

FF 18/18 Proportioning Unit

Operating Manual 17942-1-SPI

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Issue 6

GUSMER CORPORATION®

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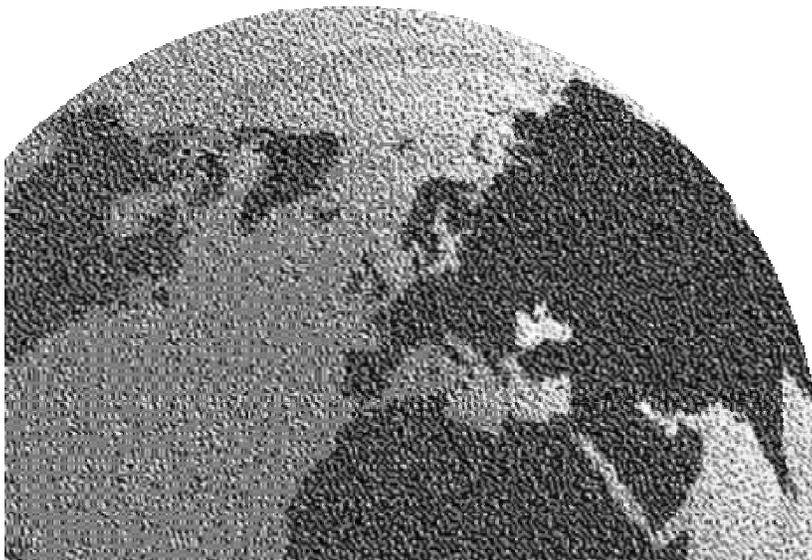
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NOTICE: This manual contains important information about your GUSMER equipment. Read and retain for future reference.

***NOTICE:** The equipment described in this technical manual must only be operated or serviced by properly trained individuals, thoroughly familiar with the operating instructions and limitations of the equipment. For technical service, call your local distributor. Call: 1-800-FOR-GSMR (1-800-367-4767) for the name and telephone number of your local distributor.*

***NOTICE:** All statements, information and data given herein are believed to be accurate and reliable but are presented without guarantee, warranty or responsibility of any kind expressed or implied. Statements or suggestions concerning possible use of GUSMER equipment are made without representation or warranty that any such use is free of patent infringement, and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated or that other measures may not be required for a particular circumstance or application.*

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WARRANTY

Gusmer Corporation (Gusmer) provides a limited warranty to the original purchaser (Customer) of Gusmer manufactured parts and equipment (Product) against any defects in material or workmanship for a period of one year from the date of shipment from Gusmer facilities.

In the event Product is suspected to be defective in material or workmanship, it must be returned to Gusmer, freight prepaid. If Product is found to be defective in material or workmanship, as determined solely by Gusmer, Gusmer will issue full credit to Customer for the freight charges incurred in returning the defective Product, and either credit will be issued for the replacement cost of the Product or a replacement part will be forwarded no-charge, freight prepaid to Customer.

This warranty shall not apply to Product Gusmer finds to be defective resulting from: installation, use, maintenance, or procedures not accomplished in accordance with our instructions; normal wear; accident; negligence; alterations not authorized in writing by Gusmer; use of "look alike" parts not manufactured or supplied by Gusmer; or Product used in conjunction with any other manufacturer's pumping or proportioning equipment. For such Product, a written estimate will be submitted to the Customer at a nominal service charge, itemizing the cost for repair. Disposition of Product will be done in accordance with the terms stated on the written estimate.

The warranty provisions applied to product that are not manufactured by Gusmer will be solely in accordance with the warranty provided by the original manufacturer of the product.

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Gusmer through the sale, lease, or rental of Product in no way expresses or implies a license for the use of, nor encourages the infringement of any patents or licenses.

To ensure proper validation of your warranty, please complete the warranty card and return it to Gusmer within two weeks of receipt of equipment.

Revised 09/02



GENERAL SAFETY INFORMATION

It is necessary to understand and follow the instructions in this manual to ensure proper and safe operation of the equipment.

As with most mechanical equipment, certain safety precautions must be taken when the equipment discussed in this manual is operated or serviced. Severe bodily injury or damage to equipment and property may result if the instructions and precautions listed throughout this manual are not followed.

Needless to say, sufficient guidelines cannot be developed to eliminate the need for good common sense in the use and servicing of this equipment, and in the use and application of the products, this equipment has been designed to process. Users of this equipment must therefore, make their own determination as to the suitability of the information contained in this manual to their specific operation and requirements. There should be no assumption made that the safety measures and instructions contained herein are all-inclusive, and that other safety measures may not be required for specific use or application.

The following safety guidelines are generally applicable to the safe and efficient use of the equipment.

Acceptable Equipment Uses

The equipment is designed for the dispensing of polyurethane foams, two-component coating systems such as polyureas, and some two-component epoxy systems. Under no circumstances should any acid or corrosive chemicals be used in the unit. Consult GUSMER if there is any doubt about the compatibility of the chemical system to be used in this equipment.

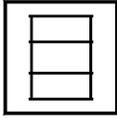
Any use of this equipment other than as indicated above constitutes misuse unless express written approval is obtained from GUSMER.

Your Gusmer equipment incorporates design parameters, features and functionality developed in over 40 years of plural component equipment design and manufacture. It is manufactured under the stringent standards of ISO 9001, and is backed by the Gusmer Warranty included herein.

The use of genuine Gusmer replacement parts is recommended for your equipment. Substitution of parts not designed, manufactured, or recommended by Gusmer may result in reduced performance of, and/or damage to, your Gusmer equipment. Any alterations to, or substitutions for, genuine Gusmer parts shall void the provisions of the Gusmer Warranty.

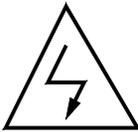
Operational Safety Procedures

This safety information will not be repeated in the text of this manual. The symbols pertaining to this information will appear where appropriate to alert the operator to potential hazards.



Solvents and Chemicals

WARNING: *THE SOLVENTS AND CHEMICALS USED WITH THIS EQUIPMENT EXPOSE THE OPERATOR TO CERTAIN HAZARDS. ADEQUATE PERSONAL PROTECTIVE MEASURES MUST BE TAKEN SO AS TO AVOID EXCEEDING THE THRESHOLD LIMIT VALUE (TLV) OF THE PRODUCTS BEING USED, AS ESTABLISHED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) OR OTHER QUALIFIED AGENCY. OBTAIN INFORMATION CONCERNING PERSONAL PROTECTION AND PROPER HANDLING FROM THE SUPPLIER OF SUCH SOLVENTS AND CHEMICALS.*



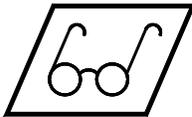
High Voltage

WARNING: *TO PREVENT SERIOUS BODILY INJURY FROM ELECTRICAL SHOCK, NEVER OPEN THE ELECTRIC CONSOLES OR OTHERWISE SERVICE THIS EQUIPMENT AND/OR EQUIPMENT USED WITH IT BEFORE SWITCHING OFF THE MAIN POWER DISCONNECT AND SHUTTING OFF AND LOCKING OUT SUPPLY VOLTAGE AT THE SOURCE. THE ELECTRICAL SERVICE MUST BE INSTALLED AND MAINTAINED BY A QUALIFIED ELECTRICIAN.*



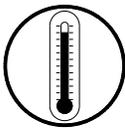
High Pressure

WARNING: *THIS EQUIPMENT HAS OR IS USED WITH EQUIPMENT THAT HAS HYDRAULIC AND CHEMICAL COMPONENTS CAPABLE OF PRODUCING UP TO 3500 PSI. TO AVOID SERIOUS BODILY INJURY FROM INJECTION OF FLUID, NEVER OPEN OR SERVICE ANY CONNECTIONS OR COMPONENTS WITHOUT BLEEDING ALL PRESSURES TO ZERO.*



Personal Protective Equipment

WARNING: *TO AVOID SERIOUS BODILY INJURY, PROPER PROTECTIVE GEAR, APPROPRIATE FOR THE TASK BEING ACCOMPLISHED, MUST BE WORN WHEN OPERATING, SERVICING, OR BEING PRESENT IN THE OPERATIONAL ZONE OF THIS EQUIPMENT. THIS INCLUDES, BUT IS NOT LIMITED TO, EYE AND FACE PROTECTION, GLOVES, SAFETY SHOES, AND RESPIRATORY EQUIPMENT AS REQUIRED TO PROVIDE PERSONAL PROTECTION FROM SOLVENTS AND CHEMICALS; HIGH PRESSURE RELEASES; HIGH TEMPERATURES; ELECTRIC SHOCK; AND OTHER HAZARDS ASSOCIATED WITH HYDRAULIC/ELECTRO-MECHANICAL EQUIPMENT. REFER TO THE APPROPRIATE WARNINGS ON THIS PAGE FOR FURTHER INFORMATION.*



High Temperature

WARNING: *THIS EQUIPMENT HAS OR IS USED WITH EQUIPMENT THAT HAS HIGH TEMPERATURE COMPONENTS SUCH AS PRIMARY HEATERS AND HEATED HOSES. TO PREVENT SERIOUS BODILY INJURY FROM HOT FLUID OR HOT METAL, NEVER ATTEMPT TO SERVICE THE EQUIPMENT BEFORE ALLOWING IT TO COOL.*



Warning

WARNING: *FAILURE TO READ AND FOLLOW THE INFORMATION ASSOCIATED WITH THIS SYMBOL MAY RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE EQUIPMENT.*



DESCRIPTION

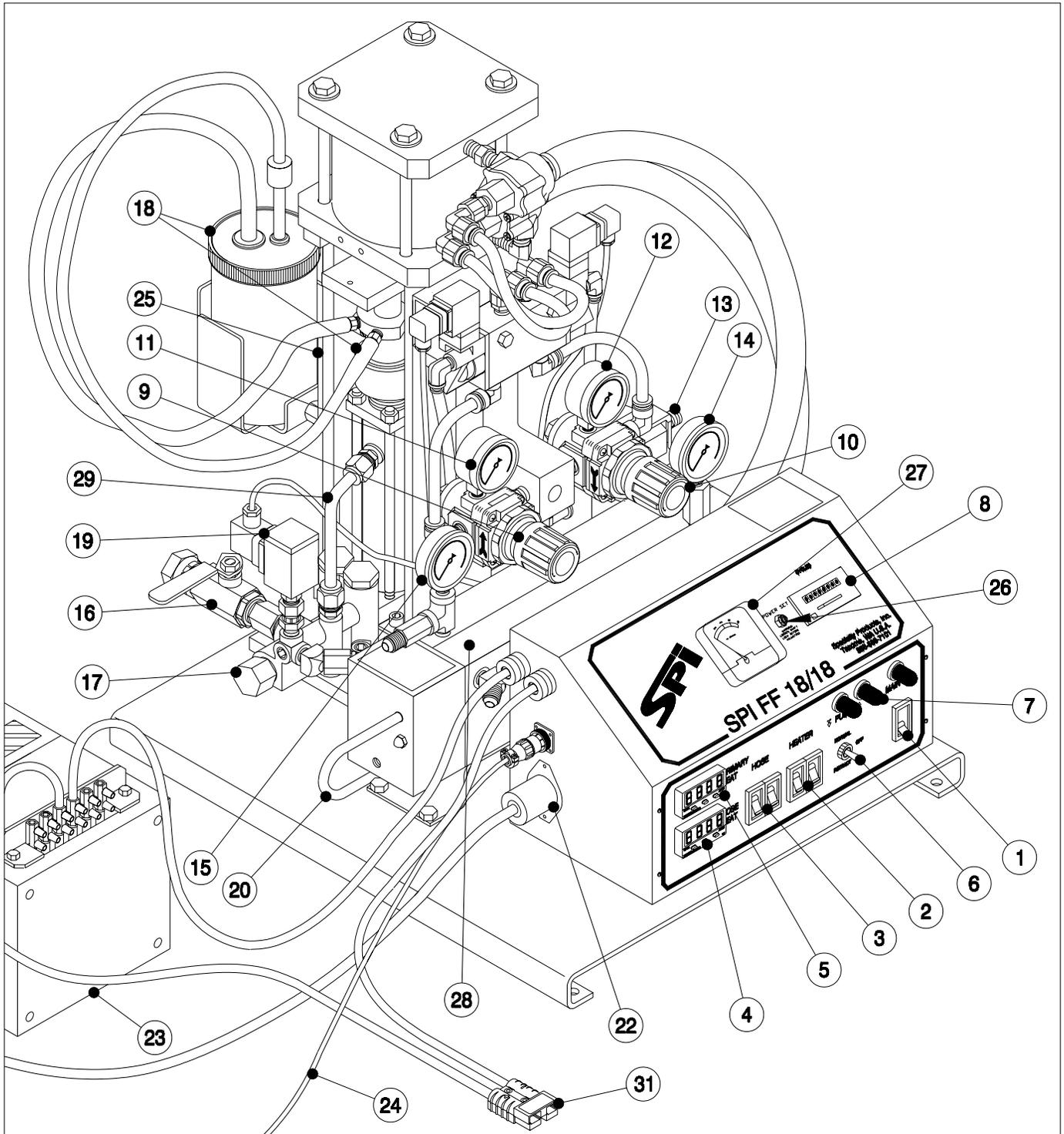


Figure 1. FF 18/18 Proportioning Unit

See FF 18/18 Parts Identification Manual (P/N 17942-SPI-ID) for complete part number information.



1. **MAIN SWITCH-** Controls power to all circuits. It must be ON for the Proportioning Unit to operate.
White pilot light indicates the main switch is ON.

WARNING: *INCOMING POWER LEADS FROM THE MAIN ELECTRICAL SOURCE REMAIN ENERGIZED WHEN THE MAIN SWITCH IS OFF. TO FULLY DE-ENERGIZE THE ELECTRICAL CONSOLE, SWITCH OFF AND LOCK OUT INCOMING POWER AT THE SOURCE.*

2. **PRIMARY HEATER CIRCUIT BREAKER-** Controls and protects the Primary Heater. It must be ON for the Primary Heater to operate.
3. **HOSE HEATER CIRCUIT BREAKER-** Controls and protects the Low Voltage Power Pack. It must be ON for the Hose Heater to operate.
4. **HOSE TEMPERATURE CONTROLLER-** Controls the temperature of the Hose Heater. Adjust the set point to the desired temperature. From this point, the temperature control is automatic.
5. **PRIMARY HEATER TEMPERATURE CONTROL-** Controls the temperature of the Primary Heater. Adjust the set point to the desired temperature. From this point, the temperature control is automatic.
6. **PUMP SWITCH-** Controls operation of the air drive system.
 - OFF- Air drive system is off.
 - NORMAL- Must be in this position for the Proportioning Pumps to operate.
 - RETRACT- Use this position for shutdown. It will stop the air motor at the bottom of the stroke with the Proportioning Pumps in the retracted position.
7. **PUMP DIRECTIONAL INDICATOR LIGHTS (Amber)-** Indicate the direction the Proportioning Pump is traveling. Both lights will be off when the Pump Switch is OFF or when either Proportioning Pump exceeds its designed operating pressure limit.
8. **COUNTER-** Records the cycle count of the Proportioning Pumps. One cycle count equals two (2) strokes (one in each direction).
9. **DOWNSTROKE AIR PRESSURE REGULATOR-** Controls the air pressure to the air motor on the downstroke.
10. **UPSTROKE AIR PRESSURE REGULATOR-** Controls the air pressure to the air motor on the upstroke.
11. **DOWNSTROKE AIR PRESSURE GAUGE-** Displays the air pressure in the air drive system during the downstroke.
12. **UPSTROKE AIR PRESSURE GAUGE-** Displays the air pressure in the air drive system during the upstroke.
13. **MAIN AIR FILTER-** Filters the system air supply.

14. **RESIN PRESSURE GAUGE-** Displays the pressure in the Resin Proportioning System.
15. **ISOCYANATE PRESSURE GAUGE-** Displays the pressure in the Isocyanate Proportioning System.
16. **A-INLET SUPPLY VALVE** (R on other side)
17. **A-INLET FILTER SCREEN** (R on other side)
18. **CONTINUOUS FLUSHING LUBE SYSTEM** (Iso Side Only)
A-PACKING NUT, LUBE CUP (Resin Side Only)
19. **PRESSURE LIMIT SWITCH-** Factory set to turn off the air drive system when the Proportioning Pump exceeds the designed operating pressure limit. (A side shown, R on other side)
20. **PRIMARY HEATER THERMOCOUPLE-** Senses the temperature of the Primary Heater and inputs that information.
21. **THERMAL LIMIT SWITCH-** (under Thermostat Cover not shown)
Interrupts power to the Primary Heater when the surface temperature approaches the designed operating temperature limit.
22. **POWER PACK CORD-** Provides AC power to the primary side of the transformer.
23. **HOSE HEAT POWER PACK-** Provides selectable low voltage outputs for heating various chemical hose lengths.
24. **TSU JUMPER HARNESS-** Carries the electrical signal from the TSU sensor in the Isocyanate Hose to the Hose Temperature Controller.
25. **AIR MOTOR REVERSING SWITCH-** (Rear of Air Motor) Energizes and de-energizes the air valve coils to reverse direction.
26. **HOSE HEAT POWER SET-** Adjusts the amount of Amperage supplied to the Hose Heating System.
27. **HOSE HEAT AMMETER-** Indicates the amount of Amperage supplied to the Hose Heating System.
28. **PRIMARY HEATER-** Heats the materials to the required dispensing temperature.
29. **A- (ISOCYANATE) PROPORTIONING PUMP-** Draws in and dispenses a fixed volume of isocyanate for delivery to the gun or pour head.
30. **R- (RESIN) PROPORTIONING PUMP-** (Opposite side, not shown) Draws in and dispenses a fixed volume of resin for delivery to the gun or pour head.
31. **POWER-LOCK™ HOSE HEAT CONNECTION-** Connects power to the Heated Hoses.



SPECIFICATIONS

MATERIAL SUPPLY: Required chemical viscosity: 250-1500 centipoise (cP). Consult your chemical supplier about material temperatures required to maintain correct viscosity.

Protect the chemical supply from atmospheric moisture with a blanket of dry nitrogen or desiccated air.

Resin Inlet: 3/4" NPT (FE) swivel

Isocyanate Inlet: 1/2" NPT (FE) swivel

Material supply pressure: 400 psi maximum (27 bars)

AIR MOTOR: 32 scfm @ 112 psi (12 liters/sec @ 7.7 bars) *

ELECTRICAL: 38 amps @ 220 volts, 50/60 Hertz single-phase, AC.

WEIGHT: 130 pounds (60 kilograms)

DIMENSIONS: Height: 27 inches (69 centimeters)

Width: 18 inches (46 centimeters)

Depth: 24 inches (61 centimeters)

PROPORTIONING PUMPS: Operating Pressure: 1800 psi (124 bars)

Output: 18 lbs./min. (8.16 kg/min) *

INLET FILTER: 80 Mesh Standard (Optional - 60/40 Mesh)

PRIMARY HEATER: 6000 Watts

HOSE LENGTH: 310 feet (94.5 meters) maximum for heating purposes

* Theoretical: actual results will vary with operating conditions.

INITIAL MACHINE SET-UP

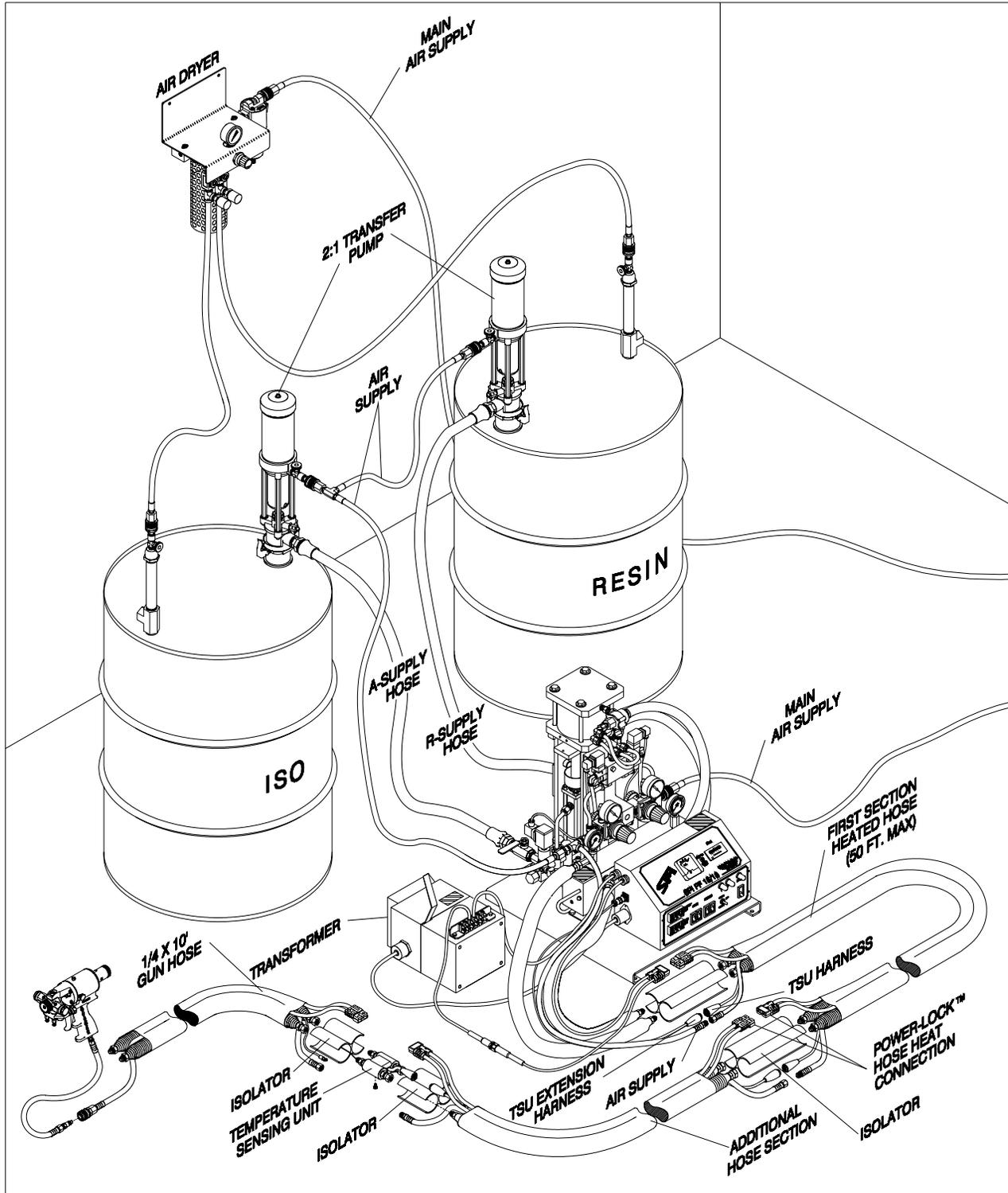


Figure 2. Typical FF 18/18 Installation

(Shown with Gusmer GX-7 Spray Gun, Transfer Pumps, Power-Lock™ Heated Hoses & Low-Voltage Power Pack)

The following parts are included with the unit and are required for set-up:

- **Tape Roll**
- **Isolator**
- **2.5-ft. Air Hose Assembly**
- **(2) Swivel Unions**
- **TSU Extension Adapter**
- **Isolation Hoses**
Blue – Resin
Red – Isocyanate

* Refer to Figure 2 for additional parts required for set-up.

Main Power Installation



WARNING: BEFORE PROCEEDING, BE SURE THAT INCOMING POWER IS DISCONNECTED AND LOCKED OUT AT THE SOURCE.

IMPORTANT: The main power source must be capable of meeting the electrical requirements specified on the nameplate of the proportioning unit must be provided with a dedicated fuse disconnect.

1. Remove and retain four (4) screws from the console cover. Open the cover.
2. Connect the main power cord to the electrical console as follows using wire size #10 or larger. (Not supplied) (See Figure 3):
 - a) Feed the power cord through the strain relief in the back of the console and connect the power leads to L1 and L2.
 - b) Connect the ground wire to the ground lug.
3. Close the console cover. Reinstall the four screws retained from Step 1.

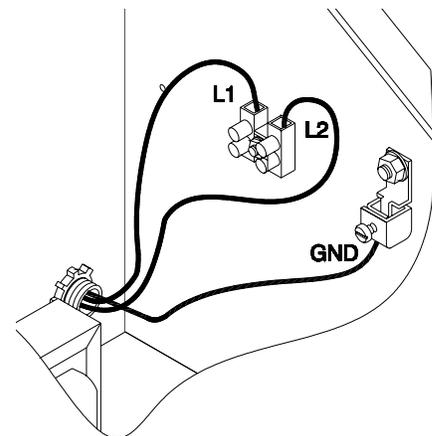
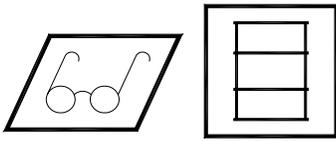


Figure 3. Main Power Connection

4. Set up the chemical supply, air supply and moisture control systems as required. See the system instructions for proper set-up and operating procedures.
5. Properly ground all auxiliary equipment. If not grounded, the high velocity flow of fluid can create a static charge, which may spark and cause fire or explosion. Certain solvents that are commonly in use with this equipment are flammable and may present a flash danger to the operator.
 - a) Ground the material supply (transfer pumps/day tanks).
 - b) The 2:1 transfer pump has a ground lug. Ground the pump in accordance with the instructions provided with the pump.
 - c) Check that the proportioning unit ground at the main electrical source is installed in accordance with the National Electrical Code. If a generator will be powering the unit, consult with your electrician about additional grounding measures that may be required.

Lubrication System Set-up



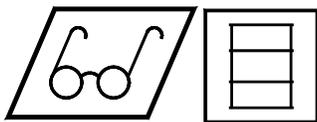
Prepare the isocyanate pump lubrication system for use as follows:

1. Lift the lubricant reservoir out of the bracket and remove the cap from the container.
2. Fill the reservoir with Gusmer pump lubricant.
3. Thread the reservoir onto the cap assembly and place it into the bracket.
4. Push the larger diameter supply tube approximately 1/3 of the way down into the reservoir.
5. Push the smaller diameter return tube down into the reservoir until it reaches the bottom.

IMPORTANT: The larger diameter supply tube must be at the upper level of the reservoir and the return tube at the lower level of the reservoir. This ensures that any isocyanate crystals will settle to the bottom of the reservoir and not return to the isocyanate pump shaft.

The lubrication system is now ready for operation. No priming is required.

Material Supply Connections

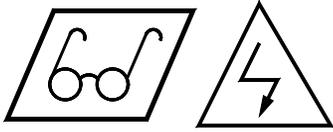


Connect the material supply to the inlets of the proportioning unit as follows:

1. Ensure that the A- and R- inlet ball valves on the proportioning unit are closed.
2. Connect and tighten the R- (resin) supply hose to the 3/4 FPT swivel fitting on the R- inlet ball valve, and to the resin transfer pump.
3. Connect and tighten the A- (isocyanate) supply hose to the 1/2 FPT swivel fitting on the A- inlet ball valve, and to the isocyanate transfer pump.
4. Connect the air supply to the 1/4 MPT nipple on the 2:1 transfer pump. Remove the cap to access it.
5. Connect the main air supply to the proportioning unit. The main air inlet at the air filter requires a 3/8 NPT fitting.

IMPORTANT: The main air supply must be clean and free of contaminants. A minimum of 3/8-inch inside diameter air line (not supplied) should be used to deliver the air supply to the proportioning unit. A main air shutoff valve to the proportioning unit is recommended.

Hose Heat Power Pack



The power pack provides low-voltage electrical power to the heating element embedded in each section of hose. The output voltage of the power pack is adjusted by changing the tap settings of the transformer. To ensure proper functioning of the heated hoses, the transformer tap settings must be adjusted to match the total length of hose to be used.

To connect the power pack and select the correct tap settings, proceed as follows:

1. Turn OFF and lock out incoming electrical power at the source.
2. Plug the tap wire with inline fuse (B) into the Power-Lock hose heat connector on the end of the console wire (A). (See Figure 4.)

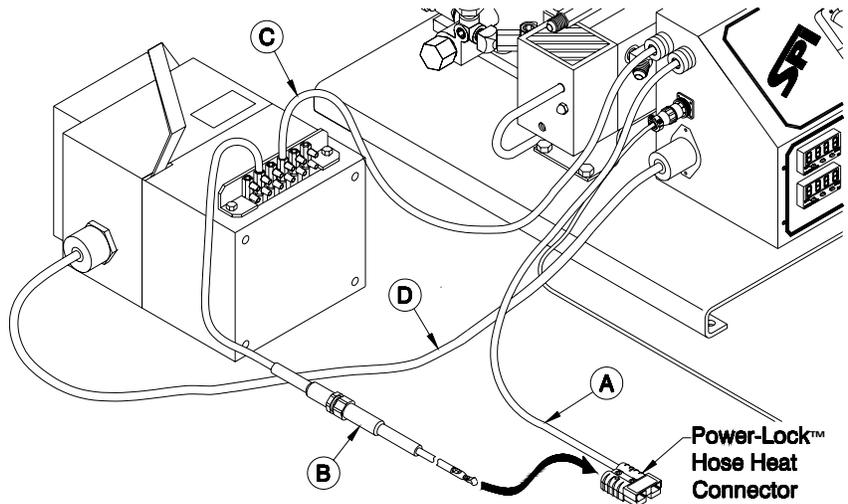


Figure 4. Transformer Connections

3. Using Figure 5 and the chart below, connect the power lead (C) and the tap wire (B) to the transformer taps that match the hose length to be used.

IMPORTANT: The power pack must be set to match the hose length used. Too much power will cause the hose heat circuit fuse to open; too little power will result in insufficient hose heating.

Hose Length	Tap Wire	Power Lead
25 ft. (7.6m)	S1	S2
35 ft. (10.6m)	S2	S3
60 ft. (18.2m)	S1	S3
110 ft. (33.3m)	S1	S4
160 ft. (48.5m)	S4	S5
210 ft. (63.6m)	S3	S5
260 ft. (78.8m)	S1	S5
310 ft. (94m)	S1	S5

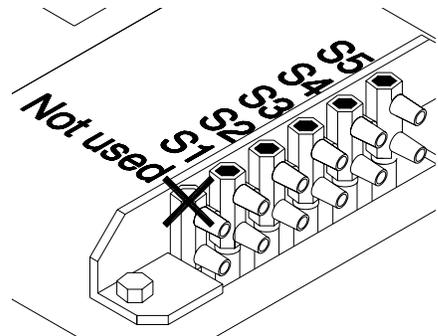
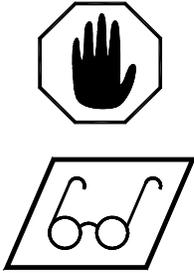


Figure 5. Manual Tap Settings

4. Connect the power cord (D) from the power pack to the electric console. Twist the plug to lock it into the receptacle.

Heated Hose Installation



WARNING: TO MAKE PROPER AND SAFE HOSE CONNECTIONS, READ AND UNDERSTAND THE FOLLOWING:

ISOCYANATE HOSES ARE COLOR-CODED RED AND RESIN HOSES ARE COLOR-CODED BLUE FOR POSITIVE IDENTIFICATION. IN ADDITION, THE RESIN AND ISOCYANATE HOSE FITTINGS HAVE DIFFERENT THREAD SIZES TO VIRTUALLY ELIMINATE INTERCHANGING THE HOSES.

THE HOSE CONNECTION POINTS ARE A POTENTIAL SOURCE OF CHEMICAL AND AIR LEAKS AND ARE THE AREAS MOST EXPOSED TO DAMAGE FROM SCUFFING AND SNAGGING ON ABRASIVE SURFACES. GUSMER CORPORATION STRONGLY RECOMMENDS INSTALLING THE OPTIONAL SCUFF JACKET TO PROTECT THE HOSES AND TSU EXTENSION HARNESS FROM DAMAGE.

1. Connect the isolation hoses to their respective primary heater outlet fittings (see Figure 6).

IMPORTANT: The heated hose assemblies are connected end to end during shipment to protect them from moisture intrusion. Do not separate the hoses until they are ready to connect to the proportioning unit.

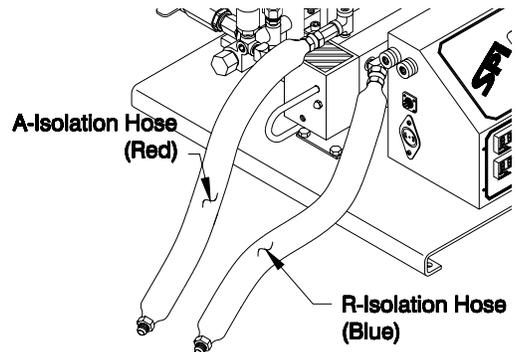


Figure 6. Isolation Hoses

2. Connect the 2.5-ft. air hose to the outlet fitting on the air manifold of the proportioning unit.
3. Connect the TSU extension harness to the TSU socket on the electric console.
4. Connect the heated hose assembly to the isolation hoses as follows:
 - a) Lay out the heated hose assemblies as shown (see Figure 7).

- A- (Isocyanate) hoses are color-coded RED.
- R- (Resin) hoses are color-coded BLUE.

See Figure 8 for Steps b) and c).

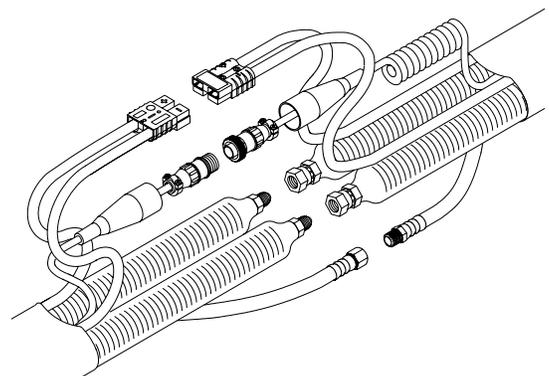


Figure 7. Hose Connection Step (a)

- b) Connect the heated hoses to the isolation hoses and tighten. To ensure a leak-proof chemical connection, take care not to cross-thread or over tighten the fittings.
- c) Connect the air hoses and tighten the fittings.

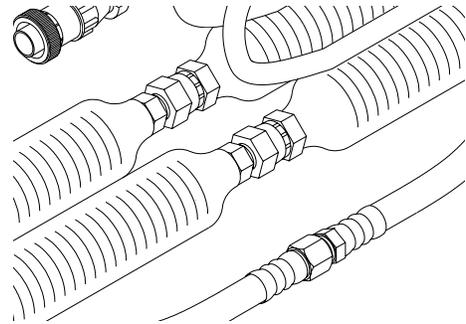


Figure 8. Hose Connection Step (b & c)

- d) Install the isolator between the chemical hose fittings. Use a small amount of tape to hold it in place (see Figure 9).

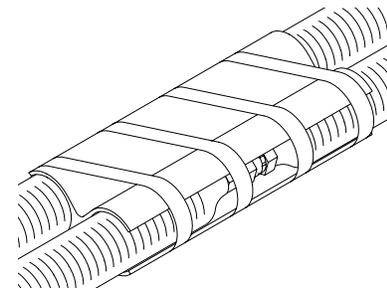


Figure 9. Hose Connection Step (d)

IMPORTANT: Always install the isolator to prevent damage to the fittings, but do not tape fully in place until after the hoses are pressurized and found to be free of leaks.

See Figure 10 for Steps e) and f).

- e) Connect the TSU harness plugs together. To ensure a secure electrical connection, place the protective electrical isolator boot over each plug and tape together.

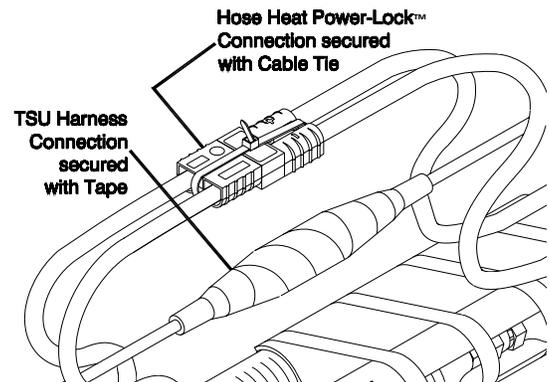


Figure 10. Hose Connection Step (e & f)

- f) Plug the Power-Lock hose heat connectors together. Secure the connection in place with the cable tie provided; failure to do so will cause a disruption in the hose heat system, should the connectors separate.

***** Repeat Step 4 for adding additional hoses. *****

- 5. Install the temperature sensing unit (TSU) to the gun whip hose as follows: (See to Figure 11.)
 - a) Pull out and carefully straighten the loose end of the temperature probe from the TSU.
 - b) Insert the temperature probe into the isocyanate hose and connect the TSU to the gun whip hose. To ensure a leak-proof chemical connection, take care not to cross-thread or over tighten the fittings.

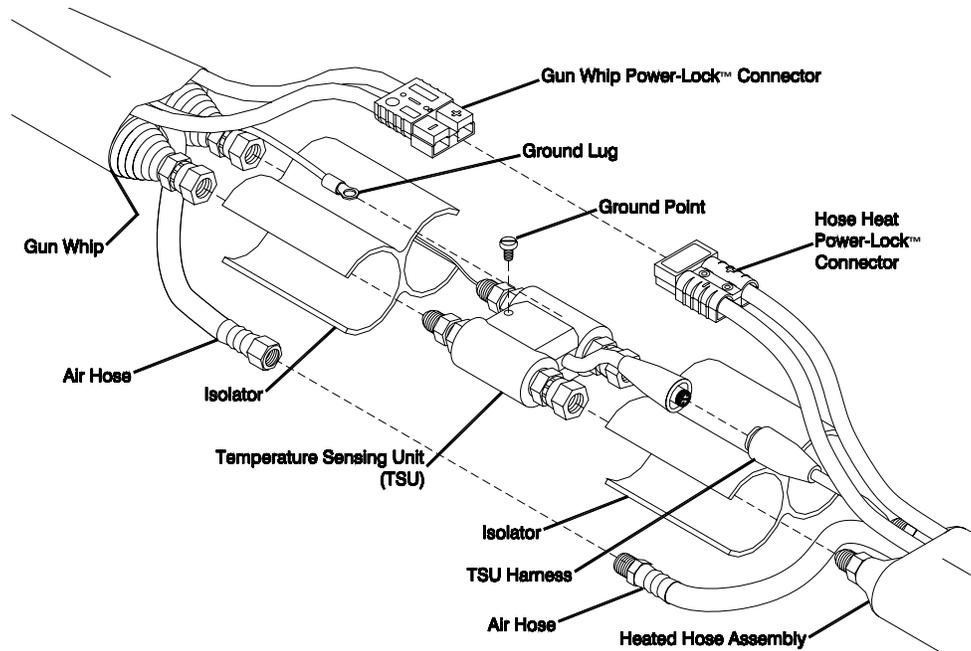


Figure 11. Temperature Sensing Unit (TSU)



WARNING: THE TEMPERATURE PROBE EXTENDS APPROXIMATELY 12 INCHES INTO THE ISOCYANATE HOSE AND ALTHOUGH IT IS A RUGGEDLY BUILT ASSEMBLY, IT WILL NOT WITHSTAND REPEATED ABUSE. TAKE CARE NOT TO CRUSH THE HOSE OR SUBJECT IT TO SEVERE BENDING IN THE AREA WHERE THE THERMOCOUPLE IS LOCATED. WHEN COILING THE HOSE TAKE CARE NOT TO COIL SMALLER THAN THE RECOMMENDED 3-FT. BEND RADIUS.

- c) Connect the ground wire on the gun hose to the ground point on the TSU.
 - d) Connect the heated hose assemblies to the TSU. To ensure a leak-proof chemical connection, take care not to cross-thread or over tighten the fittings.
 - e) Connect the TSU harness to the TSU. To ensure a secure electrical connection, place the protective electrical isolator boot over each plug and tape together.
 - f) Cut the isolator in half crosswise and secure the two pieces in place between the hydraulic fittings.
 - g) Connect and tighten the air hoses.
 - h) Plug the Power-Lock hose heat connectors together. Secure the connection in place with the cable tie provided; failure to do so will cause a disruption in the hose heat system should the connectors separate.
6. Install the optional scuff jacket, if provided.
 7. Connect the coupling block to the gun whip hose and make sure that the manual valves are closed. (See the gun operating manual.)

Digital Temperature Controllers

The SPI 18/18 temperature controllers automatically manage the temperature selected for both the hose heat system and the primary heater. Each controller has its own program and is not interchangeable with the other.



WARNING: DO NOT TURN THE TEMPERATURE CONTROLLERS ON UNTIL ALL PURGING PROCEDURES ARE COMPLETED AND THE HEATERS ARE COMPLETELY FILLED WITH CHEMICAL.

NOTE:
 Digits normally show process temperature.

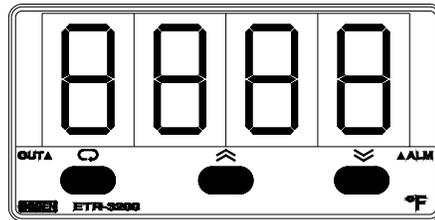


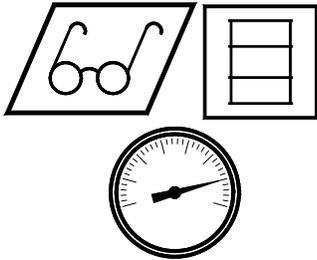
Figure 12. SPI 18/18 Controller

To change the set point, tap the ▲ or ▼ button quickly. This will brighten the individual digit in the display that requires changing. Once the correct digit is selected, hold down the ▲ or ▼ button to increase or decrease the value. After entering the set point, wait seven (7) seconds and the process temperature will be displayed. (See Figure 12.)



WARNING: THE CONTROLLERS ARE FACTORY PROGRAMMED AND ARE NOT FIELD PROGRAMMABLE. IF YOU ENCOUNTER ANY PROBLEMS WITH A CONTROLLER, CONTACT GUSMER FOR A REPLACEMENT. DO NOT ATTEMPT TO CHANGE ANY OF THE PREPROGRAMMED PARAMETERS. DO NOT SUBSTITUTE A CONTROLLER FROM AN ALTERNATE SUPPLIER AS ITS USE MAY RESULT IN DAMAGE TO THE EQUIPMENT AND/OR BODILY INJURY.

Air Purge



Before using the equipment, it is necessary to purge the entire chemical system of air and oil left over from the functional testing of the equipment at the factory.

To purge the machine proceed as follows:

1. Turn on the main air supply.
2. With the resin and isocyanate transfer pumps in their respective drums and the A and R-inlet supply valves closed, pressurize the transfer pumps. Check for chemical leaks.
3. Open the A and R-inlet supply valves.
4. Switch ON the main switch. (The white pilot light should be ON.)
5. Adjust both air pressure regulators to zero. (Fully counterclockwise).
6. Set the pump switch to NORMAL.
7. Adjust both the air pressure regulators clockwise until the pumps begin to move (approximately 15-psi air pressure).
8. Hold the coupling block with the A- and R- ports over separate containers and open both manual valves.
9. Allow material to flow out of the coupling block until all spitting of air stops and all traces of residual material have disappeared. Close the manual valves and flush any residual chemical from the outside of the coupling block (see gun operating manual).
10. Slowly increase the air pressure and check all fittings for signs of hydraulic and chemical leakage. Tighten fittings as required.
11. Turn OFF the pump switch.
12. Mount the gun to the coupling block. (See the gun operating manual.)

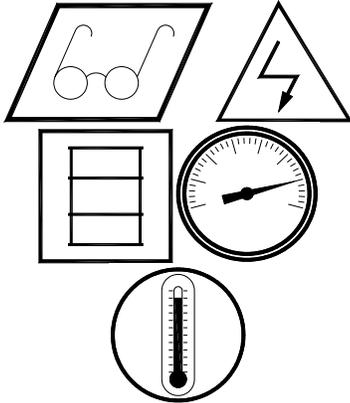
Please dispose of waste chemicals in accordance with applicable local, state, and federal codes.

IMPORTANT: After the proportioning system has been brought up to operating pressure and all hose connections are tight and free of leaks, wrap together the hoses and electrical wires around the area of the rubber isolators with a liberal amount of duct tape to form a compact bundle. If a scuff jacket is being used, pull it over the bundle and secure with tape.



OPERATION

Daily Startup Procedures



IMPORTANT: The Daily Start-up Procedures describe normal operation, assume that all calibrations have been properly executed, and that the heating system is not up to operating temperature.

1. Check the condition of the isocyanate lubrication system and service as required. Change the pump lubricant when it shows signs of color change.
2. Determine that the supply system is at the proper temperature as recommended by the system supplier, that the individual chemicals are properly mixed within their drums, and that the moisture protection system is properly set for operation.
3. Adjust the pump packings, if required. The packing nuts on the iso and resin pumps are adjustable and will require periodic tightening. The iso packing will require tightening when the pump lubricant requires frequent changing.
4. Check the inlet screens and service as required.
5. Turn on the main air supply to the transfer pumps.
6. Pressurize the transfer pumps and open both A and R-inlet supply valves.
7. Switch ON the main switch. The white pilot light should be on.
8. Uncoil the heated hose assemblies.



WARNING: UNCOIL THE HOSES BEFORE SWITCHING ON THE HOSE HEAT CIRCUIT BREAKER TO PREVENT OVERHEATING THE HOSE ASSEMBLIES AND CREATING HOT SPOTS WITHIN THEM.

9. With the hose heat power set full counterclockwise, switch ON the hose heater circuit breaker.
10. Adjust the digital temperature controller to the desired temperature. (See Digital Temperature Controllers on page 19.)
11. Adjust the hose heat power set clockwise to between 45 and 50 Amps. **Do not exceed 50 Amps.**

Make small adjustments and allow the hose heater to stabilize in between. When chemical in the hoses reaches the desired temperature, the ammeter will cycle on and off and temperature control will be automatically maintained from this point. If the required 45-50 Amp range cannot be achieved, refer to Initial Machine Set-Up and Troubleshooting sections of this manual.

12. Switch ON the primary heater circuit breaker. Adjust the digital temperature controller to the desired temperature.



WARNING: *To PREVENT EXCESSIVE PRESSURE BUILD-UP IN THE HEATED HOSES, ALWAYS BRING THE HOSES AND PRIMARY HEATER UP TO OPERATING TEMPERATURE BEFORE TURNING ON THE PUMP SWITCH.*

NOTE:
The standard size 60 pumps have a material pressure to air pressure ratio of approximately 16 to 1.

13. Set the pump switch to NORMAL. One of the amber directional indicator lights should be ON and the proportioning pumps should move a short distance and pressurize.
14. Set both pressure regulators as required. Always set the down stroke pressure regulator first to the desired air pressure, then set the upstroke pressure regulator approximately 10 psi lower to compensate for the pressure boost generated by pressure feeding material into the pumps.
15. Connect air to the gun. Consult the gun operating manual and test dispense as per the directions.
16. Observe the iso and resin pressure gauges on both the up and down strokes. Readjust the upstroke pressure regulator as required so that the proportioning pump pressure is equal on both the up and down strokes.
The proportioning unit is now ready for operation.

Daily Shutdown Procedures

1. Set the pump switch to RETRACT.
2. Trigger the gun off target until the proportioning pumps stop in the retracted (full down) position and the pressure of both pumps bleeds off to approx. 500 psi.

IMPORTANT: *DO NOT bleed the pressure to zero, as some pressure is required to keep the packings operating normally and prevent seepage during shutdown.*

3. Switch OFF the pump switch.
4. Turn the hose heat power set full counterclockwise.

IMPORTANT: *Turn the hose heat power set full counterclockwise at every shutdown to minimize the hose heat amperage and prevent damage to the phase controller during start-up.*

5. Switch OFF the hose heater and primary heater circuit breakers.
6. Switch OFF the main switch.
7. Close both inlet supply ball valves.
8. Coil and store the heated hose in a manner that prevents damage.
9. Shutdown the chemical supply system as required.
10. Turn OFF the main air supply to the gun and transfer pumps.
11. Shut down and service the gun as required (see gun operating manual).



TROUBLESHOOTING

General Information

When properly maintained and operated, GUSMER equipment will provide long and faithful service. However, occasional problems will arise which must be resolved before operation can continue. The purpose of this section is to give an explanation of what problems may arise, how to detect them, and how to resolve them.

This manual is written to give the operator a general overview of the operation of the equipment, therefore it is imperative that before any troubleshooting process begins, the operators have read and understood the applicable portions of this manual.

Training schools held on a regular basis further develop the necessary knowledge for proper operation, maintenance and troubleshooting of GUSMER equipment. These schools give concentrated training on the equipment and help to develop an operator into a competent Certified Gusmer Technician. Obtain information on these schools from SPI.

GUSMER maintains a competent staff of Technical Representatives and authorized Distributors who can resolve almost any problem you may encounter with GUSMER equipment. Feel free to call on these people for assistance when you need it.



WARNING: *THE TROUBLESHOOTING SECTION OF THIS MANUAL ASSUMES THAT THE INDIVIDUAL PERFORMING THE WORK ON THE EQUIPMENT IS QUALIFIED TO DO SO. THIS INDIVIDUAL MUST HAVE A WORKING KNOWLEDGE OF BASIC ELECTRICITY, HYDRAULICS AND PNEUMATICS; MUST FOLLOW ALL GENERALLY ACCEPTED SAFETY PRECAUTIONS USED WHEN WORKING WITH HYDRAULICS, PNEUMATIC AND ELECTRO-MECHANICAL EQUIPMENT; MUST HAVE READ AND UNDERSTOOD THE APPLICABLE SECTIONS OF THIS MANUAL; AND MUST WEAR PERSONAL PROTECTION APPROPRIATE TO THE TASK BEING UNDERTAKEN.*



WARNING: *UNLESS OTHERWISE NOTED, ALL ELECTRICAL TROUBLESHOOTING DESCRIBED IN THIS MANUAL MUST BE DONE WITH THE INCOMING POWER SWITCHED OFF AND LOCKED OUT AT THE SOURCE. ANY ELECTRICAL TROUBLESHOOTING REQUIRED BEYOND THE SCOPE OF THIS MANUAL MUST BE DONE BY A QUALIFIED ELECTRICIAN.*

Primary Heating System

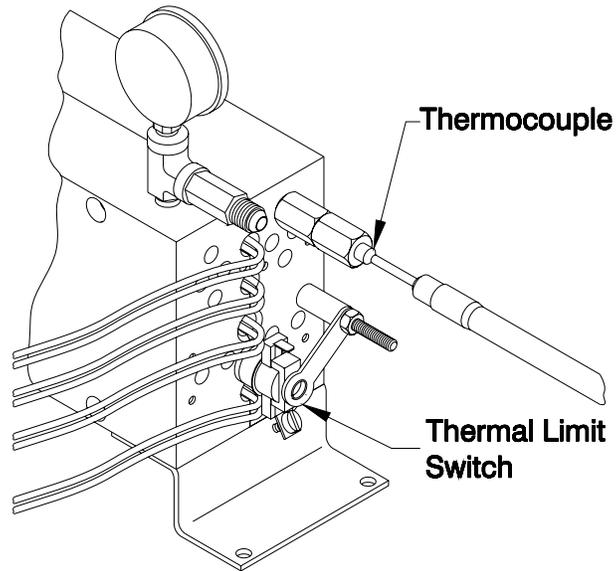
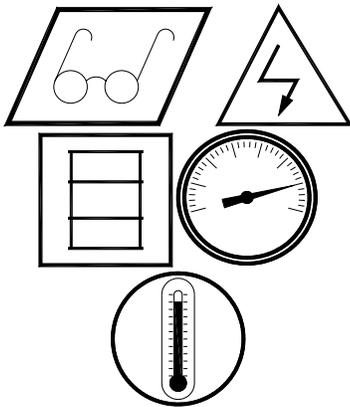


Figure 13. Primary Heater Features

IMPORTANT: Heater shown with cover removed for troubleshooting purposes only. Do not operate the proportioning unit with the cover removed.

Try the recommended solutions in the order given for each problem to avoid unnecessary repairs. Also, determine that all circuit breakers, switches, and controls are properly set and wiring is correct before assuming there is a problem. Turn off all switches and allow the heater to cool before attempting troubleshooting procedures.



<u>Problems</u>	<u>Solutions</u>
Heater Circuit Breaker trips	1
No heat	2
Partial heat, red light stays on continuously	6
Controller displays the code LLer.	3, 5
Controller displays the code SbEr.	3, 4, 5

SOLUTIONS

- THERMAL LIMIT SWITCH-** The thermal limit switch provided consists of a bimetallic switch bonded to the end of the primary heater. When the surface temperature of this section exceeds 198° F, the switch trips the primary heater circuit breaker, and removes power from the heater. Once the heater has cooled down to within normal limits, reset the limit switch. **DO NOT** attempt to reset this switch more than once. You must determine the cause of the problem and correct it.

When moving the proportioning unit, it is probable that the thermal limit switch will trip in transit. If this happens, reset the limit switch and monitor the operation of the heater to ensure the switch has not tripped as a result of a heater malfunction.

To reset the limit switch, proceed as follows:

- a) Switch OFF the main switch and primary heater circuit breaker.
 - b) Turn OFF and lock out incoming power at the source.
 - c) Remove the cover box by removing the acorn nut and sliding the cover box away from the heater.
 - d) Check to ensure all electrical power is OFF.
 - e) Reset the thermal limit switch by pushing in the red button on the switch.
 - f) If the thermal limit switch does not feel as though it reset, then disconnect one lead from the thermal limit switch and read continuity across the switch. If no continuity, the switch is defective and must be replaced.
 - g) Slide the cover box back into place and tighten the acorn nut.
 - h) Switch on the electrical power and monitor the operation of the primary heater to ensure it is functioning properly.
2. CHECK TEMPERATURE CONTROLLER SET POINT- If the set point is incorrectly set below the ambient temperature, the primary heater will not cycle on and off.
 3. REVERSED THERMOCOUPLE CONNECTION- Change the sensor leads on terminal numbers 10 and 11. Red wire must be on Terminal 10.
 4. SENSOR TYPE MISMATCHED- The preprogrammed controller operates with a type "E" thermocouple only. Ensure that only an SPI or Gusmer supplied primary heater thermocouple is used.
 5. OPEN THERMOCOUPLE- With the main switch and primary heater circuit breaker OFF, check all wiring for damage or faulty connections and make sure the primary heater thermocouple plug is in place in the rear of the console.
 6. HEATING RODS- If the primary heater has any of these symptoms listed below it is possible that one or more of the four heating rods is not working.
 - Primary heater turns on, but takes excessively long to reach the temperature desired. (Normal warm-up is about 2 minutes)
 - Primary heater has abnormally long "ON" cycles.
 - Primary heater does not turn off during dispensing.

The primary heater contains four 1500-watt (34 ohms each) heating rods wired in parallel. To check operation of the rods, proceed as follows:

- a) Turn OFF and lock out incoming power at the source.
- b) Remove the heater cover box by removing the acorn nut and sliding the cover box away from the heater.
- c) Read the resistance across the four heating rods. The combined resistance should be 8.5 ohms. A higher resistance indicates that at least one of the rods is not working. If this is the case, proceed to step (d).
- d) Disconnect the heating rods and measure the resistance of each rod. Each rod should measure 34 ohms. If not replace the faulty rod or rods.

The design of the Primary Heater allows it to maximize the heat transfer from the power available. However, under certain conditions, reducing the flow rate is necessary when the heater is not able to reach the required temperature.

Proportioning System

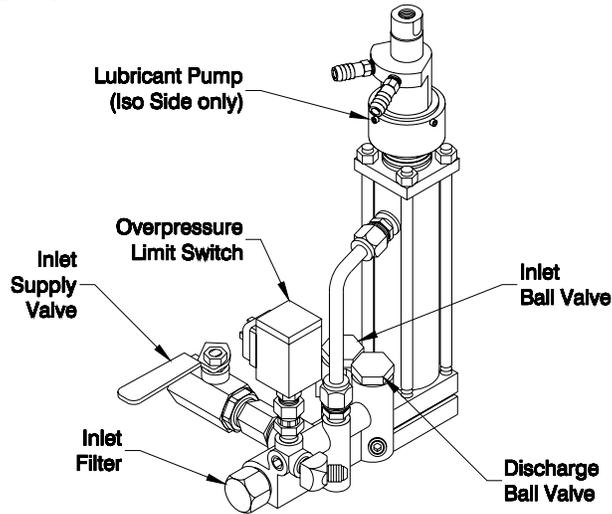
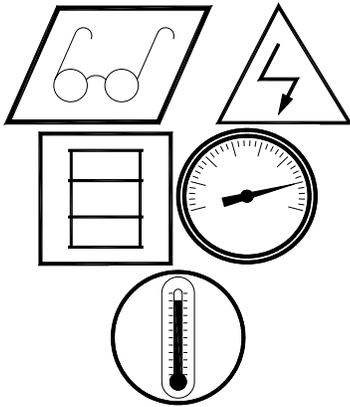


Figure 14. Proportioning Pump Features

Try the recommended solutions in the order given for each problem to avoid unnecessary repairs. Also, determine that all circuit breakers, switches, and controls are properly set and wiring is correct before assuming there is a problem. Turn off all switches and allow the chemicals to cool before attempting troubleshooting procedures.



<u>Problems</u>	<u>Solutions</u>
Proportioning pump does not hold pressure when stalled.	1
Pressure imbalance between pumps.	2, 3, 1
Cavitation in the Proportioning Pump.	2, 3, 1
Failure of the pump to reverse.	4, 7
Pumps do not move and the directional indicator lights are out.	4, 5, 6
Pump movement is erratic.	7, 9
Unequal pressure or speed on the upstroke versus the downstroke.	8

SOLUTIONS

1. LEAKING BALL CHECK VALVE- Determine which inlet or discharge ball valve is leaking by observing the pressure gauges. If the pump (A or R) is losing pressure on the upstroke, check the discharge valve of the respective pump. If the pump is losing pressure on the down stroke, check the inlet valve of the respective pump.
 - a) Disconnect the air supply to the transfer pumps and proportioning unit.
 - b) Close the inlet supply valve of the problem pump and bleed chemical pressure in the transfer pump to zero.
 - c) Bleed chemical pressure in the proportioning pump to zero.
 - d) Remove the appropriate valve cover and use a magnet to remove the valve ball.
 - e) Flush and wipe clean the valve ball and ball seat of all residual material. Inspect these parts for damage.

- f) In most cases, the cause of the leaking valve is a particle of foreign material preventing the ball from seating properly. If cleaning the ball and seat does not resolve the problem, replace them.
2. PRESSURE/CHEMICAL IMBALANCE -Troubleshooting this problem requires that two points be determined:

First- Which chemical is missing or not mixing at the proper proportion?

Second- Why is that chemical missing or failing to mix at the proper proportion?

Determine the first point by checking the color of the material exiting the gun. Since two-component foam systems are usually a combination of light and dark material, the missing or under-proportioned material can be readily determined in most cases.

The second point is due to a restriction in the gun or because the proportioning pump did not function properly in pumping its designed volume.

After determining the missing or under-proportioned material, observe the chemical pressure gauges on the problem side of the proportioning unit to see if the malfunction is due to a restriction at the gun or a lack of material produced by the pump. To prevent misinterpretation, focus must be on the pressure gauge corresponding to the missing chemical.

For example: Assume that the R-component is not reaching the mixing chamber. Spray off target and note the resin pressure gauge; If the resin gauge is considerably higher than the isocyanate gauge, the problem is within the gun. Refer to the gun manual to resolve the problem. If the resin gauge is considerably lower than the isocyanate gauge, see step 3.

3. CAVITATION- Cavitation is the formation of a partial vacuum or void created within the pump cylinder during the fill stroke. It is actually a "short fill", since the fill chamber is not completely full of chemical when the pump reverses to start the discharge stroke. Cavitation occurs when the proportioning pump demands a greater volume of material during its fill stroke than can be supplied. The most common causes of cavitation are as follows:
- a) The transfer pump cannot handle the supply requirement or is malfunctioning. The Gusmer 2:1 transfer pump is recommended for use with the FF 18/18. Also recommended is a minimum of 3/4" diameter supply hose, as short as practical.
 - b) The chemical is too viscous (thick) to pump properly. Consult your chemical supplier for the recommended material temperature required to maintain a viscosity of 250 to 1500 centipoise (cP).
 - c) The inlet filter screen in the pump base is restricted. Service as described in the Maintenance section of this manual.
 - d) An inlet valve ball and/or seat gasket that does not properly seat will permit some of the proportioned material to flow back towards the supply drum. When this happens, the proportioning pump will not pump the proper volume of material during the discharge stroke and an off-ratio condition will result. This malfunction will appear almost identical to cavitation, but somewhat less severe.
4. REVERSING MALFUNCTION- For the proportioning pumps to reverse direction, the ends of a slot machined in the rear leg of the pump yoke must contact the lever on the reversing switch assembly. The switch lever, in turn, pushes an arm on the reversing switch, which energizes one air valve coil and de-energizes the other. A problem arises when the yoke fails to contact the switch lever or when the spool in

the air valve fails to shift after its coil is activated. The most common causes of reversing malfunction are as follows:

- a) Something physically prevents the yoke from traveling its full stroke. Check for any physical obstruction and remove it.
 - b) Air pressure set too low. Increase the air pressure.
 - c) Failure of the valve coils to energize and de-energize. This failure is readily seen because the yoke will have physically switched the reversing switch, but the pump direction will not have reversed. If this occurs, the problem is either a malfunction in the reversing switch assembly, such as a faulty switch or loose wire, or a mechanical or electrical problem within the control valve, such as a faulty spool or valve coil.
5. **OVER-PRESSURE PROTECTION** - A 2200-psi pressure limit switch protects each proportioning pump. Upon reaching this pressure, the switch automatically removes power from both directional valves causing the pump to stall. When the power is removed, both directional indicator lights will go out, indicating there has been an over-pressure shutdown. When the pressure bleeds off to approximately 200 psi, the proportioning pumps will resume normal operation; however, the cause of the over-pressure condition should first be determined and corrected.

The most likely causes of over-pressure shut-down are as follows:

- a) A restriction in the gun on the high-pressure side.
 - b) Cavitation of the opposite pump.
 - c) Air pressure set too high.
6. **CONTROL TRANSFORMER FUSE**- With the incoming electrical power OFF and locked out at the source, open the electric console and remove the control transformer fuse. Check it for continuity or simply replace it. (See Figure 15.)

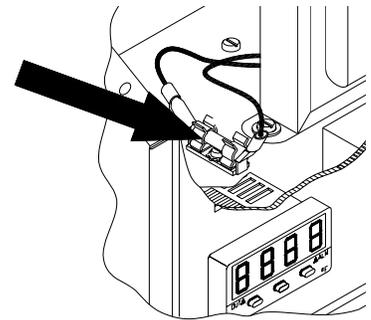


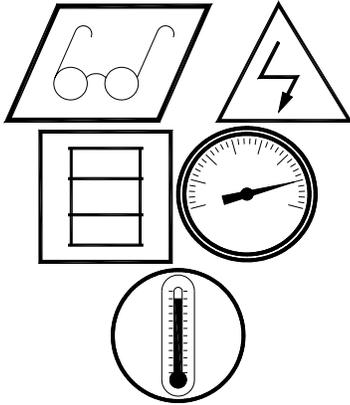
Figure 15. Transformer Fuse



WARNING: REPLACE THE FUSE WITH ONE OF THE SAME RATING. A SUBSTITUTE MAY DAMAGE THE EQUIPMENT AND CREATE A POTENTIAL SOURCE OF INJURY TO THE OPERATOR. IF THE FUSE FAILS A SECOND TIME, FIND AND CORRECT THE CAUSE OF THE FAILURE BEFORE CONTINUING PROPORTIONING UNIT OPERATION.

- 7. **PUMP YOKE ROLLER BEARINGS**- Occasionally the roller bearings on which the pump yoke travels will become clogged and seize up. Inspect and replace bearings as required.
- 8. **UPSTROKE OVER-PRESSURE**- The proportioning pump pressure is higher during the upstroke for both proportioning pumps due to the supply pump pressure. Adjust the upstroke regulator so that the proportioning pump pressures are equal on both strokes.
- 9. **AIR MOTOR ASSEMBLY** – The cylinder may require lubrication, or O-rings may be worn or damaged. DO NOT disassemble the air cylinder unless you have an O-ring kit on hand. Use only Lubriplate lubricant. Refer to the FF-18/18 Parts Identification Manual (P/N 17942-SPI-ID) for a detailed view.

Hose Heat System



To avoid unnecessary repairs, try the recommended solutions in the order given for each problem. Before assuming there is a problem, determine that all circuit breakers, switches, and controls are properly set. Turn off all switches, disconnect and lock out incoming power at the source, and allow the chemicals to cool before attempting these procedures.

<u>Problems</u>	<u>Solutions</u>
Hose warm but does not reach temperature or takes too long to reach temperature	1, 2, 8, 11
Hose does not heat; Red Light on Controller is lit.	2, 3, 4, 5
Hose Heat Circuit Breaker trips or fuse blows	2, 11
Hose temperature not maintained during flow	1, 2, 7, 8
Hose or hoses adjacent to the unit are warm - hoses downstream are cold	4
Controller displays the code LLer	9, 10
Controller displays the code SbEr	6, 9, 10

SOLUTIONS

1. HOSE LENGTH- The design of the FF 18/18 hose heater allows it to operate with up to 310 feet of hose. Hose lengths greater than that reduce the ability of the hose heat to reach temperature. (See Initial Machine Set up) In addition, if chemical or ambient temperature is too cold, the hose circuit may not have enough power to bring the chemical up to temperature.
2. HOSE HEAT POWER SET - Ensure that the power set is adjusted to 45-50 amps (do not exceed 50 amps).
3. HOSE HEAT FUSE- With electrical power OFF, remove the fuse and check it for continuity or simply replace it with one known to be good.



WARNING: REPLACE THE FUSE WITH ONE OF THE SAME RATING. A SUBSTITUTE MAY DAMAGE THE EQUIPMENT AND CREATE A POTENTIAL SOURCE OF INJURY TO THE OPERATOR. IF THE FUSE FAILS A SECOND TIME, FIND AND CORRECT THE CAUSE OF THE FAILURE BEFORE CONTINUING PROPORTIONING UNIT OPERATION.

4. HOSE HEATING ELEMENT- With the power set adjusted full counterclockwise and the hose heat circuit breaker and main switch OFF, check to see that the Power-Lock connectors on the hoses and all electrical connections between the hoses and proportioning unit are tight. If these connections are secure and hose heat is not present, then make a systematic search for the electrical fault as follows:
 - a) Starting at the gun whip hose, unplug the Power-Lock connectors and plug the hose jumper plug into the last “upstream” segment of hose.
 - b) Turn ON the main switch and hose heat circuit breaker and adjust the power set (clockwise) to 45-50 amps;
If hose heat is restored, then the fault is within the gun whip hose.

If hose heat is not restored, adjust the power set full counterclockwise, and then

turn OFF the hose heat circuit breaker and main switch and proceed with the steps below:



WARNING: THE HOSE HEAT TRANSFORMER VOLTAGE MUST BE SET TO MATCH THE HOSE LENGTH IN USE. TOO MUCH POWER WILL CAUSE THE HOSE HEAT CIRCUIT FUSE TO FAIL. TOO LITTLE POWER WILL RESULT IN INSUFFICIENT HOSE HEATING.

- c) Adjust the tap settings of the hose heat transformer to match the next shortest length of heated hose (see *Hose Heat Power Pack* on page 15).
- d) Unplug the next set of Power-Lock connectors and plug the hose jumper plug into the last “upstream” segment of hose.
- e) Turn ON the main switch and hose heat circuit breaker and adjust the hose heat power control to 45-50 amps;
If hose heat is restored, then the fault is within the last unplugged segment of hose.

If hose heat is not restored, adjust the hose heat power set full counterclockwise, turn OFF the hose heat circuit breaker and main switch and repeat Steps c) through e) until the fault is located.

- 5. DIGITAL HOSE HEAT SOLID STATE RELAY (SSR)- It is not possible to check for normal operation of the SSR without electric power. Therefore, if all other testing fails to determine the source of problem, assume the SSR is inoperative and replace it.

IMPORTANT: In order for the solid state relays located inside the electrical console to operate properly, their excess heat must be passed off to the heat sink mounted on the console rear. The heat sink is cooled with exhaust air from the air cylinder, thereby cooling the SSRs. Do not disconnect the ventilation hoses or obstruct air flow to the heat sink or damage to the SSRs will result.

MANUAL HOSE HEAT CONTROL: - The automatic hose heating system can be bypassed to allow for manual control of the hose heater. This feature will allow for continued operation of the hose heating system in the event of signal or SSR failure. To convert to manual control, proceed as follows:

- a) Turn OFF the hose heat circuit breaker and main switch. Switch OFF and lock out incoming power at the source.
- b) Adjust the tap settings of the hose heat transformer to match the next shortest length of heated hose than that in use (see *Hose Heat Power Pack* on page 15).



WARNING: THE TERMINAL JUMPER MUST NEVER BE USED ON THE PRIMARY HEATER SOLID STATE RELAY (SSR). THIS WILL RESULT IN COMPLETE LOSS OF CONTROL AND CAUSE DAMAGE TO THE EQUIPMENT OR SERIOUS BODILY INJURY.

- c) Install the terminal jumper strip across terminals #1 and #2 on the hose heater SSR.
- d) Manual Hose Heat control requires the installation of a hose thermometer. Insert the thermometer through the sponge so that the stem follows the twist of the hoses and lies between the butyl inner hose and the outer sponge insulation. This gives the most accurate temperature indication. The thermometer should be located on the end of the hose nearest the gun in a position where the operator can see it while spraying.

- e) Maintaining hose temperature now requires manual adjustment of the hose heat power set. Restore electrical power, switch ON the main switch and hose heat circuit breaker. Adjust the power set clockwise to a maximum of 50 amps for initial warm up.
- f) Monitor the thermometer for proper spray temperature and adjust the power set as required.

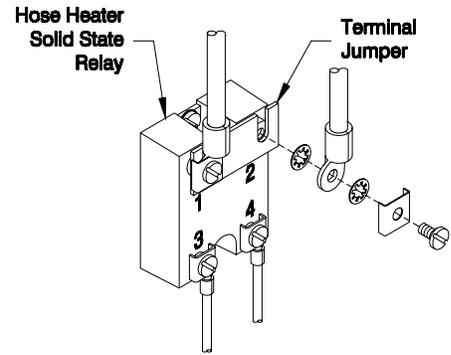


Figure 16. Terminal Jumper Placement



WARNING: DO NOT ALLOW HOSE TO OVERHEAT DURING MANUAL CONTROL OF THE HOSE HEAT SYSTEM. HOSE TEMPERATURE, AS INDICATED BY A PROPERLY INSTALLED HOSE THERMOMETER, MUST NOT EXCEED **170 °F (76 °C)**. CLOSELY MONITOR HOSE TEMPERATURE TO AVOID PERSONAL INJURY AND/OR DAMAGE TO PROPERTY.

6. TEMPERATURE SENSING UNIT (TSU)- Two conditions must be satisfied for proper operation:
 - The sensor must be functional.
 - The signal must travel uninterrupted from the sensor to the control unit.
 Unplug the TSU from its extension. Without undoing any chemical connections, move the hose section with the TSU to the proportioning unit, plug the TSU directly into the TSU extension harness, restore electrical power and energize the hose heat circuit. If control is not restored, change the TSU. If control is restored, systematically check each section of the TSU wire harness out to the gun.
7. PRIMARY HEAT AND HOSE HEAT SETTINGS- The purpose of the hose heat system is not to add heat but rather to maintain the temperature developed by the primary heater. If it appears that the hose heat system is not maintaining temperature during flow, check that the primary heater and hose heat controllers are set for the proper temperatures or reduce the output.
8. LOW LINE VOLTAGE- The hose heat system operates at 220 Volts. Low line voltage will significantly reduce power available and the heater will not perform to its full capability at maximum hose length. A qualified electrician should determine the secondary amperage of the hose heat circuit and adjust the tap setting as required to achieve 45-50 amps.
9. REVERSED TSU CONNECTION- With the main switch primary heater and hose heater circuit breakers OFF, change the sensor leads on terminal numbers 1 and 2.
10. SENSOR TYPE MISMATCHED- The preprogrammed controller operates with a type “E” Thermocouple only. Ensure that only an SPI or Gusmer supplied TSU is used.
11. HOSE HEAT TRANSFORMER TAP SETTING- The transformer voltage is adjustable to accommodate between 35 ft. and 310 ft. of hose. Ensure that the proper tap setting is selected for the hose length in use (*see Hose Heat Power Pack on page 15*).



MAINTENANCE

To realize the full productivity and maximum service life from the FF 18/18, it is necessary to perform certain maintenance procedures daily or periodically.

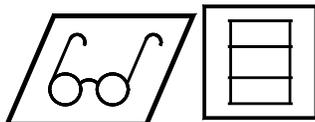


WARNING: THE MAINTENANCE SECTION OF THIS MANUAL ASSUMES THAT THE INDIVIDUAL PERFORMING THE WORK ON THE EQUIPMENT IS QUALIFIED TO DO SO. THIS INDIVIDUAL MUST HAVE A WORKING KNOWLEDGE OF BASIC ELECTRICITY, HYDRAULICS AND PNEUMATICS; MUST FOLLOW ALL GENERALLY ACCEPTED SAFETY PRECAUTIONS USED WHEN WORKING WITH HYDRAULICS, PNEUMATIC AND ELECTRO-MECHANICAL EQUIPMENT; MUST HAVE READ AND UNDERSTOOD THE APPLICABLE SECTIONS OF THIS MANUAL; AND MUST WEAR PERSONAL PROTECTION APPROPRIATE TO THE TASK BEING UNDERTAKEN.



WARNING: UNLESS OTHERWISE NOTED, ALL MAINTENANCE DESCRIBED IN THIS MANUAL MUST BE DONE WITH THE INCOMING POWER SWITCHED OFF AND LOCKED OUT AT THE SOURCE. ANY ELECTRICAL TROUBLESHOOTING REQUIRED BEYOND THE SCOPE OF THIS MANUAL MUST BE DONE BY A QUALIFIED ELECTRICIAN.

Proportioning Pumps



When the proportioning pumps are functioning properly, it is not unusual for a trace amount of resin or isocyanate chemical to seep past the pump packing onto the pump shaft. Maintain proper packing adjustment to minimize seepage. Routinely inspect the shaft and wipe away any residue when the proportioner is turned off. Disassemble and clean both proportioning pumps annually. Inspect the pistons and cylinders for mars or scratches, which may cause leakage or damage to packings. As a preventive maintenance precaution, Gusmer recommends replacement of the piston and cylinder packings during the annual cleaning. (Refer to the Proportioning Pump Assembly section of the Parts I.D. for reference.)

WARNING: AFTER REASSEMBLING OR SERVICING THE PROPORTIONING PUMPS, TORQUE THE CYLINDER TOP HEX NUTS TO 10 FT/LBS.

Pump Bases

Disassemble and clean both pump bases annually as follows:
(Refer to the Pump Base Assembly section of the Parts I.D. for reference.)

1. Bleed all chemical pressures to zero.
2. Remove the valve cover using an adjustable wrench.

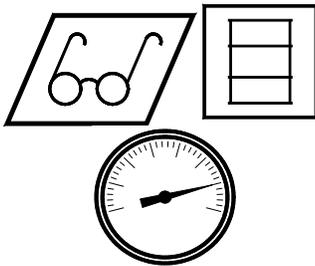
Inspect the valve cover o-ring and replace as required. Liberally coat the o-ring with Lubriplate grease before installing the valve cover back into the pump base. Also, check the chamfer around the cavity to ensure that there are no sharp edges, which could damage the o-ring and prevent proper seal.

3. Remove the valve ball and inspect it for nicks and scratches. Replace as required.

Remove the ball seat with the special tool provided and inspect it for nicks and scratches. Replace as required.

4. Inspect the face of the gasket for damage and replace as required. Reassemble the pump base.

Inlet Filter Screen



A filter screen in each proportioning pump traps solid matter that could adversely effect the operation of the ball check valves in the pump base. Both screens should be inspected daily and cleaned as required, as indicated in the Daily Start-up procedure.

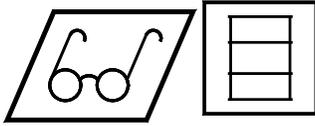
The isocyanate component can crystallize from either moisture contamination or from freezing. If the chemicals received are clean and if proper storage, transfer, and operating procedures are followed, there should be minimal contamination of the isocyanate screen. In practice though, it is good preventative maintenance to clean the isocyanate screen daily.

IMPORTANT: *Clean the isocyanate pump screen during the start-up procedure only. This will minimize moisture contamination problems by immediately flushing out any isocyanate residue at the start of the dispensing operation.*

Remove and clean the filter screen as follows:

1. Switch OFF the pump switch and disconnect air from the proportioning unit. With the gun removed, point the coupling block into an appropriate container, open the corresponding manual valve of the side to be worked on and bleed chemical pressure to ZERO.
2. Disconnect the transfer pump air supply and close the material inlet supply valve of the appropriate proportioning pump. This prevents pumping of material with the screen screw removed.
3. Place a rag beneath the filter base to catch the drain-off of chemical when removing the screen screw.
4. Loosen the screen screw just enough to allow the material in the screen screw cavity to drain out onto the rag.
5. Unthread the screen screw and remove it from the pump base.
6. Remove the retainer ring at the end of the screen screw and slide the screen from the screen screw. Thoroughly flush the screen screw, the retainer ring, and the screen with gun cleaner, and allow to dry. Inspect the screen to ensure the mesh is not restricted. Replace as required.
7. Slide the screen on the screen screw and replace the retainer ring.
8. Flush the cavity in the pump base with gun cleaner and wipe the cavity clean, using caution not to push foreign matter into the ball seat.
9. Install the screen screw assembly into the pump base by inserting the screen screw with the threaded portion sliding along the top cavity. This prevents foreign matter from entering into the ball seats. Thread the screen screw securely into the pump base.
10. Reconnect the transfer pump air supply and open the material inlet supply valve. Ensure there are no leaks and wipe the equipment clean.

Isocyanate Pump Lubricant



To ensure that the pump lubricant will do its job, check its condition daily. Change the lubricant before it becomes a gel, or when its color darkens as it becomes diluted with isocyanate.

Gel formation is due to moisture absorption by the pump lubricant. The time interval between changes due to gel formation will depend on environmental conditions in which the equipment is operating. The enclosed lubrication system of the FF 18/18 minimizes exposure to moisture, but moisture contamination is still possible.

Discoloration of the lubricant is due to continual seepage of small amounts of isocyanate past the pump packing during operation. However, if the packing within the isocyanate pump is functioning properly, pump lubricant replacement due to discoloration should not be more frequent than 3 or 4-week intervals.

To change the pump lubricant, proceed as follows:

1. Stop the proportioning unit with the pump yoke at the top of its stroke. Switch OFF the pump switch and disconnect the air from the proportioning unit.
2. Lift the lubricant reservoir out of the bracket and remove the cap from the container. Holding the cap over a suitable container, remove the check valve and allow the lubricant to drain. Reattach the check valve to the inlet hose.
3. Drain the reservoir and flush it with clean lubricant.
4. With the reservoir flushed clean, fill with fresh Gusmer pump lubricant.
5. Thread the reservoir onto the cap assembly and place it into the bracket.
6. Push the larger diameter supply tube approximately 1/3 of the way down into the reservoir.
7. Push the return tube down into the lube reservoir until it reaches the bottom.

IMPORTANT: *The larger diameter supply tube must be at the upper level of the reservoir and the return tube at the lower level of the reservoir. This ensures that any isocyanate crystals will settle to the bottom of the reservoir and not return to the isocyanate pump shaft.*

The lubrication system is now ready for operation. No priming is required.

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1	Date	Enter date report is submitted.
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3	IM Number	Enter the Part Number of the Instruction Manual from the title page.
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