



INSTRUCTIONS

This manual contains important warnings and information.  
READ AND RETAIN FOR REFERENCE

## PFC-2000

### Proportioning Controller

For Proportional Mixing And Flow Rate Control Of Plural Component Coatings  
+ 5 Volts, 1.4 Amps; + 12 Volts, 0.7 Amps; -12 Volts, 0.002 Amps

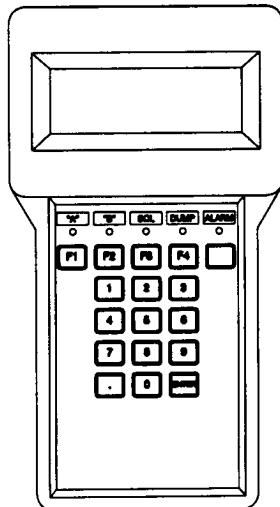
**Model: 236-674**

For use only in non-hazardous locations. Maximum applied relay voltage shall not exceed +24 volts. Do not operate in hazardous locations, as defined in article 500 of the National Electrical Code (USA).

See page 3 for Table of Contents. For Precision Mix fluid section instructions, refer to separate manual 684-013. For the Solenoid Enclosure instructions, refer to manual 308-297.

#### Part No. 965-554 Black Pendant

The RS-485 Pendant is not interchangeable with the standard Precision Mix pendant.



# WARNINGS

Serious injury, explosion, fire or electrostatic shock can occur if the precautions below are not followed. Read and understand all instruction manuals, tags, and warning labels before operating equipment.

Electrical equipment shall only be installed, operated, and serviced by trained, qualified personnel who shall be fully conversant with the requirements stated within this instruction manual.

## ***Fire, Explosion or Electric Shock Hazard***

### **General Safety**

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

1. Do not operate in hazardous locations, as defined in Article 500 of the National Electrical Code (USA).
2. Operate the PFC-2000 in well-ventilated areas only.
3. The equipment must be grounded (see below).
4. The operator control station must have an emergency stop that removes all power from the PFC-2000 Controller when it is activated.
5. Keep liquids away from the electrical components.
6. Disconnect electrical power at the main switch before servicing the PFC-2000.
7. Do not disassemble the electrical controller. Call a qualified electrician.

All parts of the fluid system must be properly grounded to reduce the risk of static electricity discharge. Sparks can ignite fumes from solvents and the fluid being sprayed, dust particles and other flammable substances and can cause a fire or explosion and serious injury and property damage.

Sparks may also occur when plugging in or unplugging a power supply cord. Do not plug in or unplug any power supply cords in the spray area when there is any chance of igniting fumes still in the air.

If you experience any static sparking or feel even a slight shock while using the system, stop operating the system immediately. Check for proper grounding of the entire system. Do not use the system again until the cause of the problem is identified and corrected.

### **Grounding**

Check your equipment instruction manuals and local electrical code for detailed grounding instructions for your area and type of equipment, and be sure to ground all of this spray equipment:

1. *PFC-2000 System:* The PFC-2000 System must be electrically connected to a true earth ground. The ground in the electrical system is not sufficient. Ground the system as instructed on page 8.
2. *Feed Pumps or Pressure Pots:* use a ground wire and clamp. See your separate pump or pressure pot manual.
3. *Air Compressor:* follow manufacturer's recommendations.

4. *Air and Fluid Hoses:* use grounded hoses only.

5. *Spray Gun:* obtain grounding through connection to a properly grounded fluid hose and PFC-2000 Manifold.

6. *Fluid Supply Container:* according to your local code.

7. *Object Being Sprayed:* according to your local code.

8. *All Solvent Pails Used When Flushing,* according to your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts the grounding continuity.

9. *To Maintain Grounding Continuity when Flushing or Relieving Pressure,* always hold a metal part of the spray gun firmly to the side of a grounded *metal* pail, then trigger the gun.

### **Flushing Safety**

*Before flushing,* be sure the entire system and flushing pails are properly grounded. Refer to **Grounding**, at left. Follow the **Pressure Relief Procedure** below. Always use the lowest possible fluid pressure, and maintain firm metal-to-metal contact between the gun and the pail during flushing to reduce the risk of injury from fluid splashing or static sparking.

### **Pressure Relief Procedure**

To reduce the risk of serious injury, including splashing fluid in the eyes or on the skin, always follow this procedure whenever you shut off the PFC-2000, when checking or servicing any part of the system, when installing, cleaning, or changing fluid tips, and whenever you stop spraying.

1. Set the PFC-2000 to STANDBY.
2. Relieve fluid and air pressure at the component and solvent feed pumps or pressure pots, as explained in their separate instruction manuals.
3. Set the PFC-2000 to MIX.
4. Hold a metal part of the spray gun firmly to the side of a grounded metal pail, and trigger the gun to relieve fluid pressure.
5. Set the PFC-2000 to STANDBY.

If you suspect that the fluid tip or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly loosen the hose end coupling and relieve pressure gradually, then loosen completely. Now clear the tip or hose.

## ***Equipment Misuse Hazard***

### **General Safety**

Any misuse of the spray equipment or accessories, such as overpressurizing, modifying parts, using non-Graco replacement parts, using incompatible chemicals and fluid, or using worn or damaged parts, can cause parts to rupture or cause equipment to malfunction and result in serious injury, such as fluid injection, splashing fluid in the eyes or on the skin, or fire, explosion or property damage.

Never alter or modify any part of this equipment; doing so could cause it to malfunction.

Check all spray equipment regularly and repair or replace worn or damaged parts immediately.

Only use genuine Graco replacement parts when servicing the PFC-2000.

Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

### **System Pressure**

Be sure that all spray equipment and accessories are rated to withstand the maximum air and fluid working pressures of the system. Do not exceed the maximum working pressure of any component or accessory used in the system.

### **Fluid Compatibility**

Be sure that all fluids and solvents used are chemically compatible with the wetted parts of each of your system's components. Always read the manufacturer's literature before using fluid or solvent in your system.

## ***Important***

United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards - particularly the General Standards, Part 1910, and the Construction Standards, Part 1926 - should be consulted.

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# How the PFC-2000 Works

The standard Graco PFC-2000 can blend most two-component epoxy or polyurethane paints. The PFC-2000 is not for use with "quick-setting" paints (those with a pot life of less than 15 minutes). For information on handling quick-setting paints or abrasive fluids, contact your Graco representative or Graco Technical Assistance (see back page).

The system can be set up to mix components supplied from pressure vessels, from feed pumps transferring the materials from their original containers, or from a central paint recirculating line.

The standard PFC-2000 is designed to operate an air spray system with a capacity of up to 2000 cc/min.

This manual describes the electronic controller module, which takes information from the fluid flow meters, installed in the fluid stream, and sends signals to control valves to reliably proportion the two component coatings. All ratio calculations are by volume. Other inputs and outputs are provided to control the flushing process, provide alarm annunciation, and interface with the operator.

## Operating Cycle

To begin operation, the spray gun operator enters the desired ratio and other parameters through the pendant and energizes the MIX input. From that point on, normal operation of the PFC-2000 is controlled by the operation of the spray gun. In order for the PFC-2000 to control flow rate a flow rate setpoint is required by entering the desired setpoint from the pendant or a external 4-20 mA. signal.

When the gun is triggered, the two components enter the pfc-2000 through separate paint lines and check valves, then are precisely monitored by flow meters.

When the spray gun is triggered, the two components are introduced into the integrator chamber one at a time. Their entry into the chamber is controlled by a dispense valve for each component. The flow meters monitor the exact quantities being dispensed, and send electrical pulses to the controller. The controller monitors these pulses and turns the dispense valves on or off accordingly (based on the target volumes calculated by the controller).

*The following is a typical ratio cycle:*

- First, the component A (resin) dispense valve opens, and the fluid begins to flow into the integrator chamber. When the correct quantity has been dispensed (based on the calculated target value), the component A dispense valve closes. See Fig. 1. During the dispense the current flow rate is measured and compared to the desired flow rate. The control adjusts the fluid pressure of the A component to match the desired and actual flow rate.
- Next, the component B (catalyst) dispense valve opens. The fluid begins to flow into the integrator chamber and is lined up proportionately with the previously-dispensed component A sample, then the B dispense valve closes. See Fig 2. During the dispense the current flow rate is measured and compared to the desired flow rate. The control adjusts the fluid pressure of the B component to match the desired and actual flow rate.
- The process repeats itself as long as the spray gun is triggered. When the trigger is released, the PFC-2000 idles; it will continue where it left off when the gun is triggered again.

The components are pre-mixed in the integrator, then given a homogeneous blending as they pass through a static mixer tube.

The two components continue to be alternately fed into the mixing block as long as the gun is triggered. When the trigger is released, the system idles. Operation can be stopped at any time by energizing the STANDBY input, or shutting off the main power switch.

## Adaptive Overrun Correction

The actual volume of fluid dispensed each cycle can vary slightly from the calculated target. However, the controller monitors this variance and compensates on the next cycle. At each cycle, the controller calculates the proper component A (resin) volume based on the desired ratio, the actual previous component B (Catalyst) volume, and the desired tolerance.

Whenever the fluid overrun is greater than the calculated tolerance volume, a relevant message is displayed on the pendant, the pendant alarm light blinks, the alarm annunciator closes, and the system stops.

## FUNCTIONAL DIAGRAM - COMPONENT A (RESIN) DISPENSE

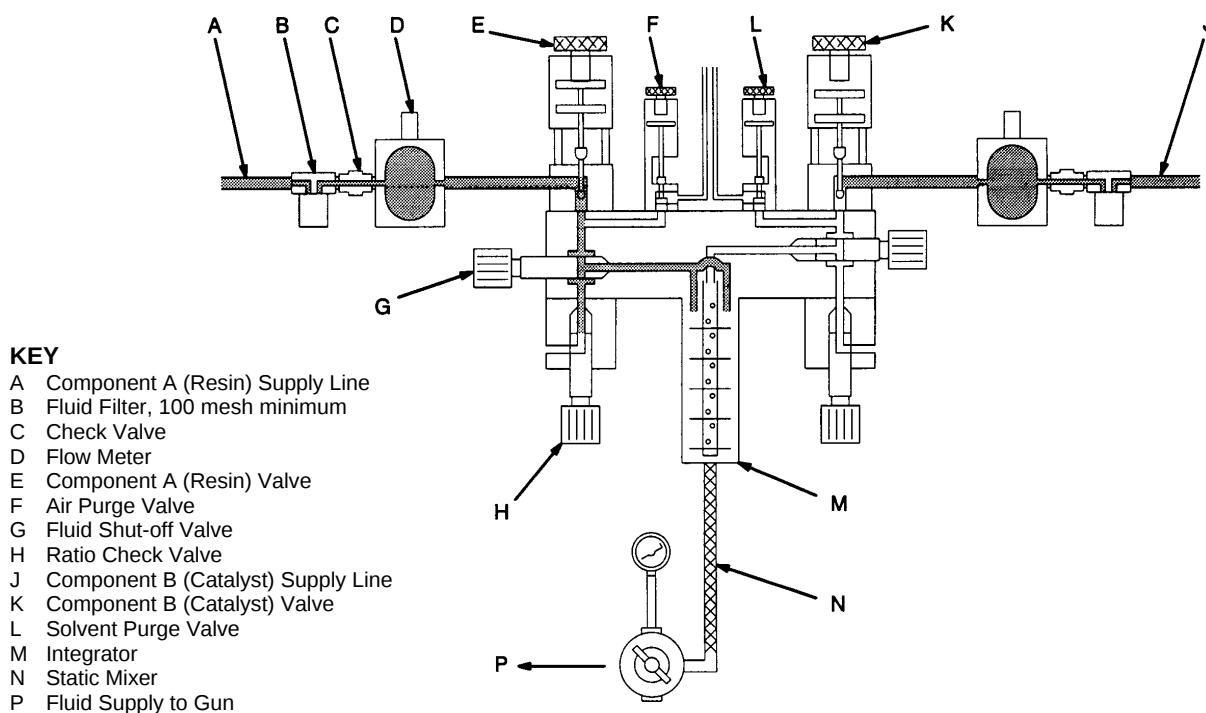


Fig 1

## FUNCTIONAL DIAGRAM - COMPONENT B (CATALYST) DISPENSE

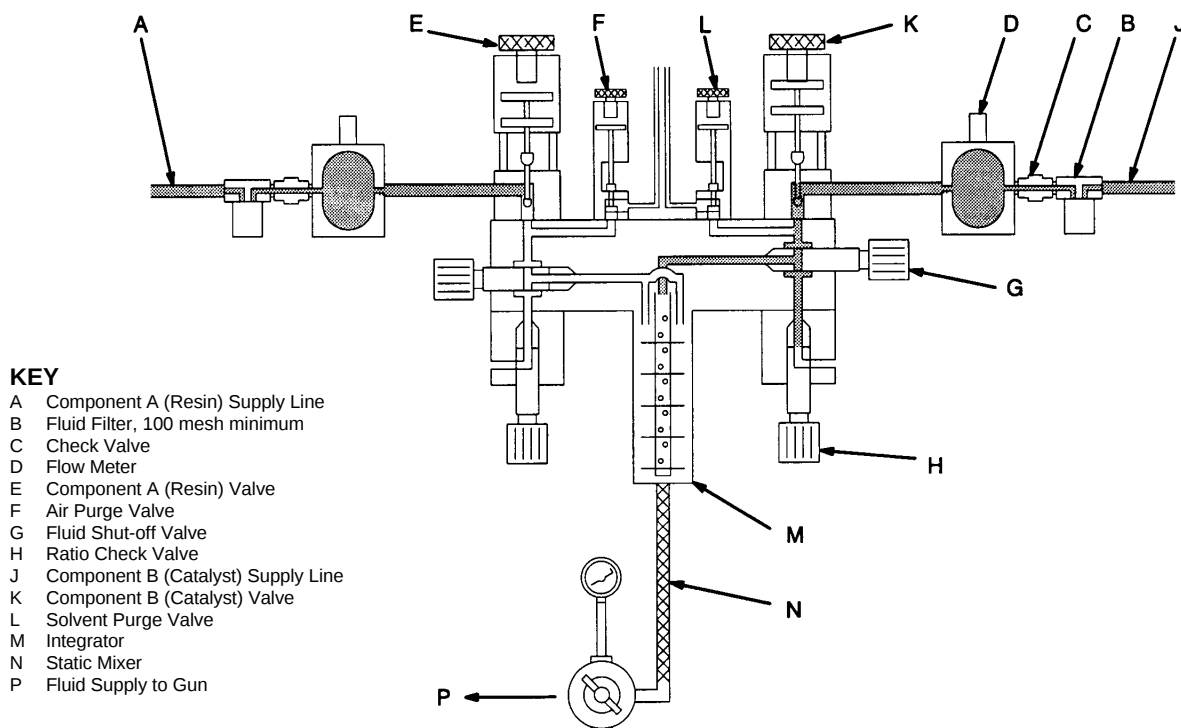
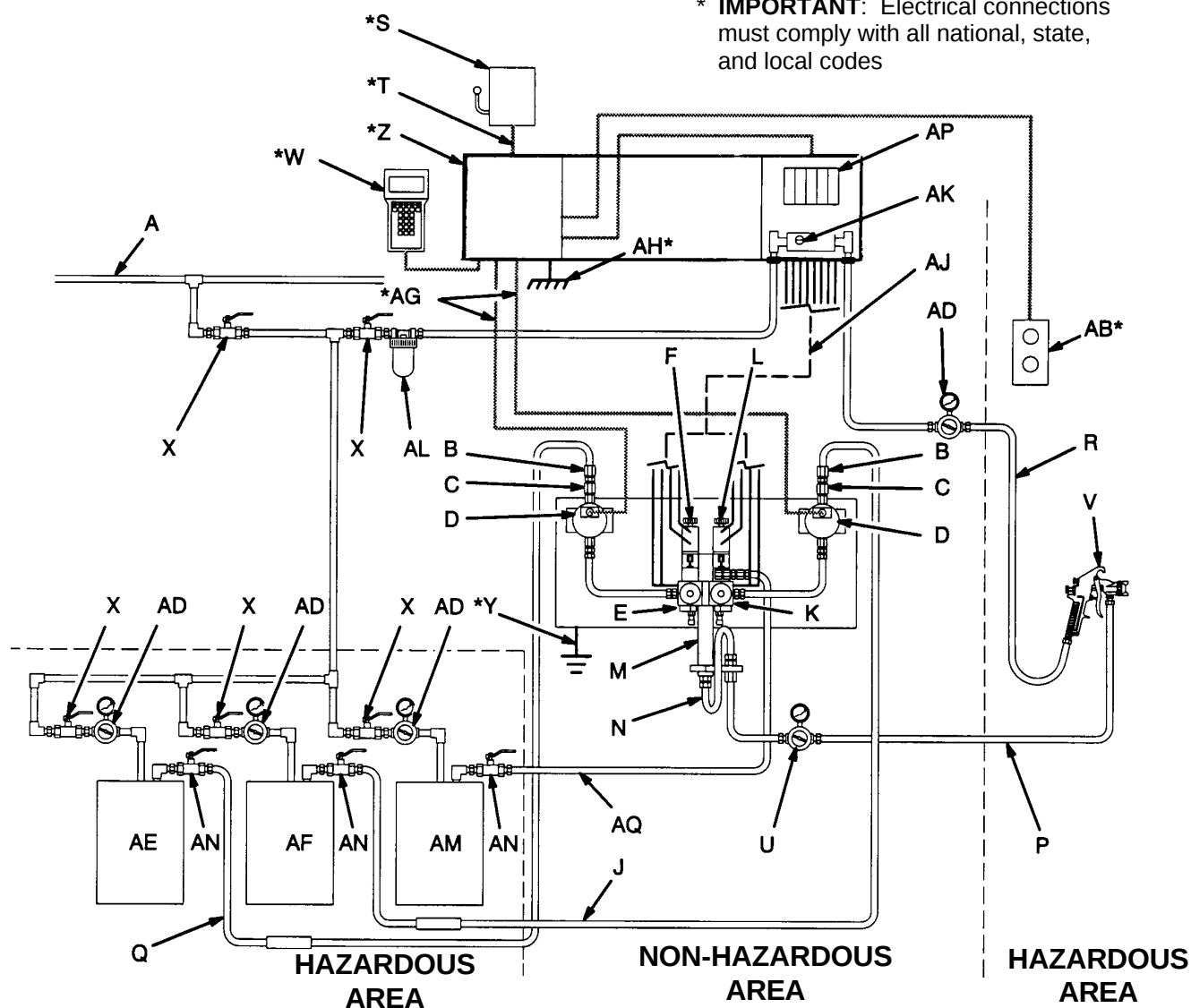


Fig 2

# Typical Installation

**\* IMPORTANT:** Electrical connections must comply with all national, state, and local codes



## KEY

|   |                                                                       |    |                                         |    |                                       |
|---|-----------------------------------------------------------------------|----|-----------------------------------------|----|---------------------------------------|
| A | Air Supply Line                                                       | R  | Air Hose                                | AE | Supply Tank, Component A (Resin)      |
| B | Fluid Filter (100 mesh minimum) and fluid component inlet to PFC-2000 | S  | Main Power Switch                       | AF | Supply Tank, Component B (Catalyst)   |
| C | Check Valve                                                           | T  | 115V 60 Hz Electrical Supply            | AG | Meter Cable                           |
| D | Flow Meter                                                            | U  | Fluid Pressure Regulator & Gauge        | AH | Earth Ground                          |
| E | Component A (Resin) Valve                                             | V  | Spray Gun                               | AJ | Solenoid Air Lines                    |
| F | Air Purge Valve                                                       | W  | Pendant                                 | AK | Air Flow Switch                       |
| J | Component B (Catalyst) Supply Line                                    | X  | Bleed-Type Air Valve (required)         | AL | Air Line Filter (10 micron or better) |
| K | Component B (Catalyst) Valve                                          | Y  | Ground Wire & Clamp 222-011 (Required)  | AM | Supply Tank, Solvent                  |
| M | Integrator                                                            | Z  | PFC-2000 Controller (in NEMA enclosure) | AN | Fluid Shut-off Valve                  |
| N | Static Mixer                                                          | AB | Operator Switch & Emergency Stop        | AP | Air Solenoid Valves                   |
| P | Fluid Supply Line to Gun                                              | AD | Air Regulator & Gauge                   | AQ | Solvent Supply Line                   |
| Q | Component A (Resin) Supply Line                                       |    |                                         |    |                                       |

Fig 3

## Installation

### NOTES:

- Reference numbers and letters in parentheses in the text refer to the callouts in the figures and the parts drawings.
- Be sure all accessories are adequately sized and pressure-rated to meet the system's requirements.
- Connect the fluid and air supply lines as instructed in the PFC-2000 Manifold manual 684-013 and the Solenoid Enclosure manual 308-297.

### WARNING

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious bodily injury if the work is not performed properly. Do not install or service this equipment or perform any of the following installation and adjustment procedures unless you are trained and qualified.

### WARNING

To prevent hazardous concentrations of toxic or flammable vapors, spray only in a properly ventilated area. Never operate the spray gun unless ventilation fans are operating.

Check and follow all national, state, and local codes regarding air exhaust velocity requirements.

The Typical Installation shown in Fig 3 is only a guideline for selecting and installing system components and accessories, and is not an actual system design. Follow the Installation Schematic provided by Graco or contact your Graco representative or Graco Technical Assistance (see back page) for assistance.

The following instructions generally presume a standard system using pressure tanks to supply the paint components and solvent. See **Optional System Arrangements** below for possible variations and their effect on the instructions.

### Location

### WARNING

The standard PFC-2000 is for use only in non-hazardous locations. Do not operate in hazardous locations, as defined in Article 500 of the National Electrical Code (USA).

**NOTE:** Special systems are available for use in hazardous locations. Contact your Graco representative.

## OPTIONAL SYSTEM ARRANGEMENTS

### OPTION "A" --

#### Feeding Through Circulating Lines

If there is a central paint recirculating line in your shop, the PFC-2000 can be connected to it instead of to pressure supply tanks. Other than references to the pressure tanks, operation is the same as described in this manual.

The fluid supply must be free of pressure spikes (normally caused by pump stroke changeover). If necessary, install pressure regulators or a surge tank on the fluid inlets to the PFC-2000, to reduce the feed pressure. Contact Graco for information on fluid pressure regulators.

For maintenance and safety, you must install a ball valve between each supply line and the PFC-2000.

### OPTION "B" --

#### Feeding Through Pail or Drum Pumps

Instead of pressure supply tanks, the PFC-2000 can be fed by pail or drum pumps. Operation is the same, other than references to the pressure supply tanks.

The fluid supply must be free of pressure spikes (normally caused by pump stroke changeover). If necessary, install pressure regulators or a surge tank on the fluid inlets to the PFC-2000, to reduce pulsation and pressure. Contact Graco for information on fluid pressure regulators.

## Installation

### Connect the Electrical Supply

#### WARNING

To reduce the risk of fire, explosion, or electric shock, electrical connections must comply with all application national, state, and local electrical codes.

Connect the PFC-2000 Controller to a +5 volt, 2 amp; +12 volt, 0.5 amp; -12 volt, 0.5 amp grounded electrical supply.

Follow the Installation Schematic provided by Graco.

#### CAUTION

If power and grounding connections are not properly made, the equipment will be damaged and the warranty will be voided.

### Ground the PFC-2000 System

(See Fig 5)

#### WARNING

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

- The PFC-2000 system must be electrically connected to a true earth ground; the ground in the electrical system is not sufficient.
- All wires used for grounding must be 10 gauge minimum.
- The operator control station must have an emergency stop that removes all power from the PFC-2000 Controller when it is activated.
- Refer to your local code for the requirements for a "true earth ground" in your area.
- Also read and follow the warnings on page 2.

Ground the PFC-2000 system as instructed below and the individual component manuals. Have a qualified electrician check resistance. A ground wire and clamp, part no 222-011, are available from Graco.

#### Controller

Connect the controller's green-yellow ground terminal block to the NEMA enclosure's grounding lug. Connect a ground wire from the enclosure to a true earth ground. The controller enclosure and the manifold mounting surface must be connected to the same true earth grounding point.

### PFC-2000 Manifold

The mounting surface for the PFC-2000 manifold must be electrically connected to the same true earth ground point as the controller enclosure. Different ground points may cause current to flow through the meter cables, causing incorrect signals.

### Flow Meters

Meter cables must be connected as shown in Fig 4. Failure to properly connect the grounded conductor and shield may cause incorrect signals.

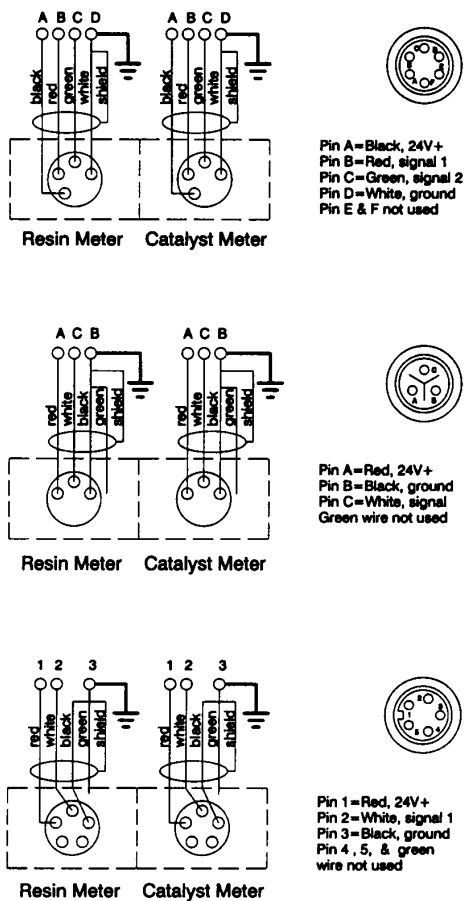


Fig 4

## Installation

### KEY

- 1 Controller Enclosure
- 5 Flow Meter Cable; connect as shown in Fig 4.
- 6 Ground Wire connection point for solenoid enclosure's grounding wire and manifold mounting surface's grounding wire
- 7 Manifold Mounting Surface Ground Wire; must be connected to same true earth ground 8 as controller
- 8 True Earth Ground; check your local code for requirements
- 9 Controller Enclosure Grounding Wire; must be connected to same true earth ground 8 as manifold mounting surface is connected to
- 10 Controller Enclosure's Grounding Lug
- 11 Controller Grounding Wire (green-yellow wire); connect to controller enclosure's grounding lug 8
- 12 Controller

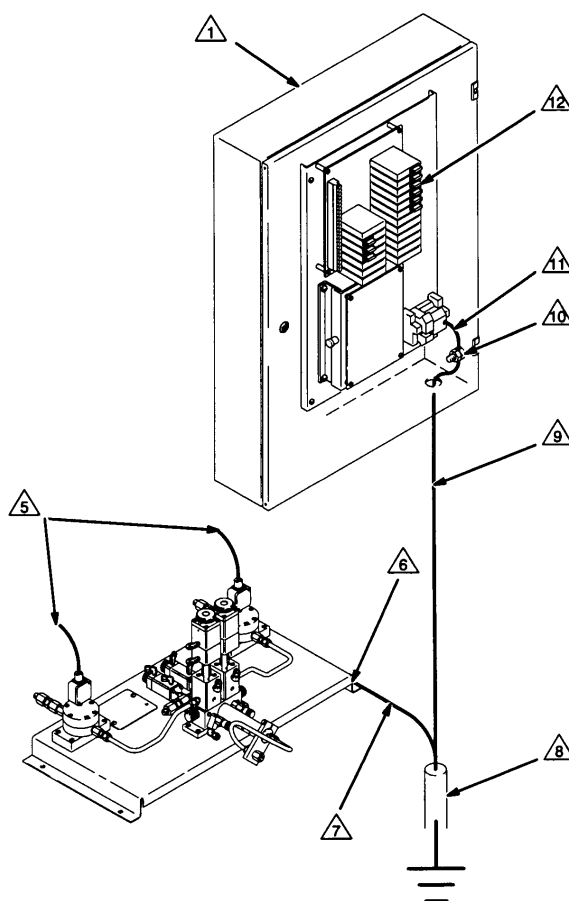


Fig 5

### Connect Other Wiring

Connect the 24 VDC meter cables to terminals inside the controller enclosure as shown on the prints provided by Graco.

### Connect The Pendant

Connect the pendant cable to the 9-pin controller connector marked PENDANT.

**NOTE:** The NEMA enclosure bulkhead has a 6-pin connect for the pendant.

# Operator Controls and Indicators

## Operator Controls

There are no operator controls on the controller itself. Two remote devices provide operator interface; these are the Operator Switch and the Pendant.

### Operator Switch (See Fig 6)

There are three operator input settings:

Mix  
STANDBY  
PURGE

| Setting:  | STANDBY                 | MIX                                               | PURGE                                   |
|-----------|-------------------------|---------------------------------------------------|-----------------------------------------|
| Use:      | To start or stop system | To start normal operation (mixing and dispensing) | To operate air and solvent purge valves |
| Function: | Idles system            | Cycles the fluid system                           | Cycles between two solenoid outputs *   |

\* This cycling can be either a function of time or of volume

**NOTE:** Moving the Operator switch from PURGE to MIX clears most alarms

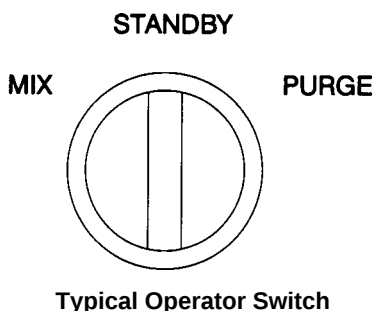


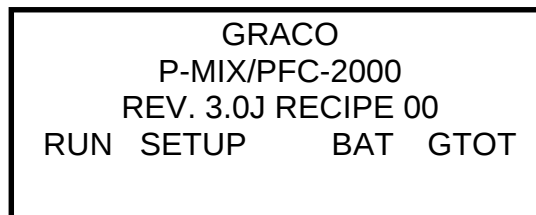
Fig 6

### Pendant (See Fig 7)

#### Pendant Display

When first powered up, the screen on the pendant displays the calculated target volumes to achieve the desired ratio, and how much fluid has been dispensed in this cycle for each component. As fluid is dispensed, the display will change to reflect the amount remaining before a cycle change.

On the bottom line of the display are the labels for the four soft keys, F1 through F4. Example: If you are at the Title screen, shown below, RUN is F1, SETUP is F2, BAT is F3, and GTOT is F4.



### Pendant Indicators

The pendant is a small display terminal with a 4x20 character display, 5 LED indicators, and a keyboard for entering setup parameters. The left four indicators match the solenoid outputs for component A ("A"), component B ("B"), purge, (SOL) and the dump valve (DUMP). The right indicator blinks to indicate an alarm condition.

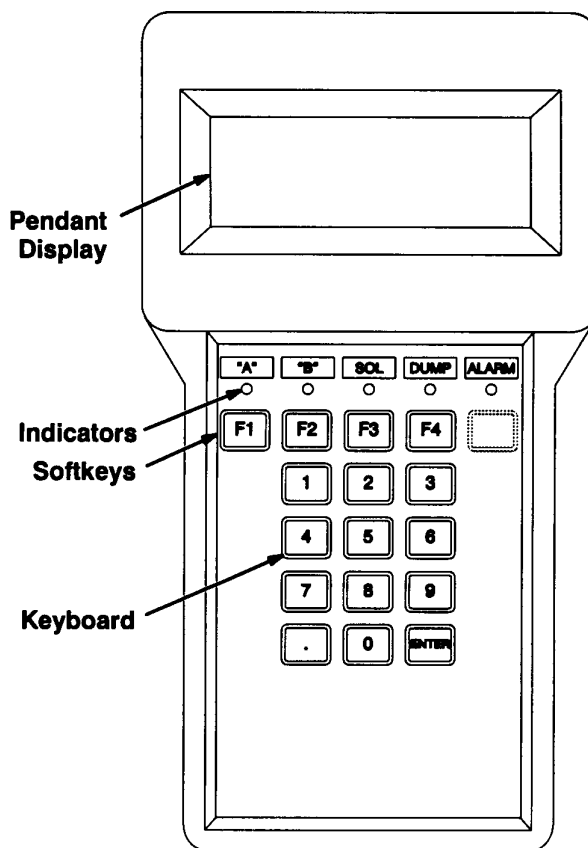
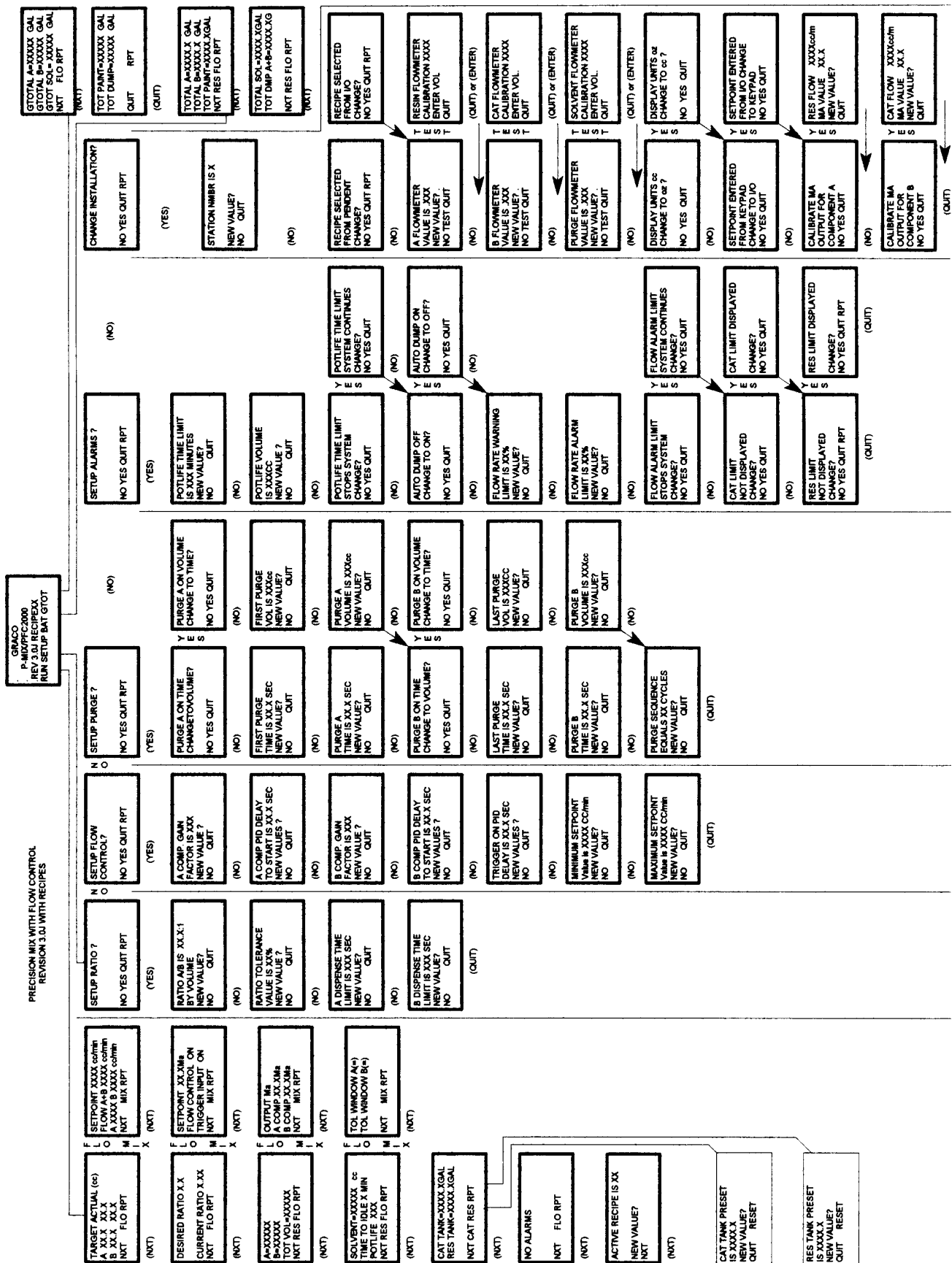


Fig 7





## Pendant Screens

**NOTE:** The keys indicated after the screen will move you to the next screen that is shown, unless otherwise indicated

To switch between the Mix Ratio run screens (MIX) and the Flow Control run screens (FLO) press the (F3) key.

### Mix Ratio Run Screens

#### Target/Actual Display

|     | TARGET | ACTUAL (cc) |
|-----|--------|-------------|
| A   | XX.X   | XX.X        |
| B   | XX.X   | XX.X        |
| NXT | FLO    | RPT         |

Press NXT

TARGET (left hand column) is the desired volumes of Component A and Component B that the controller will maintain.

ACTUAL (right hand column) shows the quantities of Component A and Component B as they are being dispensed.

#### Ratio Display

|                    |     |     |
|--------------------|-----|-----|
| DESIRED RATIO X.X  |     |     |
| CURRENT RATIO X.XX |     |     |
| NXT                | FLO | RPT |

Press NXT

DESIRED RATIO is the display of what ratio the unit is programmed to run at.

CURRENT RATIO is a display of what ratio the unit actually dispensed on the last cycle.

#### Component Totalizer

|               |     |     |     |
|---------------|-----|-----|-----|
| A=XXXXX       |     |     |     |
| B=XXXXX       |     |     |     |
| TOT VOL=XXXXX |     |     |     |
| NXT           | RES | FLO | RPT |

Press NXT

Total volume of Component A (A=), Component B (B=), and Component A + B (TOT VOL+) are displayed. The totalizers are reset by pressing the RESET key or pressing the RPT key. This screen can be altered in the setup program to read in ounces. See the **Display Units in cc or oz** screens on page 21.

#### Total Solvent, Idle and Pot Life

|                    |     |     |     |
|--------------------|-----|-----|-----|
| SOLVENT=XXXXX      |     |     | cc  |
| TIME TO IDLE X MIN |     |     |     |
| POT LIFE XXX       |     |     |     |
| NXT                | RES | FLO | RPT |

Press NXT

To use total SOLVENT, you must have an optional flow meter installed on the PFC-2000 solvent inlet.

TIME TO IDLE is a 4 minute clock that counts down the time that the spray device is not in use. After 4 minutes of not triggering the spray device, the mix manifold closes and the screen changes to the following System Idle screen.

When the spray device is triggered, the PFC-2000 will start again where it left off.

POT LIFE REMAINING displays how long the mixed fluid has been sitting in the lines. If the unit is turned on and nothing has been mixed, the pot life will not count down.

## Pendant Screens

### Mix Ratio Run Screens (continued)

#### Tank Volume

```
CAT TANK=XXXX.X GAL
RES TANK=XXXX.X GAL

NXT  CAT      RES  RPT
```

Press CAT or RES  
(Press NXT to go to **Alarm** screen)

```
CAT TANK PRESET
IS XXXX.X
NEW VALUE?
QUIT          RESET
```

OR

```
RES TANK PRESET
IS XXXX.X
NEW VALUE?
QUIT          RESET
```

Press QUIT

#### ALARM

```
NO ALARMS

NXT      FLO    RPT
Press QUIT
```

#### Current Recipe

```
ACTIVE RECIPE IS XX

NEW VALUE?
NXT
```

Press unmarked key to get back to the **Main Title** screen or press the F3 key to go to the flow control run screens.

This screen can be used to display how much fluid is left in the catalyst feed tank (CAT TANK) and the resin feed tank (RES TANK). By pressing the CAT or RES key you will see a screen that looks like the one of the two following screens.

Enter a value that is less than the amount of fluid that is in the tank and press the ENTER key. The screen should now display the new value on line 2. If you want to use the same value that was previously displayed, press the RESET key. Press the QUIT key to go back to the previous TANK VOLUME screen. As fluid is used from the tank, the value for the catalyst and resin tank will drop. When one or both of them reaches 0, the unit will stop and the alarm will display.

If an alarm is activated on the PFC-2000 this screen automatically appears, displaying the alarm that occurred. See the alarm descriptions on pages 24 and 25. This screen holds the last three alarms. The most recent alarm will appear on the bottom of the screen. NOTE: A Run Report will clear the Alarm screen.

This screen only appears when the recipe portion of the program is turned on. This screen will show you the recipe the unit is currently running.

## Pendant Screens

### Flow Control Run Screens

#### Flow Control Run Screens

##### Setpoint and Flow Rate screen

```
SETPOINT XXXX cc/min
FLOW A+B XXXX cc/min
A XXXX B XXXX cc/min
NXT          MIX      RPT
```

Press NXT

SETPOINT is the desired flow rate the closed loop flow control system will try to achieve. If the system is set up for setpoint entered from I/O the value displayed will be a representation of the analog input that is supplied to the flow control card. If the system is set up for setpoint entered from keypad type in the desired flow rate and press the enter key. The desired value will display next to the word setpoint.

FLOW A+B is a representation of the current instantaneous flow rate that either the A component or the B component is currently flowing.

A and B is the display of the current flow rate of each component independently.

##### Setpoint MA and Flow Control Status

```
SETPOINT XX.X Ma
FLOW CONTROL ON
TRIGGER INPUT ON
NXT          MIX      RPT
```

Press NXT

SETPOINT mA. displays the actual value of the external 4-20 mA. input for flow rate.

FLOW CONTROL OFF/ON displays the current status of the flow control loop. If the display shows off the flow control loop will not try to achieve the setpoint. If all conditions are correct like gun trigger on, mix process on and all delays are expired the display will change to on.

GUN TRIGGER OFF/ON displays the current status of the gun trigger off or on.

##### Output MA Display Screen

```
OUTPUT Ma
A COMP. XX.XMa
B COMP. XX.XMa
NXT          MIX      RPT
             Press NXT
```

OUTPUT mA. A and B displays the actual 4-20 mA. value for the A and the B components independently. These values represent the flow control boards output to the current to air transducers 4 mA. being lowest 20 mA. being highest.

##### Flow Rate Tolerance Screen

```
TOL WINDOW A(=)
TOL WINDOW B(=)
NXT          MIX      RPT
```

Press unmarked key to get back to the Main Title screen or press the F3 key to go to the mix process run screens.

TOLERANCE WINDOW A and B displays the current status of the flow rate in relation to the setpoint tolerance. If the actual flow rate is greater then the setpoint minus the tolerance the display will show a (+) sign. If the actual flow rate is less then the setpoint minus the tolerance the display will show a (-) sign. If the actual flow rate is within the specified tolerance of the setpoint the display will show a (=) sign.

## Pendant Screens

### Setup Screens

NOTE: Entries made in the Setup screens are buffered. When the QUIT key is pressed, returning you to the title screen, the changes made in Setup are transferred to the battery-backed memory. Since the data used while operating is also buffered, changes made in Setup will not effect PFC-2000 operation until the operator switch is moved to the Standby position and then back to Mix, transferring the data from the battery-backed memory to the operating buffer.

NOTE: It is not advisable to enter setup while the system is running. Doing this may cause erroneous flow rates.

### SETUP RATIO

#### Main Title Screen

|                     |           |      |  |
|---------------------|-----------|------|--|
| GRACO               |           |      |  |
| P-MIX/PFC2000™      |           |      |  |
| REV. 3.0J RECIPE XX |           |      |  |
| RUN                 | SETUP BAT | GTOT |  |

Press SETUP

This screen can only be accessed by pressing the unmarked key in the F5 location on the black pendant. This screen shows the Revision No. of the software. It will also show the present Recipe No. the PFC-2000 is operating with if the recipe portion of the program is turned on. From this screen, you can go into the Run, Setup, Batch Totalizer, Grand Totalizer and Clock screens.

#### Setup Ratio Title Screen

|              |     |      |     |
|--------------|-----|------|-----|
| SETUP RATIO? |     |      |     |
| NO           | YES | QUIT | RPT |

Press YES

If you want to change the program in the ratio category, press the YES key. If you do not want to change the program in the ratio category, press the NO key to move to the **Setup Flow Control Title** screen. Press the QUIT key to return to the **Main Title** screen. **NOTE:** RECIPE 00 only appears when the recipe portion of the program is activated.

#### Program Ratio

|                     |      |
|---------------------|------|
| RATIO A/B IS XX.X:1 |      |
| BY VOLUME           |      |
| NEW VALUE?          |      |
| NO                  | QUIT |

Press NO

With this screen, you select the volumetric mix ratio the PFC-2000 will operate at. The volume can be set from 0:1 to 99.9:1. The value of Component B that you enter must be a 1. If your B value does not equal one, you must convert the ratio. *Example:* If a 3:2 ratio is desired, you would convert the ratio to 1.5:1. 1.5 parts of Component A would then be dispensed to every 1 part of Component B. To enter this value, press the 1, the decimal point, and the 5 on the pendant keyboard. Then press the ENTER key. The new value will display on the top line.

#### Ratio Tolerance

|                 |      |
|-----------------|------|
| RATIO TOLERANCE |      |
| VALUE IS XX%    |      |
| NEW VALUE?      |      |
| NO              | QUIT |

Press NO

With this screen, you select the tolerance of the ratio entered above. If this tolerance is exceeded, the PFC-2000 will shut down. The value can be set from  $\pm 0$  to 25 percent. *Example:* If the mix ratio is 2:1 and the tolerance is 5%, when the PFC-2000 checks the ratio on each cycle, if the ratio is within 2.1:1 or 1.9:1, the system will continue to operate. If the ratio is not within those values, the system will shut down. To enter this value, press 0, then 5 and ENTER. The new value will display on line two.

#### A Dispense Time

|                  |      |
|------------------|------|
| A DISPENSE TIME  |      |
| LIMIT IS XXX SEC |      |
| NEW VALUE?       |      |
| NO               | QUIT |

Press NO

This is a settable time limit that monitors the amount of time it takes from the beginning of the Component A dispense to the end. The clock counts down when the spray device is triggered and will reset once the dispense is completed. If the time elapses before the dispense is complete, the PFC-2000 will go to an alarm condition. To enter a new value, type in the number on the key pad and press ENTER. The value can be set from 0 to 999 seconds. It will display on line 2. **NOTE:** This setting will not function properly if the air switch in the solenoid enclosure is not set correctly. See manual 308-297.

## Pendant Screens

### Setup Screens (continued)

#### B Dispense Time

```
B DISPENSE TIME
LIMIT IS XXX SEC
NEW VALUE?
NO          QUIT
```

Press QUIT

### SETUP FLOW CONTROL

#### Setup Flow Control

```
SETUP FLOW
CONTROL?
NO      YES    QUIT  RPT
```

Press YES

#### A Component Gain Factor

```
A COMP. GAIN
FACTOR IS XXX
NEW VALUE?
NO          QUIT
```

Press NO

#### A Component PID Delay

```
A COMP. PID DELAY
TO START IS XX.X SEC
NEW VALUES?
NO          QUIT
```

Press NO

#### B Component Gain Factor

```
B COMP. GAIN
FACTOR IS XXX
NEW VALUE?
NO          QUIT
```

Press NO

#### B Component PID Delay

```
B COMP. PID DELAY
TO START IS XX.X SEC
NEW VALUE?
NO          QUIT
```

Press NO

The B Dispense Time screen functions the same way as the A Dispense Time screen, except it is measuring the amount of time it takes to dispense Component B.

If you want to change the program in the Flow Control category, press the YES key. If you do not want to change the program in the Flow Control category, press the NO key to move to the **Setup Purge Title** screen. Press the QUIT key to return to the **Main Title** screen. **NOTE:** RECIPE 00 only appears when the recipe portion of the program is activated.

With this screen you set the component A gain factor. The gain factor determines how aggressively the flow control loop will change the air pressure to the fluid regulator in order to achieve the setpoint. The higher the number the more aggressive the change. The value is adjustable from 25 to 100. The value entered does not relate to any type of units like time or PSI.

With this screen you set the A component flow control delay time. The value entered sets the amount of time the flow control will wait after the A component valve turns on in order to flow control to the setpoint. This allows the material to stabilize flow rate from static to dynamic without reaction from the flow control loop. The value entered represents time and is adjustable from .1 to 10 seconds.

With this screen you set the component B gain factor. The gain factor determines how aggressively the flow control loop will change the air pressure to the fluid regulator in order to achieve the setpoint. The higher the number the more aggressive the change. The value is adjustable from 25 to 100. The value entered does not relate to any type of units like time or PSI.

With this screen you set the B component flow control delay time. The value entered sets the amount of time the flow control will wait after the B component valve turns on in order to flow control to the setpoint. This allows the material to stabilize flow rate from static to dynamic without reaction from the flow control loop. The value entered represents time and is adjustable from .1 to 10 seconds.

## Pendant Screens

Setup Screens (continued)

### Gun Trigger PID Delay

TRIGGER ON PID  
DELAY IS XX.X SEC  
NEW VALUES?  
NO                      QUIT

Press NO

With this screen you set the gun trigger on flow control delay time. The value entered sets the amount of time the flow control will wait after the gun trigger turns on in order to flow control to the setpoint. This allows the material to stabilize flow rate from static to dynamic without reaction from the flow control loop. The value entered represents time and is adjustable from .1 to 10 seconds.

### Minimum Flow Rate Setpoint

MINIMUM SETPOINT  
VALUE IS XXXX CC/min.  
NEW VALUE?  
NO                      QUIT

Press NO

With this screen you set the minimum allowable desired flow rate setpoint. Any requests for flow rates that are below this programmed value will not be excepted. When system is set for setpoint from I/O the minimum setpoint is the 4 mA. value. The value entered represents CC/minute and is adjustable from 1 to 9999 CC/min.

### Maximum Flow Rate Setpoint

MAXIMUM SETPOINT  
VALUE IS XXXX CC/min.  
NEW VALUE?  
NO                      QUIT

Press QUIT

With this screen you set the maximum allowable desired flow rate setpoint. Any requests for flow rates that are above this programmed value will not be excepted. When system is set for setpoint from I/O the maximum setpoint is the 20 mA. value. The value entered represents CC/minute and is adjustable from 1 to 9999 CC/min.

## SETUP PURGE

### Setup Purge Title Screen

SETUP PURGE?  
  
NO      YES      QUIT      RPT

Press YES

If you want to change the program in the purge category, press the YES key. If you do not want to change the program in the purge category, press the NO key to move to the **Setup Alarms Title** screen (on page 16). Press the QUIT key to return to the **Main Title** screen. NOTE: RECIPE 00 only appears when the recipe portion of the program is activated.

### Purge Component A on Time or Volume

PURGE A ON TIME  
CHANGE TO VOLUME?  
NO      YES      QUIT

Press NO to keep on TIME  
Press YES to change to VOLUME

With this screen, you select how the Component A portion of the purge sequence will count down, by time or by volume. To purge by volume, you must have a flow meter in line with the PFC-2000 Component A purge valve.

PURGE A ON VOLUME  
CHANGE TO TIME?  
NO      YES      QUIT

Press NO to keep on VOLUME  
Press YES to change to TIME

## Pendant Screens

Setup Screens (continued)

### First Dispense of the Purge Cycle

FIRST PURGE  
TIME IS XX.X SEC  
NEW VALUE?  
NO                      QUIT

or

FIRST PURGE  
VOL. IS XXX cc  
NEW VALUE?  
NO                      QUIT

Press NO

### Purge Component A

PURGE A  
TIME IS XX.X SEC  
NEW VALUE?  
NO                      QUIT

or

PURGE A  
VOLUME IS XXX cc  
NEW VALUE?  
NO                      QUIT

Press NO

### Purge Component B on Time or Volume

PURGE B ON TIME  
CHANGE TO VOLUME?  
NO      YES      QUIT

Press NO to keep on TIME  
Press YES to change to VOLUME

PURGE B ON VOLUME  
CHANGE TO TIME?  
NO      YES      QUIT

Press NO to keep on TIME  
Press YES to change to VOLUME

### Last Dispense of the Purge Sequence

LAST PURGE  
TIME IS XX.X SEC  
NEW VALUE?  
NO                      QUIT

or

LAST PURGE  
VOL IS XXX cc  
NEW VALUE?  
NO                      QUIT

Press NO

The first dispense of the purge sequence blows the mixed material line clear with air and is always dispensed on the component A side. The first dispense is a settable time or volume ; refer to the Purge Component A on Time or Volume screen.

To enter a new value key in the number and press ENTER. The value can be set from 0 to 99.9 seconds or 0 to 999 cc.

The purge sequence consists of two purge valves, one for Component A and one for Component B, alternating on and off. The value you enter for PURGE A determines how long the Component A purge valve is open for each dispense cycle during the purge sequence, with the exception of the first and last dispense, which have their own values. *To enter a new value*, key in the number and press ENTER. The value can be set from 0 to 99.9 seconds or 0 to 999 cubic centimeters. It will display on line two.

With this screen, you select how the Component B portion of the urge sequence will count down, by time or by volume, To purge by volume, you must have a flow meter in line with the PFC-2000 Component B purge valve. This screen functions the same as the Purge Component A selection screen.

The last dispense of the purge sequence is always Component B. The last dispense of the purge sequence is a settable time/volume. You can set the time/volume for the LAST PURGE to be more or less than the setting of the rest of the purge cycle. *To enter a new value*, key in the number and press ENTER. The value can be set from 0 to 99.9 seconds or 0 to 999 cubic centimeters. It will display on line two.

## Pendant Screens

### Setup Screens (Continued)

#### Purge Component B

```
PURGE B
TIME IS XX.X SEC
NEW VALUE?
NO          QUIT
```

or

```
PURGE B
VOLUME IS XXX cc
NEW VALUE?
NO          QUIT
```

Press NO

#### Number of Purge Cycles

```
PURGE SEQUENCE
EQUALS XX CYCLES
NEW VALUE?
NO          QUIT
```

Press NO  
(Press QUIT to return to  
Setup Ratio Title Screen)

## Set Up Alarms

### Setup Alarms Title Screen

```
SETUP ALARMS?

NO      YES   QUIT  RPT
```

Press YES

#### Pot Life Time Limit

```
POT LIFE TIME LIMIT
IS XXX MINUTES
NEW VALUE?
NO          QUIT
```

Press NO

#### Pot Life Reset Volume

```
POT LIFE VOLUME
IS XXX cc
NEW VALUE?
NO          QUIT
```

Press NO

The value you enter for PURGE B determines how long the Component B purge valve is open for each dispense cycle during the purge sequence. To enter a new value, key in the number and press ENTER. The new value will display on line two. The value can be set from 0 to 99.9 seconds or 0 to 999 cubic centimeters. It will display on line two.

With this screen, you select how many times the purge sequence shifts between Component A purge and Component B purge when the Operator Switch is set to PURGE. The value can be set from 0 to 99 cycles. NOTE: At the end of the purge cycle, the purge sequence will immediately stop and a message requesting a change to STANDBY will be displayed on the pendant.

If you want to change the program in the alarms category, press the YES key. If you do not want to change the program in the alarms category, press the NO key to move to the **Change Installation Title** screen (on page 19). Press the QUIT key to return to the **Main Title** screen. NOTE: RECIPE 00 only appears when the recipe portion of the program is activated.

With this screen, you set the maximum time allowed for mixed fluid to sit in the system before tripping a pot life alarm. Enter a time value that represents the fluid while it is still at its normal viscosity. To enter a new value, key in a number and press ENTER. The value can be set from 0 to 999 minutes. It will display on line two. NOTE: The pot life timer is reset either by a purge, or by the passage of a specified amount of fluid.

With this screen, you set the volume of fluid the PFC-2000 will mix before the pot life timer resets. Enter a value that represents the volume of mixed fluid that is in the system. To enter a new value, key in a number and press ENTER. The value can be set from 0 to 999 cubic centimeters. It will display on line two.

## Pendant Screens

### Setup Screens (Continued)

#### Pot Life Alarm

POT LIFE TIME LIMIT  
STOPS SYSTEM  
CHANGE?  
NO YES QUIT

or

POT LIFE TIME LIMIT  
SYSTEM CONTINUES  
CHANGE  
NO YES QUIT

Press NO

#### Automatic Dump

AUTO DUMP OFF  
CHANGE TO ON?  
NO YES QUIT

or

AUTO DUMP ON  
CHANGE TO OFF?  
NO YES QUIT

Press NO

#### Flow Rate Warning Screen

FLOW RATE WARNING  
LIMIT IS XX%  
NEW VALUE?  
NO QUIT

Press NO

#### Flow Rate Alarm Screen

FLOW RATE ALARM  
LIMIT IS XX%  
NEW VALUE?  
NO QUIT

Press NO

These screens allow you to select to have the pot life alarm stop the system or allow it to continue operating. In either case, the alarm light on the pendant blinks, the alarm annunciator output goes on, and the relevant alarm message is displayed on the pendant. When the pot life alarm is reset by either a purge or the movement of the specified amount of fluid, the alarm light will go out, the alarm output will go off, and the display will return to the **Target/Actual** screen (on page 11).

These screens allow you to turn the automatic dump feature on or off. This would only apply to systems with a solenoid dump valve installed on the outlet of the PFC-2000 static mixer. A separate output is provided to actuate the dump valve. When turned on, the AUTO DUMP will automatically turn on the dump valve and turn on the purge sequence two minutes after a potlife alarm occurs. This feature would be used to protect the PFC-2000 fluid components from having mixed fluid in them older than the specified potlife.

With this screen you set the (+) or (-) percent that the actual flow rate can deviate from the setpoint before a warning condition will occur. When a flow rate warning condition occurs the pendant will display FLOW RATE WARNING and the actual rate that caused the condition. An output on the I/O board will activate when the flow rate is outside the warning tolerance. The value entered for flow rate warning is adjustable from 0-99 percent.

With this screen you set the (+) or (-) percent that the actual flow rate can deviate from the setpoint before an alarm condition will occur. When a flow rate alarm condition occurs the pendant will display FLOW RATE ALARM and the actual rate that caused the condition. An output on the I/O board will activate when the flow rate is outside the alarm tolerance. The value entered for flow rate alarm is adjustable from 0-99 percent.

## ***Pendant Screens***

### **Setup Screens (continued)**

#### **Flow Rate Alarm Selection Screen**

```
FLOW ALARM LIMIT
STOPS SYSTEM
CHANGE?
NO    YES    QUIT
```

or

```
FLOW ALARM LIMIT
SYSTEM CONTINUES
CHANGE?
NO    YES    QUIT
```

Press NO

These screens allow you to select to have the flow rate alarm stop the system or allow it to continue operating. In either case the pendant displays the alarm and the output on the I/O board turns on. To swap between stops system and allow it to continue press the (F2) key.

#### **Catalyst Tank Limit Display**

```
CAT LIMIT
NOT DISPLAYED
CHANGE?
NO    YES    QUIT
```

or

```
CAT LIMIT DISPLAYED
CHANGE?
NO    YES    QUIT
```

Press NO

These two screens allow you to select whether the Catalyst Tank Volume feature in the run screen is turned on or off. If it is turned off, the catalyst tank display will not appear in the run screens.

#### **Resin Tank Limit Display**

```
RES LIMIT
NOT DISPLAYED
CHANGE?
NO    YES    QUIT    RPT
```

or

```
RES LIMIT DISPLAYED
CHANGE?
NO    YES    QUIT    RPT
```

Press NO

These two screens allow you to select whether the Resin Tank Volume feature in the run screen is turned on or off. If it is turned, off the resin tank display will not appear in the run screens.

## Pendant Screens

### Setup Screens (Continued)

#### SETUP CHANGE INSTALLATION

##### Change Installation Title Screen

|                      |     |      |     |
|----------------------|-----|------|-----|
| CHANGE INSTALLATION? |     |      |     |
| NO                   | YES | QUIT | RPT |

Press YES

If you want to change the program in the installation category, press the YES key. If you do not want to change the program in the installation category, press the NO key to return to the **Setup Ratio Title** screen (on page 13). Press the QUIT key to return to the **Main Title** screen. **NOTE:** RECIPE 00 only appears when the recipe portion of the program is activated.

##### Precision Mix™ Identification Number

|                   |      |
|-------------------|------|
| STATION NMBR IS X |      |
| NEW VALUE?        |      |
| NO                | QUIT |

Press NO

With this screen, you can set a specific ID number for the Precision Mix™. The ID number you choose will print out on the run report and the setup report. You will need to use this feature when there are multiple Precision Mix™ units connected to one printer. Station #00 is the default. It cannot be used when multiple units are connected to one printer. When station #1 to 8 are used, a (@U10) message will appear on line one of the printed reports; this is normal. *To change the station number*, key in the new value and press ENTER. The new number will display on line one.

##### Recipe Input Select

|                                            |     |      |     |
|--------------------------------------------|-----|------|-----|
| RECIPE SELECTED<br>FROM PENDANT<br>CHANGE? |     |      |     |
| NO                                         | YES | QUIT | RPT |

or

|                                        |     |      |     |
|----------------------------------------|-----|------|-----|
| RECIPE SELECTED<br>FROM I/O<br>CHANGE? |     |      |     |
| NO                                     | YES | QUIT | RPT |

Press NO

These two screens only appear when the recipe portion of the program is turned on. They allow you to select whether different recipes will be set by the pendant or by an outside source (I/O), such as a programmable logic controller or an operator switch. Whatever is selected will globally change for all recipes.

## Pendant Screens

### Setup Screens (Continued)

#### Component A Flow Meter Calibration Factor

```
A FLOWMETER  
VALUE IS .XXX  
NEW VALUE?  
NO      TEST  QUIT
```

Press NO to go to **Comp. B Flow Meter Calibration Factor** screen.  
Press TEST to go to next screen.

### CAUTION

Before pressing the TEST key, close the fluid shut-off valve on the Component A side of the Precision Mix™ manifold. The fluid must be shut off as pressing the TEST key will automatically open the Component A (resin) valve.

#### Resin Flow Meter Calibration Test

```
RESIN FLOWMETER  
CALIBRATION XXXX  
ENTER VOL  
QUIT
```

### CAUTION

**Do not run a second calibration test until you exit Setup and enter the Run mode.** After you do that, you can re-enter Setup to do a second test.

Since flow meters come in many different sizes and styles, it is necessary to tell the Precision Mix™ Control what size the flow meters are so it can properly read the electrical pulse the flow meter sends to it. With this screen, you input the size of the Component A flow meter. The flow meter size must be entered in cubic centimeters per electrical pulse. You cannot enter a whole number. The number you enter must be a 3 digit decimal, but do not enter the decimal point. *Example:* If the electrical pulse of Flow Meter A - 1 equals 0.230 cc, you would press the 2, the 3, and the 0 on the pendant keyboard. Then press ENTER. The new value will display on line two.

See manual 308-243 for the most commonly used flow meter sizes. If you do not know the size of the flow meter or do not feel the number is accurate, make sure the fluid supply is shut off, then press the TEST key to go to the **Flow Meter Calibration Test** screen, below.

NOTE: The Component A fluid shut-off valve must be closed before you come to this screen. See the **CAUTION**, above.

This screen allows you to produce a custom calibration factor for the resin (Component A) flow meter. To find the proper calibration factor, follow this procedure:

1. Place a container under the resin ratio check valve tube.
2. Open the resin ratio check valve. Make sure there is no air in the ratio check port.
3. Close the ratio check valve.
4. Press the QUIT key.
5. Press the TEST key.
6. Weigh a clean container and record the weight.
7. Place the container on a scale under the ratio check valve tube.
8. Open the ratio check valve. Allow an adequate quantity of a fluid, that is of a know accurate weight per gallon, to flow into the container.
9. Close the ratio check valve.
10. Weigh the sample and calculate how many cubic centimeters of fluid was dispensed.

On line two of the Flow Meter Test screen there will be a number that represents how much fluid the Precision Mix™ determined was dispensed, based on the previously entered calibration factor. To enter a new calibration factor, key in how much fluid was actually dispensed (four digit number in cc) and press ENTER. This will take you back to the Component A Flow Meter Calibration Factor screen, shown above. The new calibration factor will display on line two.

## Pendant Screens

### Setup Screens (Continued)

#### Component B Flow Meter Calibration Factor

B FLOWMETER  
VALUE IS .XXX  
NEW VALUE?  
NO      TEST      QUIT

Press TEST

CAT FLOWMETER  
CALIBRATION XXXX  
ENTER VOL  
QUIT

Press QUIT

PURGE FLOWMETER  
VALUE IS .XXX  
NEW VALUE?  
NO      TEST      QUIT

Press TEST

SOLVENT FLOWMETER  
CALIBRATION XXXX  
ENTER VOL.  
QUIT

Press QUIT

The **Component B Flow Meter Calibration Factor** screens and the **Solvent Flow Meter Calibration Factor** screens function the same as the **Component A Flow Meter Calibration Factor** screen on page 20. To set the calibration factor, follow the instructions there.

### CAUTION

**Before pressing the TEST key**, close the Precision Mix™ fluid shut-off valve that will close the fluid path for the flow meter you are testing. The fluid must be shut off as pressing the TEST key will automatically open the flow meter valve that you are testing.

**NOTE:** After completing the Flow Meter Tests, flush the ratio check valve and open the fluid shut-off valve before operating the Precision Mix™ again.

## Pendant Screens

### Display Units in cc or oz

DISPLAY UNITS cc  
CHANGE TO oz?

NO YES QUIT

or

DISPLAY UNITS oz  
CHANGE TO cc?

NO YES QUIT

Press NO

### Setpoint Selection Screen

SETPOINT ENTERED  
FROM KEYPAD  
CHANGE TO I/O?

NO YES QUIT

or

SETPOINT ENTERED  
FROM I/O CHANGE  
TO KEYPAD?

NO YES QUIT

Press NO

### Force MA Output A and B Component Screens

CALIBRATE MA  
OUTPUT FOR  
COMPONENT A  
NO YES QUIT

YES

RES FLOW XXXX cc/m  
MA VALUE XX.X  
NEW VALUE?  
QUIT

Press QUIT

CALIBRATE MA  
OUTPUT FOR  
COMPONENT B  
NO YES QUIT

CAT FLOW XXXXcc/m  
MA VALUE XX.X  
NEW VALUE?  
QUIT

Press QUIT to go back to the Calibrate screen.

These two screens allow you to select whether the Run Screen, Totalizers, Run Screen Flow Rate, Target/Actual, Purge by Volume Inputs, Pot Life Reset Volume Input, Minimum Flow Rate Input and Maximum Flow Rate Input displays in cubic centimeters units or ounces units.

These screens allow you to select if the input for desired flow rate setpoint is from the pendant or from an external 4-20 mA signal (I/O). To swap between the two press the (F1) key. The one that is selected completely disables the other.

This screen allows you to test the analog output of the flow control card on the A component side. The analog output is converted to air pressure by a I/P transducer supplied with all PFC-2000 systems. When the (F2) key is pressed the screen will change to the RES FLOW screen and the A component valve will turn on. At this point the fluid will flow at a flow rate represented by the last known air pressure to the fluid regulator. To change the air pressure you must use the 4 mA = 0 PSI and 20 mA = max. Air pressure formula. By typing in the new value between 4 and 20 and pressing the (ENTER) key you can change the output pressure and evaluate the flow rate. Press the (F1) to quit.

NOTE: Always enter 4 mA and press the (ENTER) key before exiting the force screen.

This screen works identical to the Calibrate mA output for the Component A side with the exception that it allows you to force the air pressure on the Component B side.

## Pendant Screens

### Grand Totalizer Screens

The Grand Totalizers are not resettable. They keep a running total in gallons of all the fluid dispensed by the system.

#### Batch Totalizer

```
TOTAL A=XXXX.X GAL
TOTAL B=XXXX.X GAL
TOTAL PAINT=XXXX.X GAL
NXT    RES    FLO    RPT
```

Press NXT

```
TOT SOL=XXXX.X GAL
TOT DUMP A+B=XXXX.X GAL
NXT    RES    FLO    RPT
```

Press Quit to go to  
Main Title screen

This screen displays the batch total volume of Component A, Component B, and Solvent. To use the solvent grand totalizer, you must have a flow meter on the PFC-2000 solvent inlet. Press the (F2) to reset the batch totalizers.

To use the paint (TOT PAINT) or dump (TOT DUMP) batch totalizers, input #14 on the I/O board must be turned on. The paint totalizer will totalize all the fluid that passes through the resin and catalyst flow meters in the paint mode. The dump totalizer will totalize all the fluid that passes through the resin and catalyst flow meters in the dump mod.

#### Grand Totalizer Component

```
GTOTAL A=XXXXXX GAL
GTOTAL B=XXXXXXGAL
GTOT SOL=XXXXXX GAL
NXT          FLO    RPT
```

Press NXT

This screen displays the grand total volume of Component A (GTOTAL A), Component B (GTOTAL B), and Solvent (GTOT SOL). To use the solvent grand totalizer (GTOT SOL), you must have a flow meter on the Precision Mix™ solvent inlet.

#### Grand Total Paint and Total Component Dump

```
TOT PAINT=XXXXXX GAL
TOT DUMP=XXXXXX GAL
QUIT          RPT
```

Press Quit to go to  
Main Title screen

To use the paint (TOT PAINT) or dump (TOT DUMP) grand totalizers, input #14 on the I/O board must be turned on. The paint totalizer will totalize all the fluid that passes through the resin and catalyst flow meters in the paint mode. The dump totalizer will totalize all the fluid that passes through the resin and catalyst flow meters in the dump mod.

## PFC-2000 Alarm Descriptions

If the machine stops from an alarm condition, the associated alarm output will be active. The alarm outputs are described below. In addition, the alarm light on the pendant blinks and a relevant message is displayed on the pendant.

Unless otherwise instructed on these pages, *clear the alarm and restart the system as follows:*

1. Purge the mixed material line.
2. Turn the Operator Switch to PURGE, then to MIX. or
3. Turn the Operator Switch to Standby, then turn the Abort reset input on #19 momentarily then turn the MIX input back on.

### Ratio Alarm Output

This output will be on output module #5. Any of the following conditions will set this alarm:

1. **Ratio Low XX.XX**  
When this alarm displays, the PFC-2000 has dispensed a cycle (A + B) at a mix ratio higher than the ratio target plus the tolerance
2. **Ratio High XX.XX**  
When this alarm displays, the PFC-2000 has dispensed a cycle (A + B) at a mix ratio higher than the ratio target plus the tolerance.
3. **Dose Time A**  
When this alarm displays, the PFC-2000 has not completed a dose of component A in the pre-selected amount of time.
4. **Dose Time B**  
When this alarm displays, the PFC-2000 has not completed a dose of component B in the pre-selected amount of time.
5. **Overdose A**  
When this alarm displays, the PFC-2000 has continued dispensing fluid on the Component A side after the valve has shifted to the Component B side.

### 6. Overdose B

When this alarm displays, the PFC-2000 has continued dispensing fluid on the Component B side after the valve has shifted to the Component A side.

### Flow Rate Warning and Alarm Output

These outputs will be on output module #20 for warning and #21 for alarm. Any of the following conditions will set these alarms:

#### 1. Flow Rate Warning

When this alarm displays, the PFC-2000 is dispensing a higher or lower fluid flow rate than the pre-selected value for warning limit in the setup screens.

#### 2. Flow Rate Alarm

When this alarm displays, the PFC-2000 is dispensing a higher or lower fluid flow rate than the pre-selected value for alarm in the setup screens.

### Pot Life Exceeded Output

This output will be on output module #15 when the PFC-2000 has not dispensed enough mixed material of a pre-selected quantity in the pre-selected amount of time.

*To remove this alarm:*

1. Purge the mixed material line.

Turn the Operator Switch to PURGE, then to MIX, and dispense the pre-selected quantity of material.

Or

Turn the Operator Switch to Standby, Then turn on the Abort reset input #19 momentarily then turn the MIX input back on.

## PFC-2000 Alarm Descriptions

### Tank Empty Alarm Output

This output will be on output module #17. Any of the following conditions will set this alarm:

#### 1. Cat Tank Empty

When this alarm displays, the PFC-2000 has dispensed the amount of Component B that was entered into the Catalyst Tank Volume screen.

*To remove this alarm:*

- Turn the Operator Switch to STANDBY.
- Press NXT key until you are at the Tank Volume screen.

```
CAT TANK=0000.0 GAL
RES TANK=0000.0 GAL

NXT    CAT    RES    RPT
```

- Press CAT key.

```
CAT TANK PRESET
IS 0000.0
NEW VALUE? XXXX.X
QUIT          RESET
```

- Enter a new value or press RESET to reset to the old value.
- Turn the Operator Switch to MIX.

#### 2. Res Tank Empty

When this alarm displays, the PFC-2000 has dispensed the amount of Component A that was entered into the Resin Tank Volume screen.

*To remove this alarm:*

- Turn the Operator Switch to STANDBY.
- Press NXT key until you are at the Tank Volume screen.

```
CAT TANK=0000.0 GAL
RES TANK=0000.0 GAL

NXT    CAT    RES    RPT
```

- Press RES key.
- Enter a new value or press RESET to reset to the old value.
- Turn the Operator Switch to MIX.

### Memory Failure Alarm

When this alarm displays, the software in the PFC-2000 memory does not match the software installed in the PFC-2000 unit. No alarm output module is associated with this alarm.

*To remove this alarm:*

Reinitiate the PFC-2000 software. See page 27.

### Parameters Not Set Go to Setup Alarm

When this alarm displays you have selected a recipe that has not been setup for ratio and flow meter calibration factors. No alarm output module is associated with this alarm.

*To remove this alarm:*

- Press the blank key (black pendant only).
- Go to the Setup screen for the recipe you want to use.
- Enter the values for ratio and flow meters.

You will not be able to use that recipe.

## New PFC-2000 Software

### WARNING

To reduce the risk of electric shock, the power to the PFC-2000 Controller must be off before you begin to change the software. The Controller shall only be serviced by trained, qualified personnel.

**NOTE:** If you change the PFC-2000 software, you must initiate the new program. Initiating the software removed the old program and loads the new program.

### Installing the New Software

1. Turn off the power to the PFC-2000 Controller.
2. Locate the computer card on the PFC-2000 Controller. See page 32
3. Locate the software chip on the computer card. See Fig 8. Note the direction of the chip and which side of the chip the blank spaces are on.

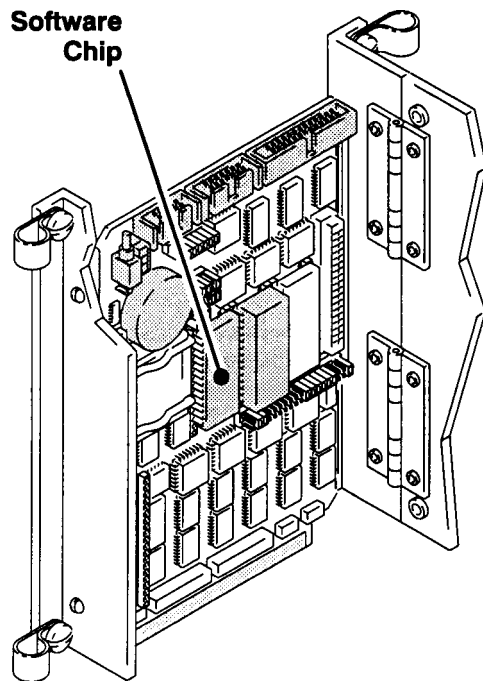


Fig 8

4. Use an I.C. extraction tool to remove the old software chip. Pull the chip directly up. See Fig 9.

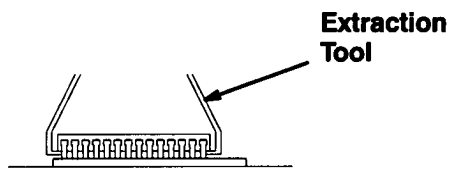


Fig 9

To remove the software chip without an extraction tool, carefully pry the chip out evenly on both sides. See fig 10.



Fig 10

5. Install the new software chip with the last row of pins in the last row of holes. Make sure the ship is facing the correct direction and all the pins are in the holes. See Fig 11.

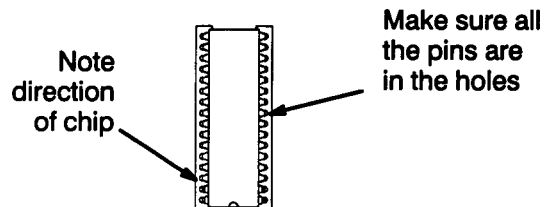


Fig 11

### NOTE:

If the software on the flow control board must be changed use the same installation procedure for the two software chips. Make sure the two chips are installed in the proper location by matching the markings (U7) and (U6) on the software chips with the markings on the computer board.

### Initiating the New Software

1. Locate the I/O board on the PFC-2000 Controller. See page 32
2. Locate the inputs for PFC-2000 paint start (input #7), purge start (input #8), and the recipe selection most significant bit (input #18).
3. Connect a jumper wire from terminal #1 to #15, then to #17, and to #37 on the I/O board. This will turn on the paint, purge, and recipe select bit (#18) at the same time, when the PFC-2000 is turned on.
4. Turn on the power to the PFC-2000 Controller. The paint (#7), purge (#8), and recipe select bit (#18) input lights should be lit. The display on the pendant should be blank.
5. Turn the power off to the PFC-2000 Controller.
6. Remove the jumper wires installed in step 3.

The program on the new chip has now been initiated.

**NOTE:** When the software is changed, the setup parameters will change to the default. Go through the entire program and set the proper parameters.

## Operation

The following instructions generally presume a standard system using pressure supply tanks for the paint components and solvent, and air spray guns. Also see **Optional System Arrangements** on page 7 for possible variations and their effect on the instructions.

### Flushing The Mixing System

Flush the mixing system with solvent and air at the end of each workday or before any break longer than the pot life of the fluid. Use the following flushing procedure:

#### WARNING

*For your safety, read the warning section **Flushing Safety** on page 3 before flushing, and follow all the recommendations given there. ALWAYS wear protective eyewear when flushing.*

1. Open the fluid pressure regulator.
2. Turn the Operator Switch to STANDBY. Refer to Fig 6, page 10.
3. During the following procedure (steps 4 to 7), follow the instructions given in your separate gun manual for safely grounding your gun while flushing.
4. Pull the trigger to hold the spray gun open. If the gun is air-operated, open it manually (trigger only).

**NOTE:** Solvent flushes the right-hand (catalyst) side of the mixing block, and the inner tube of the integrator. Air flushes the left-hand (resin) side of the mixing block, and the outer tube of the integrator. Depending on the components being used, you may flush with solvent, air, or both - modify the following procedure accordingly.

5. Turn the Operator Switch to PURGE. The purge sequence will automatically cycle. See page 14 for setup of purge sequence.
6. Should the system require further purging, turn the Operator Switch to STANDBY and back to PURGE for another sequence.
7. Set the Operator Switch back to STANDBY to stop the purge sequence.
8. Adjust the fluid pressure regulator back to the normal working pressure.

### Emergency Flush Procedure

If the electrical power is interrupted, the system can be purged by using the following procedure:

1. Open the gun trigger.
2. Press the manual override button (H) on the solvent solenoid valve, which is inside the PFC-2000 solenoid enclosure. Refer to Fig 12.
3. Hold the button in until the system is thoroughly flushed.

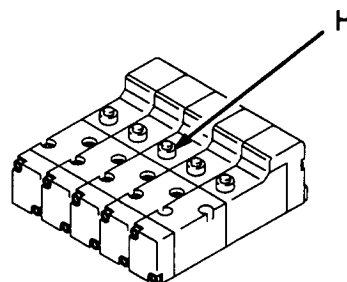


Fig 12

### Starting Production

**NOTE:** When you first start up the system after it has been shut down for a period of time, it will cycle rapidly until system pressure is built back up. This is normal and there is no cause for alarm.

1. Check that paint and solvent supply tanks are filled.
2. Check that fluid valves are turned on and the fluid pressure to the PFC-2000 is properly set.
3. Check that the air pressure to the PFC-2000 is properly set; most applications require about 80 PSI (6 bar); 60 PSI (4.2 bar) is the minimum setting.
4. Check that the PFC-2000 fluid shut-off knobs, dispense valve knobs, and purge valve knobs are all opened.
5. Turn ON the main power switch, push the NXT key on the pendant and check of the desired ratio is correct.
6. Cycle through the other pendant screens and check that the totalizer and target volumes are satisfactory.

## Operation

7. Remove any air from the fluid lines of the system:
  - a. Shut off the air to the gun by closing the air regulator on the PFC-2000
  - b. Hold a metal part of the spray gun firmly to the side of a grounded metal pail and pull the trigger.
  - c. Set the Operator Switch to MIX.
  - d. If the flow meters overrun because of air in the system, operation will stop. Repeatedly set the Operator Switch to STANDBY, then back to MIX until paint flows air-free from the spray gun.
8. If the paint output is too low, increase the air pressure on both supply tanks; if too high, reduce the air pressure, close the dispense valves further, or adjust the fluid pressure regulator.

### CAUTION

Do not use the first 4 to 5 oz. (120 to 150 ml) of paint from the system, as it may not be thoroughly mixed.

9. Check the air pressure regulators on the supply tanks, to be sure that the feed pressures are approximately the same.
10. Check or reset the air regulator in the spray air line.
11. Check or reset the (optional) fluid pressure regulator on the static mixer outlet. Use the adjustment key to adjust the regulator.
12. Begin production by setting the Operator Switch to MIX.

13. Operation of the PFC-2000 is controlled by the operation of the spray gun. When the gun is triggered, the dispense valves open and allow the A and B components to enter the mix manifold and be mixed and dispensed to the gun.

### WARNING

To reduce the risk of serious injury, including fluid injection or splashing fluid in the eyes or on skin, always follow the **Pressure Relief Procedure** on page 2 and disconnect all power to the PFC-2000 before checking or servicing any part of the system, before installing, cleaning, or changing fluid tips, and whenever you stop spraying.

### Monitoring the Fluid Supply

The PFC-2000 controller is equipped with software to monitor the amount of fluid used and shut down the system and provide an alarm when a limit is reached. See the Tank Volume screen on page 12 to set these limits.

#### NOTES:

- If required, switch on the supply tank agitators briefly whenever the fluid needs stirring.
- Periodically check the fluid level in the paint and solvent supply tanks, and refill as necessary.

### CAUTION

Never allow the paint supply tanks to empty completely while the PFC-2000 is operating. Fill them periodically, as needed. Failure to do so may cause the metering ratios to be incorrect.

### Stopping Production

Stop operation at any time by switching to STANDBY. If you stop time will not exceed the pot life of Component A or B, no additional action is needed, except to relieve pressure at the spray gun. If you stop time will exceed the pot life, you must flush the mixing system. See **Flushing the Mixing System**, page 28.

## Operation

1. Turn OFF the main power switch.
2. Bleed off all fluid pressure on both dispense valves.
3. Disconnect the base supply and catalyst supply and connect a regulated solvent line in both places.
4. Turn ON the main power switch and turn the Operator Switch to MIX.
5. At the spray gun, purge the fluid into a grounded waste container until the solvent comes out clear.
6. Turn OFF the main power switch and switch to STANDBY.
7. Bleed off all fluid pressure on the solvent. Disconnect the solvent supply from the filter inlets, and connect the new color in its place, then reconnect the catalyst supply line.
8. Using the procedure for **Setting Parameters**, at right, change the ratio and other parameters to the new values.
9. Turn ON the main power switch and switch to MIX.
10. Begin production.

## Setting Parameters

**NOTE:** See page 22 for a map of Setup screens.

To set parameters you must have a black pendant, which as the unmarked key to the right of F4 enabled. Pushing this key displays the revision screen with the choices: RUN, SETUP, BAT and GTOT.

Pushing the SETUP key displays the first of several screens for setting up or changing parameters.

Setup pendant screens are described on pages 11 to 22.

## Maintenance

The PFC-2000 Controller requires no regular maintenance. However, it is a good practice to check with Graco periodically to see if hardware or software updates are available.

## **PFC-2000 Installation and Operation Techniques**

### **Installation**

In order to optimize the performance of the flow control portion of the PFC-2000 system there are a few installation techniques that should be followed.

***NOTE: The following recommendations will not affect the mix ratio performance of the system only the flow controls ability to maintain a stable flow rate over the desired range.***

THE FOLLOWING ARE RECOMMENDATIONS NOT REQUIREMENTS AND ARE IN ADDITION TO THE STANDARD PRECISION MIX REQUIREMENTS.

### **Fluid Supplies**

1. The fluid supply systems for the A and B components should be free of any pressure spikes caused by pump changeovers or other devices feeding off the same supply. The most common technique for removing fluid pressure spikes is to add a manually operated fluid pressure regulator or surge tank at each material drop to the PFC-2000 mix manifold. For best results a fluid regulator or surge tank with a diaphragm area no less than 3" should be chosen.
2. The fluid supply systems must be filtered to 100 mesh. If the material composition will not tolerate 100 mesh filtration a minimum of 60 mesh can be substituted but the potential for flow meter plugging is substantially greater.
3. The fluid supply systems should be capable of supplying enough pressure to deliver a flow rate 1.5 times the maximum desired flow rate. There is typically a 10-20 PSI pressure drop through the PFC-2000 mix manifold.
4. The fluid supply systems should be capable of variable outbound pressures that will allow the flow control system to work within a range of 15 to 80 PSI to the fluid regulators at the minimum and maximum desired setpoints.
5. In order to achieve this manual fluid regulators may be required on the fluid supplies.

### **Equipment Location**

1. For best flow control response time the fluid manifold should be located as close to the application device as possible. The fluid hose between the outlet of the mix manifold should be no less than 6' and no more than 25'. Fluid hose lengths outside of the previously mentioned window can greatly affect response time.
2. The I/P transducers must be mounted on a vibration free surface.
3. The air hose lengths between the I/P transducers and the flow control fluid pressure regulators should be no less than 5' and no greater than 25' with a maximum inside diameter of 1/4". Air hose lengths outside of the previously mentioned window can greatly affect response time.
4. The supply air to the I/P transducers must be a maximum of 100 PSI, free of oil or water and filtered to a minimum of 40 micron.

## Initial Startup Parameters

1. Setup all mix ratio related parameters as you would a standard Precision Mix.
2. Setup the flow control related parameters as follows
  - A. "A" Component gain factor = 70 for initial setting
  - B. "A" Component PID delay time = .3 seconds for initial setting
  - C. "B" Component gain factor = 70 for initial setting
  - D. "B" Component PID delay time = .3 seconds for initial setting
  - E. Gun trigger PID delay time = .1 seconds for each foot of mixed material line for initial setting
  - F. Minimum setpoint value = 10 cc/min for initial setting
  - G. Maximum setpoint value = the next highest 100 over the maximum desired flow rate.  
Example: Maximum setpoint - 850 cc/min set maximum setpoint value to 900  
**NOTE: The larger the span between the minimum and the maximum setpoint value, the less resolution there will be for the analog input.**
  - H. Setpoint entered from keypad or I/O - If an external 4-20mA signal will be used to select the flow rate setpoint, change the screen to display setpoint entered from I/O.

Note: If recipes are being used key in the previously listed values A - G in all recipes being used.

## Initial System Startup

1. Electrical Testing
  - A. Turn the main power on the PFC-2000 control and any external control devices if applicable.
  - B. Turn on any external inputs to the PFC-2000 applicable to your system individually and verify that they are turning on the proper inputs on the PFC-2000 I/O board (mix, purge, gun trigger, recipes, etc...). See system drawing for exact details.
  - C. Turn off the supply air to the I/P transducers.
  - D. Remove the air lines from the outlets of both I/P transducers to the mix manifold.  
WARNING: This test will have free flowing air from the transducers make sure the area is safe for this test. This test will also turn on the "A" or "B" component valve. Make sure the fluid supplied are turned off.
  - E. Turn on the supply air to the I/P transducers.
  - F. With the pendant go to the Calibrate Ma Output For Component "A" screen and press the Yes key (F2). See screen map for exact location of screen.
  - G. Type in 20 and press the Enter key. Maximum air pressure should flow from the transducer located on the component "A" side.

- H. Type in 4 and press the Enter key. There should be no air flow from the transducer.  
***IMPORTANT: Whenever a transducer test is completed always exit the force screen after a 4 mA entry. Exiting with any value higher than 4 mA may cause erratic flow rates at system startup.***
  - I. Reinstall the air line from the Component "A" transducer to the Component "A" fluid regulator.
  - J. With the pendent go to the Calibrate Ma Output For Component "B" screen and press the Yes key (F2). See screen map for exact location of screen. Repeat steps G - I on the Component "B" side.  
***Note: If a external 4-20 mA signal is being used for flow rate setpoint follow steps K - M otherwise proceed to step N.***
  - K. With the pendent go to the Flow Rate Setpoint run screen. See screen map for exact location.
  - L. Vary the 4-20 mA signal and note the setpoint change on the pendent screen. All desired setpoints should be obtainable with the external input.
  - M. Turn main power to PFC-2000 control off.  
***IMPORTANT: Always exit setup before powering control down.***
  - N. Use the system drawing to locate the terminal block numbers for 24 volt supply power (typically #6) and the terminal block number that will turn on input #22 on the PFC-2000 I/O board (use core wiring drawing supplied in this manual if needed). Attach a temporary jumper wire between these two terminals.
  - O. Turn main power to PFC-2000 control on. Note that the light on input #22 is on and remains on.
2. Make sure all fluid and air lines are in there proper locations and secured.
  3. Turn on the main air to all devices applicable to the system.
  4. Load the production "A" and "B" component materials up to the mix manifold. When tuning the flow control it is advisable to do so with the actual materials that will be run in production. A change in viscosity or material composition may require different setup parameters.
  5. Perform a flow meter calibration test for the A and B component flow meters (See setup screen section of manual for detailed instructions). Follow up the flow meter calibrations with a verification ratio check (See ratio check section of manual for detailed instructions).  
***IMPORTANT: Improperly calibrated flow meters will not only cause inaccurate mix ratio but will cause unstable flow rates.***
  6. Turn main power to PFC-2000 control off. ***IMPORTANT: Always exit setup before powering control down.***
  7. Remove the temporary jumper installed in step 1-N.
  8. Turn main power to PFC-2000 control on. Note that the light on input #22 is off.
  9. With the pendent go to the Calibrate Ma Output For Component "A" screen and press the Yes key (F2). See screen map for exact location of screen.

10. Type in 20 and press the Enter key.  
***WARNING: Following steps 11-13 will have material flowing from the spray gun make sure to follow all safety precautions described at the beginning of this manual.***
11. Turn on the Gun trigger. Once all air is evacuated from the mixed material line note the flow rate display on the pendent. The flow rate should exceed the maximum desired flow rate setpoint by a minimum of 20 %. If not adjust the gun trigger needle travel or input pressure up or down to achieve this.
12. Type in 4 and press the Enter key. There should be no fluid flow from the spray gun. Increment the number up from 4 by factors of 1 (5, 6, 7, etc....) until fluid begins to flow from the spray gun note flow rate. The actual flow rate should be at least 20% below the minimum desired setpoint. If not adjust the gun trigger needle travel or input pressure up or down to achieve this. If a major change was required step 11 may need to be rerun and a compromise made.  
***IMPORTANT: Whenever a transducer test is completed always exit the force screen after a 4 mA entry. Exiting with any value higher than 4 mA may cause erratic flow rates at system startup.***
13. With the pendent go to the Calibrate Ma Output for Component "B" screen and press the Yes key (F2). See screen map for exact location of screen. Repeat steps 10-12 on the Component "B" side.

***IMPORTANT: Immediately after performing steps 10 - 13 flush the mixed material lines with solvent to remove all component A and B materials.***

### **Flow Control Operation and Tuning**

1. With the pendent go to the Flow Rate Setpoint run screen (See screen map for exact location). Select the lowest desirable flow rate setpoint by changing the external input. (Setpoint entered from I/O) or type in a new value and press the enter key (Setpoint entered from keypad).
2. Turn the mix input and the gun trigger on.
3. Once all solvent and air is evacuated from the system the actual flow rate display should stabilize close to the setpoint.  
NOTE: If step C is untrue do not adjust the needle travel or inbound pressures at this time.
4. Increment the desired setpoint up through the flow rate range. The actual flow rate should follow the setpoint. If the actual flow rate does not change refer to the trouble shooting section of the manual.
5. If the actual flow was not able to reach down low enough to achieve the minimum setpoint or was extremely unstable at the minimum setpoint run a flow rate test with a setpoint greater the maximum desired flow rate. If the actual flow rate was able to achieve the greater setpoint. This will allow you to throttle down the gun needle travel or reduce the inbound pressures.

## 6. Gain Factor Adjustment

The gain factor determines how aggressively the flow control loop will react in order to get the actual flow rate to the setpoint value. Too low of a gain factor will cause vary slow reaction time from one setpoint to another. Too high of a gain factor will cause vary unstable flow rates near the setpoint. The most ideal gain factor is the highest value without unstable flow.

Adjust the Gain factors for the “A” and “B” components independently. The gain factors are adjustable from 10-100. Keep in mind it is common for the optimum gain factor for “A” component be greater then the “B” component (see screen map for exact location of screens).

***IMPORTANT: It is never advisable to adjust setup parameters while the unit is in the “mix” mode.***

Always adjust parameters while the unit is in standby and completely exit setup before returning to operation.

## 7. Component “A”, “B” and Gun Trigger Flow Control Delay Times

The flow control delay times allow the individual components (A, B, and mixed material) to stabilize from static (No Flow) to dynamic (Full potential Flow) before the flow control loop reacts to the condition. Without these delay times when either the “A” component, “B” component or gun trigger came on the PFC-2000 control would immediately see flow rates less then the setpoint and react to them by increasing the air pressure to the fluid regulators. Once the fluid flow reached its full dynamic potential, it would most likely be higher then the setpoint due to the flow control loops premature reaction. Too low of a delay time will cause the flow rate to overshoot the setpoint each time the valve comes on. Too high of a delay time will cause the reaction time from one setpoint to another to be sluggish or not occur at all.

Adjust the delay times for the “A”, “B” and gun trigger independently. The delay times are adjustable from .1-10 seconds. Keep in mind it is common for the optimum delay time for “A” and “B” components (.2-.4 sec.) be considerably lower than the gun trigger (.5 - 2 sec.) (see screen map for exact location of screens).

***IMPORTANT: It is never advisable to adjust setup parameters while the unit is in the “mix” mode.***

Always adjust parameters while the unit is in standby and completely exit setup before returning to operation.

### NOTE FOR COLOR CHANGE USERS:

Materials with different mix ratios and viscosity's may require different inbound fluid pressures, gain factors and flow control delay times. If this is the case each recipe can be programmed independently.

The PFC-2000 system was designed to maintain consistent flow rates in a changing environment. The PFC-2000 system was not designed to jump from one setpoint to another without reaction time delays. If you are painting a part that requires different film builds in specific areas it is faster and offers more day to day consistence to increase the robot arm speed or if more film build is required decrease the robot arm speed through these areas.

[illegible]

# The Graco Warranty and Disclaimers

## WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months or two thousand hours of operation from time of sale, repair or replace any part of the equipment proven 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, 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 with Graco equipment of 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 claim. 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.

## DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including production liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

## EQUIPMENT NOT COVERED BY GRACO WARRANTY

Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, 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.

## Technical Data

Electrical supply .....+5 Volts, 1.4 Amps; +12 Volts, 0.7 Amps; -12 Volts, 0.002 Amps  
Electrical consumption .....16 watts

## Graco Phone Number

*To place an PFC-2000 equipment order, contact your Graco distributor or call Graco, EAS.*

*For PFC-2000 technical assistance, call Graco, EAS.*

**Phone No. (612) 379-3700**

**Sales Offices:** Detroit, Los Angeles

**Foreign Offices:** Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea

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