



# Master Force

## Automatic Dual Pressure Nozzles

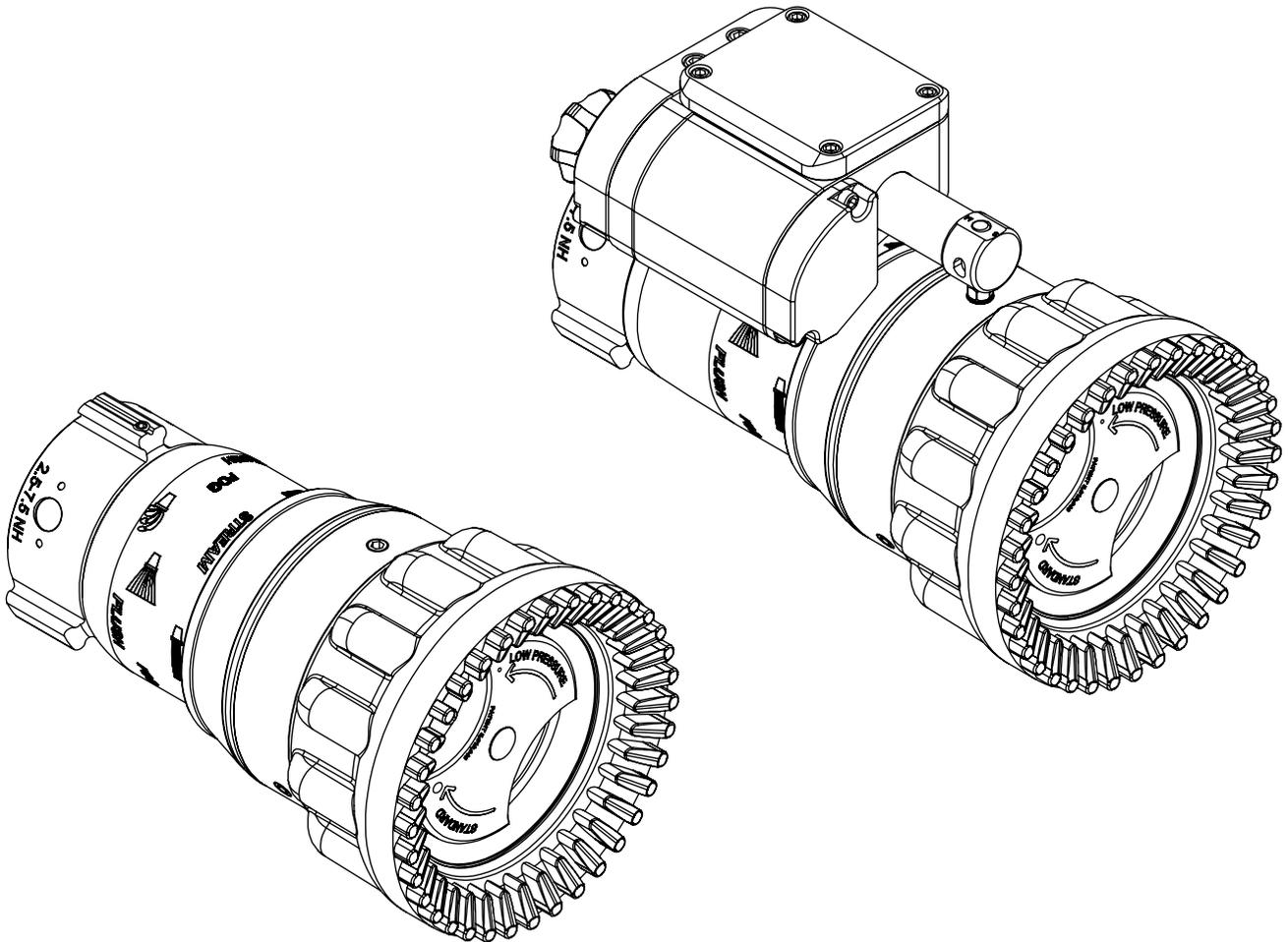
### INSTRUCTION FOR SAFE OPERATION AND MAINTENANCE

#### **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](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.



**TASK FORCE TIPS LLC**  
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3701 Innovation Way, Valparaiso, IN 46383-9327 USA  
800-348-2686 · 219-462-6161 · Fax 219-464-7155

# 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.  
PO Box 147, Lynnfield, MA 01940 • [www.FEMSA.org](http://www.FEMSA.org)

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## SUPPORTING MATERIALS

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

**MANUAL: Foam Aspirators**

**INSTRUCTIONS FOR SAFE OPERATION AND MAINTENANCE**

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**LIA-025 Foam Aspirator Manual**

**MANUAL: Remote Control (RC) Monitor Electrical Controls**

*Supplemental Instructions for use with RC Monitor Manual*

**INSTRUCTIONS FOR INSTALLATION, SAFE 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 [www.tft.com](http://www.tft.com).

**SECTION 3.0** General Information and Specifications

**SECTION 4.0** Electrical Controls Installation and Operation

**SECTION 4.1** Monitor Mounted Operator Station

**SECTION 4.2** Panel Mount Operator Station (Y4E-RP)

**SECTION 4.3** Panel Mount With Display Operator Station (Y4E-RP-D)

**SECTION 4.4** Tehered Operator Station (Y4E-CT-#B)

**SECTION 4.5** Tehered Operator Station With Display (Y4E-CT-#B-D)

**SECTION 4.6** Wireless Operator Station (Y4E-RF-#)

**SECTION 4.7** Wireless Operator Station With Display (Y4E-RF-#-D)

**SECTION 4.8** Joystick Operator Station (Y4E-JS)

**SECTION 4.9** Toggle Switch Monitor Operator Station (Y4E-TS)

**SECTION 4.10** Monitor Communication Interface Control (Y4E-COMM)

**SECTION 4.11** Monitor Position Display (Y4E-ORP)

**SECTION 4.12** Remote Auxiliary Function Interface Control (Y4E-REMAUD)

**SECTION 4.13** Electric RC Monitor Aerial Truck Installation

**SECTION 4.14** Multiplex Interface Control (Y4E-CANN)

**SECTION 4.15** Ethernet Interface Control

**SECTION 4.16** Electric Nozzle Actuator

**SECTION 4.17** Valve Kits (Y4E-VK-#)

**SECTION 5.0** Troubleshooting

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**LIY-500 Remote Control (RC) Monitor Electrical Controls**

**NOZZLE TRAJECTORY ELEVATION FACTORS**

Reach Factor (compared to 30° elevation)

*If TARGET is in this region, FLOW AND/OR PRESSURE MUST BE INCREASED*

Stream reach and height at non-optimal elevations can be estimated as a factor of the performance at the optimal 30° elevation. Refer to LIM-020 and LIM-030 for effective stream trajectories of Task Force Tips Nozzles when reached at 30° elevation. This graph cannot be used to estimate maximum reach for elevation angles above 30°.

**1.0 To estimate elevation angle when vertical and horizontal distance to target are known:**

- 1.1 Find the maximum height and reach at 30° from the appropriate trajectory curve in LIM-020 or LIM-030.
- 1.2 Calculate the Height Factor by dividing the vertical distance to the target by maximum height from step 1.1.
- 1.3 Calculate the Reach Factor by dividing the horizontal distance to the target by maximum reach from step 1.1.
- 1.4 On the graph of nozzle trajectory elevation factors, plot the intersection of the Height Factor and Reach Factor from steps 1.2 and 1.3. If this point lies on or between the curves, estimate the appropriate elevation angle. If the point lies within the shaded region of the graph, then a higher flow or pressure must be used to reach the target.

**2.0 To estimate maximum reach for a given elevation angle above 30°:**

- 2.1 From the graph of nozzle trajectory elevation factors, choose the trajectory curve for the desired elevation angle.
- 2.2 Find the point where the trajectory curve intersects the height of discharge (same height line).
- 2.3 Estimate the Reach Factor at this point using the scale across the top of the graph.
- 2.4 Multiply the Reach Factor by the reach at 30° elevation from the appropriate trajectory curve in LIM-020 or LIM-030.

**3.0 To estimate maximum height for a given elevation angle above 30°:**

- 3.1 From the graph of nozzle trajectory elevation factors, choose the trajectory curve for the desired elevation angle.
- 3.2 Find the maximum height on this trajectory curve.
- 3.3 Estimate the Height Factor at the maximum height using the scale on the left side of the graph.
- 3.4 Multiply the Height Factor by the height at 30° elevation from the appropriate trajectory curve in LIM-020 or LIM-030.

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**LTT-135 Nozzle Trajectory Elevation Factors**

**TASK FORCE TIPS ELECTRIC REMOTE NOZZLES**

*ELECTRIC REMOTE WIRING DIAGRAM*

LESS ELABORATE WIRING SYSTEMS MAY BE USED BY ELIMINATING UPPER CONTROL OR REMOTE CONTROL STATIONS

**LEGEND**

- SWITCH DPDT 5 AMP MIN. MOMENTARY ON, CENTER OFF
- CIRCUIT BREAKER - NOT INCLUDED WITH NOZZLE
- 3 MDL, 3 AMP, 12 VOLT FOR 12 & 24 VDC SYSTEM
- 1.5 MDL, 1.5 AMP, 24 VOLT FOR 24 & 36 VDC SYSTEM

WATERPROOF CORD CONNECTOR  
OPTIONAL - WATERPROOF CORD CONNECTOR OR WATER RESISTANT PLUG AND RECEPTACLE

**LEADS**

- R - RED
- G - GREEN
- W - WHITE
- B - BLACK

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**LIM-040 ER Nozzle Wiring Diagram**

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## 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.



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.



Inadequately supported nozzle reaction force can result in injury or death. The mounting must be capable of supporting the maximum nozzle reaction force as stated in the nozzle's manual.



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.



Application of water or foam solutions on energized electrical equipment could cause electrocution. Serious injury or death could result. Assume circuits are energized until confirmed to be de-energized. Do not apply water or foam to energized electrical equipment.



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.



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 1930, 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.



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

### 3.0 GENERAL INFORMATION

The Task Force Tips Master Force series automatic nozzles operate by sensing the pressure at the nozzle inlet and adjusting the discharge opening to maintain a constant pressure throughout the flow range of the nozzle. The Master Force operates at either a standard or low pressure as selected by the nozzle operator.

The Master Force are deluge nozzles with clean, far reaching straight stream capability. Stream pattern can be varied from straight stream to a dense, wide fog pattern. Turning the shaper past the wide fog setting allows flushing the nozzle of debris without shutting down flow. The Master Force nozzles are intended for use on fixed or portable monitors.

### 3.1 VARIOUS MODELS AND TERMS

Master-Force nozzles are available in several different models and inlet connections. Basic body styles are shown below.

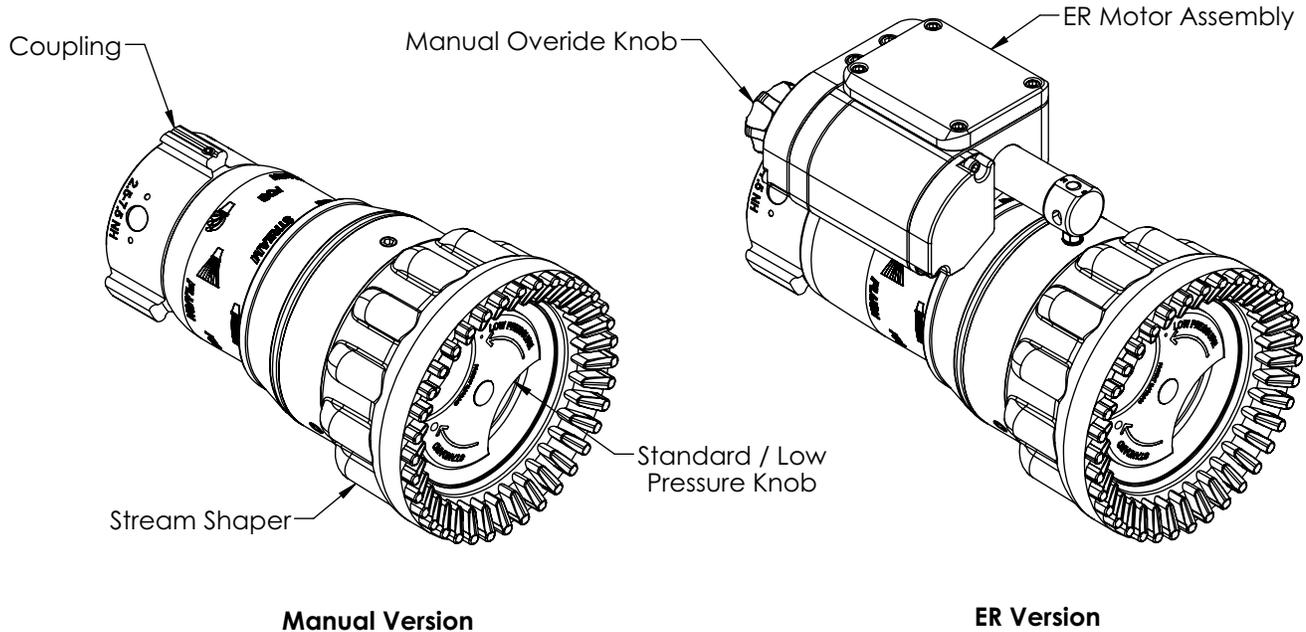


Figure 3.1

### 3.2 MECHANICAL SPECIFICATIONS

	Manual Version	ER Version
<b>Weight</b>	9.5 lbs (4.3kg)	14.2 lbs (6.4kg)
<b>Flow Range</b>	300 - 800 GPM (1100 - 3000 L/min)	
<b>Operating Pressure (Standard Mode)</b>	100 psi (7 bar)	
<b>Operating Pressure (Low Mode)</b>	55 psi (3.7 bar)	
<b>Maximum fog angle</b>	103°	
<b>Operating temperature range of fluid</b>	33 to 120°F / 1 to 50°C	
<b>Storage temperature range</b>	-40 to 150°F / -40 to 65°C	
<b>Materials used</b>	Aluminum 6000 series hard anodized MIL8625 class 3 type 2, stainless steel 300 series, nylon 6-6, nitrile rubber	

Table 3.2

### 3.3 ELECTRICAL SPECIFICATIONS

<b>Nominal Operating Voltage</b>	12 or 24 VDC
<b>Maximum Voltage</b>	32 VDC
<b>Minimum Voltage - 12 Volt System</b>	9 VDC at monitor
<b>Minimum Voltage - 24 Volt System</b>	18 VDC at monitor

Table 3.3

### 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 ELECTRIC INSTALLATION

For nozzle installation, refer to LIY-500 Remote Control (RC) Monitor Electrical Controls (shipped with TFT monitors or available at tft.com).

**WARNING** 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.

### 3.6 AUTOMATIC NOZZLE OPERATION

Automatic nozzles operate by sensing the pressure at the nozzle inlet and adjusting the discharge opening to maintain a constant pressure throughout the flow range of the nozzle. For example, when the pressure at the inlet increases, the exit area is automatically increased until the inlet pressure returns to the nominal pressure of the nozzle.

### 3.7 PATTERN CONTROL

TFT nozzles have full pattern control from straight stream to wide fog. Turning the stream shaper clockwise (as seen from the operating position behind the nozzle) moves the shaper to the straight stream position.

For ER versions, press and hold the FOG or STRAIGHT STREAM buttons on the nozzle controls to move the stream shaper. Release the button when the desired pattern is reached.

Since the stream trim point varies with flow, the stream should be “trimmed” after changing the flow to obtain the straightest and farthest reaching stream. To properly trim the stream, first open the pattern to narrow fog. Then close the stream to parallel to give maximum reach. Turning the shaper further forward will cause stream crossover and reduce the effective reach of the nozzle.

**NOTICE** Turning the shaper further forward will cause stream crossover and reduce the reach of the nozzle.

**CAUTION** Dents or nicks in the nozzle tip can seriously affect the stream reach or pattern, which may increase the risk of injury due to exposure. Care must be taken to avoid dents or nicks in the nozzle tip.

### 3.8 STANDARD/LOW PRESSURE KNOB

For situations where 100 PSI at the nozzle is impractical, the Master Force dual pressure knob may be switched to low pressure mode. In the low pressure mode, the nozzle pressure is reduced by about 50%, while maintaining a usable stream and increasing the flow. The nozzle operator must be prepared for a change in reaction when changing modes.

To switch to the low pressure mode, shut off water flow to the nozzle and turn knob at front of nozzle counterclockwise (when viewed from front). Nozzle will now operate at reduced pressure. To return to 100 PSI operation, shut off water flow to the nozzle and turn knob clockwise.

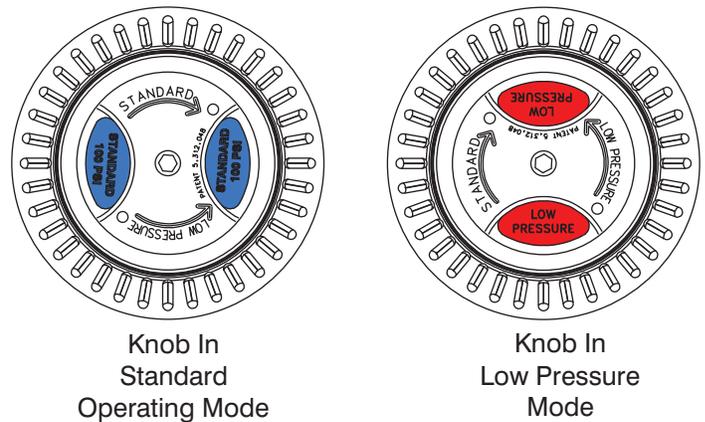


Figure 3.8

## 4.0 FLUSHING DEBRIS

Small debris may get caught inside the nozzle. This trapped material will cause poor stream quality, shortened reach and reduced flow. To remove this trapped debris, the manual nozzle can be flushed as follows:

1. While still flowing water, turn the SHAPER counterclockwise past the full fog position, allowing debris to pass through. Increased resistance will be felt on the SHAPER as the nozzle goes into flush.
2. Rotate the SHAPER clockwise and out of flush to continue normal operation.

Electric Remote Nozzles are flushed from the control panel by pushing the FOG button twice. Smart Stream controls both stream shape and flush. Requiring a second button push avoids unintentional flush.

To Flush an Electric Remote Nozzle:

1. While flowing water, push and hold FOG to move the nozzle to full fog.
2. Push the FOG button a second time to move the nozzle to flush by increasing the opening size further than the largest flow position.
3. Push the STRAIGHT STREAM button to return the nozzle to normal flow and adjust the stream shape as desired.

During flush the nozzle reaction will decrease as the pattern becomes wider and the pressure drops. The nozzle operator must be prepared for an increase of nozzle reaction when returning the nozzle from the flush position to maintain stable operation of portable monitors.



**Large amounts or pieces of debris may be unflushable and can reduce the flow of the nozzle resulting in an ineffective flow. In the event of a blockage, it may be necessary to retreat to a safe area, uncouple the nozzle and remove debris.**

## 5.0 USE WITH FOAM

The nozzle may be used with foam solutions. Refer to fire service training by the Authority Having Jurisdiction (AHJ) for the proper use of foam.



**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. Follow procedures established by the AHJ for the specific fuel and conditions.**



**Improper use of foam or using the wrong type of foam can result in illness, injury, or damage to the environment. Follow foam manufacturer's instructions and fire service training as directed by the AHJ.**

## 5.1 FOAM ASPIRATING ATTACHMENT

A low expansion aspirating attachment may be used with nozzles to increase the expansion ratio. These foam tubes attach and detach quickly from the nozzle. As expansion ratio is increased, the reach of the nozzle will decrease due to the greater amount of bubbles in the stream and their ability to penetrate the air. Generally, the straight stream reach with foam is approximately 10% less than with water only. Actual results will vary based on brand of foam, hardness of water, temperature, etc. For specific information, see LIA-025 (MANUAL: Foam Attachments for TFT Nozzles).

## 6.0 FLOW CHARACTERISTICS

### 6.1 FLOW CHART

Within its flow range, the Master Force automatic nozzle operates at the nominal pressure of 100 PSI (7 BAR, 700 KPA). The following chart shows the typical performance of this nozzle.

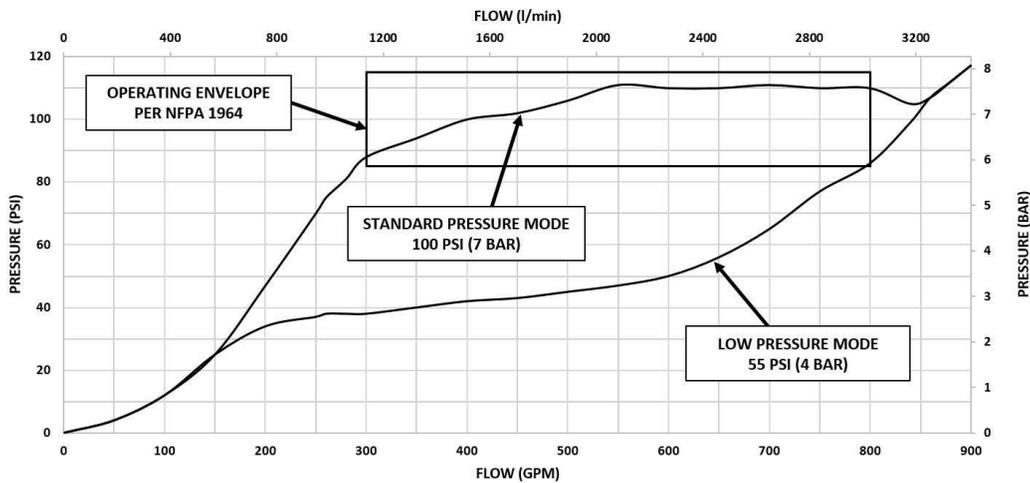


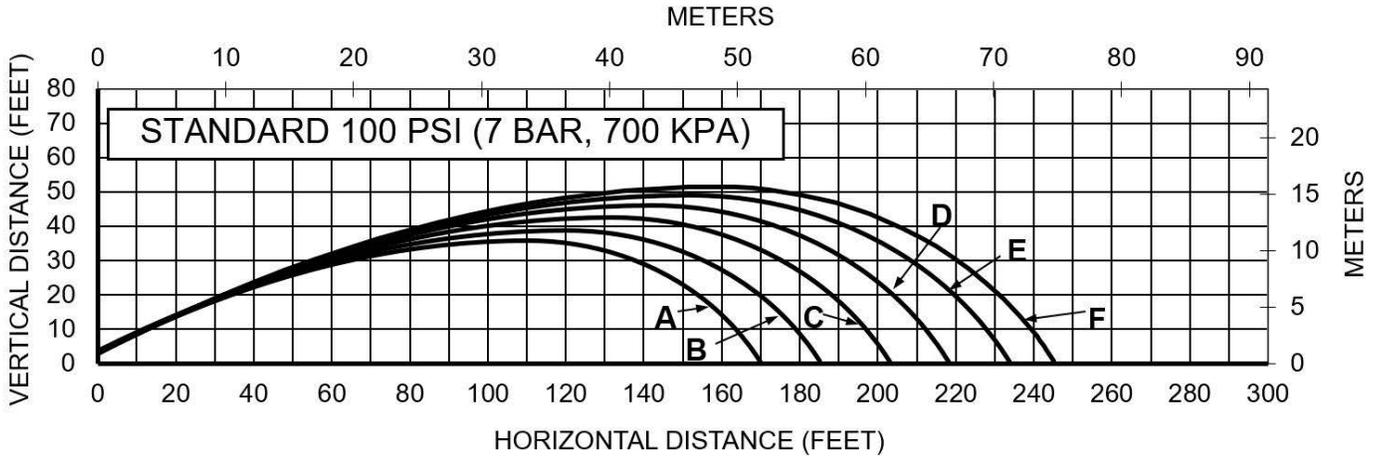
Figure 6.1A

## 6.2 REACH AND TRAJECTORY

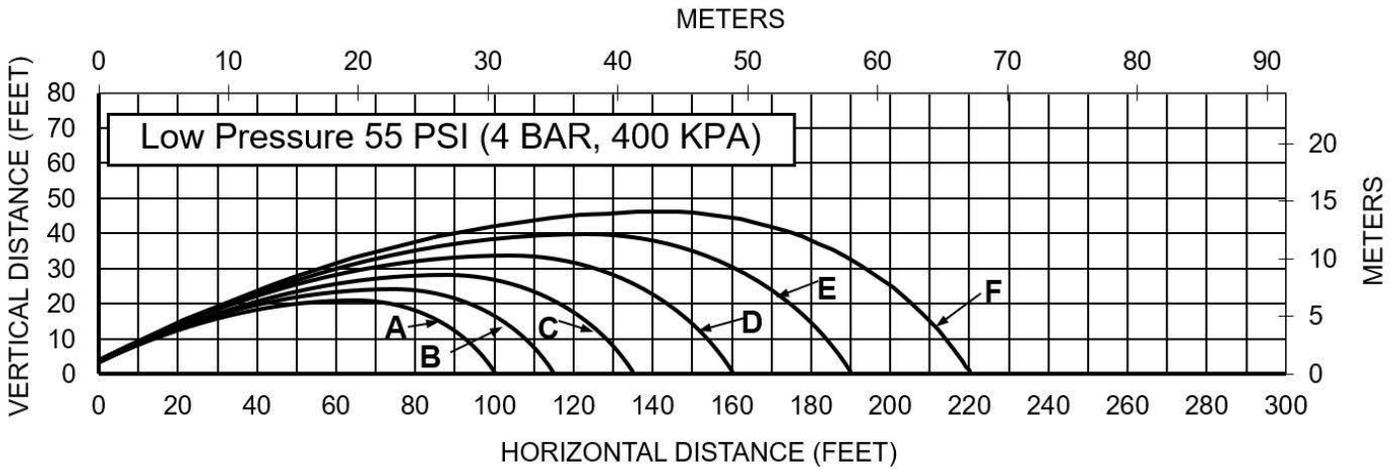
Tables and graphs in this section give the stream trajectory for the Master-Force nozzle at various flows.

Notes on trajectory graphs:

- Graphs show approximate effective stream trajectory at 30 degrees elevation in no wind conditions. Distance to last water drops approximately 10% farther.
- To estimate trajectories at elevations other than 30 degrees, refer to document LTT-135, available at tft.com.
- Trajectories shown are for water. The addition of foam is expected to decrease the reach by 10%.
- Tail or head winds of 20 MPH (30 KPH) may increase or decrease the range approximately 30%.



CURVE	GPM FLOW	LBS REACTION	CURVE	L/min FLOW	KGf REACTION
A	300	160	A	1100	70
B	400	210	B	1500	95
C	500	260	C	2000	120
D	600	320	D	2300	145
E	700	370	E	2700	170
F	800	420	F	3000	190



CURVE	GPM FLOW	LBS REACTION	CURVE	L/min FLOW	KGf REACTION
A	300	60	A	1100	30
B	400	140	B	1500	65
C	500	185	C	2000	85
D	600	225	D	2300	100
E	700	300	E	2700	140
F	800	385	F	3000	175

## 7.0 WARRANTY

Go to [tft.com](http://tft.com) for all warranty information.

## 8.0 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. Do not drop or throw equipment.

When reassembling the automatic nozzles after repairs or for preventive maintenance, coat the seal on the piston, the inner bore of the cylinder and the shaft slide surface with a waterproof lubricant such as Molykote #112 Silicone Grease. Lubrication is required to assure continued smooth operation. The frequency of lubrication will depend on frequency of usage and storage conditions. Nozzles must be checked regularly to assure proper operation.

Contact factory for parts lists and exploded views for particular models. Each nozzle is identified by a serial number located on the nozzle's stream shaper.

### 8.1 FIELD LUBRICATION

All Task Force Tips nozzles are factory lubricated with high quality silicone grease. This lubricant has excellent wash out resistance, providing long term performance. If your agency has unusually hard or sandy water, the moving parts of the nozzle 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 for signs of damage. **IF THE NOZZLE IS OPERATING CORRECTLY, THEN NO ADDITIONAL LUBRICANT IS NEEDED.** Any nozzle that is not operating correctly should be immediately removed from service. The nozzle can be returned to the factory at any time for a complete checkup and re-lubrication with silicone grease.

The field use of Break Free CLP (spray or liquid) lubricant will help to temporarily restore the smooth and free operation of the nozzle. These lubricants do not have the washout resistance and long-term performance of the silicone grease. Once Break Free CLP is applied, re-application will be needed on a regular basis until the nozzle can be returned to the factory for a complete checkup and re-lubrication with silicone grease.



**Aerosol lubricants contain solvents that can swell O-Rings if applied in excess. The swelling can inhibit smooth operation of the moving parts. When used in moderation, as directed, the solvents quickly evaporate without adversely swelling the O-Rings.**

### 8.2 SERVICE TESTING

In accordance with NFPA 1930, 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.

### 8.3 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](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.



**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.**

## 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**, 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. Debris screen is free of debris
3. Coupling is tight and leak free
4. Nozzle operates freely through full range and regulates flow
5. Nozzle flow is adequate as indicated by pump pressure and nozzle reaction
6. Shaper turns freely and adjusts pattern through full range
7. Shaper detent (if so equipped) operates smoothly and positively.

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

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



**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.**