

AC Hydraulic Power Pack Module

3A0238P
EN

AC Hydraulic Power Pack, with optional boom and hose kits, for hydraulic actuated applicators used with Graco HFR™ and VRM™ Metering Systems.

For professional use only.

2500 psi (17 MPa, 172 bar) Maximum Hydraulic Working Pressure

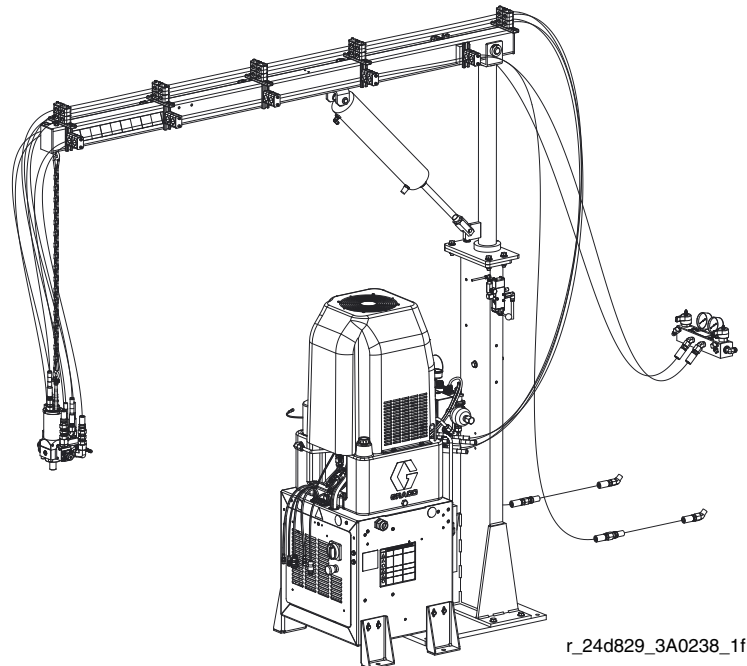


Important Safety Instructions

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

See page 3 for model information.

24D829 AC Hydraulic Power Pack Module Shown



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Contents

Related Manuals	2	Repair	27
Models	2	Remove Hydraulic Power Pack Shroud	27
AC Hydraulic Power Pack Modules	2	Install Hydraulic Power Pack Shroud	27
Applicator Kits	3	Remove Hydraulic Power Pack	27
Individual Applicators	3	Install Hydraulic Power Pack	29
Warnings	5	Replace Tank Gasket	29
Isocyanate Conditions	8	Remove Motor	30
Material Self-ignition	8	Install Motor	31
Keep Components A and B Separate	8	Remove Hydraulic Gear Pump	32
Moisture Sensitivity of Isocyanates	8	Install Hydraulic Gear Pump	33
Foam Resins with 245 fa Blowing Agents	8	Install FCM Upgrade Token	34
Changing Materials	9	Parts	36
Component Identification	10	AC Hydraulic Power Pack Module	36
AC Power Pack Module	10	Mix Module Stand	38
Hydraulic Power Pack Stand	11	Heat Exchanger Assembly	40
Main Power Disconnect	12	230V and 400V MixHead Panel	42
Circuit Breakers	12	MixHead Hydraulic Power Pack	44
Fluid Control Module (FCM)	13	Pneumatic Boom Arm	50
Setup	15	Hose Kits	52
Connect Hydraulic Hoses	15	Hose and Cable Kits	54
Connect Material Hoses to System	18	Optional Equipment	55
Connect Communication Cables	19	Electrical Schematics	58
Connect Proximity Cables	19	Dimensions	66
Connect Electrical Cord	20	AC Power Pack Module	66
Startup	21	AC Power Pack Stand	68
Operation	21	Pneumatic Boom	69
Pressure Relief Procedure	21	Technical Data	70
Shutdown	21	Graco Standard Warranty	72
Maintenance	22		
Schedule	22		
Troubleshooting	24		

Related Manuals

Manual	Description
312753	L-Head, Operation-Maintenance
312752	S-Head, Operation-Maintenance
313536	GX-16, Operation
309582	Circulation and Return Tube Kits, Instructions-Parts
313997	HFR, Operation
313998	HFR, Repair-Parts

Manual	Description
313873	VRM, Operation
313874	VRM, Repair-Parts
3A0395	Stainless Steel Tank Stands, Instructions-Parts
3A0862	Hose Extension Kits, Instructions-Parts

Models

AC Hydraulic Power Pack Modules

The table below lists kit numbers for 230V and 400 VAC hydraulic power pack modules. The modules can come with a hydraulic power pack, boom, and hose kits for S-Head and L-Head applicators. For applicator kits, see **Applicator Kits** and **Individual Applicators** on page 4 (sold separately).

Kit No.	Voltage	Includes:				Not included	
		Boom	S-Head Hose Kits	L-Head Hose Kits	Hydraulic Power Pack	L-Head Applicators Only	S-Head Applicators Only
24D829	230V	✓		✓	✓	✓	
24D830	230V	✓	✓		✓		✓
24D834✘	400V	✓		✓	✓	✓	
24D835✘	400V	✓	✓		✓		✓
24D831	230V			✓	✓	✓	
24D832	230V		✓		✓		✓
24D836✘	400V			✓	✓	✓	
24D837✘	400V		✓		✓		✓
24F297★	230V				✓	✓	
24F298★✘	400V				✓	✓	
24J912★	230V				✓		✓
24J913★✘	400V				✓		✓

★ Purchase required hoses separately. See **Hose and Cable Kits** on page 54 for hose kits.

✘ See **400 V Power Requirements**.

400 V Power Requirements

- 400 V systems are intended for International voltage requirements. Not for voltage requirements in North America.
- If a 400 volt configuration is operated in North America, a special transformer rated for 400 V ("Y" configuration (4 wire)) may be required.
- North America mostly employs a 3 wire or Delta configuration. The two configurations are not interchangeable.

Applicator Kits

The table below lists S-Head and L-Head applicators kits. All applicator kits come with an injection nozzle and needle valve calibration kit.

Applicator	Kit No.	Model	Maximum Working Pressure psi (MPa, bar)
L-Head	24A084	20.20.6/10	3000 (21, 206)
	24A085	20.20.10/14	3000 (21, 206)
	24A086	20.20.13/20	3000 (21, 206)
S-Head	24A090	30100-500-4	3000 (21, 206)
	24A092	30100-625-2	3000 (21, 206)
	24A093	30110-625-4	3000 (21, 206)

Individual Applicators

L-Head

The table below lists individual model numbers and chamber inside diameters. See L-Head manual for more information.

Model	Impingement Chamber ID (mm)	Exiting Chamber ID (mm)	Maximum Working Pressure psi (MPa, bar)	CE Approved
20.20.5/8	5	8	3000 (21, 206)	✓
20.20.6/10	6	10	3000 (21, 206)	
20.20.10/14	10	14	3000 (21, 206)	
20.20.13/20	13	20	3000 (21, 206)	
20.20.16/25	16	25	3000 (21, 206)	

S-Head

The table below lists individual model numbers and stroke lengths. See S-Head manual for more information.

Model	Stroke (in.)	Maximum Working Pressure psi (MPa, bar)
30110-500-2	2.25	3000 (21, 206)
30100-500-4	4	3000 (21, 206)
30100-625-2	2.25	3000 (21, 206)
30110-625-4	4	3000 (21, 206)

GX-16

The table below lists individual model numbers. See GX-16 manual for more information.

Applicator	Model
GX-16	24E876
	24E877
	24E878
	24J187
	24K233
	24K234

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

DANGER



HIGH VOLTAGE ELECTRIC SHOCK HAZARD

This equipment uses high voltage power. Contact with high voltage equipment and improper grounding, setup, or usage of the system can cause death or serious injury.

- Turn off and disconnect power at main switch before disconnecting any cables and before servicing equipment.
- This equipment must be grounded. Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

WARNING



TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read MSDSs to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
- Always wear chemically impermeable gloves when spraying, dispensing, or cleaning equipment.



PERSONAL PROTECTIVE EQUIPMENT

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

! WARNING



SKIN INJECTION HAZARD

High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **Get immediate surgical treatment.**

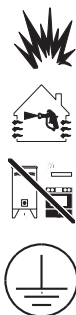
- Engage trigger lock when not dispensing.
- Do not point dispensing device at anyone or at any part of the body.
- Do not put your hand over the fluid outlet.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately.



PRESSURIZED EQUIPMENT HAZARD

Fluid from the gun/dispense valve, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow the **Pressure Relief Procedure** when you stop spraying and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.



FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Ground all equipment in the work area. See **Grounding** instructions.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail.
- If there is static sparking or you feel a shock, **stop operation immediately**. Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.

! WARNING



PRESSURIZED ALUMINUM PARTS HAZARD

Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.

- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents.
- Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.



EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.



- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.



- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed. Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.








BURN HAZARD

Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.

Isocyanate Conditions

						
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Spraying or dispensing materials containing isocyanates creates potentially harmful mists, vapors, and atomized particulates.

Read material manufacturer's warnings and material MSDS to know specific hazards and precautions related to isocyanates.

Prevent inhalation of isocyanate mists, vapors, and atomized particulates by providing sufficient ventilation in the work area. If sufficient ventilation is not available, a supplied-air respirator is required for everyone in the work area.




To prevent contact with isocyanates, appropriate personal protective equipment, including chemically impermeable gloves, boots, aprons, and goggles, is also required for everyone in the work area.

Material Self-ignition

						
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Some materials may become self-igniting if applied too thickly. Read material manufacturer's warnings and material MSDS.

Keep Components A and B Separate

						
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Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination of the equipment's wetted parts, **never** interchange component A (isocyanate) and component B (resin) parts.

Moisture Sensitivity of Isocyanates

Isocyanates (ISO) are catalysts used in two component foam and polyurea coatings. ISO will react with moisture (such as humidity) to form small, hard, abrasive crystals, which become suspended in the fluid. Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity. If used, this partially cured ISO will reduce performance and the life of all wetted parts.

NOTE: The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

To prevent exposing ISO to moisture:

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store ISO in an open container.
- Keep the ISO lube pump reservoir (if installed) filled with Graco Throat Seal Liquid™ (TSL™), Part 206995. The lubricant creates a barrier between the ISO and the atmosphere.
- Use moisture-proof hoses specifically designed for ISO, such as those supplied with your system.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Never use solvent on one side if it has been contaminated from the other side.
- Always lubricate threaded parts with ISO pump oil or grease when reassembling.

Foam Resins with 245 fa Blowing Agents

Some foam blowing agents will froth at temperatures above 90°F (33°C) when not under pressure, especially if agitated. To reduce frothing, minimize preheating in a circulation system.

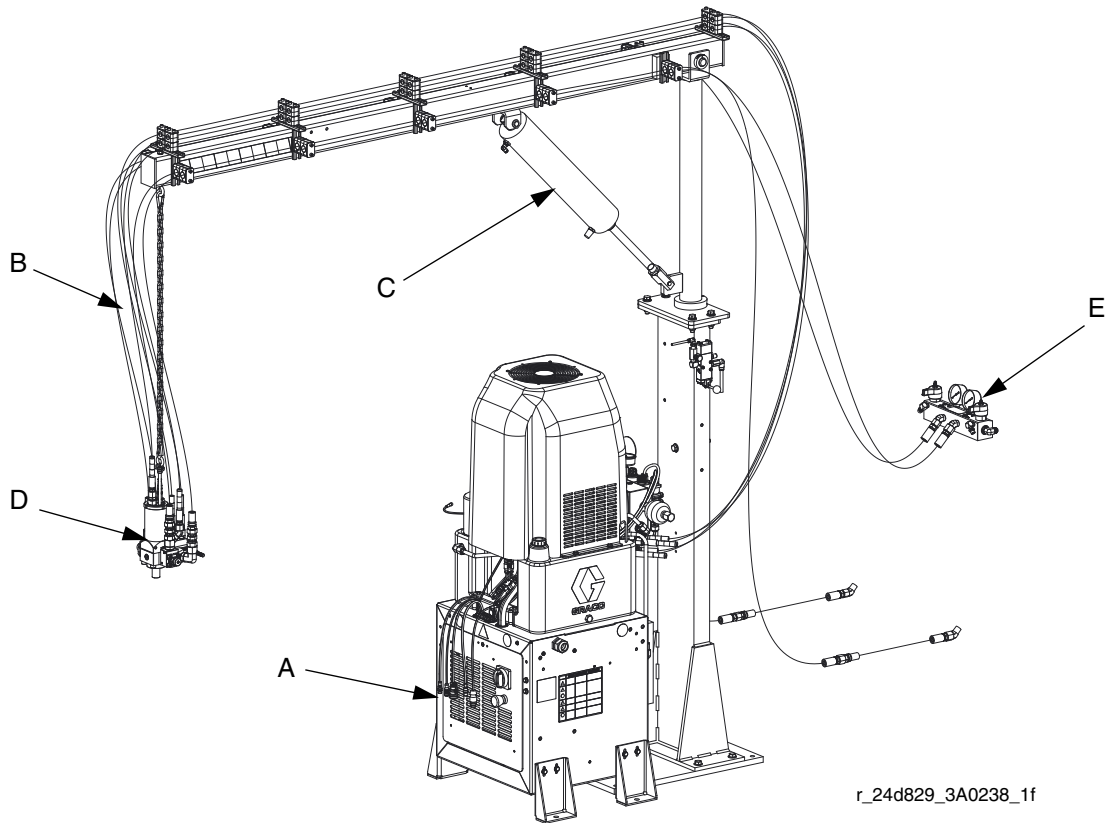
Changing Materials

- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- Most materials use ISO on the A side, but some use ISO on the B side.
- Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the B (resin) side.

Component Identification

AC Power Pack Module

24D829 AC Power Pack Module shown with circulation lines



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FIG. 1: Typical Installation

Key:

- A AC Hydraulic Power Pack
- B Hose Kit (includes A, B, and hydraulic hoses)
- C Boom (not included with all power pack kits)
- D Applicator (not included)
- E GMS™ Fluid Manifold (not included)

Hydraulic Power Pack Stand

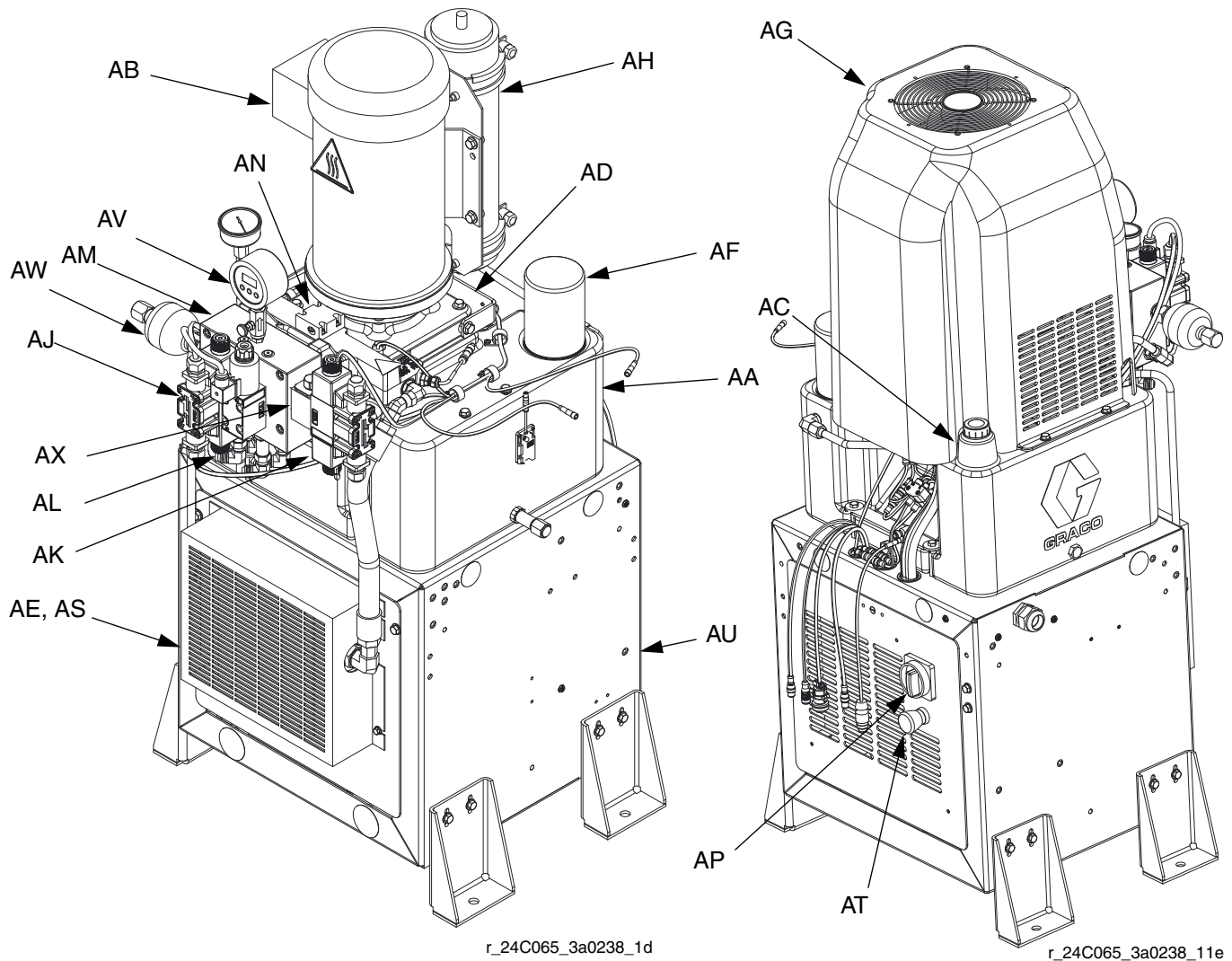


FIG. 2

Key:

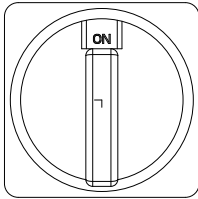
- | | |
|--|---|
| AA 10 Gallon Hydraulic Oil Reservoir (see Technical Data on page 70 for specifications) | AP Main Power Disconnect |
| AB Electric Motor | AR Electronics Panel (inside stand) |
| AC Dipstick | AS Heat Exchanger Cover |
| AD Hydraulic Housing | AT Cycle Stop Button |
| AE Heat Exchanger | AU Stand |
| AF Filter | AV Hydraulic Pressure Gauge |
| AG Shroud | AW Return Accumulator - 150 psi (1.0 MPa, 10 bar) precharge |
| AH Mixhead Accumulator - 1200 psi (24.1 MPa, 241 bar) precharge | AX Check Valve |
| AJ Cleanout Directional Valve | |
| AK Accumulator Directional Valve | |
| AL Dispense Directional Valve | |
| AM Applicator Adapter Housing | |
| AN Diverter Block | |

Main Power Disconnect

Below are the on and off positions for the main power disconnect (AP) located on the AC Power Pack module.

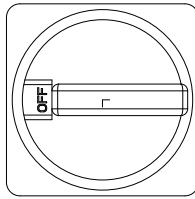
NOTE: The power must be turned “On” at the GMS unit first.

On position



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Off Position



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FIG. 3: Main Power Disconnect

Circuit Breakers



Circuit breakers are located inside the power pack frame stand.

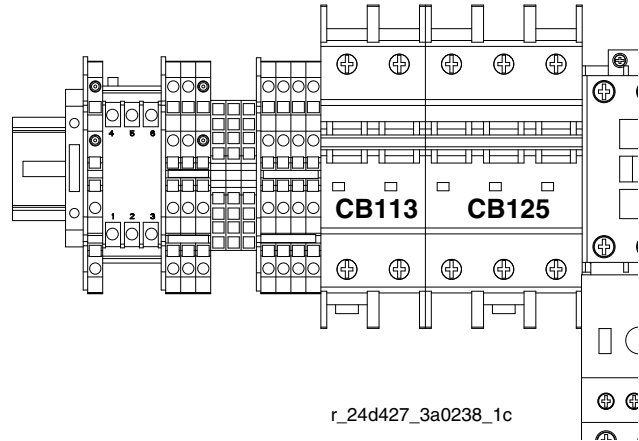


FIG. 4: Circuit Breakers

Model	Ref. No.	Size	Component
230V	CB125	30 A	Directional Valve and heat exchanger fan
	CB113	5 A	Motor
400V	CB125	20 A	Directional valve and heat exchanger fan
	CB113	5 A	Motor

Fluid Control Module (FCM)

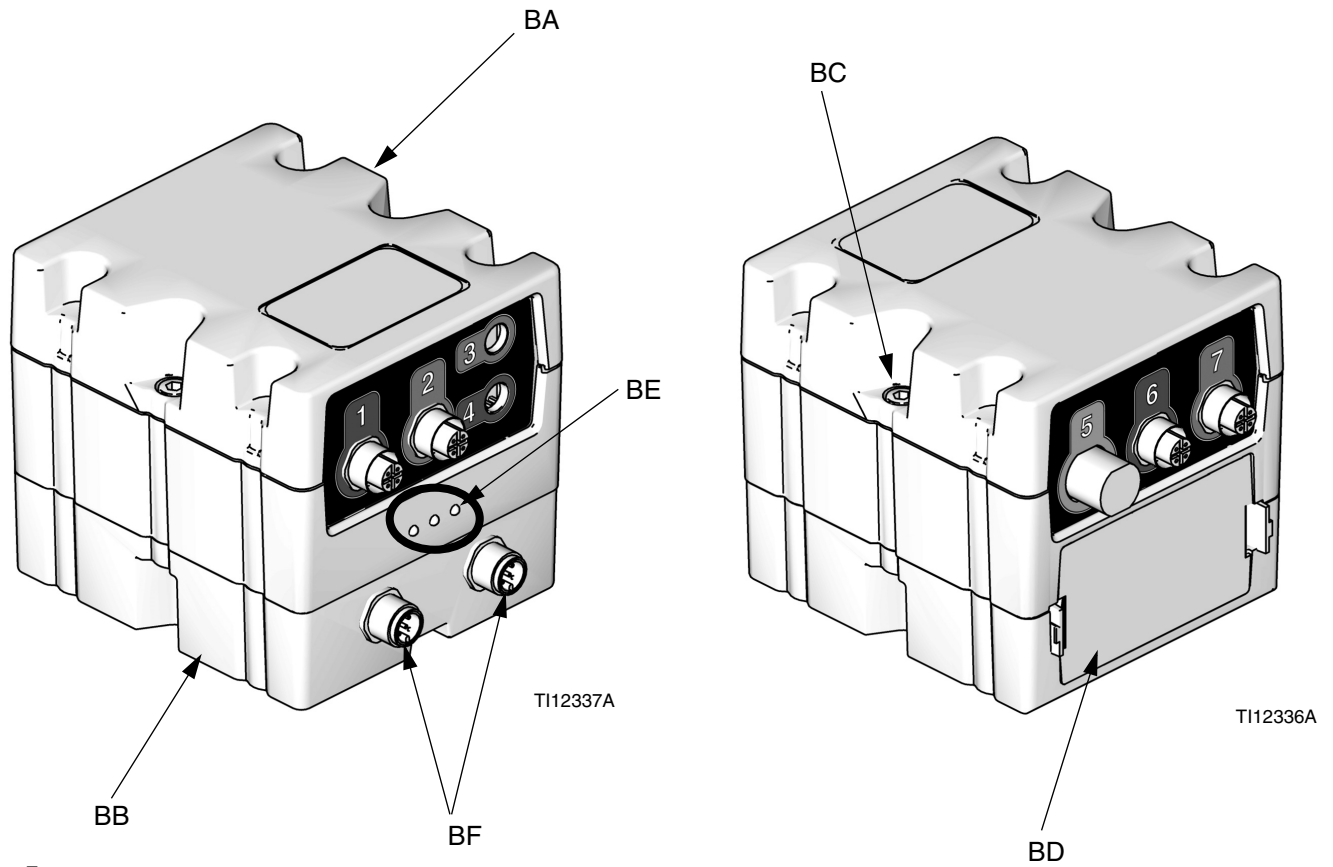


FIG. 5

Key:

- BA Fluid Control Module
- BB Base
- BC Module Connection Screws
- BD Access Cover
- BE Module Status LEDs
- BF CAN Connectors

FCM Cable Connections

FCM Connections	Cable
1	123673
2	123673
3	121686
4	121686
5	24E052
6	122497
CAN connector 1	123762
CAN connector 2	123856

Diagnostic Information

Module Status LED Signal	Diagnosis	Solution
Green on	System is powered up	-
Yellow	Internal communication in progress	-
Red solid	FCM hardware failure	Replace FCM
Red flashing fast	Uploading software	-
Red flashing slow	Token error	Remove token and upload software token again.







Adjust Selector Switch

The fluid control module uses a 16-position selector switch. Set selector switch (S) to specific selection according to the settings listed in the following table. Setting 1 is the only valid position.

Selector Switch Settings

Setting	Zone
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	A
B	B
C	C
D	D
E	E
F	F

Setup

					
<p>Avoid breathing of vapors and contact with Isocyanate as some people have severe allergic reactions. See Isocyanate Conditions on page 8.</p> <p>Avoid routing hoses in walkway areas to prevent operators from tripping on hoses running between system components.</p>					

1. Anchor the stand to the floor (mounting hardware not included). See **Dimensions** on starting on page 66 for mounting dimensions. *Suggested anchors:* McMaster-Carr (part no. 92403A400).





NOTE: The AC power pack (A) needs to be mounted no more than 6 ft (1.8m) away from the front of the GMS unit.

2. If the AC power pack has a boom (C), anchor the boom to the floor (mounting hardware not included). See **Dimensions** on starting on page 66 for mounting dimensions. *Suggested anchors:* McMaster-Carr (part no. 92403A400).

NOTE:

- If your AC Power Pack Module has a boom (C), the AC Power Pack (A) needs to be installed within 12 in. (304.8 mm) of the boom and the boom needs to be installed within 3 ft (1 m) of the GMS unit.
 - Ensure that the hose connections for applicator (D) face the mast. See FIG. 1 on page 10.
3. If the AC power pack has a boom (C), mount the applicator (D) to the boom (C). Complete **Installation** instructions in the applicator manual.

Connect Hydraulic Hoses

						
<p>Hydraulic lines could rupture and cause injury. Use hydraulic hoses with a pressure rating higher than what the system is set to.</p> <p>Twisted hydraulic hoses can cause the hoses to fatigue sooner and rupture. Ensure that the hydraulic hoses do not twist between the AC power pack and the applicator.</p>						

NOTICE

Damage can occur to the directional valve if the hydraulic hose diameter is larger than 3/8 in. (9.5 mm).

To prevent damage to the applicator or directional valves, do not allow any dirt or foreign matter to enter the lines, when connecting the hose kit (B) to the applicator (D) and hydraulic power pack (A).

Connect Hydraulic Hoses to Power Pack

1. **Connect L-Head hydraulic hoses:**
 - a. Connect the hydraulic hose fittings (A1, A2, B1, and B2) on the AC power pack to the ends of hydraulic hose (401) on the mast side of the boom (C) as listed in the table below. See FIG. 1, page 10 and FIG. 6, page 16.
2. **Connect S-Head and GX-16 hydraulic hoses:**
 - a. Connect the hydraulic hose fittings (A2 and B2) on the AC power pack to the ends of hydraulic hose (402) on the mast side of the boom (C) as listed in the table below. See FIG. 1, page 10 and FIG. 6, page 16.
 - b. Use caps (6) to plug A1 and B1 fittings.

Hydraulic Hose Fitting	Hydraulic Hoses	Hydraulic Hose Color Markings
A1✘	Cleanout close	Green/Green
A2	Material close	Green
B1✘	Cleanout open	Green/White/Green
B2	Material open	Green/White

✘ Not used for S-Head and GX-16 applicators.

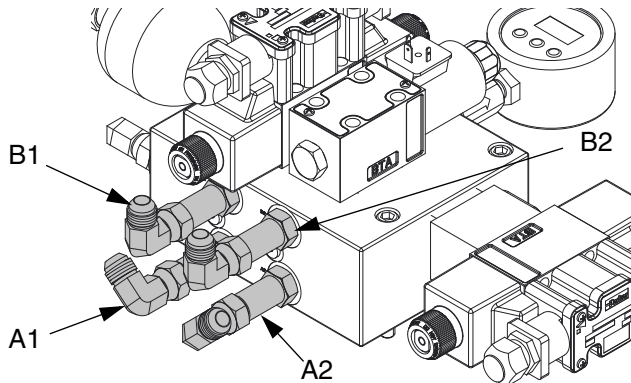


FIG. 6: L-Head Applicator Hydraulic Housing

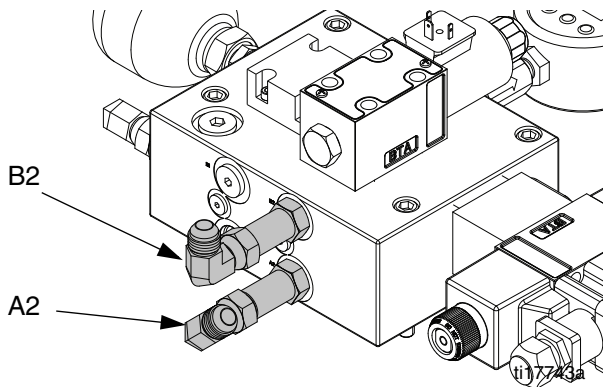


FIG. 7: S-Head Applicator Hydraulic Housing

3. Hand tighten each fitting.
4. Tighten each fitting 1-1/2 flats past hand tight.

Connect Hydraulic Hoses to Applicator

If the AC power pack (A) has a boom (C), these connections will be hanging off the end of the boom.

L-Head

See FIG. 8.

1. Connect the A1 hose, with green/green markings, to the cleanout close port (CC) on the applicator.
2. Connect the A2 hose, with the green markings, to the material close port (MC) on the applicator.
3. Connect the B1 hose, with the green/white/green markings, to the cleanout open port (CO) on the applicator.
4. Connect the B2 hose, with the green/white markings, to the material open port (MO) on applicator.
5. Hand tighten each fitting.
6. Bleed air from the hydraulic fluid lines. See the applicator manual for instructions.
7. Tighten each fitting 1-1/2 flats past hand tight.

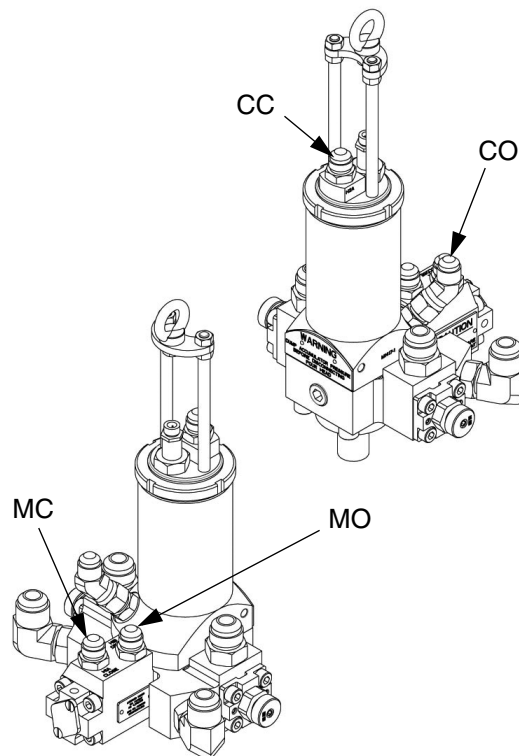


FIG. 8: Hydraulic connections on L-Head

S-Head and GX-16

See FIG. 9 and FIG. 10.

1. Connect the B2 hose, with green/white markings, to the hydraulic open (HO) port fitting.
2. Connect the A2 hose, with green markings, to the hydraulic close (HC) port fitting.
3. Hand tighten each fitting.
4. Bleed air from the hydraulic fluid lines. See the applicator manual for instructions.
5. Tighten each fitting 1-1/2 flats past hand tight.

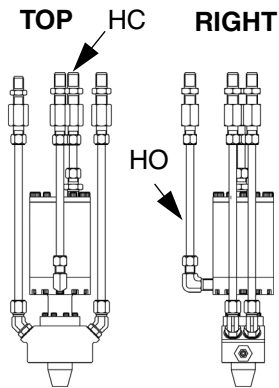


FIG. 9: Hydraulic connections on S-Head

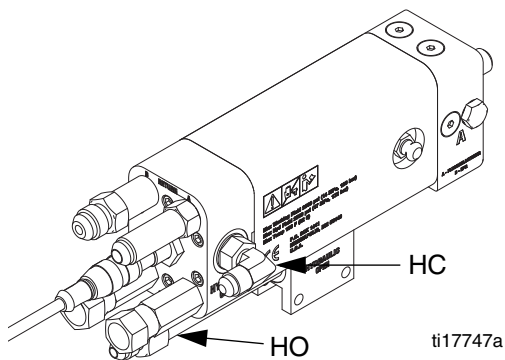


FIG. 10: Hydraulic connections on GX-16

Connect Material Hoses to System

For System With Circulation

NOTICE

Avoid routing hoses in walkway areas to prevent operators from tripping on hoses running between system components. This also prevents fittings from leaking.

1. Connect the A (red) and B (blue) supply hoses, from hose kit (3), to the GMS material manifold. See FIG. 11.
2. Connect the other end of the supply hoses to the applicator. See the applicator manual for fluid inlet identification.

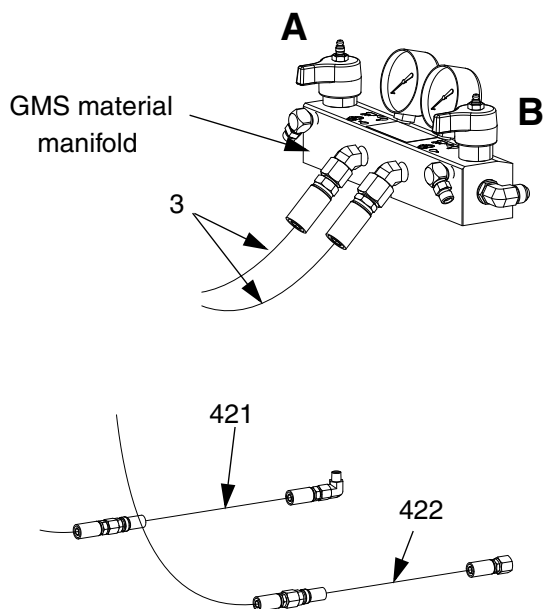


FIG. 11

NOTE: The circulation hoses contain a 10 ft (3 m) extension hose to reach the tank stands.

3. Connect the other end of the A (red) circulation hose (421) to the fluid inlet fitting on the A (red) tank stand. See FIG. 11 and FIG. 12.
4. Connect the other end of the B (blue) circulation hose (422) to the fluid inlet fitting on the B (blue) tank stand.

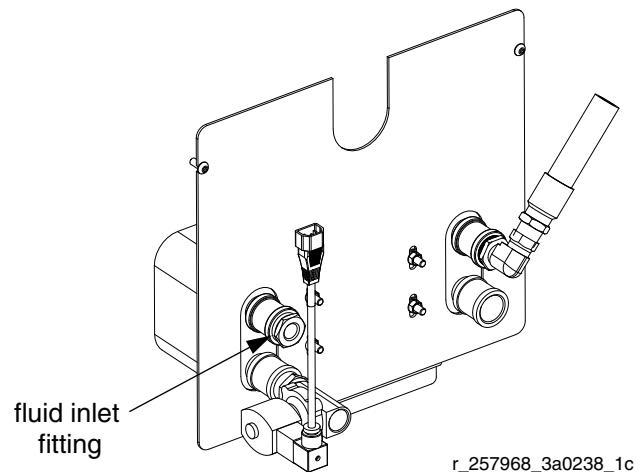


FIG. 12: Tank Stand Connections

5. Tighten each fitting.

For System Without Circulation

NOTICE

Avoid routing hoses in walkway areas to prevent operators from tripping on hoses running between system components. This also prevents fittings from leaking.

1. Connect the A (red) and B (blue) supply hoses, from hose kit (3), to the GMS material manifold. See FIG. 11.
2. Connect the other end of the supply hoses to the applicator. See the applicator manual for fluid inlet identification.
3. Hand tighten each fitting.
4. Tighten each fittings 1-1/2 flats past hand tight.

Connect Communication Cables

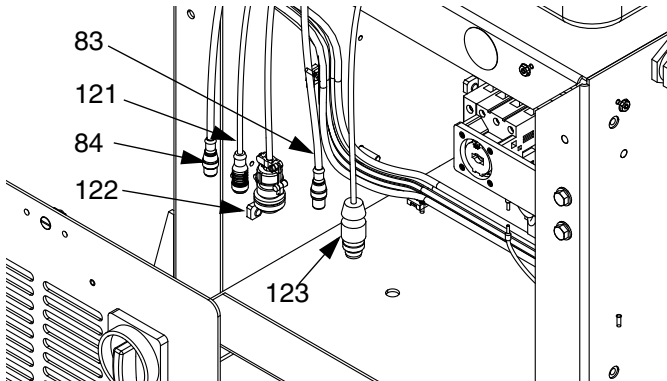
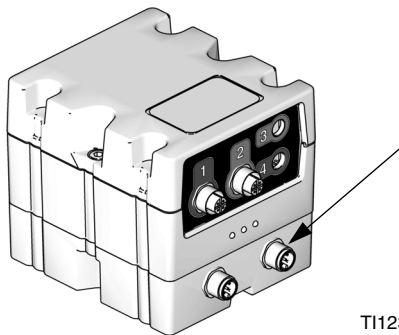


FIG. 13

1. Feed end of communication cable (83) through bulkhead of the HFR base unit.
2. Connect communication cable (83) to any open CAN connector of a GCA cube.



TI12337A

FIG. 14

Connect Proximity Cables

L-Head

1. Connect the applicator end of the proximity sensor cable (418) to the dispense proximity sensor on the L-Head.
2. Connect the applicator end of the proximity sensor cable (419) to the cleanout proximity sensor on the L-Head.
3. Connect the other end of the proximity sensor cable (418) to the dispense proximity sensor cable (122), labeled A1, on the AC power pack. See FIG. 13.
4. Connect the other end of the proximity sensor cable (419) to the cleanout proximity sensor pigtail (123), labeled 2C, on the AC power pack. See FIG. 13.

5. Connect the termination connector (425) to the connector (121), labeled 5A. Feed the connector (425) and cables (121, 84) into the base cube and secure.

S-Head (Includes GX-16)

1. Connect control cable (84) to the motor control module splitter labeled "2A" found on the HFR unit. Refer to the HFR manual for detailed locations
2. Connect the S-head proximity sensor to the electrical connector found within the material hose bundle.
3. Connect the other end of the cord to the electrical connector found near the fluid manifold on the HFR.
4. Feed the cables (121, 122, 123) into the base cube and secure.

Connect Electrical Cord

Electrical Requirements. See Table 1.



					
Installing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly. Have a qualified electrician connect power and ground to main power switch terminals, see FIG. 15. Be sure your installation complies with all National, State, and Local safety and fire codes.					

Table 1: Electrical Requirements (kW/Full Load Amps)

Model	Voltage (phase)	Full Load Peak Amps*	System Watts
230V	230V (3)	17	4000
400V✱	400V (3)	18	3200

* Full load amps with all devices operating at maximum capabilities. Fuse requirements at various flow rates and mix chamber sizes may be less.

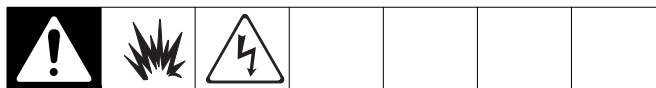
✱ See 400 V Power Requirements, page 3.

NOTE: Power cord is not supplied. See Table 2.

Table 2: Power Cord Requirements

Model	Cord Requirements AWG (mm ²)
230V	10 (5.3), 3 wire
400V	10 (5.3), 4 wire

✱ See 400 V Power Requirements, page 3.



Electrical Cord Wires by Model

230V, 3 phase: L1, L2, L3

400V, 3 phase ✱ : L1, L2, L3, N

✱ See 400 V Power Requirements, page 3.

Use 5/32 or 4 mm hex allen wrench to connect three power leads to L1, L2, and L3.

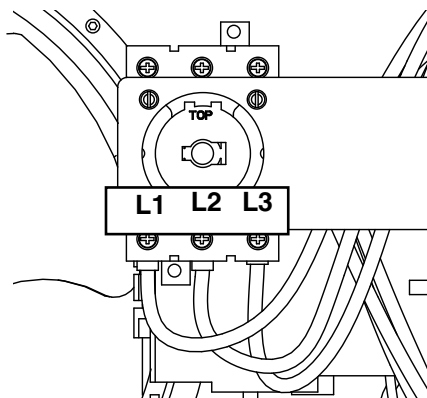


FIG. 15: 230V, 3 phase shown

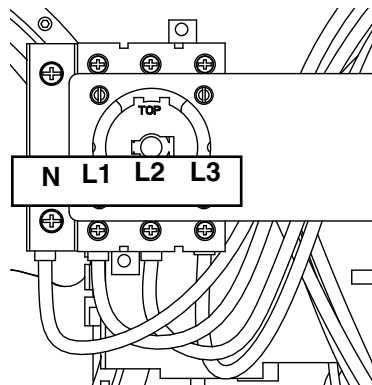






FIG. 16: 400V, 3 phase shown






Startup

						
<p>The hydraulic power pack operates at a high pressure and high voltage. Be careful during operation and always wear the appropriate protective gear.</p>						

1. Ensure all hydraulic connections are tight.
2. Turn on main power to power pack.
3. Turn power switch to the ON position.
4. Set system settings in ADM. See system operation manual for instructions.

Operation

Pressure Relief Procedure

						
<p>Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury from splashing or moving parts.</p>						

Always relieve hydraulic pressure of AC power pack:

- Before performing system maintenance
 - Long term (over night) shutdown
1. Shutdown the power pack. See **Shutdown**.
 2. Open the needle valve to show the pressure on the gauge.

NOTE: Ensure that the motor is not running.

3. Press in the lower solenoid of the accumulator charging directional valve.

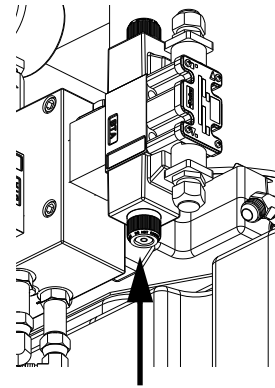


FIG. 17

4. Ensure that the pressure gauge is zero psi.
5. To relieve pressure in material hoses, perform **Pressure Relief Procedure** in HFR manual 313997.

Shutdown

1. Shutdown HFR.
2. Turn main power switch to the OFF position.
3. Turn off and lock out main power.

Maintenance



Schedule

Procedure	Frequency
Check Accumulator Pre-Charge	Weekly
Check Tightness of all Clamps and Fittings	Weekly
Check Hoses for Wear	Monthly
Check Hydraulic Fluid and Filter	6 months

NOTICE

Recommended Hydraulic Oil

Use Graco-approved Hydraulic Oil, Part No. 169236 (5 gal) or 207428 (1 gal)) or a premium, ISO grade 46 petroleum-based hydraulic oil containing rust and oxidation inhibitors and anti-wear agents.

Before using any other type of oil in this motor, contact your Graco distributor. Unauthorized use of lesser grade oil or substitutes may void the warranty.

Hydraulic Oil Working Temperature

The maximum hydraulic oil operating temperature is 180 °F (82 °C). The motor seals will wear faster and leakage may occur if the pump is operated at higher oil temperatures.

If the hydraulic oil temperature approaches 180 °F (82 °C), check the hydraulic fluid supply cooling system, filters, etc. and clean or repair as needed.

Keep the hydraulic system clean

To reduce the risk of damaging the hydraulic driver, verify that the hydraulic power supply fluid lines and reservoir are clean and free from contaminants.

Carefully follow the manufacturer's recommendations on reservoir and filter cleaning, flushing, and periodic changes of hydraulic fluid.

Always plug the hydraulic inlets, outlets and lines when disconnecting them to avoid introducing dirt and other contaminants into the system.

Check the Accumulator Pre-Charge

Graco Charging Harness (part no. 124217) can be purchased to aid in quick charging of the accumulator.

1. Turn off main power and lockout.
2. Bleed the accumulator charging valve hydraulic pressure to zero. See **Pressure Relief Procedure**, page 21.
3. Connect the charging harness to the accumulator.
4. Check the reading on the nitrogen harness pressure gauge. If the pressure is below 1200 psi, then **Pre-Charge the Accumulator** to 1200 psi.
5. Repeat the procedure for the return accumulator (AW, FIG. 2) with the precharge set to 150 psi (1.0 MPa, 10 bar).

Pre-Charge the Accumulator

NOTICE

During this procedure the nitrogen bottle, the accumulator, and the charging harness will all be under significant pressure. Use dry nitrogen gas only.

1. **Check the Accumulator Pre-Charge.**
2. Connect the other end of the harness to the nitrogen bottle. Slowly open the nitrogen bottle valve while observing the pressure gauge.
3. When the 1200 psi is reached, close the nitrogen valve.
4. Open the bleed valve on the charging harness to relieve residual pressure in the charging harness.
5. Remove the charging harness and replace the bottle guard.
6. Repeat the procedure for the return accumulator (AW, FIG. 2) with the precharge set to 150 psi (1.0 MPa, 10 bar).

Check Hydraulic Fluid

NOTE: Standard temperature switch cuts out at a housing temperature of 160°F (71°C) and approximately 180°F (82°C) hydraulic fluid temperature.

Check Hydraulic Fluid Level

1. Remove the breather filler cap (246).
2. If the fluid level is between the high and low tick marks, the fluid level is correct.
3. If the fluid level falls below the low fluid level tick mark, add fluid until the level is between the high and low level tick marks.

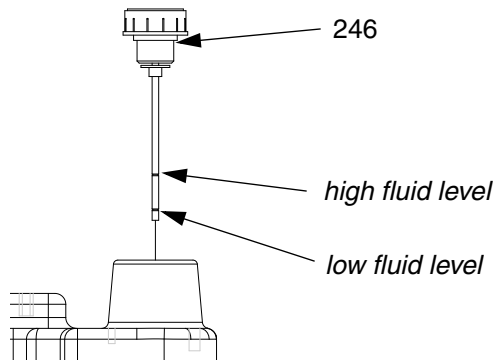


FIG. 18: High and Low Fluid Level Marks

Check Condition of Hydraulic Fluid

1. Remove the breather filler cap (246).
2. Remove some of the hydraulic fluid.
3. Replace the fluid if the fluid becomes cloudy.

Replace Hydraulic Fluid

Use only recommended hydraulic fluids. See FIG. 19.

NOTE: Be prepared to collect 10 gallons (38 liters) of fluid when emptying the tank.

1. Shutdown the system. See **Shutdown** on page 21.
2. Relieve Pressure. See **Pressure Relief Procedure** on page 21.
3. Place a container below drain port.
4. Remove drain cap (87) from the side of the hydraulic reservoir and drain the reservoir.
5. Install drain cap (87).

6. To add clean hydraulic fluid see **Check Hydraulic Fluid Level**.

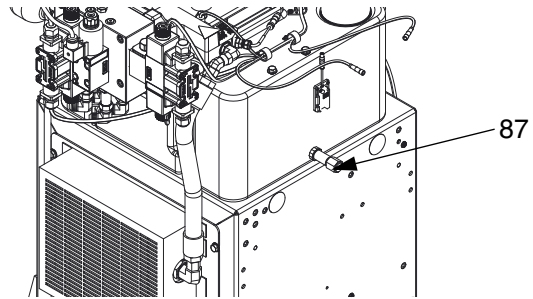


FIG. 19: Drain Cap

Replace Hydraulic Filter

NOTICE

Be careful not to allow any debris into the hydraulic tank when replacing the filter. If any debris falls into the hydraulic tank, the debris must be removed or machine damage will result.

1. Shutdown the system. See **Shutdown** on page 21.
2. Relieve Pressure. See **Pressure Relief Procedure** on page 21.
3. Use compressed air to remove any loose debris around the hydraulic filter (245).
4. Apply a light coat of hydraulic fluid to the sealing surface of the new hydraulic filter (245).
5. Replace the old filter with the new filter (245).
6. Start system.
7. Check for any leaks.

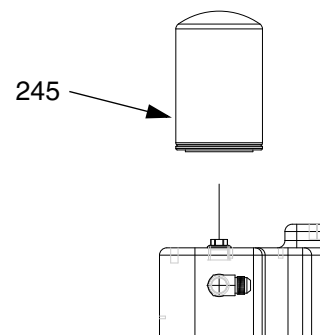


FIG. 20: Hydraulic Fluid Filter

Troubleshooting



Problem	Cause	Solution
Pressure gauge drops to zero while in operation.	Accumulator precharge is too high.	Ensure accumulator precharge is no more than 1200 psi.
No hydraulic pressure.	Motor is not turning.	Ensure main power is ON.
		Ensure all electrical connections to the motor are secure.
		Check motor circuit breaker to see if it has been tripped. Ensure all cables are connected to FCM connectors.
		Replace motor. See page 30.
		Ensure all cables are connected to FCM connectors. See FCM Cable Connections , page 13.
	Motor is spinning clockwise.	Switch two phases of incoming power.
	Leaking fluid from fittings.	Tighten leaking fittings.
	Accumulator directional valve is not charging.	Ensure accumulator charging directional valve is shifting. Verify LED lights turn ON and OFF.
		Check circuit breaker to see if it has been tripped.
Replace directional valve. See page 27.		
Replace accumulator.		
Low hydraulic fluid level in oil reservoir.	Check hydraulic fluid level. Refill as necessary.	
Leaking hydraulic fluid around the hydraulic filter.	Damaged or clogged filter.	Replace hydraulic filter. See page 27.

Problem	Cause	Solution
Hydraulic fluid over heating.	Fan in base cube is not spinning.	Check electrical connections to fan. Replace fan.
	Heat exchanger in base cube is clogged or leaking.	Replace.
	Low hydraulic fluid level in oil reservoir.	Check hydraulic fluid level. Refill as necessary.
	Cycle rate too fast.	Increase time between shots.
	Damaged gear pump.	Replace gear pump. See page 32.
	Damaged coupler between motor and gear pump.	Visually inspect coupler and spider coupling between motor and gear pump. Replace if necessary.
Material is not dispensing from applicator.	Material hoses are not connected.	Check material hoses for damage or leaking fittings.
		Ensure material hoses are connected properly. See Setup on page 15.
Hydraulic fluid leaking around any directional valves.	Damaged or worn o-ring.	Replace o-ring. Clean o-ring surfaces and grooves prior to replacement.
Hydraulic fluid leaking around diverter block.	Damaged or worn o-ring.	Replace o-ring. Clean o-ring surfaces and grooves prior to replacement.
Applicator not cycling. (continued on the next page)	No hydraulic pressure.	See page 24 for possible causes and solutions.
	Leaking fluid from fittings.	Tighten leaking fittings.
	Hydraulic hoses are not connected.	Ensure hydraulic hoses are connected properly. See Setup on page 15.
Excessive air or foamy hydraulic oil.	Pump shaft seal failure.	Replace gear pump. See Remove Hydraulic Gear Pump , page 32.

Problem	Cause	Solution
Applicator not cycling. (continued)	Accumulator directional valve is not charging.	Ensure accumulator charging directional valve is shifting. Verify LED lights turn ON and OFF.
		Check circuit breaker to see if it has been tripped.
		Replace directional valve. See page 27.
		Replace accumulator.
		Ensure all cables are connected to FCM connectors. See FCM Cable Connections , page 13.
	Cleanout directional valve is not cycling. (L-Head only)	Ensure main power is ON.
		Ensure all electrical connections to the directional valve are secure.
		Check to see if the cleanout directional valve is shifting. Verify LED lights turn ON and OFF.
		Check circuit breaker to see if it has tripped.
		Replace directional valve. See page 27.
		Ensure all cables are connected to FCM connectors. See FCM Cable Connections , page 13.
	Material directional valve is not cycling.	Ensure main power is ON.
		Ensure all electrical connections to the directional valve are secure.
		Check to see if the material directional valve is shifting. Verify LED lights turn ON and OFF.
		Check circuit breaker to see if it has tripped.
		Replace directional valve. See page 27.
		Ensure all cables are connected to FCM connectors. See FCM Cable Connections , page 13.

Repair



Remove Hydraulic Power Pack Shroud

1. Remove four screws from base of shroud.
2. Lift shroud off of hydraulic power pack.

Install Hydraulic Power Pack Shroud

NOTICE

Do not over-torque any item that threads into the hydraulic tank (237). This will strip the threads and require tank replacement.

1. Place shroud on top of hydraulic power pack.
2. Install four screws securing shroud to hydraulic tank.

Remove Hydraulic Power Pack

NOTICE

If any debris falls into the hydraulic tank, the debris must be removed or machine damage will result.

1. Perform **Shutdown** procedure, see page 21.
2. Perform **Remove Hydraulic Power Pack Shroud** procedure.

3. Disconnect all hydraulic lines from A1, A2, B1, and B2 fittings at the applicator housing.

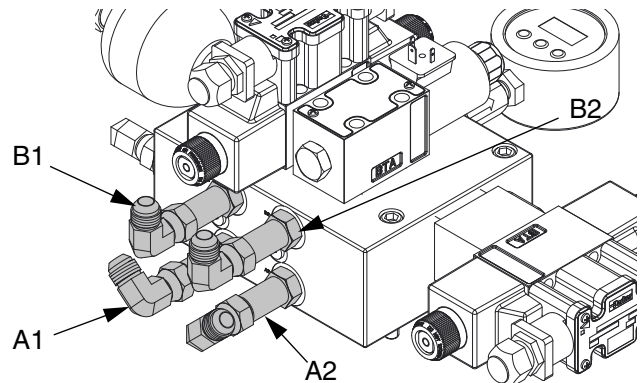


FIG. 21: L-Head Applicator Hydraulic Housing

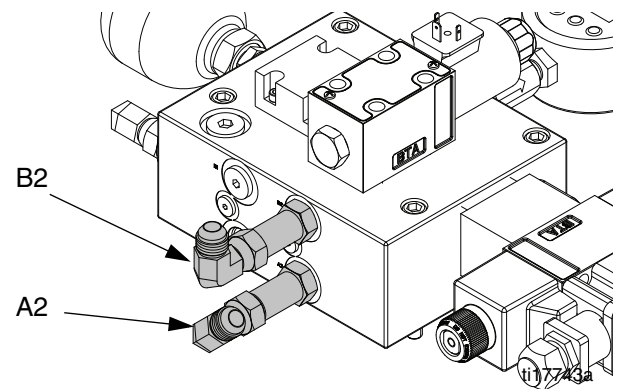


FIG. 22: S-Head Applicator Hydraulic Housing

4. Disconnect all electrical cables connected to the motor, directional valves, temperature switch, and pressure transducer.

- Disconnect heat exchanger inlet hose (76) and fitting from elbow fitting (249) on hydraulic housing (206). Disconnect heat exchanger outlet hose (77) and fitting from elbow fitting (248).

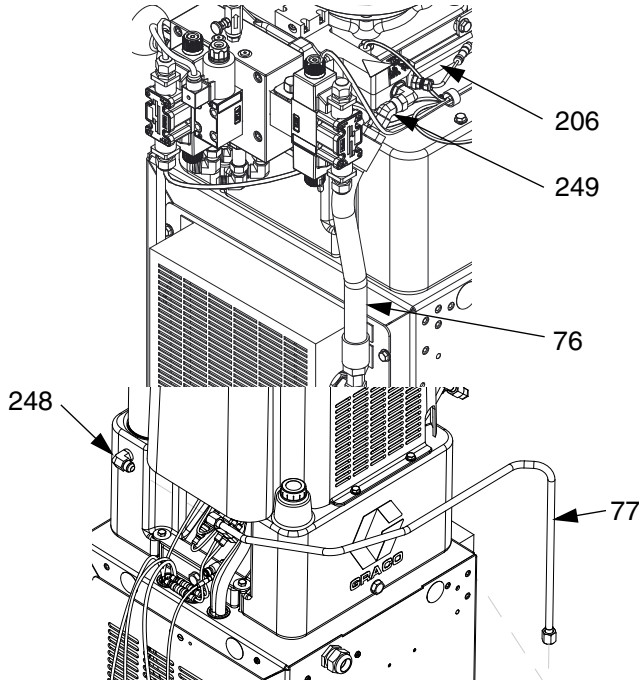


FIG. 23: Heat Exchanger Inlet and Outlet Hoses

- Remove the two bolts from (258) from the fluid housing (206) and replace each with a 5/16-18 thread eye bolt. Install a third 5/16-18 eye-bolt as indicated.

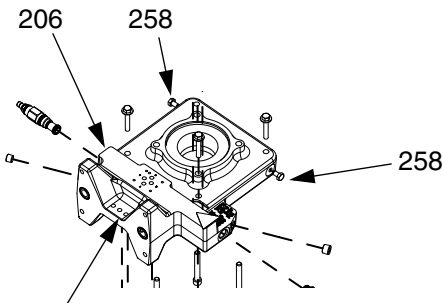


FIG. 24

- Run a rope through the three eye-bolts and between the motor and the accumulator. Secure to a hydraulic lift.

- Remove the four bolts (57) and washers (56) securing the tank to the stand.

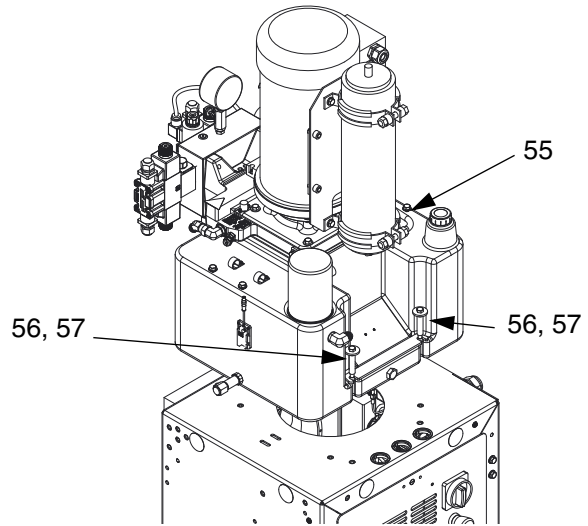


FIG. 25



To prevent serious injury from the hydraulic power pack falling, ensure that the hydraulic power pack is secured to the hydraulic lift before removing from the stand.

- Lift the hydraulic power pack (55) and place on a sturdy location capable of supporting up to 300 lbs (136 kg).

Install Hydraulic Power Pack

NOTICE

If any debris falls into the hydraulic tank, the debris must be removed or machine damage will result.

NOTICE

Do not over-torque any item that threads into the hydraulic tank. This will strip the threads and require tank replacement.

1. Run a rope through the three eye-bolts and between the motor and the accumulator. Secure to a hydraulic lift. See FIG. 24 on page 28.
2. Lift the Hydraulic Power Pack and place onto the base enclosure. See FIG. 25.
3. Align the holes with the tank then install finger-tight the four bolts (57) and washers (56) securing the tank to the stand. Torque to 10 ft-lb (13.5 N•m).
4. Remove rope and lift.
5. Remove eye-bolts. Install original bolts (258) into fluid housing (206). See FIG. 24 on page 28.
6. Connect all electrical cables to the motor, three directional valves, temperature switch, and pressure transducer.
7. Connect all hydraulic lines to applicator housing. See FIG. 21 on page 27.
8. Connect heat exchanger inlet hose (76) and fitting to elbow fitting (249) on hydraulic housing (206). Connect heat exchanger outlet hose (77) and fitting to elbow fitting (248). See FIG. 23 on page 28.

Replace Tank Gasket

1. **Remove Hydraulic Power Pack.** See page 27.
2. Remove hex head cap screws (239) and washers (238) securing hydraulic housing (206) to tank (237). Carefully remove motor (201) and hydraulic housing assembly from tank.
3. Remove tank gasket (236). If tank (237) is damaged, replace tank.
4. Install thrust washers (038) onto hex head cap screws (039). Apply pipe sealant 070408 to threads of screws. Align tank gasket (036), hydraulic housing, and tank (020) then install screws. Torque to 15 ft-lb (20.3 N•m).
5. Perform **Install Hydraulic Power Pack** procedure, see page 29.

NOTICE

Do not over-torque any item that threads into the hydraulic tank (237). This will strip the threads and require tank replacement.

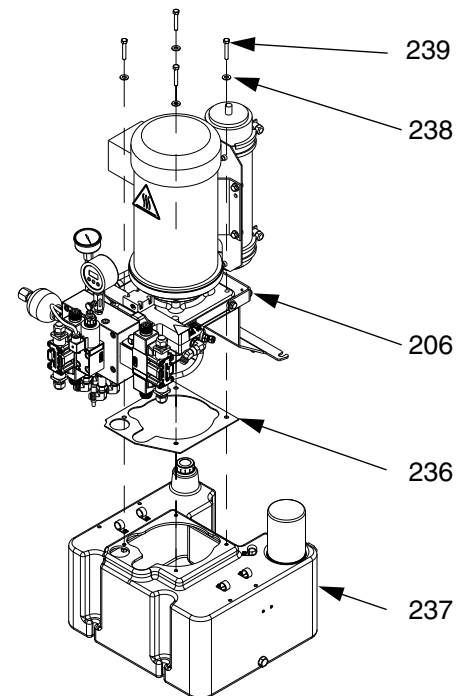


FIG. 26

Remove Motor

1. Shutdown the system. See **Shutdown** on page 21.
2. **Remove Hydraulic Power Pack.** See page 27.
3. Disconnect the tube assembly (15Y684) from the accumulator (242).

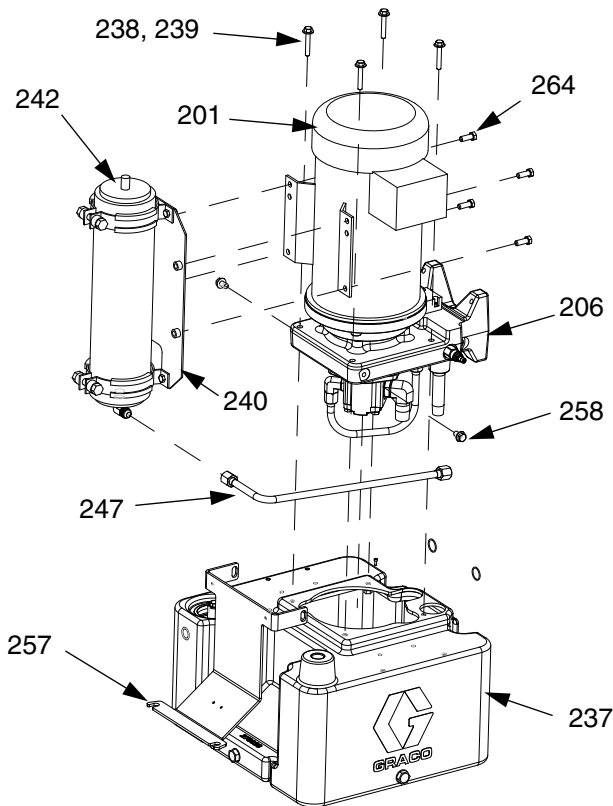


FIG. 27

4. Remove two hex head cap screws (258) connecting the support bracket (257) to the hydraulic housing (206).
5. Carefully remove motor assembly from tank.
6. Remove the four socket head cap screws (204) connecting the motor adapter plate (203) to the hydraulic housing (206).

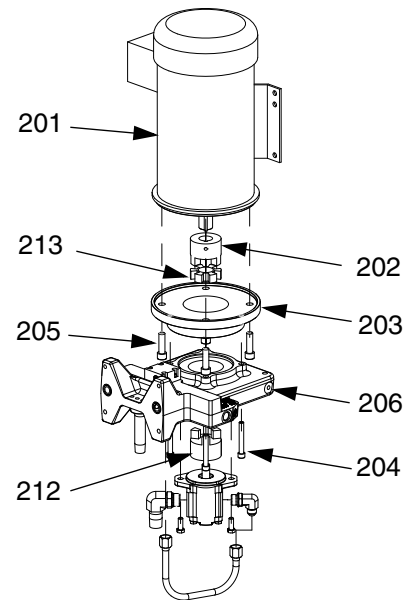


FIG. 28

7. Remove four hex head cap screws (244), accumulator (242), and mounting plate (240) from the motor (201).

NOTE: Do not lose the spider coupler (213).

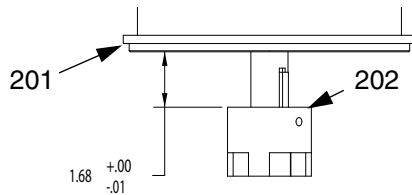
8. Remove four socket head cap screws (205) and motor (201) from the motor adapter plate (003)
9. Loosen the set screw from the motor coupler (202) and remove the motor coupler.

Install Motor

See FIG. 27 and FIG. 28.

1. Install motor coupler (202) onto motor (201). Apply thread sealant to threads of screw. Torque motor coupler set screw to 15 ft-lb (20.3 N•m).

NOTE: The coupler (202) must be 1.67-1.68 in. from the face of the motor.



2. Apply thread sealant to threads of four socket head cap screws (205). Use four screws (205) to attach the motor adapter plate (203) to motor (201). Torque to 90 ft-lb (122 N•m).
3. Use four hex head cap screws (244) to attach the accumulator (242) and mounting plate (240) to motor (201). Apply thread sealant to threads of screw. Torque to 35 ft-lb (47 N•m).
4. Install spider coupler (213) into motor coupler (202).
5. Apply thread sealant to threads of four socket head cap screws (204). Use four screws (204) to attach the hydraulic housing (206) to the motor adapter plate (203). Torque to 35 ft-lb (47 N•m).

NOTE: Be sure to align teeth of the pump coupler (212) with the teeth of the motor coupler (202).

6. Connect the tube assembly (247) to the applicator housing (206) and the accumulator (242). Torque to 1-1/2 flats past hand tight.
7. Install washers (238) onto hex head cap screws (239). Align tank gasket (236), hydraulic housing (206), and tank (237). Install screws (239). Torque to 15 ft-lb (20.3 N•m).
8. Use two hex head cap screws (258) to connect the support bracket (257).
9. **Install Hydraulic Power Pack.** See page 29.

Remove Hydraulic Gear Pump

1. Shutdown the system. See **Shutdown** on page 21.
2. **Remove Hydraulic Power Pack.** See page 27.
3. Disconnect the tube assembly (247) from the accumulator (242).

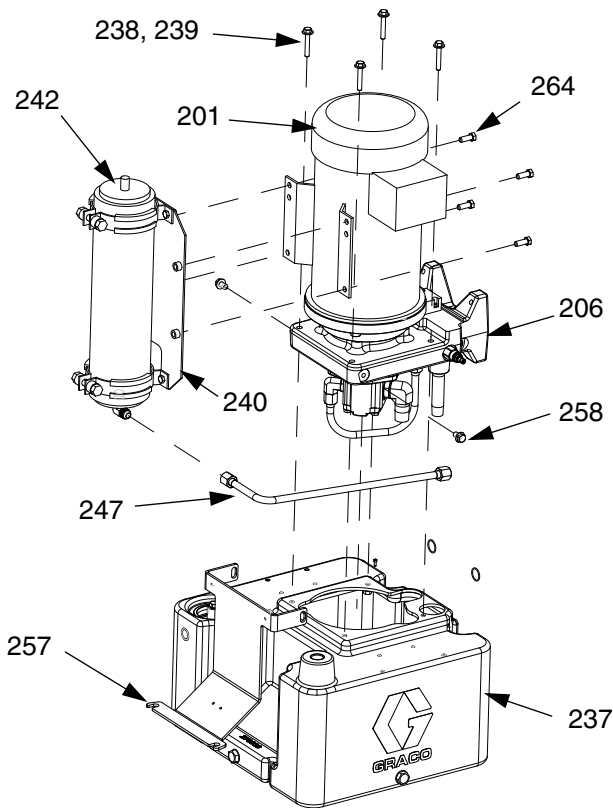


FIG. 29

4. Remove two hex head cap screws (258) connecting the support bracket (257) to the hydraulic housing (206).
5. Carefully remove motor assembly from tank (237).
6. Disconnect the tube assembly (217) from the gear pump (211) and hydraulic housing (206).

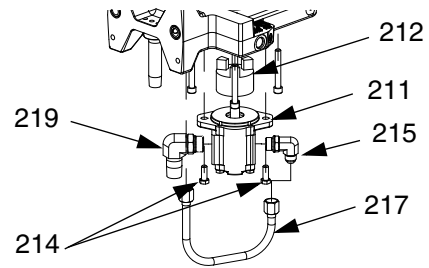


FIG. 30

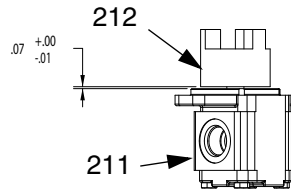
7. Remove the two hex head cap screws (214) and carefully remove the gear pump (211) from the hydraulic housing (206).
- NOTE: Do not lose the pump coupler (212).**
8. Remove the inlet fitting (219) and outlet fitting (215).
 9. Loosen set screw and remove pump coupler (202).

Install Hydraulic Gear Pump

See FIG. 29 and FIG. 30.

1. Install pump coupler (212) on the gear pump. Apply thread sealant to threads of screw. Torque motor couple set screw to 15 ft-lb. (20.3 N•m).

NOTE: The pump coupler (212) must be 0.06 in. – 0.07 in. from the face of the gear pump.



2. Install inlet and outlet fittings (219, 215). Torque to 40 ft-lb (54 N•m).
3. Apply thread sealant to threads of two hex head cap screws (258). Use two screws to attach the gear pump (211) to the hydraulic housing (206). Torque to 35 ft-lb (47 N•m).
4. Connect the tube assembly (217) to the hydraulic housing (206) and outlet fitting (219). Torque to 1-1/2 flats past hand tight.
5. Install washers (238) onto hex head cap screws (239) and apply thread sealant to threads of screws. Align tank gasket (236), hydraulic housing (206), and tank (237). Install screws (239). Torque to 15 ft-lb (20.3 N•m).
6. **Install Hydraulic Power Pack.** See page 29.

NOTE: When replacing the hydraulic gear pump, it is recommended that the check valve (271) be replaced.

Install FCM Upgrade Token

Note: FCM connection to system is temporarily disabled during the installation of upgrade or key tokens.

To install software upgrades:

1. Use correct software token stated in the table. See Graco Control Architecture™ Module Programming manual for instructions.

NOTE: Upgrade all modules in the system to the software version on the token, even if you are replacing only one or two modules. Different software versions may not be compatible.

All data in the module (System Settings, USB Logs, Recipes, Maintenance Counters) may be reset to factory default settings. Download all settings and user preferences to a USB before the upgrade, for ease of restoring them following the upgrade.

See manuals for locations of specific GCA components.

The software version history for each system can be viewed in the technical support section at www.graco.com.

Connect Cables

Ensure all cables are connected to FCM connectors. See **FCM Cable Connections**, page 13.

Token	Application
16H821	HFR: - Advanced Display Module - Motor Control Module - High Power Temperature Control Module - Fluid Control Module (AC Power Pack) - Discrete Gateway Module - Communication Gateway Module

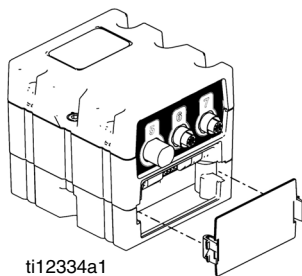
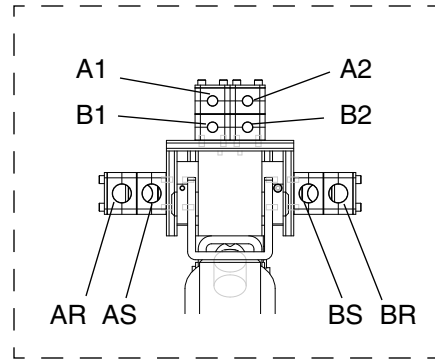


FIG. 31: Remove Access Cover

Parts

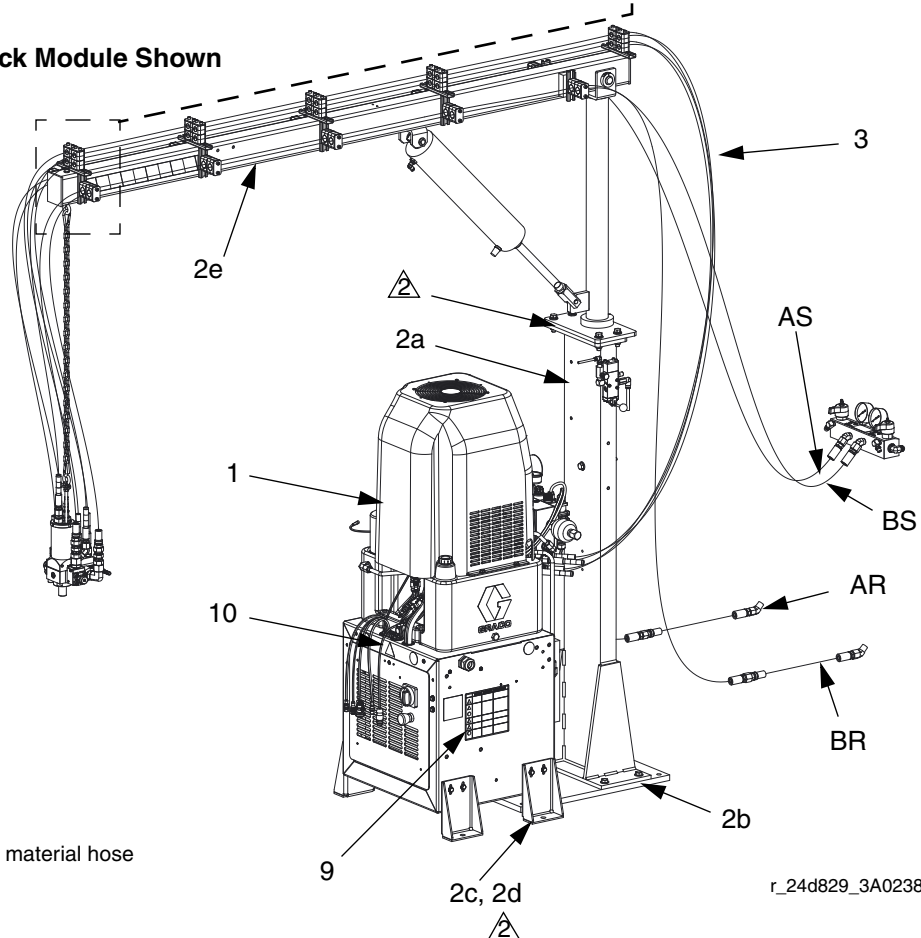
AC Hydraulic Power Pack Module

Fluid Lines (3)	Description	Color Identification
<i>Hydraulic Lines</i>		
A1	Cleanout close	Green/Green
A2	Material close	Green
B1	Cleanout open	Green/White/Green
B2	Material open	Green/White
<i>Material Lines</i>		
AR	A side material return	Red
AS	A side material supply	Red
BR	B side material return	Blue
BS	B side material supply	Blue



See **Hose Kits** on page 52 for fluid line connections.

24D829 AC Hydraulic Power Pack Module Shown



r_24d829_3A0238_1f

Torque all screws on hydraulic and material hose clamps to 6 ft-lbs (8 N•m).

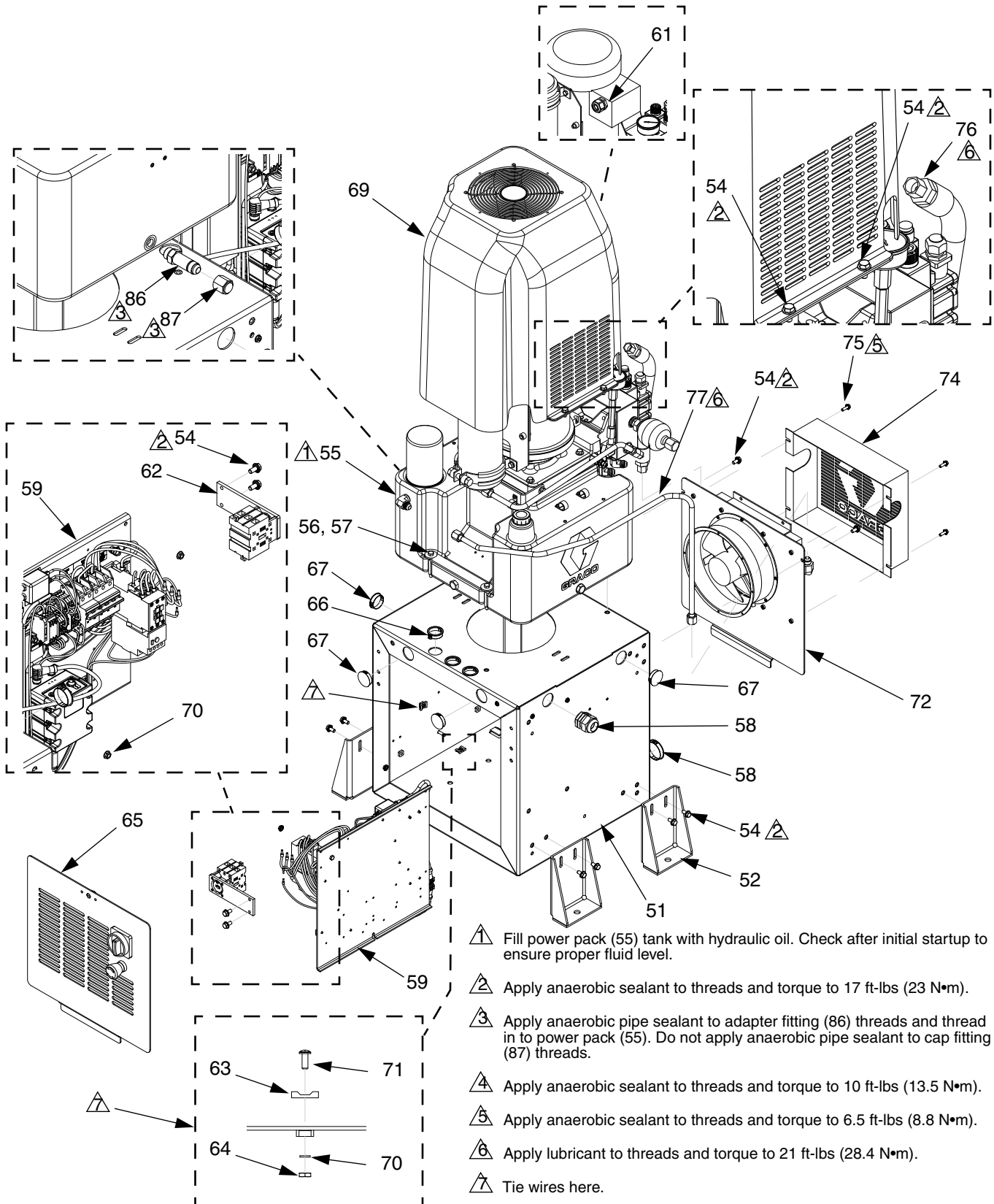
Torque to 113 ft-lbs (153 N•m).

		Power Pack Kit and Quantity												
		24D829	24D830	24D831	24D832	24F297	24J912	24D834	24D835	24D836	24D837	24F298	24J913	
Ref	Part	Description	230 V Modules						400V Modules					
1		MODULE, mixhead stand, 230v; see page 38	1	1	1	1	1	1						
		MODULE, mixhead stand, 400v; see page 38							1	1	1	1	1	1
2		ARM, boom, floor mounted; includes 2a-2e	1	1					1	1				
2a		PLATE, mounting, floor, mast	1	1					1	1				
2b	257952	BASE, arm, floor mount	1	1					1	1				
2c	109570	WASHER	1	1					1	1				
2d	100424	SCREW, cap, hex hd	1	1					1	1				
2e		ARM, pneumatic boom; see page 50	1	1					1	1				
3†		KIT, L-head hose, ms	1						1					
		KIT, S-head hose, ms		1						1				
		KIT, L-head hose, no clamps			1						1			
		KIT, S-head hose, no clamps				1						1		
6	123140	FITTING, cap, 1/2 JIC, cs; not shown		2		2	4			2		2	4	
9▲	15M511	LABEL, warning	1	1	1	1	1	1	1	1	1	1	1	1
10▲	196548	LABEL, caution	1	1	1	1	1	1	1	1	1	1	1	1

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

† All hose kits (3) include hydraulic and material lines. See **Hose Kits** on 52.

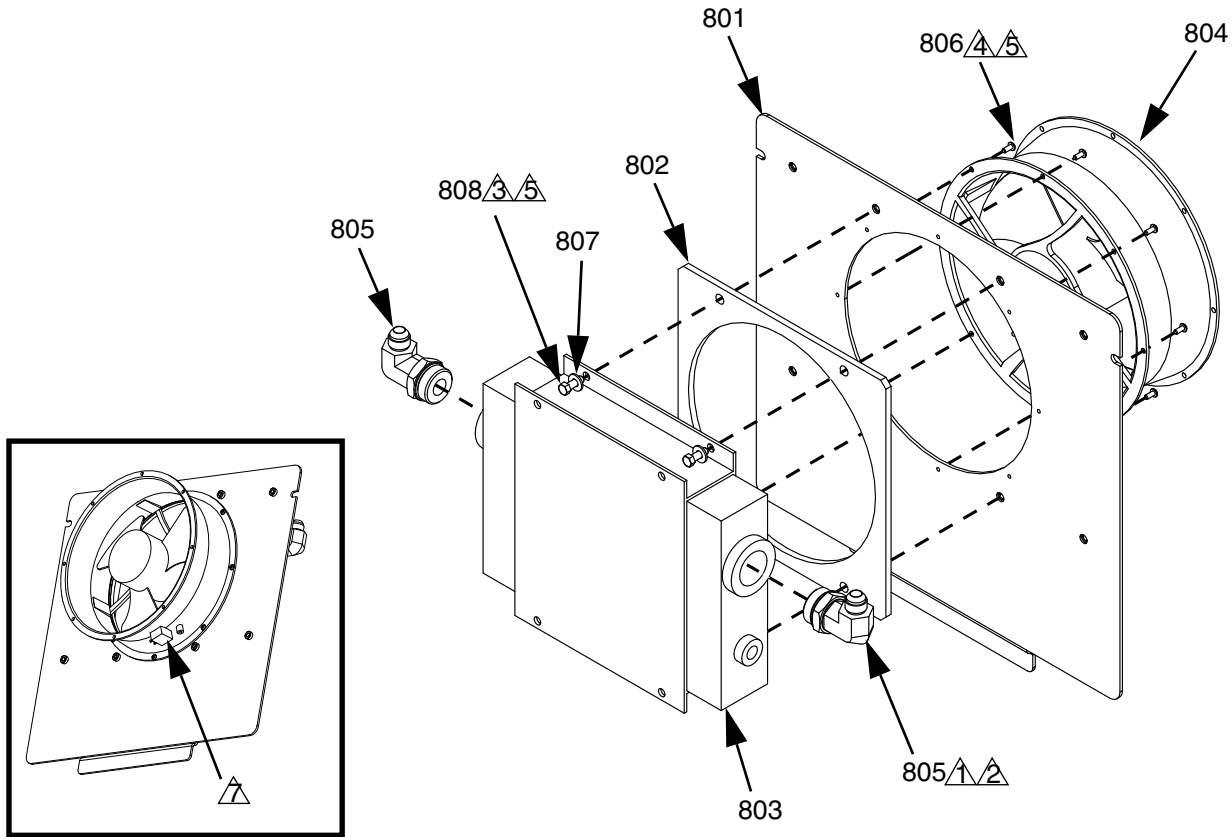
Mix Module Stand



230V Mix Module Stand
400V Mix Module Stand

Ref.	No.	Part	Description	Qty
	51		ENCLOSURE, frame	1
	52	24D021	BRACKET, anchor, cube	4
	54	111800	SCREW, cap, hex hd; 5/16-18 x 0.625	16
	55		MODULE, hydraulic power, mix-head; see page 44	1
	56	U90205	WASHER, flat, 3/8, 0.41x1.25x.13, ms	4
	57	110385	SCREW, machine; hex hd; 5/16-18 x 3 in.	4
	58	121160	GRIP, cord, 0.71-1.02	1
	59		PANEL, mixhead, 230v	1
			PANEL, mixhead, 400v	1
	60	115942	NUT, hex, flange head	3
	61	121171	GRIP, cord, 0.35-.63, 3/4	1
	62		SWITCH, assy, disconnect, 230v	1
			SWITCH, assy, disconnect, 400v	1
	63	123452	HOLDER, anchor, wire tie, nylon	7
	64	100166	NUT, full hex	7
	65		PANEL, mixhead, assembly	1
	66	123589	BUSHING, wire protector, snap-in	3
	67	123398	PLUG, hole, 1-1/2 in. dia	5
	68	123590	PLUG, hole, 2 in. dia	2
	69	24B855	COVER, assembly; includes 69a-69c	1
	69a		COVER, hydraulic module	1
	69b	117284	GRILL, fan guard	1
	69c	103646	RIVET, blind	4
	70	100020	WASHER, lock	7
	71	116610	SCREW, mach, phillips, pan hd, #10-32 x 1/2	7
	72		COVER, enclosure, heat exchanger, assy; see page 40	1
	73	102795	SCREW, cap sch; #8-32 x 1.625	2
	74	24C153	COVER, heat exchanger	1
	75	113796	SCREW, flanged, hex hd; 1/4-20 x 3/4	4
	76	24C621	HOSE, heat exchanger, inlet	1
	77	15Y935	TUBE, heat exchanger, outlet	1
	78	123855	HARNESS, 5 pin, adapter	1
	79	122497	CABLE, cord set, reverse key	1
	80	123303	HARNESS, m12	2
	81	123673	HARNESS, ext, m12xm12, 5px5p, mxf	2
	82	123856	HARNESS, can cable, delete +24v	1
	83	121201	CABLE, can, female-female, 6.0m	1
	84	24C760	HARNESS, power, ac motor, 10ga	1
	85	123764	HARNESS, m8, 4p, straight x pigtail	1
	86	122970	FITTING, adapter, JIC(08) x SAE(08), m	1
	87	123140	FITTING, cap, 1/2 jic, cs	1
	90	24D495	CORD, fan, heat exchanger, mix-head	1
	92		LABEL, identification, electronics	1

Heat Exchanger Assembly



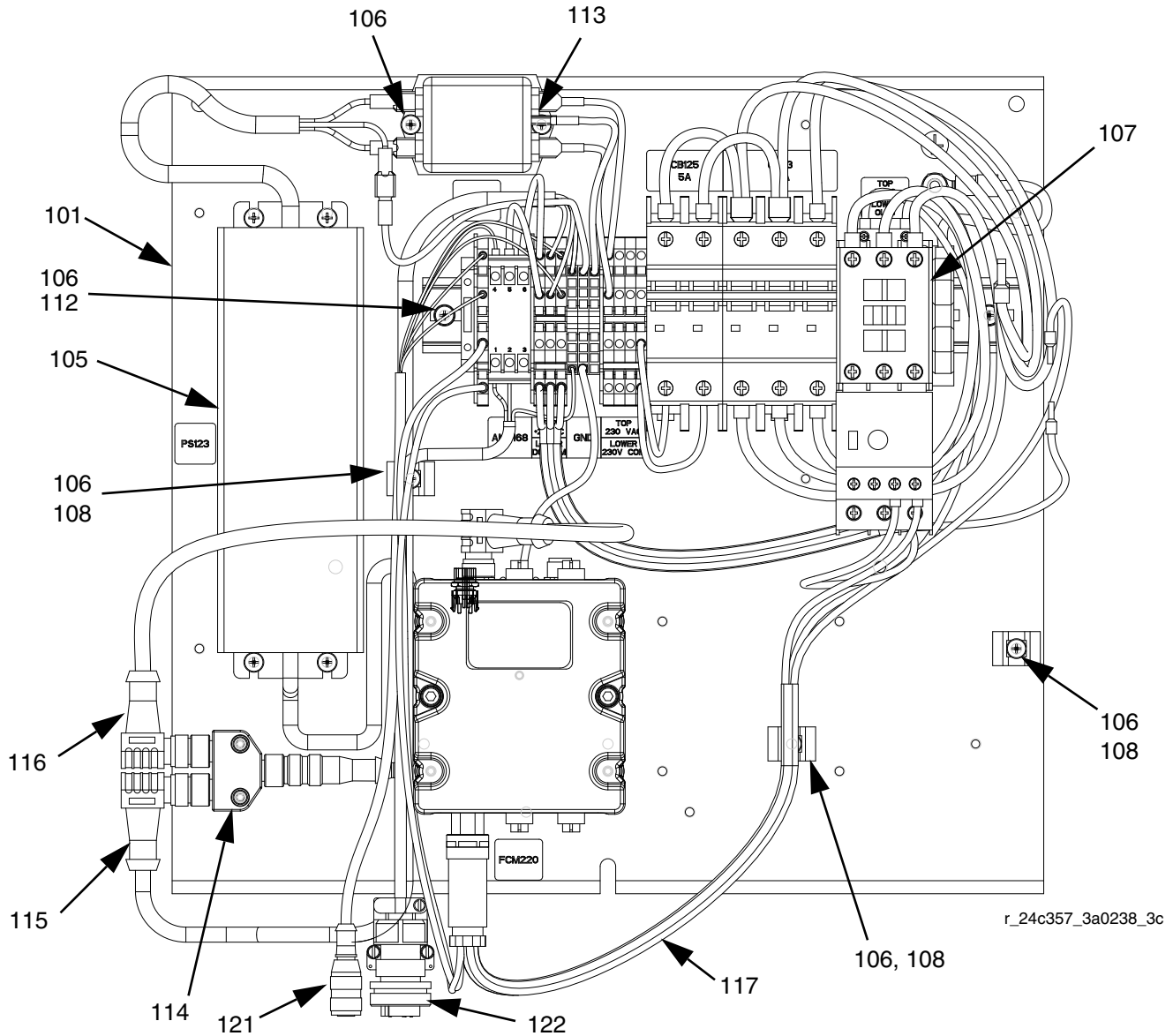
- ① Torque to 65 ft-lb.
- ② Apply lubricant to o-rings before assembling.
- ③ Torque to 8 ft-lb.
- ④ Torque to 2.5 ft-lb.
- ⑤ Apply anaerobic sealant to threads.
- ⑥ Orient fan with airflow arrow pointing toward cover.
- ⑦ Align fan plug as shown.

Ref	Part	Description	Qty
801	257967	COVER, enclosure, heat exchanger	1
802	15X621	GASKET, fan, mounting	1
803	122300	EXCHANGER, heat, m-4	1
804	122301	FAN, 220v	1
805	122842	FITTING, elbow, SAE x JIC	2
806	15U075	SCREW, cap, bh, 8-32 x 0.375	8
807	110755	WASHER, plain	4
808	100022	SCREW, cap, hex hd; 1/4-20 x 3/4	4

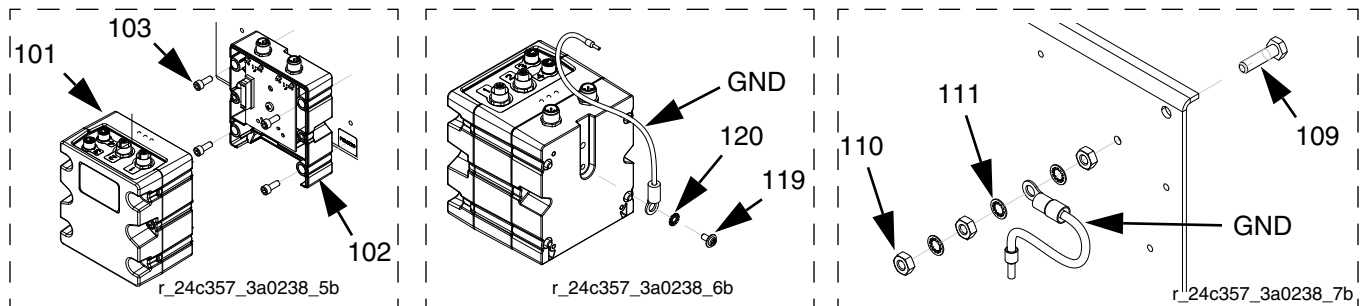
230V and 400V MixHead Panel

230V MixHead Panel Shown

See **Electrical Schematics** starting on page 58 for wire connections.



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230V and 400V MixHead Panels

Ref. No.	Part	Description	Qty
101		PANEL, electric, heat	1
102	289697	MODULE, cube, gca, base	1
103	102598	SCREW, cap, socket head; #10-32 x 1/2	4
104	289696	MODULE, gca, cube, fcm	1
105	24D207	POWER SUPPLY, 24vdc, 4A, 100w, 230vac in,	1
106	103833	SCREW, machine	11
107		MODULE, breaker, mixhead, 230v MODULE, breaker, mixhead, 400v	1 1
108	123452	HOLDER, anchor, wire tie, nylon	3
109	100021	SCREW, cap hex hd; 1/4-20 x 1	1
110	100015	NUT, hex mscr	3
111	100028	WASHER, lock	3
112	116876	WASHER, flat	2
113	123718	FILTER, emi, 6a, spade con	1
114	121807	CONNECTOR, splitter	1
115★	24D265	HARNESS, cable, can, 24vdc sup- ply	1
116★	123762	CABLE, can, 90x90, fxf, 0.5m	1
117★	24E052	HARNESS, mixhead, e-stop, mtr str	1
118★	24E211	HARNESS, mixhead, e-stop, mtr str	1
119	114993	SCREW, pan washer hd; M4 x 0.7 x 8 mm	1
120	102063	WASHER, lock, ext	1
121	24F075	HARNESS, proximity, S-head	1
122	24D003	HARNESS, proximity, L-head, pig- tail	1

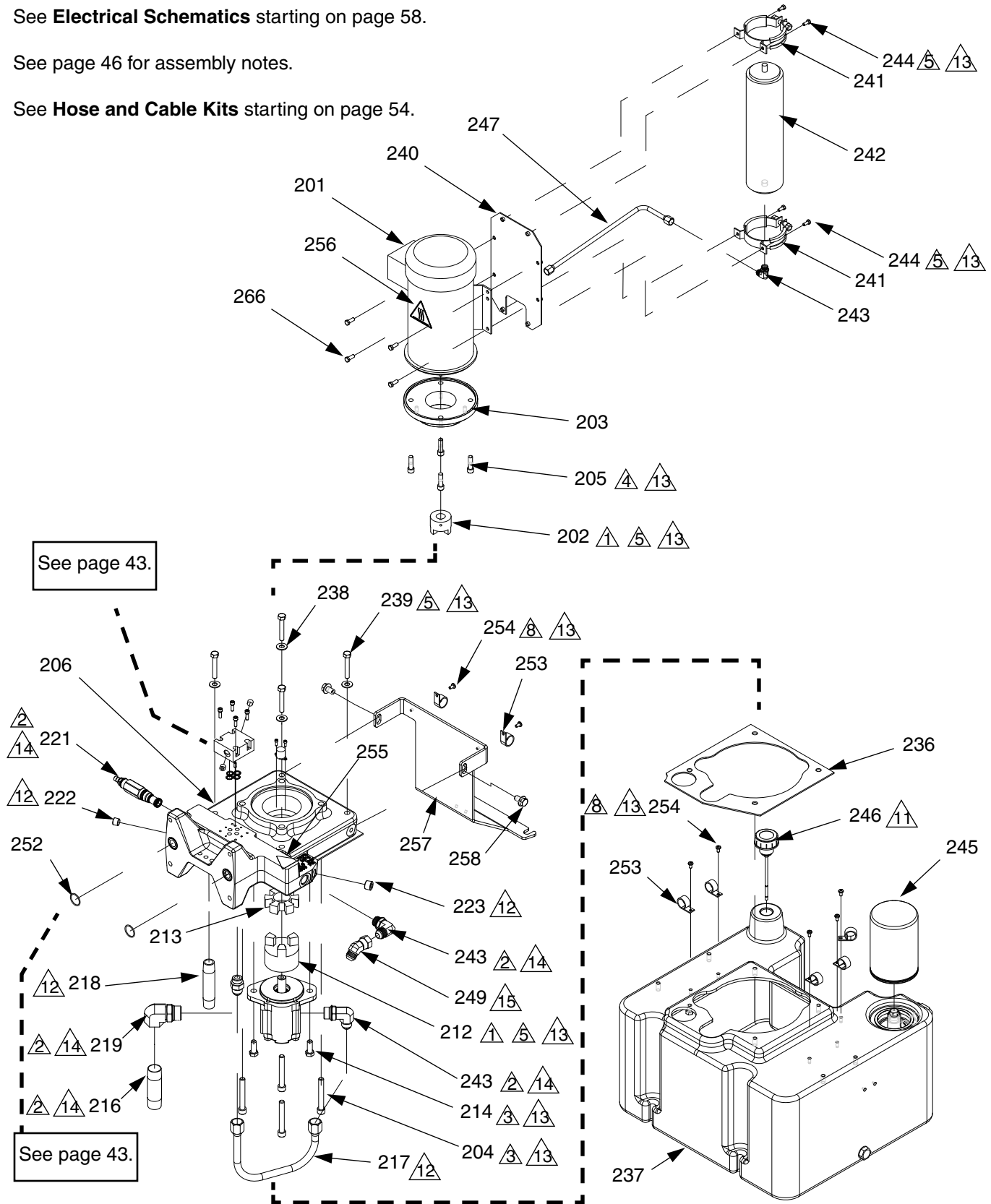
★ See **Electrical Schematics** starting on page 58 for wire connections.

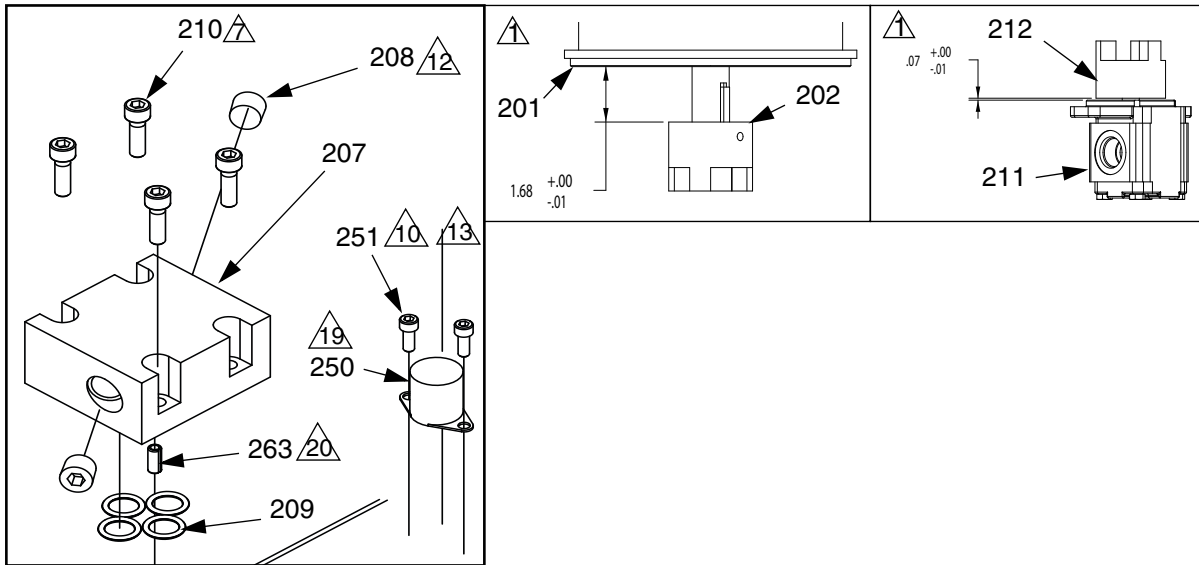
MixHead Hydraulic Power Pack

See **Electrical Schematics** starting on page 58.

See page 46 for assembly notes.

See **Hose and Cable Kits** starting on page 54.





- 1 Assemble coupler (202, 212) to specified dimension prior to mounting motor and pump to housing.
- 2 Torque to 40 ft-lbs (54 N•m).
- 3 Torque to 35 ft-lbs (47 N•m).
- 4 Torque to 70 ft-lbs (95 N•m).
- 5 Torque to 15 ft-lbs (20 N•m).
- 6 Torque to 185 in.-lbs (20 N•m).
- 7 Torque to 62 in.-lbs (7 N•m).
- 8 Torque to 65 in.-lbs (7.3 N•m).
- 9 Torque to 10 ft-lbs (13 N•m).
- 10 Torque to 40 in.-lbs (4.6 N•m).
- 11 Torque 1/4 turn past hand tight.
- 12 Apply PTFE tape on installation end only prior to assembly.

- 13 Apply sealant to threads prior to assembly.
- 14 Apply a light coating of lubricant to seals prior to assembly.
- 15 Tighten tubing nuts hand tight and then with a wrench. Torque 1-1/2 flats.
- 16 Directional valves are supplied with o-rings.
- 17 Route all signal cables through cable ties on the filter side of the power pack.
- 18 Route all power wires through cable ties on the filter side of the power pack.
- 19 Apply lubricant to contact side of thermal switch harness (250) prior to assembly.
- 20 Install roll pin (263) into diverter block (207) for orientation to hydraulic housing (206).
- 21 Cables and leads removed for clarity.

MixHead Hydraulic Power Module

Ref	Part	Description	Qty	
			L-Head	S-Head
201	122953	MOTOR, mixhead	1	1
202	16A954	COUPLER, motor	1	1
203	15Y675	PLATE, motor adapter	1	1
204	123338	SCREW, shc	4	4
205	C19852	SCREW, cap, socket head	4	4
206	15W772	HOUSING, hydraulic, module	1	1
207	16A599	BLOCK, diverter	1	1
208	100139	PLUG, pipe	2	2
209	556555	O-RING	4	8
210	104092	SCREW, cap, sch	4	8
211	122966	PUMP, gear, hydraulic	1	1
212	16A955	COUPLER, pump	1	1
213	16A956	COUPLER, spider	1	1
214	123942	FASTENER, screw, cap, hex hd	2	2
216	115597	FITTING, nipple	2	1
217	15Y696	TUBE, pump to manifold	1	1
218	101353	FITTING, nipple, pipe	1	1
219	122606	FITTING, elbow, male, female	1	1
220	100627	NIPPLE, short	1	1
221	127953	VALVE, relief, anti-shock	1	1
222	100721	PLUG, pipe	1	1
223	101754	PLUG, pipe	1	1
224	15Y629	HOUSING, adapter, mixhead	1	1
225	C19834	SCREW, cap, socket hd	4	4
226	122962	PLUG, sae 03	4	4
227	17B775	GAUGE, pressure, 0-5000 psi	1	1
228	122964	PLUG, sae 08	0	2
229	122970	FITTING, adapter, jic(08)xsaе(08)	4	2
230	122967	FITTING, elbow, swivel, 90, jic(08)	5	3
231	16K154	BLOCK, blank		1
	24D636	VALVE, cleanout, wiring, assembly	1	
232	24D634	VALVE, acc loading, wiring, assembly	1	1
233	125736	VALVE, directional, 1 sol, 24vdc	1	1
234	123366	SCREW, shc	8	4
235✘	257432	HARNESS, wire, transducer	1	1
236	15X622	GASKET, housing, to, tank	1	1
237	257162	RESERVOIR, assembly, 8 gallon	1	1
238	101971	WASHER, thrust	4	4
239	111302	SCREW, cap, hex hd	4	4
240	15Y680	PLATE, accumulator mounting	1	1
241	123293	BRACKET, accumulator mounting	2	2
242	122952	ACCUMULATOR, mixhead	1	1
243	121312	FITTING, elbow, sae x jic	3	3
244	110963	SCREW, cap, flange head	4	4
245	15J937	FILTER, oil, 18-23 psi bypass	1	1
246	116915	CAP, breather filler	1	1
247	15Y684	TUBE, manifold to accumulator	1	1
248	121486	FITTING, elbow, male, 1/2jicx1/2npt	1	1
249	123528	FITTING, elbow, swivel, 45, jic08, fm, 6k	1	1

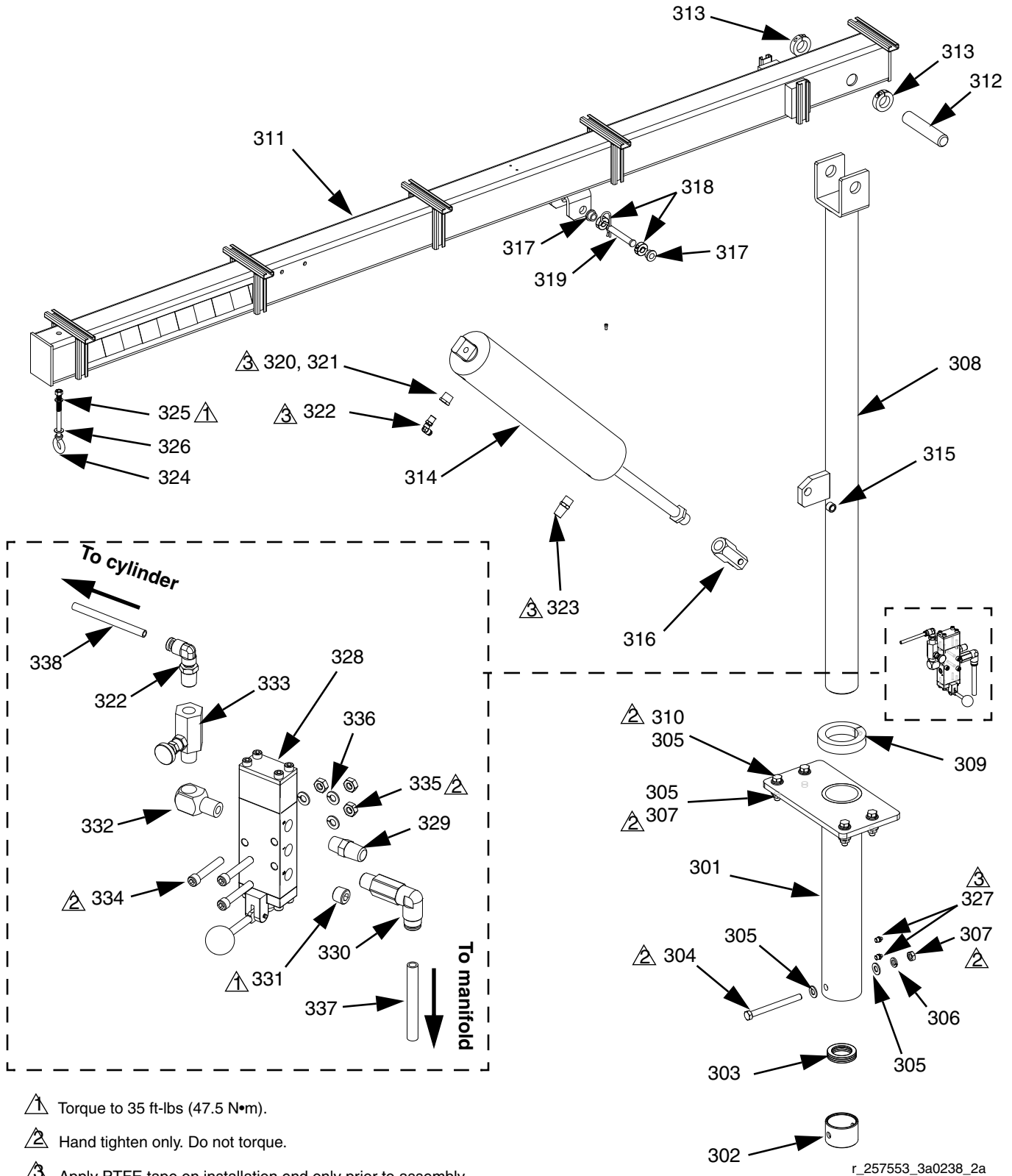
Parts

250	123367	HARNESS, m8 x thermal switch, 4-pin	1	1
251	102410	SCREW, cap soc hd	2	2
252	103413	PACKING, o-ring	2	2
253	123601	CLAMP, wire, harness, nylon, 3/4"	7	7
254	103833	SCREW, mach, crbh	7	7
255▲	189285	LABEL, caution	1	1
256▲	121208	LABEL, hot surface	1	1
257	257976	SUPPORT, tank to motor, ac power pack	1	1
258	113802	SCREW, hex hd, flanged	2	2
263	123786	FASTENER, pin, roll	1	2
266	112395	SCREW, cap	4	4
267✘	125102	HARNESS, din18, 3p, elbow	1	1
268	127952	ACCUMULATOR, hydraulic	1	1
269	127955	FITTING, adapter	1	1
270	127963	MANIFOLD	1	1
271	127954	VALVE, check, 100 psi	1	1
272	123253	VALVE, needle, 1/4 NPT	1	1
273	156971	FITTING, nipple, short	1	1
274	116575	SCREW, cap	4	4
275	100020	WASHER, lock	4	4

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

✘ Not shown.

Pneumatic Boom Arm

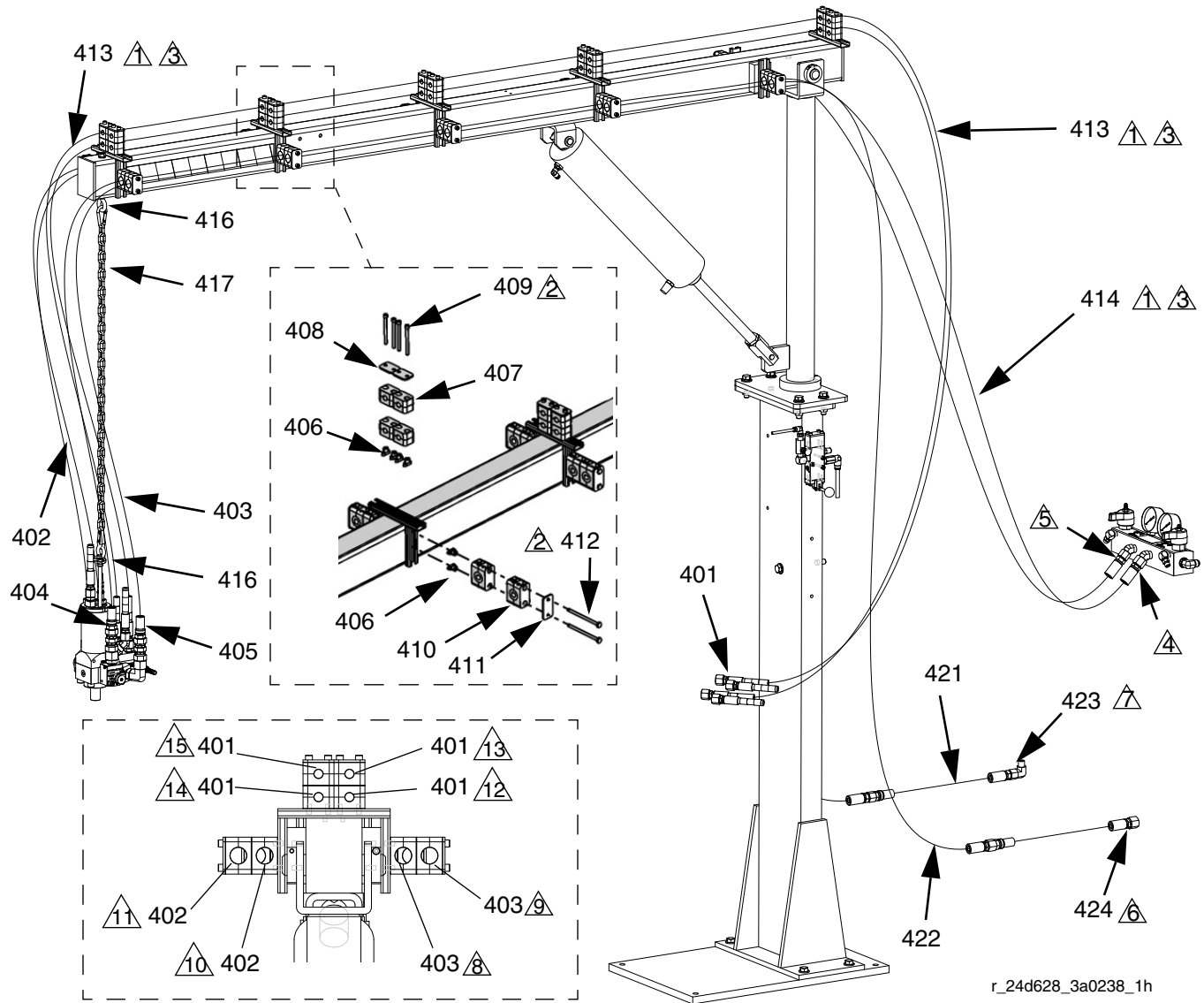


Pneumatic Boom Arm

Ref. No.	Part	Description	Qty
301	24D349	BASE, boom assembly	1
302		BEARING, thrust, 45 x 65 x 14	1
303	15Y044	BEARING, support	1
304	113470	BOLT, hex	1
305	109570	WASHER, plain	10
306	100018	WASHER, lock, spring	5
307	100338	NUT, jam	5
308		POST, boom assembly	1
309	122634	COLLAR, 2.875 clamp 1pc	1
310	100096	SCREW, cap, hex hd; 1/2-13 x 2	4
311		ARM, boom assembly	1
312	15Y045	PIN, pivot, arm, boom	1
313	122633	COLLAR, 1.125 clamp 1pc	2
314	122653	CYLINDER, air, with nut	1
315	122640	BEARING, bronze, 1/2 x 3/4 x 1/2	1
316	122652	ROD, clevis, w/pin	1
317	122646	BEARING, flange, 1/2 x 3/4, bronze	2
318	122635	COLLAR, 1/2 clamp 1pc	2
319	122637	PIN, clevis, 1/2 x 3-1/2, sst	1
320	15Y065	BUSHING, 1/2 x 1/4 npt, mf, ss, 6k, 316	1
321	15Y064	FITTING, plug, 1/4 npt, modified	1
322	116654	FITTING, tube, swivel, male elbow	2
323	122648	MUFFLER, 1/2 npt	1
324	122638	BOLT, EYE, 0.38-16 x 4-1/4	1
325	100133	WASHER, lock	1
326	100731	WASHER	6
327	100054	FITTING, lubtn, st	3
328	122650	VALVE, solenoid, 4way 3pos w/lvr	1
329	517449	MUFFLER, sintered, 1/4/ npt	1
330	121643	FITTING, elbow, 1/4 x 1/4 npt, swivel, ext	1
331	100721	PLUG, pipe	2
332	103893	ELBOW, street	1
333	122651	VALVE, bleed nmf 20 10 sk	1
334	15B588	SCREW, socket hd cap; 1/4-20 x 1.5	3
335	100015	NUT, hex mscr	3
336	100016	WASHER, lock	3
337	54106	TUBE, plyeth 0.375 OD	12
338	54118	TUBE, polyethylene	7
339	U70068	LABEL, stripe, 2in., yellow/black	2

Hose Kits

L-Head Hose Kit Shown



- Wrap bundle of hose with electrical tape every 2 ft.
- Torque to 6 ft-lbs (8 N•m).
- Wrap electrical tape on each end of scuff guard (413, 414, and 420)
- Connect to B (blue) side on system manifold.
- Connect to A (red) side on system manifold.
- Connect to B (blue) side tank stand.
- Connect to A (red) side tank stand.
- Connect to B side supply fitting on applicator.
- Connect to B side return fitting on applicator.

- Connect to A side supply fitting on applicator.
- Connect to A side return fitting on applicator.
- Connect material open hose to B2 connection marked on mixhead housing adapter (224).
- Connect material close hose to A2 connection marked on mixhead housing adapter (224).
- Connect clean-out open hose to B1 connection marked on mixhead housing adapter (224).
- Connect clean-out close hose to A1 connection marked on mixhead housing adapter (224).
- 16. Torque all screws on hydraulic and material hose clamps to 6 ft-lbs (8 N•m).

Hose Kits

Ref	Part	Description	Quantity			
			Boom Hose Kits		No Boom Hose Kits	
			L-Head	S-Head	L-Head	S-Head
401✿	24A524	HOSE, assy, hydraulic, 3/8, 20 ft (6 m); JIC 8; 4000 psi	4	2	4	2
402	262193	HOSE, A, 25 ft. (7.6 m), 1/2 in., moisture-lock	2	2	2	2
403	262194	HOSE, B, 25 ft. (7.6 m), 1/2 in., moisture-lock	2	2	2	2
404	123896	FITTING, swivel, JIC 8(f) x JIC 8(f)	2	2	2	2
405	123897	FITTING, swivel, JIC10(f)x JIC10(f)	2	2	2	2
406	122643	NUT, rail	40	20		
407	122644	CLAMP, hose, 3/8 in.	20	40		
408	122645	PLATE, cover	20	20		
409	107218	SCREW, cap, sch; 1/4-20 x 2.75	20	20		
410	123100	CLAMP, hose, boom, 7/8 in.	20	20		
411	123070	COVER, plate	10	10		
412	104594	SCREW, cap; 1/4-20 x 3.25	20	20		
413‡		JACKET, scuff, 7 ft. (2.1 m)	2	2		
414‡		JACKET, scuff, 15 ft. (4.5 m)	2	2		
416	122642	SNAP, spring, 140#, 3/8, 1/4, zinc	2	2		
417	122641	CHAIN, 3/16 OD	1	1		
418✿✿	24D002	HARNESS, proximity, material dispense, L-Head, ext	1		1	
	123660	HARNESS, proximity, material dispense, S-Head, ext		1		1
419✿✿	24D004	HARNESS, proximity, clean-out, L-head, 20 ft. (6 m)	1		1	
420‡		JACKET, scuff 25 ft. (7.6m)			1	1
421	262191	HOSE, A, 10 ft. (4.6 m), 1/2 in., moisture-lock	1	1	1	1
422	262192	HOSE, B, 10 ft (4.6 m), 1/2 in., moisture-lock	1	1	1	1
423	123106	FITTING, elbow, (08) JIC x 1/2 npt; sst	1	1	1	1
424	123107	FITTING, elbow, (10) JIC x 1/2 npt; sst	1	1	1	1
425✿	124527	HARNESS, male, cap, jumper	1		1	
426✿	124528	HARNESS, resistor; m12(m) x m12(f); 7.8 in. (198.12 mm)		1		1

✿ Not shown.

‡ Order 24E954 for replacement scuff guard. Contains 200 ft (60.9 m) of braided polyester mesh.

✿ See **Hose and Cable Kits** on page 54 for additional sizes.

See manual 3A0862 for material and hydraulic hose extensions.

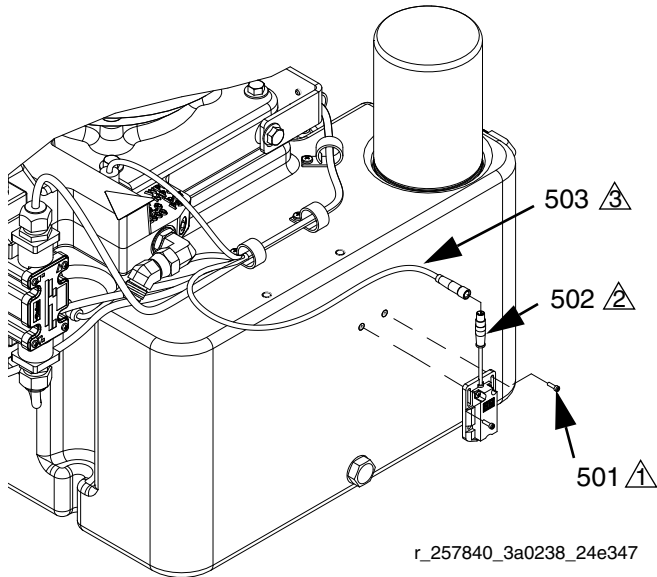
Hose and Cable Kits

Required for power pack modules 24F297 and 24F298.

Length ft (m)	Compatible Applicators and Part Number		Qty.
	S-Head	L-Head	
Heated or Unheated A and B Material Hoses			
Maximum operating pressure: 3500 psi (24 MPa, 241 bar)			
10 ft (4.6 m)	See manual 3A0237 for part numbers.	See manual 3A0237 for part numbers.	4
25 (7.6)			
50 (15.2)			
Hydraulic and Material Hose Extension Kits; see manual 3A0862			
25 (7.6)	24F237	24F235	1
50 (15.2)	24F238	24F236	1
Hydraulic Hose Assemblies			
Maximum operating pressure: 4000 psi (28 MPa, 275 bar)			
20 (6)	24A524	24A524 (4)	2 (4)
25 (7.6)	24F257	24F257 (4)	2 (4)
50 (15.2)	24F258	24F258 (4)	2 (4)
Proximity Sensor Cable (426)			
7.8 in. (198.12 mm)	124528		1
Termination Connector Cap (425)			
NA		124527	1
Material Proximity Cable Harness			
20 (6)	123660	24D002	1
25 (7.6)	123658	24F239	1
50 (15.2)	123659	24F240	1
L-Head Cleanout Proximity Cable Harness			
20 (6)		24D004	1
25 (7.6)		24F241	1
50 (15.2)		24F242	1

Optional Equipment

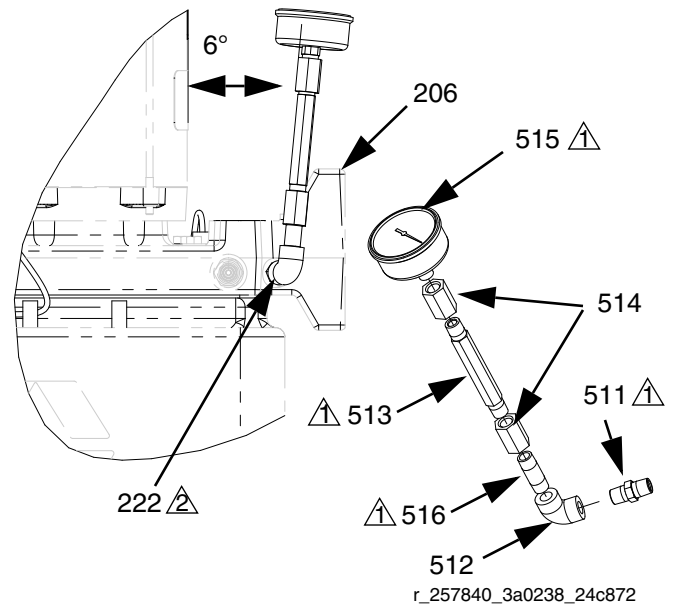
Fluid Level Sensor 24E347



- ⚠ Torque to 16 in.-lbs (1.8 N•m).
- ⚠ Connect cable (502) to (503).
- ⚠ Route and cable tie (503) with existing signal-wire bundle and connect free end of (503) to port #3 of FCM.

Ref. No.	Part	Description	Qty
501	C19950	SCREW, cap, sch; #4-40	2
502	123549	SENSOR, assy, level, cap, proximity	1
503	121686	CABLE, m8 x m8, 4p, f x m, st x rt, 2m	1

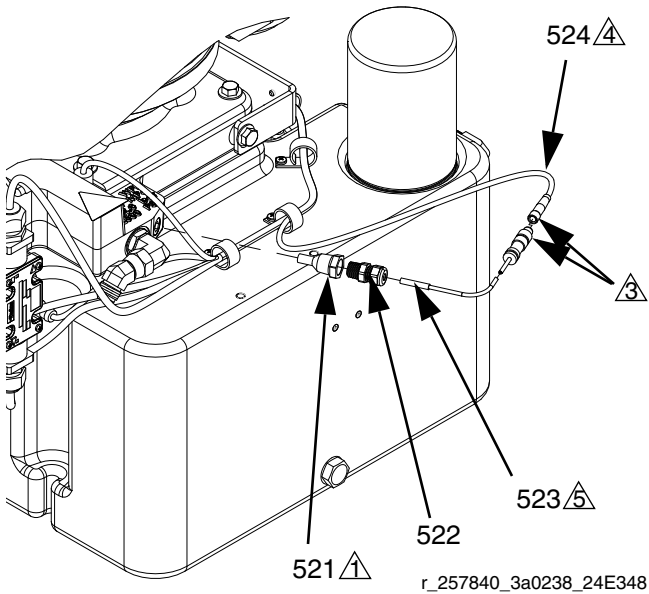
Hydraulic Pressure Gauge Kit 24C872



- ⚠ Apply sealant to threads prior to assembly.
- ⚠ Remove plug (222) from (206).
- ⚠ Verify alignment for pump and cover clearance. Adjust (512) angle as required.

Ref. No.	Part	Description	Qty
511	156971	FITTING, nipple, short	1
512	108417	ELBOW, female	1
513	177021	NIPPLE, pipe, hex	1
514	113093	CONNECTOR, pipe	2
515	804582	GAUGE, pressure, 0-500 psi	1
516	C19337	FITTING, nipple	1

Hydraulic RTD Sensor Kit 24E348

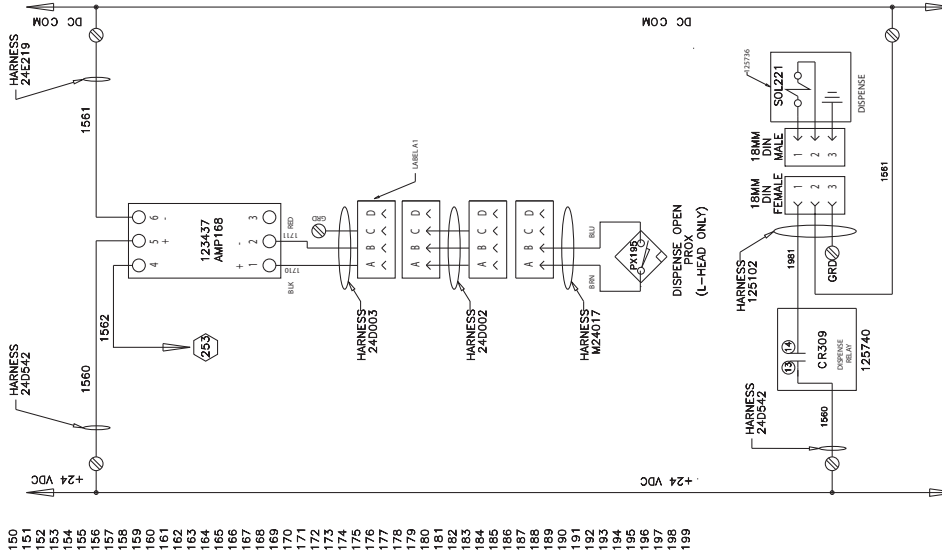


- 1 Apply sealant to threads prior to assembly.
- 2 Remove plug (223) from (206).
- 3 Connect signal end of (523) to (524).
- 4 Route and cable tie (524) with existing signal-wire bundle and connect free end of (524) to port #4 of FCM.
- 5 Apply a minimal amount of thermal grease to contact end of (523).

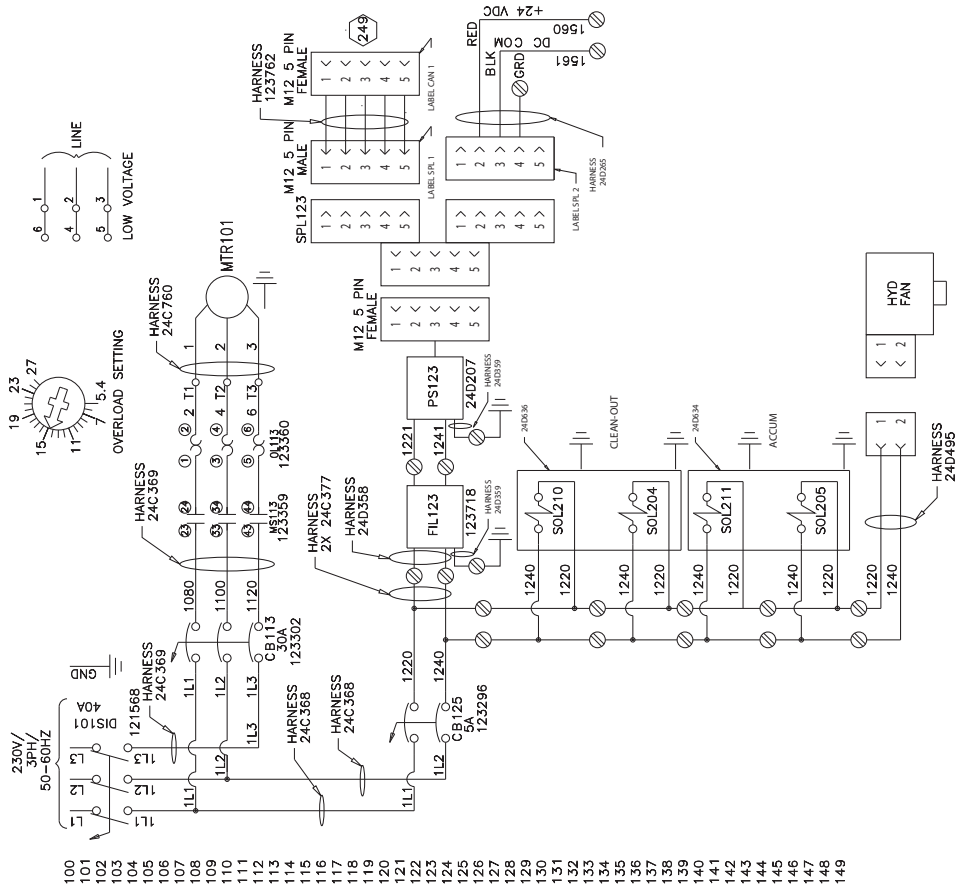
Ref. No.	Part	Description	Qty
521	15T071	HOUSING, temp, rtd	1
522	15T072	GRIP, cord, straight through	1
523	124262	SENSOR, rtd, 1 kohm, 6 ft	1
524	121686	CABLE, m8 x m8, 4p, f x m, st x rt, 2m	1

Electrical Schematics

230V Power Pack



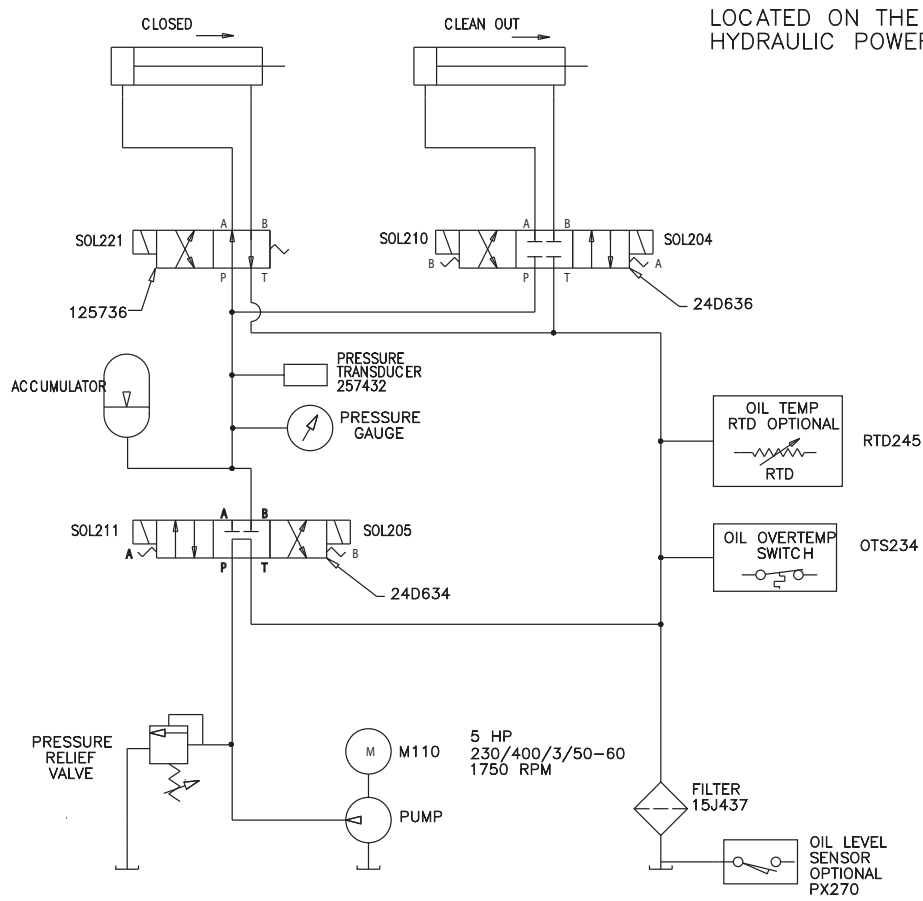
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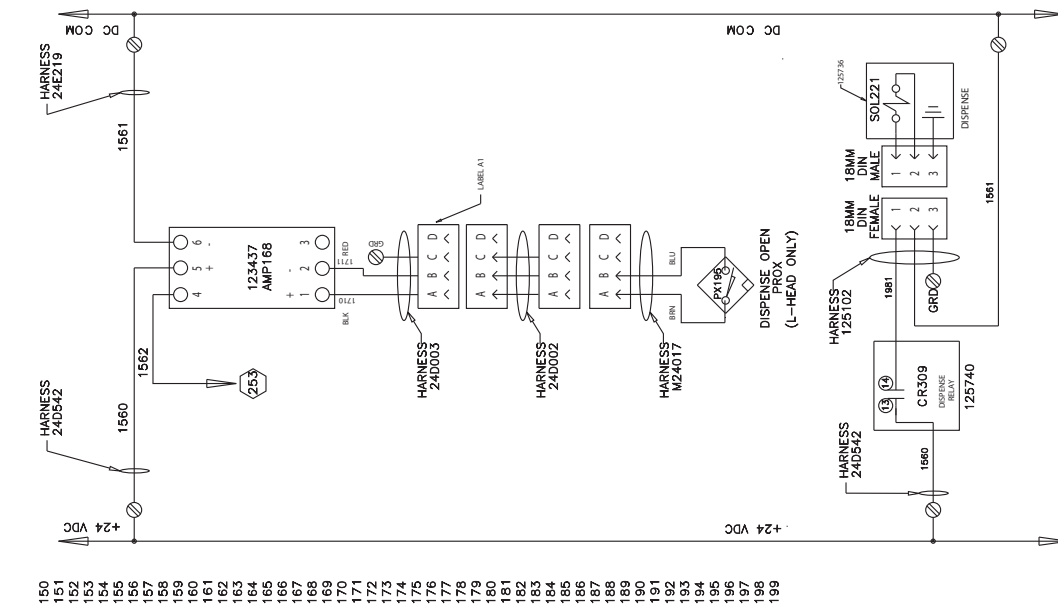
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230V Power Pack - 4

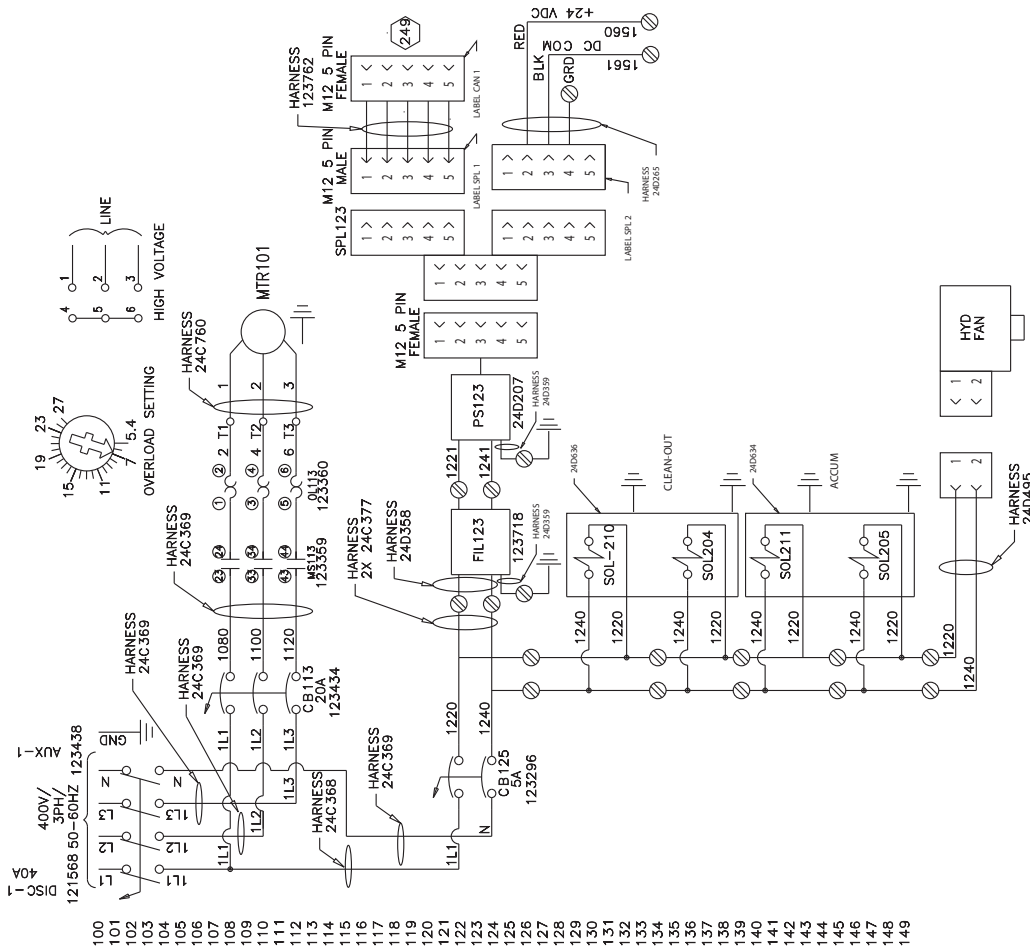
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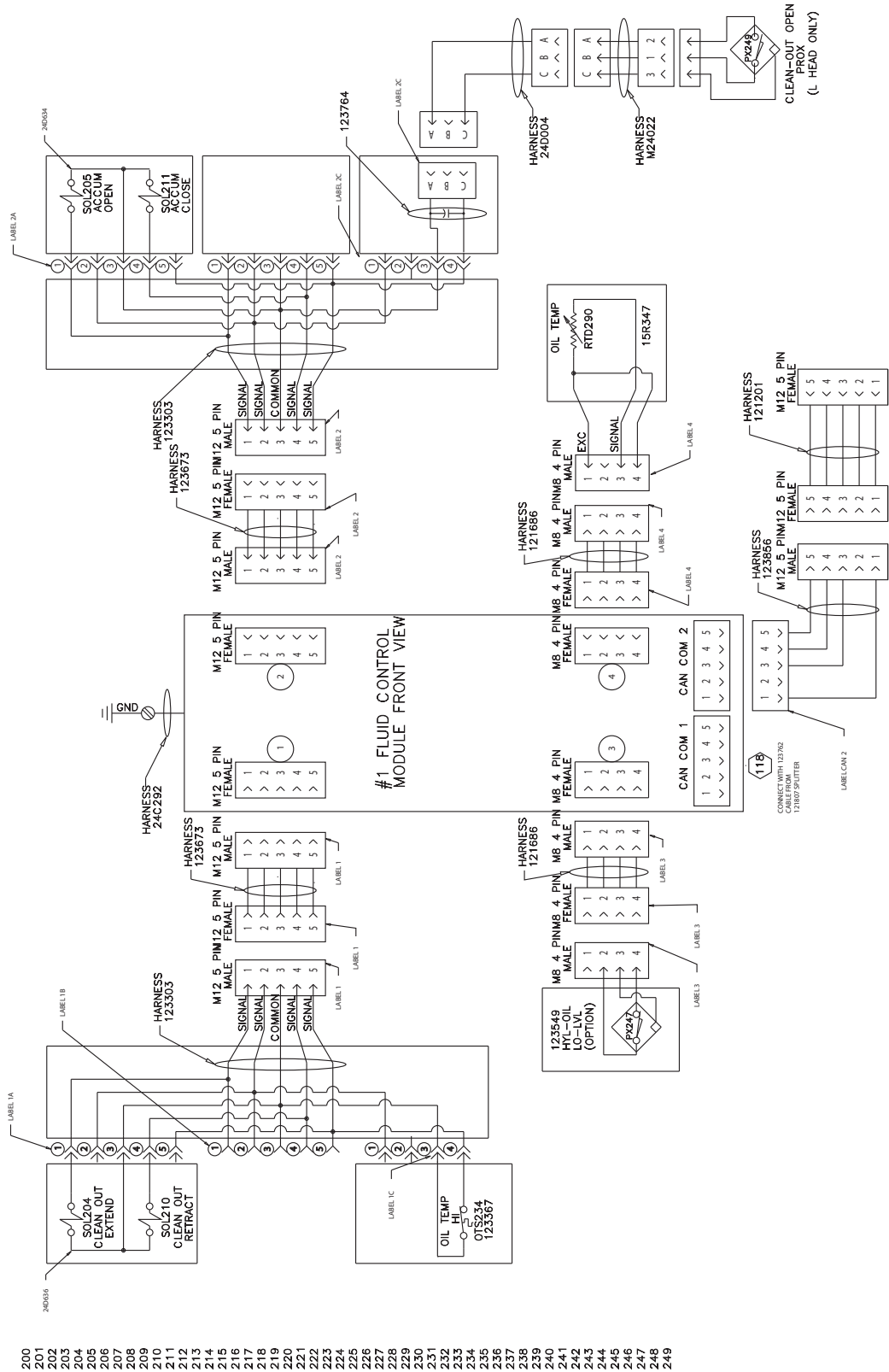
400V Power Pack



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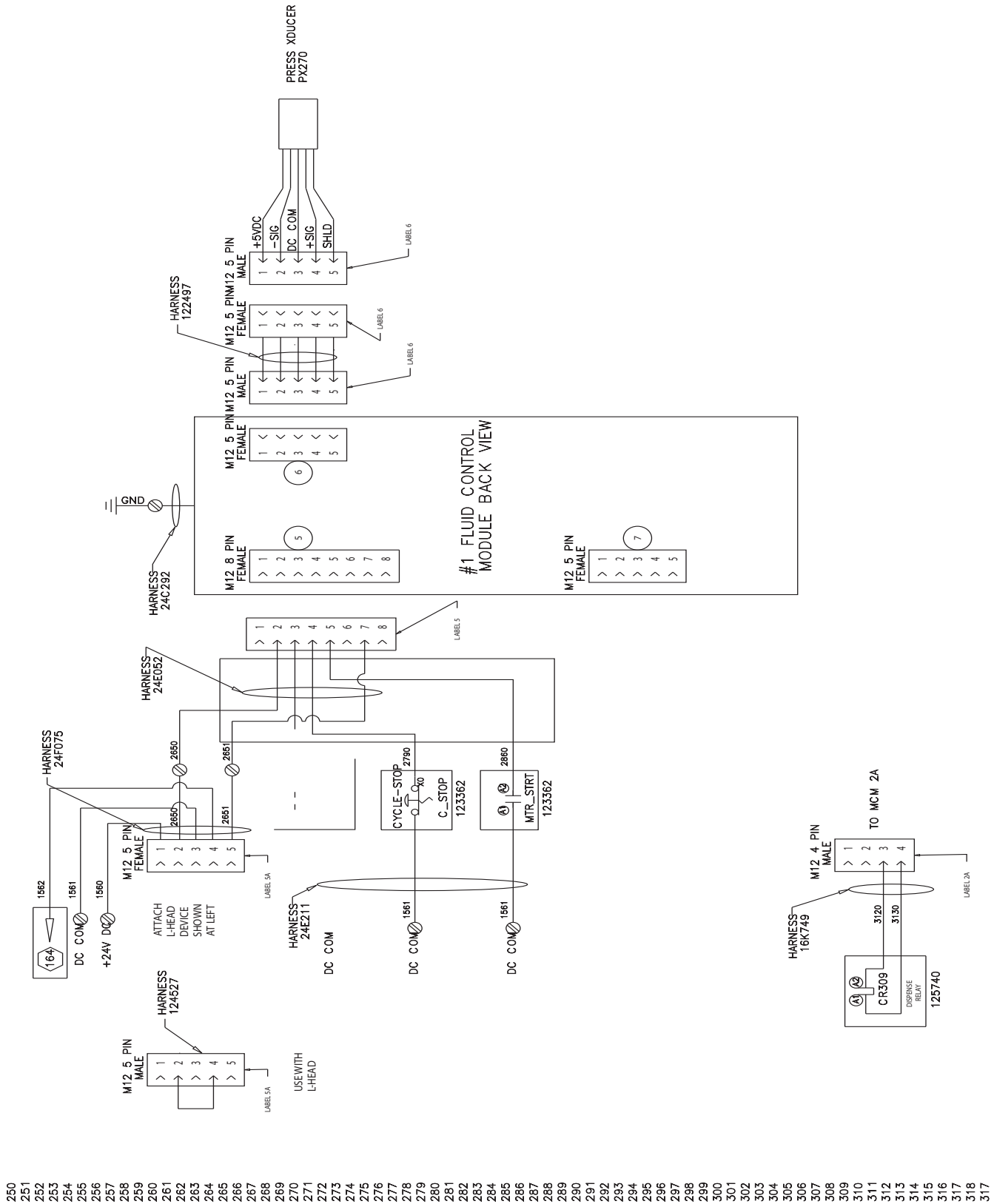


400V Power Pack -2



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400V Power Pack -3

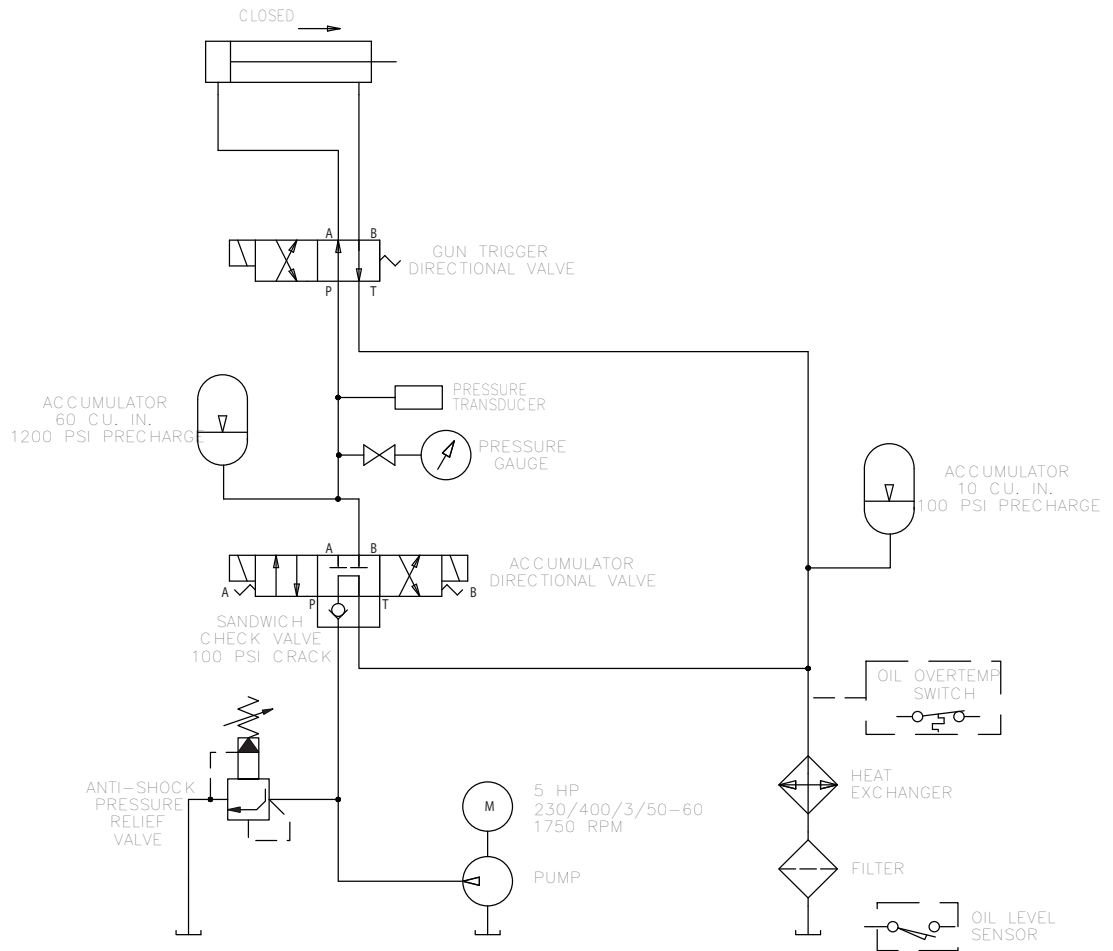


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400V Power Pack -4

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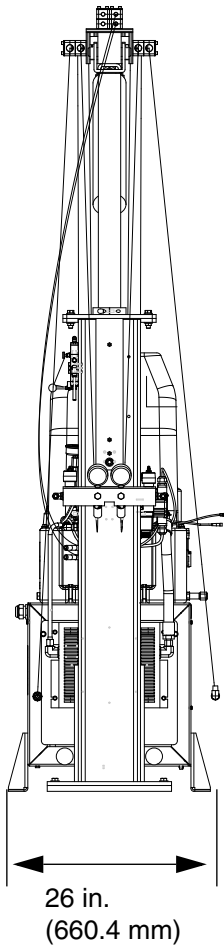
LOCATED ON THE MIX HEAD
HYDRAULIC POWER PACK



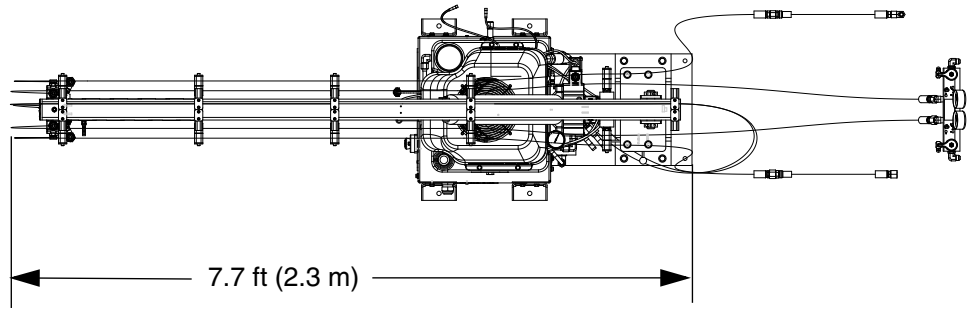
Dimensions

AC Power Pack Module

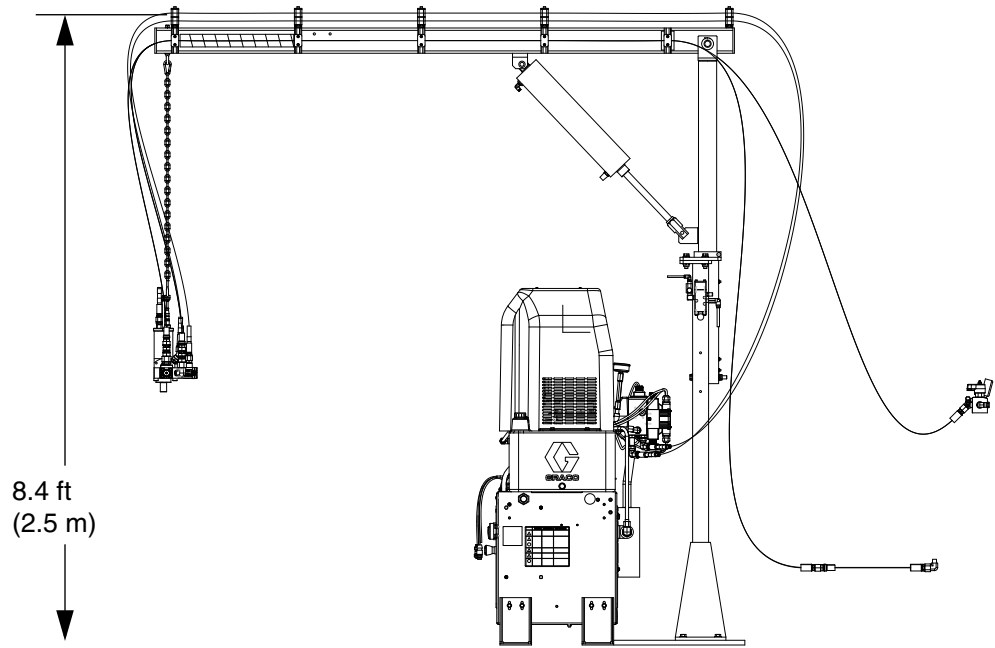
Front View



Top View

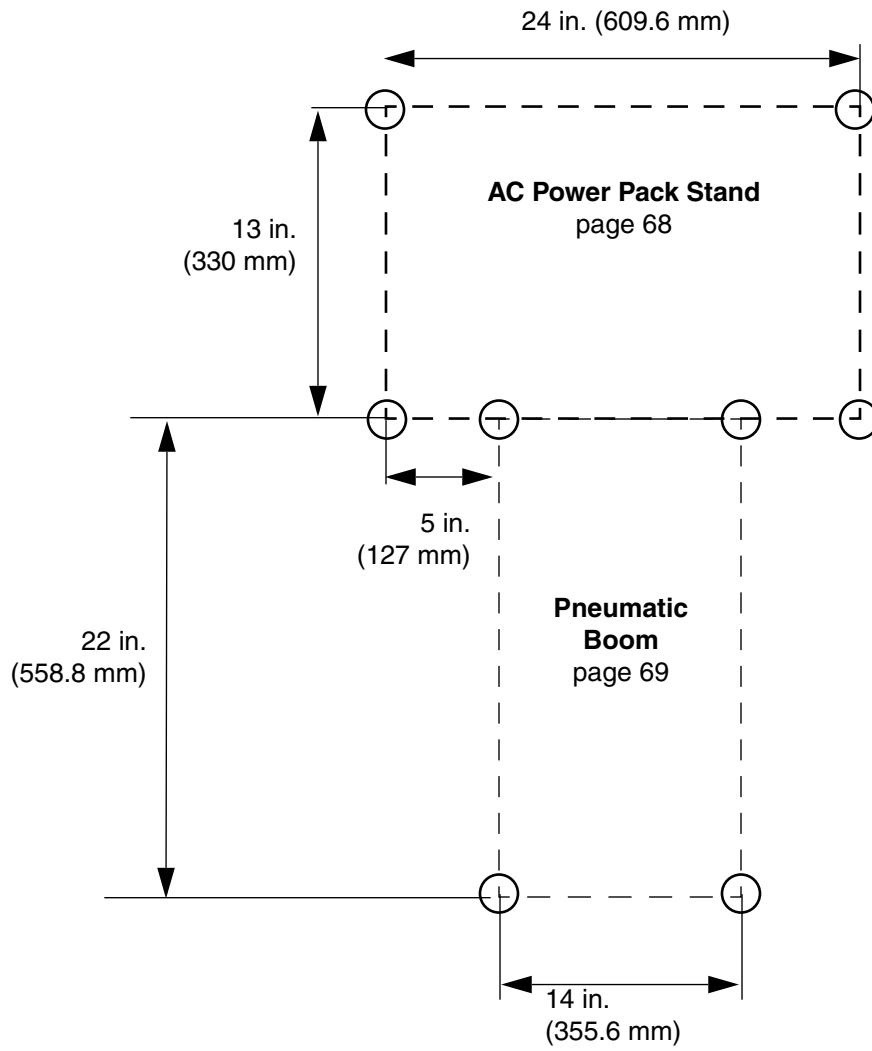


Side View



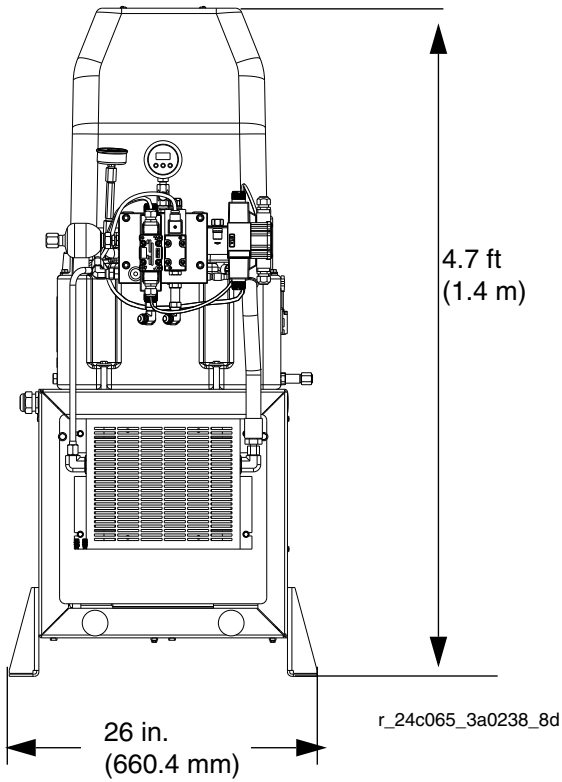
See page 67 for mounting dimensions.

Mounting Dimensions

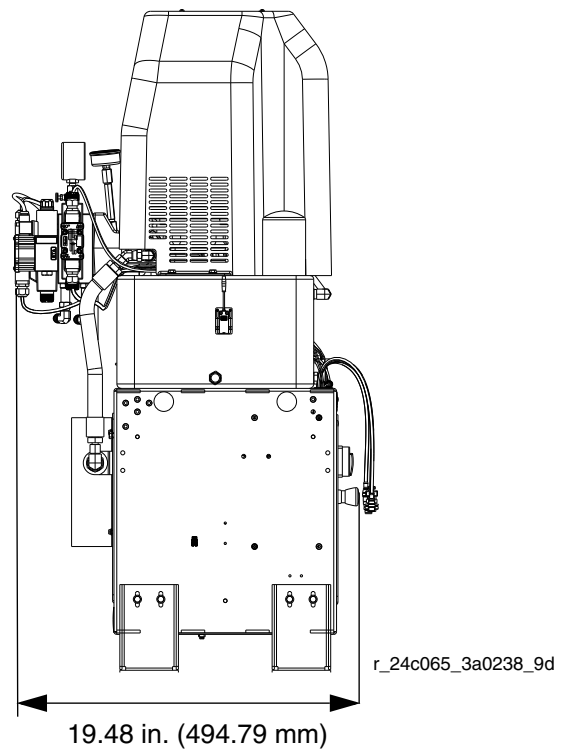


AC Power Pack Stand

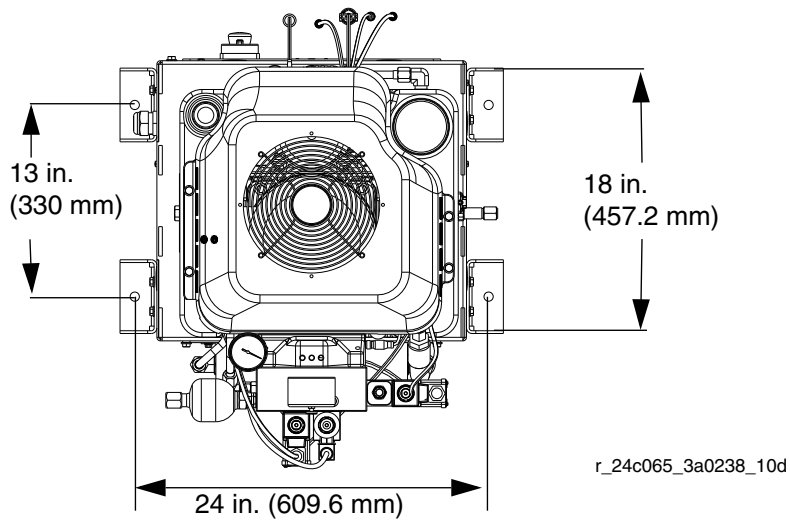
Front View



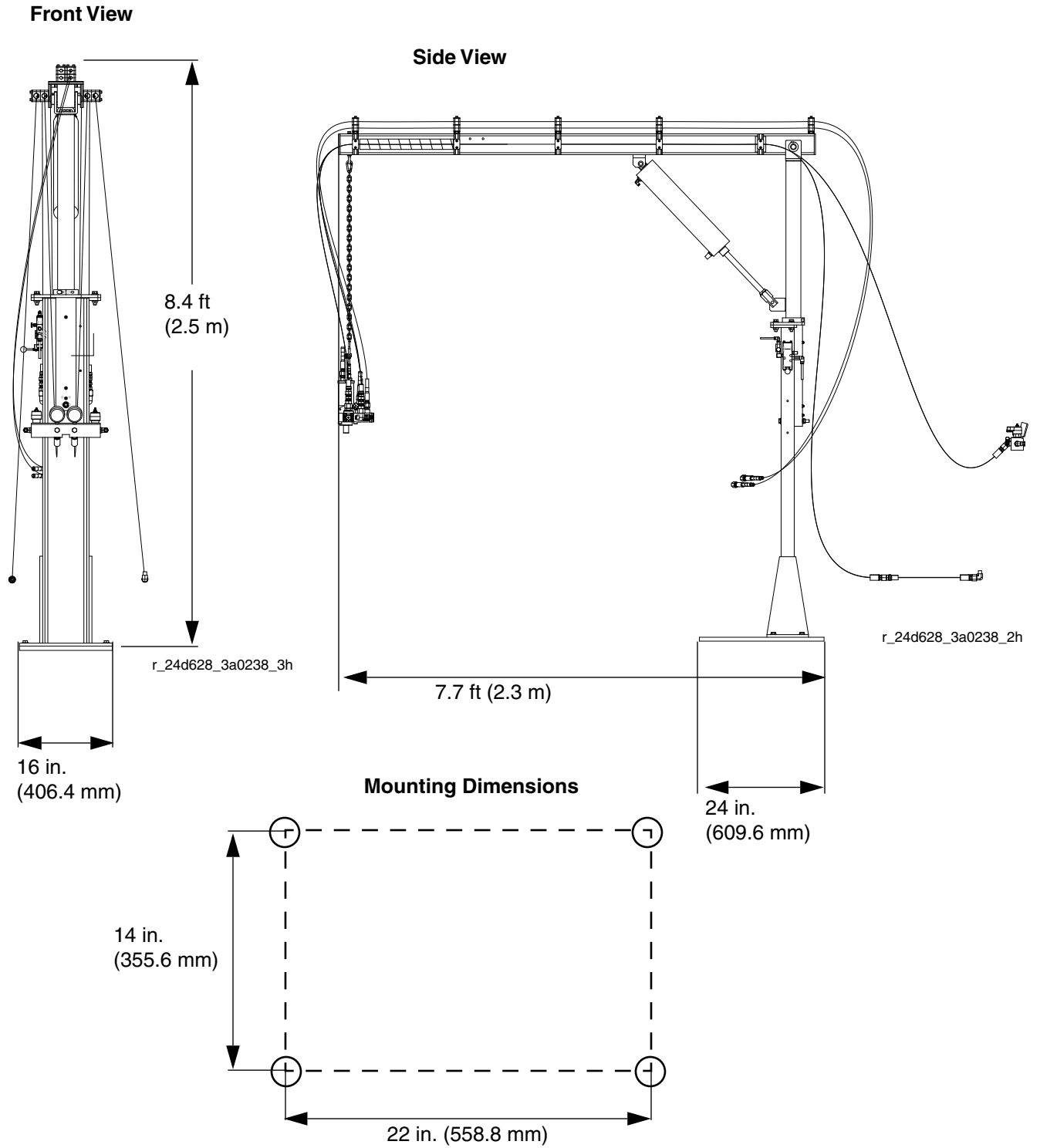
Side View



Top View



Pneumatic Boom



Technical Data

Maximum hydraulic fluid working pressure	2500 psi (17 MPa, 172 bar)
Minimum hydraulic hose working pressure	3000 psi (21 MPa, 207 bar)
Maximum hydraulic fluid temperature	180°F (82°C)
Maximum ambient temperature	120°F (49°C)
Hydraulic reservoir capacity	10 gallons (38 liters)
Recommended hydraulic fluid	ISO VG Number 46 or ASTM Grade 215
Accumulator hydraulic fluid capacity	1 gallon (3.8 liters)
Accumulator precharge	1200 psi (nitrogen)
Accumulator precharge (small)	150 psi (1.0 MPa, 10 bar)
Accumulator capacity (small)	10 in ³ (164 cc)
Maximum Weight	415 lbs (188 kg)
Minimum cycle time	7 seconds (shot time + time between shots)

Voltage (Phase)

230V Mix Module Stand	230 (3)
400V Mix Module Stand	400 (3)

Power Pack Maximum Amperage

230V System	17 A
400V System	18 A

Graco Standard Warranty

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

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

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

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For patent information, see www.graco.com/patents.

Original instructions. This manual contains English. MM 3A0238

Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

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