



**TRI NUCLEAR CORP.**

THE INDUSTRY STANDARD IN UNDERWATER FILTRATION

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# **Underwater Filter/Vacuum (UFV-xxx) and Underwater Filter (UF-xxx)**

## **Operating Instructions and Maintenance Manual**

For Models:

UFV-xxx

UF-xxx




<b>Operating Instructions and Maintenance Manual</b> Underwater Filter / Vacuum Series	<b>Doc. No.</b>	<b>Rev.</b>	<b>Date</b>	Page 1 of 73
	OI-TNC-001	0	11 Jan 2019	

ORIGINAL DOCUMENT (ENGLISH VERSION ONLY)

## Operating Instructions and Maintenance Manual Underwater Filter / Vacuum Series

### NOTE:

**This OI-TNC-001 combines and replaces the previous Tri Nuclear Operating Instructions listed below (which are now obsolete).**

Previous Document NO.	Revision	Issue Date	Title
OI-1	4.0	12/11/12	UFV-100 Operating Instructions
OI-2	4.0	12/03/12	UFV-260 Operating Instructions
OI-3	4.0	12/17/12	UF-600 Operating Instructions
OI-4	4.0	12/17/12	UFV-600 Operating Instructions
OI-29	1.0	10/05/12	UF-1000 Operating Instructions
ACN-3	-	03/27/17	Digital Flow Meter Change
<i>For information on legacy/obsolete Tri Nuclear equipment, please see the document: OI-Legacy Rev 0 (Legacy descriptions and information for Tri Nuclear Underwater Systems)</i>			
<b>Approval:</b> Operations Manager John J. Flynn 			Date 11 Jan 2019

### Tri Nuclear Record of Revision

Revision or Change Number	Effective Date of Revision or Change	Affected Page and / or Paragraph number	Person Entering Revision	Revision or change Cancelled By
Rev. 0	01/11/2019	Original Issue	-----	

If you have any questions concerning changes in this document, please call the main Tri Nuclear office at 518-399-1389 or e-mail at [info@trinuclear.com](mailto:info@trinuclear.com)

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A	UF/UFV-100, 260, 600 filter to filter tube distance	1
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### 0.3 Front Matter – ISO Safety Symbols - Defined

ISO Symbols	Meaning
	Yellow warning triangle/black graphical symbol, indicates what the hazard is. (Hazard Identification)
	Red circle-with-slash/black graphical symbol indicates a prohibited action to avoid the hazard. (Prohibited Action)
	Blue mandatory action circles/white graphical symbol - indicates an action to take to avoid the hazard. (Mandatory Action)
	<b>DANGER</b> - Indicates an imminently hazardous situation, which if not avoided, <u>will result in death or serious injury</u> .
	<b>WARNING</b> - Indicates a potentially hazardous situation, which if not avoided <u>could result in death or serious injury</u>
	<b>CAUTION</b> - Indicates a potentially hazardous situation which, if not avoided, <u>may result in minor or moderate injury</u>
<b>CAUTION</b>	“CAUTION” without the safety alert symbol should be used for safety labels that indicate only equipment damage
	<b>NOTICE</b> indicates information that relates directly or indirectly to the safety of personnel or protection of property

## 0.4 Front Matter – Precautions and Warnings

Symbol	Meaning
	<u>General Caution:</u> <ul style="list-style-type: none"> <li>Do not use this Equipment for any purpose not described in this Manual.</li> </ul>
	<u>Danger:</u> <ul style="list-style-type: none"> <li>High Voltage</li> <li>Do not operate this equipment from any power source that does not match the voltage rating stamped on the equipment. Refer to the Manufacturer's Identification Label for operational requirements.</li> </ul>
	<u>Caution:</u> <ul style="list-style-type: none"> <li>Normal operation of this equipment will likely result in radioactive contamination. Decontamination must be performed in accordance with approved procedures.</li> </ul>
	<u>Prohibited:</u> <ul style="list-style-type: none"> <li>Do NOT use tools. Hand tighten only.</li> </ul>
	Do not submerge the control box for any reason.
	Ensure proper electrical safety precautions are taken if the cover of the control box is open and there is power to the control box.
	Do NOT attempt to perform maintenance on the control box while it is energized.
	It is expected that trained and qualified personnel will operate the unit. Radiological considerations and requirements are not included in this document and should be specifically addressed by the end user organization.
	Do NOT use the electrical cables to lift the pump out of the water.
	Tri Nuclear's ergonomic testing has concluded that the control box be mounted between 2ft. - 6.5 ft. (0.6M and 1.99M) from the platform it will be used on.

## 0.4 Front Matter – Precautions and Warnings (continued)

Type	Description
<b>CAUTION</b>	Caution should be taken to <u>NOT</u> store any plastic components (eg. filters or hoses) near high radiation fields associated with equipment such as fuel bundles, LPRM's or control blades.
	Breakdown of such components can occur with accumulated exposures of 10E6 Rad. For this reason, precautions should be taken to minimize accumulative dose for the following components: suction hose, filter cartridges, power and instrument cable, flow sensor, and electric motor.
	All components are chemically suitable for long term storage in the fuel pool cavity environment.
	Use of any components other than genuine Tri Nuclear replacement parts will void the warranty.
	Slowly lower the housing into the water. This allows water to fill the housing from the drain hole(s) in the base plate. Lowering the unit too fast may cause it to become unstable until it fills with water.
	Fully submerge pump prior to starting the system. Running or "bumping" the pump dry (out of water) will result in damage to the pump.
	Pumps must be installed at least 10 ft. below the water level of the pool to ensure enough NPSH (Net Positive Suction Head) for proper operation of the pump.
	Check for proper phase rotation before running the system. Running the pump in reverse will result in damage over time.
<b>CAUTION</b>	<ul style="list-style-type: none"> <li>• When installing the power cord to the pump, ensure the keyway male end on the PSC-100P cable is aligned with the female keyway on the SC connector on the pump.</li> <li>• Ensure the PSC-100P plug is sufficiently lubricated with a non-conductive electrical lubricant (Dow Corning #4).</li> <li>• Do not use excessive downforce or side-to-side action to try and "make it fit" as you may damage the plug.</li> <li>• Install the power cord to pump pigtail HAND TIGHT ONLY. Do NOT use any tools (pliers, channel locks etc.) to tighten the connection.</li> </ul>
	<ul style="list-style-type: none"> <li>• When removing the power cord, be sure that the plug is fully unthreaded and pull in a vertical direction only.</li> <li>• Do not use side-to-side action to try and "loosen it up" as you may damage the plug.</li> </ul>
	Do not start the pump more than once every 2 minutes or 300 starts/day. Damage to the motor winding insulation may occur.

#### 0.4 Front Matter – Precautions and Warnings (continued)

Type	Description
<div>NOTICE</div>	Do not install more than 50ft of suction hose to a single suction port on a UFV filter system. This will ensure there is adequate flow velocity at the vacuum nozzle for vacuuming operations.
	One Strainer Basket (SB-.125) per filter housing must be used to ensure effective straining operations.
	One Underwater Catch Basket (UCB-1) per filter must be used to ensure effective straining operations.
	Dense granular material (less than .125in) may pass through the SB-.125 strainer basket and could collect in the bottom of the filter housing.
	Perform a flow meter check: <ul style="list-style-type: none"> <li>• Prior to initial installation</li> <li>• When a sensor is replaced</li> <li>• Sensor is suspected to be damaged</li> </ul>
	The preferred method of storing the submersible pump assembly when not in use is underwater.
	Running the unit without hoses will not produce desired results in pool filtration or water clarity.
	The UFV-600 must be run with either suction OR discharge hoses installed. It is NOT desired OR required to run the unit with BOTH suction and discharge hoses installed.
	The PP-1000SC pump discharge "T" must be in parallel with the lifting plates on the UF-1000 housing. The pump housing has internal guide bars to correctly position the pump cover and prevent the cover from rotating during operation. If the pump is installed in any other configuration, it will prevent the installation and/or removal of filter cartridges.
	Filter cartridges can take several minutes to flood while trying to submerge them in the pool. The flooding time can be minimized by pre-soaking the filters

## 1.0 Introduction

Tri Nuclear's Underwater Filter / Vacuum systems are portable underwater filter systems that:

- Will aid in the retrieval of foreign material from the water (vacuum units only).
- Provides supplemental filtration to improve water clarity.
- Provides supplemental filtration to reduce the activity in the water of spent fuel pool, reactor cavity and other areas of the plant.
- Can be used in the reactor vessel, reactor cavity, and spent fuel pool storage areas in any nuclear power plant.

They are designed to operate at flow rates between 100-1000 GPM (depending on the model) and they have the ability to filter sub-micron to 20 micron size particles using disposable filter cartridges. The vacuum units also have the ability to filter/strain larger size material with stainless steel strainer baskets in place of filter cartridges.

The Underwater Filter / Vacuum systems include a connection point on the housing for attachment of rigging to remove the unit from the pool. Rigging is ***NOT*** included with the systems.

All Tri Nuclear Underwater Filter Vacuum systems operate under negative pressure.

This design feature eliminates the need for special bolted pressure closures on the filter and pump housings requiring tooling for operation. Each filter and pump housing seals with a simple flat cover plate held in place by negative pressure during operation.

One of the many benefits of this design is that it requires no special tooling to install or remove a pump underwater. With the pump installed correctly in the pump tube, the weight of the pump keeps it in place during normal operation.

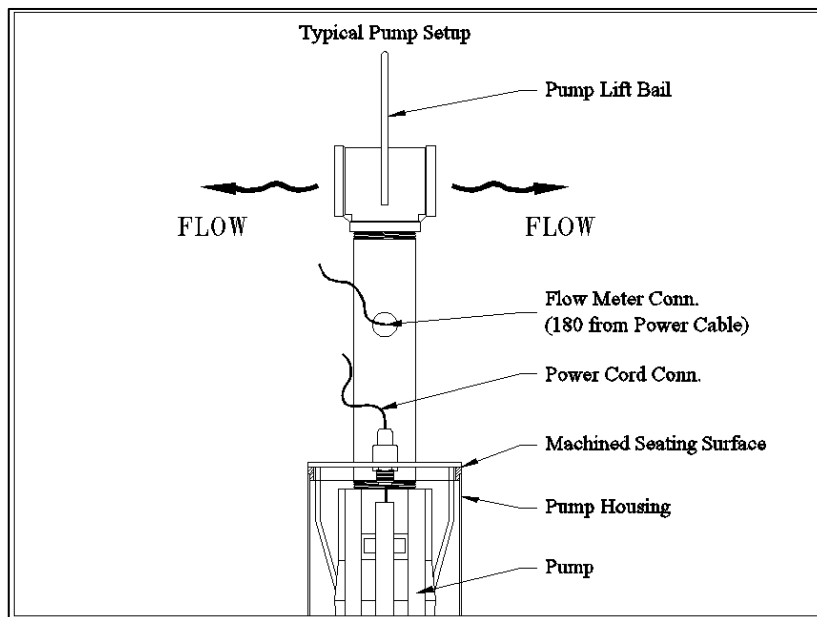


Figure 1.1 – Typical Pump Setup

### **Underwater Filter Vacuum (UFV) Systems:**

Tri Nuclear has developed a wide range of stand-alone Underwater Filter Vacuums which are ideal for use in various pool cavity applications.

- The UFV-100 is a compact stand-alone Underwater Filter Vacuums which is ideal for use on special projects or in confined areas where space is at a premium.
- The UFV-260 is a versatile stand-alone Underwater Filter Vacuums which is ideal for use in the Spent Fuel Pool or Reactor Cavity and is the most widely used underwater filter vacuum on the market.
- The UFV-600 is a large stand-alone Underwater Filter Vacuums which can process large amounts of water rapidly for water clarity and still retains the ability for minor vacuuming campaigns.

### **Underwater Filter (UF) Systems:**

Tri Nuclear also has stand-alone Underwater Filters that are used to establish or maintain water clarity but do not have the capability to vacuum.

- The UF-600 is a large stand-alone Underwater Filter which is ideal for processing large amounts of water rapidly to establish or maintain water clarity.
- The UF-1000 is the largest stand-alone Underwater Filter made by Tri Nuclear Corp. This system is specifically designed for processing significant amounts of water rapidly to establish or maintain water clarity. No system on the market can outperform the UF-1000 when pool water clarity becomes an issue impacting critical path time.

<b>Underwater Filter/Vacuum Systems</b>					
	<b>UFV-100</b>	<b>UFV-260</b>	<b>UF-600</b>	<b>UFV-600</b>	<b>UF-1000</b>
<i>Flow Rate</i>	100 GPM	260 GPM	600 GPM	600 GPM	1000 GPM
<i>Type</i>	Filter / Vacuum	Filter / Vacuum	Filter Only	Filter / Vacuum	Filter Only
<i>Filter Capacity</i>	1 Cartridge	2 Cartridges	4 Cartridges	4 Cartridges	8 Cartridges
<i>Hoses</i>	1 Suction	2 Suction	2 Discharge	2 Suction or 2 Discharge	2 Discharge
<i>Footprint</i>	14 x 24 in	24 x 24 in	24 x 30 in	38 x 30 in	34 x 34 in
<i>Height</i>	55 in	70 in	99 in	99 in	86 in
<i>Pump Weight</i>	45 lb.	90 lb.	210 lb.	210 lb.	235 lb.
<i>Housing &amp; Pump Empty Weight</i>	140 lb.	255 lb.	515 lb.	550 lb.	650 lb.
<i>Housing &amp; Pump Filled with Water Weight</i>	280 lb.	485 lb.	1,020 lb.	1,055 lb.	1,725 lb.

## 1.1 Typical Operation

Unfiltered water from the cavity pool enters from the two attached suction hoses (if equipped or installed) and into the filter tubes with installed filter cartridges. Filtered water from the filter housings passes through a common bottom tunnel connected to the pump housing.

The submersible pump draws water from the pump housing and discharges filtered water back to the cavity pool.

Filters placed into the filter housings are sealed by an O-ring mounted in the filter tube sheet. Negative pressure developed in the filter cartridges provide a positive seal between the filter cartridge and the mounted o-ring.

## 1.2 Environmental Conditions

With the exception of the electrical disconnect box, electrical controls, and the flow meter display, the Underwater Filter Vacuum Systems are designed to be submerged in the spent fuel pool and / or refueling pool water.

1.2.1 The Underwater Filter Vacuum Systems are designed to operate in continuous use in pure and / or borated water from 40F to 140F, PH ranges from 4.0 to 11.0 and up to 100 ft. water depth.

1.2.2 The Underwater Filter Vacuum System components are designed for storage out of water in an ambient temperature range in air from 40F to +140F with 100% humidity.

## 1.3 Transportation and Storage

The Underwater Filter Vacuum System components will withstand, or has been protected against, transportation and storage temperatures of 40F to 140F.

The systems have been packaged to prevent damage from the effects of normal humidity, vibration and shock.

## 1.4 Equipment Guide List

TNC Part Number	Description	UFV-100 Qty	UFV-260 Qty	UF-600 Qty	UFV-600 Qty	UF-1000 Qty
UFV-100H	Basic Housing for UFV-100 system	1				
UFV-260H	Basic Housing for UFV-260 system		1			
UF-600H	Basic Housing for UF-600 system			1		
UFV-600H	Basic Housing for UFV-600 system				1	
UF-1000H	Basic Housing for UF-1000 system					1
PP-100SC	Grundfos pump, 2HP/460/3Ph/60Hz, w/cover & SC connector	1				
CB-100-FM	2 HP/460/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-200 GPM digital flow meter.	1				
PP-260SC	Grundfos pump, 5HP/460/3Ph/60Hz, w/cover & SC connector		1			
CB-260-FM	5 HP/460/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-400 GPM digital flow meter.		1			
PP-600SC	Grundfos pump, 15HP/460/3Ph/60Hz, w/cover & SC connector			1	1	
CB-600-FM	15 HP/460/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-1000 GPM digital flow meter.			1	1	
PP-1000SC	Grundfos pump, 20HP/460/3Ph/60Hz, w/cover & SC connector					1
CB-1000-FM	20 HP/460/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-2000 GPM digital flow meter.					1
PSC-100P	PSC-100P Power Cable with twist lock plug (100ft 10/4 SO Cable w/ male twistlock plug)	1	1	1	1	1
PC-50	PC-50 drop cable with female plug (50ft Cable w/ female connector)	1	1	1	1	1
FM-SRD	Flow sensor with reinforced paddlewheel and 100ft cable with Amphenol connector.	1	1	1	1	1
PH-2x50	2in x 50ft suction hose with MxF camlock couplers	1	2			
PH-2.5x50	2.5in x 50ft suction hose with MxF camlock couplers				2	
PH-3x25	3in x 25ft discharge hose with MxF camlock couplers			2	2	
PH-4x25	4in x 25ft discharge hose with MxF camlock couplers					2



## 1.4 Equipment Guide List (continued)

TNC Part Number	Description	UFV-100 Qty	UFV-260 Qty	UF-600 Qty	UFV-600 Qty	UF-1000 Qty
SP-1	Stainless Steel Pool Pole, 1in Dia x 10ft lg, with pinned coupler.	4	4		4	
SP-1x5	Stainless Steel Pool Pole, 1in Dia x 5ft lg, with pinned coupler.	1	1		1	
SP-1x3	Stainless Steel Pool Pole, 1in Dia x 3ft lg, with pinned coupler.	1	1		1	
SP-1x2	Stainless Steel Pool Pole, 1in Dia x 2ft lg, with pinned coupler.	1	1		1	
BC-1	Buoyancy Float	5	5		5	
UT-1SPT	Stainless Steel Pool Pole "T" Handle	1	1		1	
UT-3/6	Floor Storage Rack for (6) Tri Nuclear Filter Cartridges	1	1	1	1	2
UT-3H	Hanging Filter Storage Rack for (6) Tri Nuclear Filters	1	1	1	1	1
UT-5SP	Floor Vacuum Cleaner Head	1	1			
UT-5SP-2.5	Floor Vacuum Cleaner Head for use with 2-1/2in hose				1	
UT-6SP	Hose to Pole Clamp	1	1		1	
UT-7	Stainless Steel Vacuum Nozzle	1	1			
UT-7-2.5	SS Vacuum nozzle for 2-1/2in suction hose				1	
UT-8	Diffuser Pipe for 3in discharge hose			2	2	
UT-9	Rope Filter Lift Tool	2	2	2	2	2
UT-10C	Mounting panel for PHASE REVERSING Control Box.	1	1	1	1	1
UT-11	Suction Hose Standoff	1	2			
UT-11B	Suction Hose standoff for 2-1/2in hose				2	
UT-12	1in Orifice Cap	1	1			
UT-13	Diffuser Pipe for 4in discharge hose					2
UT-14	Pump Lift Hook	1	1	1	1	1

## 1.5 Materials of Construction

TNC Part Number	Description	Materials of Construction
UFV-100H	Basic Housing for UFV-100 system	304SS, 316SS, Buna N O-rings
UFV-260H	Basic Housing for UFV-260 system	304SS, 316SS, Buna N O-rings
UF-600H	Basic Housing for UF-600 system	304SS, 316SS, Buna N O-rings
UFV-600H	Basic Housing for UFV-600 system	304SS, 316SS, Buna N O-rings
UF-1000H	Basic Housing for UF-1000 system	304SS, 316SS, Buna N O-rings
PP-100SC	Grundfos pump, 2HP/460/3Ph/60Hz, w/cover & SC connector	304SS
CB-100-FM	CB-100-FM PHASE REVERSING control box with twist lock plugs and integral digital flow meter.	Fiberglass Enclosure
PP-260SC	Grundfos pump, 5HP/460/3Ph/60Hz, w/cover & SC connector	304SS
CB-260-FM	CB-260-FM PHASE REVERSING control box with twist lock plugs and integral digital flow meter.	Fiberglass Enclosure
PP-600SC	Grundfos pump, 15HP/460/3Ph/60Hz, w/cover & SC connector	304SS
CB-600-FM	CB-600-FM PHASE REVERSING control box with twist lock plugs and integral digital flow meter.	Fiberglass Enclosure
PP-1000SC	Grundfos pump, 20HP/460/3Ph/60Hz, w/cover & SC connector	304SS
CB-1000-FM	CB-1000-FM PHASE REVERSING control box with twist lock plugs and integral digital flow meter.	Fiberglass Enclosure
PSC-100P	PSC-100P Power Cable with twist lock plug (100ft 10/4 SO Cable w/ male twistlock plug)	10/4 SOOW Cable
PC-50	PC-50 drop cable with female plug (50ft Cable w/ female connector)	10/4 SOOW Cable
FM-SRD	Flow sensor with reinforced paddlewheel and 100ft cable with Amphenol connector.	Polypropylene
PH-2x50	2in x 50ft suction hose with MxF camlock couplers	PVC hose with Polypropylene camlock couplers & 304SS crimped sleeves
PH-2.5x50	2.5in x 50ft suction hose with MxF camlock couplers	PVC hose with Aluminum camlock couplers & 304SS crimped sleeves
PH-3x25	3in x 25ft discharge hose with MxF camlock couplers	PVC hose with Polypropylene camlock couplers & 304SS crimped sleeves

## 1.5 Materials of Construction (continued)

TNC Part Number	Description	Materials of Construction
PH-4x25	4in x 25ft discharge hose with MxF camlock couplers	PVC hose with Polypropylene camlock couplers & 304SS crimped sleeves
SP-1	Stainless Steel Pool Pole, 1in Dia x 10ft lg, with pinned coupler.	304 SS
SP-1x5	Stainless Steel Pool Pole, 1in Dia x 5ft lg, with pinned coupler.	304 SS
SP-1x3	Stainless Steel Pool Pole, 1in Dia x 3ft lg, with pinned coupler.	304 SS
SP-1x2	Stainless Steel Pool Pole, 1in Dia x 2ft lg, with pinned coupler.	304 SS
BC-1	Buoyancy Float	304 SS
UT-1SPT	Stainless Steel Pool Pole "T" Handle	304 SS
UT-3/6	Floor Storage Rack for (6) Tri Nuclear Filter Cartridges	304 SS
UT-3H	Hanging Filter Storage Rack for (6) Tri Nuclear Filters	304 SS
UT-5SP	Floor Vacuum Cleaner Head	304 SS, / 316 SS, Polypropylene
UT-5SP-2.5	Floor Vacuum Cleaner Head for use with 2-1/2in hose	304 SS, / 316 SS, Polypropylene
UT-6SP	Hose to Pole Clamp	304 SS
UT-7	Stainless Steel Vacuum Nozzle	304 SS, / 316 SS
UT-7-2.5	SS Vacuum nozzle for 2-1/2in suction hose	304 SS, / 316 SS
UT-8	Diffuser Pipe for UF-600 discharge hose	304 SS, / 316 SS
UT-9	Rope Filter Lift Tool	304 SS, / 316 SS
UT-10C	Mounting panel for PHASE REVERSING Control Box.	304 SS
UT-11	Suction Hose Standoff	304 SS, / 316 SS
UT-11B	Suction Hose standoff for 2-1/2in hose	304 SS, / 316 SS
UT-12	1in Orifice Cap	Polypropylene
UT-13	Diffuser Pipe for 4in discharge hose	304 SS, / 316 SS
UT-14	Pump Lift Hook	304 SS

## 2.0 Description of Equipment

### 2.1 Pump and filter housing:

The pump and filter housings of all Tri Nuclear UF/UFV equipment provide the means of connecting the filters to the suction of the pump. All units have at least one 1/2in drain hole in the base plate to allow for filling & draining the housing. All units operate under negative pressure. Their differences are described below.



Figure 2.1.1  
UFV-100 Housing



Figure 2.1.2  
UFV-260 Housing



Figure 2.1.3  
UFV-600 Housing



Figure 2.1.4  
UF-600 Housing



Figure 2.1.5  
UF-1000 Housing

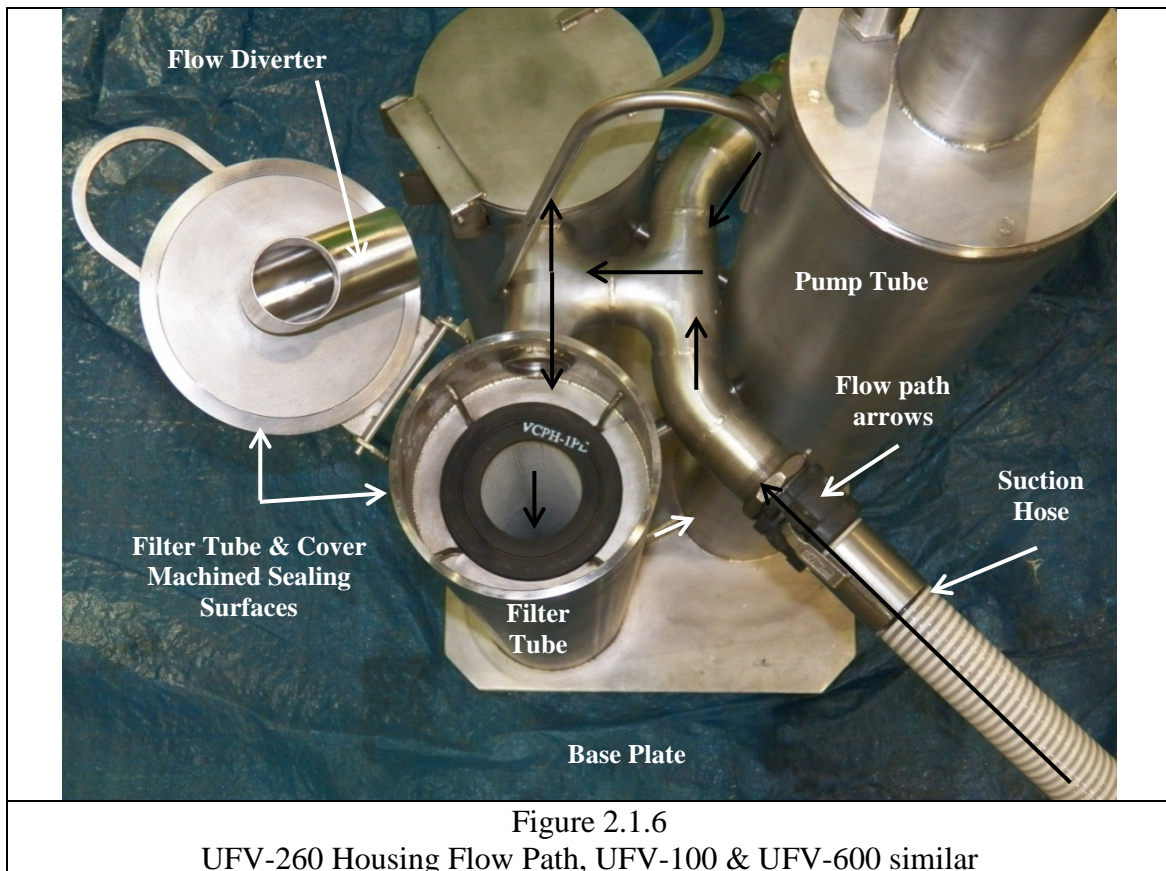


Figure 2.1.6  
UFV-260 Housing Flow Path, UFV-100 & UFV-600 similar



### 2.1.1 UFV-100 Housing (See TNC-001-02 for details)

The housing for the UFV-100 contains one filter tube with a swing cover and one pump tube. A lifting attachment is centered between the filter tube and the pump tube for lifting the UFV-100.

### 2.1.2 UFV-260 Housing (See TNC-002-02 for details)

The housing for the UFV-260 contains two filter tubes with swing covers and one pump tube. A lifting attachment is centered between the filter tubes and the pump tube for lifting the UFV-260.

### 2.1.3 UF-600 Housing (See TNC-003-02 for details)

The housing for the UF-600 contains four open top filter tubes and one pump tube. A centered swing lift bale over the pump housing is provided for lifting the UF-600.

### 2.1.4 UFV-600 Housing (See TNC-004-02 for details)

The housing for the UFV-600 contains four filter tubes with swing covers and one pump tube. A centered swing lift bale over the pump housing is provided for lifting the UFV-600.

### 2.1.5 UF-1000 Housing (See TNC-005-02 for details)

The housing for the UF-1000 contains a plenum for eight filters and one pump tube. Lifting attachments are located on either side of the pump tube for lifting the UF-1000.

## 2.2 Submersible Pump Assembly:

Tri Nuclear uses a variety of a submersible pumps and motors to provide flow for the Underwater Filter / Vacuum units. All Tri Nuclear pumps are constructed out of stainless steel and have the following common features:

The assemblies include a pump cover, discharge piping, flow sensor tap, and top lifting bail. The pump has its internal check valve welded in the open position to allow for water to drain out of the pump and pump cover when lifting and removing it from the pool.

There is a stainless steel electrical disconnect mounted on the pump cover for the 100ft PSC-100P power cable. This allows for the removal of the power cable for ease of handling and equipment storage. The electrical disconnect on the pump cover is a “Sea Con” type underwater connector.

There is a seal plug (P/N: SC-P) that should be installed on the pump Sea Con connector whenever the power cord is not installed. The seal plug provides sealing of the connector for underwater storage of the pump (without the power cable) and protects the threads of the Sea Con connector when the power cord is not installed.



	PP-100SC	PP-260SC	PP-600SC	PP-1000SC
For System	UFV-100	UFV-260	UF & UFV-600	UF-1000
Flow Rate	0-200 gpm	0-400 gpm	0-1000 gpm	0-2000 gpm
Pump Weight	45 lb.	90 lb.	210 lb.	235 lb.
Horse Power HP	2 HP	5 HP	15 HP	20 HP
Voltage / Freq / phase	460V** / 60 Hz / 3Ph			
Overcurrent Trip Set point	4.4 Amps	9.9 Amps	24.5 Amps	32 Amps
Control Box P/N	CB-100-FM	CB-260-FM	CB-600-FM	CB-1000-FM
Discharge Size	2in FNPT	3in FNPT	3in male camlock	4in male camlock
Flow Sensor	FM-SRD			
Power Cords	PSC-100P & PC-50			
Additional Pump/Motor Information				
Reference Drawing	TNC-007-02	TNC-008-02	TNC-009-02	TNC-010-02
Horse Power HP	2 HP	5 HP	15 HP	20 HP
Voltage / Freq / phase	460V** / 60 Hz / 3Ph			
Starting Amps	24 Amps	54 Amps	115 Amps	172 Amps
Overcurrent Trip Set point	4.4 Amps	9.9 Amps	24.5 Amps	32 Amps
Service Factor	1.25	1.15	1.15	1.15
Circuit Breaker Size	10 Amp	20 Amp	60 Amp	80 Amp
Nominal line to line resistance (ohms)	12.1	5.0	1.6	.78

\*\* voltage listed has an acceptable range of +/- 10% (414V – 506V)



NOTE: Standard Tri Nuclear pumps, control boxes and power cables shown, CB-xxx-FM control box versions similar.

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## 2.3 Electrical Control Box (CB-xxx-FM)

All Tri Nuclear CB-xxx-FM control boxes are UL-508 certified.

The CB-xxx-FM is an IP66 / NEMA 4X type fiberglass (14x16) that has two 460V/3Ph/60Hz motor contactors/starters, a manual motor controller with short circuit protection and an adjustable over current trip. The control box has a “phase rotation switch” with safety cover, start/stop pushbuttons and a green “run” indicating light on the front of the panel. The control box includes an integral digital flow meter and Amphenol connection for the flow sensor connection on the front cover.

The phase reversing feature in this control box allows the operator to change the phase rotation of the pump WITHOUT having to open the control box and swap two of the three motor leads. This is accomplished by a switch on the front of the control box and two motor contactors/starters inside the control box. These two motor contactors/starters are wired such that when the “phase rotation switch” is in the “A” position the pump motor rotates one direction, and when the “phase rotation switch” is in the “B” position the pump motor rotates in the opposite direction. If the “phase rotation switch” is in the center “O” position, neither motor starter will be energized and the pump will not start.

There is an electrical inlet to connect the “line in” power through the PC-50 drop cable to the control box. There is a twist lock plug to connect the PSC-100P pump power cable to the control box. These connections allow the operator to easily install and remove the cables without the need for special tools.

The primary (460V) side of the transformer is protected by two 1.4 amp fuses and the secondary (120V) side of the transformer is protected by a 1 amp fuse. Fuse details are listed below in the table on the following page.

The digital flow meter is installed to provide a gross indication of system flow. System flow rate is a gauge for determining change in pressure drop through the filters. Under normal operations a filter would be changed out when system flow rate drops to ~50% of clean filter value.

The digital flow meter uses the frequency of the flow sensor signal for indication of system flow.

The digital flow meter is powered by a 120V/24DC transformer inside the control box and the flow sensor connects to the meter through an Amphenol connection on the front of the control box.

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Advantages of the new digital, integral flow meter/totalizer are:

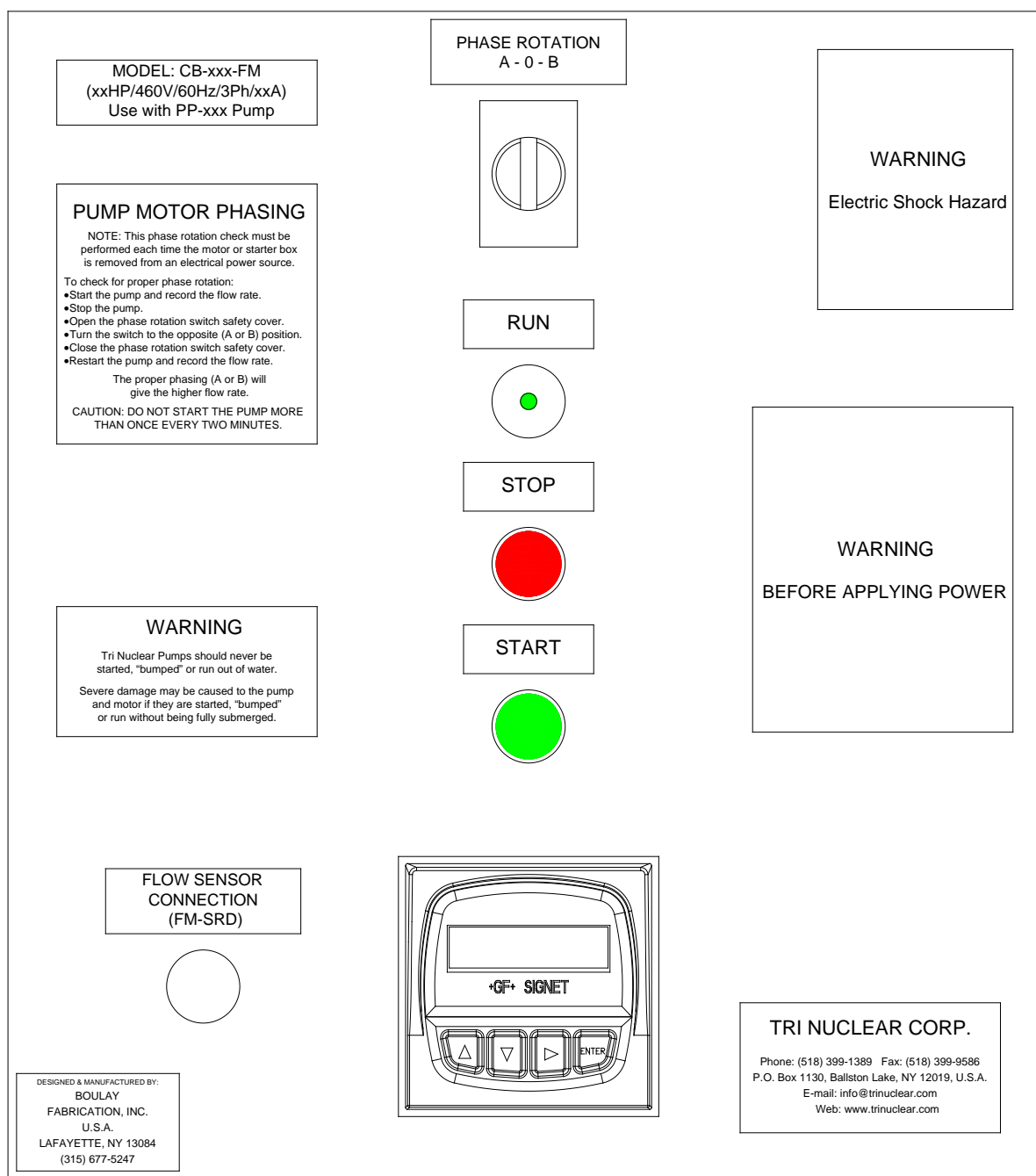
- It is integral with the pump control box. There is only one piece of equipment to attach to the mounting panel.
- It has solid state components which are not as fragile as the analog meter nor will it go out of calibration if dropped or mishandled.
- It is better protected by being mounted in the control box.
- It has digital readout, a “dial type” digital bar graph with a backlit display for easy viewing.
- No need to stock separate flow meters for separate systems.
- It has a flow totalizer function for logging throughput of the Tri Nuclear system.
- The flow sensor now uses a simple “Amphenol” type connection to connect the flow sensor to the flow meter. This connection does not require any tools to install.



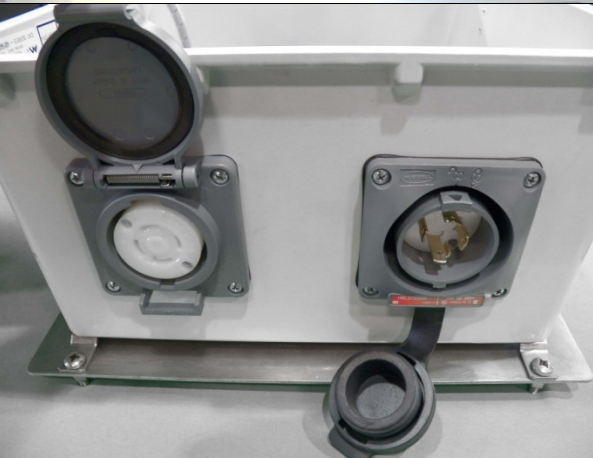


Control Box Ratings / Data				
	CB-100-FM	CB-260-FM	CB-600-FM	CB-1000-FM
<i>For System</i>	UFV-100	UFV-260	UF & UFV-600	UF-1000
<i>Horse Power HP</i>	2 HP	5 HP	15 HP	20 HP
<i>Overcurrent Trip Set point</i>	4.4 Amps	9.9 Amps	24.5 Amps	32 Amps
<i>Flow Meter Range</i>	0-200 gpm	0-400 gpm	0-1,000 gpm	0-2,000 gpm
<i>Voltage / Freq / phase</i>	460V** / 60 Hz / 3Ph			
<i>Primary Fuse Type / rating / P/N &amp; QTY</i>	Ferraz Shawmut, Amp-trap 2000® ATDR class CC fuse, 1.4 amp Replacement P/N: ATDR1-4/10 QTY: 2ea installed, 1ea spare			
<i>Secondary Fuse Type / rating / P/N &amp; QTY</i>	Littelfuse 3AG Fast-Acting Fuse, 1 Amp Replacement P/N: 312001P QTY: 1ea installed , 1 ea spare			
<i>Flow Sensor</i>	FM-SRD			
<i>Power Cords</i>	PSC-100P & PC-50			

\*\* Voltage listed has an acceptable range of +/- 10% (414V – 506V)

## Typical layout of the CB-xxx-FM control box:



<p>CB-260-FM shown Other models similar.</p> <p>The phase rotation switch has a safety cover to prevent inadvertent actuation.</p> <p>FM-SRD installed.</p> <p>Flow meter indicating 272 gpm. Note the digital “dial” and backlight screen for easy viewing.</p>	
<p>Inside view of a typical CB-xxx-FM control box showing the two motor starters, short circuit / over current trip, 460/120V transformer, 120V/24VDC transformer, fuse blocks and the line in/out twist lock plug terminals.</p>	
<p>Twist lock plugs are located on the bottom of the control box.</p> <p>The plug to the right (with the male twist lock connections) is the line in / power in plug.</p> <p>The plug to the left (with the female twist lock connections) is the power out to the pump.</p>	
<p>Figure 2.3 CB-260-FM Control Box</p>	

## 2.4 Pump Power Cable (P/N: PSC-100P):

The PSC-100P Pump Power cable is a 100ft 10/4 SO cable with a male Nema 4x Twist Lock plug x Sea Con Connector. This Pump Power cable is to supply power to the pump from the Phase Reversing Control Box.

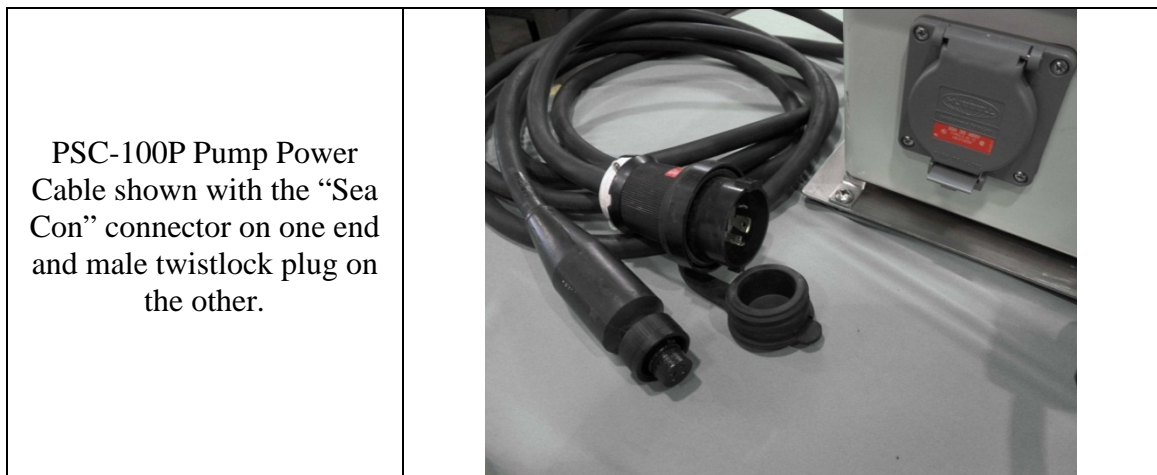


Figure 2.4  
PSC-100P Power Cable

## 2.5 Drop Cable (P/N: PC-50):

The PC-50 Control Box Drop Cable is a 50ft 10/4 SO cable with a female twist lock plug x bare wire. This drop cable is to supply the control box from the in plant power source / motor control center / welding outlets etc.

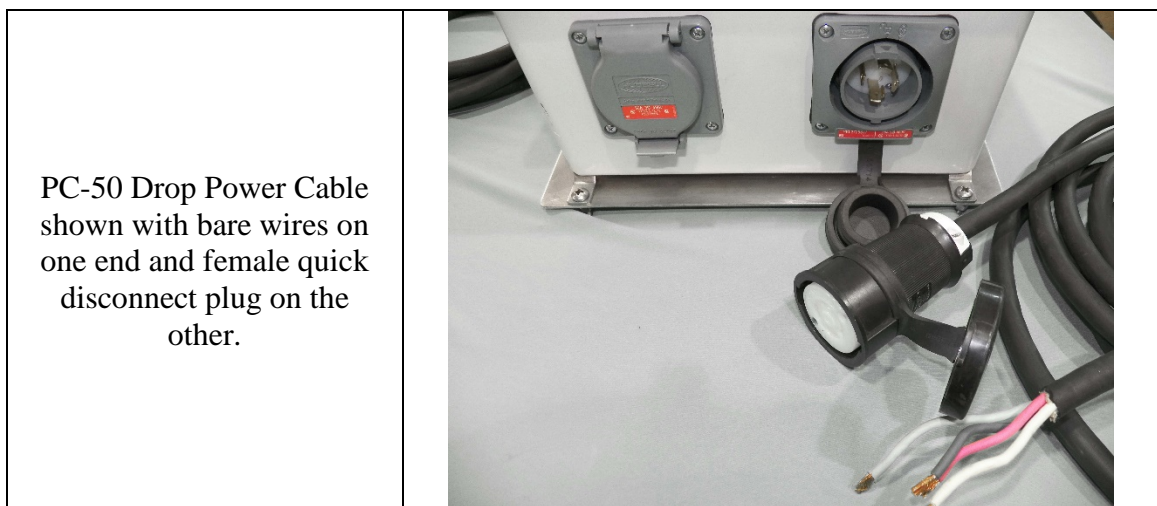
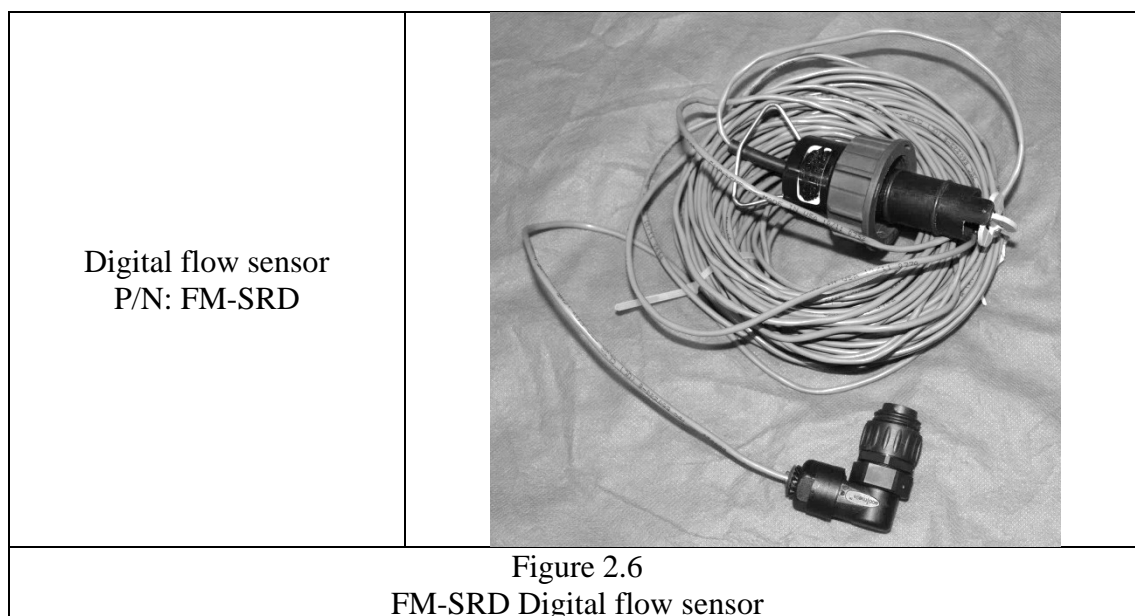


Figure 2.5  
PC-50 Drop Cable

## 2.6 Digital Flow Sensor (P/N: FM-SRD):

The digital flow sensor is a paddlewheel type flow sensor. The paddlewheel has a reinforced sleeve that covers the titanium shaft and is designed to minimize wear of the rotor. When water flows past the paddlewheel and it rotates, the flow sensor produces a sinusoidal waveform with frequency and amplitude directly proportional to the flow rate. The sensor comes equipped with 100ft of instrument cable with a 90 deg. Amphenol connector to connect to the CB-xxx-FM control box front.



## 2.7 Hoses:

2.7.1 The UFV-100 system comes equipped with one 2in x 50ft suction hose with male x female cam lock couplers for vacuuming operations and water clarity operations.

2.7.2 The UFV-260 comes equipped with two 2in x 50ft suction hoses with male x female cam lock couplers for vacuuming operations and water clarity operations.

2.7.3 The UF-600 comes equipped with two 3in x 25ft discharge hoses with male x female cam lock couplers that connect to the discharge of the PP-600SC pump for water clarity operations.

2.7.4 The UFV-600 comes equipped with two sets of hoses. The mode of operation used for the UFV-600 determines which set of hoses will be installed.

2.7.4.1 Vacuuming with the UFV-600: When vacuuming with the UFV-600, two 2.5in x 50ft suction hoses with male x female cam lock couplers are installed.

2.7.4.2 Water Clarity operations with UFV-600: When using the UFV-600 for water clarity install the two 3in x 25ft discharge hoses with male x female cam lock couplers to the discharge of the PP-600SC pump

2.7.5 The UF-1000 comes equipped with two 4in x 25ft discharge hoses with male x female cam lock couplers that connect to the discharge of the PP-1000SC pump for water clarity operations.

## 2.8 Tooling

The following is a list of Tooling and Accessories. See the EGL in Section 1.1 for a listing of tools that are supplied with your specific system.

### 2.8.1 Stainless Steel Pool Poles (P/N: SP-1)

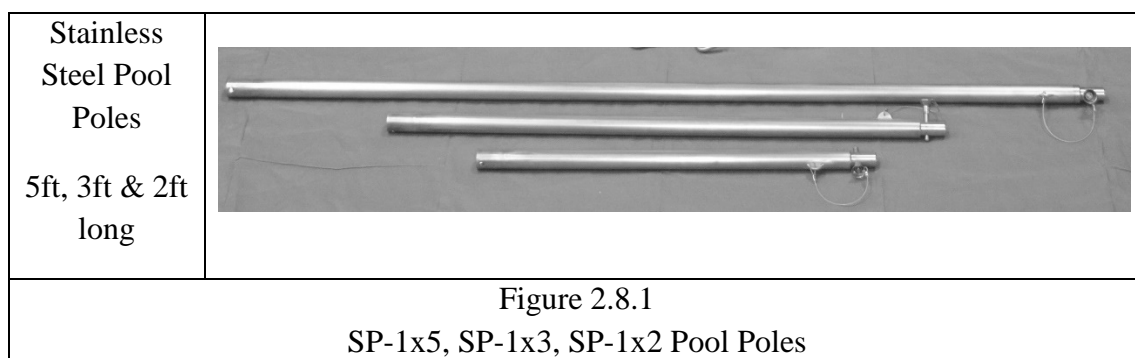
Tri Nuclear Corp. has designed special 10ft stainless steel pole sections for deep submergence pool work at nuclear power stations. The required total length of pole is obtained by coupling together (without tools) multiple 10ft sections using a quick release, "recessed button type", positive locking pull pin. This provides for a strong rigid connection for transmission of high torque and loading. The same connection is used to attach special tooling fixtures to the bottom end of the assembled pole sections for performing various types of underwater remote hand operations.

- Material: all Stainless Steel
- Weight: 10 lbs per 10ft Section
- Pool Poles are floodable
- Poles connected together with a quick release, "recessed button type", Stainless Steel, positive locking pull pin
- Pull pins are lanyarded to pool poles with stainless steel wire rope
- T-handle has a top lift bail for crane lifting operations or tying off to cavity wall

#### 2.8.1.1 Short Stainless Steel Pool Poles (P/N's: SP-1x5, SP-1x3, SP-1x2)

The SP-1x5, SP-1x3, SP-1x2 Poles are identical to the SP-1 pool pole with the exception that their lengths are 5ft, 3ft or 2ft long instead of 10 ft long.

Their purpose is to provide an overall adjustment in height for the operator on a bridge or wall.

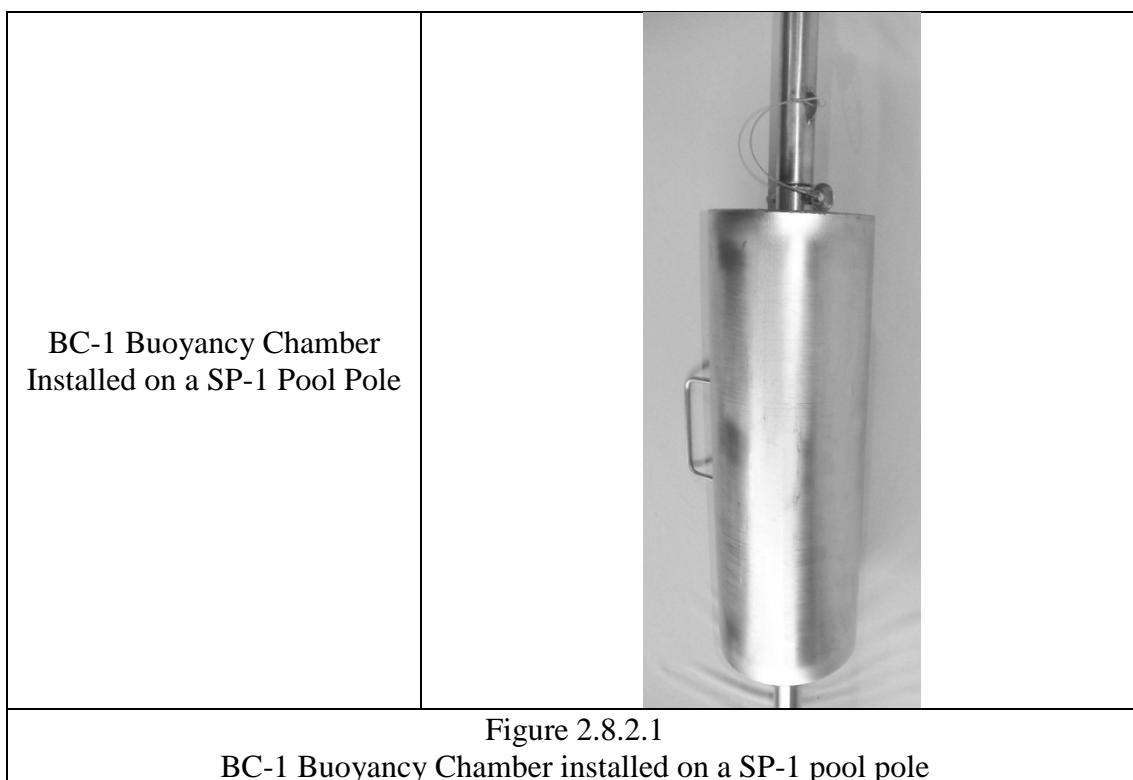
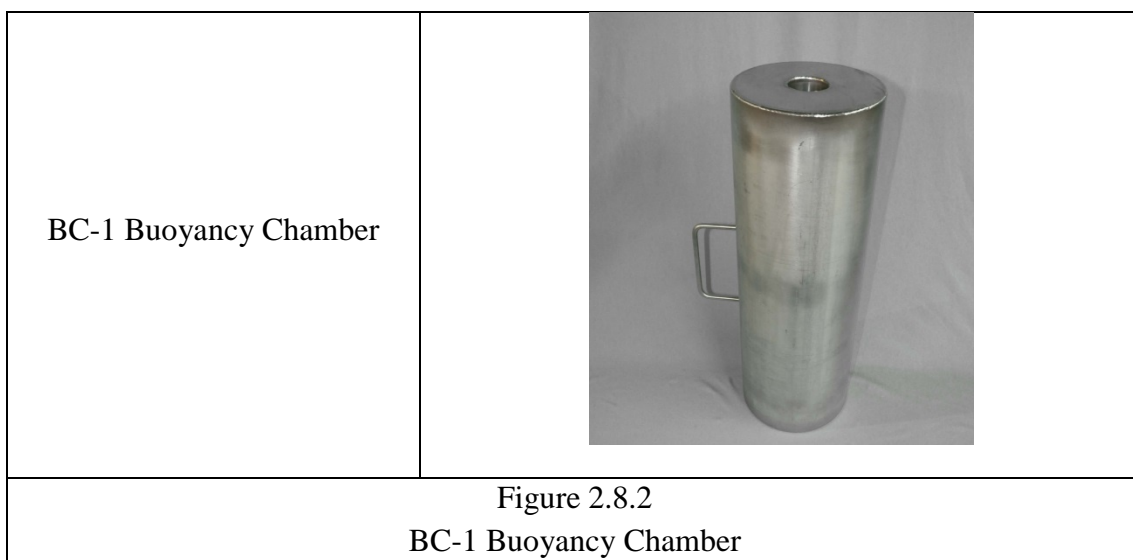




## 2.8.2 Buoyancy Chamber (P/N: BC-1)

Tri Nuclear has developed a Buoyancy Chamber that slides over the pool pole. It is a 6in x 18in long stainless steel chamber that provides positive buoyancy for the pool poles. The effect of this positive buoyancy is to reduce the overall weight of the assembled pool poles for the operator.

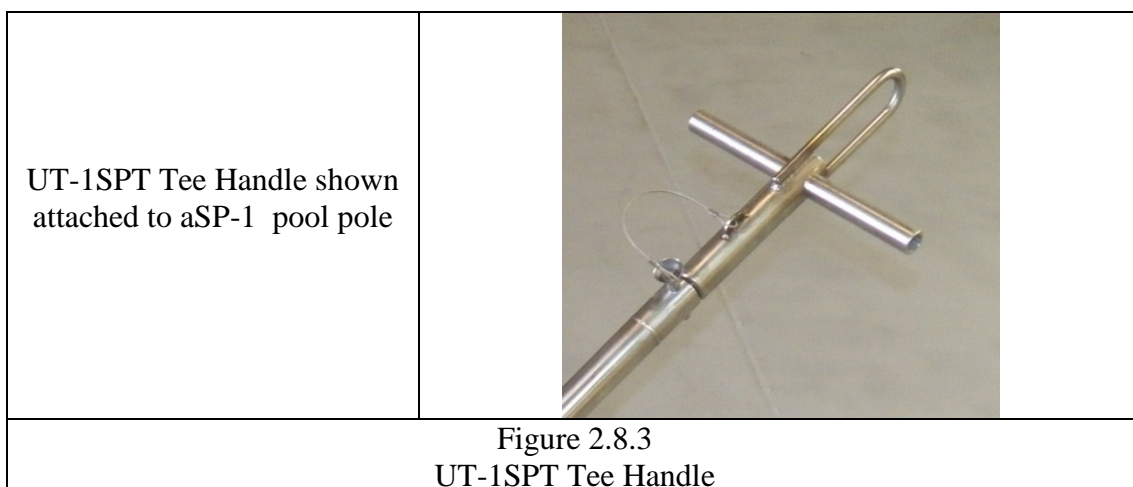
Each Buoyancy Chamber reduces the weight of the pool by approximately half. The BC-1 Buoyancy Chamber has a handle for ease of moving and installing on the pool pole.





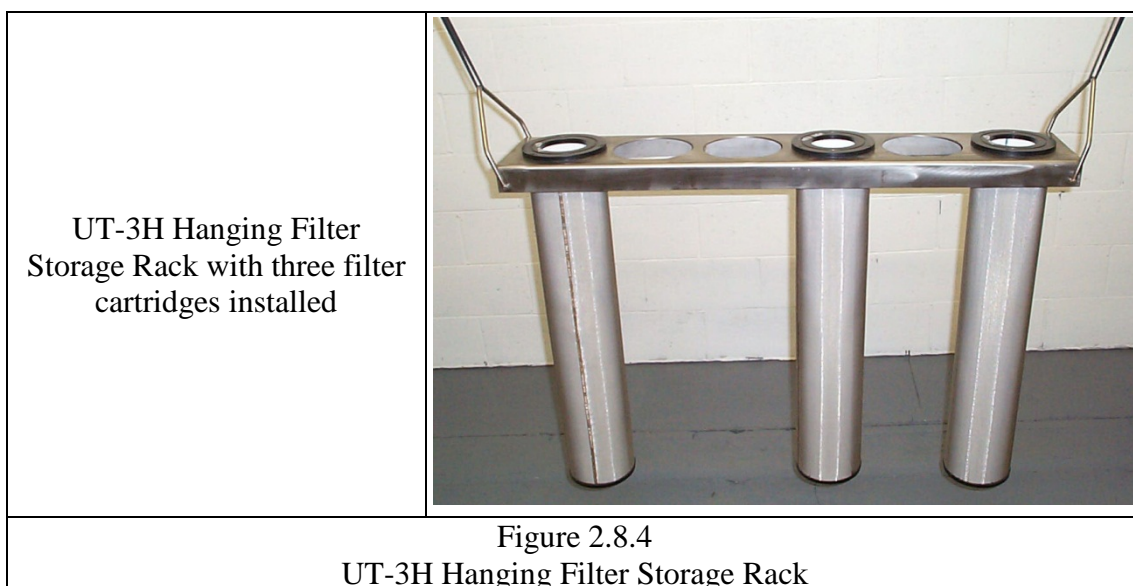
### 2.8.3 Tee Handle for Stainless Steel Pool Poles (P/N: UT-1SPT)

The Tee Handle connects to the top of the pool poles and provides the operator with the ability to lift the assembled pool poles and manipulate the tooling attached to the end of the poles.



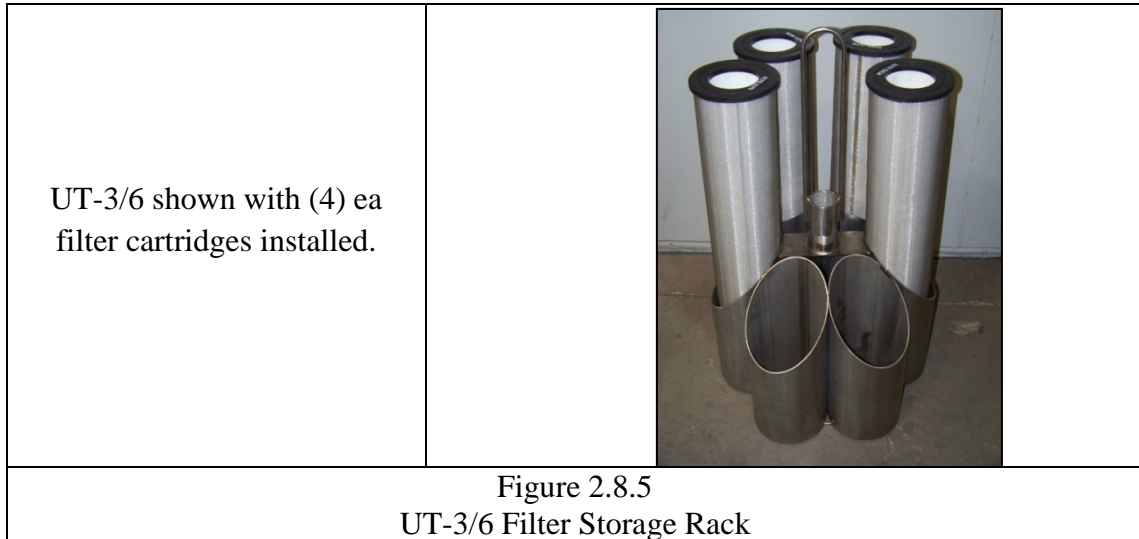
### 2.8.4 Hanging Filter Storage Rack (P/N: UT-3H)

A 42in x 8in x 4in (LWH) hanging rack for holding six (6) spare or spent filter cartridges. This rack can be hung from the railing around the pool or the fuel bridge and allows for more efficient filter change out. See TNC-014-30 for details.



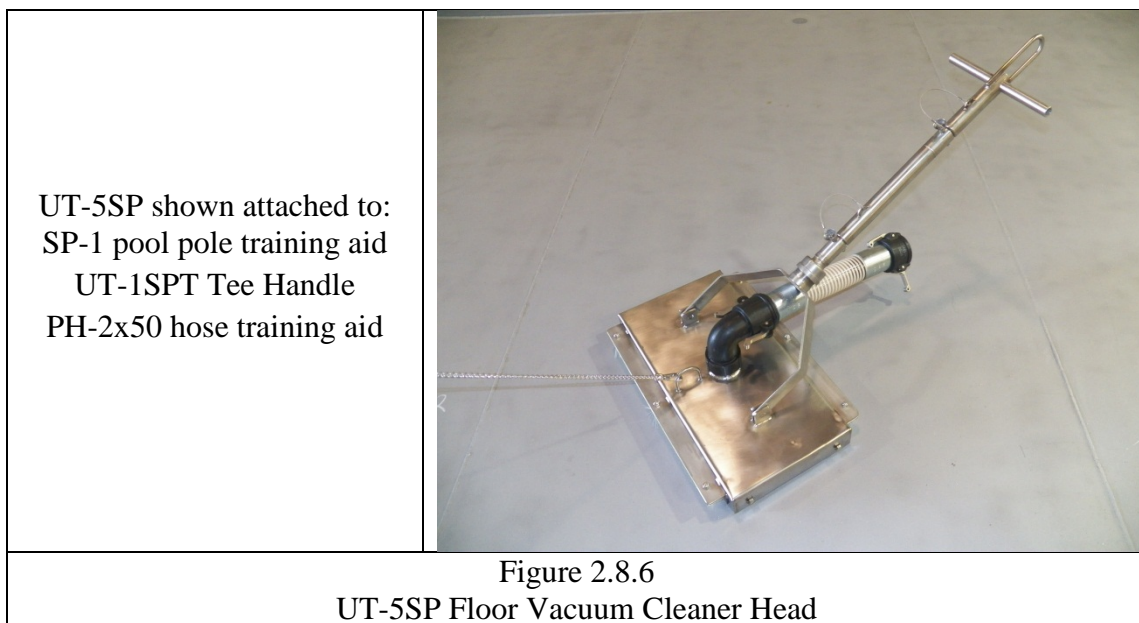
### 2.8.5 Filter Storage Rack (P/N: UT-3/6)

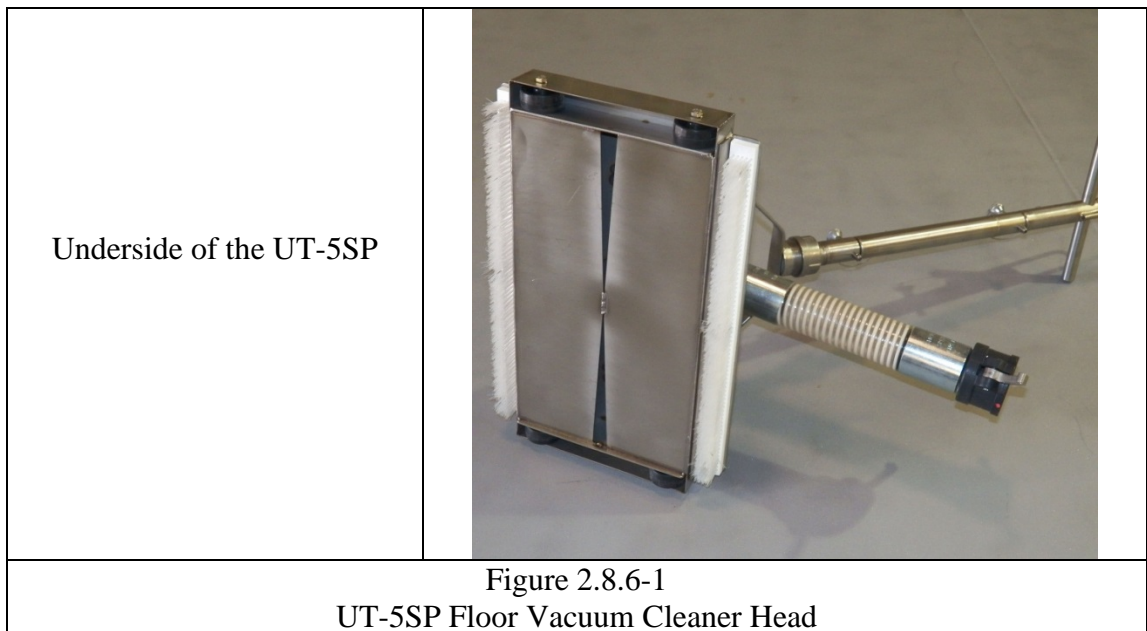
A six (6) tube 20in dia. x 33in high rack for holding filter cartridges underwater adjacent to the Underwater Filter Unit to facilitate the speedy underwater change-out and replacement of filter cartridges. This rack has a removable center lift bail that terminates above the filter cartridges for easy lifting. The UT-3/6 is designed to be easily stored in a standard 55 gal. waste drum. See TNC-014-12 for details



### 2.8.6 Floor Vacuum Cleaner Head (P/N: UT-5SP)

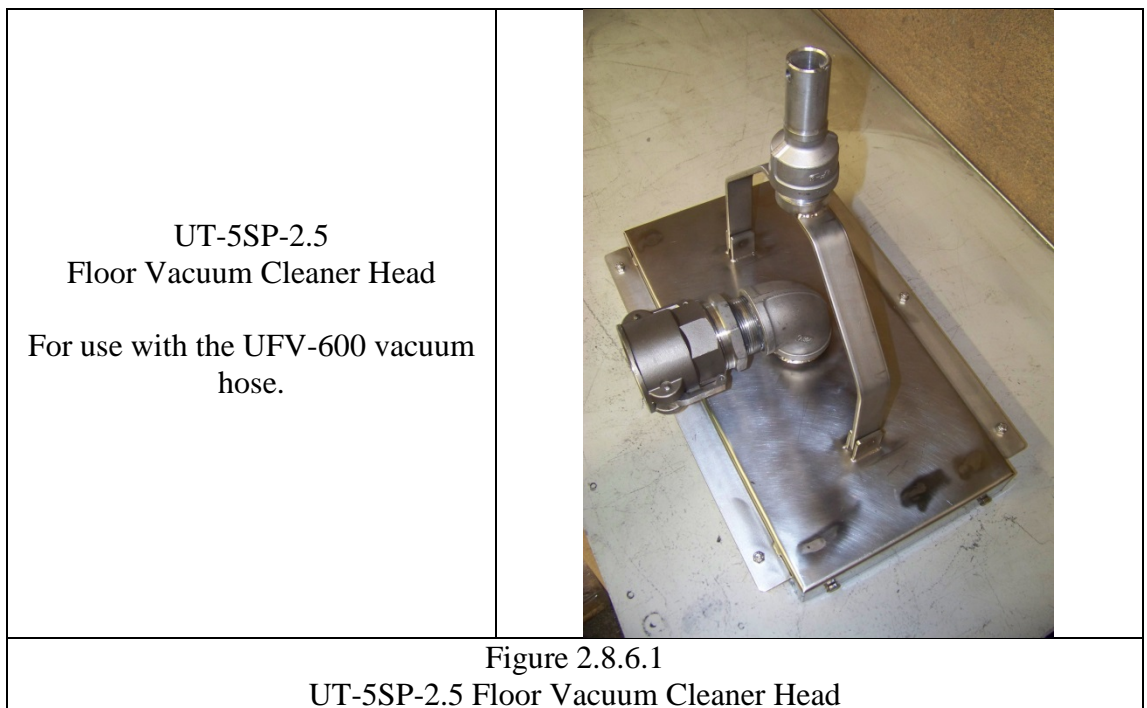
A 10in x 20in four wheel stainless steel vacuum cleaner head is equipped with two brushes, which attaches to the bottom pool pole and to the suction end of a 2in vacuum hose leading to the UFV-260 Unit. The 2in female hose connection is polypropylene.





#### 2.8.6.1 Floor Vacuum Cleaner Head (P/N: UT-5SP-2.5)

A 10in x 20in four wheel stainless steel vacuum cleaner head is equipped with two brushes, which attaches to the bottom pool pole and to the suction end of a 2-1/2in vacuum hose leading to the UFV-600 Unit. The 2-1/2in female hose connection is stainless steel.

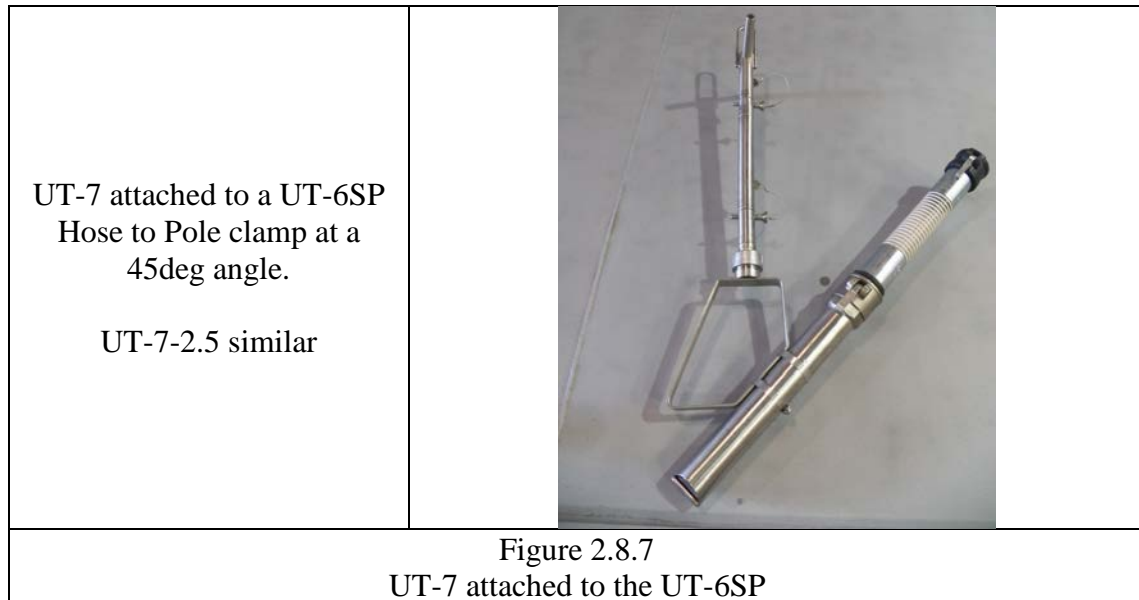


## 2.8.7 Vacuum Nozzle (P/N: UT-7)

A 2in dia.x 18in vacuum nozzle is connected to the end of a vacuum hose. The vacuum nozzle is used for vacuuming small areas requiring high water velocity for lifting. This is used with the UT-6SP Hose to Pole Clamp.

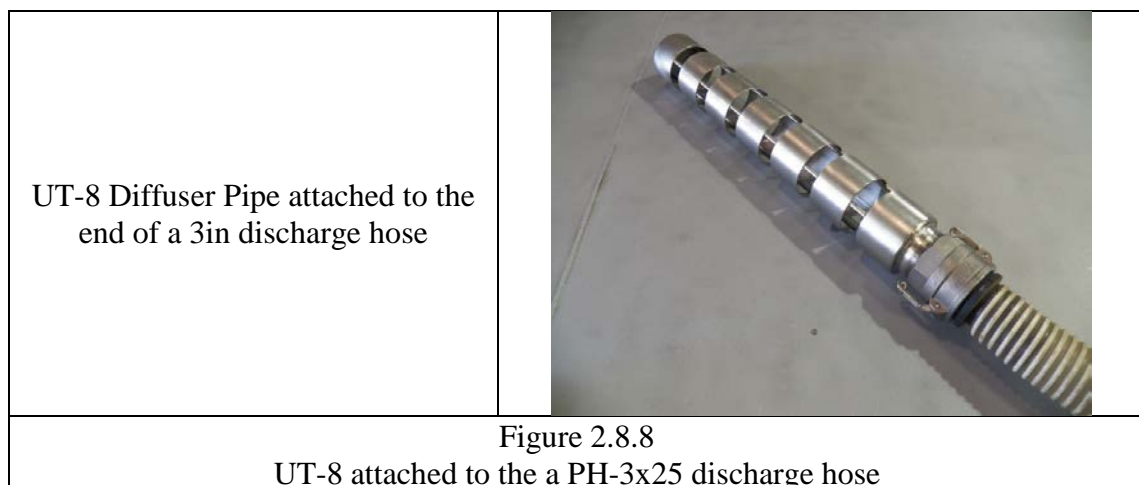
### 2.8.7.1 Vacuum Nozzle (P/N: UT-7-2.5)

A 2-1/2in dia.x 18in vacuum nozzle is connected to the end of a vacuum hose. The vacuum nozzle is used for vacuuming small areas requiring high water velocity for lifting. This is used with the UT-6SP Hose to Pole Clamp.



## 2.8.8 Diffuser Pipe (P/N: UT-8)

The Diffuser Pipe is 4.5in dia x 32in long and connects to the 3in discharge hose from the PP-600SC pump. They are used to minimize the high discharge water velocity preventing hose-end whipping and surface water agitation.



### 2.8.9 Rope Filter Lift Tool (P/N: UT-9)

A special 18in high tool is used for changing out filter cartridges remotely underwater using a customer supplied rope or chain. This tool uses a "positive latch" mechanism allowing for a very simple, effective, and quick method for filter change-out. See TNC-14-19 for details





## 2.8.10 Mounting Panel (P/N: UT-10C)

The UT-10C mounting panel allows the control box to be mounted securely to a panel that is designed to hang from a typical hand rail.

CB-260-FM control box mounted on the UT-10C mounting panel.

All Tri Nuclear control boxes mount in a similar fashion.



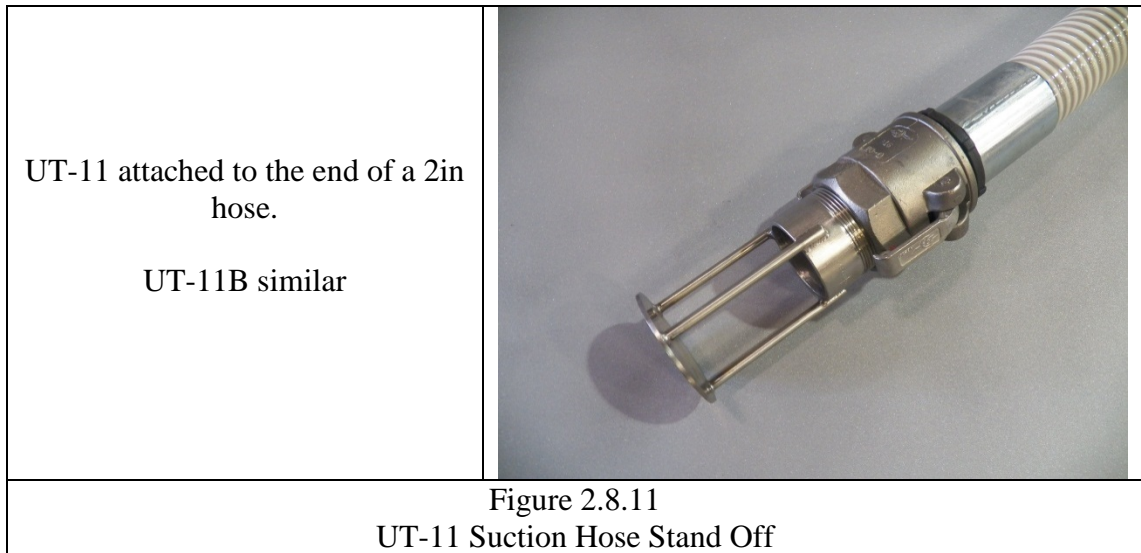
Figure 2.8.10  
UT-10C Mounting panel

### 2.8.11 Suction Hose Stand-Off (P/N: UT-11)

The suction hose stand-off is a stainless steel, 2in camlock adapter that is attached to the end of a 2in suction hose. The suction hose stand-off prevents the hose from “dead heading” on the wall or floor.

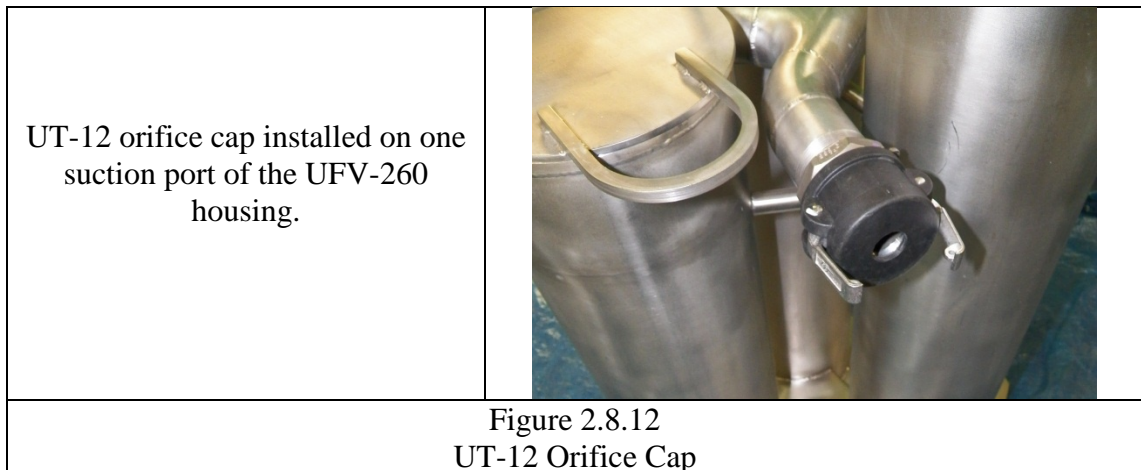
#### 2.8.11.1 Suction Hose Stand (P/N: UT-11B)

The suction hose stand-off is a stainless steel, 2-1/2in camlock adapter that is attached to the end of a 2-1/2in suction hose. The suction hose stand-off prevents the hose from “dead heading” on the wall or floor.



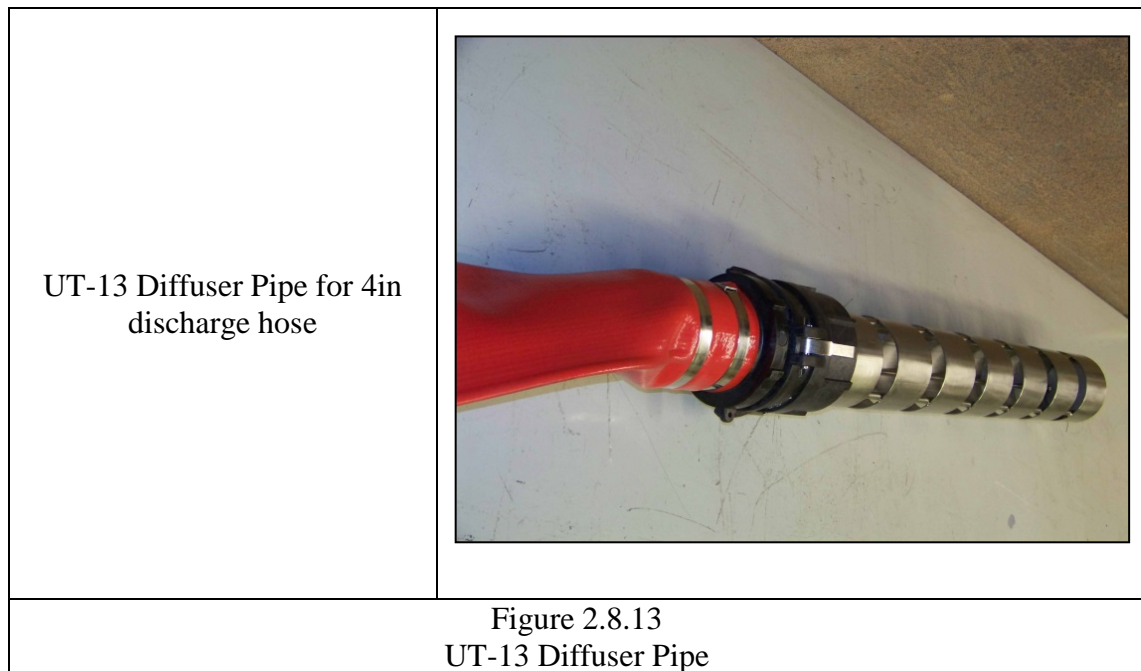
### 2.8.12 Orifice Cap (P/N: UT-12)

A 1in orifice suction cap is shipped with each UFV-260 unit. This cap is to be installed on a suction port during single hose operations. The orifice provides sufficient flow to the pump to prevent cavitation



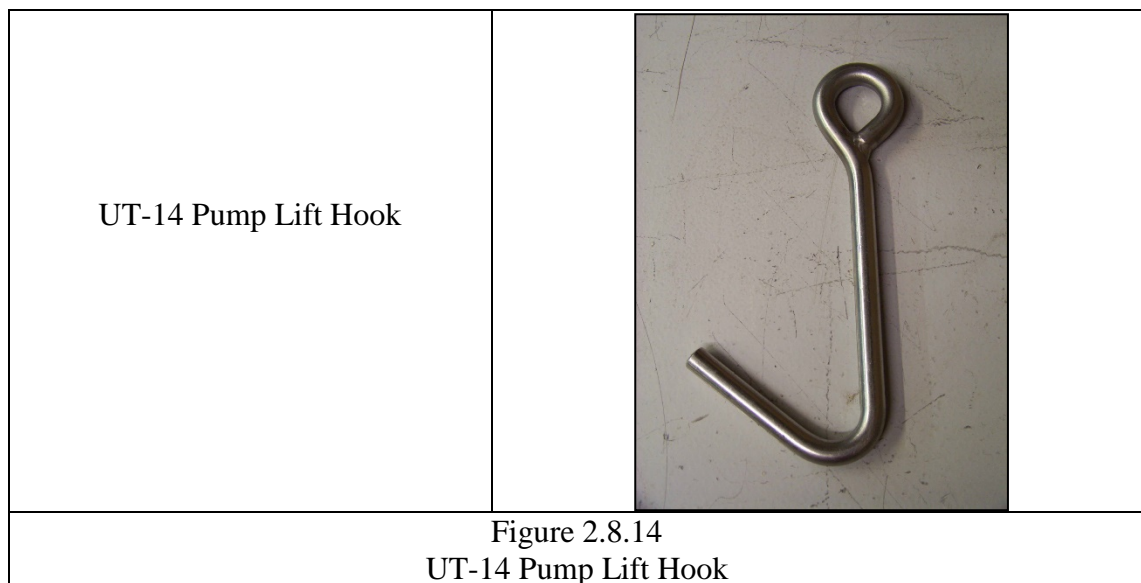
### 2.8.13 Diffuser Pipe (P/N: UT-13)

The Diffuser Pipe is 4.5in dia x 32in long and connects to the 4in discharge hose from the PP-1000SC pump. They are used to minimize the high discharge water velocity preventing hose-end whipping and surface water agitation.



### 2.8.14 PUMP LIFT HOOK (P/N: UT-14)

This stainless steel grapple hook is used with a cable (supplied by customer) to install or remove any Tri Nuclear Pump from their associated housing.





## 2.9 Tri Nuclear Filter Cartridges

Tri Nuclear Filter Cartridges are designed for inside to outside flow. This keeps major contamination on the inside of the filter cartridge and reduces contamination exposure to workers during filter change out and transfer.

The Polyester filter media has a higher dirt loading capacity than other similar media and results in longer filter runs. It also has a higher resistance to gamma radiation than conventional polypropylene media.

<b>CAUTION</b>	At 10E6 RADS accumulated dose, filter cartridges can start to break down.
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### Design Data:


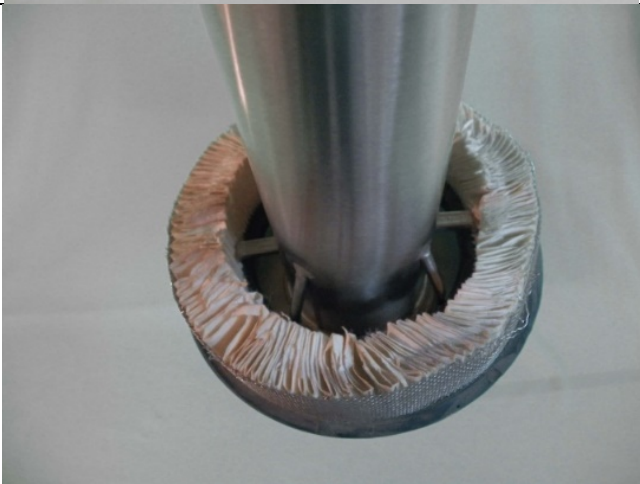

Size: 6in dia x 30in long  
Flow: Inside to outside, open top, solid bottom  
Media: Pleated Polyester  
Shroud: 18x18 Stainless Steel Mesh  
Storage: Designed for long term underwater storage  
Max D/P: 25PSID  
Max Flow: 150 GPM per filter  
Max Temp: 140F

Filter Cartridge Data					
TNC Part No.	Cartridge Size	Size Rating	Media Area	Media Type	Weight Each
VCPH-0.1G	0.1 $\mu$ (micron)	Nominal	52 Sq. Ft.	Micro Glass	6 lb.
VCPH-0.3PE	0.3 $\mu$ (micron)	Nominal	60 Sq. Ft.	Polyester	6 lb.
VCPH-1PE	1.0 $\mu$ (micron)	Nominal	62 Sq. Ft.	Polyester	4.21 lb.
VCPH-5PE	5.0 $\mu$ (micron)	Nominal	85 Sq. Ft.	Polyester	3.83 lb.
VCPH-10PE	10.0 $\mu$ (micron)	Nominal	64 Sq. Ft.	Polyester	4.21 lb.
VCPH-20PE	20.0 $\mu$ (micron)	Nominal	64 Sq. Ft.	Polyester	4 lb.

### Guidelines for filter selection:

- The 10 micron filter VCPH-10PE is normally chosen for high dirt loading when vacuuming settled particulate.
- The 5 micron filter VCPH-5PE will capture material that might bypass the 10 micron during vacuuming.
- The 1 micron filter VCPH-1PE is excellent for water clarity issues.
- The 0.3 micron VCPH-0.3PE filter is used for “polishing” when water clarity is “a must”.
- The 0.1 micron VCPH-0.1G filter is used when particles bypass the 0.3 micron filter and re-establishing water clarity is needed.

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<p>Typical Tri Nuclear Filter Cartridge showing the open top and solid bottom.</p>			
<p>Cut away view of a typical Tri Nuclear Filter Cartridge with the UT-9 Rope Filter Lift Tool engaged.</p>			
<p>Looking into a standard Tri Nuclear Filter Cartridge</p>			
<p>Figure 2.9 Typical Tri Nuclear Filter Cartridge</p>			

## 2.10 Strainer Basket (SB-.125)

(OPTIONAL EQUIPMENT)

The Tri Nuclear Strainer Basket is designed for large particle (>1/8in dia) collection / separation. The SB-.125 is used in place of a standard filter cartridge and can be installed and removed with the UT-9 Rope Filter Lift Tool.

The SB-.125 strainer basket is designed to be dumped out by upending the basket when the open cutout at the bottom of the basket is grappled. This allows for inspection of collected particles.

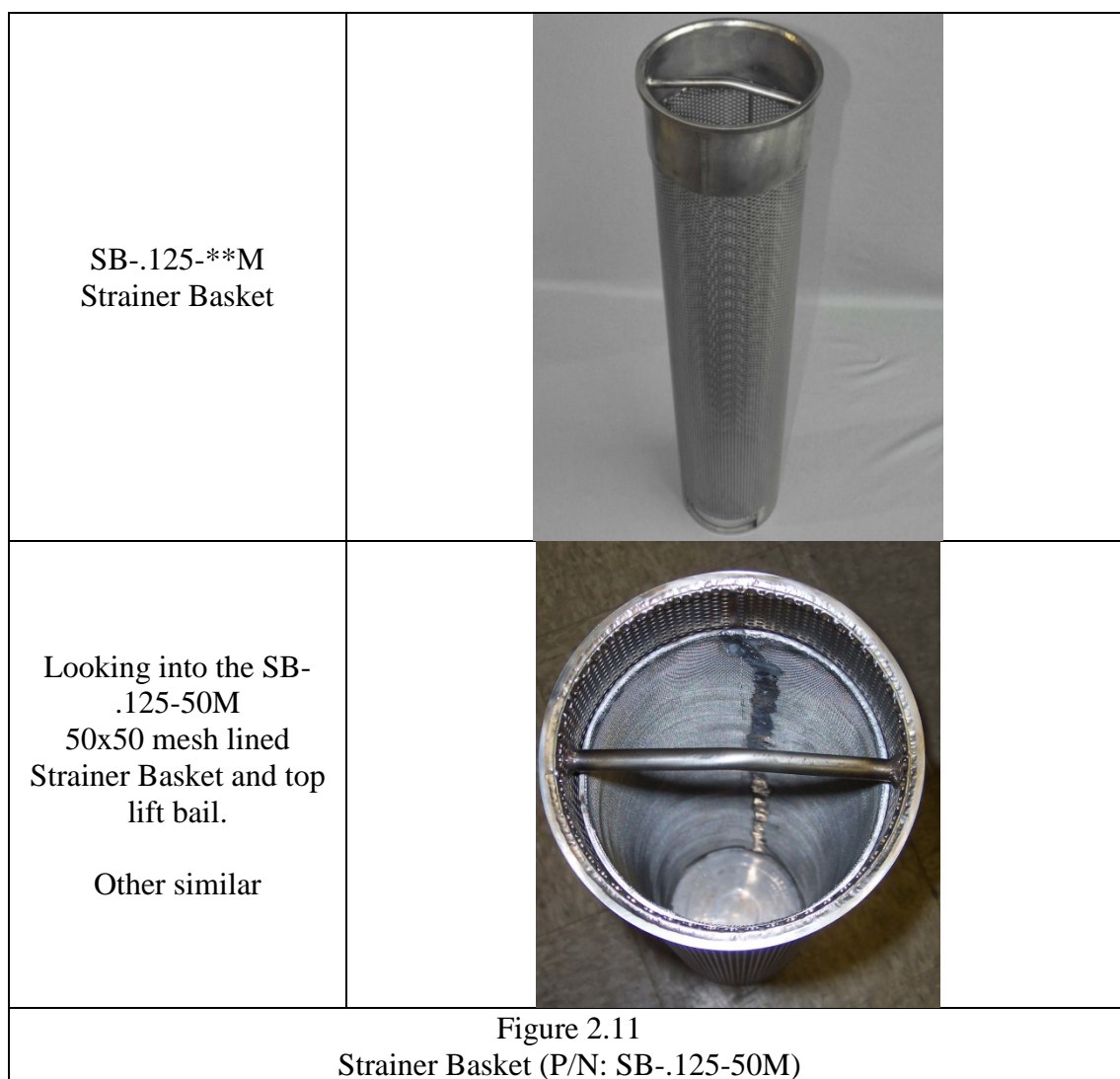


## 2.11 Mesh Lined Strainer Basket (P/N: SB-.125-\*\*-M) (OPTIONAL EQUIPMENT)

The Tri Nuclear Mesh Lined Strainer Basket is designed for fine particle collection / separation using a stainless steel mesh liner. The SB-.125-\*\*-M (where \*\* is the mesh screen size) is used in place of a standard filter cartridge and can be installed and removed with the UT-9 Rope Filter Lift Tool.

TNC Mesh Lined Strainer Basket Data		
Part Number	Mesh Size	Open Square Size
SB-.125-50M	50x50 mesh	0.012in Opening
SB-.125-100M	100x100 mesh	0.006in Opening
SB-.125-200M	200x200 mesh	0.003in Opening
SB-.125-400M	400x400 mesh	0.0015in Opening

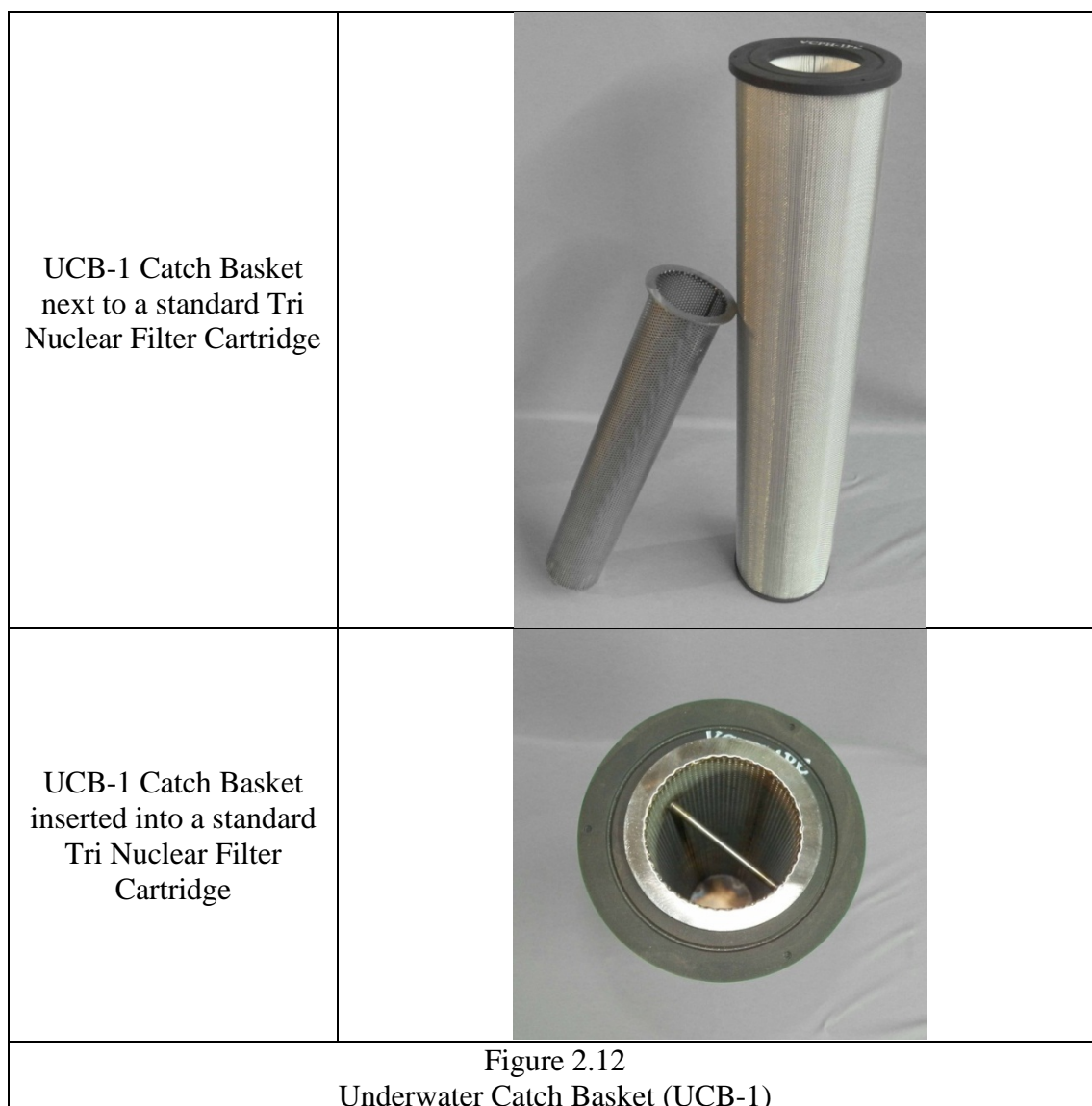
The SB-.125-\*\*-M strainer basket is designed to be dumped out by upending the basket when the open cutout at the bottom of the basket is grappled. This allows for inspection of collected particles.



## 2.12 Underwater Catch Basket (UCB-1) (OPTIONAL EQUIPMENT)

The UCB-1 Underwater Catch Basket is 20in long designed to be inserted into the open end of a standard Tri Nuclear Filter Cartridge. Its purpose is to collect large particles >3/32in and prevent them from becoming embedded in a Filter Cartridge. This helps minimize the chance a filter cartridge being classified as Intermediate level waste during actions where highly radioactive particles could be vacuumed up.

The UCB-1 is installed and removed using the UT-9 Rope Filter Lift Tool. Like the SB-.125, the UCB-1 is designed to be dumped out by upending the catch basket when one of the open loops at the bottom of the catch basket is grappled. This allows for inspection of collected particles.



### 3.0 Equipment as Shipped

This is a general description of how the equipment is normally shipped. Actual shipments may differ depending on customer shipping requirements.

The housing is shipped on a pallet. For UFV-100 & UFV-260 systems, the pumps are shipped in the housings. For UF-600, UFV-600 & UF-1000 systems the pumps are shipped in separate crates.

Control boxes, power cables, hoses and tooling are packaged securely and may be shipped on the pallet with the housing or on a separate pallet or in a pump crate.

Exact packaging is dependent on the qty of the equipment ordered and the method of shipment selected by the end user.

**RECEIPT INSPECTION** - Carefully inspect the main unit and pump for any shipping damage. Using the Packing List or EGL (Equipment Guide List), verify all material ordered has been received.



## 4.0 Assembly and Installation in Pool

### 4.1 Pre Start Up

#### 4.1.1 Mount the CB-xxx-FM control box to the UT-10C mounting panel

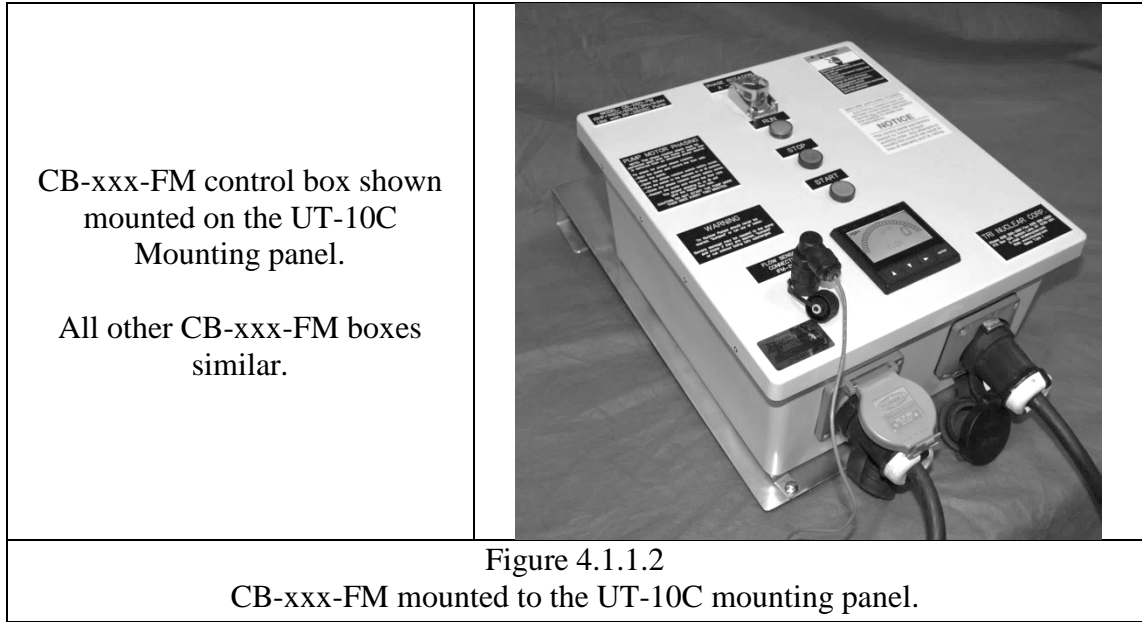
- 4.1.1.1 Remove the control box from its cardboard box. Locate the mounting feet in a bag inside the control box. The bag is taped to the bottom and/or side of the control box with a tag marked “Do Not Discard”.

Install the four (4) mounting feet to the back of the control box with a flat head screwdriver.



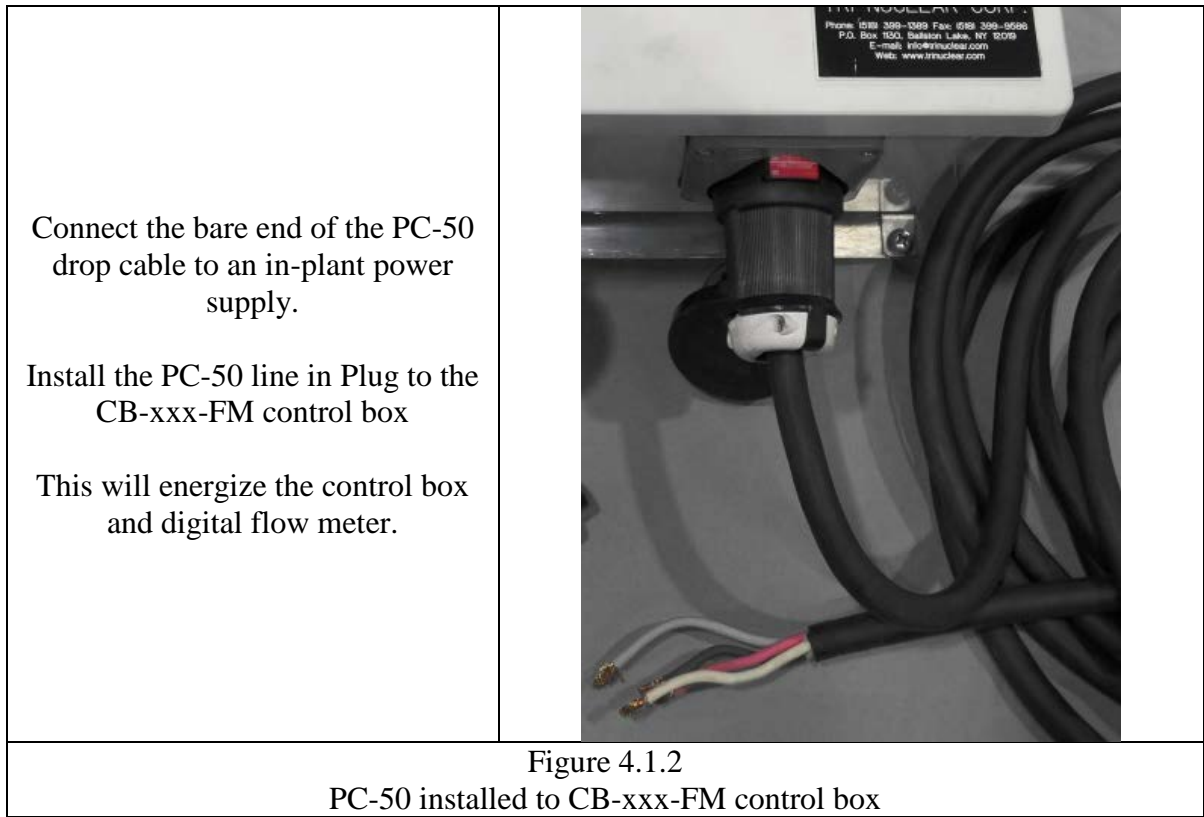
Figure 4.1.1.1  
Mounting feet installed on the back of the CB-600-FM control box  
All other CB-xxx-FM control boxes similar.

- 4.1.1.2 Using a #3 Phillips Screwdriver and a 1/2in open or box end wrench, mount the CB-xxx-FM control box using the four (4) mounting screws, lock washers & nuts (located on the UT-10C mounting panel) assembly on the UT-10D Mounting panel.



4.1.2 Install line in power to the Control Box

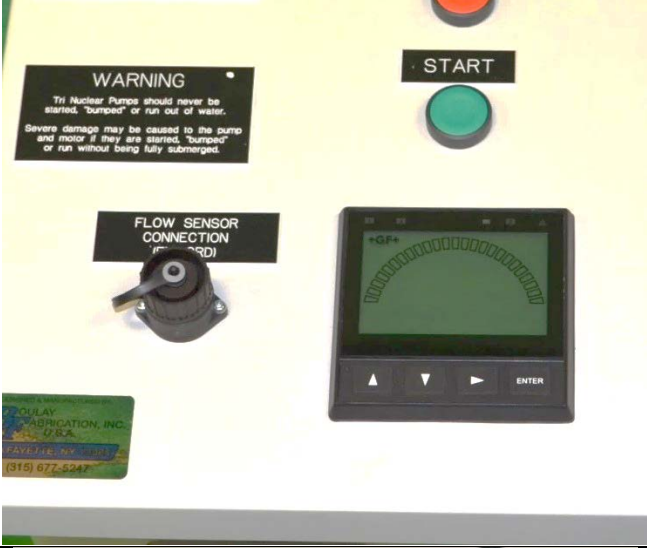

After the CB-xxx-FM control box has been mounted to the UT-10D Mounting Panel, attach the PC-50 Drop Cable as shown below:





#### 4.1.3 Install the Digital Flow Sensor cable to the control box

After the CB-xxx-FM control box has been mounted to the UT-10C mounting panel, attach the FM-SRD cable to the control box:

<p>Remove the dust cover for the FM-SRD connection on the front of the CB-xxx-FM control box.</p>	 The image shows the front panel of a control box. At the top left is a black warning label with white text. To its right is a green 'START' button. Below the warning label is a black port labeled 'FLOW SENSOR CONNECTION (FM-SRD)' with a black dust cover removed. To the right of the port is a digital display showing a green screen with a scale and the text '+GF+'. Below the display are three arrow buttons and an 'ENTER' button. A small green label with contact information is visible at the bottom left.
<p>Install the FM-SRD to the connection on the front of the CB-xxx-FM control box.</p>	 The image shows the front panel of the control box with the FM-SRD cable connected to the 'FLOW SENSOR CONNECTION (FM-SRD)' port. The digital display now shows a blue screen with a scale, the text '+GF+', 'GPM', and '0'. The 'ENTER' button is visible at the bottom right.
<p>Figure 4.1.3 FM-SRD installed in CB-xxx-FM Control Box</p>	

#### 4.1.4 Energize the control box

##### 4.1.4.1 Energize the control box by supplying power to the PC-50 power cable.

#### 4.1.5 Digital Flow Sensor installation in the pump.

<b>NOTICE</b>	<b>Perform a flow meter check:</b> <ul style="list-style-type: none"><li>- Prior to initial installation</li><li>- When sensor is replaced</li><li>- Sensor is suspected to be damaged</li></ul>
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##### 4.1.5.1 Prior to installing the flow sensor in the pump, perform a flow meter check by flipping the paddle wheel with a finger to check for dial read-out response. You should be able to achieve 1/2 to full scale deflection by spinning the paddlewheel in either direction.


This is to ensure the flow sensor and digital meter work prior to installing the pump in the water.



- 4.1.5.2 Verify the two O-rings are installed on shaft of the Flow Sensor. The flow sensor may not operate properly without the O-rings installed.
- 4.1.5.3 Prior to installing the flow sensor in the pump, lubricate the O-rings with DI water or other approved lubricant
- 4.1.5.4 Install the probe into the flow sensor tap making sure the slots in the fitting mate properly with the flow meter sensor orientation pins. The paddle wheel will then be perpendicular to the direction of flow.




#### 4.1.6 Pump Power Cable

<p style="text-align: center;"><b>CAUTION</b></p> 	<ul style="list-style-type: none"> <li>• When installing the power cord to the pump, ensure the keyway male end on the PSC-100P cable is aligned with the female keyway on the SC connector on the pump.</li> <li>• Ensure the PSC-100P plug is sufficiently lubricated with a non-conductive electrical lubricant (Dow Corning #4).</li> <li>• Do no excessive downforce or side-to-side action to try and “make it fit” as you may damage the plug.</li> <li>• Install the power cord to pump pigtail <b>HAND TIGHT ONLY</b>. Do NOT use any tools (pliers, channel locks etc.) to tighten the connection.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• When removing the power cord, be sure that the plug is fully unthreaded and pull in a vertical direction only.</li> <li>• Do not use side-to-side action to try and “loosen it up” as you may damage the plug.</li> </ul>
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When installing and removing the power cord, do not move the power cable connector with side to side motion in an attempt to install or remove it.

- If difficulty is encountered during installation ensure the keyway is oriented properly and that the male end of the PSC-100P power cord is properly lubricated with a non-conductive electrical lubricant (Dow Corning #4).
- If difficulty is encountered during removal ensure the power cable has been unthreaded fully and pull in the vertical direction **ONLY** to remove the power cable from the pump.

<p>Remove the Sea Con seal plug (P/N: SC-P) from the pump power connector. This plug should be installed whenever the power cable is removed for proper protection</p> <p>The plug provides a waterproof seal; therefore, the pump assembly can be stored underwater with the seal plug installed.</p>	
<p style="text-align: center;">Figure 4.1.6 Sea Con seal plug removal from PP-xxx-SC pump</p>	



Place a thin coat of non-conductive lubricant (Dow Corning #4) on the outside surface of the female SeaCon connector found at one end of PSC-100P cable.



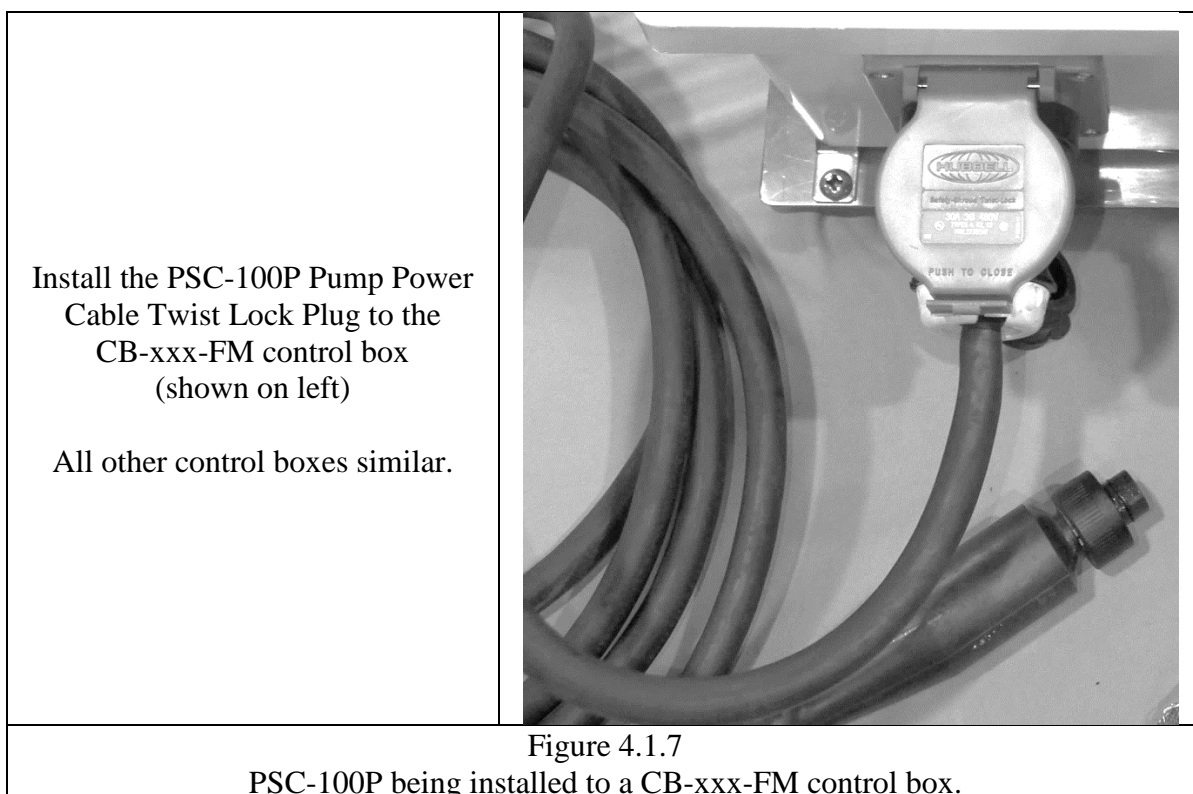
PSC-100P shown being installed on a PP-260SC pump. All other pump similar



Figure 4.1.6.1  
PSC-100P being installed on a PP-xxx-SC pump

#### 4.1.7 Install Pump Power Cables to the Control Box

Attach the PSC-100P power cord to the CB-xxx-FM control box as shown below:





#### 4.1.8 Zip-Tie Cables Together

Lay-out the 100 ft. of pump power cable and flow meter cable in a straight line. Tie the two cables together with "zip-ties" every 2 feet starting at the pump end. Approx. 50 zip-ties are in a small plastic bag in the flow meter box. These "zip-ties" are black in color and are made out of polypropylene. They will float if accidentally dropped in the water.







## 4.2 Installing the unit in the water.

	Do not submerge the control box for any reason.
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	Do NOT use the electrical cables to lift the pump out of the water.
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<b>CAUTION</b>	Slowly lower the housing into the water. This allows water to fill the housing from the drain hole(s) in the base plate. Lowering the unit too fast may cause it to become unstable until it fills with water.
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<b>NOTICE</b>	Running the unit without hoses will not produce desired results in pool filtration or water clarity.
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PP-260SC pump being installed in a UFV-260 housing All PP-100SC & PP-600SC similar		The pump will ‘self-center’ as it is lowered into the housing.	
Figure 4.2 - Pump Installation			

### 4.2.1 Install the UFV-100 in the water.

4.2.1.1 Install the PH-2x50 suction hose to the suction of the UFV-100 Housing. Ensure a suction hose stand-off (UT-11), vacuum nozzle (UT-7) or a vacuum cleaner head is installed on the end of the hose. This prevents the hose from “deadheading” on the pool floor or wall.

4.2.1.2 Install the PP-100SC pump in the housing. This step can be performed after the housing has been placed in the pool.

4.2.1.3 Attach customer supplied rigging to the UFV-100 housing center lift point. Lower the unit to the bottom of the pool and tie-off the lifting line to the side of the pool.

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#### 4.2.2 Install the UFV-260 in the water.

4.2.2.1 Install the two PH-2x50 suction hoses to the suction ports of the UFV-260 Housing. Ensure a suction hose stand-off (UT-11), vacuum nozzle (UT-7) or a vacuum cleaner head is installed on the end of each hose. This prevents the hose from “deadheading” on the pool floor or wall.

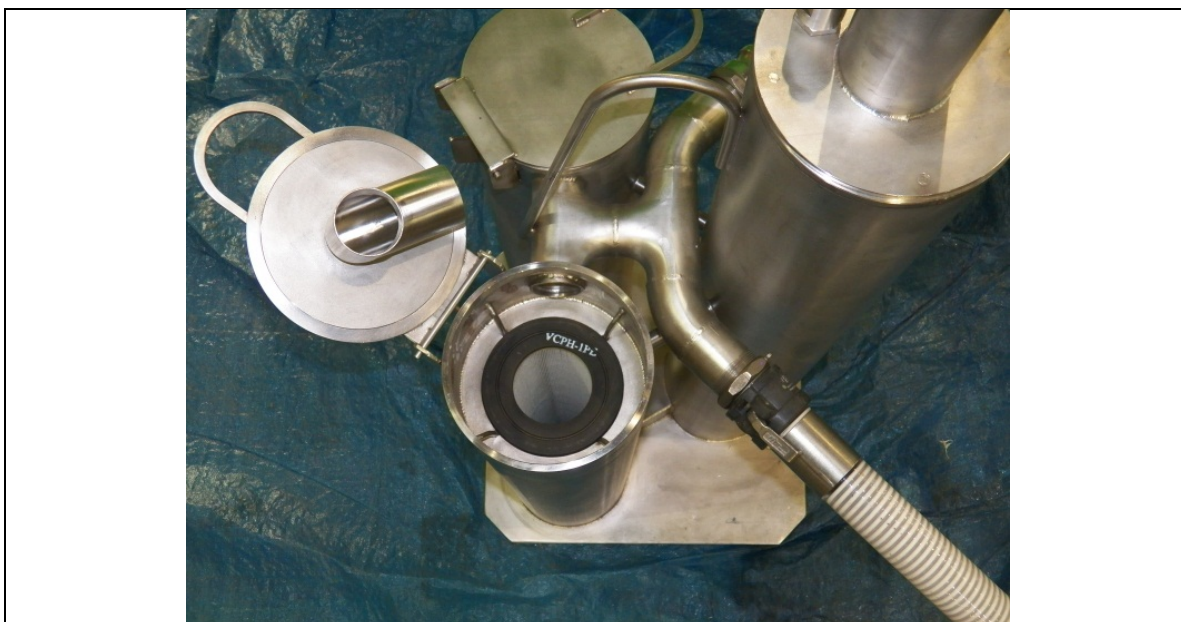


Figure 4.2.2.1  
PH-2x50 installed on the UFV-260 Housing

4.2.2.2 If only one hose is required for operation, the 1in orifice cap (P/N UT-12) MUST be installed on the other suction port. See section 5.2.4 for details of single hose operations.



Figure 4.2.2.2  
UT-12 Orifice Cap installed on the UFV-260 Housing

4.2.2.3 Install the PP-260SC pump in the housing. This step can be performed after the housing has been placed in the pool.

4.2.2.4 Attach customer supplied rigging to the UFV-260 housing center lift point. Lower the unit to the bottom of the pool and tie-off the lifting line to the side of the pool.

4.2.3 Install the UF-600 in the water.

Prior to proceeding with the UF-600 system installation in the pool, a decision must be made as to HOW the equipment will be installed, meaning will it be installed in one lift (pump installed in the housing) or two lifts (pump installed AFTER the housing is in place).

The reason why a decision must be made is the UF-600 has a swing lift bale and the discharge hoses on the PP-600SC pump have a very specific orientation depending on if one lift or two is chosen.

Advantages of single lift: One lift and the pump and housing are installed in the pool.

Disadvantages of a single lift: If there are problems with the pump, any troubleshooting of the pump & flow sensor require the entire UF-600 system to be removed from the pool.

Advantages of two lifts: It allows for the pump to be removed from the housing for troubleshooting the flow sensor or replacement if necessary without having to lift the housing out of the pool.

Disadvantages of two lifts: You have to perform two lift to install the UF-600 in the pool. This could impact critical path time.

4.2.3.1 Install the two PH-3x25 discharge hoses to the discharge of the PP-600SC pump. Install the two UT-8 diffuser pipes to the end of the hoses. It is recommended handling lines be tied to the diffuser ends for moving the hoses underwater to desired locations. The diffuser pipes are used to dampen a hose “whip” reaction which would occur on the end of a discharge hose.

NOTE: If performing a single lift, the hoses must be installed after the PP-600SC pump is installed in the housing and oriented such that the hoses do not interfere with the lift bale swing.

4.2.3.2 Install the PP-600SC pump in the housing.

4.2.3.3 Attach customer supplied rigging to the UF-600 housing center lift point. Lower the unit to the bottom of the pool and tie-off the lifting line to the side of the pool.

#### 4.2.4 Install the UFV-600 in the water.

### NOTICE

The UFV-600 must be run with either suction OR discharge hoses installed. It is NOT desired OR required to run the unit with BOTH suction and discharge hoses installed.

Prior to proceeding with the UFV-600 system installation in the pool, a decision must be made as to HOW the equipment will be installed, meaning will it be installed in one lift (pump installed in the housing) or two lifts (pump installed AFTER the housing is in place).

The reason why a decision must be made is the UFV-600 has a swing lift bale and the discharge hoses on the PP-600SC pump have a very specific orientation depending on if one lift or two is chosen.

Advantages of single lift: One lift and the pump and housing are installed in the pool.

Disadvantages of a single lift: If there are problems with the pump, any troubleshooting of the pump & flow sensor require the entire UFV-600 system to be removed from the pool.

Advantages of two lifts: It allows for the pump to be removed from the housing for troubleshooting the flow sensor or replacement if necessary without having to lift the housing out of the pool.

Disadvantages of two lifts: You have to perform two lift to install the UFV-600 in the pool. This could impact critical path time.

4.2.3.1 Install the two PH-3x25 discharge hoses to the discharge of the PP-600SC pump. Install the two UT-8 diffuser pipes to the end of the hoses. It is recommended handling lines be tied to the diffuser ends for moving the hoses underwater to desired locations. The diffuser pipes are used to dampen a hose “whip” reaction which would occur on the end of a discharge hose.

NOTE: If performing a single lift, the hoses must be installed after the PP-600SC pump is installed in the housing and oriented such that the hoses do not interfere with the lift bale swing.

4.2.3.2 Install the PH-2.5x50 suction hose to the suction of the UFV-100 Housing. Ensure a suction hose stand-off (UT-11B), vacuum nozzle (UT-7-2.5) or a vacuum cleaner head is installed on the end of the hose. This prevents the hose from “deadheading” on the pool floor or wall.

4.2.3.3 Install the PP-600SC pump in the housing.

4.2.3.3 Attach customer supplied rigging to the UF-600 housing center lift point. Lower the unit to the bottom of the pool and tie-off the lifting line to the side of the pool.

#### 4.2.4 Install the UF-1000 in the water.

4.2.4.1 Install the two PH-4x25 discharge hoses to the discharge of the PP-1000SC pump. Install the two UT-13 diffuser pipes to the end of the hoses. It is recommended handling lines be tied to the diffuser ends for moving the hoses underwater to desired locations. The diffuser pipes are used to dampen a hose “whip” reaction which would occur on the end of a discharge hose.

4.2.4.2 Install the PP-1000SC pump in the housing. This step can be performed after the housing has been placed in the pool.

<b>NOTICE</b>	The PP-1000SC pump discharge “T” must be in parallel with the lifting plates on the UF-1000 housing. The pump housing has internal guide bars to correctly position the pump cover and prevent the cover from rotating during operation. If the pump is installed in any other configuration, it will prevent the installation and/or removal of filter cartridges.
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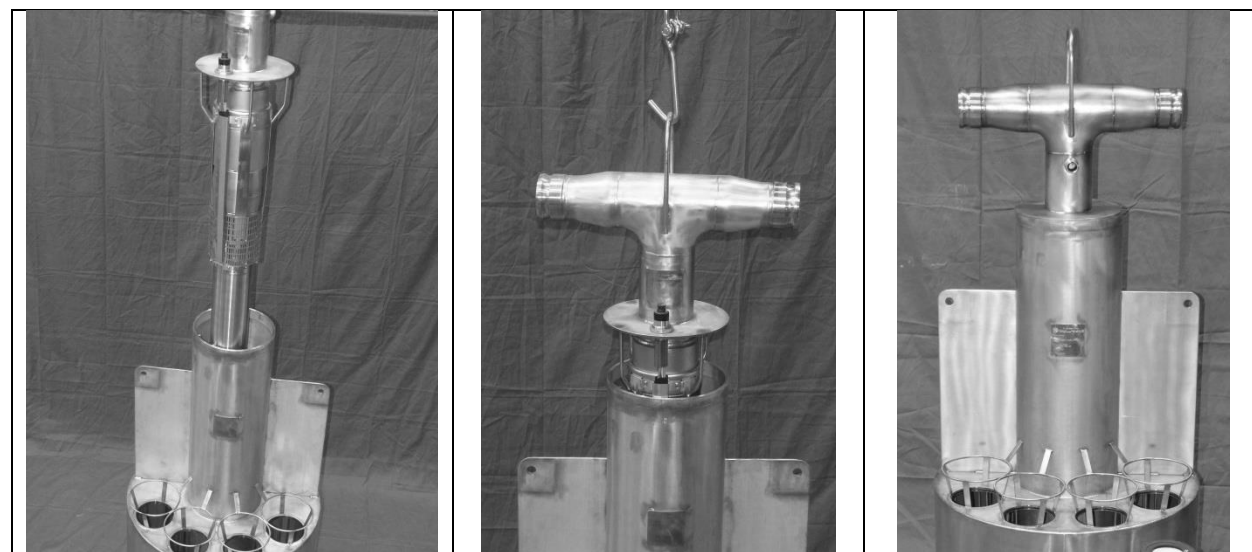


Figure 4.2.4.2 – PP-1000SC Pump Installation

4.2.4.3 Attach customer supplied rigging to the UF-1000 housing lifting points. Lower the unit to the bottom of the pool and tie-off the lifting line to the side of the pool.

### 4.3 Install Filter Cartridges

Proper Filter Selection is “a must” in order to achieve desired results. See Tri Nuclear Drawing TNC-019-02 for information on Tri Nuclear Filter Cartridges. Filter Cartridges may be installed AFTER the housing has been lowered into the pool.

Guidelines for filter selection are show below:

- The 10 micron filter VCPH-10PE is normally chosen for high dirt loading when vacuuming settled particulate.
- The 5 micron filter VCPH-5PE will capture material that might bypass the 10 micron during vacuuming.
- The 1 micron filter VCPH-1PE is excellent for water clarity issues.
- The 0.3 micron VCPH-0.3PE filter is used for “polishing” when water clarity is “a must”.
- The 0.1 micron VCPH-0.1G filter is used when particles bypass the 0.3 micron filter and re-establishing water clarity is needed.

### 4.4 Install Other Equipment

#### 4.4.1 UT-3/H Hanging Filter Storage Rack

If desired the UT-3H Hanging Filter Storage Rack can be attached to the pool bridge or side wall for additional filter storage space (for either clean or dirty filters).

#### 4.4.2 UT-3/6 Floor Storage Rack

If desired the UT-3/6 can be lowered and placed on the pool floor in the vicinity near the UFV-xxx / UF-xxx housing. The UT-3/6 can be used to hold six (6) clean or dirty filter cartridges and the SB-.125 Strainer Baskets.

### 4.5 Phase Rotation Check.

A Phase Rotation Check is necessary because a 3 phase AC motor can run both backwards & forwards, but the centrifugal pump end is designed to pump efficiently in one direction only.

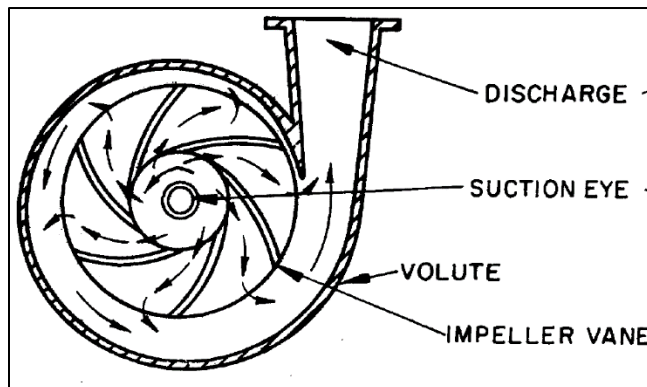
Perform a Phase Rotation Check whenever a pump is disconnected from its electrical power source!

System	Typical flow Rate phased <b>CORRECTLY</b>	Typical flow Rate phased <b>BACKWARDS</b>
UFV-100	100 GPM	30 GPM
UFV-260	260 GPM	60 GPM
UF-600 UFV-600	600 GPM	180 GPM
UF-1000	1000 GPM	200 GPM

Note: All Tri Nuclear Pumps are centrifugal pumps.

If they are phased backwards the impeller is rotating opposite of what it should.

***IT DOES NOT MEAN THE PUMP  
WILL PUMP WATER  
BACKWARDS!***



Typical centrifugal pump

<b>CAUTION</b>	Do not start the pump more than once every 2 minutes or 300 starts/day. Damage to the motor winding insulation may occur.
	Fully submerge pump prior to starting the system. Running or "bumping" the pump dry (out of water) will result in damage to the pump.
	Pumps must be installed at least 10 ft. below the water level of the pool to ensure enough NPSH (Net Positive Suction Head) for proper operation of the pump.

- 4.5.1 To check for proper phase rotation of the pump motor, turn on the unit and record the flow rate. Switch the phase of the pump using the phase rotation switch, start the pump and again record the flow rate. The proper phasing will give the higher flow rate.

To change the phase of the pump, stop the pump (if running), open the safety cover, Turn the switch to the Phase A or B position, Close the safety cover, and restart the pump.

- 4.6 When all the steps of section 4.0 are completed, the unit is ready for operation in the spent fuel pool or reactor cavity.

## 5.0 Operations

### 5.1 Modes of Operation:

There are two basic modes of operation for Tri Nuclear Underwater Filter / Vacuum units: Vacuuming Operations and Water Clarity Operations.

### 5.2 Vacuuming Operations

#### 5.2.1 Vacuuming with the Vacuum Cleaner Head (UT-5SP) – UFV-100 & UFV-260 units only.

For vacuum cleaning the bottom of a pool, use the four-wheel vacuum cleaner head (UT-5SP) attached to the bottom end of the pool poles. The suction end of the PH-2x50 hose is attached to the hose coupler on the vacuum cleaner head. Dose rates on the filter should be closely monitored since high dose rates may be reached before the filter shows much loss of flow.

A suitable rope may be attached to the loop on the Vacuum Cleaner Head to assist in moving it around the bottom of the pool.

##### 5.2.1.1 Vacuuming with the Vacuum Cleaner Head (UT-5SP-2.5) – UFV-600 units only.

For vacuum cleaning the bottom of a pool, use the four wheel vacuum cleaner head (UT-5SP-2.5) attached to the bottom end of the pool poles. The suction end of the PH-2.5x50 hose is attached to the hose coupler on the vacuum cleaner head. Dose rates on the filter should be closely monitored since high dose rates may be reached before the filter shows much loss of flow.

A suitable rope may be attached to the loop on the Vacuum Cleaner Head to assist in moving it around the bottom of the pool.

#### 5.2.2 Vacuuming with the Vacuum Nozzle (UT-7) – UFV-100 & UFV-260 units only.

Vacuum cleaning around fuel rack ledges or the rim of an open reactor vessel may be accomplished using the vacuum cleaner nozzle (UT-7) attached to the end of a suction hose and to the bottom end of the pool poles (SP-1) using the hose-to-pole clamp (UT-6SP). This fixture will permit the vacuum nozzle to be used in either a vertical, 45deg., or horizontal position.

##### 5.2.2.1 Vacuuming with the Vacuum Nozzle (UT-7-2.5) – UFV-600 units only.

Vacuum cleaning around fuel rack ledges or the rim of an open reactor vessel may be accomplished using the vacuum cleaner nozzle (UT-7-2.5) attached to the end of a suction hose and to the bottom end of the pool poles (SP-1) using the hose-to-pole clamp (UT-6SP). This fixture will permit the vacuum nozzle to be used in either a vertical, 45deg., or horizontal position.

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### 5.2.3 Pool Poles (SP-1, SP-1x5, SP-1x3 & SP-1x2)

The pool poles come in 4 different lengths – 10ft, 5ft, 3ft & 2ft long. Determine the depth the vacuuming will take place and assemble the appropriate number of pool poles for optimal operation interaction with the pool poles and tee handle.

#### 5.2.3.1 Buoyancy Chambers (BC-1)

The Buoyancy Chamber (BC-1) is designed to reduce the weight of the pool pole by about half. After determining the number of pool poles to be used, install the same number of Buoyancy Chambers on the uppermost, fully submerged pool pole. The placement of the Buoyancy Chambers at the top end of the of the Pool Pole sections helps the operator manipulate the tooling, especially the UT-5SP Vacuum Cleaner Head.



BC-1 installed on a SP-1 pool pole  
in TNC's test tank

### 5.2.4 Single Hose Operations

There are times with it is useful to operate the UFV-260 with a single hose. In order to provide adequate flow through the unit during Single Hose Operations, install the UT-12 Orifice Cap on one of the suction ports of the UFV-260.

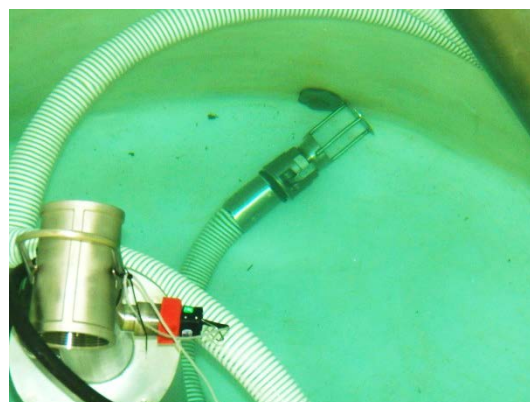
<b>NOTICE</b>	<b>Do not install more than 50ft of suction hose to a single suction port on a UFV filter system. This will ensure there is adequate flow velocity at the vacuum nozzle for vacuuming operations.</b>
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### 5.3 Water Clarity Operations (all units)

Successful water clarity operations depend on effective cross circulation. Hoses are used to either draw water to the units or direct water away from the units.

All suction hoses should have a suction hose standoff (or vacuuming attachment) installed to prevent dead heading of the hose against the pool floor.

All discharge hoses should have a diffuser installed to prevent hose whipping.





## 5.4 Filter Change Out

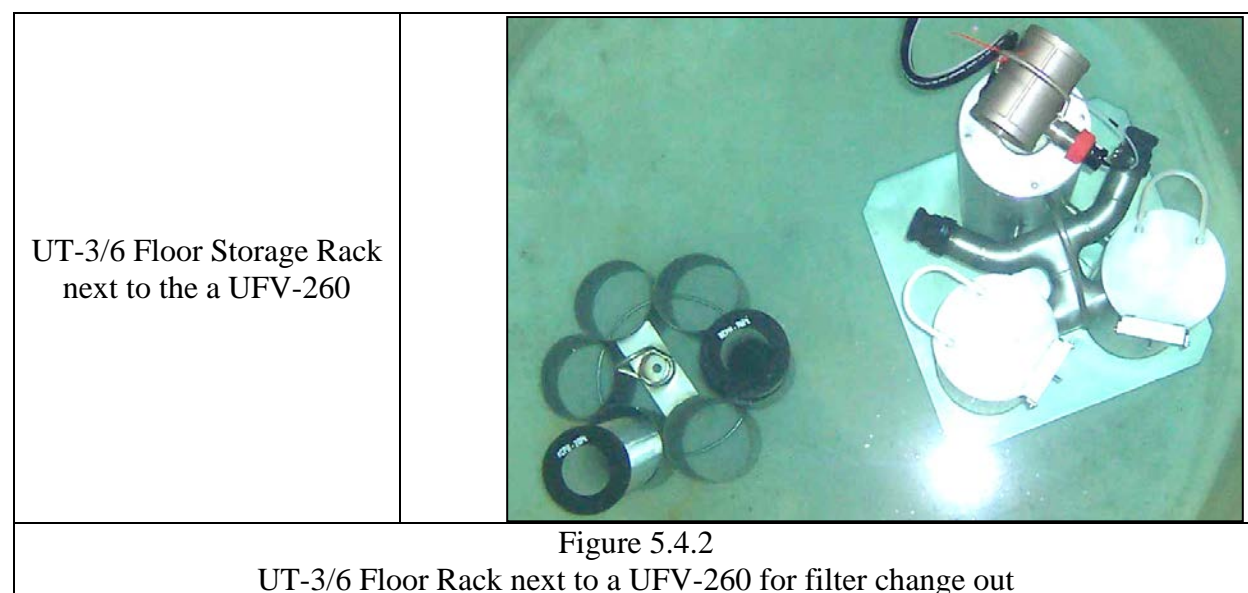
Continue operation of filters until they are considered depleted. Filters should be changed out on one of two conditions:

- 50% clean filter flow
  - If initial flow was 260 GPM then filters should be changed out at ~130 GPM
  - The filter cartridge is 'expended' at this point and running it further does not increase dirt loading/holding of the filter by very much at all.
- Pre-determined radiation levels
  - Each plant determines this level

<b>NOTICE</b>	<b>Filter cartridges can take several minutes to flood while trying to submerge them in the pool. The flooding time can be minimized by pre-soaking the filters</b>
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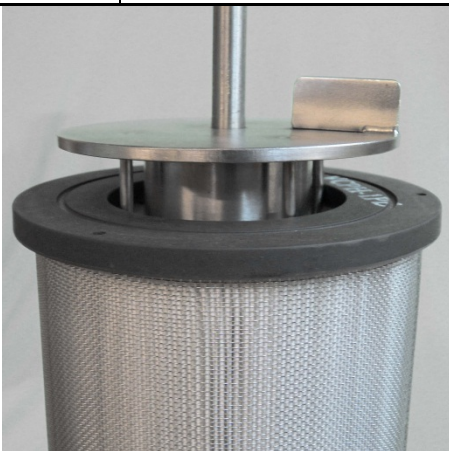
5.4.1 Turn off the pump.

5.4.2 To change-out an expended filter cartridge from an Underwater Filter/Vacuum Unit, first lower the Underwater Filter Storage Rack with new filter cartridges down to the bottom of the pool adjacent to the Underwater Filter/Vacuum Unit. Allow the filters to fill with water before lowering quickly into the pool.



5.4.3 Attach an approved rope to the top lifting eye of the Rope Filter Lift Tool, and lower it down until the bottom hook lands on the top cover of the filter housing.

- 5.4.4 Rotate and move the tool until the bottom J-hook engages the lift handle on the filter housing top cover. Note that the hook locator tab welded on the top of the tool indicates from a top view the orientation of the open side of the hook
- 5.4.5 Raise the UT-9 Rope Filter Lift Tool to open and lay back the top cover and disengage the tool from the cover.
- 5.4.6 With the filter cover open use the UT-9 rope filter lift tool to remove the expended filter cartridge and install a new filter cartridge as follows:
  - 5.4.6.1 Next, lower the tool down into the open top of the expended filter cartridge until the top plate of the Rope Filter Lift Tool seats on the top of the filter cartridge. This is determined by a sudden decrease in the weight of the tool on the rope.
  - 5.4.6.2 Continue to partially lower the rope or ONLY another 4 or 5 inches. This will allow the side arms of the tool to extend out through the open slots on the side of the tool housing and engage the underside of the filter top cap.
  - 5.4.6.3 Pull up on the tool to raise the filter out of the filter housing, and lower it into one of the open tubes in the Underwater Filter Storage Rack
  - 5.4.6.4 Slack-off the rope until the Rope Filter Lift Tool slide rod hits the bottom and all of the weight of the Rope Filter Lift Tool is transferred to the filter cartridge. This will rotate the internal cam fitting so the hinged arms will no longer extend out through the side slots in the tool housing.
  - 5.4.6.5 Next, raise the rope to lift the Rope Filter Lift Tool out of the filter cartridge.
  - 5.4.6.6 Lower the Rope Filter Lift Tool down into a new filter cartridge, and repeat the steps to install a new filter into the housing.
  - 5.4.6.7 Finally, re-engage the bottom J-hook of the Rope Filter Lift Tool onto the lift handle on the filter housing top cover, lift up to close the filter housing cover, and then disengage the hook.
- 5.4.7 Repeat steps 5.4.2 -5.4.7 for the other filter cartridge to be changed out.
- 5.4.8 Start the pump. Read and record initial clean filter flow rate for future filter cartridge change out.

		
UT-9 being lowered into a filter cartridge	UT-9 partially installed in a filter cartridge	Filter cartridge attached to the UT-9 Rope Filter Lift Tool.
		
Cutaway view of a filter cartridge showing the extended arms of the UT-9 catching the underside of the top cap of a typical Tri Nuclear Filter Cartridge	UT-9 Rope Filter Lift Tool with a Tri Nuclear Filter installed.	
Figure 5.4.6 UT-9 Rope Filter Lift Tool Operations		







Rope Filter Lift tool UT-9  
opening the filter tube  
cover



Rope Filter Lift tool UT-9  
retrieving a filter to install  
in the UFV-260

UFV-260 Filter Tube open









Figure 5.4.8.2  
UT-9 Operations

## 5.5 Pump Change Out

When it becomes necessary to remove the pump perform the following:

5.5.1 Turn off the pump.

5.5.2 Using any approved lifting hook or rigging, lift and remove the pump using the overhead crane.

5.5.3 Install the pump per section 4.2.1

5.5.6 If the pump was disconnected from the electrical power source or it was replaced, perform the phase rotation check in section 4.3 prior to operations.

## 5.6 Use of the SB-.125 or SB-.125-\*\*M Strainer Basket

The SB-.125 is used for large particle collection. It provides NO filtering capability and particles less than < .125in can pass through the perforated screen. To use the SB-.125, install the strainer baskets in place of the filter cartridges per section 5.4.1

<b>NOTICE</b>	One Strainer Basket (SB-.125) per filter housing must be used to ensure effective straining operations.
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## 5.7 Use of the UCB-1 Underwater Catch Basket

The UCB-1 is used in conjunction with any Tri Nuclear Filter Cartridge to prevent large, potentially high dose, particles greater than 3/32in from becoming embedded in the filter cartridges.

The UCB-1 is installed using the UT-9 Rope Filter Lift Tool into the open top of any Tri Nuclear filter cartridge. See Drawing TNC-086-02 for details.

<b>NOTICE</b>	One Underwater Catch Basket (UCB-1) per filter must be used to ensure effective straining operations.
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## 6.0 Storage Requirements

<b>CAUTION</b>	<p>Caution should be taken to <u>NOT</u> store any plastic components (eg. filters or hoses) near high radiation fields associated with equipment such as fuel bundles, LPRM's or control blades.</p> <p>Breakdown of such components can occur with accumulated exposures of 10E6 Rad. For this reason, precautions should be taken to minimize accumulative dose for the following components: suction hose, filter cartridges, power and instrument cable, flow sensor, and electric motor.</p> <p>All components are chemically suitable for long term storage in the fuel pool cavity environment.</p>
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- 6.1 The preferred method of storing the submersible pump assembly when not in use is underwater. The flow sensor can be removed for storage. The PSC-100P power cable can also be removed for storage, however, the SC-P plug must be installed on the pump cover to protect the electrical connection on the pump.



- 6.2 The housing for all UF / UFV systems can be stored in the reactor cavity during power operations. Many plants have found this beneficial and reduces exposure related to installing and removing equipment every outage.

The following components must be removed prior to commencement of power operations if the housing will be left in the reactor cavity:

- Filter Cartridges
- Suction Hoses
- Pump, power cable and flow sensor cable
- Discharge hoses

## 7.0 Maintenance

There is no required periodic maintenance required for Tri Nuclear UF / UFV equipment.

### 7.1 Tube Sheet O-Ring replacement

If the Tube Sheet o-ring becomes damaged, it can be replaced.

- 7.1.1 Remove the old O-ring and ensure the O-ring groove is clean and free of any material that may have been left behind from the old O-ring.
- 7.1.2 Obtain a tube sheet O-ring, and inspect for cuts and nicks. Clean the O-ring prior to installation.
- 7.1.3 Run a bead of glue around the tube sheet seating surface after cleaning surfaces thoroughly.
- 7.1.4 Install O-ring and maintain a constant pressure for approximately 20 seconds.
- 7.1.5 Verify O-ring is properly mounted by attempting to remove it using a reasonable force.
- 7.1.6 Install a standard Tri Nuclear filter cartridge and check for proper seating on the O-ring.

## 8.0 Troubleshooting

See OI-5 UFV Grundfos Pump Troubleshooting Procedure for troubleshooting Tri Nuclear equipment.

## 9.0 Replacement Parts

Below is a listing of **Recommended Spare Parts for each system:**

TNC Part Number	Description	UFV-100 Qty	UFV-260 Qty	UF-600 Qty	UFV-600 Qty	UF-1000 Qty
PP-100SC	Grundfos pump, 2 HP/460V/3Ph/60 Hz, w/cover, SC connector. Includes CB-100-FM phase reversing control box with twist lock plugs and integral 0-200 gpm digital flow meter, FM-SRD digital flow sensor, PSC-100P power cable with twist lock plug and PC-50 drop cable with twist lock plug.	1				
CB-100-FM	2 HP/460V/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-200 gpm digital flow meter. Includes FM-SRD digital flow sensor.	1				

## 9.0 Replacement Parts (continued)

TNC Part Number	Description	UFV-100 Qty	UFV-260 Qty	UF-600 Qty	UFV-600 Qty	UF-1000 Qty
PP-260SC	Grundfos pump, 5 HP/460V/3Ph/60 Hz, w/cover, SC connector. Includes CB-260-FM phase reversing control box with twist lock plugs and integral 0-400 gpm digital flow meter, FM-SRD digital flow sensor, PSC-100P power cable with twist lock plug and PC-50 drop cable with twist lock plug.		1			
CB-260-FM	5 HP/460V/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-400 gpm digital flow meter. Includes FM-SRD digital flow sensor.		1			
PP-600SC	Grundfos pump, 15 HP/460V/3Ph/60 Hz, w/cover, SC connector. Includes CB-600-FM phase reversing control box with twist lock plugs and integral 0-1000 gpm digital flow meter, FM-SRD digital flow sensor, PSC-100P power cable with twist lock plug and PC-50 drop cable with twist lock plug.			1	1	
CB-600-FM	15 HP/460V/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-1000 gpm digital flow meter. Includes FM-SRD digital flow sensor.			1	1	
PP-1000SC	Grundfos pump, 20 HP/460V/3Ph/60 Hz, w/cover, SC connector. Includes CB-1000-FM phase reversing control box with twist lock plugs and integral 0-2000 gpm digital flow meter, FM-SRD digital flow sensor, PSC-100P power cable with twist lock plug and PC-50 drop cable with twist lock plug.					1
CB-1000-FM	20 HP/460V/3Ph/60 Hz phase reversing control box with twist lock plugs and integral 0-2000 gpm digital flow meter. Includes FM-SRD digital flow sensor.					1
PSC-100P	PSC-100P Power Cable with twist lock plug (100ft 10/4 SO Cable w/ male twistlock plug)	1	1	1	1	1
PC-50	PC-50 drop cable with female plug (50ft Cable w/ female connector)	1	1	1	1	1
FM-SRD	Flow sensor with reinforced paddlewheel and 100ft cable with Amphenol connector.					
PH-2x50	2in x 50ft suction hose with MxF camlock couplers	1	2			
PH-2.5x50	2.5in x 50ft suction hose with MxF camlock couplers				2	
PH-3x25	3in x 25ft discharge hose with MxF camlock couplers			2	2	
PH-4x25	4in x 25ft discharge hose with MxF camlock couplers					2
O-Ring	O-ring for tube sheet	1	2	4	4	8
SC-P	Seal Plug for electrical connector on Tri Nuclear pumps	1	1	1	1	1

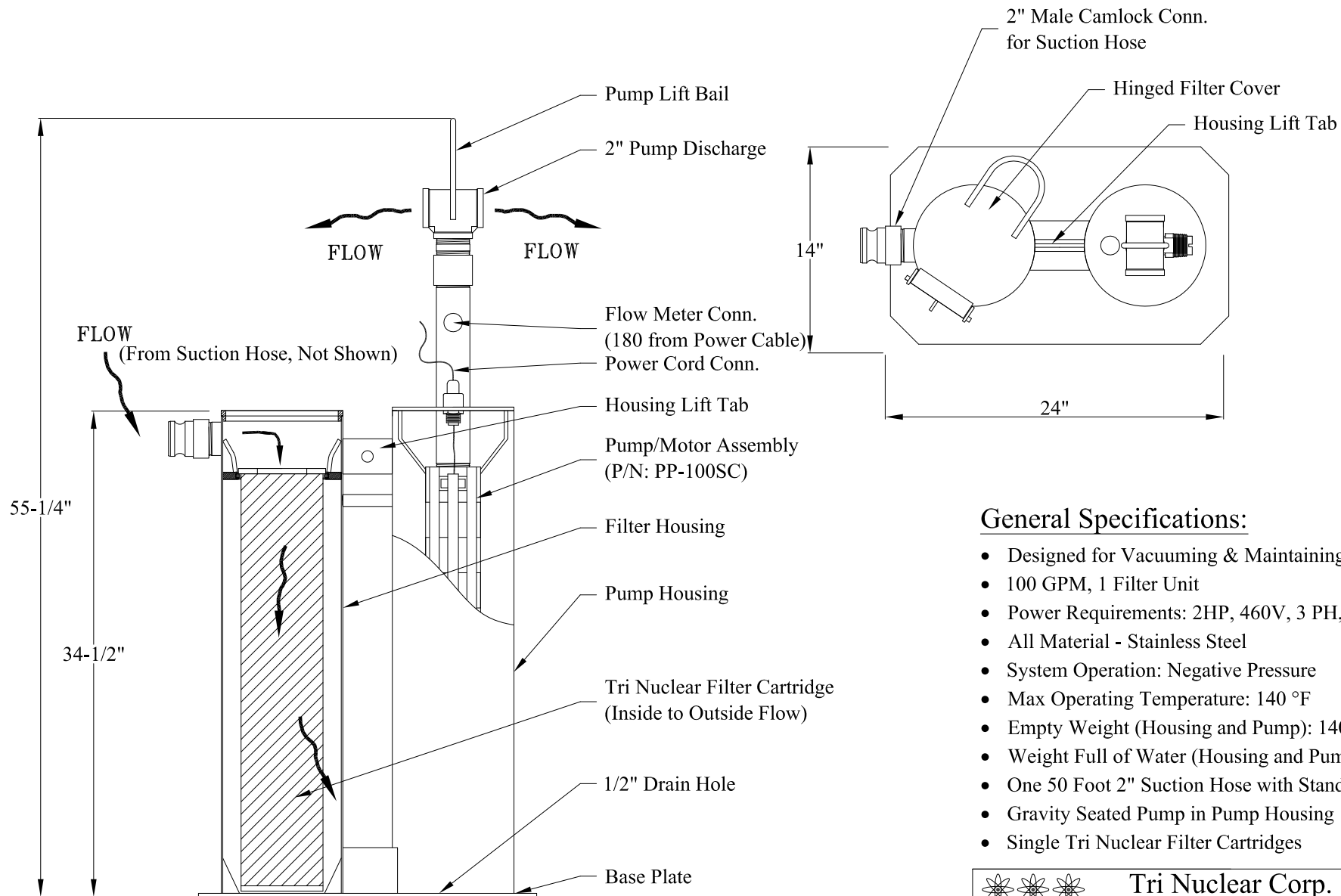
## 9.0 Replacement Parts (continued)

Strainer Baskets & Filter Cartridges		
Qty	Part No.	Description
AR	VCPH-0.1G	Filter Cartridge, 0.1 micron, 52ft <sup>2</sup> microglass, media, 6in x 30in lg, 6ea/cs
AR	VCPH-0.3PE	Filter cartridge, 0.3 micron, 60 ft <sup>2</sup> polyester media, 6in x 30in lg, 6ea/cs
AR	VCPH-1PE	Filter cartridge, 1 micron, 62 ft <sup>2</sup> polyester media, 6in x 30in lg, 6ea/cs
AR	VCPH-5PE	Filter cartridge, 5 micron, 85 ft <sup>2</sup> polyester media, 6in x 30in lg, 6ea/cs
AR	VCPH-10PE	Filter cartridge, 10 micron, 64 ft <sup>2</sup> polyester media, 6in x 30in lg, 6ea/cs
AR	SB-.125	Strainer Basket, Perforated Stainless Steel, .125in dia holes, 6in x 30in lg
AR	SB-.125-50M	Strainer Basket, Mesh Lined Perforated Stainless Steel, .125in dia holes with a 50x50 (.012in opening) Stainless steel mesh insert, 6in x 30in lg
AR	SB-.125-100M	Strainer Basket, Mesh Lined Perforated Stainless Steel, .125in dia holes with a 100x100 (.006in opening) Stainless steel mesh insert, 6in x 30in lg
AR	SB-.125-200M	Strainer Basket, Mesh Lined Perforated Stainless Steel, .125in dia holes with a 200x200 (.003in opening) Stainless steel mesh insert, 6in x 30in lg
AR	SB-.125-400M	Strainer Basket, Mesh Lined Perforated Stainless Steel, .125in dia holes with a 400x400 (.0015in opening) Stainless steel mesh insert, 6in x 30in lg
AR	UCB-1	Underwater Catch Basket insert for Tri Nuclear VCPH Filters, SS, perforated holes 3/32in

## 10.0 ADDITIONAL INFORMATION



For additional information, or if special problems develop, please contact:

Rick Russell  
Engineering Manager  
Tri Nuclear Corp.  
Ph. 518-399-1389  
Fx. 518-399-9586  
Cell. 518-728-3635  
[www.trinuclear.com](http://www.trinuclear.com)  
e-mail: [rick@trinuclear.com](mailto:rick@trinuclear.com)



### General Specifications:

- Designed for Vacuuming & Maintaining Water Clarity
- 100 GPM, 1 Filter Unit
- Power Requirements: 2HP, 460V, 3 PH, 60 Hz, 4.4A
- All Material - Stainless Steel
- System Operation: Negative Pressure
- Max Operating Temperature: 140 °F
- Empty Weight (Housing and Pump): 140 lb.
- Weight Full of Water (Housing and Pump): 280 lb.
- One 50 Foot 2" Suction Hose with Standoff
- Gravity Seated Pump in Pump Housing
- Single Tri Nuclear Filter Cartridges

<div>  <div> <b>Tri Nuclear Corp.</b>  P.O. Box 1130, Ballston Lake, NY 12019 </div>  </div>			
<div> <b>Underwater Filter Vacuum Unit</b>  <b>UFV-100</b> </div>			
Model No. <b>UFV-100</b>	Rev. Date <b>Rick Russell 08/25/17</b>	<b>Brochure</b>	
Dwg. <b>TNC-001-02</b>	Apv'd Date <b>James L. Warden 08/30/17</b>	Rev. <b>D</b>	Page <b>1</b> of <b>4</b>



# UFV-100OP "UFV-100 OPERATING SYSTEM"

SP-1x2  
Pool Pole

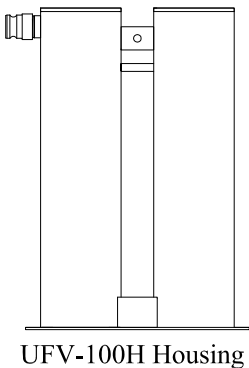
SP-1x3  
Pool Pole

SP-1x5  
Pool Pole

SP-1 Pool Pole  
Qty: 4

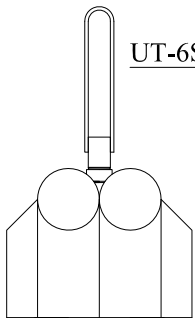
UT-9 Rope Filter Lift Tool  
Qty: 2

UT-7 Vacuum Nozzle

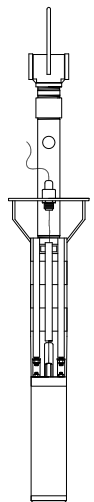


UFV-100H Housing

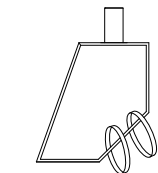
UT-3/6 Filter Storage Rack



PP-100SC Pump

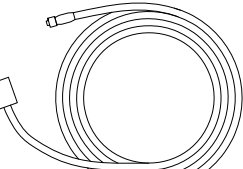
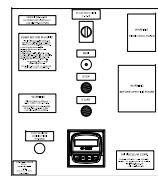


PP-100SC Pump

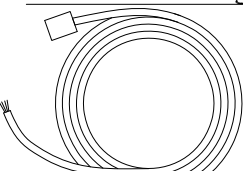


UT-6SP Hose to Pole Clamp

CB-100-FM  
Phase Reversing Control Box  
with Integral Flow Meter

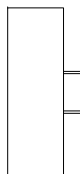


PSC-100P Power Cord  
with Twistlock Plug

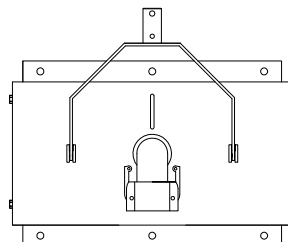


PC-50 Drop Cable  
with Twistlock Plug

BC-1 Bouyancy Float  
Qty: 5



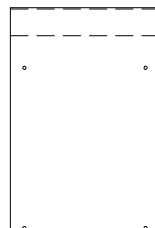
UT-5SP Vacuum Cleaner Head



FM-SRD Flow Sensor



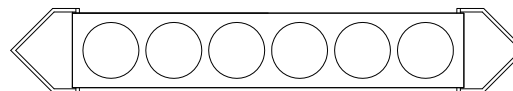
UT-10C Mounting Panel



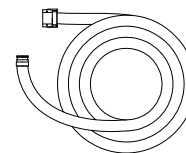
UT-11 Suction Hose Standoff



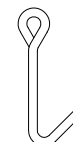
UT-3H Hanging Filter Storage Rack



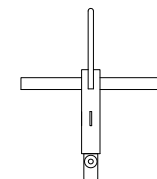
PH-2x50 Suction Hose



UT-14 Pump Lift Hook




UT-1SPT "T" Handle



VCPH-\*PE Filter Cartridge  
NOTE: Not supplied with system.

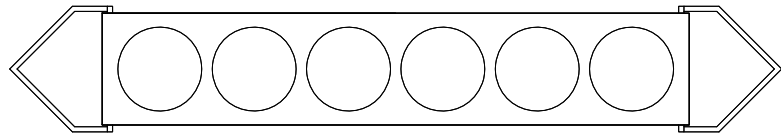
**NOTE:**  
All Items Shown come with the UFV-100 "Complete System"  
in listed quantity except as noted.

 <b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>UFV-100 System Part Identification</b>			
Model No.	UFV-100	Dwg.	TNC-001-02
Rev.	D	Page	2 of 4

8 7 6 5 4 3 2 1

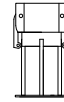
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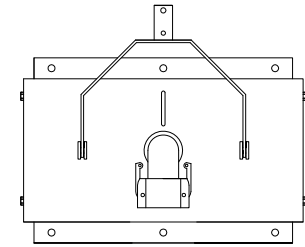


**UT-3H Hanging Filter Storage Rack**  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 42" x 8" x 4" (LWH)  
Weight: 13.5#

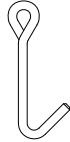
**Swing Lift Bail**



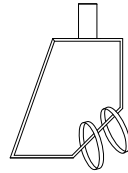
**UT-11 Suction Hose Standoff**  
Attaches to 2" Suction Hose (Typically PH-2x50)  
Dimensions: 3" Dia x 8" Lg.  
Weight: 2#



**UT-5SP Vacuum Cleaner Head**  
Attaches to 2" Suction Hose (Typically PH-2x50)  
Dimensions: 20" x 10" x 8"  
Weight: 18.5#  
Polypro Camlock Fitting



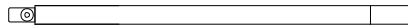
**UT-14 Pump Lift Hook**  
Dimensions: 4-1/2" x 5/8" x 8"  
Weight: 1#



**UT-6SP Hose to Pole Clamp**  
Dimensions: 13-3/4" x 8" x 2"  
Weight: 2#



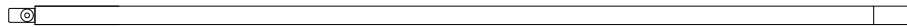
**UT-9 Rope Filter Lift Tool**  
Dimensions: 5" Dia x 24-3/4" Lg.  
Weight: 4.5#



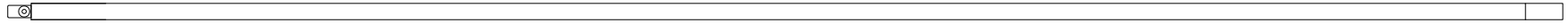
**SP-1x2 Pool Pole**  
Dimensions: 1" Dia x 2' Lg.  
Weight: 2.5#



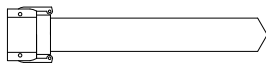
**SP-1x3 Pool Pole**  
Dimensions: 1" Dia x 3' Lg.  
Weight: 3#



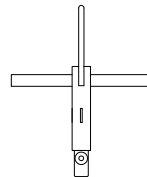
**SP-1x5 Pool Pole**  
Dimensions: 1" Dia x 5' Lg.  
Weight: 5#



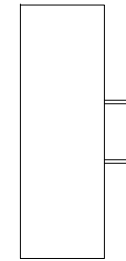
**SP-1 Pool Pole**  
Dimensions: 1" Dia x 10' Lg.  
Weight: 9#



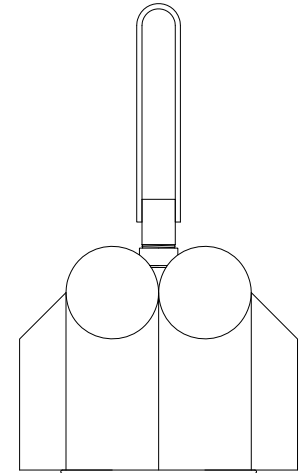
**UT-7 Vacuum Nozzle**  
Attaches to 2" Suction Hose (Typically PH-2x50)  
Dimensions: 2" Dia x 18" Lg.  
Weight: 4#



**UT-1SPT "T" Handle**  
Dimensions: 10" x 10" x 1"  
Weight: 2#

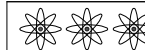


**BC-1 Bouyancy Float**  
Dimensions: 6" Dia x 12" Lg.  
Weight: 8.5#



**UT-3/6 Filter Storage Rack**  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 20" Dia x 33" High  
Weight: 50#

• All Material - Stainless Steel



**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



**UFV-100**  
**Accessory Tooling**

Model No.	UFV-100	Dwg.	TNC-001-02	Rev.	D	Page 3 of 4
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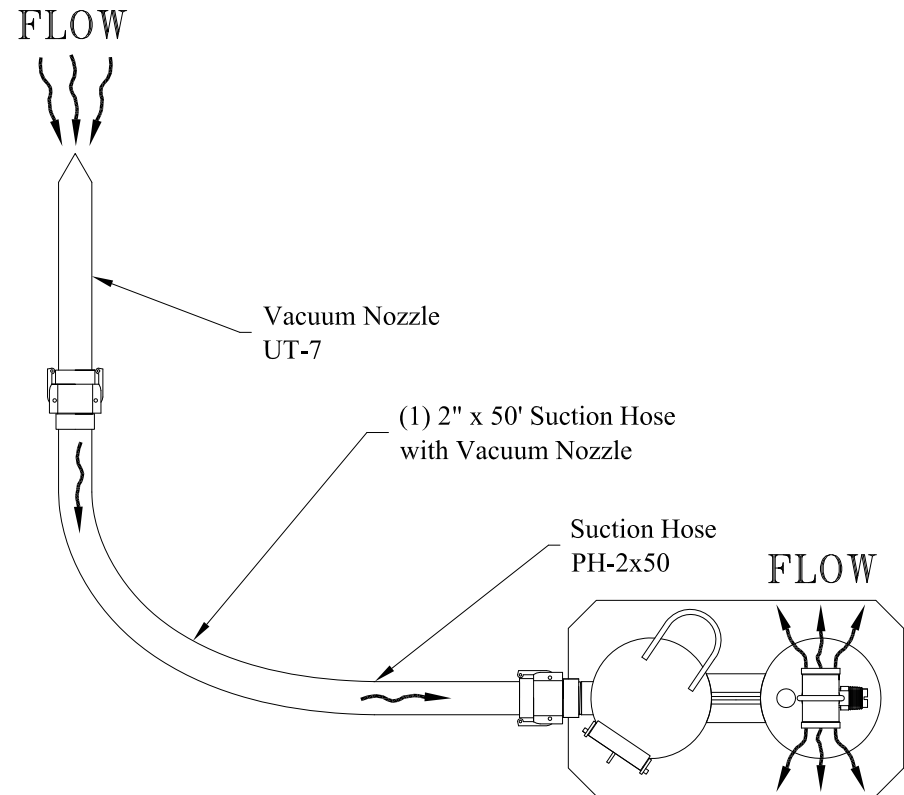
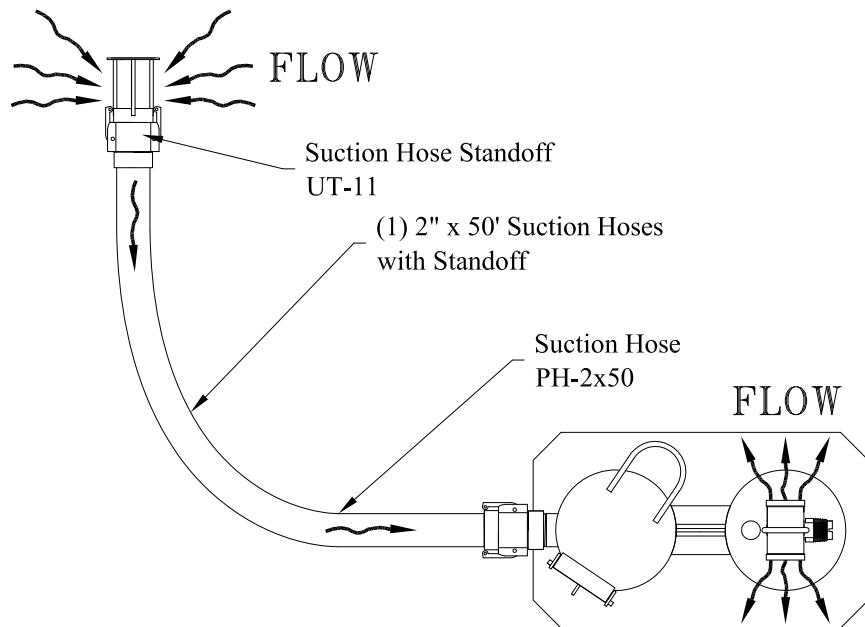
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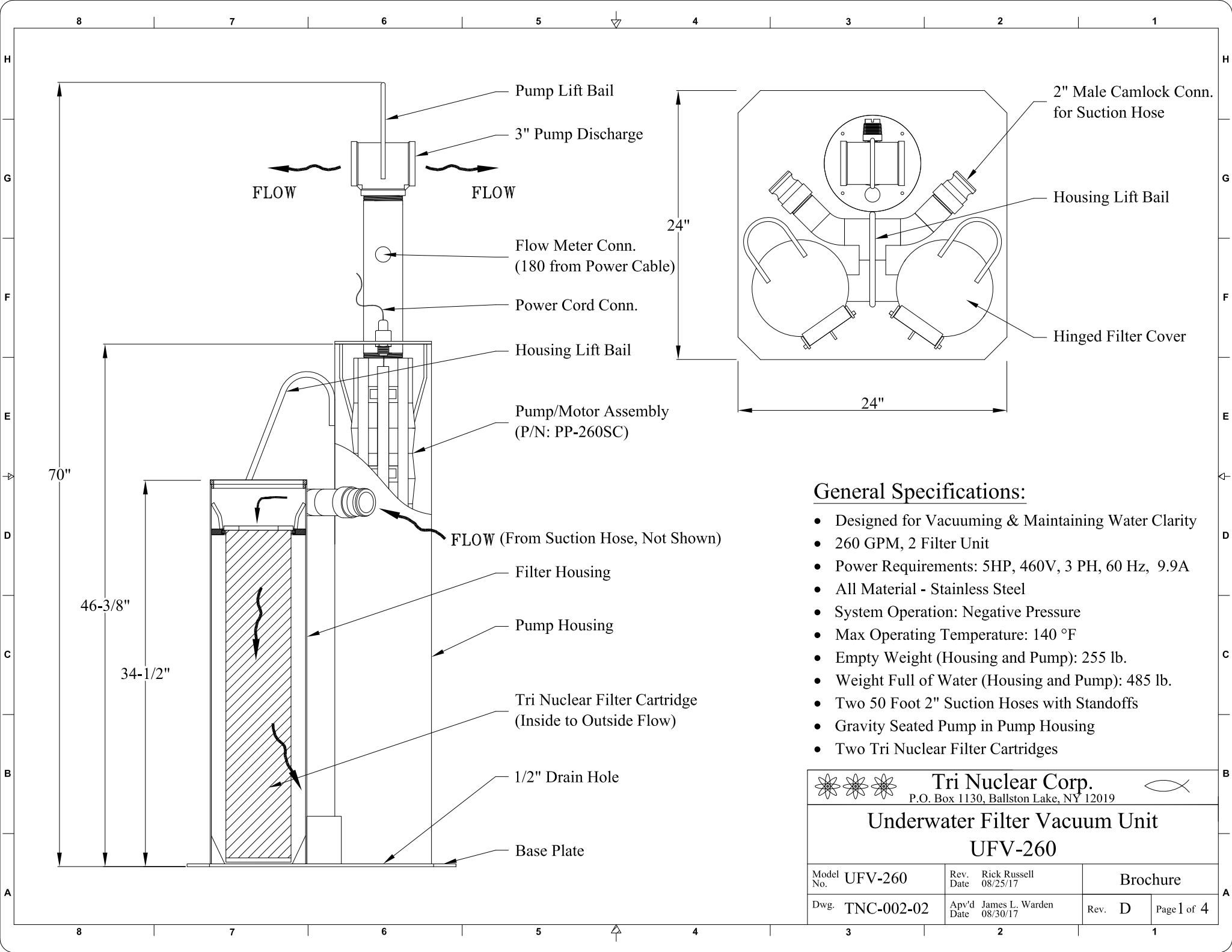
## WATER CLARITY OPERATIONS

## VACUUMING OPERATIONS




\* NOTE: UFV-100 Must be run with Suction Hose attached.

 <b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>UFV-100 System</b> <b>Modes of Operation</b>			
Model No.	UFV-100	Dwg.	TNC-001-02
Rev.	D	Page	4 of 4




**General Specifications:**

- Designed for Vacuuming & Maintaining Water Clarity
- 260 GPM, 2 Filter Unit
- Power Requirements: 5HP, 460V, 3 PH, 60 Hz, 9.9A
- All Material - Stainless Steel
- System Operation: Negative Pressure
- Max Operating Temperature: 140 °F
- Empty Weight (Housing and Pump): 255 lb.
- Weight Full of Water (Housing and Pump): 485 lb.
- Two 50 Foot 2" Suction Hoses with Standoffs
- Gravity Seated Pump in Pump Housing
- Two Tri Nuclear Filter Cartridges



**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



**Underwater Filter Vacuum Unit**  
**UFV-260**

Model No.	UFV-260	Rev. Date	Rick Russell 08/25/17	Brochure	
Dwg.	TNC-002-02	Apv'd Date	James L. Warden 08/30/17	Rev. D	Page 1 of 4

# UFV-260OP "UFV-260 OPERATING SYSTEM"

SP-1x2  
Pool Pole

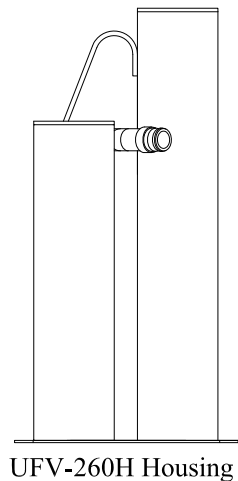
SP-1x3  
Pool Pole

SP-1x5  
Pool Pole

SP-1 Pool Pole  
Qty: 4

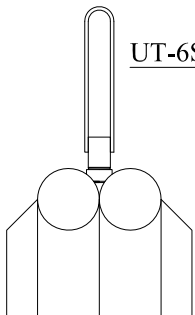
UT-9 Rope Filter Lift Tool  
Qty: 2

UT-7 Vacuum Nozzle



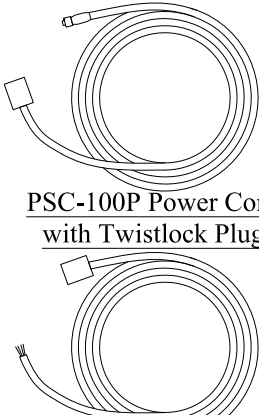
UFV-260H Housing

UT-3/6 Filter Storage Rack



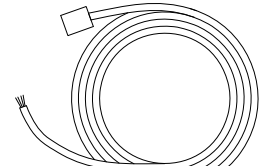
UT-6SP Hose to Pole Clamp

PP-260SC Pump

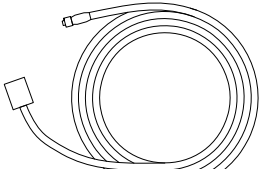


PP-260SC Pump

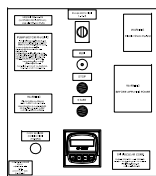
PC-50 Drop Cable  
with Twistlock Plug



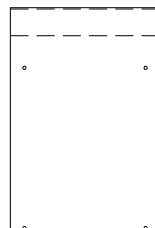
PSC-100P Power Cord  
with Twistlock Plug



CB-260-FM  
Phase Reversing Control Box  
with Integral Flow Meter



UT-10C Mounting Panel



FM-SRD Flow Sensor



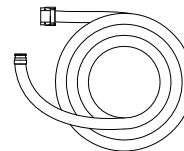
UT-11 Suction Hose Standoff  
Qty: 2



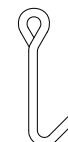
UT-12 Orifice Cap



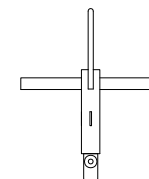
PH-2x50 Suction Hose  
Qty: 2



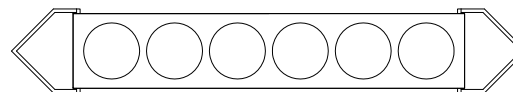
UT-14 Pump Lift Hook



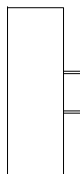
UT-1SPT "T" Handle



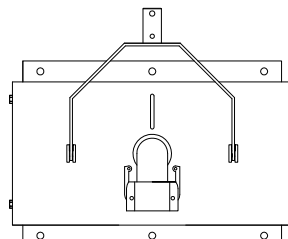
UT-3H Hanging Filter Storage Rack



BC-1 Bouyancy Float  
Qty: 5



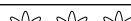

UT-5SP Vacuum Cleaner Head



**NOTE:**

All Items Shown come with the UFV-260 "Complete System" in listed quantity except as noted.

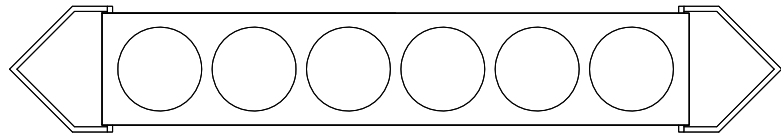
VCPH-\*PE Filter Cartridge  
NOTE: Not supplied with system.

			<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019								
<b>UFV-260 System</b> <b>Part Identification</b>											
Model No.		UFV-260		Dwg.		TNC-002-02		Rev. D		Page 2 of 4	

8 7 6 5 4 3 2 1

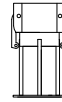
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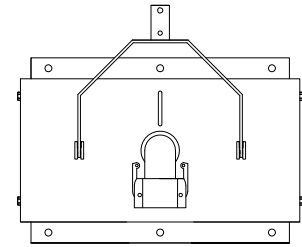


**UT-3H Hanging Filter Storage Rack**  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 42" x 8" x 4" (LWH)  
Weight: 13.5#

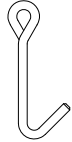
**Swing Lift Bail**



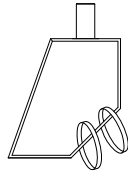
**UT-11 Suction Hose Standoff**  
Attaches to 2" Suction Hose (Typically PH-2x50)  
Dimensions: 3" Dia x 8" Lg.  
Weight: 2#



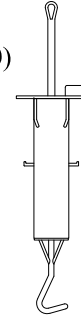
**UT-5SP Vacuum Cleaner Head**  
Attaches to 2" Suction Hose (Typically PH-2x50)  
Dimensions: 20" x 10" x 8"  
Weight: 18.5#  
Polypro Camlock Fitting



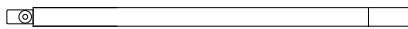
**UT-14 Pump Lift Hook**  
Dimensions: 4-1/2" x 5/8" x 8"  
Weight: 1#



**UT-6SP Hose to Pole Clamp**  
Dimensions: 13-3/4" x 8" x 2"  
Weight: 2#



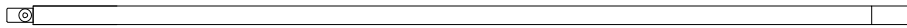
**UT-9 Rope Filter Lift Tool**  
Dimensions: 5" Dia x 24-3/4" Lg.  
Weight: 4.5#



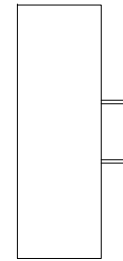
**SP-1x2 Pool Pole**  
Dimensions: 1" Dia x 2' Lg.  
Weight: 2.5#



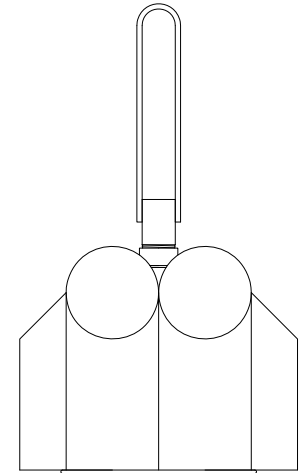
**SP-1x3 Pool Pole**  
Dimensions: 1" Dia x 3' Lg.  
Weight: 3#



**SP-1x5 Pool Pole**  
Dimensions: 1" Dia x 5' Lg.  
Weight: 5#



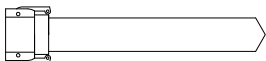
**BC-1 Bouyancy Float**  
Dimensions: 6" Dia x 12" Lg.  
Weight: 8.5#



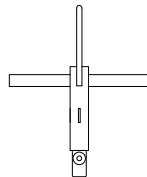
**UT-3/6 Filter Storage Rack**  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 20" Dia x 33" High  
Weight: 50#



**SP-1 Pool Pole**  
Dimensions: 1" Dia x 10' Lg.  
Weight: 9#



**UT-7 Vacuum Nozzle**  
Attaches to 2" Suction Hose (Typically PH-2x50)  
Dimensions: 2" Dia x 18" Lg.  
Weight: 4#




**UT-1SPT "T" Handle**  
Dimensions: 10" x 10" x 1"  
Weight: 2#



**UT-12 Orifice Cap**  
Dimensions: 3" x 3" x 4" (LWH)  
Weight: 0.5#  
Polypro Camlock Fitting

• All Material - Stainless Steel except as noted.

 <b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>UFV-260</b> <b>Accessory Tooling</b>			
Model No.	UFV-260	Dwg.	TNC-002-02
Rev.	D	Page	3 of 4

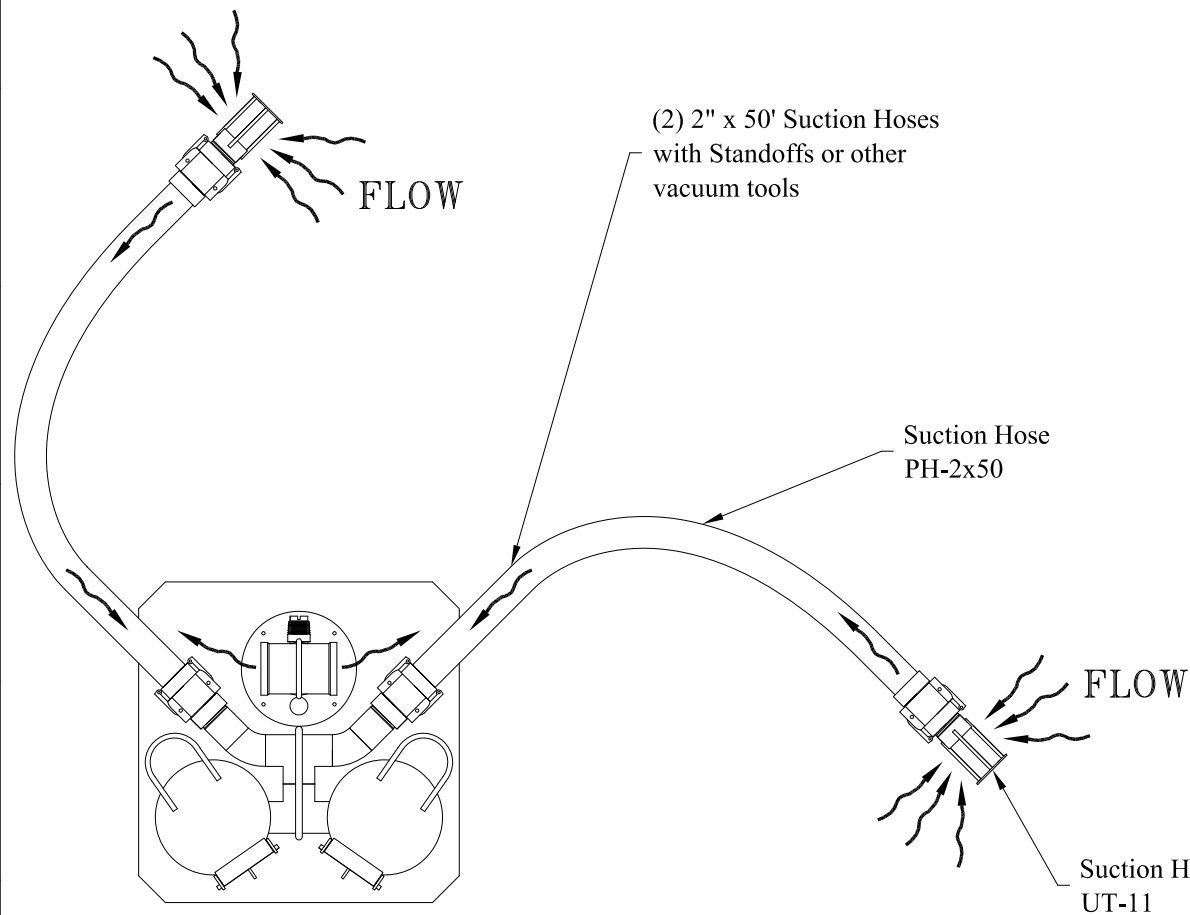
8 7 6 5 4 3 2 1

A

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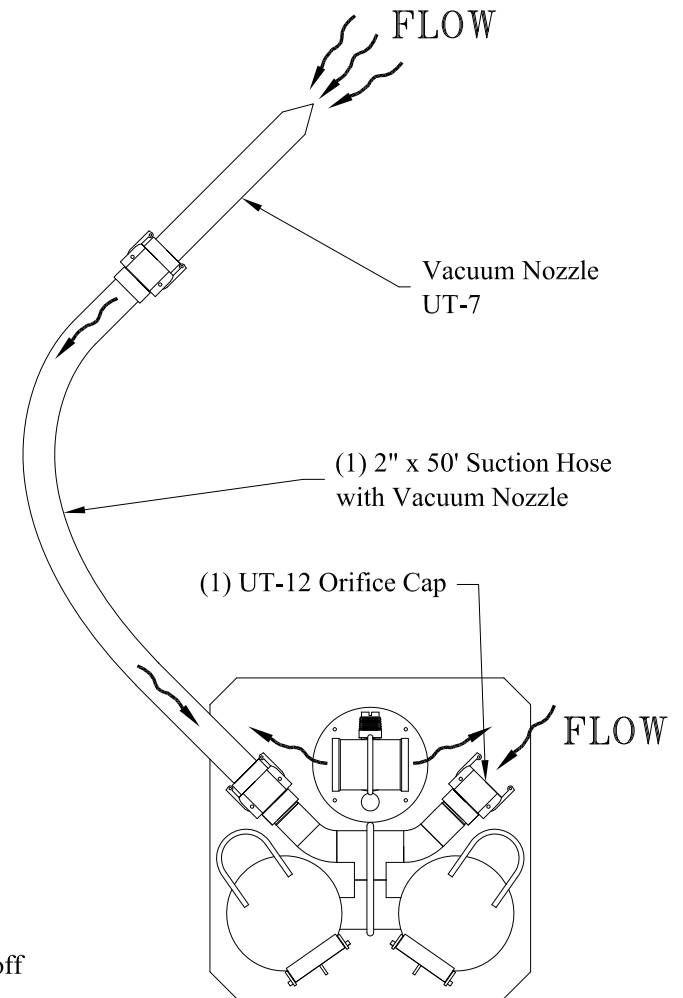
## WATER CLARITY OPERATIONS

(Dual Hose Operation)

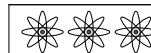


## VACUUMING OPERATIONS

(Single Hose Operation)



\* NOTE: UFV-260 Must be run with at least one Suction Hose attached.



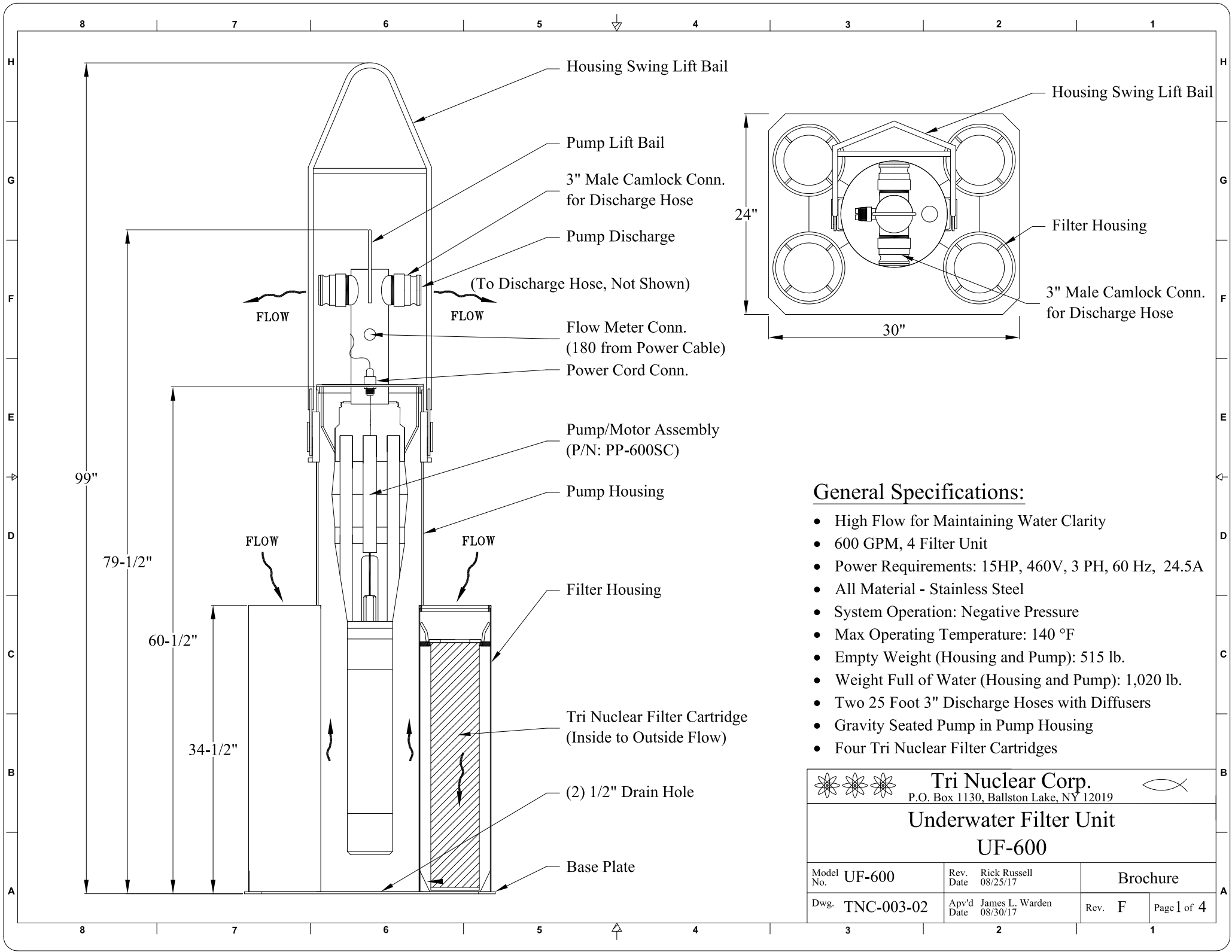
**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



**UFV-260 System**  
**Modes of Operation**



Model No.	UFV-260	Dwg.	TNC-002-02	Rev.	D	Page 4 of 4
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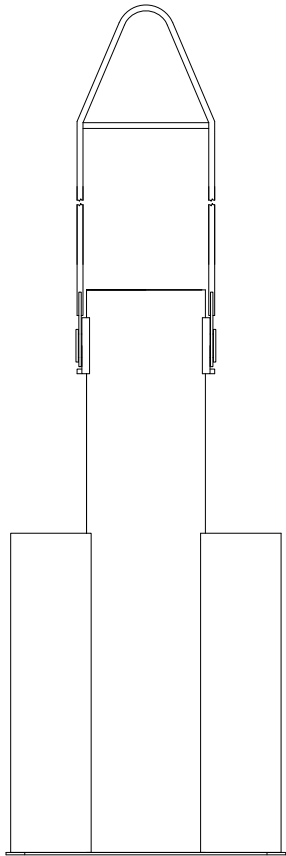


**General Specifications:**

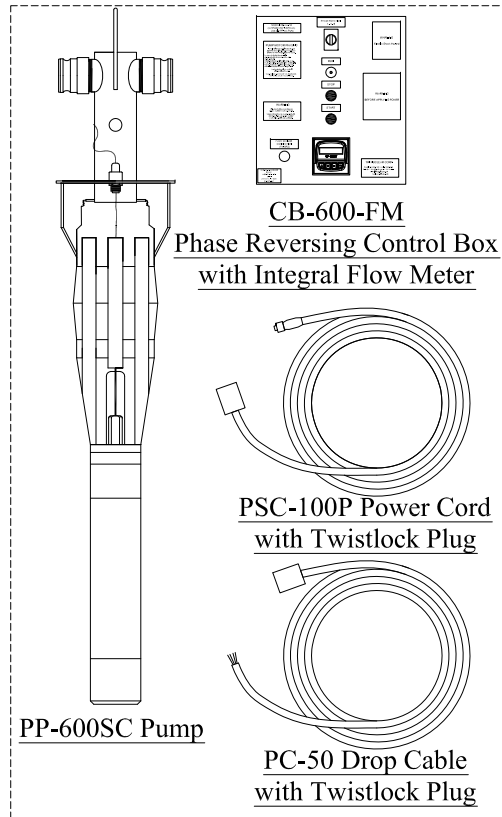
- High Flow for Maintaining Water Clarity
- 600 GPM, 4 Filter Unit
- Power Requirements: 15HP, 460V, 3 PH, 60 Hz, 24.5A
- All Material - Stainless Steel
- System Operation: Negative Pressure
- Max Operating Temperature: 140 °F
- Empty Weight (Housing and Pump): 515 lb.
- Weight Full of Water (Housing and Pump): 1,020 lb.
- Two 25 Foot 3" Discharge Hoses with Diffusers
- Gravity Seated Pump in Pump Housing
- Four Tri Nuclear Filter Cartridges

		<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>Underwater Filter Unit</b> <b>UF-600</b>					
Model No. <b>UF-600</b>		Rev. Date <b>Rick Russell</b> <b>08/25/17</b>		<b>Brochure</b>	
Dwg. <b>TNC-003-02</b>		Apv'd Date <b>James L. Warden</b> <b>08/30/17</b>		Rev. <b>F</b>	Page <b>1</b> of <b>4</b>

# UF-600OP "UF-600 OPERATING SYSTEM"



UF-600H Housing



PP-600SC Pump

CB-600-FM  
Phase Reversing Control Box  
with Integral Flow Meter

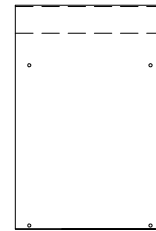
PSC-100P Power Cord  
with Twistlock Plug

PC-50 Drop Cable  
with Twistlock Plug

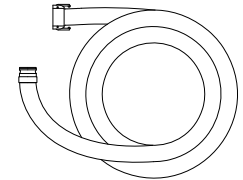
PP-600SC Pump



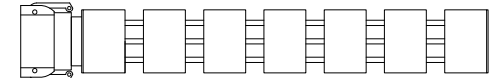
FM-SRD Flow Sensor



UT-10C Mounting Panel



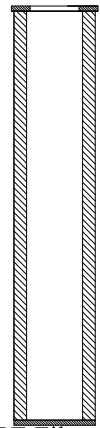
PH-3x25 Discharge Hose  
Qty: 2



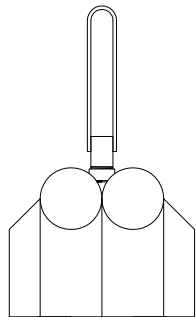
UT-8 Diffuser Pipe  
Qty: 2



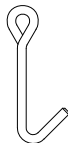
UT-9 Rope Filter Lift Tool  
Qty: 2



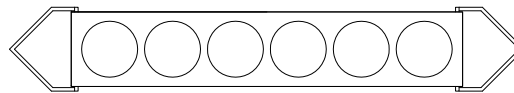
VCPH-\*PE Filter Cartridge  
NOTE: Not supplied with system.



UT-3/6 Filter Storage Rack




UT-14 Pump Lift Hook

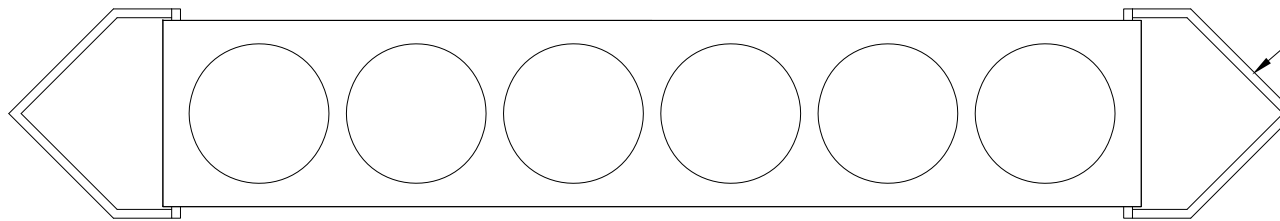


UT-3H Hanging Filter Storage Rack

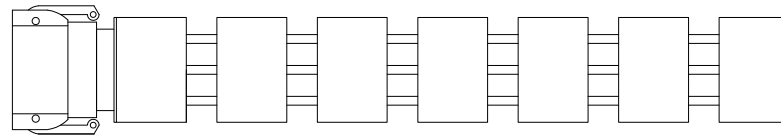
## NOTE:

All Items Shown come with the UF-600 "Complete System" in listed quantity except as noted.

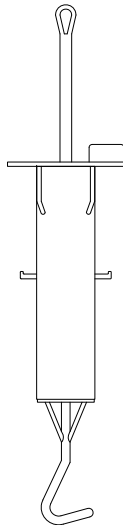
 <b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>UF-600 System</b> <b>Part Identification</b>			
Model No.	UF-600	Dwg.	TNC-003-02
Rev.	F	Page	2 of 4



UT-3H Hanging Filter Storage Rack  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 42" x 8" x 4" (LWH)  
Weight: 13.5#

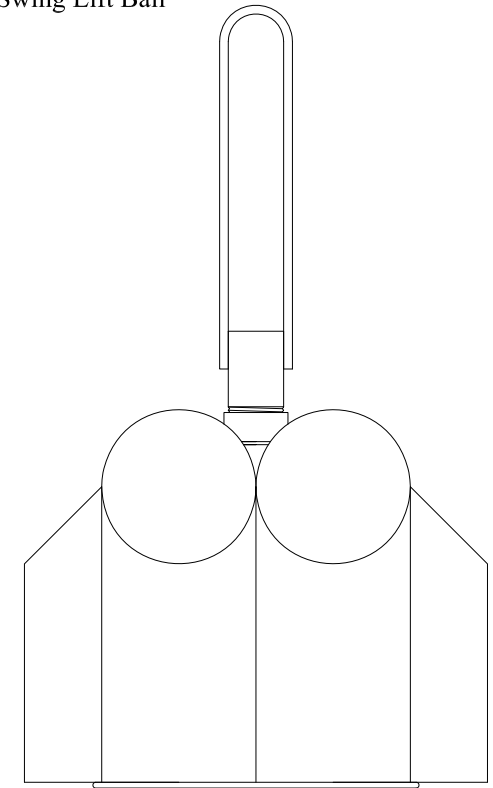


UT-8 Diffuser Pipe  
Attaches to 3" Discharge Hose (Typically PH-3x25)  
Dimensions: 3-1/2" Dia x 33-1/2" Lg.  
Weight: 15#



UT-9 Rope Filter Lift Tool  
Dimensions: 5" Dia x 24-3/4" Lg.  
Weight: 4.5#

Swing Lift Bail

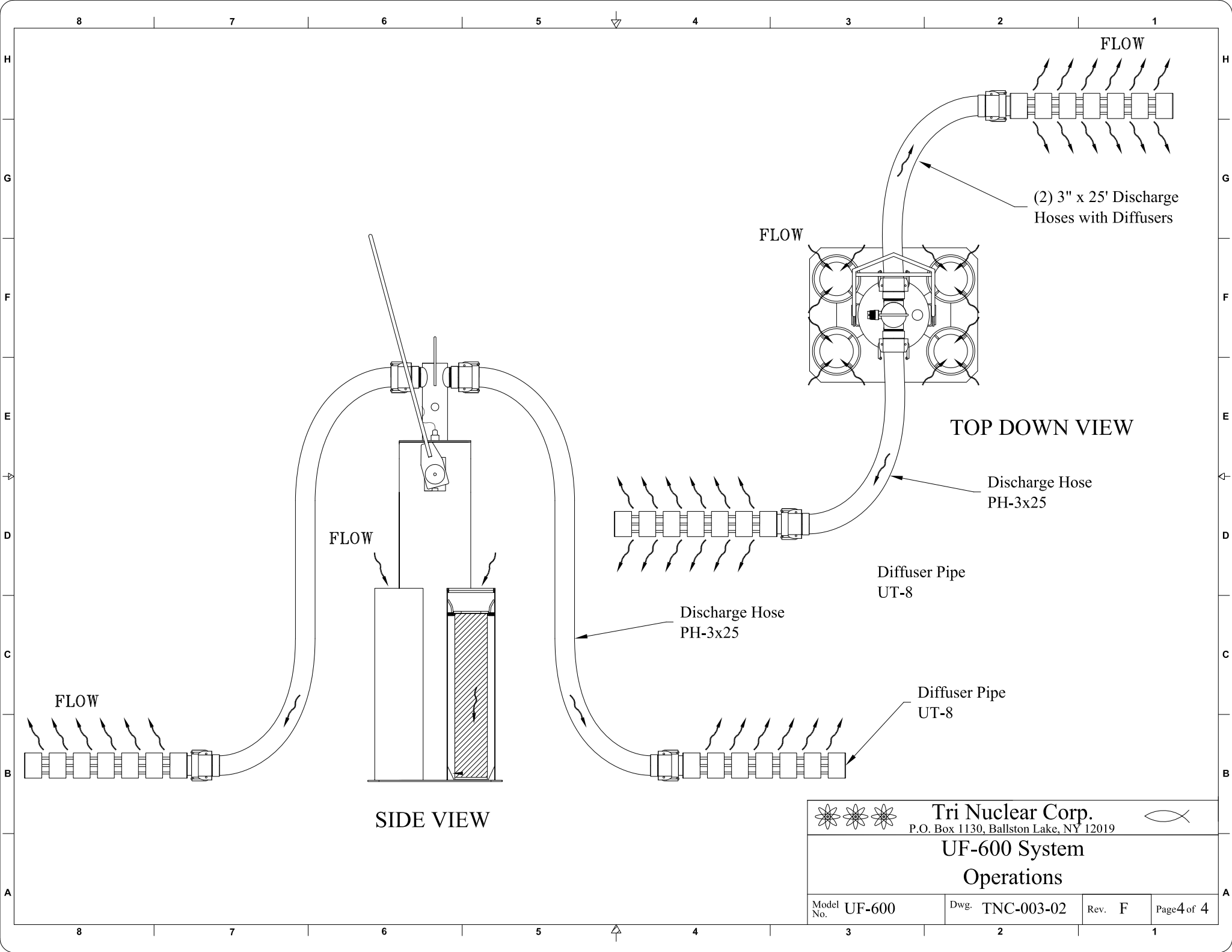


UT-3/6 Filter Storage Rack  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 20" Dia x 33" High  
Weight: 50#

UT-14 Pump Lift Hook  
Dimensions: 4-1/2" x 5/8" x 8" (LWH)  
Weight: 1#

• All Material - Stainless Steel

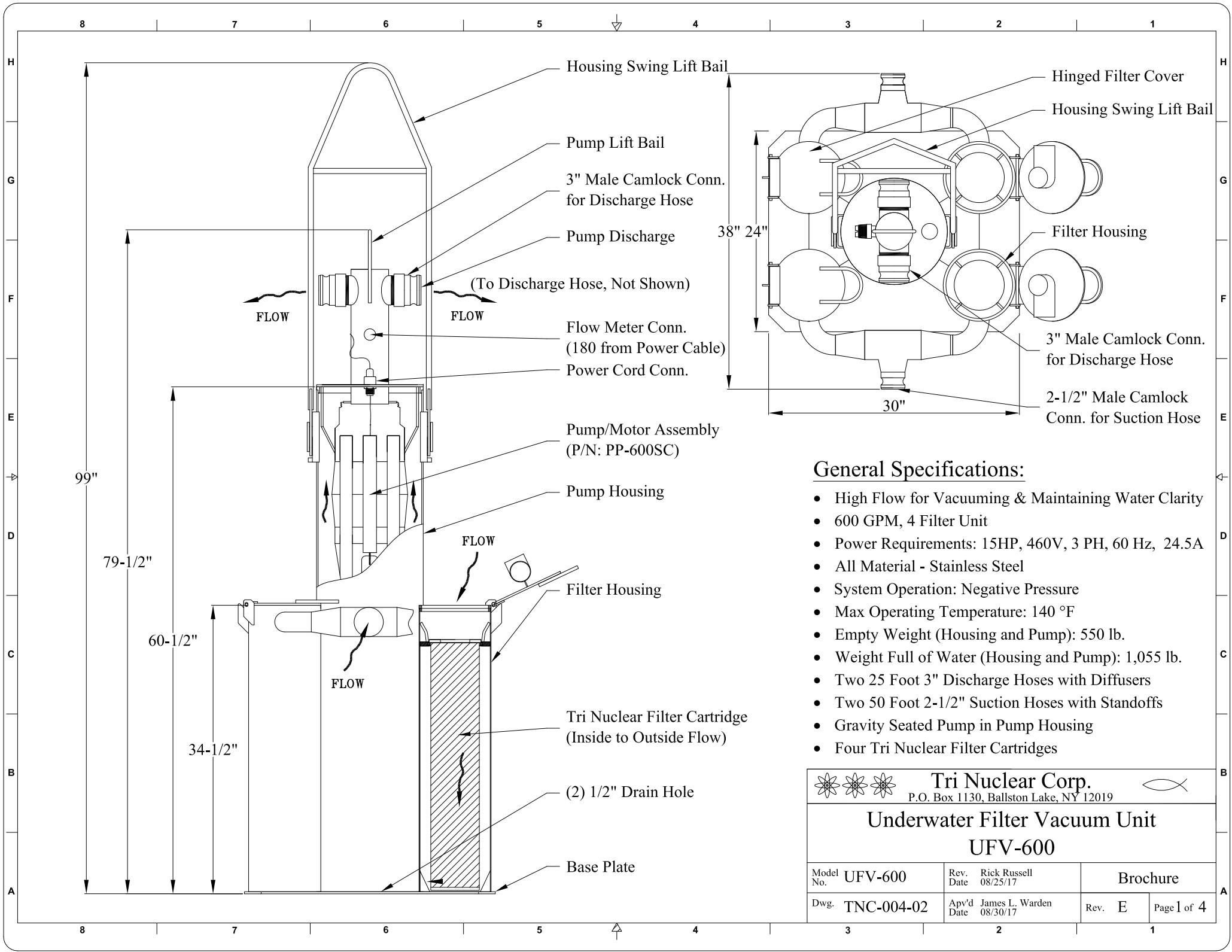
			<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019		
<b>UF-600</b> <b>Accessory Tooling</b>					
Model No.	UF-600	Dwg.	TNC-003-02	Rev.	F
			Page 3 of 4		



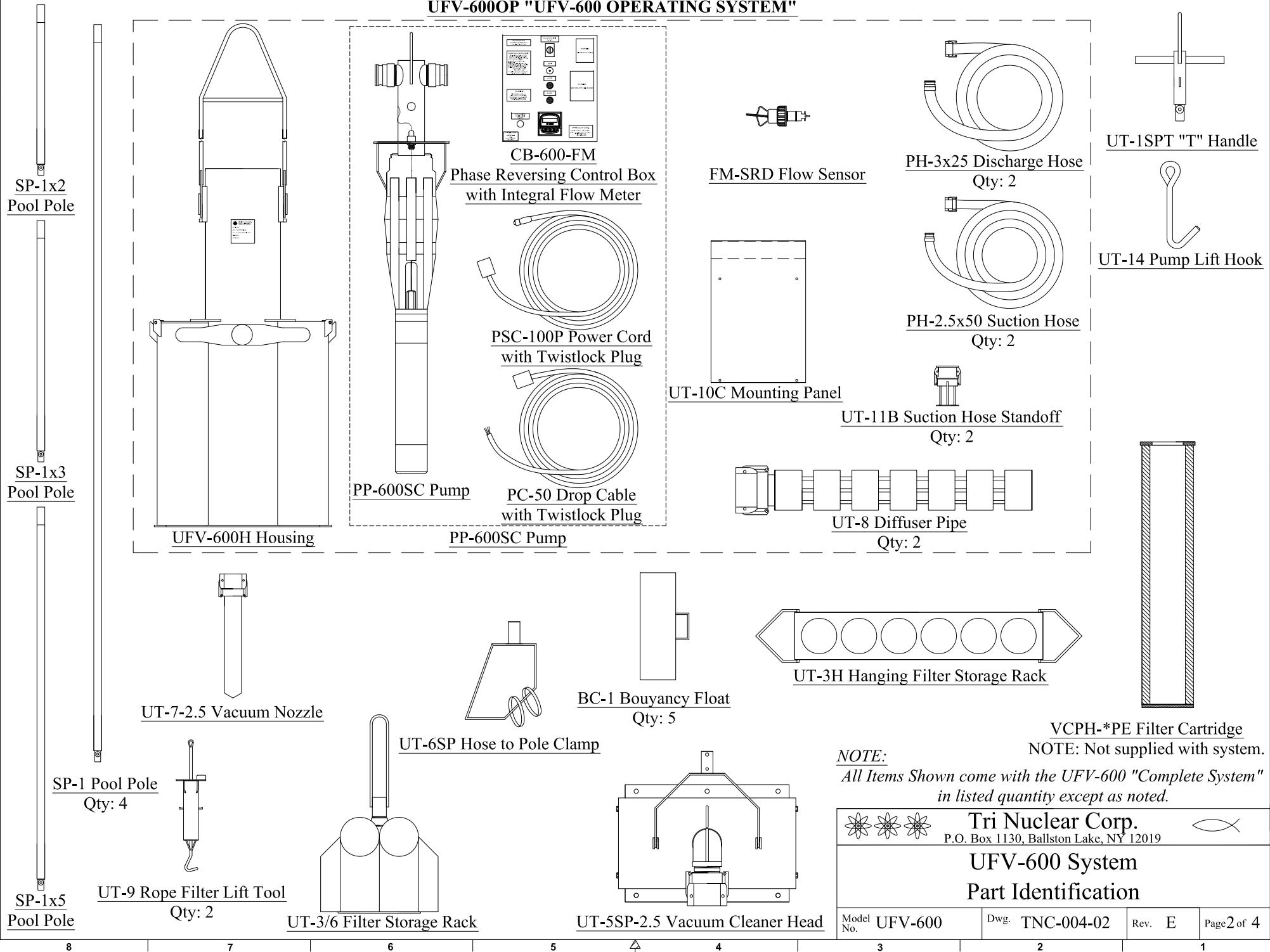
SIDE VIEW

TOP DOWN VIEW



			<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>UF-600 System</b> <b>Operations</b>						
Model No. <b>UF-600</b>		Dwg. <b>TNC-003-02</b>		Rev. <b>F</b>		Page <b>4</b> of <b>4</b>

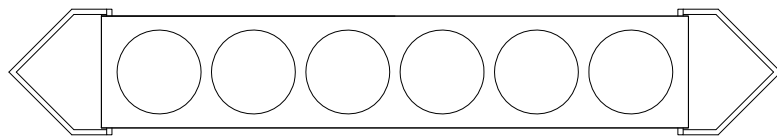


# UFV-600OP "UFV-600 OPERATING SYSTEM"

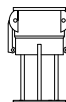


**NOTE:**  
All Items Shown come with the UFV-600 "Complete System" in listed quantity except as noted.

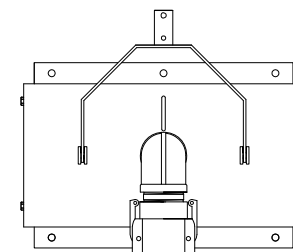
		<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019		
<b>UFV-600 System</b> <b>Part Identification</b>				
Model No.	UFV-600	Dwg.	TNC-004-02	Rev. E
		Page 2 of 4		



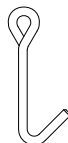
UT-3H Hanging Filter Storage Rack  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 42" x 8" x 4" (LWH)  
Weight: 13.5#



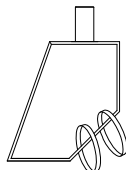
UT-11B Suction Hose Standoff  
Attaches to 2-1/2" Suction Hose (Typically PH-2.5x50)  
Dimensions: 3" Dia x 8" Lg.  
Weight: 3.5#



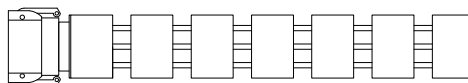
UT-5SP-2.5 Vacuum Cleaner Head  
Attaches to 2-1/2" Suction Hose (Typically PH-2.5x50)  
Dimensions: 20" x 10" x 8"  
Weight: 23.5#  
Polypro Camlock Fitting



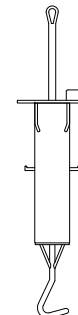
UT-14 Pump Lift Hook  
Dimensions: 4-1/2" x 5/8" x 8"  
Weight: 1#



UT-6SP Hose to Pole Clamp  
Dimensions: 13-3/4" x 8" x 2"  
Weight: 2#



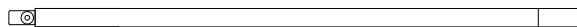
UT-8 Diffuser Pipe  
Attaches to 3" Discharge Hose (Typically PH-3x25)  
Dimensions: 3-1/2" Dia x 33-1/2" Lg.  
Weight: 15#



UT-9 Rope Filter Lift Tool  
Dimensions: 5" Dia x 24-3/4" Lg.  
Weight: 4.5#



SP-1x2 Pool Pole  
Dimensions: 1" Dia x 2' Lg.  
Weight: 2.5#



SP-1x3 Pool Pole  
Dimensions: 1" Dia x 3' Lg.  
Weight: 3#



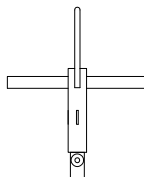
SP-1x5 Pool Pole  
Dimensions: 1" Dia x 5' Lg.  
Weight: 5#



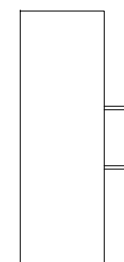
SP-1 Pool Pole  
Dimensions: 1" Dia x 10' Lg.  
Weight: 9#



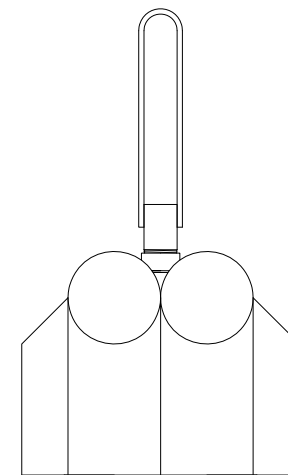
UT-7-2.5 Vacuum Nozzle  
Attaches to 2-1/2" Suction Hose (Typically PH-2.5x50)  
Dimensions: 3" Dia x 20" Lg.  
Weight: 7.5#



UT-1SPT "T" Handle  
Dimensions: 10" x 10" x 1"  
Weight: 2#

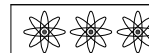


BC-1 Bouyancy Float  
Dimensions: 6" Dia x 12" Lg.  
Weight: 8.5#



UT-3/6 Filter Storage Rack  
Holds (6) Tri Nuclear Filter Cartridges  
Dimensions: 20" Dia x 33" High  
Weight: 50#

• All Material - Stainless Steel



**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



## UFV-600 Accessory Tooling

Model No. UFV-600

Dwg. TNC-004-02

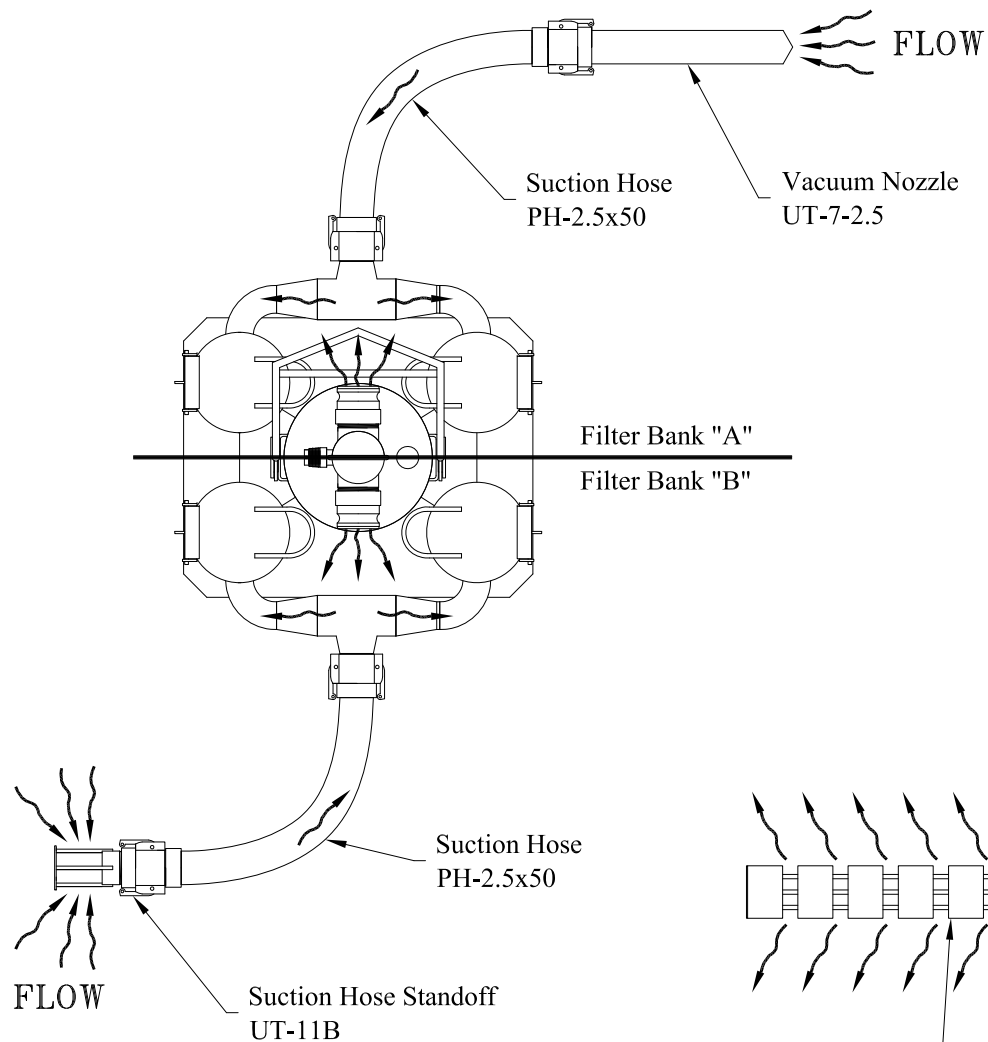
Rev. E

Page 3 of 4



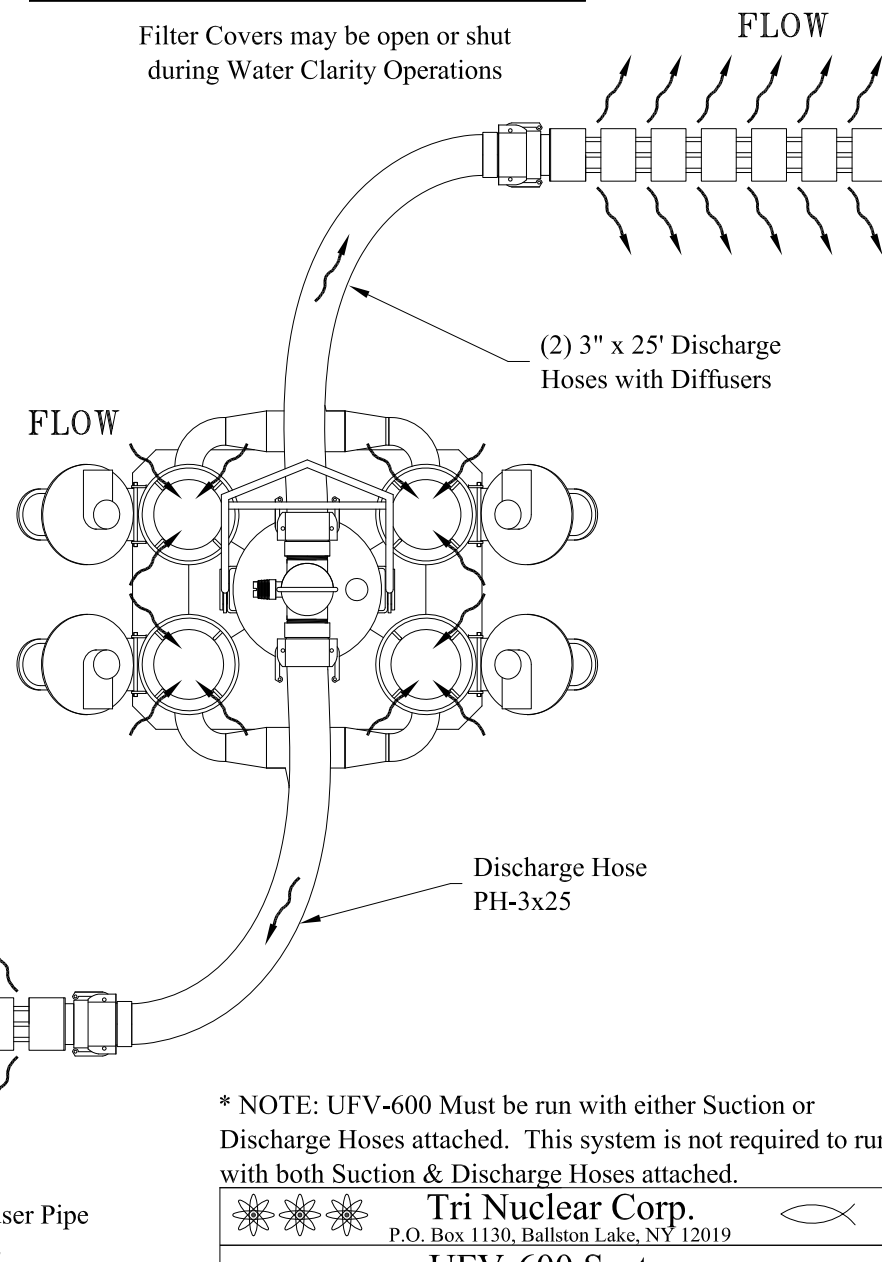
## VACUUMING OPERATIONS

NOTE: Each Suction Hose is tied to a single bank of 2 filters.  
Vacuuming with one Suction Hose can cause an imbalance in filter loading between the two banks of filters.

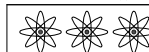


## WATER CLARITY OPERATIONS

Filter Covers may be open or shut during Water Clarity Operations



\* NOTE: UFV-600 Must be run with either Suction or Discharge Hoses attached. This system is not required to run with both Suction & Discharge Hoses attached.



**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



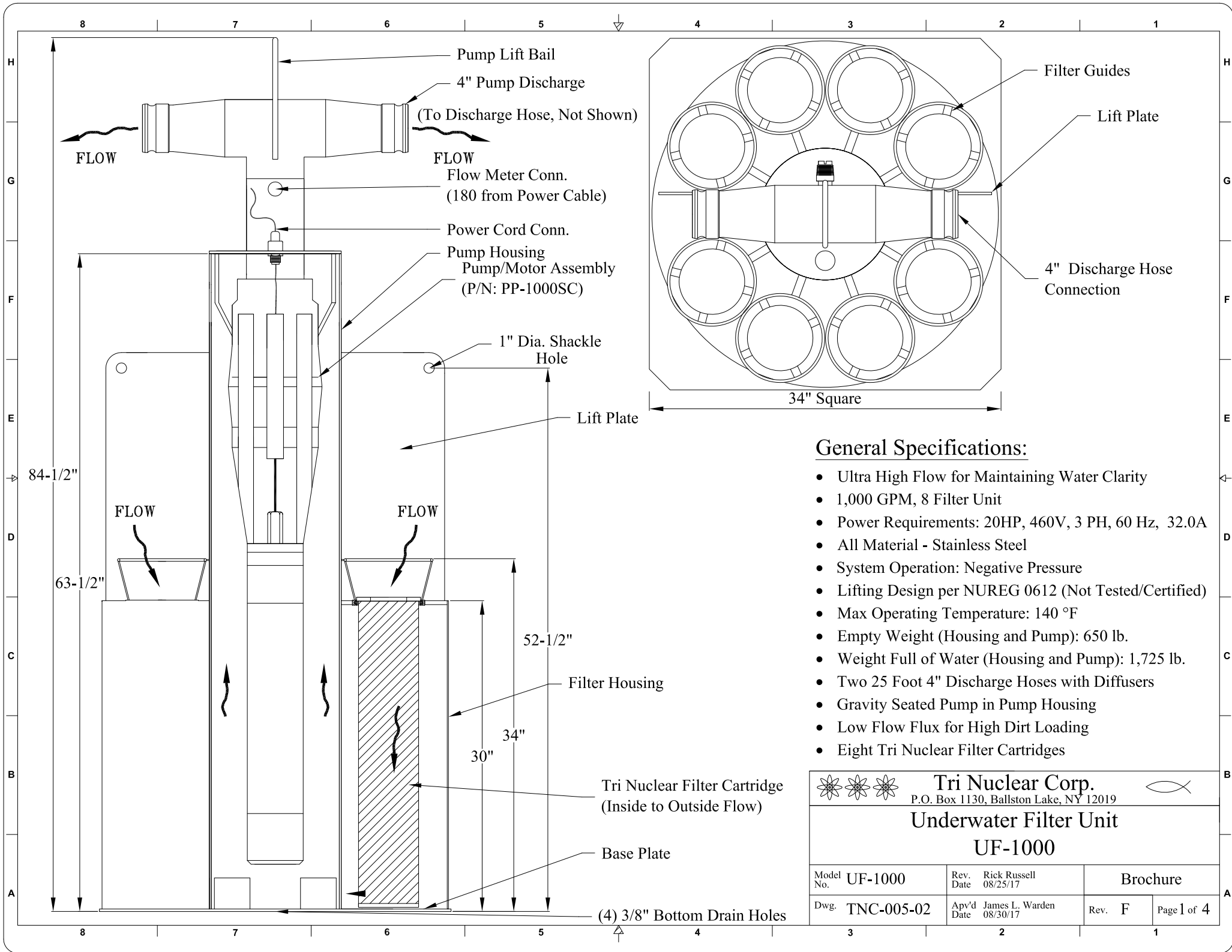
**UFV-600 System**  
**Modes of Operation**

Model No. **UFV-600**

Dwg. **TNC-004-02**


Rev. **E**

Page **4** of **4**




**General Specifications:**

- Ultra High Flow for Maintaining Water Clarity
- 1,000 GPM, 8 Filter Unit
- Power Requirements: 20HP, 460V, 3 PH, 60 Hz, 32.0A
- All Material - Stainless Steel
- System Operation: Negative Pressure
- Lifting Design per NUREG 0612 (Not Tested/Certified)
- Max Operating Temperature: 140 °F
- Empty Weight (Housing and Pump): 650 lb.
- Weight Full of Water (Housing and Pump): 1,725 lb.
- Two 25 Foot 4" Discharge Hoses with Diffusers
- Gravity Seated Pump in Pump Housing
- Low Flow Flux for High Dirt Loading
- Eight Tri Nuclear Filter Cartridges



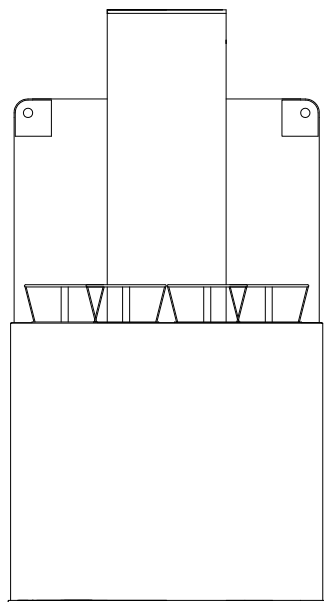
**Tri Nuclear Corp.**  
 P.O. Box 1130, Ballston Lake, NY 12019



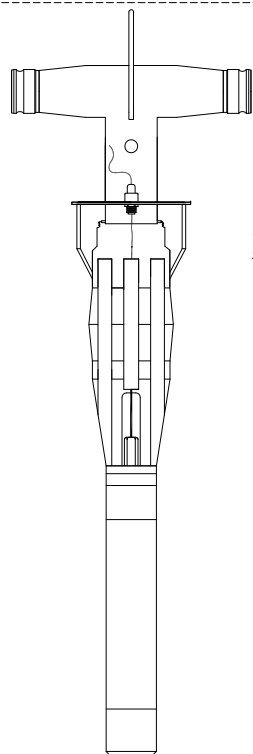
**Underwater Filter Unit**  
**UF-1000**

Model No.	UF-1000	Rev. Date	Rick Russell 08/25/17	Brochure	
Dwg.	TNC-005-02	Apv'd Date	James L. Warden 08/30/17	Rev. F	Page 1 of 4

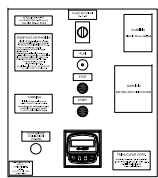
# UF-1000OP "UF-1000 OPERATING SYSTEM"



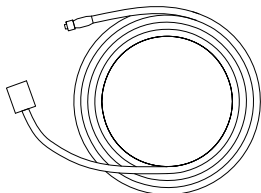
UF-1000H Housing



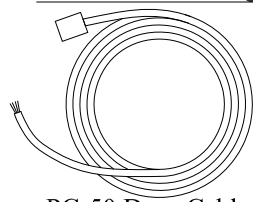
PP-1000SC Pump



CB-1000-FM  
Phase Reversing Control Box  
with Integral Flow Meter



PSC-100P Power Cord  
with Twistlock Plug

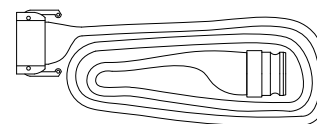


PC-50 Drop Cable  
with Twistlock Plug

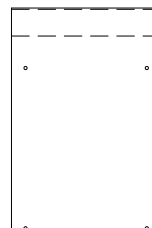
PP-1000SC Pump



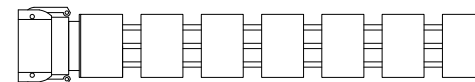
FM-SRD Flow Sensor



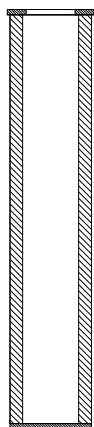
PH-4x25 Discharge Hose  
Qty: 2



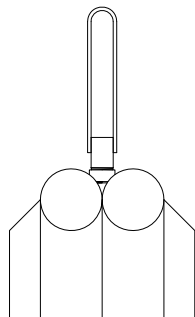
UT-10C Mounting Panel



UT-13 Diffuser Pipe  
Qty: 2



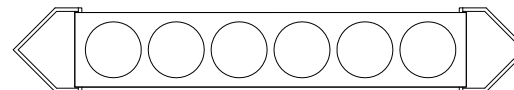
VCPH-\*PE Filter Cartridge  
NOTE: Not supplied with system.



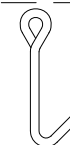
UT-3/6 Filter Storage Rack  
Qty: 2



UT-9 Rope Filter Lift Tool  
Qty: 2



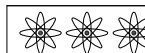
UT-3H Hanging Filter Storage Rack



UT-14 Pump Lift Hook

## NOTE:

All Items Shown come with the UF-1000 "Complete System"  
in listed quantity except as noted.



**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



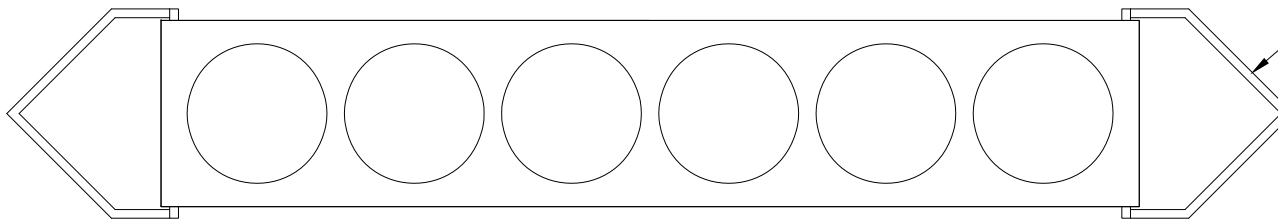
## UF-1000 System Part Identification

Model No. UF-1000

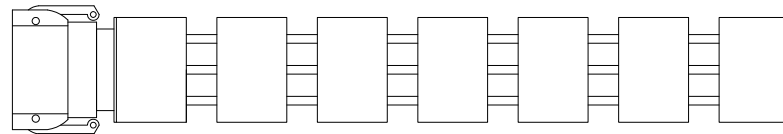
Dwg. TNC-005-02

Rev. F

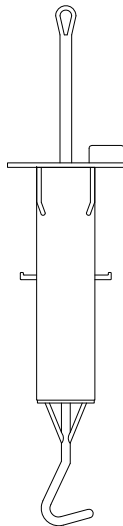
Page 2 of 4



UT-3H Hanging Filter Storage Rack  
 Holds (6) Tri Nuclear Filter Cartridges  
 Dimensions: 42" x 8" x 2" (LWH)  
 Weight: 13.5#

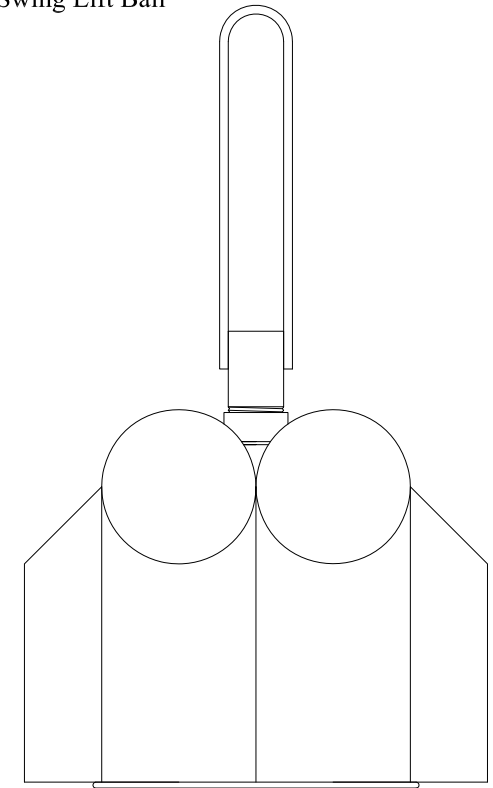


UT-13 Diffuser Pipe  
 Attaches to 4" Discharge Hose (Typically PH-4x25)  
 Dimensions: 3-1/2" Dia x 33-1/2" Lg.  
 Weight: 14#



UT-9 Rope Filter Lift Tool  
 Dimensions: 5" Dia x 24-3/4" Lg.  
 Weight: 4.5#

Swing Lift Bail

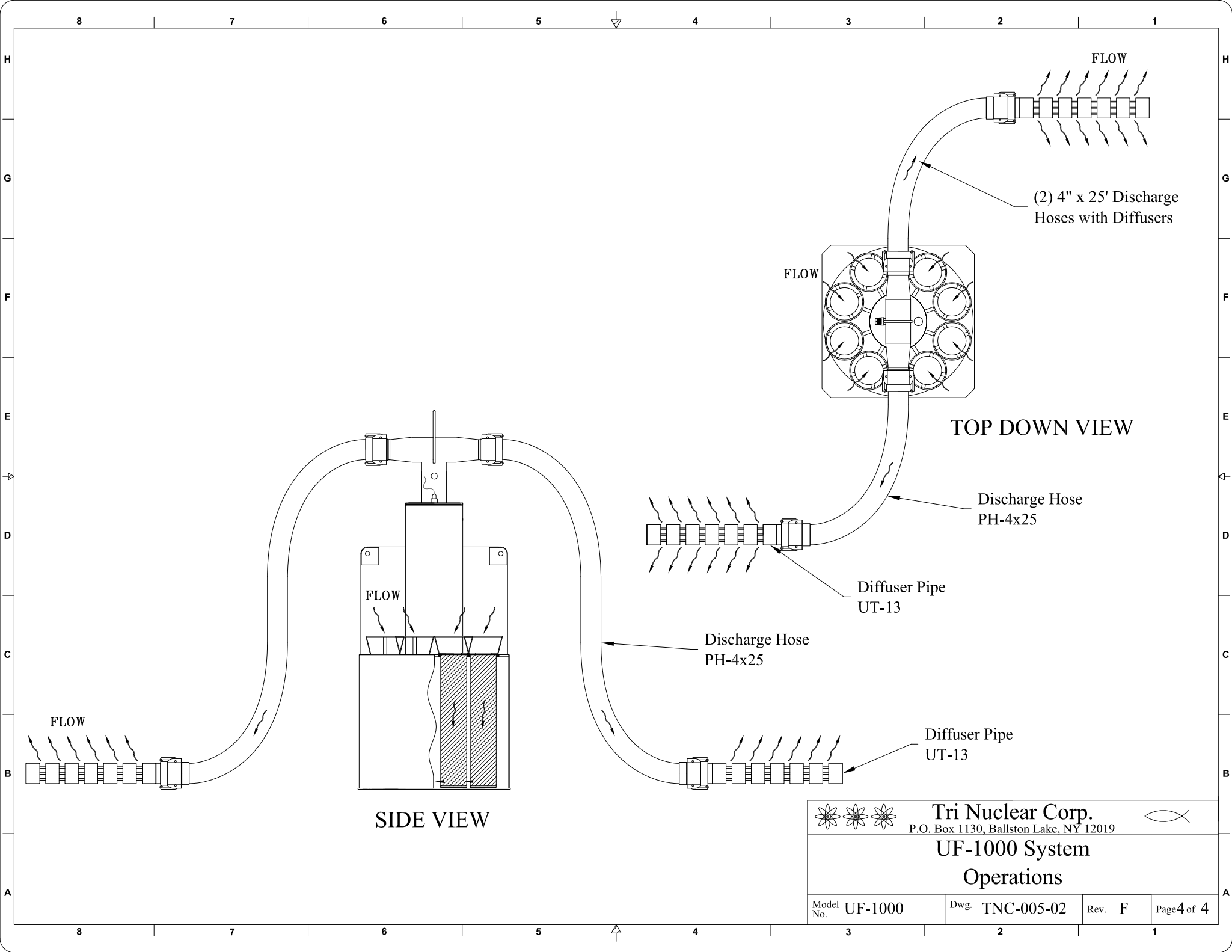


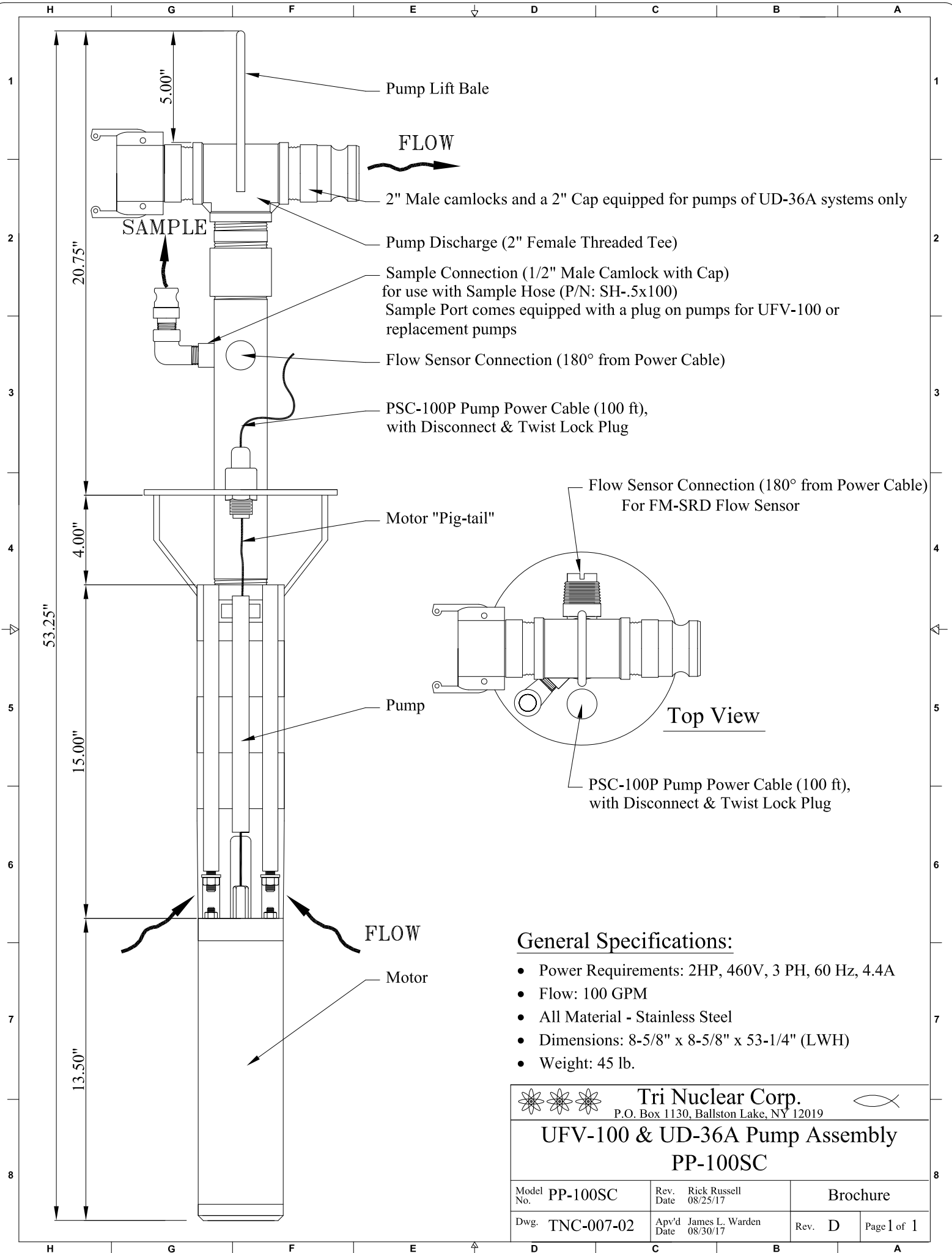
UT-3/6 Filter Storage Rack  
 Holds (6) Tri Nuclear Filter Cartridges  
 Dimensions: 20" Dia x 33" High  
 Weight: 50#

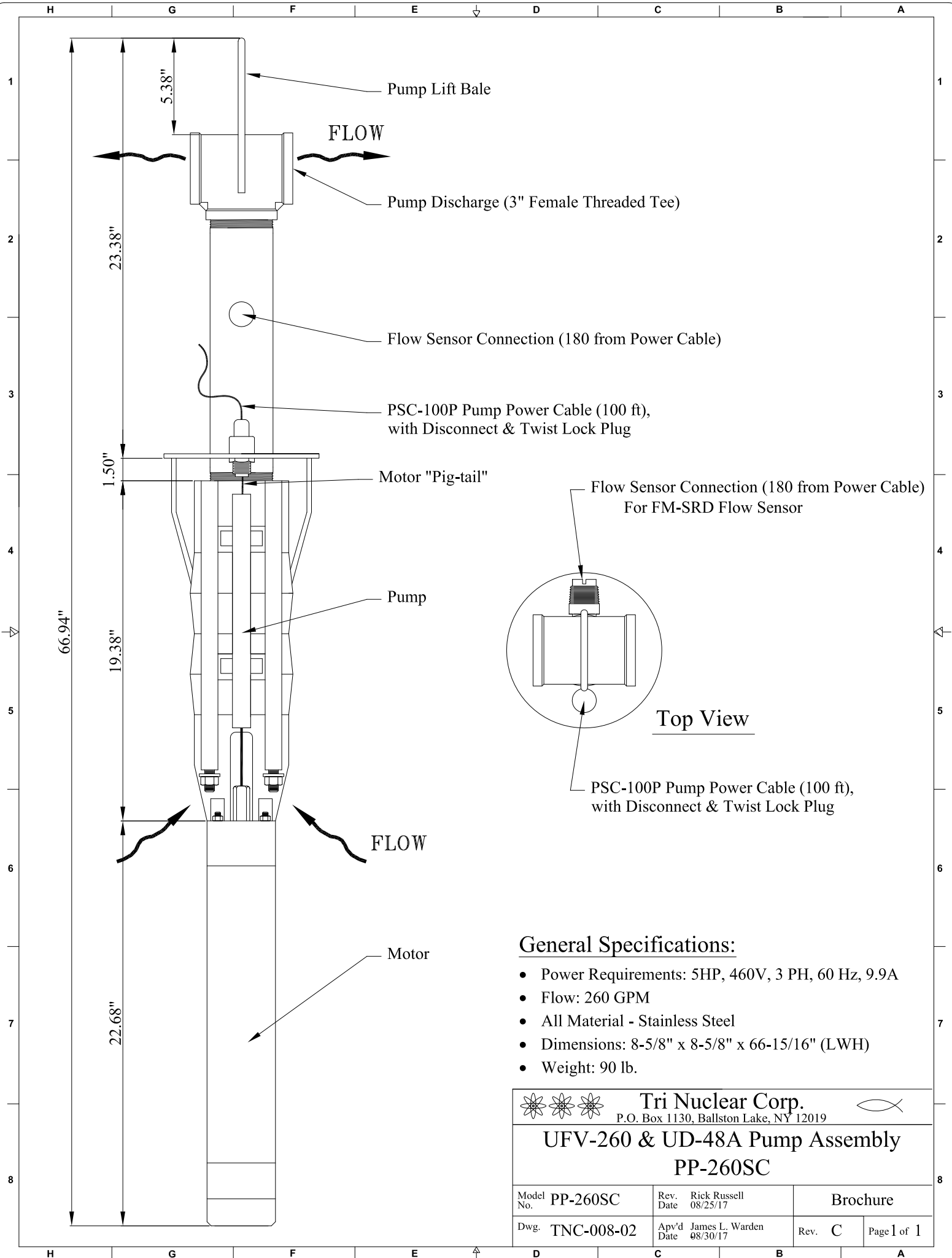
UT-14 Pump Lift Hook  
 Dimensions: 4-1/2" x 5/8" x 8" (LWH)  
 Weight: 1#

• All Material - Stainless Steel

		<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019					
<b>UF-1000 System</b> <b>Accessory Tooling</b>							
Model No.	UF-1000	Dwg.	TNC-005-02	Rev.	F	Page	3 of 4







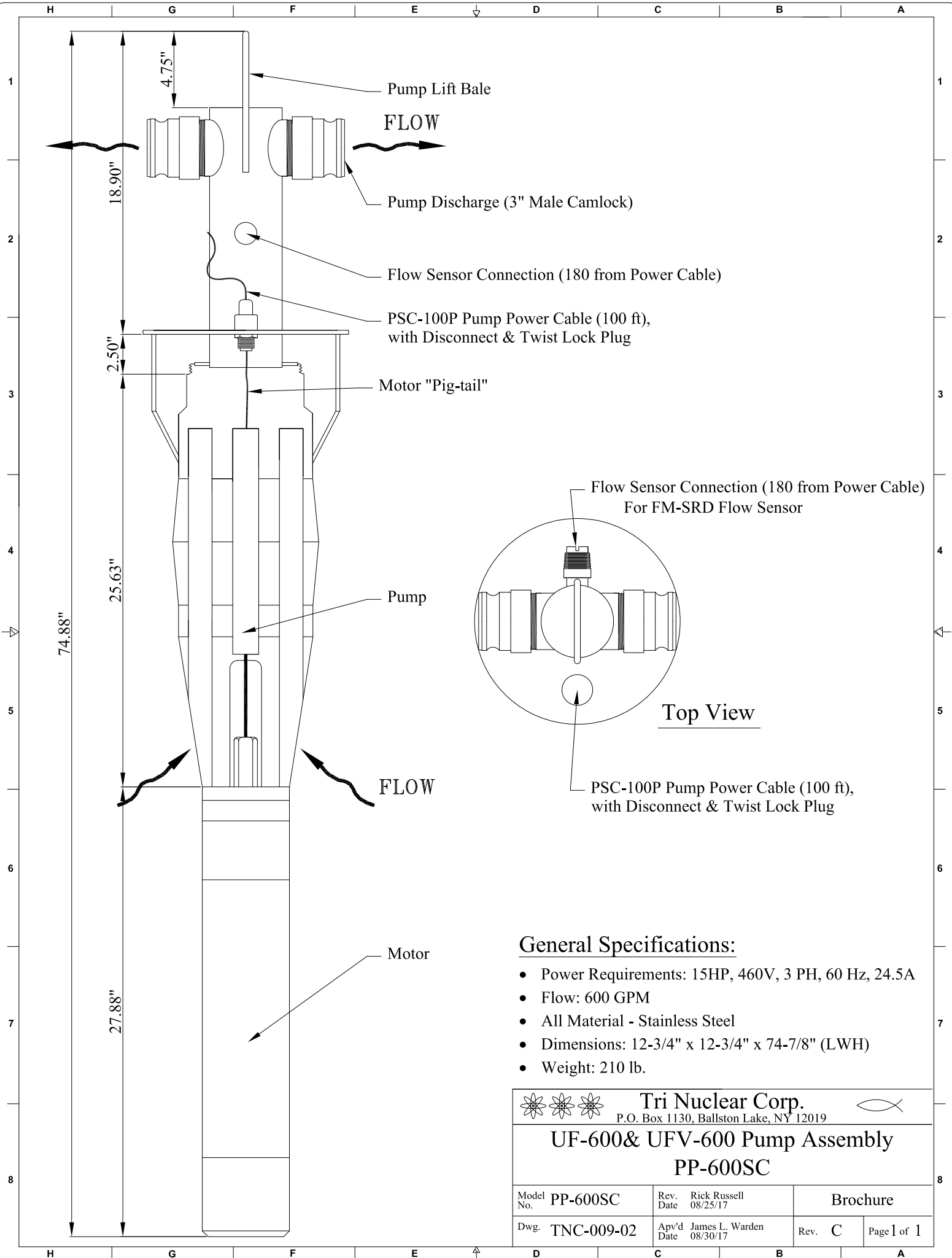


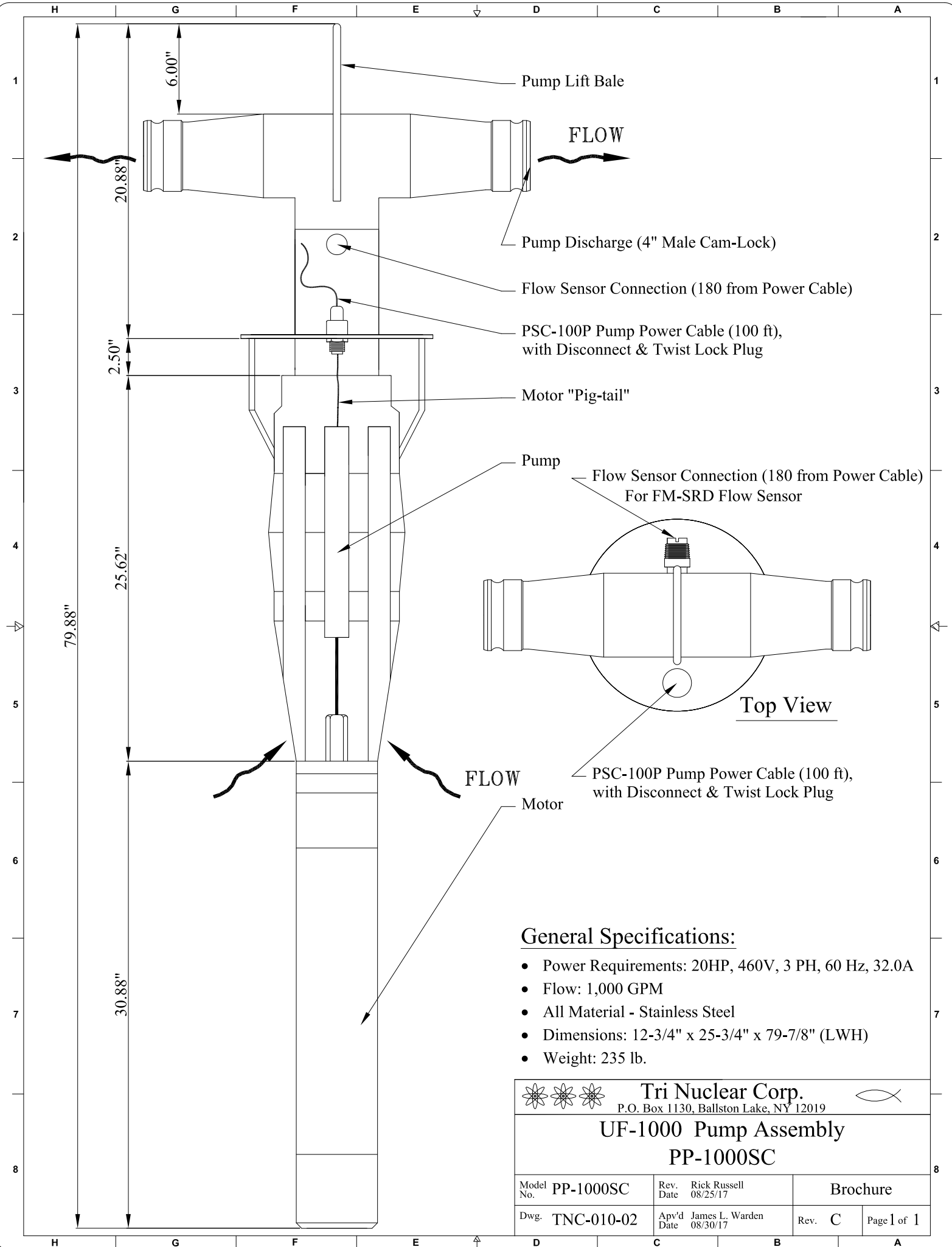
### General Specifications:

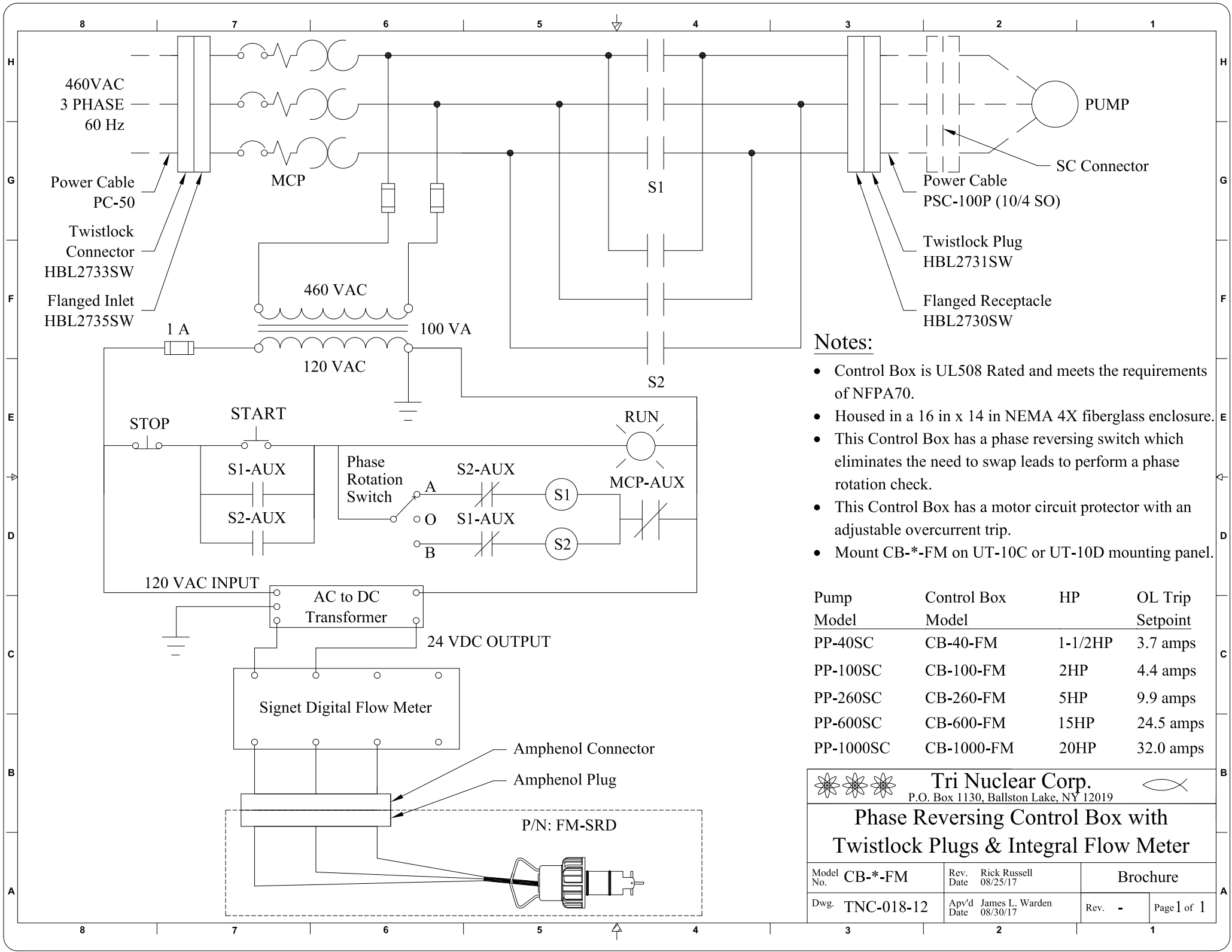
- Power Requirements: 5HP, 460V, 3 PH, 60 Hz, 9.9A
- Flow: 260 GPM
- All Material - Stainless Steel
- Dimensions: 8-5/8" x 8-5/8" x 66-15/16" (LWH)
- Weight: 90 lb.

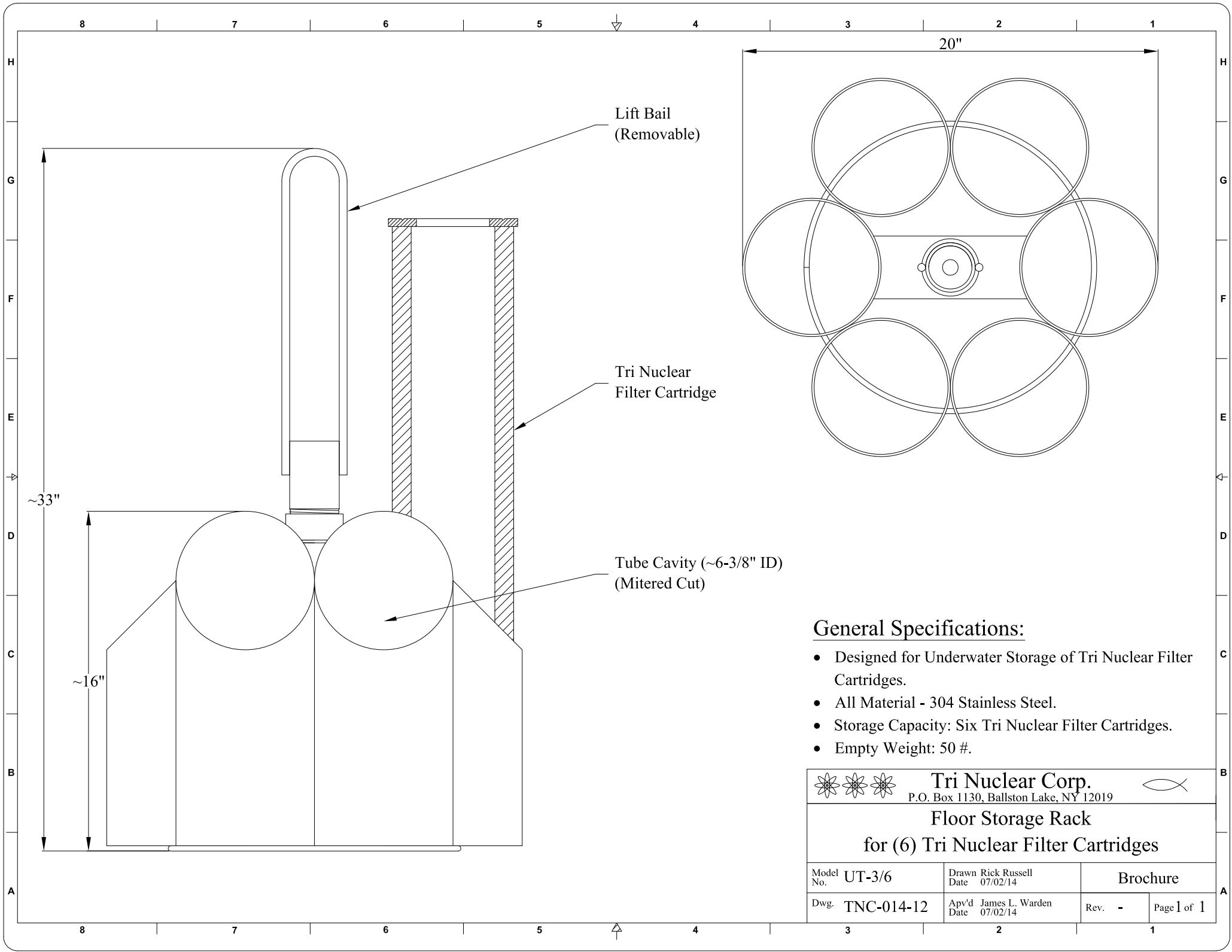
			<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019				
<b>UFV-260 &amp; UD-48A Pump Assembly PP-260SC</b>							
Model No. <b>PP-260SC</b>		Rev. Date <b>Rick Russell 08/25/17</b>		<b>Brochure</b>			
Dwg. <b>TNC-008-02</b>		Apv'd Date <b>James L. Warden 08/30/17</b>		Rev. <b>C</b>		Page <b>1</b> of <b>1</b>	









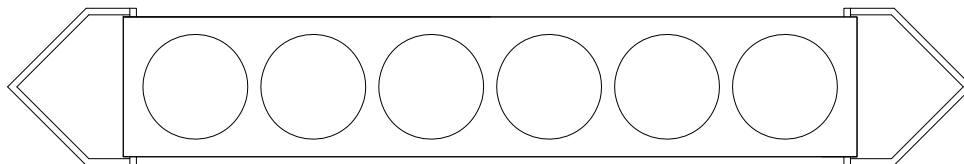
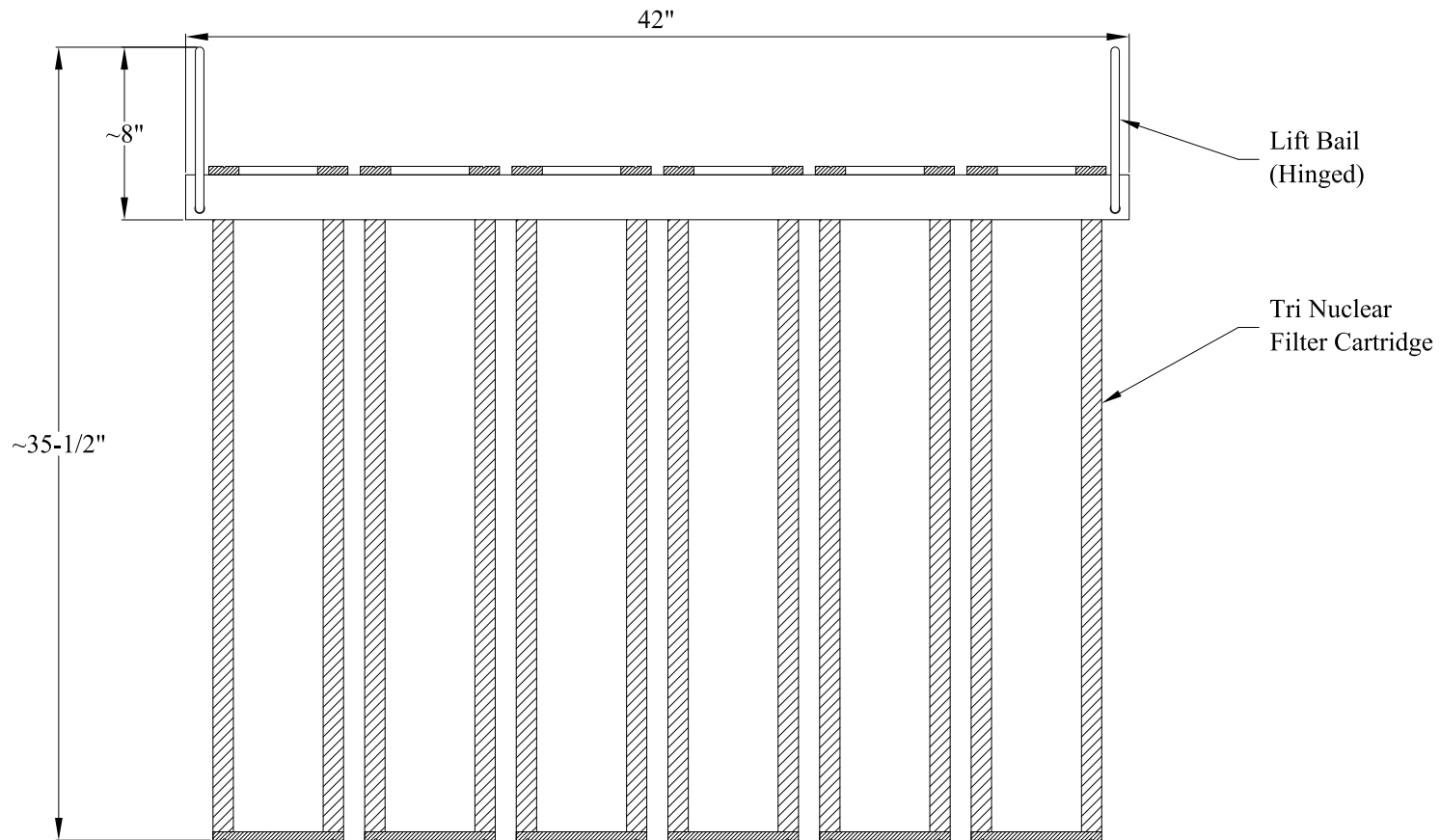




**General Specifications:**

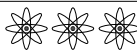

- Designed for Underwater Storage of Tri Nuclear Filter Cartridges.
- All Material - 304 Stainless Steel.
- Storage Capacity: Six Tri Nuclear Filter Cartridges.
- Empty Weight: 50 #.

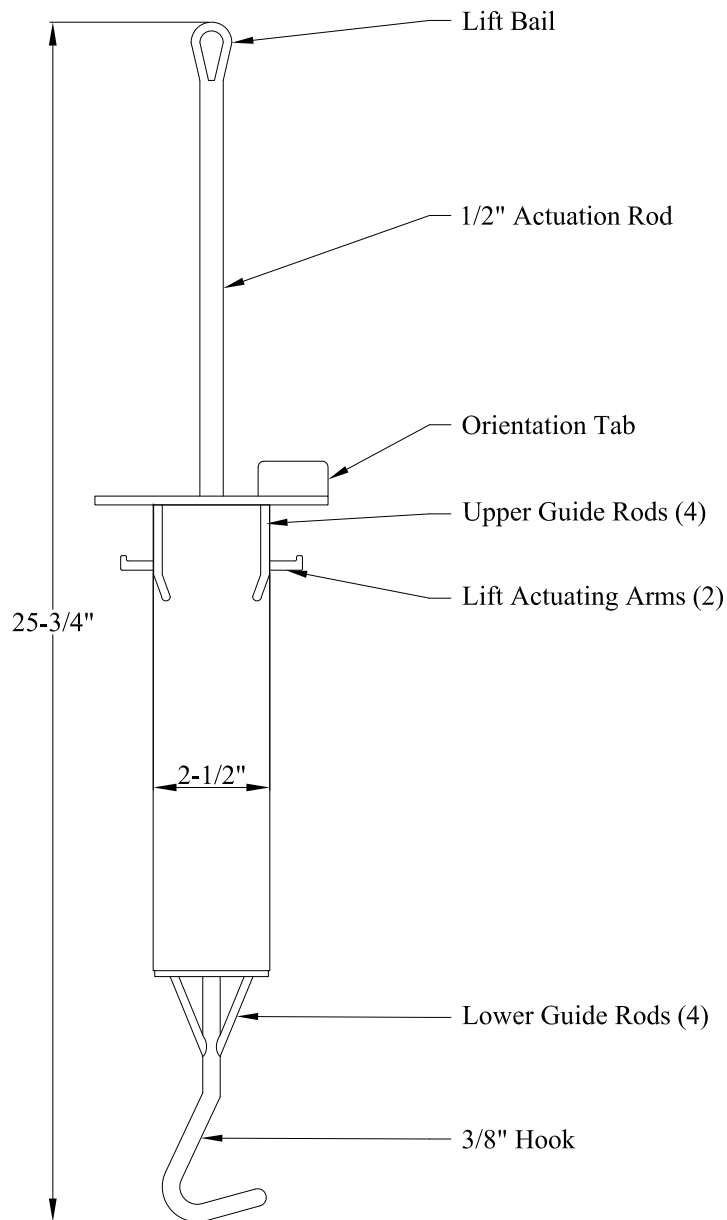
		<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>Floor Storage Rack</b>					
<b>for (6) Tri Nuclear Filter Cartridges</b>					
Model No. <b>UT-3/6</b>		Drawn Rick Russell Date 07/02/14		Brochure	
Dwg. <b>TNC-014-12</b>		Apv'd James L. Warden Date 07/02/14		Rev. -	Page 1 of 1



### General Specifications:



- Designed for Underwater Storage of Tri Nuclear Filter Cartridges.
- All Material - 304 Stainless Steel.
- Storage Capacity: Six Tri Nuclear Filter Cartridges.
- Empty Weight: 14 #.

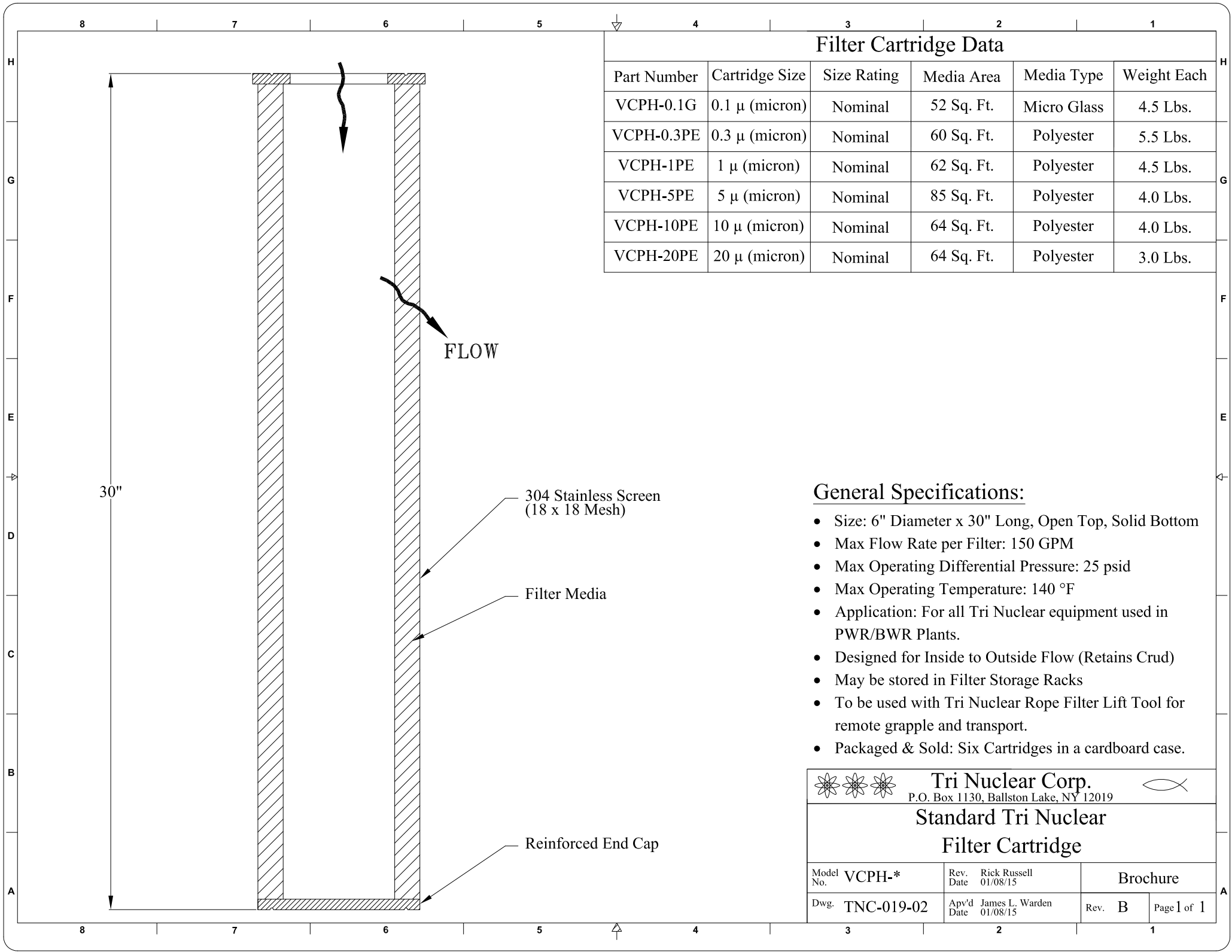
		<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019			
<b>Hanging Storage Rack</b> <b>for (6) Tri Nuclear Filter Cartridges</b>					
Model No. <b>UT-3H</b>		Drawn Rick Russell Date 07/02/14		Brochure	
Dwg. <b>TNC-014-30</b>		Apv'd James L. Warden Date 07/02/14		Rev. -	Page 1 of 1



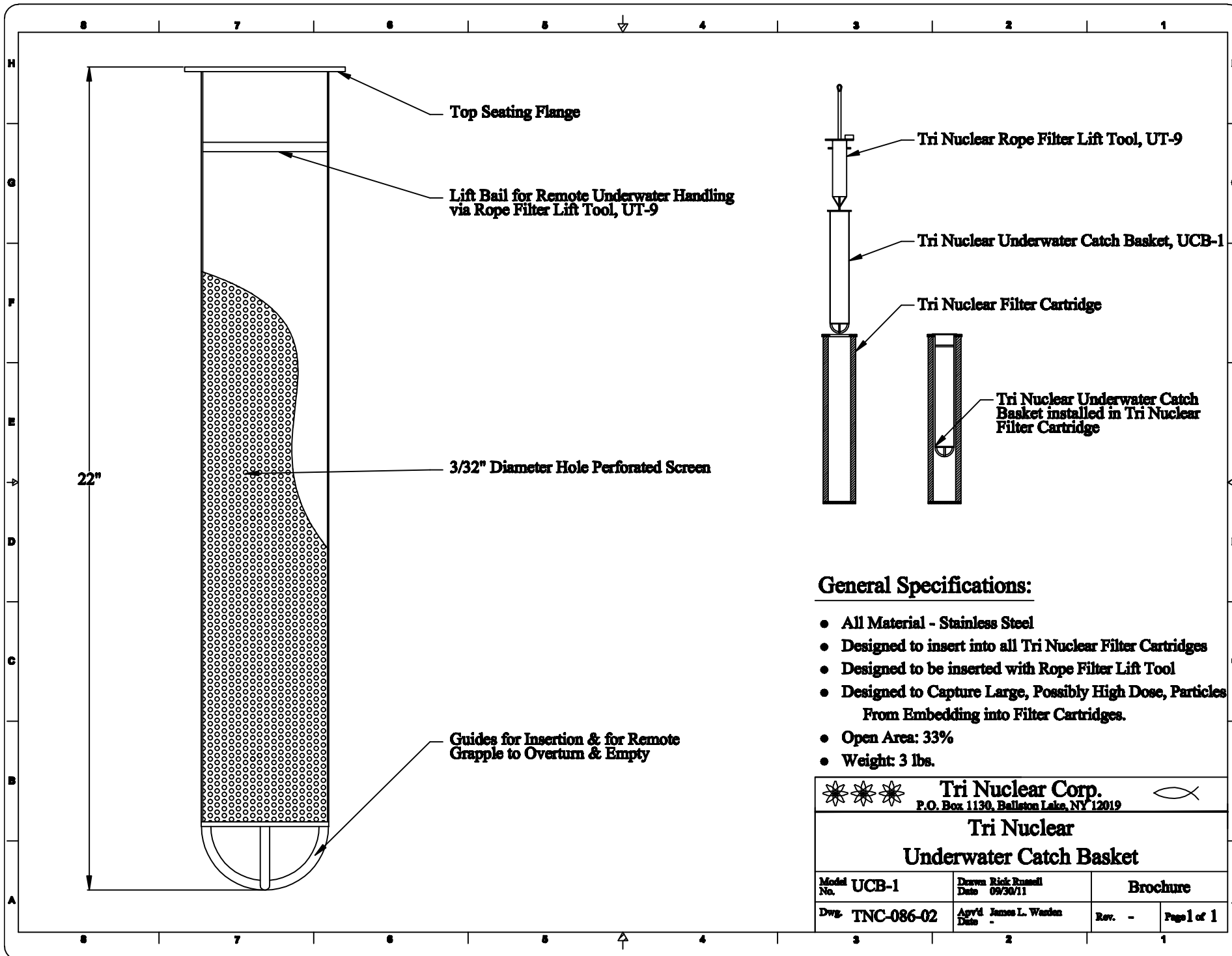
### General Specifications:

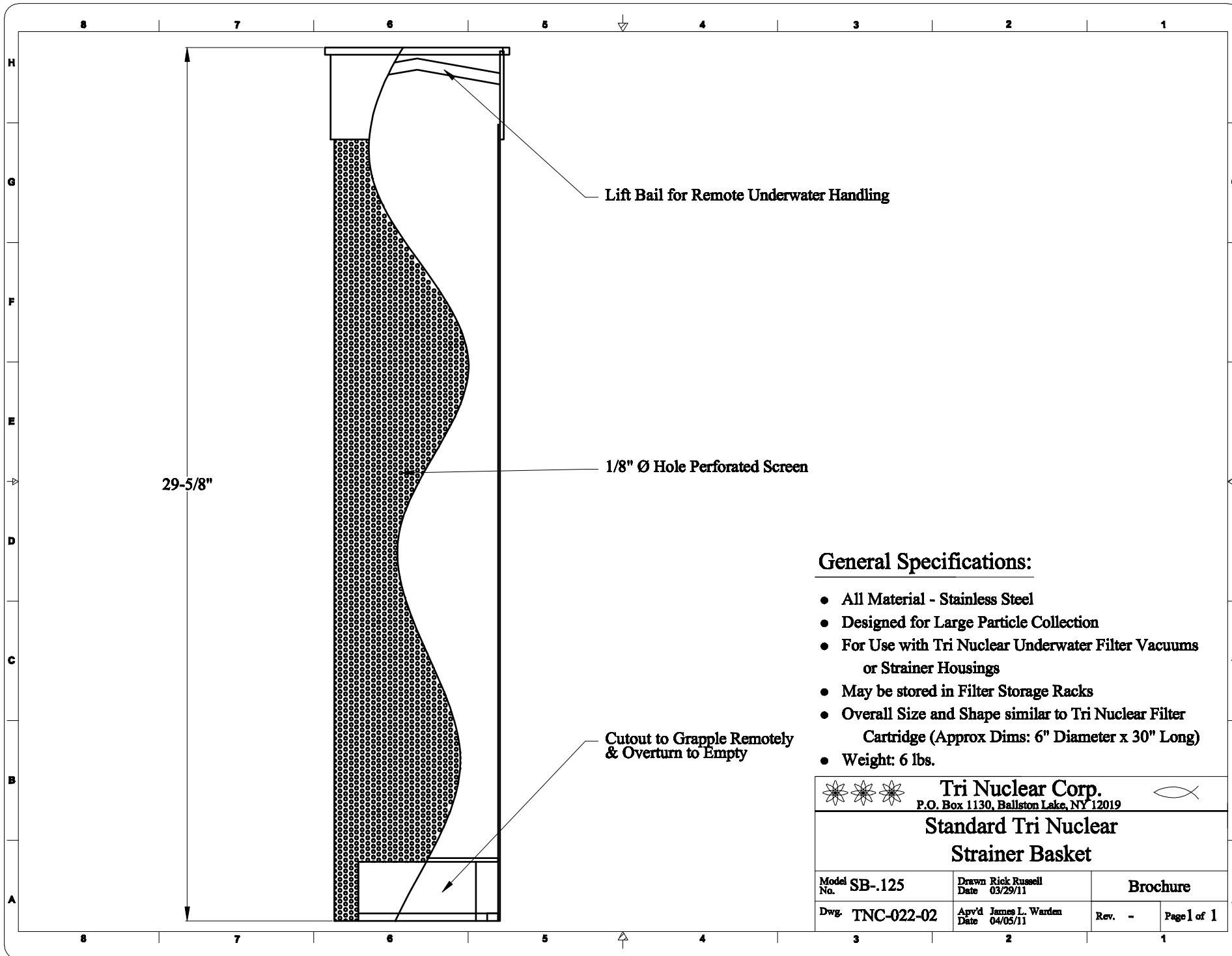
- Designed for Remote Grapple & Transport of Tri Nuclear Filter Cartridges Underwater or Out of Pool
- All Material - Stainless Steel
- Orientation Tab - To Show Open Side of Hook When Viewed from Above.
- Centering Rods - To Guide Tool into Filter Cartridge
- Hook - To Open Filter Housing Swing Cover
- Lift Bail - To Attach Rope or UT-15 Utility Chain
- Lift Arms - To Positively Latch onto Filter Cartridge
- Dimensions: 5" Dia. x 17-3/4" Fully Retracted
- Dimensions: 5" Dia. x 25-3/4" Fully Extended
- Weight: 6 Lbs.

		<b>Tri Nuclear Corp.</b>			
P.O. Box 1130, Ballston Lake, NY 12019					
<b>Rope Filter Lift Tool</b>					
<b>UT-9</b>					
Model No. <b>UT-9</b>		Drawn Rick Russell Date 07/02/14		Brochure	
Dwg. <b>TNC-014-19</b>		Apv'd James L. Warden Date 07/02/14		Rev. -	Page 1 of 1











### General Specifications:

- All Material - Stainless Steel
- Designed for Large Particle Collection
- For Use with Tri Nuclear Underwater Filter Vacuums or Strainer Housings
- May be stored in Filter Storage Racks
- Overall Size and Shape similar to Tri Nuclear Filter Cartridge (Approx Dims: 6" Diameter x 30" Long)
- Weight: 6 lbs.

			<b>Tri Nuclear Corp.</b> P.O. Box 1130, Ballston Lake, NY 12019		
<b>Standard Tri Nuclear Strainer Basket</b>					
Model No. <b>SB-.125</b>		Drawn <b>Rick Russell</b> Date <b>03/29/11</b>		<b>Brochure</b>	
Dwg. <b>TNC-022-02</b>		App'd <b>James L. Warden</b> Date <b>04/05/11</b>		Rev. <b>-</b>	Page <b>1</b> of <b>1</b>

29-5/8"

Lift Bail for Remote Underwater Handling

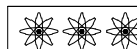
Internal Mesh Liner

1/8" Ø Hole Perforated Screen

Cutout to Grapple Remotely  
& Overturn to Empty

### General Specifications:

- All Material - Stainless Steel
- Designed for Small Particle Collection
- For Use with Tri Nuclear Underwater Filter Vacuums or Strainer Housings
- May be stored in Filter Storage Racks
- Overall Size and Shape similar to Tri Nuclear Filter Cartridge (Approx Dims: 6" Diameter x 30" Long)
- Various Standard Mesh Liner Sizes Available:
  - P/N: SB-.125-50M - 50x50 mesh - 0.012" Opening
  - P/N: SB-.125-100M - 100x100 mesh - 0.006" Opening
  - P/N: SB-.125-200M - 200x200 mesh - 0.003" Opening
  - P/N: SB-.125-400M - 400x400 mesh - 0.0015" Opening
- Other Mesh Sizes Available Upon Request.
- Weight: 8 lbs.



**Tri Nuclear Corp.**  
P.O. Box 1130, Ballston Lake, NY 12019



### Standard Tri Nuclear Mesh Lined Strainer Basket

Model No.	SB-.125-*M	Drawn Rick Russell Date 03/29/11	Brochure	
Dwg.	TNC-023-02	App'd James L. Warden Date 04/05/11	Rev. -	Page 1 of 1

10/05/16

Tri Nuclear Corp. filter distance information for the  
following units:

UFV-100

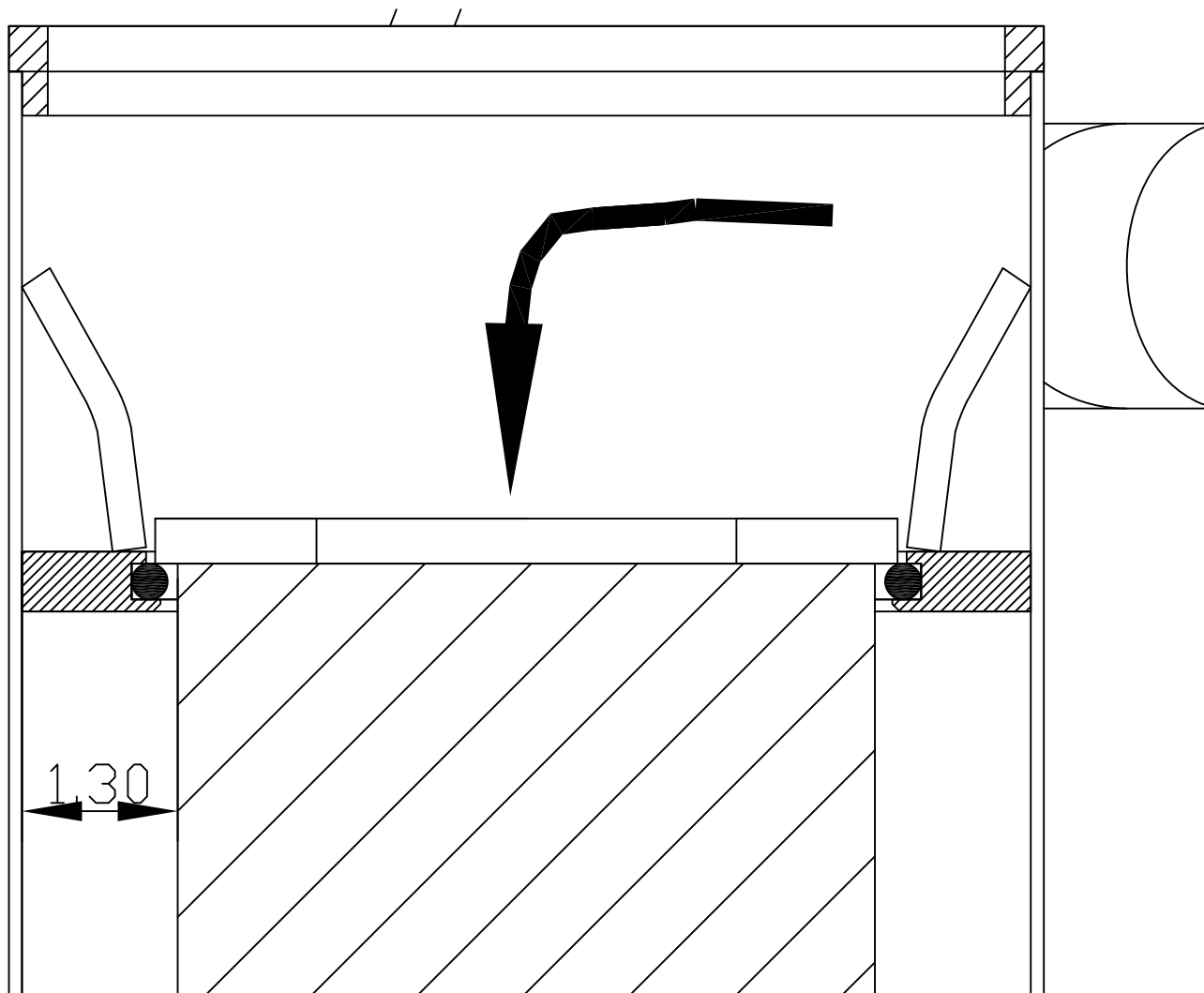
UFV-260

UF-600

UFV-600

Distance from edge of filter to ID of filter tube: 1.3 in [3.3cm]

Filter tube 0.109in [2.76mm] tk 304 Stainless Steel.



10/05/16

Tri Nuclear Corp. filter distance information for the  
following units:

UF-1000

Distance from edge of filter to ID of filter tube: 2.77in [7.04 cm]

Housing shell is 0.120 in [3.03 mm] tk 304 Stainless Steel.

