

# HFR™ for Circulating Spray

3A2904B

EN

**Hydraulic, Plural-Component, Fixed-Ratio Proportioner Systems.  
For spraying bedliner and polyurea masking materials.**

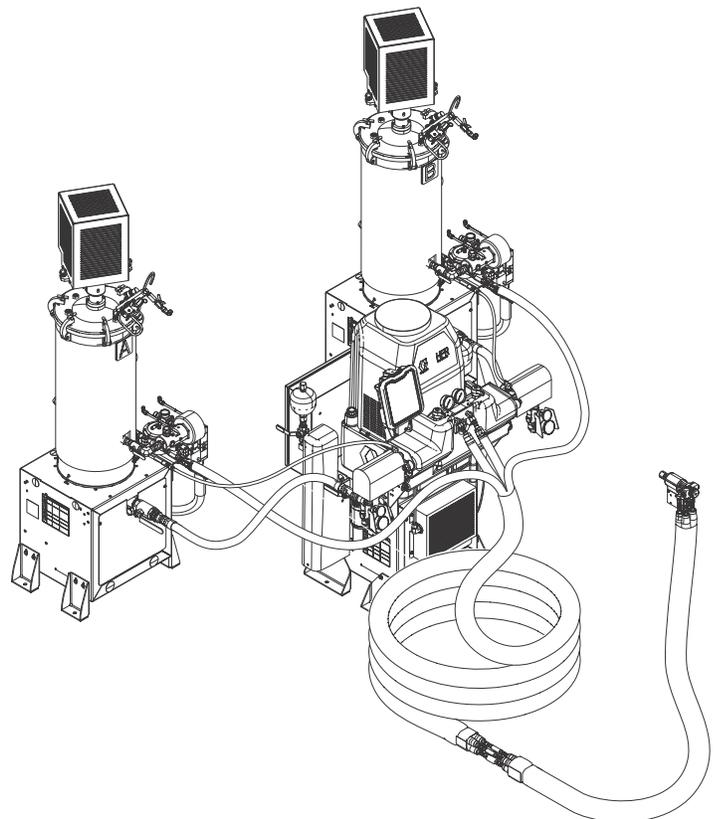
**For professional use only. Not approved for use in explosive atmospheres or hazardous locations.**



### **Important Safety Instructions**

Read all warnings and instructions in this manual. Read all warnings and instructions in the HFR Repair-Parts manual. Save all instructions.

See page 4 for model information and maximum working pressure.



ti19947b

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# Related Manuals

Manuals are available at [www.graco.com](http://www.graco.com). Component manuals listed are in English:

<b>System Manuals</b>	
313998	HFR, Repair-Parts
3A2903	HFR for Circulating Spray, Setup-Operation
<b>Power Distribution Box Manual</b>	
3A0239	Power Distribution Boxes, Instructions-Parts
<b>Pumpline Manuals</b>	
3A0019	Z-Series Chemical Pumps, Instructions-Parts
3A0020	HFR Hydraulic Actuator, Instructions-Parts
<b>Feed System Manuals</b>	
309815	Reactor <sup>®</sup> Feed Pump Kits, Instruction-Parts
309827	Air Supply Kits, Instructions-Parts
309852	Reactor Circulation and Return Tube Kits
311882	T2 2:1 Ratio Transfer Pump, Instructions
3A0235	Feed Supply Kits, Instructions-Parts
3A0237	Heated Hoses and Applicator Kits, Instructions-Parts
3A0395	Stainless Steel Tank Feed Systems, Instructions-Parts

<b>Dispense Valve Manuals</b>	
309376	EnDure <sup>®</sup> Automatic Dispense Valve
311321	GX-7A, GX-7DI, GX-7 <sup>®</sup> 400 Spray Guns, Operation-Parts-Service-Repair
311338	GX-8, Operation-Repair
311340	Gusmer <sup>™</sup> Gun Service Kit
313380	GX-7DI Auto-Robotic Spray Gun, Operation-Maintenance
313536	GX-16, Operation
<b>Accessory Manuals*</b>	
312864	HFR Communications Gateway Module, Instructions-Parts
3A1149	HFR Discrete Gateway Module Kits Manual
3A1657	HFR Flow Meter Kits, Instructions-Parts

\* Additional accessories are listed in the standard HFR manual, but may not be compatible with HFR for Circulating Spray systems. See list of accessories in the HFR for Circulating Spray operation manual.

# Models

System	Circulation Type	HFR Full Load Peak Amps Per Phase*	Voltage (phase)	Primary Heater Watts A (Red)	Primary Heater Watts B (Blue)	Max Flow Rate◆ lb/min (kg/min)	Approximate Output per Cycle (A+B) gal. (liter)	Hydraulic Pressure Ratio	Maximum Fluid Working Pressure ‡ psi (MPa, bar)
24N559	Manual	73	230V (3)	6,000	6,000	4 (1.8)	0.042 (0.160)	3.7:1	3000 (20.7, 207)
24P256 ★		75	400V (3)						
24N560	Auto	73	230V (3)						
24P257 ★		75	400V (3)						

System	Material Ratio (A:B)	A (Red) Pump Size	B (Blue) Pump Size	60' (18 m) † Chemical Hose Bundle	35' (11 m) † Chemical Hose Bundle
24N559	1:1	80	80	24P014 (Included)	Not Available
24P256 ★					
24N560				Not Available	24P013 (Order Separately)
24P257 ★					

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

◆ Flow rate is independent of frequency 50/60 Hz. Flow rate is dependant of applicator gun, spray tip, and mix module.

★  approved.

‡ The maximum fluid working pressure for the base machine without hoses is 3000 psi (20.7 MPa, 207 bar). If hoses rated at less than 3000 psi are installed, the system maximum fluid working pressure becomes the rating of the hoses. If 2000 psi hoses were purchased and installed by Graco, the working pressure for the machine is already setup for the lower 2000 psi (13.8 MPa, 138 bar) working pressure by Graco. If the machine was purchased without hoses and aftermarket hoses rated at or above 3000 psi are to be installed, see instruction manual 313998 for the procedure to setup the machine for higher rated hoses. The change in working pressure is made by changing a rotary switch setting in the Motor Control Module. The minimum pressure rating for hoses is 2000 psi. Do not install hoses with a pressure rating lower than 2000 psi.

† Hose bundles for bedliner, manual, and auto circulation systems are not interchangeable.

# 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 symbol refers to procedure-specific risk. Refer back to these warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

 <b>WARNING</b>	
	<p><b>ELECTRIC SHOCK HAZARD</b></p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> <li>• Turn off and disconnect power at main switch before disconnecting any cables and before servicing equipment.</li> <li>• Connect only to grounded power source.</li> <li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li> </ul>
	<p><b>TOXIC FLUID OR FUMES HAZARD</b></p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> <li>• Read MSDSs to know the specific hazards of the fluids you are using.</li> <li>• Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.</li> <li>• Always wear chemically impermeable gloves when spraying, dispensing, or cleaning equipment.</li> </ul>
	<p><b>PERSONAL PROTECTIVE EQUIPMENT</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>• Protective eyewear, and hearing protection.</li> <li>• Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.</li> </ul>
	<p><b>SKIN INJECTION HAZARD</b></p> <p>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. <b>Get immediate surgical treatment.</b></p> <ul style="list-style-type: none"> <li>• Do not point dispensing device at anyone or at any part of the body.</li> <li>• Do not put your hand over the fluid outlet.</li> <li>• Do not stop or deflect leaks with your hand, body, glove, or rag.</li> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses and couplings daily. Replace worn or damaged parts immediately.</li> </ul>


**WARNING**
**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.

**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.

**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.

 <b>WARNING</b>	
	<p><b>MOVING PARTS HAZARD</b>                      Moving parts can pinch, cut or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> <li>• Keep clear of moving parts.</li> <li>• Do not operate equipment with protective guards or covers removed.</li> <li>• Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the <b>Pressure Relief Procedure</b> and disconnect all power sources.</li> </ul>
	<p><b>BURN HAZARD</b>                      Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> <li>• Do not touch hot fluid or equipment.</li> </ul>

## Important Two-Component Material Information

### Isocyanate Conditions

						
<p>Spraying or dispensing materials containing isocyanates creates potentially harmful mists, vapors, and atomized particulates.</p> <p>Read material manufacturer's warnings and material MSDS to know specific hazards and precautions related to isocyanates.</p> <p>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.</p> <p>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.</p>						

### Keep Components A (Red) and B (Blue) Separate

						
<p>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, <b>never</b> interchange component A (Red) and component B (Blue) parts.</p>						

### Material Self-ignition

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

## 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 IsoGuard Select cylinder filled with IsoGuard Select, part 24F516. 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.

## A (Red) and B (Blue) Components

### IMPORTANT!

Material suppliers can vary in how they refer to plural component materials.

Be aware that when standing in front of the manifold on proportioner:

- Component A (Red) is on the left side.
- Component B (Blue) is on the right side.

- 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 (Red) side, but some use ISO on the B (Blue) side. See the following section.

For all machines:

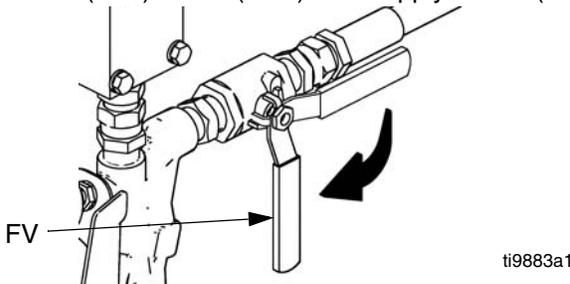
- The A (Red) side is intended for ISO, hardeners, and catalysts.
- If one of the materials is moisture-sensitive that material should always be on the A (Red) side.
- The B (Blue) side is intended for polyols, resins, and bases.

**NOTE:** For machines with material volume ratios other than 1:1, the higher volume side is typically the B (Blue) side.

# Shutdown



1. Park pumps.
  - a. From the Home screen, press  and select Standby mode.
  - b. Press . Material will not dispense. Pump will park automatically. Once pump is parked, pump will stop moving.
2. Press  to disable the ADM.
3. Turn main power switch (MP) to OFF position.
4. Close A (Red) and B (Blue) fluid supply valves (FV).

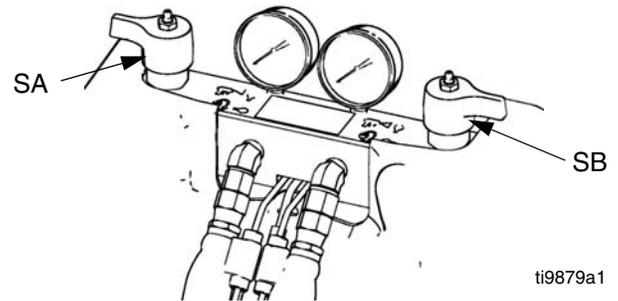


5. Perform **Pressure Relief Procedure** on page 9.
6. Shut down feed pumps as required. See feed pump manual.

# Pressure Relief Procedure



1. Press  to disable the ADM.
2. Shut off feed pumps and agitator, if used.
3. Turn PRESSURE RELIEF/DISPENSE valves (SA, SB) to PRESSURE RELIEF/CIRCULATION . Route fluid to waste containers or supply tanks. Ensure gauges drop to 0.



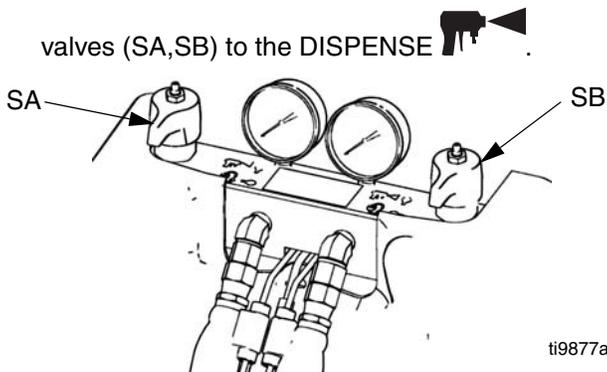
4. **For models with a dispense valve with a safety lock, engage gun safety lock.**
5. Relieve pressure in dispense valve. See dispense valve manual.

# Flushing

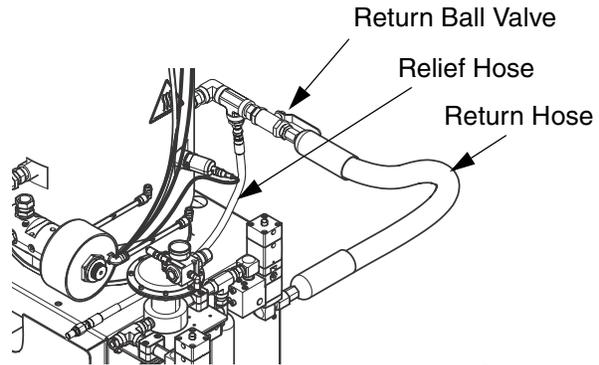


Flush equipment only in a well-ventilated area. Do not dispense flammable fluids. Do not turn on heaters while flushing with flammable solvents. Heaters must be off and cool when solvent is in the system.

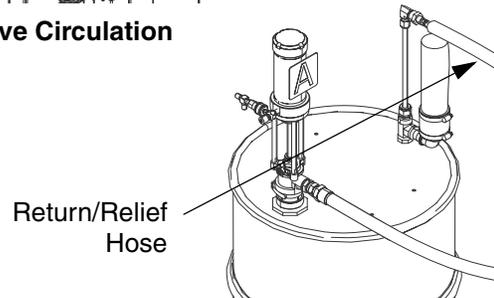
- Drain tanks (or replace drum) prior to flushing to minimize the amount of contaminated material to be flushed.
- If pumping directly from the drums, it may be advisable to clean the pump prior to placing in a new drum.
- Flush out old fluid with new fluid, or flush out old fluid with a compatible solvent before introducing new fluid.
- Use the lowest possible pressure when flushing.
- All fluid components are compatible with common solvents. Use only moisture-free solvents. See **Technical Data** on page 38 or accessory manuals for list of wetted components to verify compatibility of solvent with wetted materials. See solvent manufacturers information for material compatibility.
- To flush the pumps, and hose bundle (dispense and return hoses), set PRESSURE RELIEF/DISPENSE valves (SA,SB) to the DISPENSE



- Disconnect the return hoses from the reservoir and secure the hoses to direct flow into a waste container. Cycle the pump at a slow rate until no contamination is seen in either material.



**Active Circulation**



**Manual Circulation**

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**FIG. 1: Tank Stand Connections**

- To flush the relief hoses (material manifold to reservoir) on an Automatic Circulation system (with tank feed).
  - First relieve air pressure on the tank.
  - With a waste container ready, remove the relief hoses (R) from the PRESSURE RELIEF/DISPENSE manifold and immediately direct to the waste container.
  - Let the hose drain until no contamination is seen.

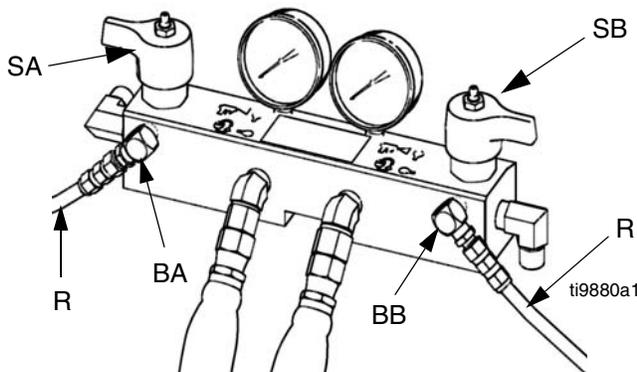
- Re-connect the hose.

**NOTE:** There is no shutoff valve in the relief hose. Material will flow out the hose as long as the end of the hose is below the material level in the tank and the material level in the tank is above the level where the hose is connected to the tank. If it is necessary to pressurize the tank for material to flow sufficiently. It is strongly recommended that a shutoff valve (not provided) is temporarily installed at the hose end to start/stop flow.

						
<p>Do not install shutoffs downstream of the PRESSURE RELIEF/DISPENSE valve outlets (BA, BB). The valves function as overpressure relief valves when set to DISPENSE . Lines must be open so valves can automatically relieve pressure when machine is operation.</p> <p>If circulating fluid back to the supply drums, use high pressure hose rated to withstand the maximum working pressure of this equipment.</p>						

- To prevent moisture from reacting with isocyanate, always leave the system dry or filled with a moisture-free plasticizer or oil. Do not use water. See **Important Two-Component Material Information** on page 7.
- *Solvent pails used when flushing:* follow your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.
- *To maintain grounding continuity when flushing or relieving pressure,* hold a metal part of dispense gun firmly to the side of a grounded *metal* pail, then trigger gun.

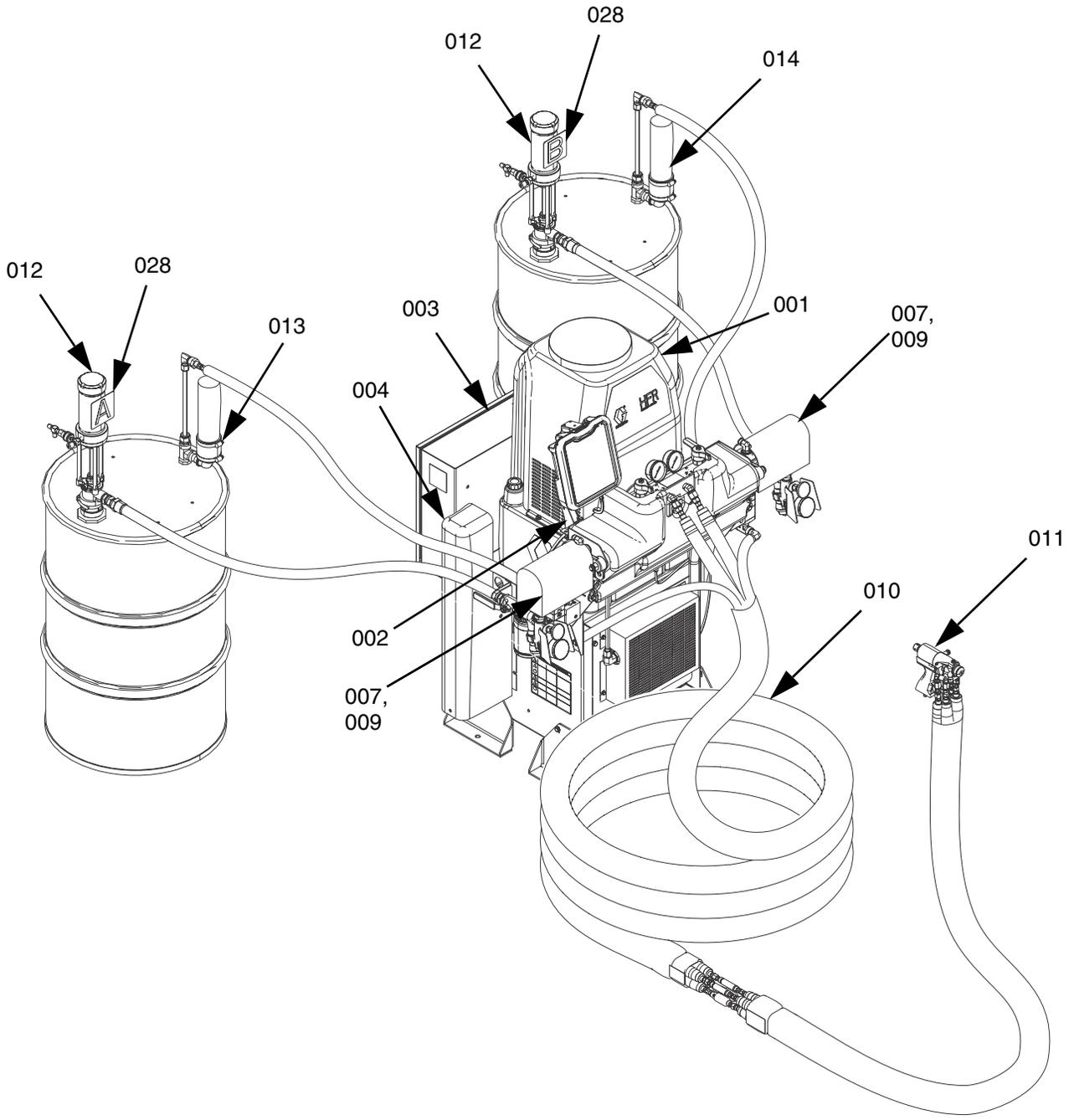
- To flush the relief hose on a Manual Circulation system (with drum pump feed)
  - Relieve air pressure on the drum pump
  - Disconnect the return/relief hoses from the return tube assembly (see FIG. 1, page 10) and secure the hoses to direct flow into a waste container.
  - Set PRESSURE RELIEF/DISPENSE valves (SA,SB) to the PRESSURE RELIEF/CIRCULATE position.



- Cycle the pumps at a slow rate until no contamination is seen in either material.

# Parts

## Manual Circulation Machine - 24N559, 24P256



ti19948a

Ref	Part	Description	Quantity	
			24N559, Manual Circulation Machine, 230V	24P256, Manual Circulation Machine, 400V
001★	24C352	BASE, fixed ratio, non-sst, 3ksi	1	1
002	24C067	KIT, pressure adj, dc pwrpack	1	1
003	24C684	MODULE, pwr dist, fix, 230v, 3ph, hi	1	
	24C688	MODULE, pwr dist, fix, 400v, 3ph, hi		1
004★	24P199	HEATER, fix, pr, 2fts, cs/al, vit, w/s	1	1
007	L080S1	LOWER, chemical, 80, sst, ucup	2	2
009	125236	COVER, lower, chemical, z-pump, 440	2	2
010	24P014	HOSE, assy, cs, fts, 60 ft (18 m), insu	1	1
011	24P633	GUN, gx-8	1	1
012	246081	KIT, supply 2:1 (w/plumb/air)	1	1
013	24N486	KIT, circulation, cs, pu, A	1	1
014	24N487	KIT, circulation, cs, pu, B	1	1
015†	24N990	KIT, blk, valve, solenoid, mach	1	1
028▲	15G476	LABEL, A-B identification	1	1

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

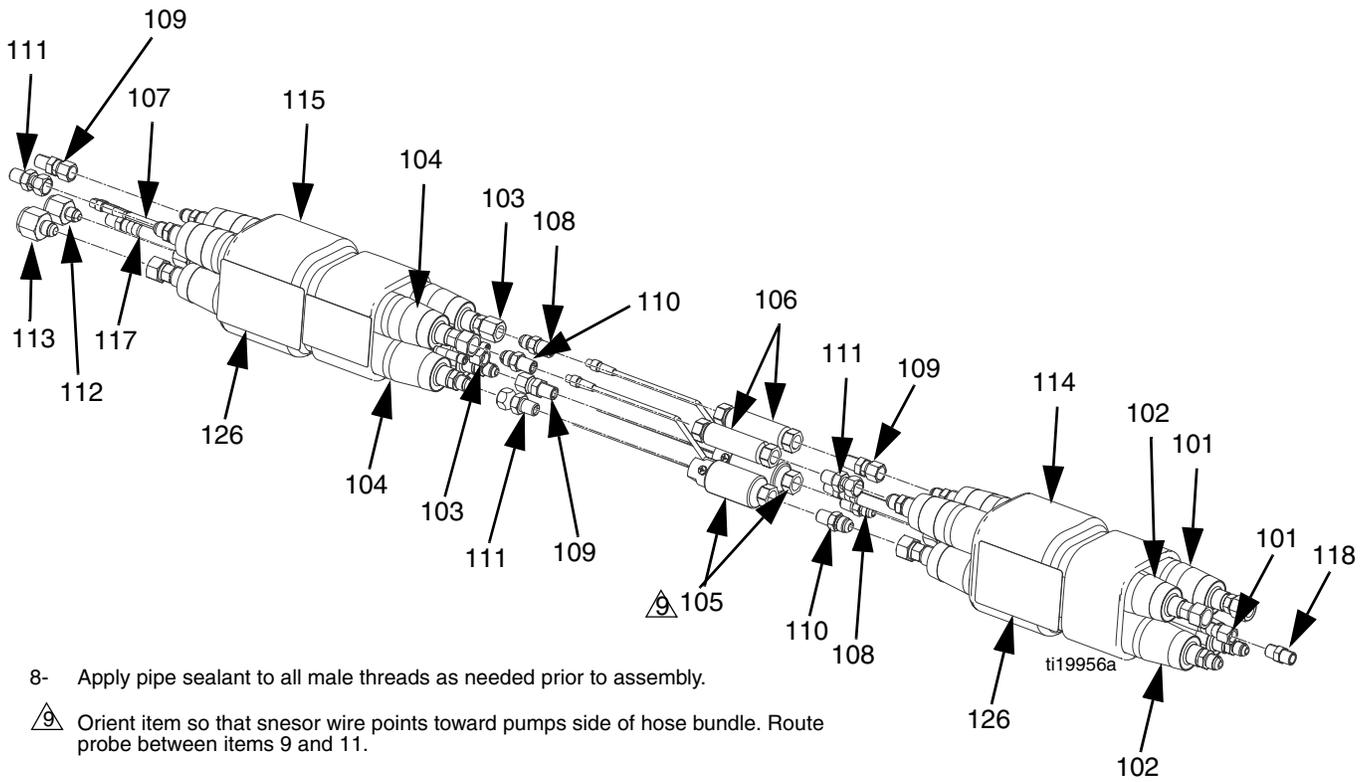
† Not shown.

✘ See HFR Parts-Repair manual or component operation/parts manuals referenced on page 3 for additional parts information and identification.

★ 24N559/24P256 assemblies include the following non-stainless steel options. Parts information for these assemblies can be found in the HFR Parts-Repair manual.

Part	Description
255629	Non Stainless Steel Manifold
255159	Non Stainless Steel Fluid Inlet Assembly
24C426	Non Stainless Steel Heater Assembly
N/A	A and B Primary Heat

# Manual Circulation Hose Assembly - 24P014

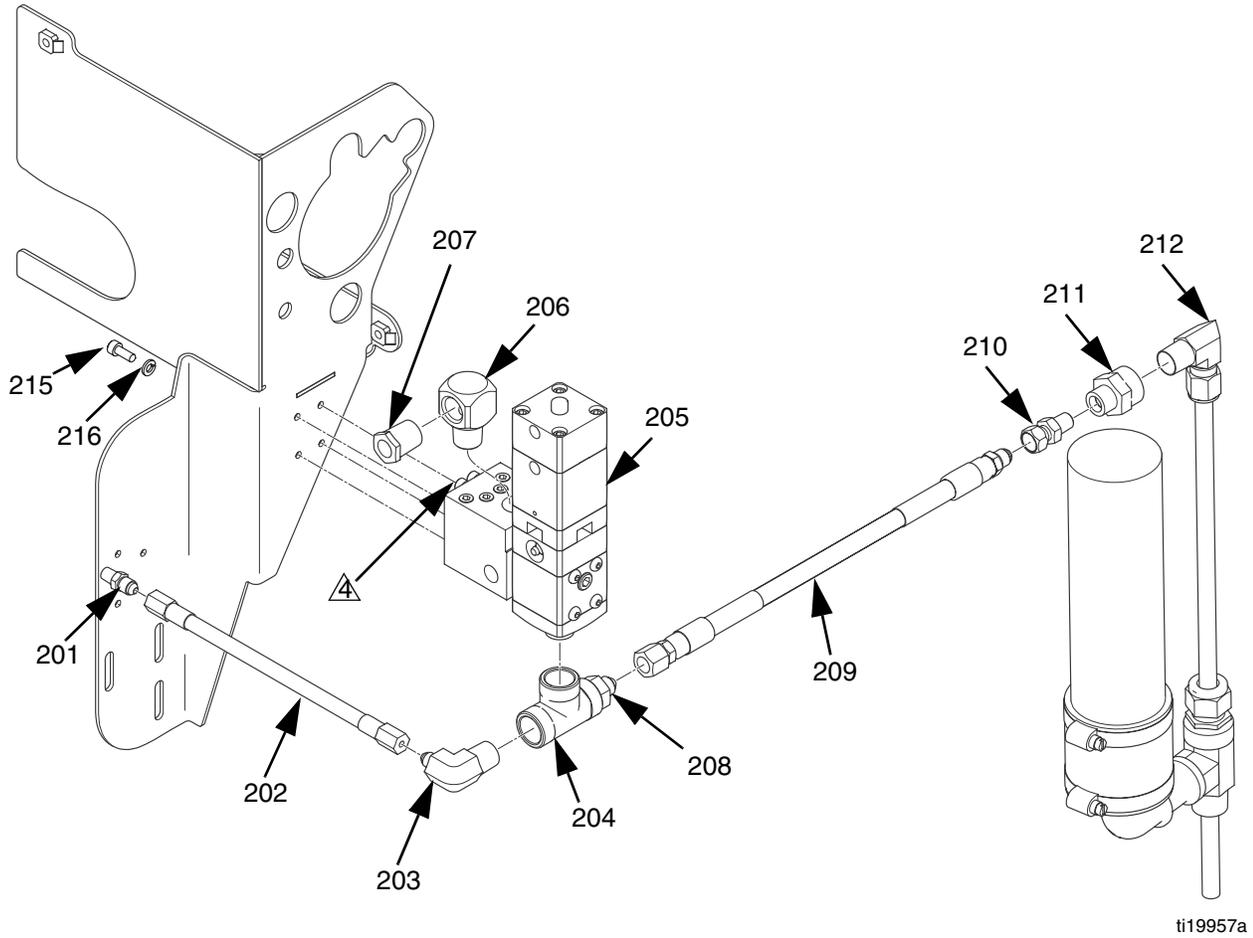


Ref	Part	Description	Quantity
101	262262	HOSE, A, 10 ft (3 m), 1/4, insulation, ms	2
102	262263	HOSE, B, 10 ft (3 m), 1/4, insulation, ms	2
103	262266	HOSE, A, 50 ft (15 m), 1/4, insulation, ms	2
104	262267	HOSE, B, 50 ft (15 m), 1/4, insulation, ms	2
105	262120	SENSOR, fluid temp rtd	2
106	261602	FITTING, coupler	2
107	122835	CABLE, m8, 4-pin, mf, 15.7m, molded	2
108	117455	FITTING, nipple, 1/4 npt x #5 jic	2
109	122963	ADAPTER, swivel, jic05 x 1/4 npt, fm, ms, 6	3
110	122722	ADAPTER, jic06 x 1/4npt, mm, ms, 6k	2
111	117506	FITTING, swivel, 1/4 npt x #6 jic	3
112	117502	FITTING, reducer #5 x #8 (jic)	1
113	117677	FITTING, reducer #6 x #10 (jic)	1
114	24D138	JACKET, scuff, 15 ft (4.5 m)	1
115	261610	JACKET, scuff, 50 ft (15 m)	1
116†	261537	HOSE, air, 10 ft (3 m)	1
117	261535	HOSE, air, 50 ft (15 m)	1
118	123257	FITTING, nipple, hex, 1/4npt, brs	1
126▲	15B679	LABEL, safety, warn, mult, htd hose	2

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

† Not shown.

### Manual Circulation Kit - 24N486, 24N487

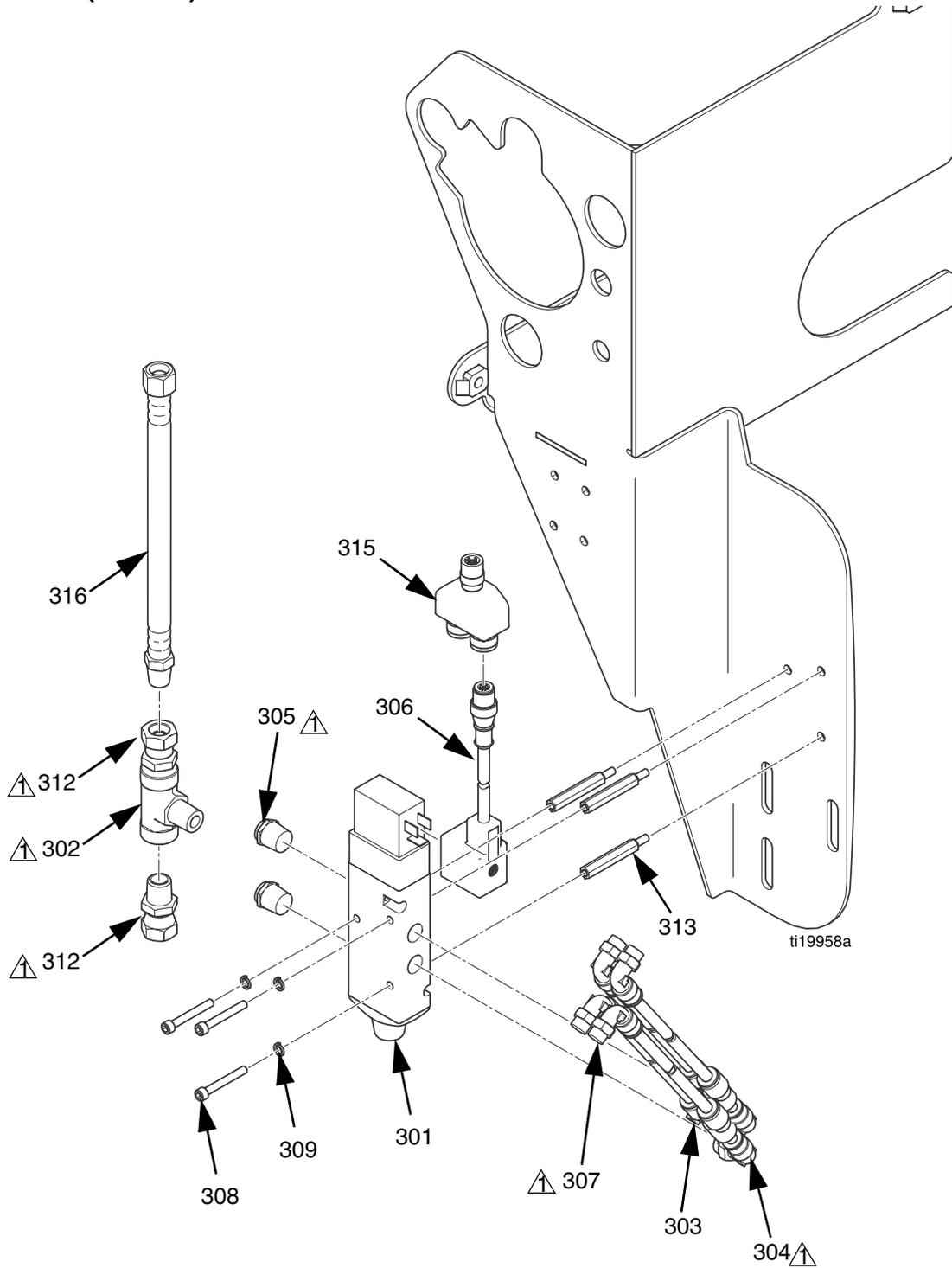


2- Apply pipe sealant to all male threads as needed prior to assembly.

 Torque to 8 ft-lb (11 N•m)

Ref	Part	Description	Quantity	
			24N486, KIT, circulation, cs, pu, a	24N487, KIT, circulation, cs, pu, b
201	556762	CONNECTOR, #4 jic 1/4pm	1	1
202	16C509	HOSE, assy, ss brd, 1/4x24, ss	1	1
203	6308-28	FITTING, elbw, 90°, jic04 x 1/2npt, mm, m	1	1
204	103475	FITTING, tee, pipe	1	1
205	24P005	VALVE, endure, amb or temp cond, 1	1	1
206	158683	FITTING, elbow, 90 deg	1	1
207	100206	BUSHING, pipe	1	1
208	6310-200	ADAPTER, jic(05) x 1/2 npt, m ms	1	
	94/0653/99	ADAPTER, jic06 x 1/2npt, mm, ms, 3k		1
209	262175	HOSE, A, 10 ft (3m) , 1/4, moisture-lok, ms	1	
	262176	HOSE, B, 10 ft (3 m), 1/4, moisture-lok, ms		1
210	122963	ADAPTER, swivel, jic05 x 1/4npt, fm, ms, 6	1	
	117506	FITTING, swivel, 1/4 npt x #6 jic		1
211	124281	FITTING, cplg, 1/2npt x 1/4npt, ff, ms	1	1
212	246477	KIT, accessory, return tube	1	1
215	124313	SCREW, shcs, m6-1 x 16 mm, sst	4	4
216	100016	WASHER, lock	4	4

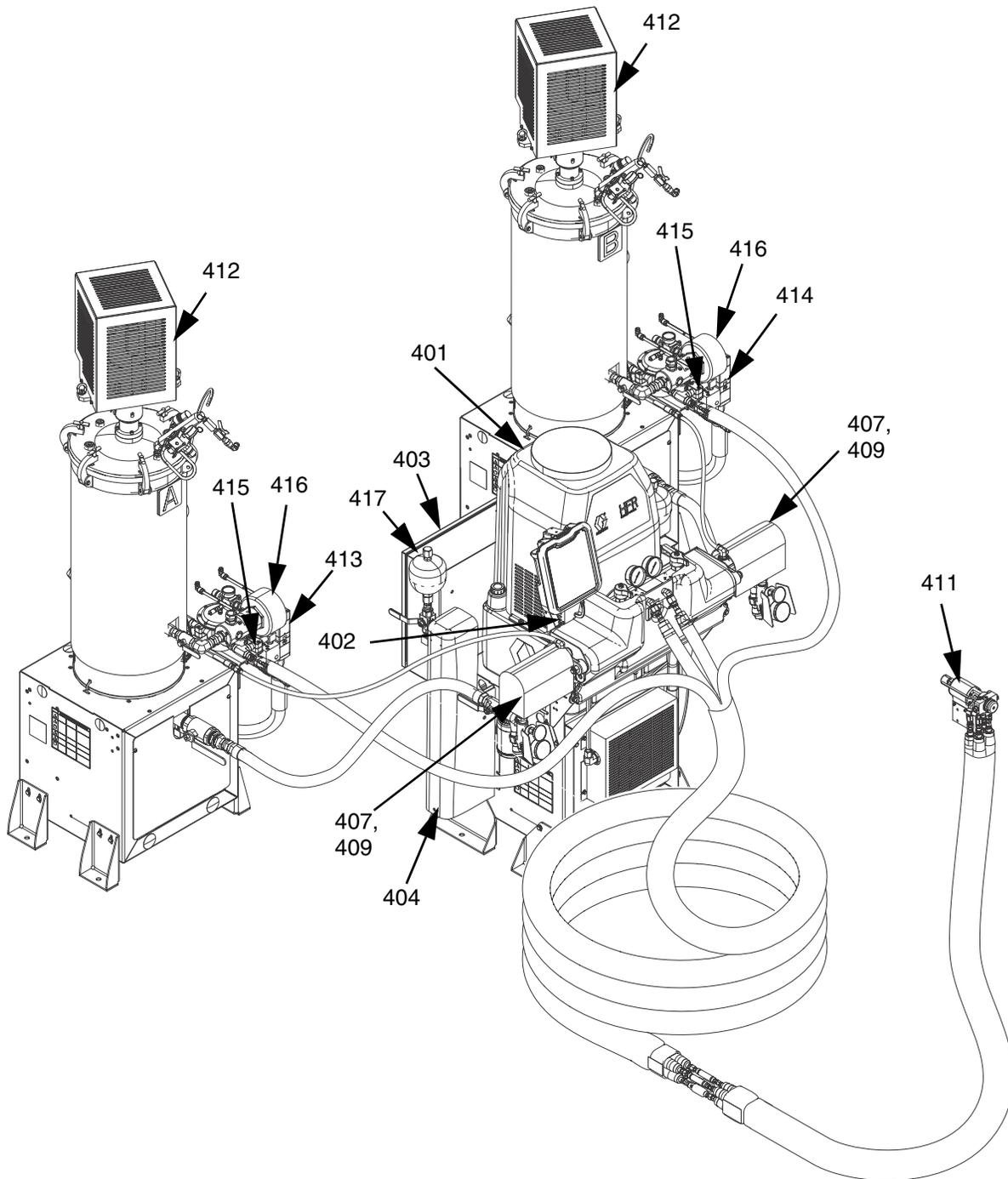
### Solenoid Valve (Manual) - 24N990



 Apply pipe sealant to all male threads prior to assembly.

Ref	Part	Description	Quantity
301	120900	VALVE, solenoid, 3 way	1
302	108638	FITTING, pipe, tee	1
303	114158	FITTING, adapter, y	2
304	121022	FITTING, elbow, male, 1/4 npt	2
305	121021	MUFFLER, 1/4 npt	2
306	123395	HARNESS, pwr valve, tank	1
307	112698	ELBOW, male, swivel	4
308	115968	SCREW, cap, socket head	3
309	GC2107	WASHER, lock, spring, #8	3
312	114339	FITTING, union, swivel, 1/4 npt, sst	2
313	124876	SPACER, standoff, 1.5 lg, 8-32 thrd	3
315	120953	CONNECTOR, splitter	1
316	299971	HOSE, 1/4 x 2 ft (0.6 m) (mxf) air	1

# Auto Circulation Machine - 24N560, 24P257



**NOTE:** Hose bundle is shown for reference only and must be specified separately.

ti19947b

Ref	Part	Description	Quantity	
			24N560, Auto Circulation Machine, 230V	24P257, Auto Circulation Machine, 400V
401✕★	24P174	BASE, fixed ratio, sst/al, vit, 3k	1	1
402✕	24C067	KIT, pressure adj, dc pwrpack	1	1
403✕	24C684	MODULE, pwr dist, fix, 230v, 3ph, hi	1	
	24C688	MODULE, pwr dist, fix, 400v, 3ph, hi		1
404✕	24P173	HEATER, fix, pr, 2fts, sst/al, vit, w/	1	1
405✕†	24D161	KIT, auto fusion, gms	1	1
406†	120955	CORD SET, euro, male, 4pin, 3wire, 4m l	1	1
407✕	L080S1	LOWER, chemical, 80, sst, ucup	2	2
409	125236	COVER, lower, chemical, z-pump, 440	2	2
411✕	24N552	DISPENSER, gx7 di a-robot w/o mod	1	1
412✕	24P091	MODULE, tank, 75l, agit, ht, ins, lvl	2	2
413	24N366	VALVE, assy, circ, auto, sst, bed, a	1	1
414	24N367	VALVE, assy, circ, auto, sst, bed, b	1	1
415	24N991	KIT, blkg, valve, solenoid, mach	1	1
416	24P673	KIT, refill, hfr, nvh, a-side	2	2
417	24R783	ACCUMULATOR; with shutoff	2	2
428†	123659	CABLE, 5pin, male/female, 16m	1	1

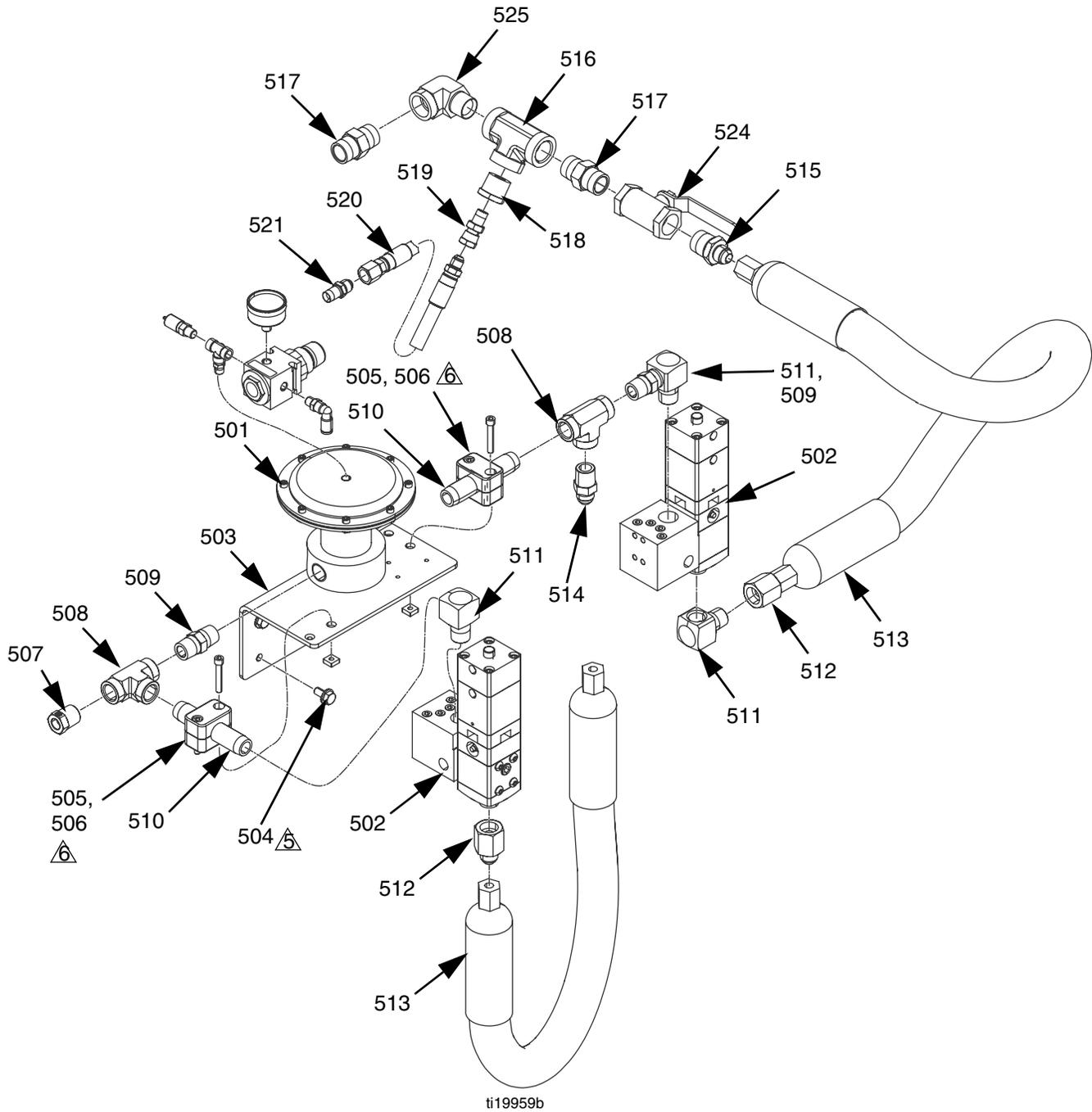
† Not shown.

✕ See HFR Parts-Repair manual or component operation/parts manuals referenced on page 3 for additional parts information and identification.

★ 24N560/24P257 assemblies include the following aluminum-stainless steel options. Parts information for these assemblies can be found in the HFR Parts-Repair manual.

Part	Description
24P166	Aluminum Manifold with Stainless Steel Fittings
24P167	Aluminum Fluid Inlet Assembly with Stainless Steel Fittings
24P165	Aluminum Heater Assembly with Stainless Steel Fittings
N/A	A and B Primary Heat

**Auto Circulation Assembly - 24N366, 24N367**



2. Apply Sealant to all male threads prior to assembly.

△<sub>5</sub> Torque to 17 ft-lb (23 N•m)

△<sub>6</sub> Torque to 8 ft-lb (11 N•m)

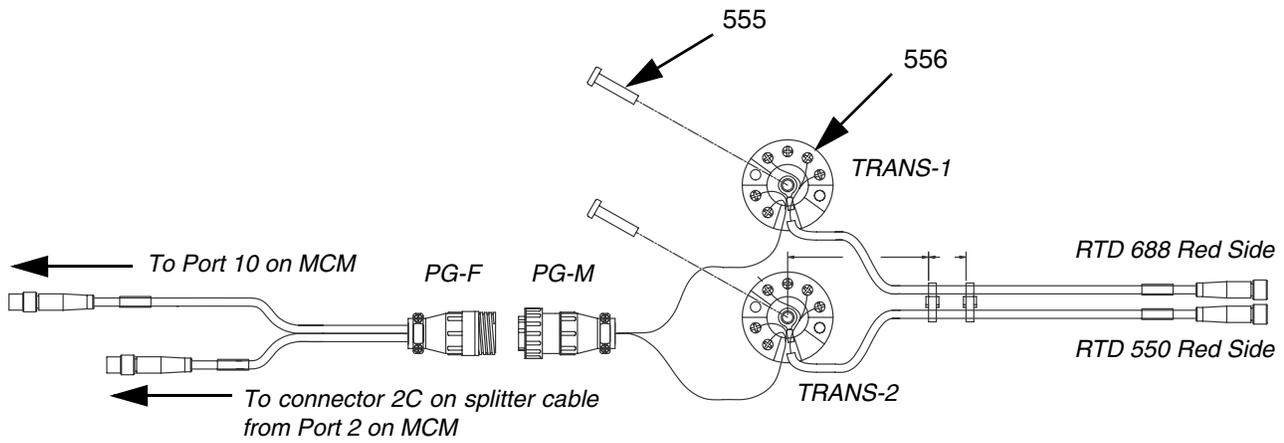
Ref	Part		Description	Quantity
	Assembly 24N366 - Red (A)	Assembly 24N367 - Blue (B)		
501	24P009	24P009	VALVE, back pressure, reg, gauge, r	1
502	24P005	24P005	VALVE, endure, amb or temp cond, 1	2
503	24N908	24N908	BRACKET, vlve, blk, mtg, top, stand, t	1
504	111800	111800	SCREW, cap, hex hd	3
505	20039-51	20039-51	KIT, pipe clamp 1/2 stauff	2
506	96/0105/99	96/0105/99	SCREW, shc, 1/4-20 x 1.50, ms, e	4
507	16C630	16C630	BUSHING, reducer, 1/2 in. x1/4 in., mx, ss	1
508	502570	502570	FITTING, tee, 1/2 npt	2
509	114373	114373	FITTING, nipple, 1/2 npt, sst hex	2
510	126434	126434	FITTING, npl, 1/2 npt x 4.00, mm, ss, 3k	2
511	166242	166242	FITTING, elbow, street, 90°	3
512	94/1012/98	94/1012/98	ADAPTER, jic08x1/2npt, mf, ss, 3k, 316	2
513	LC0219	LC0219	HOSE, assy, insulated, 1/2x30	2
514	16C398	16C398	FITTING, adpt, 1/2 npt x 08 jic, 6k, ss	1
515	125296	125296	ADAPTER, 3/4 npt x 08jic mm sst	1
516	113833	113833	TEE, pipe, female	1
517	123111	123111	FITTING, nipple, hex, 3/4 npt, 3k, ss	2
518	516308	516308	FITTING, bushing, reducer, sst	1
519	262205	262206	FITTING, swivel, npt x jic	1
520	262902	262903	HOSE, 15', 1/4, moisture-lok, ss	1
521	122727	122991	ADAPTER, jic x npt, mm, ss, 6k, 316	1
524	122770	122770	VALVE, ball, 2w, 3/4 npt, f, 2k, ss	1
525	122763	122763	FITTING, elbow, str, 3/4npt, 90, 3k, ss	1



<b>Ref</b>	<b>Part</b>	<b>Description</b>	<b>Quantity</b>
551	24C332	MODULE, panel, power	1
552	24R784	HARNESS, assy, 2 RTS	1

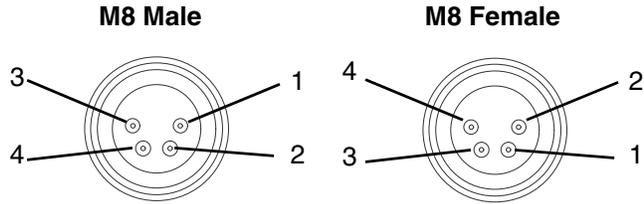
## 24R784, 2 RTS Harness Assembly

See **Pinouts**, page 27.

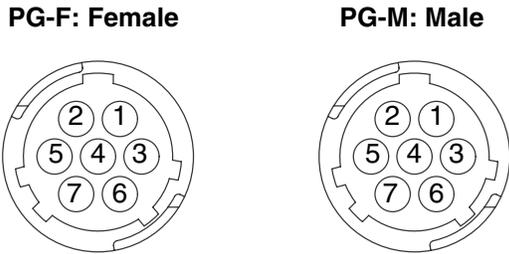


Ref	Part	Description	Quantity
555	127086	TRANSMITTer, RTD, TO 4-2MA, 0-100C	1
556	96/0863/99	SCREW, bhsc, 10-32 x 3/4	1

**Pinouts**



Pin	Wire Color
1	Brown
2	Drain Wire
3	Blue
4	Black

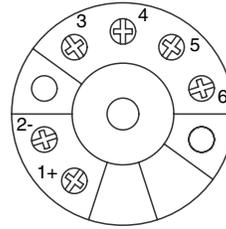


PG-F		
Pin	Wire Color*	From
1	Black	10
2	Blue	10
3	Black (J5)	2C
4	---	---
5	Black	2C
6	Blue (J2)	10
7	Brown	10

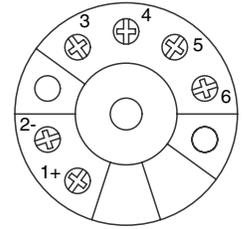
PG-M		
Pin	Wire Color*	From
1	Yellow (J2)	TRANS-1
2	Resistor	TRANS-1
3	Blue	TRANS-1
4	---	---
5	Blue	TRANS-2
6	Resistor	TRANS-2
7	White/Blue (J6)	TRANS-2

\* Wire colors designated with a (Jx) also have a jumper wire or resistor to pin (x). Resistor is covered with a black heat shrink.

**TRANS-1 : RED**



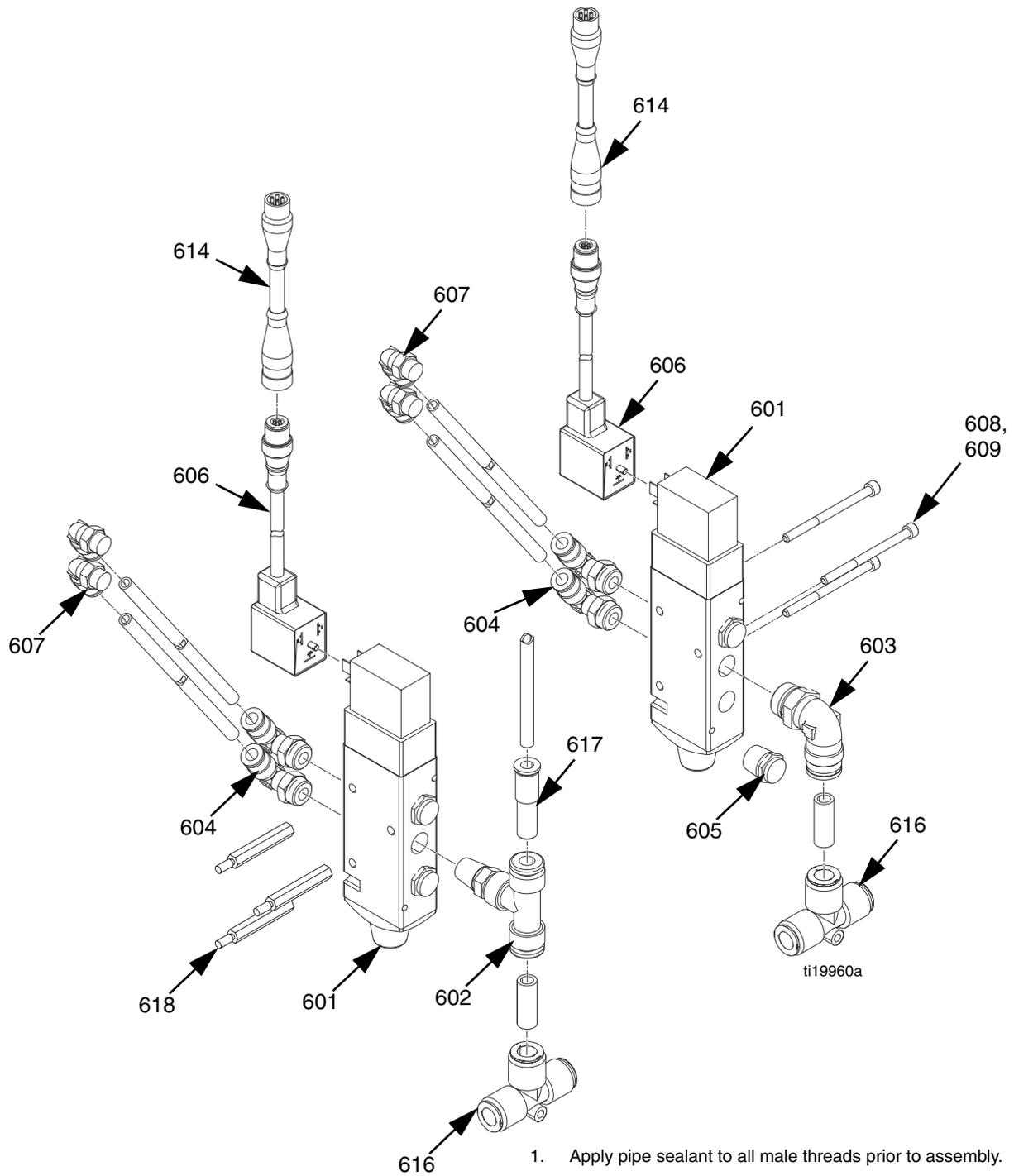
**TRANS-1 : BLUE**



TRANS-1: Red Hose Temperature Monitor		
Pin	Wire Color	From
1+	Blue	PG-M
2-	Orange	PG-M
3	Blue	RED RTD
4	---	---
5	Brown	RED RTD
6	Black	RED RTD

TRANS-2: Blue Hose Temperature Monitor		
Pin	Wire Color	From
1+	Blue	PG-M
2-	White/Blue	PG-M
3	Blue	BLUE RTD
4	---	---
5	Brown	BLUE RTD
6	Black	BLUE RTD

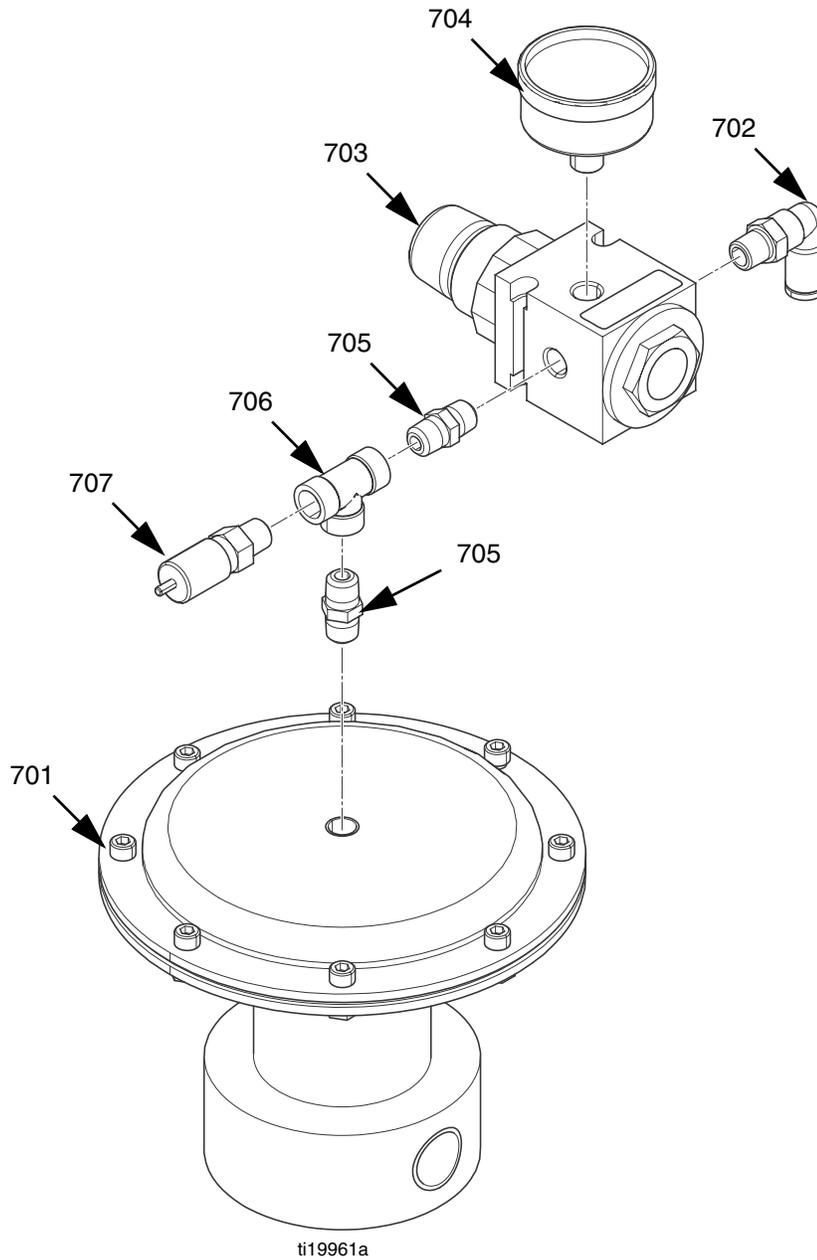
### Solenoid Valve (Auto) - 24N991



Ref	Part	Description	Quantity
601	120900	VALVE, solenoid, 3 way	4
602	94/0696/96	FITTING, tee, branch, 3/8tbex1/4npt	2
603	121018	FITTING, elbow, male, swivel, 1/4 npt	2
604	121022	FITTING, elbow, male, 1/4 npt	8
605	121021	MUFFLER, 1/4 npt	8
606	123395	HARNESS, pwr valve, tank	4
607	112698	ELBOW, male, swivel	8
608	125476	SCREW, shcs, 8-32x2.25, cs	6
609	GC2107	WASHER, lock, spring, #8	6
613†	123656	CABLE, 5pin, male/female (matrix)	1
614	124415	CABLE, 5pin, mf, 3.0m, molded	4
615†	120953	CONNECTOR, splitter	3
616	U70137	FITTING, tee, 3/8 tube push-lock, pe	4
617	617569	FITTING, reducer, plug-in	2
618	124846	SPACER, standoff, 1.5 lg, 8-32 thread	6

† Not shown.

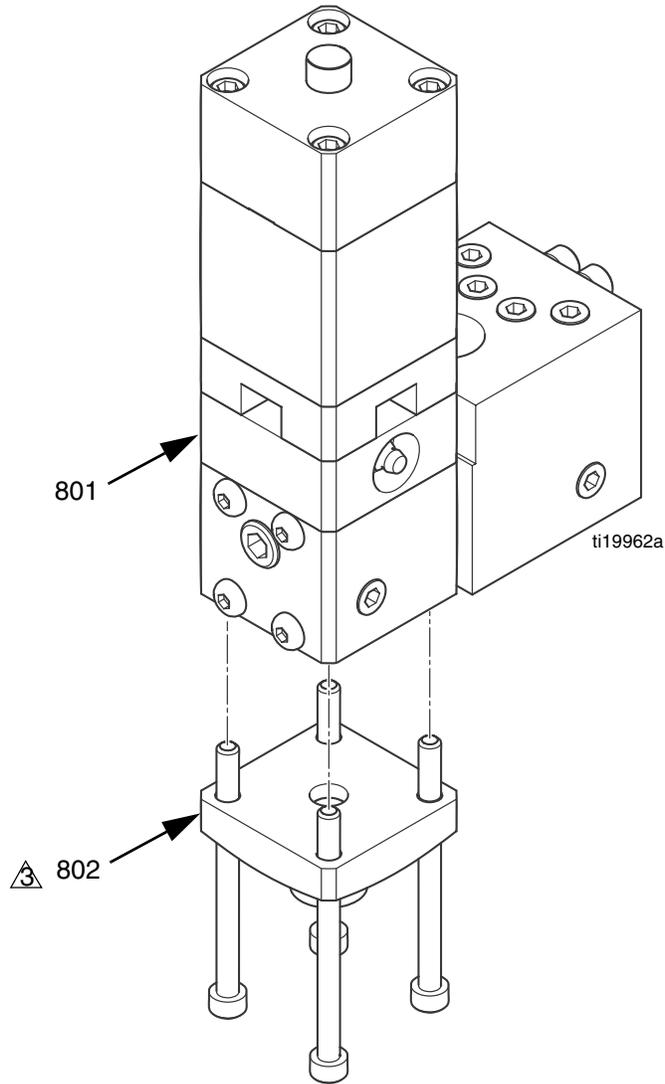
### Back Pressure Valve - 24P009



1. Apply pipe sealant to all male threads prior to assembly.

<b>Ref</b>	<b>Part</b>	<b>Description</b>	<b>Quantity</b>
701	06310	VALVE, back pressure valve	1
702	112781	ELBOW, swivel, 90°	1
703	110341	REGULATOR, air	1
704	108190	GAUGE, pressure, air	1
705	103656	FITTING, pipe, hex	2
706	125497	FITTING, tee, 1/8 nptf, female	1
707	6562A-6	VALVE, pressure relief	1

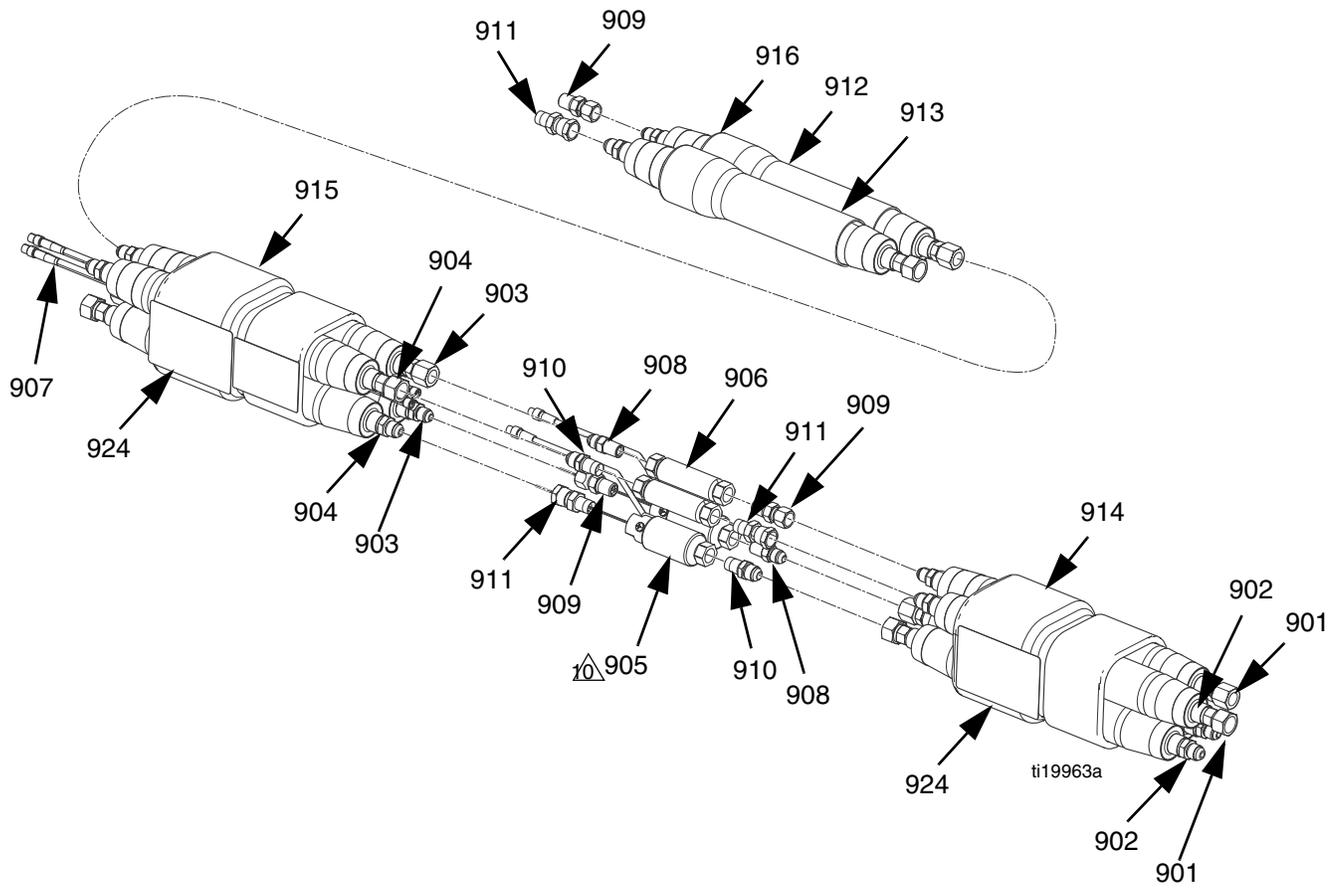
Valve - 24P005



 Apply sealant to all male threads prior to assembly.  
Torque to 3-4 ft-lb (4-5 N•m).

<b>Ref</b>	<b>Part</b>	<b>Description</b>	<b>Quantity</b>
801	244910	VALVE, endure, amb or temp cond	1
802	198443	FLANGE, nose piece, (1/2 NPT)	1

### Auto Circulation Hose Assmebly - 24P013



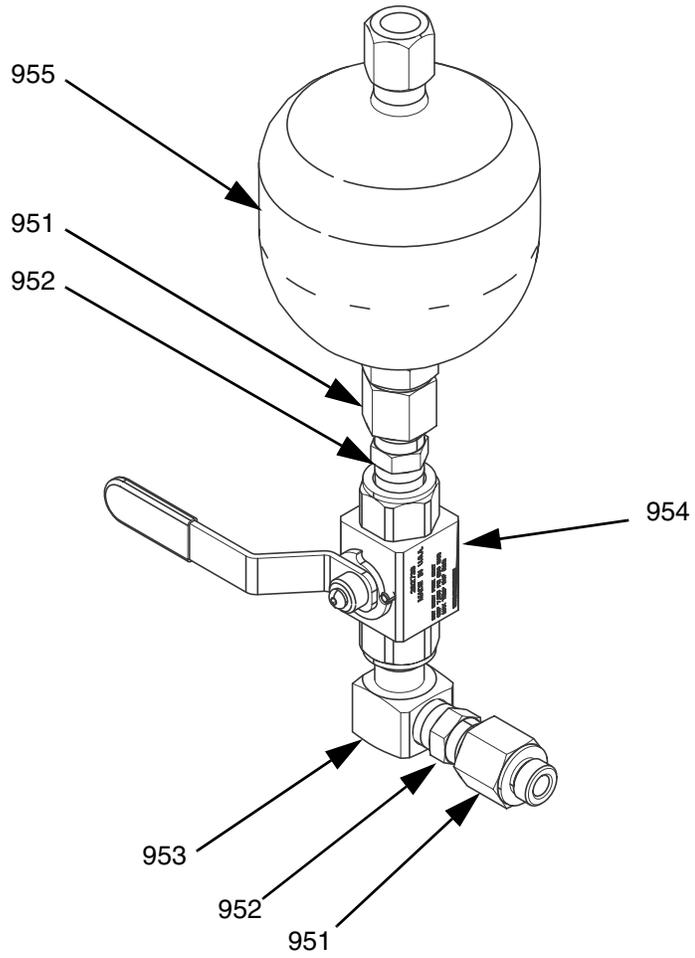
9- Apply pipe sealant to all male threads as needed prior to assembly.

 Orient item so that sensor wire points toward pumps side of hose bundle. Route probe between items 9 and 11.

Ref	Part	Description	Quantity
901	262334	HOSE, A, 10 ft (3 m), 1/4, insulation, ss	2
902	262335	HOSE, B, 10 ft (3 m), 1/4, insulation, ss	2
903	262344	HOSE, A, 25 ft (7.6 m), 3/8, insulation, ss	2
904	262345	HOSE, B, 25 ft (7.6 m), 3/8, insulation, ss	2
905	262120	SENSOR, fluid temp rtd	2
906	261602	FITTING, coupler	2
907	122836	CABLE, m8, 4-pin, mf, 8m, molded	2
908	122727	ADAPTER, jic05x1/4npt, mm, ss, 6k, 316	2
909	262205	FITTING, swivel, npt x jic	3
910	122991	ADAPTER, jic06x1/4, mm, ss, 6k, 316	2
911	262206	FITTING, swivel, 1/4npt x 6 jic	3
912	262342	HOSE, A, 10 ft (3 m), 3/8, insulation, ss	1
913	262343	HOSE, B, 10 ft. (3 m), 3/8, insulation, ss	1
914	24D138	JACKET, scuff, 15 ft (4.5 m)	1
915	246805	JACKET, scuff 25 ft (7.6 m)	1
916	262027	JACKET, scuff, 7 ft (2.1 m)	2
924 ▲	15B679	LABEL, safety, warn, mult, htd hose	2

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

**Accumulator Assmebly - 24R783**



<b>Ref</b>	<b>Part</b>	<b>Description</b>	<b>Quantity</b>
951	6307-6-SS	ADAPTER, 1/2 npt x SAE 08, fm, ss,	2
952	114373	NIPPLE, 1/2 npt, hex, sst	2
953	166242	ELBOW, street, 90°	1
954	262739	VALVE, 1/2 in. ball	1
955	127101	ACCUMULATOR	1

## Technical Data

Maximum Fluid Working Pressure . . .	3000 psi (20.7 MPa, 207 bar)
Maximum Fluid Temperature . . . . .	190°F (88°C)
Fluid Inlet Feed Pressure Range . . . .	50 psi (0.35 MPa, 3.5 bar) to 250 psi (1.75 MPa, 17.5 bar)
Fluid Inlets . . . . .	<i>Component A (Red):</i> 1/2 npt(f) <i>Component B (Blue):</i> 3/4 npt(f)
Fluid Outlets. . . . .	<i>Component A (Red):</i> #8 (1/2 in.) JIC (3/4-16 unf), with #5 (5/16 in.) JIC adapter <i>Component B (Blue):</i> #10 (5/8 in.) JIC (7/8-14 unf), with #6 (3/8 in.) JIC adapter
Fluid Circulation Ports . . . . .	1/4 npsm(m), with plastic tubing, 250 psi (1.75 MPa, 17.5 bar) maximum
Line Voltage Requirement . . . . .	<i>230V / 1 phase and 230V / 3 phase Models:</i> 195-264V, 50/60 Hz <i>400V / 3 phase:</i> 360-440V, 50/60 Hz
Amperage Requirement. . . . .	See <b>Models</b> on page 4
Sound Power . . . . .	93 dB
Heater Power (A (Red) and B (Blue) heaters total, no hose, Heated HFR Models only). . .	12 kW
Hydraulic reservoir capacity. . . . .	8 gal. (30 liters)
Recommended hydraulic fluid . . . . .	Citgo A/W Hydraulic Oil, ISO Grade 46
Weight . . . . .	<i>Units with 12 kW Heaters:</i> 868 lb (394 kg) <i>Units without heaters:</i> 634 lb (288 kg)
Wetted Parts . . . . .	Aluminum, stainless steel, zinc-plated carbon steel, brass, carbide, chrome, fluoroelastomer, PTFE, ultra-high molecular weight polyethylene, chemically resistant o-rings

*All other brand names or marks are used for identification purposes and are trademarks of their respective owners.*



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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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*Original instructions. This manual contains English. MM 3A2904*

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

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