Instructions Parts

200 LITER (55 GALLON) DRUM SIZE

Therm–O–Flow Plus®

309085 rev.M

Hot Melt Drum Unloaders
All Models

Maximum Operating Temperature (All Models): 400°F (204°C)

Senator Powered Unloaders, Models A–1 and A–2
1900 psi (13 MPa, 131 bar) Maximum Fluid Working Pressure
100 psi (0.7 MPa, 7 bar) Maximum Air Inlet Pressure

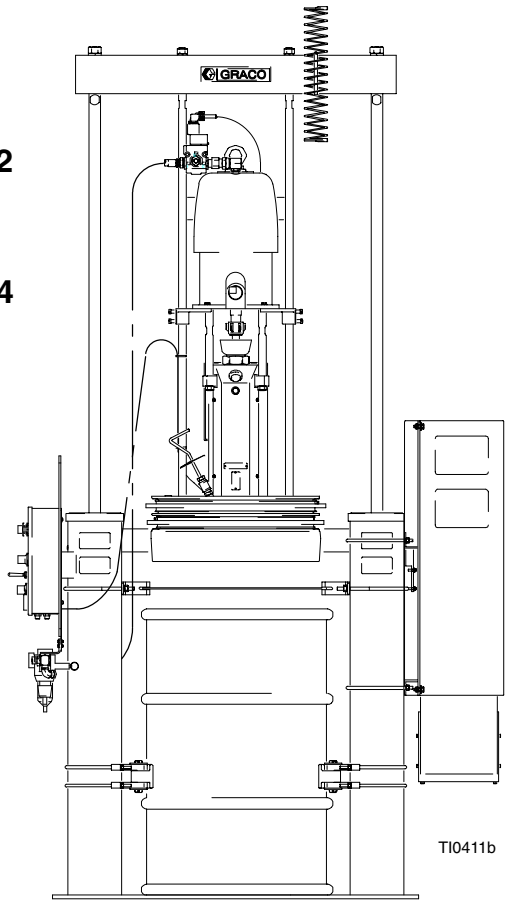
Bulldog Powered Unloaders, Models A–3 and A–4
3100 psi (21 MPa, 213 bar) Maximum Fluid Working Pressure
100 psi (0.7 MPa, 7 bar) Maximum Air Inlet Pressure

King Powered Unloaders, Models A–5 and A–6
3900 psi (26 MPa, 269 bar) Maximum Fluid Working Pressure
90 psi (0.6 MPa, 6 bar) Maximum Air Inlet Pressure

Important Safety Instructions
Read all warnings and instructions in this manual.
Save these instructions.

Refer to Graco manual 309180 for Installation and Operation instructions.

See page 2 for **Table of Contents**.



PROVEN QUALITY. LEADING TECHNOLOGY.

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

CE

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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

⚠ CAUTION

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

⚠ WARNING

INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, warnings, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed 125 psi (8.8 bar) maximum inbound air pressure to the ram.
- Never exceed the recommended working pressure or the maximum air inlet pressure stated on your pump or in the **Technical Data** on page 94.
- Be sure that all spray/dispensing equipment and accessories are rated to withstand the maximum working pressure of the pump. Do not exceed the maximum working pressure of any component or accessory used in the system.
- Route the hoses away from the traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose non-heated hoses to temperatures above 82° C (180° F) or below -40°C (-40° F).
- Do not kink or overbend hoses or use hoses to pull the equipment.
- 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.
- Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturers.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.

⚠ WARNING

HOT SURFACE AND FLUID HAZARD

Heated fluid can cause severe burns and can cause equipment surfaces to become very hot.

- Wear eye protection, gloves and protective clothing when installing, operating, or servicing this dispensing system.
- Be sure to tighten the bleed stick after bleeding the air. Otherwise hot material will leak out of the opening.
- Do not touch the metal heat sink when the surface is hot.
- Allow the equipment to cool thoroughly before servicing.
- Do not wipe hot fluid that gets on your skin.

Some heated systems are designed to dispense Polyurethane (PUR) heated materials. PUR systems are supplied with ventilation hoods, and require proper ventilation and specially designed system components.

INJECTION HAZARD

Fluid from the spray gun/dispense valve, 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 a spray gun if you are spraying.
- Check the gun diffuser operation weekly (if so equipped). 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 23 if the spray tip/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.

⚠ WARNING

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 electric shock and other serious injury.

- Ground the equipment, the object being dispensed to, and all other electrically conductive objects in the dispense area. See **Ground the System** on page 13.
- Do not use this equipment with flammable fluids.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Keep the dispense area free of debris, including solvent, rags, and gasoline.
- If there is any static sparking or you feel an electric shock while using the equipment, **stop dispensing immediately**. Do not use the equipment until you have identified and corrected the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvent or material.
- Do not smoke in the dispense area.
- Extinguish all open flames or pilot lights in the dispense area.
- 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.
- Never exceed the maximum wattage of the supply unit. See the wiring diagrams in this manual for more information.
- Only use hoses that have a maximum wattage less than an equal to 1250 watts. Using hoses with higher maximum wattage could create a runaway temperature condition.

MOVING PARTS HAZARD

Moving parts, such as the ram plate and pump inlet, can pinch or amputate your fingers.

- Moving equipment parts can cause personal injury, including severing of hands or fingers. Make sure all personnel are clear of moving parts before operating the equipment.
- Keep clear of all moving parts when starting or operating the equipment.
- Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
- Keep clear of the ram 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 23.

⚠ WARNING

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.
- Provide adequate ventilation.

PRESSURIZED FLUID HAZARD

Bursts of material and air will exit the bleed port! To reduce the risk of serious injury or damage to equipment, wear eye protection and protective clothing whenever working with this supply system.

Overview

How the Therm–O–Flow Plus Works

A heated platen melts the sealant or adhesive and directs the molten material to the pump inlet. The material then travels through a heated Check–Mate pump and heated fluid moves to the application tool.

Model Numbers

The model number stamped on your machine defines the equipment in the following eight categories:

- Motor
- Heated Platen
- Drum Ram
- Heat Controls Supply Voltage
- Heat Controls (number of heat zones)
- Drum Unloader Options
- Application Accessories
- Hose Kit Layout

This manual will refer to the model number when defining parts in your application.

Typical Model Number: HM55–D–2–2–1–1–3–1–2–N–N–N–N–CEG–DEG–NNN–NNN

Model	Product Description
HM55–D	55 gal./200 liter Hot Melt Drum Unloader, Revision D
Code A	**Power Ratio (Fluid Out/Air In)**
1	19:1 Senator® Standard Air Motor
2	19:1 Senator® Quiet Air Motor
3	31:1 Bulldog® Standard Air Motor
4	31:1 Bulldog® Quiet Air Motor
5	65:1 King® Standard Air Motor
6	65:1 King® Quiet Air Motor
N	None
Code B	**Heated Platen Style**
1	Standard Fin Design Drum Platen, 2 Silicone T–Wipers
2	Standard Fin Design Drum Platen, 2 Hose Wipers
3	Standard Fin Design Drum Platen, 1 Bottom Black Hose Wiper, 1 Top Silicone T–Wiper
4	MegaFlo™ High Flow Drum Platen, 2 Silicone T–Wipers
5	MegaFlo™ High Drum Platen, 2 Hose Wipers
6	MegaFlo™ High FLow Drum Platen, 1 Bottom Black Hose Wiper, 1 Top Silicone T–Wiper
7	Smooth Bottom (No Fin) Drum Platen with 2 Silicone T–Wipers
N	None
Code C	**Drum Ram Style**
1	6.5” Cylinder Dual Post Pneumatic (100 psi) Drum Ram with Controls
2	6.5” Cylinder Dual Post Air–Powered Hydraulic (200 psi) Drum Ram
N	None

Code D	Heat Control Supply Voltage
1	220/240 VAC 50/60 Hz 3 phase
2	380/400 VAC 50/60 Hz 3 phase
3	470/490 VAC 50/60 Hz 3 phase
4	570/590 VAC 50/60 Hz 3 phase
N	None (J–Box only for customer connection)
Code E	**Number of Heat Zones Available**
1	6 Heat Zones (platen, pump, 2 hoses, 2 accessories)
2	8 Heat Zones (platen, pump, 3 hoses, 3 accessories)
N	None
Code F	**Drum Unloader Options (select up to 5 or select None for each space)**
1	Advanced Pendant Control with 7–Day Timer
2	Low Level Kit
3	Pump Inactivity Switch Kit
4	Vent Hood Kit
5	Drum Clam Shell*
6	Heavy Duty Drum Clamp*
7	Drum Ram Post Saddle Clamps*
N	None
	* pick only one of 5, 6, and 7
Code G	**Cross–Over Control**
1	Dual Unloader Cross–Over Control Kit
N	None
Code H	**Application Kits**
_ _ _ or NNN	Hose Kit Position One
_ _ _ or NNN	Hose Kit Position Two
_ _ _ or NNN	Hose Kit Position Three
_ _ _ or NNN	Hose Kit Position Four

Model No. HM55–D–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__	–	__
Code	**A**		**B**		**C**		**D**		**E**		**F**		**F**		**F**		**F**		**F**		**G**		**H**		**H**		**H**		**H**	

Fig. 1 Model Code Layout

Typical Installation

A Master Air Valve (bleed-type) (required)
B Pump Air Supply Hose
2 Electrical Control Panel
102 Ram Module
104 Heated Ram Plate Assembly
106 Depressurization Valve
109 Pump Assembly
115 Pump Mounting Bracket
202 Air Line Filter
203 Air Line Lubricator
204 Pump Air Regulator
211 4-way Ram Valve (Ram Up/Ram Down)
214 Pump Bleed-Type Master Air Valve (required)
226 Main Air Line Inlet
319 Ram Plate Bleed Stick
327 Lower Wiper
329 Upper Wiper

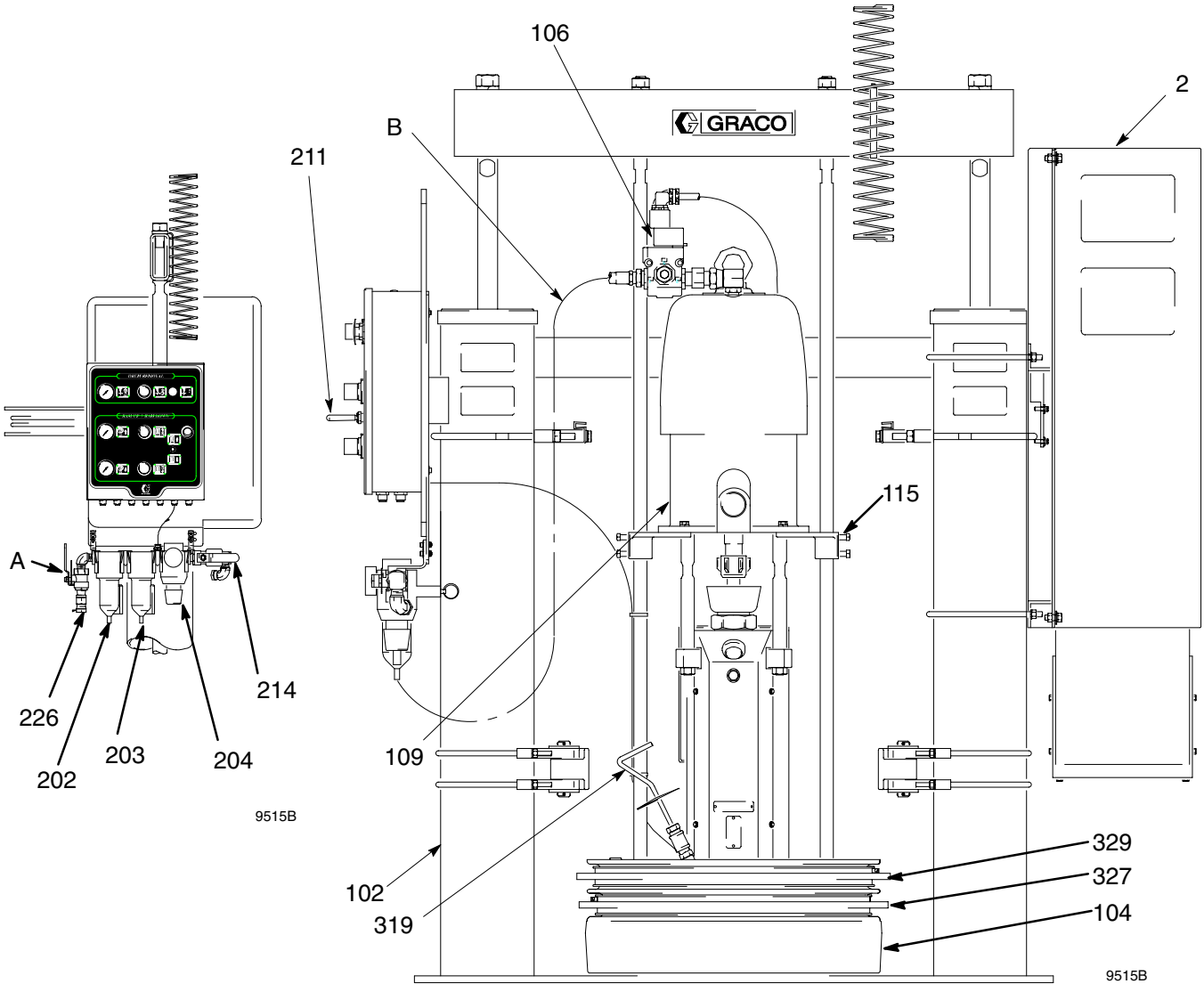


Fig. 2

Typical Installation

For operation and startup, refer to Graco form 309180, Therm–O–Flow Plus Installation and Operation Guide.

The typical installation discussed below is only a guide for selecting and installing system components and accessories. Contact your Graco distributor and refer to technical data sheet 325008 for help in designing a system to suit your particular needs.

This air-powered ram extruder forces high viscosity fluids into the intake valve of the fluid pump. Wiper rings and other accessory equipment for use with this ram are listed in the **Accessories** section on page 92.

NOTE: For information about converting the ram from air to hydraulic operation, contact your Graco distributor.

Selecting a Location for the Ram

Refer to the Ram Mounting and Clearance Dimensions drawing on page 91 for ram mounting and clearance dimensions.

When selecting a location for the ram, keep the following in mind:

1. There should be sufficient space for installing and using the equipment.
   - Make sure there is sufficient overhead clearance for the pump and ram when the ram is in the fully raised position.
   - If you are installing a vent hood, make sure there is sufficient horizontal clearance for it.
   - Make sure the air regulators for the pump and ram are fully accessible.
   - Make sure there is easy and safe access to an appropriate electrical power source. The National Electrical Code requires 3 feet of open space in front of the electrical panel.
2. Make sure that you will be able to level the base of the ram using metal shims.
3. When you bolt the ram to the floor the anchors should be long enough to prevent the unit from tipping. Refer to the Dimensional Drawing on page 91 for more information.
4. If you are installing a vent hood, make sure the ram is installed near a connection to the factory ventilation system.

System Accessories and Modules

Before you install the system you should be familiar with the parts discussed in the subsequent paragraphs.

Air and Fluid Hoses

⚠ WARNING

FIRE HAZARD
Only use hoses that have a maximum wattage less than or equal to 1250 watts. Using hoses with higher maximum wattage could create a failure in the electrical circuit.

The Therm–O–Flow Plus unit was designed for use with Graco single–circuit material hoses that are rated at a maximum of 1250 watts.

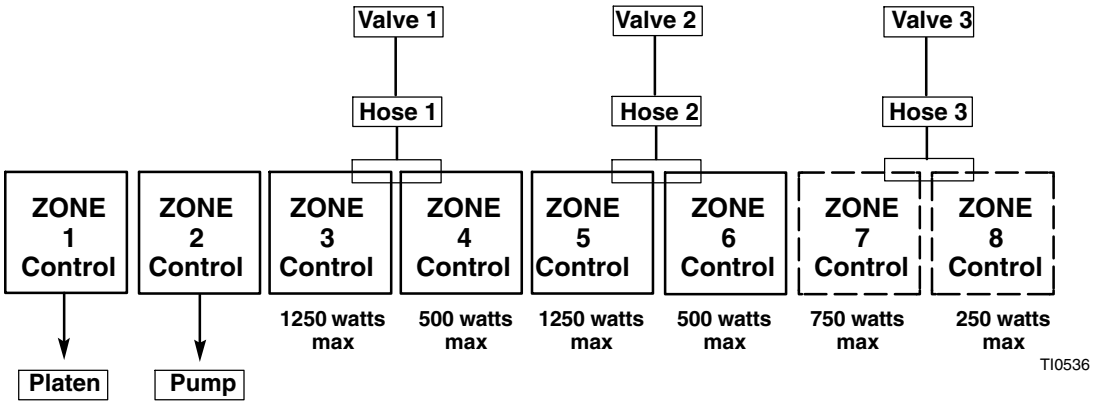
When installing a system, make sure:

- all air and fluid hoses are properly sized for your system.
- to use only electrically conductive air and fluid hoses.

Typical Installation

Heat Control Zone Selection

The Therm–O–Flow Plus can be ordered with six (code E–1) or eight (code E–2) heat zones (see Fig. 3). Zones 1 and 2 are always used for heated drum platen and the heated pump. Zones 3 and 4, 5 and 6, and optional zones 7 and 8 are each available as paired zones through a 16–pin connector. The heated hoses have a 16–pin connector on the inlet end cable, and an 8–pin connector on the outlet end cable. All heated valves, manifolds and heaters are equipped with an 8–pin matching connector. Accessory cables are available for other possible combinations.



NOTE: Zone seven can be used for hoses up to 15 ft. (4.5 meters) or a heated header or any accessory device up to 750 watts with the right accessory cable. Zone eight can be used for hand guns or automatic valves only.

Fig. 3

Typical Installation

Air Line Modules

⚠ WARNING

PRESSURIZED FLUID HAZARD AND MOVING PARTS HAZARD

The bleed-type master air valve (C) and auto depressurization valve (P) are required in your system to relieve air trapped between this valve and the pump after the pump air regulator is closed. Trapped air can cause the pump to cycle unexpectedly, which could result in serious bodily injury, including splashing in the eyes or on the skin and injury from moving parts.

4-Regulator Air Control Module (shown)

For more information, refer to Fig. 2 on page 8. The following components are included with the module:

- Bleed-type Master Air Valve (A) is used to shut off the air supply from the entire supply unit.
- Bleed-type Motor Air Valve (214) is supplied in your system to relieve air trapped between it and the air motor when the valve is closed (see **WARNING** above). This bleed valve should be easily accessible and located downstream from the air regulator. It can be used as a safety lockout.
- Pump Air Regulator (204) controls pump speed and outlet pressure by adjusting the air pressure to the pump. It is located on the air control panel upstream from the bleed-type master air valve.
- Auto Depressurization Valve (106) exhausts air from the system at shutoff. The built-in control delays startup to allow material to heat thoroughly.
- Ram Air Regulator (224) controls the air pressure to the ram. There are separate air regulators to control the ram pressure in the up and down directions.
- Ram Air Supply Hose connects the ram air regulator to the air manifold.
- Ram Plate Blow-off Valve controls the air pressure to the ram plate blow-off.
- FRL (filter, regulator, lubricator) (202), (203), and (204) conditions the air to the ram and the pump. The pump air regulator is located in this assembly. The ram air is taken from this assembly; an air line tube connects the FRL and the ram air control module.

Fluid Line Accessories (Typical)

A pressure compensator valve controls fluid pressure to the gun/valve, and dampens pressure surges. Install the pressure compensator valve in the position shown in the Typical Installation, using adapters as necessary.

Vent Hood Kit (if supplied)

The vent hood assembly is designed to efficiently draw fumes to the factory exhaust system during drum change-out. This assembly requires connection to a factory ventilation system that draws a minimum air flow of 8.4 m^3/min (300 scfm). This kit is recommended for Polyurethane Reactive (PUR) applications.

Heat Control Zone Selection

The Therm–O–Flow Plus can be ordered with six (Code E–1) or eight (Code E–2) heat zones. Zones 1 and 2 are always used for the drum heated platen and the heat pump. Zones 3 and 4, 5 and 6, and optional zones 7 and 8, are available as paired zones through a 16 pin connector. The heated hoses have a 16–pin connector on the inlet end cable, and an 8–pin connector on on the outlet end cable. All heated valves, manifolds and heaters are equipped with an 8–pin matching connector. Accessory cables are available for other possible connections.

Installation

The installation procedure includes:

- locating and installing the ram
- electrically connecting hoses to the electrical control panel
- grounding the system
- connecting the electrical control panel to a power source
- checking resistance
- setting controls on the electrical control panel

Graco form 309180, Therm–O–Flow Plus Installation and Operation Guide, includes:

- starting up the system
- initially loading material

Installing the Ram

To install the ram, follow the procedure below. Refer to the Ram Mounting and Clearance Dimensions drawing on page 91 for ram mounting and clearance dimensions.

1. Select a convenient location for the equipment. Check that there is sufficient overhead clearance for the pump and ram when the ram is in the fully raised position. Make sure the air regulators for the pump and ram are fully accessible.
2. Level the base of the ram, using metal shims.
3. Using the holes in the base as a guide, drill holes for 13 mm. (1/2”) anchors. Bolt the ram to the floor with anchors, which are long enough to prevent the unit from tipping. Refer to the Dimensional Drawing on page 91.

Electrically Connect Hoses to the Electrical Control Panel

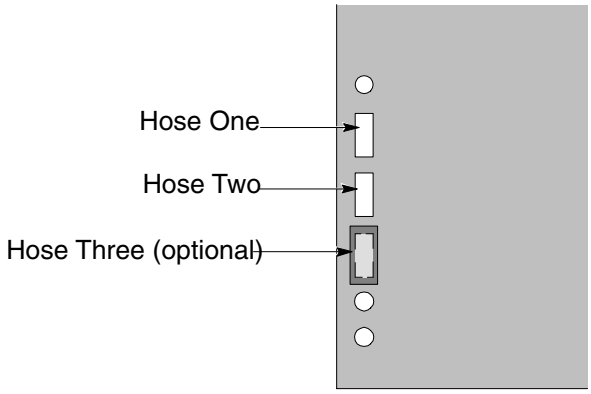
⚠ WARNING

FIRE HAZARD
Only use hoses that have a maximum wattage less than or equal to 1250 watts. Using hoses with higher maximum wattage could create a runaway temperature condition.

Assemble the hose and gun components as needed. For information on connecting the hose and gun components, follow the gun’s instructions.

Electrically connect the hoses to the electrical control panel. The connectors are located on the back of the electrical control panel (Fig. 4).

1. Connect the plug from hose 1 to the Hose 1/Gun 1 receptacle.
2. Connect the plug from hose 2 to the Hose 2/Gun 2 receptacle.



Rear View of Electrical Control Box

Fig. 4

Installation

Ground The System

Ground the supply unit as instructed here and in the individual component manuals.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock:

- The power source conduit is not an adequate ground for the system. The unit must be bonded to either the building ground or a true earth ground.
- A qualified electrician must complete all grounding and wiring connections and check the resistance as instructed on page 15.
- Refer to your local code for the requirements for a “true earth ground” in your area.
- Also read and follow the warnings on page 5.

To reduce the risk of static sparking, ground the pump, object being dispensed to, and all other spraying/dispensing equipment used or located in the spraying/dispensing area. Check your local electrical code for detailed grounding instructions for your area and type of equipment.

Air and Fluid Hoses:

Use only electrically conductive hoses.

Dispensing/Spray Gun

Follow the dispensing/spray gun grounding instructions.

Object Material is Applied To

Ground the object according to your local code.

Material Drums

Ground the material drums according to your local code. Use only metal drums placed on a grounded surface. Do not place the drum on a nonconductive surface, such as paper or cardboard, which interrupts the grounding continuity.

Maintain Grounding Continuity When Purging Or Relieving Pressure

Follow the instructions in your separate gun manual for safely grounding your gun while purging.

Installation

Connecting the Electrical Control Panel to a Power Source

The electrical control panel (Fig. 5) comes already attached and wired to the ram, however before the supply unit becomes functional, you must connect the electrical control panel to a power source.

⚠ WARNING

ELECTRIC SHOCK HAZARD
Do not connect the electrical control panel to a power source unless you are a trained professional. Failure to follow standard procedures or to observe the necessary precautions could result in serious bodily injury or equipment damage.

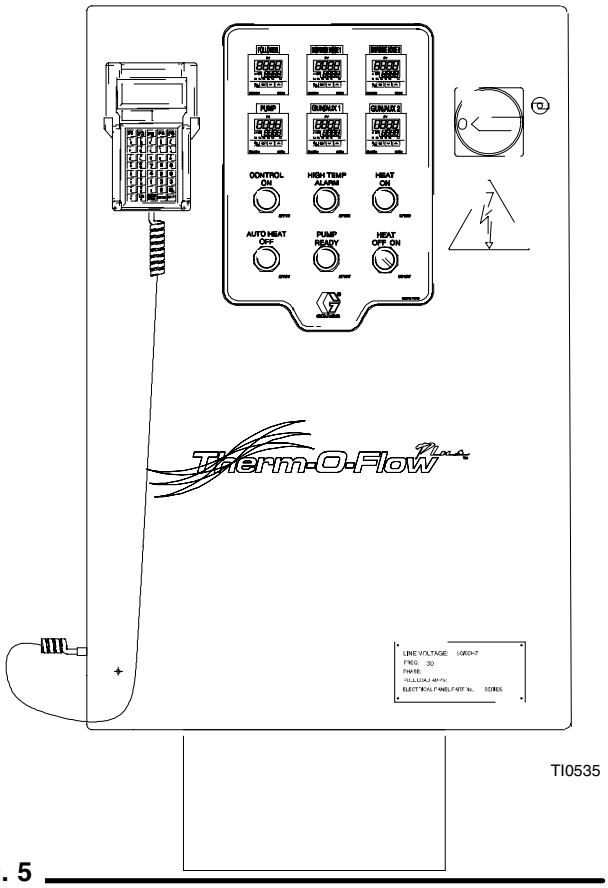


Fig. 5

Have a trained electrician connect the electrical control panel (Fig. 5) to a grounded electrical source that has the required service ratings:

⚠ CAUTION

If power and grounding connections are not done properly, the equipment will be damaged and the warranty will be voided. Check the label on the control box for the proper voltage.

AC Panel Voltage	Hz	Phase	* Platen Selection	Full Load Amps
220/240	50/60	3	B–1, B–2, B–3, & B–7	70
			B–4, B–5, & B–6	80
380/400	50/60	3	B–1, B–2, B–3, & B–7	42
			B–4, B–5, & B–6	48
470/490	50/60	3	B–1, B–2, B–3, & B–7	35
			B–4, B–5, & B–6	40
570/590	50/60	3	B–1, B–2, B–3, & B–7	29
			B–4, B–5, & B–6	32

B–1, B–2, & B–3 = Standard grid platen: 18 Kw
B–4, B–5, & B–6 = Mega–Flow platen: 21 Kw
B–7 = Smooth bottom platen: 18 Kw

For information about specific terminal locations and connections, see **Control Panel Component Layout** on page 86 and refer to Electrical Setup in Graco form 309180, Therm–O–Flow Plus Installation and Operation Guide

To connect the control panel to the electrical source:

1. Locate the opening in the control panel‘s top housing for the conduit that will enclose the wire from the facility’s power source. The hole will accept a 1” conduit fitting. It is 1.3” dia. (33mm).

2. Thread the wire from the power source into the control panel housing, and then connect the power source wires to the appropriate terminals on the DISCONNECT switch.

Installation

Check the Resistance Between the Supply Unit and the True Earth Ground

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock the resistance between the supply unit components and true earth ground must be less than 0.25 ohms.

Have a qualified electrician check the resistance between each supply unit component and the true earth ground. The resistance must be less than 0.25 ohms. If the resistance is greater than 0.25 ohms, a different ground site may be required. Do not operate the system until the problem is corrected.

NOTE: Use a meter that is capable of measuring resistance at this level.

Checking Resistance

⚠ WARNING

ELECTRIC SHOCK HAZARD

Do not open the electrical control panel, unless you are a trained professional.

Before opening the control panel, make sure that all power has been removed from the control panel.

You can check the resistance of the supply unit's heat sensors and heaters.

Sensor Resistance Checks

⚠ WARNING

ELECTROCUTION HAZARD

To reduce risk of injury or damage to equipment, conduct these electrical checks with the main disconnect OFF.

The package includes up to eight heat sensors and controllers for each of the heated zones. To check sensor resistance:

1. Make sure the power is off and that the disconnect switch is in the OFF position.
2. Make electrical resistance checks for the components.
3. Replace any parts whose resistance readings do not comply with the ranges listed in the chart below.

NOTE: Check resistance at ambient room temperature (63° – 77° Fahrenheit).

RTD Sensors

Zone	Component	Terminals	Value Range
1	Ram Plate	2161 & 2171	108 ± 2% ohms
2	Fluid Pump	2231 & 2241	108 ± 2% ohms
3	Dispense Hose 1	2301 & 2310	108 ± 2% ohms
4	Dispense Gun 1	2371 & 2381	108 ± 2% ohms
5	Dispense Hose 2	2561 & 2571	108 ± 2% ohms
6	Dispense Gun 2	2631 & 2641	108± 2% ohms
7	Dispense Hose 3	2661 & 2671	108 ± 2% ohms
8	Dispense Gun 3	2731 & 2741	108 ± 2% ohms

Installation

Heater Resistance Checks

⚠ WARNING

ELECTROCUTION HAZARD

To reduce risk of injury or damage to equipment, conduct these electrical checks with the main disconnect OFF.

To check heater resistance:

1. Make sure the power is off and that the disconnect switch is in the OFF position.
2. Make electrical resistance checks for the components. Refer to **Control Panel Component Layout** on page 86 for wiring diagram information.
3. Replace any parts whose resistance readings do not comply with the ranges listed in Table 1.

NOTE: Check resistance at ambient room temperature (63° – 77° F).

Table 1. Heaters

Zone	Component	Between Terminals	For Unit Voltage	Platen Model Code	Resistance Values (ohms)
1	Ram Plate Heaters from J–Box or Control Box	3L1 & 3L2	240	B–1, B–2, B–3, or B–7	6.4 ohms ± .65 ohms
				B–4, B–5, & B–6	5.5 ohms ± .55 ohms
			Not 240	B–1, B–2, B–3, or B–7	25.5 ohms ± 2.6 ohms
				B–4, B–5, & B–6	22 ohms ± 2.2 ohms
		3L2& 3L3	240	B–1, B–2, B–3, or B–7	6.4 ohms ± .65 ohms
				B–4, B–5, & B–6	5.5 ohms ± .55 ohms
			Not 240	B–1, B–2, B–3, or B–7	25.5 ohms ± 2.6 ohms
				B–4, B–5, & B–6	22 ohms ± 2.2 ohms
		3L3 & 3L1	240	B–1, B–2, B–3, or B–7	6.4 ohms ± .65 ohms
				B–4, B–5, & B–6	5.5 ohms ± .55 ohms
			Not 240	B–1, B–2, B–3, or B–7	25.5 ohms ± 2.6 ohms
				B–4, B–5, & B–6	22 ohms ± 2.2 ohms
		Any leg to ground	Any	Any	At least 70K ohms

2	Pump Heaters from J–Box with jumpers installed	T1 & TC	240	Any	45 ohms ± 4 ohms
		B1 & BC	240	Any	45 ohms ± 4 ohms
		5L1 & 4L2	240	Any	45 ohms ± 4 ohms
		T1 & T2	380–480	Any	180 ohms ± 4 ohms
		B1 & B2	380–480	Any	180 ohms ± 4 ohms
		5L1 & 4L2	380–480	Any	180 ohms ± 4 ohms
		T1 & T2	575	Any	360 ohms ± 4 ohms
		5L1 & 4L2	575	Any	450 ohms ± 4 ohms
3 thru 8 Check hose tag or valve manual for valve					

Installation

Overview of the Temperature Controller Settings

The basic program settings for each temperature controller satisfy most application needs. These settings are preset at the factory, but can be changed. The input type, temperature scale, and over temperature alarm point are the critical controller settings that are set before doing an auto-tune or using any controller in normal operation. See Form 309100 for operation of the temperature controls.

Graco Factory P, I, and d Settings

Table 2 lists the P, I, and d settings for standard control panels. These settings are preset at the factory. Use the table for reference information only.

Table 3 lists the default settings for each zone.

Checking P, I, and d Settings

For each zone controller:

1. Press and hold the SET key until the display reads “AL1.”

2. Use the SET key to scroll to the P setting. Repeat for the I and d settings.

3. If the P, I, and d settings are not correct for the device you are heating, you will need to change them. Refer to the **Operation** section of Form 309100.

4. If your machine is equipped with the optional Advanced Communication Pendant, the proper values can be set automatically. Refer to page 39 in this manual.

Table 2. Graco Factory P, I, and d Settings

Category	P	I	d	Unit Voltage
Ram Plate	41	118	29	ALL
Pump	50	1186	296	ALL
Hose	9.9	51	12	ALL
Gun	75	49	12	ALL
Manifold	24.1	144	36	ALL
Compensator	40.9	87	21	ALL
Header	1.7	109	16	ALL
Regulator	58.5	330	82	ALL

These P, I, and d values are usually generated by running an autotune process for each heat zone. The controllers will automatically find the proper P (proportional), I (integral), and d (derivative) values during this autotune process. These are values that allow the heat zones to reach their maximum temperature as fast as possible without significantly exceeding desired temperature.

It is not recommended that “AutoTune” be used for the heated pump zone.

Table 3. Graco Factory Default Values

Zone Number	Factory Default Values Set For:
1	Ram Plate
2	Pump
3	Hose
4	Gun
5	Hose
6	Gun
7	Hose
8	Gun

Installation

Flushing the System

Flushing the system before its initial use can prevent material contamination, which may cause the material to fail or perform poorly.

⚠ CAUTION

Flush the system before performing the initial material loading procedure. The system was factory-tested using a light soluble oil, a soybean oil, or some other oil as tagged. Flush the system to avoid contaminating the material that has been designated for initial material loading.

To flush the system, perform the following procedure:

1. Select the material for the initial material load.
2. Verify whether the factory-test oil and the initial material load are compatible:
   a. If the two substances are compatible, omit the remaining steps in this procedure and refer to Graco form 309180, Therm–O–Flow Plus Installation and Operation Guide, for start up and operation instructions.
   b. If the two substances are incompatible, perform the remaining steps in this procedure to flush the system at ambient temperature.

⚠ 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.

Provide fresh air ventilation to avoid the buildup of flammable fumes from solvent or material.

3. Select a drum containing solvent that can dissolve, clean, and eliminate the factory-test oil from the system. If necessary, check with Graco or the material supplier for a recommended solvent.
4. Before flushing, be sure the entire system and flushing drums are properly grounded. Refer to **Ground The System**, on page 13.
5. Turn all heat zones to OFF. This will allow air to the air motor, with no alarms, in a cold state.
6. Refer to Graco form 309180, Therm–O–Flow Plus Installation and Operation Guide, for instructions on how to load the drum containing the solvent.
7. Flush the solvent through the system for approximately 1 to 2 minutes.
8. Remove the drum containing the solvent.

Installation

Optional Low Level Kit 233096

The Low Level Kit is used to indicate that a drum is EMPTY or LOW, depending on the adjustment of the limit switch. A RED beacon will illuminate when the switch is activated. The kit contains a limit switch, mounting bracket, a cable for connecting to the Therm-O-Flow plus control panel, and a RED beacon assembly. When a drum goes LOW or EMPTY (operator preference), the RED beacon will illuminate. See Fig. 6.

When ordering this kit individually to connect to an existing Therm-O-Flow Plus unloader assembly, use the bolts, screws and washers provided to mount to the closest ram post to the control box. Mount the limit switch to the bracket as shown, with the limit switch lever in the center position of the bracket. This will ensure it makes contact with the rod actuator. Place the rod actuator on the ram cylinder rod and adjust so the switch actuates the RED beacon at the desired level within the drum.

Also, when the RED beacon is illuminated indicating a LOW or EMPTY drum, terminals 3161 and 3171 within the main control box will be OPEN (no continuity). These terminals 3161 & 3171 are the DRUM NOT EMPTY/LOW connections available for the customer for interfacing to other equipment. CLOSED (continuity) at these terminals indicate the drum is NOT empty. These are dry relay contacts rated at 10A at 28VDC and 13A at 120VAC to 277VAC.

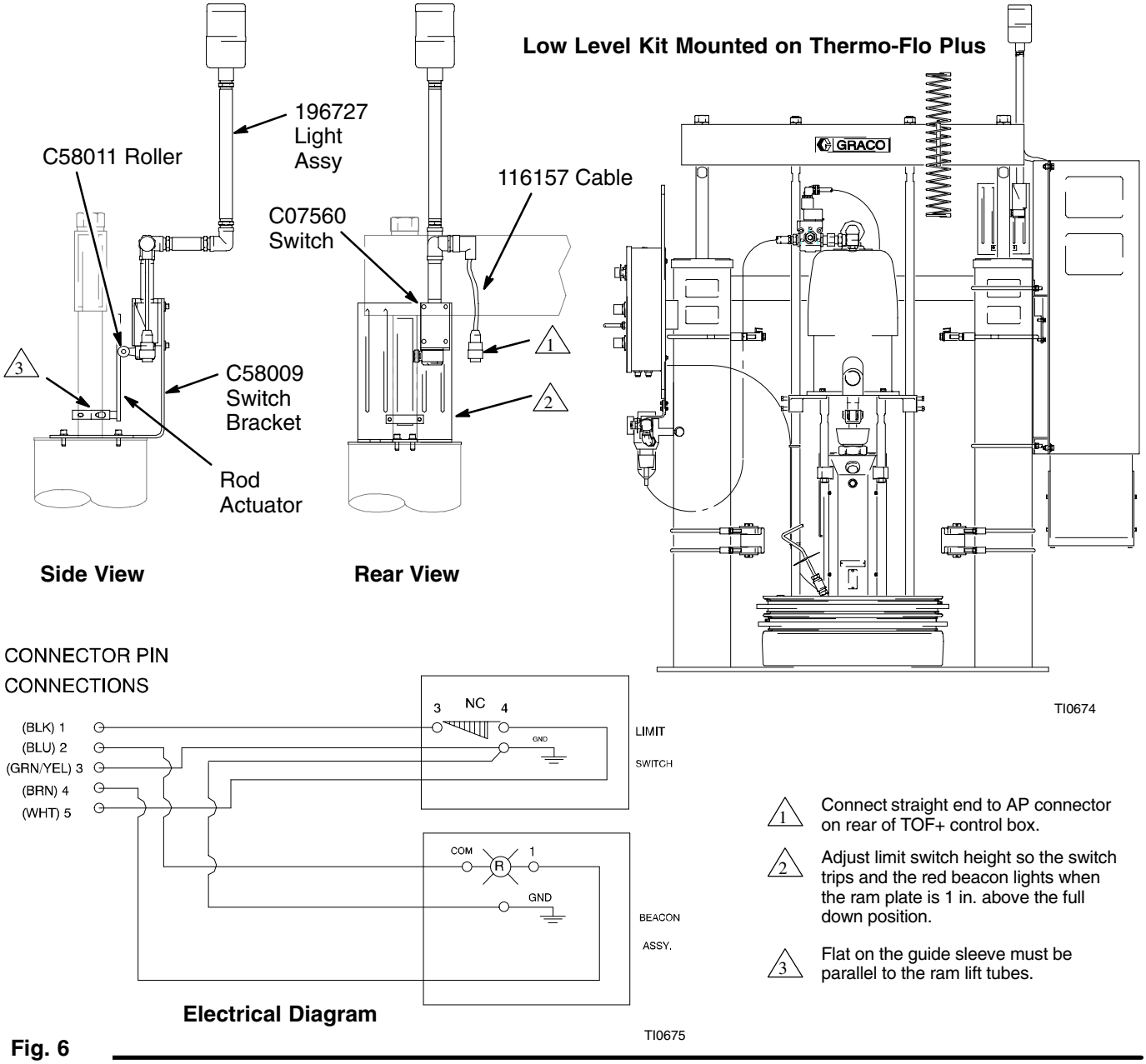


Fig. 6

Optional Inactivity Timer Kit 233097

The Inactivity Timer will shut off all power to the heat zones when the pump has not operated for 2–10 hours. This is done by a proximity switch mounted to the pump assembly, which senses movement of a collar mounted to the connecting rods of the air motor and the pump assembly. Every time the collar moves in front of the proximity switch, the timer in the main control box resets itself and starts a new time out cycle. Once the timer has timed out without pump activity, the BLUE light indicating AUTO HEAT OFF will illuminate. To reset, turn the HEAT OFF/ON switch to OFF, then to ON.

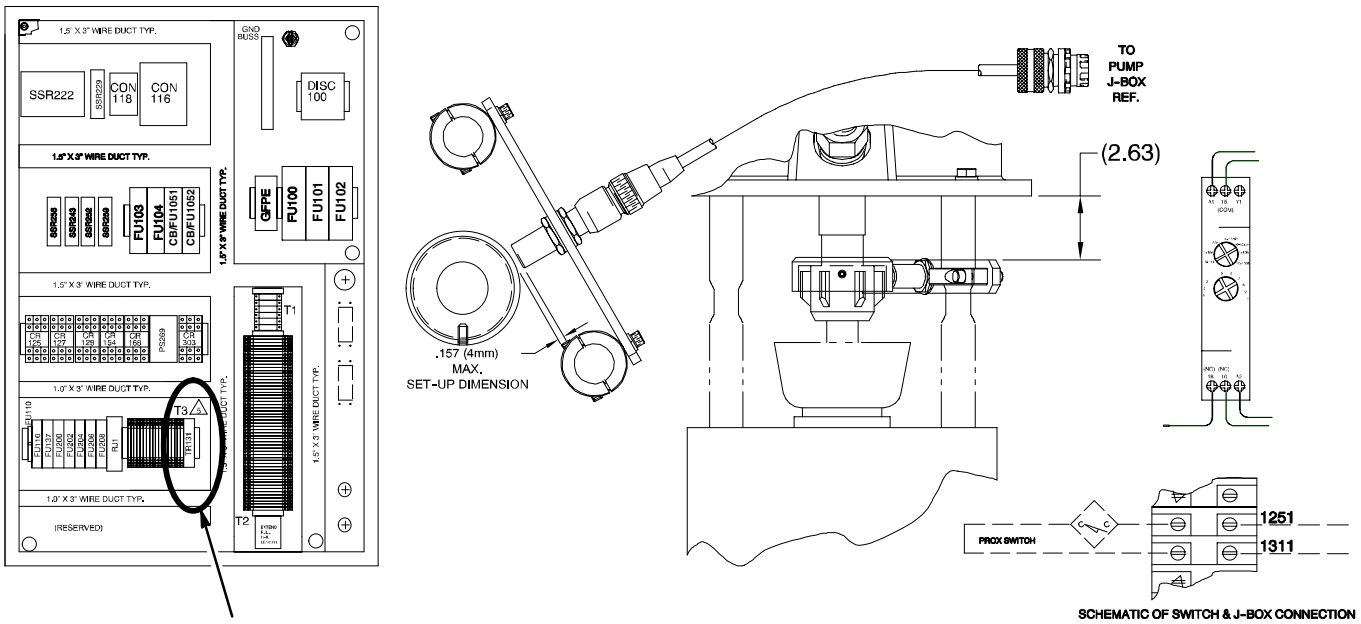
If the Inactivity Timer Kit 233097 is ordered as a kit for an existing system, the proximity switch will need to be mounted to the pump assembly and wired to the pump j–box assembly. Also the timer assembly will come with wires pre–labeled for mounting within the Therm–O–Flow plus control box assembly. To connect the Inactivity Timer Kit, refer to Fig. 7.

The proximity switch contains all the hardware required to mount to the tie rods of the pump. Ensure the distance from the top of the mounting plate of the proximity switch to the bottom of the air motor housing is 2.63 in. Refer to Fig. 7. Mount the collar over the existing connecting rod nut by breaking loose the connection, running the air motor to allow the collar to fit over the nut, and reconnect the nut to the air motor shaft. Terminate the wires of the proximity switch in the pump j–box by removing the plug of an unused hole and terminate the wires to terminals 1251 and 1311 as shown. (Polarity of the wires is not important). Snap the timer assembly onto the din rail of the control panel as shown. The schematic diagram of the related section of the control panel is shown for reference. Ensure the top dial on the timer is set for 1 to 10 hours, and the bottom dial is set at 2. This will set the timer for automatic shut–off of all power to the heat zones on the control box. If the timer has not been reset by the proximity switch by movement of the pump, all the heat zones will not have power to operate. The BLUE light on the front of the panel will be illuminated, indicating the timer has timed out and the AUTO HEAT OFF has been activated by the timer. To reset the timer, turn the HEAT ON/OFF switch to OFF then ON again. The timer will reset and another 2 hour time out will start.

NOTE: Never set the timer for less time than it takes your system to fully heat up from a cold start.

Installation

Optional Inactivity Timer Kit 233097 (continued)



Reserved location for Inactivity Timer (TR184) Selection E3.

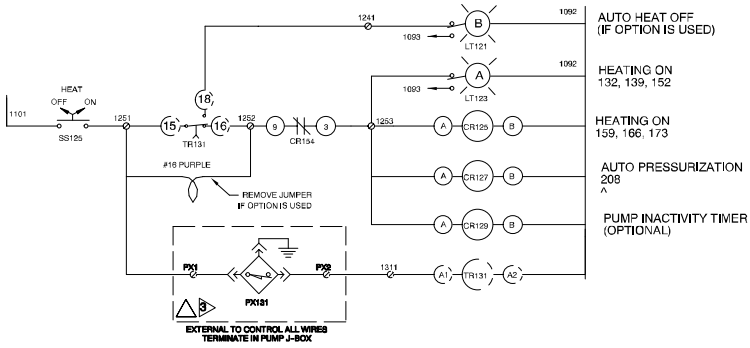


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Fig. 7

Control Box Wiring of Timer Relay

1. Remove the terminal jumper between 1251 and 1252.

2. Snap the timer assembly to the din rail in the control box, as shown.

3. Connect the wires supplied:
   - A–1 to 1311
   - A–2 to 1092
   - 15 to 1251
   - 16 to 1252
   - 18 to 1241

4. Set the upper dial from 1 to 10 hours.

5. Set the lower dial to “2”.

Operation

Start Up and Operation

See Graco form 309180, Installation and Operation Guide, for detailed start up and operation instructions.

Pressure Relief Procedure

This procedure describes how to relieve pressure for the supply unit. 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.

⚠ WARNING

MOVING PARTS HAZARD
Follow the **Pressure Relief Procedure** below before checking or repairing the ram or any other part of the system and when shutting down the system. Keep hands and fingers away from the ram plate, fluid pump inlet, and lip of the fluid container when raising or lowering the ram to reduce the risk of pinching or amputating hands or fingers.

During operation, also keep hands and fingers away from limit switches to reduce the risk of pinching or amputating hands or fingers.

HOT SURFACE AND FLUID HAZARD
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.

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, moving parts, follow the **Pressure Relief Procedure** whenever you:

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

PRESSURE FLUID HAZARD
High pressures can cause serious personal injury. Be sure to **open the dispense valve during system heat-up** to alleviate pressure which might occur in the system due to material expansion.

To relieve pressure in the supply unit, perform the following procedure:

1. Lock the gun/valve trigger safety.
2. Shut off the main air supply to the pump.
3. Close all air bleed valves.
4. Unlock the gun/valve trigger safety.
5. Hold a metal part of the gun/valve firmly to the side of a grounded metal drum, 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 nozzle retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Now clear the tip/nozzle or hose.

9. If you want to relieve pressure in the ram, see the **Ram Pressure Relief Procedure** on page 62.

⚠ CAUTION

To help avoid damage to equipment:

- Be sure to reload the empty supply unit with a full drum of material immediately. Do not allow the supply units to operate when empty, which would cause a pump runaway and damage to the system.
- Do not raise the ram and remove the ram plate from the empty drum until you are ready to immediately install a new drum.
- Do not use a drum of material that has been dented or otherwise damaged; damage to the ram plate wipers may result.

⚠ CAUTION

Do not raise the ram and remove the ram plate from the empty drum unless the supply unit is at full operating temperature. Drum changes can only be performed when the system is heated. Attempting to change a drum when the supply unit is cold could result in injury, damage to the equipment, or rupture of the material drum.

An empty drum clamp can interfere with up and down operation of the ram. When raising or lowering the ram, make sure the drum clamp stays clear of the ram plate assembly.

Operation

Using the 7-Day Timer in the Optional Pendant Control

Each Night:

Follow this procedure when the 7-day timer is active:

1. Leave the control main power switch ON.
2. Leave the HEAT switch (V) on the electrical control panel ON.
3. Follow the procedures to set and operate the 7–day timer on page 35.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 23).

4. **Relieve the supply unit pressure.**

NOTE: The auto depressurization circuit relieves air pressure from the supply unit when power is turned off.

5. Leave the dispense valve open and over an empty waste container, to relieve pressure that could build up while the system is heating.
6. Make sure that all material valves are open.
7. Make sure the pump air supply valve (214, Fig. 2) has been turned OFF.

The system is ready for start-up with the 7-day timer.

To override the current program time period, manually turn each heat zone OFF or ON.

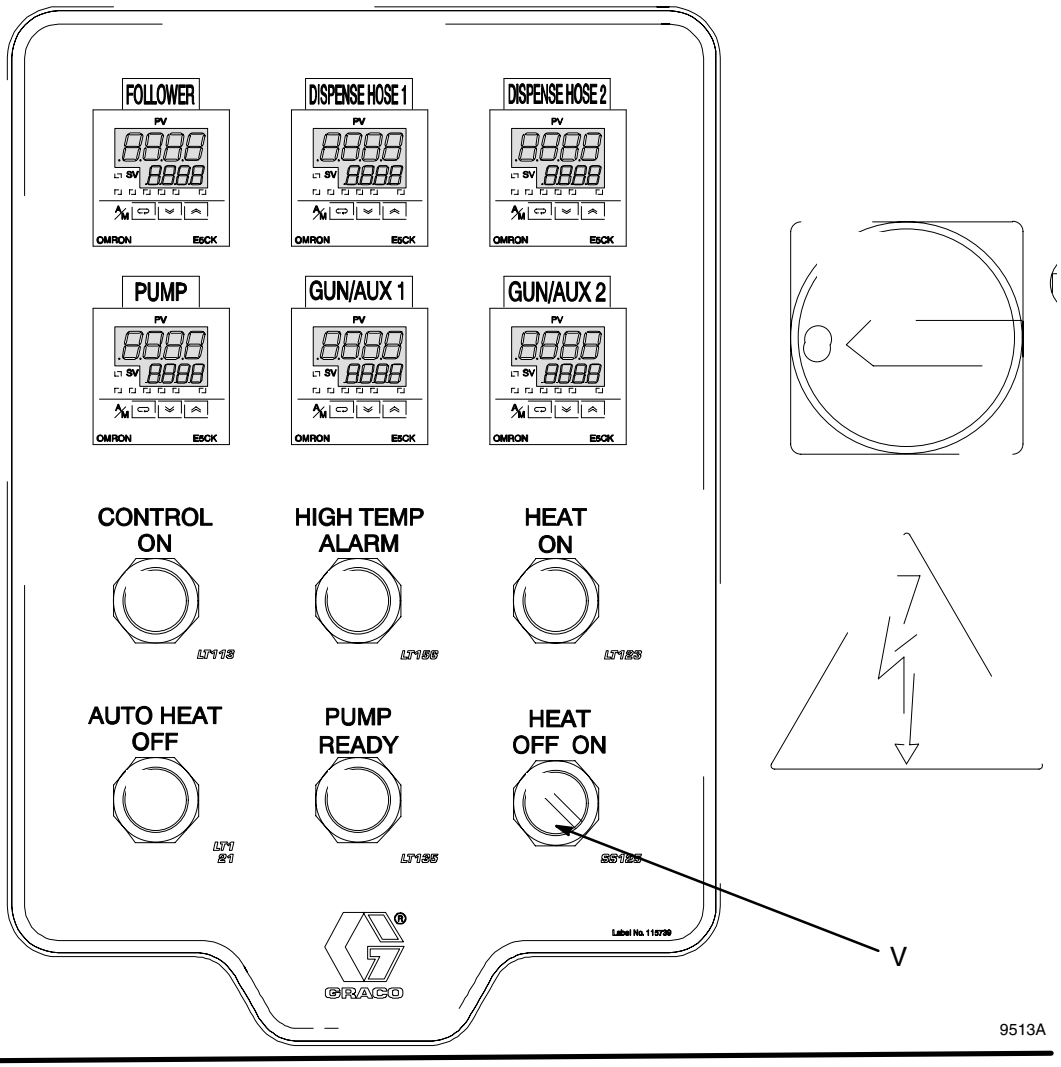


Fig. 8

Operation

Reading the Electrical Control Panel Indicators

Use the table and Fig. 9 below to read the indicators on the electrical control panel.

Light	Indicator:	Indicator Light is:	Meaning:
AB	Control On	ON	Power is on.
		OFF	Power is off.
		DIMLY LIT	There may be a problem with the system power connections. Have connections checked by a qualified electrician before attempting to start the system.
AC	Heat On	ON	The CONTROL ON switch (U) is set to either the ON or AUTO position and power is being supplied to the electrical control panel components.
		OFF	The CONTROL ON switch (U) is set to the OFF position.
AD	High Temperature Alarm	ON	The temperature of any of the heated components is out of range, and the power to all heated components is interrupted. For more information, see **Temperature Out of Range** on page 26.
		OFF	None of the heated components have temperatures that are out of range.
AE	Auto Heat Off	ON	The Inactivity Timer has turned off the heat for the supply unit, due to inactivity. See **Resetting the Supply Unit After the Inactivity Timer (Worklife Timer) Has Been Triggered** on page 26 for instructions on restarting the supply unit.
		OFF	The supply unit is functioning normally.
AF	Pump Ready	ON	The temperature of all zones is within within the operating window. The air solenoid to the pump motor is energized.
		OFF	One or more zones have not reached the normal operating window. The air solenoid to the pump motor is not energized.

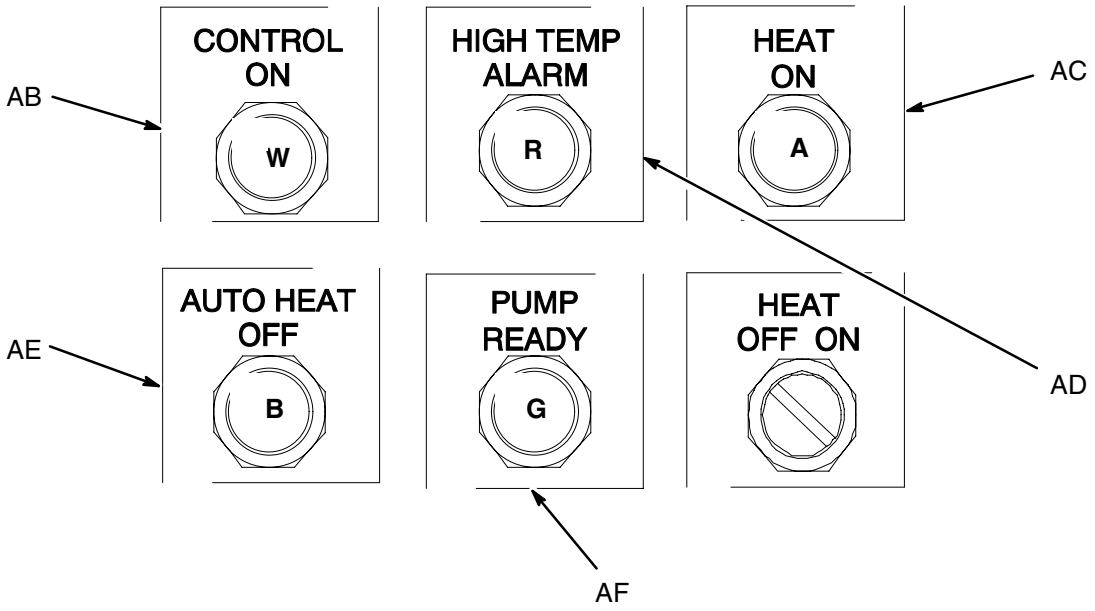


Fig. 9

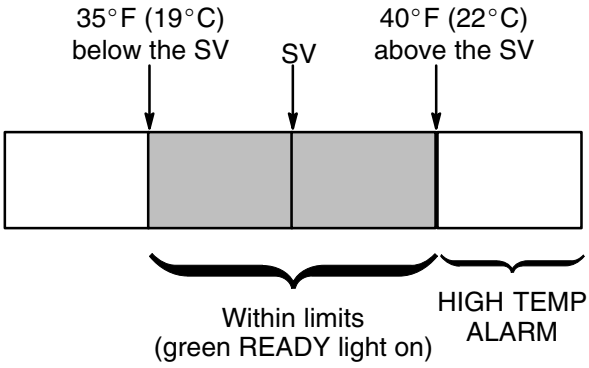
Operation

Reading the Temperature Controllers

Refer to Form 309100 for instructions on reading the CB100 temperature controller.

Temperature Out of Range

Should any of the temperatures go out of the preset range for any of the zones, power to the heated components is interrupted, and the HIGH TEMPERATURE ALARM light (AD) goes ON. The alarm automatically goes OFF and the system resets when the temperature is back in range. The HIGH TEMPERATURE ALARM will activate at 40°F (22°C) over the set value (SV).



The green READY light will illuminate when the temperature is within the limits of 35°F (19°C) below the SV to 40°F (22°C) above the SV. The green READY light also indicates that the air solenoid is allowed to operate.

Resetting the Supply Unit After the Inactivity Timer (Worklife Timer) Has Been Triggered

Your system may have an inactivity timer. If the pump has not moved for a set amount of time, the inactivity timer:

- turns off power to the heaters
- lights the AUTO HEAT OFF light (AE)

To re-heat the supply unit:

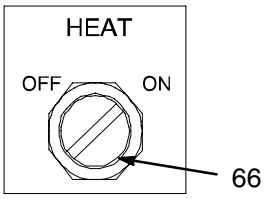


Fig. 10

1. Turn the HEAT switch (V) to the OFF position, then turn it to the ON position.
2. Wait until all components in the supply unit have returned to operating temperature.
3. Resume operation.

Setting the Optional Inactivity Timer

1. Turn off the main power.
2. Open the control box (Fig. 11).
3. Locate the timer in the left hand column, bottom row (last item mounted on the right end of the rail).
4. Select a time on dial 1. Default is 1–10 hours.
5. Set mode “2S” on dial 2.

NOTE: The timer must be set to a value larger than the heat–up time of your system, or the machine will never reach normal temperature.

Operation

Resetting the Ground Fault Interrupt

This control panel is equipped with a ground fault interrupt (GFPE) circuit breaker (Fig 11). If the disconnect switch is ON, but all lights on the electrical control panel are off, have a qualified electrician check the ground fault interrupt.

⚠ WARNING

ELECTROCUTION HAZARD
To reduce risk of injury or damage to equipment, perform this procedure with the main disconnect OFF.

To reset the ground fault interrupt, have a qualified electrician:

1. Turn OFF the electrical disconnect on the electrical control panel.
2. Open the electrical control box and locate the Ground Fault Interrupt switch (GFPE). The ground fault interrupt will be in a “neutral” position, between the ON and OFF positions.
3. Move the GFPE switch to the OFF position, then move it to the ON position.
4. Close the door and turn ON the disconnect switch.

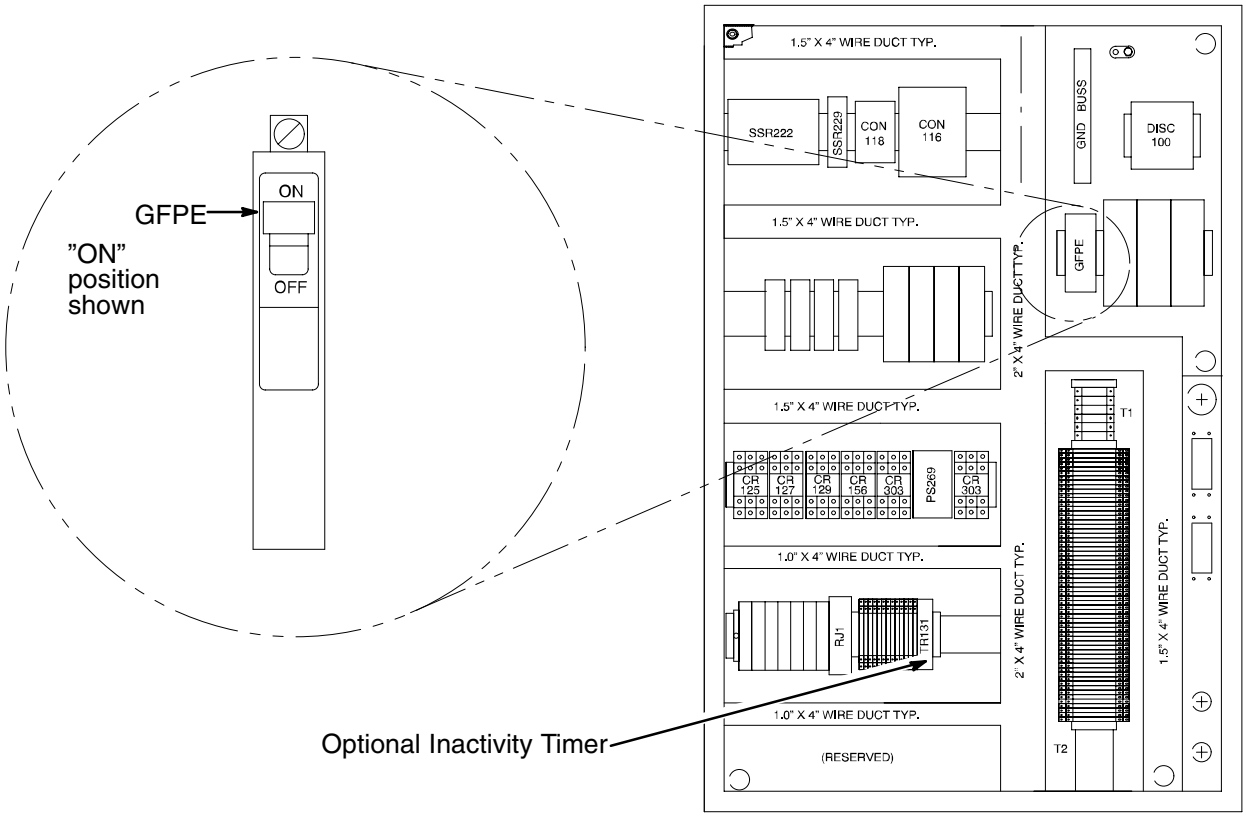
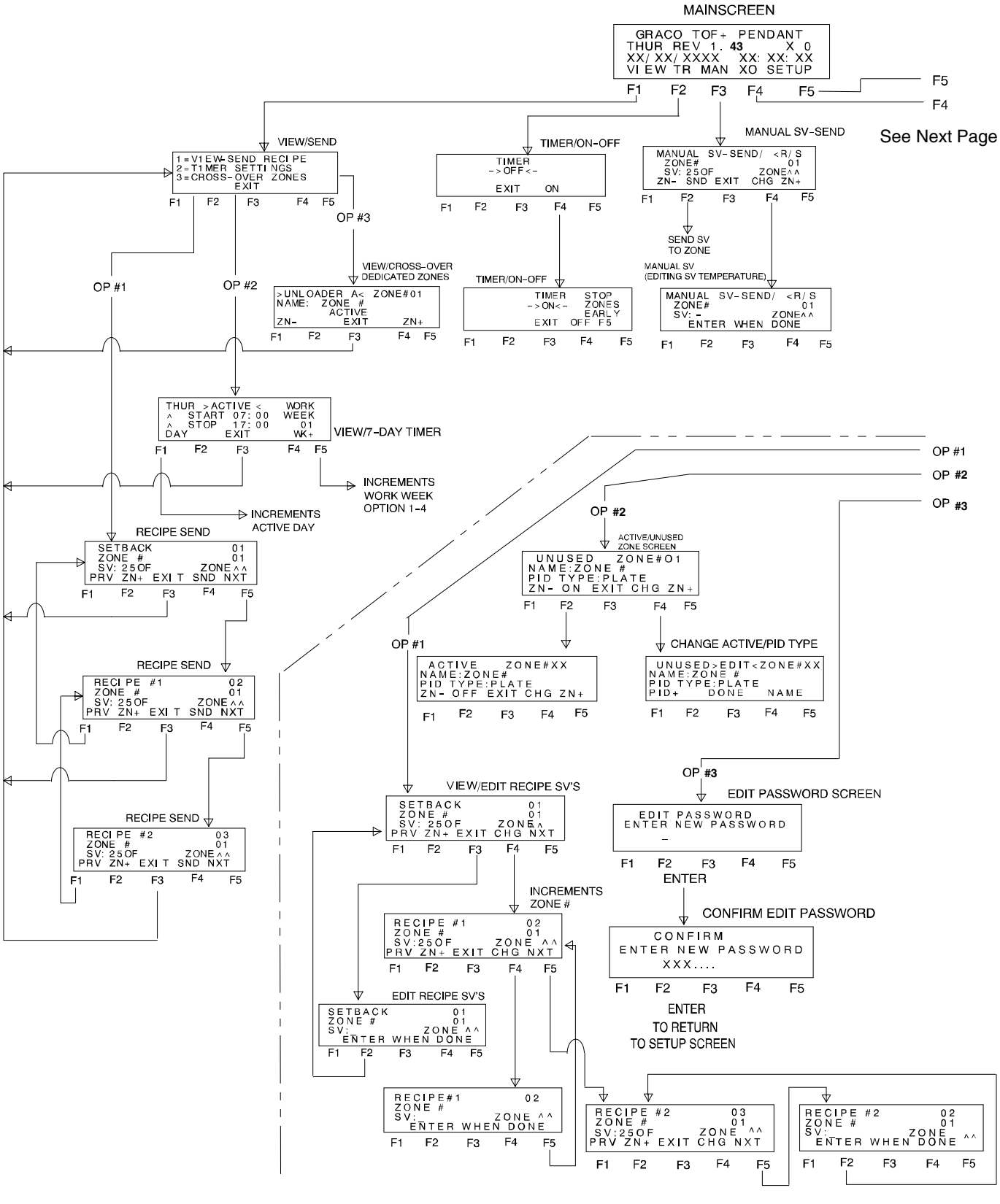


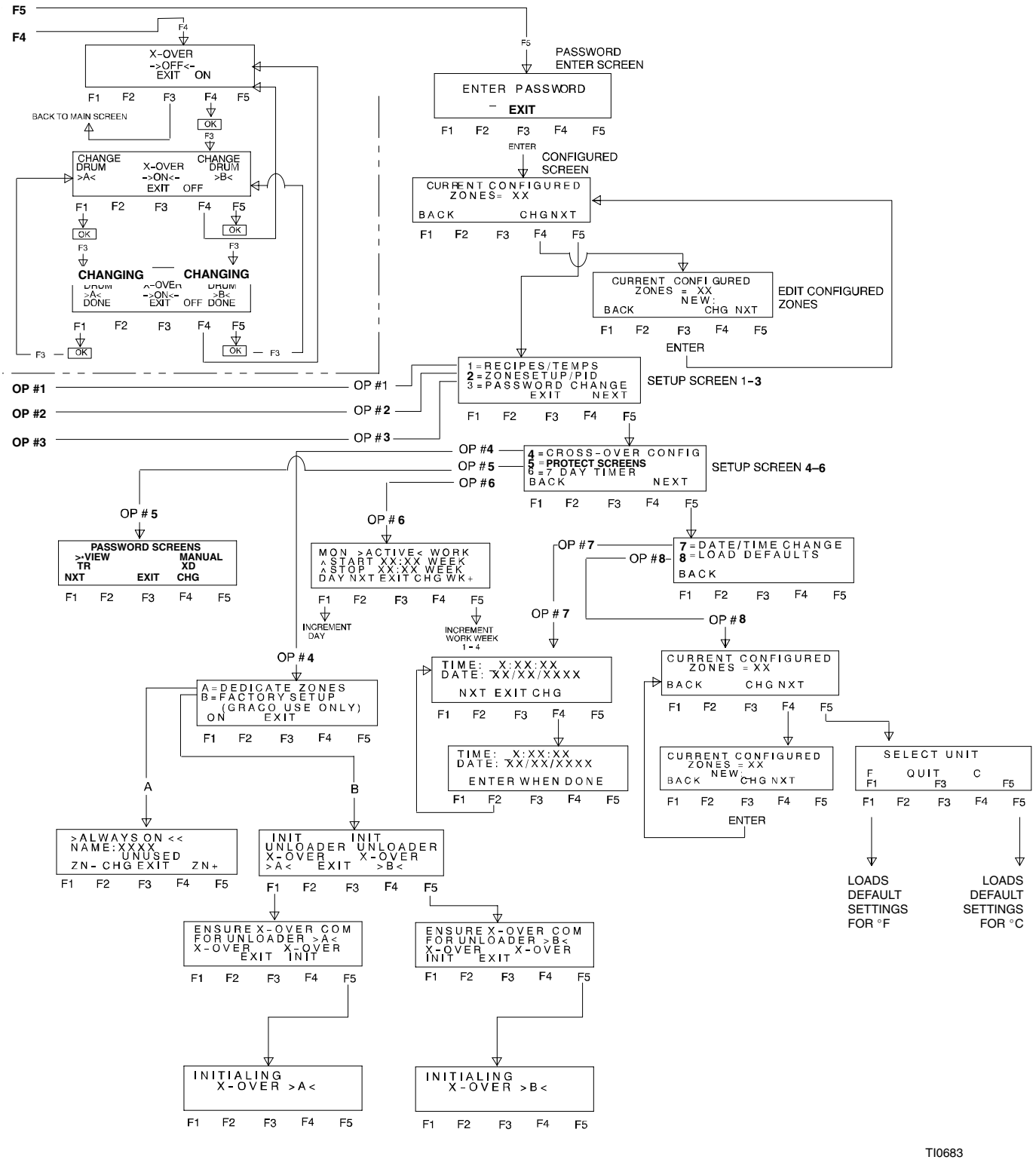
Fig. 11

Advanced Pendant Control Screen Map



Advanced Pendant Control Screen Map

See Previous Page



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Advanced Pendant Control

Refer to Fig. 12. The optional Advanced Pendant Control (Part No. 233098) is used for communicating with the temperature controllers of a Therm-O-Flow Plus hot melt system. The pendant's 7–Day Timer Function automatically turns heat on and off at specified times each day, allowing preheating of the system before production begins. The pendant also provides an easy means of setting PID values for different heat zones for maximum operating efficiency. Easy to use functions are provided to quickly change the SV temperature settings of each controller without the need to manually access each temperature control. Three recipes are available to help when you need to quickly change the SV temperature settings of all the temperature controls at one time. Included in the functions of the pendant are advanced operations for controlling unloader systems which contain dual ram cross-over functions, referred as X-Over functions. This provides an easy to use method to automatically change from an empty drum to a full, preheated drum.

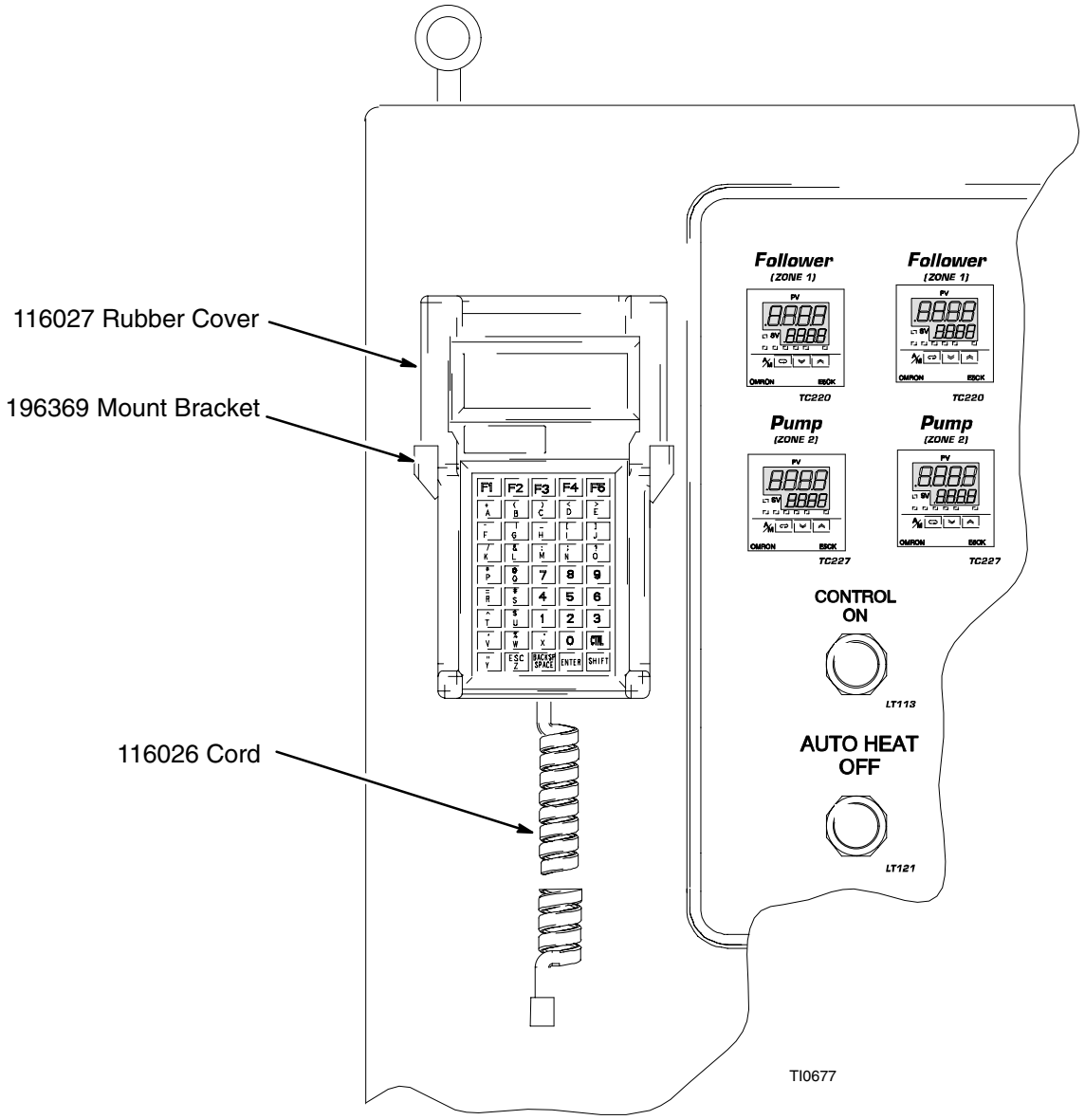


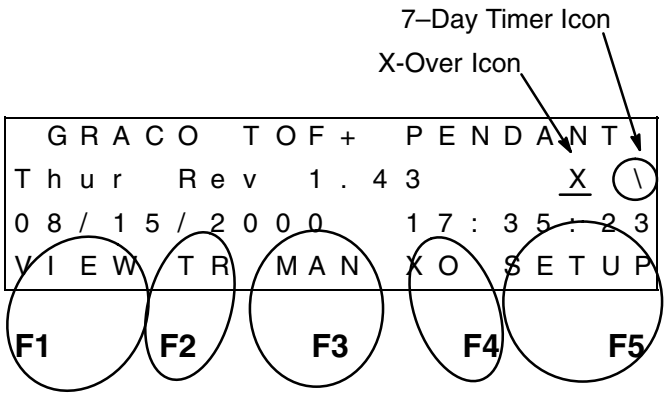
Fig. 12

Advanced Pendant Control

Operation of Pendant

NOTE: These instructions refer to pendent software Rev. 1.43. Reference early manual revisions for software Rev's before 1.43.

Operate the pendant by pressing the proper keys when prompted. The pendant contains 45 keys consisting of the full alphabet and 0–9 numeric keys. The first row of keys are labeled F1, F2, F3, F4 and F5. These keys are always associated with a key function shown on the screen. Reference the MAIN screen shown below. The F1 key is associated with the VIEW function, the F2 with the TR function, F3 with the MAN function, F4 with the XO function and F5 with the SETUP function. All the screens have functions that correlate to the F keys as described here.



Reference the screen map on page 28.

The first line of the MAIN menu shows that this is the GRACO TOF+ PENDANT. TOF+ is an acronym for Therm-O-Flow Plus. The screen shows the current day is Thursday. The rev. of the software is 1.21 and the current time and date are also shown. (The date is MM/DD/YEAR, the time is a 24 hr clock HH:MM:SS, 17:35:23 represents 5:35:23 pm.

The **VIEW** screens are accessed by pressing F1 (VIEW). These screens are for:

- Viewing and sending of heat zone setup recipes
- Viewing 7–day timer ON/OFF settings
- Viewing empty pump cross–over heat zone settings.

The F2 **TR** selection accesses the TIMER screens. These screens are used to turn the 7–day timer on and off.

The F3 **MAN** selection accesses the MANUAL operation screen. Here any Set Value (SV) can be sent to any zone controller. You can also place the controls in RUN or STOP mode from this screen.

The F4 **XO** selection is used for turning off and on the X-Over control functions (for those systems equipped with the proper X-Over controllers). This screen is never accessible for systems that are not dual ram cross-over systems.

The F5 **SETUP** selection is used for changing and editing the pendant parameters for all functions. The SETUP screens are password protected and are intended to be accessed only by approved personnel, typically at system startup or when heat zone components are being added to the system.

When the 7–day timer is turned on, the clock icon is turned on and shown on the MAIN screen. The dual ram X-Over X icon is turned on when the cross-over function is active.

The following functions are available in the SETUP screens.

- Change Password (the Graco default from the factory is 11111111)
- Change the number of CONFIGURED zones on the system.
- Edit the SV temperatures of the SETBACK, RECIPE #1 and RECIPE #2 recipes.
- Set up the ZONE PID TYPES, ZONE NAMES, ZONE ACTIVE/UNUSED STATUS
- Edit the real time clock DATE/TIME.
- Edit the 7–day timer Start/Stop times, for each day of 4 different work weeks.
- Configure the required settings for dual ram cross-over (X-Over) systems.
- Load Graco default parameters to each temperature controller of the hot melt system.

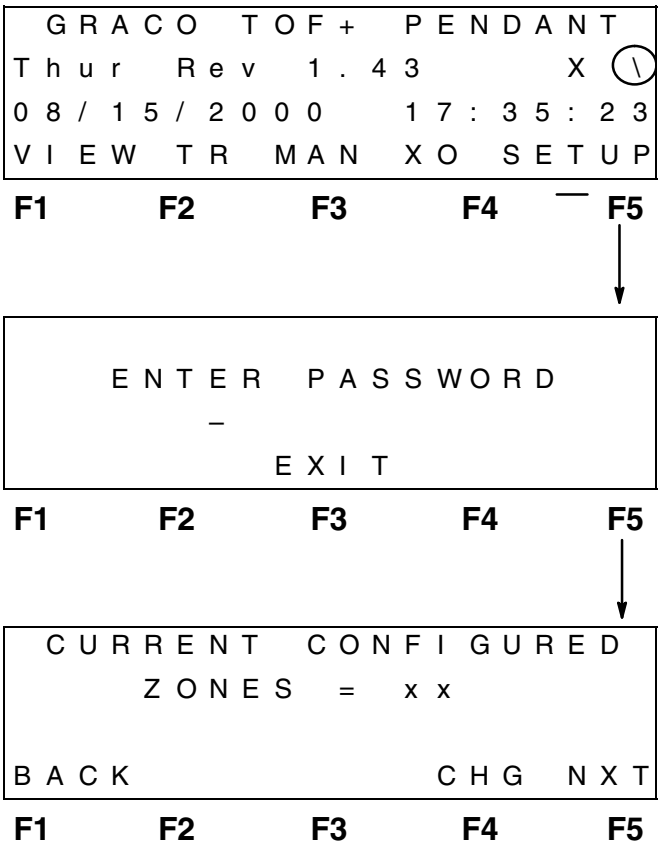
Advanced Pendant Control

Operation of Pendant (continued)

The first task to do when first using the Advanced Pendant Control on a Therm-O-Flow Plus system is to ensure the number of zones of the system are configured properly within the pendant. This tells the pendant how many zones there are with which to communicate. The second task is to input which zones are ACTIVE and which are UNUSED. An example of this is a 6 Zone Therm-O-Flow Plus unloader assembly. Zone # 1 is dedicated to the FOLLOWER PLATE, Zone #2 to the PUMP. Zones #3, #4, #5 and #6 can be used as needed. If for example Zones #5 and #6 are unused, the pendant needs to know that these are UNUSED. This lets the pendant know that sending commands and setting SV temperatures are not needed because there are no devices connected to the zone. When you place the zone in STOP mode manually, the pendant will not try to communicate with it.

NOTE: All zones must be properly set up for communications. This includes the proper address, baud rate, parity, data bits and stop bits. This is always done from the factory. If for some reason communication errors exist with the pendant to the temperature controller zones, reference manual 309100, section Check Communication Parameters. Zone #1 is address 1, zone #2 is address 2, etc.

To configure the zones properly in the pendant, proceed to the SETUP selection, enter the correct password and CHG the Configured Zones.



Change the configured zones to match the total number of zones of the Therm-O-Flow Plus system. Do this by pressing F4 (CHG), and using the numeric keys to enter the correct number of zones. Press ENTER when done editing the zones. Press F1 (BACK) to return back to the MAIN screen.

The pendant is capable of communicating with up to 16 zones (Rev. 1.43 communicates up to 20 zones). If you have one of the rare systems with more than 16 zones (Rev. 1.43 has 20 zones), you will have to connect the excess zones to an accessory control box, and control these zones independently.

NOTE: While in any screen other than the MAIN screen, all screens (except EDIT DATE/TIME) will time out and proceed to the previous screen when no activity is seen on the keypad. This forces the pendant to maintain communication operations that happen while in the MAIN menus screen. The screens will automatically timeout, returning to the previous screen until it reaches the MAIN screen.

Recipe Functions

A recipe is a series of SV temperatures for all temperature zones on the system. Once a recipe is set up, one push of a key on the pendant will automatically change all the SV temperatures on the system to the desired value.

The first recipe is called SETBACK. A typical use is to set the SV of all the zones on the system for recipe SETBACK to 250°F (example). When production is to stop for awhile, the SETBACK recipe can be sent automatically, setting all the active zones back to 250°F. Each individual zone can have it's own unique temperature setting within a recipe. The two other recipes (RECIPE #1 and RECIPE #2) can be set up for sending SV temperatures to zones automatically. For example, RECIPE #1 could be set for the operating temperature of the hot melt material. Once production resumes, RECIPE #1 can be sent to the temperature controllers, automatically setting all the active zones to the running temperature.

To VIEW the recipe functions while in the MAIN menu screen, press F1 (VIEW) to proceed to the view screens, as shown.

Pressing 1 on the key pad will access the VIEW–SEND RECIPE screen shown.

```
1 = VIEW– SEND RECIPE
2 = TIMER SETTINGS
3 = CROSS– OVER ZONES
          EXIT
F1    F2    F3    F4    F5
```

The SETBACK recipe is the first recipe shown. It shows the SV temperature zone #1 is 250°F. Viewing the SV temperature for the remaining zones is done by pressing F2 (ZN+). This increments the zone displayed to the next configured zone. When the last zone is reached, it returns back zone #1. To view RECIPE #1 and RECIPE #2, press the F1 (PRV) or F5 (NXT) keys as needed. Pressing F3 (EXIT) returns back to the MAIN SCREEN. To SEND a recipe to all the active zones on the system, press F4 (SND). This will send the recipe shown on the screen. All the zones will automatically receive the SV temperature settings for each zones of the recipe. If a communication error is encountered, the zone number is displayed and proper action must be taken to determine why communication to that particular zone is lost.

```
SETBACK                    01
ZONE #                     01
SV: 250F              ZONE ^ ^
PRV  ZN+  EXIT  SND  NXT
F1    F2    F3    F4    F5
```

Advanced Pendant Control

Recipe Functions (continued)

To EDIT RECIPE SVs, access the SETUP manuals and enter the correct password.

```
  GRACO TOF+ PENDANT
Thur Rev 1.43        X
08/15/2000    17:35:23
VIEW TR MAN XO SETUP
```

F1 F2 F3 F4 F5

Enter the correct password using the numeric keys. Press ENTER when done entering password.

```
      ENTER PASSWORD
            _
               EXIT
```

F1 F2 F3 F4 F5

Verify the Current Configured Zones match those of your system.

```
  CURRENT CONFIGURED
      ZONES = xx

BACK              CHG NXT
```

F1 F2 F3 F4 F5

```
1 = RECIPES/TEMPS
2 = ZONE SETUP/PID
3 = PASSWORD CHANGE
            EXIT    NEXT
```

F1 F2 F3 F4 F5

Press 1 on the keypad to access the Edit RECIPES/ TEMPS screen.

```
  SETBACK              01
  ZONE #               01
  SV: 250F        ZONE^ ^
PRV ZN+ EXIT CHG NXT
```

F1 F2 F3 F4 F5

To EDIT the SETBACK recipe shown, press F4 (CHG). The screen will change as follows.

To change another recipe, scroll to the desired recipe using F5 (NXT).

Use the numeric keys on the keypad to change the SV temperature. Press ENTER when done. The SV: will show the new temperature entered. Access the zones as in the VIEW screens by pressing F2 (ZN+).

```
  SETBACK              01
  ZONE #               01
  SV: _           ZONE^ ^
    ENTER when done
```

F1 F2 F3 F4 F5

To VIEW and SEND the new temperature settings, EXIT back to the MAIN menu and access the VIEW SEND RECIPE screen as described above.

Advanced Pendant Control

7–Day Timer Functions Setup

The 7–day timer starts and stops the heat zones automatically each day of the week. Typical uses of the 7–day timer are to start the heat zones of a Therm-O-Flow Plus hot melt system before the system is to be used for production, and to stop all heat zones automatically at a specified time each day of the week. The typical heat up time from ambient temperature to full melting temperature of all heat zones of a 55 gal. hot melt unloader system is 20 to 40 minutes depending on the temperature settings. The 7–day timer can preheat the system and have it ready at production temperature before production is to start. The 7–day timer can also shut off all heat zones at specific times of the day. The 7–day timer can be set for 4 different work weeks, each day of the week with its own separate start and stop time.

The four different weeks can be used to preset days and times for holiday weeks or different shifts.

Starting of the heat zones is done by placing the zones in the RUN mode. Stopping the zones from heating is done by placing the zones in the STOP mode. The Therm-O-Flow Plus unloader unit is equipped with serial communications, accessed by the pendant. Through this RS485 serial communication connection to the temperature controllers of the unloader, the pendant can manage the RUN and STOP modes automatically.

NOTE: For the 7–day timer to work properly, the HEAT OFF/ON switch (on the Therm-O-Flow Plus control box) must be left in the ON position. This allows power to all heat zones and allows the temperature controllers to manage the heat to the zones. If the switch is left in the OFF position, no electrical power will be supplied to the heat zone heating elements, even though the temperature control is in the RUN mode. For daily operation with the 7–day timer, refer to page 24.

The 7–day timer works from a 24 hour clock. Shown below is an example of typical settings of the 7 day time as viewed in the VIEW – TIMER SETTINGS menu of the pendant.

Thur	>ACTIVE<	Work
^	Start 07:00	Week
^	Stop 17:00	01
DAY	EXIT	WK+

F1 F2 F3 F4 F5

The sample screen shows the Active work week is Week 1, the day viewed on the display is Thursday, the Start time is 0700 hrs (7:00 am) and the Stop time is 1700 hrs (5:00 pm). The F1, F2, F3, F4 and F5 represent the first row of keys on the pendant keypad. Pressing the F1 key accesses the DAY command from the last row of the display. F1 will increase the day from THUR to FRI and so on as the F1 key is pressed. The F2 key is not functional with this screen. The F3 key is associated with the EXIT command. The EXIT command exits (returns) back to the previous screen. The F4 key is also not functional and the F5 key increases the work week to the next week, work week 2. When Work Week 4 is reached, the next press of F5 will return the work week back to Work Week 1, thus toggling the work week through 4 weeks. Only one Work Week can be active at a time. When entering the VIEW–TIMER SETTINGS screen, the current day will show corresponding to the Active work week.

Advanced Pendant Control

7–Day Timer Functions (continued)

To EDIT the 7–day timer settings, enter the SETUP screens of the pendant by entering the correct password and pressing F5 (NEXT) until the following screen is shown.

```
4 = CROSS–OVER CONFIG
5 = PROTECT SCREENS
6 = 7 DAY TIMER
BACK                NEXT
```

F1 F2 F3 F4 F5

Press 6 on the pendant keypad to access the timer edit screen, shown below.

```
Thur  >ACTIVE<      Work
^     Start 07:00   Week
^     Stop  17:00     01
DAY  NXT  EXIT  CHG  WK+
```

F1 F2 F3 F4 F5

In this screen F2 is now functional. The F2 (NXT) key changes the location of the cursor from one section of the screen to the next editable item of the screen. Pressing F4 (CHG) will allow editing of the selected item. When editing the time, use the F2 key to move the cursor to the desired Hour and Minute sections of the Start or Stop times. Ensure the proper day is selected and the desired work week is shown on the screen. Pressing F4 (CHG) while the cursor is over the 7 of the Start of the screen will clear the HOUR portion of the Start time and allow editing by pressing the numeric keys of the keypad. When done entering the new HOUR portion of the Start time, press ENTER on the keypad. Editing the MINUTE portion of the time is done in the same manner.

To change the ACTIVE work week, use the F2 (NXT) while in a work week screen that shows >off< at the top row. The cursor will move to that location. Pressing F4 (CHG) will change the >off< to >ACTIVE< as the example shows. This will now be the only active work week of the timer. Returning to the main menu and turning the Timer ON will run that ACTIVE work week. The defaults are Start time of 0700 and Stop time of 1700 for all days of all work weeks.

NOTE: To keep the timer from starting zones on a particular day, set the start and stop times to the same value, or 00:00. A typical example is that many plants do not run production on Saturday and Sunday.

To turn the Timer ON or OFF, return to the MAIN MENU and press the F2 (TR) key. The following screen will show.

```
          TIMER
        –>off<–


          EXIT  ON
```

F1 F2 F3 F4 F5

To turn the 7–day timer ON, press F4 (ON). The Timer will will turn on the appropriate zones and show it is –> ON<–.

If the current time is before the ON operation window to the current day's Start and Stop times, the screen will show as follows.

```
START     TIMER
ZONES   –>ON  <–
EARLY
  F1      EXIT  OFF
```

F1 F2 F3 F4 F5

Pressing F1 will manually start the zones earlier than the current start time. This allows starting all the zones without shutting off the timer, which is useful if an operator arrives at work early and needs to start all the heat zones before the timer has started them automatically. The zones will still shut off automatically at the appropriate Stop time for the day.

If the current time is within the timer operating window (after the Start time but before the Stop time), the following screen is shown.

```
          TIMER   STOP
        –>ON  <–  ZONES
                  EARLY
          EXIT  OFF  F5
```

F1 F2 F3 F4 F5

Pressing F5 will shut off all the heat zones before the timer does it automatically. This saves energy when production ends early by allowing the heat zones to be stopped for the day.

When the timer is turned OFF, the Therm-O-Flow Plus unloader will operate normally, leaving the zones in their current state. (If the zones are in the STOP mode or the RUN mode, they remain there).

Advanced Pendant Control

Timer Functions Past Midnight

If you have a pendant with software revision 1.42 or higher, you can use the timer to control heat zones, even if a work shift extends over two calendar days.

To ensure that the timer does not shut off at midnight, enter stop time of 2401 in the timer setup screen. The internal clock of the pendant never reaches 2401, therefore will not act on that setting. You can then enter an appropriate stop time for the shift. One start and one stop must be programmed for each day.

The schematic in Fig. 13 illustrates this procedure. Note that each day can accept only one stop and one start entry. So while you can operate the timer to start heating on Monday and stop on Tuesday, you cannot enter multiple start and stop times.

In the schematic, a start time of 2401 is shown for Saturday, which will allow the heat zones to operate until 2:00 AM Saturday and not restart until Monday morning.

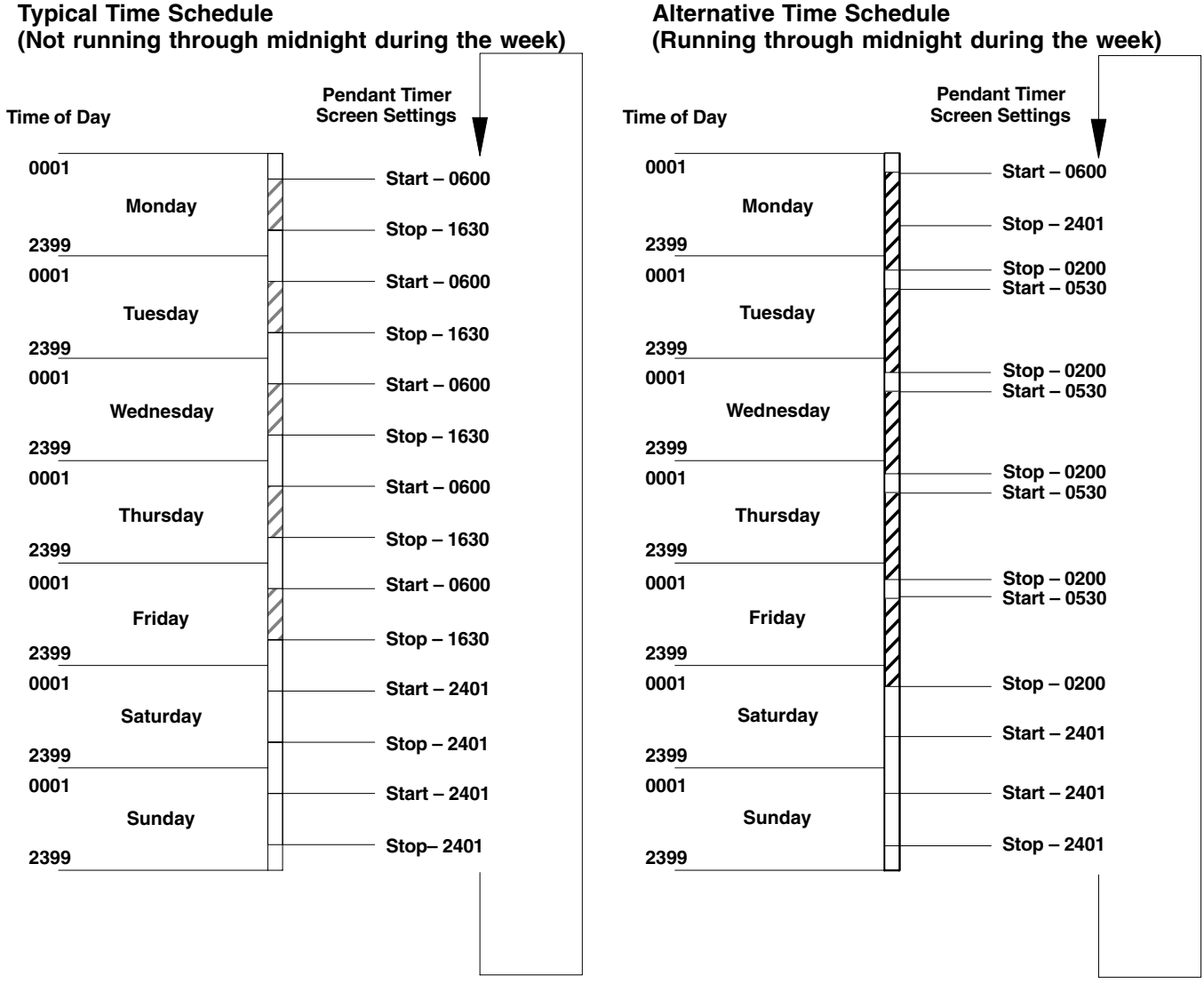
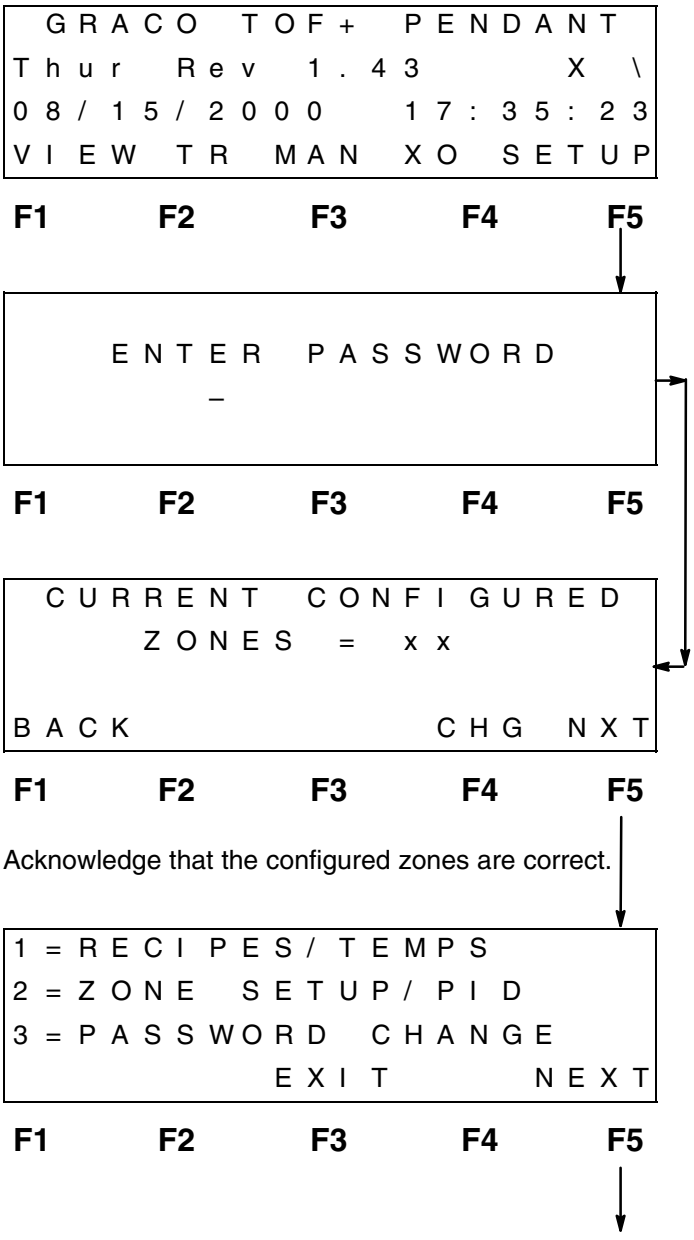


Fig. 13

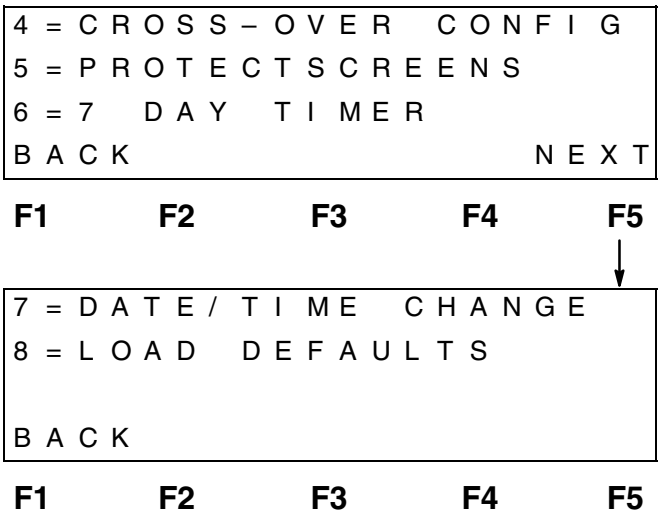
Advanced Pendant Control

Date/Time Functions

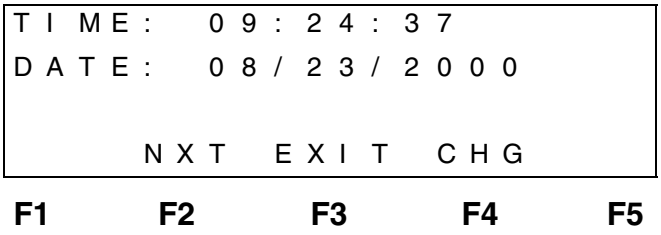
On the MAIN menu the current DAY, DATE, and TIME is displayed. To edit the time and date, proceed to the SETUP selection, enter the correct PASSWORD, and proceed to screen selection 7.



Acknowledge that the configured zones are correct.



Select 7 and the follow EDIT TIME/DATE screen will show. Pressing the F2 (NXT) button will toggle the cursor from the different locations on the screen for editing the time and date. The time is changed in HR, MIN and SEC increments independently. The Date is also edited by selecting the MONTH, DAY or YEAR independently. The DAY is automatically changed and updated on the MAIN menu screen. Once editing is complete, EXIT and return to the MAIN menu to verify the time and date are properly changed. You are updating the critical clock functions while in this screen. The time and clock functions are very important to the overall operation of the pendant. The automatic screen time out is inactive at this point. YOU MUST EXIT THIS SCREEN MANUALLY WHEN FINISHED EDITING!



EXIT WHEN FINISHED EDITING TIME AND DATE!

Advanced Pendant Control

Zone Setup/PID Type Selection

Each zone must be set up within the pendant. The pendant must know if the zone is ACTIVE or UNUSED. If ACTIVE, the pendant must know what type of Graco heat device is connected so the proper PID values can be loaded to the zone temperature controller. If the proper PID values for a given device are not loaded, that device will heat up slowly or inefficiently. Each zone can be named as needed, to help differentiate the devices connected to the hot melt system.

Access the ZONE SETUP/PID screen through the SETUP selection, enter the correct PASSWORD, acknowledge the proper amount of zones are configured and proceed to the following screen.

```
1 = RECIPES/TEMPS
2 = ZONE SETUP/PID
3 = PASSWORD CHANGE
ZN–  OFF  EXIT  CHG  ZN+
```

F1 F2 F3 F4 F5

Press 2 on the numeric keypad and the ZONE SETUP/PID screen is displayed.

```
  ACTIVE          ZONE# 01
NAME: ZONE #
PID TYPE: PLATE
ZN–  OFF  EXIT  CHG  ZN+
```

F1 F2 F3 F4 F5

This screen shows the status of the zone, ACTIVE or UNUSED, the zone NAME and the PID TYPE. Press the F1 (ZN–) and F5 (ZN+) keys to toggle through the zones. Pressing F2 will turn the zone to UNUSED if active or turn the zone to ACTIVE if unused. Change the status to ACTIVE if a heat device is connected to the zone. Change to UNUSED if nothing is connected to the zone. Pressing F4 (CHG) will change the F–Key selections to allow editing of the zone NAME or toggle through the available PID types.

The following screen is displayed when F4 (CHG) is pressed.

```
>ACTIVE>EDIT<ZONE#xx
NAME: ZONE #
PID TYPE: PLATE
PID+      DONE      NAME
```

F1 F2 F3 F4 F5

Pressing F5 (NAME) will clear the zone name and allow the user to enter any name needed. Press F3 and then ENTER on the keypad when done entering the new name.

Pressing F1 (PID+) will toggle through the available PID zone types available. The following PID types will show after PID TYPE: when F1 (PID+) is pressed.

Type	P	I	d
Ram Plate	41	118	29
Pump	50	1186	296
Hose	9.9	51	12
Gun	75	49	12
Manifold	24.1	144	36
Compensator	40.9	87	21
Header	1.7	109	16
Regulator	58.5	330	82

When done selecting the appropriate PID type connected to the zone, press F3 (DONE). If the PID TYPE was changed, the appropriate PID settings are immediately sent to the zone. The PID values are not editable and are fixed within the pendant. If different settings are required from those listed above, they will need to be entered manually into the zone temperature controller. See Form 309100 for this procedure.

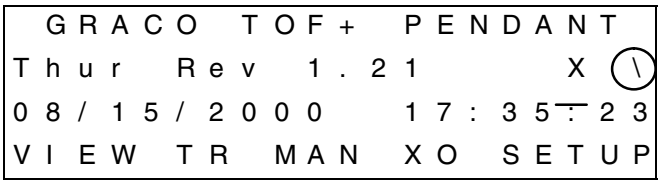
When pressing F3 (DONE), the screen will return to the previous view screen. EXIT back to the MAIN menu when done.

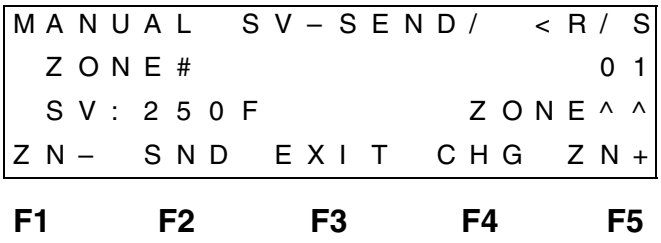
Advanced Pendant Control

Manual Send SV Temperatures

The pendant can be used to quickly change the SV of any zone on the Therm-O-Flow Plus system. It can also be used to place any zone in RUN or STOP mode with a push of the R key (RUN) or the S key (STOP). The MAN (manual) function of the pendant can be useful for troubleshooting zones or sending SV temperatures to zones that may not have been preset within recipes.

To access the MAN (manual) screen, from the MAIN screen, press F3 (MAN).

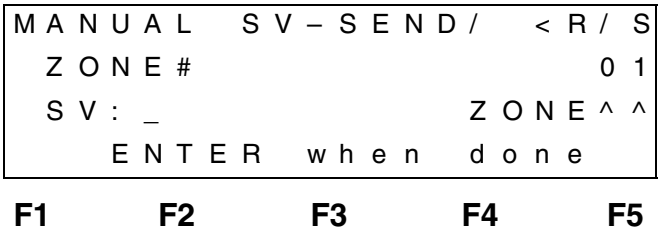




Here, the zones can be incremented up and down using the F1 (ZN–) and the F5(ZN+) keys. Pressing the F2 (SND) key will send the SV shown on the display to the zone shown. Note that incrementing through the zones will keep the same SV temperature setting. This makes it easy to set all zones to 250°F, for example. Press F1(SND), increment to the next zone by pressing F5 (ZN+), and press F2 (SND) again until all zones are set to 250°F.

The <R/S at the top of the screen represents the same operation the <R/S key of the Syscon RKC CB–100 temperature control on the control box door. Pressing R on the pendant keypad will RUN the displayed zone, while S on the keypad will STOP the zone.

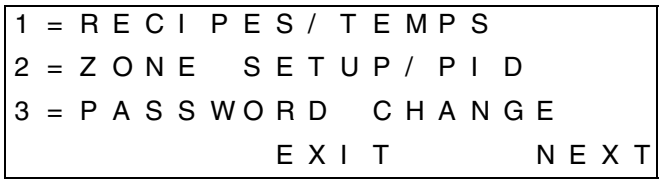
To change the SV temperature setting, press F4 (CHG). The following screen will be shown.



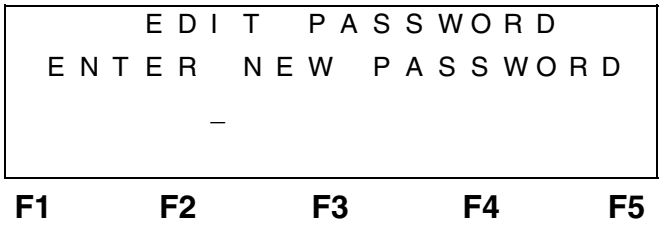
Use the numeric keys to enter the desired temperature. Press the ENTER key when done. The new SV temperature will be displayed. Return to the previous screen and send the new SV just entered. Pressing F3 (EXIT) will return to the MAIN screen.

Password Change

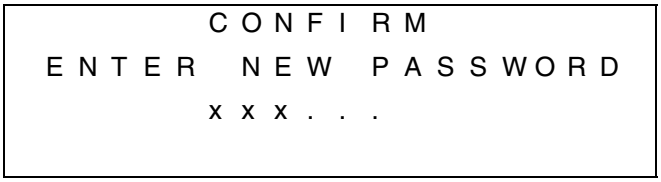
The password should be changed the first time the pendant is used. The Graco default password is 11111111 (eight 1s). Change the password, record the new password and keep in a safe, easily accessible place. To change the password, access the SETUP screens and proceed to the following screen.



Press 3 on the numeric keypad to access the PASSWORD CHANGE screen.



Enter the NEW PASSWORD, followed by the ENTER key.



Type the same password without errors and the password has been changed.

The screen will proceed back to the setup screens 1 through 4. EXIT back to the MAIN menu when done.

Advanced Pendant Control

Load Graco Defaults

This selection is not normally used when receiving a new system from Graco. This is used to set up all the parameters within each zone controller, the alarms values, the units of measure (°F or °C) and various setup parameters not accessible by the user. It will be useful if a temperature controller has been replaced or access has been gained to a temperature controller and settings have been changed which affect the operation of the system. The LOAD DEFAULTS selections automatically loads all the setup parameters that are important to the operation of the system to each ACTIVE temperature controller. It loads the current configured PID TYPES along with the proper alarms settings for each control. The user is prompted for the unit when when this is selected.

To LOAD DEFAULTS, access the SETUP screens by entering the correct PASSWORD, acknowledge the proper amount of zones are configured, and proceed to the following screen.

```
7 = DATE/TIME CHANGE
8 = LOAD DEFAULTS


BACK
```

F1 F2 F3 F4 F5

Press 8 on the numeric keypad.

```
          SELECT UNIT


  F          QUIT          C
F 1            F 3         F 5
```

F1 F2 F3 F4 F5

NOTE: If this screen is accessed by accident, press F3 (QUIT) to return to the previous screen.

Pressing F1 (F) will send all the settings to all the ACTIVE zones with the proper settings for °F operation. Pressing F5 (C) will send all the setting to all the ACTIVE zones with the proper settings for °C operation.

The display will change, showing the sending of PID values and other setup parameters to different zones. Watching the temperature controllers, you will see the screen change and the pendant will beep as it finishes each setup. The zones are placed in the STOP mode when complete.

Once done, all the zones are configured for proper operation with the Therm-O-Flow Plus system. Use this selection if some of the critical setup parameters on the temperature controller setup screens have been changed, or a temperature controller has been changed.

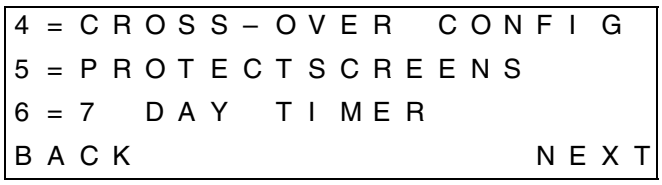
NOTE: The temperature controls have also been set for °F or °C. This can be verified on the display of each temperature control while being powered up. Refer to manual 309100. Using the pendant with this procedure is a much easier means of converting from one unit to another. The pendant will remember the last unit sent to the controls and will continue to prompt for the proper temperature unit when editing and sending SV temperature settings.

Password Protect Screens

The 4 of the 5 main screens accessible from the main screens are configurable for password protection. The setup screen by default is password protect and cannot be changed.

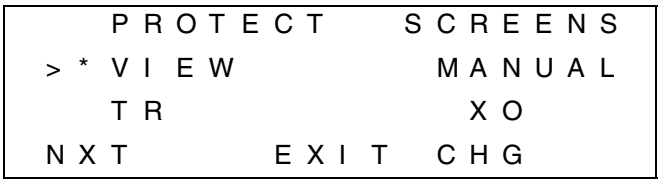
The 4 remaining screens, VIEW TIMER (TR), MANUAL (MAN), and CROSS–OVER (XO) can be password protected selectable through the PASSWORD SCREEN selection in SETUP.

Proceed through SETUP and access the following screen.



F1 F2 F3 F4 F5

Select 5 to proceed to the PROTECT SCREENS selection display as shown.



F1 F2 F3 F4 F5

Pressing F1(NXT) moves the selection arrow to each of the 4 selections. Pressing F4(CHG) toggles the selection * off and on. When the star is shown, that screen will be password protected along with the setup screens.

NOTE: This is the same password as SETUP password.

Notes

Dual Ram Cross-Over Control Function

If your Therm-O-Flow Plus system has cross-over control boxes (243254) installed on each unloader assembly (A) and (B), the X-Over functions of the pendant are functional. The unloaders are typically shipped pre-installed at the Graco factory with label (A) and (B) placed on the upper left hand corner of the main control box. See Fig. 14.

Cross–Over Overview

The cross-over control functions of the pendant allow dual (2) drums to operate. As one drum (DRUM A) activates the LOW limit switch, the other drum (DRUM B) is preheated, readying itself for when DRUM A goes empty. When DRUM A goes EMPTY, the active drum will now be DRUM B. The air solenoid for DRUM A is turned off and the DRUM B air solenoid is allowed to come on if all the zones are up to temperature (see **NOTE** at right). DRUM A will stay hot for 1 hour, allowing the operator time to get a new drum and change the drum. Once 1 hour has passed, DRUM A zones will automatically shut off. The operator will change the drum by pressing the F4 (X0) selection on the MAIN menu. The operator will be prompted to CHANGE DRUM A and the heat zones and the air motor solenoid will be started, if still not running). The operator will change the drum as normal. When done with the drum change, the operator will acknowledge the change with the pendant by pressing the appropriate DONE key and the zones and solenoid will shut off for DRUM A. The same process is used when DRUM B is emptied and operation has returned to DRUM A.

Optional remote change–over buttons are available. They allow drum changes without accessing the pendent. See **Drum Change Over** procedures on page 56.

If the active drum goes LOW and the other drum has not been changed since being empty, the AMBER light of the drum to be changed will begin to flash off/on, alerting the operator to change the drum.

Pendent Cross–Over Operational Flow on page 47 simplifies this process.

NOTE: The air solenoid is allowed to turn on by the X-Over controls. The solenoid is not on until all the zones are within the operating temperature window.

NOTE: The 7–day timer settings take precedence over all functions of the X-Over. If the 7–day timer is on but the current time is outside the Start/Stop time operating window, all the zones will be off and the X-Over will not operate until the current time is within the operating time window of the 7–day timer.

Each unloader has it's own X-Over control box with a 3 light beacon and a dual limit switch assembly. The top light is a GREEN light. When this is illuminated, that unloader is the ACTIVE UNLOADER and the solenoid to the air motor is on, allowing the pump to move material to the dispense point. The AMBER light is the LOW light; it will illuminate when the low level switch is activated. The RED light is the EMPTY light and will illuminate when the drum empty switch is activated.

Each unloader assembly has been marked from the factory indicating whether it is UNLOADER A or UNLOADER B by a letter mounted on the upper left hand side of the control box. The A unloader will have it's temperature controllers addressed 1 thru 6 for 6 Zone control panels (1 thru 8 for 8 Zone panels). The B unloader will have it's temperature controllers addressed 7 thru 12 for 6 Zone control panels (9 thru 16 for 8 Zone control assemblies). The labels on the front of the control panel have not been changed and do not reflect the proper zone addresses.

See page 48 for a simplified schematic of unloader A. Unloader B is duplicated exactly like unloader A without a pendent connected. The zone addresses continue in order. In this case numbers 7 through 12.

Dual Ram Cross-Over Control Function

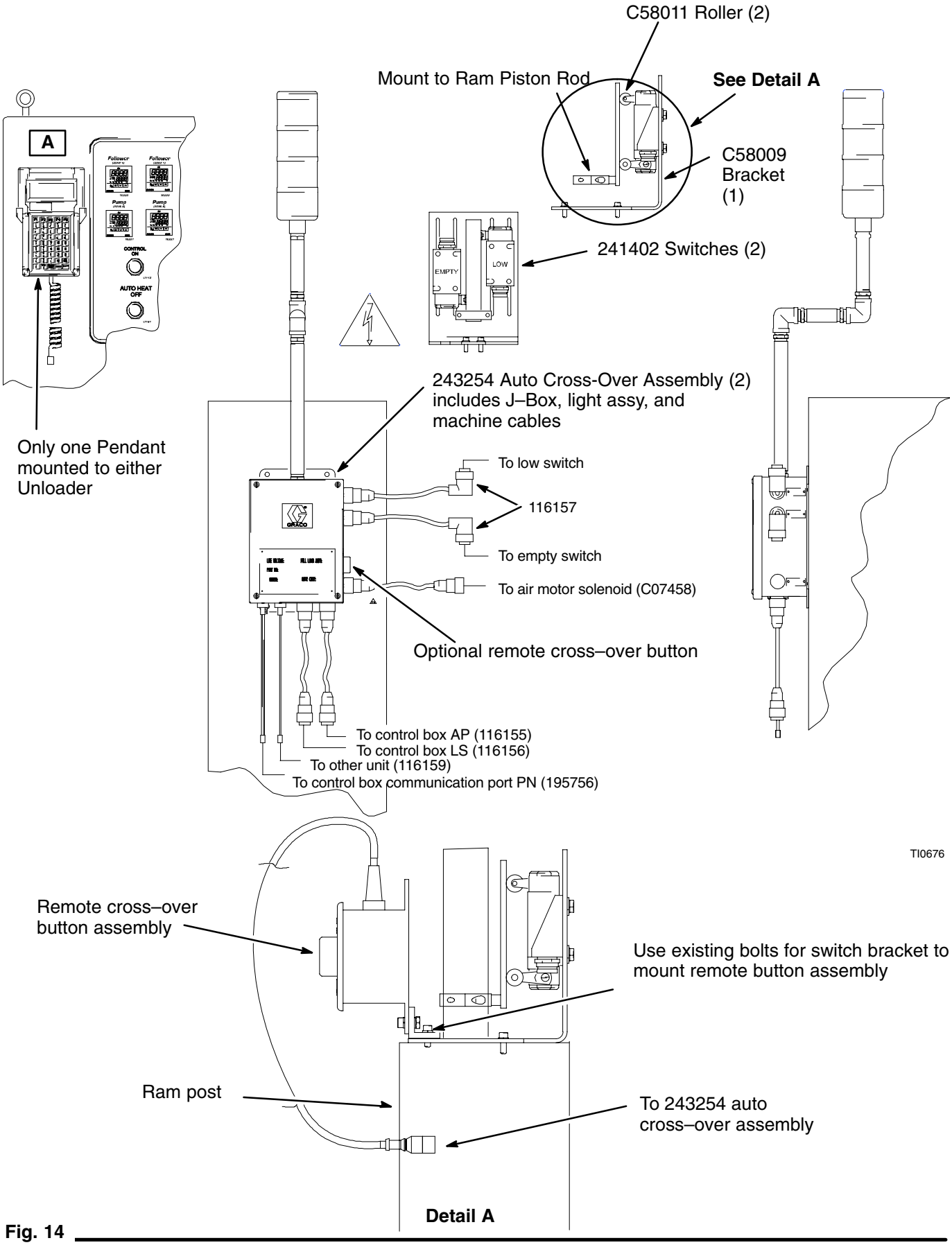


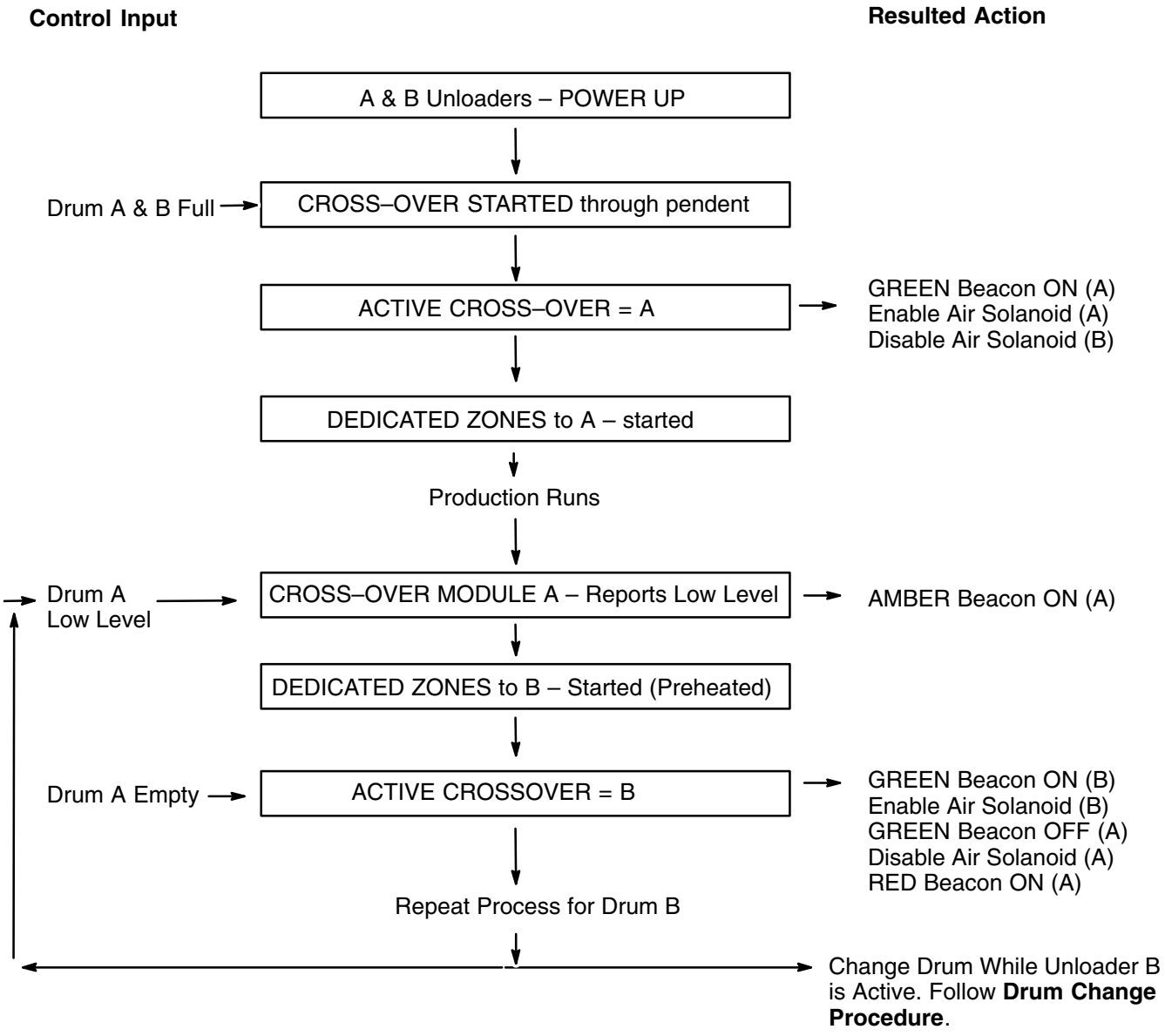
Fig. 14

Dual Ram Cross-Over Control Function

Pendent Cross–Over Operational Flow

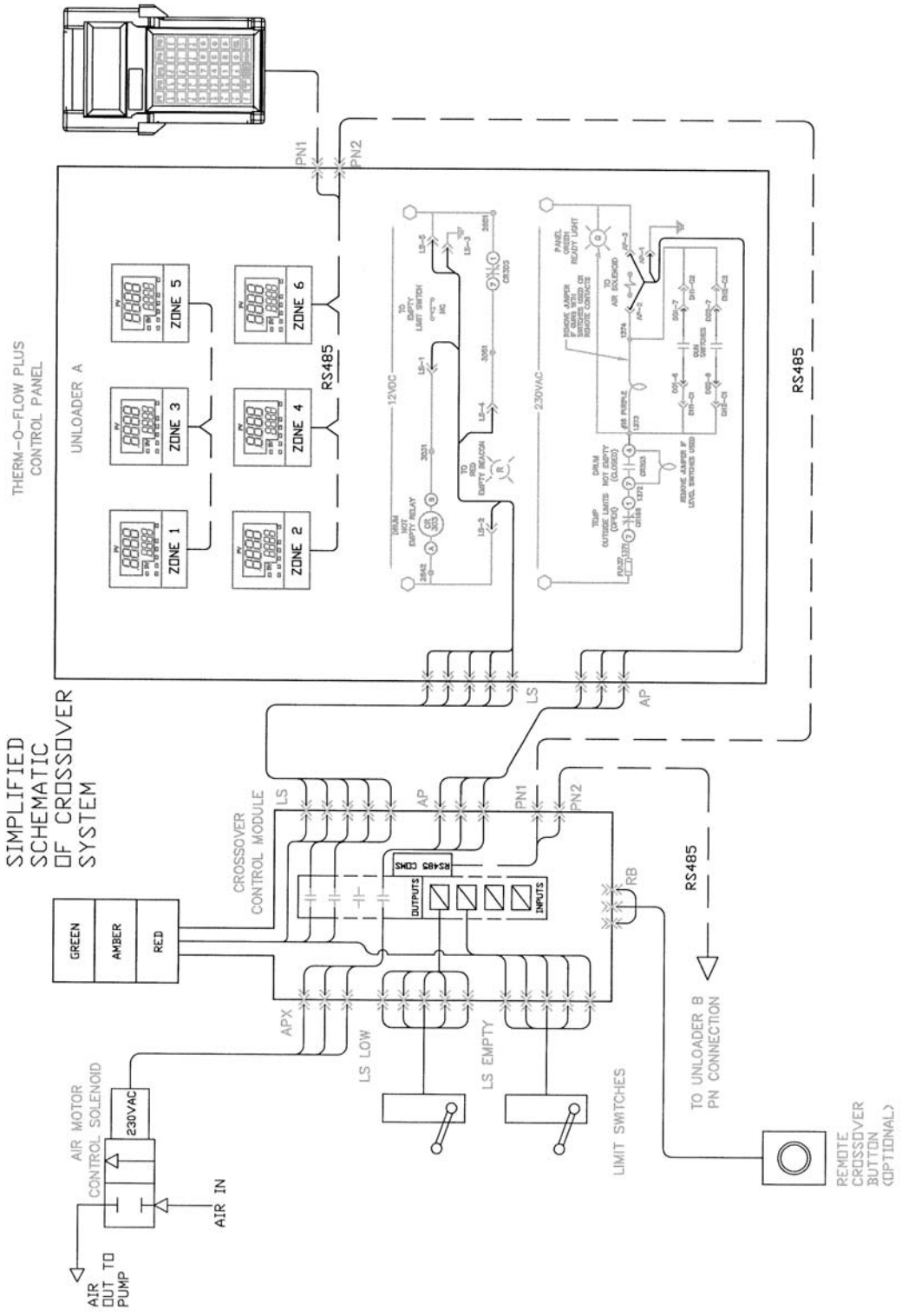
NOTES

- Pendent Checks for inputs every 5 seconds and takes appropriate action.
- ALWAYS ON ZONES are kept on (in RUN mode) continuously by the Pendent.
- UNUSED ZONES are kept off (in STOP mode) continuously by the Pendent.



Dual Ram Cross-Over Control Function

Simplified Schematic of Cross–Over System



Dual Ram Cross-Over Control Function

Setup of Cross-Over

There are 4 steps that must be completed before the X-Over is properly set up within the pendant.

1. Connect Devices and record their zone location.

2. Ensure all zones are configured for ACTIVE or UNUSED (ZONE SETUP/PID selection).

3. Dedicate zones to UNLOADER A, UNLOADER B or ALWAYS ON zones.

4. Ensure full drums are available when starting the X-Over functions.

Reference **Typical Zone Configurations for Therm–O–Flow Plus Cross–Over System** on page 50. A blank configuration sheet on page 51 will help in organizing your system. Keep the configuration sheet in an easily accessible place. It serves as a basis for the following sections.

Connect all hot melt devices to their appropriate connections of each control box DH connector. Record the device type and zone location for ease of reference when setting the pendant parameters. Remember, UNLOADER B has zone address higher than UNLOADER A and which are not reflected on the labeling of the control panel.

ATTENTION: Heated Header Assemblies should never be connected to zone #8 of an 8 Zone control panel. This zone is only rated for a maximum wattage of 250W. The heated header assembly requires 500W for operation. Therefore, the heated header assemblies should always be connected on zones 3, 4, 5 or 6 of any Therm-O-Flow Plus control assembly. (The 8 Zone control panel has the only restricted zones, 750W for Zone #7 and 250W for Zone #8). Reference page 10, Heat Control Zone Selection.

When first setting up the pendant for X-Over operation, ensure all zones are properly set up for ACTIVE or UNUSED zones within the ZONE SETUP/PID option. (See ZONE SETUP/ PID TYPE section.)

The pendant must be told which zones are DEDICATED zones and which zones are ALWAYS ON. DEDICATED zones are zones that are controlled off/on with the unloader. For example, the pump and plate of each unloader is dedicated to the unloader. When the unloader is not active, the pump and plate heat zones are not left on. ALWAYS ON zones are heat zones that are ON regardless of which unloader is the active, pressurized drum. This includes headers, manifolds, and hoses and guns connected on the outbound side of these components. These heat zones are ALWAYS ON and are not turned off when a drum goes empty, and the zones dedicated to this drum are turned off.

Dual Ram Cross-Over Control Function

Typical Zone Configurations for Therm–O–Flow Plus Cross–Over System

System Name:	Example: Therm–O–Flow Plus Cross–Over System				
(2) 8 Zone Unloaders and (1) 4 Zone Access Control * = Configured in Advance Pendents Control					
Physical Panel Location/Connection	**Zone Address**	**Name**	**PID Type**	**Unloader Dedication**	**Active or Unused**
Unloader A (1)	1	A Plate	Plate	A	Active
Unloader A (2)	2	A Pump	Pump	A	Active
Unloader A (3)	3	Outlet Hose A–1	Hose	A	Active
Unloader A (4)	4				Unused
Unloader A (5)	5	Outlet Hose A–2	Hose	A	Active
Unloader A (6)	6	Header	Header	Always On	Active
Unloader A (7)	7	Supply Hose A	Hose	Always On	Unused
Unloader A (8)	8	Compensator A	Compensator	Always On	Unused
Unloader B (1)	9	B Plate	Plate	B	Active
Unloader B (2)	10	B Pump	Pump	B	Active
Unloader B (3)	11	Outlet Hose B–1		B	Active
Unloader B (4)	12				Unused
Unloader B (5)	13	Outlet Hose B–2		B	Active
Unloader B (6)	14				Unused
Unloader B (7)	15	Supply Hose B	Hose	Always On	Active
Unloader B (8)	16	Compensator B	Compensator	Always On	Unused
4 Zone Access. (1)	17	Dispense Hose A	Hose	Always On	Active
4 Zone Access. (2)	18	Dispense Gun A	Gun	Always On	Active
4 Zone Access. (3)	19	Dispense Hose A	Hose	Always On	Active
4 Zone Access. (4)	20	Dispense Gun B	Gun	Always On	Active
		Name Describing Device Connected (15 Characters Max)	>Selectable< PID Values automatically sent to appropriate Temp. Control	>Selectable<	>Selectable<

Dual Ram Cross-Over Control Function

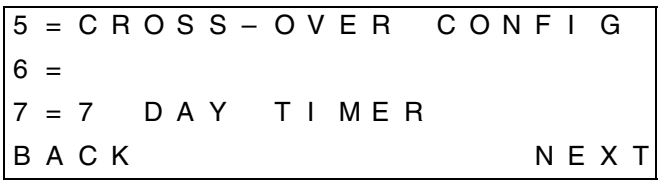
Typical Zone Configurations for Therm–O–Flow Plus Cross–Over System

System Name:					
* = Configured in Advance Pendents Control					
Physical Panel Location/Connection	**Zone Address**	**Name**	**PID Type**	**Unloader Dedication**	**Active or Unused**
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				
		Name Describing Device Connected (15 Characters Max)	>Selectable< PID Values automatically sent to appropriate Temp. Control	>Selectable<	>Selectable<

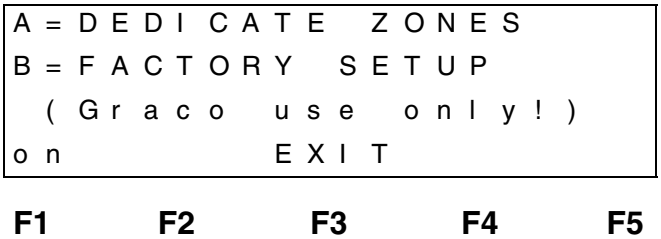
Dual Ram Cross-Over Control Function

Dedicate Zones

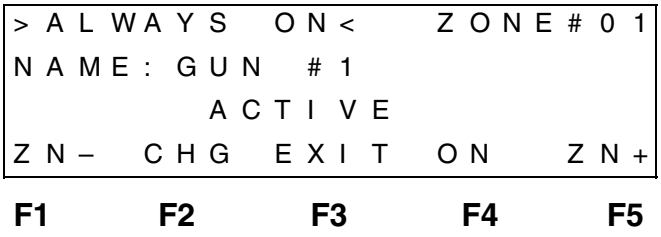
To dedicate zones, access the SETUP screens by pressing F5 from the MAIN menu, enter the correct password, acknowledge the proper zones are configured and proceed to the following screen.



Press 5 on the numeric keypad to access the Cross-Over Configuration screen.



There are two options available in the Cross-Over Configuration screen. DEDICATE ZONES to a particular unloader or FACTORY SETUP. FACTORY SETUP will be discussed later. Press A on the keypad to access the DEDICATE ZONES screen as shown below.



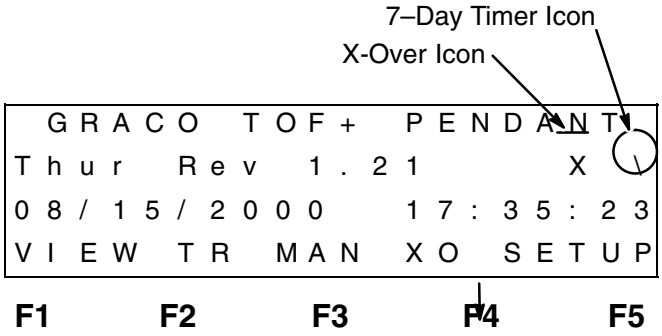
The DEDICATE ZONES screen shows the ZONE # and zone NAME, the ACTIVE or UNUSED status of the zone and whether the zone is ALWAYS ON or dedicated to UNLOADER A or UNLOADER B. Pressing the F1(ZN–) and F5 (ZN+) will toggle through the zones. Pressing F2 (CHG) will change the dedication status shown from ALWAYS ON, to UNLOADER A or UNLOADER B. Ensure the proper dedication status is entered for each zones. For zones that are UNUSED, leave as ALWAYS ON dedication status. The pendant will ignore that zone if it is UNUSED.

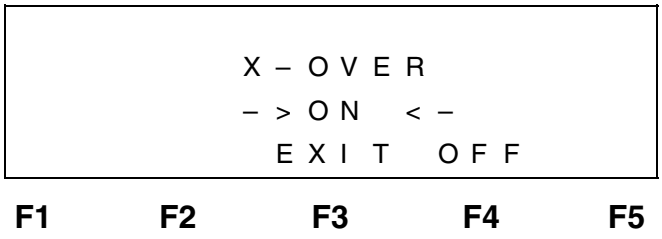
Return back to the main screen. At this point the X-Over system is ready to run.

Dual Ram Cross-Over Control Function

Starting/Stopping Cross-Over Operations

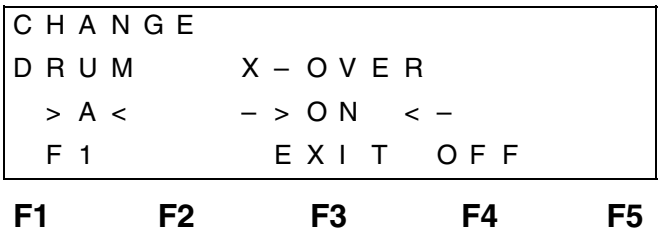
Shown below is the MAIN screen. This shows the 7–day timer and the X-Over are running. Accessing the Start/Stop X-Over screen is done by pressing F4 (XO). This is the operating screen for all user X-Over functions for turning the X-Over on/off, changing drums or accessing /acknowledging communication errors.



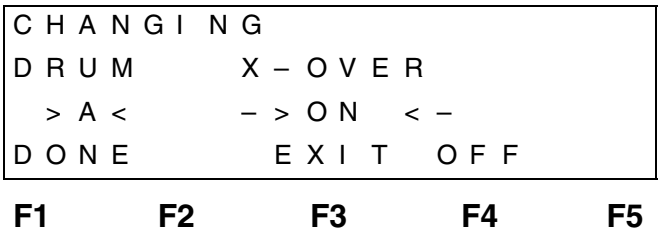


This screen shows the X-Over is on, thus one drum is active and the other is on standby, ready when the drum goes low. Turn the X-Over off by pressing F4 (OFF).

While the X-Over is running and a drum goes low, it will need to be changed. Once the EMPTY limit switch is activated on an unloader, the RED light will be activated (as well as the AMBER light because the LOW limit switch is also activated). The X-Over active drum will change to the other unloader, indicated by the GREEN light on the beacon assembly. The pendant will keep the heat zones of the empty drum on for 59 min. This allows time for the operator to change the drum while it is still hot. After 59 min, the zones will automatically turn off on the EMPTY drum. This X-Over screen will change as follows to prompt the operator to change the drum.



As shown, the X-Over screen will give the operator the prompt to change a drum. When this prompt is lit, you can only change the drum if all heat zones are within the temperature limits. Pressing F1 will restart the heat zones of DRUM A, turn on the air solenoid and allow the operator to change the drum once all heat zones are within temperature limits of all ACTIVE zones. Once F1 is pressed, the X-Over will change again, requiring the operator to acknowledge that the drum change is complete.



The F1 key has now changed to F1 (DONE). When the drum has been changed and ready with new material, pressing F1 (DONE) will stop the heat zones dedicated to UNLOADER A, and shut off the air solenoid to UNLOADER A. The prompt for changing the drum will no longer show on the X-Over screen. See **Advanced Pendent Control Drum Changeover Procedure** on page 56.

NOTE: If the operator fails to press F1 (DONE), the pendant will not recognize that a fresh drum is loaded. When the active drum activates LOW limit switch, the AMBER light will flash as if no new drum was staged.

Remote Drum Change Push Button

If option remote drum change buttons are installed on each unloader, a drum change does not have to be accessed through the pendant. Follow **Remote Push Button Changeover Procedure** on page 57.

Dual Ram Cross-Over Control Function

Starting/Stopping Cross–Over Operations (continued)

For changing DRUM B, the same sequence of screens is displayed as shown.

```
                          CHANGE
             X–OVER         DRUM
             –>ON  <–        >B<
              EXIT  OFF  F5
```

F1 F2 F3 F4 F5

```
                        CHANGING
             X–OVER         DRUM
             –>ON  <–        >B<
              EXIT  OFFDONE
```

F1 F2 F3 F4 F5

```

             X–OVER
             –>ON  <–
              EXIT  OFF
```

F1 F2 F3 F4 F5

NOTE: For systems that do not contain cross-over modules, the X-Over screen will show the following.

```
NO  X–OVER  MODULES
          PRESENT
  >X–OVER  DISABLED<
            EXIT
```

F1 F2 F3 F4 F5

If starting the X-Over when no cross-over modules exist on the system the X-Over will be disabled. (Entering the X-Over Screen automatically ENABLES cross–over functions, communicating with cross-over modules mounted to each unloader assembly.)

Cross–Over Startup/Shutdown Procedure

The pendant is constantly looking at the heat zones in sequence. If it looks for data and does not find it, it deactivates the cross–over function. For this reason, it is important that the following procedures are followed when manually powering on and off a system with cross–over control.

Startup

Turn on power first to the unloader which is *not connected* to the pendant. Turn on power to the unloader with the pendant after a few seconds.

Shutdown

Turn off the unloader with the pendant first, then turn off the second unloader.

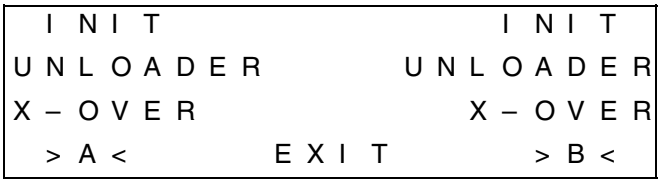
Dual Ram Cross-Over Control Function

Cross–Over Factory Setup

The FACTORY SETUP option within the X-Over CONFIGURATION screen is typically for factory use only. It will be needed, however, if a 243254 cross-over module is replaced or the communication module within the control box has been replaced.

The FACTORY SETUP option will show the following screen. This function initializes the cross-over control box that is mounted to the side of the main control box. Initializing the cross-over box is to configure the cross-over box for the right communication setup and assign the proper address associated with UNLOADER A or UNLOADER B. This is done at the factory when a dual ram cross-over system is ordered. When F1 or F5 is pressed, the operator will be prompted to ensure the communication cables to UNLOADER A or UNLOADER B cross-over control box is the **ONLY** one connected. When ready, the operator will be prompted to continue, the pendant will search for a cross-over control box and initialize it as the appropriate UNLOADER module, A or B.

To access this screen, from the MAIN screen, F5 (SETUP), enter the correct PASSWORD, acknowledge the correct zones are configured, proceed to the CONFIGURE X-Over selection, then press B.



F1 **F2** **F3** **F4** **F5**

This function must be used for a customer that has two Therm-O-Flow Plus unloader assemblies and later adds the cross-over modules themselves. This operation would be required to initialize each unloader so the cross-over controls and the pendant know which cross-over is related to which module.

Advanced Pendent Control Drum Changeover Procedure

Changeover from pump A to B

Stack Light Indication:

- Green Light = Active Unloader
- Yellow Light = Low Drum Level
- Red Light = Drum Empty

NOTE: To perform drum changeover from Pump B to Pump A, perform the following steps replacing Pump A with Pump B.

When the drum is empty in Pump A, the equipment will automatically crossover to Pump B. The green light on Pump B will come on and pumping will begin.

1. Pump A dedicated zones will stay heated for a drum change for 1 hour.

2. Access the cross–over screen (XO) from the main screen by pressing F4.

3. Select CHANGE DRUM A from the (XO) screen. This will preheat the dedicated zones to A, if they are not already on.

4. Once all the zones on unloader A are up to set temperature, drum change can begin.

To change the drum in Pump A:

1. To Raise the follower plate, from the elevator control panel, turn the toggle switch in the up position.

2. Turn the air regulator clockwise until the follower plate begins to rise.

3. Push and hold the air relief button, located above the toggle switch, until the follower plate rises completely out of the drum.

4. Remove the drum and dolly from Pump A.

5. Insert the new drum into Pump A and secure with the drum hold–down mechanism. Make sure the drum is centered to the follower plate.

6. Remove the follower plate bleed handle.

7. Place the toggle switch in the down position, lowering the follower plate into the drum.

8. When the ram stops, re–insert the follower plate handle. Hand–tighten and clean off any excess material.

9. Place a waste collection container under the bleed valve.

10. Slowly open the bleed valve with the Graco wrench. The pump should cycle 3–4 times with product flowing into the waste collection container. The pump should move slowly up and down with no air popping or erratic movements.

11. Close the bleed valve with the Graco wrench.

12. Go to the pendent access (XO) screen and press F4 to complete the drum change. This puts Pump A into a ready mode while Pump B operates. Pump A will automatically begin pumping when the drum in Pump B is empty.

Remote Push Button Drum Changeover Procedure

Changeover from pump A to B

Stack Light Indication:

- Green Light = Active Unloader
- Yellow Light = Low Drum Level
- Red Light = Drum Empty

NOTE: To perform drum changeover from Pump B to Pump A, perform the following steps replacing Pump A with Pump B.

When the drum is empty in Pump A, the equipment will automatically crossover to Pump B. The green light on Pump B will come on and pumping will begin.

1. Pump A dedicated zones will stay heated for a drum change for 1 hour.

2. Press the remote push button for Pump A for up to 5 seconds. The green beacon will begin to flash indicating drum change mode. This operation will preheat the dedicated zones to A if not already on.

3. Once all the zones on unloader A are up to set temperature, drum change can begin.

To change the drum in Pump A:

1. To Raise the follower plate, from the elevator control panel, turn the toggle switch in the up position.

2. Turn the air regulator clockwise until the follower plate begins to rise.

3. Push and hold the air relief button, located above the toggle switch, until the follower plate rises completely out of the drum.

4. Remove the drum and dolly from Pump A.

5. Insert the new drum into Pump A and secure with the drum hold–down mechanism. Make sure the drum is centered to the follower plate.

6. Remove the follower plate bleed handle.

7. Place the toggle switch in the down position, lowering the follower plate into the drum.

8. When the ram stops, re–insert the follower plate handle. Hand–tighten and clean off any excess material.

9. Place a waste collection container under the bleed valve.

10. Slowly open the bleed valve with the Graco wrench. The pump should cycle 3–4 times with product flowing into the waste collection container. The pump should move slowly up and down with no air popping or erratic movements.

11. Close the bleed valve with the Graco wrench.

12. Press the remote push button for up to 5 seconds or until the green beacon stops flashing. This puts Pump A into a ready mode while Pump B operates. Pump A will automatically begin pumping when the drum in Pump B is empty.

Communication Errors

If the pendant experiences communication errors, all communication to all devices is shut off and the pendant will continue to display an error message and beep approximately every 5 sec until the operator acknowledges the error. This means the TIMER is shut off and the X-Over is disabled.

To acknowledge the error, depending on the type of error, press the TIMER icon or the X-Over icon from the MAIN menu. At that point acknowledge the error if displayed by pressing F3 (OK) and fix the communication problem. The TIMER must be restarted as well as the X-Over.

If starting the X-Over when no cross-over modules exist on the system, these errors will occur and the X-Over will be disabled. (Starting the X-Over automatically ENABLES it, expecting to communicate with cross-over modules mounted to each unloader assembly.)

NOTE: With systems that include cross-over assembly modules, if communication to the cross-over control boxes mounted to the side of each unloader assembly main control is interrupted, the modules will return to their OFF state. The GREEN and AMBER lights will go out and the air solenoid of the unloader will not be allowed to turn on. If this happens, the Quatech communication module within the cross-over control box will blink, indicating that it had timed out and is ignoring all commands from the pendant. (The pendant is constantly sending commands to the cross-over module to ensure it is operating properly, thus allowing the solenoids to operate and continue with cross-over functions). After fixing the communication problem, **CYCLE POWER** to the control panel(s), or unplug the pendant and reconnect, and check for proper operation of the cross-over assembly.

Contacts Available for Connection to External Equipment

A series of dry contacts are available for customer monitoring of the status of the heat zones of the control and the drum empty/low status.

The following connections are available for monitoring. The contact ratings are 10A at 28VDC and 13A at 120VAC to 277VAC.

Terminals 3081 & 3101 TEMPERATURE WITHIN LIMITS

- CLOSED (continuity) indicates ALL zones are within operation limits (the operating window). See page 26.
- OPEN, one or more zones are not within operating range. (See READING TEMPERATURE CONTROLLERS section.)

Terminals 3131 & 3141 NO HIGH TEMPERATURE ALARM

- CLOSED (continuity) indicates ALL zones are not in high temperature alarm. Thus the actual temperature (PV) is below SV + 40°F (22°C).
- OPEN, one or more zones are in HIGH TEMPERATURE alarm.

Terminals 3161 & 6171 DRUM NOT EMPTY/LOW (when equipped with low level switch kit or cross-over modules assemblies).

- CLOSED (continuity) indicates the drum is NOT empty/low.
- OPEN, the drum IS EMPTY/LOW.

Ram Troubleshooting

Problem	Cause(s)	Solution(s)
Ram won't raise or lower	Closed main air valve or clogged air line	Open air valve, clear air line
	Not enough air pressure	Increase ram pressure
	Worn or damaged piston	Replace piston. See procedure in Form 310523.
	Ram plate not fully up to temperature	Wait for full temperature.
	Ram air pressure too high	Decrease ram air pressure.
	Dented drum	Fix drum or do not use.
Ram raises or lowers too fast	Ram "down" air pressure too high	Decrease ram air pressure
Air leaks around cylinder rod	Worn rod seal	Replace o-rings in guide sleeve. See procedure in Form 310523.
Fluid squeezes past ram plate wipers	Ram air pressure too high	Decrease ram air pressure
	Worn or damaged wipers	Replace wipers. See procedure on page 63.
Pump won't prime properly, or pumps air	Closed main air valve or clogged air line	Open air valve, clear air line
	Not enough pump air pressure	Increase pump pressure
	Worn or damaged ram piston	Replace piston. See procedure in Form 310523.
	Ram directional valve closed or clogged	Open, clear hand valve or exhaust
	Ram directional valve dirty, worn or damaged	Clean, service hand valve
	Bent drum has stopped ram plate	Replace drum
	Ram air pressure too high	Decrease ram air pressure.
	Dented drum	Fix drum or do not use.
Air pressure won't push drum plate out	Closed main air valve or clogged air line	Open air valve, clear air line
	Not enough blow–off air pressure	Increase plate blow–off air pressure
	Blow–off valve passage clogged	Clean valve passage
	Dented drum	Fix drum or do not use.
	Wipers bonded to drum or drum liner	Lubricate wipers with high temperature grease at every barrel change.

Heated Pump Troubleshooting

For additional information about the Check-Mate 800 Displacement Pump, see Form 308570.

Problem	Cause(s)	Solution(s)
Rapid down stroke or up stroke (pump cavitation)	Material not heated to proper pumping temperature.	Check and adjust temperature set point. Wait for pump/plate to heat up.
	Air is trapped in pump.	Bleed air from the pump using this procedure: 1. 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. 4. Shut off air to the pump and close the bleed port. 5. Turn air on to the pump and set the pump air regulator for normal operation.
	Downstroke: Lower check in pump is worn or fouled. Upstroke: Upper check in pump is worn or fouled.	Clean, rebuild or replace pump, as necessary.
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 on page 61.
	Foreign object lodged in pump.	Remove object and rebuild pump assembly. **⚠ WARNING** To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 23). Before attempting to dislodge a foreign object: 1. Relieve system pressure. 2. Remove the pump from the air motor.
Wet-cup leaks	Worn throat seal.	Replace wet-cup and throat seal packings (See form 314934).

Air Motor Troubleshooting

For additional information about the air motor, see manual 307049.

Problem	Cause(s)	Solution(s)
Air motor does not run	Air motor solenoid is off	Wait for heat zones in use to reach “window” around temperature set values.
Air motor will not shift directions, stalled in DOWN position	Main air valve spool is dirty or damaged	Clean/rebuild main air valve.
Air motor will not shift directions, stalled in UP position		
Air motor stalled halfway between the top and bottom		
Air continually exhausting around air motor shaft.	Air motor shaft seal is damaged	Replace air motor shaft seal.
Air continually exhausting around the air valve/slide valve	Air valve/slide valve gasket is damaged	Replace the valve gasket.
Air continually exhausting from muffler while the motor is idle	Internal seal damage	Rebuild air motor.
Oil leaking from exhaust port	Too much lubricant mixed in with the air supply	Reduce lubricant supply.
Frost build-up on muffler	Air motor operating at high pressure, or high cycle rate	Reduce pressure, cycle rate, or duty cycle of the air motor.

Electrical Control Panel Troubleshooting

For more information, see the electrical control panel documentation.

Problem	Cause(s)	Solution(s)
Disconnect is ON, but no indicator lights are lit	The ground fault interrupt has been activated	Reset the ground fault interrupt. See procedure on page 27.
	One or more fuses has (have) been blown	Replace the blown fuse(s)
High Temperature Alarm lights	The temperature of a heated component has gone out of range.	Supply unit automatically turns off power to supply unit components and air motor. Unit turns power back on when overheated components reach appropriate temperatures.
Heat is turned off after a period of pump inactivity	Pump has not moved within the programmed time period and the inactivity timer has been triggered.	See procedure on page 26.
High Temperature Alarm indicator is lit before the unit has heated up	One or more temperature controllers has different alarm value settings.	Set the alarm values on all temperature controllers to the same settings.
	One or more temperature controllers correspond to zones that are not in use.	Turn off the unused temperature controller(s). See Form 309100.

Service

Inspection Frequency

Ram

Periodically (once a month), inspect the ram guide sleeves, rods and cylinders for wear or damage, replace all worn parts. See the **Service** section of Form 310523 for instructions on replacing worn parts.

Pump

See the material pump instructions for its inspection frequency.

Ground Fault Interrupt

Periodically (once a month) test the ground fault interrupt switch by pushing the TEST button.

Removing/Replacing the CB100 Controller

See Form 309100 for instructions on removing and/or replacing the temperature controllers on the system.

Ram Service

To relieve ram air pressure, follow the procedure below. For more more information about servicing the ram, see Form 310523, **165 mm (6.5”) Global Ram Module**.

Ram Pressure Relief Procedure

⚠ WARNING

To reduce the risk of serious injury whenever you service the ram, always follow the procedure below.

To relieve air pressure in the ram:

1. **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** (page 23).

2. Using the ram hand valve lever on the air control (Fig. 15), move the ram to the DOWN position.

PH00019

Fig. 15

3. When the ram reaches the full down position, move the ram hand valve lever to OFF.

4. Close the master air lock-out valve (A) shown in Fig.16.

PH00032

Fig. 16

5. Exhaust air from both sides of the ram:

   a. Move the ram hand valve lever to the DOWN position until all air is exhausted from one side of the ram.

   b. Move the ram hand valve lever to the UP position until all air is exhausted from the other side of the ram.

Service

Removing a 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.

NOTE: Before you perform the procedures in this section, remove the material drum from the supply unit. *Only remove the drum from the supply unit while the supply unit is hot*. Observe the cautions and warnings, then follow steps 1 through 7 of the **Drum Changing** procedure in Graco form 309180, Installation and Operation Guide.

Servicing the Ram Plate

This section describes service you can perform without removing the ram plate from the supply unit:

- servicing wipers
- replacing heat sensors

To remove the ram plate from the supply unit, see the procedure on page 66. For information about replacing wires that connect the ram plate to the pump, see Form 310530, or contact your Graco distributor.

Servicing Wipers

⚠ 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.

To replace a worn or damaged wiper (327, 329):

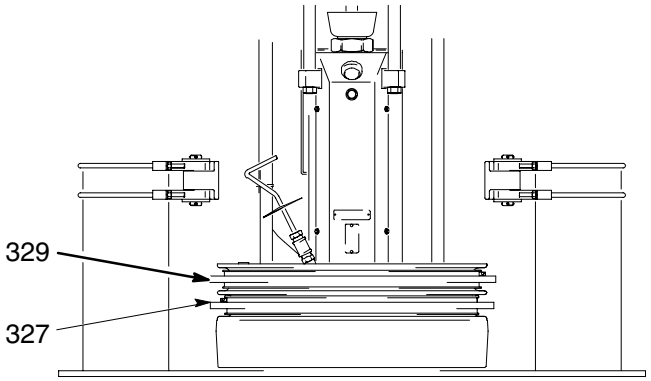


Fig. 17

1. Raise the ram plate up out of the drum by observing the cautions and warnings, then following steps 1 through 7 of the **Drum Changing** procedure in Graco form 309180, Installation and Operation Guide.

2. See form 309196 for instructions about replacing tee wipers.

Service

Replacing Heat Sensors

Perform the following procedure to replace a sensor:

⚠ 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.

1. If the material drum has already been removed from the supply unit, go to step 2. If you need to remove the material drum, perform steps 1 through 7 of the **Drum Changing** procedure in Graco form 309180, Installation and Operation Guide .

2. Make sure the ram plate is down and the ram hand valve is in the OFF position (Fig. 15).

⚠ WARNING

ELECTROCUTION HAZARD

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

3. Turn OFF the main electrical disconnect.

4. Turn the system HEAT ON switch to OFF.

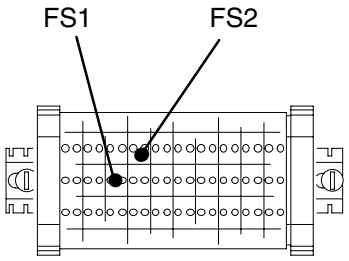
5. Loosen the conduit locknut (312).

6. Remove the sensor (309) from the ram plate.

7. Loosen the cord grip, located under the junction box.

8. Remove the junction box's cover.

9. Disconnect the two sensor wires from the junction box. See Fig. 18.



9520A

Fig. 18

10. Connect the two wires from the new sensor to the terminals in the junction box.

11. Replace the junction box cover.

12. Coat the sensor with non-silicone heat-sink compound.

13. Slide the cord grip o-ring back into the cord grip and then tighten the cord grip underneath the junction box.

14. Slide the new sensor into the sensor opening in the ram plate.

15. Tighten the conduit locknut (312).

Service

Pump Removal and Replacement

For information about servicing the Check-Mate™ 800 Displacement Pump, see Form 308570.

1. If the material drum has already been removed from the supply unit, go to step 2. If you need to remove the material drum, perform steps 1 through 7 of the **Drum Changing** procedure in Graco form 309180, Installation and Operation Guide.

2. Make sure the ram plate is down and the ram hand valve is in the OFF position (Fig. 15).

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 23).

3. **Relieve the supply unit pressure**.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve ram pressure, always follow the **Ram Pressure Relief Procedure** on page 62.

4. **Relieve the ram air pressure.**

5. Turn OFF the main electrical power to the supply unit. Follow all applicable safety procedures and lockout rules.

6. Turn OFF the main electrical disconnect.

⚠ WARNING

ELECTROCUTION HAZARD

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

7. Bleed off excess material and pressure in the system by opening the dispense gun and catching the material in a waste container.

8. On the electrical control panel, turn the system HEAT ON switch to OFF.

9. Disconnect all material hoses.

10. Disconnect the pump from the junction box by:

    a. Removing the cover of the junction box.

    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 and moving it backwards out of the way.

11. Loosen the pump mounting screws (116) and then remove the pump mounting plates (115).

12. Remove the two bolts from the top of the ram plate rods.

13. Secure the air motor to the ram tie bar.

14. Remove the pump and service it as needed. To remove the remaining shrouds from the pump, go to the next section, **Separating the Pump from the Air Motor** (page 66). See Form 308570 for more information about the pump.

15. Reverse this procedure to reinstall the pump.

Separating the Pump from the Air Motor

To separate the pump from the air motor:

NOTE: Refer to Parts information on page 72 while performing this procedure.

1. Remove the pump assembly by performing the **Pump Removal and Replacement** procedure on page 65.

2. Remove the remaining sheet-metal shrouds from the pump.

3. Remove the coupling nut (504), which attaches the pump to the air motor. Be careful not to lose the collar couplings (505).

4. Remove the nuts (506) from the tie rods (503). You can now separate the pump from the air motor.

5. To access the bare pump, remove the pump's:

   - insulation
   - 2 heater bands
   - sensor block

Reattaching the Air Motor to the Pump

Perform the above procedure in reverse order to reattach the pump to the air motor.

Be sure that:

- when you reinsert the collar couplings into the coupling nut the large flanges point upwards

Separating the Ram Plate and the Pump

To separate the ram plate and the pump assembly:

1. Remove the pump assembly by performing the **Pump Removal and Replacement Procedure** procedure on page 65.

2. Disconnect the sensor wires from the junction box (Fig 19).

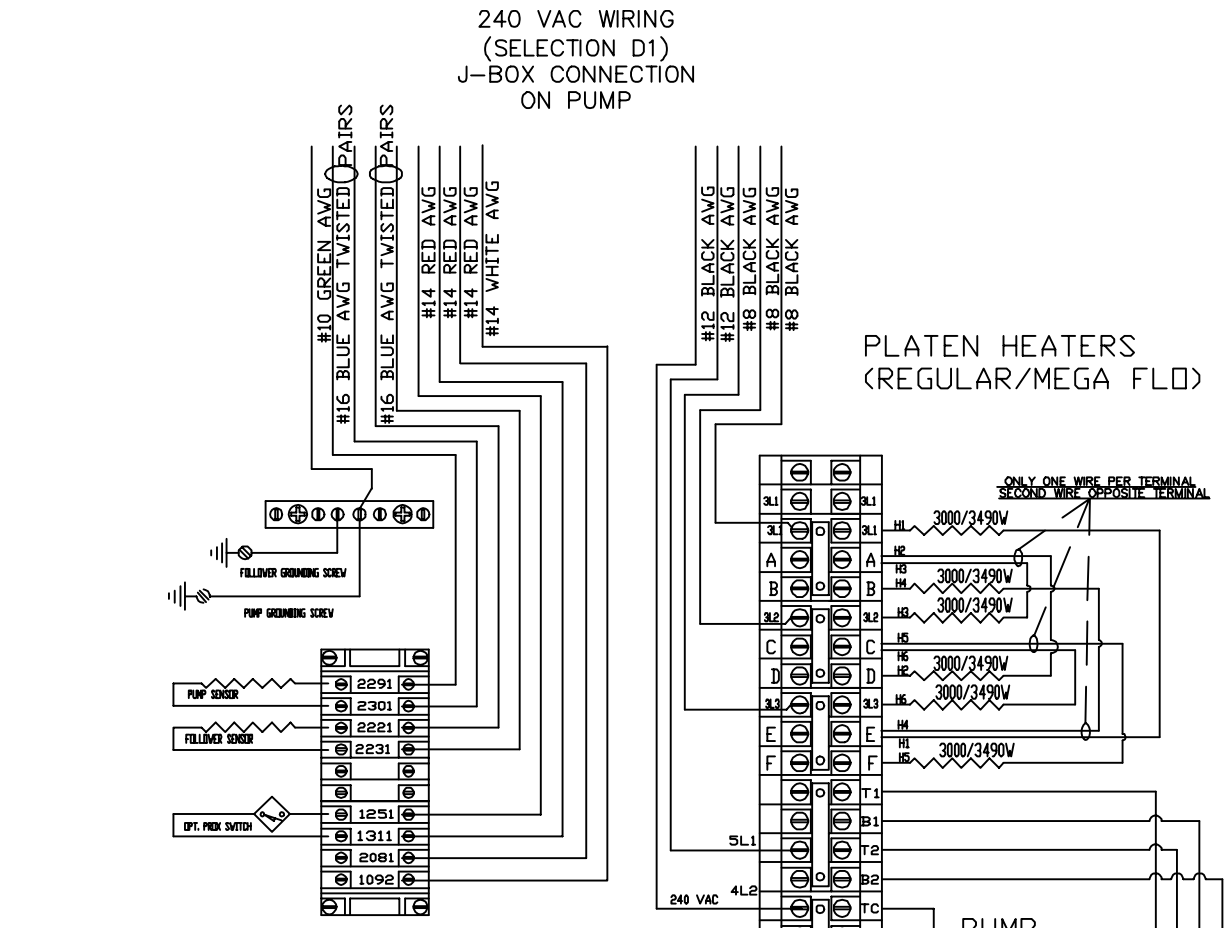
3. Disconnect the ram plate wires from the junction box (Fig 19).

4. Loosen the coupling nuts from the ram plate conduits and from the sensor conduit.

5. Remove the air line from the blow-off valve.

6. Pull the pump from the plate assembly. The pump intake is now free to slide up and out of the ram plate. Always replace O–ring (P/N 109482) on the intake. Ref. service form 308570.

For 240 VAC Supply Units–Junction Box Schematic



PLATEN HEATER CHECKS

	SMOOTH 243875	STD. GRID 243874	MEGA. FLO 243300
ALL HX PAIRS H1 TO H1, H2 TO H2 ETC.	19.2 Ω^{+2}_{-3}	19.2 Ω^{+2}_{-3}	16.5 Ω^{+1}_{-2}
ALL H WIRES TO GROUND (ALL MODELS) 100,000 Ωmin			

PUMP HEATER CHECKS

T1 TO TC	B1 to BC	5L1 & 4L2
45 Ω^{+}_{-} 4	45 Ω^{+}_{-} 4	45 Ω^{+}_{-} 4
ALL PUMP HEATER TERMINALS TO GROUND–NO CONTINUITY		

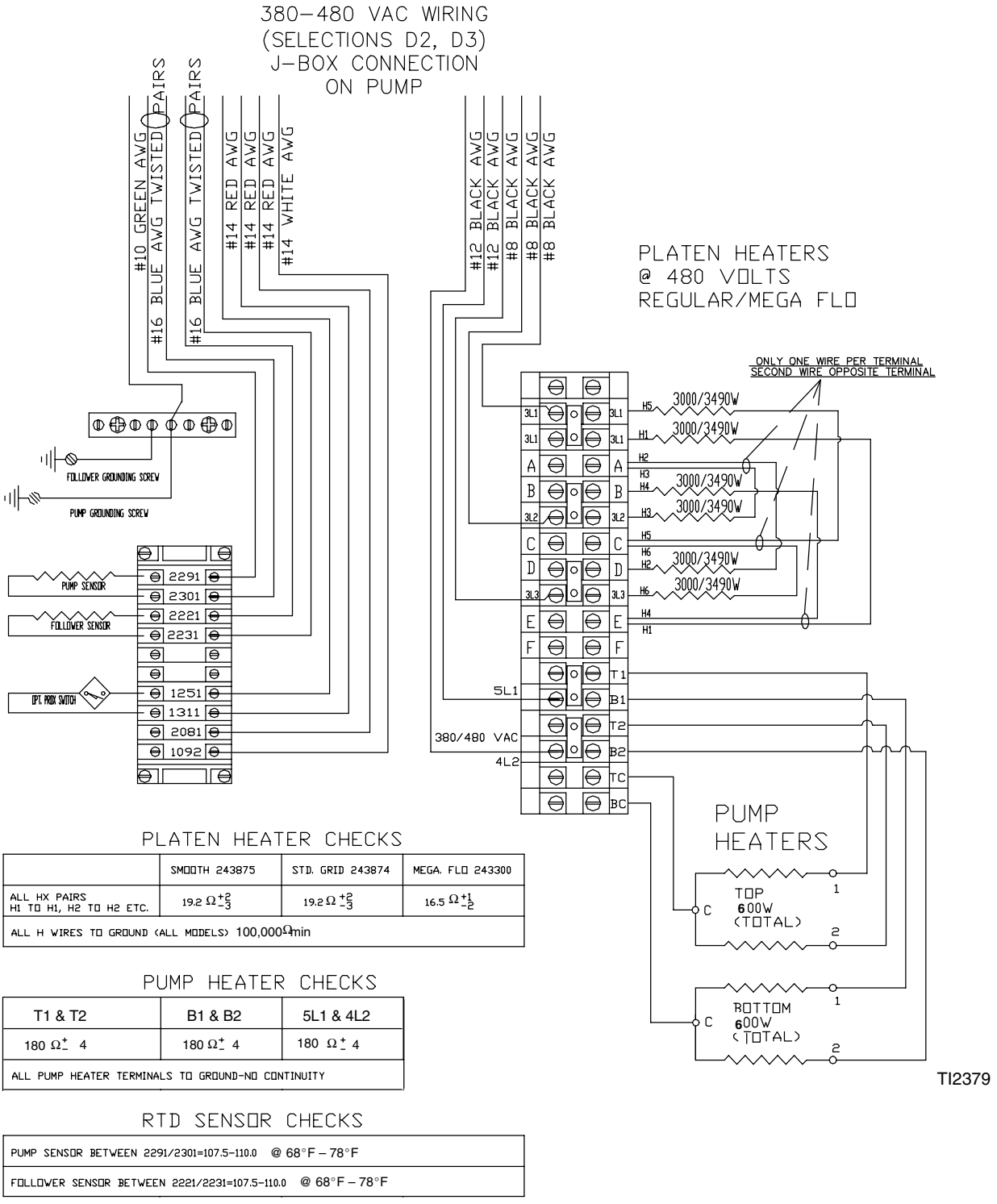
RTD SENSOR CHECKS

PUMP SENSOR BETWEEN 2291/2301=107.5–110.0 @ 68°F – 78°F
FOLLOWER SENSOR BETWEEN 2221/2231=107.5–110.0 @ 68°F – 78°F

Fig. 19

Service

For 380–480 VAC Supply Units – Junction Box Schematic



PLATEN HEATER CHECKS

	SMOOTH 243875	STD. GRID 243874	MEGA. FLO 243300
ALL HX PAIRS H1 TO H1, H2 TO H2 ETC.	19.2 Ω^{+2}_{-3}	19.2 Ω^{+2}_{-3}	16.5 Ω^{+1}_{-2}
ALL H WIRES TO GROUND (ALL MODELS) 100,000Ωmin			

PUMP HEATER CHECKS

T1 & T2	B1 & B2	5L1 & 4L2
180 Ω^{+}_{-} 4	180 Ω^{+}_{-} 4	180 Ω^{+}_{-} 4
ALL PUMP HEATER TERMINALS TO GROUND–NO CONTINUITY		

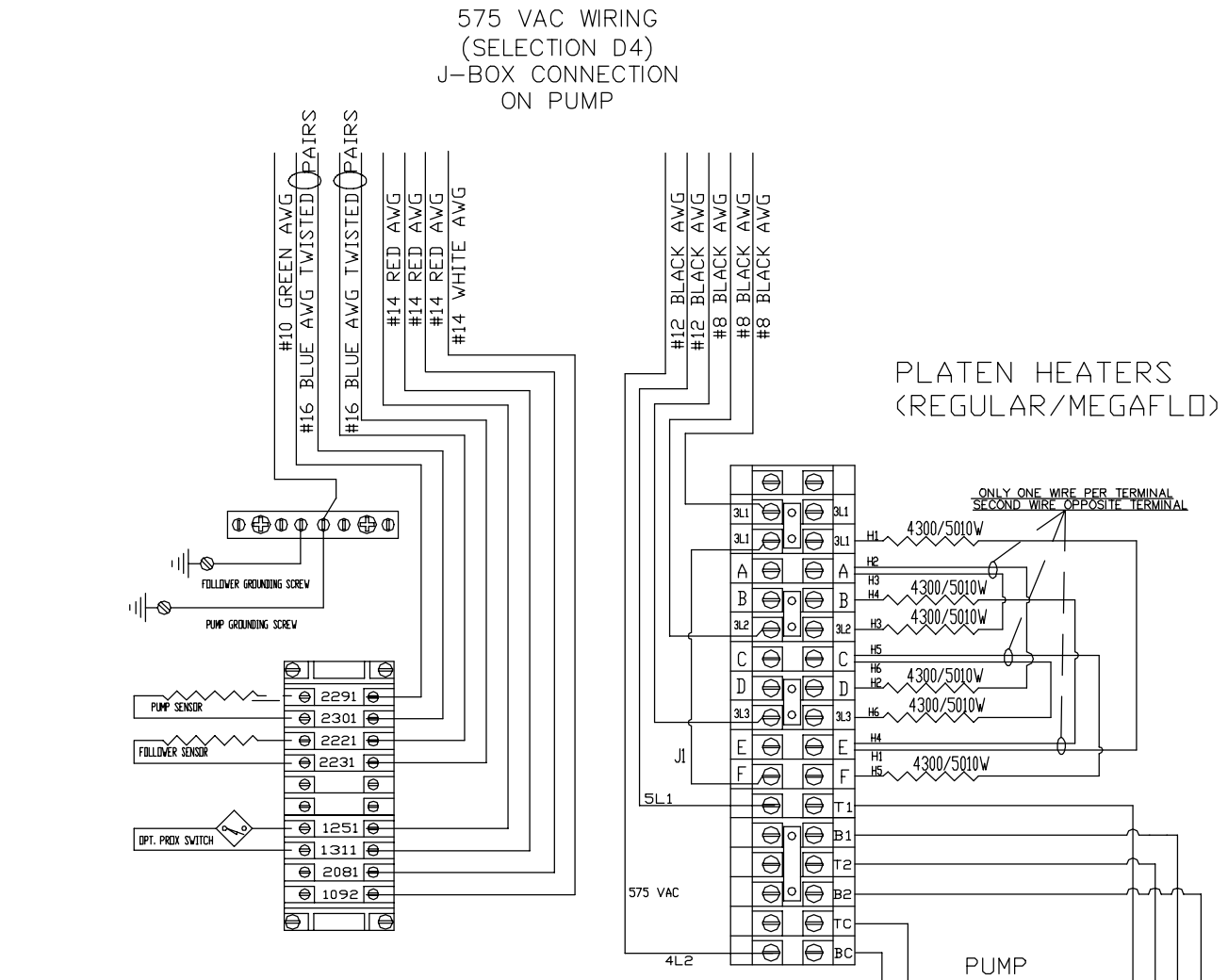
RTD SENSOR CHECKS

PUMP SENSOR BETWEEN 2291/2301=107.5–110.0 @ 68°F – 78°F
FOLLOWER SENSOR BETWEEN 2221/2231=107.5–110.0 @ 68°F – 78°F

Fig. 20

Service

For 575 VAC Supply Units – Junction Box Schematic



PLATEN HEATER CHECKS

	SMOOTH 243875	STD. GRID 243874	MEGA. FLO 243300
ALL HX PAIRS H1 TO H1, H2 TO H2 ETC.	19.2 Ω $^{+2}_{-3}$	19.2 Ω $^{+2}_{-3}$	16.5 Ω $^{+1}_{-2}$
ALL H WIRES TO GROUND (ALL MODELS) 100,000Ωmin			

PUMP HEATER CHECKS

T1 & T2	5L1 & 4L2
360 Ω $^{+}_{-}$ 4	450 Ω $^{+}_{-}$ 4
ALL PUMP HEATER TERMINALS TO GROUND–NO CONTINUITY	

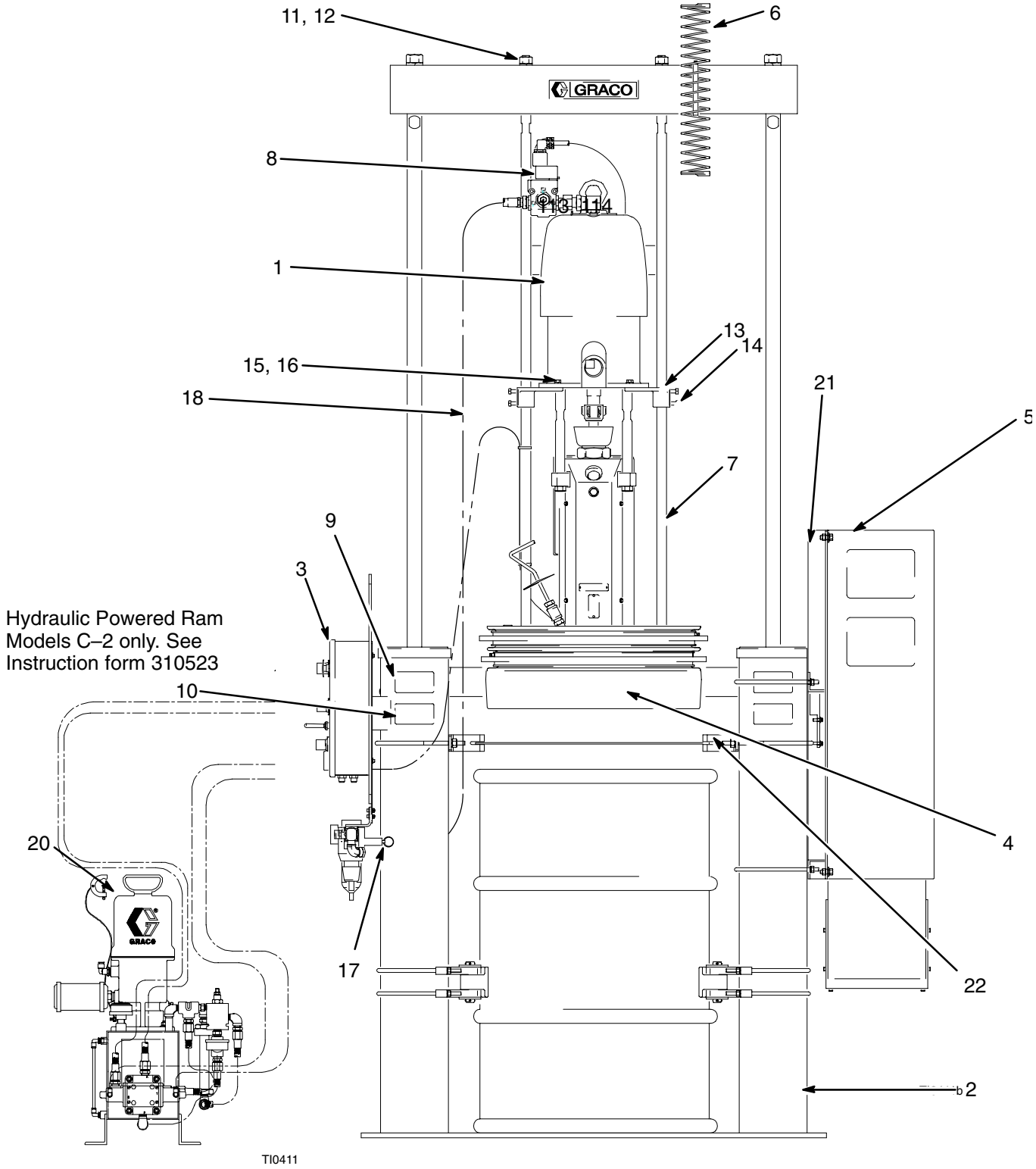
RTD SENSOR CHECKS

PUMP SENSOR BETWEEN 2291/2301=107.5–110.0 @ 68°F – 78°F
FOLLOWER SENSOR BETWEEN 2221/2231=107.5–110.0 @ 68°F – 78°F

Fig. 21

Parts

All Models Supply Unit



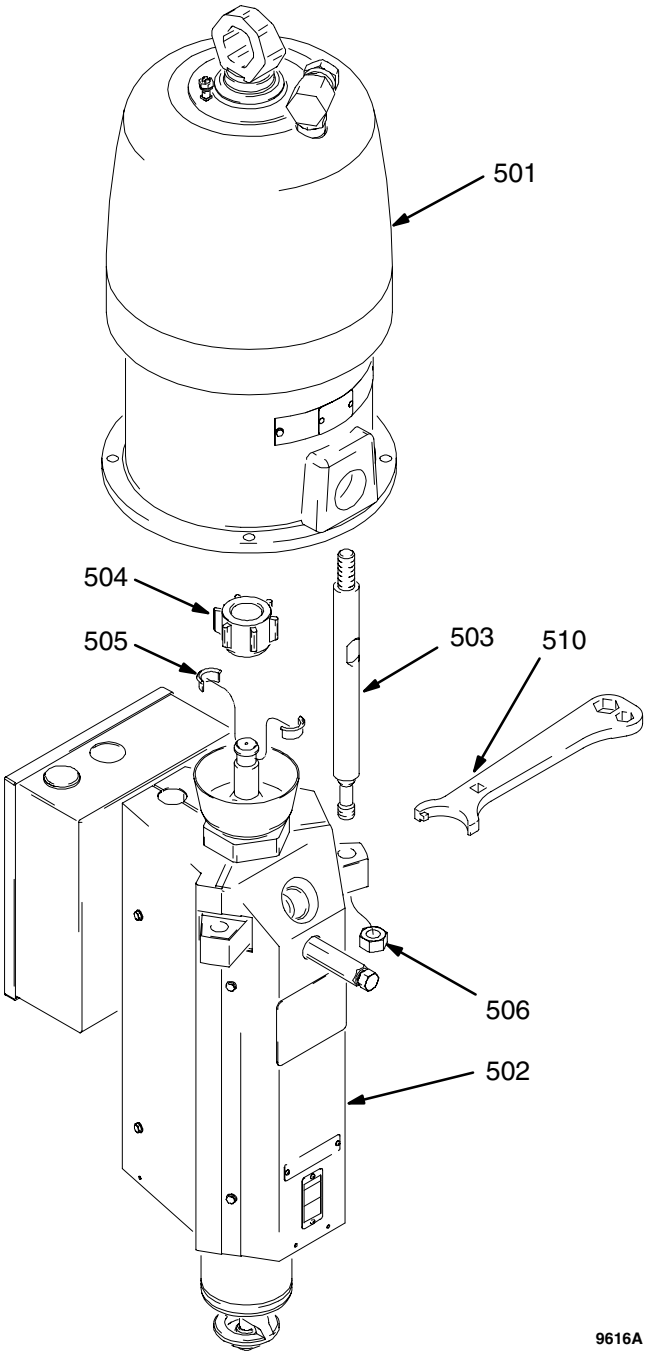
Parts

All Models Supply Unit

Ref No.	Part No.	Description	Qty
1		PUMP, See page 72 for model breakdown	1
2	233087	RAM, C–1 , air powered (See form 310523)	1
	918420	RAM, C–2 , oil powered (See form 310523)	1
3	243785	CONTROL, assembly, ram (See form 310523)	1
4		PLATE, heated ram; see page 77	1
5		CONTROL, heat zones; see page 86	1
6	918461	KIT, mount, hose support, 6.5” rams	1
7	C32402	ROD, follower, heated	2
8	243422	KIT, depressurize; see page 83 for details)	1
9	C14043	LABEL, pinch point	4
10	C14005	LABEL, heated equipment	2
11	101015	WASHER	2
12	C19187	NUT	2
13	161822	BRACKET, mounting	2
14	100672	SCREW	4
15	100133	WASHER, lock	4
16	100101	SCREW	4
17		VALVE, air pressure 60 psi (4.1 bar) Models A–5 and A–6 only (Kings)	1
18	241233	HOSE, air 1/2”X88” (13mmX2.23m)	1
19	100896	BUSHING 3/4X1/2	1
20	918510	MODULE, hydraulic ram supply, (Model C–2 only)	1
21	243302	KIT, control box mount 6 and 8 zone, see page 83	1
22	253479	KIT, drip shield	1

Parts

All Models Air Motor and Pump Assembly

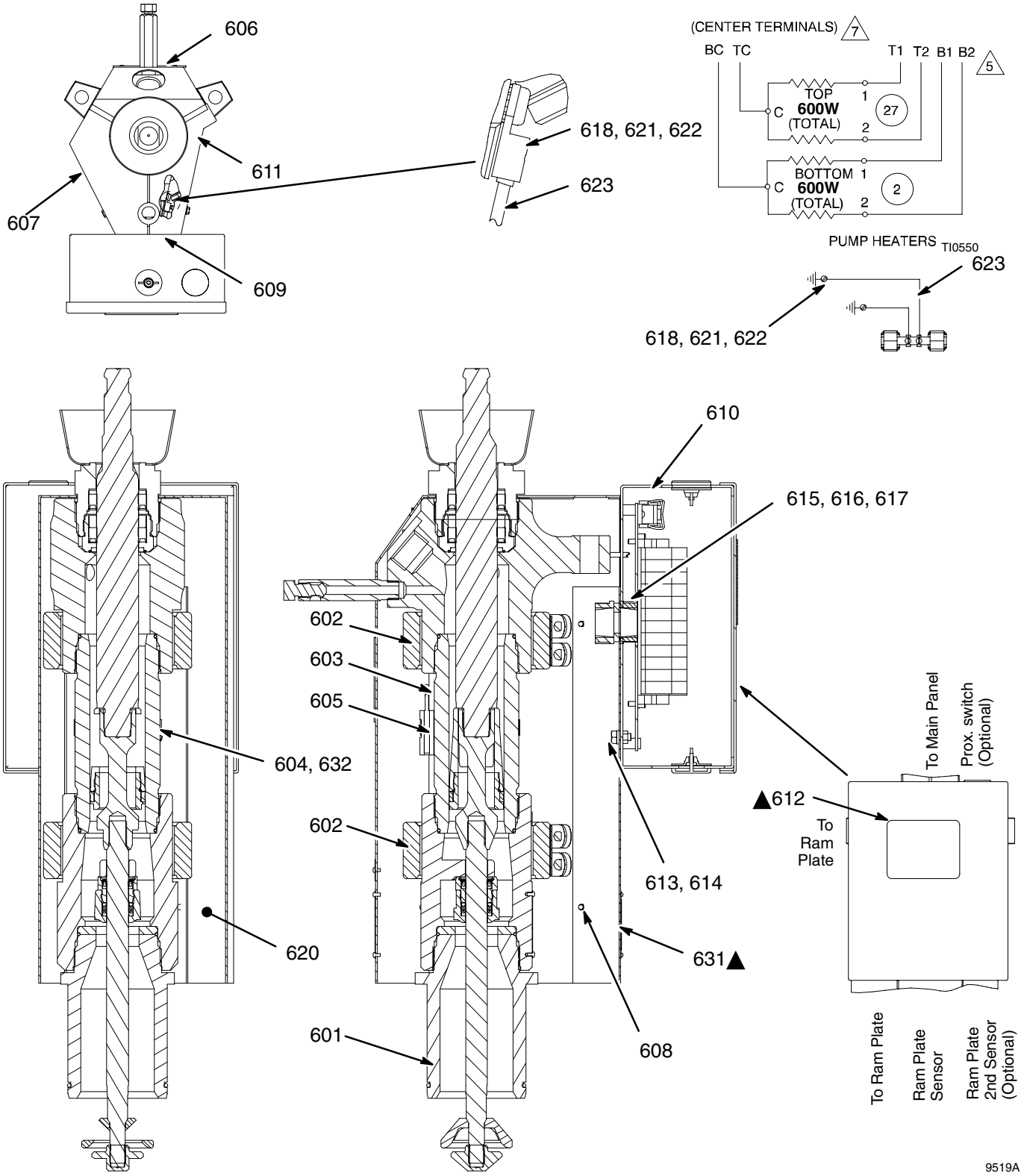


Ref No.	Part No.	Description	Qty
501		AIR MOTOR	1
	217540	used on code A–1 see 307592	
	220571	used on code A–2 see 307592	
	208356	used on code A–3 see 307049	
	215255	used on code A–4 see 307304	
	207647	used on code A–5 see 309347	
	220106	used on code A–6 see 309348	
502	243276	PUMP, heated, see page 74	1
503	190000	ROD, tie; 224 mm (8.82”) shoulder to shoulder	3
504	186925	NUT, coupling	1
505	184129	COLLAR, coupling	2
506	106166	NUT, hex; M16 x 2.0	3

Notes

Parts

Model 243276, Series A Heated Pump



Parts

Model 243276, Series A Heated Pump

Ref No.	Part No.	Description	Qty
601	237795	PUMP, displacement, Check-Mate™ 800; see manual 308570	1
602	15C044	HEATER, band, pump; 600 watt	2
603	C32255	SENSOR, RTD	1
604	C31012	CLAMP, band	1
605	C03507	MOUNT, RTD sensor	1
606	C03482	COVER, pump front	1
607	C03491	COVER, pump right side assy	1
608	C20474	SCREW, self tapping; no. 10 x 0.75 in. (19 mm)	8
609	C03484	COVER, pump rear	1
610	243264	JUNCTION BOX ASSY	1
611	C03490	COVER, pump left side assy	1
612▲	C14009	LABEL, high voltage	2
613	100016	WASHER, lock; 1/4 in.	4
614	C19080	SCREW, hex head; 1/4–20 x 0.5 in. (13 mm)	4
615	C20867	BUSHING, conduit; 3/4 npt	2
616	C20716	LOCKNUT, conduit; 3/4–14	1
617	C20487	NIPPLE, hex; 3/4 npt	1
618	C32256	TERMINAL, ring; for #10 stud	1
620	C32105	INSULATION 28 in. (711 mm)	
621	C38162	SCREW, round head; 10–24 x 0.31 in. (8 mm)	1
622	C38163	WASHER, lock, ext. tooth; no. 10	1
623	C07523	WIRE, green; 10 AWG 6 in. (152 mm)	
625	206994	THROAT SEAL LIQUID; 8 oz; not shown	1
631▲	184090	PLATE, warning	2
632	C33049	TAPE; fiberglass 18 in. (457 mm)	

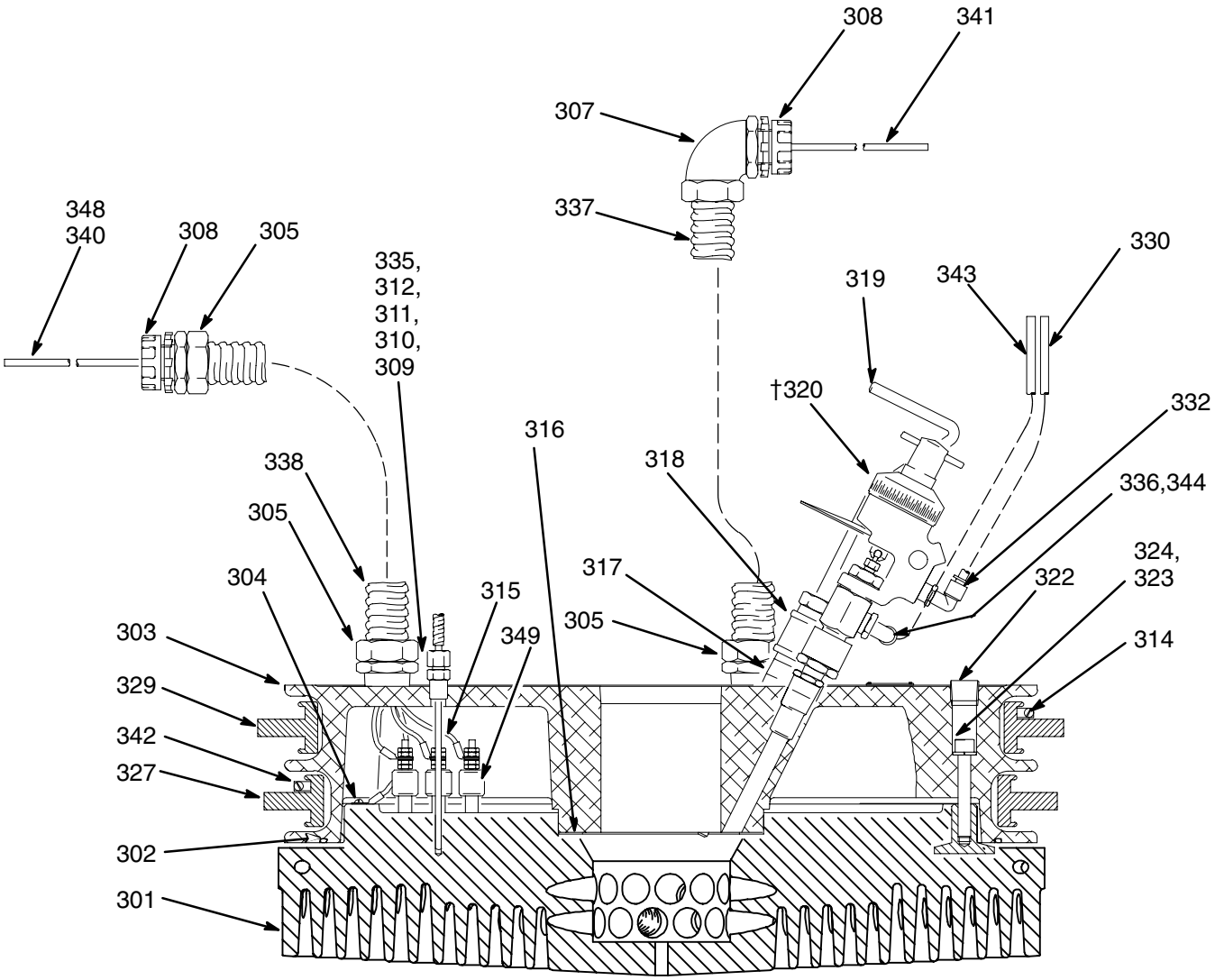
▲ *Replacement Danger and Warning labels, tags and cards are available at no cost.*

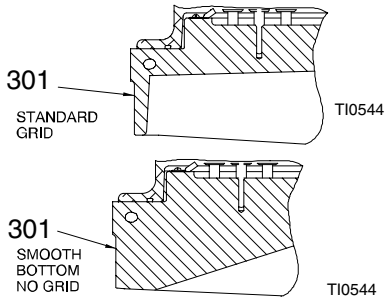
Refer to manual 310530 for more detailed information.

Parts

Twin Tee Wiper Platens

Part No. 243874 Ram Plate, Standard Grid (Code B–1)
Part No. 243300 Ram Plate, Mega Flo (Code B–4)
Part No. 243875 Ram Plate, Smooth Bottom (Code B–7)





† Use item 345 when replacing the gasket in item 320.

9517A

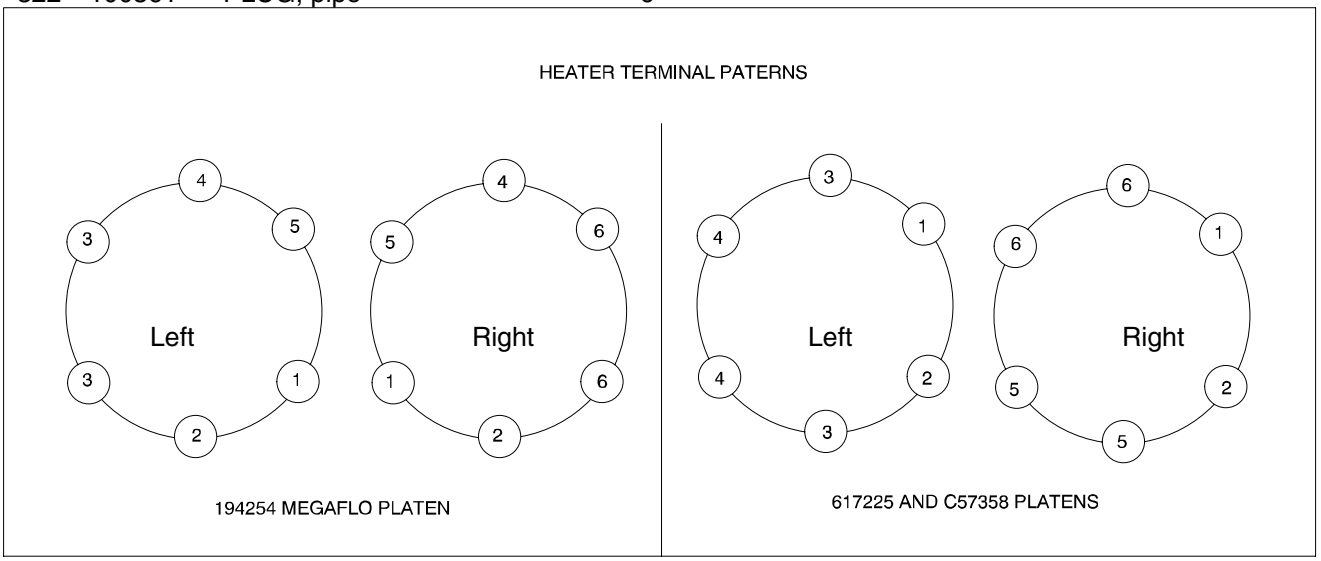
Parts

Twin Tee Wiper Platens

Part No. 243874 Ram Plate, Standard Grid (Code B–1)
Part No. 243300 Ram Plate, Mega Flo (Code B–4)
Part No. 243875 Ram Plate, Smooth Bottom (Code B–7)

Ref No.	Part No.	Description	Qty
301		PLATE, ram	1
	617225	standard grid code B–1	
	194254	Mega Flo code B–4	
	C57358	smooth grid code B–7	
302	C32204	O-RING	1
303	617226	PLATE, ram, tire	1
304	C19049	SCREW, machine, slotted, round hd	1
305	C20731	FITTING, conduit, connector; 1 in.	3
307	C20730	FITTING, conduit, elbow; 1 in.	1
308	C20868	BUSHING, conduit	2
309	C32202	SENSOR, temperature	1
310	C20575	GRIP SEALING, cable	1
311	C20874	O-RING, conduit sealing	1
312	C20715	FITTING, locknut, conduit	1
*314	115658	BAND, wiper ring	2
315	100166	NUT, hex	24
316	C32201	GASKET, ram plate	1
317	158491	NIPPLE	1
318	158581	COUPLING, hex	1
319	617227	BLEED HANDLE, ram plate	1
320	246501	VALVE, blow off;	1
321	100721	PLUG, pipe	1
322	100361	PLUG, pipe	6
323	100133	WASHER, lock	6
324	C19846	SCREW, cap, socket hd	6
*327	115655	SEAL, wiper ring; lower; 19.2 in. (488 mm) ID	1
*329	115656	SEAL, wiper ring; upper; 19.7 in. (500 mm) ID	1
330	054779	HOSE; PTFE 6.5 ft (2.0 m)	
331	C33037	TAPE; fiberglass;	
	not shown	8 ft (2.74 m)	
332	115949	FITTING, elbow	1
335	C20865	BUSHING, conduit	1
336	100176	BUSHING, hex	1
337	194342	CONDUIT, flexible; 1 in.	1
338	194343	CONDUIT, flexible; 1 in.	1
340	114831	CONDUCTOR; 40 in. (1016 mm)	6
341	114832	CONDUCTOR; 55 in. (1397 mm)	6
*342	115657	BAND , wiper ring	2
343	054778	TUBE, PTFE 6.5 ft. (2.0 m)	1
344	115948	FITTING	1
348	118332	CONDUCTOR, ground; 40 in. (1016 mm)	1
349	15D550	WASHER, ceramic insulator	1

* Included in wiper replacement kit 243279



16.5 Ohms across pairs

19.25 Ohms across pairs

These schematics refer to the wiring terminals for the heaters that are cast into the drum platen. Each pair of numbers connects across a heating element.

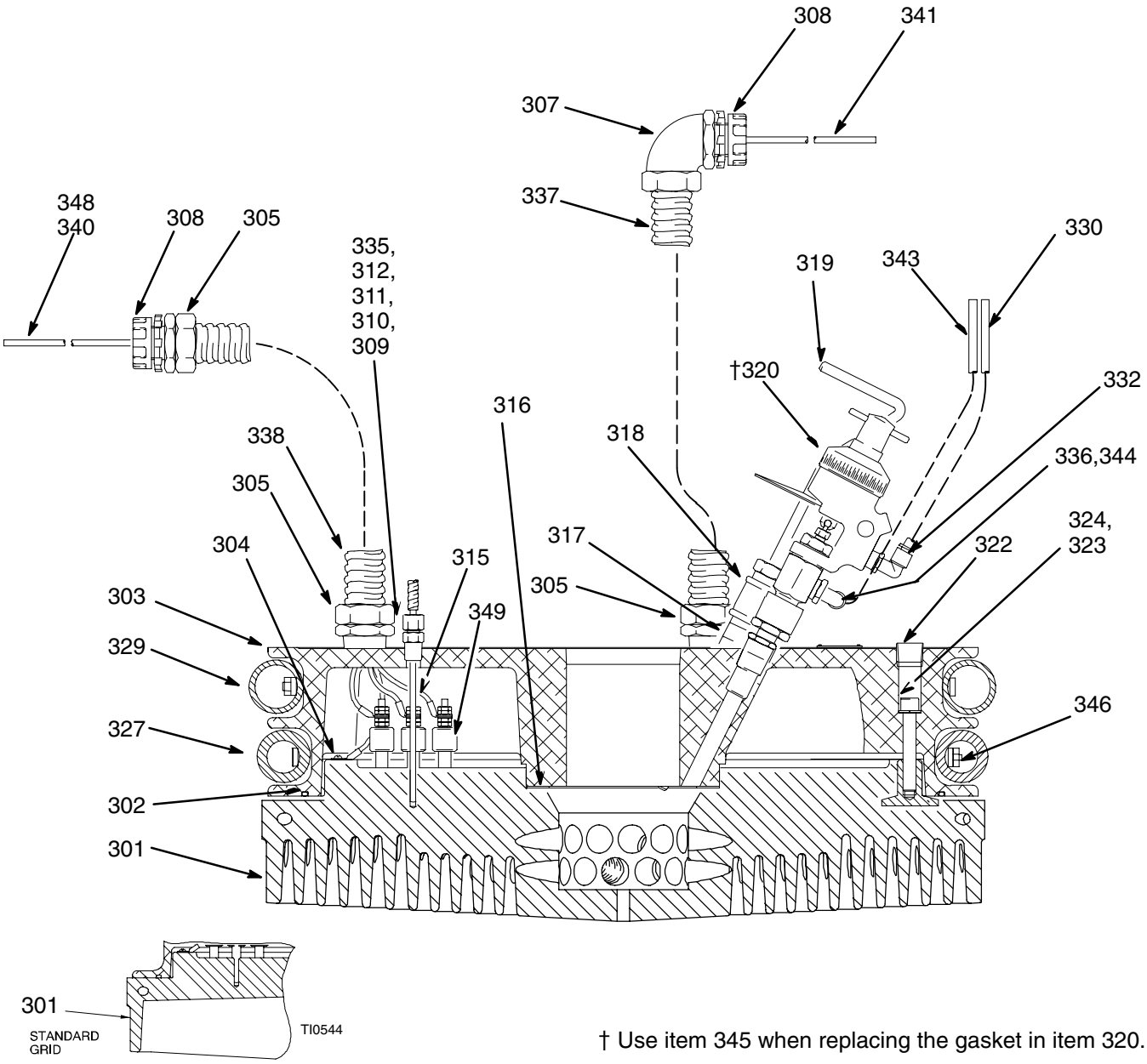
TI054

5

Parts

Twin Hose Wiper Platens

Part No. 245741 Ram Plate, Standard Grid (Code B–2)
Part No. 245740 Ram Plate, Mega Flo (Code B–5)



† Use item 345 when replacing the gasket in item 320.

Parts

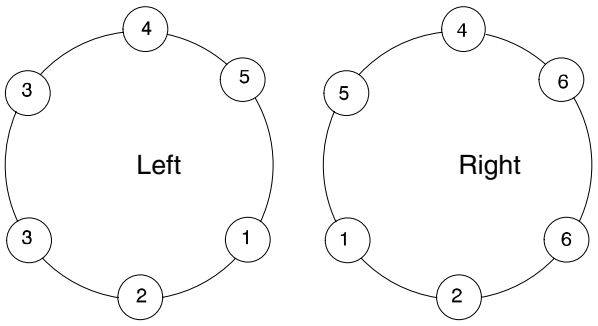
Twin Hose Wiper Platens

Part No. 245741 Ram Plate, Standard Grid (Code B–2)
Part No. 245740 Ram Plate, Mega Flo (Code B–5)

Ref No.	Part No.	Description	Qty
301		PLATE, ram	1
	617225	standard grid code B–2 (245741)	
	194254	Mega Flo code B–5 (245740)	
302	C32204	O-RING	1
303	617226	PLATE, ram, tire	1
304	C19049	SCREW, machine, slotted, round hd	1
305	C20731	FITTING, conduit, connector; 1 in.	3
307	C20730	FITTING, conduit, elbow; 1 in.	1
308	C20868	BUSHING, conduit	2
309	C32202	SENSOR, temperature	1
310	C20575	GRIP SEALING, cable	1
311	C20874	O-RING, conduit sealing	1
312	C20715	FITTING, locknut, conduit	1
315	100166	NUT, hex	24
316	C32201	GASKET, ram plate	1
317	158491	NIPPLE	1
318	158581	COUPLING, hex	1
319	617227	BLEED HANDLE, ram plate	1
320	246501	VALVE, blow off;	1
321	100721	PLUG, pipe	1
322	100361	PLUG, pipe	6
323	100133	WASHER, lock	6
324	C19846	SCREW, cap, socket hd	6
* 327	C31005	HOSE, follower; lower;	1
*329	C31003	HOSE, follower, upper	1
330	054779	HOSE; PTFE 6.5 ft (2.0 m)	
331	C33037	TAPE; fiberglass; not shown 8 ft (2.74 m)	
332	115949	FITTING, elbow	1
335	C20865	BUSHING, conduit	1
336	100176	BUSHING, hex	1
337	194342	CONDUIT, flexible; 1 in.	1
338	194343	CONDUIT, flexible; 1 in.	1
340	114831	CONDUCTOR; 40 in. (1016 mm)	6
341	114832	CONDUCTOR; 55 in. (1397 mm)	6
343	054778	TUBE, PTFE 6.5 ft. (2.0 m)	1
344	115948	FITTING	1
*346	C31002	CLAMP, banding	1
348	118332	CONDUCTOR, ground; 40 in. (1016 mm)	1
349	15D550	WASHER, ceramic insulator	1

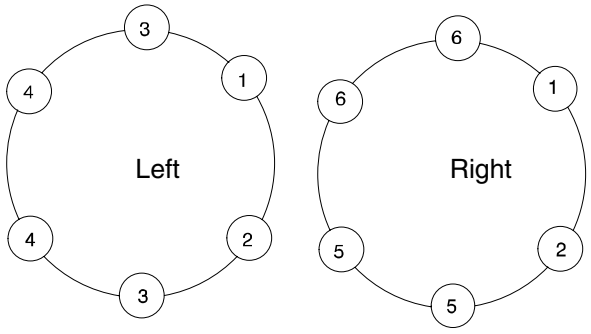
* Included in wiper replacement kit C31007

HEATER TERMINAL PATERNS



194254 MEGAFLO PLATEN

16.5 Ohms across pairs



617225 **Standard** PLATEN

19.25 Ohms across pairs

These schematics refer to the wiring terminals for the heaters that are cast into the drum platen. Each pair of numbers connects across a heating element.

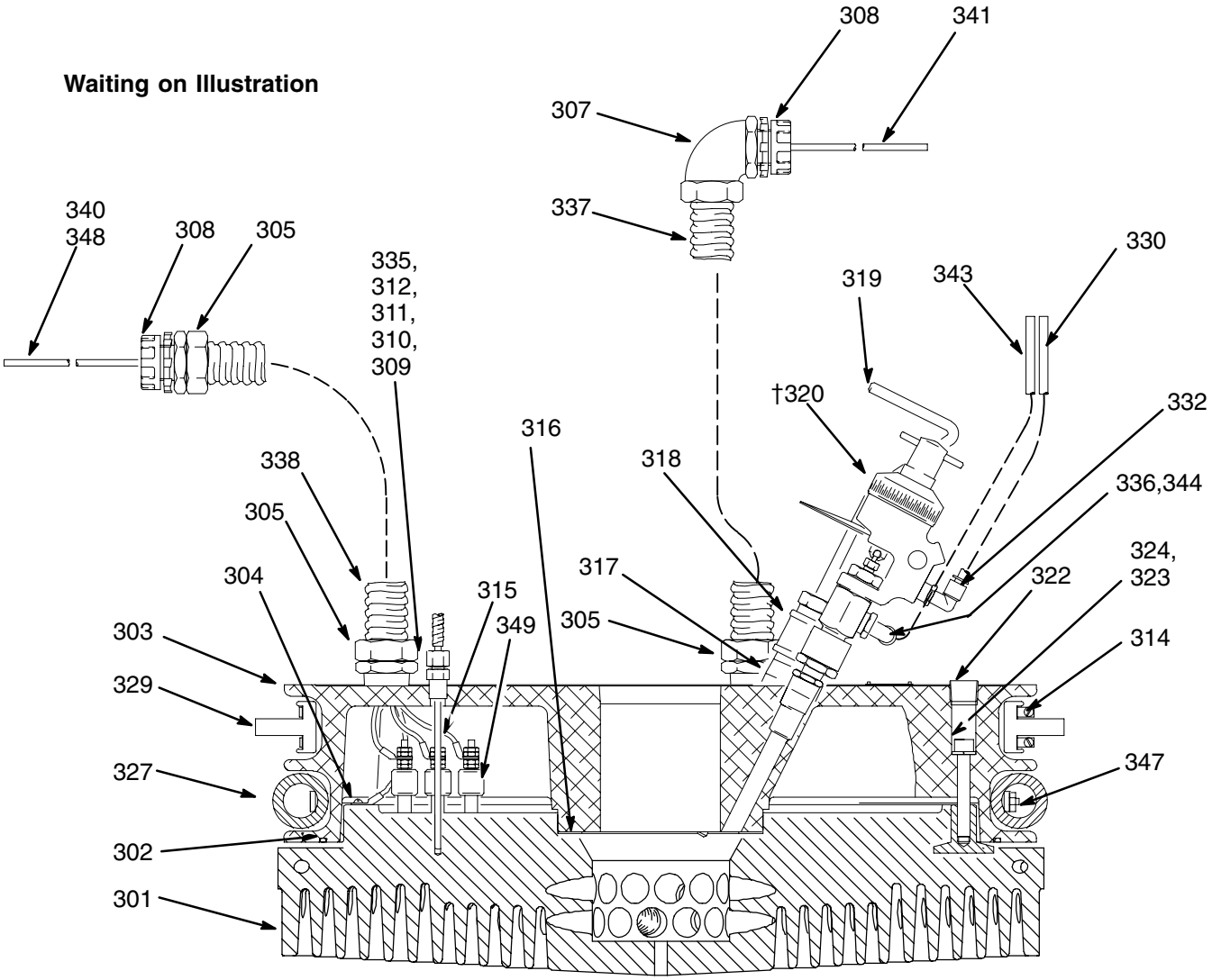
TI0545

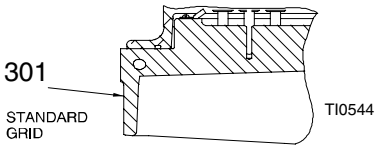
Parts

Tee and Hose Wiper Platens

Part No. 245739 Ram Plate, Standard Grid (Code B–3)
Part No. 245738 Ram Plate, Mega Flo (Code B–6)

Waiting on Illustration





† Use item 345 when replacing the gasket in item 320.

TI2382

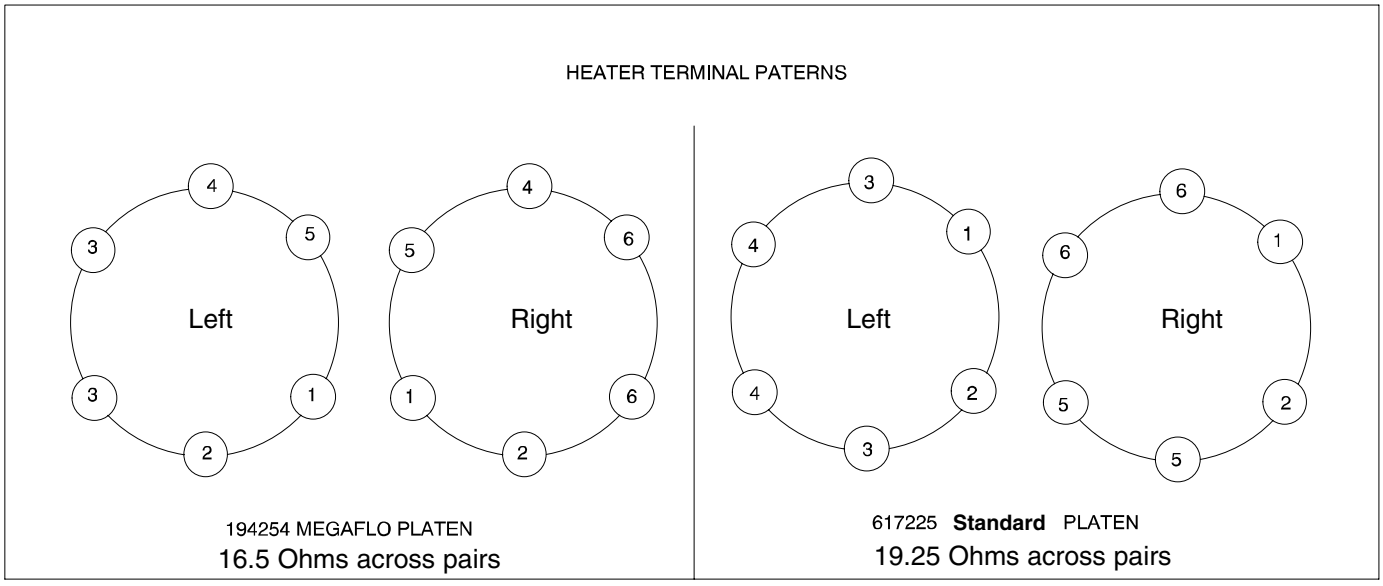
Parts

Tee and Hose Wiper Platens

Part No. 245739 Ram Plate, Standard Grid (Code B–3)
Part No. 245738 Ram Plate, Mega Flo (Code B–6)

Ref No.	Part No.	Description	Qty
301		PLATE, ram	1
	617225	standard grid code B–3 (245739)	
	194254	Mega Flo code B–6 (245738)	
302	C32204	O-RING	1
303	617226	PLATE, ram, tire	1
304	C19049	SCREW, machine, slotted, round hd	1
305	C20731	FITTING, conduit, connector; 1 in.	3
307	C20730	FITTING, conduit, elbow; 1 in.	1
308	C20868	BUSHING, conduit	2
309	C32202	SENSOR, temperature	1
310	C20575	GRIP SEALING, cable	1
311	C20874	O-RING, conduit sealing	1
312	C20715	FITTING, locknut, conduit	1
*314	115658	BAND, wiper ring	2
315	100166	NUT, hex	24
316	C32201	GASKET, ram plate	1
317	158491	NIPPLE	1
318	158581	COUPLING, hex	1
319	617227	BLEED HANDLE, ram plate	1
320	245501	VALVE, blow off	1
321	100721	PLUG, pipe	1
322	100361	PLUG, pipe	6
323	100133	WASHER, lock	6
324	C19846	SCREW, cap, socket hd	6
*327	C31005	HOSE, follower, lower	1
*329	115656	SEAL, wiper ring; upper; 19.7 in. (500 mm) ID	1
330	054779	HOSE; PTFE 6.5 ft (2.0 m)	
331	C33037	TAPE; fiberglass; not shown 8 ft (2.74 m)	
332	115949	FITTING, elbow	1
335	C20865	BUSHING, conduit	1
336	100176	BUSHING, hex	1
337	194342	CONDUIT, flexible; 1 in.	1
338	194343	CONDUIT, flexible; 1 in.	1
340	114831	CONDUCTOR; 40 in. (1016 mm)	6
341	114832	CONDUCTOR; 55 in. (1397 mm)	6
343	054778	TUBE, PTFE 6.5 ft. (2.0 m)	1
344	115948	FITTING	1
*347	C33040	CLAMP, banding	1
348	118332	CONDUCTOR, ground; 40 in. (1016 mm)	1
349	15D550	WASHER, ceramic insulator	1

* Included in wiper replacement kit 245668



These schematics refer to the wiring terminals for the heaters that are cast into the drum platen. Each pair of numbers connects across a heating element.

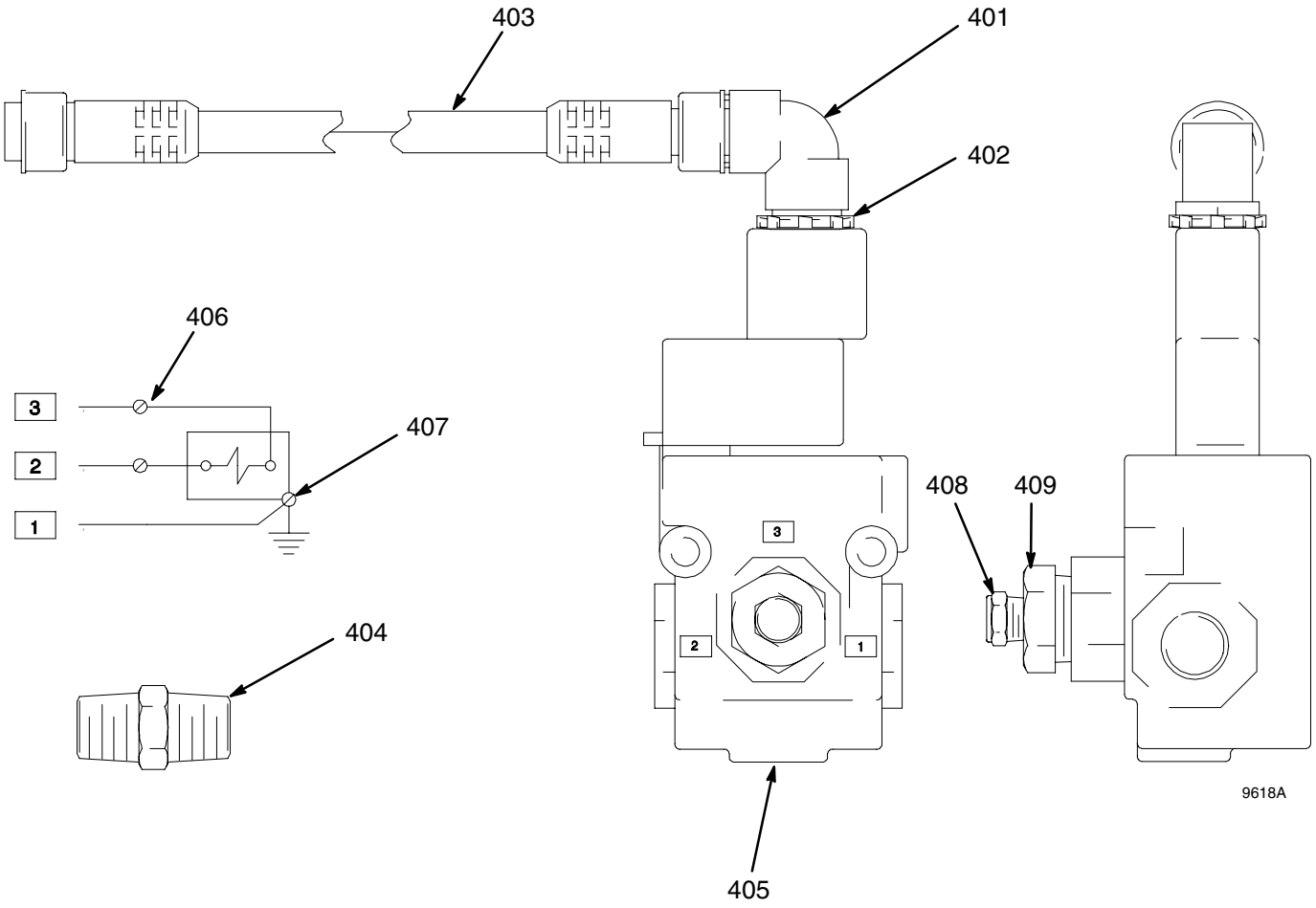
TI054

5

Parts

Part No. 243422 Depressurization Kit

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
401	C07430	CONNECTOR, sealed	1	406	C07403	NUT, wire; gray	2
402	C20715	FITTING, conduit	1	407	617550	TERMINAL, ring;	
403	C07458	CONNECTOR, sealed	1			16–18 AWG x no. 6 bolt	1
404	C20485	FITTING; 1/2 npt	1	408	C32390	FILTER, breather	1
405	115712	VALVE, solenoid; 240V	1	409	C19681	BUSHING, pipe	1

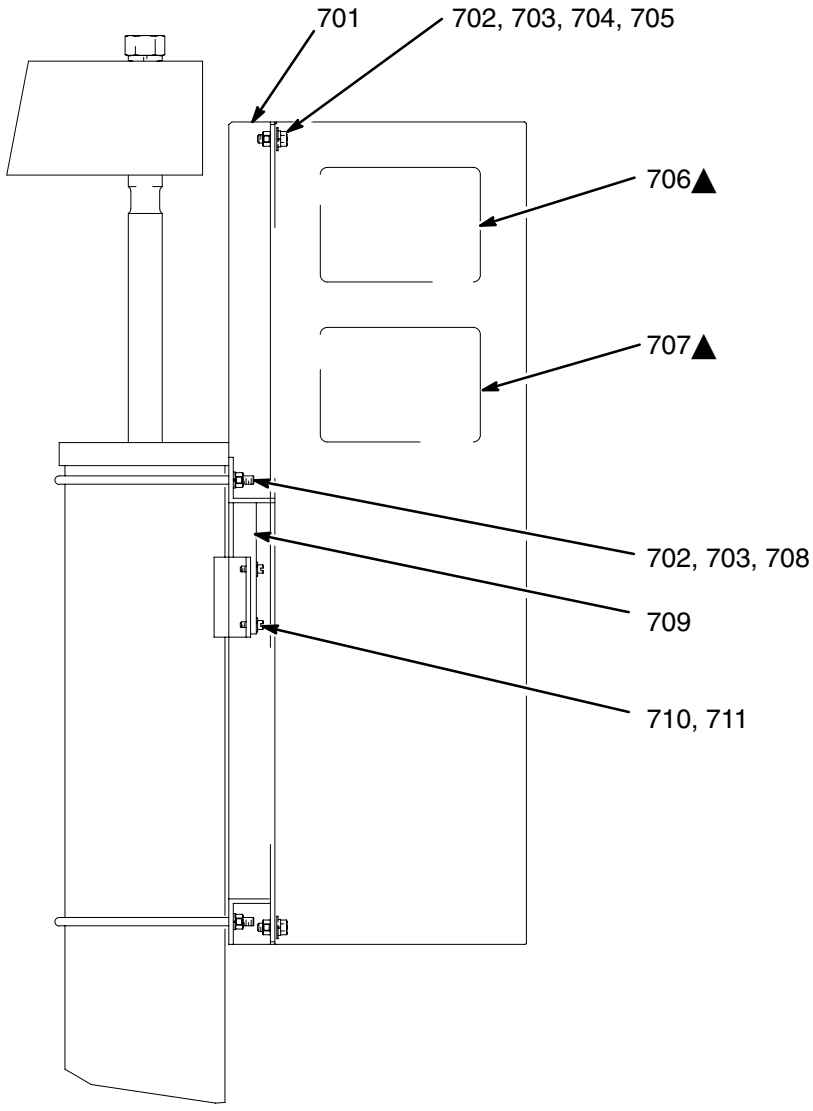


Parts

Part No. 243302 6–Zone and 8–Zone Control Installation Kit

Ref No.	Part No.	Description	Qty
701	195865	FRAME, enclosure	1
702	C19185	NUT, jam, hex	8
703	C19213	WASHER, lock	8
704	C19200	WASHER, plain	4
705	C19124	SCREW, cap, hex hd	4
706▲	C14004	LABEL, warning	1
707▲	C14003	LABEL, warning	1
708	C32424	U-BOLT; 7 in.	2
709	617727	STOP, control panel	1
710	C19802	SCREW, cap, socket hd	4
711	110755	WASHER, plain	4

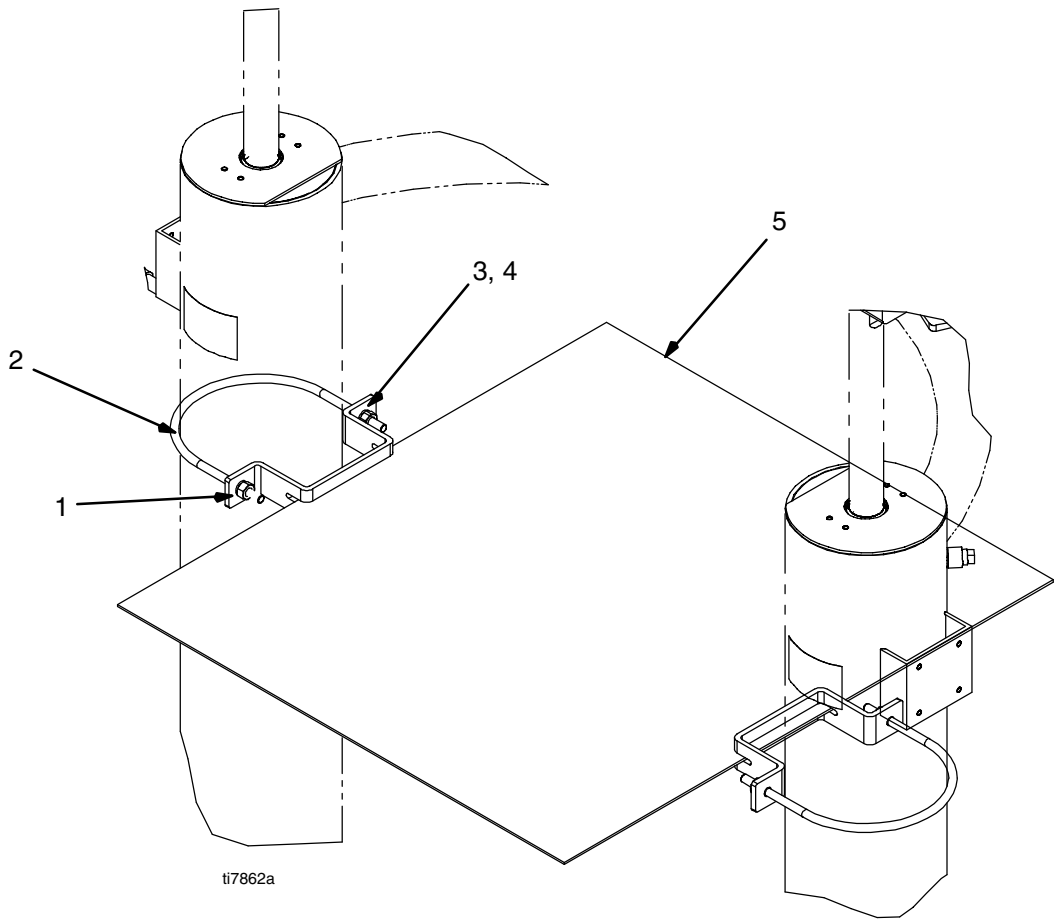
▲ *Replacement Danger and Warning labels, tags and cards are available at no cost.*



Parts

Part No. 253479 Drip Shield Mount Kit

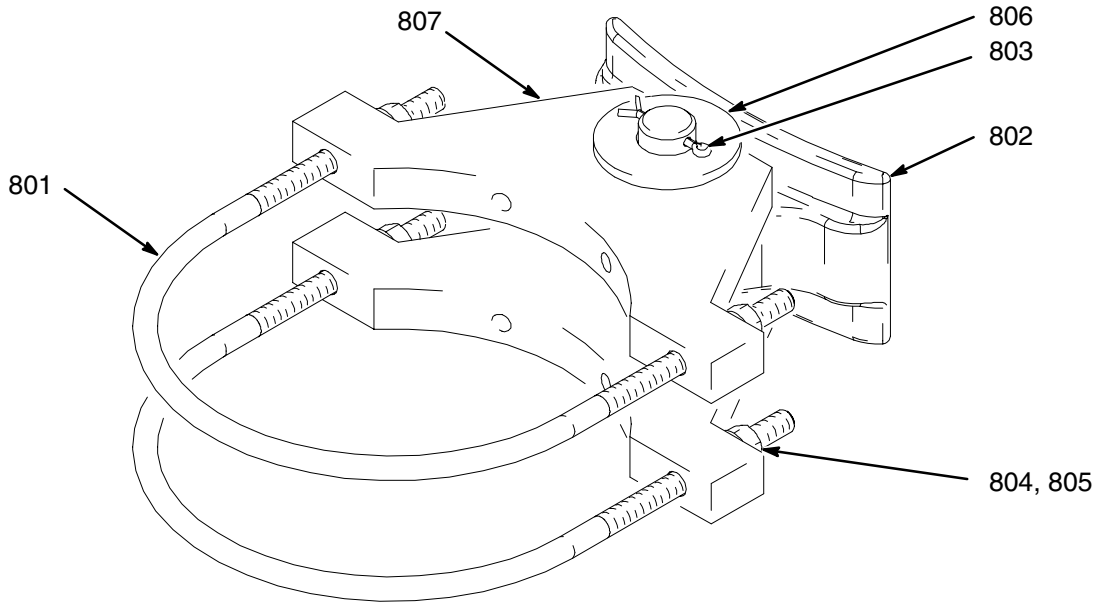
Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
1	15E026	BRACKET, drip shield mount	2	4	100133	WASHER, lock	4
2	15H609	BOLT, U, 6 in. pipe	2	5	115694	SHIELD, 29.9 X 27.3 X 1/8 in.	2
3	100131	NUT, full hex	4				



Parts

Option Code F-7
Part No. C32463 Saddle Assembly Clamp

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
801	C32424	U-BOLT; 7 in.	2	805	100133	WASHER, lock	4
802	160111	CLAMP	1	806	C38182	WASHER, plain	2
803	100103	PIN, cotter	2	807	C32461	CLAMP, saddle	2
804	100307	NUT, hex	4	808	166265	PIN; not shown	1



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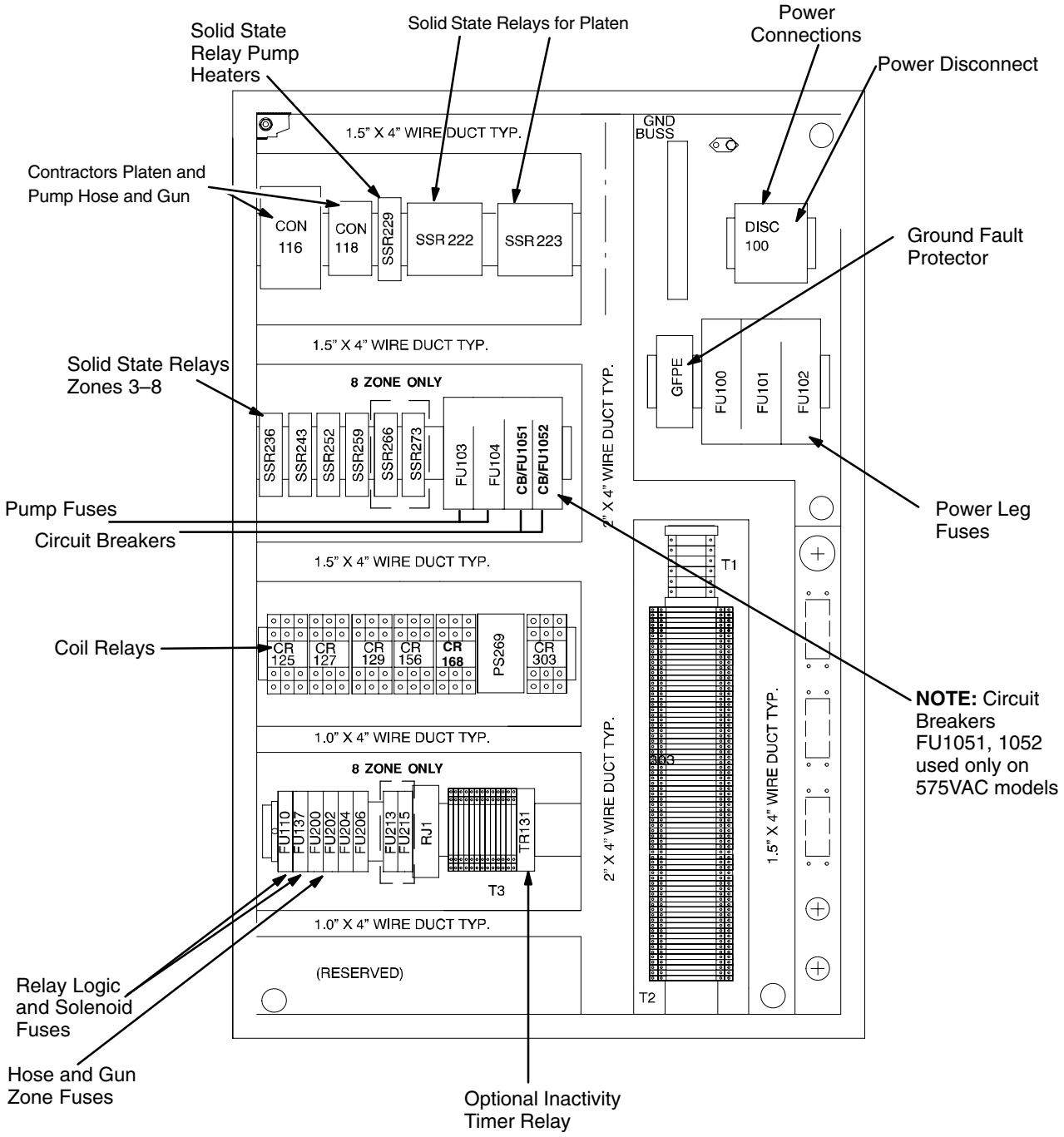
Parts

All Models Control Panel Component Layout



Repair parts are listed on pages 87 through 90.

Control Box Spare Parts List

Check the control box number on your machine, then find that control box on the tables on this and the following pages. Refer to the illustration on page 86 for device numbers.

Device	Manufacture	Mfg #	Graco #	Qty. in Panel
115969 6 Zone Control (230/240VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259	Carlo Gavazzi	RJ1A60D20U (10A)	116204	5
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU103, 104	Bussmann	LPJ–7SP Class J	116217	2
FU100, 101, 102	Bussmann	LPJ–80SP Class J	116218	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	6
CB1051–1052	Altech Corp.	2DU20	117711	1
115971 6 Zone Control (400VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259	Carlo Gavazzi	RJ1A60D20U (10A)	116204	5
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU103, 104	Bussmann	LPJ–4SP Class J	116220	2
FU100, 101, 102	Bussmann	LPJ–45SP Class J	116224	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	6
CB1051–1052	Altech Corp.	2DU15	15C025	1

Control Box Spare Parts List

Device	Manufacture	Mfg #	Graco #	Qty. in Panel
115659 6 Zone Control (480VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259	Carlo Gavazzi	RJ1A60D20U (10A)	116204	5
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU103, 104	Bussmann	LPJ–4SP Class J	116220	2
FU100, 101, 102	Bussmann	LPJ–45SP Class J	116224	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	6
CB1051–1052	Altech Corp.	2DU15	15C025	1
115972 6 Zone Control (575VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259	Carlo Gavazzi	RJ1A60D20U (10A)	116204	5
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU103, 104	Bussmann	LPJ–3–2/10SP Class J	116223	2
FU100, 101, 102	Bussmann	LPJ–45SP Class J	116224	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	6
FU1051–1052	Bussman	LPJ–15SP	116219	2

Control Box Spare Parts List

Device	Manufacture	Mfg #	Graco #	Qty. in Panel
115973 8 Zone Control (230/240VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259, 265, 273	Carlo Gavazzi	RJ1A60D20U (10A)	116204	7
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU213	Bussmann	FNQ–R–3–1/2 Class CC	116212	1
FU215	Bussmann	FNQ–R–1–1/4 Class CC	116213	1
FU103, 104	Bussmann	LPJ–7SP Class J	116217	2
FU100, 101, 102	Bussmann	LPJ–80SP Class J	116218	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257, 264, 271	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	8
CB1051–1052	Altech Corp.	2DU20	117711	1
115975 8 Zone Control (400VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259, 265, 273	Carlo Gavazzi	RJ1A60D20U (10A)	116204	7
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU213	Bussmann	FNQ–R–3–1/2 Class CC	116212	1
FU215	Bussmann	FNQ–R–1–1/4 Class CC	116213	1
FU103, 104	Bussmann	LPJ–4SP Class J	116220	2
FU100, 101, 102	Bussmann	LPJ–45SP Class J	116224	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257, 264, 271	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	8
CB1051–1052	Altech Corp.	2DU15	15C025	1

Control Box Spare Parts List

Device	Manufacture	Mfg #	Graco #	Qty. in Panel
115976 8 Zone Control (480VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259, 265, 273	Carlo Gavazzi	RJ1A60D20U (10A)	116204	7
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU213	Bussmann	FNQ–R–3–1/2 Class CC	116212	1
FU215	Bussmann	FNQ–R–1–1/4 Class CC	116213	1
FU103, 104	Bussmann	LPJ–4SP Class J	116220	2
FU100, 101, 102	Bussmann	LPJ–45SP Class J	116224	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257, 264, 271	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	8
CB1051–1052	Altech Corp.	2DU15	15C025	1
115977 8 Zone Control (575VAC)				
CR303	Deltrol	20311–81 3PDT (SEMKO) (12VDC Coil)	15D557	1
CR125, 127, 129, 156, 168	Deltrol	20308–85 3PDT (SEMKO) (240VAC Coil)	116202	5
SSR222, 223	Crouzet	84134130	15C395	2
SSR229, 236, 243, 252, 259, 265, 273	Carlo Gavazzi	RJ1A60D20U (10A)	116204	7
Lamps for LT113, 121, 123, 135, 156 (Lights on Door)	Allen–Bradley	800T–N169	116206	5
FU110	Bussmann	FNQ–R–1–1/2 Class CC	116207	1
FU200, 204	Bussmann	FNQ–R–6 Class CC	116208	2
FU202, 206	Bussmann	FNQ–R–2–1/4 Class CC	116209	2
FU213	Bussmann	FNQ–R–3–1/2 Class CC	116212	1
FU215	Bussmann	FNQ–R–1–1/4 Class CC	116213	1
FU103, 104	Bussmann	LPJ–3–2/10SP Class J	116223	2
FU100, 101, 102	Bussmann	LPJ–45SP Class J	116224	3
FU284	Bussmann	GDC–1A (5 x 20mm)	116225	1
TC220, 227, 234, 241, 250, 257, 264, 271	Syscon RKC	CB100FDA9–VN*AC–51/A/Y	233150	8
FU1051–1052	Bussman	LPJ–15SP	116219	2

Dimensions

Ram Mounting and Clearance Dimensions

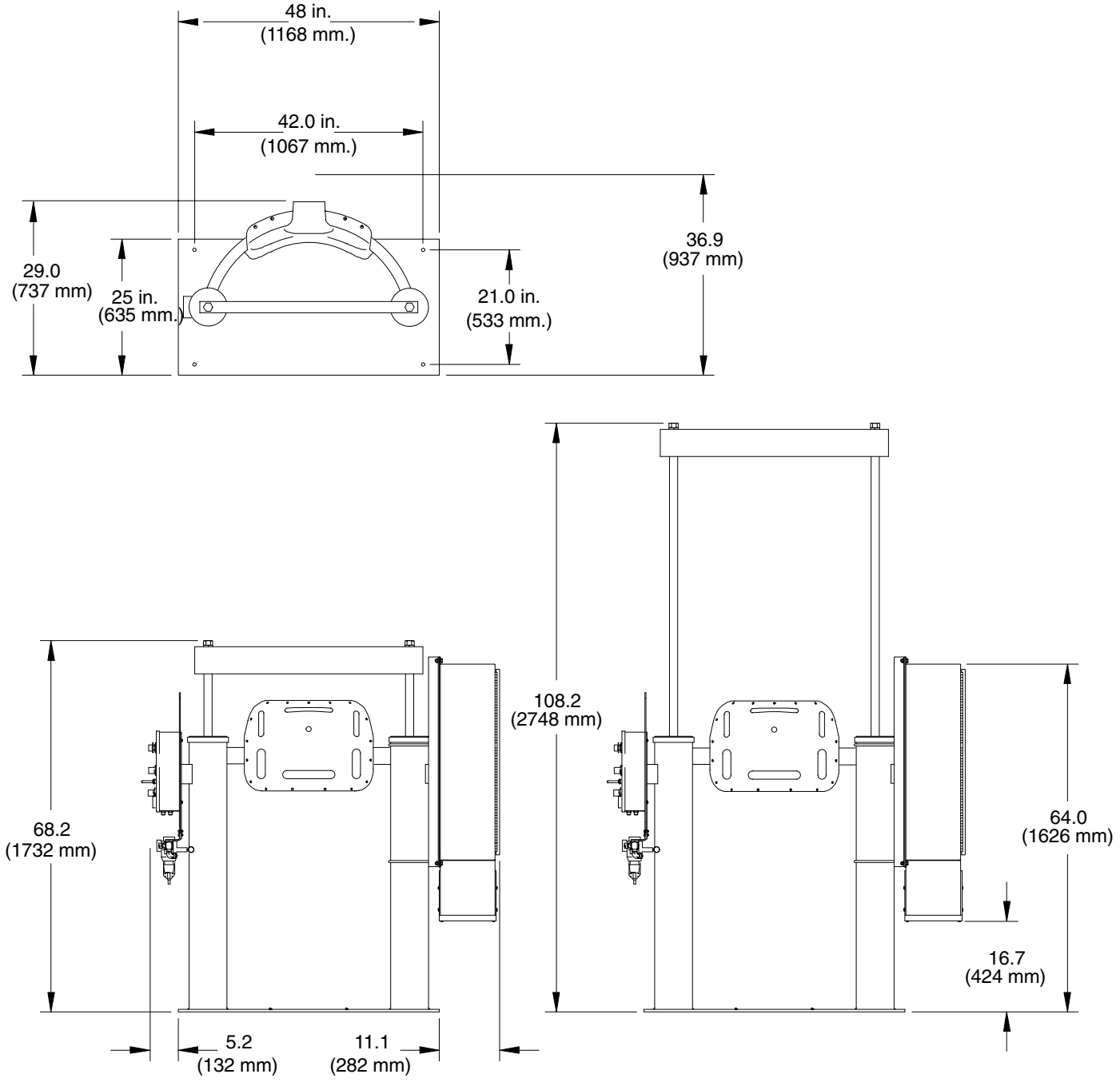


Fig. 22

Accessories

233095 **Automatic Cross-Over Kit**
Switches operation of one pump to a second pump. Includes low level switches, lights and control for preheat and automatic drum cross–over. Powered from LS connector of control panel. Requires 233098 Pendant.

233096 **Low Level Drum Signal Kit**
Includes switch and bracket and lights a red beacon when drum is empty.

918461 **Hose Support Kit for all 165 mm (6–1/2 in.) Hydraulic Rams**
Includes hose spring support and bracket to prevent hose kinks. Use for second heated hose.

C34130 **Hose Hanger Kit**
Includes hose spring support and bracket for hanging.

243697 **Heated Manifold**
Includes (2) 3/4 npt(f) inlet check valves, 1 npt 4–posted manifold, (2) 1 in. npt(f) outlet gate valves, mounting bracket, 400w 230 VAC heaters, RTD sensor and 8 pin connector box.

243279 **Tee Wiper Kit**
Includes both wipers and all band clamps.

234338 **Fuse Conversion Kit for Canadian ESA Approval Applications**
Includes fuses and fuseblock to replace circuit breakers CB 1051–1052.

245668 **Tee and Hose Wiper Kit**
Includes upper tee and lower hose and all band clamps

C31007 **Twin Hose Wiper Kit**
Includes both hoses and all band clamps.

233559 **Vent Hood Kit**
Mounts to rear of ram and used to vent fumes. Use for ram pumps without vent hood for dispensing PUR materials.

233097 **Inactivity Timer Kit**
Set to shut off unit if there is no pump activity within a given time.

918397 **Drum Clam Shell**
Used to reinforce fiber drums when on the pump ram.

918395 **Heavy Duty Drum Clamp**
Centers, supports, and holds drum during ram removal.

C32463 **Saddle Clamps**
Locates drum on base for raising and lowering of ram.

253479 **Drip Tray Kit**
Includes drip tray shield and two brackets which mount on the ram cylinders to catch material drips when changing drums.

115694 **Drip Tray Shield**
Used with 253479, to retain any material drips from heated plates.

233098 **Pendant Control with 7–Day Timer**
Plugs into any Therm–O–Flow Plus 6–/8–zone control box.

15D558 **Remote Cross–Over Change Button**
Plugs into cross–over modules. One required for each unloader.

Part No.	Accessory Controllers and Cables
243698	2–Zone (self–tuning PID) control box for adding one hose (up to 15 ft) and one heated accessory. 230 volt plug, 25 amp, (2) 16 pin connectors. Note: Cable needed to connect to remote devices.
243699	4–Zone (self–tuning PID) control box for adding two hoses (up to 15 ft) and two heated accessories. 230 volt plug, 25 amp, (2) 16 pin connectors. Note: Cable needed to connect to remote devices.
196313	15 ft cable, 16 pin to 16 pin extension cable. Runs between controller and heated hose.
196314	25 ft cable, 16 pin to 16 pin extension cable. Runs between controller and heated hose.
196315	15 ft cable, 16 pin to 8 pin extension cable. Runs between controller and heated accessory.
196316	25 ft cable, 16 pin to 8 pin extension cable. Runs between controller and heated accessory.
196317	15 ft cable, 16 pin to (2) 8 pin extension cable. Runs between controller and heated devices.
196318	25 ft cable, 16 pin to (2) 8 pin extension cable. Runs between controller and heated devices.
116159	25 ft cable, for communications from drum unloader control to Therm–O–Flow Plus accessory zone controls (2–zone 243698 and 4–zone 243699). (Connects to PN connector of controls.)

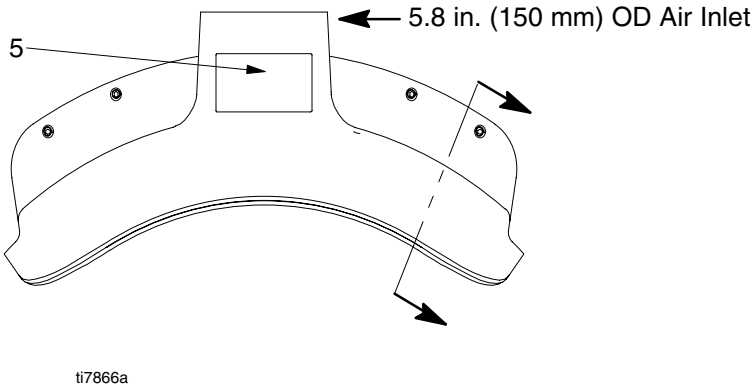
Part No.	Solenoid Kits for Air–Operated Valves
C58942	120 volt AC solenoid kit for heated double–acting air–operated valves. Includes solenoid, 61 cm high temp. Air tubes, air fittings and muffler.
C59038	24 volt DC solenoid kit for heated double–acting air–operated valves. Includes solenoid, 61 cm high temp. Air tubes, air fittings and muffler.
243703	240 volt AC solenoid kit for heated double–acting air–operated valves. Includes solenoid, 61 cm high temp. Air tubes, air fittings and muffler.

Accessories

Part No. 233559 Vent Hood Accessory Kit

For 6–1/2 in. Ram

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	280434	VENT, hood	1	3	100016	WASHER, lock	4
2	112166	SCREW, cap, hex head	4	5	C14038	LABEL, warning	1



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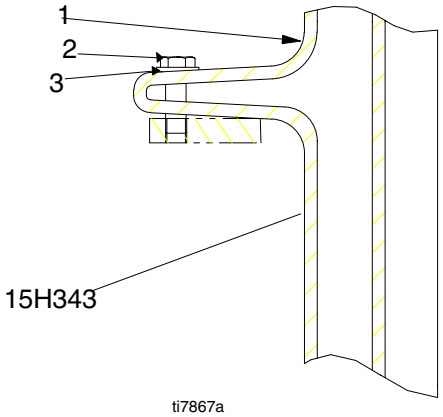

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Refer to Form 406506 (supplied with kit) for installation instructions.

Technical Data

Description	Specification
Displacement pump effective area	1.24 $in.^2$ (8 cm^2)
Volume per cycle	11.7 $in.^3$ (192 cm^3)
Pump cycles per 1 gal. (3.8 liters)	21
Maximum fluid working pressure	
Senator 19:1	2280 psi (15.7 MPa, 157 bar)
Bulldog 31:1	3100 psi (21.5 MPa, 215 bar)
King 65:1	5850 psi (40.0 Ma, 400 bar)
Maximum air input pressure	
Senator 19:1	120 psi (0.84 MPa, 8.4 bar)
Bulldog 31:1	100 psi (0.7 MPa, 7 bar)
King 65:1	90 psi (0.63 Ma, 6.3 bar)
Maximum pump operating temperature	400°F (204°C)
Air motor piston effective area	
Senator 19:1	24 $in.^2$ (154 cm^2)
Bulldog 31:1	38 $in.^2$ (248 cm^2)
King 65:1	78.5 $in.^2$ (506 cm^2)
Air inlet size	1/2 npsm(f)
Pump fluid outlet size	1 npt(f)
Wetted parts	Carbon steel; brass chrome; zinc; and nickel-plating; 304, 316, 440, and 17-4 PH grades of SST; alloy steel; ductile inron; PTFE; glass-filled PTFE
Weight	1200 lbs. (545 kg)
Displacement pump weight	81 lbs. (37 kg)
Instruction manuals	
65:1, 31:1, 19:1 heated ram pump packages	309085
Heated 55 gallon (200 liter) pump lowers	310530
Bare displacement pump lower	308570
6.5 in. (165 mm)global ram module	310523
Power Requirements	
Compressed air	25-50 scfm typical
Electricity	
Voltage (as selected)	220/240 3 phase & 50/60 Hz 380/400 3 phase & 50/60 Hz 470/490 3 phase 50/60 Hz 575 3 phase & 50/60 Hz
Peak Consumption*	
With standard melt grid	24.5 KVa
With MegaFlo melt grid	27.5 KVa
With smooth melt grid	24.5 KVa

*Includes drum melt grid, pump, and a 5 KVa transformer for the 230 volt hoses and accessories

Notes

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is 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.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non–Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

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.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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Graco Information

TO PLACE AN ORDER, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

1–800–328–0211 Toll Free
612–623–6921
612–378–3505 Fax

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MM 309085

This manual contains English.

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