

Instructions – Parts List



**55 GALLON (200 LITER) DRUM SIZE
6-1/2" DUAL POST**

Global Ram

310523 rev.N

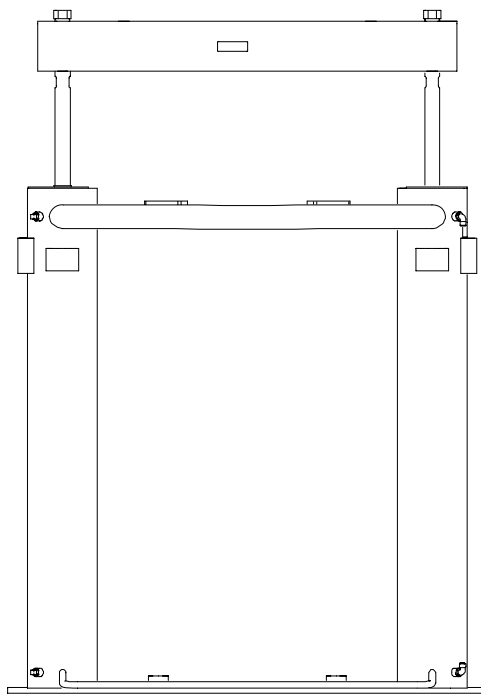


Important Safety Instructions

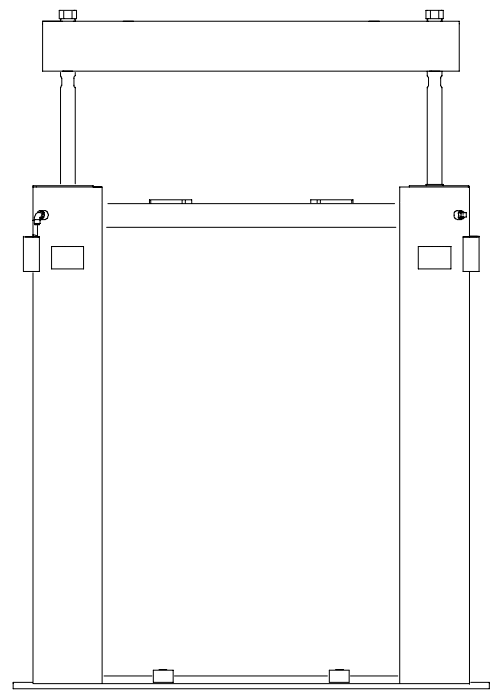
**Read all warnings and instructions in this manual.
Save these instructions.**

See page 2 for Table of Contents.

See page 2 for model numbers and maximum working pressures.



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Models

Part No.	Series	Description	Maximum Inlet Pressure, psi (MPa, bar)
233087	B	Air-Powered Ram	125 (0.9, 8.8) [air]
243785	A	Ram Air Control Module	125 (0.9, 8.8) [air]
253137	A	Pneumatic Control	125 (0.9, 8.8) [air]
297401	A	Stand Alone Air Control Kit	125 (0.9, 8.8) [air]
918420	B	Hydraulic-Powered Ram	225 (1.6, 16) [hydraulic]
918510	A	Hydraulic Power Supply Module	75 (0.53, 5.3) [air]

Symbols

Warning Symbol



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

Caution Symbol



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

WARNING



MOVING PARTS HAZARD

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

- Keep clear of all moving parts when starting or operating the pump.
- Keep hands and fingers away from the ram plate, pump fluid inlet, and lip of the fluid container when raising or lowering the ram.
- Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 19 to prevent the equipment from starting unexpectedly.



SKIN INJECTION HAZARD

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

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate surgical treatment.**
- Do not point the gun/valve at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip/nozzle.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun/valve trigger safety operates before spraying.
- Lock the gun/valve trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedure** on page 19 whenever you: are instructed to relieve pressure; stop spraying/dispensing; clean, check, or service the equipment; and install or clean the spray tip/nozzle.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.

WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.
- Do not exceed 1.6 MPa (16 bar) (225 psi) maximum hydraulic ram pressure.
- Do not exceed 0.53 MPa (5.3 bar) (75 psi) maximum inbound air pressure to the hydraulic power supply's air valve.
- Do not exceed 0.87 MPa (8.7 bar) (125 psi) maximum pneumatic ram pressure.
- Never exceed the recommended working pressure or the maximum air inlet pressure stated on your pump or in the **Technical Data** on page 55.
- Be sure that all spray/dispensing equipment and accessories are rated to withstand the maximum working pressure of the pump. Do not exceed the maximum working pressure of any component or accessory used in the system.
- Route the hoses away from the traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82° C (180° F) or below -40° C (-40° F), except electrically heated hoses.
- Use fluids and solvents that are chemically compatible with the equipment wetted parts. See the **Technical Data** sections of all the equipment manuals. Always read the material manufacturer's literature before using fluid or solvent in this pump.
- Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturers.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.
- Read the Material Safety Data Sheet for Hydraulic Fluid, Form# 307766, and follow all applicable safety warnings for handling, use, and disposal of hydraulic fluid.

WARNING



FIRE AND EXPLOSION HAZARD

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

- Ground the equipment and the object being sprayed. Refer to **Grounding** on page 7.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop spraying/dispensing immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed/dispensed.
- Keep the spray/dispense area free of debris, including solvent, rags, and gasoline.
- Electrically disconnect all equipment in the spray/dispense area.
- Extinguish all open flames or pilot lights in the spray/dispense area.
- Do not smoke in the spray/dispense area.
- Do not turn on or off any light switch in the spray/dispense area while operating or if fumes are present.
- Do not operate a gasoline engine in the spray/dispense area.



TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.
- Avoid exposure to heated material fumes.
- Provide adequate ventilation.

WARNING



FIRE, EXPLOSION AND ELECTRIC SHOCK HAZARD


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




- Ground the equipment, the object being sprayed, and all other electrically conductive objects in the dispense area. Proper grounding dissipates static electricity generated in the equipment. See **Grounding** on page 7.
- Keep the dispense area free of debris, including solvent, rags, and gasoline.
- If there is any static sparking or you feel an electric shock while using the equipment, **stop dispensing immediately**. Do not use the equipment until you have identified and corrected the problem.
- Make sure all electrical work is performed by a qualified electrician only.
- Make sure all electrical equipment is installed and operated in compliance with applicable codes.
- Make sure power is disconnected when servicing and repairing equipment.
- Have any checks, installation, or service to electrical equipment performed by a qualified electrician only.

Typical Air–Powered Ram Installation

Grounding



WARNING



FIRE AND EXPLOSION HAZARD
Before operating the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 5.

1. *Pump:* use a ground wire and clamp. See Fig. 1. Loosen the grounding lug locknut (W) and washer (X). Insert one end of a 1.5 mm² (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. See the **Accessories** section to order a ground wire and clamp.

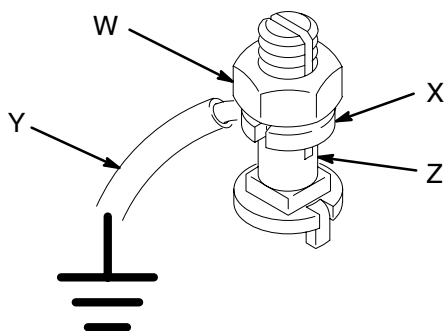


Fig. 1

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2. *Air hoses:* use only electrically conductive hoses.
3. *Fluid hoses:* use only electrically conductive hoses.
4. *Air compressor:* follow the air compressor manufacturer's recommendations.
5. *Spray gun/dispense valve:* ground through connection to a properly grounded fluid hose and pump.
6. *Fluid supply container:* follow your local code.
7. *Object being sprayed:* follow your local code.
8. *All solvent pails used when flushing:* follow 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 gun/valve firmly to the side of a grounded *metal* pail, then trigger the gun/valve.

Typical Air–Powered Ram Installation

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

NOTE: To convert the ram from air to hydraulic operation, contact your Graco representative for details.

Locating the Ram

NOTE: Refer to **Dimensions** on page 52 for ram mounting and clearance dimensions.

1. Select a convenient location for the equipment. Check that there is sufficient overhead clearance for the pump and ram when the ram is in the fully raised position. Make sure the air regulators for the pump and ram are fully accessible.
2. Level the base of the ram, using metal shims.
3. Using the holes in the base as a guide, drill holes for 1/2 in. (13 mm) anchors. Bolt the ram to the floor using anchors which are long enough to prevent the unit from tipping. Refer to **Dimensions** on page 52.
4. Mount the pump on the ram, following the applicable procedure (refer to **Mounting the Pumps**, at right).

Installing Accessories and Connecting Air Lines

Refer to the Typical Installation drawing (Fig. 3) on page 9.

- Install an air line filter (A) on the air supply line to remove harmful moisture and contaminants from the compressed air supply.

WARNING

The system bleed–type master air valve (C) and the air motor master air valve (E) are required in your system to relieve trapped air. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin and injury from moving parts.

- The air motor master air valve (E) is required in your system to relieve air trapped between it and the air motor when the valve is closed. This valve should be easily accessible and located downstream from the air regulator.
- The system bleed–type master air valve (C) is required in your system to shut off the air supply to the entire unit. Locate this valve upstream from all other air accessories.

Mounting the Pumps (Unheated)

NOTE: CM2100, DF2400, and DF1800 pump installations require Mounting Kit 222776. See **Accessories** on page 50. CM1000 and CM800 pump installations require an O-ring, 109465.

1. Place the gasket (K) from Mounting Kit 222776 on the ram plate. See Fig. 2. Lower the pump onto the gasket and plate. Secure the pump's intake flange to the plate with the screws (L) and lugs (M) included in the mounting kit (used with CM2100, DF2400, and DF1800 pumps).
2. Position the mounting brackets (57) under the base of the air motor. See the Typical Installation on page 9. Attach the motor to the mounting brackets with the screws (27) and washers (26) provided.

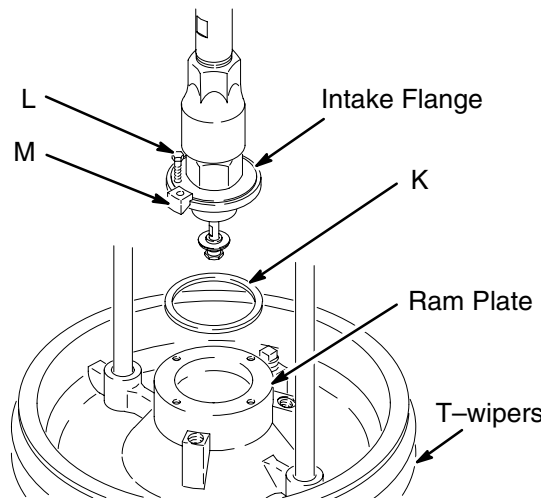


Fig. 2

Typical Air-Powered Ram Installation

KEY

A	Air Line Filter	H	Ram Blow-off Push Button Valve	Q	Ram Up/Down Lever
B	Air Inlet	J	Pump Mounting Bracket	R	Ram Module
C	System Bleed-Type Master Air Valve (required)	K	Depressurization Valve	S	Heated Ram Plate Assembly
D	Pump Air Regulator	L	Blow-off Air Regulator	T	Wipers
E	Air Motor Master Air Valve (bleed-type, required)	M	Pneumatic Control Panel	U	Drum Clamp
F	Electrical Control Panel	N	Ram Up Air Regulator	W	Main Power Disconnect Switch
G	Ram Plate Bleed Stick	O	Ram Down Air Regulator	Y	EasyKey Display and Keypad
		P	Pump Assembly	Z	Safety Relief Valve

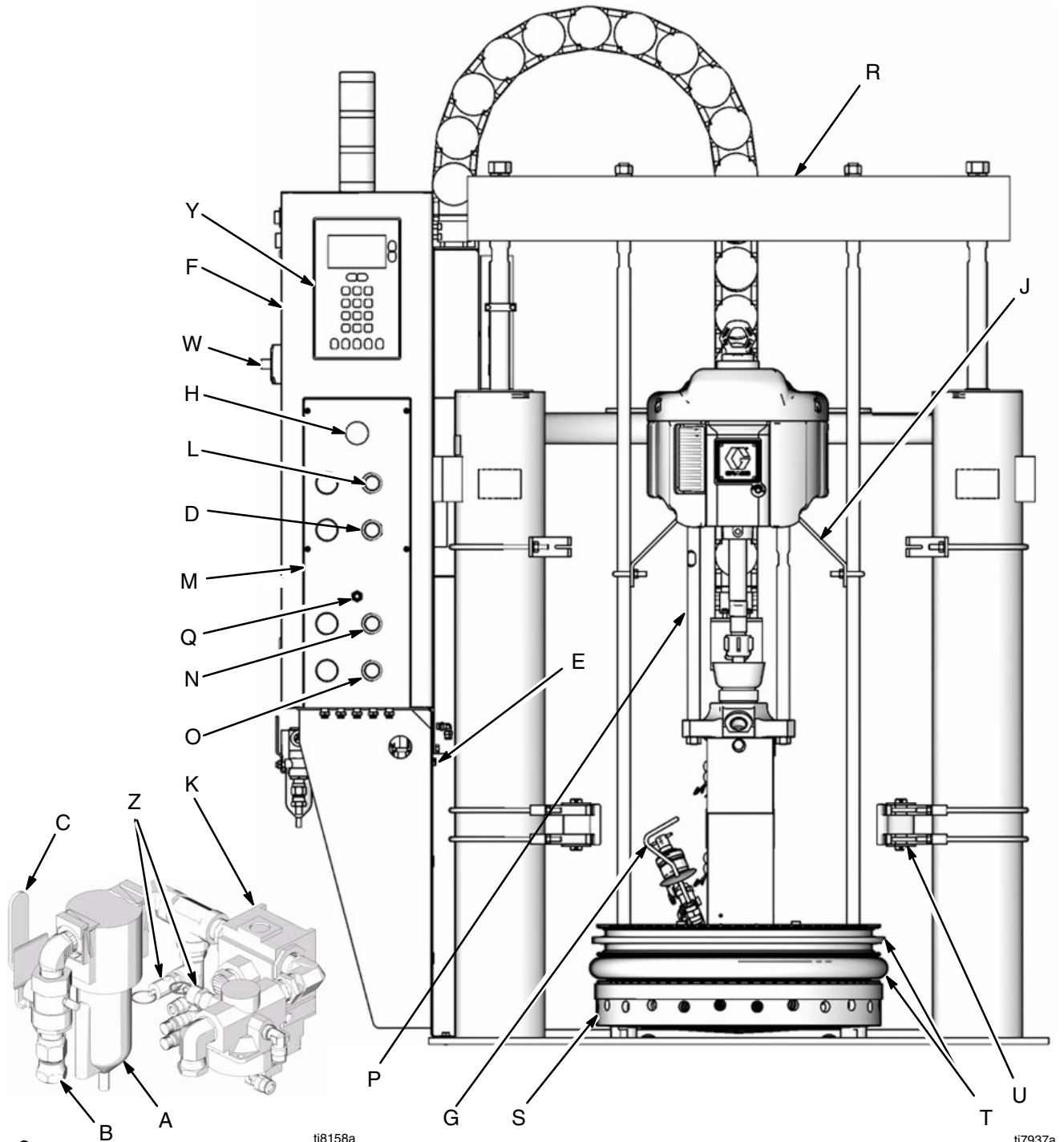


Fig. 3

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Typical Hydraulic Ram Installation

KEY

A	Air Line Filter	H	Ram Blow-off Push Button Valve	Q	Ram Up/Down Lever
B	Air Inlet	J	Pump Mounting Bracket	R	Ram Module
C	System Bleed-Type Master Air Valve (required)	K	Depressurization Valve	S	Heated Ram Plate Assembly
D	Pump Air Regulator	L	Blow-off Air Regulator	T	Wipers
E	Air Motor Master Air Valve (bleed-type, required)	M	Pneumatic Control Panel	U	Drum Clamp
F	Electrical Control Panel	N	Ram Up Air Regulator	V	Hydraulic Power Supply
G	Ram Plate Bleed Stick	O	Ram Down Air Regulator	W	Main Power Disconnect Switch
		P	Pump Assembly	Y	EasyKey Display and Keypad
				Z	Safety Relief Valve

Therm-O-Flow® Supply Unit Model shown with Hydraulic Powered Ram Module (918420)

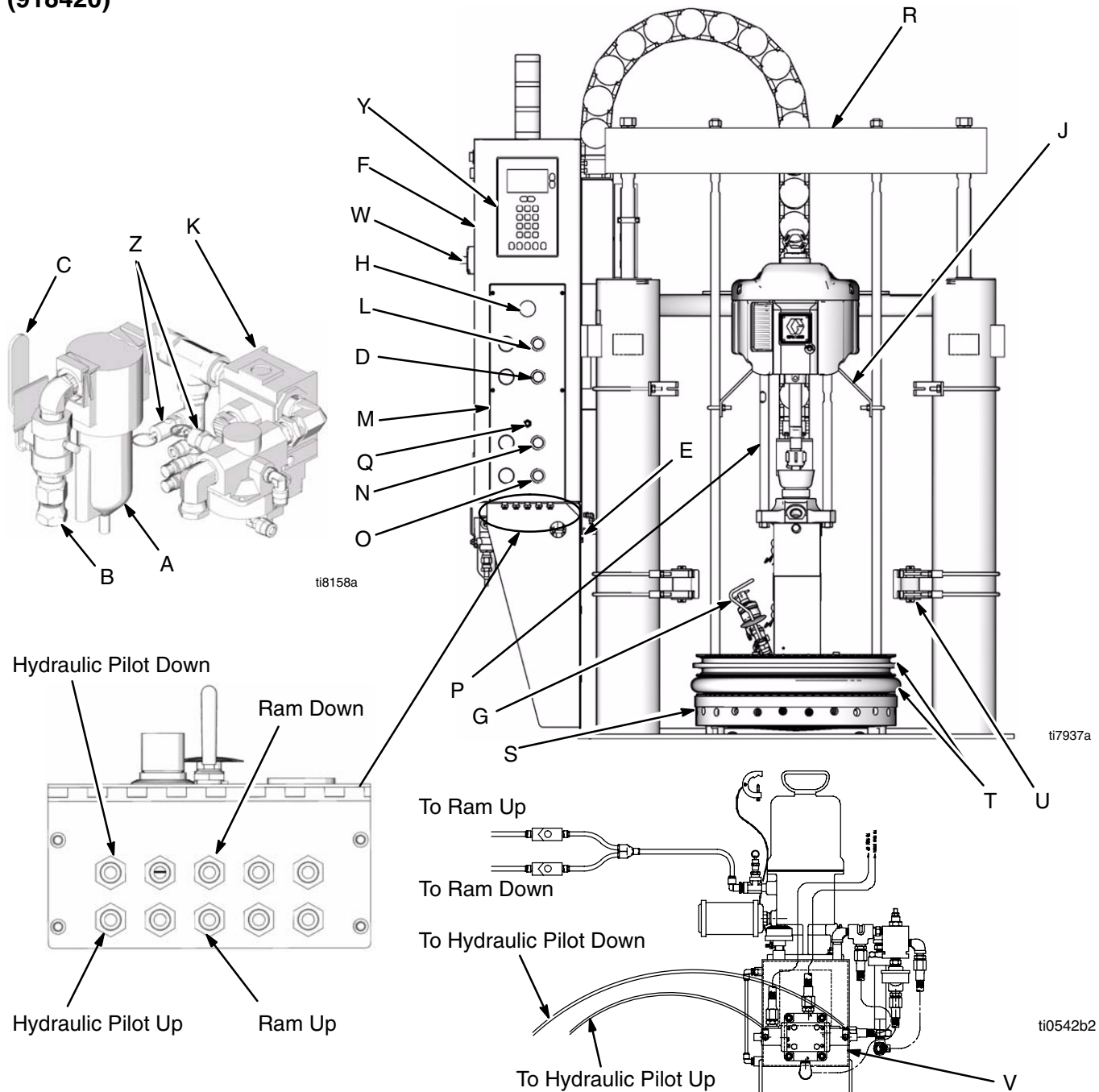


Fig. 4

Typical Hydraulic Ram Installation

The typical installation discussed below is only a guide for selecting and installing system components and accessories. Contact your Graco representative or Graco Technical Assistance for help in designing a system to suit your particular needs.

This ram extruder forces high viscosity fluids into the intake valve of the fluid pump.

Selecting a Location for the Ram and Hydraulic Power Supply

Refer to the Mounting and Clearance Dimensions drawings (Figs. 30 and 31 on pages 53 and 54) for mounting and clearance dimensions.

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

1. There should be sufficient space for installing and using the equipment.
 - Make sure there is sufficient overhead clearance for the material pump and ram when the ram is in the fully raised position.
 - If you are installing a vent hood, make sure there is sufficient horizontal clearance.
 - Make sure the air regulators for the pump and ram are fully accessible.
 - Make sure there is easy and safe access to an appropriate electrical power source. The National Electrical Code requires 3 feet of open space in front of the electrical panel.
 - Locate the hydraulic power supply in an area that:
 - has easy access for servicing and adjusting the hydraulic pressure on the supply unit
 - has sufficient clearance for the hydraulic lines that attach to the pump
 - will allow you to easily read the hydraulic fluid level gauge

2. Make sure you will be able to level the base of the ram using metal shims.
3. When you bolt the ram to the floor, the anchors should be long enough to prevent the unit from tipping. Refer to the Dimensional Drawing (page 53) for more information.
4. When installing a vent hood, make sure the ram is installed near a connection to the factory ventilation system.

Refer to the Ram Mounting and Clearance Dimensions drawing, Fig. 30 on page 53, for ram mounting and clearance dimensions.

5. Place the hydraulic power supply so there is easy access for servicing the unit.

System Accessories and Modules

Before you install the system you should be familiar with the parts discussed below. For more information, refer to Fig. 4 on page 10.

Air and Fluid Hoses

When installing a system, make sure:

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

Typical Hydraulic Ram Installation

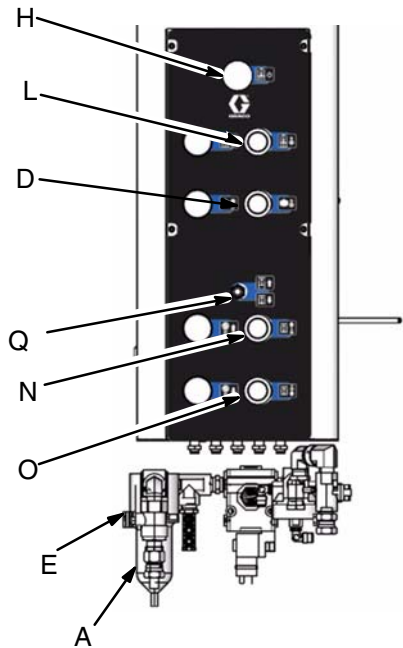
4-regulator Air Control Module (243785)

WARNING

The system bleed-type master air valve (C) and the air motor master air valve (E) are required in your system to relieve trapped air. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin and injury from moving parts.

See the Typical Installation drawing (Fig. 4) and Fig. 5. The following components are included with the module:

- The air motor master air valve (E, Fig. 4) is required in your system to relieve air trapped between it and the air motor when the valve is closed. This valve should be easily accessible and located downstream from the air regulator.
- The system bleed-type master air valve (C, Fig. 5) is required in your system to shut off the air supply to the entire unit. Locate this valve upstream from all other air accessories.



- Pump Air Regulator (D) controls pump speed and outlet pressure by adjusting the air pressure to the pump. It is located on the air control panel.
- Ram Air Regulators (N, O) control the air pressure to the hydraulic power supply that controls ram movement. There are separate air regulators to control the ram pressure in the up and down directions.
- Hydraulic Power Supply (Fig. 4, item V) controls the ram's movement.
- Ram Plate Blow-off Push Button Valve (H) controls the air pressure to the ram plate blow-off valve.
- Air Filter (A) conditions the air to the ram and the pump.

Air Line Accessories

- Pump runaway valve senses when the pump is running too fast and automatically shuts off the air to the motor. A pump that runs too fast can be seriously damaged.
- Accessory bleed-type air valve isolates the air line accessories for servicing. Locate upstream from all other air line accessories. This isolates the accessories for servicing.

Vent Hood Kit

The vent hood assembly is designed to efficiently draw fumes to the factory exhaust system during drum change-out. This assembly requires connection to a factory ventilation system that draws a minimum air flow of 8.4 m³/min (300 scfm). This kit is required for Polyurethane Reactive (PUR) applications.

Hydraulic Power Supply Module

The hydraulic power supply module delivers up to 39 liters per minute (10 gpm) at 66 cycles per minute for moving the ram cylinder rods.

Fig. 5

Typical Hydraulic Ram Installation

The installation procedure includes:

- installing the ram
- installing the hydraulic power supply
- grounding the system
- initially loading material

Installing the Ram

Follow the procedure below to install the ram. Refer to the ram mounting and clearance dimensions drawing (Fig. 30 on page 53) for ram mounting and clearance dimensions.

1. Select a convenient location for the equipment. Make sure there is sufficient overhead clearance for the pump and ram when the ram is in the fully raised position. Make sure the air regulators for the pump and ram are fully accessible.
2. Level the base of the ram, using metal shims.
3. Using the holes in the base as a guide, drill holes for 13 mm. (1/2") anchors. Bolt the ram to the floor anchors, which are long enough to prevent the unit from tipping. Refer to the Dimensional Drawing on page 53.

Installing Hydraulic Power Supply

Follow the procedure below to install the hydraulic power supply. See the Dimensional Drawing in Fig. 31 on page 54 for more information.

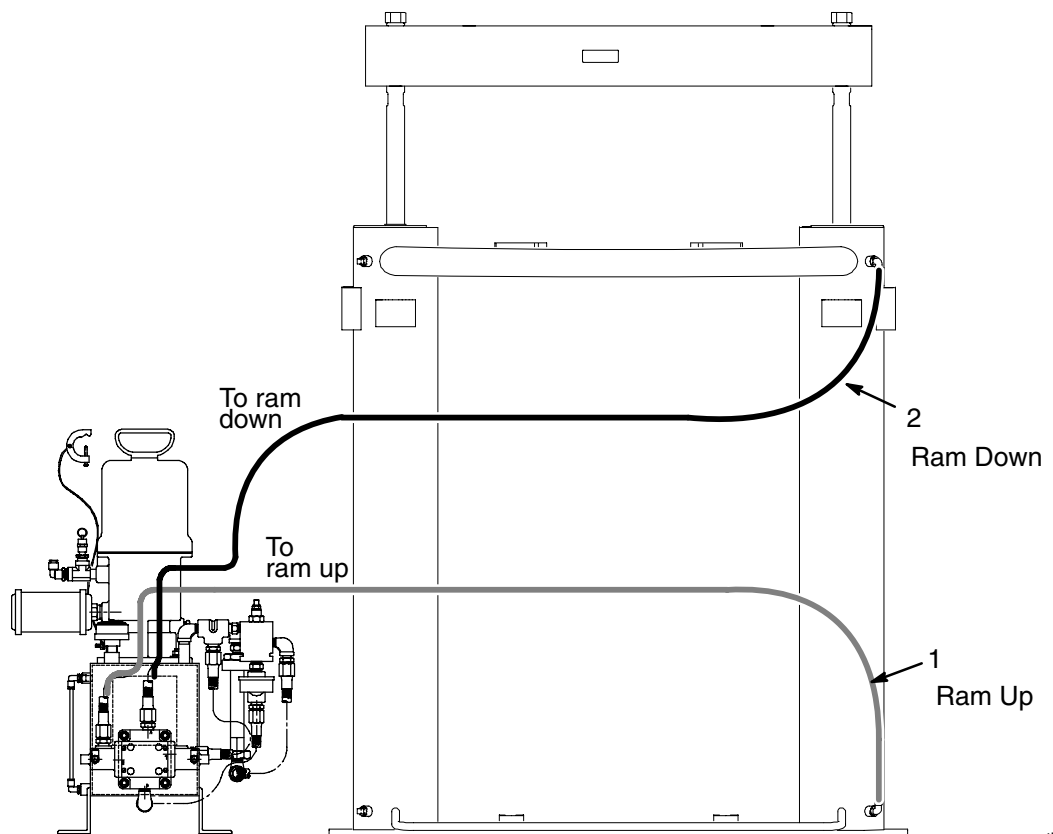
Bolting Hydraulic Power Supply to the Floor

1. Select a convenient location for the power supply. Make sure there is sufficient room to service the unit. Make sure the air and hydraulic lines can be easily connected to the supply unit.
2. Level the base of the hydraulic power supply, using metal shims.
3. Using the holes in the base as a guide, drill holes for (3/8") anchors. Bolt the hydraulic power supply to the floor anchors, which are long enough to prevent the unit from tipping.

Connecting Hydraulic Hoses to Ram

Connect the hydraulic lines from the hydraulic power supply to the ram (Fig. 6).

1. Connect the RAM DOWN hydraulic line (1) to the RAM DOWN connector on the side of the ram.
2. Connect the RAM UP hydraulic line (2) to the RAM UP connector on the side of the ram.



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Fig. 6

Typical Hydraulic Ram Installation

Connecting Ram Air Hoses to Hydraulic Supply

Connect the air hoses from the air control to the hydraulic supply (Fig. 7). See page 47 for a schematic drawing of the connection between the ram air control and the ram.

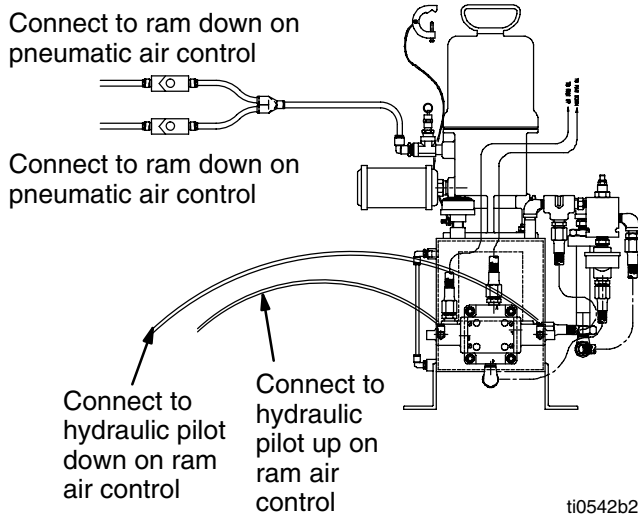


Fig. 7

1. Connect the RAM DOWN line on the hydraulic supply to the RAM DOWN bulkhead on the pneumatic box.
2. Connect the RAM UP line on the hydraulic supply to the RAM UP bulkhead on the pneumatic box.
3. Connect the hydraulic pilot down line to the hydraulic pilot down bulkhead on the pneumatic box.
4. Connect the hydraulic pilot up line to the hydraulic pilot up bulkhead on the pneumatic box.
5. Use the ram hand valve lever (Fig. 8) to raise the ram to the UP position. If the ram goes down instead of up, check your hydraulic line and air line connections, you may have incorrectly connected the lines.
6. After you have determined the hydraulic lines and air lines are connected correctly, run the ram up and down 5 or 6 times to bleed air from the hydraulic lines.

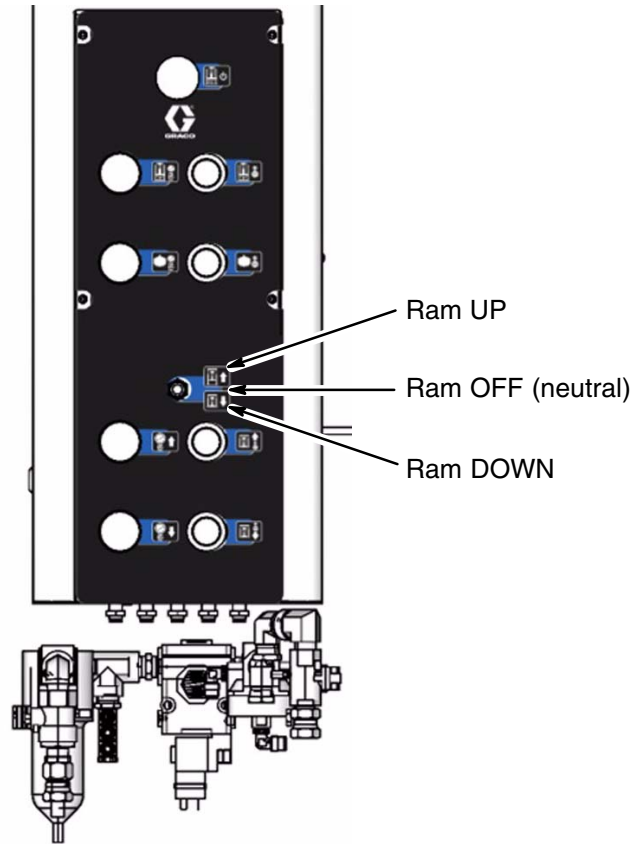


Fig. 8

Checking the Hydraulic Fluid Level

Check the hydraulic fluid level in the supply unit (Fig. 9). It should be approximately 51–102 mm (2 – 4”) from the top of the fluid level gauge (3). If necessary, add more hydraulic fluid, through the breather hole (4) (Graco part# 169236).

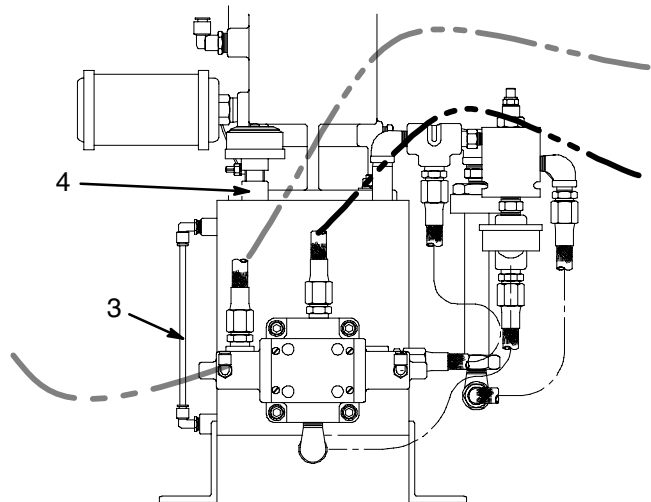






Fig. 9

Typical Hydraulic Ram Installation

Grounding

**WARNING**



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
Before operating the pump, ground the system as described in the documentation for your supply unit, or in the system documentation.

Also read and follow the warnings on page 6.

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

To order a ground wire and clamp, order part# 222011.

For more information about the President™ Pump, see Form# 308485.

To ground the hydraulic power supply unit's pump, connect the ground wire and clamp to a true earth ground as shown in Fig. 10:

1. Loosen the grounding lug locknut (W) and washer (X).
2. Insert one end of the 1.5 mm² (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely.

3. Connect the other end of the wire to a true earth ground.

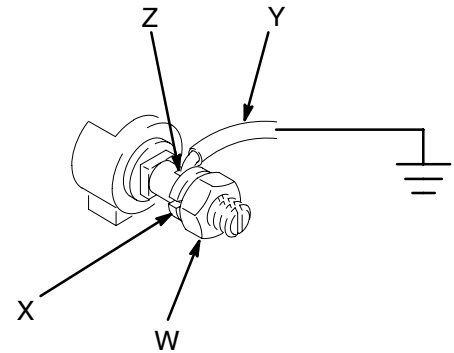


Fig. 10

You must also provide an earth ground to the supply unit's electrical control box. Make sure the ram is installed correctly to ensure that the ram is properly grounded.

For information about grounding other components in your system, see the system or supply unit documentation, as well as the documentation for individual components.

Typical Hydraulic Ram Installation

Starting Up Hydraulic Ram for the First Time

⚠ WARNING



PRESSURIZED EQUIPMENT HAZARD
To help reduce the risk of injury or equipment damage:

- Do not pressurize the system until you have verified the system is ready, and it is safe to do so.
- Make sure all material hose connections and hydraulic hose connections are secure.



Do not exceed 0.53 MPa (5.3 bar) (75 psi) maximum inbound air pressure to the hydraulic power supply. Exceeding the pressure can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

Ram down pressure is controlled by the inline hydraulic fluid regulator. Before you start up the hydraulic ram, you must determine the amount of air pressure needed to produce the desired hydraulic pressure.

The maximum hydraulic pressure you can set is 1.6 MPa (16 bar) (225 psi). Use Fig. 11 as a guide for setting the regulator.

You need these tools:

- 9/16" open-end wrench
- 5/32" hex key

Hydraulic Down Pressure

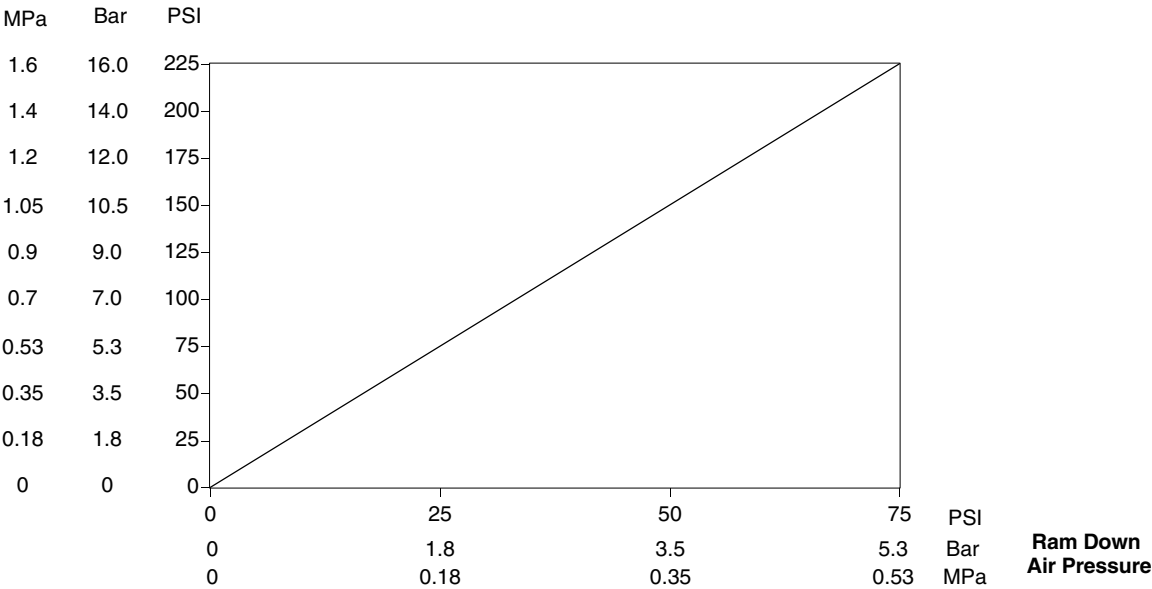


Fig. 11

Typical Hydraulic Ram Installation

Starting Up Hydraulic Ram for the First Time *(continued)*

1. Check all air lines, hydraulic lines, and fittings to insure tightness and to prevent any air or hydraulic fluid leakage.
2. Check all system air and hydraulic lines. Make sure that all routing of air and hydraulic lines will not interfere with any moving components within the fixture.

WARNING



PRESSURIZED EQUIPMENT HAZARD

Do not exceed 1.6 MPa (16 bar) (225 psi) maximum inbound hydraulic pressure to the ram. Exceeding the pressure can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

3. Set the hydraulic fluid regulator (Fig. 12):
 - a. Loosen the locking nut (5) with a 9/16" wrench/
 - b. Set fluid pressure to the desired pressure by turning the regulator set screw (6) with a 5/32" hex key. Watch the fluid pressure gauge (7) for changes.
 - c. Tighten the locknut (5).
4. Raise the ram, using the following procedure:
 - a. Close all air regulators.
 - b. Move the ram hand valve lever to the UP position.
 - c. Slowly open the air regulators until the ram starts to move upwards. Do not apply more than 0.53 MPa (5.3 bar) (75 psi) inbound air pressure to the hydraulic supply.

If the ram does not move in the expected direction, make sure that you have correctly connected the hydraulic lines and air lines. For more information, go back to the procedure for **Installing Hydraulic Power Supply** on page 13.

 - d. Raise and lower the ram 5 or 6 times to bleed air from the hydraulic system.
5. Check the hydraulic fluid level (3) on the hydraulic supply unit (Fig. 13). Add more hydraulic fluid, if necessary.
6. After bleeding air from the hydraulic system, raise the ram plate above the height of the material drum to be used, then move the ram hand valve lever to OFF.

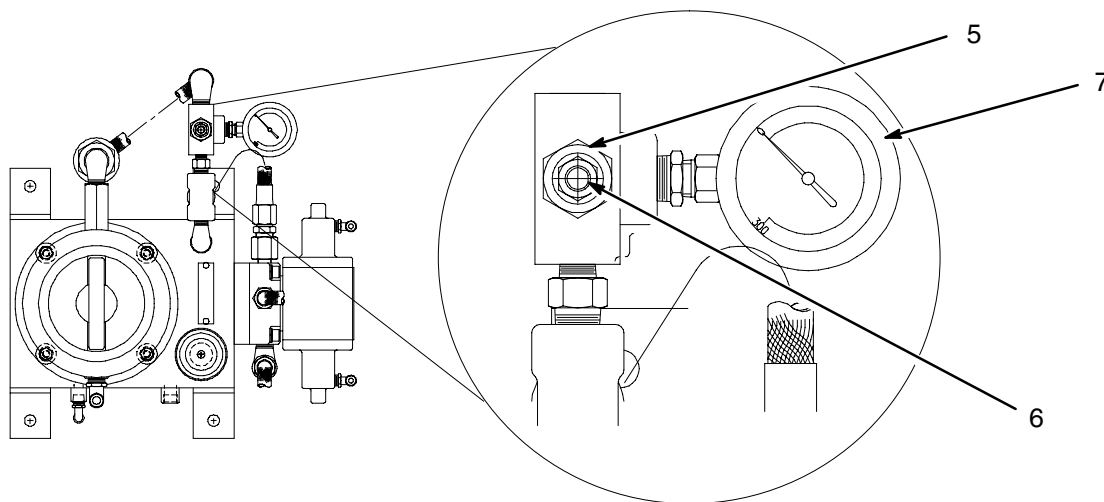


Fig. 12

Typical Hydraulic Ram Installation

Changing Hydraulic Fluid Filter

The filter element of the hydraulic fluid assembly (8) may become clogged with manufacturing residue after the first 40 hours of operation. So after the first 40 hours of operation, change the filter element. For regular inspection frequency information about the hydraulic fluid filter assembly, see page 39.

For information about starting up the rest of the system, see your system or supply unit documentation.

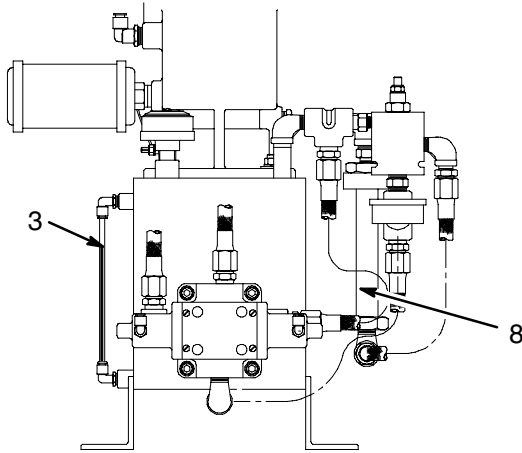


Fig. 13

Air-Powered Ram Operation

Pressure Relief Procedure

WARNING



SKIN INJECTION HAZARD

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

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

NOTE: See page 9 for the following items on the air powered ram.

1. Lock the gun/valve trigger safety.
2. Shut off and the air to the pump.
3. Close the bleed-type master air valves (C, E, required in your system).
4. Unlock the gun/valve trigger safety.
5. Hold a metal part of the gun/valve firmly to the side of a grounded metal pail, and trigger the gun/valve to relieve pressure.
6. Lock the gun/valve trigger safety.
7. Open the drain valve (required in your system) and/or the pump bleeder valve, having a container ready to catch the drainage.
8. Leave the drain valve open until you are ready to spray/dispense again.

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

Before Pumping Fluid

WARNING



MOVING PARTS HAZARD

Keep hands and fingers away from the priming piston, ram plate, pump fluid inlet, and lip of the fluid container when raising or lowering the ram and whenever the pump is charged with air. Moving parts can amputate a hand or finger. Follow the **Pressure Relief Procedure** at left before checking or repairing the ram or any other part of the system and when shutting down the system.

1. Move the hand valve lever (page 9, item Q) to the center position (OFF). Close the ram air regulator and main air control valve.
2. Move the hand valve lever to UP. Open the main air control valve and ram air regulator until the ram starts to move upward. Let the ram rise to its full height.
3. Set a full drum of fluid on the ram base, slide it back against the drum stop (if supplied), and center it under the ram plate. See the Typical Installation on page 9 and the Accessories section for drum clamps (U) that center, hold, and properly align the drum with the ram.

NOTE: Do not use drums that have side bungs or large dents with this ram. Rough bung openings or large dents will damage the wipers or stop the ram plate, resulting in a runaway pump or an overpressurized drum.

4. Move the hand valve lever to the DOWN position and lower the ram until the ram plate is just ready to enter the drum, then move the valve to OFF. Reposition the drum so the wipers will not hit the drum lip, then open the vent valve (G) on the ram plate.
5. Move the hand valve lever to the DOWN position, lower the ram plate until all air is forced out and fluid comes out of the vent opening. Then move the hand valve lever to OFF and close the vent valve (G).
6. Set the air pressure to the ram at 50 psi (4 bar). Move the hand valve lever to the DOWN position. Start the pump (open the bleed-type master air valve and fluid dispensing valve). Let the pump run until the system is primed and all air is forced out. Close the bleed-type master air valve or fluid dispensing valve to stop the pump.

NOTE: Increase air pressure to the ram if the pump does not prime properly with heavier fluids. If fluid is forced out around the top wiper, ram pressure is too high and the air pressure should be decreased.

Air–Powered Ram Operation

How to Use the Ram

1. To pump fluid from the drum, move the hand valve lever to the DOWN position and start the pump. Always use the lowest air pressure possible to both the pump and ram.
2. To change drums, stop the pump and move the hand valve lever to UP. Push the air assist valve button (M) intermittently, just enough to keep the drum from raising off the floor, until the ram plate clears the top of the drum. When the ram reaches its maximum height, remove the empty drum and put a full drum in its place. Follow the procedure under **Before Pumping Fluid**, above.

Shutdown

1. Move the hand valve lever (Q) to the OFF position.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 19.

2. Shut off the air supply to the ram and pump.
Relieve the pressure.

Emergency Stop

1. To stop the ram from moving place the hand valve lever (Q) to the OFF position.
2. To stop the pump, close the air motor master air valve (E).

Inspection Frequency

Periodically (once a month), inspect the ram guide sleeves, rods and cylinders for wear or damage; replace all worn parts. See SERVICE section for instructions.

Hydraulic Ram Operation

Pressure Relief Procedure

WARNING



MOVING PARTS HAZARD

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

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



HOT SURFACE AND FLUID HAZARD

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



SKIN INJECTION HAZARD

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

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



HIGH PRESSURES CAN CAUSE SERIOUS PERSONAL INJURY. Be sure to **OPEN THE DISPENSE VALVE DURING SYSTEM HEATUP** to alleviate pressure which might occur in the system due to material expansion.

This procedure describes how to relieve pressure from the supply unit. Use this procedure whenever you shut off the dispenser/sprayer and before checking or adjusting any part of the system, to reduce the risk of serious injury.

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

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

9. If you want to relieve pressure in the ram, see the **Ram Pressure Relief Procedure** on page 27.

Hydraulic Ram Operation

Raising and Lowering the Ram

The ram hand valve on the ram air control has 3 positions (Fig. 14):

- Ram UP raises the ram
- Ram DOWN lowers the ram
- Ram OFF puts the ram in “neutral.” Moving the hand valve to OFF does not change the position of the ram, but it stops the pressure from attempting to move the ram either up or down.

NOTE: Do not apply more than 0.53 MPa (5.3 bar) (75 psi) inbound air pressure to the hydraulic power supply.

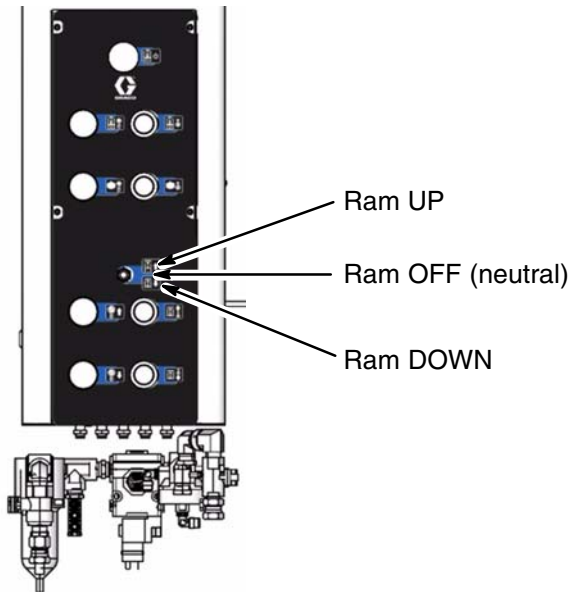


Fig. 14

Shutting Down

To shut down the ram:

1. Move the ram hand valve lever [(Q) in Fig. 15] to the OFF position. Shut off the air supply to the ram and pump.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 21).

2. Relieve the pressure.

Emergency Stop

Emergency stop the ram from moving by (Fig. 15):

- a. Closing the system master air valve (C).
- b. Moving the ram hand valve lever (Q) to the OFF position.

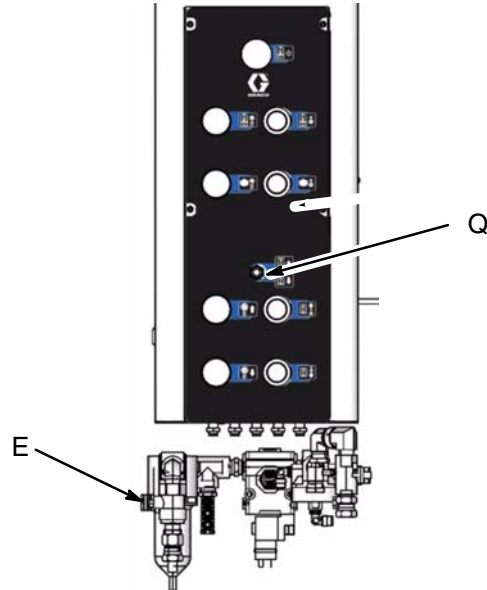


Fig. 15

Monthly Maintenance

Check the hydraulic fluid level (Fig. 16). Add more hydraulic fluid if the fluid level falls lower than 102 mm (4") from the top of the fluid level gauge (3).

1. Unscrew the breather (4).
2. Pour hydraulic fluid through the breather hole (13).
3. Replace the breather.

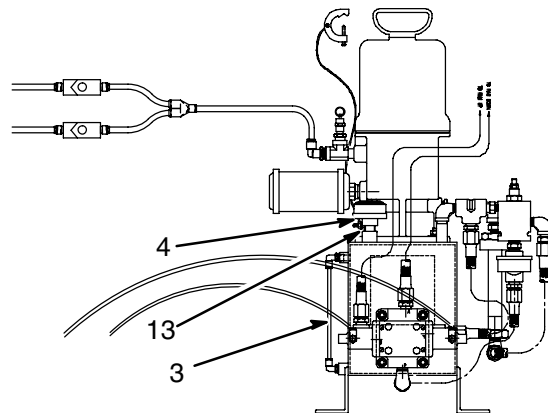


Fig. 16

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Air–Powered Ram Troubleshooting Chart

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 19.

1. **Relieve the pressure.**
2. Check all possible causes and problems before disassembling the pump.

PROBLEM	CAUSE	SOLUTION
Ram will not raise or lower.	Closed air valve or clogged air line.	Open, clear.
	Not enough air pressure.	Increase.
	Worn or damaged piston.	Replace.
	Hand valve closed or clogged.	Open, clear.
Ram raises and lowers too fast.	Air pressure is too high.	Decrease.
Air leaks around cylinder rod.	Worn rod seal.	Replace.
Fluid squeezes past ram plate wipers.	Air pressure too high.	Decrease.
	Worn or damaged wipers.	Replace.
Pump will not prime properly or pumps air.	Closed air valve or clogged air line.	Open, clear.
	Not enough air pressure.	Increase.
	Worn or damaged piston.	Replace.
	Hand valve closed or clogged.	Open, clear.
	Hand valve is dirty, worn, or damaged.	Clean, service.
Air hand valve will not hold drum down or push plate up.	Closed air valve or clogged air line.	Open, clear.
	Not enough air pressure.	Increase.
	Valve passage clogged.	Clean.

Hydraulic Ram Troubleshooting

Problem	Cause(s)	Solution(s)
Ram won't raise or lower or ram moves too slowly	Closed main air valve or clogged air line.	Open air valve, clear air line.
	Not enough pressure.	Increase ram pressure.
	Worn or damaged piston.	Replace piston. See page 29.
	Hand valve closed or clogged.	Open, clear hand valve or exhaust.
	Hydraulic valve is not working.	Replace hydraulic valve. See procedure on page 37.
	Hydraulic fluid regulator not working.	Replace hydraulic fluid regulator. See procedure on page 37.
	Hydraulic filter clogged.	Clean or replace hydraulic filter. See page 37.
	Low hydraulic fluid level.	Check for leaks. Refill reservoir. See page 22.
Ram raises or lowers too fast	Ram pressure too high.	Decrease ram pressure.
Hydraulic fluid leaks around cylinder rod	Worn rod seal.	Replace o-rings in guide sleeve. See page 29.
Fluid squeezes past ram plate wipers	Ram pressure too high.	Decrease ram pressure.
	Worn or damaged wipers.	Replace wipers. See procedure in the Supply Unit documentation.
Material pump won't prime properly, or pumps air	Closed main air valve or clogged air line.	Open air valve, clear air line.
	Not enough material pump air pressure.	Increase material pump pressure.
	Worn or damaged ram piston.	Replace ram piston. See page 29.
	Hand valve closed or clogged.	Open, clear hand valve or exhaust.
	Hand valve dirty, worn or damaged.	Clean, service hand valve.
	Bent drum has stopped ram plate.	Replace drum.
	Hydraulic valve is not working.	Replace hydraulic valve. See procedure on page 37.
	Hydraulic filter clogged.	Clean or replace hydraulic filter. See page 37.
	Low hydraulic fluid level.	Check for leaks. Refill reservoir. See page 22.
	Ram hand valve lever not in the down position.	Move ram hand valve lever to the down position.
	Ram down pressure too low.	Increase ram down air pressure.
Pressure won't hold drum down or push plate up	Closed main air valve or clogged air line.	Open air valve, clear air line.
	Not enough ram pressure.	Increase ram pressure.
	Hydraulic valve passage clogged.	Replace hydraulic valve. See page 37.
	Worn ram piston seal.	Replace ram piston seal.
Ram moves in opposite direction than expected	Incorrectly connected hydraulic lines, or incorrectly connected air lines.	Connect hydraulic or air lines to their correct connectors. See pages 13 – 14.

Servicing the Air-Powered Ram

Piston Rod Seal Service (Fig. 17) (Model 233087 Ram)

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 19.

1. **Relieve the pressure.**
2. Remove the four nuts and lockwashers holding the tie bar to the rods. Remove the tie bar.
3. Remove the guide sleeve retaining ring by gripping the ring tab with a pair of pliers and rotating the ring out of its groove.
4. Remove the guide sleeve by sliding it off of the rod. Four 1/4"-20 holes are provided to ease removal of the guide sleeve.
5. Inspect the parts for wear or damage. Replace as necessary.
6. Install new O-rings and seal guard. Lubricate the packings with O-ring lubricant.
7. Slide the guide sleeve onto the rod and push it into the cylinder. Replace the retaining ring by feeding it around the guide sleeve groove.
8. Reinstall the tie bar using the nuts and lockwashers. Torque to 40 ft-lb (54 N•m).

WARNING

Do not use pressurized air to remove the guide sleeve or piston. Failure to follow this instruction may result in personal injury.

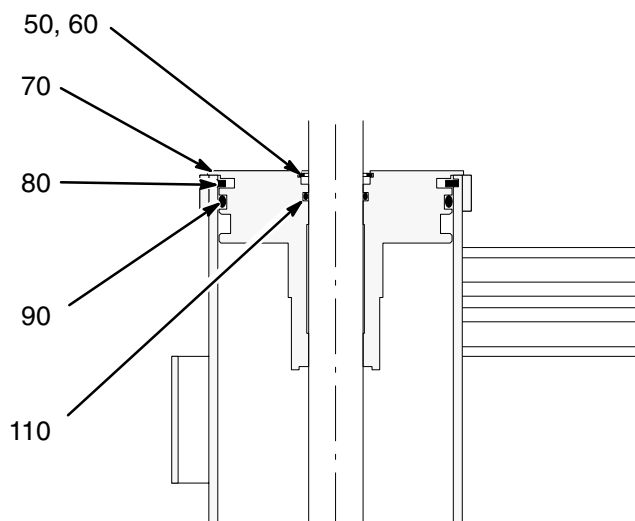


Fig. 17

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Servicing the Air-Powered Ram

Ram Piston Service (Fig. 18) (Model 233087 Ram)

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 19.

1. **Relieve the pressure.**
2. Remove the tie bar as explained under **Piston Rod Seal Service.**
3. Remove the guide sleeve and slide it off of the piston rod.
4. Carefully pull the piston rod **straight** up out of the cylinder. If the rod is cocked to one side, the piston or inside surfaces of the cylinder could be damaged.
5. Carefully lay the piston and rod down so the rod will not be bent. Remove the lower piston retaining ring. Slide the piston off the piston rod.
6. Install new O-ring seals on the piston rod and the piston. Lubricate the piston and seals. Reinstall the piston and retaining ring.
7. Carefully insert the piston into the cylinder and push the rod **straight** down into the cylinder. Add 3 ounces of lubricant (230) to each cylinder after inserting the piston.
8. Slide the guide sleeve onto the piston rod. Reinstall the retaining ring and tie bar, as explained under **Piston Rod Seal Service.**

WARNING

Do not use pressurized air to remove the guide sleeve or piston. Failure to follow this instruction may result in personal injury.

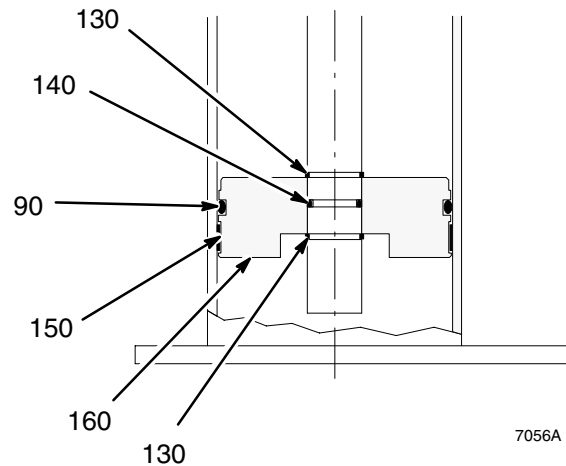


Fig. 18

Replacing Wipers

1. To replace worn or damaged wipers (W), raise the ram plate up out of the drum. Remove the drum from the base. Wipe the fluid off the ram plate.
2. Separate the wiper butt joint and bend back the strapping covering the clamp. Loosen the clamp by unscrewing the worm gear and remove the wiper.
3. Thread the strapping through the new wiper. Install the wiper on the ram plate. Insert the end of the strap through the clamp and tighten by screwing the worm gear. Position the wipers so they are 180° apart.
4. Pound the wiper all the way around the ram plate with a rubber mallet until the ends are butted tightly together.

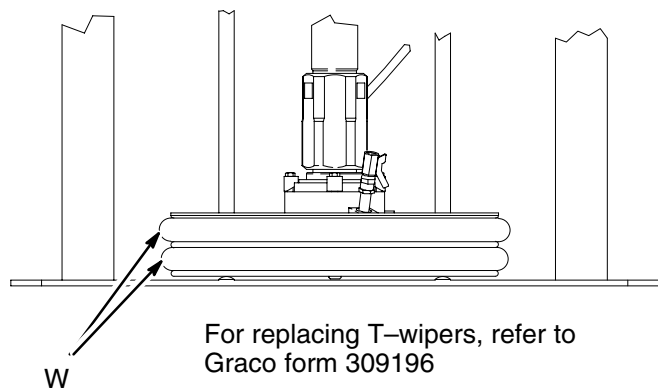


Fig. 19

Servicing the Hydraulic Ram

This section describes servicing the different parts of your ram.

Ram Service

Ram Pressure Relief Procedure

WARNING

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

To relieve pressure in the ram:

1. **Relieve the supply unit pressure.**

WARNING

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 21).

2. Using the ram hand valve lever on the air control [(Q) in Fig. 20], move the ram to the DOWN position.
3. When the ram reaches the full down position, move the ram hand valve lever to OFF.
4. Set the ram regulator pressure, on the air regulator panel, for both RAM UP and RAM DOWN to 0 (zero).
5. Exhaust pressure from both sides of the ram:
 - a. Move the ram hand valve lever to the DOWN position until all hydraulic pressure is exhausted from one side of the ram.
 - b. Move the ram hand valve lever to the UP position until all hydraulic pressure is exhausted from the other side of the ram.
6. Close the system master air valve (C) (Fig. 20).

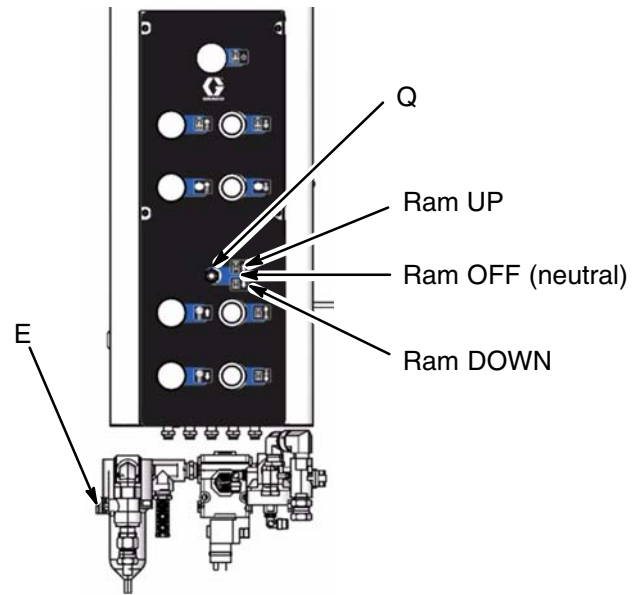


Fig. 20

Servicing the Hydraulic Ram

Removing a Material Drum from the Supply Unit

WARNING



MOVING PARTS HAZARD

To reduce risk of injury or damage to equipment, take care when adjusting blow off pressure. Too much pressure can cause the ram plate to rise very quickly or burst the drum. Too little pressure can cause the ram to lift the entire drum from the ground.



HOT MATERIAL HAZARD

The material and equipment will be hot! To reduce risk of injury or damage to equipment:

- Wear eye protection, gloves and protective clothing when installing, operating, or servicing this dispensing system.
- Be sure to tighten the bleed stick after bleeding the air. Otherwise hot material will leak out of the opening.



PRESSURIZED FLUID HAZARD

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

CAUTION

To help avoid damage to equipment:

- Do not allow the supply units to operate when empty, which would cause a pump runaway and cause damage to the system.

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

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

Read all warnings and instructions before attempting this procedure!

On a heated supply unit, only remove the drum from the supply unit while the supply unit is at operating temperature.

When a material drum is empty, follow this procedure to remove a drum of material from the ram:

1. Stop the pump by closing the pump bleed-type master air valve.
2. Raise the ram plate out of the drum:
 - a. Set the ram UP air regulator to 0.07–0.1 MPa (0.7–1.05 bar) (10–15 psi).
 - b. Move the hand valve lever to the UP position. At the same time, carefully equalize the pressure in the drum by cycling the ram plate blow-off valve open and closed.
3. With the ram plate completely out of the drum, open the drum clamp.
4. Remove the drum from the ram.

Servicing the Hydraulic Ram

Remove the material drum from the supply unit before performing the procedures in this section.

Lift Rod Service

To service the lift rods, you need a Graco Ram Repair Kit, part no. 918432.

Always service both cylinders at the same time. We strongly recommend that when you service the lift rod (40) you change the o-rings in the guide sleeve (140) and lift-rod piston (90) at the same time. Servicing both lift rods and changing o-rings at the same time helps insure that the ram components wear evenly.

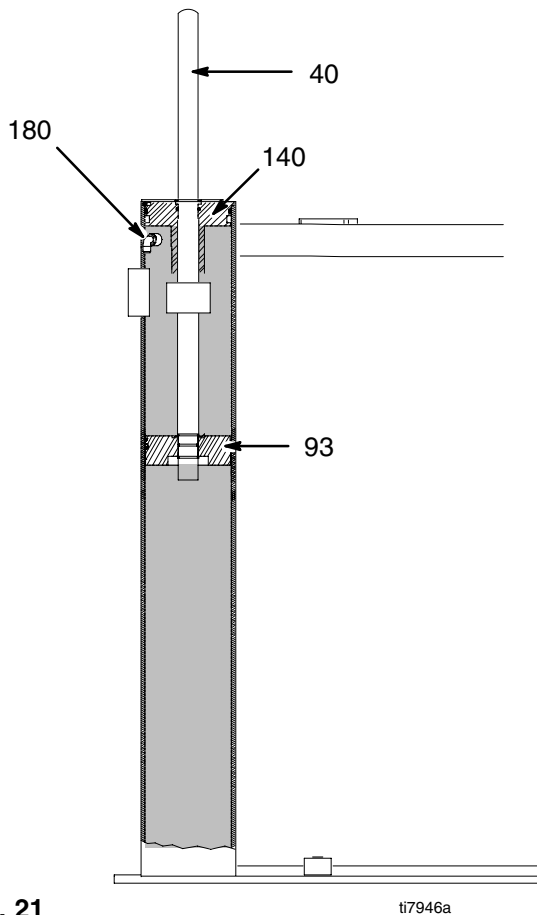


Fig. 21

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The procedure below describes how to service both ends of the lift rod. Service one lift rod, then repeat the procedure for the other lift rod. Refer to Fig. 21 through Fig. 24.

1. Start with the ram in the down position. Remove the two nuts and lockwashers from the lift rods and ram plate rods. Then remove the tie bar.
2. Raise the ram lift rods to their highest positions. Leave the follower rods and follower in place.
3. **Relieve Both System Pressure and Ram Pressure.**

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 21).

To reduce the risk of serious injury whenever you service the ram, always follow the **Ram Pressure Relief Procedure** (page 27).

4. Have a container ready to catch the leakage, then loosen the hydraulic lines from the elbow (180).

⚠ WARNING

Do not use pressurized air or hydraulic fluid to remove the guide sleeve or the piston. Using pressurized air or hydraulic fluid to remove the piston or guide sleeve can result in personal injury.

5. Select a lift rod (130) to service.
6. Remove the guide sleeve (140) by gripping the spiral retaining ring tab with a pair of pliers and rotating the spiral retaining ring out of the groove.
7. Remove the rod retaining ring and rod seal scraper.
8. Slide the guide sleeve (140) off of the rod. Be careful not to nick or dent the guide sleeve's rims.
9. Scoop the remaining oil out of the cylinder.
10. Remove the lift rod from the ram. Be aware that when you pull the lift rod from the cylinder, hydraulic fluid may be released with it.

Servicing the Hydraulic Ram

Lift Rod Service *(continued)*

11. Service the lift-rod piston (Fig. 22):

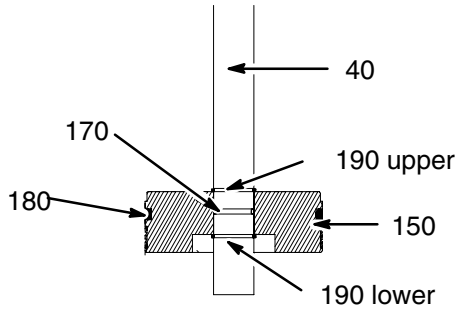


Fig. 22

NOTE: When servicing the lift-rod piston or the guide sleeve, always install new o-rings.

- a. Remove the lower piston retaining ring (190 lower). Inspect it for damage or wear, and replace it with a new one if necessary.
 - b. Remove the piston (150) from the lift rod (40) and inspect it for damage or wear. Replace it with a new one, if necessary.
 - c. Remove the 2 old o-rings (170) and (180) in Fig. 22) from inside and outside the piston. Replace the o-rings with new ones.
 - d. Lubricate the o-rings with o-ring lubricant. Make sure the lubricant is compatible with the o-rings as well as the hydraulic fluid.
 - e. Put the piston (150) back onto the lift rod (40). Position the piston against the upper retaining ring.
 - f. Snap the lower piston retaining ring (190) back into its groove, between the bottom of the piston and the end of the lift rod.
12. Re-insert the lift rod (40) into its cylinder.
 - a. Check the level of the hydraulic fluid inside the cylinder. Make sure it is 6–8" below the cylinder's oil inlet. Add hydraulic fluid, if necessary.
 - b. Carefully push the rod straight down as far as it will go. Make sure the piston goes below the level of the hydraulic fluid inlet.

Servicing the Hydraulic Ram

Lift Rod Service (continued)

13. Service the guide sleeve (Fig. 23):

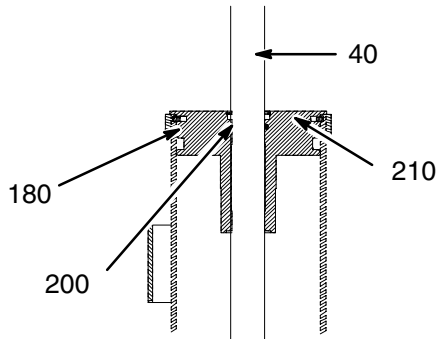


Fig. 23

- Inspect the guide sleeve. If it is damaged or worn, replace it with a new one.
- Remove the 2 old o-rings (180) and (200) in Fig. 23) from inside and outside the guide sleeve. Replace the o-rings with new ones.
- Lubricate the o-rings with o-ring lubricant. Make sure the lubricant is compatible with the o-rings as well as the hydraulic fluid.
- Slide the guide sleeve back onto the lift rod, positioning the guide sleeve so that the spiral retaining ring relieved area (10) faces toward the middle of the ram. Then push the guide sleeve all the way into the cylinder.

CAUTION

Make sure the guide sleeve goes in straight, or the guide sleeve can be damaged.

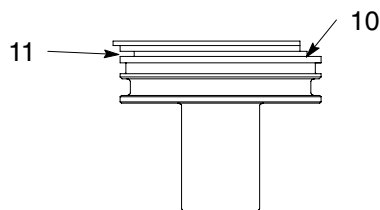


Fig. 24

- Install a new spiral retaining ring by feeding it into the spiral retaining ring groove (11). You may have to wiggle it around a bit to get it feeding properly.

The ring is installed completely when the ring tab is facing toward the middle of the ram, and it is the only part of the spiral retaining ring that remains above the guide sleeve.

WARNING



PRESSURIZED EQUIPMENT HAZARD

Make sure the retaining ring is securely in place before attempting to repressurize the ram. If the retaining ring is loose, repressurizing the ram could unexpectedly force the guide sleeve out of the cylinder.

- Repeat steps 5–13 to service the parts of the other lift rod.
- Reconnect and tighten the hydraulic lines to the hydraulic elbow (180).
- Repressurize the ram.

WARNING



PRESSURIZED EQUIPMENT HAZARD

Do not exceed 0.53 MPa (5.3 bar) (75 psi) maximum inbound air pressure to the hydraulic power supply. Exceeding the pressure can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

- Close all air regulators.
- Move the ram hand valve lever to the UP position.
- Slowly open the air regulators until the ram starts to move upwards. Do not apply more than 0.53 MPa (5.3 bar) (75 psi) inbound air pressure to the hydraulic power supply.

If the ram does not move in the expected direction, make sure you have correctly connected the hydraulic lines and air lines. For more information see the procedure for **Installing Hydraulic Power Supply** on page 13.

- Raise and lower the ram 5 or 6 times to bleed air from the hydraulic system.
- Lower the ram lift rods, then secure the tie bar to the ram, using the same nuts and lockwashers as before. Torque to 54 N.m (40 ft-lb).
 - Check for air or hydraulic fluid leaks.
 - Check the fluid level in the hydraulic power supply. If necessary, add hydraulic fluid through the breather hole.

Servicing the Hydraulic Ram

Replacing Hydraulic Fluid in the Ram

To replace hydraulic fluid in the ram:

1. Drain hydraulic fluid from the ram cylinders.
2. Refill the ram cylinders with hydraulic fluid.

There are 2 ways to refill the ram cylinders:

- Remove the ram guide sleeves and pour hydraulic fluid directly into the cylinders. This method replaces the hydraulic fluid more quickly, but you have to disassemble parts of the ram to perform it. This method is useful if you are also going to service the ram's lift rods.
- Use the hydraulic power supply to pump hydraulic fluid back into the cylinders. This method takes longer to replace the hydraulic fluid, but it requires less disassembly of the ram.

Gather the following materials before starting this procedure:

- Graco Hydraulic Fluid (part no. 169236). You need 22.5 liters (6 gallons) for each ram cylinder.
- Material Safety Data Sheet (Form# 307766) for hydraulic fluid
- two or more 20-liter (5-gal.) pails to catch hydraulic fluid
- a regulated air supply for forcing hydraulic fluid out of the cylinders
- a drain hose

Read the Material Safety Data Sheet for Hydraulic Fluid (Form# 307766) and follow all applicable safety warnings for handling, use, and disposal of hydraulic fluid.

Before beginning this procedure, remove the material drum from the ram. See page 28 for the procedure.

Servicing the Hydraulic Ram

Draining the Ram Cylinders

To drain the hydraulic fluid, follow this procedure.

For this procedure, you need:

- two or more 20 liter (5 gal.) pails to catch hydraulic fluid
- regulated air supply for forcing hydraulic fluid out of the cylinders
- drain hose

1. **Relieve Both System Pressure and Ram Pressure.**

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 21).

To reduce the risk of serious injury whenever you service the ram, always follow the **Ram Pressure Relief Procedure** (page 27).

2. Make sure the ram lift rods are in their lowest positions.
3. Remove the tie bar by removing the two nuts and lockwashers from the lift rods and follower rods. Then remove the tie bar.

CAUTION

To reduce the risk of injury, be sure to remove the tie bar from the ram. Removing the tie bar now makes it easier for the ram to return to its lowest position, after you remove the regulated air supply from the ram (step 9).

4. Have a container ready to catch the leakage, then loosen the hydraulic lines from the hydraulic elbow (180) in Fig. 25).
5. Connect one end of the drain hose to the upper hole (ram down) and run the other end to a 20 liter (5 gal.) pail.
6. Connect a regulated air supply to the lower elbow (180).
7. *Slowly* increase the air pressure to the lower hole (ram up) until hydraulic fluid starts coming out of the drain hose.

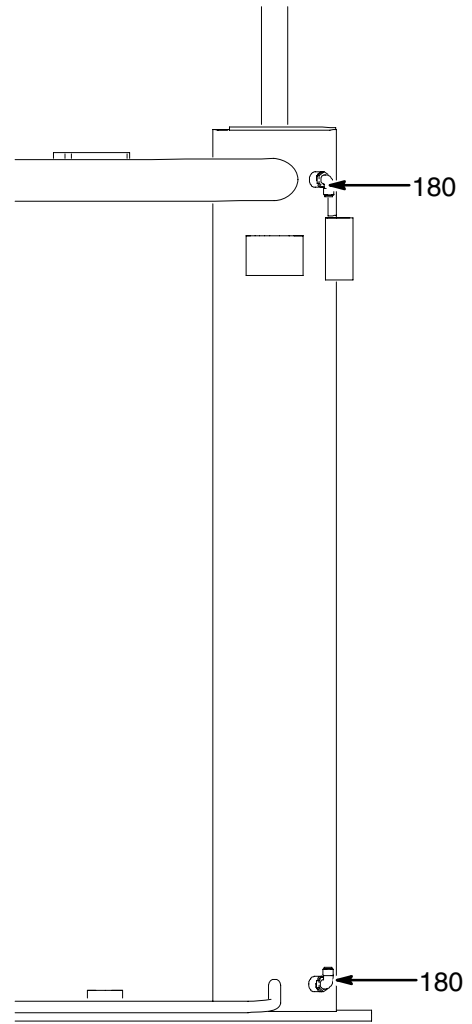


Fig. 25

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8. Maintaining the same air pressure, continue draining the hydraulic fluid until the lift rods reach the tops of the cylinders and fluid stops coming out of the hose.
9. Relieve the regulated air supply's air pressure, then disconnect the regulated air supply from the ram.
10. Reconnect and tighten the hydraulic lines to the elbow (180).
11. If you are going to either remove the guide sleeves and then fill the ram cylinders with hydraulic fluid, or service the lift rods before refilling the ram, you should perform those tasks now. Follow the steps in the **Lift Rod Service** procedure, on page 29.

Servicing the Hydraulic Ram

Pouring Hydraulic Fluid Directly into the Ram Cylinders

Refill the ram by pouring hydraulic fluid into the ram cylinders.

For this procedure, you need:

- Graco Hydraulic Fluid (part no. 169236). You need 22.5 liters (6 gallons) for each ram cylinder.
- Material Safety Data Sheet (Form# 307766) for hydraulic fluid

1. Make sure:
 - a. You have securely reconnected the hydraulic lines to the elbows (180 in Fig. 25).
 - b. The lift rods are in their lowest positions.
 - c. You have removed the tie bar from the ram.
2. If you have not removed the guide sleeve, do it now, following steps 5–8 of the **Lift Rod Service** procedure, on page 29.
3. Pour hydraulic fluid into the cylinder. Fill it to within 152 – 203 mm (6–8") from the top of the cylinder.
4. Repeat steps 2–3 for the 2nd cylinder.
5. Check the hydraulic fluid level in the hydraulic supply and add more fluid to the cylinders if necessary.

If the fluid level in the hydraulic power supply is too low, the pump will cavitate.
6. Replace the guide sleeves. Follow the procedure for servicing the guide sleeves in step 13 on page 31.

7. Repressurize the ram.

WARNING



PRESSURIZED EQUIPMENT HAZARD

Do not exceed 0.53 MPa (5.3 bar) (75 psi) maximum inbound air pressure to the hydraulic power supply. Exceeding the pressure can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

- a. Move the ram hand valve lever to the UP position.
 - b. *Slowly* open the air regulators until the ram starts to move upwards. Do not apply more than 0.53 MPa (5.3 bar) (75 psi) inbound air pressure to the hydraulic power supply.

If the ram does not move in the expected direction, make sure you have correctly connected the hydraulic lines and air lines. For more information go back to the procedure for **Installing the Hydraulic Power Supply** on page 13.
 - c. Raise and lower the ram 5 or 6 times to bleed air from the hydraulic system.
8. Check for air or hydraulic fluid leaks.
 9. Lower the ram lift rods, then secure the tie bar to the ram, using the same nuts and lockwashers as before. Torque to 54 N.m (40 ft-lb).
 10. Check for air or hydraulic fluid leaks.
 11. Check the fluid level in the hydraulic power supply. If necessary, add hydraulic fluid through the breather hole.

Servicing the Hydraulic Ram

Using the Hydraulic Power Supply to Pump Fluid into the Ram

You can refill the ram by using the hydraulic power supply to pump fluid back into the ram cylinders.

For this procedure, you need:

- Graco Hydraulic Fluid (part no. 169236). You need 22.5 liters (6 gallons) for each ram cylinder.
- Material Safety Data Sheet (Form# 307766) for hydraulic fluid
- Hydraulic Power Supply

1. Make sure you have securely reconnected the hydraulic lines to the manifold (160 in Fig. 25).
2. Remove the breather (240) from the hydraulic power supply.
3. *Slowly* begin raising the ram:
 - a. Move the ram hand valve lever to the UP position.
 - b. *Slowly* open the air regulators until the ram starts to move upwards. Do not apply more than:
 - 0.53 MPa (5.3 bar) (75 psi) inbound air pressure to the hydraulic power supply
 - 1.6 MPa (16 bar) (225 psi) hydraulic pressure to the ram

4. Continue raising the ram while watching the level in the fluid level gauge (Fig. 26).

When the fluid level drops below 102 mm (4") from the top of the fluid level gauge, pour hydraulic fluid into the breather hole (12) until the level reaches approximately 51 mm (2") from the top of the fluid level gauge (280).

As you add more hydraulic fluid to the ram, the ram lift rods will rise.

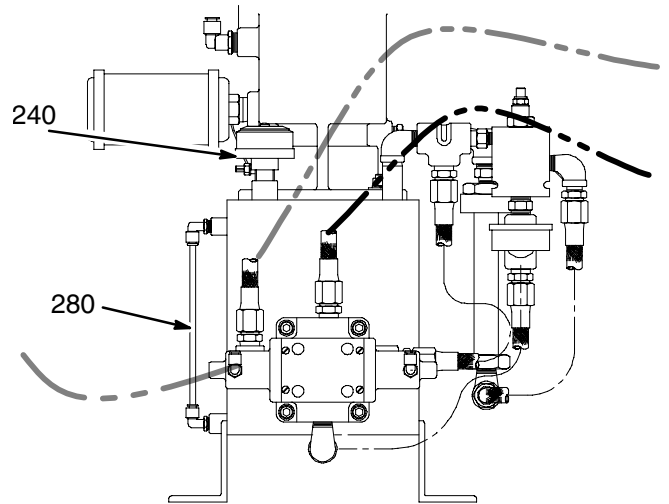


Fig. 26

5. Repeat step 4 until the ram reaches its highest position.
6. Replace the breather (240).
7. Raise and lower the ram 5 or 6 times to bleed air from the hydraulic system.
8. Check for air or hydraulic fluid leaks.
9. Lower the ram lift rods, then secure the tie bar to the ram, using the same nuts and lockwashers as before. Torque to 54 N.m (40 ft-lb).
10. Check for air or hydraulic fluid leaks.
11. Check the fluid level in the hydraulic power supply. If necessary, add hydraulic fluid through the breather hole.

Servicing the Hydraulic Power Supply

This section describes how to service the different parts of your hydraulic supply unit. For information about servicing the President air motor, see the air motor's documentation, Form# 308485.

⚠ WARNING



PRESSURIZED EQUIPMENT HAZARD

High pressures can cause serious personal injury or damage to the equipment. **Do not** overpressurize the hydraulic power supply or the ram supply unit.

You can replace the following parts of the hydraulic power supply (Fig. 27):

- hydraulic fluid filter element [inside of (100)]
- hydraulic air valve
- hydraulic fluid regulator

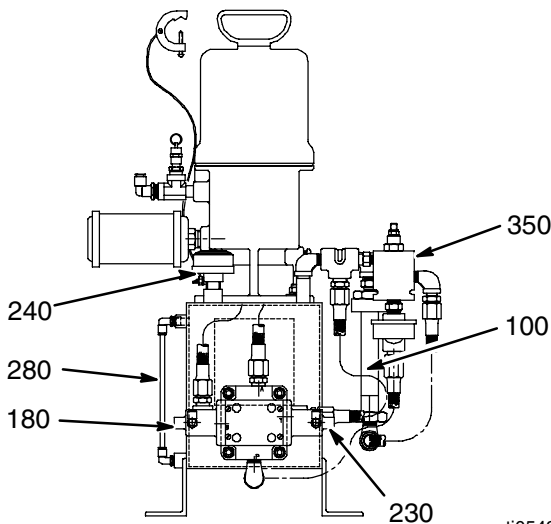


Fig. 27

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Before replacing these components, you must shut down the system supply unit. After completing service, you must re-attach the hydraulic supply to the ram.

Readying the Supply Unit for Servicing the Hydraulic Power Supply

For more information about shutting down the system supply unit, see Form# 310534, or your system documentation.

Before working on components in the hydraulic power supply, perform these steps:

1. If the material drum has already been removed from the supply unit, go to step 2. If you need to remove the material drum, perform the procedure in **Removing a Material Drum from the Supply Unit** on page 28.
2. Make sure the ram hand valve is in the OFF position.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 21).

3. **Relieve the supply unit pressure.**
4. Bleed off pressure in the system and excess material by opening the dispense gun and catching the material in a waste container.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve ram pressure, always follow the **Ram Pressure Relief Procedure** (page 27).

5. **Relieve the ram hydraulic pressure.**
6. Turn off the electrical power to the supply unit. Follow all applicable safety procedures and lockout rules.
7. Turn OFF the main electrical disconnect on the supply unit's electrical control panel.

⚠ WARNING

ELECTROCUTION HAZARD



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

8. Turn the system CONTROL ON switch to OFF.

Servicing the Hydraulic Power Supply

Replacing the Hydraulic Fluid Filter

To replace the hydraulic fluid filter (Fig. 27):

1. Perform the procedure for **Readying the Supply Unit for Servicing the Hydraulic Power Supply** on page 36.
2. Make sure you have disconnected the hydraulic lines from the hydraulic power supply connectors (230).
3. Unscrew the filter assembly (100) from the hydraulic power supply.
4. Remove the hydraulic filter element.
5. Put in the new filter element.
6. Re-attach and tighten the filter assembly to the hydraulic power supply unit.
7. Perform the procedure for **Re-attaching the Hydraulic Supply to the Ram**, on page 38.

Replacing the Hydraulic Air Valve

To replace the hydraulic air valve (Fig. 28):

1. Perform the procedure for **Readying the Supply Unit for Servicing the Hydraulic Power Supply** on page 36.
2. Make sure you have disconnected the hydraulic lines from the hydraulic power supply connectors (230).
3. Make sure you have disconnected the air lines from the air fittings (190).
4. Remove the 4 socket head screws from the front of the air valve (290).
5. Replace the valve:
 - a. Make sure the valve's o-rings are properly seated in the valve assembly.
 - b. Re-attach and tighten it to the hydraulic power supply.
6. Perform the procedure for **Re-attaching the Hydraulic Supply to the Ram**, on page 38.

Replacing Hydraulic Fluid Regulator

To replace the hydraulic fluid regulator [(350) in Fig. 28]:

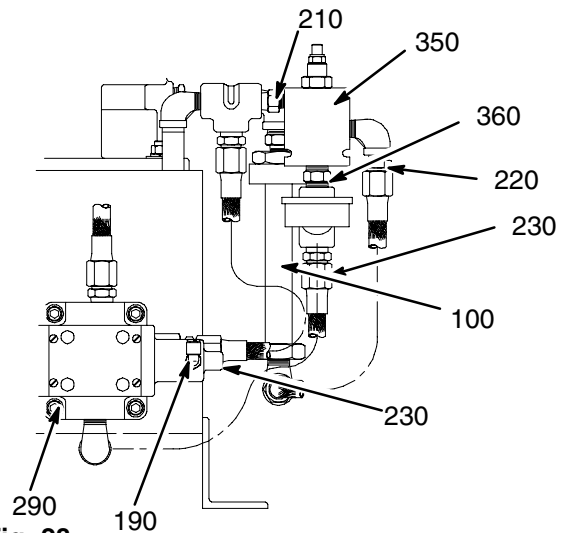


Fig. 28

1. Perform the procedure for **Readying the Supply Unit for Servicing the Hydraulic Power Supply** on page 36.
2. Make sure you have disconnected the hydraulic lines from the hydraulic power supply connectors (230).
3. Remove the fittings (210, 220, 230, 350, 360).
4. Remove the hydraulic fluid regulator (350).
5. Put in the new fluid regulator.
6. Re-attach the fluid regulator to the fittings.
7. Perform the procedure for **Re-attaching the Hydraulic Supply to the Ram**, on page 38.

Servicing the Hydraulic Power Supply

Re-attaching the Hydraulic Supply to the Ram

1. Reconnect and tighten the hydraulic lines to the hydraulic power supply connectors (230).
2. Repressurize the ram.

WARNING



PRESSURIZED EQUIPMENT HAZARD

Do not exceed 0.53 MPa (5.3 bar) (75 psi) maximum inbound air pressure to the hydraulic power supply. Exceeding the pressure can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

- a. Move the ram hand valve lever to the UP position.
 - b. *Slowly* open the air regulators until the ram starts to move upwards. Do not apply more than 0.53 MPa (5.3 bar) (75 psi) air pressure to the hydraulic power supply.
If the ram does not move in the expected direction, make sure you have correctly connected the hydraulic lines and air lines. For more information go back to the procedure for **Installing Hydraulic Power Supply** on page 13.
 - c. Raise and lower the ram 5 or 6 times to bleed air from the hydraulic system.
3. Check for air or hydraulic fluid leaks.
 4. Check the fluid level in the hydraulic power supply. If necessary, add hydraulic fluid through the breather hole.

Replacing the Breather

The breather's air filter is contained in the breather. Replace the breather with a new breather.

Hydraulic Ram Service

Inspection Frequency

Ram

Periodically (once a month), inspect the ram guide sleeves, rods and cylinders for wear or damage, replace all worn parts.

Replace the rod seals every 2 years.

Material Pump

See material pump instructions for inspection frequency.

Hydraulic Power Supply Unit (Fig 29)

- **Fluid Filter Assembly (100)** — Change the fluid filter element, which may become clogged with manufacturing residue, after the first 40 hours of operation. Then change the filter after every 1000 hours of operation, or at least once a year.
- **Breather (240)** — Check the breather at least once a month. Replace it when it becomes dirty.
- **Motor Pump (30)** — See the 3:1 President pump's instructions (Form# 308485) for its inspection frequency.

- **Hydraulic Fluid Level (280)** — Check the hydraulic fluid level at least once a month. Add more hydraulic fluid if the fluid level falls lower than 102 mm (4") from the top of the fluid level gauge.

1. Unscrew the breather (240).
2. Pour hydraulic fluid through the breather hole.
3. Replace the breather.

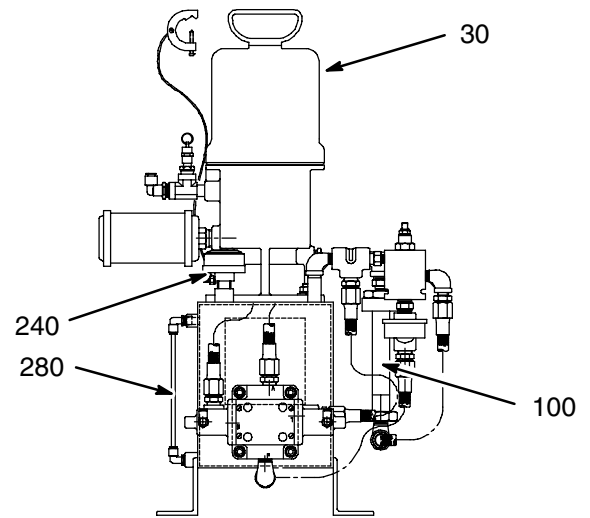


Fig. 29

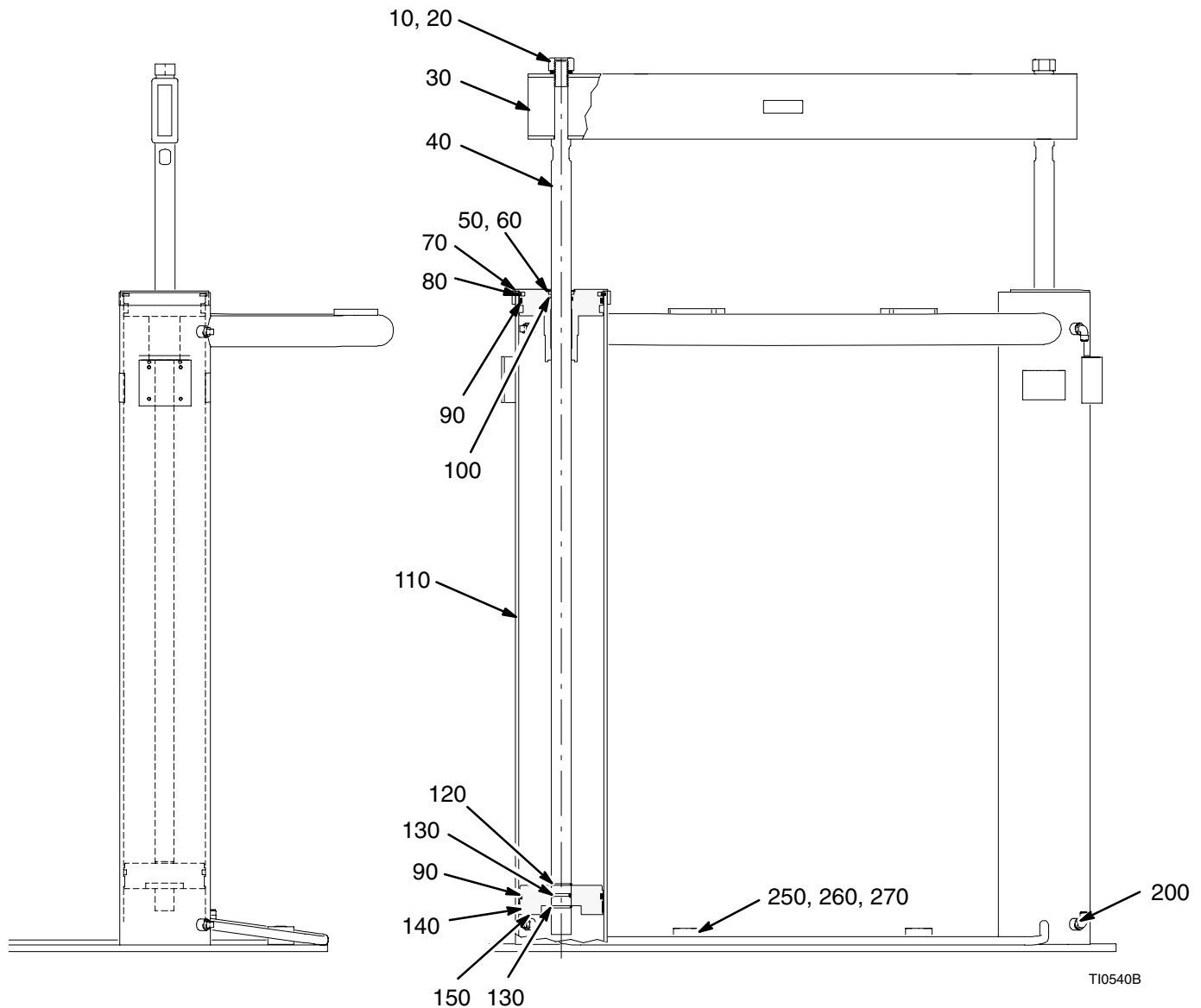
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Air-Powered Ram Parts

Model 233087 Series B

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
10	113939	NUT, jam, hex	2	120*	C20417	RING, retaining	4
20	113993	WASHER, lock, helical	2	130*	158776	O-RING	2
30	C32406	BAR, tie	1	140*	C32408	BAND, guide	2
40	C32401	ROD, elevator	2	150	C32405	PISTON, elevator air	2
50*	C03043	RING, snap internal; 1.88" dia.	2	190	054776	TUBING, nylon-OD 8mm/5/16"	1.2 ft
60*	C31001	GUARD, seal; for 1.5 dia. rod	2	200	115947	FITTING, elbow, 90° 5/16" tube	4
70	617414	SLEEVE, guide	2	210	073021	LUBRICANT, oil	6 oz
80*	C32409	RING, retaining	2	250	C32467	STOP, drum	2
90*	C38132	O-RING; 6.5" OD x 0.25"	4	260	C19853	S.H.C.S.; 1/2-13 x 1-1/4 long	2
100*	156593	O-RING; 6.5" OD x 0.25"	2	270	C38185	WASHER, lock, hi-collar; 1/2	2
110	918434	WELDMENT, elevator	1	*	Indicates items included in 918432 Repair Kit.		



Hydraulic Ram Parts

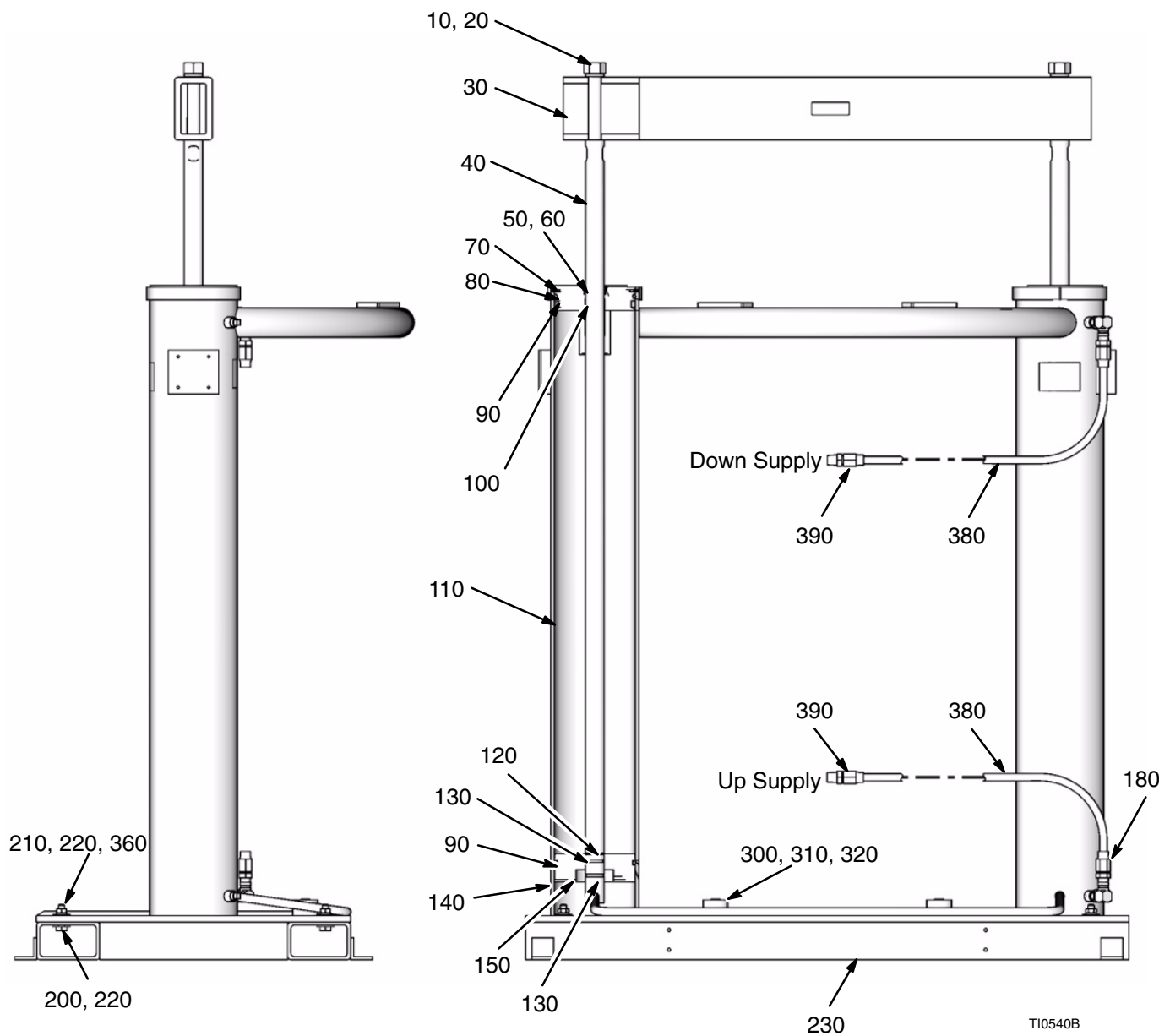
Model 918420 Series B, 165 mm (6.5") Hydraulic-Powered Ram

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	113939	NUT, hex, 1–8 un	2	180	517445	ELBOW, 90° jic to pipe, 3/8–18 x 7/8–14	2
20	113993	WASHER, lock, 1"	2	200	C19141	SCREW, hex head, 1/2–13 unc x 1/75	4
30	617388	BAR, tie	1	210	100018	WASHER, lock, Ø 1.5 rod	4
40	C32401	ROD, elevator	2	220	101044	WASHER, flat, Ø 1.5 rod	8
50	C03043	RING, snap internal, Ø 1.88	2	230	918418	WELDMENT, base reinforcement	1
60	C31001	GUARD, seal, for Ø 1.5 rod	2	270	073021	LUBRICANT (not shown)	AR
70	617414	SLEEVE, guide	2	300	C32467	STOP, drum	2
80	C32409	RING, retaining	2	310	C19853	S.H.C.S., 1/2–13 x 1 1/4 long	2
90	C38132	O-RING, 6.5 od. x 0.25	4	320	C38185	WASHER, lock, hi-collar, 1/2	2
100	156593	O-RING, 1.75 od. x 0.12	2	360	100338	NUT, REG 1/2–13	4
110	918434	WELDMENT, ram	1	380*	C12310	HOSE 5/8 x 54", 1/2 npt	2
120	C20417	RING, retaining, for Ø 1.5 rod	8	390*	104654	NIPPLE, shutoff	2
130	158776	O-RING, 1.5 od. x 0.12	2				
140	C32408	BAND, guide	2				
150	C32405	PISTON, ram air	2				

* Not assembled unless ram is packaged as an upper-level assembly

Hydraulic Ram Parts

Model 918420 Series B, 165 mm (6.5") Hydraulic-Powered Ram



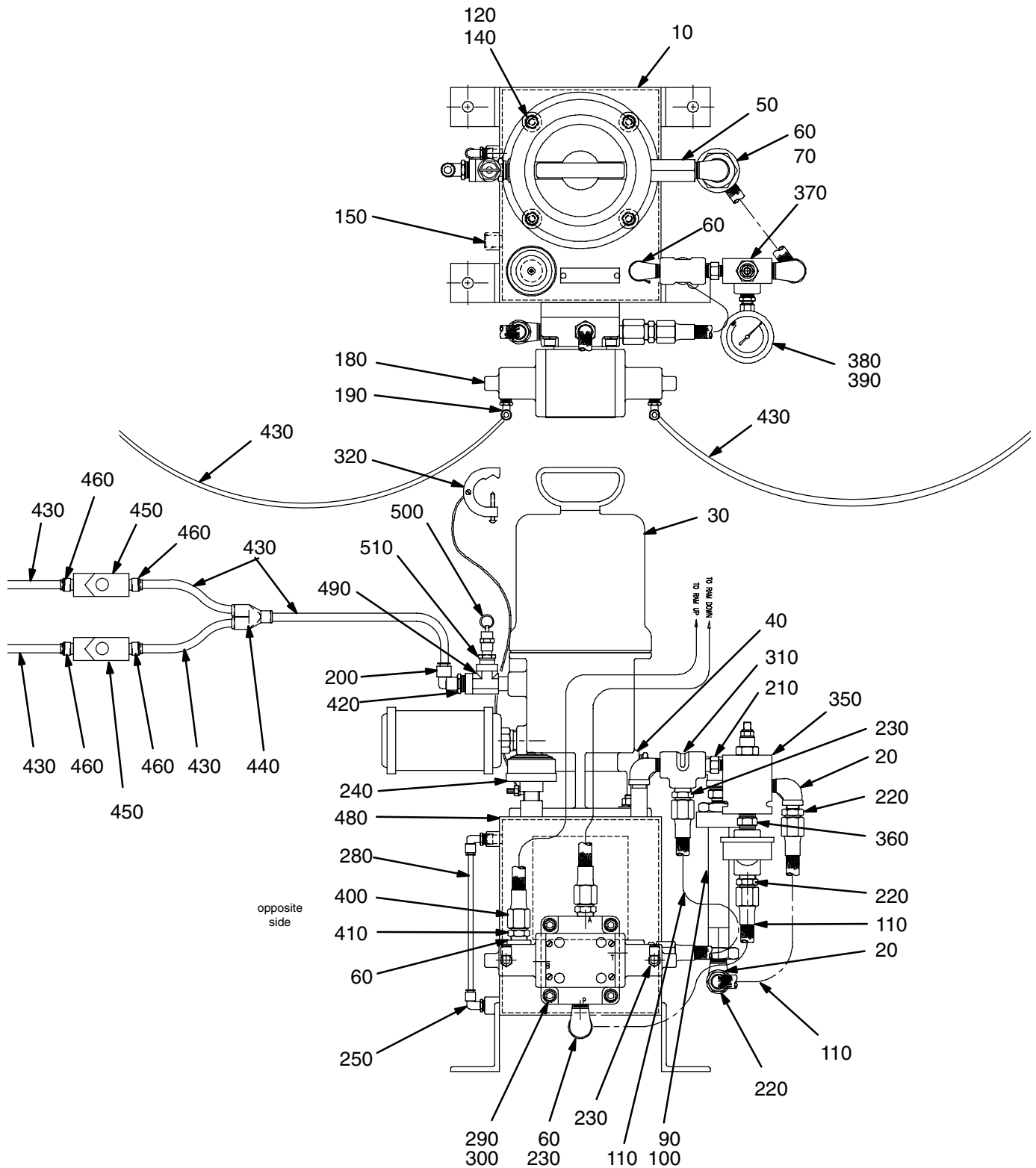
Hydraulic Power Supply Parts

Model 918510, Hydraulic Power Supply

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	918457	RESERVOIR, hydraulic assy.	1	300	100133	WASHER, lock, 3/8	8
20	155699	ELBOW, plan hp, 1/2 npt	2	310	103475	TEE, plain hp, 1/2 npt	1
30	237526	PUMP, President 3:1 See 308485 for parts	1	320	237569	GROUND Wire and Clamp 7.6 m	25'
40	C19685	REDUCER, bushing, 3/4" npt x 1/2 npt	1	350	617552	VALVE, pressure reducing	1
50	113173	VALVE, check, 1/2 npt	1	360	C20483	NIPPLE, hex, 3/8 npt	1
60	158683	ELBOW, street hp, 1/2 npt	4	370	C19476	FITTING, tee, plain, hp, 3/8npt	1
70	159239	NIPPLE, reducing hex, 1/2 npt x 3/8 npt	1	380	C19675	BUSHING, reducer, 3/8npt x 1/4npt	1
90	521900	ELEMENT, screen, 75 micron	1	390	617553	GAUGE, pressure 300 psi (21 bar) (2.1 MPa)	1
100	915700	FILTER assy.	1	400	104653	COUPLER, shutoff, quick disconnect	2
110	918509	HOSE assy., 5/8 x 10.5", 7/8-14(37°)	3	410	166244	NIPPLE, 1/2-14npt	2
120	100132	WASHER, flat, 5/16	4	420	100081	BUSHING, 1/2 x 3/8npt	1
140	100307	NUT, hex, 5/16-18 unc	4	430	054776	TUBE, nylon, OD 8mm/5/16"	108"
150	101754	PLUG, pipe, 3/8 npt	1	440	116002	FITTING, 8mm tube OD	1
180	517435	VALVE, 4-way hydraulic, 1/2 npt	1	450	115957	VALVE, check, 3/8" tube OD	2
190	116197	ELBOW, swivel, 5/16t x 1/8p	2	460	116196	FITTING, stem reducer, 3/8" male x 5/16" tube OD	4
200	115947	ELBOW, swivel, 5/16t x 1/2p	1	480	C38227	GASKET	1
210	162449	NIPPLE reducing hex, 1/2 npt x 1/4 npt	1	490	108126	TEE; 1/2 npt (mxxf)	1
220	C20769	ADAPTER, male, 7/8 (37°) x 3/8p	3	500	120306	VALVE, safety relief	1
230	C20768	ADAPTER, male, 7/8 (37°) x 1/2p	3	510	100206	BUSHING, pipe; 1/2 npt(m) x 1/4 npt(f)	1
240	107189	FILTER, air, 1/2 npt	1				
250	C19391	ELBOW, male, 1/4t x 1/4p	2				
280	C12191	TUBING, nylon, Ø 0.25 x 0.035 wa	8"				
290	112566	SCREW, soc. hd. cap, 3/8-16 x 1.75	4				

Hydraulic Power Supply Parts

Model 918510, Hydraulic Power Supply



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Ram Air Control Module Parts

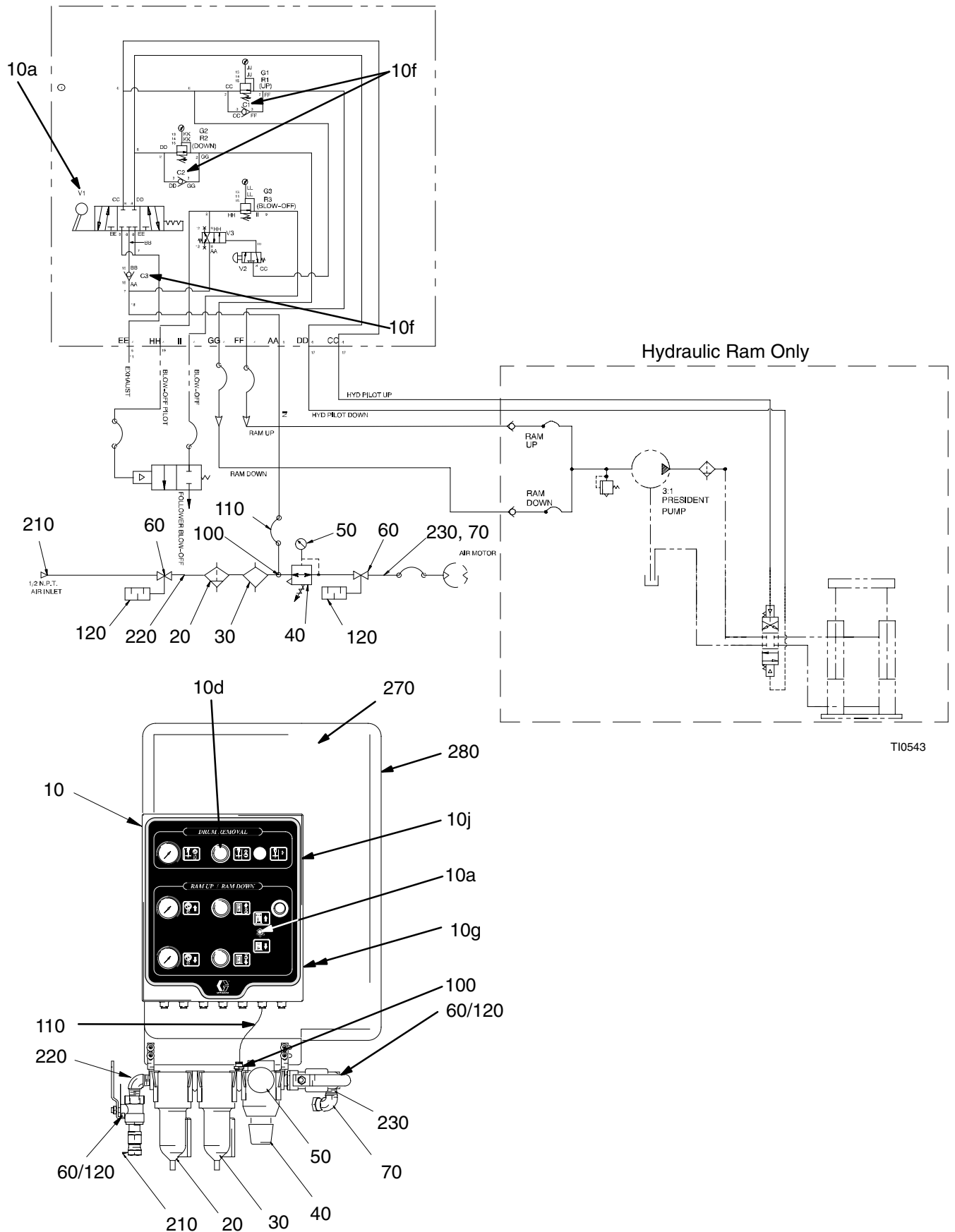
Model 243785, Ram Air Control Module

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	196330	CONTROL, box, air (includes items 10a through 10j)	1	150	196331	BRACKET, air control	1
10a	115952	VALVE, 5 way/ 3 position, 1/8 npt	1	200	C11055	KIT, mounting	2
10d	115955	REGULATOR, air	3	210	155865	UNION, swivel, adapter, 1/2–1/4 npsm	1
10f	115957	VALVE, check, 3/8 OD	3	220	116117	FITTING, elbow, 90° 1/2–14npt	1
10g	115948	FITTING, elbow, pushbutton, 90°	3	230	115683	ELBOW, 90° 1/2–14npt	1
10j▲	C14043	LABEL, warning	1	240	100643	SCREW, cap, sch 1/4–20 x 1" unc	4
20	C11033	FILTER, air	1	250	100016	WASHER, lock	4
30	C11034	LUBRICATOR, air	1	270	196735	SHIELD, safety	1
40	C11029	REGULATOR, air	1	280	062122	TRIM, protective	1
50	C36260	GAUGE, pressure, air	1				
60	113269	VALVE, ball, vented	2				
70	C19024	FITTING, elbow, swivel	1				
100	115950	FITTING, connector , 5/16 tube x 1/4nptf	1				
110	054776	TUBE, nylon, round OD 8mm/5/16"	6.7"				
120	C06299	MUFFLER, #10–32 unf	2				

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

Ram Air Control Module Parts

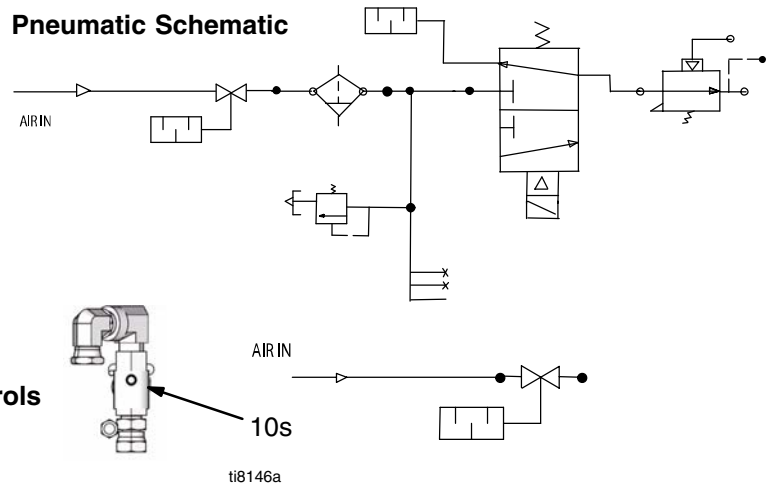
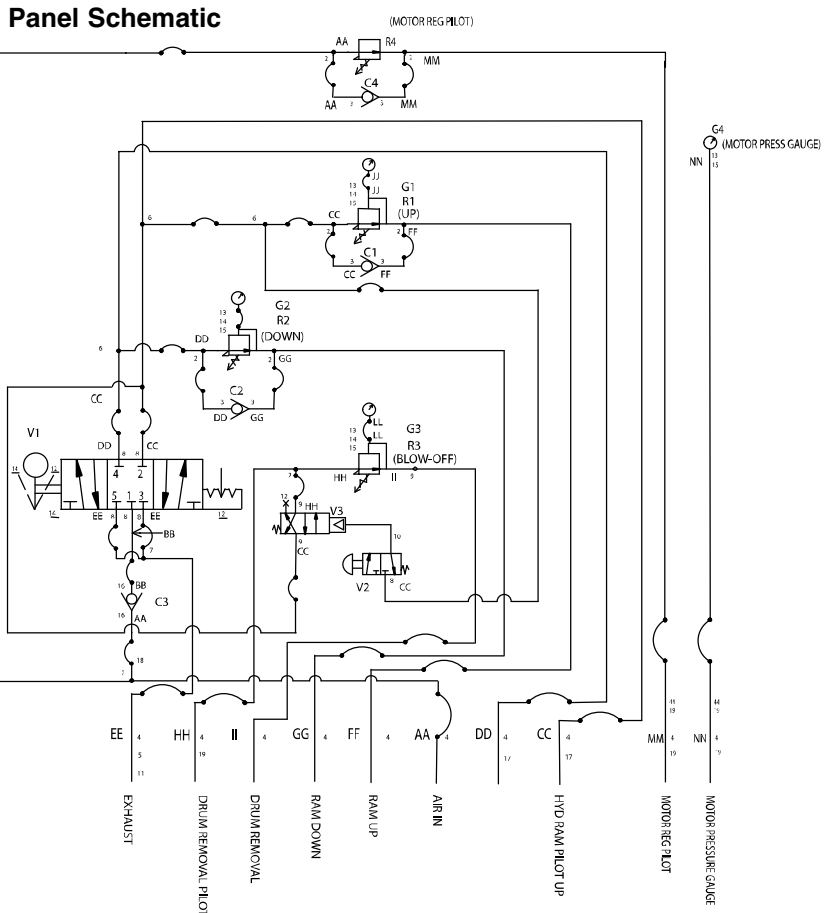
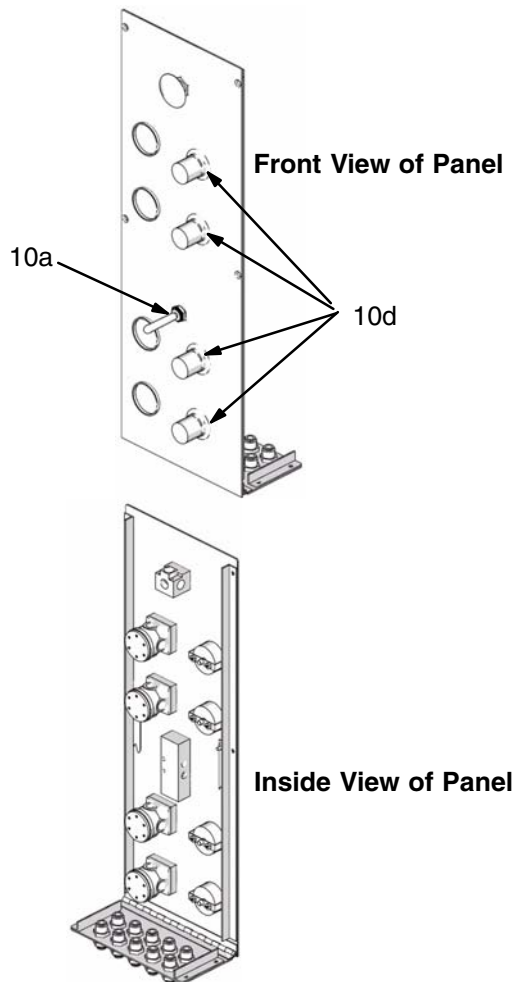
Model 243785, Ram Air Control Module



Pneumatic Control Parts

Part No. 253137, Pneumatic Control

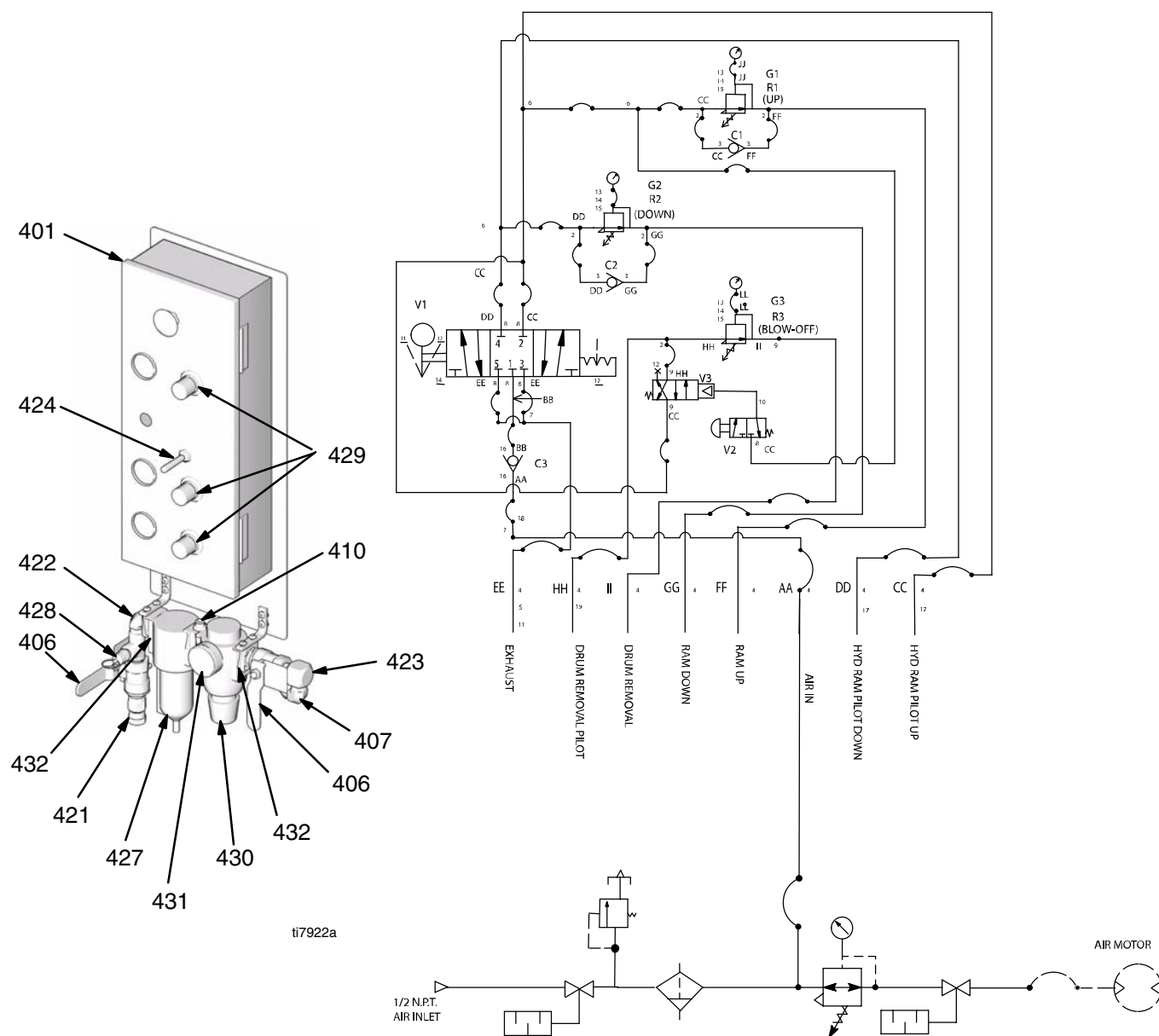
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10a	115952	VALVE, 5 way/ 3 position, 1/8 npt	1	10n	C11033	FILTER, air	1
10d	120432	REGULATOR, air	4	10p	113269	VALVE, ball, vented	1
10k	120434	VALVE, solenoid, 3-way; 24 Vdc	1	10r	113286	VALVE, safety relief	1
10m	120435	REGULATOR, air, piloted	1	10s	15H236	VALVE, ball, vented; 1/2 npt(fbe)	1
				10t	C11037	INSERT; 1/2 npt	2



Stand Alone Air Control Kit Parts

Part No. 297401, Stand Alone Air Control Kit

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
401	15G227	CONTROL, box, air	1	427	C11033	FILTER, air	1
406	113269	VALVE, ball, vented; 1/2 npt	2	428	113286	VALVE, safety relief	1
407	C19024	FITTING, elbow, swivel	1	429	120432	REGULATOR, air	3
410	115950	FITTING, connector; 1/4 npt(m), 5/16 in. (8 mm) diameter tube	1	430	C11029	REGULATOR, air	1
421	155865	UNION, adapter	1	431	C36260	GAUGE, pressure, air	1
422	116117	FITTING, elbow, 90°; 1/2 npt (mbe)	1	432	C11037	INSERT; 1/2 npt	2
423	158683	FITTING, elbow, 90°	1				
424	115952	VALVE, 5 way/ 3 position, 1/8 npt	1				



Air-Powered Ram Accessories

Use Only Genuine Graco Parts and Accessories

UNHEATED 55-GALLON RAM PLATE ASSEMBLY 918305

22" (560 mm) OD. Order wiper rings separately.

HEATED 55-GALLON RAM PLATE ASSEMBLY C32435

Used for 240, 380, 480, 575 VAC.

22" (560 mm) OD. Order wiper rings separately.

55-GALLON RAM PLATE WIPER RING KITS

22" (560 mm) OD.

Kit contains upper and lower hoses and clamp.

C03059	PVC, unheated applications
918312	EPDM, unheated applications
C03228	Neoprene, unheated applications
C31009	Silicone/Silicone, heated applications
C31008	Silicone/Silicone, heated applications, fiber drums
C31007	Silicone/Steam, heated applications

AIR CONTROL MODULES FOR RAM AND AIR CONTROL 243785

DRUM CLAMP MODULE, STANDARD, C32463

(Two required per ram)

Attach to ram cylinders to center drum in place and prevent drum from moving.

DRUM CLAMP, HEAVY DUTY, 918395

(Two required per ram)

Includes all hardware to attach to ram cylinders to center drum in place and prevent drum from moving. The heavy duty drum clamp is used in applications where excessive material adhesion may be a problem.

AUTOMATIC CROSSOVER KIT 918393

Switches ram operation to alternate ram, automatically.

LOW LEVEL DRUM KIT 918394

Provides signal when the drum is empty.

MOUNTING KIT 222776

Required for mounting Check-Mate pumps to ram plate.

AIR MOTOR/PUMP MOUNTING KIT C32434

Used in heated applications to connect the heated CM800 pump to various air motors (King, Bulldog, and Senator).

PUMP MOUNTING KIT

Used to connect the ram plate to the tie bar. Pumps mount on the brackets.

C32434	King/Bulldog/Senator heated applications
918309	King/Bulldog/Senator unheated applications
918304	Premier w/Check-Mate pumps
918310	Premier w/Dura-Flo pumps

HOSE SUPPORT KIT 918461

DRUM STOP KIT C32468

Provides a physical stop for drums to accurately position drums under the ram plate.

FIBER DRUM CLAMP KIT 918397

Contains clamshell clamp for fiber drums and all hardware to install on ram.

EMPTY DRUM KIT 918396

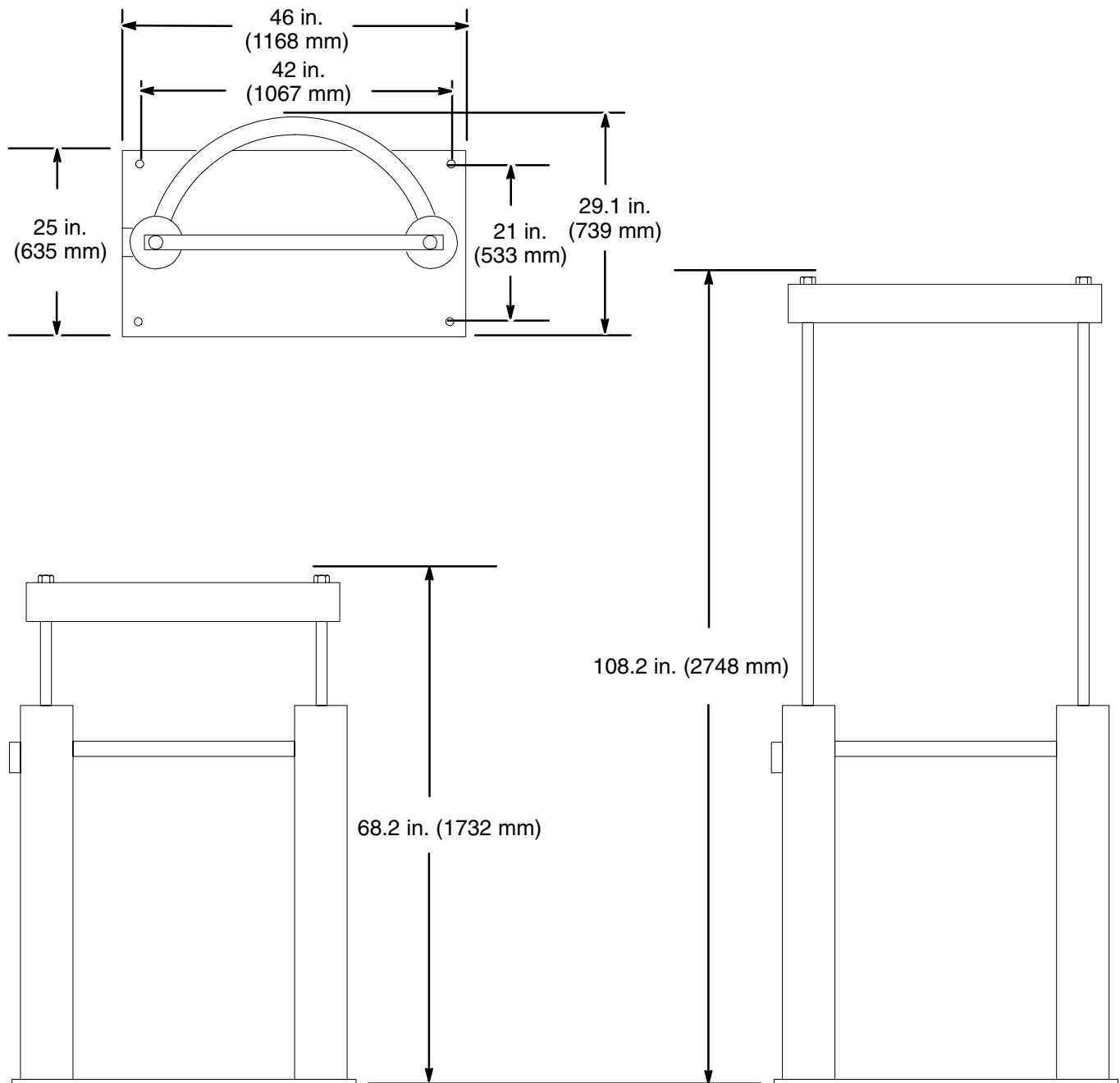
Shuts off air motor when drum is empty.

Hydraulic Ram Accessories

Use Only Genuine Graco Parts and Accessories

Description	Part No.
PASSIVE DRUM CENTER (SADDLE) CLAMPS 2 required)	C32463
DRUM CLAMP, HEAVY DUTY (Includes all hardware to attach to ram cylinders) Attach to ram cylinders to center drum in place and prevent drum from moving. The heavy duty drum clamp is used in applications where excessive material adhesion may be a problem.	918395
CLAM SHELL DRUM HOLDER KIT For fiber drums.	918397
AUTO DRUM/PUMP CROSS-OVER KIT For all pneumatic.	918393
LOW LEVEL BEACON KIT 120 volt. Includes switch, bracket, beacon, and cable.	918394
EMPTY DRUM KIT With pump shut-off. All pneumatic.	918396
HOSE SUPPORT KIT Large spring and bracket for cross beam.	918461
VENT HOOD COLLECTOR KIT Used for venting toxic fumes. Required for Polyurethane Reactive (PUR) supply units.	C32451
AIR CONTROL MODULE FOR RAM AND HYDRAULIC CONTROL 4 Regulator module contains controls for ram up, ram down, blow-off and motor 0.7 MPa (7 bar) (100 psi) <i>MAXIMUM WORKING PRESSURE</i> for Ram 0.53 MPa (5.3 bar) (75 psi) <i>MAXIMUM WORKING PRESSURE</i> for Hydraulic Control	918425
PUMP MOUNTING KIT Used to secure pump assembly to ram. Includes follower rods and brackets.	C32434
PUMP AIR MOTOR MOUNTING KIT Used in heated applications to connect the heated Therm-O-Flow pump module to King, Bulldog, King, and Senator air motors.	C03510
GLOBAL RAM REPAIR KIT Includes all hardware to service lift-rod guide sleeves and pistons in one ram.	918432
HOSE SUPPORT KIT Supports hose to ram to prevent hose kinks	C34220
MATERIAL PUMP REBUILD KIT See Form# 308570	
GUN STATION DROP-LINE FILTER 75 micron, stainless steel hydraulic fluid filter element.	521900
HYDRAULIC FLUID 20 liters (5 gallons)	169236

Air-Powered Ram Dimensions



7060A

Hydraulic Ram Dimensions

Ram Mounting and Clearance Dimensions

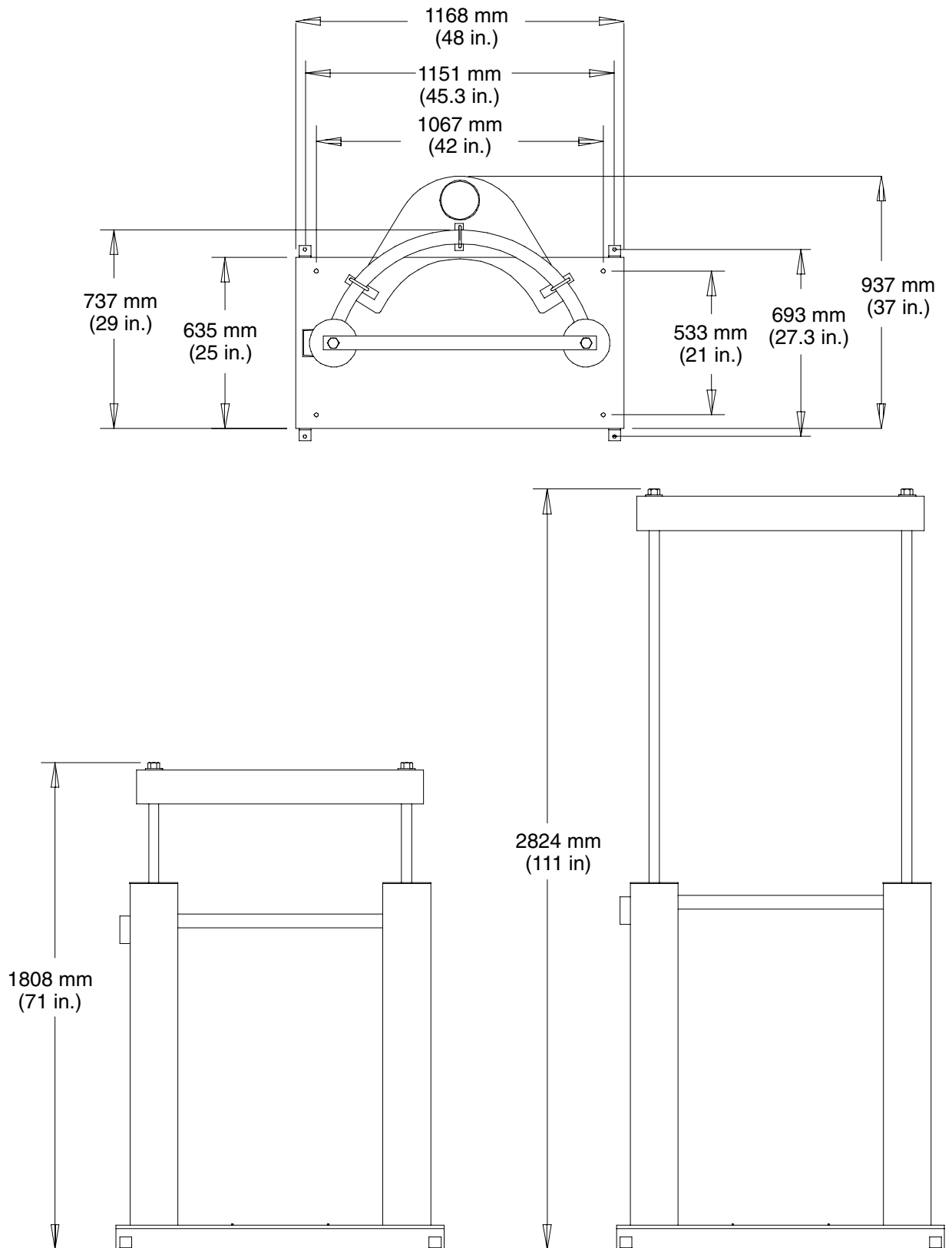


Fig. 30

Hydraulic Power Supply Dimensions

Hydraulic Power Supply Mounting and Clearance Dimensions

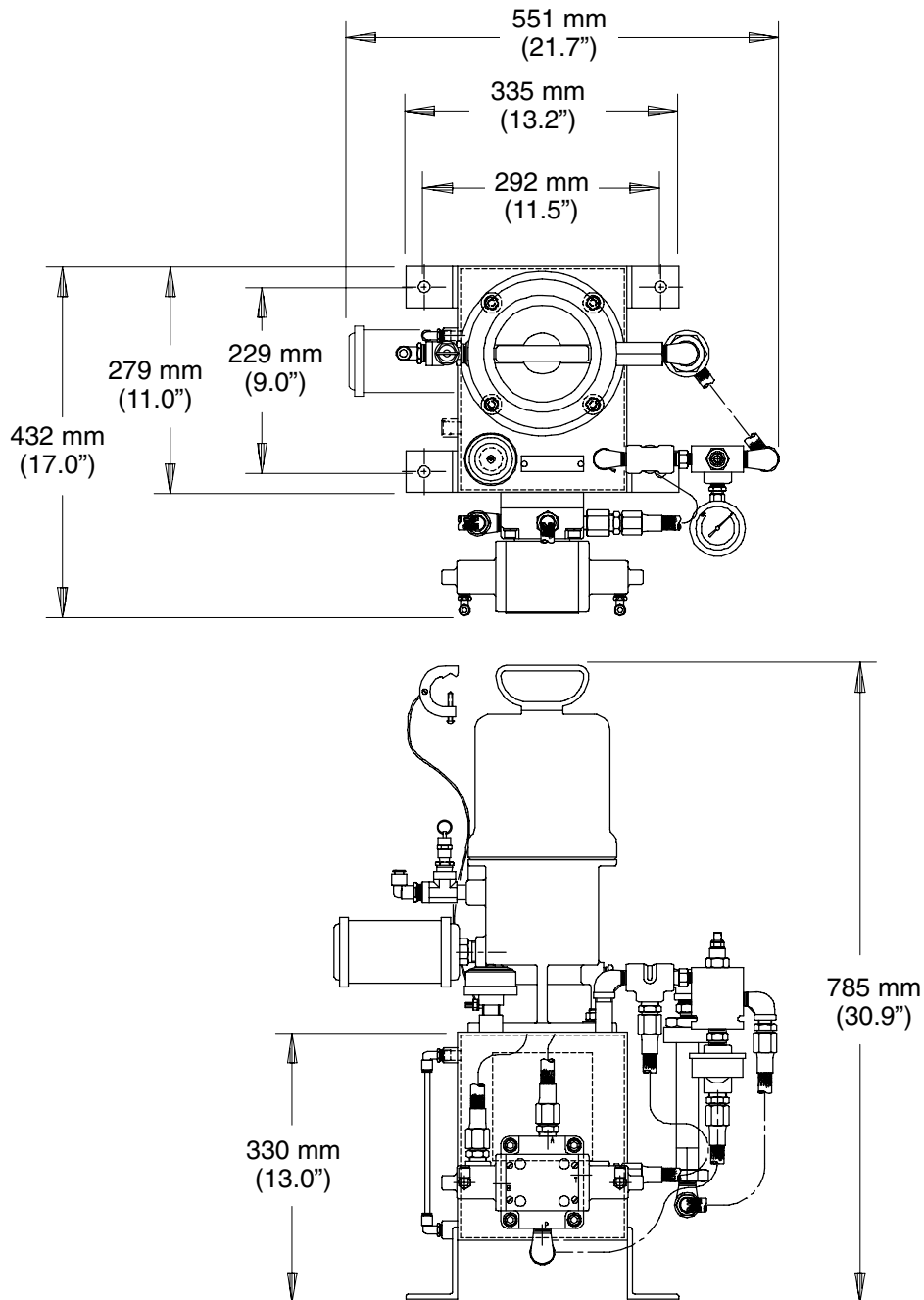


Fig. 31

Air–Powered Ram Technical Data

Maximum inbound air pressure 125 psi (8.8 bar) Wetted parts . . . Carbon steel, aluminum, nitrile, nylon
Weight approx. 475 lb (216 kg)

Hydraulic Ram Technical Data

Maximum ram hydraulic working pressure	1.6 MPa (16 bar) (225 psi)
Maximum hydraulic power supply inlet air pressure	0.53 MPa (5.3 bar) (75 psi)
Maximum pump inlet air pressure	0.7 MPa (7 bar) (100 psi)
Weight (ram assembly + hydraulic fluid)	approx. 254 kg (560 lbs)
Weight (hydraulic power supply + hydraulic fluid)	approx. 41 kg (90 lbs)
Wetted parts (ram)	Carbon steel, aluminum, nitrile, nylon, nickel plating
Floor space dimensions (ram w/vent hood)	1.62 m wide x 1.04 m deep (63.8" x 40.9")
Floor space (hydraulic power supply)	551 mm x 432 mm deep (21.7" x 17")
Overall height (ram lowered)	1808 mm (71.2")
Overall height (ram extended)	2824 mm (111.2")
Overall height (hydraulic power supply)	785 mm (30.9")
Sound Data (ram)	N/A

Hydraulic Ram Related Publications

Product	Form#
Therm-O-Flow Pump Modules	310530
President Air Motor, 3:1	308485
NXT™ Air Motor	311238
Therm-O-Flow 55 Hydraulic-Powered Ram Heated Supply Unit	310534
Material Safety Data Sheet for Hydraulic Fluid	307766

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612-623-6921
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