



MANUAL: VORTEX® ER NOZZLE

INSTRUCTIONS FOR INSTALLATION, SAFE OPERATION AND MAINTENANCE

⚠ WARNING

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 instruction manual is intended to familiarize firefighters and maintenance personnel with the operation, servicing and safety procedures associated with the VORTEX fire fighting nozzles.

This manual should be kept available to all operating and maintenance personnel.

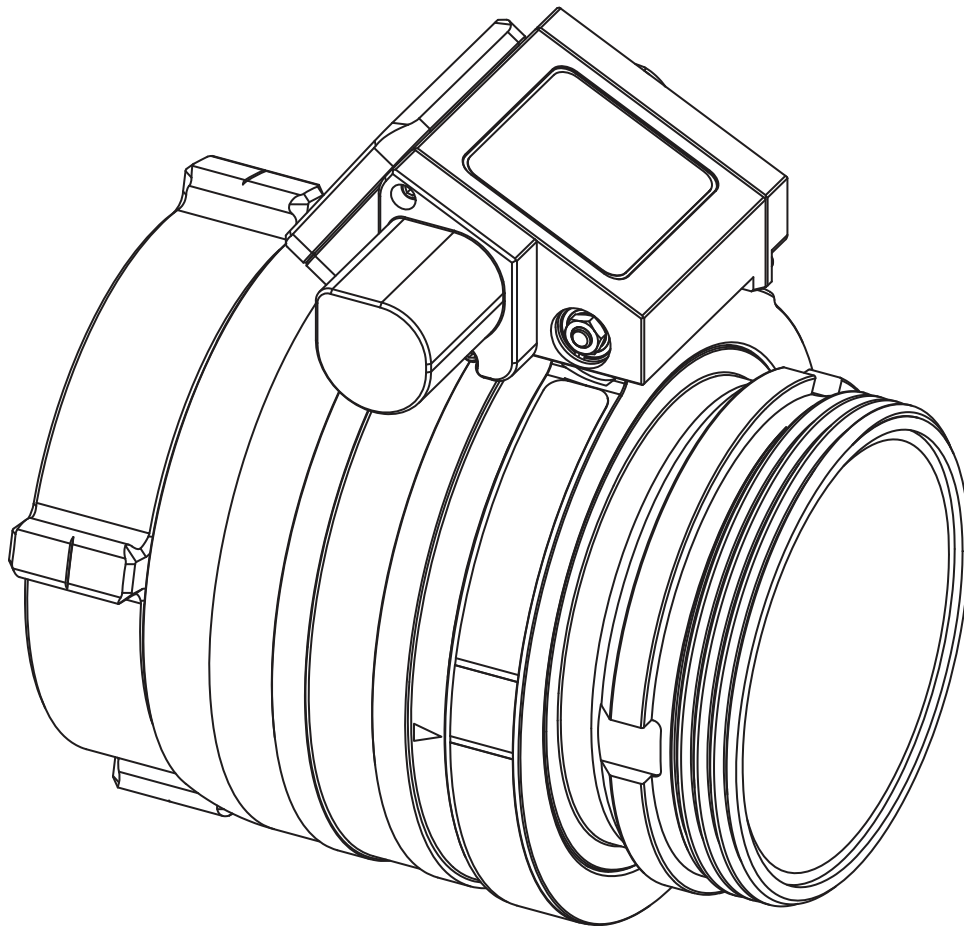


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PERSONAL RESPONSIBILITY CODE

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 upon 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
P.O. Box 147, Lynnfield, MA 01940 • www.FEMSA.org

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 standard Z535.6-2011, 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 nozzle pressure and/or flow will cause an ineffective stream and can result in injury, death, or loss of property. See flow graphs or call 800-348-2686 for assistance.
	The device may be damaged if frozen while containing significant amounts of water. Such damage may be difficult to detect visually and can lead to possible injury or death. Any time the device is subject to possible damage due to freezing, it must be tested by qualified personnel before being considered safe for use.
	This device is intended for use by trained personnel for firefighting. Their use for other purposes may involve hazards not addressed by this manual. Seek appropriate guidance and training to reduce risk of injury.
	The RC control boxes and motors are not rated as ignition proof, explosion proof, or intrinsically safe. Install in locations with adequate ventilation and no hazard of flammable vapor buildup.
	The device may be remotely operated. The electric drives produce enough force to cause injury. Keep hands and fingers away from pinch points on the device.
	Water is a conductor of electricity. Application of water on high voltage equipment can cause injury or death by electrocution. The amount of current that may be carried back to the device will depend on the following factors: <ul style="list-style-type: none">• Voltage of the line or equipment• Distance from the nozzle to the line or equipment• Size of the stream• Whether the stream is solid or broken• Purity of the water¹
	<small>¹ The Fire Fighter and Electrical Equipment, The University of Michigan Extension Service, Fourth Printing 1983. Page 47</small>
	Fire streams are capable of injury and damage. Do not direct water stream to cause injury or damage to persons or property.
	Do not use the manual override while the electric controls are in operation. The electric drives produce enough torque to cause injury.
	Maximum flow and pressure is shown in Figure 3.1.1 Operating Envelope. Damage or injury may result if the monitor is operated beyond these limits.

3.0 GENERAL INFORMATION

The TFT Vortex ER Nozzles enhance the use of smoothbore nozzles. They are intended for installation behind a smooth bore nozzle for use with water or fire fighting foam solutions. Six short vanes in the bore of the Vortex reduce turbulence in straight stream. Actuating a Vortex ER Nozzle from “STREAM” to “VORTEX” causes the vanes to pivot proportionally. This induces a gentle spin in the water to create a uniformly dispersed Vortex stream pattern. The vanes are less obtrusive than a typical stream straightener, resulting in virtually no friction loss regardless of which stream pattern is selected. The vanes also allow large debris to easily pass through the Vortex.

3.1 PART IDENTIFICATION AND TERMS

Vortex ER 6 models are configured with a 6”NH female fixed coupling and 6”NH male threads on the outlet for use with connecting to Tsunami Stacked Tips.

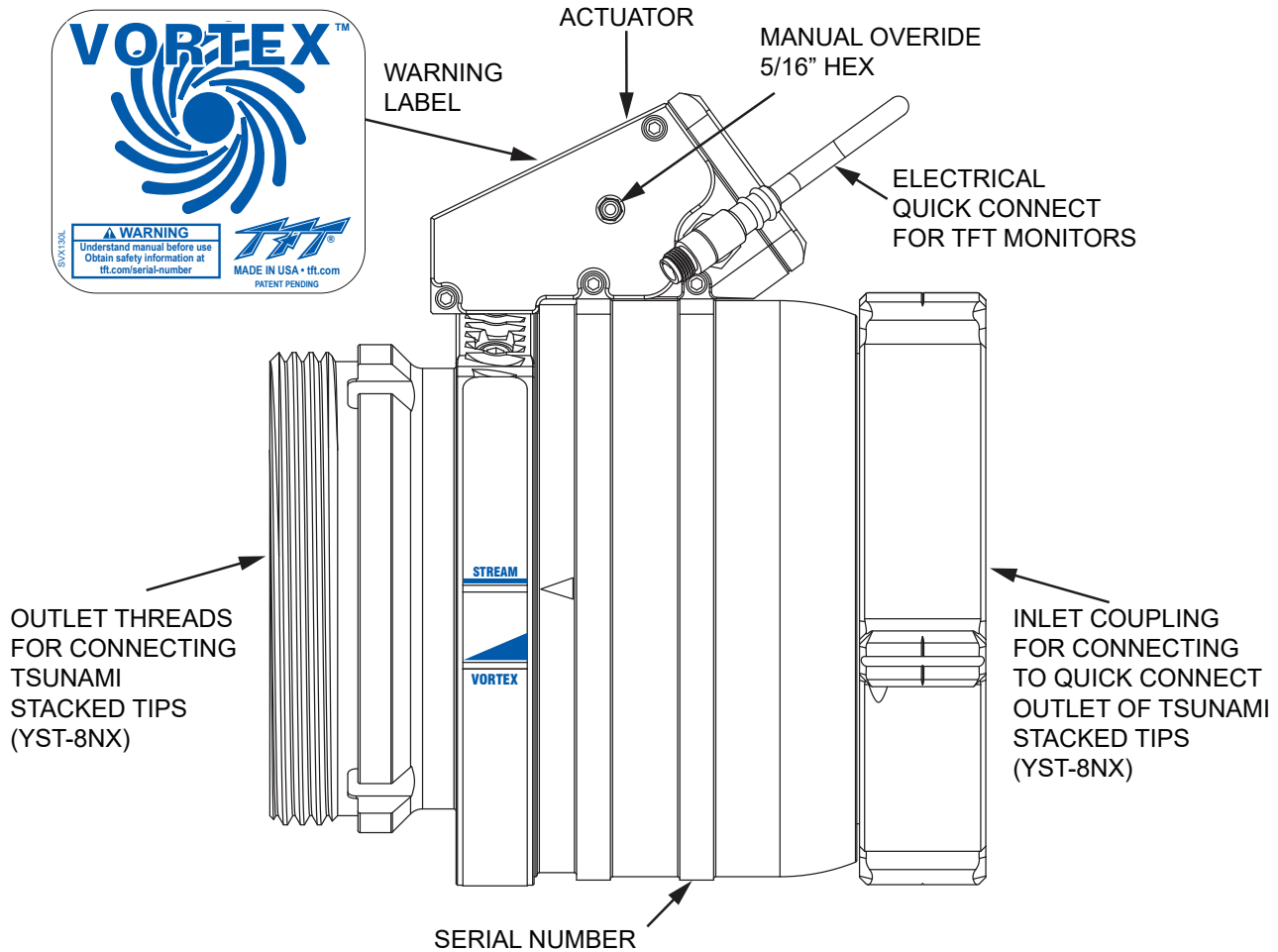


Figure 3.1 Part Identification and Terms

3.2 SPECIFICATIONS

Maximum operating pressure	300 psi / 21 bar
Actuation Time for Full Travel	14 seconds
Electrical Requirements	12V/24V
IP Rating	IP65
Weight	22.5 lbs / 10.2 kg
Length	11" / 28 cm
Operating temperature range of fluid	33 to 120°F / 0 to 50° C
Stored Temperature Rating	-40 to 150°F / -40 to 65°C
Materials used	Aluminum 6000 series hard anodized MIL8625 class 3 type 2, stainless steel 300 series, nylon 6-6, nitrile rubber

3.3 NOZZLE COUPLINGS

NH (National Hose Threads per NFPA #1963) threads are standard on all nozzles.



Nozzle must be properly connected. Mismatched or damaged threads may cause nozzle to leak or uncouple under pressure and could cause injury.



Dissimilar metals coupled together can cause galvanic corrosion that can result in the inability to unscrew the threads or complete loss of thread engagement over time. Per NFPA 1962 (2008 edition), if dissimilar metals are left coupled together an anti-corrosive lubricant should be applied to the threads. Also, the coupling should be disconnected and inspected at least quarterly.

3.4 USE WITH SALTWATER

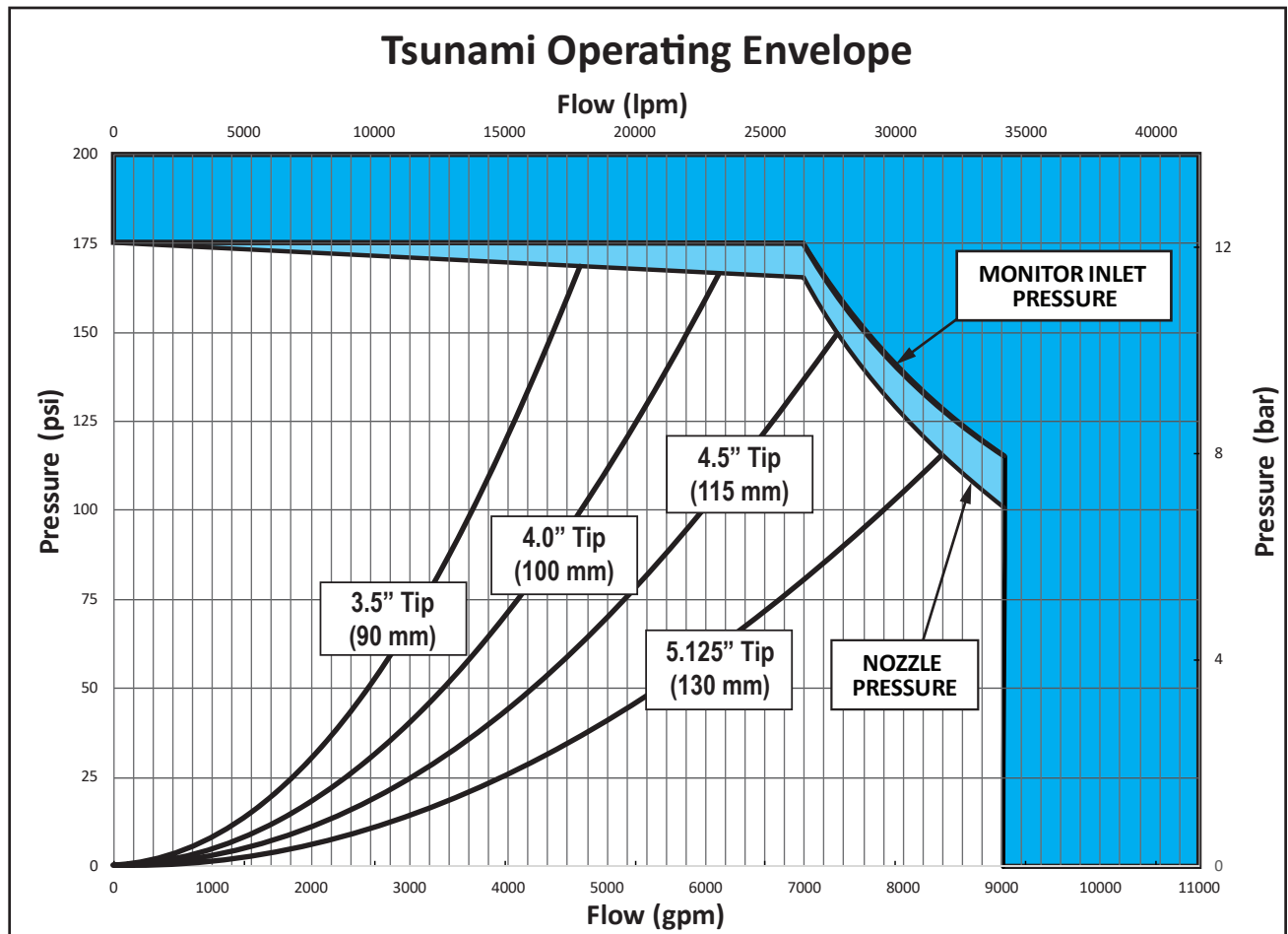
Use with saltwater is permissible provided nozzle is thoroughly cleaned with fresh water after each use. The service life of the nozzle may be shortened due to the effects of corrosion and is not covered under warranty.

4.0 FLOW CHARACTERISTICS AND CHARTS

The Vortex ER 6 has a 6" (152mm) waterway integrated into the outlet. If a smaller smooth bore is attached to the outlet, follow the appropriate flow chart for the smaller orifice size instead.



SPECIAL CONFIGURATIONS If nozzles are made according to the special marking or performance requirements of the fire department then the operating characteristics may differ from the published data in this manual. Repair parts specific to each serial number may differ from those shown in the service procedure. The required parts for each serial number are available online by entering tft.com/H123456 with the numbers corresponding to the serial number engraved on the product.



3.5" (90 mm) smoothbore flows 3640 gpm (13780 l/min) at 100 psi (7 bar), K factor = 360
 4.0" (100 mm) smoothbore flows 4750 gpm (17980 l/min) at 100 psi (7 bar), K factor = 470
 4.5" (115 mm) smoothbore flows 6020 gpm (22790 l/min) at 100 psi (7 bar), K factor = 600
 5.125" (130 mm) smoothbore flows 7800 gpm (29520 l/min) at 100 psi (7 bar), K factor = 780

Figure 4.0
6" Waterway Flow Chart

Nozzle Diameter (inches)	Nozzle Pressure (PSI)							
	50		60		80		100	
	Flow GPM	Reaction lbf	Flow GPM	Reaction lbf	Flow GPM	Reaction lbf	Flow GPM	Reaction lbf
3.5	2570	960	2820	1160	3260	1540	3640	1930
4	3360	1260	3680	1510	4250	2010	4750	2510
4.5	4250	1590	4660	1910	5380	2550	6020	3180
5.125	5520	2060	6040	2470	6980	3300	7800	4130

Nozzle Diameter (mm)	Nozzle Pressure (BAR)							
	3.5		4.1		5.5		7	
	Flow LPM	Reaction kgf	Flow LPM	Reaction kgf	Flow LPM	Reaction kgf	Flow LPM	Reaction kgf
90	9730	440	10670	530	12340	700	13780	880
100	12720	570	13930	690	16090	910	17980	1140
115	16090	720	17640	870	20360	1160	22790	1450
130	20890	940	22860	1120	26420	1500	29520	1880

Figure 4.2
Stacked Tip Flow Tables

⚠ DANGER An inadequate supply of nozzle pressure and/or flow will cause an ineffective stream and can result in injury, death or loss of property. See flow chart in Figure 4.0 or call 800-348-2686 for assistance.

5.0 INSTALLATION

The VORTEX ER 6 is intended to be installed in place of the straight section of the YST-8NX Tsunami Stacked Tips and paired with stacked tips of smooth bores.

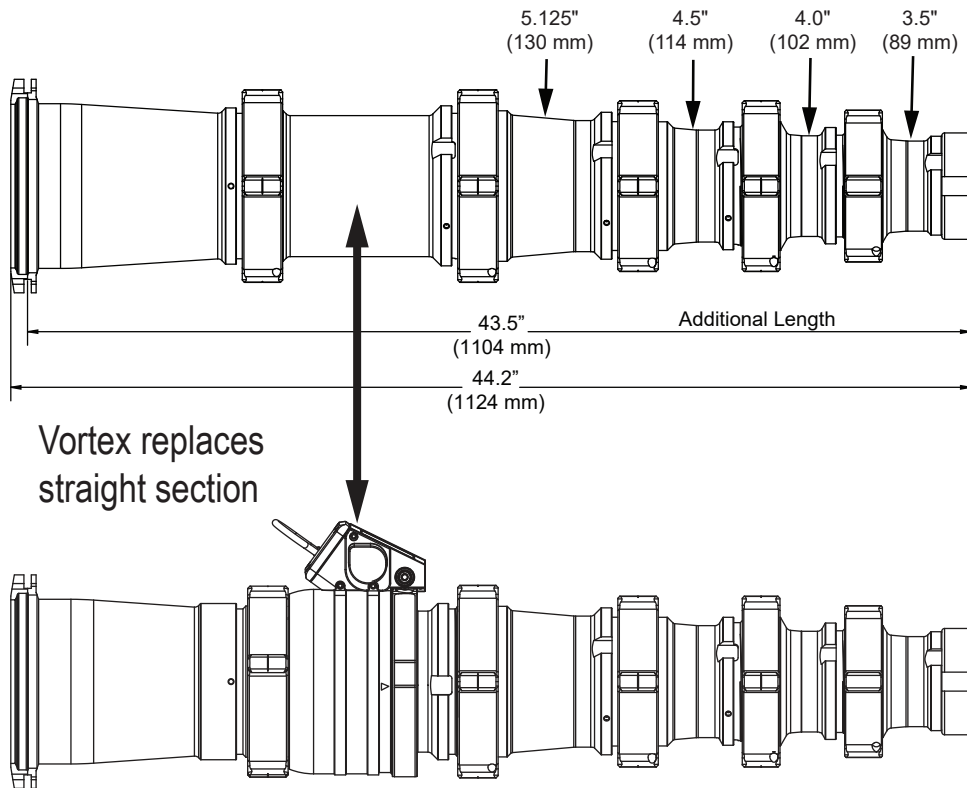


Figure 5.0
6" Vortex Installation

⚠ WARNING Do not mount peripheral jet type nozzles onto the discharge of the Vortex ER nozzles. Inadequate installation will cause an ineffective stream and can result in injury, death or loss of property.

6.0 OPERATION

The TFT Vortex Nozzle allow the stream pattern to be infinitely varied from a straight stream to a uniformly dispersed Vortex pattern. Typical stream results are shown in figures 6.0A and 6.0B below.

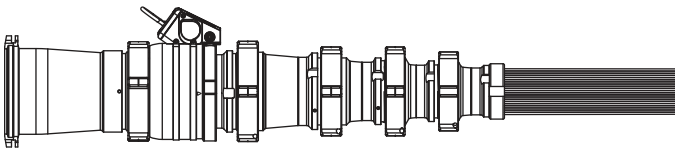


Figure 6.0A
Straight Stream Pattern

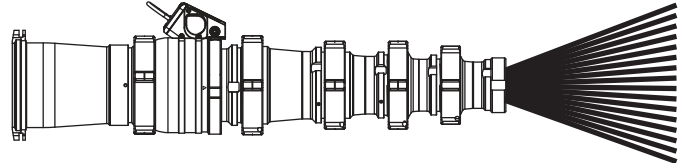
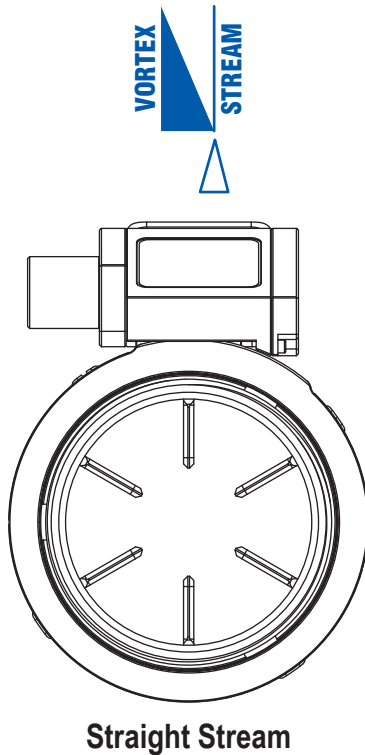


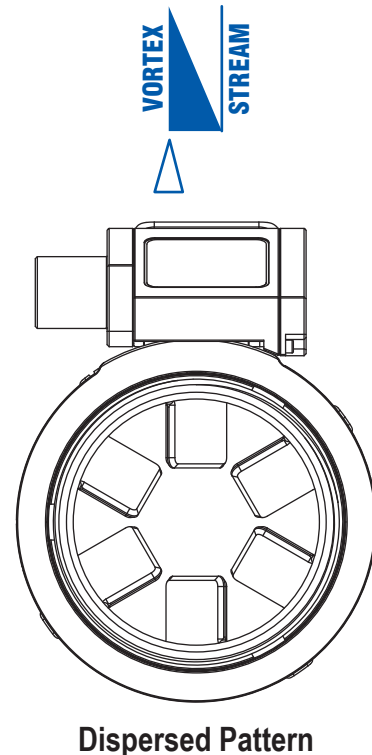
Figure 6.0B
Full Vortex Pattern

The Vortex includes a label indicator for the user to confirm when the Vortex is at the straight stream or in a Vortex dispersed position. As seen from the operating position behind the nozzle, actuating the Vortex indicator counterclockwise moves into the straight stream position shown in figure 6.0C. Actuating the Vortex indicator clockwise will result in an increasingly wider pattern until reaching the full Vortex pattern shown in figure 6.0D.



Straight Stream

Figure 6.0C
Straight Stream pattern setting



Dispersed Pattern

Figure 6.0D
Full Vortex pattern setting

Pivoting the vanes have virtually no effect on the flow area or ability to pass large debris up to 2.7". As a result, discharge pressure and flow rate remain constant regardless of stream pattern.

Manual override is possible by using the 5/16" hex head to drive the motor shaft. Turning the shaft clockwise moves the nozzle towards a straight stream pattern. Turning the shaft counterclockwise moves the nozzle to the dispersed Vortex spray pattern. Do not force the shaft further after it stops firmly at each end of stroke. Exceeding 60 in-lb (6.8 N m) will damage the actuator.

CAUTION Electric remote nozzle has finger pinch points. Keep fingers away from nozzle when using electric control.

7.0 USE WITH FOAM

The VORTEX may be used with foam solutions. The Vortex is not rated for use with compressed air foam. Refer to fire service training for the proper use of foam.

⚠ WARNING

For Class B fires, lack of foam or interruption in the foam stream can cause a break in the foam blanket and greatly increase the risk of injury or death.

Assure that:

- Application rate is sufficient (see NFPA 11 or foam manufacturer's recommendations)
- Enough concentrate is on hand to complete task (see NFPA for minimum duration time requirements)
- Foam logistics have been carefully planned.

Allow for such things as:

- Storage of foam in a location not exposed to the hazard it protects
- Personnel, equipment, and technique to deliver foam at a rapid enough rate
- Removal of empty foam containers
- Clear path to deliver foam, as hoses, other equipment, and vehicles are deployed

⚠ WARNING

Improper use of foam can result in injury or damage to the environment. Follow foam manufacturer's instructions and fire service training to avoid:

- Using wrong type of foam on a fire, i.e. Class A foam on a Class B fire
- Plunging foam into pools of burning liquid fuels
- Causing environmental damage
- Directing stream at personnel

⚠ WARNING

There are a wide variety of foam concentrates. Each user is responsible for verifying that any foam concentrate chosen to be used with this unit has been tested to assure that the foam obtained is suitable for the purpose intended.

8.0 USE OF NOZZLES

Many factors contribute to the extinguishment of a fire. Among the most important is delivering water at a flow rate sufficient to absorb heat faster than it is being generated. The flow rate depends largely on the pump discharge pressure and hose friction loss. It can be calculated using a hydraulic equation such as:

$$PDP = NP + FL + DL + EL$$

PDP	=	Pump discharge pressure in PSI
NP	=	Nozzle pressure in PSI
FL	=	Hose friction loss in PSI
DL	=	Device loss in PSI
EL	=	Elevation loss in PSI

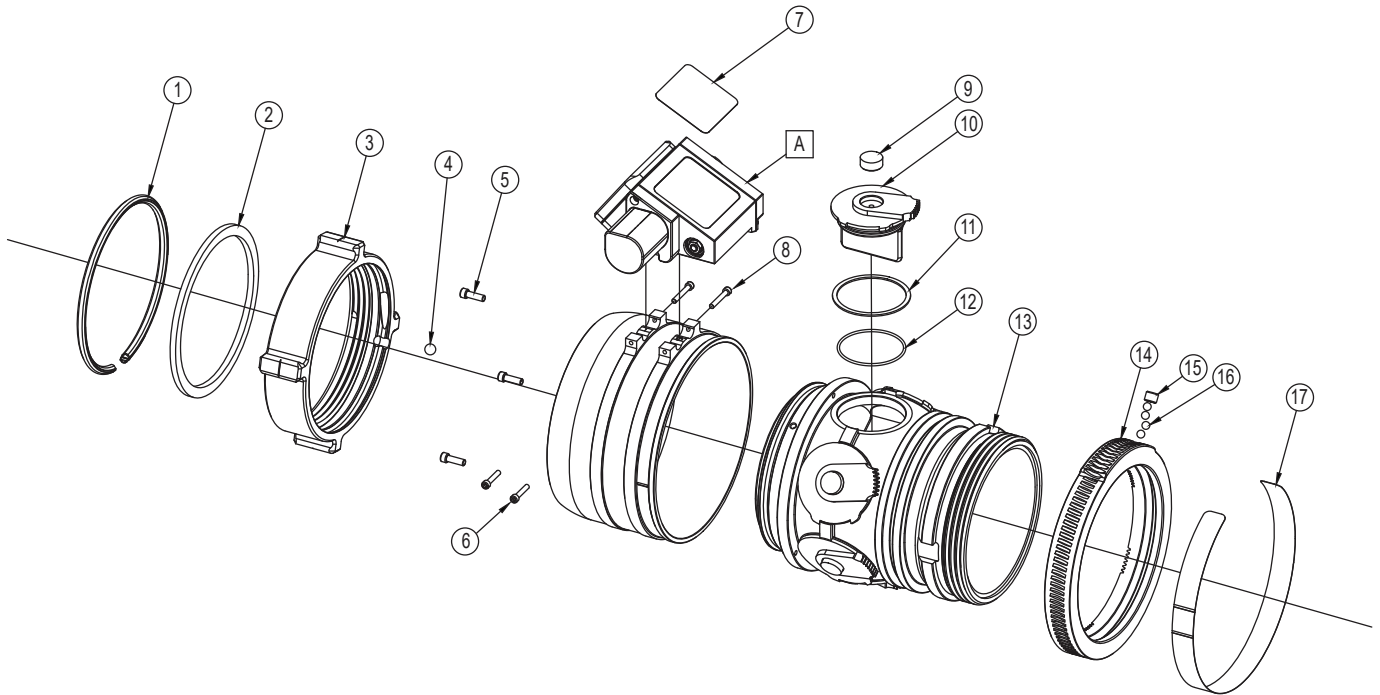
This manual is not intended to act as a training guide for safe fireground tactics and operations. For additional information visit www.tft.com or contact customer service at 800-348-2686.

9.0 APPROVALS

Vortex threaded nozzles meet the requirements of NFPA 1962 (2013) and NFPA 1964 (2008).

10.0 EXPLODED VIEW AND PARTS LIST

10.1 VORTEX ER 6 NOZZLE ASSEMBLY



ITEM	DESCRIPTION	QTY	PART #
1	PLASTIC STRIP 7.00"	1	A1290
2	6.0" - GASKET	1	V3241
3	COUPLING RL 6.0"NHF	1	A4674NX
4	BALL 7/16" STAINLESS	1	VB.437
5	1/4-20 X 3/4 SOCKET HEAD CAP SCREW	3	VT25-20SH750
6	10-32 X 1.0 SOCKET HEAD CAP SCREW	2	VT10-32SH1.0
7	GEARBOX LABEL: VORTEX	1	SVX130L
8	10-32 X 1-1/4 SOCKET HEAD CAP SCREW	2	VT10-32SH1.2
9	VANE BUSHING CAP	6	SVX121
10	VANE	6	SVX110
11	VANE WEAR WASHER	6	SVX122
12	O-RING 145	6	VO-145
13	BASE 6" NHM	1	SVX100
14	DRIVE RING	1	SVX115
15	1/2-20 X 3/8 SOCKET SET SCREW CUP POINT	1	VT50-20SS375
16	BALL 7/16" TORLON	51	VB437TO
17	RING LABEL: VORTEX	1	SVX131L
A	ACTUATOR	1	Y7200

11.0 MAINTENANCE

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

11.1 FIELD LUBRICATION

All Task Force Tip nozzles are factory lubricated with high quality silicone grease. This lubricant has excellent washout resistance and long term performance. If your department has unusually hard or sandy water, the moving parts may be affected. Foam agents and water additives contain soaps and chemicals that may break down the factory lubrication.

The moving parts of the nozzle should be checked on a regular basis for smooth and free operation, and signs of damage. IF THE NOZZLE IS OPERATING CORRECTLY, THEN NO ADDITIONAL LUBRICATION IS NEEDED. Any nozzle that is not operating correctly should be immediately removed from service.

11.2 SERVICE TESTING

In accordance with NFPA 1962 (2013), nozzles must be tested a minimum of annually. Nozzles failing any part of this test must be removed from service, repaired and retested upon completion of the repair.

11.2.1 HYDROSTATIC TESTING

1. The nozzle shall be placed in a device capable of holding it and the shut off shall be closed.
2. A device capable of exerting a hydrostatic pressure of 300 psi (2070 kPa) or 1.5 times the maximum operating pressure, whichever is higher, shall be attached to the nozzle.
3. All air shall be bled from the system.
4. The gage pressure shall be increased by 50 psi (3.5 bar or 345 kPa) increments, held for 30 seconds at each pressure up to the maximum pressure for which the nozzle is being tested, and then held for one minute without leakage.
5. There shall be no sign of leakage through the nozzle.

11.2.2 RECORDS

A record of testing and repairs must be maintained from the time the nozzle is purchased until it is discarded. Each TFT nozzle is engraved with a unique serial number which, if so desired, can be used to identify nozzle for documentation purposes.

The following information, if applicable, must be included on the test record for each nozzle:

1. Assigned identification number
2. Manufacturer
3. Product or model designation
4. Vendor
5. Warranty
6. Hose connection size
7. Maximum operating pressure
8. Flow rate or range
9. Date received and date put in service
10. Date of each service test and service test results
11. Damage and repairs, including who made the repairs and the cost of repair parts
12. Reason removed from service

NFPA 1962: Standard for the care, use, inspection, service testing, and replacement of fire hose, couplings, nozzles and fire hose appliances. (2013 ed., Section 5.5.4). Quincy, MA: National Fire Protection Agency.

11.3 REPAIR

Factory service is available with repair time seldom exceeding one day in our facility. Factory-serviced nozzles are repaired by experienced technicians, wet tested to original specifications, and promptly returned. Repair charges for non-warranty items are minimal. Any returns should include a note as to the nature of the problem and whom to reach in case of questions.

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 www.tft.com for parts lists, exploded views, test procedures and troubleshooting guides. All replacement parts must be obtained from the manufacturer to assure proper operation of the product, and to maintain approval of the device.

Performance tests shall be conducted on the nozzle 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 nozzle. 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.



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

12.0 WARRANTY

Task Force Tips LLC, 3701 Innovation Way, Valparaiso, Indiana 46383-9327 USA (“TFT”) warrants to the original purchaser of its nozzles (“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.

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.

13.0 OPERATION AND INSPECTION CHECKLIST

BEFORE EACH USE the nozzle must be inspected to this checklist:

- 1) There is no obvious damage such as missing, broken or loose parts, damaged labels etc.
- 2) Internal vanes are free of debris
- 3) Coupling is tight and leak free
- 4) Nozzle flow is adequate as indicated by pump pressure and nozzle reaction
- 5) Nozzle turns freely and adjusts pattern through full range with electric and manual control

BEFORE BEING PLACED BACK IN SERVICE, nozzles must be inspected to this checklist;

- 1) All controls and adjustments are operational
- 2) There are no broken or missing parts
- 3) There is no damage to the nozzle that could impair safe operation (e.g. dents, cracks, corrosion or other defects)
- 4) The thread gasket is in good condition
- 5) The waterway is clear of obstructions
- 6) Nozzle is clean and markings are legible
- 7) Coupling is retightened properly
- 8) Nozzle is set to desired pattern

NFPA 1962: Standard for the care, use, inspection, service testing, and replacement of fire hose, couplings, nozzles and fire hose appliances. (2013 ed., Section 5.2.2). Quincy, MA: National Fire Protection Agency.



Any nozzle 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 a nozzle that has failed the checklist is a misuse of this equipment.