

VUM and VUM RC (4" Valve Under Monitor)

INSTRUCTION FOR INSTALLATION, OPERATION, AND MAINTENANCE

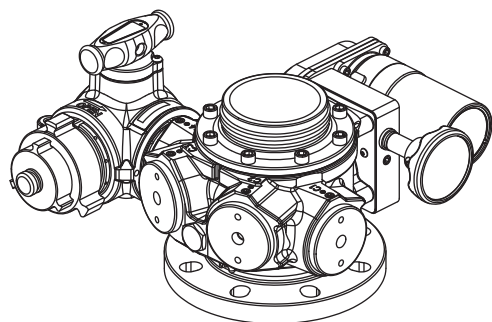
⚠ DANGER

Understand manual before use. Operation of this device without understanding the manual and receiving proper training is a misuse of this equipment. Obtain safety information at tft.com/serial-number.

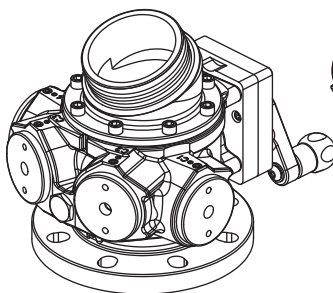
This equipment is intended for use by trained and qualified emergency services personnel for firefighting. All personnel using this equipment shall have completed a course of education approved by the Authority Having Jurisdiction (AHJ).

This instruction manual is intended to familiarize firefighters and maintenance personnel with the operation, servicing, and safety procedures associated with this product. This manual should be kept available to all operating and maintenance personnel.

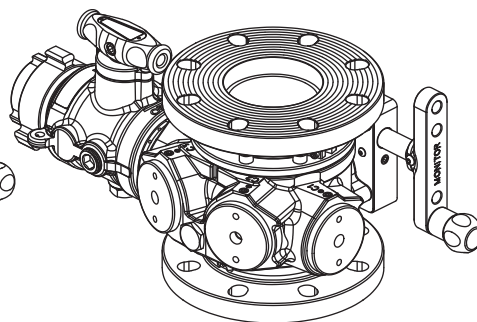
SAMPLE CONFIGURATIONS



VUM RC with CODE-RPM outlet
and 2.5" Gated Elbow
AKE111113D



VUM with 22.5° CODE-RPM outlet
and Parallel Shaft Gearbox
AKP121111D



VUM with 4" ANSI 150 outlet
and 2.5" Straight Valve
AKM131114D

SAFE OPERATING RANGE FOR MONITOR OUTLET:

Up to 2500 gpm below 130 psi (9500 L/min @ 9 bar)*
Up to 2000 gpm below 200 psi (8000 L/min @ 14 bar)*
Up to 1600 gpm @ 300 psi maximum (6000 L/min @ 21 bar)*

*these maximum flow rates and nozzle inlet pressures are valid for monitor outlets up to 17" (432 mm) tall from the VUM outlet.

HYDROSTATIC PROOF TEST: 900 psi (62 bar)**

**Do not exceed the rated operating pressure of 300 psi (21 bar). The hydrostatic proof test is performed on a sample valve to ensure it does not visibly rupture, crack or permanently distort at 3 times the rated operating pressure. The purpose of the proof test is to be confident the valve design may be safely operated at the rated operating pressure.

DANGER

PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. **Firefighting and Emergency Response** are inherently **dangerous activities** requiring proper training in their hazards and the use of **extreme caution** at all times.
2. **IT IS YOUR RESPONSIBILITY** to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called on to use.
3. **IT IS YOUR RESPONSIBILITY** to know that you have been properly trained in **Firefighting and/or Emergency Response** and in the use, precautions, and care of any equipment you may be called upon to use.
4. **IT IS YOUR RESPONSIBILITY** to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. **IT IS YOUR RESPONSIBILITY** to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.

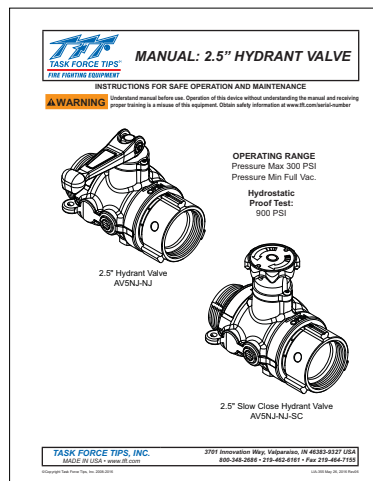
Fire and Emergency Manufacturers and Service Association, Inc.
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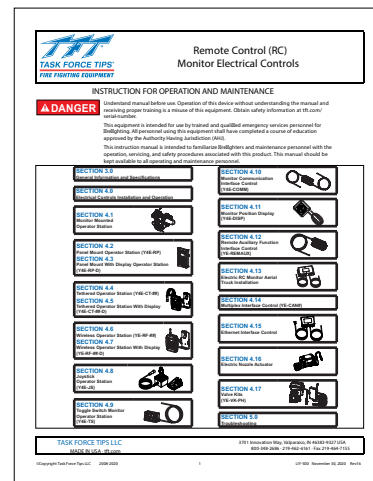
FEMSA

SUPPORTING MATERIALS

The following document contains supporting safety and operating information pertaining to the equipment described in this manual.



LIA-335 2.5" Hydrant Valve Manual



LIY-500 Remote Control (RC)
Monitor Electrical Controls

TABLE OF CONTENTS

1.0	MEANING OF SAFETY SIGNAL WORDS
2.0	SAFETY
3.0	GENERAL INFORMATION
3.1	SPECIFICATIONS
3.1.1	MECHANICAL
3.1.2	ELECTRICAL
3.2	CORROSION
3.3	USE WITH SALT WATER
3.4	VARIOUS MODELS AND TERMS
3.5	OPTIONS, DIMENSIONS, AND WEIGHTS
3.5.1	MODEL NUMBERING SEQUENCE
3.5.2	MAIN VALVE BODY DIMENSIONS
3.5.3	VALVE CONTROL OPTIONS
3.5.4	SIDE B MONITOR OUTLET OPTIONS
3.5.5	AUXILIARY PORT OPTIONS
4.0	INSTALLATION
4.1	DIRECTION OF FLOW
4.2	STRUCTURAL REQUIREMENTS FOR PIPE FLANGE MOUNTED MONITORS
4.3	MONITOR INSTALLATION AND COMPATIBILITY
4.3.1	CODE-RPM DIRECT CONNECTION
4.3.2	MOUNTING A MONITOR WITH 4" ANSI 150 OR DN 100 PN16 FLANGE
4.4	ELECTRONIC INSTALLATION AND WIRING
4.4.1	INTERFACE ENCLOSURE MOUNTING
4.4.2	TESTING THE ELECTRICAL INSTALLATION
4.5	INPUTS SIGNAL CONFIGURATION
4.6	VALVE POSITION FEEDBACK RELAYS
4.7	AUX BUTTON OPERATION
4.8	CHANGING THE CRANK HANDLE TO THE OPPOSITE SIDE OF THE VALVE (MANUAL MODELS)
4.9	CHANGING THE CRANK HANDLE TO THE OPPOSITE SIDE OF THE VALVE (RC MODELS)
4.10	SHAFT EXTENSION FOR HANDWHEEL OR CRANK HANDLE
4.11	CHANGING THE OFFSET OF THE COMPACT CRANK HANDLE
4.12	ALUMINUM HANDLE KITS FOR 2.5" GATED ELBOWS AND STRAIGHT HYDRANT VALVES
4.13	RECONFIGURING AUXILIARY PORTS
4.13.1	RECONFIGURING BLIND CAP, GAUGE, AND VENT (AUTO DRAIN VALVE)
5.0	USE
5.1	VALVE OPERATION AND POSITION INDICATOR
5.2	VUM RC MANUAL OVERRIDE
5.3	ELECTRIC REMOTE CONTROL OPERATION
5.4	DRAINING RESIDUAL WATER
5.4.1	EXTERNAL DRAIN VALVE
5.4.2	INTERNAL DRAIN VALVE
5.4.3	USE ON TELESCOPING WATERWAYS (AERIAL APPARATUS)
5.4.3.1	CONFIGURING THE INTERNAL AUTOMATIC DRAIN
5.5	PRESSURE RELIEF VALVE
5.5.1	SETTING THE PRESSURE RELIEF VALVE
6.0	PRESSURE LOSS
7.0	WARRANTY
8.0	MAINTENANCE
8.1	SERVICE TESTING
8.2	TROUBLESHOOTING
8.3	REPAIR
8.4	CRANKSHAFT OVERRIDE AND REPLACEMENT
8.4.1	EMERGENCY CRANKSHAFT OVERRIDE
8.4.2	DIAGNOSING MAIN VALVE CRANKSHAFT FAILURE
8.4.3	MAIN VALVE CRANKSHAFT REPLACEMENT
8.4.4	VALVE SEAT REPLACEMENT
9.0	EXPLODED VIEW AND PARTS LISTS
10.0	OPERATION AND INSPECTION CHECKLIST

1.0 MEANING OF SAFETY SIGNAL WORDS

A safety related message is identified by a safety alert symbol and a signal word to indicate the level of risk involved with a particular hazard. Per ANSI Z535.6, the definitions of the four signal words are as follows:



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE is used to address practices not related to physical injury.

2.0 SAFETY



An inadequate supply of pressure and/or flow will cause an ineffective stream and can result in injury or death. Choose operating conditions to deliver adequate fire suppression.



This equipment is intended for use by trained personnel for firefighting. Use of this equipment for other purposes may involve hazards not addressed by this manual. Seek appropriate guidance and training to reduce risk of injury.



Equipment may be damaged if frozen while containing significant amounts of water. Such damage may be difficult to detect visually. Subsequent pressurization can lead to injury or death. Any time the equipment is subject to possible damage due to freezing, it must be tested and approved for use by qualified personnel before being considered safe for use.



This device is not rated as ignition proof, explosion proof, or intrinsically safe. Use only in locations with adequate ventilation and no hazard of flammable vapor buildup.



Sudden changes in valve position can cause pressure spikes (water hammer) and could lead to hose or pipe failure or an out of control monitor. Open and close the valve slowly to avoid water hammer.



Interrupting flow to the device could cause injury or death. Avoid situations that may interrupt flow to the device such as: hose line kinks, traffic running over hose, and automatic doors or devices that can pinch the hose.



The electric drives are current limited but may still produce enough force to cause injury. To avoid injury from moving equipment:

- Be aware that equipment may be remotely operated
- Keep hands and fingers away from pinch points
- Never operate the manual override while electric controls are in operation



To prevent mechanical damage, do not drop or throw equipment.

3.0 GENERAL INFORMATION

The Valve Under Monitor (VUM) is a lightweight, low friction-loss valve and manifold for installation directly beneath monitors on ladders, platforms, and various locations. The VUM combines the robust valve mechanism from the TFT Ball Intake Valve with a 4" ANSI 150 inlet and up to four 2.5" outlets. The 2.5" outlets are available with integrated valves, male hose threads, or female pipe threads. When paired with a TFT monitor, the monitor flange is omitted for additional weight savings and ease of maintenance.

An electric remote controlled (RC) model allows the valve to be operated from a remote location or from any TFT RC Monitor Operator Station. Unit is supplied with 2' of cable & plug on VUM RC and valve interface box is supplied with 10' of cable & mating receptacle so installation effort is minimized. Cable has only four conductors (two for power and two for communications) further easing installation effort.

To complete the installation, the installer will need to mount and wire the valve interface box. The power supply for the VUM RC will need to be connected to a protected circuit from the truck's power distribution center or a direct current based on installation.

3.1 SPECIFICATIONS

3.1.1 MECHANICAL

	STANDARD	METRIC
Valve Seat Diameter	3.65"	93 mm
Auxilliary 2.5" Port Minimum Diameter	2.25" (typical) 2.0" for integrated valves	57 mm (typical) 50.8 mm for integrated valves
Maximum Operating Pressure	300 psi	21 bar
Maximum Flow at Specified Nozzle Inlet Pressure	2500 gpm @ 130 psi	9500 L/min @ 9 bar
	2000 gpm @ 200 psi	8000 L/min @ 14 bar
	1600 gpm @ 300 psi	6000 L/min @ 21 bar
Hydrostatic Proof Test Pressure (See note on front cover)	900 psi	62 bar
Operating Temperature Range of Fluid	33° to 120°F	0° to 50°C
Storage Temperature Range*	-25° to 135°F	-32° to 57°C
Worm Drive Gearbox Reduction	7.5 turns open to close (30:1)	
Parallel Shaft Gearbox Reduction	8 turns open to close (32:1)	
Materials Used	Aluminum 6000 series hard anodized MIL8625 class 3 type 2, stainless steel 300 series	

* For temperatures below 32°F (0°C), valves must be drained after use to avoid damage.

Table 3.1.1

3.1.2 ELECTRICAL

ELECTRICAL SPECIFICATIONS		
Opening/Closing Speed	9 seconds	
Motor Current	Nominal	
	@12 VDC	@24 VDC
	12 amp	6 amp
Recommended Fuse or Circuit Breaker Size	20 amp	10 amp
Environmental Rating	All components designed to meet minimum rating of NEMA 4 (IP65)	

Table 3.1.2

3.2 CORROSION

All valve bodies are hard anodized aluminum which is powder coated inside and out to help prevent corrosion. Galvanic corrosion due to dissimilar metals can be minimized by using flange isolation kits and an anti-corrosive lubricant such as Molykote 112 Silicone Grease. Where practical, the standpipe should be drained while not in use to eliminate a path of conduction. Do not install brass fittings, discharge fittings, or monitors onto this valve. The effects of corrosion can also be minimized by good maintenance practice.

3.3 USE WITH SALT WATER

Use with salt water is permissible provided the equipment is thoroughly cleaned with fresh water after each use. The service life of the equipment may be shortened due to the effects of corrosion, and is not covered under warranty.

3.4 VARIOUS MODELS AND TERMS

VUM WITH MANUAL CRANK CONTROL (WORM DRIVE GEARBOX)

VUM model AKM111113D shown with Monsoon model Y4-MP1A

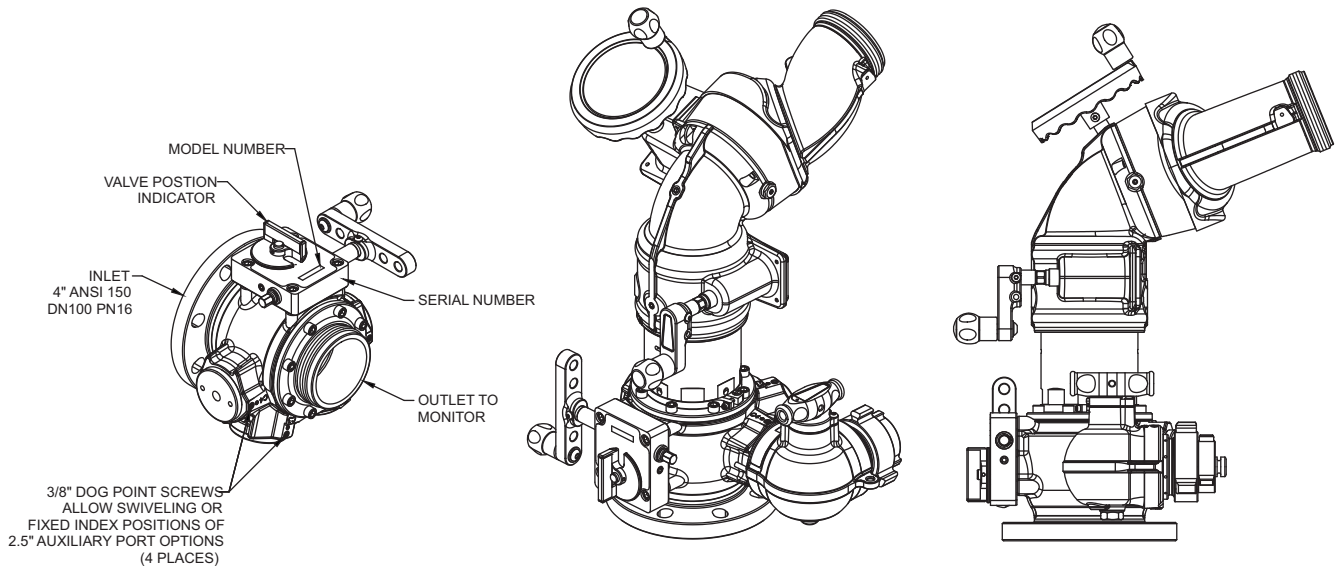


Figure 3.4A

VUM WITH MANUAL CRANK CONTROL (PARALLEL DRIVE GEARBOX)

VUM model AKP131111D shown with Monsoon model Y4-M21A

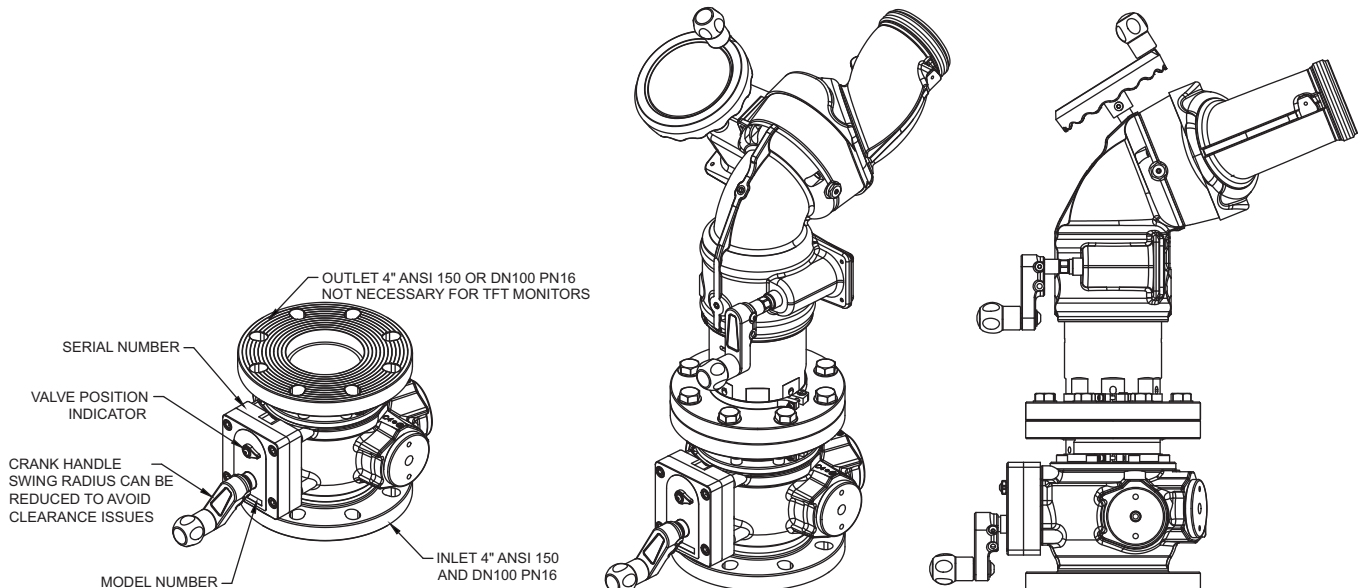


Figure 3.4B

VUM WITH ELECTRIC REMOTE CONTROL (VUM RC) VUM model AKE11111D shown with Monsoon RC model Y4-EP1A-P

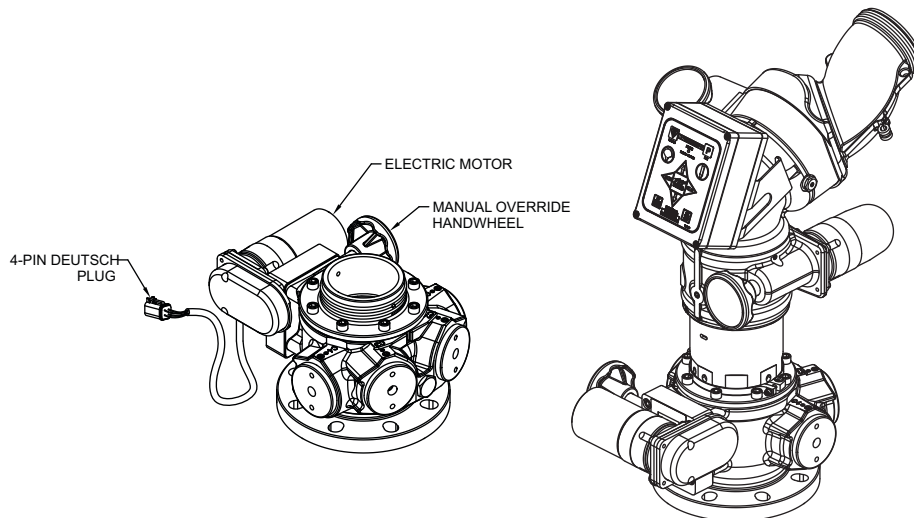


Figure 3.4C

STRAIGHT VERSUS ANGLED OUTLET VUM model AKP11111D (straight) and AKP121111D (angled) shown with Typhoon model Y5-DP1A

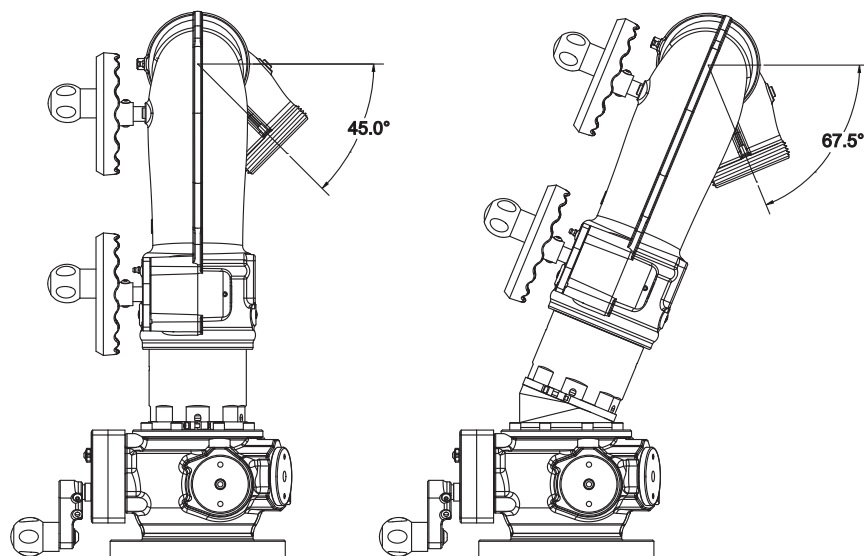


Figure 3.4D

- Angle of monitor is offset by 22.5° below horizontal (45° of travel below horizontal becomes 67.5°)
- Not all auxiliary port options are compatible with the 22.5° outlet, depending on which model monitor is used.
- Please consult TFT Service Department for questions regarding option compatibility.

3.5 OPTIONS, DIMENSIONS, AND WEIGHTS

Several options are available for valve control, monitor mounting, and the four auxiliary ports. Each option is described in the following sections. The dimensions and weights of individual options can be added together to calculate the overall size and weight of the VUM with the desired options installed.

3.5.1 MODEL NUMBERING SEQUENCE

Model numbers can be specified by combining 10 characters in the sequence shown below. The unique characters for each component option are presented in [section 3.5.2](#) through [section 3.5.5](#), along with the corresponding weights and dimensions.

Character Position	1	2	3	4	5	6	7	8	9	10
Component	AK (same prefix for all models)		VALVE CONTROL	RESERVED (same for all options)	SIDE B (monitor)	PORT C1 (aux.)	PORT C2 (aux.)	PORT C3 (aux.)	PORT C4 (aux.)	DRAIN IN HALF BALL

Example Model #	AKM132113D	Character Sequence	Weight (lb)
Main Valve Body	Same for all models	prefix AK (same for all models)	11.4
Valve Control	Worm Drive Gearbox	Character "M" in position 3	+ 3.5
Side B (monitor)	4" ANSI 150/DN 100 PN16 Flange, Straight	Character "3" in position 5	+ 6.5
Port C1 (aux.)	Gated Elbow Left-Hand 2.5"NHM w/T-Handle	Character "2" in position 6	+ 6.4
Port C2 (aux.)	Blind Plug	Character "1" in position 7	+ 0.4
Port C3 (aux.)	Blind Plug	Character "1" in position 8	+ 0.4
Port C4 (aux.)	Gated Elbow Right-Hand 2.5"NHM w/T-Handle	Character "3" in position 9	+ 6.4
Drain in Half Ball	Included	Character "D" in position 10	
Net Weight:			= 35.0

3.5.2 MAIN VALVE BODY DIMENSIONS

The main valve body is shared by all VUM models. It weighs 11.4 lb (5.17 kg), including an aluminum half ball and all fasteners that are shared by every VUM model.

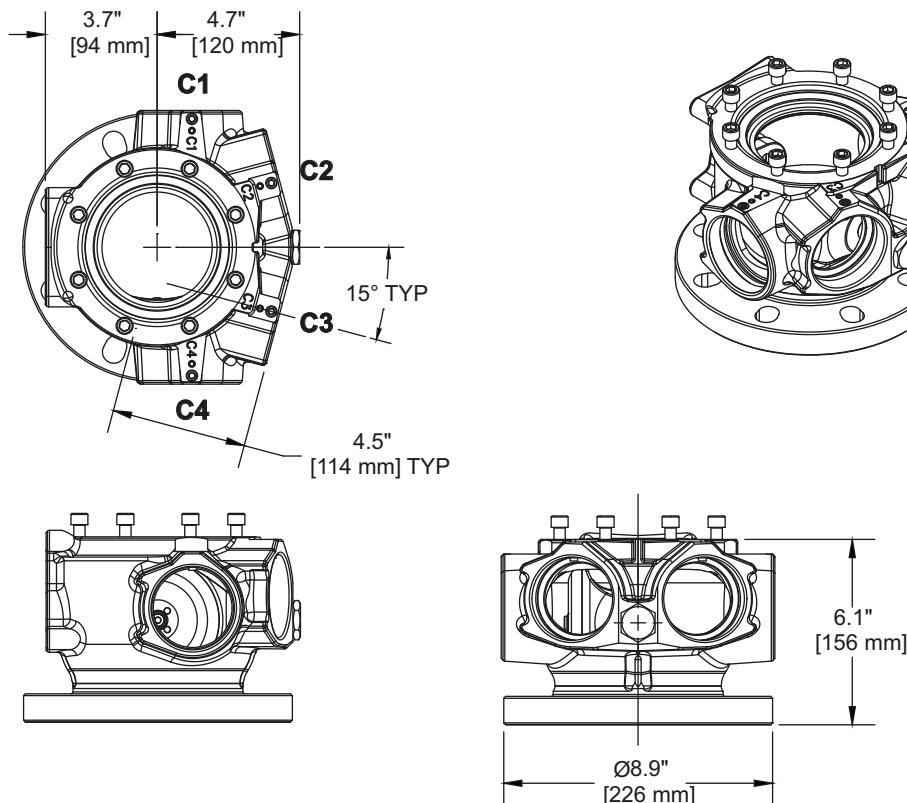


Figure 3.5.2

3.5.3 VALVE CONTROL OPTIONS

Three valve control options are available: worm drive gearbox, parallel shaft drive gearbox, or electric remote control. These options may be chosen for ease of operation, or to avoid interference with surrounding equipment.

The worm drive gearbox (option M) features a crank handle that can be installed on either the left side (default) or right side of the valve.

The parallel shaft gearbox (option P) features a crank handle that points away from all of the auxiliary ports, offering the most flexibility in configuring those ports.

The electric remote control gearbox (option E) adds a motor to the worm drive gearbox. The included RC Remote Interface Box allows the valve to be operated from a simple hardwired switch, or from a CANbus output module. The valve can also be controlled from a remote operator station with valve position feedback, or can be integrated with a wired or wireless TFT monitor control station (all sold separately).

VALVE CONTROL OPTION (character position 3)	CHARACTER	PART NUMBER	WEIGHT	
			lb	kg
WORM DRIVE GEARBOX	M	A1636	3.5	1.59
PARALLEL DRIVE GEARBOX	P	A1633	3.5	1.59
RC GEARBOX (A1637), GEARBOX MOTOR (AX1656), AND CHAIN DRIVE (AX1692)	E	as noted	8.4	3.81
RC REMOTE INTERFACE BOX		A5920	3.4	1.54

Table 3.5.3

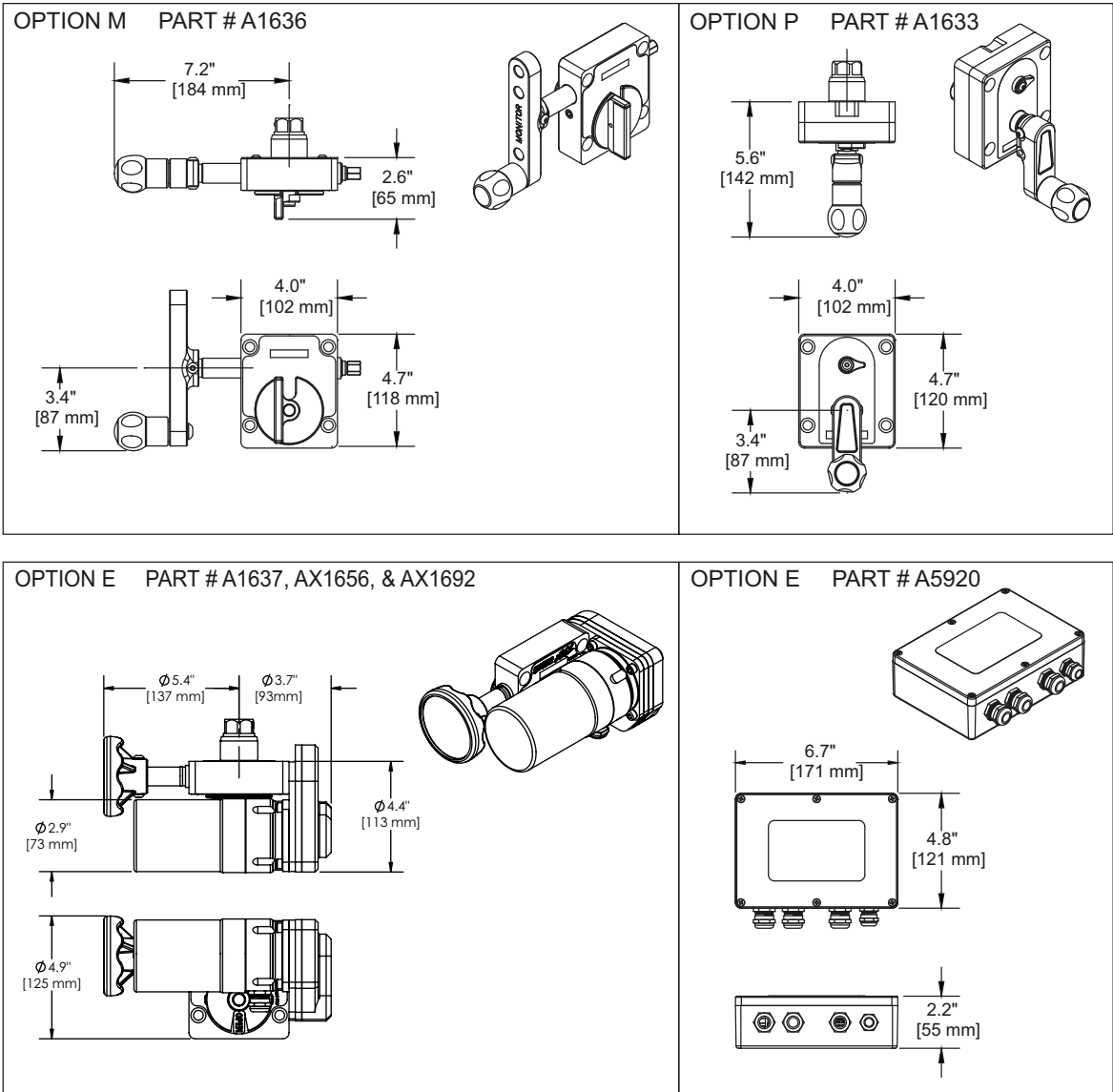


Figure 3.5.3

3.5.4 SIDE B MONITOR OUTLET OPTIONS

SIDE B OPTION (chatacter position 5)	CHARACTER	PART NUMBER	WEIGHT	
			lb	kg
CODE-RPM direct connection for TFT monitor, STRAIGHT	1	A1026	1.8	0.82
CODE-RPM direct connection for TFT monitor, ANGLED 22.5°	2	A1040	2.8	1.27
4" ANSI 150/DN 100 PN16 FLANGE, STRAIGHT	3	A1039.1	6.5	2.95

Table 3.5.4

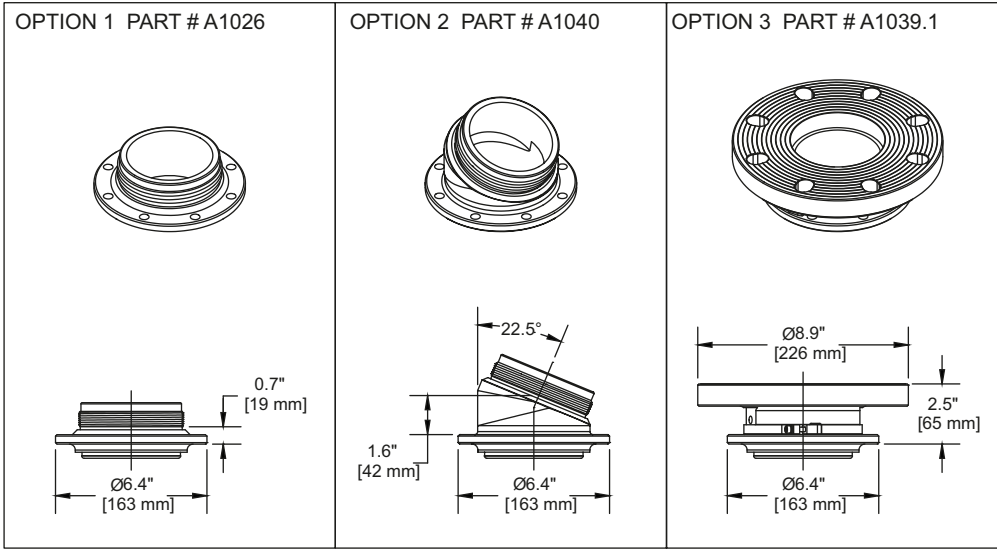
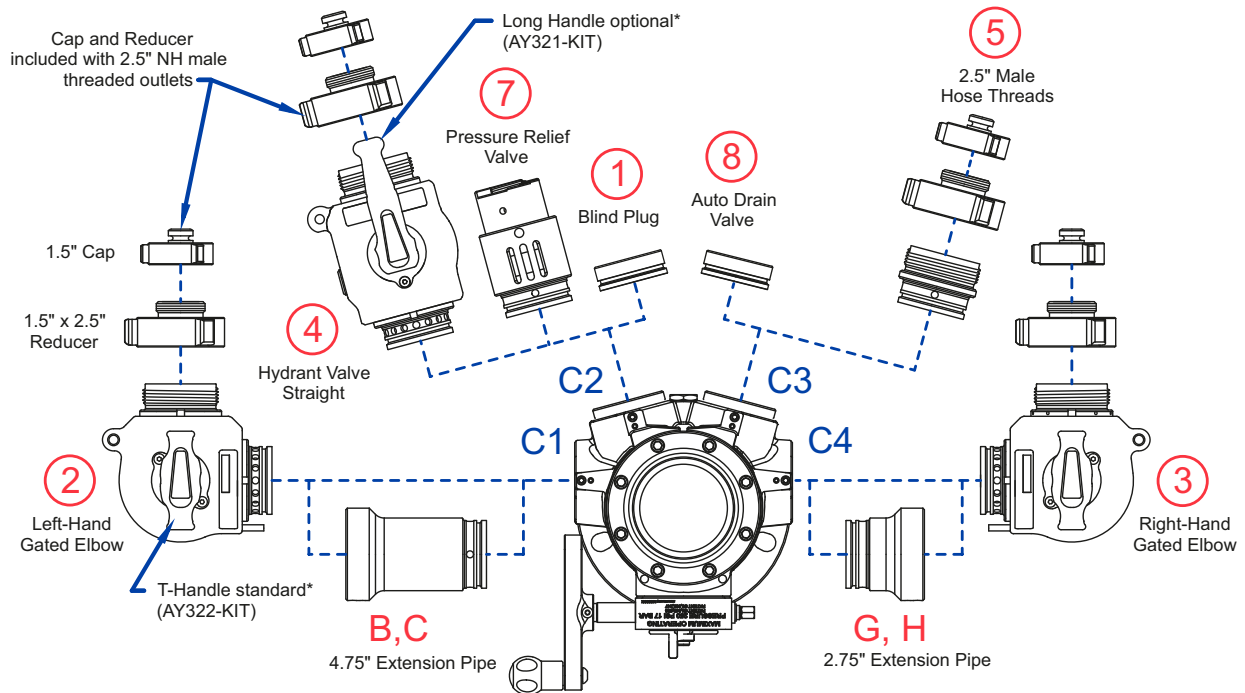


Figure 3.5.4

3.5.5 AUXILIARY PORT OPTIONS

Four auxiliary ports are included to enhance the capabilities of the VUM by adding hose connections, a pressure relief valve, or an external drain valve. Any of the options shown below may be specified for each of the C1, C2, C3 and C4 ports.

Blind plugs are installed in any unused ports, and each blind plug has ¼" NPT threads tapped into a blind pilot hole. To install a pressure gauge or other accessory on a blind plug, first drill through the blind pilot hole using a 1/4" drill bit.



*T-Handle is not compatible with side B option "Q". Long Handle is standard for those models.

Figure 3.5.5

AUX. PORT OPTIONS (character positions 6 thru 9)	CHARACTER	PART NUMBER	WEIGHT	
			lb	kg
BLIND PLUG	1	A1031.1	.04	0.18
GATED ELBOW LEFT-HAND 2.5"NHM w/T-HANDLE (port C1 typical - includes 2.5" X 1.5" reducer & cap)	2 (B)(G)	AV5LVUM-NJ	6.4	2.90
GATED ELBOW RIGHT-HAND 2.5"NHM w/T-HANDLE (port C4 typical - includes 2.5" X 1.5" reducer & cap)	3 (C)(H)	AV5RVUM-NJ	6.4	2.90
STRAIGHT HYDRANT VALVE 2.5"NHM w/T-HANDLE (includes 2.5" X 1.5" reducer & cap)	4	AV5VUM-NJ	6.4	2.90
2.5"NH MALE HOSE THREADS (no valve - includes 2.5" X 1.5" reducer & cap)	5	A1033NJ.1	1.5	0.68
PRESSURE RELIEF VALVE (see section 5.5)	7	A1694	1.5	0.73
EXTERNAL AUTO DRAIN VALVE (see section 5.4)	8	A1023.1	0.8	0.36
EXTENSION PIPE 4.75" LONG (add weight to options 2 and 3 above)	B,C	A1032.1	1.8	0.82
EXTENSION PIPE 2.75" LONG (add weight to options 2 and 3 above)	G,H	A1042.0	1.12	0.54

Table 3.5.5

Hose connections on ports C1 and C4 can potentially interfere with the worm drive gearbox. In most cases, worm drive interference issues can be avoided using the dimensions shown in this section and utilizing the hand crank relocation instructions from [section 4.8](#) through [section 4.11](#). There are no such interference issues when a parallel shaft gearbox or electric remote gearbox is installed.

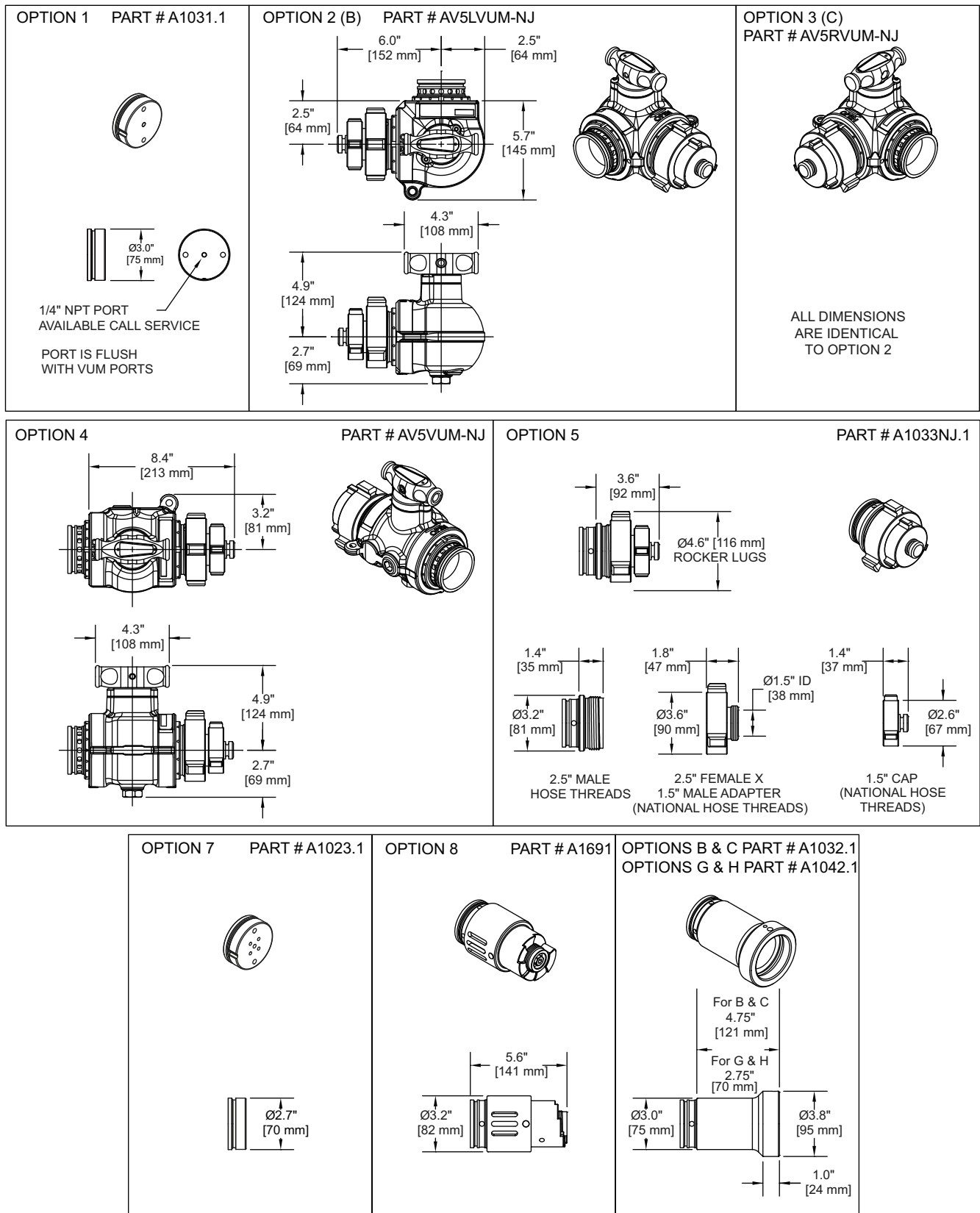


Figure 3.5.5

4.0 INSTALLATION

⚠ CAUTION

Mismatched or damaged waterway connections may cause equipment to leak or uncouple under pressure. Failure could result in injury. Equipment must be mated to matched connections.

⚠ CAUTION

Dissimilar metals coupled together can cause galvanic corrosion that can result in the inability to uncouple the connection, or complete loss of engagement over time. Failure could cause injury. Per NFPA 1962, if dissimilar metals are left coupled together, an anti-corrosive lubricant should be applied to the connection and the coupling should be disconnected and inspected at least quarterly.

4.1 DIRECTION OF FLOW

This product is intended to be installed with the main valve seat towards the outlet end. This allows the auxiliary discharge ports to be used while the main valve (to monitor) is closed. If the direction of flow is reversed, the auxiliary discharge ports will not be active when the main valve is closed and the internal automatic drain valve will not seal (if so equipped).

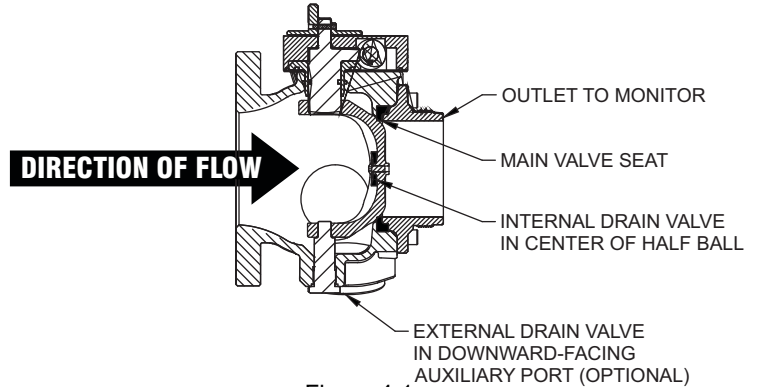


Figure 4.1

4.2 STRUCTURAL REQUIREMENTS FOR PIPE FLANGE MOUNTED MONITORS

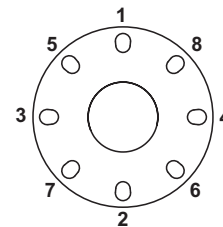
⚠ WARNING

Reaction forces generated are capable of causing injury and property damage if not properly supported. Nozzle reaction can be as high as 1500 lbs (680 kg) (equivalent to 2000 gpm at 200 psi or 1600 gpm at 300 psi). To reduce the risk of injury due to an inadequately supported device:

- Equipment should be securely installed by qualified individuals.
- Mounting objects must be capable of withstanding the internal pressure of the monitor as well as shear and bending forces due to nozzle reaction.
- The monitor must be securely mounted to rigid support members.
- Do not use flanges or pipe made from plastic for monitor mounting.
- Torque all fasteners to specified values.
- Verify that mobile equipment is constructed and setup for stable and safe operation under the influence of tipping and sliding hazards.

For 4"ANSI 150 or DN100 PN16 flanged connections, the use of flat flanges without raised faces is recommended. Use a ring gasket as defined in ASME 16.21 or ISO 7483. Tighten flange bolts in an alternating sequence as shown. Tighten sequentially each bolt or stud three times with 30%, then 60%, and finally 100% of the specified torque.

Tighten to 76-80 ft-lb (100-110 Newton-Meters).



Tighten Sequentially Each Bolt Three Times
to a Total of 76-80 ft-lb (100-110 N·m)

Figure 4.2

4.3 MONITOR INSTALLATION AND COMPATIBILITY

The Valve Under Monitor may be equipped with either a CODE-RPM direct connection to TFT monitors or an ANSI/DN flange for use with other devices. Table 4.3 describes the installed height of each VUM outlet option.

VUM OUTLET TYPE	INSTALLED HEIGHT
CODE-RPM	5.6" net*
22.5° ELBOW CODE-RPM	7.0" net* at center line
4" ANSI 150 FLANGE	8.7" (net = gross)
DN 100 PN16 FLANGE	8.6" (net = gross)
* versus 4" ANSI 150 monitor without VUM. Gross height of CODE-RPM is 0.94" taller than net height.	

Table 4.3



Keep monitor discharge height within acceptable limits. Injury can result from the reaction forces when the monitor discharge height is more than 17" (432 mm) from the bottom edge of the monitor inlet to the center line of the monitor outlet. Avoid use of exceptionally tall monitors or accessories between valve and monitor, or telescopic waterways such as the Task Force Tips Extend-A-Gun which exceed the acceptable monitor discharge height.

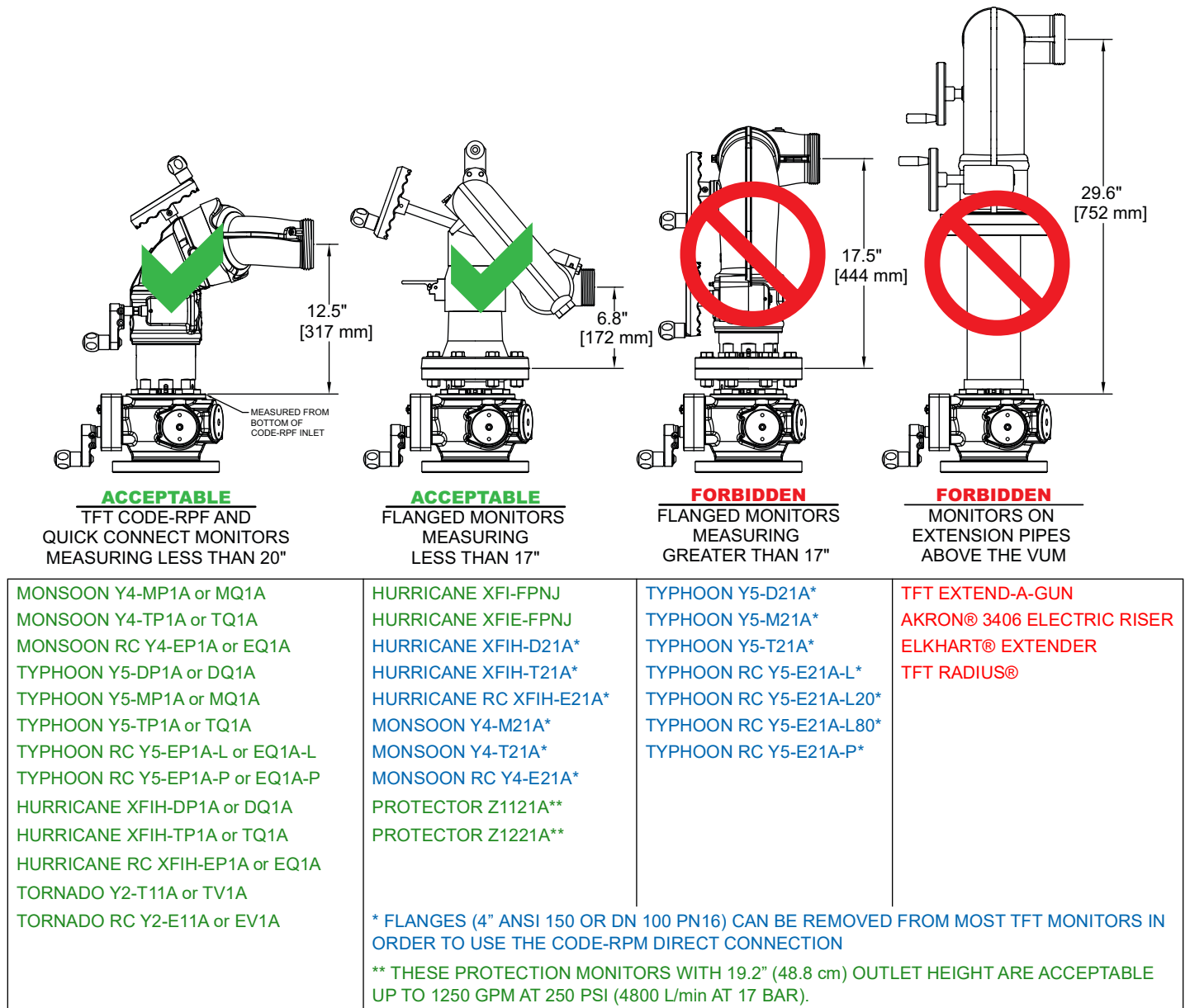


Figure 4.3

4.3.1 CODE-RPM DIRECT CONNECTION

1. Apply blue Loctite® to the threads on both Cylinder Nuts.
2. Align the grooves in the heads of the Cylinder Nuts with the top sides of the Clamps.
3. Slide the Screws through the Washers and Clamps and loosely thread into the Cylinder Nuts.
4. Place the Clamps over the male threads of the VUM outlet. Cylinder Nuts heads MUST be on the top side of the Clamps.
5. Screw the monitor onto the VUM until the threaded joint bottoms out.

NOTICE

Make sure the Clamp is not tight enough to prevent the monitor Base from bottoming out. The monitor will leak if it does not bottom out in this step.

NOTICE

Do not use pipe dope or Loctite on the monitor base threads. These threads are sealed with the O-ring shown, which is installed in the monitor at the factory. The use of thread locking compounds will make removal difficult.

6. Unscrew monitor until the "Straight Ahead Reference Mark" is facing the desired direction.

NOTICE

Monitor may be unscrewed up to one full turn from the bottomed out position. Monitor will leak if unthreaded more than one full rotation from bottomed out condition.

7. Ensure that Clamp assembly does not interfere with RC monitor Power/Com Cable (if applicable). Reposition Clamp if needed.
8. Tighten each Screw gradually until both are finger tight with approximately equal spacing between opposite ends of the Clamp.
9. Carefully tighten each Screw one additional turn using a 5/32 hex wrench by alternating to the opposite Screw in half-turn increments.

NOTICE

Over tightening the Screws will damage Screws and Clamp.

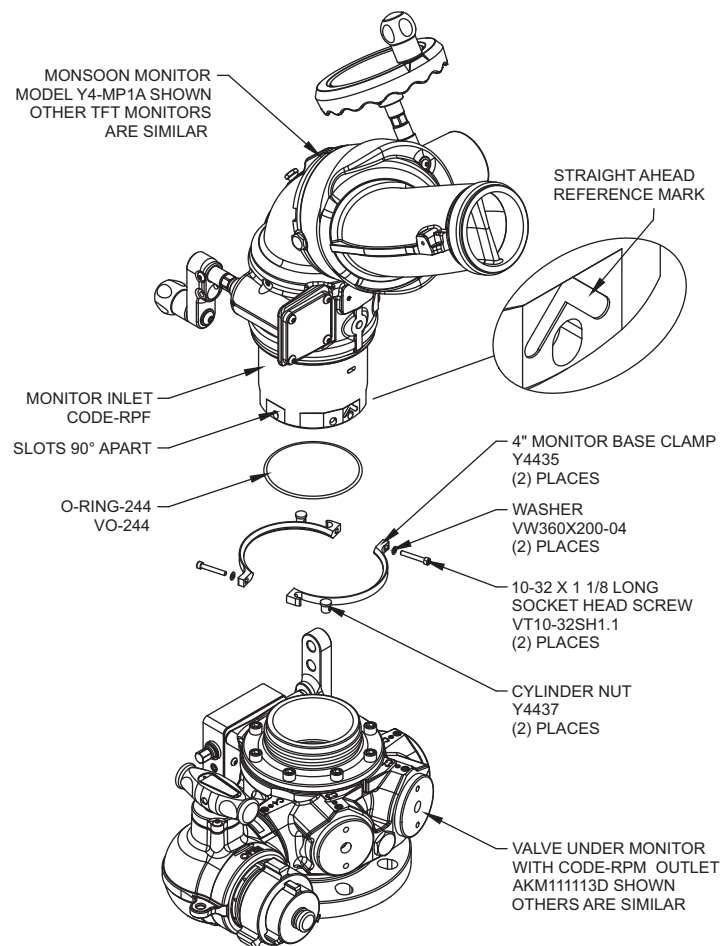


Figure 4.3.1

4.3.2 MOUNTING A MONITOR WITH 4" ANSI 150 OR DN 100 PN16 FLANGE

Verify that the bolt pattern of the VUM outlet flange will allow the desired orientation of the monitor. If alignment is acceptable, proceed to step 5. If alignment is not acceptable, the flange may be rotated using the following steps.

1. Slightly loosen two Screws on Clamps until the outlet flange is able to rotate.
2. Rotate outlet flange as desired.
3. Tighten each Screw gradually until both are finger tight with approximately equal spacing between opposite ends of Clamps.
4. Carefully tighten each Screw one additional turn using a 5/32 hex wrench by alternating to the opposite Screw in half-turn increments.

NOTICE

Over tightening the Screws will damage Screws and Clamp.

5. Install Monitor onto VUM outlet flange using instructions from section 4.2.

4.4 ELECTRONIC INSTALLATION AND WIRING

Red (+) and black (-) wires of the Valve Interface Box must be connected to a 12 or 24 VDC protected circuit from the power distribution center. To control the valve from a TFT RC monitor operator station, the valve's Blue and White communication wires must be connected to the monitor's blue and white wires as described in LIY-500 RC MONITOR ELECTRICAL CONTROLS SUPPLEMENT. [Figure 4.4](#) shows the VUM RC typical interface box connections.

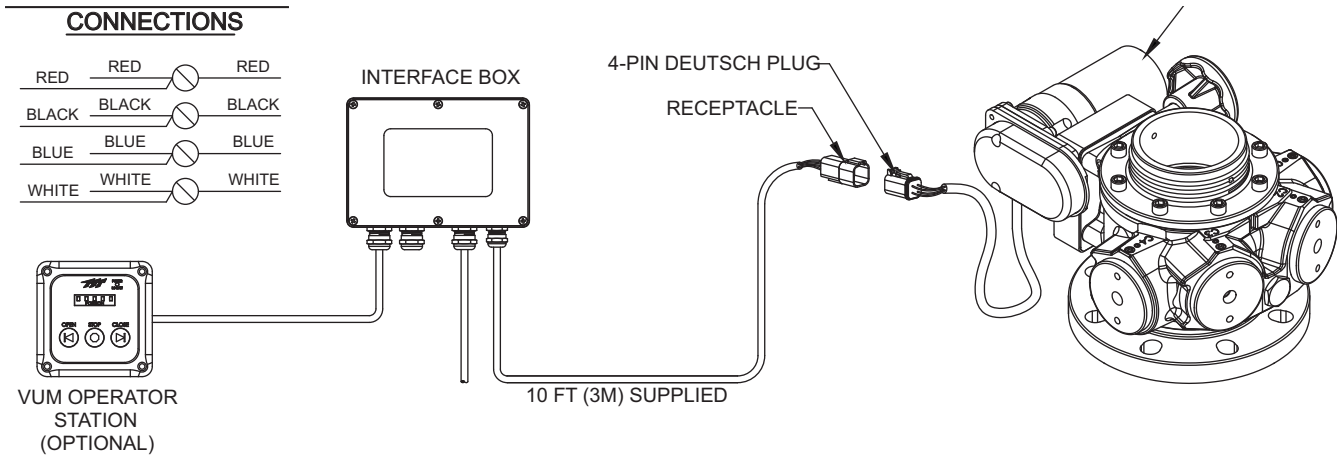


Figure 4.4

NOTICE

To avoid excessive voltage drop at the valve motor, do not lengthen factory supplied receptacle cable. Power cable selection is critical. Voltage supplied to the valve motor should not fall below 10 Volts when the valve is in operation.

NOTICE

In applications where the only valve control will be from a TFT operator station and no feedback relays are required, it is acceptable to install the VUM RC without the valve interface box. The 4-conductor cable with receptacle can be removed from the interface box. The installer must make appropriate connections to a protected circuit and the monitor communication wires, as described above, in a protected enclosure.

NOTICE

Cable is gel filled to prevent moisture wicking into the enclosure. Gel is non-hazardous and should be wiped from conductors with a rag.

4.4.1 INTERFACE ENCLOSURE MOUNTING

Select an enclosure location. The enclosure is designed to be surface mounted and the size is 4-3/4" x 6-3/4" (120 mm x 170 mm). Height of enclosure is 2-1/4" (57 mm). Two tapped holes are included on the back of the enclosure for mounting from behind.

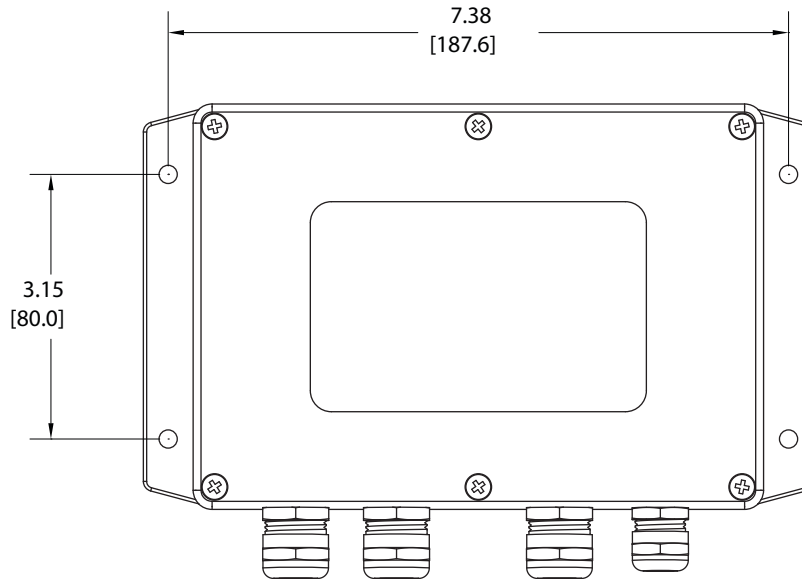


Figure 4.4.1

4.4.2 TESTING THE ELECTRICAL INSTALLATION

VERIFY PROPER VOLTAGE

The TFT Valve Under Monitor RC has built in circuit protection to guard against a circumstance where the unit's movement is blocked before reaching its full travel limits. Without this circuitry the motor would stall, overheat, and could be permanently damaged.



Inadequate voltage can cause the valve to become damaged to the point of inability to properly open or close, resulting in inadequate water supply. Injury or death can occur. To reduce the risk of improper voltage:

- Check wiring for proper gauge for the installed length, and for proper termination.
- Never lengthen factory supplied receptacle cable.
- Ensure that the power source supplying the VUM RC and the grounding are adequate (other electrical loads on a shared circuit with the VUM RC may cause a low-voltage situation).
- ALWAYS test for proper voltage after installation.

VOLTAGE TEST

When mechanical installation and electrical connections are complete, perform the following test to verify voltage supply is adequate and the current limiting feature is functioning.

1. Apply power to Valve Control.
2. Press OPEN or CLOSE button and hold until valve reaches stop position. Continue to hold button down.
3. Once movement is stopped, manually turn override knob in opposite direction while continuing to hold button down. (The override knob will only turn in one direction.
 - A. If knob can be turned, then voltage supply is adequate.
 - B. If knob can't be turned and motor continues to operate, the current limit was not reached because the voltage supply or wiring is not adequate.

SET TRAVEL STOPS

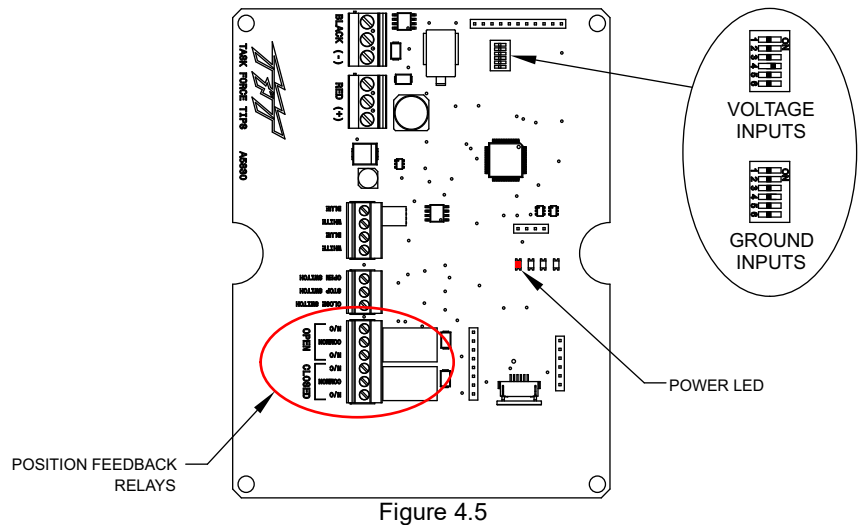
Once proper voltage is verified, perform the following to set the full travel limits:

1. Apply power to Valve Control.
2. Press CLOSE button and continue to hold until valve is fully closed. Motor must stop by current limit method.
 - A. If motor continues to operate, see proper voltage test above.
3. Press OPEN button and continue to hold until valve is fully open. Motor must stop by current limit method.
 - A. If motor continues to operate see proper voltage test above.
4. OPEN/CLOSE input relays will now track valve movement.

4.5 INPUTS SIGNAL CONFIGURATION

The Valve Interface box is shipped from the factory configured to accept +12/24 volt DC input signals, but can be field changed to accept ground input signals. To change configuration:

1. Remove the lid from the box.
2. Locate DIP switches on the A5830 board.
3. Slide DIP switch #4 to the OFF position to select GROUND inputs, or slide to the ON position to select VOLTAGE input.
4. Replace the lid.
 - A. Verify rubber seal is clean and undamaged.
 - B. Verify that no wires are caught between lid and box.



4.6 VALVE POSITION FEEDBACK RELAYS

The Valve Interface Box provides position feedback for the user to indicate which position the valve is in. The position relays are energized when the valve is in the corresponding position. The contact rating of the relay is 1 amp @ 30 VDC for resistive loads and 0.2 amps @ 30 VDC for inductive loads.

The position relays have one dry Form-C contact (common, normally open, normally closed) that can be used. [Figure 4.5](#) shows the terminal blocks available for user wiring.

4.7 AUX BUTTON OPERATION

The VUM RC can be operated from any TFT RC Monitor operator station equipped with AUX 1/AUX 2 buttons. The VUM RC is factory configured to operate from the AUX 2 button, but can be changed to operate from the AUX 1 button. To change AUX button operation:

1. Turn off power.
2. Remove the motor enclosure from the back of motor. NOTE: this will require removing or cutting DO NOT REMOVE label.
3. Slide DIP switch #1 to the desired position.
4. Replace the motor enclosure.
5. Apply Power.

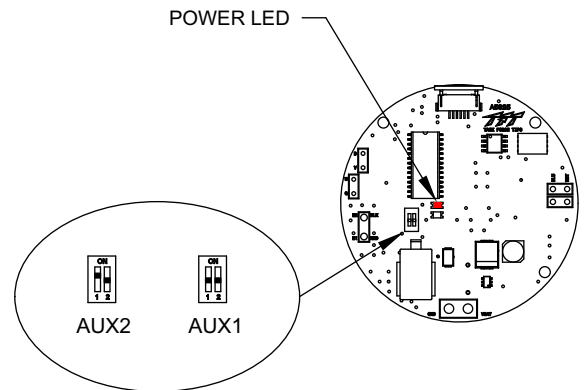


Figure 4.7A

Each VUM RC is shipped with several button overlays with adhesive that can be attached to any RC monitor operator station with an AUX button. If additional overlays are needed, contact the factory. To apply the overlay:

1. Clean operator station surface to remove any oils or residues.
2. Carefully peel off the desired overlay and place on top of AUX button, just inside blue border of button.

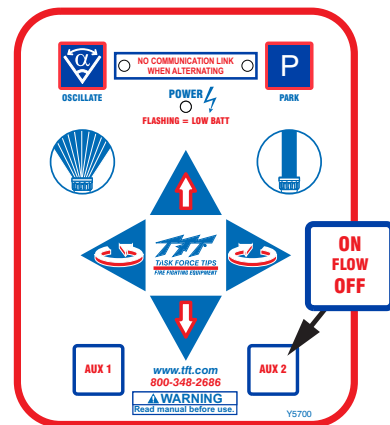


Figure 4.7B

4.8 CHANGING THE CRANK HANDLE TO THE OPPOSITE SIDE OF THE VALVE (MANUAL MODELS)

Side-mounted crank handles are factory configured on the left hand side of the valve. The crank handle can be switched to the right hand side for convenience or if it interferes with other equipment on the apparatus. For greater clearance, the A1623 crank handle subassembly can be substituted for the A1622 subassembly. To move the crank handle to the opposite side of the valve, refer to the steps and graphic below:

1. Remove the retaining ring (1) on the end of the shaft. DO NOT over expand the retaining ring.
2. Pull the shaft (2) out of the gear box.
3. As the shaft is withdrawn, grasp the small key (3) on the shaft so it does not get lost.
4. Remove and switch the two plastic bushings (4 and 5) from the shaft holes in the gearbox.
 - A. The O-rings (6) typically remain in the gearbox, however should be slid back into the gearbox immediately if they slide out with the bushings.
5. Reinstall the bushings on opposite sides of the gearbox. The smaller bushing with the groove on the outside diameter (4) must be installed on the same side as the crank handle.
6. Apply a small dab of grease to the key and insert it into slot on the shaft. The purpose of the grease is to prevent the key from falling out of the shaft.
7. Look through the gear box bore to observe the orientations of the notch in the thrust washer (gold color) and the keyway in the worm (silver color) inside the gear box.
8. Slide the shaft into the gearbox with the key oriented the same as the notch in the thrust washer.
9. Rotate the shaft until the key finds both the notch and the keyway, then continue to slide the shaft until the hex flats protrude from the larger bushing. The retaining ring groove should be exposed near the hex flats.
10. Reinstall the retaining ring in the square shouldered groove. Do not over expand the retaining ring.

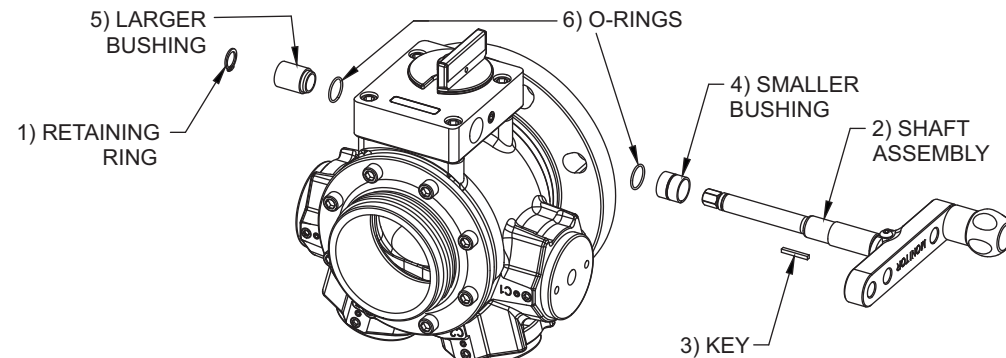


Figure 4.8

4.9 CHANGING THE CRANK HANDLE TO THE OPPOSITE SIDE OF THE VALVE (RC MODELS)

1. Remove screws and end cover (1).
2. Slide off both sprockets and chain (2) as one unit.
3. Remove button head screw and lock washer (3) to remove motor unit.
4. Remove set screw (4) from opposite side of gearbox and reinstall it with blue thread locker in the hole where the motor unit was mounted. The set screw plugs the hole to keep dirt from entering the gearbox.
5. Remove 4 screws (5) and reposition motor so electric wire points in desired direction.
6. Change handwheel (6) to other side as in [section 4.8](#).
7. Reverse steps 1, 2, and 3 to reinstall motor on other side. Apply Loctite #242 (blue) the screw threads and replace the 4 screws.
8. Reverse polarity (direction) of motor by applying power and holding OPEN & CLOSE buttons or activating OPEN & CLOSE inputs simultaneously for 15 seconds. Cycle power to unit.

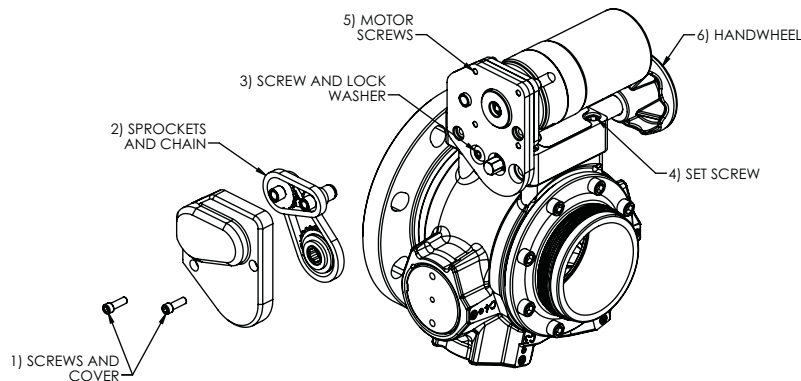


Figure 4.9

4.10 SHAFT EXTENSION FOR HANDWHEEL OR CRANK HANDLE

To avoid obstructions or enhance usability, the A1037-KIT shaft extension kit is available for use on both handwheels and crank handles. This kit relocates the handwheel or crank handle 5" further from the gearbox. A1037-KIT adds 0.3 lb (0.14 kg) to the weight of the valve assembly.

If further extension is desired, two standard extensions or a custom length extension may be used, with the addition of a support collar to prevent damage to the shaft and gearbox components. Support collars and/or custom length shafts may be constructed based on the dimensions in the figure below. It is recommended that the support collar constrains the smaller 3/4" end of the extension. The 11/16" hex flats are not necessary for custom shafts.

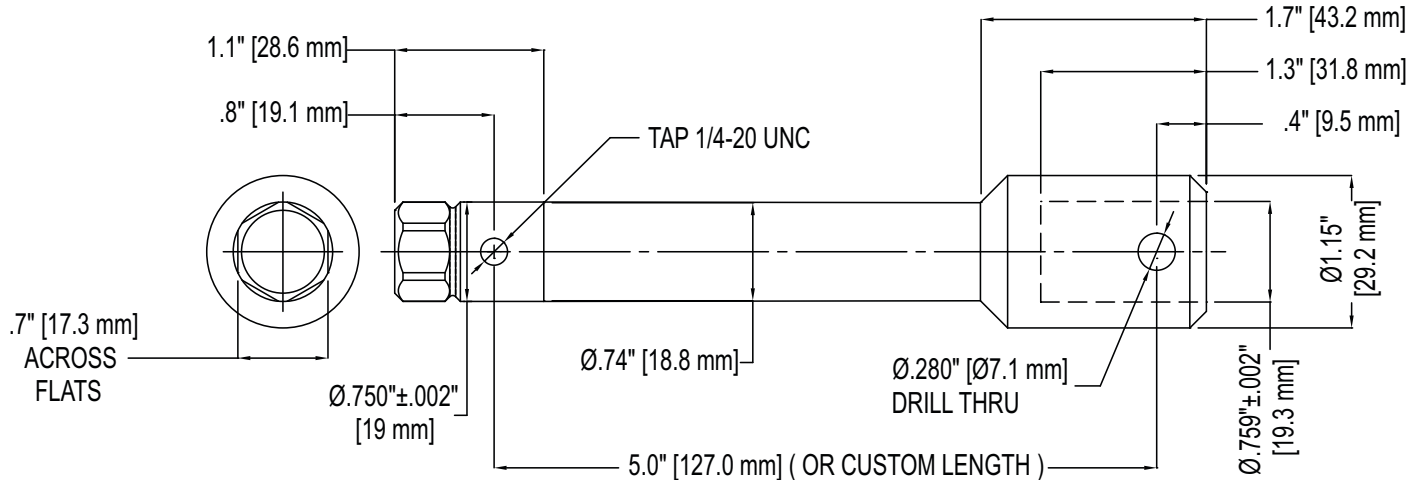


Figure 4.10

4.11 CHANGING THE OFFSET OF THE COMPACT CRANK HANDLE

A compact crank handle is installed by default on the parallel shaft gearbox. It is also available separately as A1623-KIT, which is compatible with the worm drive gearbox and shaft extension kit. A1623-KIT reduces the assembly weight by 0.21 lb (0.10 kg) versus the standard T-shaped crank handle.

The A1623-KIT compact crank handle includes two offset positions to adjust the swing radius of the crank and knob. The longer offset position offers reduced effort to operate the valve. The shorter offset position can be used to avoid interference with other equipment on the apparatus. To change the offset:

1. Remove two 1/4"-20 x 1/2" long button head cap screws from the crank.
2. Place crank in desired position.
3. Apply Loctite #242 (blue) to screw threads and replace the screws.

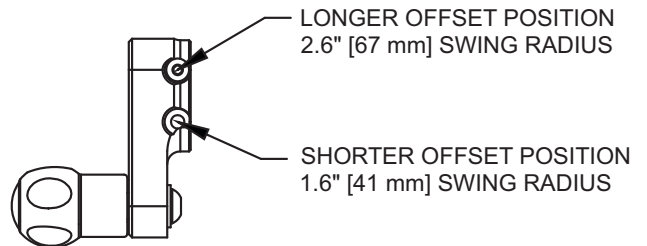
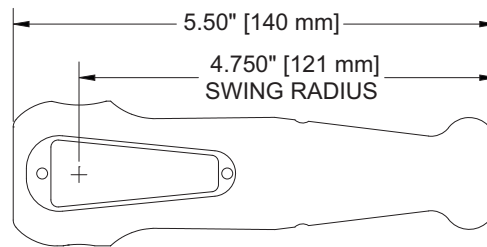


Figure 4.11

4.12 ALUMINUM HANDLE KITS FOR 2.5" GATED ELBOWS AND STRAIGHT HYDRANT VALVES

An aluminum handle option is available for the 2.5" Gated Elbows and Straight Hydrant Valves. This kit is supplied with a 5/16-18 x 1" long socket head cap screw and a packet of Loctite #242 (blue) to secure the handle.

The **AY321-KIT Long Handle** provides greater mechanical advantage, however the longer swing radius may result in interference with certain combinations of monitor and/or apparatus. The Long Handle is installed by default when the quick connect outlet (option Q) is specified on side B. The AY321-KIT adds 0.2 lb (0.09 kg).



AY321-KIT

Figure 4.12

4.13 RECONFIGURING AUXILIARY PORTS

If re-configuration is necessary, auxiliary port options can be exchanged by removing 46 ball bearings through the 1/4"-28 set screw hole (A). It is not necessary to dismount the entire VUM if a high-flow vacuum source is available. A 2 hp shop vacuum with a small nozzle is adequate.

1. Loosen the 3/8"-16 dog point set screw (B).
2. Remove 1/4"-28 set screw (A).
3. While applying vacuum to the set screw hole (A), twist the auxiliary device in either direction to help free the ball bearings.

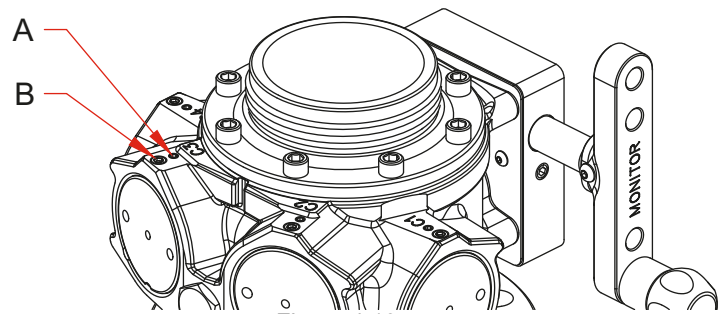


Figure 4.13

If desired, gated elbows are able to pivot, reducing the likelihood and severity of hose kinks. This is accomplished by keeping the 3/8"-16 dog point screw disengaged.

When attached directly to ports C1-C4 (options 2 and 3 in section 3.5.5), pivot range is limited to $\pm 22.5^\circ$ by a spring pin to prevent interference between the monitor and hoses attached to the gated elbow.

When attached to an extension pipe (options B and C in section 3.3.5), no spring pin is installed and 360° rotation is possible.

Rotation can be locked to any of 8 indexed positions by engaging the 3/8"-16 dog point set screw (B in Figure 4.13 above).

4.13.1 RECONFIGURING BLIND CAP, GAUGE, AND VENT (AUTO DRAIN VALVE)

If re-configuration is necessary, auxiliary port options: blind cap, gauge, and vent (auto drain valve) can be changed by using the following procedure. It is not necessary to dismount the VUM if an air source is available. An air hose with a small nozzle is adequate.

1. Loosen 3/8"-16 dog point set screw (B).
2. Remove 1/4"-28 set screw (A).
3. Align ball removal port in auxiliary port option with ball removal port in VUM (C).
4. There are 46 ball bearings per each auxiliary port. Rotate auxiliary port back and forth while applying air to blow the balls out (A).
5. Once all ball bearings are removed from auxiliary port, remove auxiliary port option from VUM.

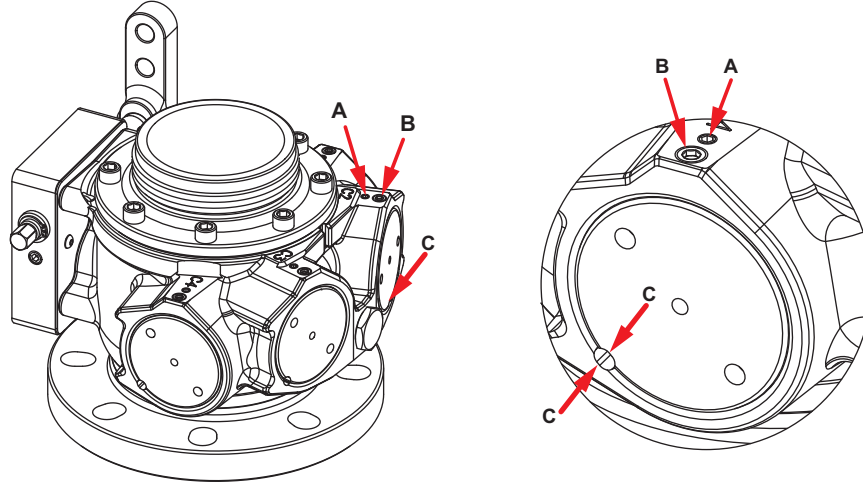


Figure 4.13.1

5.0 USE

5.1 VALVE OPERATION AND POSITION INDICATOR

To open the valve, turn the handwheel or crank handle until the pointer indicates "OPEN".

To close the valve, turn the handwheel or crank handle the opposite direction until the pointer indicates "CLOSED".

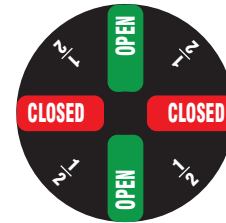


Figure 5.1

5.2 VUM RC MANUAL OVERRIDE

The VUM RC is motor driven but also has an override handwheel for operating the valve manually. The override handwheel may also be used in the event of power failure. If electrical power is supplied to the control panel, the LED valve position display will track the valve's position as the knob is moved. If the knob is moved while there is no power to the electric controls, the LED valve position display will be in error when the electric power is reconnected. The LED valve position indicator will self correct the first time the valve is cycled under electric control.

If more compactness is desired, the override knob may be removed. The drive shaft has a hex so a wrench or socket may be used for manual override. If the manual override knob is removed, assure that the correct size wrench or socket is available in the event of power failure.

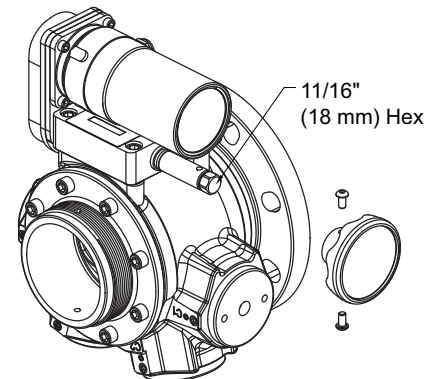


Figure 5.2

5.3 ELECTRIC REMOTE CONTROL OPERATION

Power LED:

- LED will be solid green when power is present.
- Flashing green LED indicates low voltage.

Changing Modes (Unit is shipped from factory in the Automatic Mode):

- Activate CLOSE and STOP inputs together for 3 seconds to change to Automatic Mode.
- Activate OPEN and STOP inputs together for 3 seconds to change to Manual Mode.

Manual Mode – not connected to TFT RC monitor:

- Activating OPEN input will cause valve to open.
- Deactivating OPEN input will cause valve to stop.
- Activating CLOSE input will cause valve to close.
- Deactivating CLOSE input will cause valve to stop.
- STOP input is not applicable in Manual Mode.

Manual Mode – when connected to TFT RC monitor:

- Activating AUX2 signal or OPEN input will cause valve to open.
- Deactivating AUX2 signal or OPEN input will automatically cause valve to close.

Automatic Mode – not connected to TFT RC monitor:

- Activating OPEN input (momentarily) will cause valve to travel to full open position.
- Activating CLOSE input (momentarily) will cause valve to travel to full close position.
- Activating STOP input while valve is moving will stop valve.

Automatic Mode – when connected to TFT RC monitor:

- Activating AUX2 signal will cause full travel. If valve was open, it will move closed and vice-versa.
- Activating AUX2 signal while valve is moving will cause valve to stop momentarily, then reverse direction to full travel.
- Activating OPEN input will cause valve to travel to full open position.
- Activating CLOSE input will cause valve to travel to full close position.
- Activating STOP input while valve is moving will stop valve.

5.4 DRAINING RESIDUAL WATER



Equipment may be damaged if frozen while containing significant amounts of water. Such damage may be difficult to detect visually. Subsequent pressurization can lead to injury or death. Any time the equipment is subject to possible damage due to freezing, it must be tested and approved for use by qualified personnel before being considered safe for use.

The automatic water drain valve allows the monitor and valve body to drain fully after the half ball is closed, thus minimizing susceptibility to damage from corrosion and freezing water. The drain valve is designed to close automatically when pressure exceeds 5 psi. When pressure drops below 5 psi, the drain valve will open. This is dependent on proper assembly, which should be verified visually and functionally prior to fire ground use. Two types of automatic water drain valves are available.

5.4.1 EXTERNAL DRAIN VALVE

The external type of drain valve may be specified in one of the four auxiliary ports. It is ideal for installations in which the VUM is installed in a horizontal or angled pipe. By choosing the appropriate downward facing auxiliary port, the drain valve can discharge towards the ground to remove as much water as possible from the valve body. In orientations where the monitor shape does not allow full drainage through the half ball, it may be beneficial to specify both the internal and external drain valve types to avoid pockets of water getting trapped and frozen.

5.4.2 INTERNAL DRAIN VALVE

The internal type of drain valve is located within the center of the half ball. It is ideal for installations in which the VUM is installed on a vertical pipe, and allows water from the monitor and valve body to drain into the pipe rather than draining on the ground.

5.4.3 USE ON TELESCOPING WATERWAYS (AERIAL APPARATUS)

The standard internal automatic drain valve assists draining and retracting of telescoping waterways. The internal automatic drain valve is only functional after pressure has been relieved from the waterway and will not serve as a pressure relief valve under any circumstances.

After pressure has been fully relieved to less than 5 psi, the internal drain valve allows water and atmospheric air to backflow through the monitor and VUM to drain the waterway, even if the VUM remains closed. Then, the internal drain valve allows air to vent out to the atmosphere as the waterway is retracted.

If the internal drain valve is not included, then the VUM must be opened prior to draining and retracting the waterway. Otherwise, damage to the waterway may occur if no other atmospheric vent orifice is present.

5.4.3.1 CONFIGURING THE INTERNAL AUTOMATIC DRAIN

When the automatic drain valve function is not desired, it may be disabled. This does not prevent the drain valve from being enabled in the future if desired, follow the steps below:

1. Remove the screw and washer from inside of half ball (index 4 & 5).
2. **To disable**, flip rubber drain valve (index 3) so that raised edge is against flat face of half ball.
3. **To enable**, flip rubber drain valve (index 3) so that raised edge is away from flat face of half ball.
4. Apply Loctite #242 (blue) to screw threads.
5. Reassemble the washer and screw against the rubber drain valve.

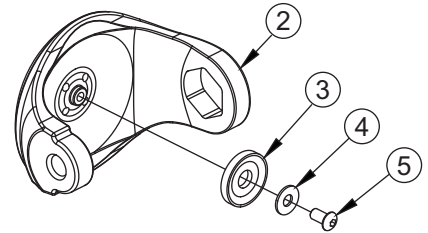


Figure 5.4.3.1

NOTICE

Included automatic drain valves may result in an air leak during a vacuum test of the aerial waterway, even if the automatic drain function has been disabled per 5.4.3.1.

- For VUMs with an internal drain only, the vacuum test can be completed by installing a cap on the outlet of the monitor.
- For VUMs with an external drain, it will also be necessary to move the rubber drain valve to the exterior of the blind plug, with the raised edge of the rubber drain valve against the flat face of the blind plug.

5.5 PRESSURE RELIEF VALVE

The optional pressure relief valve can be set to any pressure between 90 and 300 psi. Its function is to protect the pump, aerial waterway, and/or supply hose from excess pressure. Typical performance at various pressures is shown in the graph below. The relief valve may be rotated so its discharge slots face in the desired direction by disengaging and reengaging the 3/8"-16 dog point screw according to the instructions in [section 4.13](#).

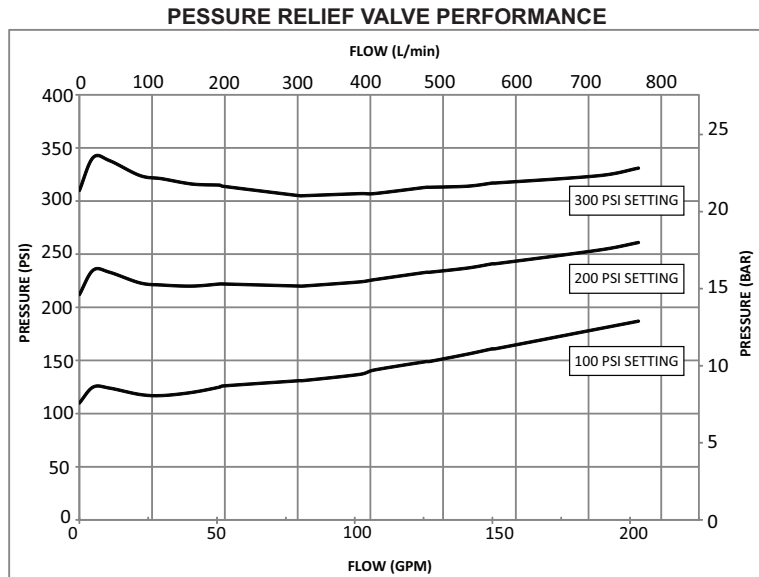


Figure 5.5

5.5.1 SETTING THE PRESSURE RELIEF VALVE



WARNING The Pressure Relief Valve is disabled in the OFF position and offers no system protection against over-pressurization. Avoid water hammer or other pressure spikes during pump tests. Ensure PRV is returned to its normal pressure setting following pump testing.



WARNING The Pressure Relief Valve will open to relieve excess pressure but it may not have enough flow capacity to protect against large pressure spikes such as those caused by water hammer. Excess pressure can cause equipment failure and directly or indirectly lead to injury or death. Always operate valves slowly to avoid the risk of water hammer.

To set the relief valve pressure, turn the adjusting screw on the relief valve housing until the surface of the screw is even with the desired pressure. Do not cap or plug discharge opening.

To turn off the Pressure Relief Valve, align the adjusting screw with the OFF position. Placing the Pressure Relief Valve in the OFF position, prevents the valve from venting water.

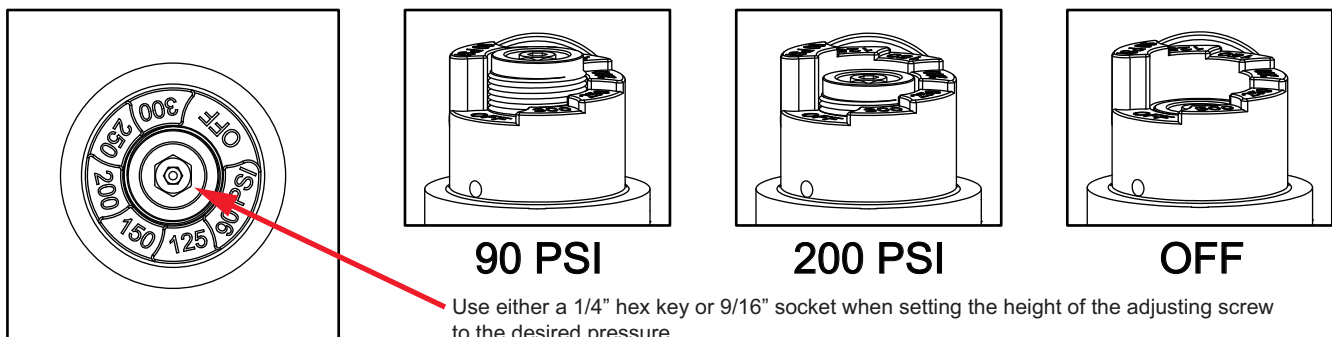


Figure 5.5.1

6.0 PRESSURE LOSS

The flow coefficients and graph below apply to all models of the Valve Under Monitor. Data shown is for flow path from the VUM inlet to the specified outlet only and does not include monitor, nozzle or hose pressure losses.

The Cv flow coefficients below are calculated according to the formula:

$$C_v = \frac{Q}{\sqrt{\Delta P}}$$

Where:

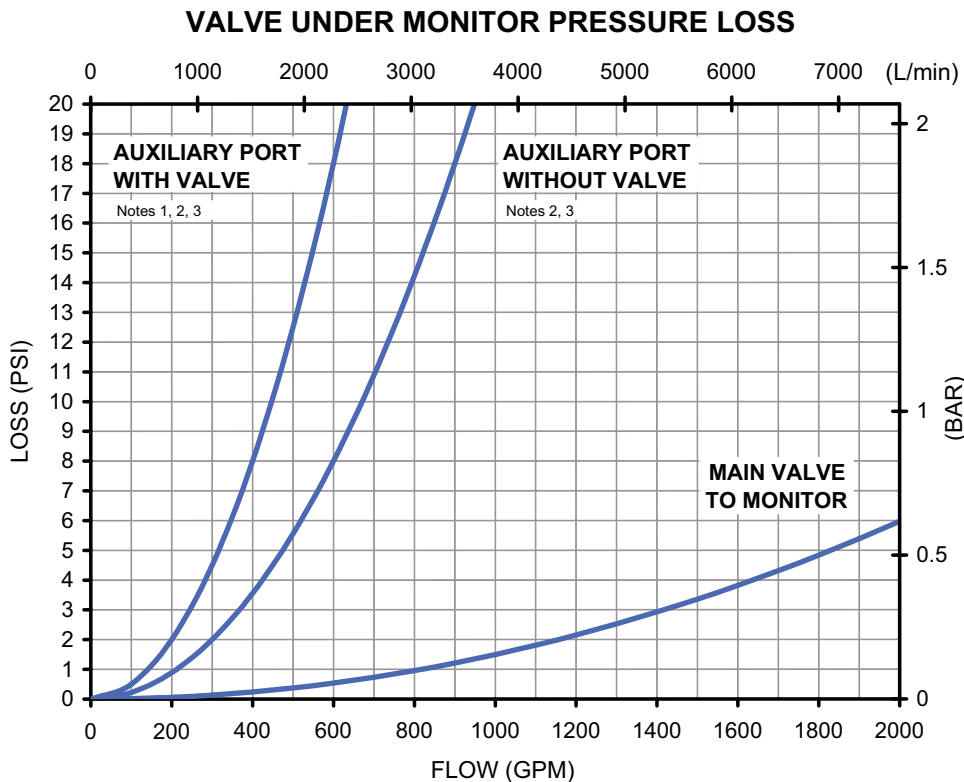
- C_v = flow coefficient
- for the main valve to the monitor - **815**
 - for an aux. port with a 2.5" gated elbow installed (options 2, 3, B, and C) - **141**
 - for and aux port with a 2.5" straight valve installed (options 4 and D) - **153**
 - for and aux port with no valve installed (options 5, 6, E, and F) - **212**

Q = flow rate in gpm

ΔP = pressure loss in psi across valve
(water only)

To calculate pressure loss for a given flow rate, this formula can be rearranged as:

$$\Delta P = \frac{Q^2}{C_v^2}$$



NOTES:

- 1) Curve represents auxiliary port options 2 and 3 (gated elbows). Pressure loss for auxiliary port option 4 (straight hydrant valve) is about 15% less than indicated.
- 2) When valve to monitor is open, pressure loss through auxiliary ports C3 and C4 may be up to 50% greater than indicated. Auxiliary ports C1 and C2 are not affected by this condition.
- 3) Extension pipes (auxiliary port options B through F) do not add significant pressure loss.

Figure 6.0

7.0 WARRANTY

Task Force Tips LLC, 3701 Innovation Way, Valparaiso, Indiana 46383-9327 USA ("TFT") warrants to the original purchaser of its products ("equipment"), and to anyone to whom it is transferred, that the equipment shall be free from defects in material and workmanship during the five (5) year period from the date of purchase for mechanical components, and the two (2) year period from the date of purchase for electrical components. TFT's obligation under this warranty is specifically limited to replacing or repairing the equipment (or its parts) which are shown by TFT's examination to be in a defective condition attributable to TFT. To qualify for this limited warranty, the claimant must return the equipment to TFT, at 3701 Innovation Way, Valparaiso, Indiana 46383-9327 USA, within a reasonable time after discovery of the defect. TFT will examine the equipment. If TFT determines that there is a defect attributable to it, TFT will correct the problem within a reasonable time. If the equipment is covered by this limited warranty, TFT will assume the expenses of repair.

If any defect attributable to TFT under this limited warranty cannot be reasonably cured by repair or replacement, TFT may elect to refund the purchase price of the equipment, less reasonable depreciation, in complete discharge of its obligations under this limited warranty. If TFT makes this election, claimant shall return the equipment to TFT free and clear of any liens and encumbrances.

This is a limited warranty. The original purchaser of the equipment, any person to whom it is transferred, and any person who is an intended or unintended beneficiary of the equipment, shall not be entitled to recover from TFT any consequential or incidental damages for injury to person and/or property resulting from any defective equipment manufactured or assembled by TFT.

It is agreed and understood that the price stated for the equipment is in part consideration for limiting TFT's liability. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above may not apply to you.

TFT shall have no obligation under this limited warranty if the equipment is, or has been, misused or neglected (including failure to provide reasonable maintenance) or if there have been accidents to the equipment or if it has been repaired or altered by someone else.

THIS IS A LIMITED EXPRESS WARRANTY ONLY. TFT EXPRESSLY DISCLAIMS WITH RESPECT TO THE EQUIPMENT ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. THERE IS NO WARRANTY OF ANY NATURE MADE BY TFT BEYOND THAT STATED IN THIS DOCUMENT.

This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

8.0 MAINTENANCE

TFT products are designed and manufactured to be damage resistant and require minimal maintenance. However, as the primary firefighting tool upon which your life depends, it should be treated accordingly. The unit should be kept clean and free of dirt by rinsing with water after each use. Any inoperable or damaged parts should be repaired or replaced before placing the unit in service. To help prevent mechanical damage, do not drop or throw equipment.

In applications where appliances are left continuously connected to the apparatus or other devices or are used where water is trapped inside the appliance, the appliance must be flushed with fresh water following each use and inspected for damage.

This appliance should be disconnected, cleaned and visually inspected inside and out at least quarterly, or as water quality and use may require. Moving parts such as handles, valve ball and couplings should be checked for smooth and free operation. Seals shall be greased as needed with Silicone based grease such as Molykote 112. Any scrapes that expose bare aluminum should be cleaned and touched up with enamel paint such as Rust-Oleum. Replace any missing or damaged parts before returning to service.

Any equipment taken out of service due to failure should be returned to the factory for repair or replacement. If you have any questions regarding the testing or maintenance of your valve, please call Task Force Tips at 800-348-2686.

8.1 SERVICE TESTING

In accordance with NFPA 1962, equipment must be tested a minimum of annually. Units failing any part of this test must be removed from service, repaired and retested upon completion of the repair.

8.2 TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	REMEDY
Leaks	Debris or damage in seal area	Clean out debris and/or replace damaged parts
Binding, Erratic Operation	Low voltage (see below)	See Below
Power LED on but no operation	Low voltage due to: <ul style="list-style-type: none">• wire gauge too small• wire length too long• poor connection• inadequate apparatus electrical system	Check connections and wiring See Section 4.3.2 on page 16.
LED D6 on motor board blinks rapidly when button is pressed	Bad motor encoder	Replace motor subassembly
No power LED	Polarity reversed or poor connection	Check wiring and correct polarity
Valve operates from the valve control but not from RC monitor operator stations	Incorrect communication wiring	Check Blue and White communication wiring

Table 8.2

8.3 REPAIR

Factory service is available. Factory serviced equipment is repaired by experienced technicians, wet tested to original specifications, and promptly returned. Call TFT service department at 1-800-348-2686 to troubleshoot and, if needed, directions for return. A return for service form can also be obtained at tft.com/Support/Returning-an-Item-for-Service.

Repair parts and service procedures are available for those wishing to perform their own repairs. Task Force Tips assumes no liability for damage to equipment or injury to personnel that is a result of user service. Contact the factory or visit the web site at tft.com for parts lists, exploded views, test procedures and troubleshooting guides.

Performance tests shall be conducted on the equipment after a repair, or anytime a problem is reported to verify operation in accordance with TFT test procedures. Consult factory for the procedure that corresponds to the model and serial number of the equipment. Any equipment which fails the related test criteria should be removed from service immediately. Troubleshooting guides are available with each test procedure or equipment can be returned to the factory for service and testing.



It is the responsibility of service technicians to ensure the use of appropriate protective clothing and equipment. The chosen protective clothing and equipment must provide protection from potential hazards users may encounter while servicing equipment. Requirements for protective clothing and equipment are determined by the Authority Having Jurisdiction (AHJ).



Any alterations to the product or its markings could diminish safety and constitutes a misuse of this product.



All replacement parts must be obtained from the manufacturer to assure proper performance and operation of the device.

8.4 CRANKSHAFT OVERRIDE AND REPLACEMENT

The crankshaft includes an intentional shear joint to protect the gear train from overload, costly repairs and loss of service. The magnitude of torque required to shear the crankshaft is several times greater than the torque typically needed to operate the valve at maximum operating pressure. If the crankshaft breaks during use, this is an indication that either there is something obstructing the half ball internally or the crank shaft has been abused (e.g. used as a step for climbing).

8.4.1 EMERGENCY CRANKSHAFT OVERRIDE

In an emergency, the opposite side of the crankshaft can be turned using a 1/2" wrench or hex socket. This allows the valve to be opened or closed until the crankshaft is replaced. To prevent loss of the 1/8" square key on the crankshaft, do not allow the crankshaft to slide out of gearbox until a replacement crankshaft is on hand. It is important not to rely on the emergency override as a long-term method of operation.

8.4.2 DIAGNOSING MAIN VALVE CRANKSHAFT FAILURE

To determine the cause of a crankshaft to failure, complete the following steps:

1. Close the upstream water supply. If possible, relieve pressure leading up to the valve.
2. Locate 1/2" hex where crankshaft protrudes from opposite side of gearbox. For VUM RC models, it will be necessary to remove the chain cover using a 3/16" hex key, then remove the chain and sprockets.
3. Gently turn crank shaft away from travel stop using a 1/2" hex wrench. To prevent further damage, do not strike the wrench with a hammering action and do not exceed 50 ft-lb (68 N·m) of torque.
4. **If crankshaft will not rotate**, the half ball is likely obstructed. Only after relieving pressure on flanged joint, unbolt valve. Clear any obstructions and evaluate whether repair is needed before returning to service.
5. **If crankshaft is able to rotate**, cycle the valve several times from open to closed to determine whether the crankshaft binds at any place between the travel stops. If crankshaft binds, consult Task Force Tips Service Department to determine the appropriate repairs.
6. **If crankshaft rotates freely after clearing any obstructions**, a replacement crank shaft may be ordered from Task Force Tips and replaced as described below.

8.4.3 MAIN VALVE CRANKSHAFT REPLACEMENT

A broken crankshaft can be replaced at any time by completing the following steps, regardless of whether or not the upstream water supply is pressurized. To replace a broken crankshaft, follow the steps below:

1. Remove external retaining ring (item 118) adjacent to 1/2" hex on crankshaft. Do not over-expand the retaining ring.
2. Using a punch or Phillips head screwdriver at least 6" in length, gently push on dimple in 1/2" hex end of crankshaft (item 131). Continue to push crankshaft through until it protrudes from opposite side of gearbox.
3. Grab broken end of crankshaft and pull out of gearbox. As crankshaft is withdrawn, grasp small key (item 119) on shaft so it does not get lost.
 - A. If 1/8" square x 1" long key is not visible in shaft, it has likely fallen into gearbox bore and must be removed before installing new crankshaft. If square key is visible in gearbox bore, slide it out of bore. Needle-nose pliers may be helpful, depending on position of key in bore.
4. Verify polymer bushings (item 117 and 120) are still seated in bores on each side of gearbox. If not, locate and reinstall bushings.
5. Look through gearbox bore and note approximate orientation of square keyway in worm (item 115). Verify round notch in thrust washer (item 116) is aligned with square keyway in worm.
6. Prepare new crankshaft by applying small dab of grease to keyway and seating 1/8" square x 1" long key into keyway. Grease will keep key in place during assembly.
7. Slide shaft into gearbox with key orientation the same as keyway in worm.
8. Rotate shaft slightly in alternating directions until key finds keyway, then push shaft in until it stops. Retaining ring groove and 1/2" hex should be protruding through opposite side of gearbox.
 - A. If hex is not visible, it may be necessary to slide polymer bushing (item 117) back into gearbox bore.
9. Install retaining ring (item 118) onto shaft. Do not over-expand the retaining ring.

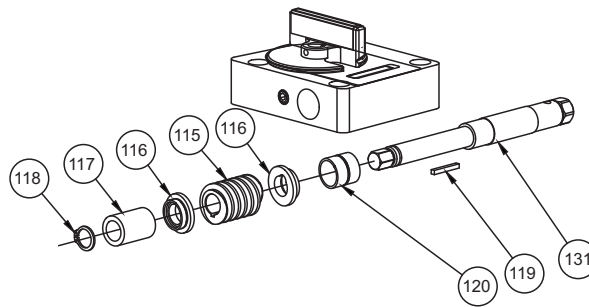


Figure 8.4.3

8.4.4 VALVE SEAT REPLACEMENT

Valve seats may be replaced in the field if it becomes a source of leakage due to harsh environmental conditions or excessive age. For the valve seats in the 2.5" hydrant valve and gated elbow options, see LIA-355. To replace the main valve seat:

1. Close upstream water supply and relieve pressure leading up to valve.
2. Remove the monitor from the VUM, then remove the Side B Outlet Adapter. This procedure varies depending on connection type.
 - A. For models with a 4"ANSI 150 / DN100 PN16 flange (index 19) installed on side B, loosen screws (index 28) using a 5/32" male hex key until two-piece clamp can move freely. Next, unscrew flange from assembly.
3. For all models, remove (8) Socket Head Cap Screws (index 27) from Side B Outlet Adapter (index 20 through 26) using a 5/16" male hex key.
4. Remove Side B Outlet Adapter.
5. Pull old Valve Seat (index 9) out of counter-bore in Valve Body (index 1). Observe whether or not there is text "A1520 – NITRILE RUBBER" visible on the wider side (upstream facing side) of the valve seat.
6. If a VUM Outlet Shim (index 10) is also present between Adapter and Valve Body, remove Shim.
7. Clean sealing surfaces of Half Ball, Valve Body, and Side B Outlet Adapter (index 20 through 26). Verify all sealing surfaces are smooth and intact. If significant damage is visible, consult Task Force Tips Service Dept.
8. Apply light coat of silicone based grease such as Molykote 112 to all sealing surfaces of Half Ball, Valve Body, and Side B Outlet Adapter.
9. Open valve so Half Ball is out of the way.
10. Install new Valve Seat (index 9) into counter-bore in valve body with wider side facing the half ball.
11. The VUM Outlet Shim may or may not be needed. Install a new Shim if either of the following conditions are true:
 - A. A Shim was observed in Step 6.
 - B. The text "A1520 – NITRILE RUBBER" was observed on the old Valve Seat in Step 5.
12. Align screw holes of Side B Outlet Adapter with Valve Body in desired orientation, then press firmly on outlet side of Adapter until it slides into inner diameter of Valve Seat.
13. Apply Loctite #242 (blue) to (8) Socket Head Cap Screws (index 27). Install Screws through Adapter into Valve Body, then gradually tighten each Screw three times in the alternating sequence of figure 4.2, stopping at a torque of 180 to 200 in-lbs (15 to 17 ft-lbs).
14. Manually close the valve and observe whether the operator effort is excessive as the valve approaches the CLOSED travel stop. If so, it may be necessary to install the VUM Outlet Shim as described in Step 11.
15. Reinstall the inlet flange of the VUM according to instruction in [section 4.2](#), then restore the water supply to it.
16. Open the valve approximately 10 degrees to bleed air out of the standpipe, then close the valve. Verify that the valve seat does not leak when the valve is closed. It may be helpful to soak up excess water with a sponge or absorbent cloth. If leakage is observed, consult Task Force Tips Service Department.
17. Reinstall monitor according to instructions in [section 4.3](#).

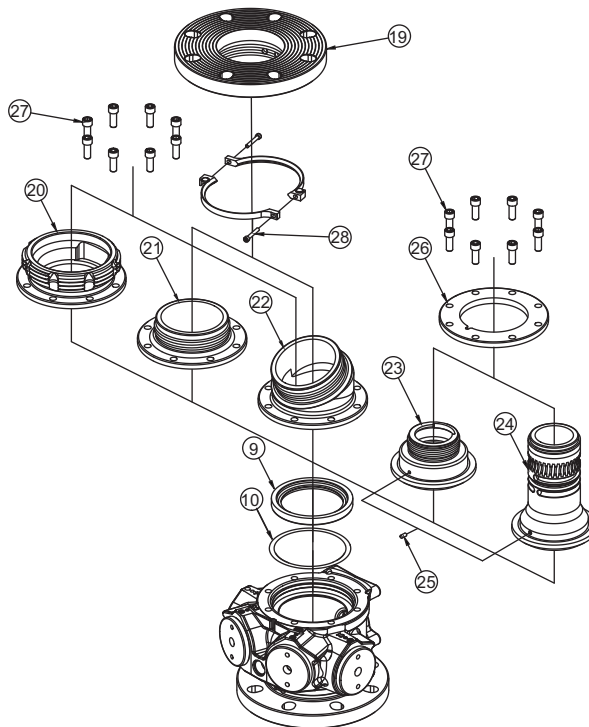


Figure 8.4.4

9.0 EXPLODED VIEW AND PARTS LISTS

Exploded views and part lists are available at tft.com/serial-number.

10.0 OPERATION AND INSPECTION CHECKLIST

BEFORE EACH USE, equipment must be inspected to this checklist:

1. All valves open and close fully and smoothly.
2. Waterway is clear of obstructions.
3. There is no damage to any thread or other connection.
4. All locks and hold-down devices work properly.
5. The pressure setting on the relief valve (if so equipped) is set correctly.
6. Gaskets are in good condition.
7. There is no obvious damage such as missing, broken or loose parts.
8. There is no damage to the appliance (e.g. dents, cracks, corrosion, or other defects that could impair operation).
9. All swiveling elements rotate freely.
10. There is no corrosion on any surface.
11. There are no missing, worn out or broken lugs on couplings.
12. Hose is securely attached.

BEFORE BEING PLACED BACK IN SERVICE, equipment must be inspected to this list:

1. All valves open and close smoothly and fully.
2. The waterway is clear of obstructions.
3. There is no damage to any thread or other type connection.
4. The pressure setting on the relief valve (if so equipped) is set correctly.
5. All locks and hold-down devices work properly.
6. Internal gaskets are in good condition
7. There is no damage to the appliance (e.g., dents, cracks, corrosion, or other defects that could impair operation).
8. All swiveling connections rotate freely.
9. There are no missing parts or components.
10. The marking for maximum operating pressure is visible.
11. There are no missing, broken, or worn lugs on couplings.



Equipment failing any part of the checklist is unsafe for use and must have the problem corrected before use or being placed back into service. Operating equipment that has failed the checklist is a misuse of this equipment.

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