



T&T Pump Co., Inc.  
Fairmont, WV 26554  
Phone (304) 366-1300  
Fax (304) 366-1398

# S Series O&M Manual

## High Pressure Submersible Modular Booster Pump

S75MB, S77MB, S81MB, S83MB



Rev. 10-26-09



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## 1. Limitations to Operation and General Notes

**!Caution!**

To prevent hearing damage, wear hearing protection when in environments where sound levels are consistently above an 8-hour weighted average of 85 decibels or greater.

### CAUTION

Read this manual before starting this pump!

Max water temp! Water temperature should not exceed 85° F.

Do not run this pump dry! The inlet pressure should be monitored and not be allowed to drop below 20psi.

Install pressure gauges! Pressure gauges should be installed at the inlet and at the discharge. For present and future trouble shooting we must know the inlet and discharge pressures.

Install flow meters! Flow meters should be installed between the pump discharge and throttle valve. To ensure accurate readings, follow the manufacturer's specifications for proper installation.

Never throttle pump at suction! This must be controlled at the discharge.

Control valve at discharge! For proper control of flow and pressures, a control valve must be installed at the discharge end of the pump.

Designated flow range! Operation of pump at either the extreme right or left of the curve may cause damage to the pump. Operate the pump in the designated area of the performance curve.

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Manually bleed air from the system! Install an air bleeder as close to the suction inlet as possible. Bleed the air from the system before starting the pumping system. Trapped air in the pump may cause immediate damage to the pump.

DO NOT OPERATE THIS PUMP MODEL

ABOVE	_____	PSI
OR BELOW	_____	PSI

(REFER TO PUMP PERFORMANCE CURVE)

WARRANTY MAY BE VOIDED IF ABOVE CONDITIONS ARE NOT FOLLOWED

For start up assistance contact T&T Pump Co. Inc. immediately at (304) 366-1300

The modular booster pump is fully tested at the factory and will require little maintenance. It is very important to have at least 20 PSI incoming pressure. Failure to have incoming pressure will lead to motor or complete pump failure.

Never run the modular booster pump at shut off head. It will lead to severe damage of the pump's staging assembly, possible overheating, or possible failure of the motor.

The modular booster pump is designed to boost pressure and should not be used as a shallow well pump. If pump is used to pull water, it may damage the staging assembly and pull fluid out of the motor leading to motor failure.

The modular booster pump is designed to deliver fluids under pressure and care should be taken to install the properly rated fittings to insure a safe and reliable installation.

Pump must be mounted on strong flat (level) platform. Never hang piping from pump. Always support piping so that no piping weight will be on pump.

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After installation, it is recommended to fill pump system with water and let set 2-3 hours if possible. This will allow motor to purge entrapped air. Always bleed pump casings before starting.

Never run pump at shut off. This will cause the water inside the motor to super heat and damage the motor and staging assembly.

Always check for proper rotation (clockwise from suction end, the unit will torque counter clockwise at start-up) pump will only operate at 1/3 its rated performance in reverse rotation.

Never pump solids with the modular booster pump. Suspended solids may damage staging assembly.

## **2. Applications**

The high pressure submersible modular booster pump satisfies many applications that require...

- Seal-less pumps
- Pumps able to cope with high system pressure
- High pump heads
- Silent operation
- Operation with minimum maintenance

Typical applications include:

- Water treatment, particularly ultra-filtration and reverse osmosis
- Production of fresh water from sea water desalination
- Pressure booster
- Closed circulation systems with high static pressure

## **3. Pumped Liquids**

The liquid to be pumped must be non-explosive and contain no abrasive particles or fibers. The liquid must not attack the pump material chemically or mechanically.

## **4. Construction**

The pumps used in the high pressure submersible modular boosters are modified submersible water well pumps. These pumps are contained in a 316ss casing. The pump end is available in either 304ss or 316ss. The wetted parts of the motor are 316ss. The suction and discharge ends of the pump mate with victaulic-type couplings.

## **5. Motor**

The motor is an asynchronous submersible squirrel cage motor of the canned type with propylene glycol/water-lubricated bearings.

### **5.1 Storage**

The submersible motors are a water-lubricated design. The filling solution consists of a mixture of deionized water and Propylene Glycol, a non-toxic anti-freeze. The solution will prevent damage from freezing for temperatures down to -40°F. Repeated freezing and thawing should be avoided to prevent possible loss of solution.

### **5.2 Frequency of starts**

The average number of starts per day over a period of months or years influences the life of the submersible pumping system. The pump size, tank size, and other components should be selected to keep the starts per day as low as practical for longest life, based on the maximum number of starts per day as shown in the table below.

Motor rating	Max. starts per 24hr day	
	Single phase	Three phase
Up to ¾ hp	300	300
1hp thru 5hp	100	300
7-1/2hp thru 30hp	50	100
40hp and above		100

Motors should be allowed to run for a minimum of one minute to dissipate heat build up from the starting current.



## **5.3 Mounting Position**

Motors are suitable for operation in mounting positions from vertical shaft up to horizontal. If 4 inch motors through 2hp are started more than 10 times per day, it is recommended the shaft be tilted 15° from horizontal to minimize coast down wear of the upthrust washer.

## **5.4 Water Temperature**

The submersible motors are designed to operate with loading up to maximum service factor horsepower in water up to 86°F. If the motors are operated in water over 86°F, the motor horsepower must be increased to maintain safe motor operating temperatures.

## **6. Automatic Control Devices**

To protect the pumps against dry-running and to ensure the minimum flow of cooling water past the motors, the system must be fitted with flow and pressure control devices.

A pressure switch must be installed on the suction side in accordance with the estimated inlet pressure.

All discharge connections to the system must be fitted with flow switches that will stop the system at the preset minimum flows.

The above control devices ensure a correct inlet pressure and a minimum flow of cooling water past the motor.

Flow switch cutting-in after a fault must be adjusted for a minimum time delay equivalent to the maximum starting frequency of the system.

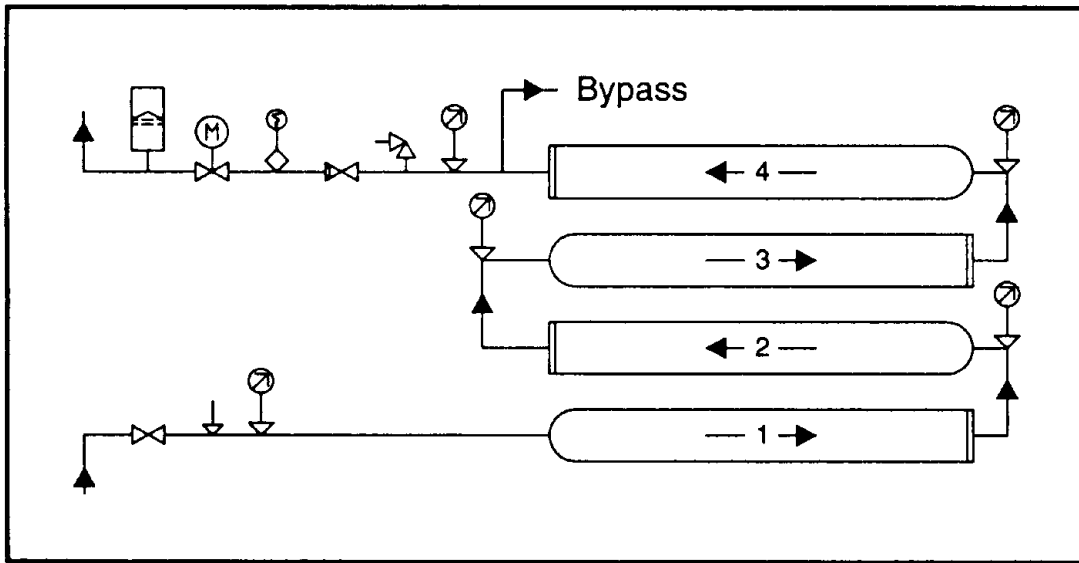
## **7. Periodic Inspection**

Depending on the number of operating hours of the pumps, the following should be checked at suitable intervals:

1. Flow
2. Starting frequency
3. Control and protective devices
4. Liquid temperature
5. Minimum flow through modules during operation

## 8. Series Operation (High Pressure)

If a pressure higher than that of a single module is required, several modules may be connected in series. The resulting pressure is found by adding the pressures of each individual module. The flow will be the same as for one pump. Pressure shall not exceed 500psi at the inlet of any pump in series. Maintain 20psi or greater at each pump inlet.



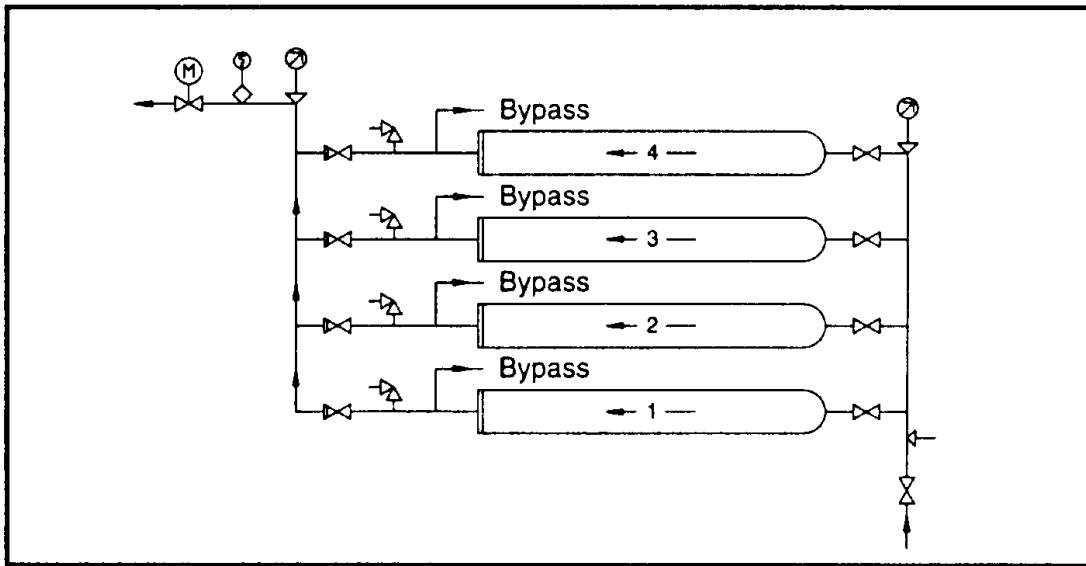
### ***Legend***

Air escape valve	
Closing valve	
Check (Non-return) valve	
Pressure switch	
Flow switch	
Pressure gauge	
Motor operated valve	
Diaphragm tank	



## 9. Parallel Operation (High Flow)

If a flow higher than that of a single module is required, two or more identical models (same performance curves) may be connected in parallel. The resulting flow is found by adding the flows of each individual module. The pressure will be the same as for one pump.



### ***Legend***

Air escape valve	
Closing valve	
Check (Non-return) valve	
Pressure switch	
Flow switch	
Pressure gauge	
Motor operated valve	
Diaphragm tank	

## **10. Troubleshooting**

### **Troubleshooting Guide**

#### **Pump will not start**

- Check to make sure all power connections are correct and there is power to the control box.
- Check to make sure all circuit breakers or fuses are working and are the proper size for the current they will be carrying.
- Check to make sure that the proper power (voltage, phase, and frequency) is being used.
- Check motor and pump to verify that neither are bound or locked and can be rotated easily.

#### **Pump starts but overload or breaker trips**

- Check to verify the motor and starter are correctly sized for flow and pressure point that the pump is running at. You may be overloading your motor.
- Check to make sure voltage is neither too low or too high. Either condition can cause overloads or breakers to trip.
- Make sure pump is properly lubricated and not binding. Check to see if pump is plugged up with silt or solids.
- Make sure all valves are open or set properly. Never run pump dry. Dry running will destroy staging.

#### **Pump runs but does not deliver water**

- Make sure pump has been primed and purged of all air.
- Check to see that all valves are open so pump is not starving for water. Be sure check valves are installed correctly. You must have a minimum of 20 PSI of incoming pressure.
- Check all strainers in system to verify that water can flow freely.

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- Make sure pump is running in the proper rotation. The correct rotation for the modular booster pump is CLOCKWISE from suction end of pump (the unit will torque counter-clockwise at start-up).
- Check system head versus pump curve to make sure pump is not running at shut off.
- Inspect motor to verify it is running the proper speed for the pump. The wrong speed motor can greatly affect pump performance.

## **Pump runs but at reduced capacity or head**

- Pump may be running backwards. Check motor for proper rotation. Refer to motor manual for instructions for changing rotation.
- Check the discharge pressure and compare to pump performance curve to verify that pump is not running at or near shut off. Pump may be too small for your application.
- Check for system by-passing. Inspect all relief valves and by-pass gate or globe valves for correct settings.
- Check for leaking or broken pipe in discharge system.
- Discharge piping may be partially plugged with chemical deposits.
- Strainer or filter system may be partially plugged and requires cleaning or replacing.
- Pump may be worn by pumping abrasive materials. The pump may need repaired or replaced.

If you need to contact a service center, please get the following information to help the technician define your problem.

- Pump model, size, and serial number.
- Date pump was received and date pump was installed.
- How long pump was used before problems started?
- What is the actual voltage being used?
- What is running amperage when pump is running?
- Was the electrical system checked for grounds or open circuits?
- How many starts per hour does the system perform?

If you are still experiencing problems, please contact:  
T & T Pump Co., Inc. at 304-366-1300



## **11. Limited Warranty Statement**

T&T Pump Co., Inc. warrants that its products are free from defects in material and workmanship for a period of one (1) year from the date of documented installation or eighteen months from date of shipment, whichever ever occurs first.

DURING the warranty period and subject to the conditions hereinafter set forth, T&T Pump Company, Inc. will repair or replace to the original user or consumer parts, which prove defective due to defective materials or workmanship of T&T Pump Co., Inc. Contact your nearest authorized T&T Pump distributor or T&T Pump Company for warranty service. At all times, T&T Pump Company shall have and possess the sole right and option to determine whether to repair or replace defective equipment, parts or components.

WARRANTY EXCEPTIONS: Seals, piston cups, packing and liners are covered for a period of ninety (90) days. All engines and motors are warranted only to the extent of the warranty given by the engine and motor manufacturer; and only when proper starting equipment is supplied and used in accordance with applicable codes, ordinances, and good trade practices.

LABOR, ETC.: T&T Pump Company shall IN NO EVENT be responsible or liable for the cost of field labor or other charges incurred by any customer in removing and/or reaffixing any T&T Pump Company product, part, or component thereof.

THIS warranty will not apply: (A) to defects or malfunctions resulting from failure to properly install, operate, or maintain the unit in accordance with printed instructions provided; (B) to failures resulting from abuse, accident, or negligence; (C) to normal maintenance services and the parts used in connection with such service; (D) to units which are not installed in accordance with applicable codes, ordinances, and good trade practices; (E) if the unit is moved from its original installation location and; (F) if unit is used for purpose other than for what it was designed and manufactured.

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**RETURN OR REPLACEMENT COMPONENTS:** Any item to be replaced under this Warranty must be returned to T&T Pump Company at Fairmont, West Virginia, or such other place as T&T may designate, freight both ways to be paid by customer.

**PRODUCT IMPROVEMENTS:** T&T Pump Company reserves the right to change or improve its product or any portions thereof without being obligated to provide such a change or improvement.

**WARRANTY EXCLUSIONS:** As to any specific T&T Pump Company product, after the expiration of the time period of the warranty applicable thereto as set forth above, **THERE WILL BE NO WARRANTIES, INCLUDING ANY IMPLIED WARRANTIES, OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.**

**LIABILITY LIMITATION:** In no event shall T&T Pump Company be liable or responsible for consequential, incidental, or special damages resulting from or relating in any manner to any T&T product or parts thereof.

**T&T PUMP CO., INC. RR #8, BOX 343, FAIRMONT, WV 26554  
PHONE: 304-366-1300 FAX: 304-366-1398**

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## **Appendix**

A. RGT Form (Return Goods Tag) NEXT PAGE

**Customer Service Department**

**Phone (304) 366-1300**

**Return Goods Authorization Request**

**Fax (304) 366-1398**

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Please complete this form. Fax or mail the completed form to T&T to be assigned a return goods number (RGT#). Place a copy of the RGT form with assigned RGT# with the item to be returned. Return freight prepaid to: **T&T Pump Co., Inc., Rt 8 Box 343, Fairmont, WV 26554**

<b>Customer:</b>	<b>Phone:</b>	<b>Fax:</b>
<b>Address:</b>	<b>City:</b>	<b>State:</b>
<b>Requested by:</b>	<b>OEM / End User:</b>	
<b>Pump Model:</b>	<b>Serial #:</b>	<b>Install Date:</b>
<b>Failure Date:</b>	<b>Motor Mfg:</b>	<b>Motor Tag info:</b>
<b>Pump Application:</b>	<b>Fluid Pumped:</b>	<b>Water temp:</b>

**Warranty consideration:**  yes  no

**Failure/problem description (be specific):**

**Range of operation**

<b>Lowest</b>		<b>Normal</b>		<b>Highest</b>	
<b>GPM</b>	<b>PSI</b>	<b>GPM</b>	<b>PSI</b>	<b>GPM</b>	<b>PSI</b>

- **System location:**
- **Suction pressure at pump inlet:**
- **Discharge pressure:**
- **Does system utilize a soft start:**  
-If so, time in seconds:
- **Is the pump used in the cleaning operation of membranes:**
- **Are chemicals run through the pump:**
- **How long is the cleaning operation:**
- **Was the failure/problem immediate:**

**Motor performance info**

<b>Line voltage</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>
<b>Line amperage</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>

**Motor protection used:**

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**Signature:**

**Date:**

**RGT# assigned:**

**Date assigned:**