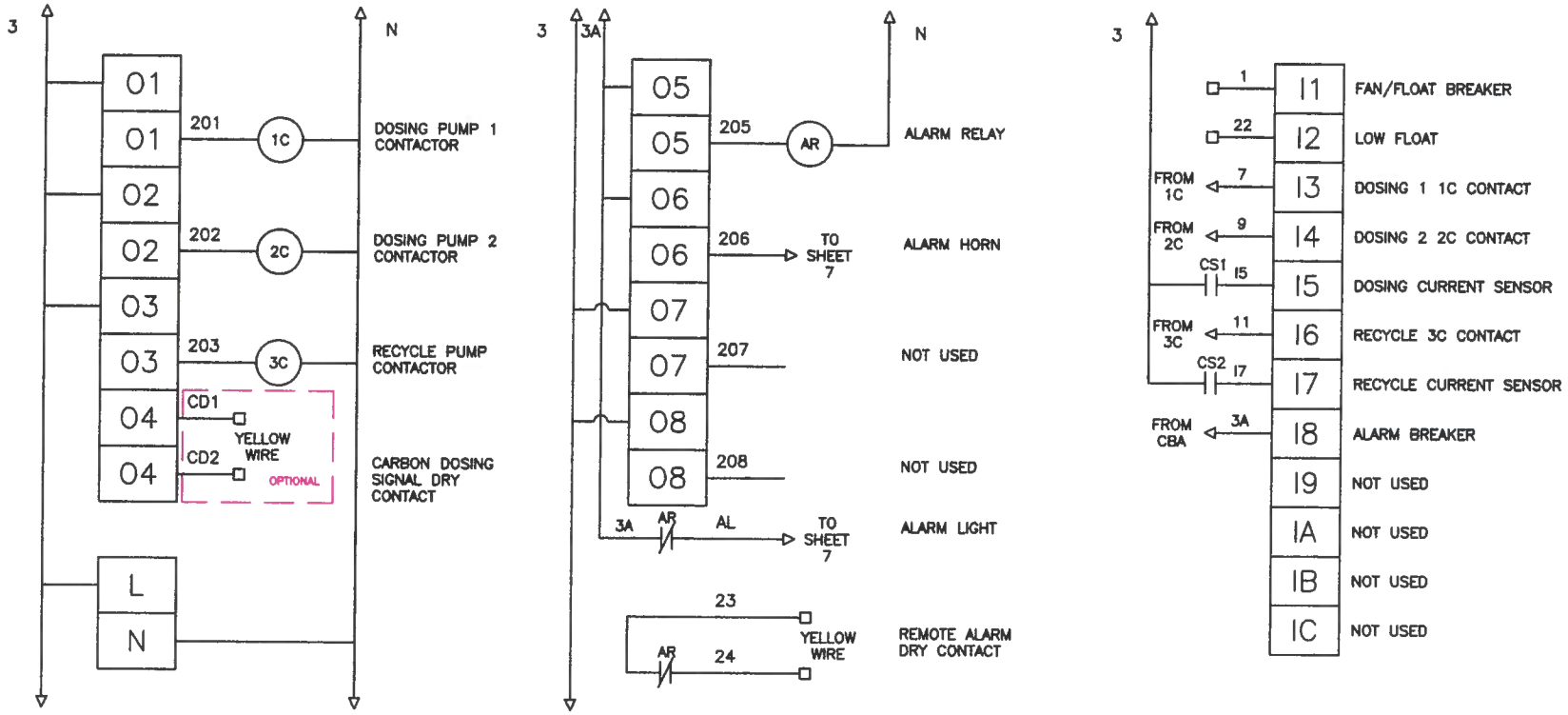
DOUBLE DOUBLE 36 PLR 220V

SIZE B | REVISION A | DRAWING NO. AWT3369

SCALE: NONE | AWT 3369_B_revA | SHEET 6 OF 7

NOTES:

WIRE EACH SIDE, PREFIX WIRE NUMBERS WITH SIDE (A OR B)



CROUZET CD20 SMART PLR
BASE UNIT 88974053

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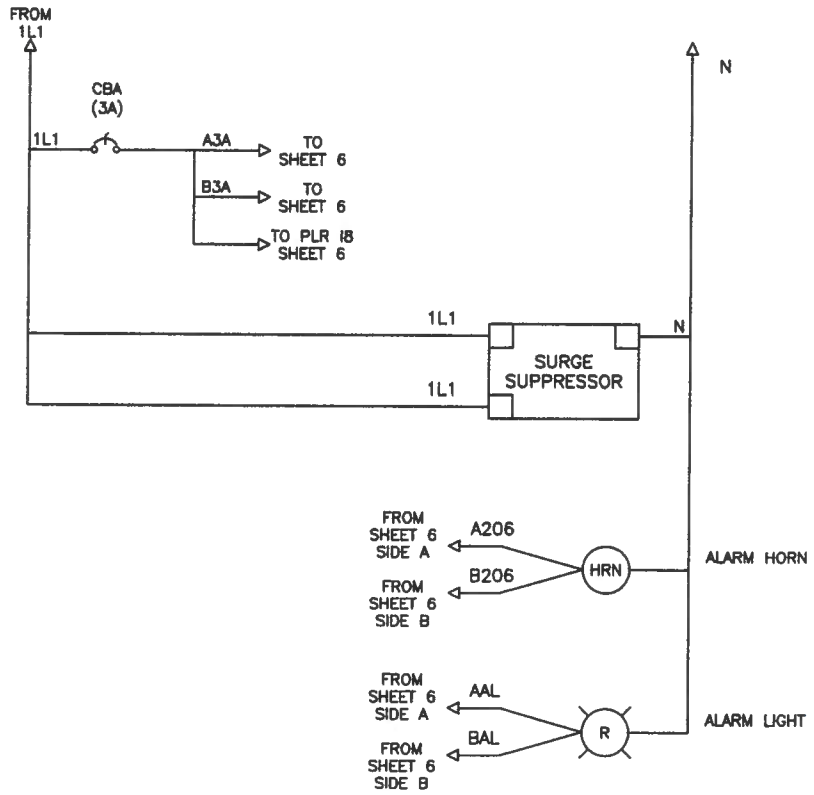
DOUBLE DOUBLE 36 PLR 220V

B | A | AWT3369

NOTES:

COMMON DEVICES WIRING SIDE A AND B



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DOUBLE DOUBLE 36 PLR 220V

B | A | AWT3369

MISSION COMMUNICATIONS

MODEL M-800 Series

Real Time Monitoring And Control System

This type of low cost, turnkey SCADA system has never been available before. The complete system includes the M-800 field RTU, all wireless connections, report and graph software, all alarms, and two websites.

NEMA 4X Enclosure Option Shown

One M-800 Is a Complete SCADA System

Each M-800 includes a field RTU, wireless communications through cellular data, MISSION based computers and software, amazing alarm notifications, and two customer websites. The whole system is up and running in a few hours. Customer has no computers or networks to maintain!

M-800 RTU Comes With Everything You Need

Each RTU has 8 digital inputs (plus 4 built-in), 2 analog, 2 pulse counter (optional), and 1 key reader inputs; 3 remotely controllable relay outputs. Optionally expand to 6 analog or 16 digital inputs. It also includes a radio, enclosure, antenna, antenna cable, power supply, and backup battery.

Continuous, Real-Time Wireless Connectivity

The M-800 series connects continuously through AT&T, Nextel, Sprint, or Verizon. There is no polling. Analog and digital input changes are updated as they occur. Watch in real time as pumps turn on/off and levels change. Turn relays on/off manually or automatically.

Centralized Web-Based Software and/or Direct Into Yours

MISSION's web-based software is very simple; we set it up for you and upgrades are included and automatic. Send your data directly into your existing HMI software like Wonderware® or Intellution®.

Full Suite of Cost Saving Software Features

It tracks hourly pump run times and starts, analyzes them, and calls you before there's a serious problem. Continuous volumetric flow calculations and false alarm suppression features save money too.

Flexible Alarm Notifications, Tracked to Alarm Site

Alarms can be delivered via all pagers, e-mail, faxes, voice phone calls, or OPC. Electronic RTU service keys log personnel site arrival and maintenance times. No more manual logs.

Website Provides Remote Data Access and Control

MISSION provides each customer with a secure website to view current status, run reports, or make updates. It even runs on WAP cell phones.

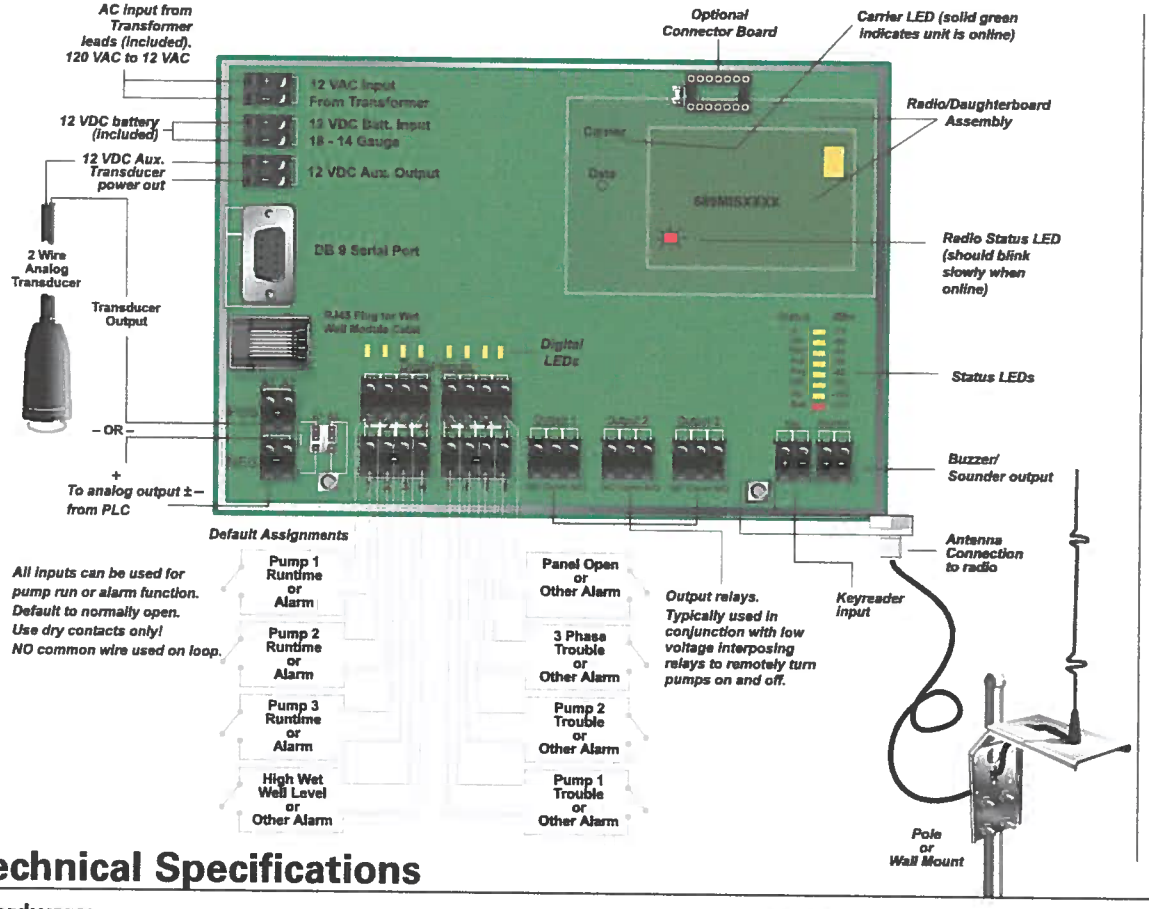
- **One M-800 Is a Complete SCADA System**
- **M-800 RTU Comes With Everything You Need**
- **Continuous, Real-Time Wireless Connectivity**
- **Centralized Web Software and/or Direct Into Yours**
- **Full Suite of Cost Saving Software Features**
- **Flexible Alarm Notifications, Tracked to Alarm Site**
- **Website Provides Remote Data Access and Reports**

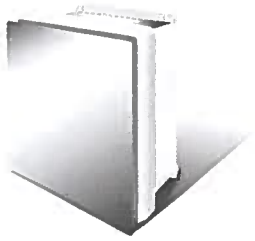
MISSION COMMUNICATIONS

MODEL M-800 Series

Details

MISSION uses AT&T/Nextel/Sprint/Verizon and centralized computer services to offer a revolutionary, real-time monitoring and control SCADA system. It can also economically replace or complement existing radio or phone line based SCADA systems.





Outdoor NEMA 4X enclosure:
Top and front sun shield
13.75"h x 13.25"w x 6.25"d
(with sun shield)

NEMA1 enclosure:
11.25"h x 11.375"w x 3.5"d
Use indoors, wall mounting

Flatpak NEMA1 enclosure:
7.75"h x 10.5"w x 1.5"d
Use inside MCC cabinet

Technical Specifications

Hardware:

- 8 supervised digital inputs; 8 changeable to runtime/starts accumulators. 4 additional built-in alarms (AC, low battery, and communications fail, input wiring fault). Optionally expand to 16 digital inputs.
- 2 analog inputs: 0-5 VDC, 4-20mA, 10-bit resolution, 4 alarm set points per input. Option board expands analogs to 6.
- 2 pulse counter inputs (optional): rainfall or flowmeter or reading.
- 1 electronic key reader for site activity tracking.
- 3 remotely controllable, form C dry contact relay outputs (1 amp @ 12 VDC), SPDT, N.O./N.C.
- Supervised 1.2 amp power supply with 5AH battery backup included.
- 8 vertical LEDs have two display modes: diagnostic or signal strength.
- 8 digital input LEDs display alarm status and wiring faults.
- Includes Antenna Kit with mounting bracket and 11' of cable. Omnidirectional outdoor antenna can be wall or pole mounted.

Radio:

- Units automatically self enroll, no startup delays. Radios make live, continuous, encrypted socket connections with all data and alarms being "end-to-end" acknowledged. MISSION does not use SMS. "text" messaging for any communications with the M-110 or M-800.
- AT&T, Nextel, Sprint or Verizon radios, all with 128 bit encryption, and all using the data transmission protocol.
- 0.6 to 2 watt maximum transmit power and -112dBm sensitivity.

Physical:

- M-800 NEMA1 enclosure: 11.25"h x 11.375"w x 3.5"
- M-802 NEMA 4X enclosure, with sun shield: 13.75"h x 13.25"w x 6.25"d
- M-803 NEMA1 "FlatPak": 7.75"h x 10.5"w x 1.5"d
- Operating temperature –20F° to +160F°

MISSION Control:

- All MISSION facilities secured and redundant.
- Data center links real-time with existing SCADA HMI software (Wonderware, Intellution, etc.) that is OPC compliant.

MISSION Website:

- Two websites: full size screens and one for cell phones/PDAs.
- Read only, read/write and control level access by password.

MISSION Web Software:

- Very simple; no programming; upgrades included.
- View key data from all units on one overview map screen.
- Full graph and report options for your data which is held forever.

MISSION Notification:

- Full logs and delivery results of every attempt to call out an alarm; all voice alarms recorded. Know who got what alarm and when.
- Powerful alarm notification scheduler changes call list by time, date or alarm type; simple to adjust through the web or by MISSION.

MISSION COMMUNICATIONS

3060-C Business Park Dr. • Norcross, GA 30071 • Toll Free: (877) 993-1911 • Email: sales@123mc.com

www.123mc.com

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Specifications subject to change without notice.

Literature Code: M800-0609

KPSI 705

- Non-fouling submersible level transducer
- Non-Clogging PTFE coated elastomeric diaphragm
- ±0.25% FS static accuracy
- Two year warranty

Features

- Custom polyurethane or ETFE cable lengths
- Welded 316SS or titanium body
- Custom level ranges up to 115 ft. (35 m) H_2O
- PTFE coasted elastomeric diaphragm
- Optional lifetime lightning protection
- Available molded cable seal

Applications

- Lift stations
- Wastewater
- Slurry Tanks
- Pump control

The KPSI 705 is a submersible hydrostatic level transducer specifically designed to meet the adverse environments encountered in wastewater applications. This suitably-sized transducer features a wide sensing area comprised of a PTFE coated elastomeric diaphragm for reliable operation in highly viscous or slurry environments.

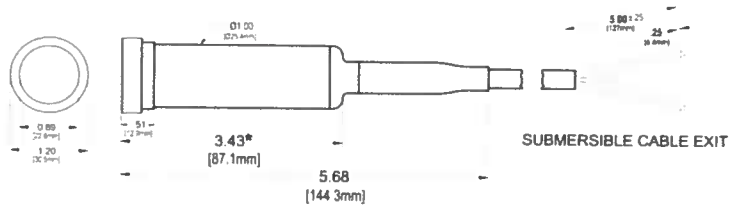
All KPSI Transducers utilize a highly accurate pressure sensor assembly. The assembly is integrated with supporting electronics in a durable waterproof housing constructed of 316 stainless steel or titanium. The attached polyurethane or ETFE electrical cable are custom manufactured to specifications and includes para-aramid synthetic fiber members to prevent errors due to cable elongation, and a unique water block feature that self-seals in the event of accidental cuts to the cable. Each vented reference transducer is shipped with our latest SuperDry Vent Filter that prevents moisture from entering the vent tube for at least one year without maintenance, even in the most humid environment.

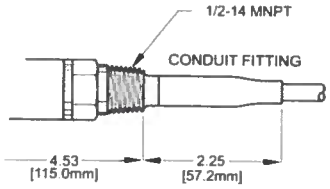
Specifications

PARAMETER		COMMENT
LEVEL RANGES		
Full Scale Level Ranges (intermediate level ranges are available)	6 thru 115 ft. H_2O (2 thru 35 m H_2O) 10 thru 115 ft. H_2O (3 thru 35 m H_2O)	Vented Gage Reference Sealed Gage Reference
Proof Pressure	1.5 x FS	
Burst Pressure	2.0 x FS	
STATIC PERFORMANCE		
Static Accuracy (Combined effects of non-linearity, hysteresis and repeatability, best fit straight line method)	±0.25% FSO	BFSL method
Resolution	+0.0001% FS	

ENVIRONMENTAL		
Wetted Materials	316 SS or Titanium; FKM; PTFE; Polyurethane or ETFE	
Compensated Temp Range	0 to 50ºC	
Thermal Error (maximum allowable deviation from the Best Fit Straight Line due to a change in temperature)	±0.10% FSO/ºC	Worse case for level ranges > 23' (7 m) H_2O prorated for level ranges <=23' (7 m) H_2O
Operating Temp Range	-20 to 60 ºC	When attached to polyurethane cable
Protection Rating	IP 68, NEMA 6P	
ELECTRICAL		
Excitation	9-28 V – VDC output 9-28 V – mA output 15-28 V – VDC output 10-28 V – VDC output	0-5 V, 0-2.5 V, 0-4 V 4-20 0-10 V 1.5-7.5 V
Input Current	20 mA max. 3.5 mA max.	For mA output For VDC output
Output	4-20 mA, 0-5 VDC, 0-2.5 VDC, 0-4 VDC, 0-10 VDC, 1.5-7.5 VDC	
Zero Offset	Rezero after installation for optimum accuracy. Span is not affected (See application note on website)	
Output Impedance	See loop diagram for mA output 20 ohm for VDC output	
Insulation Resistance	100 mega ohm at 50 VDC	
Circuit Protection	Polarity, surge/shorted output	
CERTIFICATIONS		
	CE compliant	EN 61326-1:2013 and 61326-2-3:2013
	UL, CUL and FM	Class I, II, III, Div. 1, Groups A,B,C,D,E,F&G
	WEEE/RoHS	Waste from Electrical and Electronic Equipment (WEEE) and Restrictions on the use of Hazardous Substances (RoHS)
PHYSICAL		
Approximate Weight	0.5 lbs. (227 g) transducer 0.05 lbs./ft. (79 g/m) cable	
Cable Jacket Material	Polyurethane (Standard) ETFE (Optional)	
Cable Pull Strength	200 lbs. (90 kg)	
Cable Number of Conductors	4	
Cable Conductor Size	22 AWG	
Cable Seal	Molded Polyurethane FKM Gland	For polyurethane cable For ETFE cable
TEMPERATURE OUTPUT OPTION (Not intrinsically safety approved)		
Temperature Range	-20 to 60ºC	Available for 4-20 mA output versions only
Output Signal	4-20 mA	
Temperature Measurement Accuracy	±4ºC	± 1ºC with single point calibration
LIGHTNING PROTECTION (Power supply needs to be limited to 150mA to avoid lock up of the gas tube after a suppression event)		
Life Expectancy	>1,000 operations	
Peak Clamping Voltage	36 volts	
Response Time	<10 nsecs	
Shunts	20,000 amperes	

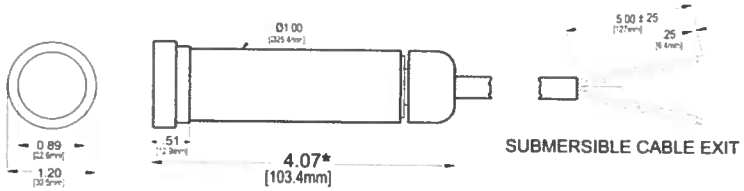
Dimensions





*ADD 1.95" FOR LIGHTNING PROTECTION OPTION

Molded Cable Seal Configuration for Polyurethane Cable

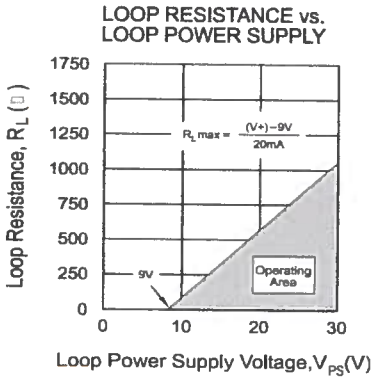


*ADD 1.95" FOR LIGHTNING PROTECTION OPTION

Gland Cable Seal Configuration for ETFE Cable

Electrical Termination / Loop Resistance

ELECTRICAL TERMINATION		
22AWG CONDUCTORS IN A SHIELDED CABLE WITH VENT TUBE		
4-20 mA	RED	+ EXCITATION
	BLACK	- EXCITATION
0-5 VDC	RED	+ EXCITATION
	BLACK	- EXCITATION
	WHITE	+ SIGNAL
ALL	DRAIN WIRE	SHIELD



Ordering Information

MODEL	SUBMERSIBLE LEVEL TRANSDUCER
705	±0.25% FSO Static Accuracy
	MATERIAL
	S Stainless Steel
	T Titanium
	REFERENCE FORMAT
	1 Vented gage
	3 Sealed gage
	OUTPUT
	3 0-5 VDC
	F 0-2.5 V
	G 0-4 V
	H 0-10 V
	J 1.5-7.5V
	4 4-20mA
	6 4-20mA temperature measurement option
	PRESSURE CONNECTION
	C PTFE-coated elastomeric diaphragm
	ELECTRICAL CONNECTION
	0 Molded cable seal
	4 1/2" - 14 NPT male conduit fitting with molded cable seal
	A Gland cable seal
	B 1/2" - 14 NPT male conduit fitting with gland cable seal
	LIGHTNING PROTECTION
	A None
	B Full Lightning Protection
	LEVEL RANGE (at MAX output)[1]
	# # # . # # #
	LEVEL RANGE (at MIN output)[1]
	# # # . # # #
	MOISTURE PROTECTION
	A None (sealed only)
	B Vent Filter
	C Aneroid Bellows
	D Stainless Steel Vent Filter
	CABLE TYPE
	1 Polyurethane
	2 ETFE (Electrical Connection "A" or "B" Only)
	CABLE LENGTH
	# # # # (in feet)
	LABEL[2]
	A psi
	B Ft. H_2O
	C m H_2O
705	C

Notes:

1 The part number requires two level range limits, corresponding to the maximum and minimum analog outputs of the transducer, to be specified in **pounds per square inch (psi)** to three decimal places. The lower level range is typically 000.000 unless otherwise required. For reverse output requirements, enter the lower level range for the maximum output signal and the upper range for the minimum output. Use the following conversion factors: **Ft. H_2O / 2.3073 = psi // m H_2O / 0.703265 = psi**
Examples: 10 ft. H_2O / 2.3073 = 4.334 psi (Enter 004.334 in the part number), 10 m H_2O / 0.703265 = 14.219 psi (Enter 014.219 in the part number)
For sealed gage reference add local atmosphere when converting to psi. Contact PSI for assistance.
Example:10 ft. H_2O / 2.3073 +14.7 = 19.034 psi (Enter 019.034 in the part number)

2 Units of measure on standard MEAS label. Contact Measurement Specialties if private labeling is required.

NORTH AMERICA

Measurement Specialties, Inc.,
a TE Connectivity company
1000 Lucas Way
Hampton, VA 23666
Tel : 1-757-766-1500
Fax : 1-757-766-4297
Toll Free: 1-800-745-8008
Email: WL.Sales@te.com

EUROPE

Measurement Specialties (Europe), Ltd.,
a TE Connectivity company
26 Rue des Dames
78340 Les Clayes-sous-Bois, France
Tel : +33 (0) 130 79 33 00
Fax : +33 (0) 134 81 03 59
Email: customercare.lcsb@te.com

ASIA

Measurement Specialties (China), Ltd.,
a TE Connectivity company
No. 26 Langshan Road
Shenzhen High-Tech Park (North)
Nanshan District, Shenzhen 518057 China
Tel : +86 755 3330 5088
Fax : +86 755 3330 5099
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te.com/sensorsolutions

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MS1000

ELECTROMAGNETIC FLOWMETERS

Combines reliable full-pipe flow measurement with high accuracy, low-cost and ease of installation

FLOMOTION SYSTEMS

ELECTROMAGNETIC FLOWMETER

The MS1000 is available with Polypropylene, Ebonite or PTFE liner and local or remote mounted converter.

TYPICAL APPLICATIONS

- Water
- Polymers
- Wastewater
- Lime Slurries
- Dyes
- Process Chemicals
- Caustics
- Slurries
- Acids
- Starches

ML110 Converter

ML210 Converter with Graphics Display (wall mount version)

ML210 Converter with Graphics Display (panel mount version)

MS1000 FEATURES

- Accuracy to ±0.2% of rate from 1 to 33 ft/sec.
- Lower cost than flanged units.
- Twelve sizes from 1/2" to 16" Pipe Diameters.
- Flow ranges from 0.85 to 19,934 GPM.
- Standard pressure: 230 PSI.
- Volumetric flow rate measurement independent of fluid viscosity, density and temperature.
- No moving parts for zero maintenance.
- Bi-directional flow measurement.
- No pressure drop through sensor.
- Optional integral ground electrode eliminates grounding rings with plastic piping systems.
- Minimal straight pipe run required.
- Every sensor is factory wet-calibrated.

CONTROLLER FEATURES

	ML110	ML210
Mounting	Sensor or Wall	Sensor, Wall or Panel
Keypad	3 Internal Keys	3 Keys
LCD Display	2-Line Alphanumeric	Graphic Display
Backlight	N	Y
4-20mA Output	Y (opt)	Y
Pulse/Frequency/ Alarm Output	2 Assignable Open Collector	2 Assignable
Empty Pipe Detection	Y	Y
Interface	PC, Hand Terminal	RS485, PC, Hand Terminal
Batch Function	N	Y
Power Supply	90-265 VAC (Std.) 10-63VDC 15-45VAC	90-265 VAC 10-35VDC 18-63VDC/ 15-45VAC
Enclosure	Plastic NEMA 4x	Aluminum or Plastic (panel version). NEMA 6

ENGINEERING SPECIFICATIONS

MS1000 Flow Sensor

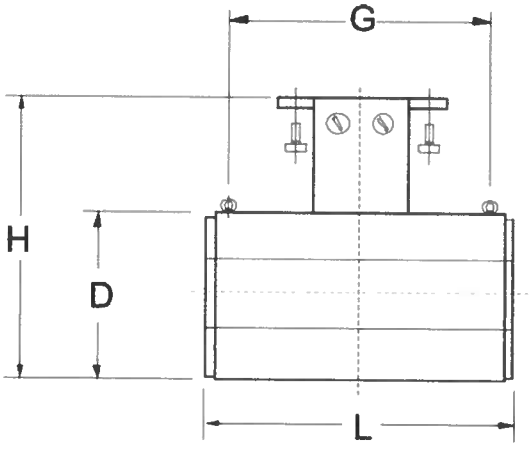
· Accuracy:
  ML210: ±0.2% of rate from 1 to 33 ft/sec.
  ML110: ±0.4% of rate from 1 to 33 ft/sec.
· Repeatability: ±0.1%
· Temperature (Process)
  +32 to 140°F (PP)
  +23 to 175°F (Ebonite)
  -4 to 212°F (PTFE Compact)
  -4 to 302°F (PTFE Remote)

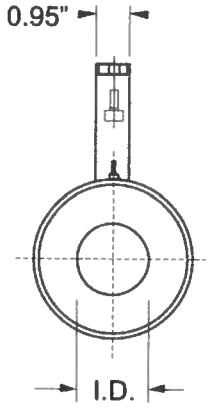
· Pressure: 230 PSI Std. (higher pressures upon request)
· Liner Material: PTFE, Ebonite or Polypropylene
· Flow Tube: Carbon Steel, Painted or 304/316 S.S. (optional)
· Electrode Material: 316 S.S.*
· Number of Electrodes: 2 (3rd grounding electrode optional)
· Environmental Rating: NEMA 6
· Fluid Conductivity: 5 µS/cm (min)
· Connections: Wafer tightening between ANSI 150 flanges
· Case Material: Carbon steel with two-part epoxy coating, S.S. Optional

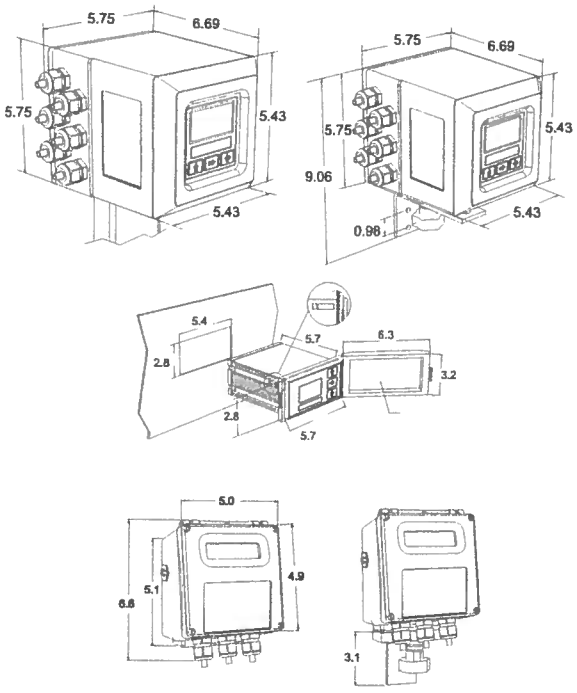
** Hastelloy C, Platinum-Rhodium or Tantalum electrodes optional (other upon request).*

DIMENSIONS

Size I.D. (in.)	1/2	1	1-1/2	2	3	4	6	8	10	12	14	16
Min flow rate (gpm @ 1 ft/sec)	0.85	2.37	6.08	9.49	24.30	37.97	85.44	151.9	237.3	341.8	465.2	607.6
Max flow rate (gpm @ 33 ft/sec)	28	77.9	199.3	311.5	797.4	1246	2803	4984	7787	11213	15262	19934
Weight (lbs.)	3.5	2.7	4.0	4.4	8.4	11.0	18.1	40.1	52.9	59.5	70.6	86.0
Length - L below (in.)	3.94	3.94	3.94	3.94	5.91	5.91	7.09	7.87	9.84	11.81	13.78	15.75
Height - H below (in.)	6.25	5.79	6.34	6.97	8.23	9.25	11.46	14.25	16.42	18.39	20.75	22.80
Outside Dia. - D below (in.)	2.48	2.21	2.76	3.39	4.65	5.67	7.87	10.67	12.84	14.80	17.17	19.21
Lift Ring Distance - G (in.)	-	-	-	-	-	-	-	5.67	7.64	9.61	11.58	13.54







MS1000 Sensor

FLOMOTION SYSTEMS Inc.
165 Creekside Drive, Suite 112
Buffalo NY 14228-2103
Tel: 800-909-FLOW (3569)
Tel: 716-691-3941
Fax: 716-691-1253
Email: info@flomotionsystems.com
www.flomotionsystems.com

FLOMOTION SYSTEMS

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MV110

ISOMAG FLOMOTION SYSTEMS

AC or DC OPERATED CONVERTER FOR ISOMAG ELECTROMAGNETIC FLOW METERS

Next generation solution for full-pipe flow measurement

ELECTROMAGNETIC FLOWMETER

The new MV110 converter is designed for applications in water, wastewater and other industrial markets where basic measurement requirements or output protocols are required.

- Accuracy: ± 0.4% of the reading
- Repeatability: ± 0.2%
- Programmable through keypad on front panel or via PC connected through mini USB cable adapter
- Flexible mounting so that display can be seen from the top or from the front
- Galvanic separation: all inputs and outputs are separated from each other and from the power supply
- Housing material: Nylon reinforced with 15% fiberglass, or Aluminum
- Protection rating: NEMA 6 (IP 67) IP68 on request

Standard features:

- Compatible with any Isomag® flow sensor
- Low flow rate cut-off
- Bidirectional measurement
- Peak cut-off
- Empty pipe detection
- Alarm limits
- Large back-lit LCD display with protective cover

Available accessories:

- Rechargeable backup battery (assures the measurement in case of power loss)
- 4 GB data logger
- Built-in Verificator (BIV) for verifying electrical characteristics of the sensor

Available communications

- Hart or Modbus protocol
- RS485 communications
- One or two 4-20mA outputs
- Two (2) pulse/frequency open collector outputs
- One (1) digital open collector input

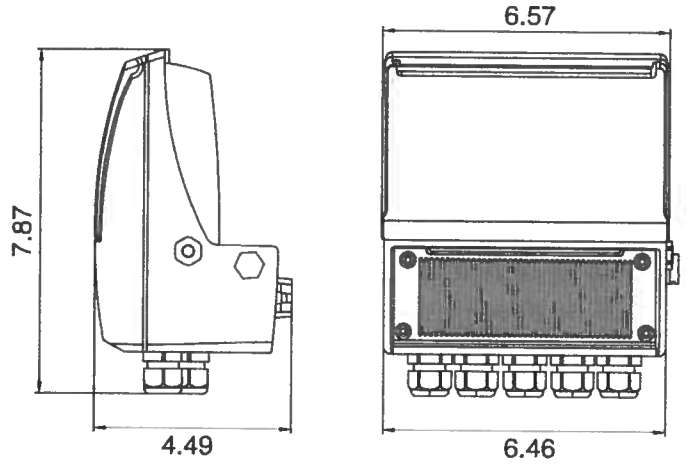
MV110 converter with graphics display and flip-up protective cover mounted on an MS2500 flow sensor with Rilsan liner.

FLOMOTION MV110 ENGINEERING SPECIFICATIONS

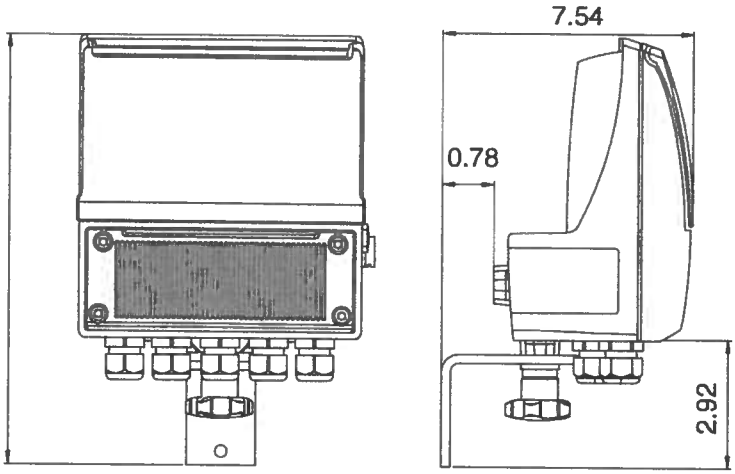
- Accuracy to ±0.4% of rate
- Repeatability: ± 0.2%
- Ambient Temperature
  - -4 to 140°F (Aluminum Housing)
  - -4 to 104°F (Nylon Housing)
- Humidity Range: 0-100%
- Environmental Rating:
  - NEMA 6 / IP67
- Fluid Conductivity: 5 μS (min, compact mount)
- 4-20mA output maximum load: 1000Ω, 24VDC.
- Inputs/outputs are galvanically isolated from power supply up to 250 V
- USB cable type A/USB MINI B required for PC programming
- Values stored in memory in case of power failure
- Graphic display 128x64 pixels w/back light
- 3 external programming keys
- Digital Outputs, 1250 Hz, 100mA, 30 Vdc (max)
- MicroSD Memory Card 4 - 32 GBytes
- Power consumption 1.5W (sensor only), 5W (all loads)
- Cable glands - PG11

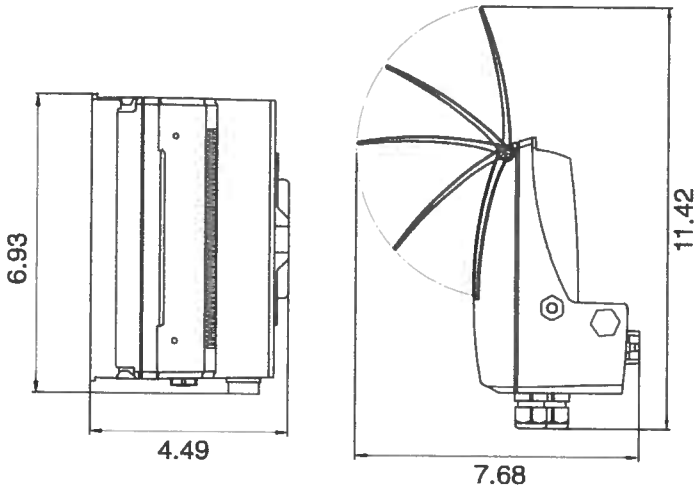
DIMENSIONS

Compact Version

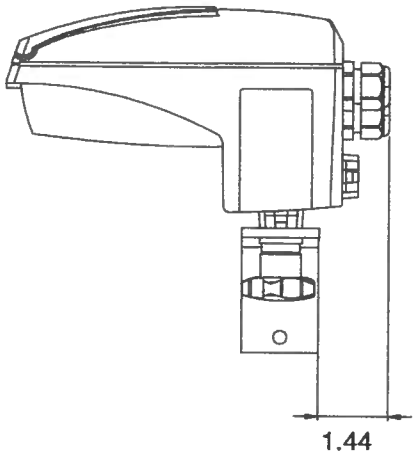


Vertical Separate Version





Horizontal Separate Version



DIMENSIONS IN INCHES

FLOMOTION SYSTEMS Inc.
165 Creekside Drive, Suite 112
Buffalo NY 14228
Tel: 716-691-3941
Fax: 716-691-1253
Email: info@FlomotionSystems.com
www.FlomotionSystems.com

FLOMOTION SYSTEMS

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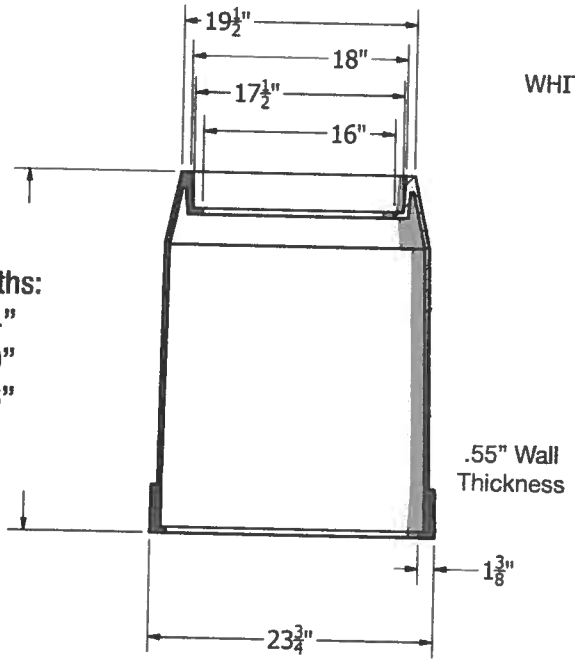
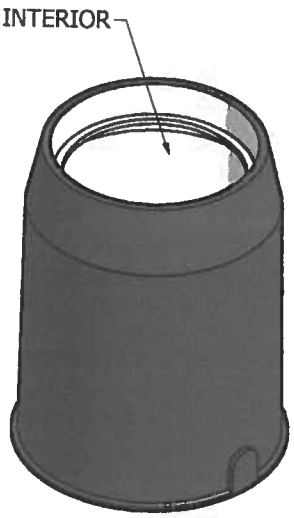
Heavywall

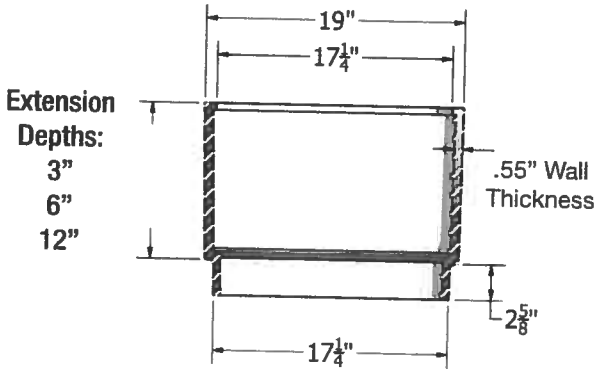
0018-Max





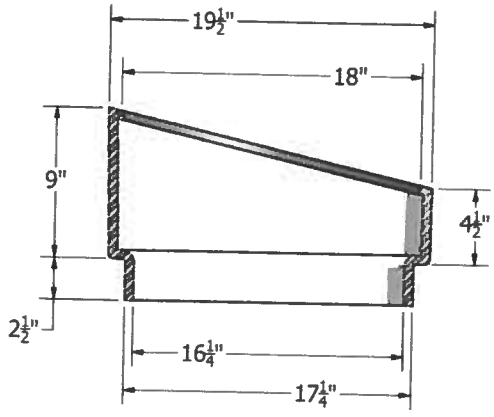
BODY:

Material:	Polyethylene Blend
Model:	18" Dia.
Weight:	24" Depth: 19 lbs 30" Depth: 21 lbs 36" Depth: 33 lbs
Mouseholes:	2



EXTENSION:

Material:	Polyethylene Blend
Weight:	3" Depth: 5 lbs 6" Depth: 7 lbs 12" Depth: 11 lbs 22° Off Grade: 7 lbs



Medium Duty:
Non-deliberate Traffic

For use in non-vehicular traffic situations only.

We do not recommend installation in concrete or asphalt.

Actual load rating is determined by the box and cover combination.
Weights and dimensions may vary slightly

*Cover comes standard with permanent markings for manufacturer, load rating, model size and manufacturing location.

Contact your Oldcastle Enclosure Solutions Distribution Center for specific information and additional options.

©2013 Oldcastle, Inc.

Heavywall

0018-Max

Options:

Available Plastic Covers:
MSIL1 Plastic Cover (for use with cast iron frame)

Available Cast Iron Covers:
Flush Cast Iron Cover with Cast Iron Frame (2 Piece)
T Cast Iron Cover with Cast Iron Frame (2 Piece)
Flat Frame Cast Iron Cover
Drop In (for use with cast iron frame)

MSIL1

Add On Options for Plastic Covers:
Touch Read Hole
ERT Holder

Add On Options for Cast Iron Covers:
Touch Read Hole

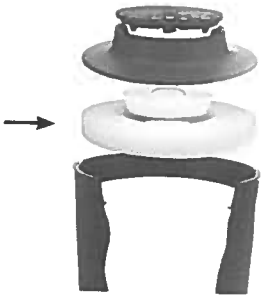
Cast Iron Cover

Cast Iron Frame

Locking Options for Plastic Covers:
Penta Nut (Small or Large)

Locking Options for Cast Iron Covers:
Penta Nut (Small or Large)

Add On Options for Unit:
Thermo-Pak



Thermo Pak

Penta Nut Detail

Raw Material Specifications:

- Meter Boxes are high-density Polyethylene, one-piece molded construction
- Wall thickness minimum .550"
- Vertical load rating minimum 15,000 lbs.
- Sidewall loading of 200 lb side load, applied with a 4" X 4" plate.
- Multi-layer wall construction
- Black exterior surface to provide UV protection
- Gray foaming for strength and insulating value
- White interior surface for ease of meter reading
- Manufactured by Oldcastle Precast Enclosure Solutions

Cast Iron Meter Ring and Lid Specifications:

- Made of cast iron conforming to ASTM A48 standards and marked with country of origin
- Coated with a factory applied water based asphalt paint
- Castings are ground smooth and cleaned by shot blasting, uniform quality, free from sand holes, shrinkage, cracks and other surface defects, with a dimensional tolerance of +/- 1/16" per foot based on the accepted foundry tolerances outlined in the Iron Castings Handbook published by the American Foundry Society.

Product Load Rating:

Medium Duty : Non-Deliberate Traffic

Note:

Actual load rating is determined by the box and cover combination. Weights and dimensions may vary slightly

All information contained on this sheet is current at the time of printing.
Oldcastle Precast, Inc. reserves the right to discontinue or update product information without notice.

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TechData

STEP Systems

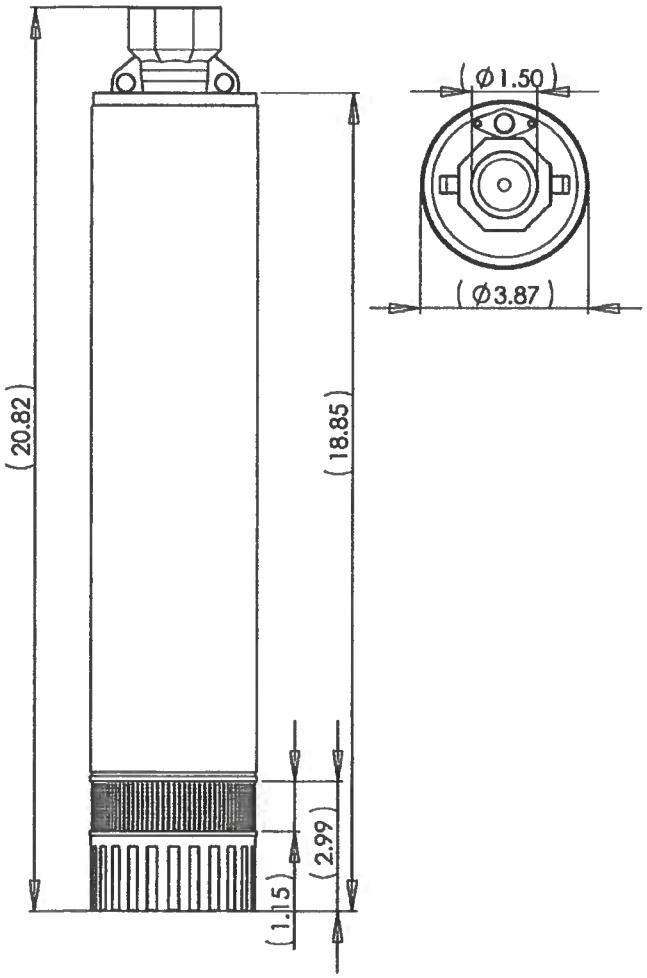
Pumps (Turbine Effluent)

P-TE-10 Plus, P-TE-20 Plus, P-TE-30 Plus

Features

- Bottom intake allows effluent to move across motor without the need for a flow inducer sleeve
- Bottom intake saves storage volume
- High head performance at 10, 20 or 30 GPM
- Dry run capability

Product Information 026 / Pricing 187



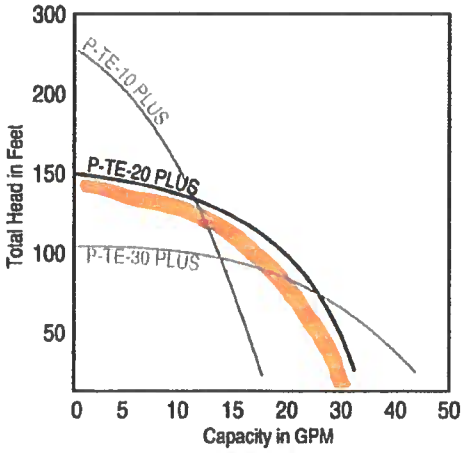
Specifications

Capacities: To 40 GPM
Heads: To 250 FT
Motor: 1/2 HP, PSC with thermal overload
Electrical:
P-TE-10 Plus 115V, 11.0 FLA, 1PH, 60Hz
P-TE-20 Plus 115V, 9.5 FLA, 1PH, 60Hz
P-TE-30 Plus 115V, 9.5 FLA, 1PH, 60Hz
Operation: Manual model controls required
Impeller: Delrin®, closed vane type
Solids handling: 1/8" (3.2mm)
Power Cord: 10' (3M), 300 V SJOW jacketed, 2-wire with ground
Materials of Construction: 300 grade stainless steel
Discharge: 1-1/4"

Warranty for Defects in Material and Workmanship

- All components - 3 Years

AutoCad R-14 dwg files at **www.quanics.net**



Quanics
Engineering Water Solutions

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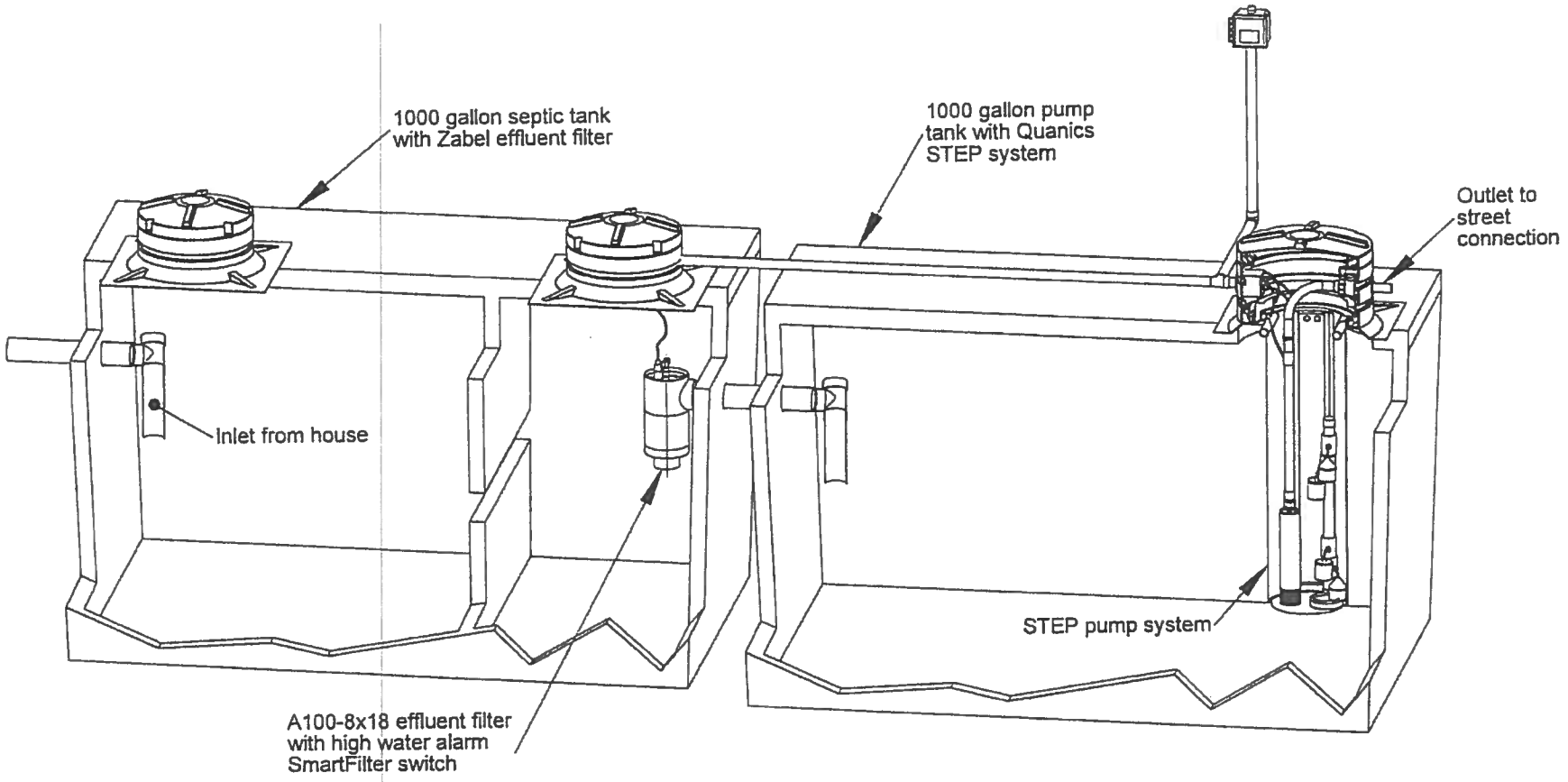
Product(s) covered by one or more U.S. and/or International patents. Other U.S. and International patents may be pending

1000 gallon STEP system for 3 bedrooms



For questions and concerns please contact
Aquatics Resources, Inc.
P.O. Box 645
White Pine, Tennessee 37890
(865) 674-0838

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SCALE 1 : 30

	NAME	DATE
DRAWN	TNJ	03-24-06
CHECKED	BB	03-24-06
UPDATED		

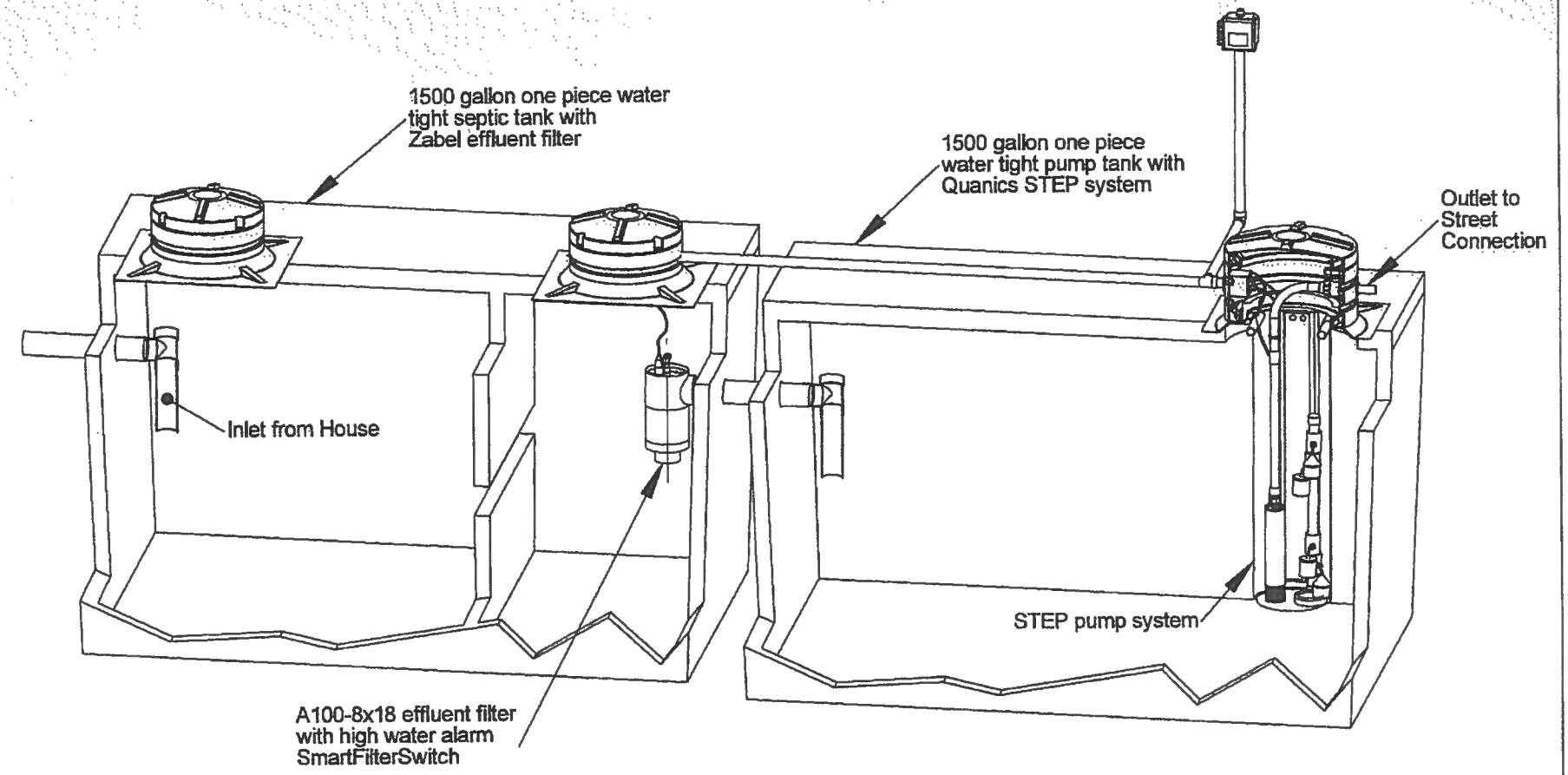
Quanics

P.O. Box 1520, Crestwood KY. 40014
www.quanics.net

SIZE A | DESCRIPTION 1500 gal. STEP system 4 bedrooms or more | REV.

SHEET 1 OF 1

1500 gallon STEP system for 4 bedrooms or more



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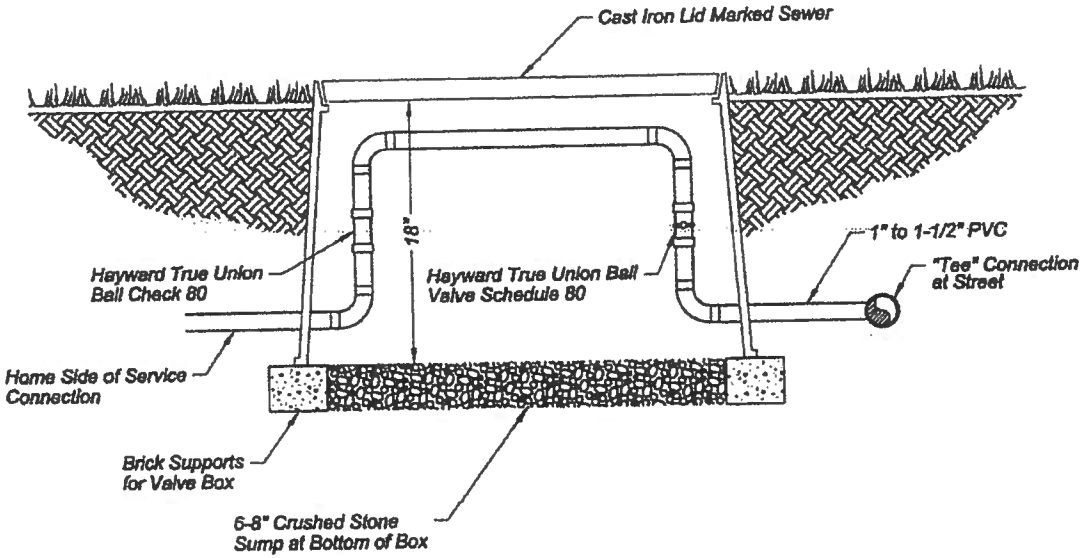
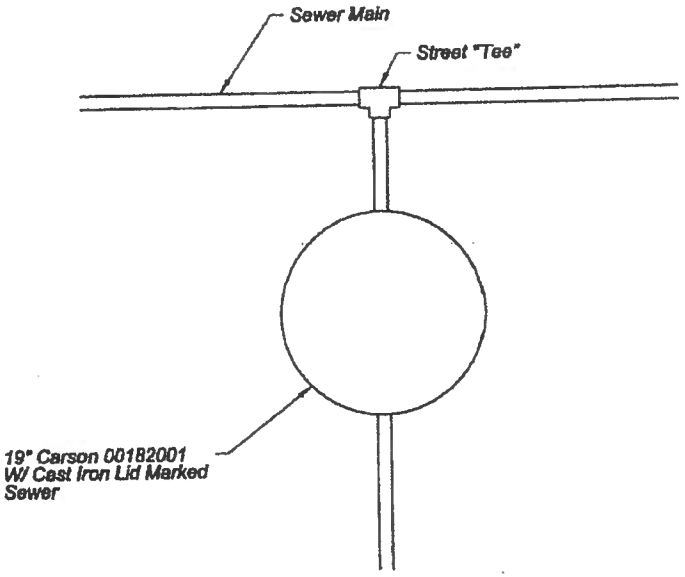
SCALE 1 : 30

Quanics
P.O. Box 1520, Crestwood KY. 40014
www.quanics.net

SIZE	DESCRIPTION	REV.
A	1000 gal. STEP System 3 bedrooms or less	

SHEET 1 OF 1





SERVICE CONNECTION

(OR APPROVED EQUAL)
NOT TO SCALE

Service Connections

Submittal Data Sheet

Applications:

Adenus Technologies Service Connections are an easy way to connect a STEP or STEG service line from the tank to a service tap.

General Information:

Adenus Technologies Service Connections each come with a ball valve for water shutoff and a clear swing check valve for backflow prevention and easy viewing of water flow.

Service connections are preassembled and manufactured with quality. They are ready for installation and include preinstalled extensions of Schedule 40 PVC pipe for easy connections to service lines and taps.

For ease in access to Service Connections, a meter box with lid should be installed over unit and check valve shall be positioned with the "Flow" arrow pointing away from the tank.

Service Connections from Adenus Technologies are currently available in 1", 1-1/4", and 2" diameters.

Standard Features:

Feature:	Specification(s):
Pipe	Schedule 40 PVC with NSF approval and manufactured in accordance with ASTM D2241
Ball Valve	High impact PVC Type II material, ball type, 150 *psi* working pressure at 70° F
Check Valve	High-impact clear PVC swing check valve with EDPM swing gate, 150 *psi* rated
Diameters	1", 1-1/4", 2"
Part Numbers	1" – AT-SC100; 1-1/4" – AT-SC125; 2" – AT-SC200

Or Equivalent

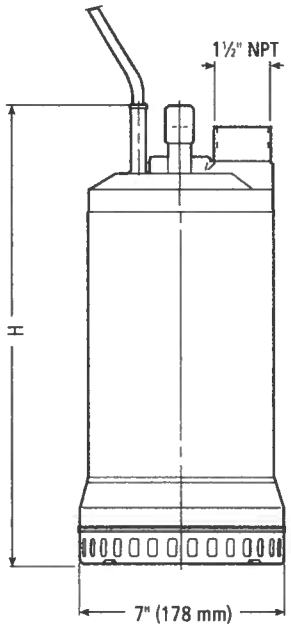
GOULDS PUMPS

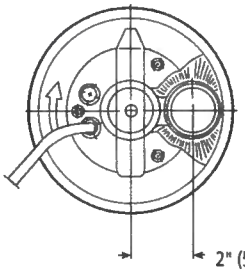
Submersible Dewatering Pump

SERIES 1DW

1½" Dewatering Pump

DIMENSIONS





Series	HP	Phase	Dimensions in inches (mm) H	Discharge Size
1DW	½	1	14⅛ (363)	1½"
		3	13⅝ (348)	
	¾	1	15⅛ (383)	
		3	14⅛ (363)	
	1	1	15⅞ (403)	
		3	15⅛ (383)	
	1½	3	15⅞ (403)	

MECHANICAL DATA

Order No.	HP	Volts	Phase	Max. Amps.	RPM	Weight (lbs.)
1DW51C0EA	½	115	1	10.3	3450	29
1DW51C1EA		230		4.5		
1DW51C3EA			3	2.5		27
1DW51C4EA		460		1.3		
1DW51D1EA	¾	230	1	5.7		32
1DW51D3EA			3	3.6		29
1DW51D4EA		460		1.8		
1DW51E1EA	1	230	1	6.3		38
1DW51E3EA			3	4.0		33
1DW51E4EA		460		2.0		
1DW51F3EA	1½	230	3	5.6		37
1DW51F4EA		460		2.7		

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www.goulds.com

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Goulds Pumps

ITT Industries

GOULDS PUMPS

Submersible Dewatering Pump

SERIES 1DW

1½" Dewatering Pump

APPLICATIONS

Specifically designed for the following uses:

- Handling dirty waters
- Draining ditches and pits
- Excavating in the building trades
- Water transfer
- Industrial water drainage or transfer

SPECIFICATIONS

Pump:

- Discharge size: 1½" NPT.
- Capacities: up to 110 GPM.
- Total heads: up to 66 feet TDH.
- Max. solids: ⅜" spherical.
- Mechanical seal: Drive lube silicon carbide rotary/silicon carbide stationary, 300 series stainless steel metal parts, BUNA-N elastomers.
- Maximum submergence: 23'.
- Temperature limit: 120°F (50°C) maximum.
- Fasteners: 300 series stainless steel.

Motor:

- Single phase: 60 Hz, 3500 RPM, ½ HP, 115 and 230 V; ¾ and 1 HP, 230 V only.
- Three phase: 60 Hz, 3500 RPM, ½ to 1½ HP, 230 or 460 V.
- Built-in thermal overload protection with automatic reset on single phase models.
- Three phase: Overload protection must be provided in starter unit with three phase pumps.
- Power cord: 20 feet long. Single phase 115 V and 230 V models are supplied with molded NEMA plugs and built-in capacitors. Three phase models are supplied with bare leads.
- Class F insulation.

FEATURES

■ **Impeller:** AISI 304 SS open impeller.

■ **Diffuser Plate:** AISI 304 SS with Polyurethane coating for maximum resistance to abrasion.

■ **Casing:** AISI 304 SS.

■ **Mechanical Seal:** Drive lube silicon carbide sealing faces, all metal components of AISI type 300 stainless steel running in protected oil chamber.

■ **Elastomers:** BUNA-N.

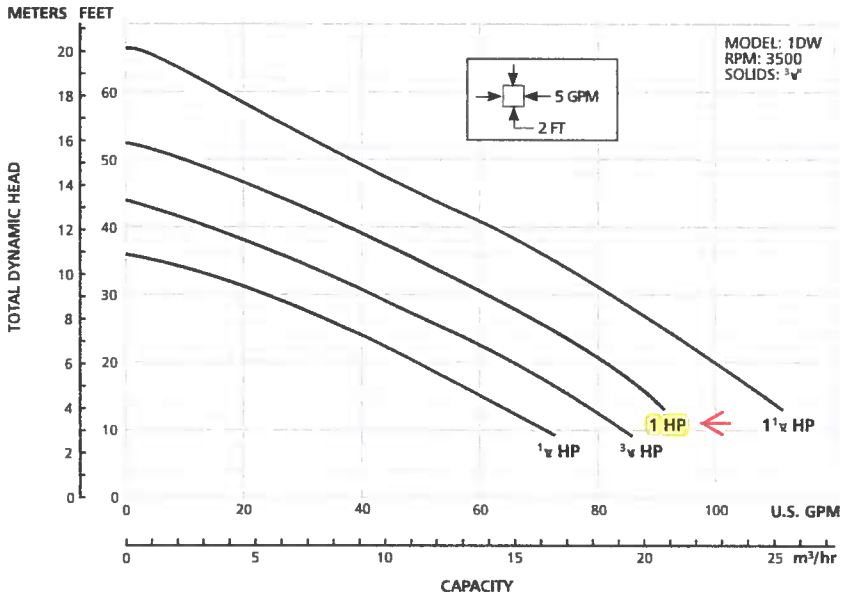
■ **Shaft:** AISI type 304 stainless steel high strength pump shaft with keyed and locking cap screw impeller fastening.

■ **Motor:** Air filled class F insulated design for continuous use.

■ **Designed for Continuous Operation:** Pump ratings are within the motor's working limits and can be operated continuously without damage.

■ **Bearings:** Upper and lower heavy duty ball bearing construction.

Component	Material
Pump body and motor casing	Stainless steel (AISI 304)
Outer sleeve	Stainless steel (AISI 304)
Impeller	Stainless steel (AISI 304)
Motor shaft	Stainless steel (AISI 304)
Suction strainer	Stainless steel (AISI 304)
Front diffuser plate	Stainless steel (AISI 304) coated with polyurethane elastomer
Lower mechanical seal	Silicon carbide/ silicon carbide
Upper lip seal	Nitrile rubber
Handle	Stainless steel (AISI 304) coated with polyacetalic resin



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Effective November, 2005
B1DW

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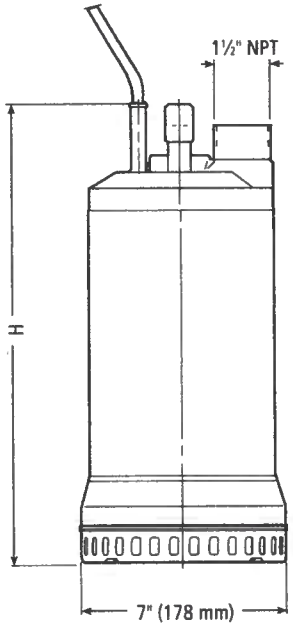
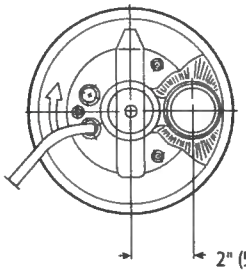
DIMENSIONS





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	¾	1	15⅛ (383)	
		3	14⅛ (363)	
	1	1	15⅞ (403)	
		3	15⅛ (383)	
	1½	3	15⅞ (403)	

MECHANICAL DATA

Order No.	HP	Volts	Phase	Max. Amps.	RPM	Weight (lbs.)
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Specifically designed for the following uses:

- Handling dirty waters
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- Excavating in the building trades
- Water transfer
- Industrial water drainage or transfer

SPECIFICATIONS

Pump:

- Discharge size: 1½" NPT.
- Capacities: up to 110 GPM.
- Total heads: up to 66 feet TDH.
- Max. solids: ⅜" spherical.
- Mechanical seal: Drive lube silicon carbide rotary/silicon carbide stationary, 300 series stainless steel metal parts, BUNA-N elastomers.
- Maximum submergence: 23'.
- Temperature limit: 120°F (50°C) maximum.
- Fasteners: 300 series stainless steel.

Motor:

- Single phase: 60 Hz, 3500 RPM, ½ HP, 115 and 230 V; ¾ and 1 HP, 230 V only.
- Three phase: 60 Hz, 3500 RPM, ½ to 1½ HP, 230 or 460 V.
- Built-in thermal overload protection with automatic reset on single phase models.
- Three phase: Overload protection must be provided in starter unit with three phase pumps.
- Power cord: 20 feet long. Single phase 115 V and 230 V models are supplied with molded NEMA plugs and built-in capacitors. Three phase models are supplied with bare leads.
- Class F insulation.

FEATURES

■ **Impeller:** AISI 304 SS open impeller.

■ **Diffuser Plate:** AISI 304 SS with Polyurethane coating for maximum resistance to abrasion.

■ **Casing:** AISI 304 SS.

■ **Mechanical Seal:** Drive lube silicon carbide sealing faces, all metal components of AISI type 300 stainless steel running in protected oil chamber.

■ **Elastomers:** BUNA-N.

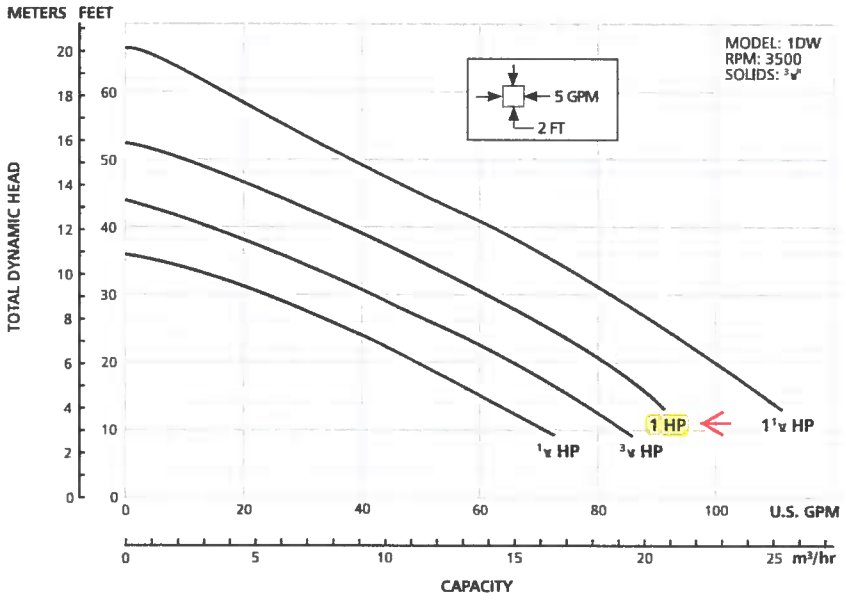
■ **Shaft:** AISI type 304 stainless steel high strength pump shaft with keyed and locking cap screw impeller fastening.

■ **Motor:** Air filled class F insulated design for continuous use.

■ **Designed for Continuous Operation:** Pump ratings are within the motor's working limits and can be operated continuously without damage.

■ **Bearings:** Upper and lower heavy duty ball bearing construction.

Component	Material
Pump body and motor casing	Stainless steel (AISI 304)
Outer sleeve	Stainless steel (AISI 304)
Impeller	Stainless steel (AISI 304)
Motor shaft	Stainless steel (AISI 304)
Suction strainer	Stainless steel (AISI 304)
Front diffuser plate	Stainless steel (AISI 304) coated with polyurethane elastomer
Lower mechanical seal	Silicon carbide/ silicon carbide
Upper lip seal	Nitrile rubber
Handle	Stainless steel (AISI 304) coated with polyacetalic resin



Goulds Pumps

ITT Industries

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B1DW

Axial Fans

Dayton

Single-speed fans are not speed-controllable. All AC units are rated at 60/50 Hz (50 Hz operation will decrease CFM by approximately 20%). Zero-friction fans eliminate friction between shaft and bearing for rotational stability. Optional fan guards and cord sets available separately on page 4472. UL and C-UL Recognized Component, CE Certified, and RoHS Compliant.

Note: Sleeve-bearing fans must be mounted for horizontal airflow only. Ball-bearing and zero-friction fans may be mounted in any position.

Square DC—Driven with brushless DC motor.

Square AC—Driven with impedance-protected shaded pole or thermally-protected PSC motor.

Oblong AC—Driven with thermally-protected PSC motor.

No. 2RTF2

No. 2RTF9

No. 2RTJ3

No. 2RTE4

No. 2RTK5

No. 2RTK7

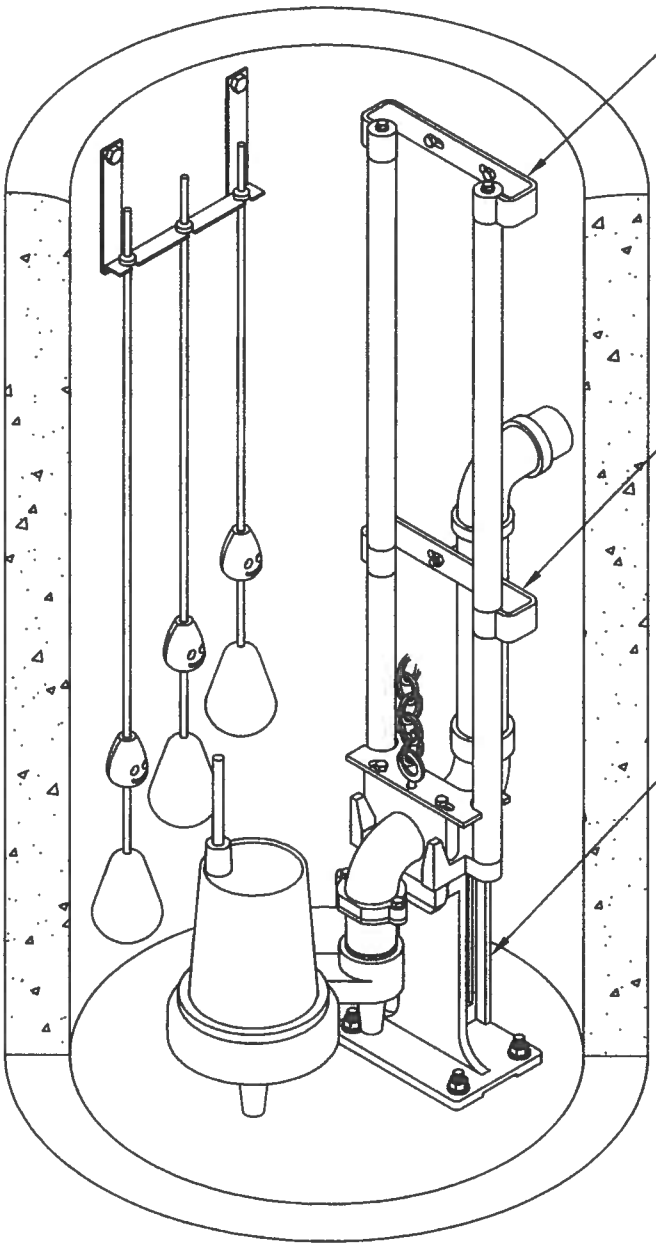
H (In.)	W (In.)	D (In.)	Mounting Holes O.C. (In.)	CFM @ 0.000" SP	Voltage	Amps	Watts	Electrical Connec.	dBA	Bearings	Housing Material	Item No.	$ Each
Square DC													
1 15/16	1 15/16	9/16	1 9/16	10.2	5 DC	0.09	0.5	12" Leads	22	Zero Friction Air	PBT Plastic	2RTF4 ‡	14.63
1 15/16	1 15/16	9/16	1 9/16	13	5 DC	0.15	0.8	12" Leads	29	Zero Friction Air	PBT Plastic	2RTF3 ‡	14.63
1 15/16	1 15/16	3/8	1 9/16	11	5 DC	0.16	0.8	12" Leads	26	Zero Friction Air	PBT Plastic	2RTF2	12.40
2 3/8	2 3/8	3/8	1 15/16	11.7	5 DC	0.13	0.7	12" Leads	21.5	Zero Friction Air	PBT Plastic	2RTF6	15.28
2 3/8	2 3/8	3/8	1 15/16	13.6	5 DC	0.20	1	12" Leads	25	Zero Friction Air	PBT Plastic	2RTF5	14.83
2 3/8	2 3/8	5/8	1 15/16	15	5 DC	0.10	0.5	12" Leads	25	Zero Friction Air	PBT Plastic	2RTF8	15.85
2 3/8	2 3/8	5/8	1 15/16	18	5 DC	0.18	0.9	12" Leads	31	Zero Friction Air	PBT Plastic	2RTF7	16.17
2 3/8	2 3/8	1	1 15/16	19.3	12 DC	0.09	1.1	12" Leads	29	Sleeve	PBT Plastic	4WT34	40.55
2 3/8	2 3/8	1	1 15/16	19.3	12 DC	0.13	1	12" Leads	30	Ball	PBT Plastic	6KD67 ✓	47.90
2 3/8	2 3/8	1	1 15/16	40	12 DC	0.27	3.2	12" Leads	41	Zero Friction Air	PBT Plastic	2RTF9	28.95
2 3/8	2 3/8	1	1 15/16	19.3	24 DC	0.06	1.4	12" Leads	29	Sleeve	PBT Plastic	4WT37	41.05
2 3/8	2 3/8	1	1 15/16	19.3	24 DC	0.56	1.3	12" Leads	30	Ball	PBT Plastic	6KD71 ✓	47.35
2 3/8	2 3/8	1	1 15/16	31.5	24 DC	0.13	3.1	12" Leads	41	Zero Friction Air	PBT Plastic	2RTH1	30.35
2 3/8	2 3/8	1 1/2	1 15/16	49.2	12 DC	0.58	7	12" Leads	52	Ball	PBT Plastic	2RTH2	39.35
2 3/8	2 3/8	1 1/2	1 15/16	49.2	24 DC	0.31	7.4	12" Leads	52	Ball	PBT Plastic	2RTH3	40.65
3 1/8	3 1/8	1	2 13/16	36.5	12 DC	0.12	1.4	12" Leads	31	Sleeve	PBT Plastic	4WT35	40.70
3 1/8	3 1/8	1	2 13/16	37	12 DC	0.11	1.3	12" Leads	32	Ball	PBT Plastic	6KD68 ✓	48.20
3 1/8	3 1/8	1	2 13/16	36.5	24 DC	0.05	1.3	12" Leads	31	Sleeve	PBT Plastic	4WT38 ‡	40.70
3 1/8	3 1/8	1	2 13/16	37	24 DC	0.05	2.1	12" Leads	32	Ball	PBT Plastic	6KD72 ‡ ✓	45.05
3 1/8	3 1/8	1 1/2	2 13/16	74.5	12 DC	0.53	6.4	12" Leads	51.6	Ball	PBT Plastic	2RTH5	42.10
3 1/8	3 1/8	1 1/2	2 13/16	84.1	12 DC	0.76	9.1	12" Leads	55.2	Ball	PBT Plastic	2RTH4	42.10
3 1/8	3 1/8	1 1/2	2 13/16	84.1	24 DC	0.40	9.6	12" Leads	55.2	Ball	PBT Plastic	2RTH6	42.00
3 1/8	3 1/8	1 1/2	2 13/16	59.5	48 DC	0.14	6.7	12" Leads	51.6	Ball	PBT Plastic	2RTH8	43.95
3 1/8	3 1/8	1 1/2	2 13/16	84.1	48 DC	0.19	9.1	12" Leads	55.2	Ball	PBT Plastic	2RTH7	42.85
3 5/8	3 5/8	1	3 1/4	48	12 DC	0.13	1.6	12" Leads	33	Ball	PBT Plastic	6KD69 ✓	50.85
3 5/8	3 5/8	1	3 1/4	48	24 DC	0.06	1.4	12" Leads	33	Ball	PBT Plastic	6KD73 ✓	50.30
3 5/8	3 5/8	1 1/2	3 1/4	91.7	12 DC	0.47	5.6	12" Leads	50.3	Ball	PBT Plastic	2RTJ2	43.90
3 5/8	3 5/8	1 1/2	3 1/4	106.3	12 DC	0.71	8.5	12" Leads	53.8	Ball	PBT Plastic	2RTJ1	43.90
3 5/8	3 5/8	1 1/2	3 1/4	120.2	12 DC	1.04	12.5	12" Leads	57.6	Ball	PBT Plastic	2RTH9	43.90
3 5/8	3 5/8	1 1/2	3 1/4	106.3	24 DC	0.40	9.6	12" Leads	53.8	Ball	PBT Plastic	2RTJ4	43.90
3 5/8	3 5/8	1 1/2	3 1/4	120.2	24 DC	0.51	12.2	12" Leads	57.6	Ball	PBT Plastic	2RTJ3	42.00
4 1/16	4 1/16	1	4 1/8	133	24 DC	0.36	8.6	12" Leads	51	Ball	PBT Plastic	2RTJ5 ✓	45.75
4 1/16	4 1/16	1 1/2	4 1/8	107	12 DC	0.51	6.1	12" Leads	41	Sleeve	PBT Plastic	4WT36	37.85
4 1/16	4 1/16	1 1/2	4 1/8	108	12 DC	0.50	6	12" Leads	42	Ball	PBT Plastic	6KD70 ✓	54.00
4 1/16	4 1/16	1 1/2	4 1/8	170	12 DC	1.20	14.4	12" Leads	51	Ball	PBT Plastic	2RTJ6 ✓	50.40
4 1/16	4 1/16	1 1/2	4 1/8	108	24 DC	0.26	6.2	12" Leads	42	Ball	PBT Plastic	6KD74 ✓	50.20
4 1/16	4 1/16	1 1/2	4 1/8	170	24 DC	0.57	13.7	12" Leads	51	Ball	PBT Plastic	2RTJ7 ✓	51.75
4 1/16	4 1/16	1 1/2	4 1/8	170	48 DC	0.30	14.4	12" Leads	51	Ball	PBT Plastic	2RTJ8 ✓	52.85
Square AC													
2 3/8	2 3/8	1	1 15/16	18	115 AC	0.17	3.3	12" Leads	31	Zero Friction Air	PBT Plastic	2RTE4	31.25
2 3/8	2 3/8	1	1 15/16	18	230 AC	0.21	3.8	12" Leads	31	Zero Friction Air	PBT Plastic	2RTE5	32.60
2 3/4	2 3/4	1	2 3/8	29	115 AC	0.18	3	12" Leads	31	Zero Friction Air	PBT Plastic	2RTE6	33.35
2 3/4	2 3/4	1	2 3/8	29	230 AC	0.23	3.4	12" Leads	31	Zero Friction Air	PBT Plastic	2RTE7	34.65
3 1/8	3 1/8	1	2 13/16	41	115 AC	0.12	3.6	12" Leads	33	Zero Friction Air	PBT Plastic	2RTE8	35.35
3 1/8	3 1/8	1	2 13/16	41	230 AC	0.10	4.6	12" Leads	33	Zero Friction Air	PBT Plastic	2RTE9	38.70
3 1/8	3 1/8	1 1/2	2 13/16	30	115 AC	0.13	12	12" Leads	35	Sleeve	Cast Aluminum	4WT40	36.65
3 1/8	3 1/8	1 1/2	2 13/16	31	115 AC	0.13	12	12" Leads	36.5	Ball	Cast Aluminum	3LE75 ✓	57.85
3 1/8	3 1/8	1 1/2	2 13/16	30	230 AC	0.08	16	12" Leads	35	Sleeve	Cast Aluminum	4WT41	37.20
3 1/8	3 1/8	1 1/2	2 13/16	31	230 AC	0.08	16	12" Leads	36.5	Ball	Aluminum	2RTD2	37.90
4 1/16	4 1/16	1 1/2	4 1/8	55	115 AC	0.12	11	Terminals	33.5	Sleeve	Cast Aluminum	4WT49	34.00
4 1/16	4 1/16	1 1/2	4 1/8	70	115 AC	0.13	11	Terminals	36	Sleeve	Cast Aluminum	4WT48	34.10
4 1/16	4 1/16	1 1/2	4 1/8	75	115 AC	0.11	10	Terminals	49	Ball	Cast Aluminum	3LE77 ✓	57.55
4 1/16	4 1/16	1 1/2	4 1/8	78	115 AC	0.11	11	Terminals	39	Ball	Cast Aluminum	3LE76 ✓	57.70
4 1/16	4 1/16	1 1/2	4 1/8	100	115 AC	0.22	20	Terminals	47	Sleeve	PBT Plastic	2RTK5	44.05
4 1/16	4 1/16	1 1/2	4 1/8	105	115 AC	0.18	18	Terminals	48	Sleeve	Cast Aluminum	4WT47	34.35
4 1/16	4 1/16	1 1/2	4 1/8	105	115 AC	0.18	14	Terminals	48	Ball	Cast Aluminum	3VU65 ✓	56.75
4 1/16	4 1/16	1 1/2	4 1/8	107	115 AC	0.18	18	Terminals	50	Ball	Cast Aluminum	6KD76 ✓	45.65
4 1/16	4 1/16	1 1/2	4 1/8	115	115 AC	0.24	20	Terminals	49	Sleeve	Cast Aluminum	4WT46	37.25
4 1/16	4 1/16	1 1/2	4 1/8	115	115 AC	0.25	20	Terminals	49	Sleeve	Aluminum	2RTD1	29.80
4 1/16	4 1/16	1 1/2	4 1/8	117	115 AC	0.24	20	Terminals	50	Ball	Cast Aluminum	6KD75 ✓	50.35
4 1/16	4 1/16	1 1/2	4 1/8	124	115 AC	0.25	21	Terminals	47	Ball	Aluminum	2RTK6	41.50
4 1/16	4 1/16	1 1/2	4 1/8	62	230 AC	0.06	10.5	Terminals	30	Sleeve	Cast Aluminum	3VU64 ✓	47.35
4 1/16	4 1/16	1 1/2	4 1/8	63	230 AC	0.05	10	Terminals	32	Sleeve	Aluminum	2RTD5	35.40
4 1/16	4 1/16	1 1/2	4 1/8	78	230 AC	0.05	10	Terminals	39	Ball	Aluminum	2RTD7	41.75
4 1/16	4 1/16	1 1/2	4 1/8	102	230 AC	0.09	15	Terminals	48	Ball	Aluminum	2RTD8	44.05
4 1/16	4 1/16	1 1/2	4 1/8	105	230 AC	0.11	19	Terminals	48	Sleeve	Cast Aluminum	4WT33	34.35
4 1/16	4 1/16	1 1/2	4 1/8	107	230 AC	0.11	19	Terminals	50	Ball	Cast Aluminum	3LE74 ✓	57.55
4 1/16	4 1/16	1 1/2	4 1/8	115	230 AC	0.12	21	Terminals	49	Sleeve	Aluminum	2RTD9	33.60
4 1/16	4 1/16	1 1/2	4 1/8	117	230 AC	0.12	21	Terminals	50	Ball	Aluminum	2RTE1	39.45
6 15/16	6 15/16	3 1/2	6	355	115 AC	0.27	30	Terminals	66	Ball	Cast Aluminum	3VU66 ✓	130.70
6 15/16	6 15/16	3 1/2	6	335	230 AC	0.15	30	Terminals	66	Ball	Aluminum	2RTE2 ✓	204.25
Oblong AC													
6 3/4	5 15/16	2	6 3/8	200	115 AC	0.48	36	12" Leads	55	Ball	Aluminum	2RTK7 ✓	67.75
6 3/4	5 7/8	2	6 3/8	239	115 AC	0.23	27	Terminals	55	Ball	Cast Aluminum	4WT42 ✓	79.90
6 3/4	5 15/16	2	6 3/8	239	115 AC	0.23	27	Terminals	58	Ball	Aluminum	2RTE3 ✓	110.70
6 3/4	5 15/16	2	6 3/8	200	230 AC	0.24	36	12" Leads	55	Ball	Aluminum	2RTK8 ✓	71.65
6 3/4	5 7/8	2	6 3/8	239	230 AC	0.11	26	Terminals	55	Ball	Cast Aluminum	4WT43 ✓	82.65
6 3/4	5 7/8	2	6 3/8	239	230 AC	0.11	26	Terminals	58	Ball	Cast Aluminum	3VU70 ✓	84.15

‡ Limited availability.

CONTINUED

TYPICAL APPLICATIONS

GUIDE BRACKET



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CONERY MFG INC

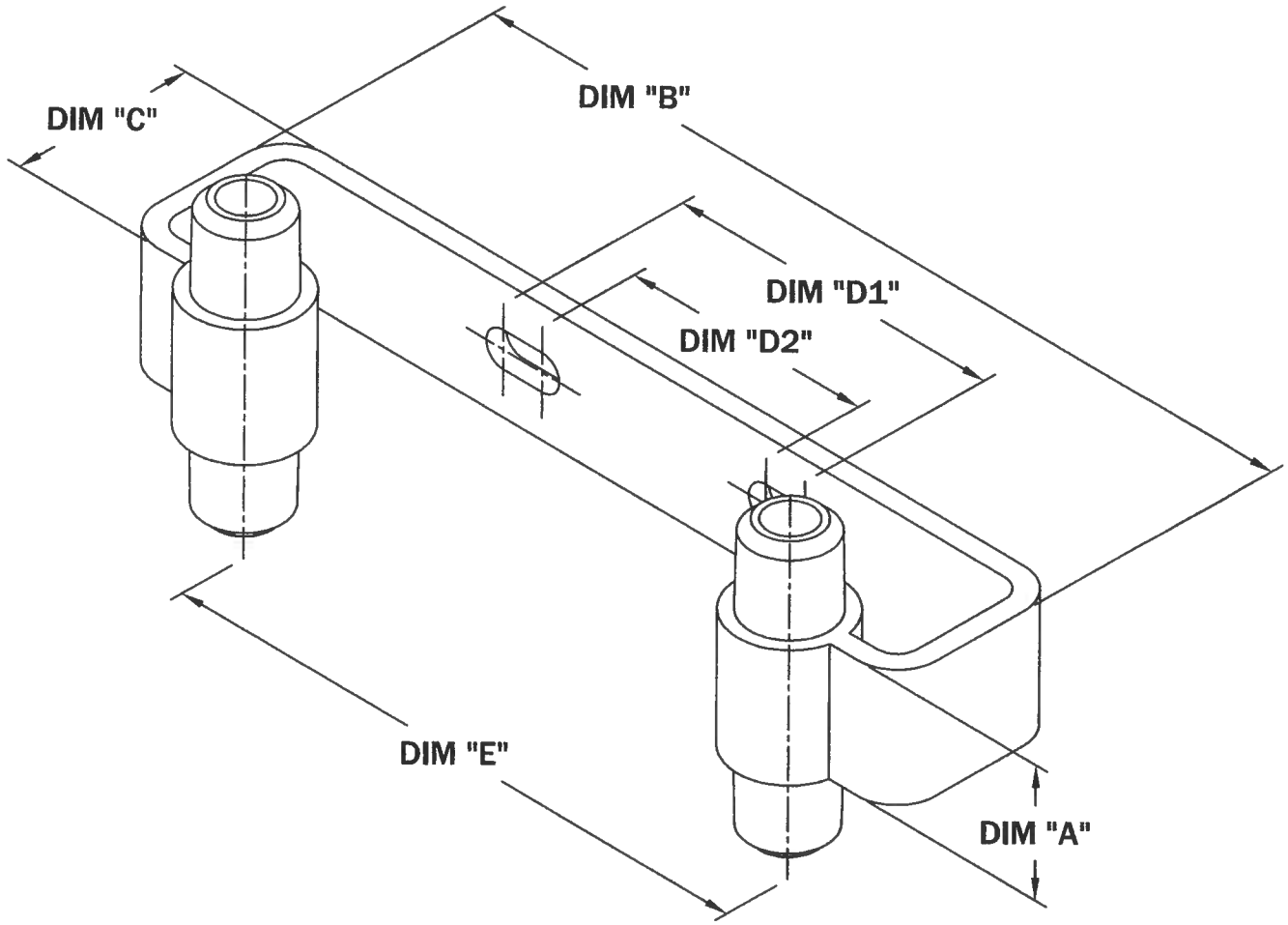
CHANGES		TOLERANCES	DRAWN BY	DATE
F		DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	12/15/04
E			MATERIAL SPECIFICATION: 300 SERIES SST	
D				
C				
B				
A				

SPECIFICATION SHEET
DIMENSIONAL DATA

SCALE:	PART NO.
NONE	GUIDE BRACKET

NOTE: IGB-075-SS USED FOR $\frac{3}{4}$" RAILS
IGB-100-SS USED FOR 1" RAILS
IGB-125-SS USED FOR $1\frac{1}{4}$" RAILS
MOUNTING SLOTS ARE Ø$\frac{7}{16}$

GUIDE BRACKET



MODEL NO.	DIA. "A"	DIM "B"	DIM "C"	DIM "D1"	DIM "D2"	DIM "E"
IGB–075–SS	1 1/2"	10"	2 1/8"	3 7/8"	2 7/8"	7"
IGB–100–SS	1 1/2"	10"	2 1/8"	3 7/8"	2 7/8"	7"
IGB–125–SS	1 1/2"	10"	2 1/8"	3 7/8"	N/A	7"

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CONERY MFG INC

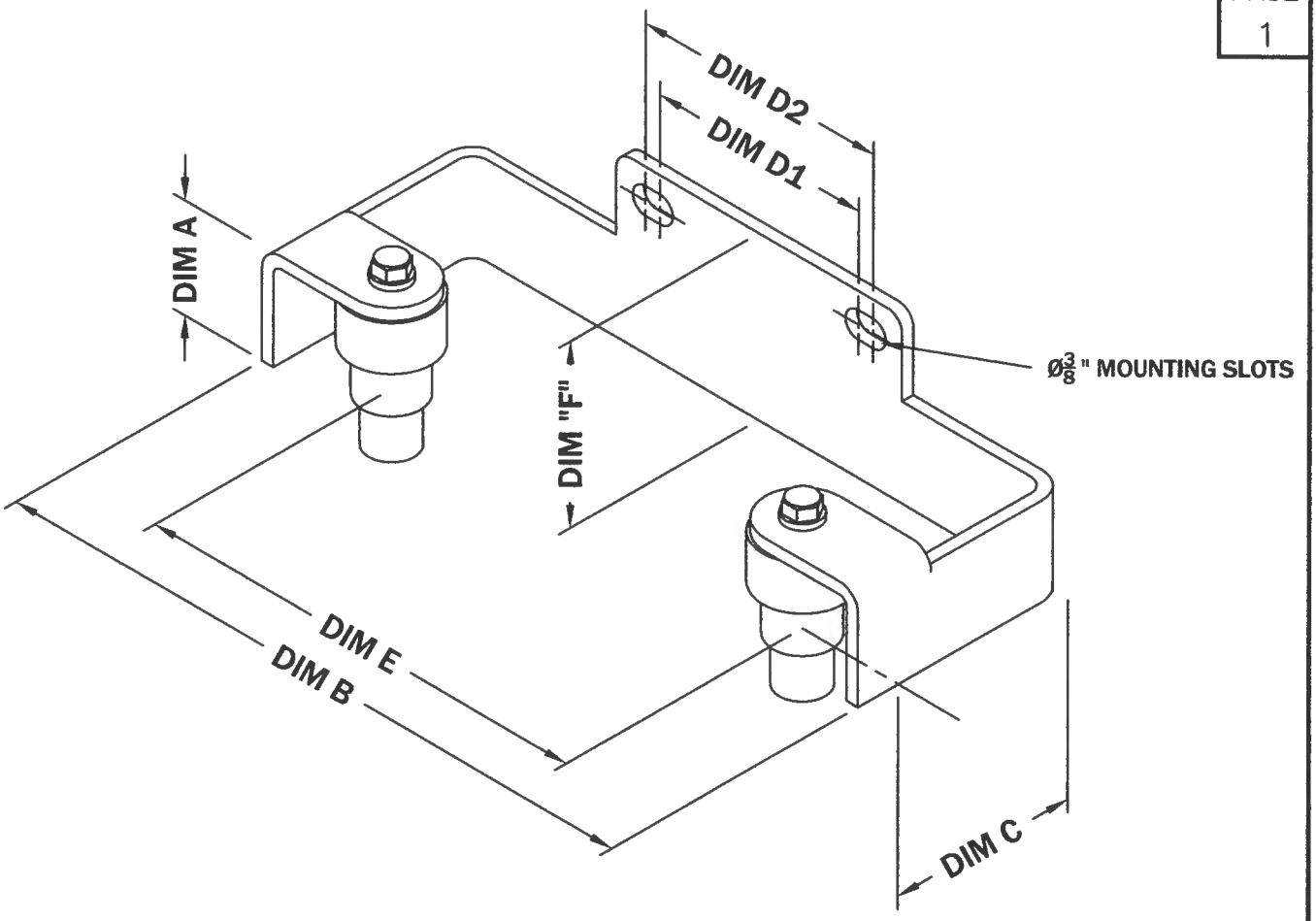
CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	12/15/04
E		MATERIAL SPECIFICATION: 300 SERIES SST	
D			
C			
B			
A			

SPECIFICATION SHEET
DIMENSIONAL DATA

SCALE:	PART NO.
HALF	GUIDE BRACKET

NOTE: BRACKET CAN BE USED FOR $\frac{3}{4}$", 1", $1\frac{1}{4}$" GUIDE RAILS.

GUIDE BRACKET



MODEL NO.	DIA. "A"	DIM "B"	DIM "C"	DIM "D1 + D2"	DIM "E"	DIM "F"
UGB–STNLS	1 3/4"	10 1/8"	2 11/16"	2 7/8"–3 7/8"	7"	2 3/4"

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CONERY MFG INC

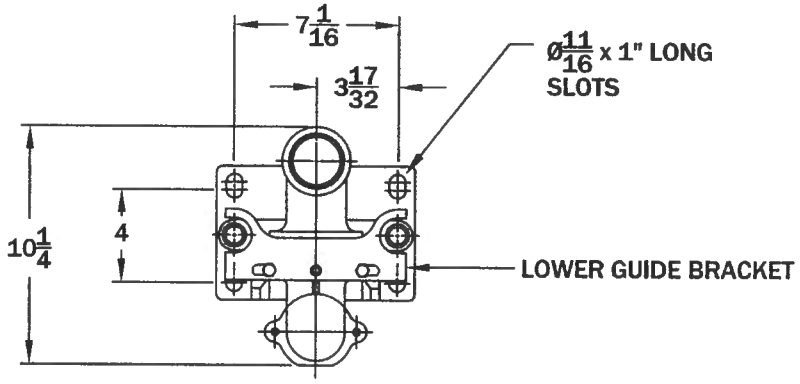
CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS	D. MIDDLETON	03/22/04
E	.XXX = ±.005		
D	.XX = ±.010	MATERIAL SPECIFICATION:	
C	FRACTIONAL	300 SERIES SST	
B	X/X = ±.1/64		
A	ANGLES		
	X° = ±1/2°		

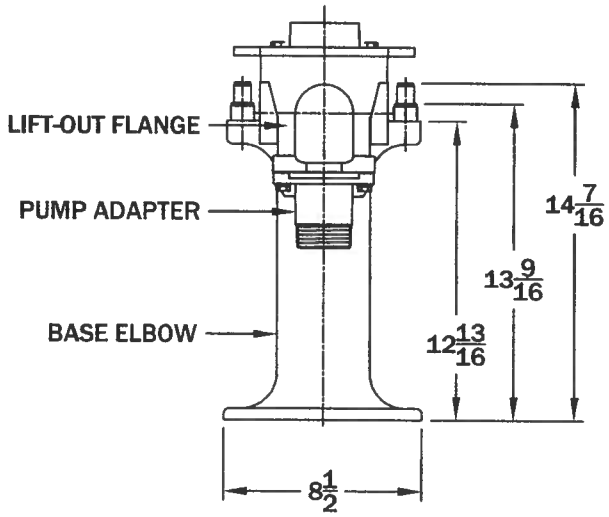
SPECIFICATION SHEET DIMENSIONAL DATA

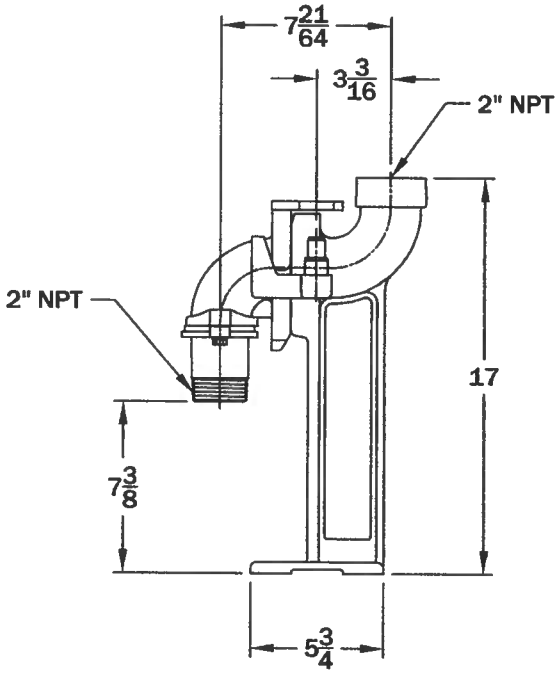
SCALE:	PART NO.
NONE	GUIDE BRACKET

NOTE: ALL DIMENSIONS ARE IN INCHES.
MATERIALS OF CONSTRUCTION:
PUMP ADAPTER: 304 SST
BASE ELBOW: CAST DUCTILE IRON
LIFT-OUT FLANGE: CAST DUCTILE IRON
LOWER GUIDE BRACKET: 304 SST
ALL FASTENERS ARE 304 SERIES SST
USABLE RAIL SIZES: $\frac{3}{4}$" & 1"
MAXIMUM WEIGHT ALLOWANCE: 200 lbs

BERS 200







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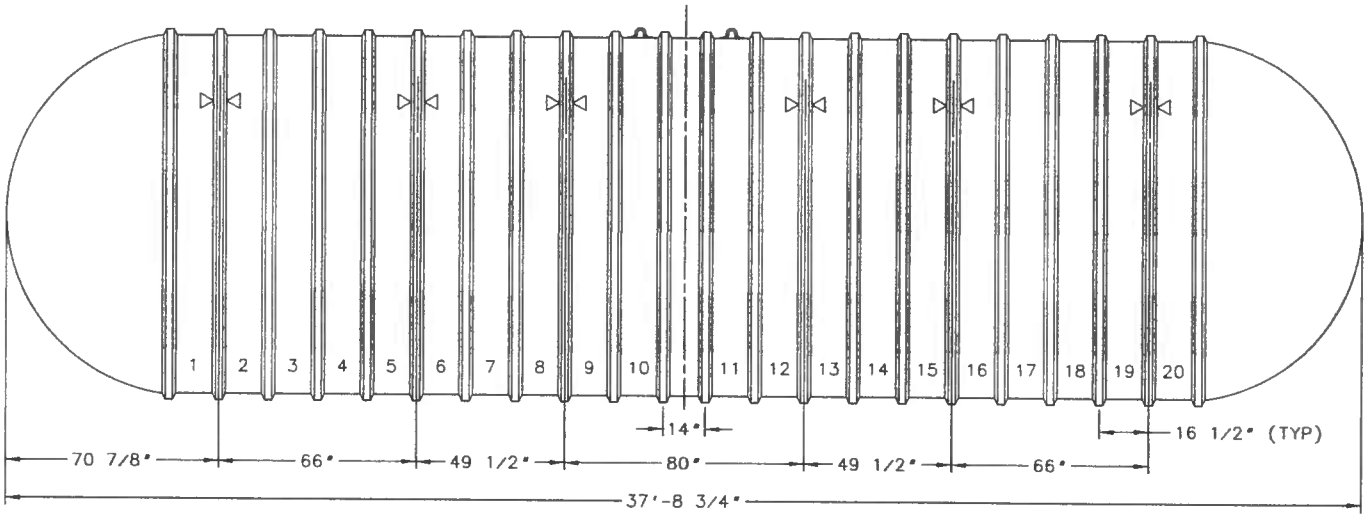
CONERY MFG INC

CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	03/05/04
E		MATERIAL SPECIFICATION: AS NOTED	
D			
C			
B			
A			

SPECIFICATION SHEET
DIMENSIONAL DATA

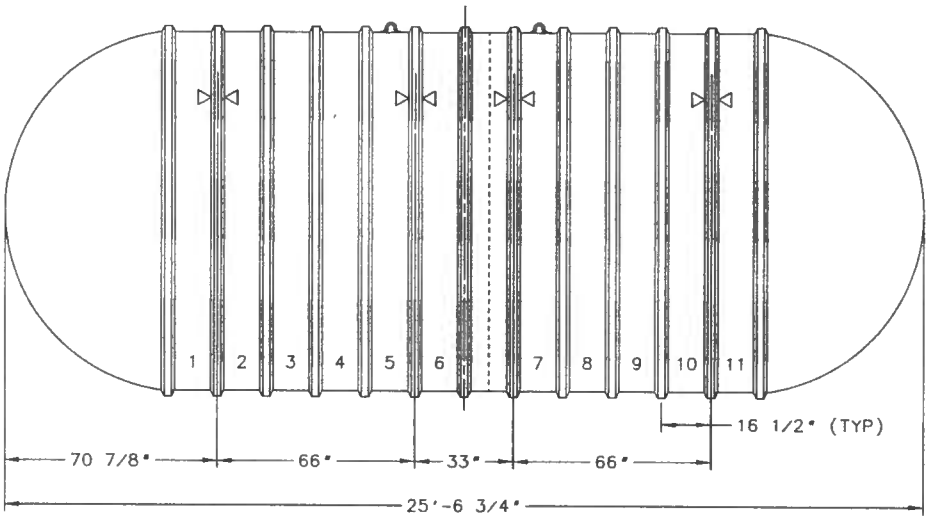
SCALE:	PART NO.
1/8	2" LIFT OUT DIM



For non UL-listed configurations only.

XERXES® CORPORATION

TITLE	10' DIA. S.W.T. CAP. 20,000 GALLONS
DATE 8-05	DR. NO. S10-889.03

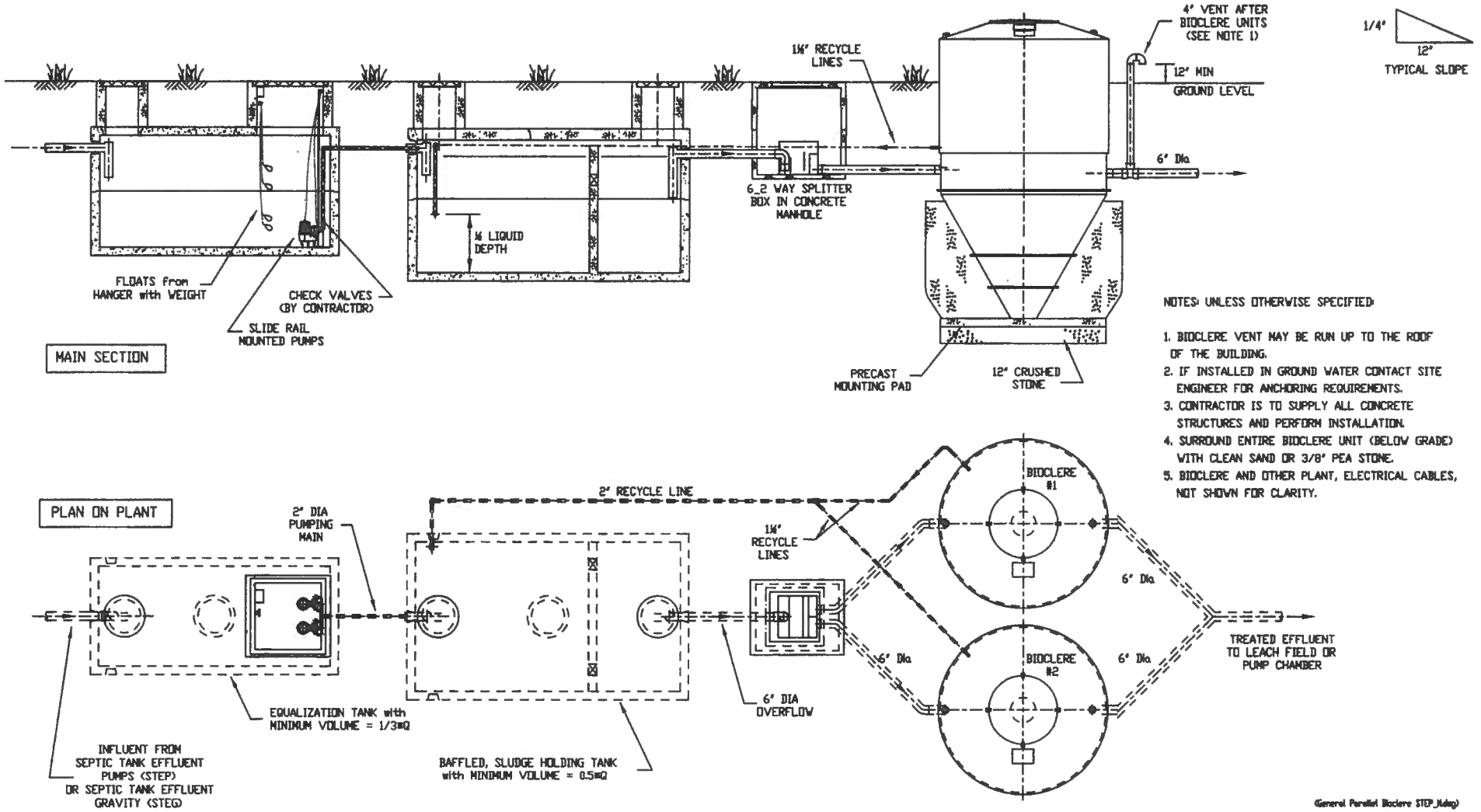


For non UL-listed configurations only.

XERXES® CORPORATION

TITLE
10' DIA. S.W.T.
CAP. 13,000 GALLONS

DATE 8-05 | DR. NO. S10-886.01



(General Parallel Bioclere STEP_N.dwg)

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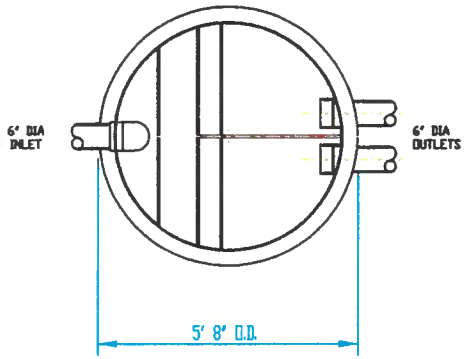
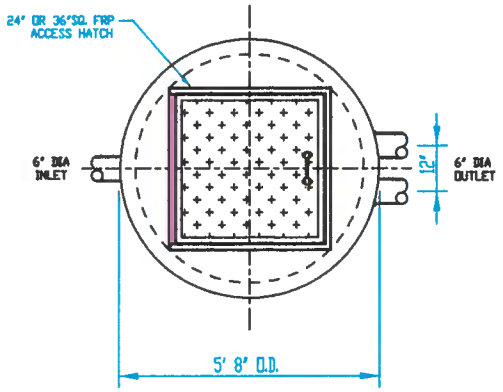
AquaPoint
Performance Based Wastewater Treatment Systems
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	BIOCLERE GENERAL PARALLEL ARRANGEMENT LAYOUT (STEP_N)
DRAWING NO:	1264-7
REVISION:	B
DATE:	4 May 2005
DWN BY:	P.WILLEY
SCALE:	1 : 70
SIZE:	B / A3
SHEET #:	



INTERNAL PLAN



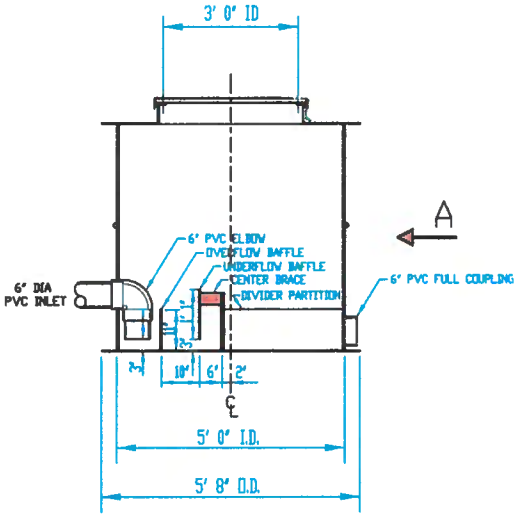
EXTERNAL PLAN

NOTES FOR CONTRACTOR:
1. ALL EXTERNAL CONNECTIONS TO THE TANK MUST BE FLEXIBLE.
2. SPLITTER BOX TO BE INSTALLED LEVEL WITH ACCESS TO GRADE.
3. IF INSTALLED IN SEASONAL HIGH GROUNDWATER CONSULT ENGINEER FOR ANCHORING & CONCRETE PAD REQUIREMENTS.
4. FOR INSTALLATION AND BACKFILLING REQUIREMENTS CONSULT AND ADHERE TO THE FRP TANK MANUAL.

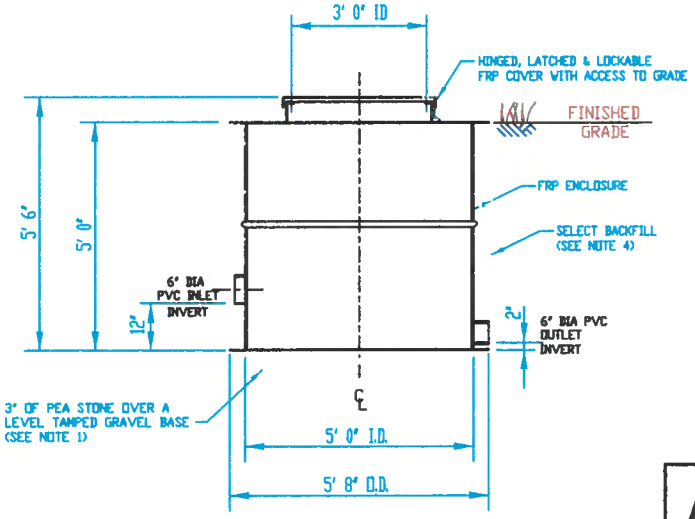
FIBERGLASS NOTES.
INTERNAL WALLS & WEIR PLATES TO BE 1/4" THICK FIBERGLASS.
EXTERNAL WALLS TO BE 1/4" MIN THICK FIBERGLASS.

WEIR FLOW (gpm) = 647.6 x (H^2.5)
(H = HEIGHT OF FLOW ABOVE V-NOTCH (ft))
@ H = 5" V-NOTCH FLOW = 72.6 GPM

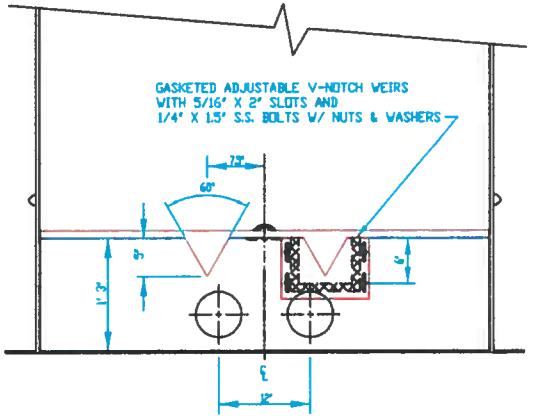
FIBERGLASS VERTICAL CYLINDRICAL 5' SPLITTER BOX



SECTION VIEW



SIDE ELEVATION
(INSTALLED)



CROSS SECTION VIEW ON "A"
SCALE: 2X

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5' DIAx5' SPLITTER BOX.dwg

AquaPoint
Performance Based Wastewater Treatment Systems
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	F.R.P. 5' Dia. x 5' SPLITTER BOX (OUTFITTED)
DRAWING NO:	1440-2
REVISION:	NONE
DATE:	AUGUST 25, 2016
DWN BY:	K. LEACH
SCALE:	NONE SIZE: B / A3
SHEET #:	1

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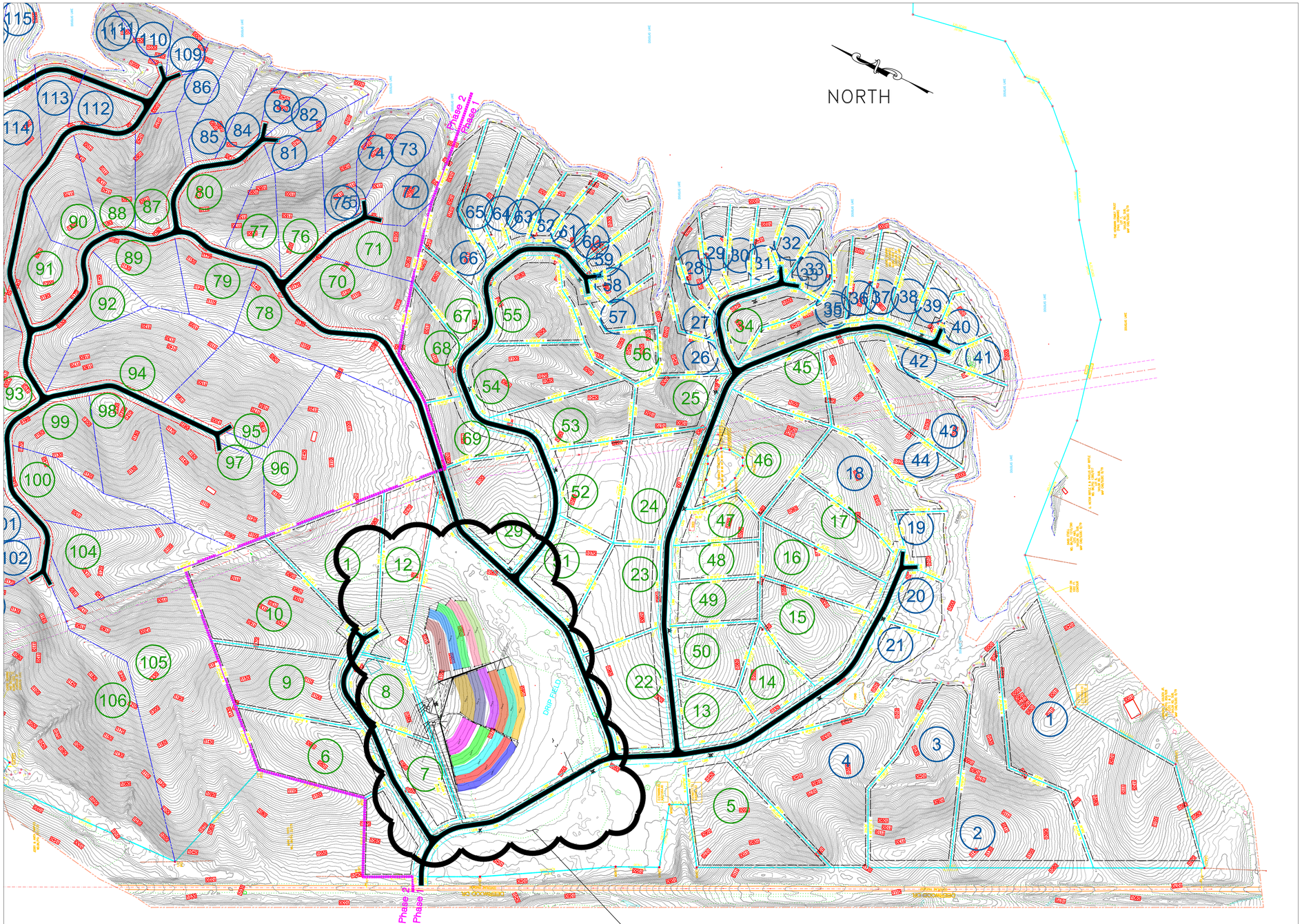

MK	DATE	BY

JEFFREY SHAWN FOX
REGISTERED ENGINEER
AGRICULTURE
STATE OF TENNESSEE

PROPOSED SITE PLAN FOR WATERSIDE AT DOUGLAS LAKE

JEFFERSON COUNTY, TENNESSEE

SANITARY SEWER SYSTEM

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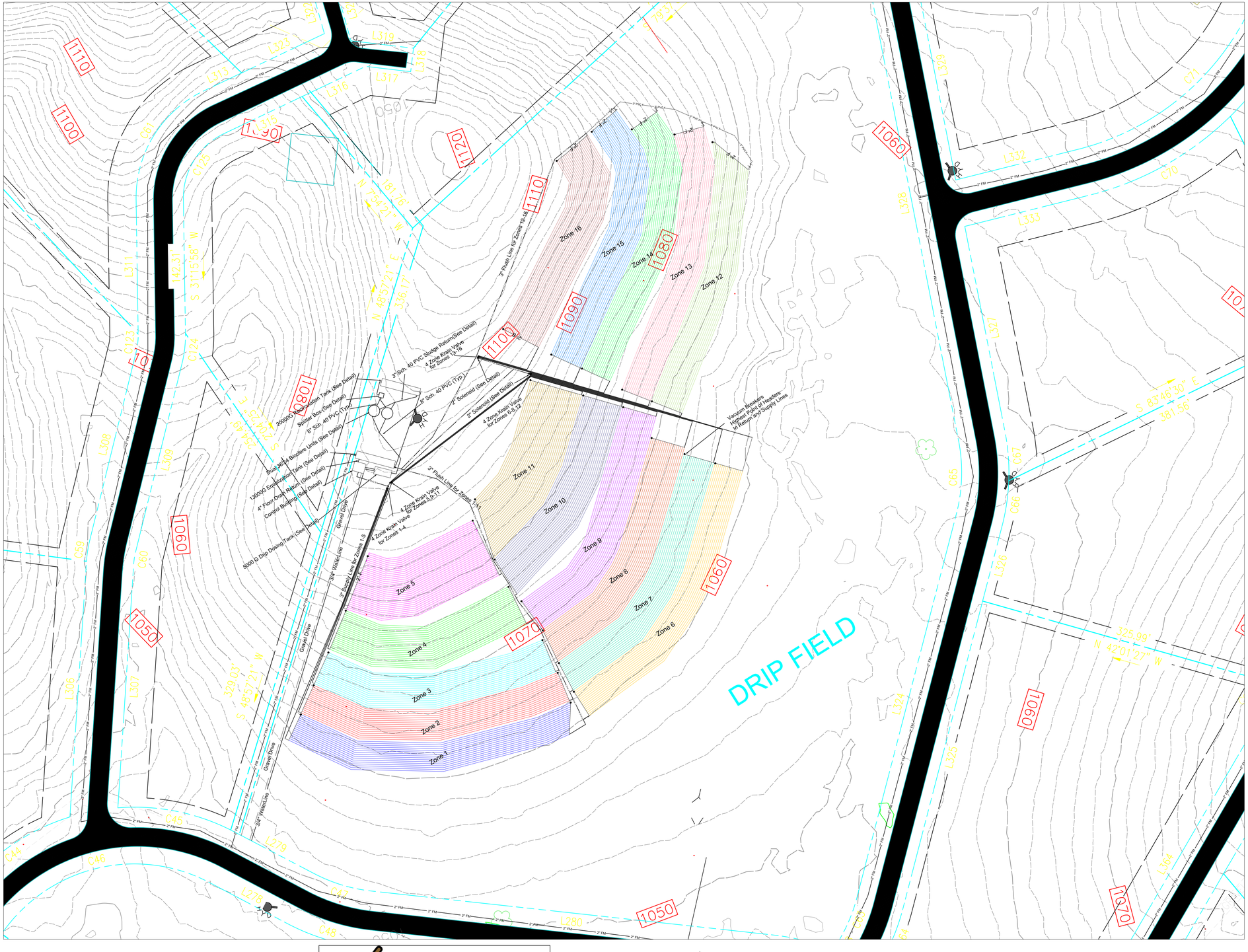

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REGISTERED ENGINEER
AGRICULTURE
STATE OF TENNESSEE

PROPOSED SITE PLAN FOR WATERSIDE AT DOUGLAS LAKE

JEFFERSON COUNTY, TENNESSEE

SANITARY SEWER SYSTEM

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Email: iwsonsite@gmail.com

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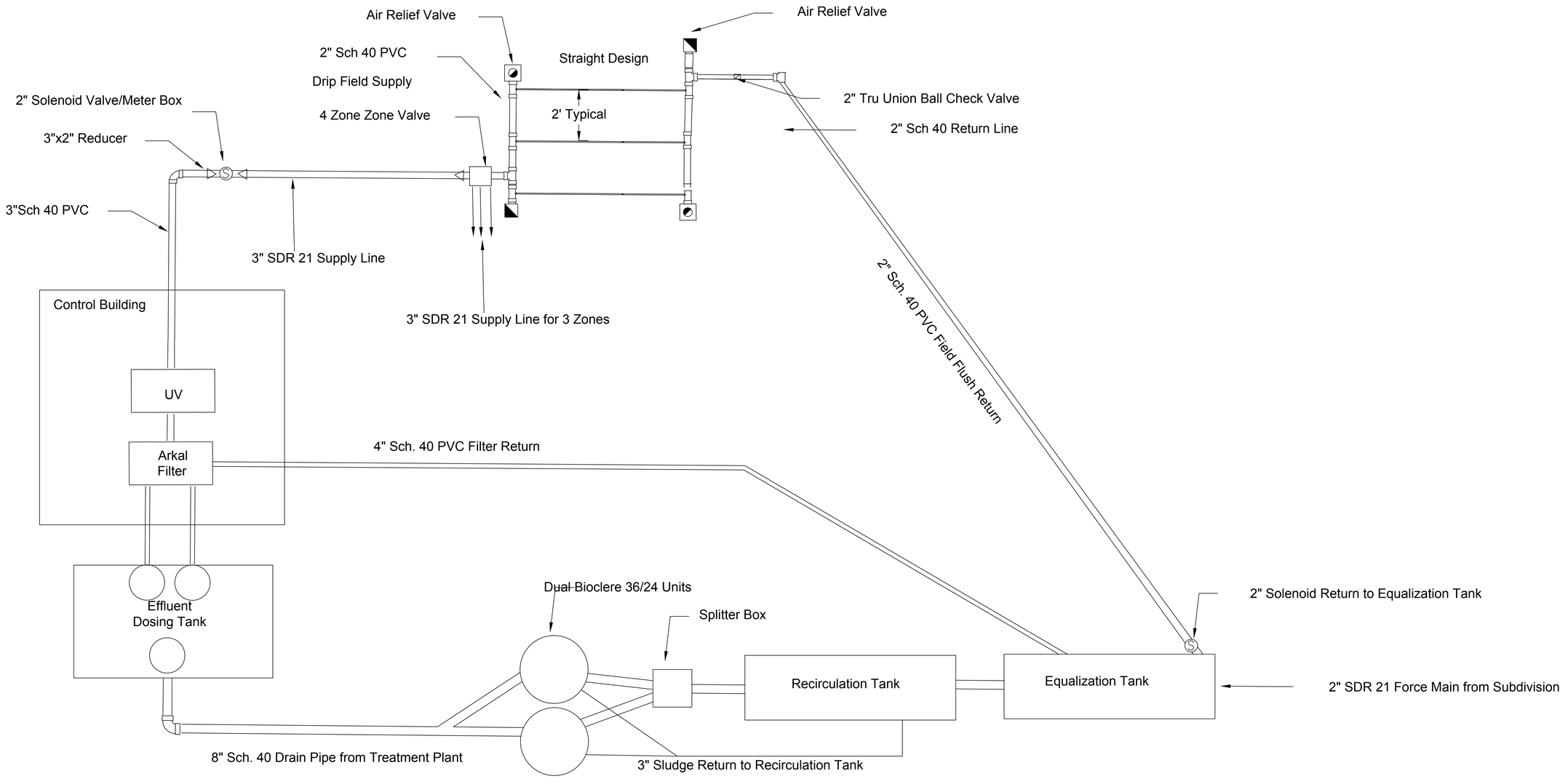

Drip Field Effluent Disposal Schematic

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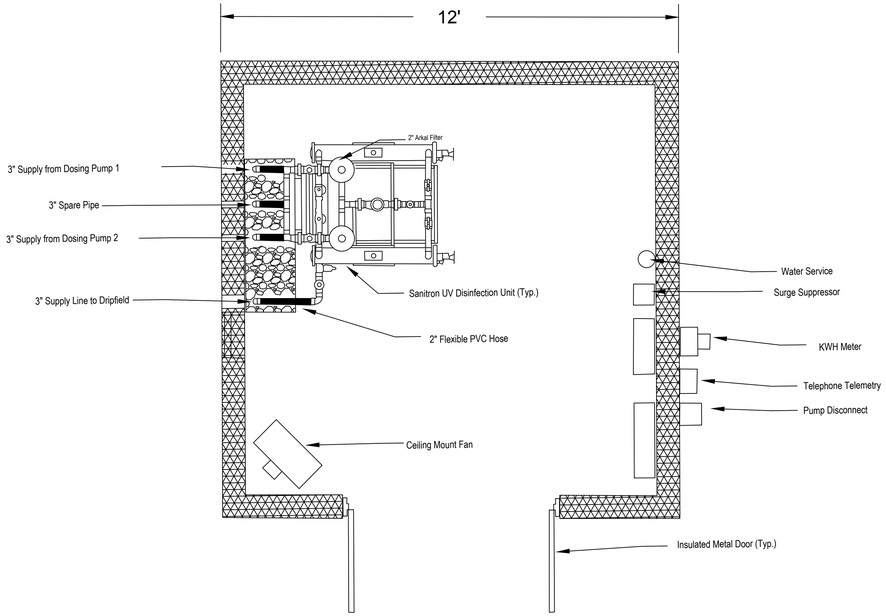
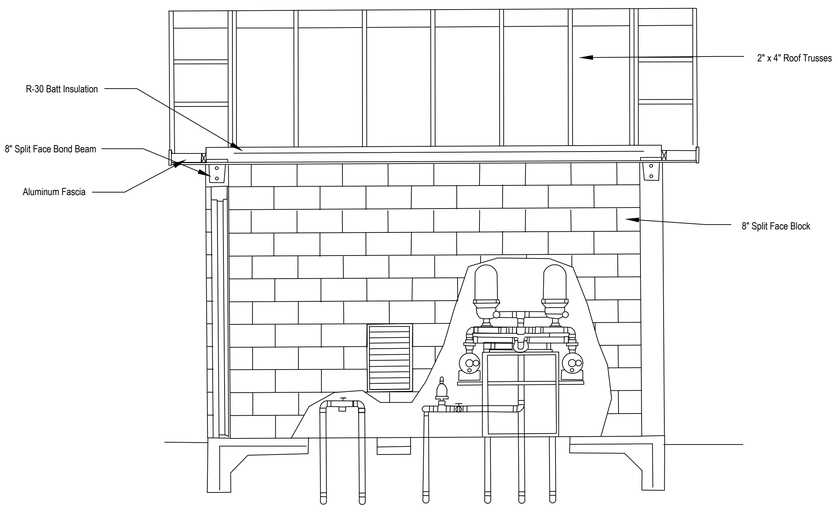
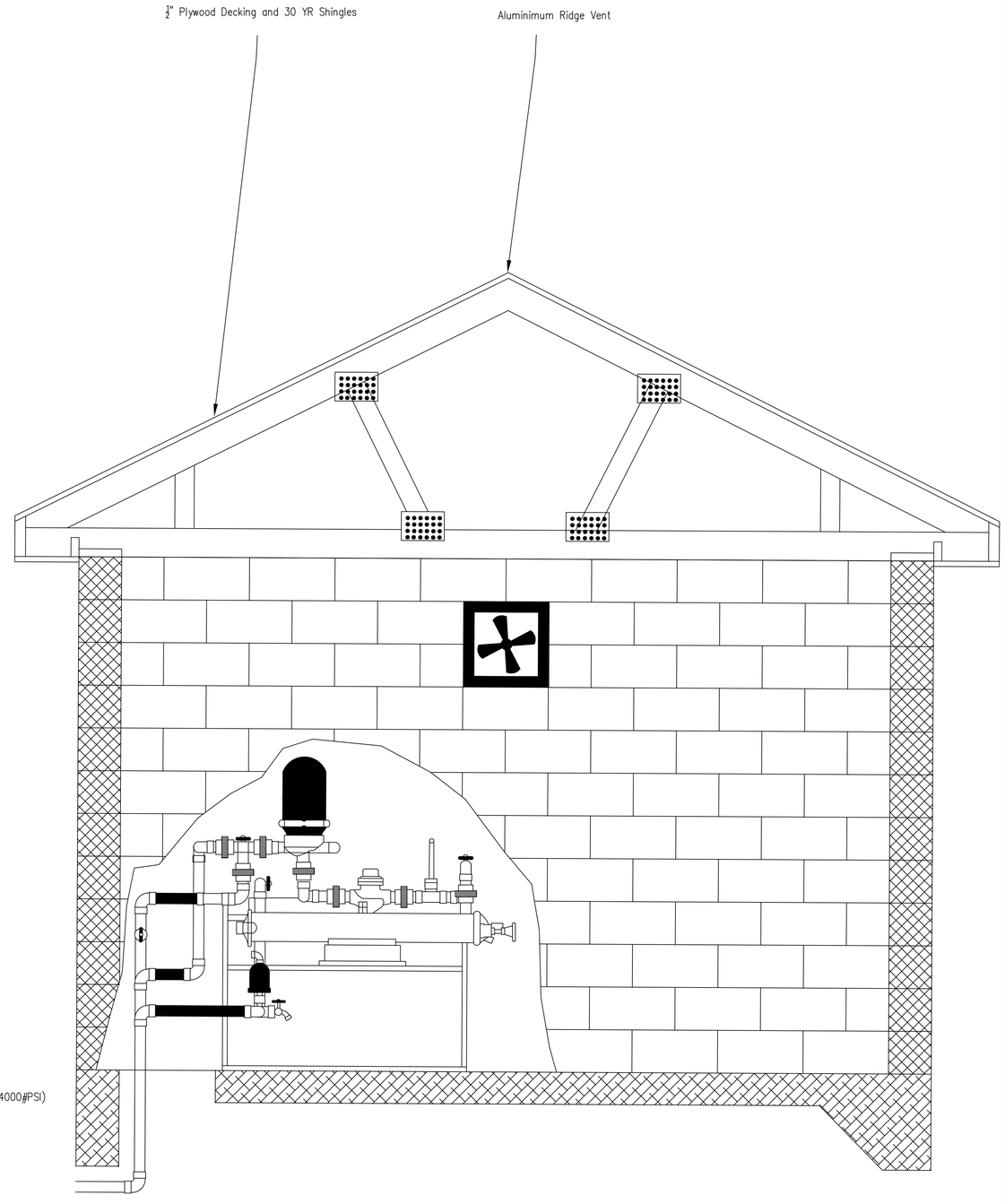


Arkal Filters with Dual Sanitron UV





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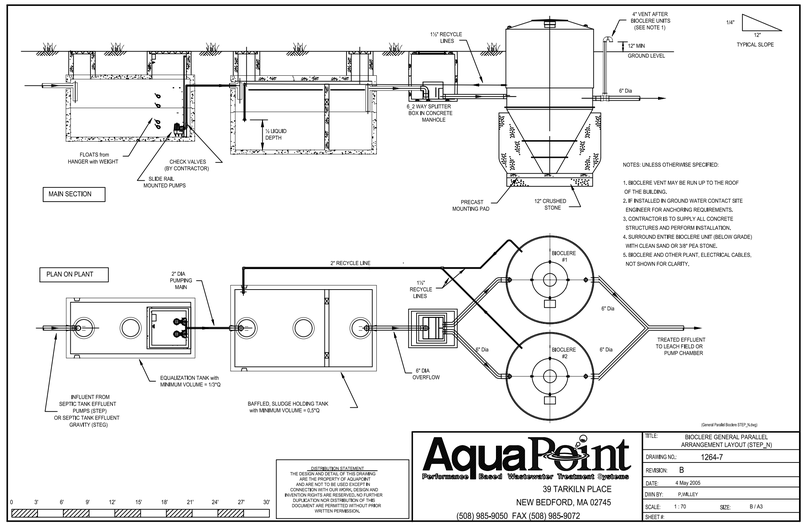

MK	DATE	BY

BIOCLERE MODEL	'A'	'B'	STEEL REINFORCEMENT GRID	APPROX PAD WEIGHT
24	8'	1'6"	#3 REBAR @ 8" O.C.	8,000 lbs
30	10'	2'0"	#3 REBAR @ 8" O.C.	12,500 lbs
36	12'	2'6"	#4 REBAR @ 10" O.C.	18,000 lbs

Electrical Requirements for Panels:

UV Panel	**20 AMP**	**115V/1 ph/60 Hz**
Equalization Tank Panel	**40 AMP**	**115V/1 ph/60 Hz**
Dual BioClere Panel	**50 AMP**	**230V/1 ph/60 Hz**
Drip Dosing Panel	**60 AMP**	**230V/1 ph/60 Hz**
Mission Telemetry Panel	**20 AMP**	**230V/1 ph/60 Hz**
Heater	**20 AMP**	**230V/1 ph/60 Hz**
Lights/Receptacles (16)	**20 AMP**	**115V/1 ph/60 Hz**

Main Breaker 200 AMP 32- Space 40- Circuit Indoor Main Breaker

Individual Service Requirements:

UV Panel	
Power Connection	**(1) ¾" C with (2) #12, #12G**
Equalization Tank	
Pumps	**(1) 1" Conduit with (6) #12, #12 G**
Floats	**(1) 1" Conduit with (8) #12, #12 G**
Dual BioClere Panel	
Pumps	**(2) 1" C, with (9) #12, #12 G to Pumps**
Fan	**(2) ¾" C with (2) #12, #12 G**
Floats	**(2) ¾" C with (2) #12, #12 G**
Drip Dosing Panel	
Pumps	**(1) 1" C, with (6) #10, #10 G**
Solenoids	**(1) 1" C with (10) #16, #16 G**
Floats	**(1) ¾" C with (8) #12, #12 G**

STATE OF TENNESSEE

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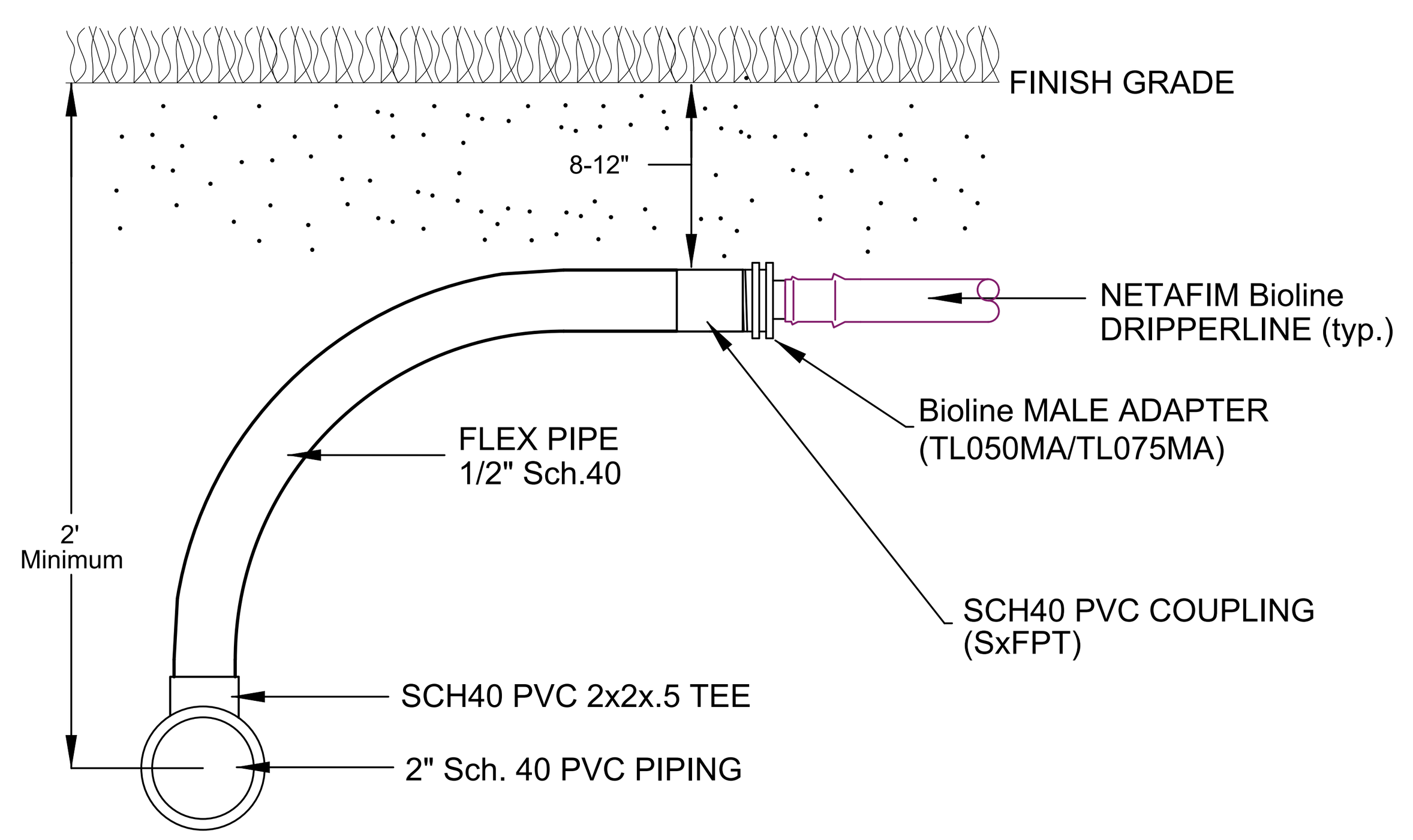
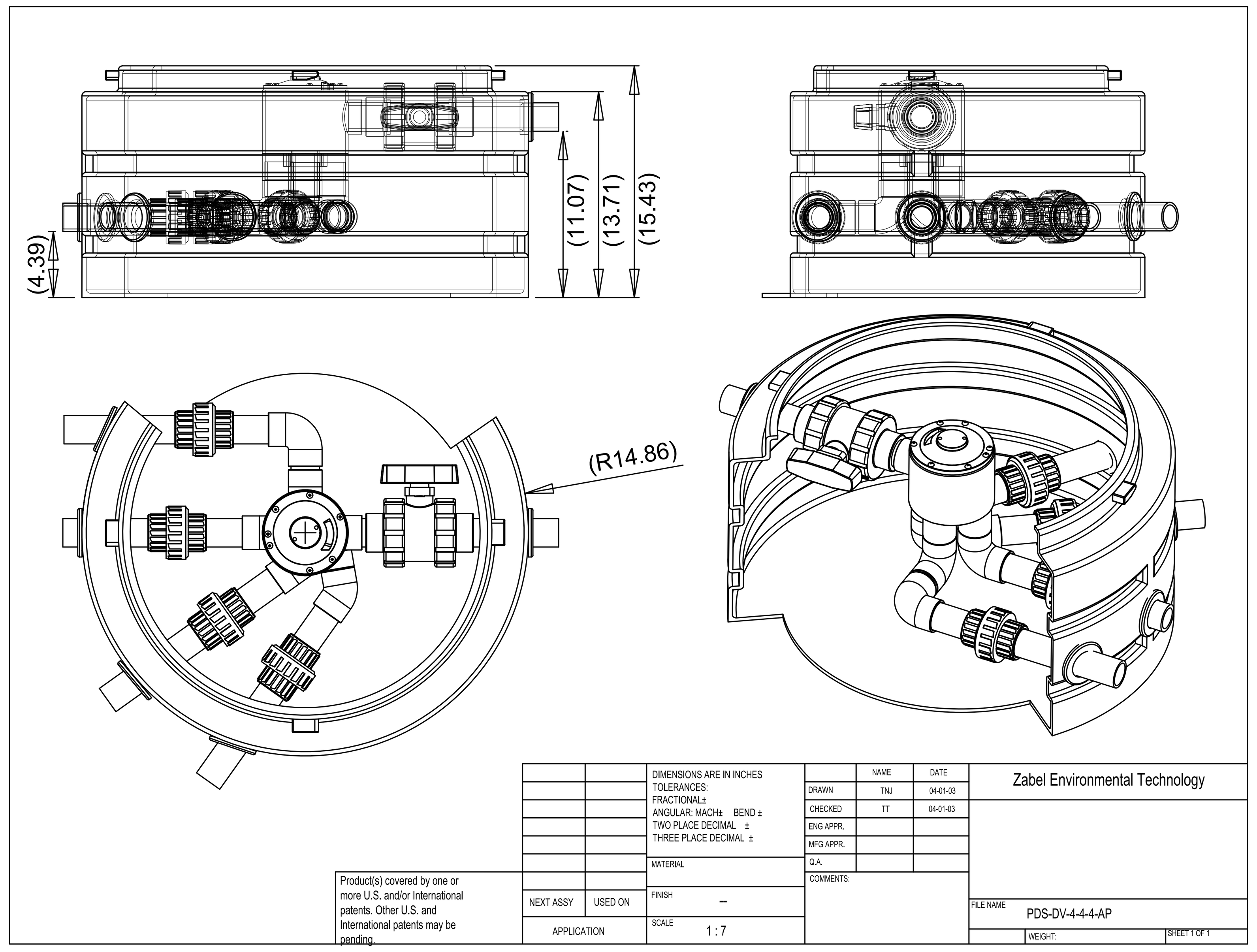
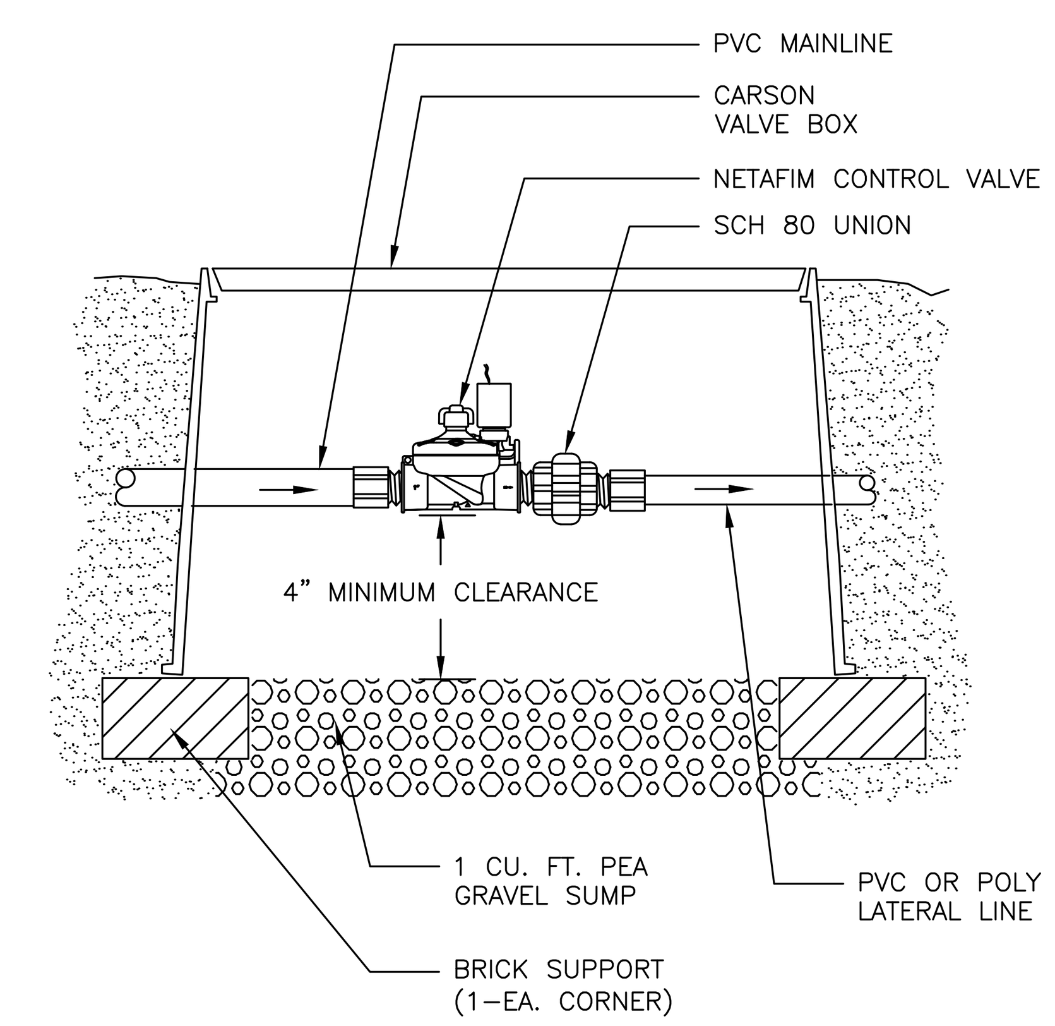


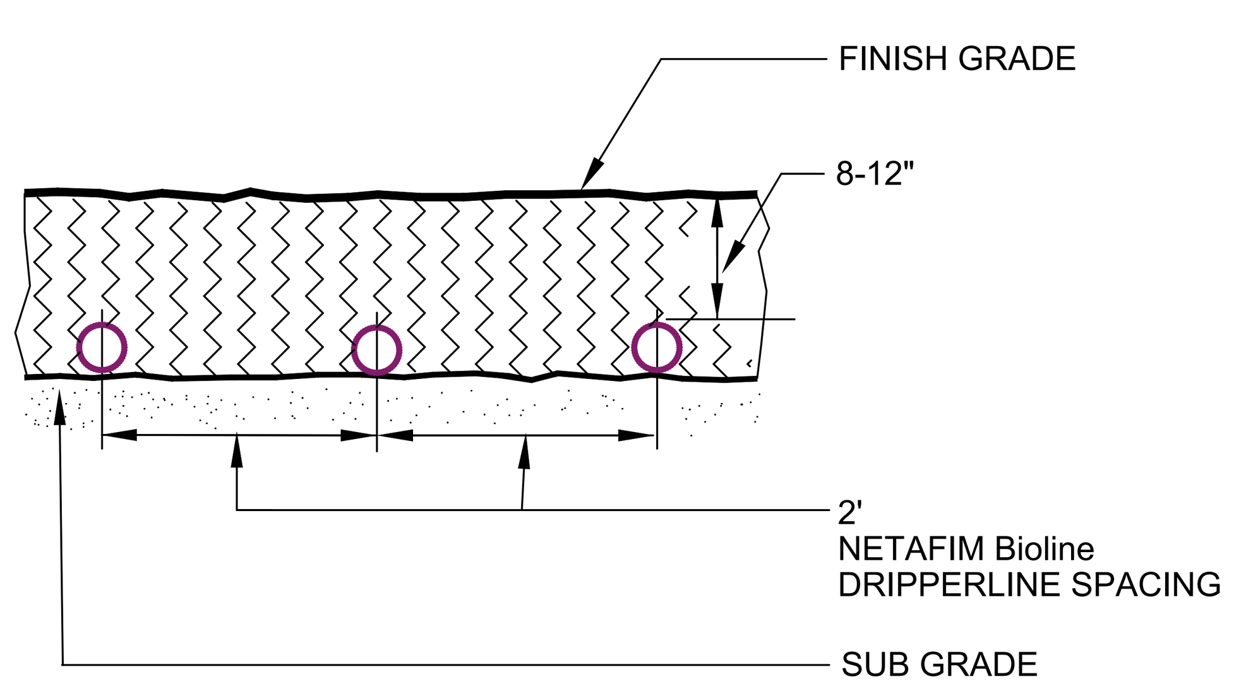
A5 NETAFIM Bioline DRIPPERLINE: End Feed
START CONNECTION w/ FLEX PIPE
DETAIL
NO SCALE



4 Zone Valve KRain
6000 Series



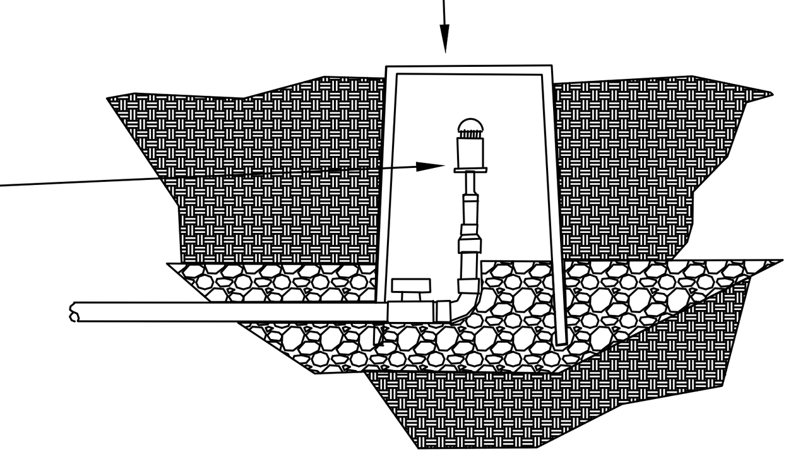
A1 SERIES 80 NYLON CONTROL VALVE
NOT TO SCALE
DETAIL – V101



A4 NETAFIM Bioline DRIPPERLINE
SUBGRADE INSTALLATION
DETAIL - NO SCALE

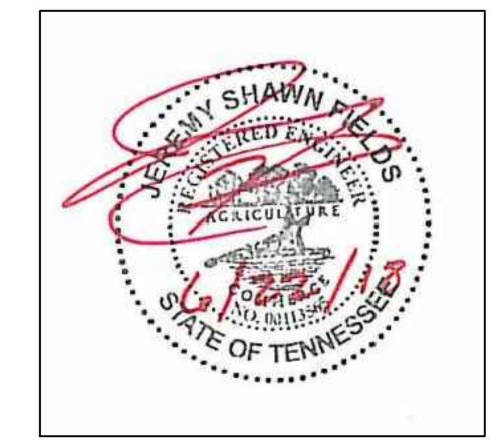
Carson Meter Box (Typ.)

3/4" Air Vacuum Valve (Typ.)



DRIP DISPOSAL AUTOMATIC AIR RELEASE VALVE ASSEMBLY

MK	DATE	BY

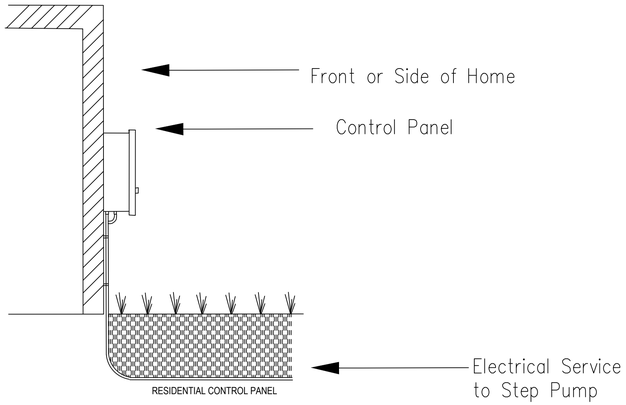


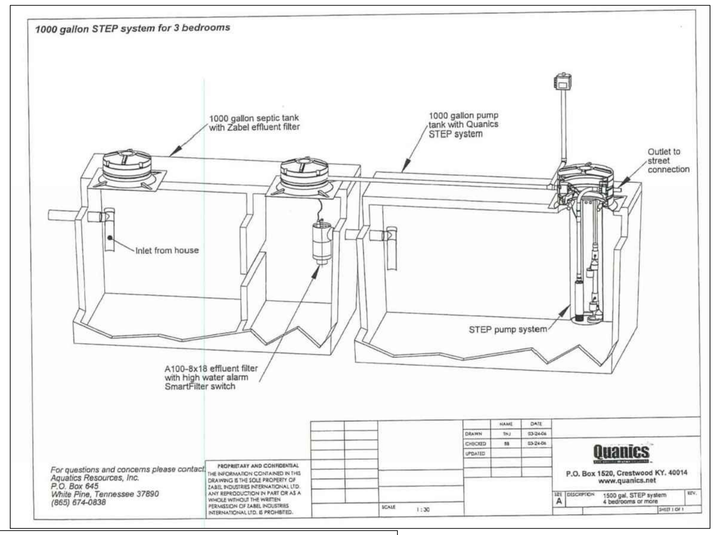
PROPOSED SITE PLAN FOR
WATERSIDE AT DOUGLAS LAKE
JEFFERSON COUNTY, TENNESSEE
SANITARY SEWER SYSTEM

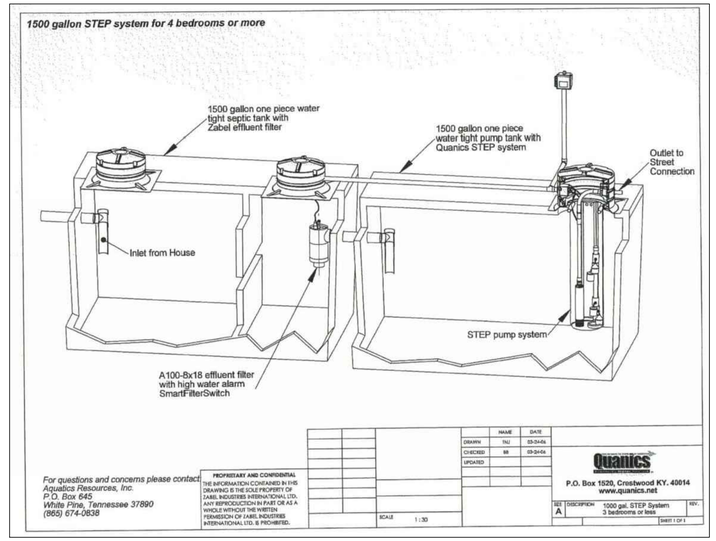
INNOVATIVE WASTEWATER SOLUTIONS, INC.
3675 Brown Springs Road Greeneville, TN 37743
Phone: (423) 620-0036 Phone: (865) 776-8771
Email: iwsonsite@gmail.com

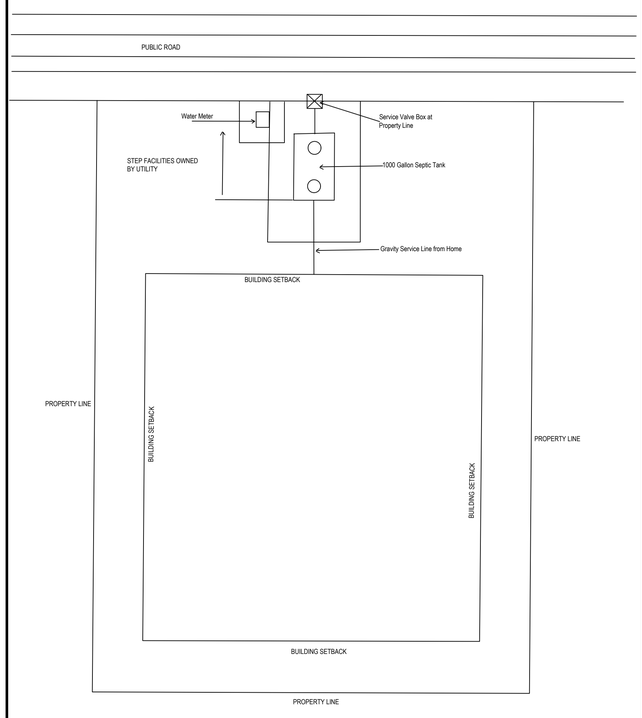
DRAWN
KD
CHECKED
JF
DATE
06/22/2018
SCALE
AS SHOWN
JOB NO.

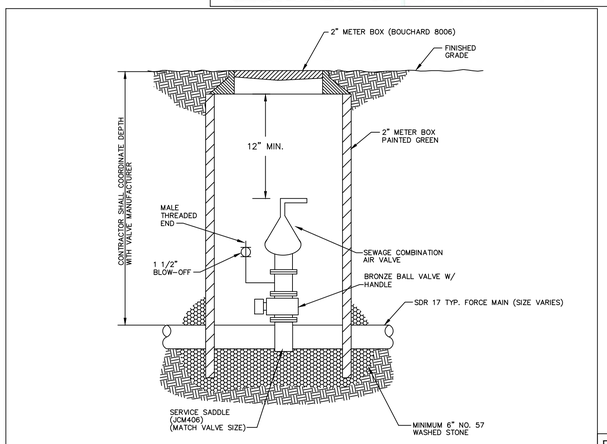
SHEET
SS-6
OF
7
SHEETS







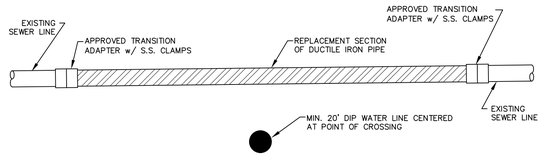




NOTES:
1. COMBINATION AIR VALVE TO BE INSTALLED AT ACTUAL HIGH POINT OF LINE. CONTRACTOR SHALL COORDINATE LOCATION WITH INSPECTOR.
2. VALVE SIZE AS SHOWN ON DRAWINGS OR DETAILED IN THE SPECIFICATIONS.
3. ALL PIPING FOR COMBINATION AIR VALVE SHALL BE BRASS OR STAINLESS STEEL.
4. CONTRACTOR SHALL ADJUST THE DEPTH OF THE FORCE MAIN AT ALL HIGH POINTS TO ACCOMODATE THE INSTALLATION OF THE COMBINATION AIR VALVE.

SEWAGE FORCE MAIN COMBINATION AIR VALVE

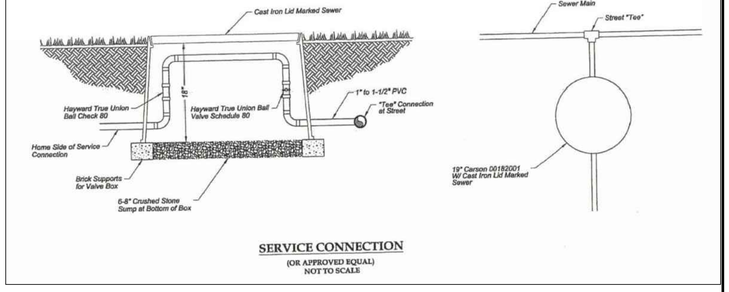
NOT TO SCALE



NOTE: THIS DETAIL SHALL ONLY BE USED IF THE FOLLOWING WATER AND SEWER SEPARATIONS CANNOT BE MET:
WATER AND SEWER LINES SHALL HAVE A MINIMUM 10' HORIZONTAL SEPARATION OR A MINIMUM 18" VERTICAL SEPARATION WITH THE WATER OVER THE SEWER, OR BOTH WATER AND SEWER LINES SHALL BE DUCTILE IRON PIPE 10' EITHER SIDE OF THE CROSSING.

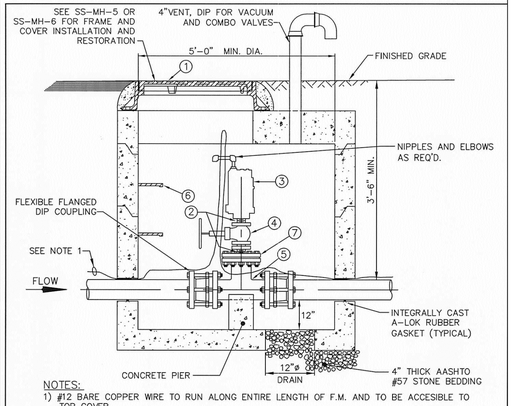
WATER AND SEWER CROSSING

NOT TO SCALE



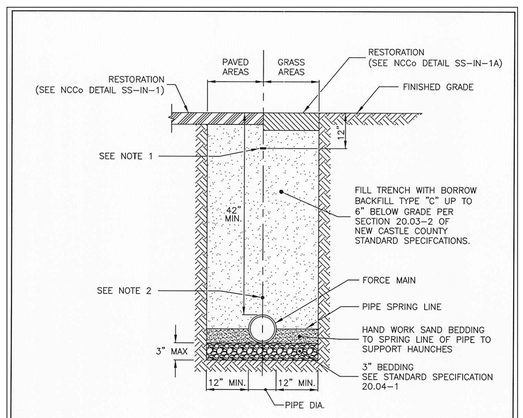
SERVICE CONNECTION

(OR APPROVED EQUAL)
NOT TO SCALE



NOTES:
1) #12 BARE COPPER WIRE TO RUN ALONG ENTIRE LENGTH OF F.M. AND TO BE ACCESIBLE TO TOP COVER.
2) ALL NUTS & BOLTS SHALL BE STAINLESS STEEL (S.S.).
3) NCC OR ENGINEER MAY REQUIRE A COMBINATION AIR/VACUUM RELEASE VALVE IN CERTAIN CIRCUMSTANCES.
4) CHAMBER MUST BE SIZED TO PROVIDE ACCESS TO SERVICE VALVES.
5) ALL DIP SHALL BE COATED WITH 2 COATS ASPHALTIC COATING.

ITEM	DESCRIPTION
1	N.C.C STD. M.H. COVER & FRAME – DETAIL SS-MH-9
2	2" FTP STAINLESS STEEL NIPPLES
3	AIR/VACUUM OR COMBO RELEASE VALVE W/2" INLET (GA INDUSTRIES OR APPROVED EQUIVALENT)
4	2" NRS RESILIENT WEDGE GATE VALVE (US PIPE OR EQUIVALENT)
5	FULL TEE (FJ x FJ x FJ)
6	NCC STANDARD MANHOLE STEPS – DETAIL SS-MH-10
7	BLIND FLANGE WITH 2" THD. TAP



NOT TO SCALE

NOTES:
1) PIPELINE DETECTABLE TAPE SHALL BE INSTALLED CONTINUOUSLY ALONG PIPE. THE TAPE SHALL BE "LINEGUARD" TYPE III DETECTABLE TAPE AS MANUFACTURED BY LINEGUARD INC., OF WHEATON, IL, OR EQUAL. TAPE SHALL BE 2" WD. MIN., COLOR-GREEN, WITH MESSAGE "CAUTION-SEWER LINE BELOW"
2) PIPELINE DETECTABLE WIRE SHALL BE INSTALLED CONTINUOUSLY ALONG PIPE. WIRE SHALL BE INSULATED (GREEN), SOLID COPPER, #14 AWG, 600 VOLT, OF NOT LESS THAN 98% CONDUCTIVITY, CONFORMING TO ASTM. B.58. SPLICING SHALL BE SOLDERLESS, SPLIT BOLT BUG CONNECTOR AS MANUFACTURED BY ILSCO TYPE IK-8 CONNECTOR OR EQUAL. WIRE TO BE BROUGHT UP TO THE SURFACE AT THE BEGINNING AND TERMINATION OF THE PIPE AND AT ANY IN-LINE VALVING (INTERIOR OF THE VALVE BOX).

MK	DATE	BY

JEREMY SHAWN FOX
REGISTERED ENGINEER
AGRICULTURAL
STATE OF TENNESSEE

PROPOSED SITE PLAN FOR
WATERSIDE AT DOUGLAS LAKE
JEFFERSON COUNTY, TENNESSEE
SANITARY SEWER SYSTEM

INNOVATIVE WASTEWATER SOLUTIONS, INC.
3675 Brown Springs Road Greeneville, TN 37743
Phone: (423) 620-0036 Phone: (865) 776-8771
Email: iwsonsite@gmail.com

IWS

DRAWN KD
CHECKED JF
DATE 06/22/2018
SCALE AS SHOWN
JOB NO.

SHEET **SS-7** OF **7** SHEETS