Instructions – Parts List



CARBON STEEL 200 LITER (55 GALLON) AND 20 LITER (5 GALLON) Therm-O-Flow[®] Pump Modules 310530 rev.N

(Heated Check-Mate[™] 800) with heaters, insulation, and shrouds 398 bar, 39.8 MPa (5850 psi) Maximum Fluid Working Pressure 200 Liter (55 Gallon) H 243276 TOF Plus Pump Module (all voltages) 241987 Pump Module, 480 VAC 20 Liter (5 Gallon) C03509 Pump Module, 480/575 VAC C03512 Pump Module, 240 VAC Important Safety Instructions. Read all warnings and instructions in this manual. Save these instructions. Model C03509

PROVEN QUALITY. LEADING TECHNOLOGY.

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Air Motor Selection Chart

Use Connection Kit, C03510, to connect the air motor to the Heated Check Mate[™] Pump.

Air Motor	Ratio	Part Number	Manual
King™	65:1	245111	309347
Quiet King™	65:1	220106	309348
Bulldog®	31:1	208356	307049
Quiet Bulldog®	31:1	215255	307304
Senator®	19:1	217540	307592
Quiet Senator®	19:1	220571	307592

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Symbols

Warning Symbol

WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the corresponding instructions.

Caution Symbol

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the corresponding instructions.





SKIN INJECTION HAZARD

Spray from the spray gun, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Splashing fluid in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. Get immediate surgical treatment.
- Do not point the gun/valve at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip/nozzle.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Always have the trigger guard on the gun when dispensing.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun/valve trigger safety operates before dispensing.
- Lock the gun/valve trigger safety when you stop dispensing.
- Follow the **Pressure Relief Procedure** on page 11 if the nozzle clogs, and before cleaning, checking or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Do not repair high pressure couplings; you must replace the entire hose.



FIRE, EXPLOSION AND ELECTRIC SHOCK HAZARD

Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in fire, explosion, or electrostatic shock and other serious injury.

- Ground the equipment, the object being dispensed, and all other electrically conductive objects in the dispense area. Proper grounding dissipates static electricity generated in the equipment. See **Grounding** on page 10.
- Do not use this equipment with flammable liquids.
- Keep the dispense area free of debris, including solvent, rags, and gasoline.
- If there is any static sparking while using the equipment, **stop dispensing immediately**. Identify and correct the problem.
- Make sure all electrical work is performed by a qualified electrician only.
- Make sure all electrical equipment is installed and operated in compliance with applicable codes.
- Make sure power is disconnected when servicing and repairing equipment.
- Have any checks, installation, or service to electrical equipment performed by a qualified electrician only.

 MOVING PARTS HAZARD
Moving parts, such as the pump inlet can pinch fingers.
 Keep clear of all moving parts when starting or operating the equipment.
 Do not operate the equipment with the guard removed.
• Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
 Keep clear of the follower plate, pump fluid inlet, and lip of the fluid container when raising or lowering the ram.
 Before checking or servicing the ram or pump, follow the Pressure Relief Procedure on page 11.
TOXIC FLUID HAZARD
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 TOXIC FLUID HAZARD Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed. Know the specific hazards of the fluid you are using. Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
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 TOXIC FLUID HAZARD Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed. Know the specific hazards of the fluid you are using. Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines. Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer. Avoid exposure to heated material fumes.

Introduction

The Therm-O-Flow Pump Module consists of a specially designed Check-Mate 800 Displacement Pump for heated applications, combined with a sensor, junction box, band heaters, insulation, and shrouds.

The pump module is the lower pump assembly in either a 200 liter (55 gal.) or 20 liter (5 gal.) supply unit. You install it between the bottom of the air motor and the top of the follower. This manual describes installing, operating and servicing the pump module. For information about the pump itself, see 308570.



Fig. 1

Installing 200 Liter (55 Gallon) Pump Module

Before you begin this procedure, make sure:

- you have your system documentation and copies of the following manuals:
 - 310523 (200 l/55 gal.) ram
 - 310527 (200 I/55 gal.) TOF supply unit or 309085 (200 I/55 gal.) TOF Plus supply unit
 - 308570 (servicing the pump)
- either the air motor is secured in the ram (if you used the procedure in 310527), or you have 2 people to hold the pump assembly

To connect the pump module to the air motor, follow this procedure:

1. Make sure coupling nut (40) and coupling collars (30) are in place on displacement rod.

The collar couplings should be placed in coupling nut so large flanges point upwards.

- 2. Attach pump module to air motor. Orient pump's fluid outlet (60) to motor's air inlet (70).
- 3. Remove or loosen back shroud. This gives you access to back stand-off rod (90).

NOTE: RTV sealant on the pump shroud may make it difficult to remove individual shroud pieces. Use a knife or razor to scrape the sealant off of the seams of the shrouds.

- 4. Screw nuts (10) onto 3 stand-off rods (20 and 90), and torque to 81 − 89 N•m (60 − 66 ft-lb).
- Screw coupling nut (40) onto motor shaft loosely. Hold motor shaft flats with wrench to keep it from turning. Use adjustable torque wrench to tighten coupling nut. Torque to 196 – 210 N•m (145 – 155 ft-lb).
- Check torque setting on packing nut/wet-cup (50). Ensure it is 203 – 237 N•m (150 – 175 ft-lb).



<u>Notes</u>

- ➢ Torque to 81 − 89 N•m (60 − 66 ft-lb)
- > Torque to 196 210 N•m (145 155 ft-lb)

Fig. 2

- 7. Attach follower to pump:
 - a. Push pump inlet (80) into follower until pump bottoms out.
 - b. Attach air line to blow-off valve.
 - c. Attach and secure coupling nuts to follower conduits and to sensor conduit.
 - d. Connect follower-plate wires to junction box. See wiring diagrams on pages 21–25.
 - e. Insert follower-plate sensor into follower plate.

Installing 200 Liter (55 Gallon) Pump Module *(continued)*

- 8. When re-installing pump module, wire pump to junction box (100). If pump module is already wired to junction box, go to step 9.
 - a. Open cover of junction box.
 - b. Connect pump's heater wires and sensor wire to correct terminals in junction box. See wiring diagrams in Fig. 15 (480/575 VAC) or Fig. 16 (240 VAC).
- 9. Fig. 3. Make remaining connections to and from junction box. See wiring diagrams in 310527 for additional wiring information.



- 10. Close pump's back shroud.
- 11. Apply RTV sealant to all of shroud's seams.
- 12. Connect all fluid hoses.
- 13. Fill wet-cup/packing nut (50) 1/3 full of Graco Throat Seal Liquid, or compatible solvent/lubricant.

NOTE: The pump is tested with a lightweight oil. The oil is left in the pump to protect pump parts from corrosion. If the material you are pumping is not compatible with the oil, flush the pump with an correct solvent before using the pump. Consult your material supplier for solvent recommendations.

14. Load material into supply unit using procedure in either supply unit manual or system documentation.

Installing 20 Liter (5 Gallon) Pump Module

Before starting procedure, make sure:

- system documentation and copies of the following manuals are available:
 - 310525 (20 l/5 gal.) ram
 - 310528 (20 l/5 gal.) supply unit
 - 308570 (servicing pump)
- air motor is secured in the ram (if procedure in 310528 was used), or 2 people are available to hold pump assembly

Connect pump module to air motor as follows:

1. Make sure coupling nut (40) and coupling collars (30) are in place on displacement rod.

Collar couplings should be placed in coupling nut so large flanges point upwards.

- 2. Attach pump module to air motor. Orient pump's fluid outlet (60) to motor's air inlet (70).
- 3. Remove or loosen back shroud. This gives access to back stand-off rod (90).

NOTE: RTV sealant on the pump shroud may make it difficult to remove individual shroud pieces. Use a knife or razor to scrape the sealant off of the seams of the shrouds.

- Screw nuts (10) onto 3 stand-off rods (20 and 90), and torque to 81 − 89 N•m (60 − 66 ft-lb).
- Screw coupling nut (40) onto motor shaft loosely. Hold motor shaft flats with wrench to keep it from turning. Use adjustable torque wrench to tighten coupling nut. Torque to 196 – 210 N•m (145 – 155 ft-lb).
- Check torque setting on packing nut/wet-cup (50). Ensure it is 203 – 237 N•m (150 – 175 ft-lb).

- 7. Attach follower to pump:
 - a. Attach pump inlet (80) to follower plate. Tighten screws on follower adapter.
 - b. Attach air line to blow-off valve.
 - c. Attach and secure coupling nuts to follower conduit and to sensor conduit.
 - d. Connect follower-plate wires to junction box. See wiring diagrams in Figs. 15 and 16.
 - e. Insert follower-plate sensor into follower plate.





Installing 20 Liter (5 Gallon) Pump Module *(continued)*

- 8. When re-installing pump module, wire pump to junction box (100). If pump module is already wired to junction box, go to step 9.
 - a. Open cover of junction box.
 - b. Connect pump's heater wires and sensor wire to correct terminals in junction box. See wiring diagrams in Fig.15 (480/575 VAC) or Fig. 16 (240 VAC).
- 9. Fig. 5. Make remaining connections to and from junction box. See wiring diagrams in 310528 for additional wiring information.



Fig. 5

- 10. Close pump's back shroud.
- 11. Apply RTV sealant to all of shroud's seams.
- 12. Connect all fluid hoses.
- 13. Fill the wet-cup/packing nut (50) 1/3 full of Graco Throat Seal Liquid, or compatible solvent/lubricant.

NOTE: The pump is tested with a lightweight oil. The oil is left in the pump to protect pump parts from corrosion. If the material you are pumping is not compatible with the oil, flush the pump with an correct solvent before using the pump. Consult your material supplier for solvent recommendations.

14. Load material into supply unit using procedure in either supply unit manual or system documentation.

Grounding

WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD Before operating the pump, ground the

system as described in the manual for your supply unit, or in the system documentation.



Also read and follow the warnings on page 4.

You must provide an earth ground to the supply unit's electrical control box. Make sure the pump assembly is installed correctly to ensure that the pump is properly grounded. See the wiring illustrations in Figs. 12 and 13 (200 liter/55 gal.), or Figs.15 and 16 (20 liter/5 gal.).

Insulating Additional Components

It is necessary to insulate some heated components after the equipment installation is complete. If any components and/or exposed connection joints are to be insulated, it will be noted in the system layout and/or the individual component drawing. Insulate the required components before the components are heated.

Operation

Pressure Relief Procedure

WARNING



SKIN INJECTION HAZARD

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Fluid under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the Pressure Relief Procedure whenever you:

- are instructed to relieve the pressure
- stop spraying/dispensing
- check or service any of the system equipment
- install or clean the spray tip/nozzle

Use this procedure whenever you shut off the dispenser/sprayer and before checking or adjusting any part of the system, to reduce the risk of serious injury.

- 1. Lock the gun/valve trigger safety.
- 2. Shut off the main air supply to the pump.
- 3. Close all air bleed valves.
- Unlock the gun/valve trigger safety.
- 5. Hold a metal part of the gun/valve firmly to the side of a grounded metal drum or pail, and trigger the gun/valve to relieve pressure.
- 6. Lock the gun/valve trigger safety.
- 7. Have a container ready to catch the drainage, then open the drain valve or pump bleed valve.
- 8. Leave the drain valve open until you are ready to spray/dispense again.

If you suspect that the spray tip/nozzle or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly loosen the tip guard retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Now clear the tip/nozzle or hose.

9. To relieve pressure in the ram, see Ram Pressure Relief Procedure in the supply unit's documentation.

Emergency Stop

See instructions in either supply unit or system documentation for more information.

- 1. On supply unit's electrical control panel:
 - a Turn CONTROL ON switch to OFF.
 - b. Turn OFF main electrical disconnect.
- 2. Stop pump by closing Bleed-type Master Air Valve closest to motor's air inlet.

Daily Maintenance Procedures

WARNING

Use fluids and solvents that are chemically compatible with the equipment wetted parts. See the Technical Data sections of all the equipment manuals. Always read the material manufacturer's literature before using fluid or solvent in this pump.

- Clean out material build-up in wet-cup to extend 1 life of pump packing and displacement rod.
- 2. Ensure packing nut/wet-cup is tightened to correct torque setting, 203 - 237 N•m (150 - 175 ft-lb). Do not overtighten packing nut.
- 3. Before starting pump, fill wet-cup 1/3 full with Graco Throat Seal Liquid or compatible solvent.

NOTE: Adding Graco Throat Seal Liquid or other compatible solvents to wet-cup will help lubricate the seal and prevent material leakage.

For additional maintenance procedures, see the **Op**eration/Maintenance section of 308570.

Operation

Flushing Safety

WARNING ſ

Use fluids and solvents that are chemically compatible with the equipment wetted parts. See the Technical Data sections of all the equipment manuals. Always read the material manufacturer's literature before using fluid or solvent in this pump.

Before flushing:

Ensure entire system and flushing drums or pails 1. are properly grounded. See system manual or supply unit manual for more information.

WARNING $\mathbf{\Lambda}$

To reduce the risk of serious injury, whenever you are instructed to relieve pressure always follow the Pressure Relief Procedure on page 11.

2. Perform the Pressure Relief Procedure on page 11.



PRESSURIZED FLUID HAZARD

Always use the lowest possible fluid pressure, and maintain firm metal-tometal contact between the gun/valve and the drum or pail during flushing to reduce the

risk of fluid injection injury, static sparking and splashing.

3. Remove spray tip/nozzle from spray gun/dispensing valve.

Troubleshooting

For additional trouble-shooting information about the pump, see the pump's documentation.

Problem	Cause(s)	Solution(s)
Rapid down stroke or up stroke	Material not heated to proper pumping temperature	Check and adjust temperature set point.
	Air is trapped in pump	Bleed air from the pump using this pro- cedure:
		 Place a waste container under the pump bleed port.
		2. Turn on air to the pump
		3. Allow material to flow from the bleed port until it is air-free.
		 Shut off air to the pump and close the bleed port.
		 Turn air on to the pump and set the pump air regulator for normal opera- tion.
	Downstroke: Lower check in pump is worn	Rebuild and replace pump, as neces- sary.
	Upstroke: Upper check in pump is worn	
Material leaks around pump outlet	Outlet fitting is loose	Tighten outlet fitting.
Material leaks around bleed port	Bleed port fitting is loose	Tighten bleed port fitting.
Pump won't move up or down	Problem with air motor	See Air Motor Troubleshooting chart in supply unit or system documentation.
	Foreign object lodged in pump	Remove object and rebuild pump assembly. See 308570 for pump rebuild instructions.
		WARNING
		To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the Pressure Relief Procedure on page 11.
		Before attempting to dislodge a foreign object:
		1. Relieve system pressure.
		 Remove the pump from the air motor.
Pump fails to prime properly	Pump needs to be primed	See Use of the Bleeder Valve in 308570.
Wet-cup leaks	Throat seal is worn	Replace throat seal. See Servicing the Throat Packings in 308570

This section contains the procedures for:

- servicing a pump module from a 200 liter (55 gallon) supply unit
- servicing a pump module from a 20 liter (5 gallon) supply unit
- replacing the sensor and heater bands in the pumpmodule

For information about servicing the pump unit itself, see 308570.

Servicing Pump Module from 200 liter (55 gallon) Supply Unit

This section describes how to:

- remove a pump module from a supply unit (200 liter/55 gal. or 20 liter/5 gal.)
- separate the pump module from the air motor (including disassembling the pump module)
- replace a pump module in a supply unit (200 liter/ 55 gal. or 20 liter/5 gal.)

Removing Pump Module from 200 Liter (55 gallon) Supply Unit

To remove the pump assembly from the ram, follow this procedure:

1. Remove the material drum from the supply unit:

WARNING

The material and equipment will be hot! To reduce risk of injury, wear eye protection, gloves and protective clothing when installing, operating, or servicing this dispensing system.

a. Raise the ram out of the drum using the ram hand valve. At the same time, carefully equalize the pressure in the drum by cycling the follower blow-off valve open and closed.

- b. With the follower completely out of the drum, remove the drum.
- c. Being careful not to damage the follower wipers, wipe any material build-up from the follower plate and wipers.
- d. Move the ram hand valve to the OFF position.
- 2. Make sure the ram hand valve is in the OFF position.
- 3. Relieve the supply unit pressure.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 11.

4. Relieve the ram air pressure.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve ram pressure, always follow the **Ram Pressure Relief Procedure** in the supply unit or system documentation.

5. Turn the system CONTROL ON switch (located on the supply unit's electrical control panel) to OFF.

WARNING



ELECTROCUTION HAZARD

To reduce risk of injury or damage to equipment, make sure the main disconnect is OFF before continuing with this procedure.

- 6. Turn OFF the main electrical disconnect.
- 7. Turn off the electrical power to the supply unit. Follow all applicable safety procedures and lockout rules.
- 8. Bleed off pressure in the system and excess material by opening the dispense gun and catching the material in a waste container.
- 9. Disconnect all material hoses.

Removing the Pump Module from 200 Liter (55 gallon) Supply Unit *(continued)*

1. RTV sealant on the pump shrouds (1) may make it difficult to remove individual shroud pieces. Using a knife or razor, scrape the sealant off of the seams of the shrouds.



Fig. 6

- Fig. 6 and Fig.15 for 480/575 VAC, Fig. 16 for 240 VAC. Disconnect the junction box from the pump module by:
 - a. Removing the cover of the junction box (2).
 - b. Disconnecting the sensor wire and heater wires that come from the pump.
 - c. Removing the wires from the junction box.
 - d. Disconnecting the pump's back shroud and moving it backwards out of the way.
- 3. Fig. 7. Loosen the pump mounting screws (5) and then remove the pump mounting plates (4).
- 4. Secure the air motor to the ram tie bar (3).
- Leaving the air motor attached to the tie bar, separate the pump module (6) from the air motor. Go to the Separating the 200 Liter (55 Gallon)
 Pump Module from the Air Motor section.







Fig. 8

Separating the 200 Liter (55 Gallon) Pump Module from the Air Motor

Fig. 8. To separate the pump from the air motor:

- 1. Remove the remaining sheet-metal shrouds from the pump.
- 2. Remove the coupling nut (40), which attaches the pump to the air motor. Be careful not to lose the collar couplings (30).
- Remove the nuts (10) from the stand-off rods (20). You can now separate the pump from the air motor.
- 4. To access the bare pump:
 - a. Unscrew the bolts that hold the front shroud in place, then remove the front shroud.
 - b. Remove the pump's insulation.
 - c. Disconnect the electrical wires from the heater band.
 - d. Unscrew the screws that hold the heater bands in place.
 - e. Remove the heater bands from the pump.
 - f. Remove the clamp that holds the sensor on the pump.
 - g. Remove the sensor.

Replacing the Pump Module in the 200 Liter (55 Gallon) Supply Unit

- 1. Put the pump module back together.
- 2. Replace the pump module into the follower.
- 3. Re-install pump module into supply unit by following procedure for **Installing a 200 Liter (55 Gal-Ion) Pump Module**.
- Reverse procedure for Removing the Pump Module from a 200 liter (55 gallon) Supply Unit to re-install pump. Be sure to re-apply RTV sealant to seams of shrouds before replacing them on pump.

Servicing Pump Module from 20 Liter (5 gallon) Supply Unit

This section describes how to:

- remove a pump module from a 20 liter (5 gallon) supply unit
- separate the pump module from the air motor (including disassembling the pump module)
- replace a pump module in a 20 liter (5 gallon) supply unit

Removing Pump Module from 20 liter (5 gallon) Supply Unit

To remove the pump assembly from the ram, follow this procedure:

1. Remove the material pail from the supply unit:

A WARNING



The material and equipment will be hot! To reduce risk of injury, wear eye protection, gloves and protective clothing when installing, operating, or servicing this dispensing system.

- a. Raise the ram out of the pail using the ram hand valve. At the same time, carefully equalize the pressure in the pail by cycling the follower blow-off valve open and closed.
- b. With the follower completely out of the pail, remove the pail.
- c. Being careful not to damage the follower wiper, wipe any material build-up from the follower plate and wiper.
- d. Move the ram hand valve to the OFF position.

- 2. Make sure the ram hand valve is in the OFF position.
- 3. Relieve the supply unit pressure.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 11.

4. Relieve the ram air pressure.

To reduce the risk of serious injury whenever you are instructed to relieve ram pressure, always follow the **Ram Pressure Relief Procedure** in the supply unit or system documentation.

5. Turn the system CONTROL ON switch (located on the supply unit's electrical control panel) to OFF.

WARNING



To reduce risk of injury or damage to equipment, make sure the main disconnect is OFF before continuing with this procedure.

- 6. Turn OFF the main electrical disconnect.
- 7. Turn off the electrical power to the supply unit. Follow all applicable safety procedures and lockout rules.
- 8. Bleed off pressure in the system and excess material by opening the dispense gun and catching the material in a waste container.
- 9. Disconnect all material hoses.

Removing Pump Module from 20 Liter (5 gallon) Supply Unit *(continued)*

- Fig. 9. RTV sealant on the pump shrouds may make it difficult to remove individual shroud pieces (8) and (A). Using a knife or razor, scrape the sealant off of the seams of the shrouds.
- Fig. 9, Fig. 15 (480/575 VAC) and Fig.16 (240 VAC). Disconnect the junction box from the pump module and) by:
 - a. Removing the cover of the junction box (9).
 - b. Disconnecting the heater wires and sensor wires that come from the pump.
 - c. Removing the wires from the junction box.
 - d. Disconnecting the pump's back shroud (A) and moving it backwards out of the way.



Fig. 9

- 3. Remove the follower from the pump by:
 - a. Removing the sensor from the follower plate.
 - b. Removing the air line from the blow-off valve.
 - c. Removing the bolts from the follower adapter.
 - d. Sliding off the follower.
- Separate the pump from the air motor. Go to the next section, Separating the 20 Liter (5 Gallon) Pump Module from the Air Motor.



Separating the 20 Liter (5 Gallon) Pump Module from the Air Motor

Fig. 10. To separate the pump from the air motor:

- 1. Remove the remaining sheet-metal shrouds from the pump.
- 2. Remove the coupling nut (40), which attaches the pump to the air motor. Be careful not to lose the collar couplings (30).
- 3. Remove the nuts (10) from the stand-off rods (20). You can now separate the pump from the air motor.
- 4. Access the bare pump by:
 - a. Unscrewing the bolts that hold the front shroud in place, then removing the front shroud.
 - b. Removing the pump's insulation.
 - c. Disconnecting the electrical wires from the heater bands.
 - d. Unscrewing the screws that hold the heater bands in place.
 - e. Removing the heater bands from the pump.
 - f. Removing the clamp that holds the sensor on the pump.
 - g. Removing the sensor.
- 5. Remove the pump and service it as needed. See 308570 for more information about the pump.

Replacing the Pump Module in the 20 Liter (5 Gallon) Supply Unit

- 1. Put the pump module back together.
- 2. Replace the pump module into the follower.
- Re-install the pump module into the supply unit by following the procedure for Installing a 20 Liter (5 Gallon) Pump Module.
- 4. Reverse the procedure for **Removing the Pump Module from a 20 liter (5 gallon) Supply Unit**, to reinstall the pump. Be sure to re-apply RTV sealant to the seams of the shrouds before replacing them on the pump.

Replacing Heater Bands and Sensors in Pump-Module

Module heaters and sensor can be serviced without removing pump module from supply unit. Remove front shrouds and pump insulation. When finished servicing pump module, rewrap pump in new insulation and re-attach shrouds.



Fig. 11

Removing/Replacing Heater Band

- 1. Unscrew screws that hold front shroud in place, then remove front shroud.
- 2. Remove pump's insulation.
- 3. Disconnect electrical wires from heater band.
- 4. Unscrew screw that holds heater band in place.
- 5. Remove heater band from pump.
- 6. Fig. 11. Install new heater band in same location as old heater band:
 - a. Locate heater terminals (G) so they line up with back of pump (J).
 - b. Tighten heater band.

7. Re-connect heater wires and re-attach ceramic caps that insulate terminal.

NOTE: On TOF Plus machines (all machines manufactured after June 2000), the heaters are not identical. The upper heater is 1000 watts and the lower heater is 500 watts. These heaters also have 3 wiring lugs, instead of two. Always replace the heaters with identical units.

Removing/Replacing Sensor

- 1. Unscrew screws that hold front shroud in place, then remove front shroud.
- 2. Remove pump's insulation.
- 3. If sensor wire is connected to junction box, disconnect it now.
- 4. Loosen clamp holding sensor on pump.
- 5. Remove sensor.
- 6. Fig. 11. Replace sensor (H) in clamp:
 - a. Coat sensor and mounting surface of sensor block with non-silicone heat sink compound.
 - b. Place sensor approximately 30° counter clockwise from pump outlet (I).
 - c. Tighten clamp.
- 7. Re-connect sensor wire to junction box.

Inspection/Maintenance Frequency

The pump packings do not require any other service or maintenance, except as described in the **Daily Maintenance Procedures**. See 308570 for inspection frequency of the pump.

Throat Packings

The pump throat packings are available as a preassembled, prelubricated kit. For series B pumps, order Part No. 241782. For series A pumps order Part No. 237905. Refer to manual 308570 for replacement instructions.

Therm-O-Flow Plus Pump Module with 3 lug heaters, 200 liter (55 gal.) Model 243276, Series A Heated Pump, 240 VAC Supply Units – (used on Therm-O-Flow 55, June 2000 and after)



Fig. 12

Therm-O-Flow Plus Pump Module with 3 lug heaters, 200 liter (55 gal.) Model 243276, Series A Heated Pump, 400, 480 VAC Supply Units – (used on Therm-O-Flow 55, June 2000 and after)



Therm-O-Flow Plus Pump Module with 3 lug heaters, 200 liter (55 gal.) Model 243276, Series A Heated Pump, 575 VAC Supply Units – (used on Therm-O-Flow 55, June 2000 and after)



Model C03509, Therm-O-Flow Pump Module, 20 liter (5 gal.) 480/575 VAC



Fig. 15 _

Model C03512, Therm-O-Flow Pump Module, 20 liter (5 gal.) 240 VAC



TO CONTROL BOX

FOLLOWER HEATERS

Notes

Model 241987, Therm-O-Flow Pump Module, 200 liter (55 gal.) 480 VAC



Model 243451, Series A Displacement Pump (refer to manual 308352 for service instructions)



Model 243451, Series A Chrome Free Displacement Pump (refer to manual 308352 for service instructions)

Part No.	Description	Qty	Ref No.	Part No.	Description G	lty
195984	ROD, displacement; stainless ste	el1	18	189492	SEAL, intake; PTFE	1
236582	PACKING NUT/WET-CUP;	1	19	195988	SEAT, intake valve; stainless steel	1
	stainless steel		20	195983	ROD, priming piston;	1
189645	HOUSING, throat packing;	1			stainless steel	
	steel		21	195581	CYLINDER, intake; stainless steel	1
109306	V-PACKING, throat; PTFE	5	23	276378	PISTON, priming; stainless steel	1
184176	GLAND, throat, female; stainless	1	24	190241	SEAT, priming piston;	1
	steel				stainless steel	
166073	SEAL; PTFE	1	26	184221	GLAND, intake valve, male;	1
184226	GLAND, throat, male; stainless	1			stainless steel	
	steel		27	109301	V-PACKING, intake valve; PTFE	4
113040	SEAL, cylinder; PTFE	2	28	184171	GLAND, intake valve, female;	1
243169	HOUSING, outlet; stainless steel	1			stainless steel	
195985	CYLINDER, pump; stainless stee	el 1	33	109213	O-RING; PTFE	1
189511	GUIDE, piston; stainless steel	1	34	172479	TAG, warning (not shown)	1
195986	PISTON; stainless steel	1	35	109482	O-RING; fluoroelastomer	1
190015	SEAL, piston; PTFE	1	39	243168	HOUSING, intake; stainless steel	1
195987	SEAT, piston; stainless steel	1	42	195608	FITTING, outlet; 3/4 in. sanitary x	1
189725	SEAL, intake valve; PTFE	1			M42 x 2.0; stainless steel	
189728	NUT, packing, intake valve;	1	A R	enlacement	Danger and Warning labels tags ar	nd
	stainless steel			urds are ava	ilable at no cost	ŭ
195989	VALVE BODY, intake;	1	04	nus are ava		
	stainless steel		* Co	ontained in I	PTFE throat packing kit 222786	
	Part No. 195984 236582 189645 109306 184176 166073 184226 113040 243169 195985 189511 195986 190015 195987 189725 189728 195989	PartNo.Description195984ROD, displacement; stainless steel236582PACKING NUT/WET-CUP; stainless steel189645HOUSING, throat packing; steel109306V-PACKING, throat; PTFE184176GLAND, throat, female; stainless steel166073SEAL; PTFE184226GLAND, throat, male; stainless steel113040SEAL, cylinder; PTFE243169HOUSING, outlet; stainless steel195985CYLINDER, pump; stainless steel195986PISTON; stainless steel195987SEAL, piston; PTFE195987SEAL, intake valve; PTFE189728NUT, packing, intake valve; stainless steel195989VALVE BODY, intake; stainless steel	PartDescriptionQty195984ROD, displacement; stainless steel 1236582PACKING NUT/WET-CUP; 1stainless steel189645HOUSING, throat packing; 1steel109306V-PACKING, throat; PTFE184176GLAND, throat, female; stainless166073SEAL; PTFE1184226GLAND, throat, male; stainless113040SEAL, cylinder; PTFE243169HOUSING, outlet; stainless steel1195985CYLINDER, pump; stainless steel1195986PISTON; stainless steel1195987SEAL, piston; PTFE1195987SEAL, nitake valve; PTFE1189728NUT, packing, intake valve;1195989VALVE BODY, intake;1195989VALVE BODY, intake;	PartRefNo.DescriptionQtyNo.195984ROD, displacement; stainless steel 118236582PACKING NUT/WET-CUP; 119stainless steel20189645HOUSING, throat packing; 121109306V-PACKING, throat; PTFE5184176GLAND, throat, female; stainless1166073SEAL; PTFE126184226GLAND, throat, male; stainless1steel27113040SEAL, cylinder; PTFE2243169HOUSING, outlet; stainless steel1195985CYLINDER, pump; stainless steel1195986PISTON; stainless steel1195987SEAL, piston; PTFE1195987SEAL, intake valve; PTFE1189728NUT, packing, intake valve;1195989VALVE BODY, intake;1stainless steel* <i>ca</i> * <i>ca</i>	PartRefPartNo.DescriptionQtyNo.No.195984ROD, displacement; stainless steel18189492236582PACKING NUT/WET-CUP;119195988236582PACKING NUT/WET-CUP;119195988189645HOUSING, throat packing;120195983109306V-PACKING, throat; PTFE523276378184176GLAND, throat, female; stainless124190241steel2119558124190241166073SEAL; PTFE126184221184226GLAND, throat, male; stainless127109301113040SEAL, cylinder; PTFE228184171243169HOUSING, outlet; stainless steel133109213189511GUIDE, piston; stainless steel135109482190015SEAL, piston; PTFE139243168195987SEAL, intake valve; PTFE139243168195987SEAL, intake valve; PTFE142195608189728NUT, packing, intake valve;1 <i>K Replacement cards are ava</i> 195989VALVE BODY, intake;1 <i>K Contained in F</i>	PartRefPartNo.DescriptionQtyNo.No.DescriptionQ195984ROD, displacement; stainless steel 118189492SEAL, intake; PTFE236582PACKING NUT/WET-CUP;119195988SEAT, intake valve; stainless steel236582PACKING, NUT/WET-CUP;119195988SEAT, intake valve; stainless steel189645HOUSING, throat packing;120195983ROD, priming piston;statel20195983ROD, priming; stainless steel21195581109306V-PACKING, throat; female; stainless 124190241SEAT, priming piston;statel21195581CYLINDER, intake valve, male;stainless steel184226GLAND, throat, male; stainless 126184221GLAND, intake valve, male;184226GLAND, throat, male; stainless 127109301V-PACKING, intake valve; PTFE113040SEAL, cylinder; PTFE228184171GLAND, intake valve; PTFE113040SEAL, cylinder; PTFE228184171GLAND, intake valve; PTFE113040SEAL, piston; stainless steel133109213O-RING; fluoroelastomer195985CYLINDER, pump; stainless steel133109213O-RING; fluoroelastomer195986PISTON; stainless steel135109482O-RING; fluoroelastomer190015SEAL, piston; stainless steel135109488O-RING; fluoroelastomer <t< td=""></t<>

Therm-O-Flow Plus Pump Module with 3 lug heaters, 200 liter (55 gal.) Model 243276, Series A Heated Pump (used on Therm-O-Flow 55, June 2000 and after)



Therm-O-Flow Plus Pump Module with 3 lug heaters, 200 liter (55 gal.) Model 243276, Series A Heated Pump (used on Therm-O-Flow 55, June 2000 and after)

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description 0	⊋ty
601	237795	PUMP, displacement,	1	615	C20867	BUSHING, conduit; 3/4 npt	2
		Check-Mate [™] 800;		616	C20716	LOCKNUT, conduit; 3/4–14	1
		see manual 308570		617	C20487	NIPPLE, hex; 3/4 npt	1
602	15C044	HEATER, band, pump; 600 watt	2	618	C32256	TERMINAL, ring; for #10 stud	1
603	119711	SENSOR, RTD	1	620	C32105	INSULATION, 28 in. (711 mm)	1
604	C31012	CLAMP, band	1	621	C38162	SCREW, round head;	1
605	C03507	MOUNT, RTD sensor	1			10–24 x 0.31 in. (8 mm)	
606	C03482	COVER, pump front	1	622	C38163	WASHER, lock, ext. tooth; no. 10	1
607	C03491	COVER, pump right side assy	1	623	C07523	WIRE, green; 10 AWG,	1
608	C20474	SCREW, self tapping;	8			6 in. (152 mm)	
		no. 10 x 0.75 in. (19 mm)		625	206994	THROAT SEAL LIQUID; 8 oz;	1
609	C03484	COVER, pump rear	1			not shown	
610	243264	JUNCTION BOX ASSY	1	631	184090	PLATE, warning	2
611	C03490	COVER, pump left side assy	1	632	C33049	TAPE; fiberglass, 18 in. (457 mm)) 1
612	C14009	LABEL, high voltage	2				
613	100016	WASHER, lock; 1/4 in.	4				
614	C19080	SCREW, hex head;	4	🔺 Re	placement	Danger and Warning labels, tags a	nd
		1/4–20 x 0.5 in. (13 mm)		cai	rds are ava	ilable at no cost.	

Therm-O-Flow Pump Module, 20 liter (5 gal.) Models C03509 480/575 VAC, and C03512 240 VAC



Model C03509, Therm-O-Flow Pump Module, 20 liter (5 gal.) 480/575 VAC

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
10	237897	PUMP, hot melt; 20 liter (5 gal.)	1	160	184090	PLATE, warning	2
20	C32053	HEATER, band pump lower;	2	170	C33049	TAPE, fiberglass; 457 mm	18"
		600 watts		180	C32256	TERMINAL, ring for #10 stud	5
30	119711	SENSOR, RTD	1	190	C32386	WIRE, high temp.; 10 awg;	100
40	C31012	CLAMP, band	1			2540 mm	in.
50	C03507	MOUNT, RTD sensor	1	200	C32105	INSULATION; 711 mm	28"
60	C03482	COVER, pump front	1	210	C38162	SCREW, round head;	1
70	C03491	COVER, pump right side assy.	1			#10–24 x 0.31	
80	C20474	SCREW, self tapping; #10 x 0.75	8	220	C38163	WASHER, lock external tooth, #10	1
90	617431	COVER, pump rear	1	230	C07523	WIRE, green; 10 awg;	6"
100	617432	JUNCTION BOX ASSY	1			152.4 mm	
110	C03490	COVER, pump, left side assy.	1	240	C03493	COVER, pump left bottom	1
120	C14009	LABEL, high voltage	2	250	C03494	COVER, pump right bottom	1
130	C19209	WASHER, lock: 1/4	4	260	206994	FLUID, TSL; 8 oz.	1
140	C19080	SCREW, hex head:	4	270	C07664	COMPOUND, heat sink	
-		1/4–20 x 0.5		300	150707	PLATE, designation	1
150	100508	SCREW, drive; #4 x 3/16 in.	6	310	C78267	JUMPER, terminal	2

Model C03512, Therm-O-Flow Pump Module, 20 liter (5 gal.) 240 VAC

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
10	237885	PUMP, hot melt; 20 liter (5 gal.)	1	160	184090	PLATE, warning	2
		See manual 308570		170	C33049	TAPE, fiberglass; 457 mm	18"
20	C32053	HEATER, band pump lower;	2	180	C32256	TERMINAL, ring for #10 stud	5
		600 watts		190	C32386	WIRE, high temp.; 10 awg;	100
30	119711	SENSOR, RTD	1			2540 mm	"
40	C31012	CLAMP, band	1	200	C32105	INSULATION; 711 mm	28"
50	C03507	MOUNT, RTD sensor	1	210	C38162	SCREW, round head;	1
60	C03482	COVER, pump front	1			#10–24 x 0.31	
70	C03491	COVER, pump right side assy.	1	220	C38163	WASHER, lock external tooth,	1
80	C20474	SCREW, self tapping;	8			#10	
		#10 x 0.75		230	C07523	WIRE, green; 10 awg;	6"
90	617431	COVER, pump rear	1			152.4 mm	
100	617432	JUNCTION BOX ASSY	1	240	C03493	COVER, pump left bottom	1
110	C03490	COVER, pump left side assy.	1	250	C03494	COVER, pump right bottom	1
120	C14009	LABEL, high voltage	2	260	206994	FLUID, TSL; 8 oz.	1
130	C19209	WASHER, lock; 1/4	4	270	C07664	COMPOUND, heat sink	
140	C19080	SCREW, hex head;	4	300	150707	PLATE, designation	1
		1/4–20 x 0.5		310	C78267	JUMPER, terminal	4
150	100508	SCREW, drive; #4 x 3/16 in.	6				

Model C03510, Pump Air Motor Mounting Kit



Fig. 18

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
10	106166	Nut, hex M16 x 2	3	30	184129	Collar, coupling	2
20	190000	Rod, stand-off	3	40	186925	Nut, coupling	1

Technical Data

Maximum fluid working pressure (pump)	403 bar (5850 psi)
Maximum recommended pump speed	30 cycles/minute
Maximum service temperature	204° C (400° F)
Maximum power TOF machines 575 VAC 3 phase 480 VAC 3 phase 240 VAC 3 phase Maximum power TOF Plus machines 575 VAC 3 phase 480 VAC 3 phase 400 VAC 3 phase 240 VAC 3 phase	1200 w 1200 w 1200 w 1200 w 1200 w 1200 w 1200 w
Wetted parts (pump)	See 308570
Fluid outlet	1 in. npt (f)

Related Publications

Manual	Manual #
20 Liter (5 Gallon) 76 mm (3 in.) Air-Powered Ram Module	310525
165 mm (6.5 in.) Global Ram Module	310523
Check-Mate 800 Displacement Pump	308570
Therm-O-Flow Plus 55 Air-Powered Ram Heated Supply Unit	309085
Therm-O-Flow 5 Air-Powered Ram Heated Supply Unit	310528
King Air Motor, 65:1	309347
Quiet King Air Motor, 65:1	309348
Bulldog Air Motor, 31:1	307049
Quiet Bulldog Air Motor, 31:1	307304
Senator Air Motor, 19:1 and Quiet Senator Air Motor, 19:1	307592
Throat Packing Kit 241782	314934

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Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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