



## TORNADO™ MONITOR SERIES

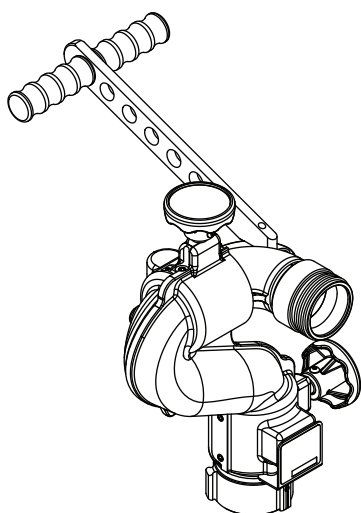
### INSTRUCTION FOR INSTALLATION, OPERATION, AND MAINTENANCE

#### **⚠ DANGER**

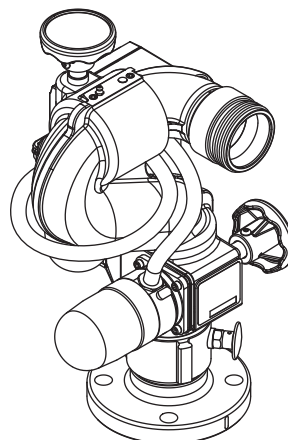
Understand manual before use. Operation of this device without understanding the manual and receiving proper training is a misuse of this equipment. Obtain safety information at [tft.com/serial-number](http://tft.com/serial-number).

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).

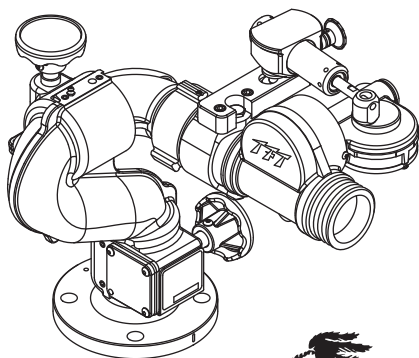
This instruction manual is intended to familiarize firefighters and maintenance personnel with the operation, servicing, and safety procedures associated with this product. This manual should be kept available to all operating and maintenance personnel.



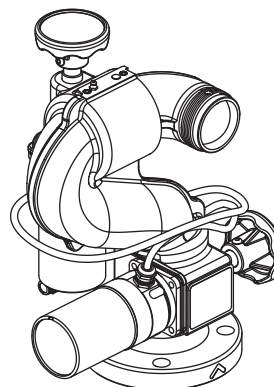
***TORNADO***™



***TORNADO RC***™



***TORNADO OSC***™



***TORNADO LT***™

(see section 3.3) for Flow/Pressure Operations Envelope

**TASK FORCE TIPS LLC**  
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# 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.

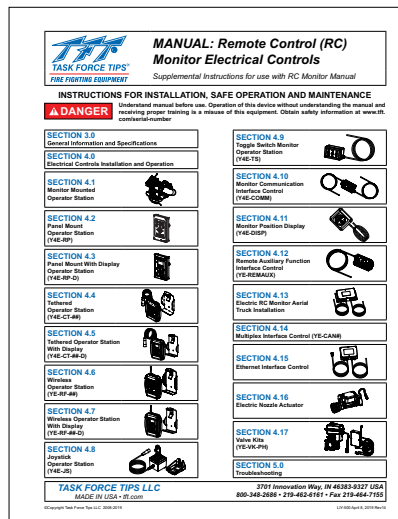
Fire and Emergency Manufacturers and Service Association, Inc.  
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## SUPPORTING MATERIALS

The following document contains supporting safety and operating information pertaining to the equipment described in this 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 MECHANICAL SPECIFICATIONS
  - 3.2 ELECTRICAL SPECIFICATIONS
  - 3.3 OPERATING ENVELOPE
  - 3.4 USE WITH SALT WATER
  - 3.5 VARIOUS MODELS AND TERMS
  - 3.6 INLETS AND OUTLETS
  - 3.7 OVERALL DIMENSIONS
- 4.0 INSTALLATION
  - 4.1 ELECTRICAL INSTALLATION
  - 4.2 STRUCTURAL REQUIREMENTS
  - 4.3 QUICK CONNECT INLET AND TRAVEL RANGES
  - 4.4 TRAVEL STOPS
  - 4.5 NOZZLE INSTALLATION
  - 4.6 PRESSURE GAUGE PORT
  - 4.7 TILLER HANDLE INSTALLATION
  - 4.8 DRAINING RESIDUAL WATER
- 5.0 OPERATING INSTRUCTIONS
  - 5.1 MANUAL (TILLER) MODEL SPRAY TRAJECTORY ADJUSTMENT
  - 5.2 OPERATION OF OSCILLATING MONITORS
    - 5.2.1 HORIZONTAL ROTATION CONTROL
    - 5.2.2 ELEVATION CONTROL
    - 5.2.3 TO ENGAGE THE OSCILLATING MECHANISM
    - 5.2.4 TO DISENGAGE THE OSCILLATING MECHANISM
    - 5.2.5 COVERAGE AREA OF THE OSCILLATING MONITOR
  - 5.3 OPERATION OF RC MODELS
  - 5.4 RECOMMENDED PARK POSITION
  - 5.5 OVERRIDE KNOBS
- 6.0 FLOW CHARACTERISTICS
  - 6.1 STACKED TIPS FLOW AND REACTION
  - 6.2 REACH AND TRAJECTORY
  - 6.3 TORNADO MONITOR AND STREAM STRAIGHTENER FRICTION LOSS
  - 6.4 STREAM STRAIGHTENERS
    - 6.4.1 STREAM STRAIGHTENERS WITH STACKED TIPS
    - 6.4.2 STREAM STRAIGHTENERS WITH FOG NOZZLES
- 7.0 WARRANTY
- 8.0 MAINTENANCE
  - 8.1 SERVICE TESTING
  - 8.2 LUBRICATION
  - 8.3 TROUBLESHOOTING
  - 8.4 REPAIR
- 9.0 EXPLODED VIEWS 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. See flow graphs.



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.



Injury or damage can occur from an inadequately supported monitor. The mounting must be capable of supporting the nozzle reaction force which can be as high as 1500 lbs.



The stream exiting a nozzle is very powerful and capable of causing injury and property damage. Make sure the nozzle is securely attached and pointing in a safe direction before water is turned on. Do not direct water stream to cause injury or damage to persons or property.



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.



On many vehicle installations, the monitor is the highest point on the apparatus. Damage or injury could occur if there is not sufficient clearance to safely pass under doors or overhead obstructions. Always check stowed position of the monitor before moving.



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

### 3.0 GENERAL INFORMATION

The Tornado monitor is a 2 ¼ inch waterway, 500 gpm maximum monitor. It is available in several configurations including manually operated, electric remote or joystick controlled, and hydraulically oscillating versions.

### 3.1 MECHANICAL SPECIFICATIONS

	MANUAL		ELECTRIC		OSC	
	US	METRIC	US	METRIC	US	METRIC
Weight	12 lbs	5.5 kg	25 lbs	11.4 kg	27 lbs	12.2 kg
Minimum Flow Area	8.3 in <sup>2</sup>	24.5 cm <sup>2</sup>	8.3 in <sup>2</sup>	24.5 cm <sup>2</sup>	8.3 in <sup>2</sup>	24.5 cm <sup>2</sup>
Maximum Flow	500 gpm	1900 L/min	500 gpm	1900 L/min	500 gpm	1900 L/min
Maximum Operating Pressure	200 psi	14 bar	200 psi	14 bar	200 psi	14 bar
Operating Temperature Range of Fluid	33°F to 120°F / 1°C to 50°C					
Storage Temperature Range	-40 to 150°F / -40 to 65°C					
Materials	ANSI A356.0-T6 Aluminum, Stainless, Nylon					

Figure 3.1

### 3.2 ELECTRICAL SPECIFICATIONS

Nominal Operating Voltage	12 or 24 VDC	
Maximum Voltage	32 VDC	
Maximum Torque (Elevation)	35 ft·lbs	50 N·m
Maximum Torque (Horizontal)	35 ft·lbs	50 N·m
Speed (Elevation)	25 deg/sec	
Speed (Horizontal)	25 deg/sec	

Figure 3.2

Further specifications for Tornado RC models are shown in the Remote Control (RC) Monitor Electrical Controls Supplemental Instructions (LIY-500).

### 3.3 OPERATING ENVELOPE



Damage or injury could result from operating the monitor beyond the safe operating envelope. Do not operate the monitor outside the envelope in the following graph(s).

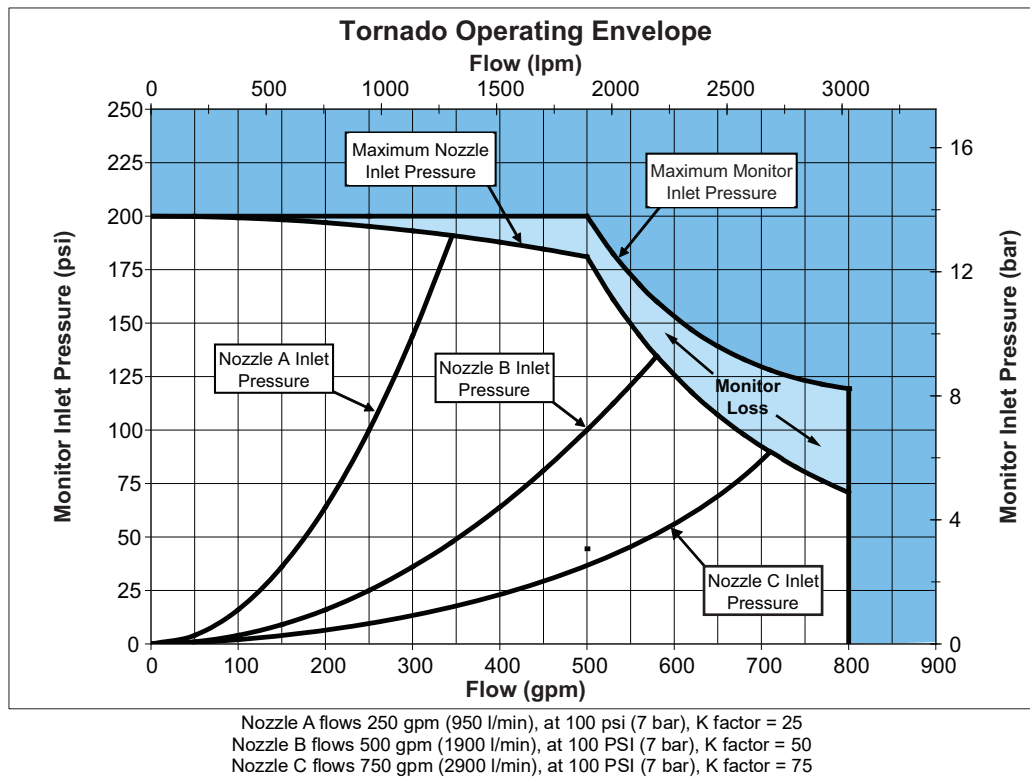


Figure 3.3A

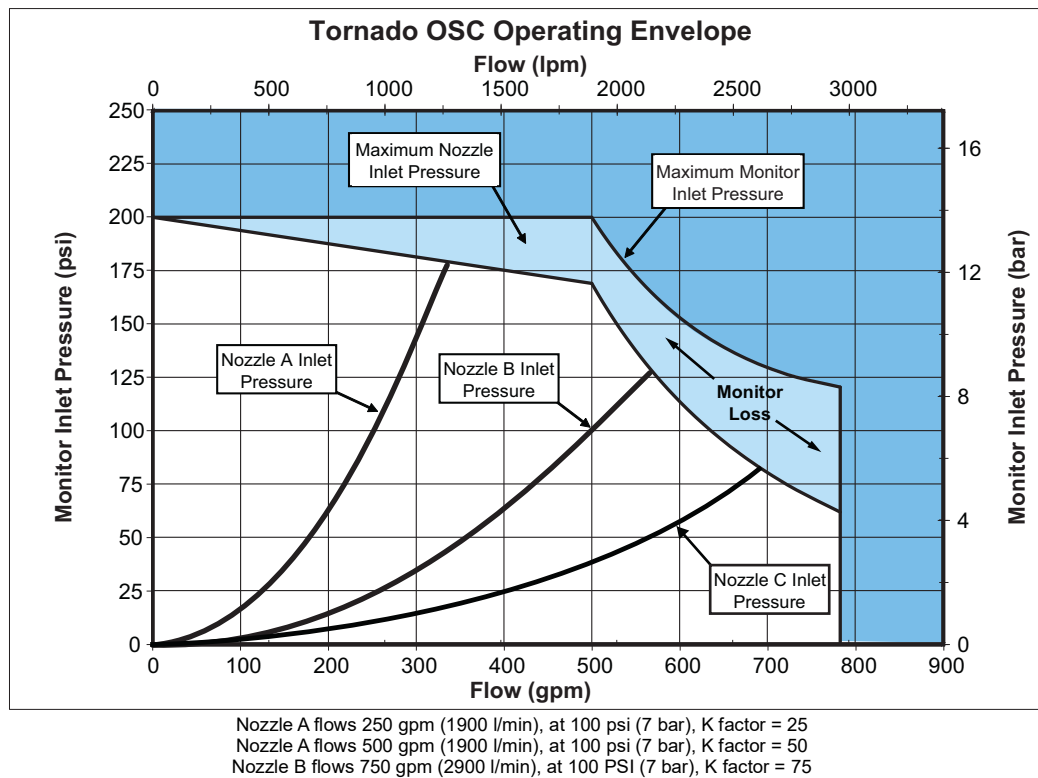


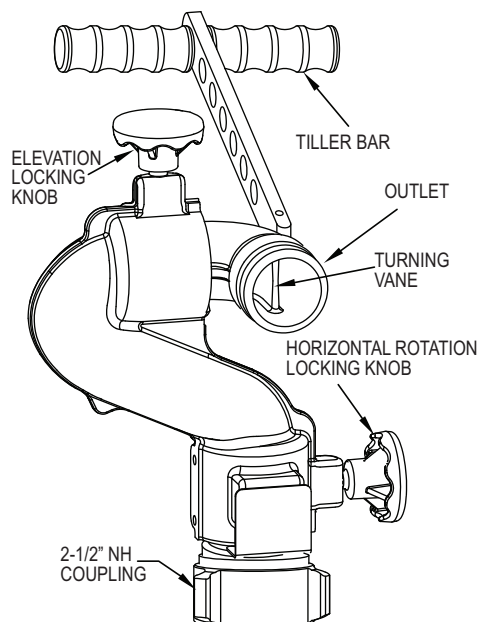
Figure 3.3B

### 3.4 USE WITH SALT WATER

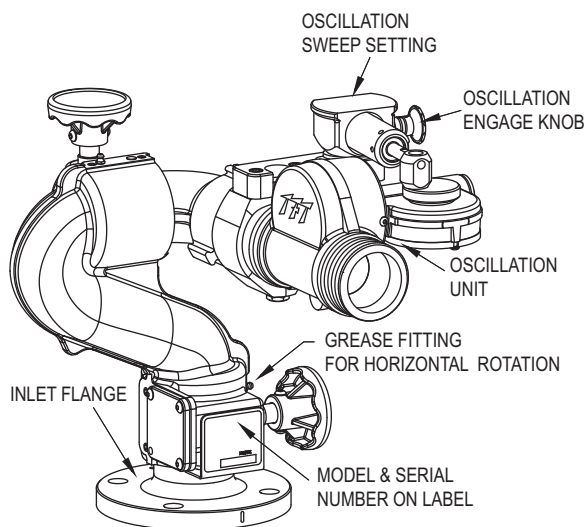
Use with salt water is permissible provided the equipment is thoroughly cleaned with fresh water after each use. The service life of the equipment may be shortened due to the effects of corrosion, and is not covered under warranty.

### 3.5 VARIOUS MODELS AND TERMS

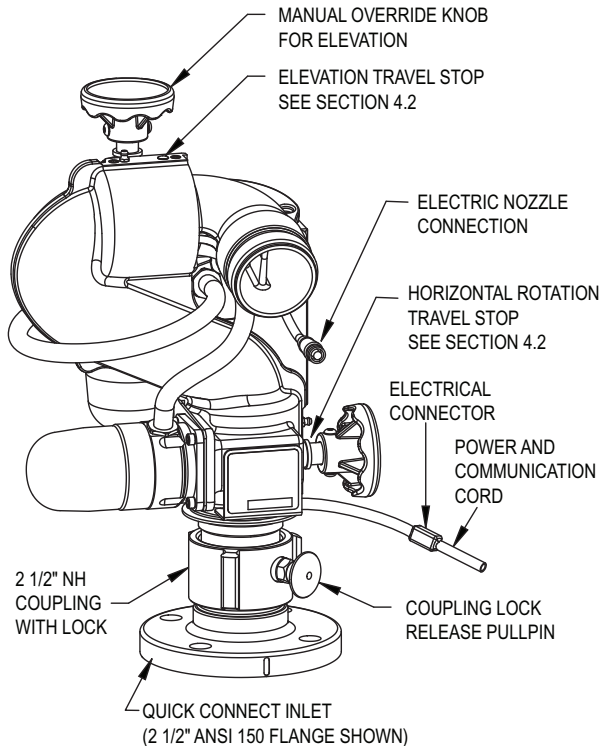
The Tornado monitor is available in several different models and inlet connections. Basic body styles are shown below, along with various parts and controls.



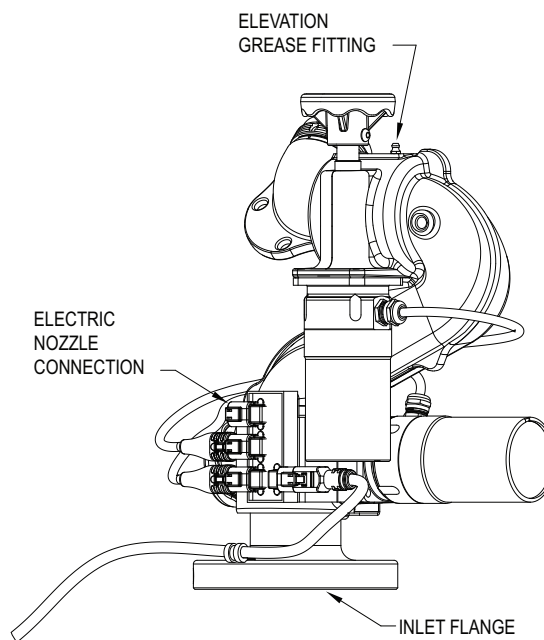
**TORNADO**



**TORNADO OSC**



**TORNADO RC**



**TORNADO LT**

Figure 3.5



### 3.6 INLETS AND OUTLETS

Available inlets and outlets are shown below and should be specified at time of order. The overall height and weight of the monitor may differ slightly based on the inlet and outlet configuration.

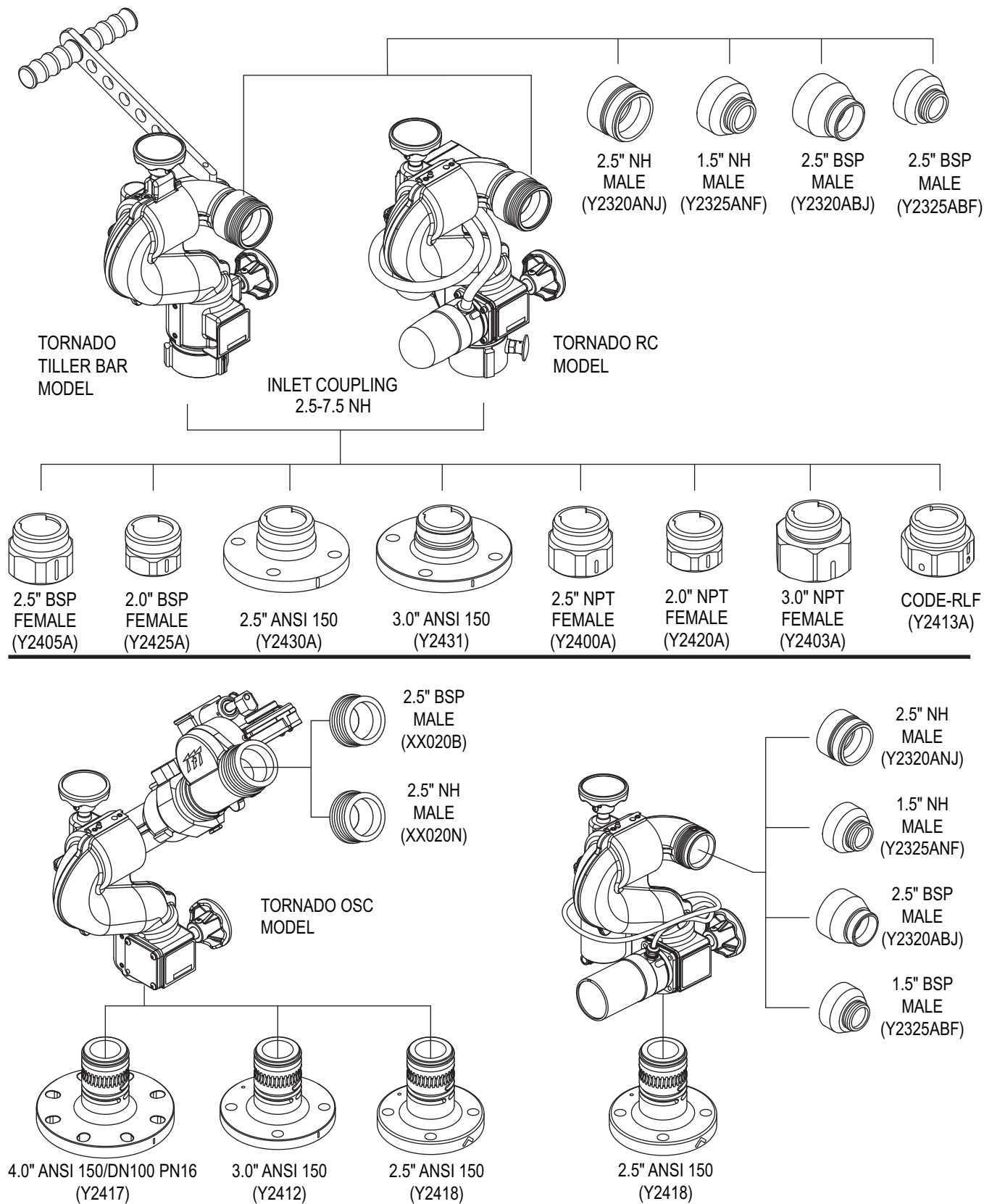
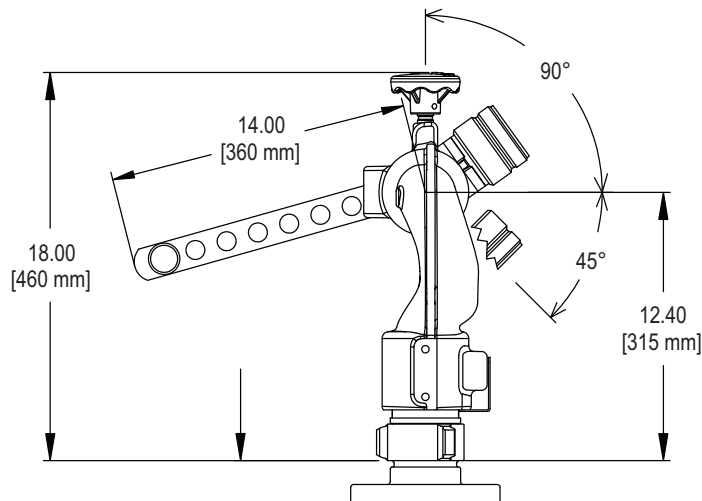
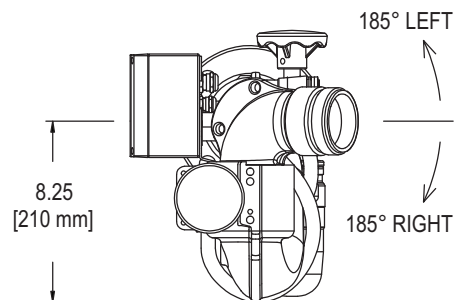
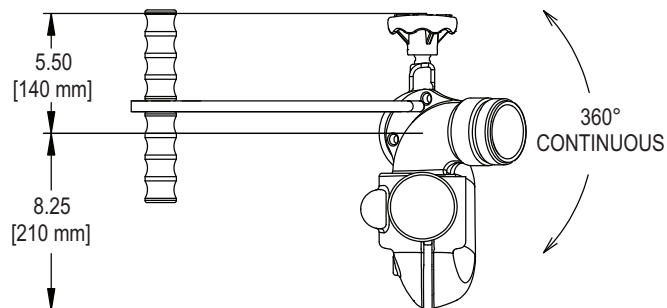


Figure 3.6



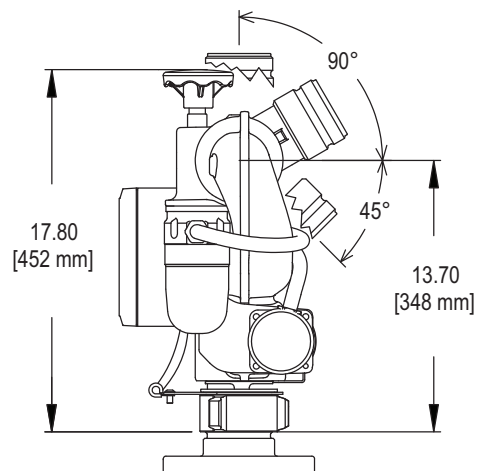
### 3.7 OVERALL DIMENSIONS

Dimensions shown are for nominal monitor height. See tables for additional height as a result of the chosen inlet.



See table below for additional height  
from Inlet Fitting

Figure 3.7A  
TORNADO



See table below for additional height  
from Inlet Fitting

Figure 3.7B  
TORNADO RC

MODEL	INLET FITTING TYPE	ADDITIONAL HEIGHT
Y2-*1*A	2.5" - 7.5 NH FEMALE (no inlet fitting)	0.00" 0 mm
Y2-*2*A	2.5" - 11 BSP FEMALE	2.00" 51 mm
Y2-*3*A	2.0" - 11.5 BSP FEMALE	1.50" 38 mm
Y2-*6*A	2.5" ANSI 150 FLANGE	2.00" 51 mm
Y2-*0*A	3.0" ANSI 150 FLANGE	2.10" 53 mm
Y2-*7*A	2.5" - 8 NPT FEMALE	2.00" 51 mm
Y2-*8*A	2.0" - 11.5 NPT FEMALE	1.50" 38 mm
Y2-*9*A	3.0" - 8 NPT FEMALE	2.44" 62 mm
Y2-*L*A	TFT CODE-RLF (fits Extend-A-Gun RC3)	2.00" 51 mm

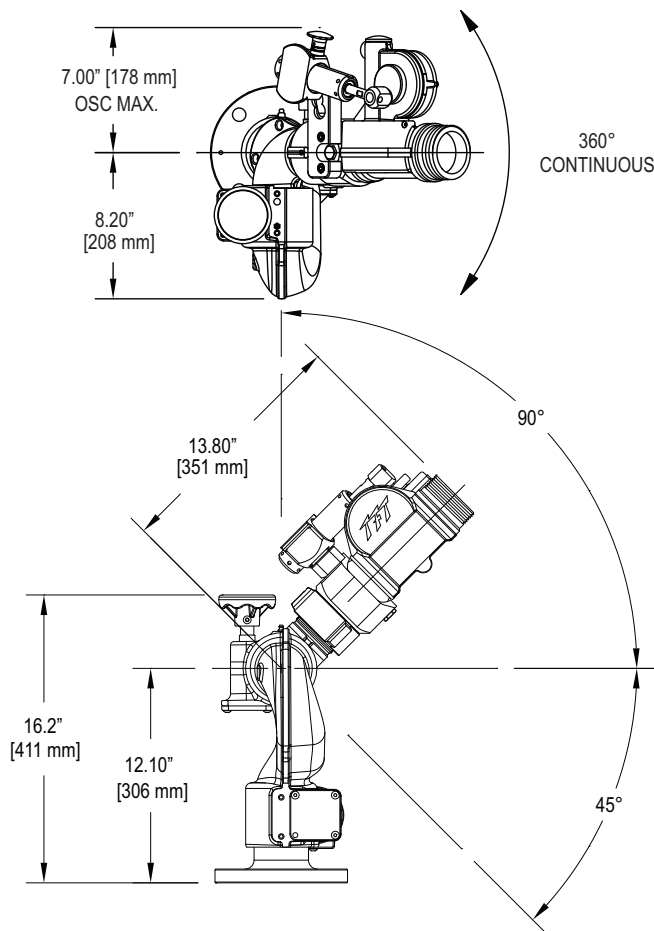


Figure 3.7C  
TORNADO OSC

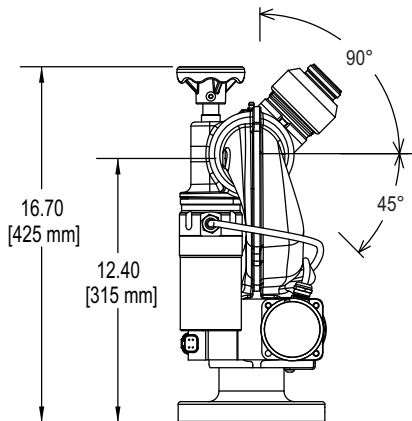
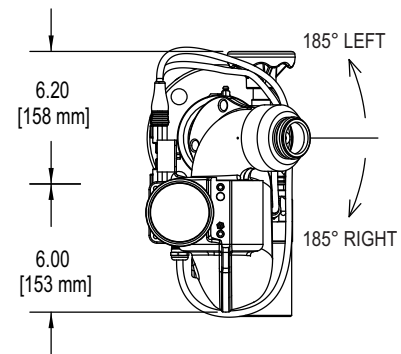


Figure 3.7D  
TORNADO LT

MODEL	INLET FITTING TYPE	ADDITIONAL HEIGHT
Y2-SD*A	2.5" ANSI 150 FLANGE	0.60" 15 mm
Y2-SF*A	3.0" ANSI 150 FLANGE	0.00" 0 mm
Y2-SG*A	4.0" ANSI 150 FLANGE DN100 PN16	0.16" 4 mm

## 4.0 INSTALLATION

### 4.1 ELECTRICAL INSTALLATION

See Remote Control (RC) Monitor Electrical Controls Supplemental Instructions LIY-500.

### 4.2 STRUCTURAL REQUIREMENTS

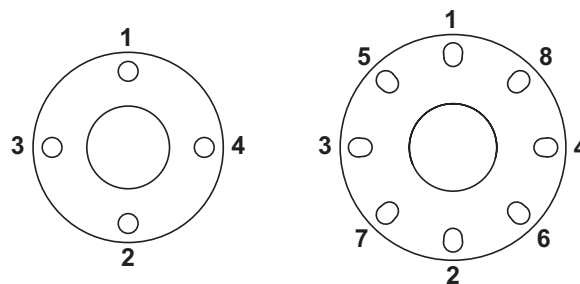


**Reaction forces generated by master stream flows are capable of causing injury and property damage if not properly supported. Monitors should be securely installed by qualified individuals.**

- Mounting objects must be capable of withstanding maximum nozzle reaction force.
- 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.

The structure that the monitor is mounted to must withstand the internal pressure of the monitor as well as shear and bending forces due to nozzle reaction.

For 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 below. Tighten sequentially each bolt or stud three times to 30%, then 60%, and finally 100% of the specified torque. Tighten to a total of 76-80 ft-lb (100-110 N·m).



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

Figure 4.2

FLANGE TYPE	OUTSIDE DIAMETER		THICKNESS		BOLT HOLE CIRCLE		# OF BOLTS	SIZE OF BOLTS	
	in	mm	in	mm	in	mm		in	mm
2.5" ANSI 150	6.9	175	0.98	25	5.5	140	4	5/8	16
3" ANSI 125/150-DN80 PN20	7.5	190	0.75	20	6.0	152.5	4	5/8	16
4" ANSI 150-DN100 PN20	9.0	230	0.94	23	7.5	190	8	5/8	16
DN80, PN16 Flange	7.9	200	0.87	22	6.3	160	8	5/8	16
DN100, PN16 Flange	8.7	220	0.87	22	7.1	180	8	5/8	16

Table 4.2

### 4.3 QUICK CONNECT INLET AND TRAVEL RANGES

The Tornado Monitor is available with various inlet fittings. These Inlet Adapters must be oriented upon installation so the Tornado will point in the desired direction. Travel ranges relative to the Straight Ahead Reference Mark are shown in Figure 4.3B. Figure 4.4 gives the location of the “Stop Bolts”, which are used to limit the travel.

A rotational lock is included on quick connect couplings on RC models. The locking pin also holds the coupling up and out of the way while orienting the monitor to engage the internal ear into the slot on the adapter. Hold the pin out, push the coupling up and release the pin before installing monitor on the adapter. Once the monitor is properly aligned on the adapter, hold the pin out while sliding the coupling down to the adapter. Rotate the coupling until it is tight. The coupling may become sufficiently tight before reaching the next detent position. It is not necessary to over tighten the coupling if the pull pin is between detent positions. Do not use the pull pin as a lever to tighten or loosen the coupling.

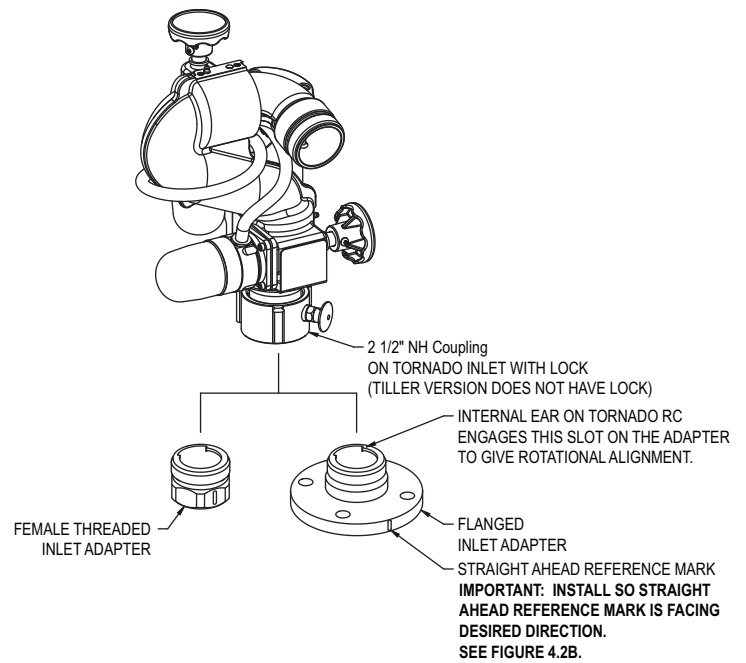


Figure 4.3A

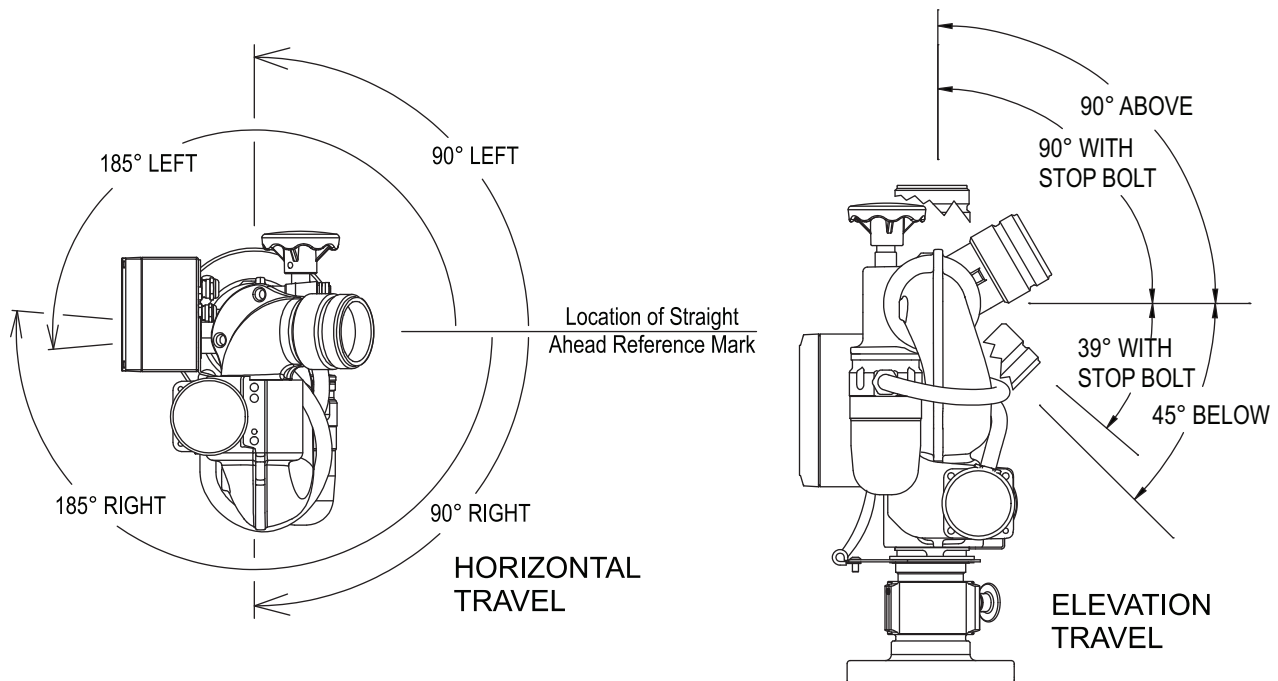


Figure 4.3B

## 4.4 TRAVEL STOPS

Stop bolts and adjustment disks can be installed to limit the travel of the monitor in either travel direction. Instructions on how to install the stop bolts and adjustment disks are shown below.

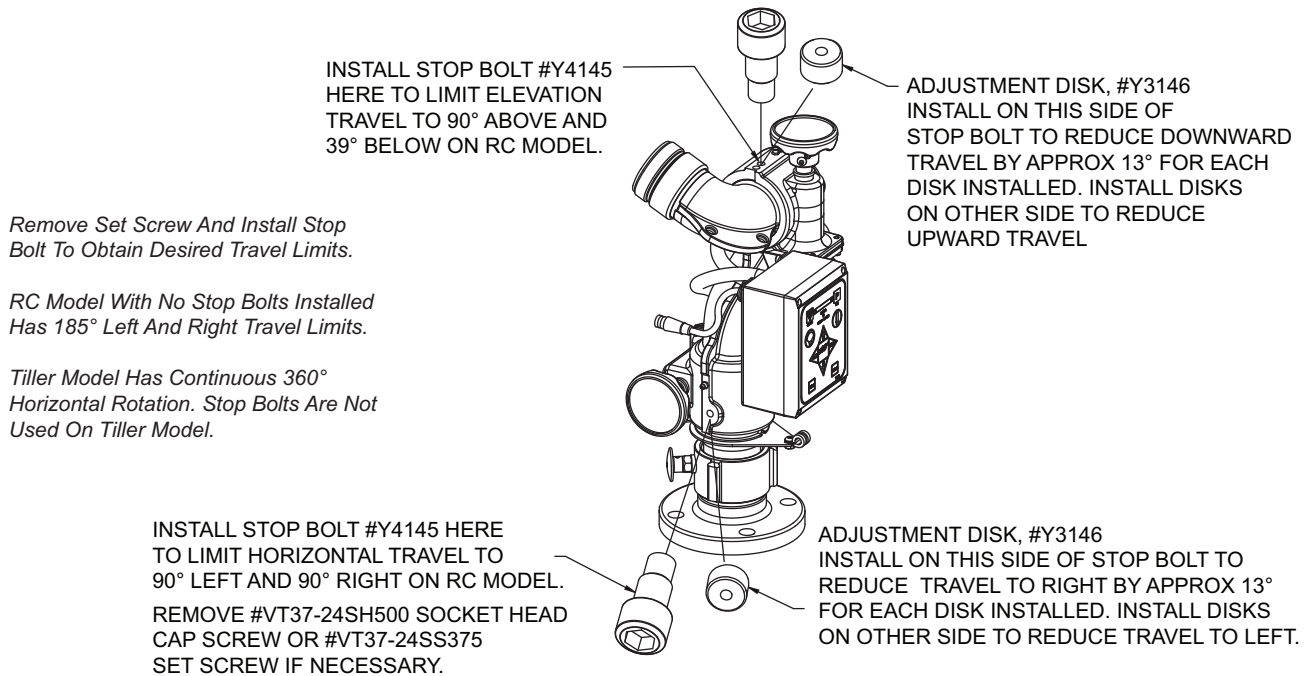


Figure 4.4

## 4.5 NOZZLE INSTALLATION

The nozzle is simply screwed onto the monitor's exit threads. If the nozzle is installed on a Tornado RC (with electric motors) assure that the nozzle's actuator does not make contact with the horizontal drive motor housing when the monitor is in its lowest elevation position.

### 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.

## 4.6 PRESSURE GAUGE PORT

There is a 1/4" NPT female threaded hole on the back of the monitor and the exit elbow (see Figure 3.5). The holes are plugged from the factory. If a pressure gauge is desired, unscrew the plug and install the gage using pipe sealant. Make sure the gauge does not interfere with operation.

## 4.7 TILLER HANDLE INSTALLATION

For tiller models, the handle is shipped loose from the monitor and must be installed to complete the installation process. When installing the tiller handle, be sure to coat the threads of the mounting screw with the Loctite® supplied in the hardware packet.

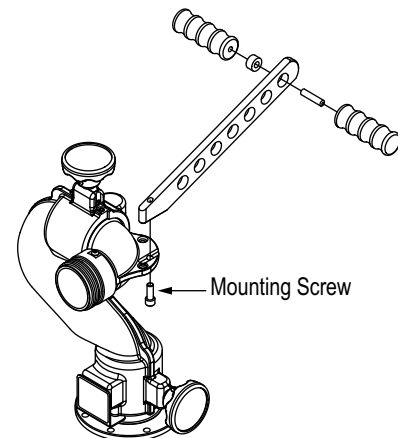


Figure 4.7

## 4.8 DRAINING RESIDUAL WATER

There is no drain on the Tornado monitor itself. A drain valve should be installed on the piping to which the monitor is attached.

### **⚠ WARNING**

Monitors, valves, and piping may be damaged if frozen while containing sufficient amounts of water. Such damage may be difficult to detect visually and can lead to possible damage, injury, or death. Equipment that may be exposed to freezing conditions must be drained immediately following use to prevent damage.

### **⚠ CAUTION**

Structural damage from corrosion can result from failure to drain appliance between uses. Damage from corrosion can cause injury due to equipment failure. Always drain appliance between uses.

## 5.0 OPERATING INSTRUCTIONS

### 5.1 MANUAL (TILLER) MODEL SPRAY TRAJECTORY ADJUSTMENT

On the Tiller Bar model the horizontal rotation is changed by pushing or pulling horizontally on the Tiller Handle. Elevation is changed by moving the Tiller Handle up or down. Twisting the Rotation Locking Knobs clockwise will increase the drag on the swivel joints to “lock” the monitor in a particular direction.

### **⚠ WARNING**

Debris in the nozzle may cause off center nozzle reaction. Injury or damage from spinning or sudden movement of the monitor could occur. To reduce the risk of an out of control monitor:

- Always check for waterway obstructions before flowing water
- Always keep the rotation lock tight when not rotating the monitor
- Always keep one hand on the tiller handle when loosening the rotation lock
- When 360° rotation is not needed, install horizontal rotation stop bolts to limit monitor travel

### 5.2 OPERATION OF OSCILLATING MONITORS

#### 5.2.1 HORIZONTAL ROTATION CONTROL

A handwheel controls the monitor's horizontal rotation direction. Clockwise rotation of the handwheel moves the nozzle to the left and counter-clockwise rotation to the right. Approximately 8.5 turns of the handwheel will give a 90 degree change in horizontal rotation direction.

#### 5.2.2 ELEVATION CONTROL

A handwheel controls the monitor's elevation direction. Clockwise rotation of the handwheel raises the elevation and counterclockwise lowers it. About 13 turns of the handwheel will give the complete 135 degree elevation travel range of the monitor.

### **⚠ DANGER**

Modifying this oscillating mechanism to fit any other monitor will cause the reaction force of the nozzle to be unaligned with the center of rotation. An unaligned monitor may spin very fast with a very high force, which can result in serious injury or death. Do not modify the oscillator to fit any other monitor.

#### 5.2.3 TO ENGAGE THE OSCILLATING MECHANISM

If the nozzle moves freely left to right by hand, the oscillating mechanism is not engaged. To engage, ensure the black knob on the side of the oscillator is released, and move the nozzle from one side to the other until the black knob clicks into the groove on the spring canister. The minimum flow required to oscillate is 175 gpm (650 L/min).

The oscillating mechanism is equipped with a safety device that prevents damage to the gear train in case the oscillator comes in contact with an object. The safety device will allow the mechanism to continue to oscillate the portion of its sweep path not blocked by the obstruction. The safety mechanism also allows the oscillating mechanism to sweep vertically without disengaging the oscillator. Once obstruction is removed, sweep pattern will return to normal.

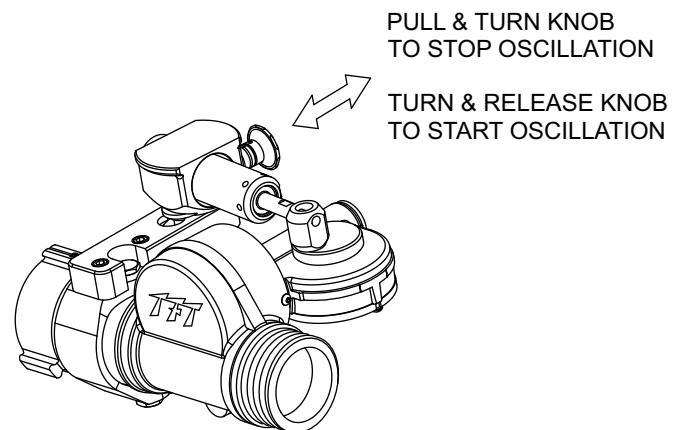


Figure 5.2.3

### **⚠ CAUTION**

The oscillator unit contains moving parts that can pinch fingers and hands when the unit is in operation. Keep hands and fingers away from the moving parts of the oscillating unit when water is flowing.

## 5.2.4 TO DISENGAGE THE OSCILLATING MECHANISM

To operate the oscillating monitor manually, pull then twist the black knob located on the side of the monitor. Twisting will lock the knob in the disengaged position. The crank, rod, and spring canister will continue to move. Move the nozzle to the desired position by hand.

## 5.2.5 COVERAGE AREA OF THE OSCILLATING MONITOR

### CAUTION

Because the nozzle attached to the oscillator must slow down, stop and reverse direction at the end of each sweep, the ends of the covered area will receive more water than the center. If the center area of coverage needs the most cooling, occasionally narrow the area of coverage or use the oscillator manually.

### NOTICE

The type of nozzle and flow pressure are critical to the coverage area. The graph shows coverage area based on the movement capability of the oscillating mechanism. Actual coverage will depend on flow, pressure, type of nozzle, angle of fog pattern, and wind conditions.

To adjust the area of coverage, refer to figure 6.3. Engage the oscillating mechanism once the desired angle has been set.

Oscillation speed: The chart shows how many times per minute the oscillator makes one complete cycle as a function of flow. The higher the flow, the faster it oscillates.

Nozzle reach: Refer to the operating manual for the specific nozzle. For reach with oscillation, subtract 20% from the distance.

APPROXIMATE CYCLES/MIN	GPM	L/min
8	175	650
13	250	1000
21	375	1500
28	500	2000

OSCILLATION SPEED

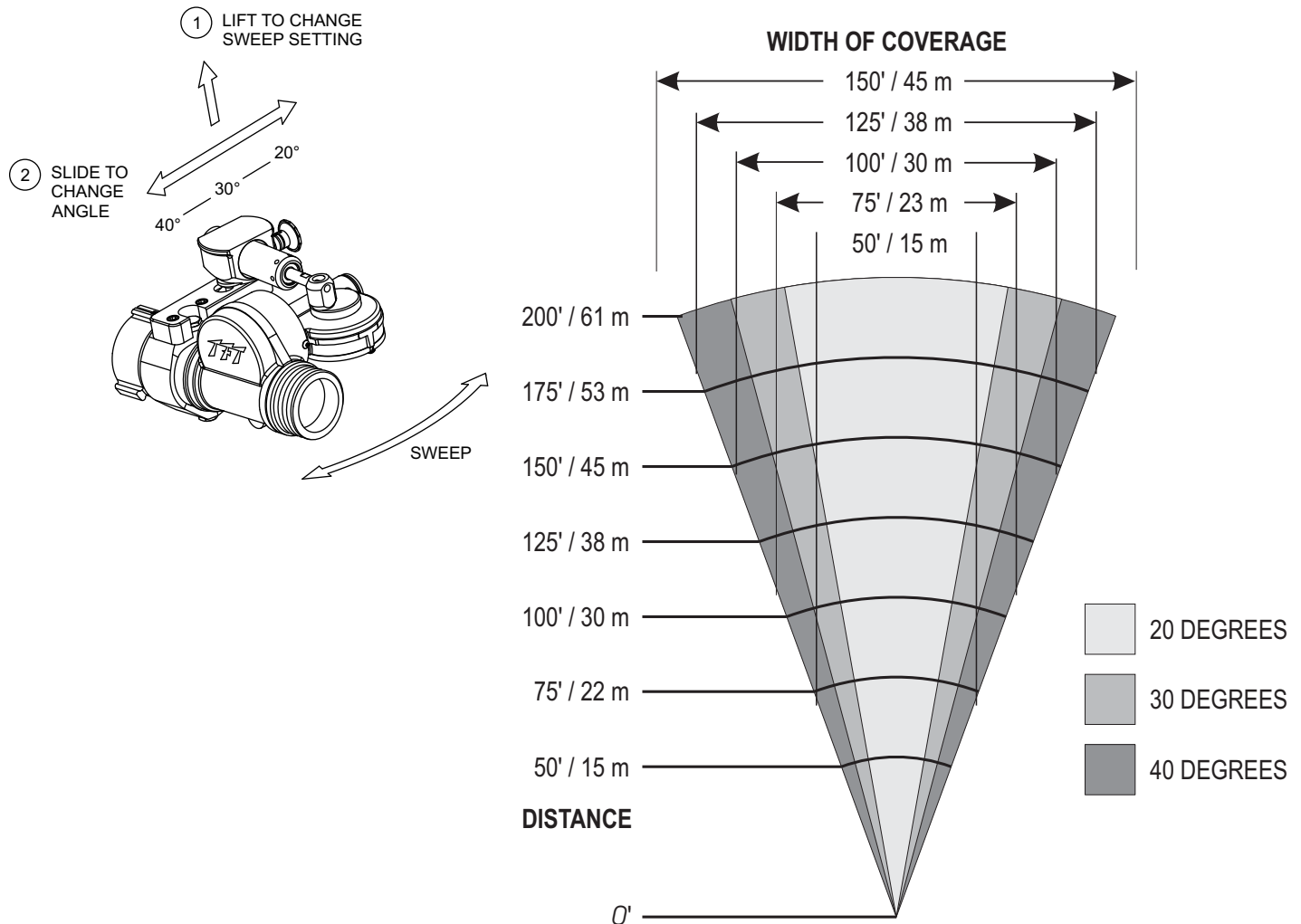


Figure 5.2



### 5.3 OPERATION OF RC MODELS

See Remote Control (RC) Monitor Electrical Controls Supplemental Instructions LIY-500 for operation of the Tornado RC Monitors.

### 5.4 RECOMMENDED PARK POSITION

For truck mounted applications, it is recommended that the monitor be parked in a position such that the monitor's nozzle rests against a bracket or support surface. If a support surface is not available, run the elevation against one of the travel stops to take some of the backlash out of the gear drive. This will minimize bouncing of the nozzle when the apparatus is traveling. Always be sure the monitor is properly parked before moving the truck and know the overall height to avoid damage from overhead obstructions such as doors or bridges. See LIY-500 for information on programming PARK position.

### 5.5 OVERRIDE KNOBS

In the event of electrical system failure on the monitor or fire truck, the Tornado RC monitor may be manually operated with factory supplied override knobs. To make the Tornado RC more compact, the manual override knobs may be removed. Removing the override knobs exposes a hex so an 11/16" wrench or socket may be used for manual override.

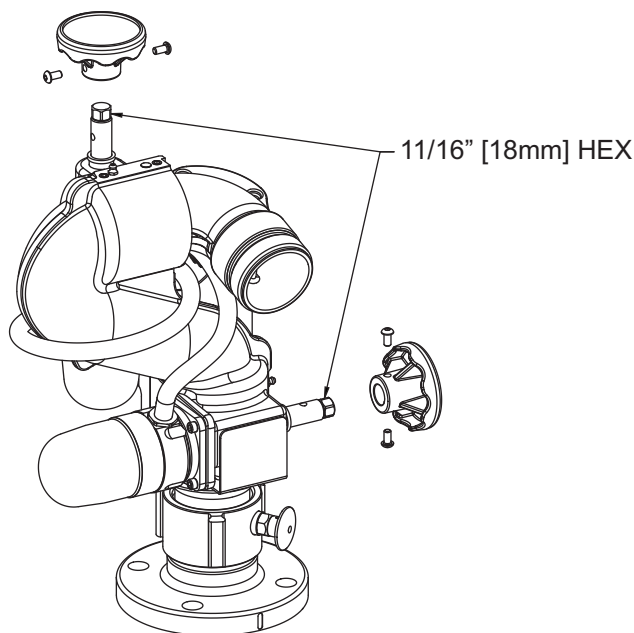


Figure 5.5

## 6.0 FLOW CHARACTERISTICS

### 6.1 STACKED TIPS FLOW AND REACTION

NOZZLE DIAMETER	NOZZLE INLET PRESSURE									
	50 PSI		80 PSI		100 PSI		150 PSI		175 PSI	
	FLOW (GPM)	REACTION (LBS)	FLOW (GPM)	REACTION (LBS)	FLOW (GPM)	REACTION (LBS)	FLOW (GPM)	REACTION (LBS)	FLOW (GPM)	REACTION (LBS)
1.00"	210	80	270	120	300	150	360	230	390	260
1.25"	330	120	410	190	460	230	--	--	--	--
1.50"	470	170	--	--	--	--	--	--	--	--
FLOW EXCEEDS RATING OF THE TORNADO MONITOR										

NOZZLE DIAMETER	NOZZLE INLET PRESSURE									
	4 BAR		6 BAR		8 BAR		10 BAR		12 BAR	
	FLOW (L/min)	REACTION (KG)	FLOW (L/min)	REACTION (KG)	FLOW (L/min)	REACTION (KG)	FLOW (L/min)	REACTION (KG)	FLOW (L/min)	REACTION (KG)
25 mm	830	40	1000	60	1200	80	1300	100	1400	120
32 mm	1300	70	1700	100	1900	130	--	--	--	--
38 mm	1900	90	--	--	--	--	--	--	--	--
FLOW EXCEEDS RATING OF THE TORNADO MONITOR										

Table 6.1

## 6.2 REACH AND TRAJECTORY

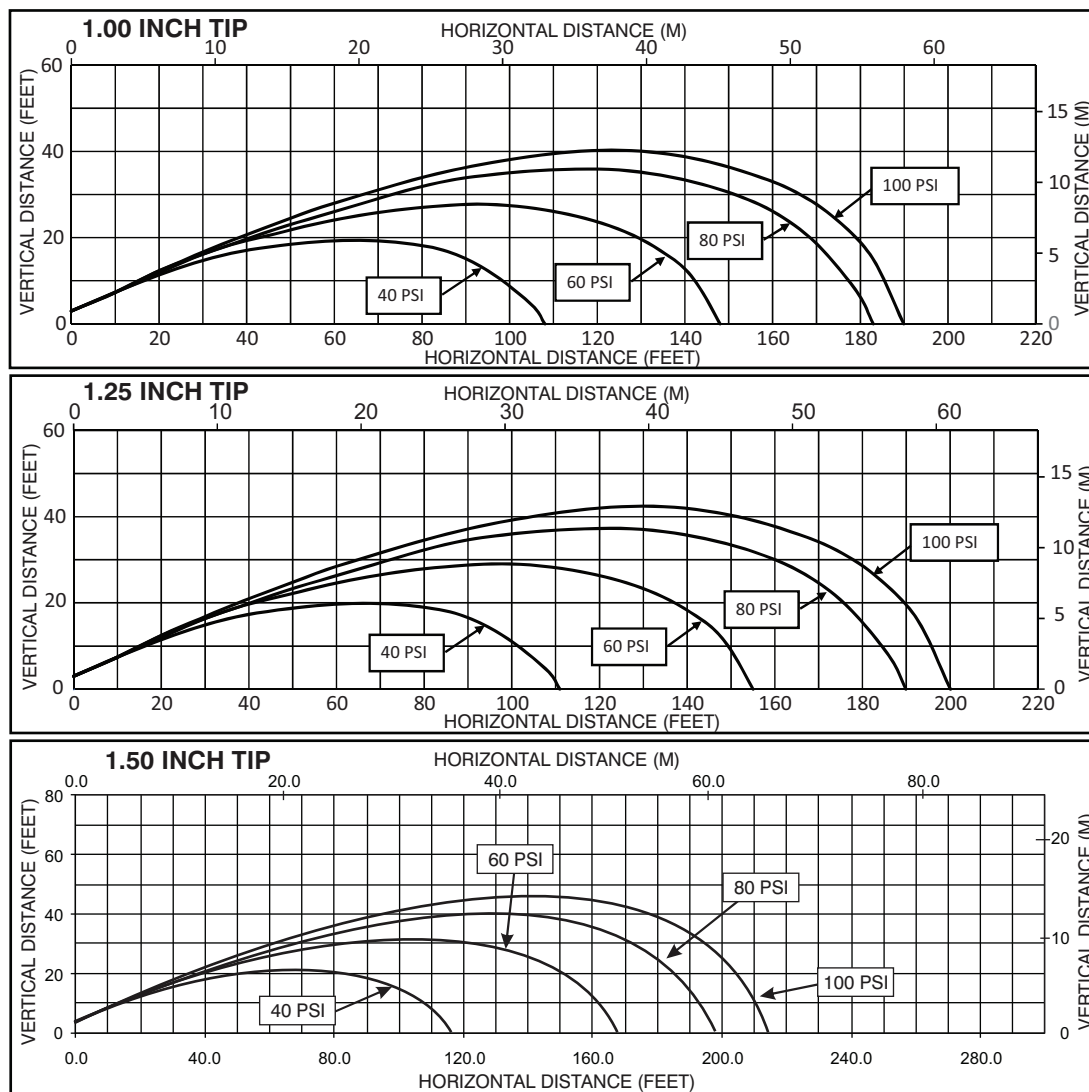


Figure 6.2

## 6.3 TORNADO MONITOR AND STREAM STRAIGHTENER FRICTION LOSS

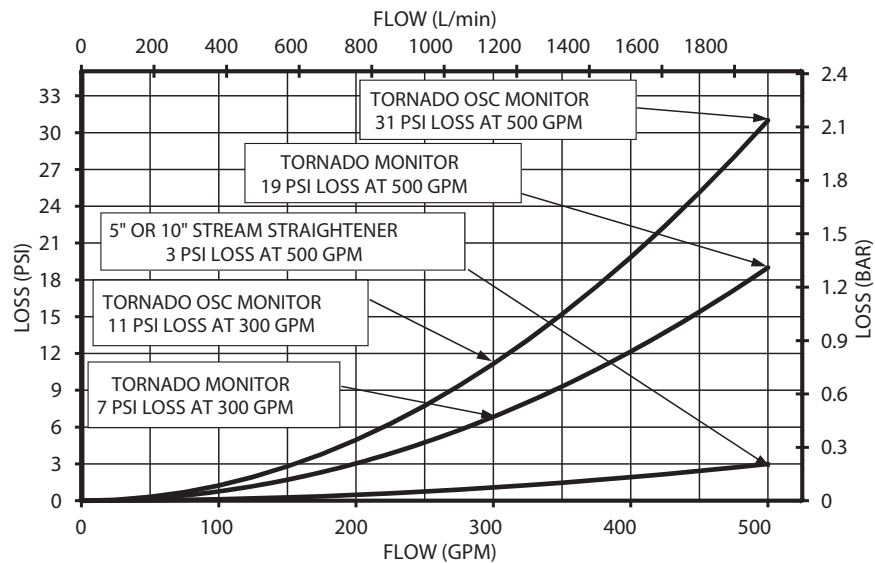


Figure 6.3

## **6.4 STREAM STRAIGHTENERS**

### **6.4.1 STREAM STRAIGHTENERS WITH STACKED TIPS**

Turbulence though the Tornado monitor is very low, but stream quality and reach can be improved with the use of the integral stream straightener on the TFT stacked tip nozzle. Stream straighteners will add some friction loss as indicated above.

### **6.4.2 STREAM STRAIGHTENERS WITH FOG NOZZLES**

When using a fog nozzle for flows below 300 gpm (1,100 L/min), it is recommended that no stream straightener be used since the fog nozzle's flow path serves as a stream straightener. Above 300 gpm (1,100 L/min), TFT's 5 inch Stream Straightener will generally improve a fog nozzle's stream.

## **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 LUBRICATION

The Tornado monitor generally should not require greasing. In the event that the operation becomes stiff, grease may be applied to the horizontal rotation and elevation worm gears. SEE SECTION 3.5 for grease fitting locations. Use medium viscosity automotive chassis grease. Apply only enough grease to restore normal operation. If normal operation is not restored by greasing, inspect for other causes of stiff operation.

#### NOTICE

**Do not over pump grease. The monitor's greased areas lead to large chambers that could trap several pounds of grease before becoming visible.**

### 8.3 TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	REMEDY
Leaks	Debris or damage in the seal area	Clean out debris or replace damaged parts
Elevation Binding	Debris or damage to the elevation drive parts	Clean out debris or replace damaged parts
	Lack of lubricant	Grease, ( <a href="#">see section 8.2</a> )
Horizontal Rotation Binding	Debris or damage to the horizontal drive parts	Clean out debris or replace damaged parts
	Lack of lubricant	Grease, ( <a href="#">see section 8.2</a> )

### 8.4 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](http://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](http://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.

#### WARNING

**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).**

#### CAUTION

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

#### NOTICE

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

## 9.0 EXPLODED VIEWS AND PARTS LISTS

Exploded views and parts lists are available at [tft.com/serial-number](http://tft.com/serial-number).

## 10.0 OPERATION AND INSPECTION CHECKLIST

**BEFORE EACH USE**, appliances must be inspected to this checklist:

1. All valves (if so equipped) 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 repair
7. There is no obvious damage such as missing, broken or loose parts
8. There is no damage to the appliance that could impair safe operation (e.g. dents, cracks, corrosion, or other defects)
9. All swiveling elements rotate freely
10. Nozzle is securely attached

**BEFORE BEING PLACED BACK IN SERVICE**, appliances must be inspected to this checklist:

1. All valves (if so equipped) 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 of the relief valve, if any, is set correctly
5. All locks and hold-down devices work properly
6. Internal gaskets are in accordance with NFPA 1962
7. There is no damage to the appliance that could impair safe operation (e.g. dents, cracks, corrosion, or other defects)
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



**WARNING** 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.

**TASK FORCE TIPS LLC**

MADE IN USA · [tft.com](http://tft.com)

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