



Village Marine IMF 7,000-20,000

Part Number: 95-0020

Industrial Media Filter

IMF 7,000-20,000

Installation, Operation & Maintenance

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

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The following are definitions of the type of flags used in this manual. They should be given special attention when they appear in the text:

WARNING!

- Concerns an operating procedure or practice that, if not strictly observed, can result in injury to personnel or loss of life.

CAUTION

- Concerns an operating procedure or practice that, if not strictly observed, can result in damage to or destruction of equipment.

NOTE

- Concerns an operating procedure or condition that needs highlighting.

1.0 SYSTEM DESCRIPTION

The Village Marine Tec Media IMF systems are specifically designed to operate with Village Marine Tec PW RO systems. The media layers are designed to remove particulate and suspended contaminants ahead of the micron filtration. IMF model numbers correspond to watermaker capacity. For example, PW3000 to PW7000 watermakers require IMF7000 media filtration system.

1.1 SPECIFICATIONS

1.1.1 Performance Characteristics

Table 1-1 Performance Specifications.

Parameter	IMF7000	IMF10000	IMF20000
Maximum design flow, GPM *	20/25	30/38	40/50
Raw water temperature range, °C (°F)	1-45 (33-110)	1-45 (33-110)	1-45 (33-110)
Raw water inlet design pressure, psi**	0-25/30-75	0-25/30-75	0-25/30-75
Max filter differential pressure, psi	25	25	25

* Design flow without cyclones/design flow with optional cyclones

** With boost pump/Without boost pump (boost pump optional). Media filter vessel and piping maximum pressure 100 psi, regulator should be installed if necessary.

CAUTION

The pressure within the media filter system should never exceed 100 psi. Serious damage to the equipment will result.

CAUTION

The Media filter unit will be damaged under vacuum conditions. The Media filter units are supplied with vacuum breaker valves to prevent this condition.

1.1.2 Skid Physical Characteristics (Dimensions subject to change with the addition of optional equipment and/or a particular application)

	IMF7000	IMF10000	IMF20000
o Length:	48"	48"	48"
o Width:	40"	40"	48"
o Height:	80"	95"	95"
o Weight:	2,000 lbs.	2,300 lbs.	2,500 lbs

*Dimensions and weight may vary with optional equipment.

1.1.3 Power Requirements (optional boost pump, please check serial number plate)

- Voltage: 110/220/380/460 VAC
- Hertz: 50/60
- Phase: 1 or 3
- HP: 2

2.0 GENERAL THEORY OF OPERATION

2.1 MEDIA FILTER THEORY

The objective of the media filter is to reduce particulate and suspended matter that is in the raw water source. The target filtration is to remove all particles above a particle size of 30 microns.

A media filter uses layers of material to filter particulate matter contained in the raw water. Village Marine Tec uses a specific mix and amount of media to target particulate matter and installation conditions, allowing improved performance of the downstream RO system.

Media filter constituents (common application):

- Anthracite
- Ironsborb Birm
- sand
- fine gravel base (supplied on some installations only)

Alternate media filter constituents with chlorinated feed and iron reduction requirement:

- Greensand
- Fine gravel base

2.2 OPERATIONAL DESCRIPTION

Water is pumped into the intake of the media filter at the top of the tank. The media filter catches particulate matter in the gaps and pores between the media. When the filter becomes loaded with particles (determined by the increase in differential pressure), it can be back flushed and the accumulated solids discharged to drain. Upon completion of the back flushing process the filter can be rinsed before putting back into service.

2.3 CONTROLS AND INSTRUMENTATION

At this time it is advisable to review all drawings to familiarize yourself with the instrumentation and controls.

Table 2. Instruments and Controls.

Call Out	Description	Function
FC	Backflush flow control orifice.	Automatically regulates backwash flow rate.
PI1	Cyclone inlet gauge (optional).	Indicates inlet pressure to the cyclone array.
PI2	Media filter inlet pressure gauge.	Indicates inlet pressure of media filters.
PI3	Media filter outlet pressure gauge	Indicates outlet pressure
P1	Boost Pump (optional)	Increases feedwater pressure.
V1	Top 3-way valve.	Allows operator to run and back flush filter.
V2	Bottom 3-way valve.	Allows operator to run, and rinse filter.
V3	Backflush valve.	Allows operator to initiate back flush flow.
V4	Cyclone reject valve. (optional)	Allows operator to regulate cyclone reject flow.
ST1	Inlet strainer.	Removes large particulate matter ahead of unit.
SW3	Boost pump START/STOP (optional)	Allows operator to start or stop media filter boost pump.
VB	Vacuum breaker.	Prevents collapse of media filter during vacuum condition.

3.0 OPERATION

3.1 INITIAL START-UP OPERATION

1. After filling the filter with granular media and the initial media cleaning (see instructions at back of manual), place media filter unit's valves in positions indicated in Table 3-1.

Table 3. Valve Positions- Initial Start-up.

ID	Description	Position
V1	Top 3-way valve.	Normal/left
V2	Bottom 3-way valve.	Rinse/right
V3	Backflush Valve	Closed
V4	Cyclone reject valve (optional)	Cracked

2. Prepare down stream equipment for operation.
3. Open the raw water source to the media filter system.
4. Adjust Pressure Regulator (if equipped) to 50 psi max (or 75 psi if equipped with cyclones).
5. If optional boost pump is installed start the pump. Allow the unit to run in rinse mode.
6. Adjust the Cyclone Reject Valve, V4, to allow the pressure drop across the cyclones to be 15 to 25 psi.
7. Allow media filter to run for 3-5 minutes in rinse mode while media settles, flushes and stabilizes.
8. When you are ready to start the downstream RO, turn V2 180° clockwise to the normal/left position.
9. The media filter is now operating in normal mode.

NOTE

Rotate V2 rapidly making sure not to hesitate in the closed/perpendicular position.

3.2 SHUT DOWN PROCEDURES

3.2.1 Shutdown Procedure

1. Shut down RO unit prior to turning off media filter boost pump.
2. Push media filter boost pump Stop button (if equipped with pump). There is no special position the valves need to be in for shutting down the media filters. If no boost pump is installed, simply secure the unit. The three way valves are closed when the handle is in the center position.

3.2.2 Extended Shutdown Procedure

If the Media Filter unit is to be shutdown for periods exceeding 7 - 10 days, stagnant water in the system could breed bacteria and other biological growth. These organisms may increase in numbers sufficient to block the media filter unit and can create nuisance odors. The extended preservation procedure found in Section 4.5 can be avoided with either of the following procedures:

- o Backwash the media filter unit with fresh water for 10 minutes every 10 days.
- o Rinse the media filter unit by operating system with seawater for 10 minutes every 4 days

4.0 MAINTENANCE INSTRUCTIONS

4.1 GENERAL

The following chart (Figure. 5-1) illustrates the frequency of basic maintenance required by the Media filter to keep the system in good operating condition.

Task	Frequency							SEE SECTION
	100 HOURS	200 HOURS	500 HOURS	1000 HOURS	2000 HOURS	ANNUALLY	AS REQUIRED	
Inspect Plumbing		◆						N/A
Lubricate motor						◆		4.4
Change mechanical seal							◆	Mfg. Lit.
Backflush media bed							◆	4.2
Change media bed							◆	Loading Inst.

Figure 1. Maintenance/Task Chart.

4.2 MEDIA FILTER BACK FLUSHING

4.2.1 When to back flush.

The media filters should be back flushed before the pressure difference between PI2 and PI3 reaches 25 psi. More frequent backflushing is sometimes desirable, depending on specific operating circumstances. Shorter backwashes at shorter intervals are preferred over longer backwashes at longer intervals.

4.2.2 Back flush procedure.

1. Place media filter unit's valves in backwash positions as indicated in Table 4-1.

Table 4-1. Valve Position- Back flush Mode.

ID	Description	Position
V1	Top 3-way valve.	Back flush/ right
V2	Bottom 3-way valve.	Closed/ Perpendicular
V3	Back flush Inlet valve.	Open
V4	Cyclone reject valve. (optional)	Do not adjust

2. Turn on the media filter boost pump (if equipped) and / or open the raw water supply. Run unit in back flush mode.
3. Observe the flow through the back flush sight glass. The first few minutes should appear muddy as the filter flushes out its acquired loading. After 5-10 minutes the water should appear clear and the back flush process will be complete.
4. After the media filter has been sufficiently back flushed stop the media filter boost pump (if equipped, or secure the feedwater supply).
5. Place media filter unit's valves in the rinse positions as indicated in Table 4-3.

Table 4-3. Valve Position- Rinse Mode.

ID	Description	Position
V1	Top 3-way valve.	Normal/left
V2	Bottom 3-way valve.	rinse/right
V3	Backflush Inlet Valve.	Closed
V4	Cyclone reject valve. (optional)	Cracked

6. Restart the media filter boost pump (or open the feed water inlet) and run the unit in rinse mode. After 1-3 minutes the media filter will be sufficiently rinsed. Now stop the media filter boost pump (or secure the inlet).
7. Turn V2, the bottom 3-way valve to its normal/pointing to the left position. The media filter is now back flushed and rinsed and ready to put back on line.

4.3 MEDIA FILTER PRESERVATION

During periods when the Media Filter unit is to be shut down for an extended period of time, it is necessary to add a preservative solution to prevent the growth of biological organisms. Use the following procedure to preserve the Media Filter:

1. Dissolve 2 lbs of VMT preservative chemical #3 with 5 gallons of water in a pail.

CAUTION

Preserving chemical #3 is a food-grade preservative. See warning label on package and observe all safety precautions on label.

2. Insure that the media filter and all associated equipment are turned off and all pressure has been relieved from the system. Secure the feedwater inlet.
3. Close valve V2 by turning the valve to the half way (perpendicular) position.
4. Open the top of the vessel and drain water enough to pour the 5 gallon bucket preservative mixture into media filter. It is often possible to unscrew the vacuum breaker valve and pour the preservative through a funnel rather than unscrewing the top cap. There is drain plug in the bottom of the piping.
5. The system is now preserved and may be left idle for a one month period of time. The preservation procedure should be repeated monthly.

4.4 RESTARTING UNIT AFTER PRESERVATION

Follow procedure in Section 3.1, Initial Start Up Procedure to restore Media Filter unit to service.

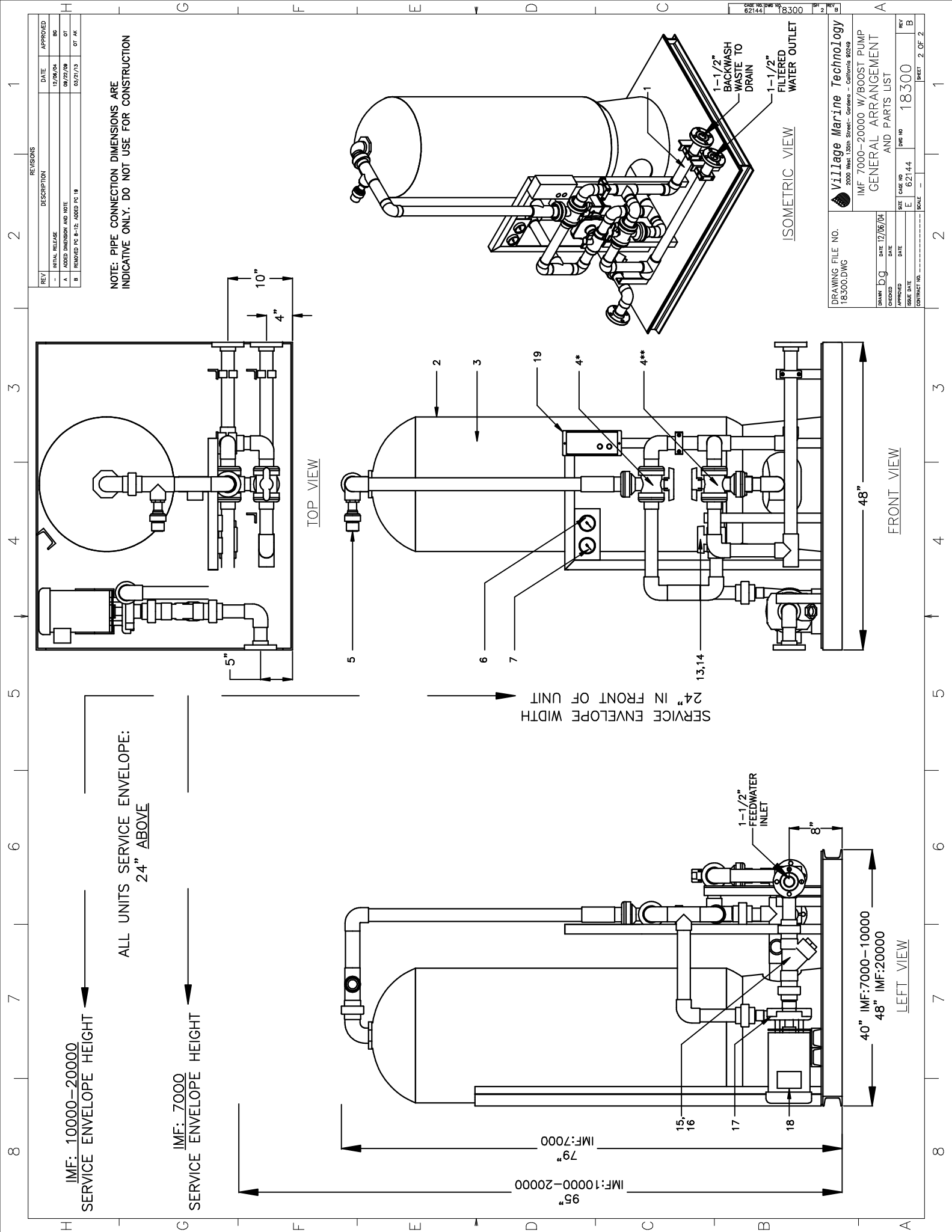
4.5 INSPECTION

Figure 4-1 depicts a sample operation log for the Media Filter unit. If the filter is used with a RO Desalinators, the log table might be combined with one for the RO for convenience. The operator of the Media Filter unit should follow the program for routinely entering the required data on a regular basis which will aid in determining maintenance frequency and reduce system downtime. This log data is also required in the event a Media Filter warranty claim is made

Product Information Sheet
PRESERVATIVE CHEMICAL #3

<p>Hazard Data::</p> <p>Appearance and Odor:</p> <p>Solubility in Water:</p> <p>pH of 1% Solution @ 20°C:</p> <p>Fire and Explosion data:</p> <p>Reactivity Data:</p> <p>Hazardous Polymerization:</p> <p>Toxicity:</p>	<p>Moderate health hazard, irritant</p> <p>Coarse white granules with a sulfur dioxide odor</p> <p>Complete</p> <p>4.5</p> <p>No hazard exists</p> <p>Minimal</p> <p>Will not occur</p> <p>TLV 5</p>
<p>2. Health Hazard Information:</p> <p>(a) Oral Ingestion:</p> <p>(b) Eye Contact:</p> <p>(c) Skin Contact:</p> <p>(d) Inhalation:</p>	<p>Not considered a primary route of contact</p> <p>Considered a moderate irritant</p> <p>Considered a mild irritant</p> <p>Considered a moderate irritant</p>
<p>3. Emergency First Aid:</p> <p>(a) Oral ingestion:</p> <p>(b) Eye Contact:</p> <p>(c) Skin Contact:</p> <p>(d) Inhalation:</p>	<p>Do not induce vomiting. If conscious, give lots of water or milk. Get immediate medical attention.</p> <p>Flush eye immediately with large volume of water for 15 minutes lifting eyelids occasionally. Get medical attention.</p> <p>Wash contacted area with soap & water. Launder clothing before reuse.</p> <p>Remove to fresh air. Give artificial respiration if not breathing. Get immediate medical attention.</p>
<p>4. Spill or Leak: Steps to be taken in case material is released or spilled.</p> <p>(a) Sweep/shovel into salvage containers</p> <p>(b) Flush are with water to remove final traces</p>	
<p>5. Waste Disposal Method:</p> <p>(a) Material may be diluted with water and flushed into an approved drain</p> <p>(b) Comply with all applicable federal, state and local regulation</p>	
<p>6. Special Protection Information:</p> <p>(a) Respiratory Protection:</p> <p>(b) Ventilation:</p> <p>(c) Protective Gloves:</p> <p>(d) Eye protection:</p>	<p>NIOSH approved respirator</p> <p>Local mechanical exhaust</p> <p>Acid-resistant gloves</p> <p>Chemical goggles. Contact lenses should not be worn.</p>
<p>7. Handling and Storing:</p>	<p>Conform to normal warehousing conditions</p>
<p>8. Product Information:</p>	<p>Membrane preservative is a mild acidulating and reducing agent for use as a bleach, antichlor, antiseptic in the fermentation industries and food preservative.</p>

5.0 SYSTEM/EQUIPMENT DRAWINGS



REV	DESCRIPTION	DATE	APPROVED
-	INITIAL RELEASE	12/06/04	BP
A	ADDED DIMENSION AND NOTE	09/27/09	OT
B	REMOVED PC 8-12; ADDED PC 19	03/27/13	OT JK

NOTE: PIPE CONNECTION DIMENSIONS ARE INDICATIVE ONLY. DO NOT USE FOR CONSTRUCTION

IMF: 10000-20000
SERVICE ENVELOPE HEIGHT

ALL UNITS SERVICE ENVELOPE:
24" ABOVE

IMF: 7000
SERVICE ENVELOPE HEIGHT

TOP VIEW

10"
4"

5"

48"

FRONT VIEW

2
3
19
4*
4**
13,14

5
6
7

24" IN FRONT OF UNIT
SERVICE ENVELOPE WIDTH

LEFT VIEW

95"
IMF:10000-20000
79"
IMF:7000
40" IMF:7000-10000
48" IMF:20000
1-1/2" FEEDWATER INLET
8"

ISOMETRIC VIEW

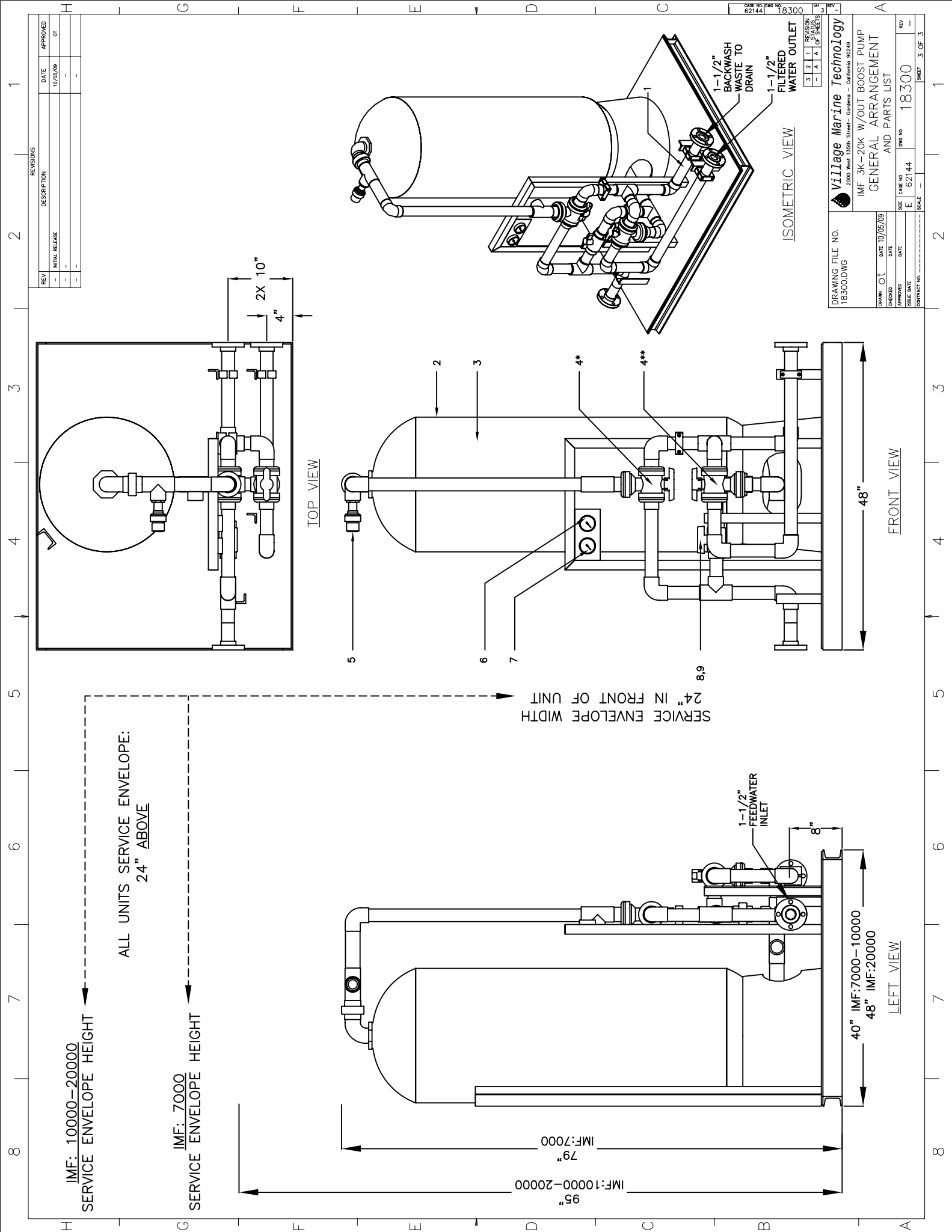
1-1/2" BACKWASH WASTE TO DRAIN
1-1/2" FILTERED WATER OUTLET

DRAWING FILE NO. 18300.DWG
 DRAWN: dg DATE: 12/06/04
 CHECKED: DATE: DATE: DATE:
 ISSUE DATE: E 62144
 CONTRACT NO. PART: SHEET 2 OF 2

Village Marine Technology
 2000 West 155th Street - Corona - California 92689

IMF 7000-20000 W/BOOST PUMP
 GENERAL ARRANGEMENT
 AND PARTS LIST

DWG NO. 18300
 SHEET 2 OF 2



REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1	INITIAL RELEASE	10/05/09	GT

CASE NO. 1086 NO. 62144 18,300

REVISION	
NO.	DESCRIPTION
1	
2	
3	

Village Marine Technology
 2000 West 135th Street - Gardena - California 90249

IMF 3K-20K W/OUT BOOST PUMP
 GENERAL ARRANGEMENT
 AND PARTS LIST

DRAWING FILE NO. 18300.DWG	DATE 10/05/09	SCALE E	REV 18300
DRAWN BY	DATE	DATE	REV
CHECKED BY	DATE	DATE	
DESIGNED BY	DATE	DATE	
CONTRACT NO.			

18300.DWG 3 OF 3

6.0 MANUFACTURERS LITERATURE

INSTRUCTIONS

The care required of this pump, while nominal, is very important. We recommend a careful review of the installation and maintenance covered in this instructional pamphlet to ensure extended trouble-free service.

LOCATION

The motors used on Ampco pump units have been selected as the best for the anticipated environment. For greatest service life, mount the pump and motor where the environment is relatively clean, dry, and non-corrosive. Standard totally enclosed motors may be installed where dirt, moisture and mild corrosion are present or in outdoor locations. Specialty motors may be required for moist, corrosive, or explosive environments. Motor drain plugs (if not equipped with automatic drains) must be removed periodically to drain accumulated condensation. Pump units should be located where daily visual inspection is possible and no surrounding structure interferes with ventilating air over or through the motor.

INSTALLATION

Installation of Ampco pumps should be made as close to the supply of liquid as possible, with short and direct suction piping. Avoid high points in the piping where air pockets can form. The suction and discharge piping should be simple with the connections properly aligned to prevent any strain from being placed on the pump casing. Provisions should be made for pipe expansion and contraction in services handling hot or cold liquids. Base-mounted pedestal pumps must be realigned AFTER installation and piping is completed.

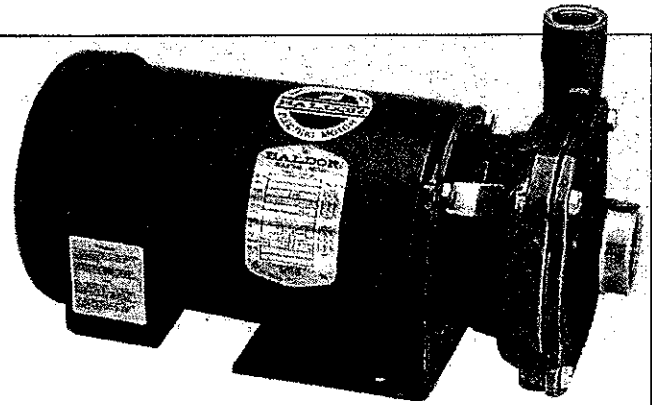
ROTATION

Check direction of rotation BEFORE starting the pump. Correct rotation is counter clockwise as viewed from the pump inlet. Incorrect rotation may cause catastrophic failure. Close coupled pumps will be equipped with single phase motors properly sequenced or with three phase motors labeled to indicate required power sequence ABC or CBA for correct rotation. Use a phase sequence indicator to identify power source sequence. For base mounted pumps disconnect the coupling and check motor rotation while disconnected from the pump.

MAINTENANCE

Daily observation of Ampco pumps while in operation is the ounce of prevention needed to extend the service life. Mechanical seals are selected for maximum life with due consideration to the economy of the installation. The seal is the only expendable item. Other pump parts are designed for indefinite life expectancy, except as they may be corroded and/or eroded by aggressive products or by misapplication such as undersizing, oversizing, cavitation, etc. Bearings on

KC2/KP2 PUMPS



some pedestal pumps and some motors are prelubricated and require no additional lubrication. Schedule for regreasing other types of bearings will vary, depending on size speed, duty, and environment. For guidance, a steady running, indoor installation in a relatively clean atmosphere at 40C (104F) ambient should not require grease for two years. Care should also be taken not to over grease motors. Pumps handling corrosive or otherwise aggressive solutions should be flushed with clean water after each use because stagnant conditions are usually most corrosive. In seawater, Ampco Alloy pumps provide cathode protection for stainless steel parts. To prevent crevice corrosion and pitting, drain and then flush out the pump with fresh water when inactive for periods greater than one week.

Ampco KC2 and KP2 pumps fitted with standard mechanical seals have all-metal seal parts of 316 stainless steel, carbon rotating face, ceramic stationary seat, and Buna-N elastomers. Other seal types are supplied when specified. Optional materials such as Viton, EPDM, or Teflon elastomers, Tungsten Carbide, Silicon Carbide, or Ni-Resist faces can be supplied when requested. The mechanical seal should be replaced at the first sign of leakage where the shaft enters the pump. Leakage may cause motor bearing damage. Also, since the primary seal surfaces are lapped to precise flatness, the seal should be replaced whenever the pump is dismantled to the point of separating the seal faces. Always keep a replacement seal kit on hand. It includes a complete seal along with the gasket and o-ring required to rebuild the pump.

There may be other pump assemblies, parts and seal arrangements not shown or otherwise described in this pamphlet, that require the same philosophy of seal positioning. It is suggested that highlights of these instructions be applied while paying close attention to parts arrangement during dismantling.

Service

DISMANTLE AND REPLACE PARTS AS FOLLOWS:

Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, to retain correct direction of rotation when reconnecting. Incorrect rotation may cause catastrophic failure.

It is recommended that the complete unit be removed and serviced on a workbench. For the close-coupled KC2 disconnect the power marking the wires for reconnection. For the base mounted KP2, disengage the coupling and remove the pump and pedestal.

1. Remove the suction cover by unbolting the four capscrews (9/16 wrench). Note the condition of the gasket, which will adhere either to the suction cover or the casing.
2. Unscrew the impeller from the shaft, turning in a counter-clockwise direction. Loctite used during assembly may require heating impellers of all type KC2 and KP2 to assist in removal. Apply approximately 350F heat to the center of the impeller. A screwdriver slot on the motor shaft opposite the pump is provided for steadying the shaft. Use of a strap wrench on the impeller hub is recommended to prevent marring. Otherwise, file or polish out wrench marks before reusing impeller.

The fluid end of the pump is now sufficiently dismantled for completing most repairs and replacements, including the mechanical seal.

3. If it is necessary to repair or replace the motor of a close coupled assembly or the bearing adapter of a pedestal assembly, unbolt the capscrews fastening the pump to motor or pedestal, thus disengaging the casing and bracket.

The mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces.

4. Remove the rotating parts of the mechanical seal from the impellers shaft like extension (see drawing). The seals flexible bellows may stick tightly to the impeller stem. Bathe in oil to soften the adhesive, or cut away with knife. Remove the o-ring from the shaft I.D.
5. The stationary seat and its cup gasket or o-ring may be removed while the casing is in an assembled position with a wire hook (coat hanger wire). Insert the hook between the I.D. of the seat and the shaft and pull forward, or remove the casing and press out the seat.
6. Thoroughly clean impeller stem, seat cavity and motor shaft with solvent and dry with a clean cloth.

An anti-seize lubricant was originally applied to the I.D. of the impeller that fits over the shaft and is retained by an o-ring. Either preserve this lubricant or add fresh lubricant to the I.D., not the shaft, and replace the o-ring. One drop of oil applied on the shaft will prevent the o-ring from binding on the shaft while assembling the impeller.

7. Lightly oil bore and finger press stationary seat with gasket or o-ring into its cavity. Seat (usually ceramic) is fragile. Do not abuse.
8. Clean the polished face of the stationary seat with a lint-free cloth or tissue, and lightly coat this surface with an SAE-10 or equivalent oil. Care should be taken that the cleansing material and the oil are free of foreign particles. Do not use grease or allow grease onto the sealing surfaces.
9. Place the rotating portion of the mechanical seal on the shaft like extension of the impeller that may be lightly oiled (SAE 10W-30) to facilitate sliding of the bellow by softening an adhesive film on the seal (Use soap, glycerin, etc. if oil is not permitted i.e. EPDM). Do not use grease, as this would prevent the adhesive film from resetting. Final adherence to the impeller stem is essential for shaft, impeller, and seal to rotate as a unit. First place the spring retainer and spring over the impeller shaft. Then press the carbon rotating sub-assembly down the impeller shaft until it engages the spring. Do not continue to slide the assembly down the shaft once the rotating assembly has engaged the spring. Inspect the carbon sealing face and remove any foreign particles with a lint-free cloth or tissue. Do not allow grease on the sealing surfaces.
10. Place the impeller with mechanical seal in place on the drive shaft. A slight extra push is required to start the o-ring onto the shaft. Proceed to screw the impeller clockwise onto the treaded shaft, utilizing the slot on the opposite end of the shaft to steady the shaft. Hand tighten or use a strap wrench, or other non-marring device such as a jar opener.
11. The pump assembly is completed by reinstalling the suction cover plate and its gasket. Be sure casing and gasket surfaces are relatively clean and free of foreign particles.
12. Your pump is now ready to be reinstalled into its accompanying pipe system and the motor reconnected.

One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating or checking rotation.

NOTE: Starting motor in direction of unthreading impeller will result in jamming and damaging bearing and possibly other motor and pump parts. Motor connections should have been marked to avoid this possibility. Also, an economical phase sequence indicator will identify your A-B-C connections. If a reassembled pump unit is not going to be put back in service immediately, or if there is a real possibility for incorrect start up rotation, a suitable thread-locking compound may be used (i.e. Loctite #271).

Village Marine Tec.

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World Wide Web: www.villagemarine.com, E-mail: sales@villagemarine.com

IMF MEDIA FILTER LOADING PROCEDURE

Village Marine's media mix comes in portions according to the capacity of filter being used. Village Marine uses up to four different media materials labeled #0 (if applicable), #1, #2, and #3. All of the media that is supplied should be divided evenly between the number of filters installed in order of their respective labels. Some overage may be supplied – under no circumstances fill beyond 65% full. The media should be poured into the filter through the top cap fitting on the tank. If a riser pipe present, cover hole with tape to prevent media falling into pipe. Filling tank one third full of water before adding media will help reduce dust. Clean media after initial fill by alternate rinsing, backwashing and rinsing as per operation manual.

