

MAXI-FLO[®]



STAINLESS STEEL AND TITANIUM HEAT EXCHANGER FOR SWIMMING POOLS & SPAS INSTALLATION AND MAINTENANCE MANUAL

⚠ WARNING

Before proceeding with installation and operation, read entire manual carefully. Failure to do so can cause injury or property damage.

NOTICE

Warranty Registration Card must be filled out by the customer and mailed within thirty (30) days of installation in order to gain warranty coverage.

When receiving a Triangle Tube product, any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

Leave all documentation received with owner for future reference.

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Following terms are used to bring attention to the presence of various risk levels or to important information concerning product life.



DANGER
Indicates presence of a hazard which will cause severe personal injury, death or substantial property damage if ignored.



WARNING
Indicates the presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.



CAUTION
Indicates the presence of a hazard which will or can cause minor personal injury or damage if ignored.



NOTICE
Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.



Prolonged Immersion May Cause Hypothermia

Hypothermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6°F. The symptoms of hypothermia include dizziness, fainting, drowsiness, lethargy, and an increase in the internal temperature of the body. The effects of hypothermia include:

- Unawareness of impending hazard;
- Failure to perceive heat
- Failure to recognize the need to exit pool or tub
- Physical inability to exit pool or tub
- Fetal damage in pregnant women; and
- Unconsciousness resulting in a danger of drowning.



The use of alcohol, drugs or medication can greatly increase the risk of fatal hypothermia in pools and tubs.



When using this equipment, basic safety precautions should always be followed, including the following:

1. READ AND FOLLOW ALL INSTRUCTIONS

2. To reduce the risk of injury:

- a) The water in a pool or tub should never exceed 104°F (40°C). A water temperature in excess of 104°F is considered unsafe for all persons. Lower water temperatures are recommended for extended use (exceeding 10 - 15 minutes) and for all young children.
- b) Since excessive water temperatures have a high potential for causing fetal damage during the early months of pregnancy, pregnant or possibly pregnant women should limit pool or tub water temperatures to 100°F (38°C).
- c) Before entering a pool or tub, the user should measure the water temperature at several occupant locations using an accurate thermometer since the tolerance of water temperature-regulating devices may vary as much as +/-5°F (+/-3°C).
- d) Alcohol, drugs or medication should not be used before or during pool or tub use since their use may lead to unconsciousness with the possibility of drowning.
- e) Obese persons and persons with a medical history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a pool or tub,
- f) Persons using medication should consult a physician before using a pool or tub since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation

Installation

CODE COMPLIANCE

Maxi-Flo Heat Exchanger installation must conform with the instructions in this manual and where applicable:

- Local, state, provincial, and national codes, laws, regulations and ordinances.

LOCATING THE MAXI-FLO HEAT EXCHANGER

- The Maxi-Flo® is not intended for outdoor installation. The unit must be sheltered from direct contact of rain and moisture.
- Keeping the distance between boiler and Maxi-Flo® to a minimum will:
 - reduce piping heat loss
 - provide minimal friction loss
- The Maxi-Flo® should not be located in an area where possible water leakage will result in damage to the appliance or to the surrounding structure.

WARNING

It is recommend to install the Maxi-Flo® in an area at or above the pool water level. Installing the Maxi-Flo® in an area below the pool water level, such as a basement, may result in extensive flooding of the area and potential draining of the pool.

AUTOMATIC CHLORINATORS AND CHEMICAL FEEDERS

- All chemicals must be introduced and completely diluted into the pool or spa water before being circulated through the heater.
- Do not place chlorine tablets or bromine sticks in the skimmer. High chemical concentrations will result when the pump is not running (i.e. overnight).
- Chlorinators must feed downstream of the unit and have an anti-siphoning device to prevent chemical back-up into the heat exchanger when the pump is shut-off.

WARNING

High chemical concentrations from improperly adjusted feeders and chlorinators can cause rapid corrosion to the heat exchanger. Bypassing the heat exchanger, is recommended, prior to stabilization of pH at 7.2 to 7.8 level and chlorine residual at 1.0 to 3.0 ppm.

NOTICE

Equip the chlorinator with an anti-siphoning device to prevent high concentrations of chloride from siphoning back into the heat exchanger after the filter pump shuts off.

- The chlorinator should not operate unless the filter pump is running.
- If the chlorinator is controlled by an independent timer, ensure the timer is synchronized with the filter pump timer.

OPERATING RESTRICTIONS

- Maximum boiler water temperature is 230°F.
- Maximum working pressure for Maxi-Flo® is 140 psig (primary and secondary) for stainless steel, and 425 psig primary and 70 psig secondary for titanium.
- Recommended water chemistry levels:

Free Chlorine	.....1.0 - 3.0ppm
Bromine	.....2.0 - 4.0ppm
pH	.....7.2 - 7.8
Total Alkalinity	.....60 - 120ppm
Calcium Hardness	.....200 - 1,000ppm
Langelier Saturation Index (S.I)	.....(-)0.5 to (+)0.5
Cyanuric Acid	.....30 - 150ppm
Total Dissolved Solids (TDS)	.....< 1000 ppm
Copper	.....0ppm
Chloride	.....140ppm
Salt Concentration	.....80 ppm
- Water chemistry restrictions for Titanium Maxi-Flo:

Free Chlorine	.....0 - 15ppm
Salt concentration	.....0 - 10,000ppm

GENERAL PIPING

- Typical pool or spa piping is plumbed as follows (see Figures 1 & 2):
 - Inlet of the filter is piped directly to the discharge side of the filter pump.
 - Outlet of the filter is piped to the inlet side of the Maxi-Flo® heat exchanger.
 - The return line to the pool, spa or chlorinator is piped to the outlet of the Maxi-Flo® heat exchanger.
- Standard plastic pipe (PVC) should not be connected directly to the Maxi-Flo® heat exchanger.
 - Install stainless steel nipples (available from Triangle Tube) between the heat exchanger and any plastic piping. Check local codes for conformity. Does not apply to the MF-135 and MF-260T.
 - Install high temperature plastic pipe (CPVC) nipples between the heat exchanger and any plastic piping on MF-135T and MF-260T models.
- In lieu of stainless steel nipples installer may use high temperature plastic pipe (CPCV). Check local code for conformity. Applies to all Models.
- Ensure all threaded connections are properly sealed with piping compound suitable for high temperature and pool applications.
- The MF-135, MF-200, MF-260 and MF-400 should be mounted in a vertical position to prevent entrapment of air.
- The MF-80, MF-135T and MF-260T may be mounted in a horizontal or vertical position.
- The MF-135T and MF-260T requires the use of rubber couplings to aid in sealing the pool piping/heat exchanger connection. See Fig. 4 page 7.

RECOMMENDED TEMPERATURE

- Swimming pool water temperature of 80°F
 - US Swimming Rules and Regulations require pools for competition, water temperature must be at 78° to 80°F.
- Spa and tub water temperatures should not exceed 104°F.

WARNING

Water temperatures in excess of 104°F is considered unsafe for all persons. Lower temperatures are recommended for extended use (exceeding 10 to 15 minutes) and for young children.

MAXI-FLO WIRING

CAUTION

Electrical shock hazard. Can cause severe personal injury, death or substantial property damage. Disconnect power before installing and/or servicing.

General

- All line voltage wiring must be a minimum of 14 gauge and installed in accordance with:
 - USA - National Electrical Code ANSI/NFPA 70 - latest edition and any other national, state or local code requirements having jurisdiction.
 - Canada - C.S.A. C22.1 Canadian Electrical Code Part 1 and any other national, provincial and local code requirements having jurisdiction.
- For recommended Maxi Flo control wiring, see Figure 3.
 - For availability of the Tekmar 150 Temperature Controller contact the nearest Triangle Tube representative.
 - For availability of the McDonnell & Miller FS4-3 flow switch contact the nearest ITT representative.

WATER CHEMISTRY

Pool

- The mineral content of the pool water will increase daily due to natural evaporation and addition of algicidal and sanitizing chemicals. This increase in mineral content may cause damage to the heat exchanger.

Spa

- The size, higher temperature and heavy usage can create various chemical levels.

Installation

- Not maintaining proper chemical levels and/or not changing the water on a regular basis can promote unsanitary water conditions.



Not maintaining proper water chemistry levels as listed in the Operating Restrictions section can cause damage to the heat exchanger and void any warranty claims.

CORROSION

The corrosive action of the pool or spa water on the heat exchanger is increased by the following conditions:

- a) Low pH - acidity
- b) Low Total Alkalinity - bicarbonates
- c) Low Calcium Hardness - soft water

WATER CHEMISTRY TESTING

- Pool/Spa owner should purchase and use regularly a test kit that will at a minimum measure chloride, pH level and alkalinity.
- A professional service technician should perform a more extensive chemical testing on a periodic basis.

START-UP PROCEDURES

1. Close isolation valves on the inlet and outlet piping of the heat exchanger, isolating the heat exchanger from the pool or spa, and open the by-pass piping valve.
2. Remove all timing controls, allowing the filtering system to run continuously.
3. Establish proper water chemistry in the pool or spa.
4. After establishing proper water chemistry, open the isolation valves at the heat exchanger and close the by-pass valve.
5. Set the thermostatic control to the desired water temperature.
6. Continue running the filter system until the water reaches the desired temperature setting.

SPRING AND FALL OPERATION

During cold periods (those above freezing weather) maintain a minimum temperature setting (65°F to 70°F) for periodic usage. This will prevent the water from becoming chilled and will reduce the amount of time to reheat to the desired temperature.

WINTERIZING

Pool/Spa

- Completely drain the pool/spa piping system by opening the drain valve shown in Figure 1 and 2.
- Use compressed air to blow out any standing water in the piping and filter system components.

Boiler

- If the heat exchanger is mounted in an unheated area, isolate and drain the boiler system piping at the heat exchanger.
- Use compressed air to blow out any standing water in the system piping and heat exchanger.
- The heat exchanger is compatible with inhibited propylene glycol solution with a maximum 50/50 mixture.



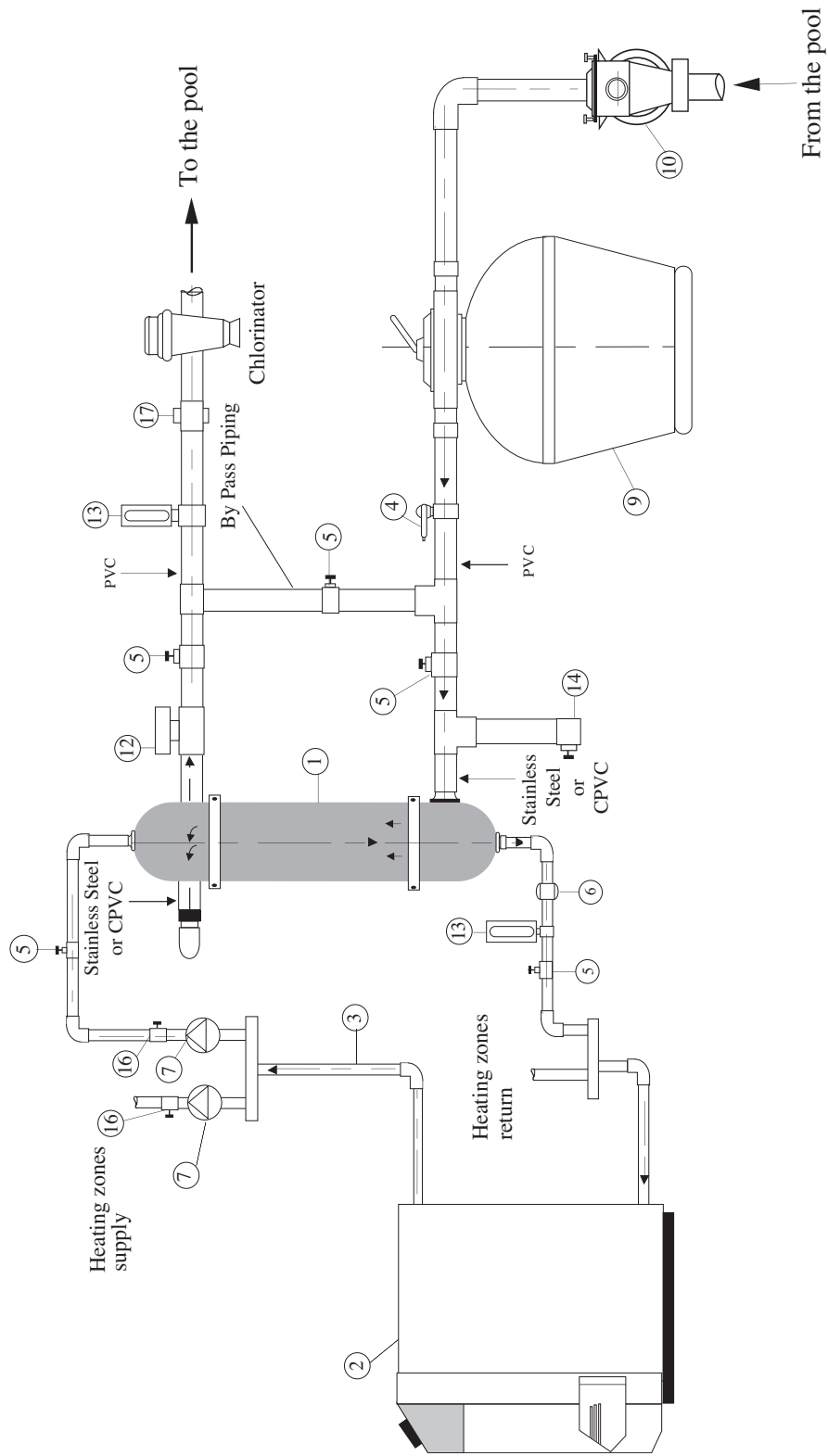
Do not use automotive or ethylene glycol antifreeze, or any undiluted antifreeze. This can cause severe personal injury, death or substantial property damage.

- Check the pH level of the glycol solution. If different than a pH level of 7.0, the antifreeze must be replaced immediately.

PERIODICAL MAINTENANCE - MAXI-FLO®

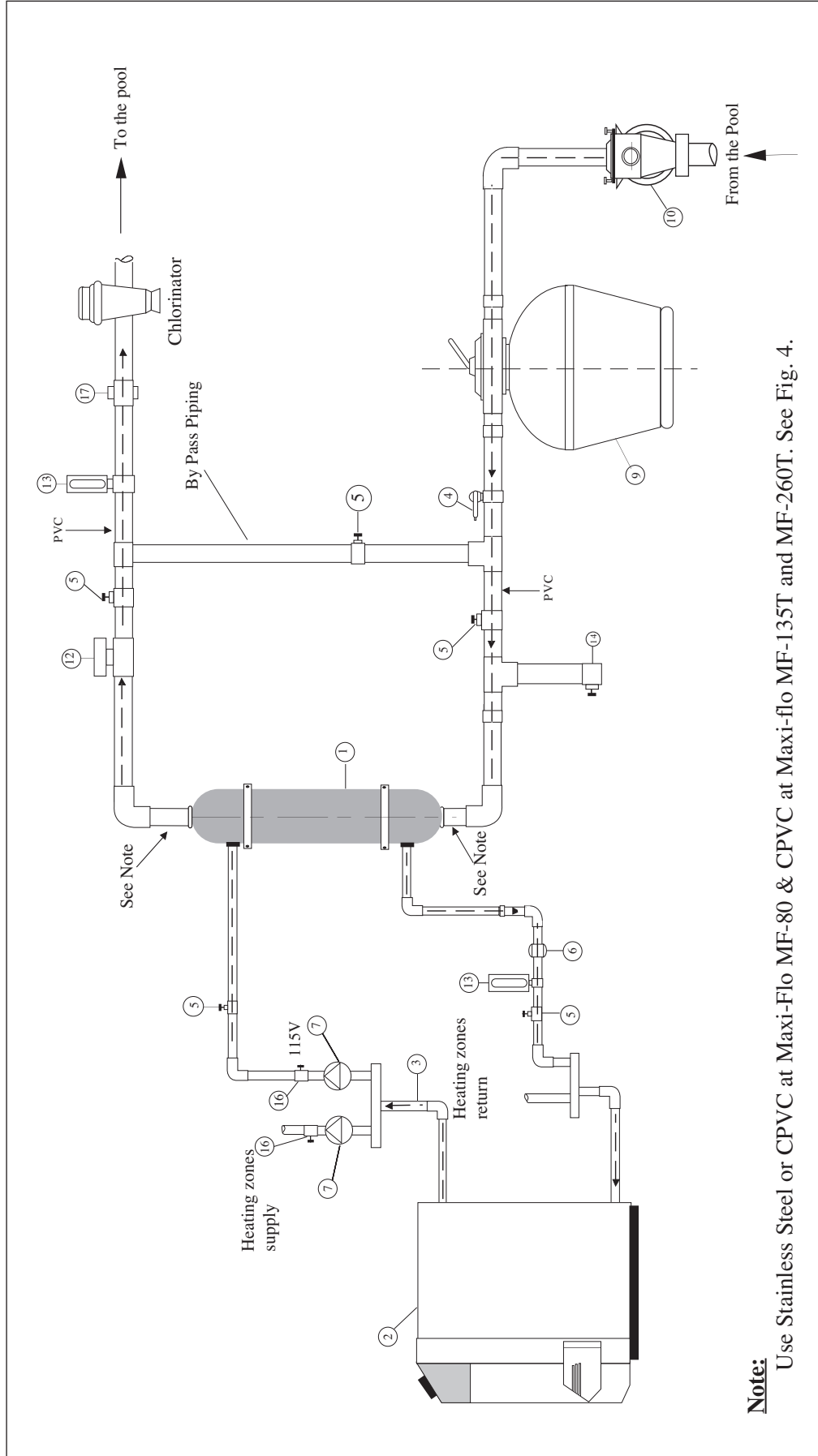
- Check all valves, piping and fittings for visible leaks.
- Check function of all field installed controls. Consult the control manufacturer's instructions.
- Inspect the heat exchanger for scaling or particles. Flush the heat exchanger with a light solution (5% concentration) of phosphoric acid to remove any scaling.

**Fig. 1 Recommended Piping Schematic
MF-135, MF-200, MF-260 & MF-400**



- | | | | | | |
|----|-------------------------|-----|-------------|-----|----------------------------------|
| 1. | Maxi-Flo Heat Exchanger | 6. | Check Valve | 13. | Thermometer |
| 2. | Boiler | 7. | Circulators | 14. | Drain Valve |
| 3. | Boiler Water Circuit | 9. | Filtration | 16. | Flow Control Valve |
| 4. | Sensor or Aquastat | 10. | Pump | 17. | Check Valve / Anti-siphon Device |
| 5. | Isolation Valve | 12. | Flow Switch | | |

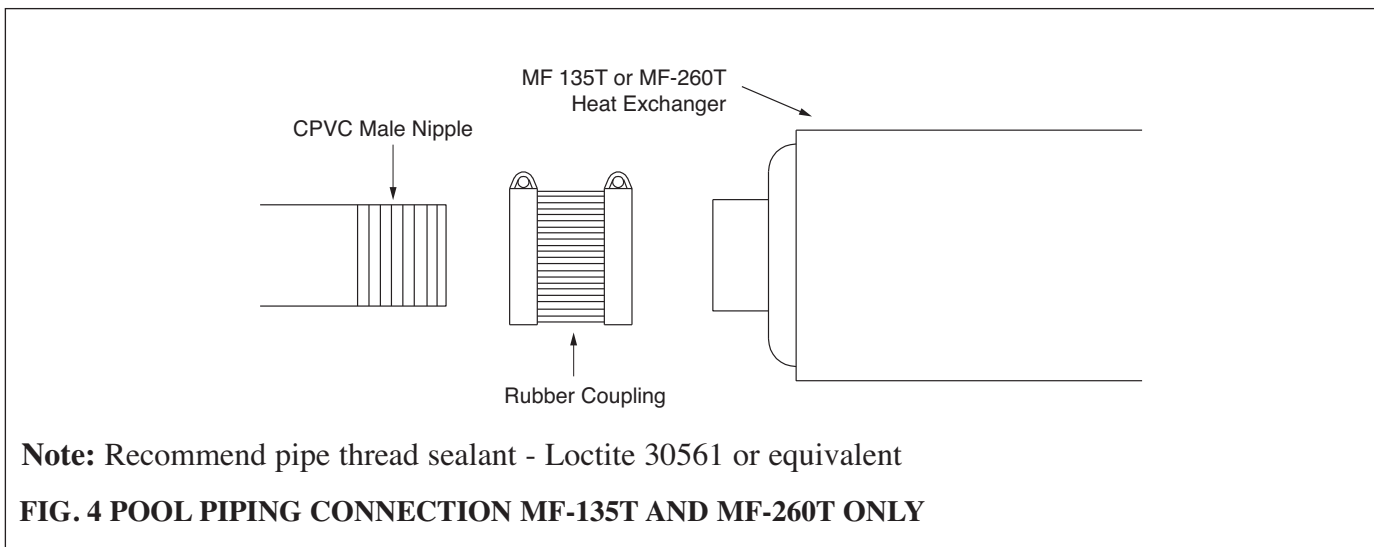
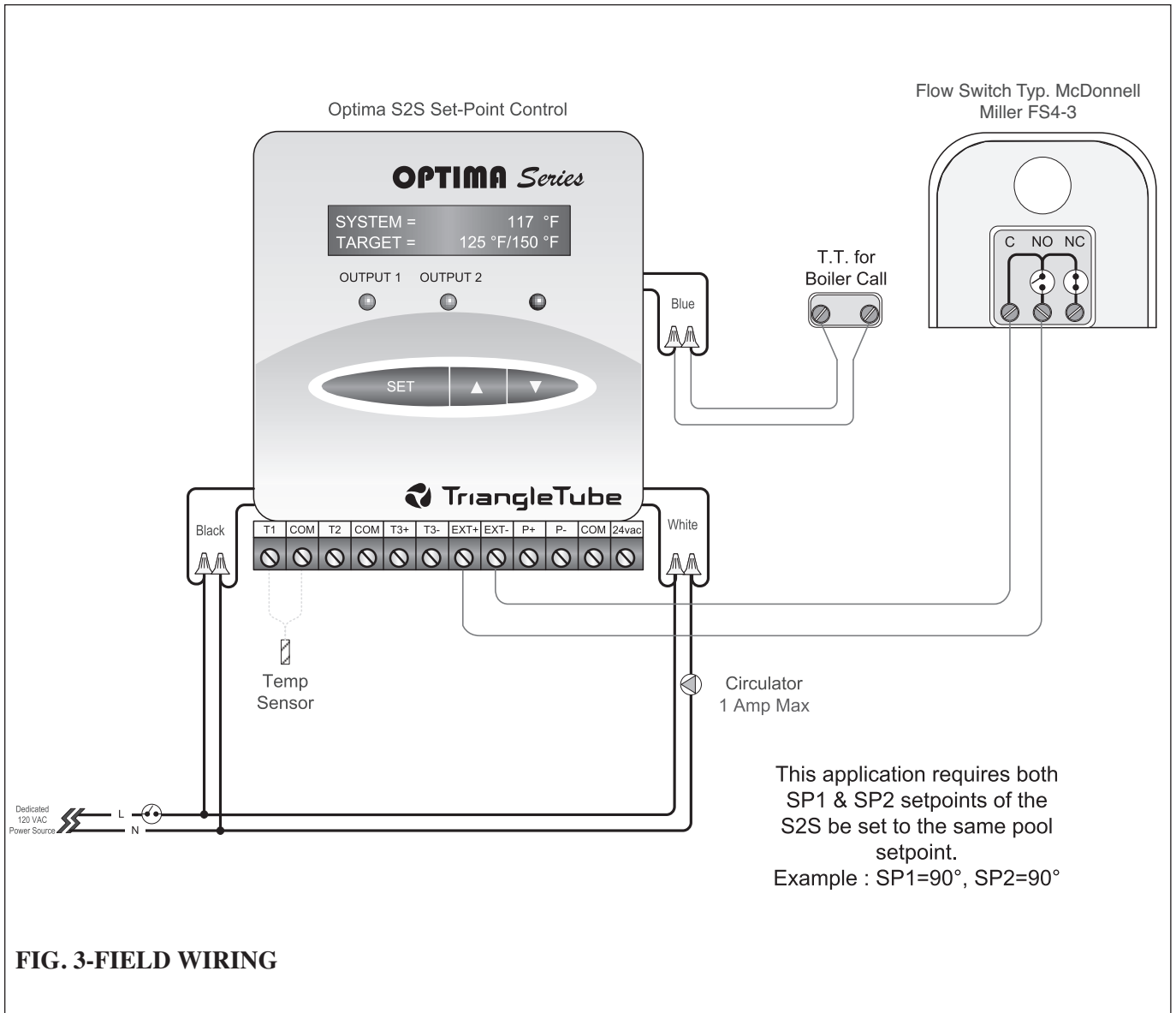
**Fig. 2 Recommended Piping Schematic
MF-80, MF-135T, MF-260T**



Note:

Use Stainless Steel or CPVC at Maxi-Flo MF-80 & CPVC at Maxi-flo MF-135T and MF-260T. See Fig. 4.

- | | | |
|----------------------------|-----------------|--------------------------------------|
| 1. Maxi-Flo Heat Exchanger | 6. Check Valve | 13. Thermometer |
| 2. Boiler | 7. Circulators | 14. Drain Valve |
| 3. Boiler Water Circuit | 9. Filtration | 16. Flow Control Valve |
| 4. Sensor or Aquastat | 10. Pump | 17. Check Valve / Anti-siphon Device |
| 5. Isolation Valve | 12. Flow Switch | |



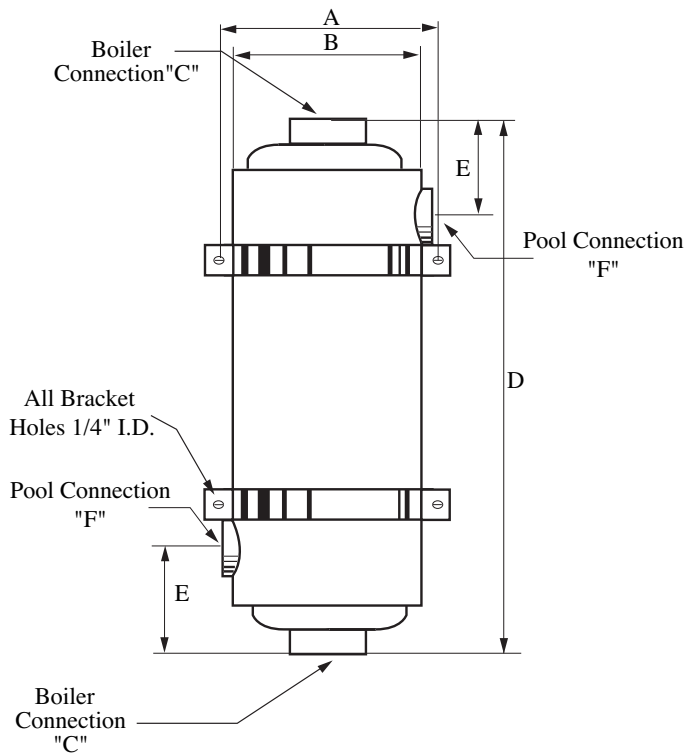
Installation

Thermal Output Maxi-Flo Stainless Steel Heat Exchangers

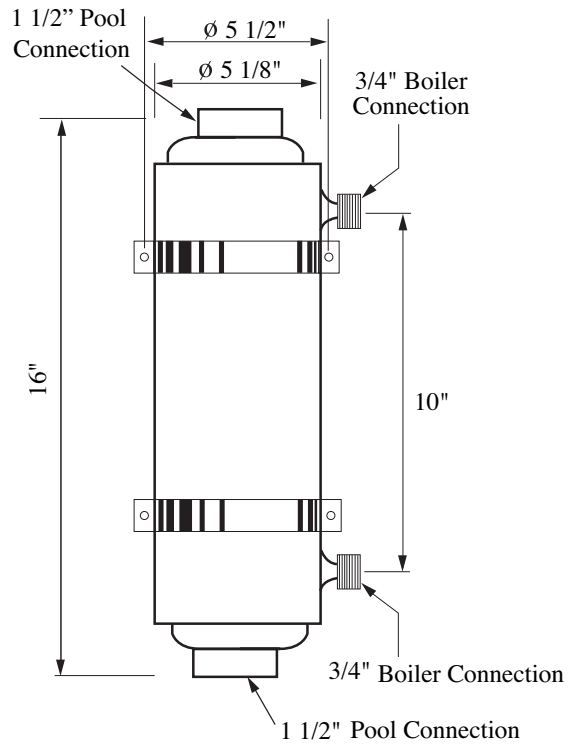
Model No.	Thermal Output Btu/hr	Hot Water Flow		Cold Water Flow		Heat Transfer Surface Sq. Ft.
		GPM	Pressure Drop Ft	GPM	Pressure Drop Ft	
MF-80	95,000	7	6	77	6	2
MF-135	135,000	7	2	55	3	3
MF-200	200,000	8	2	65	5	5
MF-260	260,000	9	2	77	6	6
MF-400	400,000	13	3	93	8	12

Dimensions

Model No.	A	B	C	D	E	F	Weight lb
MF-135	5 1/2"	5 1/8"	1"	13 1/2"	3"	1 1/2"	8
MF-200	5 1/2"	5 1/8"	1"	18 3/4"	3"	1 1/2"	11
MF-260	5 1/2"	5 1/8"	1"	23 3/4"	3"	2"	14
MF-400	5 1/2"	5 1/8"	1 1/2"	41 3/4"	3 1/2"	2"	24
MF-80	(See below)						6



MF Stainless Model



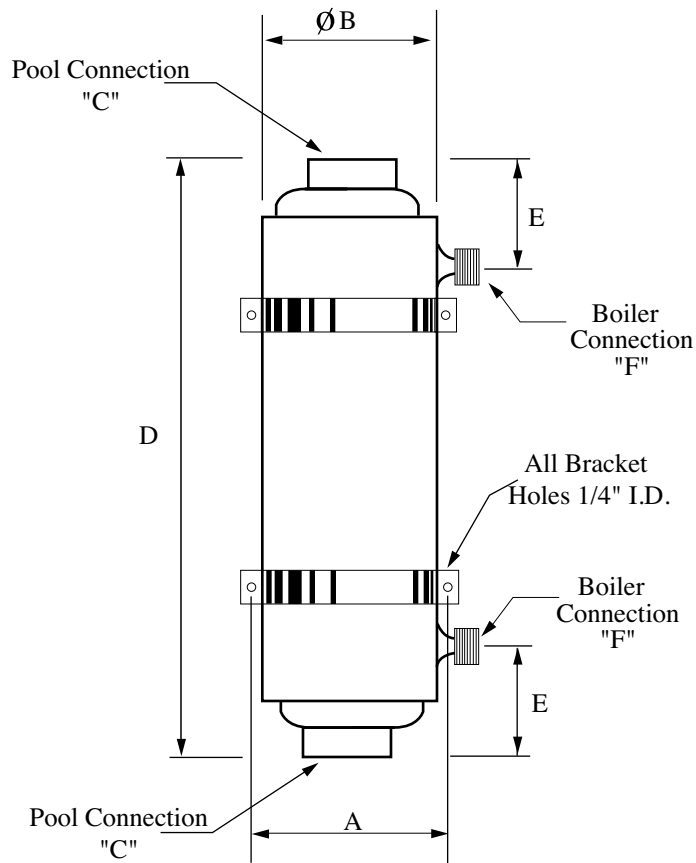
MF-80

Thermal Output Maxi-Flo Titanium Heat Exchangers

Model No.	Thermal Output Btu/hr	Hot Water Flow		Cold Water Flow		Heat Transfer Surface Sq. Ft.
		GPM	Pressure Drop Ft	GPM	Pressure Drop Ft	
MF-135T	135,000	11	9	92	5	2
MF-260T	260,000	13	24	92	6	3

Dimensions

Model No.	A	B	C	D	E	F	Weight lb
MF-135T	5 1/2"	5"	11/2"	20"	4 1/4"	1"	4
MF-260T	5 1/2"	5"	11/2"	29 1/2"	4 1/4"	1"	6



MF Titanium Model

Additional quality water heating equipment available from Triangle Tube

PRESTIGE CONDENSING WALL MOUNTED BOILER



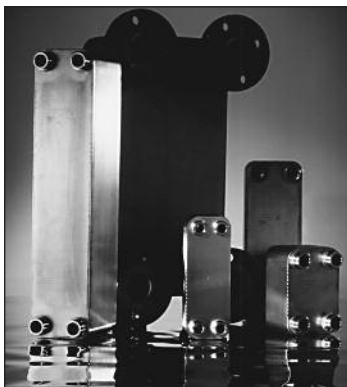
- 95% AFUE
- Fully modulating
- Natural gas or propane
- Stainless Steel Construction
- Direct vent with standard schedule 40 PVC
- Outdoor Reset

SMART SERIES INDIRECT FIRED WATER HEATERS



- Exclusive tank-in-tank design
- Stainless steel construction
- Available in 7 sizes
- Limited LIFETIME residential warranty
- 6 year limited commercial warranty
- Self cleaning/self descaling design

TTP BRAZED PLATE HEAT EXCHANGERS



- For domestic water, snow melting, radiant floor, refrigeration
- Plates made of stainless steel, with a 99.9 % copper and brazed, ensuring a high resistance to corrosion
- Self cleaning and self descaling
- Computerized sizing available from Triangle Tube/Phase III
- Available in capacities from 25,000 BTU/hr to 5,000,000 BTU/hr



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