

HydroShield™ Air-Assisted Batch Waterborne Isolation Systems

3A7370C
EN

Air-assisted spray system for use when electrostatically spraying conductive, waterborne fluids that meet at least one of the conditions for non-flammability listed on page 5. Not approved for use in explosive atmospheres or hazardous (classified) locations. For professional use only.

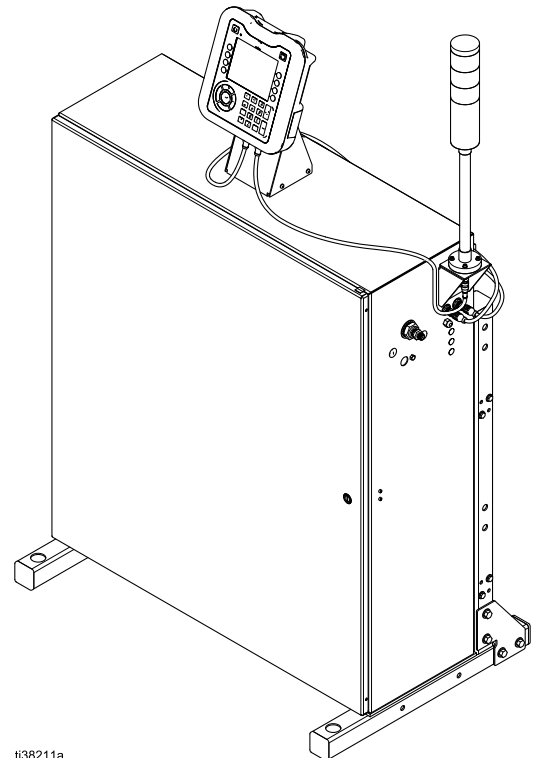


Important Safety Instructions

Read all warnings and instructions in this manual and in the spray gun manual before using the equipment. **Save these instructions.**

*100 psi (0.7 MPa, 7.0 bar) Maximum Air Working Pressure
See page 6 for model information including maximum fluid working pressure.*

NOTE: This manual covers isolation system operation. For spray gun operation, see manual 3A7503.



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Contents

Related Manuals	3	Upload System Configuration	45
Isolation System Overview	4	Clean the Screen Surface	45
How the Isolation System Works	4	Update the System Software	45
Spraying Waterborne Fluids		Run Menus	49
Electrostatically	4	Home Screen	49
Models	5	Events Screen	54
Approved System Components	5	Status Screens	54
Warnings	8	Setup Menus	56
Component Identification	11	Presets	56
Typical Installation	12	Purge Screens 1–5	57
Installation	13	Pump Screens	58
System Requirements	13	Advanced Screens	59
Display Warning Signs	13	Calibrate Screens	61
Installation Location	13	Maintenance Screens	63
Install the System	13	System Screen	69
Ventilate the Spray Booth	13	Maintenance	70
Mount the Cabinet	14	Routine Maintenance	70
Install the Light Tower	15	Prepare the System for Service	71
Grounding	16	Check for Fluid Leaks	71
Connect the Hoses	17	Replace the Wash Fluid	72
Connect the CAN Cables	21	Check and Lubricate the Ground Rod	72
Connect the Power Supply	23	Check the Bleed Resistor	73
Connect the Gun Flush Box	23	Check the Door Switch	73
Install the Optional System Stop Pneumatic		Troubleshooting	74
Input Kit	25	General Troubleshooting	74
Wire the System Stop Digital Input	26	LED Diagnostic Information	78
Install the Optional System Status		Troubleshooting the Control Interface	78
Output	26	Voltage Loss Troubleshooting	79
Check the Grounding of the Spray Gun and		Troubleshooting Color Change Solenoid	
Isolation System	27	Valves	81
Flush the Equipment Before First Use	28	Error Codes	84
Operation	29	Repair	93
Operation Overview	29	Prepare the Isolation System for	
Fluid Voltage Discharge and Grounding		Service	93
Procedure	29	Service the Isolation Valve	94
Pressure Relief Procedure	31	Service the Isolation Fluid Pump	104
Flush the System (Systems without Color		Service the Electrical Controls	109
Change)	33	Pneumatic Connections	114
Flush the System (Color Change Enabled		Wiring Connections	116
Systems)	35	Color Change: Pneumatic and Wiring	
Gun Flush Box Operation	36	Connections	118
Prime the Isolation System	37	Parts	119
Spray with the Isolation System	37	Isolation System	119
Adjust the Gun Fluid and Air Settings	38	25N030 Isolation Valve Parts	125
Shutdown	39	25N031 Isolation Fluid Pump Parts	127
Control Interface	40	Electronic Control Parts	129
Menu Bar	41	Repair Kits and Accessories	132
Soft Key Icons	41	Accessories	132
Navigate the Screen	41	Kit 26B400, Supply Pump	134
Run Screens and Setup Screens	42	Color Change Components	135
Control Interface Setup and Maintenance	43	Isolation Valve Kits	139
Enable USB Data	43	Pump Kits	141
USB Logs	43	Performance	142
System Configuration Settings File	43	Ignitability of Coating Materials	143
Custom Language File	43	Dimensions	144
Download System Data	44		

Notes	145	California Proposition 65	147
Technical Specifications	146	Graco Standard Warranty	148

Related Manuals

Manual in English	Description
3A7503	Pro Xp™ Air-Assisted WB Gun
309455	Test Fixture, High Voltage Probe, and kV Meter
312782	Air Actuated Dispense Valve
312794	Merkur® Pump Assembly
307273	Fluid Outlet Filter
309227	Gun Flush Box Module
312783	Color and Catalyst Change Valve Stacks
3A1244	Graco Control Architecture™ Module Programming

Isolation System Overview

How the Isolation System Works

When using a HydroShield Air-Assisted Batch Waterborne Isolation System, the fluid supply remains grounded. The fluid supply can be any low pressure pump or circulation system. The low pressure fluid supply first fills an internal low pressure pump reservoir, that then feeds into an isolated Merkur AA fluid pump to send high pressure fluid to the gun. After the isolation system has filled with paint, the isolation valve separates and raises. This allows the fluid inside the isolation system to become electrostatically charged when the gun is triggered. The charged fluid is attracted to the grounded workpiece, wrapping around and evenly coating all surfaces. When the gun trigger is released, the isolation pump automatically refills.

Spraying Waterborne Fluids Electrostatically

This isolation system and electrostatic air-assisted gun are designed to spray **only** waterborne fluids which meet at least one of the following flammability requirements:

- **FM, FMc Approved:**

Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.

- **CE-EN 50059 Compliant:**

Material is classified as non-ignitable as defined by EN 50059: 2018.

See [Ignitability of Coating Materials, page 143](#).

When an electrostatic gun is connected to a voltage isolation system, all of the fluid in the spray gun, fluid hose, and isolated fluid supply is charged to high voltage, which means that the system has more electrical energy than a solvent-based system. Therefore, only non-flammable fluids (as defined above and in [Models, page 5](#)) can be sprayed with the system or be used to clean, flush, or purge the system.

Precautions must be taken when using electrostatic waterborne equipment to avoid potential shock hazards. When the spray gun charges the isolated fluid to high voltage, it is similar to charging a capacitor or a battery. The system will store some of the energy while spraying and retain some of that energy after the spray gun is shut off. Because it takes some time for that stored energy to discharge, it is important to read the instructions, including the [Fluid Voltage Discharge and Grounding Procedure, page 29](#), and [Grounding, page 16](#), to understand when you can approach or touch the gun nozzle. The amount of time it takes to discharge the energy depends on the system design. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 29](#), before approaching the front of the gun.

Models

Approved System Components

Any combination of the following isolation cabinets, spray guns, fluid hoses, and air hoses are FM-approved and meet the requirements of EN 50059: 2018.

Complete isolation systems are available which include an isolation cabinet, a spray gun, a high pressure fluid hose, and an air hose. See [Table 2 Pre-packaged FM-approved Isolation Systems, page 6](#) for details about the components in each package.

Table 1 FM-approved and CE-compliant Components



Isolation Cabinets	Spray Guns	Fluid Hoses (Shielded water-borne)	Air Hoses (Grounded)
WMBH00: Isolation cabinet for manual air-assisted spray, 30:1 fluid pressure ratio			
WMBH01: Isolation cabinet for manual air-assisted spray, equipped for gun flush box, 30:1 fluid pressure ratio		25R012 25 ft. (7.6 m)	235070 25 ft. (7.6 m)
WMBH02: Isolation cabinet for manual air-assisted spray, installed color change inlet valves, 30:1 fluid pressure ratio	H60T18 Pro Xp™ 60 AA WB	25R013 36 ft. (10.9 m)	235071 36 ft. (10.9 m)
WMBH03: Isolation cabinet for manual air-assisted spray, installed color change inlet valves, equipped for gun flush box, 30:1 fluid pressure ratio	Standard electrostatic air-assisted gun for waterborne coatings	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH04: Isolation cabinet for manual air-assisted spray, 15:1 fluid pressure ratio	H60M18 Pro Xp™ 60 AA WB	25R015 75 ft. (22.8 m)	235073 75 ft. (22.8 m)
WMBH05: Isolation cabinet for manual air-assisted spray, equipped for gun flush box, 15:1 fluid pressure ratio	Smart electrostatic air-assisted gun for waterborne coatings	25R016 100 ft. (30.5 m)	235074 100 ft. (30.5 m)
WMBH06: Isolation cabinet for manual air-assisted spray, installed color change inlet valves, 15:1 fluid pressure ratio			
WMBH07: Isolation cabinet for manual air-assisted spray, installed color change inlet valves, equipped for gun flush box, 15:1 fluid pressure ratio			
<div>  <div> <p>Condition for non-flammability:</p> <p>FM approved for use with fluids that meet the following condition:</p> <ul style="list-style-type: none"> • Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206. </div> </div>			
<div>  <div> <p>Condition for non-flammability:</p> <p>Models are compliant with EN 50059 when used with fluids that meet the following criteria:</p> <ul style="list-style-type: none"> • Material is classified as non-ignitable as defined by EN 50059: 2018. <p>For more information, see Ignitability of Coating Materials, page 143.</p> </div> </div>			

Table 2 Pre-packaged FM-approved Isolation Systems

System Part No.	Isolation cabinet included	Equipped for gun flush box	Color Change*	Maximum Fluid Working Pressure** psi (MPa, bar)	Gun included H60T18 Pro Xp 60 AA WB spray gun	Fluid hose included	Air hose included
WMBH20	WMBH00	—	—	3000 (20.7, 207)	✓	25R012 25 ft. (7.6 m)	235070 25 ft. (7.6 m)
WMBH40	WMBH00	—	—	3000 (20.7, 207)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH41	WMBH01	✓	—	3000 (20.7, 207)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH42	WMBH02	—	✓	3000 (20.7, 207)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH43	WMBH03	✓	✓	3000 (20.7, 207)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH44	WMBH04	—	—	1500 (10.3, 103)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH45	WMBH05	✓	—	1500 (10.3, 103)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)
WMBH47	WMBH07	✓	✓	1500 (10.3, 103)	✓	25R014 50 ft. (15.2 m)	235072 50 ft. (15.2 m)

* Systems with color change inlet valves installed include six fluid valves which allow the use of three colors and purge sequences. These systems are also equipped for dump valve operation. See [Color Change Components, page 135](#).

** All systems have a maximum inlet pressure of 100 psi.






Table 3 Isolation Cabinets









Must purchase Pro Xp gun and hoses separately.








Part No.	Description	Equipped for gun flush box	Color change	Maximum Fluid Working Pressure psi (MPa, bar)
WMBH00	Isolation cabinet for manual air-assisted spray, 30:1 fluid pressure ratio.	—	—	3000 (20.7, 207)
WMBH01	Isolation cabinet for manual air-assisted spray, equipped for gun flush box, 30:1 fluid pressure ratio.	✓	—	3000 (20.7, 207)
WMBH02	Isolation cabinet for manual air-assisted spray, installed color change inlet valves, 30:1 fluid pressure ratio.	—	✓	3000 (20.7, 207)
WMBH03	Isolation cabinet for manual air-assisted spray, installed color change inlet valves, equipped for gun flush box, 30:1 fluid pressure ratio.	✓	✓	3000 (20.7, 207)
WMBH04	Isolation cabinet for manual air-assisted spray, 15:1 fluid pressure ratio.	—	—	1500 (10.3, 103)
WMBH05	Isolation cabinet for manual air-assisted spray, equipped for gun flush box, 15:1 fluid pressure ratio.	✓	—	1500 (10.3, 103)
WMBH06	Isolation cabinet for manual air-assisted spray, installed color change inlet valves, 15:1 fluid pressure ratio.	—	✓	1500 (10.3, 103)
WMBH07	Isolation cabinet for manual air-assisted spray, installed color change inlet valves, equipped for gun flush box, 15:1 fluid pressure ratio.	✓	✓	1500 (10.3, 103)

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 or on warning labels, 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.

 <h2 style="margin: 0; font-size: 2em;">WARNING</h2>	
<div style="display: flex; flex-direction: column; align-items: center; gap: 10px;">     </div>	<h3 style="margin: 0;">FIRE AND EXPLOSION HAZARD</h3> <p>Combustible dust or flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> Fluids used must meet the appropriate flammability requirements: <ul style="list-style-type: none"> FM, FMc Approved: Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206. CE-EN 50059 Compliant: Material is classified as non-ignitable as defined by EN 50059: 2018. Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual. Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem. Check gun resistance, hose resistance, and electrical grounding daily. Use and clean equipment only in well ventilated area. Interlock the gun air supply to prevent operation unless ventilation air flow is above the minimum required value. Only use non-flammable solvents when flushing or cleaning equipment. Only use the red-colored Graco electrically conductive gun air hose with this gun. Do not use black or gray-colored Graco air hoses. Do not use pail liners unless they are conductive and grounded. Always turn the electrostatics off when flushing, cleaning or servicing equipment. Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc). Do not plug or unplug power cords or turn lights on or off when flammable fumes are present. Keep work area free of debris, including solvent, rags and gasoline. Keep a working fire extinguisher in the work area.

 <h1>WARNING</h1>	
 	<h3>ELECTRIC SHOCK HAZARD</h3> <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"> • Turn off and disconnect power cord before servicing equipment. • Connect only to grounded electrical outlets. • Use only 3-wire extension cords. • Ensure ground prongs are intact on power and extension cords. • Do not expose to rain. Store indoors. • Wait five minutes after disconnecting power cord before servicing. • Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. See Grounding instructions. • Connect the electrostatic gun to a voltage isolation system that will discharge the system voltage when not in use. • All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations. • Follow the Fluid Voltage Discharge and Grounding Procedure when instructed to discharge the voltage; before cleaning, flushing, or servicing the system; before approaching the front of the gun; and before opening the isolation enclosure for the isolated fluid supply. • Do not touch the gun nozzle or electrode, or come within 4 in. (102 mm) of the electrode during gun operation. Follow the Fluid Voltage Discharge and Grounding Procedure. • Only use the red-colored Graco electrically conductive gun air hose with this gun. Do not use black or gray-colored Graco air hoses. • Do not splice hoses together. Install only one continuous Graco waterborne fluid hose between the isolated fluid supply and the spray gun.
 	<h3>MOVING PARTS HAZARD</h3> <p>Moving parts can pinch, cut or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.
  	<h3>SKIN INJECTION HAZARD</h3> <p>High-pressure fluid from gun, 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.</p> <ul style="list-style-type: none"> • Do not spray without tip guard installed. • Engage trigger lock when not spraying. • Do not point gun at anyone or at any part of the body. • Do not put your hand over the spray tip. • Do not stop or deflect leaks with your hand, body, glove, or rag. • 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 and couplings daily. Replace worn or damaged parts immediately.

 <h1>WARNING</h1>	
 	EQUIPMENT MISUSE HAZARD <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • 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 Specifications in all equipment manuals. • Use fluids and solvents that are compatible with equipment wetted parts. See Technical Specifications in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request a Safety Data Sheet (SDS) from your 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. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • 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.
 	PLASTIC PARTS CLEANING SOLVENT HAZARD <p>Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.</p> <ul style="list-style-type: none"> • Use only compatible water-based solvents to clean plastic structural or pressure-containing parts. • See Technical Specifications in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.
	TOXIC FLUID OR FUMES <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"> • Read Safety Data Sheet (SDS) 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.
	PERSONAL PROTECTIVE EQUIPMENT <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • Protective eyewear and hearing protection. • Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Component Identification

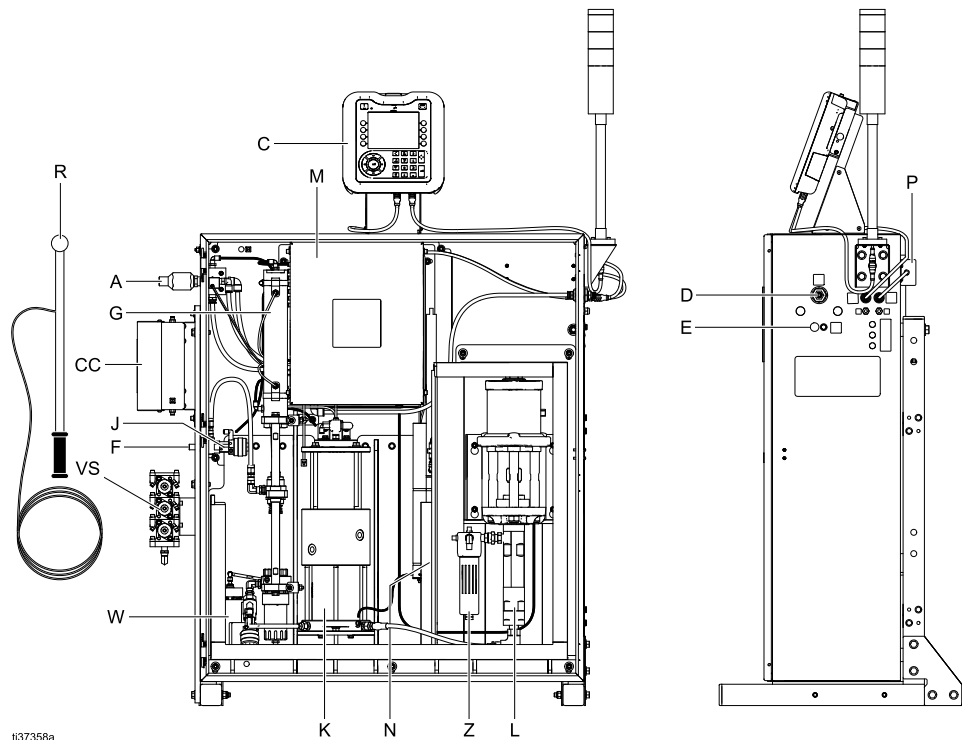


Figure 1 Components of the Air-Assisted Isolation System in a Typical Waterborne Manual Batch System

Key

Item	Description
A	Air Inlet
C	Control Interface
CC	Color Change Module (on color change enabled systems)
D	Air Outlet to Gun
E	Fluid Outlet to Gun
F	Fluid Inlet
G	Isolation Valve
J	Fluid Inlet Valve
K	Isolation Fluid Pump

Item	Description
L	Merkur AA Fluid Pump
M	Electronics Panel
N	Ground Rod and Bleed Resistor
P	Power Supply
R	Hand-held Grounded Rod
VS	Color Change Valve Stack (on color change enabled systems)
W	Wash Fluid Bottle
Z	Fluid Filter (100 mesh)

Typical Installation

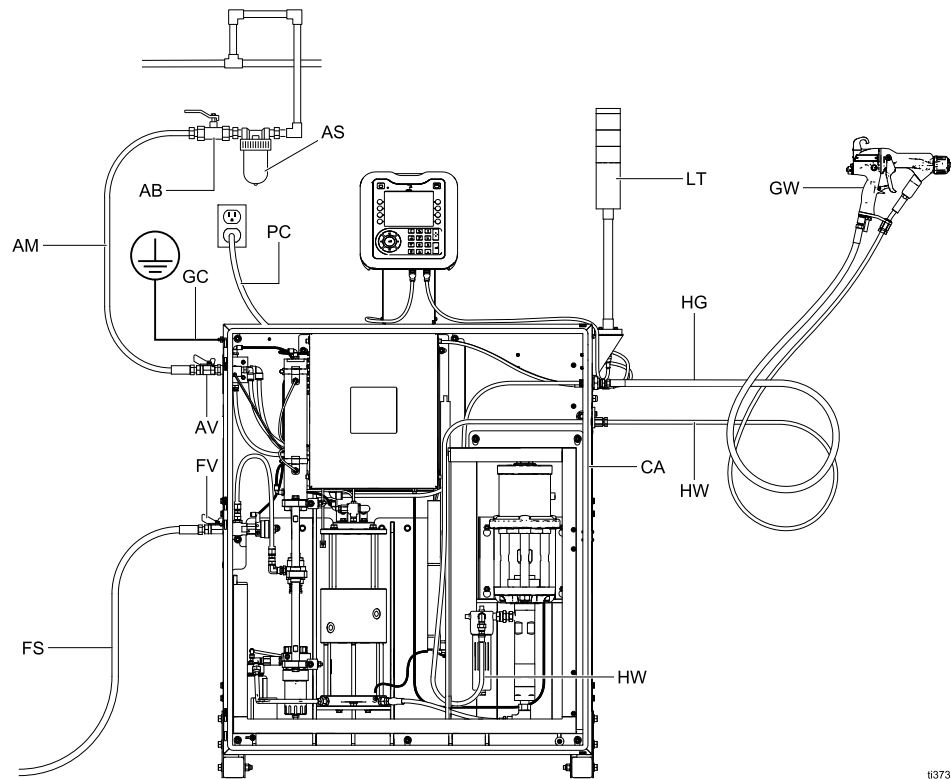


Figure 2 Typical Installation, Air-Assisted Waterborne Isolation System, Non-Hazardous Location

Key

Item	Description
AB †	Bleed Type Air Valve
AM †	Main Air Supply Line
AS †	Oil Separator
AV ❖	Air Shut-off Valve
CA	Isolation Cabinet
FS †	Fluid Supply Line
FV ❖	Fluid Shut-off Valve
GC	Ground Wire
GW	Pro Xp Waterborne Electrostatic Air-Assisted Spray Gun




Item	Description
HG	Graco Red Grounded Air Hose (left-hand threads at gun)
HW	Graco Waterborne Fluid Hose
LT	Light Tower
PC	Power Cord

† Required, not supplied.

❖ Optional, not supplied.

Installation

System Requirements

				
<p>The use of multiple guns with one isolation cabinet may cause electric shock, fire, or explosion. To help prevent injury or equipment damage, use only one gun per isolation cabinet.</p>				

The Graco voltage isolation system has the following features:

- An isolation cabinet that prevents persons from making contact with the high voltage components before the system voltage is discharged. All components of the isolation system that are charged to high voltage are contained within the cabinet.
- A bleed resistor that drains off the system voltage when the spray gun is not in use. All metal parts that contact high voltage fluid are electrically connected to the bleed resistor.
- A door switch interlock that automatically discharges the system voltage any time the isolation cabinet door is open.

Note

The Graco warranty and approvals are void if a non-Graco electrostatic spray gun is connected to the voltage isolation system or if the gun is operated above 60 kV.




Display Warning Signs

Mount warning signs in the spray area where they can easily be seen and read by all operators. An English Warning Sign is provided with the gun.

Installation Location






Position the isolation system as close to the spray area as feasible to minimize the hose length to the gun. Minimizing the hose length minimizes the system charge and discharge time. Position the supply pump as close as possible for the fastest fill time. Install in a non-hazardous location.

Install the System

				
<p>Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.</p> <ul style="list-style-type: none"> • Do not install or service this equipment unless you are trained and qualified. • Comply with all local codes and regulations. 				

The figure in [Typical Installation, page 12](#), shows a typical air-assisted waterborne manual batch system. It is not an actual system design.

Ventilate the Spray Booth

				
<p>Do not operate the gun unless ventilating air flow is above the minimum required value. Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Interlock the gun air and fluid supply to prevent operation unless ventilating air flow is above the minimum required value.</p>				

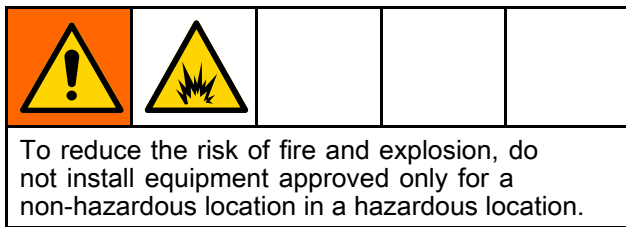
The spray booth must have a ventilation system that reliably collects and removes overspray.

Electrically interlock the gun air and fluid supply with the ventilators to prevent gun operation any time that the ventilation air flow falls below minimum values. Check and follow all local codes and regulations regarding air exhaust velocity requirements. Verify the operation of the interlock at least once a year.

Note

High velocity exhaust air can decrease the operating efficiency of the electrostatic system.

Mount the Cabinet



The cabinet can be mounted on the wheels that are provided with the system, mounted on the wall, or mounted on the floor.

Install the Optional Wheels

Follow these steps to install the wheels that are included with the system. If wheels are not needed, use a forklift or two people to move or lift the system.

1. With two people, remove the system from the pallet.
2. Install the wheels (95), washers (96), and nuts (97). Tighten the nuts securely.
3. Install the end plugs (3a, 3b).
4. When the system is in the desired location, lock all four wheels.

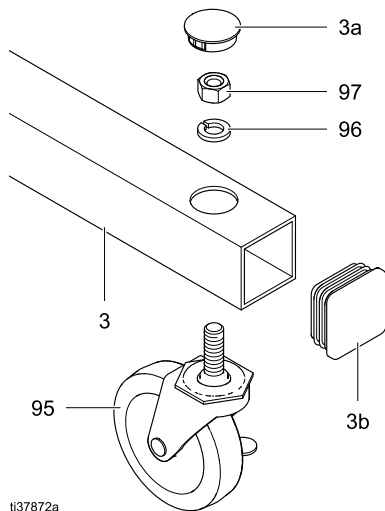


Figure 3 Wheel Mount Parts

Mount on the Wall

Before mounting the isolation cabinet to the wall, make sure that the wall can support the weight of the system. See [Technical Specifications, page 146](#) for the weight.

1. Select and attach the appropriate mounting hardware to the stand.
2. Drill holes into the wall based on the selected hardware.

A mounting hole pattern is provided on each side of the frame.

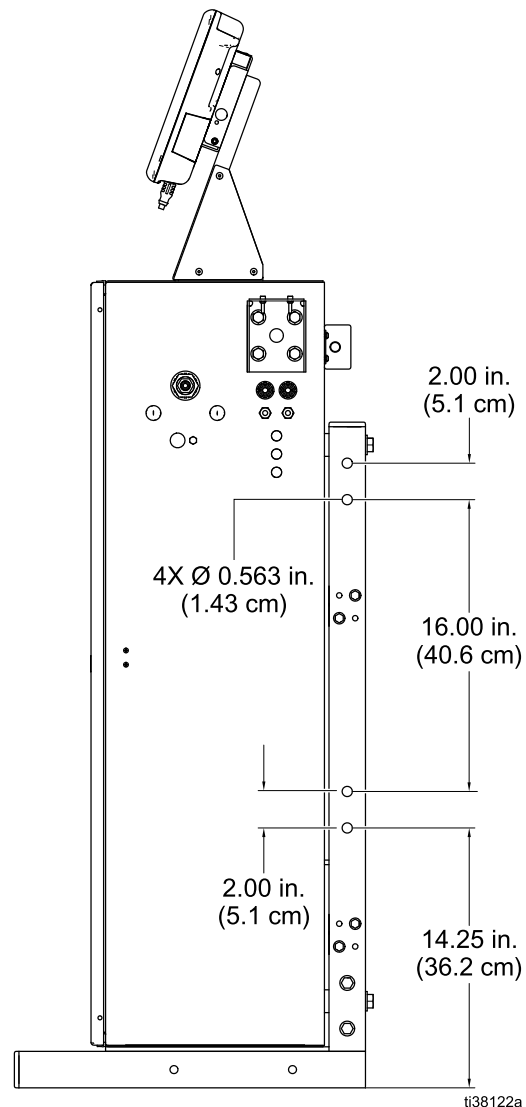


Figure 4 Hole Pattern for Wall Mounting

3. With two people, remove the isolation system from the shipping pallet.

4. Remove the feet (3a, 3b, 3c) from the frame.

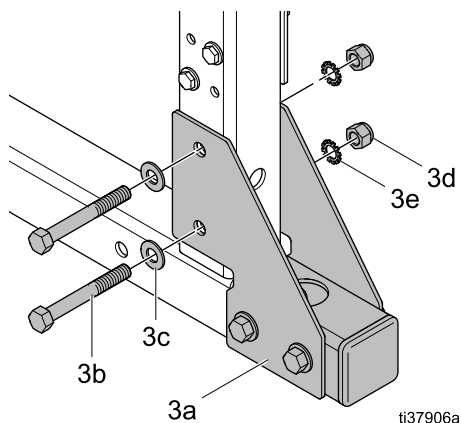


Figure 5 Removing the Frame Feet

5. Secure the system to the wall.

Mount on the Floor

1. Use the bolt pattern to drill holes into the floor.

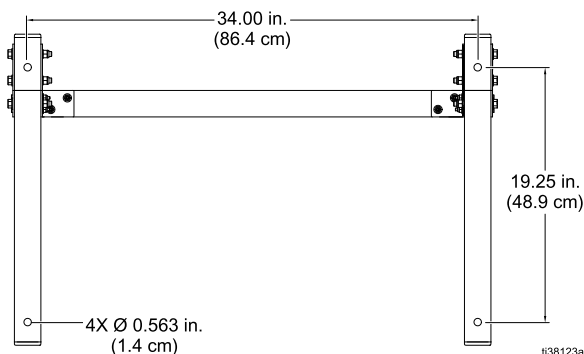


Figure 6 Bolt Pattern for Floor Mounting

2. With two people, remove the isolation system from the shipping pallet.
3. Secure the system to the floor.

Install the Light Tower

The system is equipped with a light tower which indicates how much paint is in the isolation fluid pump (K) as it fills and dispenses.

1. Locate the light tower bracket (61) on the isolation cabinet (CA). Use screws (66), washers (67), and nuts (68) to mount the light tower (LT) onto the light tower bracket (61).

The light tower bracket can be removed from the isolation cabinet and installed in another location. If relocated, make sure that the light tower is installed in a non-hazardous location and that the painter can see it from the spray booth.

Longer extension cables are available. See [Accessories, page 132](#).

2. Connect the CAN extension (.4m) cable (121226) to the CAN cable on the light tower (LT).
3. Connect cable to the control interface (C) so that the isolation system can communicate with the light. Longer cables are available.
4. The bottom of the controller contains two fittings. Screw the end of the CAN cable into the fitting (111). See [Connect the CAN Cables, page 21](#).

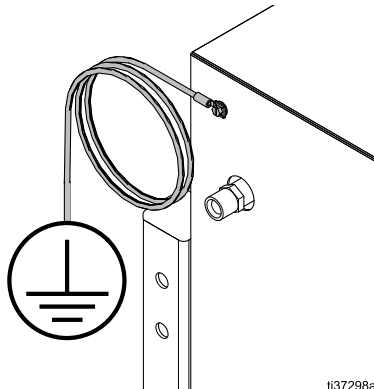
Grounding

<p>The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Ground all equipment, personnel, objects being sprayed, and conductive objects in or close to the spray area. The resistance must not exceed 1 megohm. Grounding provides an escape wire for the electric current.</p>				

When operating the electrostatic gun, any ungrounded objects (such as people, containers, and tools) in the spray location can become electrically charged.

The following are minimum grounding requirements for a basic electrostatic system. Your system may include other equipment or objects which must be grounded. Your system must be connected to a true earth ground. Check ground connections daily. Check your local electrical codes and regulations for detailed grounding instructions.

- **Isolation cabinet:** Connect the system ground wire to a true earth ground. Do not disconnect or tamper with the internal ground wire connections inside the cabinet. For more information, see [Troubleshooting HydroShield Voltage, page 80](#).

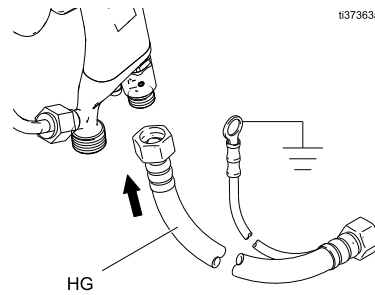


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After grounding the system, check the resistance between the exterior of the isolation cabinet and a true earth ground. The resistance must be less than 100 ohms.

- **Fluid supply:** Ground the fluid supply by connecting a ground wire and clamp. See your fluid supply instruction manual for grounding instructions.
- **Power supply:** The power supply is grounded through the power cord to a grounded outlet.
- **Spray gun:** Ground the gun by connecting the red-colored Graco grounded air hose (HG) to the

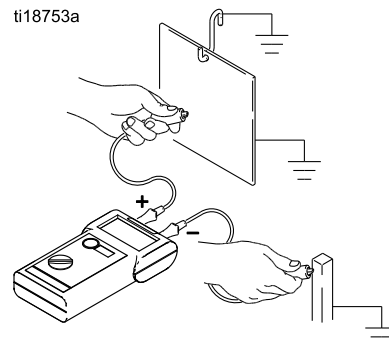
gun and connecting the air hose ground wire to a true earth ground.



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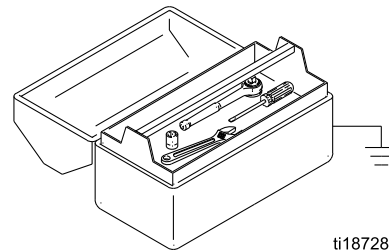
This electrostatic hand-held spraying equipment could present hazards if it is not operated according to the information given in the spray gun instruction manual. See [Related Manuals, page 3](#).

- **Waterborne fluid hose:** The hose must be directly connected to the fluid supply inside the system.
- **Object being sprayed:** Keep the workpiece hangers clean and grounded at all times.



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- **All electrically conductive objects or devices in the spray area:** These items must be properly grounded.

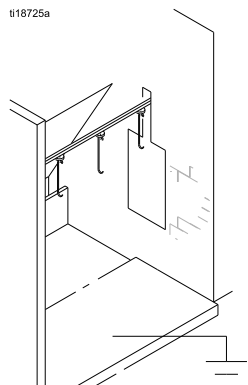


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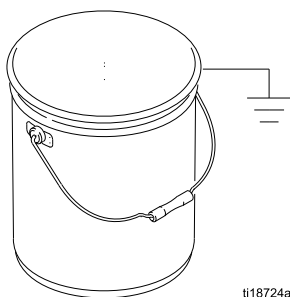
- **Fluid and waste containers:** Ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used to catch the excess fluid must be electrically conductive and grounded.
- **Air compressors:** Ground the equipment according to the manufacturer's recommendations.
- **All air lines:** These must be properly grounded. Use only grounded hoses with a maximum of 100

feet (30.5 m) combined hose length to ensure grounding continuity.

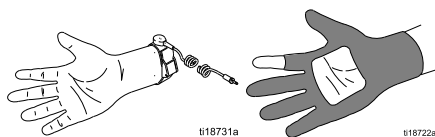
- **Floor of the spray area:** The floor must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.



- **All solvent pails:** Use only grounded metal containers, which are conductive. Do not use plastic containers. Use only non-flammable solvents. Do not store more than the quantity needed for one shift.



- All persons entering the spray area must wear shoes having conductive soles such as leather, or wear personal grounding straps. Do not wear shoes with non-conductive soles such as rubber or plastic. If gloves are necessary, wear the conductive gloves supplied with the gun. If non-Graco gloves are worn, cut off fingers or palm area of gloves to ensure your hand contacts the grounded gun handle. Conductive gloves and footwear must not exceed 100 megohm per EN ISO 20344, EN 1149-5.



Connect the Hoses

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To reduce the risk of electric shock, install only one continuous Graco waterborne hose between the isolation cabinet and the gun. Do not splice hoses together.

Always use a Graco waterborne fluid hose between the fluid outlet on the isolation cabinet and the gun fluid inlet.

When setting up the isolation system for the first time, connect the hoses in the following order:

1. Fluid hose from the gun to the isolation cabinet. See [Connect the Fluid Hose from the Gun to the Cabinet, page 18](#).
2. Air hose from the gun to the isolation cabinet. See [Connect the Air Hose from Gun to the Cabinet, page 19](#).
3. Air hose from the air supply to the isolation cabinet. See [Connect the Air Supply Hose to the Cabinet, page 20](#).
4. Fluid hose from the fluid supply to the isolation cabinet. See [Connect the Fluid Supply Hose to the Cabinet, page 21](#).

Note

- If the air hose or the fluid hose must pass through the wall of a booth to the isolation cabinet, make sure that the hole through the booth wall does not have sharp edges that could damage the hoses.
- The holes in the wall must be large enough to allow the hose fittings to pass through.

Connect the Fluid Hose from the Gun to the Cabinet

1. Remove the gun air inlet fitting (21).

Note

This fitting uses a left-hand thread.

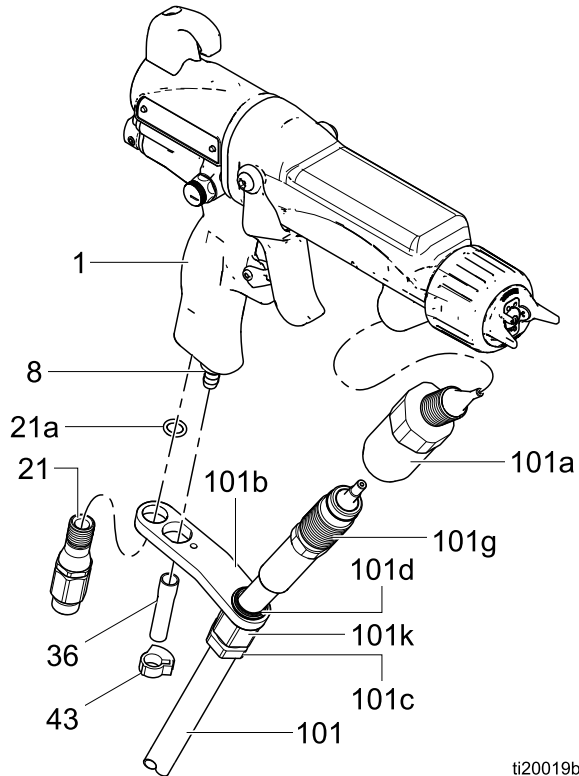


Figure 7 Connect the Fluid Hose

2. Remove the o-ring (21a) and assemble the inlet fitting through the bracket (101b). Reassemble the o-ring.
3. Make sure the barrel fluid inlet is clean and dry. Apply dielectric grease to the threads and front of the barrel connector (101a) and screw it into the fluid inlet just until snug. Then continue to tighten the fitting a minimum of 1/2 turn and continue to rotate until the fitting is oriented as shown. The gap between the fitting and the barrel must be less than .125 in (3.2 mm).

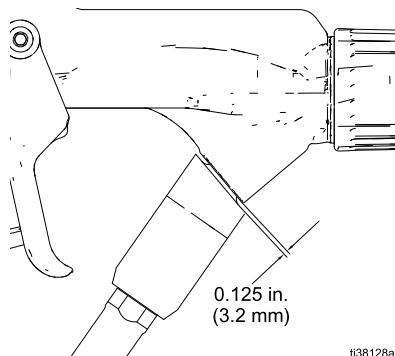


Figure 8 Orientation of Fitting and Barrel

4. Loosen the strain relief nut (101c).
5. Apply dielectric grease to the threads of the hose connector (101g). Pull the connector back and apply grease to the outside diameter of the hose. Thread it into the barrel connector (101a) until snug and then a minimum of 1/2 turn more. Use a wrench to hold the barrel connector when tightening.
6. Align the bracket (101b) holes with the air inlet and exhaust outlet. Secure with the air inlet fitting (21).
7. Tighten the strain relief nut (101c).

Note

Whenever possible, keep the fluid hose assembled to the gun barrel. To remove the barrel, disconnect the hose bracket at the gun handle.

8. Press the exhaust tube (36) onto the exhaust valve. Secure with the clamp (43).
9. Before entering the cabinet:
 - a. Follow the [Fluid Voltage Discharge and Grounding Procedure](#), page 29.
 - b. Follow the [Pressure Relief Procedure](#), page 31.
 - c. Open the cabinet. Slide the electrostatic shield (82) up to remove, and then slide the electrostatic shield (12) to the left to remove.
10. Loosen the strain relief nut at the hose inlet end (101c).
11. Slide the other end of the hose through the hole in the side of the isolated enclosure (CA). Connect the swivel (101h) to the fluid outlet of the pump.
12. Secure the hose to the side of the enclosure with the bracket (101j). A bolt (S) assembles through the hole in the bracket and screws into the side of the enclosure. Set screw (101m) can be loosened to rotate the bracket if needed.

13. Tighten the strain relief nut (101c) and set screw (101m).

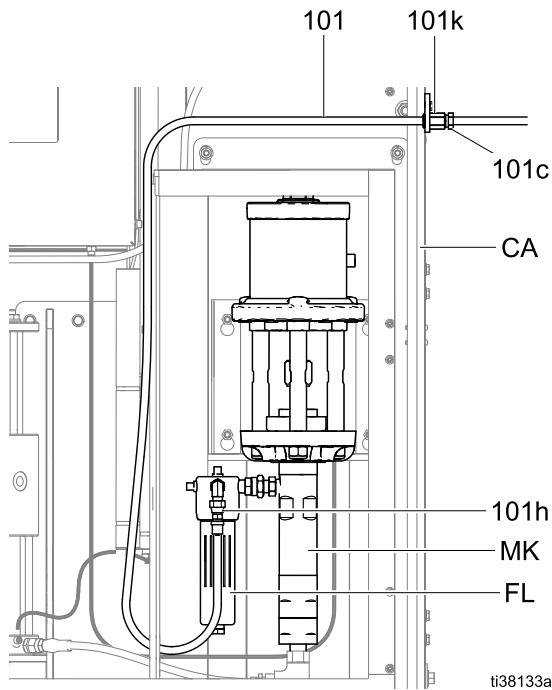


Figure 9 Hose Connection at Enclosure

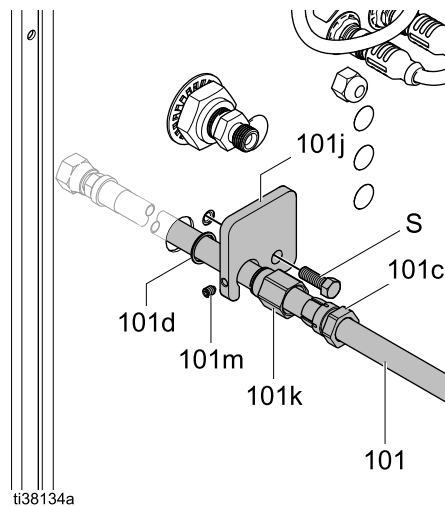


Figure 10 Hose Connection at Enclosure

Connect the Air Hose from Gun to the Cabinet

Connect the gun air hose between the air outlet (D) on the isolation cabinet and the gun air inlet swivel on the gun. Before beginning this procedure, the fluid hose should be attached to the gun barrel and the air inlet swivel should be positioned through the bracket at the gun handle.

1. Install and tighten the air hose onto the gun air inlet swivel.

Note

This fitting connection is a left-hand thread.

2. Connect the air hose from the gun to the air outlet (D) on the isolation cabinet.

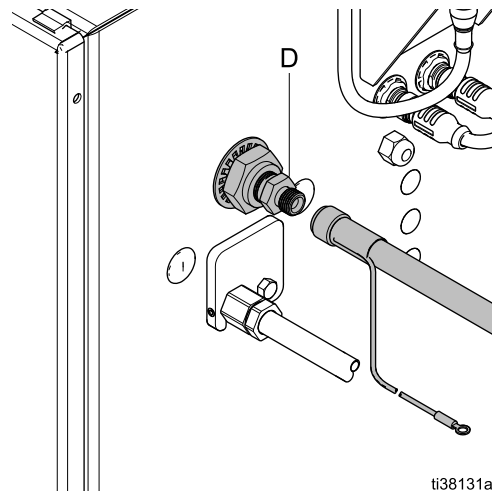


Figure 11 Air Connection Location

3. The fitting on the air hose has a ground connection for electrostatic guns. Attach the other end of the ground wire to a true earth ground. See [Grounding, page 16](#).

Prepare the Isolation Valve Before the First Use

The isolation system may be shipped with a tie wrap holding the isolation valve (G) in the upmost position to prevent movement. Before operation, remove the tie and fill the wash fluid bottle (W).

1. Use a flat blade screwdriver to open the cabinet.
2. Slide the electrostatic shield (12) up to remove.
3. To remove the isolation valve cover (99), loosen the top and bottom screws (99a).
4. If a tie wrap is securing the isolation valve (G), cut and remove the tie.
5. Disconnect the push-to-connect tube from the bottle cap of the wash fluid bottle (W).
6. Lift the sealed wash fluid bottle (W) out of the system. Fill it with clean HydroShield cleansing solution above the minimum line marked on the bottle. Replace it in the cabinet.

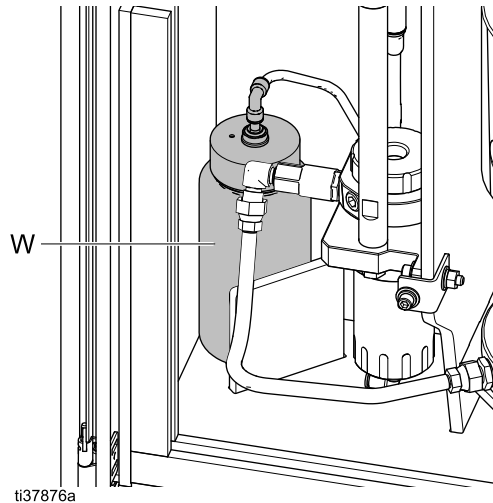


Figure 12 Replacing Wash Fluid Reservoir

7. Reconnect the push-to-connect tube to the bottle cap of the wash fluid bottle (W).
8. Replace the isolation valve cover (99) and tighten the top and bottom screws (99a).
9. Reinstall the electrostatic shield (12) inside the cabinet.
10. Close the cabinet door and use a flat blade screwdriver to secure the door shut.

Connect the Air Supply Hose to the Cabinet

Use a wrench to connect the air supply hose between the air supply and the air inlet (A) on the isolation cabinet. The maximum air pressure is 100 psi (0.7 MPa, 7.0 bar). A minimum of 70 psi (0.5 MPa, 5.0 bar) is needed to operate the system.

For best performance use an air supply hose with a minimum inner diameter of 3/8 inch (10 mm). Do not use quick disconnect connectors.

Install a bleed type air valve (AV) near the cabinet to easily turn off the air supply during installation or service.

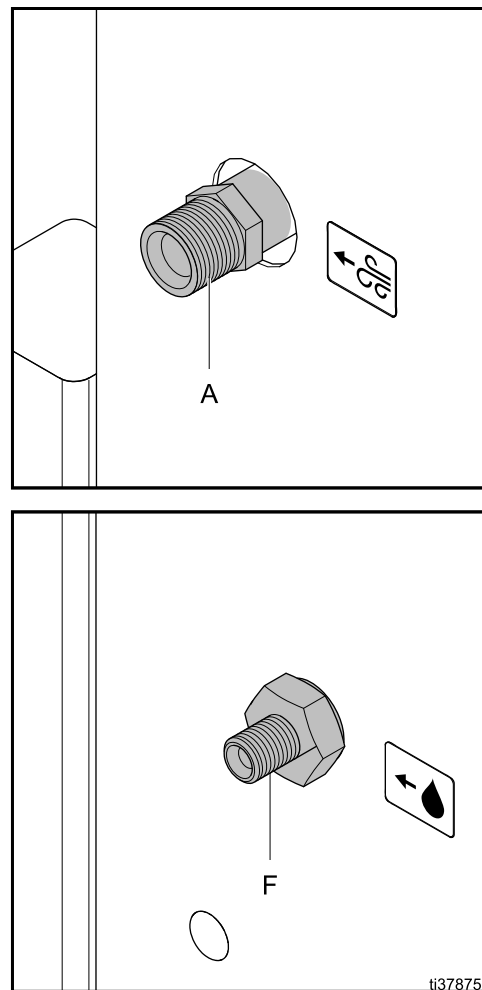


Figure 13 Air and Fluid Inlets

Connect the Fluid Supply Hose to the Cabinet

On systems that are not color change enabled:

Use a wrench to connect the fluid supply hose between the fluid supply and the fluid inlet (F) on the isolation cabinet. The maximum fluid pressure is 100 psi (0.7 MPa, 7.0 bar).

Note

Do not overtighten as this will rotate the inlet valve and cause an issue with the flexible hose on the inside of the cabinet. The valve outlet on the inside of the cabinet should be pointed upward.

Note

For the system to function correctly, the inlet fluid pressure must not exceed the inlet air pressure.

Consider installing a manual fluid shut-off valve (FV) close to the cabinet to easily turn off the fluid supply during installation or service.

On systems that are color change enabled:

Connect the fluid supplies to the inlet color change valves. Ensure that the air line, flush material, and dump hose are connected to the correct color change valves. If the dump valve is not used, plug the fluid port on the dump valve.

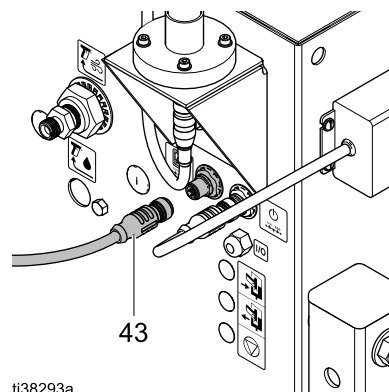
Valve Number	Valve Purpose
Valve 1	Air line
Valve 2	Flush material
Valve 3	Dump hose

Valve Number	Valve Purpose
Valve 4	Color 1
Valve 5	Color 2
Valve 6	Color 3

Connect the CAN Cables

Connect the Control Area Network (CAN) cables to the control interface (42) so that the interface can communicate with the isolation system.

1. Connect the power supply CAN cable:
 - a. Locate the CAN cable attached to the power supply (47) on the back of the cabinet.
 - b. Screw the cable into the right fitting on the right side of the cabinet below the light tower.



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Figure 14 Controller CAN Cable Connections on the Cabinet (no Color Change)

Installation

- The system is equipped with another CAN cable (43) that is used to connect to the control interface:

On systems that are not color change enabled:

- Screw one end of the cable (43) into the fitting on the right side of the cabinet.
- The bottom of the controller contains two fittings. Screw the other end of the cable (43) into the fitting as shown below.

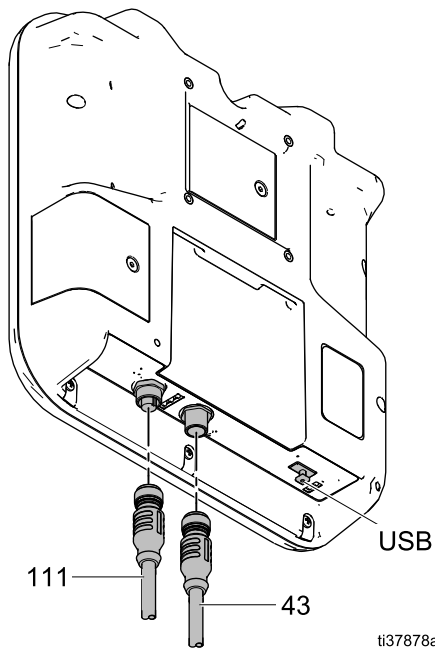


Figure 15 Connections on the Control Interface (Systems without Color Change)

On systems that are color change enabled:

- Screw cable (611) into C4 on the color change module. See the parts figure in [Color Change Components, page 135](#) and [Color Change: Pneumatic and Wiring Connections, page 118](#).
 - Connect C5 from the color change module to the control interface.
- Insert the controller into the bracket (41) on the top of the cabinet.

To mount the controller in another location, remove bracket (41) from the system and mount it in a convenient location. For information about available alternate length CAN cables, see [Accessories, page 132](#).

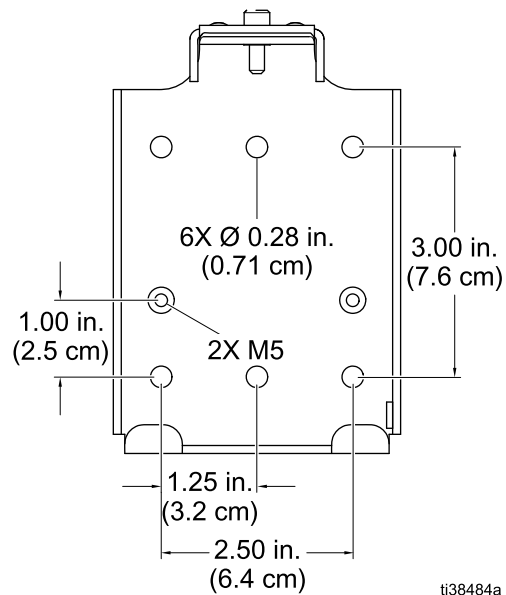


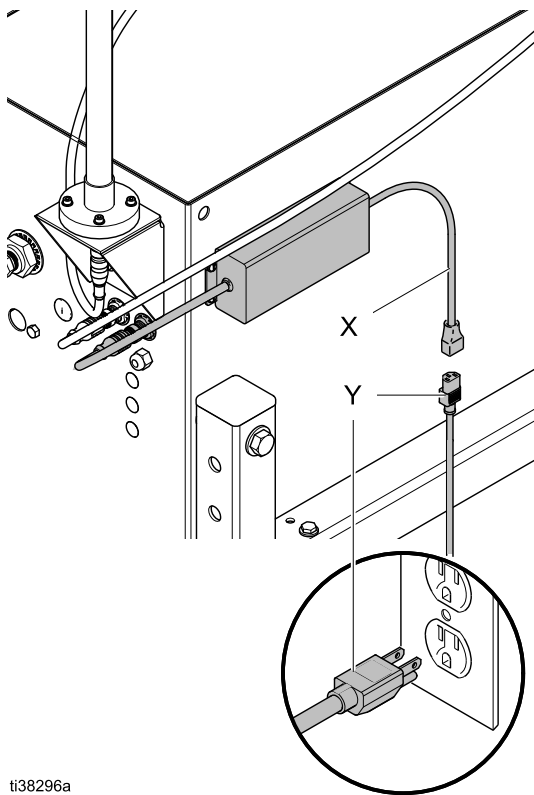
Figure 16 Bracket (41) Mounting Holes

Connect the Power Supply

The power supply (47) with connector (X) is installed at the factory on the back of the isolation cabinet. Power cords with regional plugs are also supplied. Use a supplied power cord or purchase a regional plug separately.

1. Plug the power cord (Y) into the power supply connector (X) at the cabinet.
2. Plug the pronged/male end of the power cord (Y) into an AC outlet.

When the system is plugged in, the control interface powers up in Off mode.



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Figure 17 Power Supply Connections

Connect the Gun Flush Box

Required Gun Flush Box Parts

Additional parts or kits are required to add gun flush box capability to a HydroShield system. The parts needed depend on whether the model is equipped for a gun flush box.

If the model is equipped for a gun flush box (WMBH01, WMBH03, WMBH05, WMBH07, WMBH41, WMBH43, WMBH45, WMBH47), the following additional parts are required:

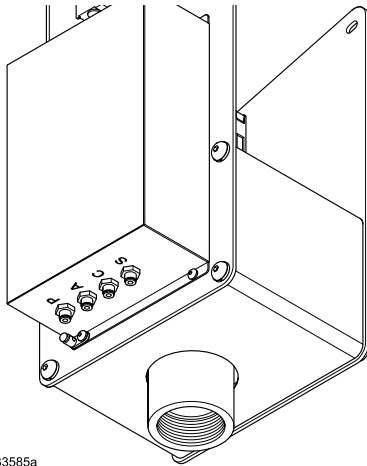
- Gun Flush Box Module, 244105. The module comes with many parts, including:
 - Graco manual 309227.
 - 5/32 in. tube plug, 113279.
- Gun Flush Box Adapter Kit for 60 kV and 85 kV Guns, 24N528.
- 5/32 inch tubing, 598095.

If the model is not equipped for a gun flush box (WMBH00, WMBH02, WMBH04, WMBH06, WMBH20, WMBH40, WMBH42, WMBH44) the following additional parts are required:

- Gun Flush Box Modification Kit, 26B420. See [Accessories, page 132](#).
- 5/32 inch tubing, 598095.

Gun Flush Box Port Connections

The gun flush box contains four pneumatic ports for 5/32 inch tubing.



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Figure 18 Gun Flush Box Ports

Table 4 Gun Flush Box Connections for Use with a HydroShield Isolation System

Gun Flush Box Port	Purpose
P	Supplies air to the gun flush box.
A	Provides the output air signal to indicate that a gun is in the box and the lid is closed.
C	Provides the inlet air for the gun trigger cylinder.
S	Provides the output air signal to atomizing air shutoff valve.

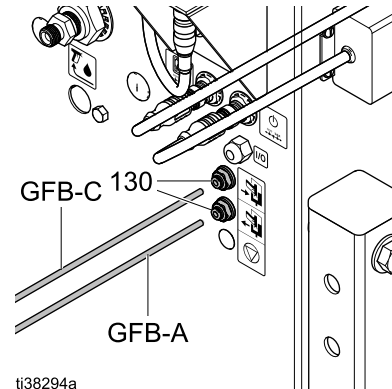
1. Supply air to port P.
2. Connect port A to the cabinet at the bulkhead

fitting labeled



This is connection A11 in [Pneumatic Connections, page 114](#).

The output air lets the system know that the gun flush box is closed and contains a gun. See [Status Screen 1, page 54](#).



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Figure 19 Gun Flush Box Tube Connections on Isolation System

3. Connect port C to the cabinet at the bulkhead

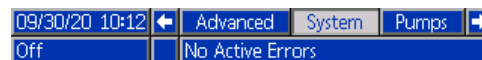
labeled



This is connection A8 in [Pneumatic Connections, page 114](#).

The input air connection activates the solenoid which, in turn, activates the gun trigger in the gun flush box.

4. Plug port S with 5/32 in. tube plug, 113279. Port S is not used since the isolation system controls the air to the gun.
5. In the control interface System menu, check the Gun Flush Box field. If this option is not enabled, the system does not recognize that the gun flush box is present. See [System Screen, page 69](#).



Pump Ratio: 30 : 1
 Gun Flush Box: ☐
 Fill Start Delay: 03 sec
 Ground Rod Delay: 03 sec
 Color Change: ☒ 15 Colors
 Dump Enable: ☐
 Restart System: ☐


Install the Optional System Stop Pneumatic Input Kit

The optional System Stop Pneumatic Input Kit 26B414 provides a pneumatic means to signal the HydroShield system to stop. This contact is normally open, but turns the system off when activated with a pressure above the set pressure.

If the input is read as CLOSED, it stops system operation and puts the system into Off mode. If the input is read as OPEN, the system operates normally.

The optional System Stop Air input uses a pressure switch to detect the pneumatic signal.

The optional System Stop Air pressure switch does not come pre-installed. Purchase and install kit 26B414 to use the optional System Stop Air input.

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Install two bulkheads in the system. The location is represented by A12 in [Pneumatic Connections, page 114](#). Both locations are labeled with the following red stop symbol :
 - Install one bulkhead into the bottom of the control panel (14).
 - Install one bulkhead on the right side of the cabinet.

3. Mount the air pressure switch to the DIN rail (436) to the right of the other pressure switch(s), as shown in the following figure.

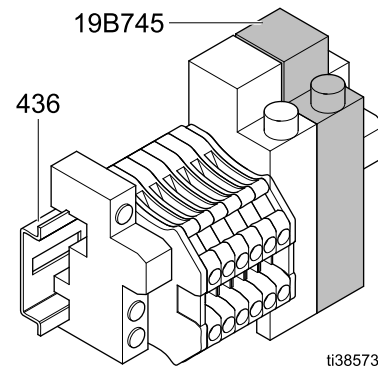


Figure 20 Port Connections for Kit 26B414

4. Remove the wires in the existing terminal blocks and install in the pressure switch ports as shown below:

Pressure Switch Port	Terminal Block
NO	3
COM	4

Air Pressure	System Stop Air State
Less than 70 psi (0.5 MPa, 5.0 bar)	System Stop Air inactive (system run)
Greater than 70 psi (0.5 MPa, 5.0 bar)	System Stop Air activated (system stop)

5. Remove unused terminal blocks after connecting the wires to the pressure switch ports.
6. Connect approximately 1 foot of 5/32" tube from the pressure switch to the bulkhead on the inside of the electronics panel.
7. Connect approximately 2 feet of 5/32" tube from that bulkhead on the electronics panel to the bulkhead on the side of the unit.

Wire the System Stop Digital Input

The System Stop Digital input provides a means to signal the HydroShield system to stop. This normally open contact turns the system off when activated. If the input is read as CLOSED, it stops system operation and puts the system into Off mode. If the input is read as OPEN, the system operates normally.

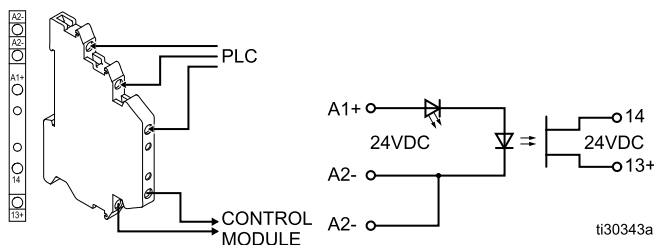
The System Stop Digital input uses an optocoupler to protect the HydroShield controls from outside voltages.

Optocoupler Port	Connect to
13+	Control module
14	
A1+	External device or PLC
A2–	

NOTICE

To prevent damage to equipment, do not use these terminal blocks without an optocoupler present.

Apply the 24 VDC signal to A1+ and GND to A2–. Only one A2– port needs to be connected to GND, as the two ports labeled A2– are connected internally.



Function	A1+ (relative to A2–)
System Stop: Digital activated (system stop)	24 VDC
System Stop: Digital inactive (system run)	Less than 13.5 VDC

Install the Optional System Status Output

The optional System Status Output provides a means to signal connected devices that the HydroShield is running.

The optional System Status Output optocoupler does not come pre-installed and must be purchased and installed separately. Install kit 24Z226 to use the System Status Output.

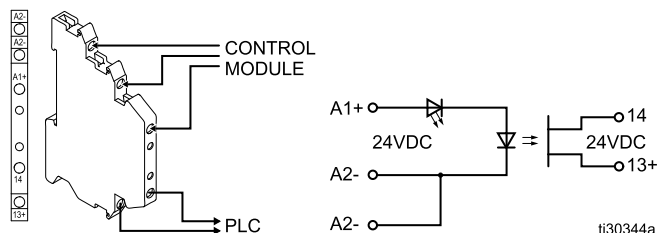
The optional System Status Output is inactive when the system is in Off mode. The optional System Status Output is active in all other operation modes.

The System Status Output uses an optocoupler to protect the HydroShield controls from outside voltages.

- Optocoupler ports A1+ and A2– are wired to the control module.
- Optocoupler ports 13+ and 14 are wired to the external device or PLC.

For active-low signals/sourcing input: Connect GND to 14. Assuming the input signal is at non ground, monitor when 13+ is connected to GND to tell when the System Status output is active.

For active-high signals/sinking input: Connect 24 VDC to 13+. Monitor when 14 is connected to 24 VDC to tell when the System Status Output is active.



Function	A1+ (relative to A2–)	PLC
System Status Output Active	24 VDC	13+ and 14 connected
System Status Output Inactive	Less than 13.5 VDC	13+ and 14 not connected

- Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
- Mount the optocoupler (432) to the DIN rail (436) to the right of the other pressure switch(s).

3. Switch the wires over to the new optocoupler ports:




Optocoupler Port	Terminal Block
A1+	7
A2–	8

NOTICE

To prevent damage to equipment, do not use these terminal blocks without an optocoupler present.

4. Remove unused terminal blocks.

Check the Grounding of the Spray Gun and Isolation System

				
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Megohmmeter Part No. 241079 (AB in Figure 22) is not approved for use in a hazardous location. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- The gun has been removed from the hazardous location;
- Or all spraying devices in the hazardous location are turned off, ventilation fans in the hazardous location are operating, and there are no flammable vapors in the location (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury.

Graco Part No. 241079 Megohmmeter (AB) is available as an accessory to check that the gun is properly grounded.

1. Have a qualified electrician check the electrical grounding continuity of the spray gun and air hose.
2. Turn off the electrostatics.
3. Turn off the air and fluid supply to the gun. Follow the [Pressure Relief Procedure, page 31](#). The fluid hose must be empty.
4. Purge the fluid hose with air, if needed.
5. Make sure the red-colored grounded air hose (HG) is connected and the hose ground wire is connected to a true earth ground.

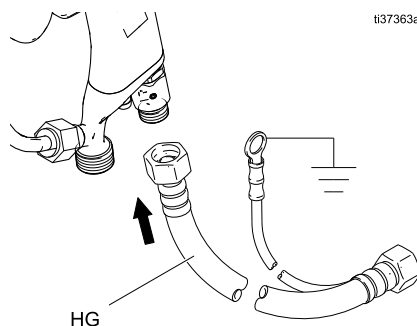


Figure 21 Grounding the Red-Colored Graco Hose

Installation

6. Use an ohmmeter (or megohmmeter in the ohm range) to measure the resistance between the gun handle (BB) and a true earth ground (CC). The resistance should not exceed 100 ohms.
7. If the resistance is greater than 100 ohms, check the tightness of the ground connections and be sure the air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the air hose.

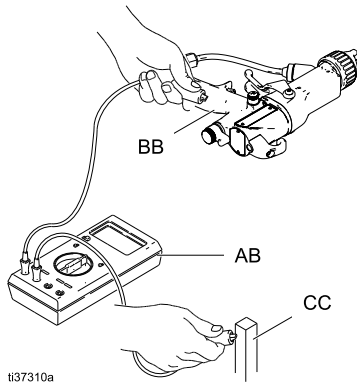


Figure 22 Check the Electrical Grounding of the Gun

8. Use an ohmmeter (or megohmmeter in the ohm range) to measure the resistance between the cabinet ground lug (214) and a true earth ground (CC). The resistance must be less than 100 ohms.

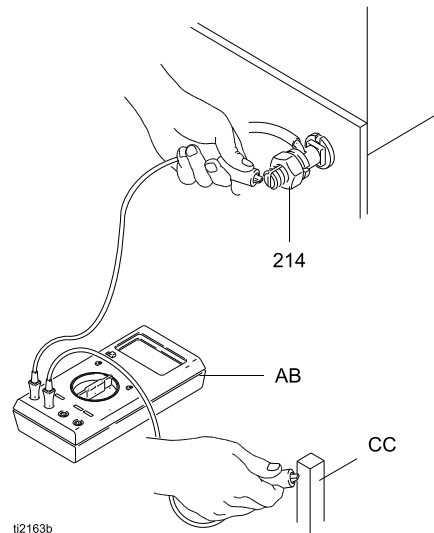



Figure 23 Check the Grounding of the Cabinet

Flush the Equipment Before First Use

The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with flushing fluid before you use the equipment. See [Flush the System \(Systems without Color Change\)](#), page 33 or [Flush the System \(Color Change Enabled Systems\)](#), page 35.

Operation

Operation Overview



1. Plug in the system. The system powers up and enters Off mode. See [Connect the Power Supply, page 23](#).
2. Verify that the fluid supply and air supply are connected. Press the Power button . The system enters Standby mode.
3. Prime the system. Use the control interface to change the mode to Prime mode. See [Home Screen, page 49](#). Trigger the gun until your material dispenses from the gun.
4. Use the control interface to set the air and fluid pressure. See [Home Screen, page 49](#).
5. Use the control interface to change the mode to Spray mode. The system begins to fill. See [Home Screen, page 49](#).
6. Begin to spray.

Note

The system automatically refills when the gun trigger is released and the fluid level is below the Start Fill setting.

For information about the Start Fill setting, see [Pump Screen 1: Pump Volume, page 58](#).

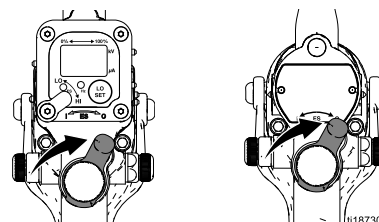
Fluid Voltage Discharge and Grounding Procedure

				
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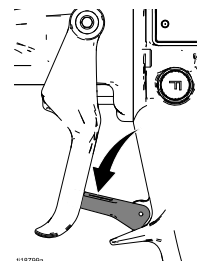
The fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the voltage isolation system or spray gun electrode will cause an electric shock. To avoid an electric shock, do not alter or bypass the door switch interlock and follow the **Fluid Voltage Discharge and Grounding Procedure**:



- Whenever you are instructed to discharge the voltage
- Before cleaning, flushing, or servicing the system equipment
- Before approaching the front of the gun
- Before opening the isolation cabinet

1. Release the gun trigger and turn off electrostatics by turning the ES ON/OFF valve on the back of the handle to the OFF position.









2. Engage the trigger lock.



3. When the gun trigger is released and the ground rod delay time elapses, the ground rod (N) inside the isolation cabinet lowers and discharges the system. Look at the main system run screen on the control interface to verify that the system is discharged:
 - a. Check that the Ground Rod status indicator shows the ground symbol . See [Run Menus, page 49](#).
 - b. Check that the Voltage Level reading on the control interface reads 0 kV. See [Run Menus, page 49](#).
 - c. Touch the gun electrode to the grounded rod (R).
4. Press the Stop button  on the control interface to change to Off mode.
5. Wait one minute before entering the isolation cabinet. Use a flat blade screwdriver to open the cabinet.
6. Use the hand-held grounded rod (R) to dissipate any static discharge in the cabinet before touching any components. Pick up the grounded rod (R) and use it to touch all major components inside the cabinet. For example, use it to touch the isolation fluid pump (K), the Merkur AA fluid pump (L), and the isolation valve (G) before touching any of the system components with your hands.

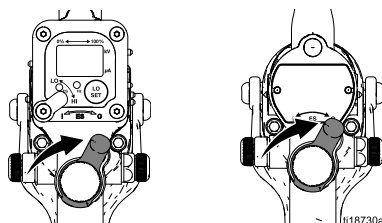
Note: If maintenance or service is required inside the isolation cabinet continue with the following steps:

Pressure Relief Procedure

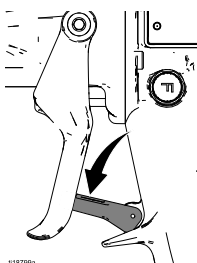
				
				

This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid, and moving parts, follow the **Pressure Relief Procedure** when you stop spraying and before cleaning, checking, or servicing the equipment.


1. Release the gun trigger and turn off electrostatics by turning the ES ON/OFF valve on the back of the handle to the OFF position.

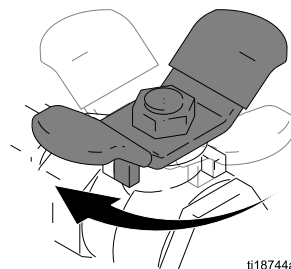


2. Engage the trigger lock.

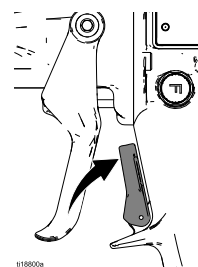


3. Follow the [Fluid Voltage Discharge and Grounding Procedure](#), page 29.

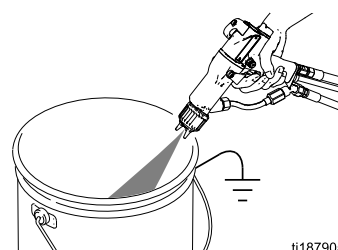
4. Push the Stop button  on the control interface to change to Off mode. See [Control Interface](#), page 40.
5. Turn off the air supply and fluid supply to the system.



6. Disengage the trigger lock.



7. Trigger the gun into a grounded metal waste container to relieve the fluid pressure in the gun, the gun fluid hose, and the fluid pump in the isolation system.



8. Relieve fluid pressure in the fluid supply unit as instructed in your fluid supply unit manual.

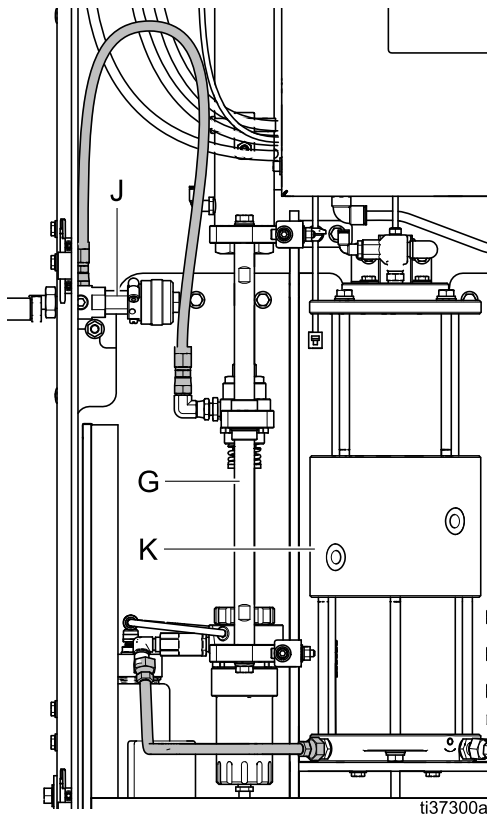
Operation

9. If the objective is to shut down and then service the system, relieve any residual pressure in the two flexible fluid lines between the inlet valves (J) and the isolation fluid pump (K).

Note

The contents of the isolation fluid pump (K) may spill into the cabinet at this point. If the pump has been emptied, the volume of fluid in the lines is small and only a small amount of fluid may spill out.

- a. To relieve the fluid pressure between the fluid valve (J) and the isolation valve (G), carefully loosen one of the swivel fittings.
- b. To relieve the fluid pressure between the isolation valve (G) and the isolation fluid pump (K), carefully loosen one of the swivel fittings.



Flush the System (Systems without Color Change)

To flush systems that are color change enabled, follow the steps in [Flush the System \(Color Change Enabled Systems\)](#), page 35.



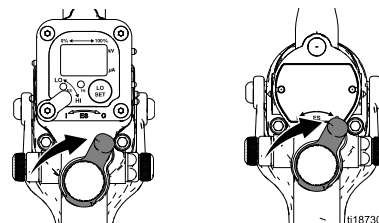
The components in the isolation system were tested in fluid at the factory. To avoid contaminating your fluid, flush the isolation system with a compatible flushing fluid before you use the equipment.

Flush the system using Purge mode. In Purge mode, the air to the gun is shut off and the system dispenses all of the fluid in the fluid cylinder. To flush the system:

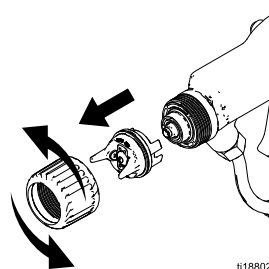
- Use Purge mode to first empty the system of paint.
- Switch to a cleaning fluid to continue to completely fill and empty the isolation fluid pump (K) to flush it clean.
- Press the Do Not Fill button to stop the refill sequence:



1. Release the gun trigger, engage the trigger lock, and turn off electrostatics by turning the ES ON/OFF valve on the back of the handle to the OFF position.



2. Follow the [Fluid Voltage Discharge and Grounding Procedure](#), page 29.
3. Follow the [Pressure Relief Procedure](#), page 31.
4. Shut off the paint supply to the unit.
5. Remove the air cap and spray tip. Use the control interface to change the fluid pressure to the lowest possible value to avoid splashing.



6. Clean the air cap and spray tip as instructed in the spray gun manual.
7. Use the control interface to put the system into Standby. Then change the mode to Purge mode:




8. Trigger the gun into a grounded metal pail until paint stops flowing. Use the lowest possible pressure to avoid splashing.
9. Supply compatible cleaning fluid to the system.
10. Deactivate the Do Not Fill button:

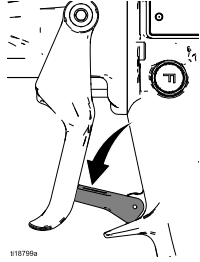


11. The system fills until the isolation fluid pump is completely full.

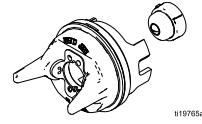
Trigger the gun until the fluid runs clear. When the pump is empty, the fluid will stop coming out of the gun while the pump refills. Continue triggering the gun while the pump refills and the gun will resume flushing once the pump is full.

Operation

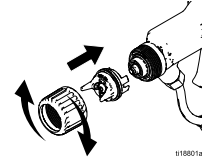
12. Activate the Do Not Fill button  so that the isolation fluid pump will not refill after it is empty. See [Home Screen, page 49](#).
13. Trigger the gun until the system indicates that the isolation fluid pump is empty.
14. Follow the [Pressure Relief Procedure, page 31](#).
15. Engage the trigger lock.



16. Align the spray tip tab with the groove in the air cap. Install the tip.



17. Reinstall the air cap, tip guard, and retaining ring.



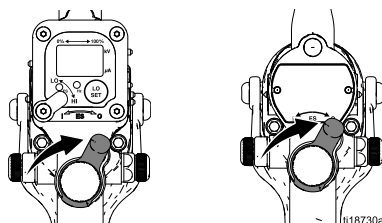
Flush the System (Color Change Enabled Systems)



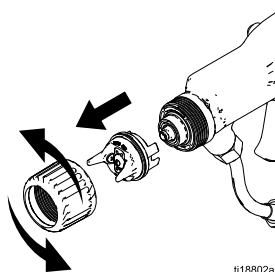
The components in the isolation system were tested in fluid at the factory. To avoid contaminating your fluid, flush the isolation system with a compatible flushing fluid before you use the equipment.

Flush the system using Purge mode. In Purge mode, the air to the gun is shut off and the system dispenses all of the fluid in the fluid cylinder. To flush the system:

- Use Purge mode to empty the system of paint and then flush it clean.
 - To use a purge sequence, set up a purge profile in advance. For details, see [Purge Screens 1–5, page 57](#).
 - Ensure that the air line, flush material, and dump hose are connected to the correct color change valves.
1. Release the gun trigger, engage the trigger lock, and turn off electrostatics by turning the ES ON/OFF valve on the back of the handle to the OFF position.



2. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 29](#).
3. Follow the [Pressure Relief Procedure, page 31](#).
4. Remove the air cap and spray tip.



5. Clean the air cap and spray tip as instructed in the spray gun manual.

6. Use the control interface to put the system into Standby. Then change the mode to Purge mode:



7. Continue to flush the system by using either:
 - A purge profile.
 - A manual purge.

Note

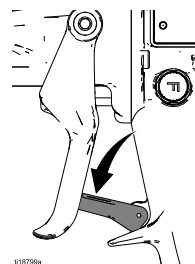
When flushing without a spray tip installed, use the lowest possible fluid pressure to avoid splashing.

To use a purge profile:

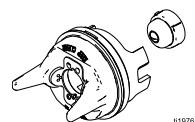
1. If using purge profile 1-5, push the flashing Play button on the left side of the screen to run the purge sequence:



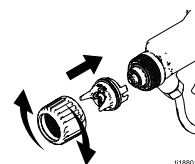
2. Trigger the gun until the system completes the purge sequence.
3. After flushing is complete, the system returns to Standby mode.
4. Follow the [Pressure Relief Procedure, page 31](#).
5. Engage the trigger lock.



6. Align the spray tip tab with the groove in the air cap. Install the tip.



7. Reinstall the air cap, tip guard, and retaining ring.



To purge manually:

1. If using purge profile 0, the system must be manually flushed. On the left side of the screen, three icons appear that activate the dump, flush material, and air inlet valves.

2. *If a dump hose is connected*, activate the Dump valve button:



This pushes all of the material in the system back out the inlet, through the dump valve, and into a waste or reclaim container.

3. After using the Manual Dump valve button or if the dump line is not connected, activate the Flush material button:



4. Trigger the gun to push all of the material in the system out through the gun.
5. After the isolation fluid pump is empty, the system lets in flush material and fills the pump. Once the pump is full, it will pressurize and dispense material out to the gun. Continue this process until clean material exits the spray gun.

6. Press the Flush material button again to deactivate it:



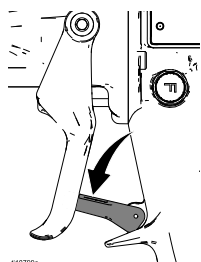
If desired, the system can be left loaded with flush material.

7. Activate the Air button to push the remaining flush material out to the spray gun:

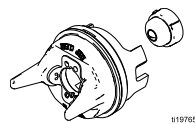


Once the isolation fluid pump is empty, the system allows air through it and out to the spray gun.

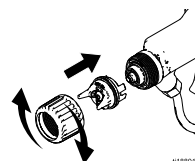
8. Release the gun trigger once the system has been sufficiently purged with air.
9. Follow the [Pressure Relief Procedure, page 31](#).
10. Engage the trigger lock.



11. Align the spray tip tab with the groove in the air cap. Install the tip.



12. Reinstall the air cap, tip guard, and retaining ring.





Gun Flush Box Operation

Opening and closing the gun flush box lid could pinch or cut fingers or other body parts. Be careful when pressing or releasing the latch knobs and keep clear of the closing lid.				



1. Stop spraying.
2. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 29](#).
3. Insert the gun into the gun holder inside the gun flush box.
4. Press the two spring-loaded latch knobs inward and close the gun flush box lid.
5. Verify that flush material is supplied to the system and that the flush pressure is set appropriately.
6. Use the control interface to change to Prime or Purge mode. The gun is automatically triggered to flush the gun. The gun flush box cannot operate unless the system is in either Prime or Purge mode.
7. When the gun is sufficiently flushed, change to Standby or Off mode.
8. Remove the gun from the gun flush box to determine whether the gun is clean.

Prime the Isolation System

Use the following steps to load the system with paint, change paint colors, or change from flushing fluid to paint.


1. Enter Prime mode  to empty any flushing fluid or paint without refilling the isolation fluid pump. See [Home Screen, page 49](#).
2. Supply the new paint to the fluid supply hose.
If using a color change equipped system, change the spray preset to one using the desired color or select a new color number if using Preset 0.
3. Check and adjust the gun fluid pressure if necessary. For example, adjust the pressure down to avoid splashing while emptying the paint into a container or gun flush box. Increase the gun fluid pressure to speed up the priming process.
4. Trigger the gun until new paint exits the gun. The time that it takes to prime the system depends on the length of hose and the fluid pressure.
5. Enter Spray mode . The isolation fluid pump automatically fills. See [Home Screen, page 49](#).

Spray with the Isolation System

				
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Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 4 in. (102 mm) of the front of the gun during operation or until performing the [Fluid Voltage Discharge and Grounding Procedure, page 29](#).

Follow the [Fluid Voltage Discharge and Grounding Procedure, page 29](#) when you stop spraying and whenever you are instructed to discharge the voltage.

1. Prime the isolation system. Follow [Prime the Isolation System, page 37](#).
2. Set the gun fluid and air settings. See [Adjust the Gun Fluid and Air Settings, page 38](#).
3. Put the system into Spray mode .

The isolation fluid pump automatically fills. The light tower indicates the fluid level in the pump as it fills or dispenses.

These set points can be customized in the system settings on Pump Screen 1. See [Pump Screen 1: Pump Volume, page 58](#).

Light	Definition
Green (solid)	The pump is 50% full or more.
Yellow (solid)	The pump is less than 50% full but more than 10% full.
Red (solid)	The pump is less than 10% full.

Note



To enter Spray mode, you must first be in either Prime or Standby mode. You cannot enter Spray mode directly from Purge mode.

If color change is enabled, the system remembers if it still has flush material in the pump. The system will not allow Spray mode to be entered until the pump has been emptied in either Purge or Prime mode.

4. Turn the electrostatics on at the gun. Verify that the ES indicator or Hz indicator is green. Adjust the gun air pressure if needed. See gun manual for details. Adjust the gun fluid pressure according to the Gun Setup procedure in your gun manual.

5. When the gun is triggered:
 - The control interface displays the voltage building in the system.
 - The system raises the ground rod (N) in the cabinet. When the ground rod symbol disappears and the charge symbol appears, the system is capable of building a charge. See [Home Screen, page 49](#).
6. When the trigger on the gun is released and the ground rod delay time has elapsed, the ground rod (N) drops and discharges the system. Release the gun trigger at any time to refill the system.

Tips:

 - Trigger air only to fully charge the system before spraying
 - To maintain a higher spraying voltage, increase the ground rod delay time as far as practical. However, increasing the ground rod delay time also slows the fill time. See [System Screen, page 69](#).
7. When approaching the end of painting, activate the Do Not Fill button . This saves paint by preventing the isolation fluid pump from filling unnecessarily.
8. When finished painting, release the trigger, turn the electrostatics off at the gun, and put the system in Standby mode .
9. At this point, you may perform any of the following actions:
 - Supply more paint to the system. See [Prime the Isolation System, page 37](#).
 - Flush and clean the system. See [Flush the System \(Systems without Color Change\), page 33](#) or [Flush the System \(Color Change Enabled Systems\), page 35](#).
 - Shut down the system. See [Shutdown, page 39](#).

Adjust the Gun Fluid and Air Settings

Preset 0 allows operators to change the gun fluid and air pressure at any time. Preset 0 assumes a manual purge profile.







Use Preset 1 through 99 to configure different gun fluid and air pressure settings and a purge profile number. To set up a purge profile, see [Purge Screens 1–5, page 57](#).

For example, Preset 1 might use the best pressure settings for black paint, Preset 02 might use the best pressure settings for red paint, and Preset 99 might be set to a higher fluid pressure to perform a quicker flush.

For instructions on creating presets, see [Presets, page 56](#). Refer to the gun setup procedure in your gun manual to select the best gun fluid and air settings.

To use Preset 0






Preset 0 can be changed by the operator at any time during operation.

1. Press the right arrow  until Home appears on the menu bar.
2. Press the Enter Screen button  to enter the screen to edit the current settings.
3. Use the down arrow  to navigate to the Air field.
4. Press the numbers on the keypad to the desired psi value.
5. Press the Enter button  to register the value. The interface automatically advances to the Fluid field.
6. Press the numbers on the keypad to the desired psi value.
7. Press the Enter button  to register the value. The interface automatically advances to the Preset field.
8. Press the Exit Screen button  to exit the screen settings.


Note

If an operator is in Preset 1–99, and then switches to Preset 0, Preset 0 will reflect the previous settings.

To use Preset 1 through 99:

1. Press the right arrow  until Home appears on the menu bar.
2. Press the Enter Screen button  to enter the screen to edit the current settings.
3. Use the up and down arrows  to navigate to the Preset field.
4. Enter the Preset number that you would like to use.
5. Press the Enter button  to register the value.
6. Press the Exit Screen button .

Shutdown

1. Discharge the system voltage. Follow the [Fluid Voltage Discharge and Grounding Procedure, page 29](#).
2. Flush the gun. See [Flush the System \(Systems without Color Change\), page 33](#) or [Flush the System \(Color Change Enabled Systems\), page 35](#).
3. Follow the [Pressure Relief Procedure, page 31](#).
4. Press the Stop button  on the control interface to change to Off mode.

Control Interface

The control interface displays graphical and text information related to setup and spray operations.

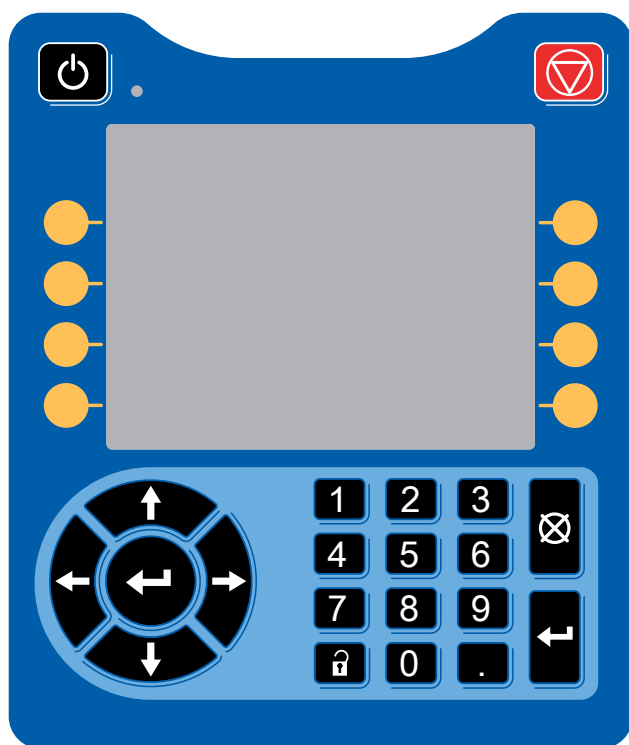
Soft keys are used to input numerical data, enter setup screens, navigate within screens, scroll through screens, and select setup values.








Most information is communicated using icons to simplify global communication. The soft keys are membrane buttons whose function correlates with the screen content to the immediate left or right of the

button. 

NOTICE

To prevent damage to the soft key buttons, do not press the buttons with sharp objects such as pens, plastic cards, or fingernails.



Soft Key	Function
	Power When the system is in Off mode, press to activate the system. This button puts the system into Standby mode.
Stop 	Stop Press to stop the system immediately. This button puts the system into Off mode and turns off air and fluid to the gun.
	Navigation Left/Right Arrows: Use to move from screen to screen. Up/Down Arrows: Use to move among the fields on a screen, to move through the items on a drop down menu, or to move among multiple screens within a function.
	Keypad Use to input values.
	Cancel Use to cancel a data entry field. The cancel button cannot be used to acknowledge events. (See the description for the Enter soft key.)
	Setup To unlock the Setup menus, press Setup. If a password is configured, enter the password. (Default: 0000.) See Advanced Screen 1, page 59 . To exit the Setup menus, press unlock again.
	Enter Press to choose a field to update, to make a selection, to save a selection or value, to enter a screen, or to acknowledge an event.

Menu Bar

The menu bar appears at the top of each screen.



Date and Time: The date and time are always displayed in one of the following formats.

- DD/MM/YY HH:MM
- MM/DD/YY HH:MM
- YY/MM/DD HH:MM

The time is always displayed as a 24-hour clock. Set the time in the following Setup menu:

[Advanced Screen 1, page 59.](#)

Arrows: The left and right arrows indicate screen navigation.

Screen Menu: The screen menu indicates the currently active screen, which is highlighted. It also indicates the associated screens that are available by scrolling left and right. For example, Home or Calibrate.

System Mode: The current system mode is displayed at the left of the menu bar. There are five modes: Off, Standby, Prime, Spray, and Purge.

Error Status: If there is an active system error, one of the following icons displays in the middle of the menu bar: Advisory, Deviation, or Alarm.

If no icon displays, the system has no information or no error has occurred.

Icon	Function	Description
	Advisory	Informational
	Deviation	Important, no system shutdown
	Alarm	Very important, system shutdown

Soft Key Icons

NOTICE

To prevent damage to the soft key buttons, do not press the buttons with sharp objects such as pens, plastic cards, or fingernails.



Blue icons indicate that a button is not available.



Gray icons with a green outline indicate that the button is active or selected.



Blue icons with a gray outline show that the button is available, but not active or selected.

Navigate the Screen

To edit the information on a screen press the Enter

Screen key

To advance to the next screen, press the down arrow



Press the Exit Screen button to exit the screen settings.

To enable a check box, navigate to the box for the item and press the Enter button . To clear the box, press the Enter button again.

Use the up and down arrows to navigate through the screen.

To reset the cycle count to 0 in the In the Maintenance screens, press the Count Reset button for one second.


Run Screens and Setup Screens

The control interface uses two sets of screens:

- The Run screens control spraying operations and display system status and data.
 - Home (See [Home Screen, page 49.](#))
 - Status (See [Status Screens, page 54.](#))
 - Events (See [Events Screen, page 54.](#))
- The Setup screens control system parameters and advanced features.
 - Advanced (See [Advanced Screens, page 59.](#))
 - Maintenance (See [Maintenance Screens, page 63.](#))

- Calibrate (See [Calibrate Screens, page 61.](#))
- System (See [System Screen, page 69.](#))
- Pumps (See [Pump Screens, page 58.](#))
- Presets (See [Presets, page 56.](#))
- Purge (See [Purge Screens 1–5, page 57.](#))



Press unlock  on any Run screen to enter the Setup screens. If the system has a password lock, the Password screen displays. If the system is not locked (password is set to 0000), the System screen displays.

Press unlock on any Setup screen to return to the Status screen.

Control Interface Setup and Maintenance

Enable USB Data

If the system is configured with USB capability, be sure to check (enable) the box for Enable USB Downloads/Uploads on [Advanced Screen 3, page 60](#). All files downloaded from the USB are put in a DOWNLOAD folder on the drive.

For example: "E:\GRACO\12345678\DOWNLOAD\"

The 8-digit numeric folder name matches the 8-digit serial number on the control interface. When downloading from multiple controllers, there is one sub-folder in the GRACO folder for each control interface.

USB Logs

During operation, the control interface stores system and performance related information to memory in the form of log files. It maintains two types of log files: an event log and system logs. To retrieve log files, see [Download System Data, page 44](#).

Event Log

The event log file name is 1-EVENT.CSV and is stored in the DOWNLOAD folder.

The event log maintains a record of the last 1,000 events. Each event record in the log file contains the date and time the event occurred, the event type, event code, and event description.

System Log

The system log file name is 2-SYSTEM.CSV and is stored in the DOWNLOAD folder.

The system log maintains a record of all control interface modules connected to the system. Each event record in the log file contains the date, time, software part number, and software version.

System Configuration Settings File

The system configuration settings file name is SETTINGS.TXT and is stored in the DOWNLOAD folder.

A system configuration settings file automatically downloads each time a USB flash drive is inserted. Use this file to back up system settings for future recovery or to easily replicate settings across multiple systems. For instructions on how to use this file, see [Upload System Configuration, page 45](#).

For the location of the USB port on the control module, see [Connect the CAN Cables, page 21](#).

Retrieve the SETTINGS.TXT file after all system settings are set as desired. Store the file for future use as a backup in case the settings are changed and need to be quickly changed back to the desired setup.

Note

- System settings may not be compatible between different versions of the software.
- Do not modify the contents of this file.

Custom Language File

The custom language file name is DISPTXT.TXT and is stored in the DOWNLOAD folder.

A custom language file automatically downloads each time a USB flash drive is inserted. If desired, use this file to create a user-defined set of custom language strings to be displayed within the control interface.

The control interface is able to display the following Unicode characters. For characters outside of this set, the system displays the Unicode replacement character, which appears as a white question mark inside of a black diamond.

- U+0020 - U+007E (Basic Latin)
- U+00A1 - U+00FF (Latin-1 Supplement)
- U+0100 - U+017F (Latin Extended-A)
- U+0386 - U+03CE (Greek)
- U+0400 - U+045F (Cyrillic)

Create Custom Language Strings

The custom language file is a tab-delimited text file that contains two columns. The first column consists of a list of strings in the language selected at the time of download. The second column can be used to enter the custom language strings. If a custom language was previously installed, this column contains the custom strings, otherwise the second column is blank.

Modify the second column of the custom language file as needed and follow the [Upload System Configuration, page 45](#), to install the file.

The format of the custom language file is critical. The following rules must be followed in order for the installation process to succeed.

- The file name must be DISPTXT.TXT.
- The file format must be a tab-delimited text file using Unicode (UTF-16) character representation.
- The file must contain only two columns, with columns separated by a single tab character.
- Do not add or remove rows to the file.
- Do not change the order of the rows.
- Define a custom string for each row in the second column.

Download System Data

1. Insert the USB flash drive into the USB Port. See [Connect the CAN Cables, page 21](#).
2. The menu bar and USB indicator lights indicate that the USB is downloading files. Wait for USB activity to complete. A pop-up is present until the transfer is complete if it is not acknowledged.
3. Remove the USB flash drive from the USB port.
4. Insert the USB flash drive into the USB port of computer.
5. The USB flash drive window automatically opens. If it does not, open USB flash drive from within Windows® Explorer.
6. Open the Graco folder.
7. Open the system folder. If downloading data from more than one system, there is more than one folder. Each folder is labeled with the corresponding serial number of the control interface. (The serial number is on the back of the control interface.)
8. Open the DOWNLOAD folder.
9. Open the LOG FILES folder labeled with the highest number. The highest number indicates the most recent data download.
10. Open the log file. Log files open in Microsoft® Excel® by default as long as the program is installed. However, they can also be opened in any text editor or Microsoft Word.

Note

All USB logs are saved in Unicode (UTF-16) format. If opening the log file in Microsoft Word, select Unicode encoding.

Upload System Configuration

Use this procedure to install a system configuration file and/or a custom language file.

1. If necessary, follow [Download System Data, page 44](#), to automatically generate the proper folder structure on the USB flash drive.
2. Insert the USB flash drive into the USB port of computer.
3. The USB flash drive window automatically opens. If it does not, open the USB flash drive from within Windows Explorer.
4. Open the Graco folder.
5. Open the system folder. If working with more than one system, there is more than one folder within the Graco folder. Each folder is labeled with the corresponding serial number of the control interface. (The serial number is on the back of the control interface.)
6. If installing the system configuration settings file, place the SETTINGS.TXT file into the UPLOAD folder.
7. If installing the custom language file, place the DISPTXT.TXT file into the UPLOAD folder.
8. Remove the USB flash drive from the computer.
9. Install the USB flash drive into the USB port on the control interface.
10. The menu bar and USB indicator lights indicate that the USB is downloading files. Wait for USB activity to complete.
11. Remove the USB flash drive from the USB port.

Note

If the custom language file was installed, users can select a different language from the Language drop-down menu in the Advanced Setup Screen 1. See [Advanced Screen 1, page 59](#).

Clean the Screen Surface

Use any alcohol-based household cleaner, such as glass cleaner, to clean the control interface.

Update the System Software

A new HydroShield system includes a control interface that is pre-programmed to operate the HydroShield system. If the control interface is replaced, a Graco black software update token (17Z578) is included, which contains the latest software. Use the token to program the replacement control interface, as described in 3A1244. See [Related Manuals, page 3](#).

The token uses Token In-System Programming, which provides the capability to transfer software updates from a USB drive to the token. With this feature, you can obtain the software updates online, download them to a USB drive, and transfer them directly to the token instead of waiting for a new software update token to be shipped.

If you already have a Graco black software update token, you can use it to update the HydroShield system software.

Note

This process is for Graco black tokens only, not Graco blue tokens.

Note

All update files must have either file extension *.GTI (software update files) or *.GMI (gateway map files). A maximum of 14 files can be present in the \Graco\Software\ folder.

To update the software on the isolation system:

- Download the latest software version for the system from the Graco website. Follow the steps in [Obtain Software Updates, page 45](#).
- Transfer the software to the control interface. Follow the steps in [Transfer Software from USB to System, page 46](#).

Obtain Software Updates

Use a computer with internet access to obtain software updates for the system.

1. Insert a USB drive into a USB port on your computer.
2. Open an internet browser and go to help.graco.com.
3. Navigate to the desired software update.

4. Save the GTI software update file to the \GRACO\SOFTWARE\ folder on the USB drive.

To automatically create the SOFTWARE folder on the USB drive, insert the USB into the control interface and press the soft key next to the



Software Update icon on Advanced Screen 4. See [Advanced Screen 4, page 60](#).

Note

Limit the number of software update files in the folder on the USB to 14. The software on the control interface can only display the first 14 updates found.

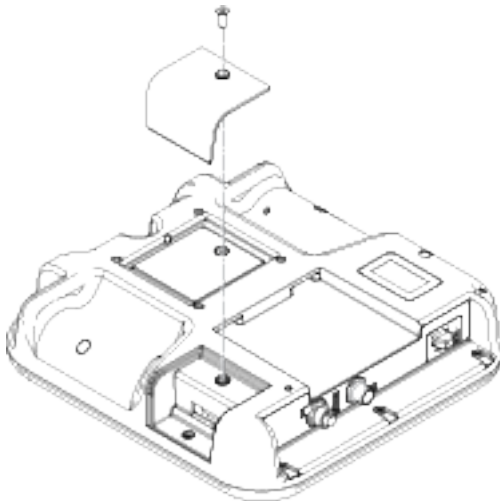
5. After the software is downloaded to the USB drive, exit the browser and remove the USB drive from the computer.

Transfer Software from USB to System

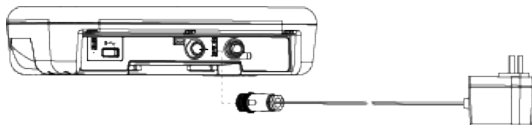
After downloading a system software update to a USB drive, use this procedure to transfer the update from the USB drive to the control interface.

Prepare the control interface to receive the software:

1. Place the control interface face down on a flat surface and remove the token access cover.



2. Turn the control interface face up.
3. Supply electrical power to the control interface using either system power or Power Supply Kit 24F672, which is available separately. The control interface starts and is ready for use when power is supplied.



Transfer the software to the system:

1. Navigate to Advanced Screen 4. See [Advanced Screen 4, page 60](#). Press the soft key



next to the icon. Follow the on-screen prompts on the Software Update Start screen.

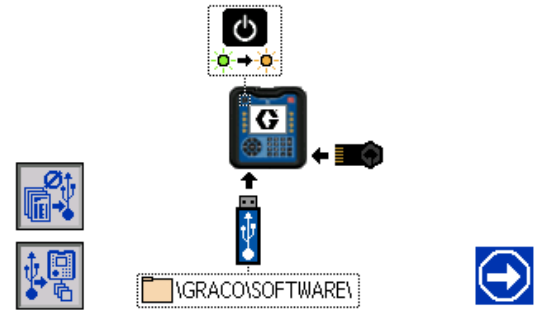


Figure 24 Software Update Start Screen

2. Consider whether to disable the upload/download options:



Pressing the soft key next to the icon disables the upload/download options for USB logs, system settings, and custom language files. Upload/download options are disabled when the



icon appears gray

Note


Disabling the upload/download options allows for a faster software transfer procedure. However, a factory reset to default settings is possible during the software transfer procedure. Graco recommends that upload/download options remain enabled if any data logs, system settings, and custom language files are critical. Upload/download options are enabled when the icon



appears blue



Press the soft key next to the icon to exit the USB update screen.

3. Press the Power button  to turn off the system.

Note

If power is cycled while a token is present, the system tries to load the software that is currently loaded on the token. If you insert a token that contains older software, do not cycle power and inadvertently load the old software. Depending on the age of the software, it may not be possible to reprogram a token.

4. Insert a black update token into the slot where the cover was removed.

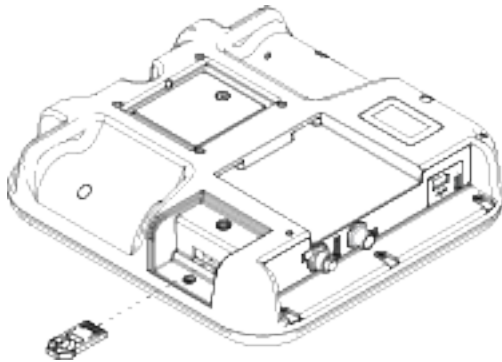


Figure 25 Insert Token

5. Insert the USB drive that contains the updated software into the USB interface slot.

A warning may flash on the screen signaling that a USB download is occurring. Wait for the warning to indicate that the USB download is

complete. Press the Enter key  to return to the Software Update Start screen.

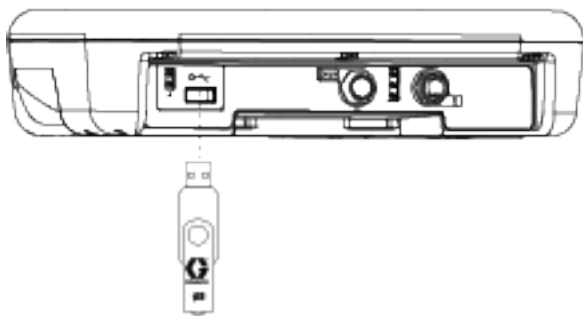



Figure 26 Insert USB Drive


An hour glass  displays while the USB drive prepares for the software transfer process. If this process takes more than a couple of minutes, remove the USB drive and try again.

The following message is displayed if no compatible software files are found on the USB


drive:  GRACO\SOFTWARE\

6. When the process is ready to begin, the screen automatically transitions to the USB Software Update screen.

- On the left side of the screen, use the drop-down box to select the software update file from the USB drive. The software part number and version for each update is listed beneath the file.

Press the Enter key  to change the selection on the USB drive. A drop-down menu displays the available software update files (up to 14 files).

Use the keypad arrows to highlight the desired

update, and then press Enter  to select the update.

- On the right side of the screen, the current software part number and version on the token is listed.

07/02/20 09:03	Maint.	Advanced	System
Off	EQUO: USB Idle		

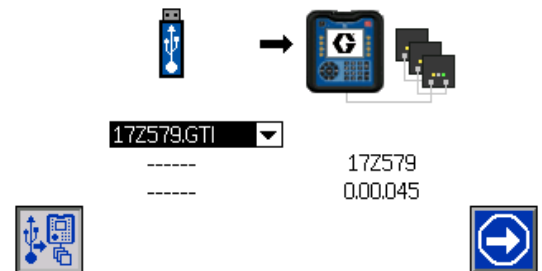



Figure 27 USB Software Update Screen

7. Press the soft key next to the Continue  icon to begin the software transfer.

In the following example, software version 0.01.002 of the 17X093 software will be copied from the USB drive and will overwrite version 0.01.001 of 17X083 on the token.

The progress of writing the software update to the token can take several minutes to complete. Leave the USB drive and token inserted while the transfer is in progress. The control interface buttons are not functional during this time.

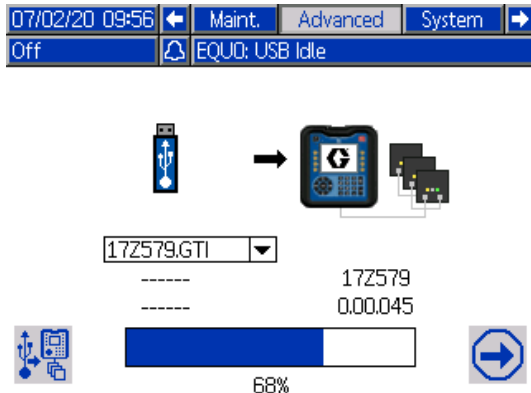


Figure 28 Software Transfer Process

8. When the transfer is complete, the progress bar is solid blue and the progress is 100%. Remove the USB drive and token from the control interface.

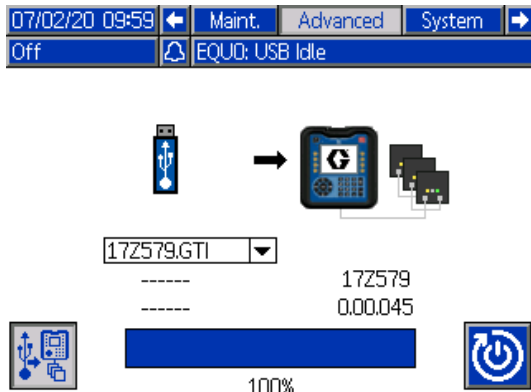



Figure 29 Software Transfer Complete


9. After the transfer is complete, press the soft key

next to the  icon to automatically reset the control interface to load software. Refer to manual 3A1244 for step-by-step instructions on how to update the software version of Graco Control Architecture Modules. See [Related Manuals, page 3](#).

Note

The system must be manually reset to load a *.GMI file. Follow your system manual to load a new version of the gateway map.

10. If the software update transfer fails, the progress bar turns red and no percentage is shown. Make sure the token and USB are inserted correctly (not loose) and retry the procedure. Do not remove the USB drive or token until the transfer process is complete. Press the soft key next to

 to reattempt a software transfer.

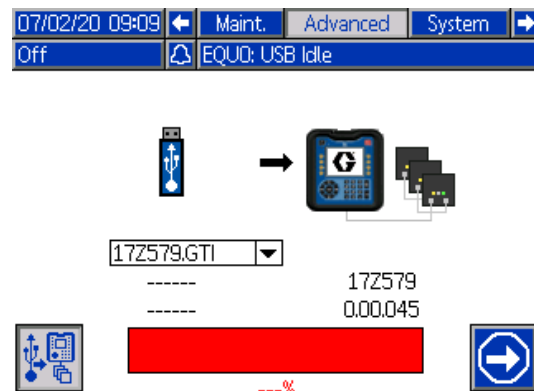


Figure 30 Software Transfer Not Completed

When the software transfer is completed successfully, the control interface powers up as normal. You can repeat the procedure with another token if needed.



Run Menus



Home Screen

The Home screen is the primary screen that the operator uses while painting. When the system is powered, it enters Off mode.

The operator must first select Standby mode for painting. The available settings vary depending on whether color change is enabled on the system. After Standby is selected, the operator can select the Prime, Purge, or Spray buttons.

Table 5 Key to System Modes

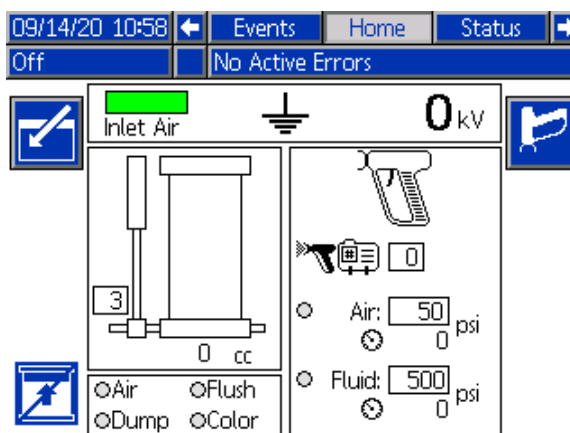
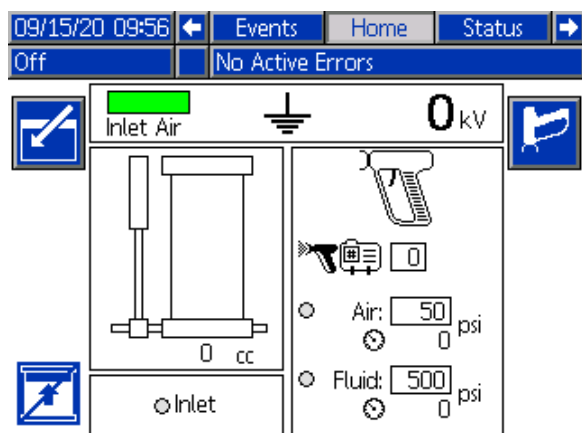
Soft Key	Function
	<p>Standby</p> <p>Press to put the system into Standby mode. Standby mode is used to prepare the system for operation or for a break in operation, such as a shift change. All fluid valves are closed and all air valves are off. The isolation valve (G) is in the down (bottom) position.</p> <p>In Standby mode, the system verifies that there is inlet air supply and that the minimum required 70 psi (0.5 MPa, 4.8 bar) air pressure is supplied to the system.</p>
	<p>Prime</p> <p>Press to enter Prime mode. Prime mode is used to load the system with new material. The volume in the isolation fluid pump (K) is minimized and air to the gun is off. The system stays grounded.</p>

Soft Key	Function
	<p>Purge</p> <p>Press to enter Purge mode. Purge mode is used for flushing the system or changing colors. The isolation fluid pump (K) fills and dispenses, but air to the gun is off and the system stays grounded.</p> <p>In Purge mode with color change enabled, the buttons that are available vary depending on whether the operator is in Preset 0 or is using a purge profile:</p> <ul style="list-style-type: none"> • Preset 0 presents buttons for the operator to perform a manual purge. • Purge profiles present a play button for the purge profile to automatically perform a preconfigured purge sequence. <p>See Home Screen in Purge Mode, page 53.</p>
	<p>Spray</p> <p>Press to enter mode. Spray mode is used for painting. As soon as the system enters Spray mode, the isolation fluid pump (K) begins to fill.</p> <p>When the gun is triggered to spray, the isolation valve (G) and the ground rod (N) raise to allow the system to build voltage.</p> <p>When the trigger is released, the isolation valve (G) and the ground rod (N) lower. The system discharges and the pump begins to refill.</p> <p>To enter Spray mode, you must first be in either Prime or Standby mode. You cannot enter Spray mode directly from Purge mode.</p> <p>In Spray mode, the menu bar displays the following:</p> <ul style="list-style-type: none"> • Spray-Fill when the pump is filling. • Ready when the pump is full and the system is waiting for a gun trigger. • Dispense when the gun is triggered for spraying.

Home Screen Without Color Change

Home Screen With Color Change Enabled

Off Mode



Standby Mode

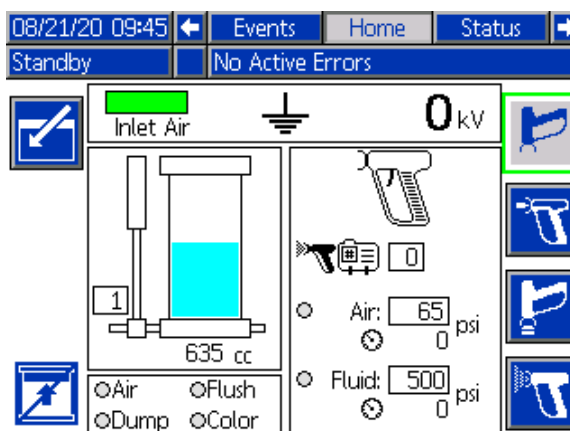
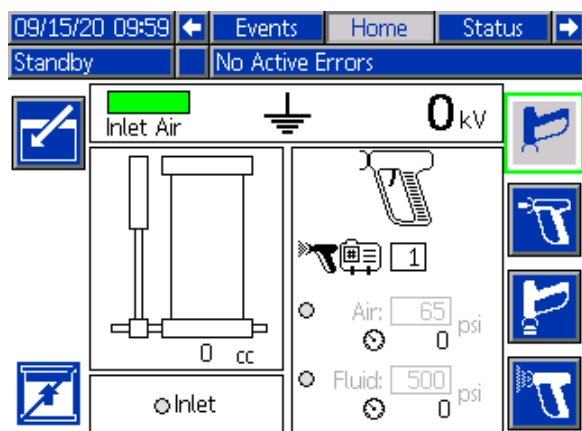






















Table 6 Key to Home Screen with and without Color Change Enabled

Key or Field	Description
	Enter Screen Press to enter a screen for editing. Highlighted data or fields can be changed by the operator. Use up or down arrows to move among the data fields.
	Exit Screen Press to exit a screen after editing.

Key or Field	Description
	<p>Do Not Fill</p> <p>Activate Do Not Fill to prevent the isolation fluid pump from refilling when the trigger is released. Do Not Fill is commonly used at the end of a paint job. Once the pump is empty, the system waits until another mode is selected.</p> <p>Do Not Fill mode is useful in the following situations:</p> <p>While in Spray mode:</p> <ul style="list-style-type: none"> • The operator is getting close to the end of the shift and doesn't want paint to sit in the pump. • The remaining number of parts to spray won't require another full pump of paint. • The paint color will be changing soon. <p>While in Purge mode (without color change enabled):</p> <ul style="list-style-type: none"> • The operator is done spraying and is dispensing the last of the paint in the pump through the gun. Once the pump is empty, the operator can easily switch the fluid supply hose to cleaning fluid.
	<p>Inlet air</p> <p>A green inlet air status bar indicates the inlet air supply pressure is above the minimum required 70 psi (0.5 MPa, 4.8 bar).</p> <p>Red indicates the system cannot run because the required air pressure is not detected.</p>
	<p>Ground rod</p> <p>A ground rod icon indicates that the ground rod (N) is down and the system is discharging.</p> <p>A charge icon indicates that the ground rod is up and the system is capable of holding a charge.</p>
	<p>Volt Level</p> <p>Displays the system voltage level.</p>
	<p>Fluid Level</p> <p>Displays the fluid level of the isolation fluid pump.</p> <ul style="list-style-type: none"> • 0% (Empty) • 50% • 100% (Full) <p>With color change enabled, the icon displays the fluid level of the isolation fluid pump and the paint color being used. The color on the pump indicates the pump contents:</p> <ul style="list-style-type: none"> • Aqua/cyan color = Unknown fluid; usually flush fluid. • Dark blue = Paint; the paint number appears to the left of the icon. • Gray = Air; used when flushing the system.
	<p>Spray Preset</p> <p>Enter a spray preset number to set the gun air and fluid pressure. The spray gun symbol indicates that the number is a spray preset number:</p>  <p>To configure Preset 1 through 99, see Adjust the Gun Fluid and Air Settings, page 38.</p> <p>Preset 0 allows the operator to change the settings at any time during operation.</p>

Key or Field	Description
  	<p>Purge Profile</p> <p>Enter a purge profile number to purge the system automatically. (Available on color change enabled systems only.) The purge gun symbol indicates that the number is a purge profile number:</p>  <p>To configure a purge sequence, see Purge Screens 1–5, page 57.</p>
 Air: <input type="text" value="65"/>  8 psi	<p>Gun Air Pressure</p> <p>Set the air pressure for the gun. If the dot is filled, air pressure to the gun is active. The actual air pressure displays below the rectangle.</p>
 Fluid: <input type="text" value="40"/>  500 psi	<p>Gun Fluid Pressure</p> <p>Set the fluid pressure for the gun. If the dot is filled, fluid pressure to the gun is active. The actual fluid pressure displays below the rectangle.</p>
 Inlet  Air  Flush  Dump  Color	<p>Valve Indicators</p> <p>A green circle indicates which valve is active when the system is in use. A gray circle indicates the valve is off.</p>

Home Screen in Purge Mode

Home Screen With Color Change Enabled

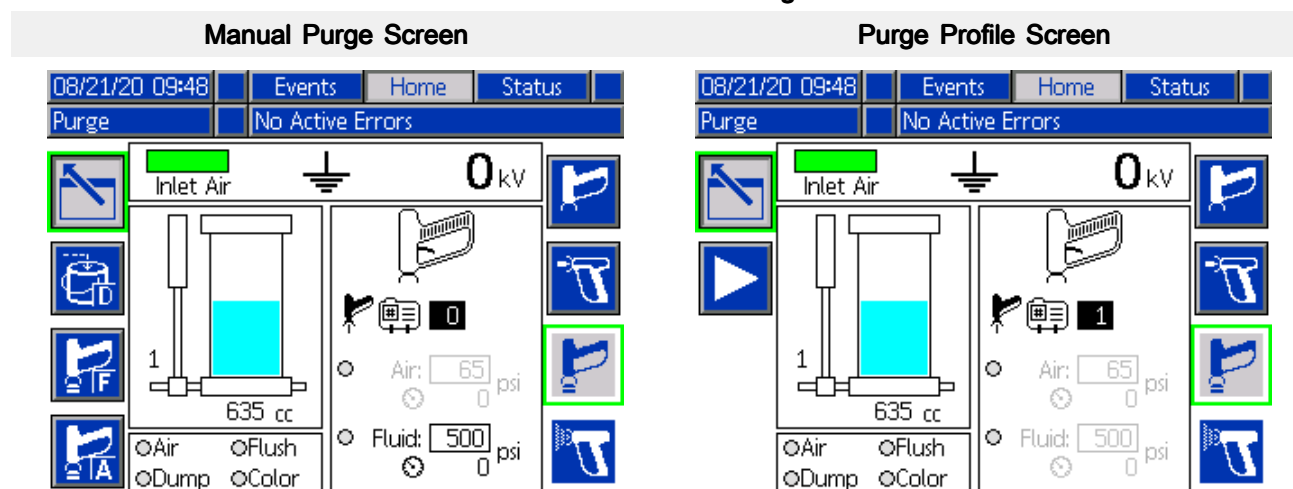






Table 7 Key to Home Screen in Purge Mode

Soft Key or Field	Description
	Manual Dump Press to manually dump the contents of the isolation fluid pump out the dump valve. If the pump is empty, the button will not activate. Press the button again to stop dumping.
	Manual Flush Press to continually empty and refill the isolation fluid pump. Use to flush the system clean. Press the button again to stop flushing.
	Manual Air Press to manually push air through the fluid lines out to the gun. The isolation fluid pump must be empty before the system lets air in. Press the button again to stop pushing air.
	Play Purge If a purge profile is entered, press the play button to begin the purge sequence.

Events Screen

Use the Events screen to view the last 99 status messages generated by the isolation system. Click the up and down arrows on the right of the screen to scroll through the messages.

Each message line includes the date, the time, and the status code. See [Error Codes, page 84](#).

03/13/20 16:00	←	Status	Events	Home	→
Standby		No Active Errors			
03/13/20 15:57	EQU0-V	USB Idle			
03/13/20 15:57	EQU1-R	Sys. Settings Downloaded			
03/13/20 15:57	EQU3-R	Custom Lang. Downloaded			
03/13/20 15:57	EQU5-R	Logs Downloaded			
03/13/20 15:57	EAUX-V	USB Busy			
03/13/20 15:56	CA01-A	Comm. Error ADM			
03/13/20 15:56	EL00-R	System Power On			
03/13/20 15:56	EM00-R	System Power Off			
03/13/20 15:41	ENA1-V	Linear Sensor Cal. Top			
03/13/20 15:19	EBUX-R	USB Drive Removed			

Status Screens

The Status screens display a summary of the input signals that are monitored by the system and the solenoids that drive system activity. The screens are for information and troubleshooting purposes.

Status Screen 1

The Status screens display a summary of the input signals that are monitored by the system and the solenoids that drive system activity. The Status screens are for information and troubleshooting purposes.

03/13/20 16:00	←	Home	Status	Events	→
Standby		No Active Errors			
<div> <input checked="" type="checkbox"/> </div>					
Inputs			Solenoids		
<input type="radio"/> System Stop: Air <input type="radio"/> System Stop: Digital <input checked="" type="radio"/> Inlet Air <input type="radio"/> Shuttle Top <input checked="" type="radio"/> Shuttle Bottom <input type="radio"/> Gun Flush Box <input type="radio"/> Fluid Trigger			<input checked="" type="checkbox"/> Shuttle Down <input type="checkbox"/> Shuttle Up <input type="checkbox"/> Shuttle Eject <input type="checkbox"/> Shuttle Fluid In <input type="checkbox"/> Pump Fluid In <input type="checkbox"/> Pump Pressure <input type="checkbox"/> Ground Rod <input type="checkbox"/> Gun Flush Box <input checked="" type="checkbox"/> System Status		

Inputs

Inputs are signals that the system acts on. When the status circle next to the input appears yellow, the sensor is activated.

- **System Stop: Air:** The external pneumatic input that tells the system to stop. The system stop pneumatic input is available only when the optional System Stop Pneumatic Input Kit 26B414 is installed. To install, see [Install the Optional System Stop Pneumatic Input Kit, page 25](#).
- **System Stop: Digital:** The external electrical input that tells the system to stop. The system stop digital input is available only when the optional Optocoupler Kit 24Z226 is installed. To install, see [Install the Optional System Status Output, page 26](#).
- **Inlet Air:** Indicates the minimum required air pressure 70 psi (0.5 MPa, 4.8 bar) is detected.
- **Shuttle Top:** The sensor that indicates that the isolation valve is in the top position.
- **Shuttle Bottom:** The sensor that indicates that the isolation valve is in the bottom position.
- **Gun Flush Box:** The sensor that indicates that the gun flush box is closed. (The gun flush box is an accessory that automatically cleans and purges the system and gun.)
- **Fluid Trigger:** The air flow switch that indicates that the gun is triggered.

Solenoids

Electrical to pneumatic actuators that drive system activity.

- **Shuttle Down:** Drives the isolation valve down and open for filling.
- **Shuttle Up:** Drives the isolation valve up and closed for isolating the charged fluid.
- **Shuttle Eject:** From the down position, ejects the isolation valve up from the seat.
- **Shuttle Fluid In:** Opens the fluid valve near the system fluid inlet.
- **Pump Fluid In:** Opens the fluid valve near the isolation fluid pump fluid inlet when it is present.
This fluid valve is not present in standard systems. Purchase a conversion kit to replace a spring check valve with a pneumatically activated fluid inlet valve.
- **Pump Pressure:** Activates the air pressure to the isolation fluid pump.
- **Ground Rod:** Activates (raises) the ground rod to allow the system to build a charge.
- **Gun Flush Box:** Activates the gun trigger in the gun flush box.
- **System Status:** Indicates to the system that it is okay to spray.

Status Screen 2

Status screen 2 displays the current status of the solenoids that drive activity for the color change valves.

Solenoid Valve/ Function	
<input checked="" type="checkbox"/> 1 / Air	<input type="checkbox"/> 14 / Color 7
<input checked="" type="checkbox"/> 10 / Flush	<input type="checkbox"/> 6 / Color 8
<input checked="" type="checkbox"/> 2 / Dump	<input type="checkbox"/> 15 / Color 9
<input type="checkbox"/> 11 / Color 1	<input type="checkbox"/> 7 / Color 10
<input type="checkbox"/> 3 / Color 2	<input type="checkbox"/> 16 / Color 11
<input type="checkbox"/> 12 / Color 3	<input type="checkbox"/> 8 / Color 12
<input type="checkbox"/> 4 / Color 4	<input type="checkbox"/> 17 / Color 13
<input type="checkbox"/> 13 / Color 5	<input type="checkbox"/> 9 / Color 14
<input type="checkbox"/> 5 / Color 6	<input type="checkbox"/> 18 / Color 15

The screen lists the solenoid valve number and the function of the valve. A checked box indicates that the solenoid is activated.

Solenoid Valve / Function	Description
1 / Air	Solenoid 1 controls the air valve (default).
10 / Flush	Solenoid 10 controls the flush valve (default).
2 / Dump	Solenoid 2 controls the dump valve (default).
Valves 3–9 and 11–18 / Color 1 through 15	Solenoids 3–9 and 11–18 control valves for color material 1–15.

Setup Menus

To unlock the Setup menus, press the Setup key



If a password is configured, enter the password. (Default: 0000.) To configure a password, see [Advanced Screen 1, page 59](#).

To exit the Setup menus and return to the Home screen, press the Setup key .

To edit the information on a screen press the Enter Screen key .

Presets

Use this screen to preconfigure spray settings for different fluids, parts, and scenarios.

For information about using Preset 0-99, see [Adjust the Gun Fluid and Air Settings, page 38](#).

Preset: The number assigned to this set of spray parameters, paint color, and purge sequence.

Air: Air pressure delivered through the gun.

Fluid: Fluid pressure delivered through the gun.

Color: Indicate a color number to associate with this preset.

Purge: Indicate a custom purge sequence as configured in a Purge screen. See [Purge Screens 1–5, page 57](#).

Custom Fill: Check the box to customize when the pump fills and when the light tower indicates material levels in the pump. Leave the box unchecked to use the global pump settings in Pump Screen 1. See [Pump Screen 1: Pump Volume, page 58](#).

Purge Screens 1–5

Use the Purge screens to configure up to 5 purge profiles. Customize each purge profile to best suit different fluids.

The screenshot shows the 'Purge: 1' screen with the following settings:

- Timeout: 0 sec
- Fluid: 500 psi
- Dump Enable: ☐
- Air Push: 0 sec
- Flush Push: 0 sec
- Refill Cycles: 1
- Chop: ☒
- Air Chop: 2.0 sec
- Flush Chop: 2.0 sec
- Total Chop: 10.0 sec
- Final Push: Flush (dropdown menu)
- Final Push: 0 sec

Navigation buttons (up, 4, 5, 1, 2, 3, down) are visible on the right side of the screen.

Purge: Assign a number to the purge profile.

The purge profile number can be used:

- In the Home screen when in Purge mode. See [Home Screen, page 49](#).
- In the Presets screen to associate a purge profile with a paint color. See [Presets, page 56](#).

Timeout: The number of seconds that the system waits for action before it indicates that there is a problem completing the purge profile. The timeout should be set long enough to complete the refill cycles. Enter 0 to disable the timeout.

Fluid: Set the fluid pressure for the fluid to exit the system during this purge profile.

The remaining settings define the actions in the purge sequence:

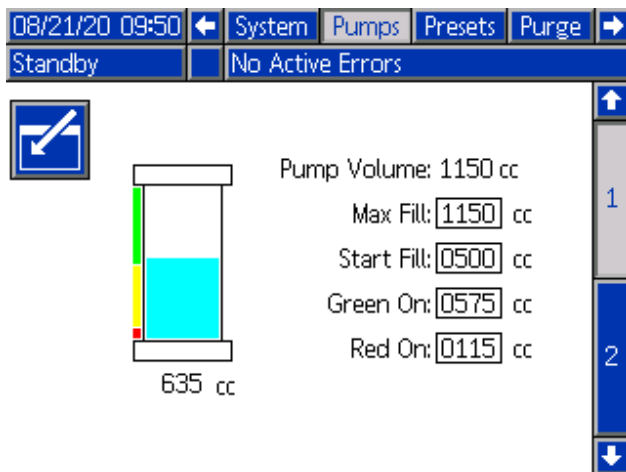
1	Dump Enable:	Check this box if the dump valve is connected to a hose that empties into a waste container. If the dump valve is not connected to a hose, be sure to clear this box, or the remaining contents from the pump will spill out of the system.
2	Air Push:	After the pump is empty, the number of seconds that air pushes through the system. Enter 0 to skip the air push.
3	Flush Push:	The number of seconds that flush fluid pushes through the system. Enter 0 to skip the flush push.
4	Refill Cycles:	The number of times to empty and refill the pump. Enter 0 to skip the refill cycles.
5	Chop:	Check this box to add a flush period of alternating fluid and air to the purge sequence. <ul style="list-style-type: none"> • Air Chop: The number of seconds for the air interval. • Flush Chop: The number of seconds for the fluid interval. • Total Chop: The total number of seconds that the air and fluid will alternate through the system.
6	Final Push:	Select the last action of the purge sequence: <ul style="list-style-type: none"> • None: Perform no final action. The purge is complete after the Refill Cycles or the Chop has completed. • Air: Push air through the system for a number of seconds. • Flush: Push flush fluid the system for a number of seconds.

Pump Screens

Use the Pump screens to enter volume information about the isolation fluid pump and to manually purge the system in the event of a problem.

Pump Screen 1: Pump Volume

Use this screen to enter global settings for volume information about the isolation fluid pump and how the light tower indicates material levels in the pump. To configure different pump settings for specific paint colors, set those as part of a Preset. See [Presets, page 56](#).



Pump Volume: The total volume capacity of the pump in cubic centimeters.

Max Fill: The pump will not fill past this volume, as set by the user.

Start Fill: The system will not begin to fill until the pump volume drops below this volume, as set by the user. Setting this appropriately may help avoid delays and unnecessary refills.

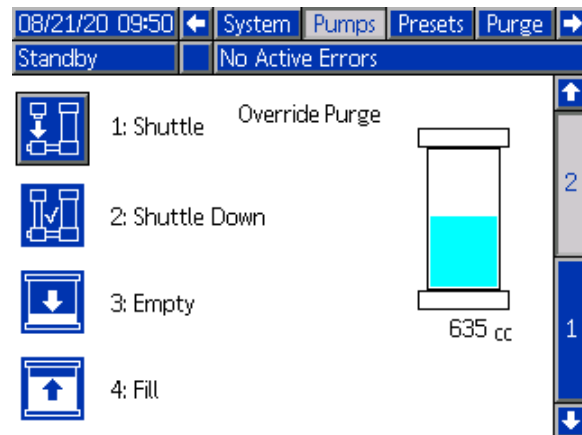
Green On: The light tower turns green when the pump volume is above the Green On setting. The light tower turns yellow when it is between the Green On and Red On settings.

Red On: The light tower turns red when the pump volume is below the Red On setting.

Pump Screen 2: Override Purge

Use this screen in troubleshooting situations to empty the isolation fluid pump and manually purge the system. This screen allows operators to override the isolation valve sensors (103) that detect the shuttle position, as well as the linear sensors (321) on the isolation fluid pump that detect the full and empty pump status.

Open the cabinet and then follow the sequence on this screen to manually empty and refill the pump.



Open the cabinet and then follow the sequence on this screen to manually empty and refill the pump.

1: Shuttle: Press to enter Standby mode. Press again to drive the shuttle down.

2: Shuttle Down: Check inside the cabinet to make sure that the shuttle is down. Press Shuttle Down to confirm that the shuttle is in the down position.

3: Empty: Press and then trigger the gun to empty the pump of fluid.


4: Fill: Press to fill the pump. To clean the pump, make sure that a hose supplying cleaning fluid is connected.

If desired, press Empty and Fill again until clean fluid comes out of the gun.

Now that the system is purged, continue troubleshooting the issue.

Advanced Screens

To edit the information on a screen press the Enter

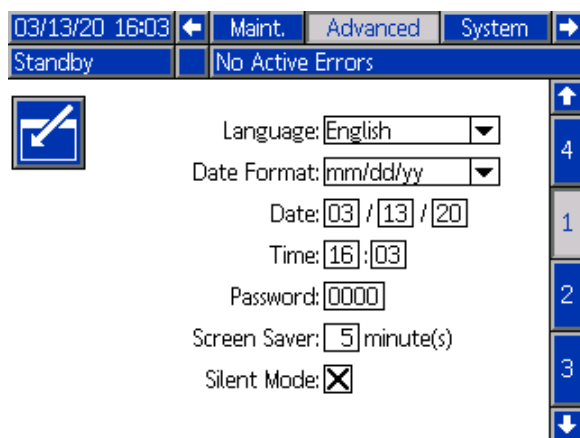
Screen key .

To advance to the next Advanced screen, press the

down arrow .


Advanced Screen 1

Use this screen to set user preferences.



03/13/20 16:03 ← Maint. Advanced System →

Standby No Active Errors



Language: English ▼

Date Format: mm/dd/yy ▼

Date: 03 / 13 / 20

Time: 16 : 03

Password: 0000

Screen Saver: 5 minute(s)

Silent Mode: ☒

1 2 3 4

Language: Select the desired language.

Date Format: Select the desired date format.

Date: Enter today's date using the number keypad.

Time: Enter the correct local time (24-hour clock) using the number keypad.

Note

The time does not update automatically for local adjustments, such as daylight savings time.

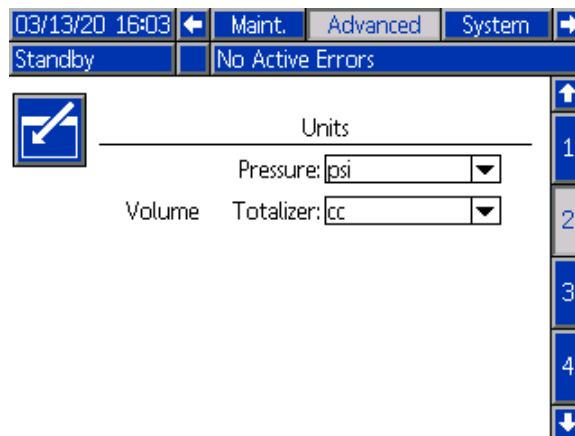
Password: The default password is 0000. Use the number keypad to set a password, if desired, for entry into the Setup screens. To disable password protection, set the password to 0000.

Screen Saver: Use the number keypad to set the period of time that the screen remains backlit if no button is pressed.

Silent Mode: Check this box so the control interface does not beep every time a button is pressed or when events are active.


Advanced Screen 2

Use this screen to select the pressure units for the system.



03/13/20 16:03 ← Maint. Advanced System →

Standby No Active Errors



Units

Pressure: psi ▼

Volume Totalizer: cc ▼

1 2 3 4

Pressure: Select between: (Default) psi, bar, MPa

Volume Totalizer: Select between: (Default) cc, L, Oz, gal

Advanced Screen 3

Use the settings on this screen to enable the system to send or receive data via USB.

03/13/20 16:03 | Maint. | Advanced | System |

Standby | No Active Errors

Enable USB Downloads/Uploads: ☒

Download Depth: Last days

Log 90% Full Advisory Enabled: ☒

Navigation buttons: 1, 2, 3, 4, Up, Down

Enable USB Downloads/Uploads: Check this box to enable USB download and upload of system information. When enabled, the Download Depth field becomes active.

Download Depth: Enter the number of days for which data retrieval is allowed. For example, to retrieve data for the previous week, enter 7.

Log 90% Full Advisory Enabled: When enabled (default), the system issues an advisory when the memory log becomes 90% full. At that point or before, perform a download to avoid loss of data. See [Download System Data, page 44](#).

For information about troubleshooting messages related to the Advanced screens, see [Error Codes, page 84](#).

Advanced Screen 4

Use this screen to update the software part numbers and versions for the system components. Refer to this screen when contacting a Graco distributor for technical assistance.

04/23/20 11:49 | Maint. | Advanced | System |

Standby | No Active Errors

Software Part #: 172579

Software Version: 1.02.001

Navigation buttons: 1, 2, 3, 4, Up, Down

Press the soft key next to the magnifying glass



to display system software details for each module.

04/23/20 11:49 | Maint. | Advanced | System |

Standby | No Active Errors

Software Part #: 172579

Software Version: 1.02.001

Module	Software Part #	Software Version
Advanced Display	172583	1.02.001
USB Configuration	172609	1.02.001
Fluid Plate 1	172581	1.02.001

Navigation buttons: Left, Right

• A green check mark indicates that all modules are current with the system version.

• A red cross mark indicates that one or more of the modules contain software versions that differ from what is expected. If this is the case, a red box flashes around the magnifying glass. The software that is mismatched is highlighted in light red.

Scroll to the right to display more information about the system. The column header for the serial number

of the module is shown as

04/23/20 11:49 | Maint. | Advanced | System |

Standby | No Active Errors

Software Part #: 172579

Software Version: 1.02.001

Module	Software Version	Serial Number
Advanced Display	1.02.001	00306509
USB Configuration	1.02.001	-----
Fluid Plate 1	1.02.001	00264496

Navigation buttons: Left, Right

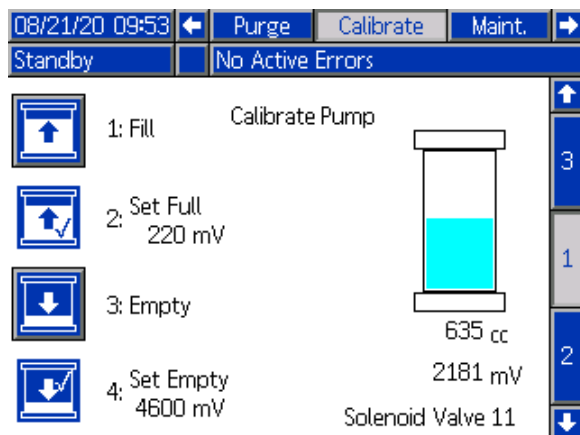
Press the magnifying glass to return to the previous screen.

To update the system software, follow the procedure in [Update the System Software, page 45](#).

Calibrate Screens

Calibrate 1: Calibrate Pump

Use the Calibrate 1 screen to calibrate the linear position sensor in the isolation fluid pump. Calibration determines the full and empty limits of the pump to ensure accurate volume and performance. Calibrate the pump after the pump is removed for service or after new system software is loaded. Follow the steps in [Calibrate the Pump, page 61](#).



Calibrate the Pump

Before calibrating the isolation fluid pump, be sure that air and fluid are being supplied to the system. Put the system into Standby mode.

1. Press the Fill button. This allows fluid into the system and begins to fill the pump. In the lower right corner of the screen, the pump volume indicator increases and the corresponding number of millivolts (mV) decreases.

2. When the pump volume and mV values stop changing, the pump is full. Press the Set Full button. The stored mV value also displays next to the button. The system returns to Standby mode.
3. Press the Empty button. This pressurizes the pump and sends fluid to the spray gun.

Note

The fluid pressure will be whatever the active preset is currently set to. It may be desirable to turn it down. Changing to Preset 0 and setting the desired pressure is the quickest way to accomplish this.

Pull the gun trigger to dispense fluid. In the lower right corner of the screen, the pump volume indicator decreases and the corresponding mV value increases.

The screen lists the solenoid valve that the system will use to feed fluid into the system in a color change equipped system. The valve corresponds to the color selected for the current preset.

4. When fluid stops flowing out of the gun, release the trigger. At this point, the Merkur AA fluid pump will keep cycling until the Set Empty button is pushed. Press the Set Empty button. The stored mV value also displays next to the button. The system returns to Standby mode.

NOTICE

Press the Set Empty button as soon as fluid stops flowing out of the gun to prevent the Merkur AA fluid pump from running while empty.

Calibrate 2: Air and Fluid

Use the Calibrate 2 screen to adjust the calibration value of the air and fluid. (Default value is 1000 mV.)

Calibrate the air and fluid:

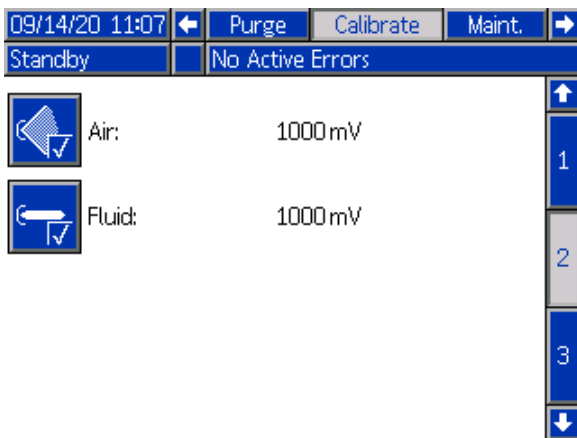
- When the actual air or fluid pressure does not match the target value on the Home screen and it seems like it should. [Home Screen, page 49](#).

For example, when air is applied to the system and the system is in Standby mode, both target and actual values should be 0.

- After replacing the electro/pneumatic regulator (V2P) (415).
- After replacing the V2P cable.

Follow the steps in

[Calibrate the Air and Fluid, page 62](#).



Air: Current air pressure in millivolts (mV) for calibration purposes.

Fluid: Current fluid pressure in mV for calibration purposes.

Calibrate the Air and Fluid

Before calibrating the air and fluid, be sure that no air pressure is present in the system.

- Perform the zero clear steps described within [Replace an Electro/pneumatic \(V2P\) Regulator, page 110](#).
- On the Calibrate 2 screen, select Air:



- On the Calibrate 2 screen, select Fluid:

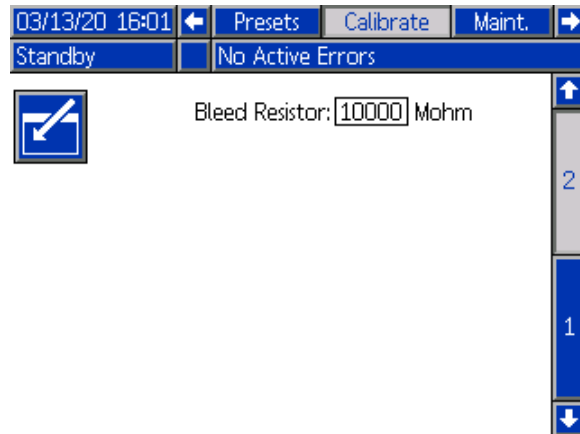


Resume system use.

Calibrate 3: Bleed Resistor

Use the Calibrate 2 screen to adjust the calibration value of the bleed resistor. (Default value is 10000 Mohms.) Follow the [Calibrate the Bleed Resistor, page 62](#).

Adjusting the value changes the kV display on the Home screen.



Bleed Resistor: The resistor that is used to slowly discharge the system, providing a path to ground when the system is charged.

Note

All systems are shipped with the value set at 10,000 Mohm. A new bleed resistor displays accurate system voltage.

Calibrate the Bleed Resistor

- With the bleed resistor (24) removed from the system, measure the resistance across the bleed resistor. See [Check the Bleed Resistor, page 73](#).
- Use the keypad to enter the measured value. Only values between 9,000 and 11,000 Mohm are allowable.
- Reinstall the bleed resistor into the system.
- Reattach the wire from the fluid pressure regulator (21) to the bleed resistor (24) and the bleed resistor to the ground rod (18).
- Make sure the wire coming out of the top of the bleed resistor is plugged back into the kV board (428) inside the electronics control panel.
- After the reassembly is complete, check the continuity between the fluid pressure regulator, bleed resistor, and ground rod.

Maintenance Screens

Maintenance 1: Maintenance Due

Use the Maintenance Due screen to set maintenance reminders for system components. When the cycle counters for each item reach these set values, an advisory is displayed on the screen.

Isolation Valve: The number of times the isolation valve shuttle has moved.

Isolation Valve Seal: The number of times the seals in the housing have been engaged.

Wash Fluid: The number of times the wash fluid has been moved through the isolation valve.

Volume: The total volume (cc) of fluid dispensed by the isolation fluid pump between maintenance events. This value does not account for material that is pushed through the system in Prime mode.

Pump: The number of times the isolation fluid pump has dispensed fluid.

Pump: The number of days that have passed since the last stall test was completed successfully. See [Pump Stall Test Procedure, page 64](#).

Solenoid Valve: The number of times the solenoid valves have been activated. (All of the solenoids listed in Status screens 1 and 2. See [Status Screens, page 54](#).)

Maintenance 2: Pump Stall Test

Use the Pump Stall Test screen to test the isolation fluid pump for internal and external fluid leaks. During the Pump Stall Test, the pump position is held for 60 seconds while the system looks for leaks.

Pump Stall Test Procedure

Before stall testing the isolation fluid pump, be sure that air and fluid are supplied to the system.

Prime the system to make sure that there is no air in the pump. Put the system into Standby mode.

1. Press the Fill button. The system automatically fills.

Be sure the gun trigger is released. Engage the trigger lock. During the test, the fluid line pressurizes to the active preset value. No air is sent to the gun.

Note

The fluid pressure down stream of the Merkur AA fluid pump will be whatever the active preset is currently set to. It may be desirable to turn it down. Changing to Preset 0 and setting the desired pressure is the quickest way to accomplish this.

2. Press the Stall Test button. The isolation fluid pump pressurizes and the system monitors the linear sensor to look for leaks with the pump at the top of the pump stroke. The screen displays the text, "Stall Test" and "Test In Progress."

The test takes about 1 minute to complete. If the test is successful, a confirmation displays on the screen. The system returns to Standby.

3. Press the Spray button. Dispense between 700-1000 cc so that the pump is about 1/4 full.
4. Be sure the gun trigger is released and press the Stall Test button. The system is now tested with the pump near the bottom of the pump stroke.

The test takes about 1 minute to complete. If the test is successful, a confirmation displays on the screen. The system returns to Standby.

Note

In addition to the HydroShield, this test checks the hose connections and gun. If the test fails, repeat the test with the fluid pressure set to 0. This will prevent high pressure from going to the gun and help determine if the leak is within the system or not.

Maintenance 3: Shuttle Valve Resets and Test

View the isolation valve actuation counts, reset those counts, and test the valves. When the status circle next to the item appears yellow, the sensor is activated.

03/13/20 16:02		Calibrate	Maint.	Advanced
Standby		No Active Errors		
		Shuttle Valve Resets and Test		
	Shuttle Down	2 cycles	<input checked="" type="checkbox"/>	9
	Shuttle Up	0 cycles	<input type="checkbox"/>	1
	Shuttle Eject	2 cycles	<input type="checkbox"/>	2
				3
				4
				5
				6
				↓

Shuttle Down: The valve that is used to drive the shuttle down, towards the bottom of its movement or stroke.

Shuttle Up: The valve that is used to drive the shuttle up, towards the top of its movement or stroke.

Shuttle Eject: The valve that is used to eject the shuttle from its seal, before moving the shuttle up.

Note

To ensure proper operation of the isolation valve, the system only allows these valves to be turned on in a specific order.

Maintenance 4: Fluid Valve Resets and Test

View fluid valve actuation counts, reset those counts, and test the valves.

03/13/20 16:02		← Calibrate Maint. Advanced →	
Standby		No Active Errors	
Fluid Valve Resets and Test			
12345 ↓ 00000	Shuttle Fluid In	3 cycles	<input type="checkbox"/>
12345 ↓ 00000	Pump Fluid In	3 cycles	<input type="checkbox"/>
12345 ↓ 00000	Pump Pressure	0 cycles	<input type="checkbox"/>

Shuttle Fluid In: The fluid valve near the system fluid inlet.

Pump Fluid In: The fluid valve near the fluid inlet on the isolation fluid pump. (Not present in WMBL00, WBML01.)

Pump Pressure: The valve that supplies air pressure to the isolation fluid pump.

Maintenance 5: Misc Valve Resets and Test

Use this screen to view system valve actuation counts for the ground rod and gun flush box, reset those counts, and test the solenoid valves.

03/13/20 16:02		← Calibrate Maint. Advanced →	
Standby		No Active Errors	
Misc Valve Resets and Test			
12345 ↓ 00000	Ground Rod	0 cycles	<input type="checkbox"/>
12345 ↓ 00000	Gun Flush Box	0 cycles	

Ground Rod: Activates (raises) the ground rod to allow the system to build a charge. Use this option to perform ground rod maintenance. See the steps in [Check and Lubricate the Ground Rod, page 72](#).

Note

The ground rod activates (raises) only if the pneumatic door switch is closed.

Unchecked box: The system is grounded.

Checked box: The system is ungrounded.

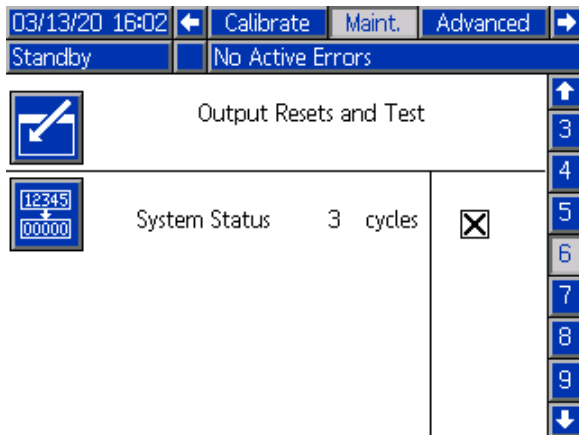
Gun Flush Box: Activates the gun trigger to the gun flush box.

Maintenance 6: Output Resets and Test

Use this screen to view system output counts, reset those counts, and test the output. Install kit 24Z226 to use this feature.

For details, see

[Install the Optional System Status Output, page 26.](#)



System Status: The system status output, which tells an external device if the system has an error or is off.

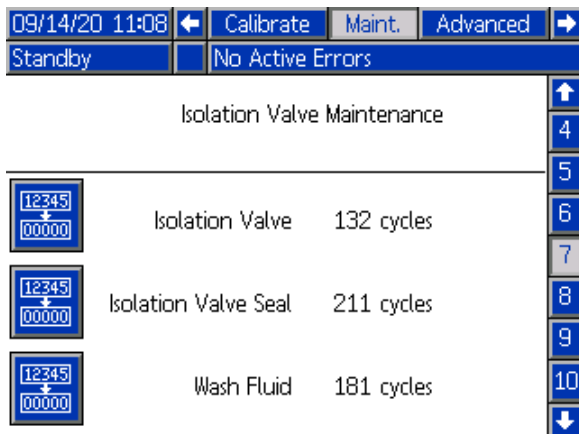
Unchecked box: Output off; indicates a system error or the system is off.

Checked box: Output on; indicates that the system is ready or active.

Maintenance 7: Isolation Valve Maintenance

Use this screen to view isolation valve actuation counts and reset those counts. The counters are useful to monitor solenoid, air cylinder, or bearings use.

The cycles increase each time the isolation valve engages. Each item can be reset at different times, based on maintenance schedules.



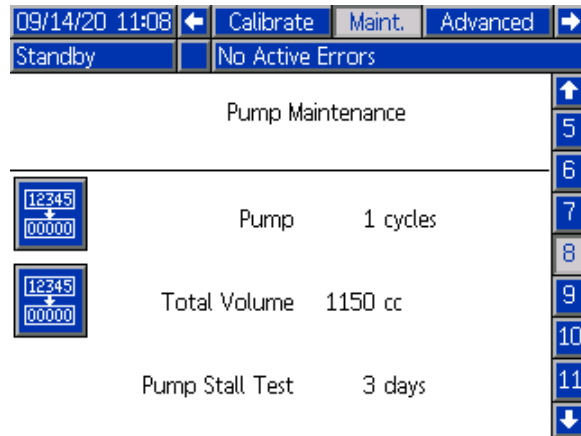
Isolation Valve: Monitors each time the isolation valve engages.

Isolation Valve Seal: Monitors the life of the fluid seals in the isolation valve assembly.

Wash Fluid: Monitors the life of the wash fluid. The wash fluid keeps the isolation valve seal clear from material.

Maintenance 8: Pump Maintenance

View information about maintaining the isolation fluid pump, including cycles and calendar days since the last stall test.



Pump: Dispense cycles since the last maintenance event.

Total Volume: The total volume of fluid dispensed by the system, based on pump cycles. The total does not include material pushed through the system in Prime mode.

Pump Stall Test: Refers to the pump stall test. This count is cleared automatically when a pump stall test is completed. Follow the [Pump Stall Test Procedure, page 64.](#)

Maintenance 9: V/P

Use the V/P (Voltage to Pressure) screen to test the function of the electro/pneumatic regulator (415) and determine whether air pressure and fluid pressure are being supplied to the system.

Gun: Check the box for the V/P to deliver a test air pressure when the gun is actuated.

Fluid: Check the box for the V/P to deliver a test fluid pressure when the fluid is actuated. The Merkur AA fluid pump may begin cycling.

Maintenance 10: Color Change Valves Reset and Test

View the color change valve actuation counts, reset those counts, and test the valves.

1 / Air: Cycles for solenoid 1, the air valve.

10 / Flush: Cycles for solenoid 10, the flush valve.

2 / Dump: Cycles for solenoid 2, the dump valve.

Maintenance 11: Color Change Valves Reset and Test

View the color change valve actuation counts, reset those counts, and test the valves.

11 / Color 1: Cycles for solenoid 11, the valve for color 1.

3 / Color 2: Cycles for solenoid 3, the valve for color 2.

12 / Color 3: Cycles for solenoid 12, the valve for color 3.

Maintenance 12: Color Change Valves Reset and Test

View the color change valve actuation counts, reset those counts, and test the valves.


4 / Color 4: Cycles for solenoid 4, the valve for color 4.

13 / Color 5: Cycles for solenoid 13, the valve for color 5.

5 / Color 6: Cycles for solenoid 5, the valve for color 6.

Maintenance 13: Color Change Valves Reset and Test

View the color change valve actuation counts, reset those counts, and test the valves.

08/21/20 09:55		←	Calibrate	Maint.	Advanced	→
Standby		No Active Errors				
		Color Change Valves Reset and Test				↑
14 / Color 7		cycles				10
6 / Color 8		cycles				11
15 / Color 9		cycles				12
						13
						14
						15
						1
						↓


14 / Color 7: Cycles for solenoid 14, the valve for color 7.

6 / Color 8: Cycles for solenoid 6, the valve for color 8.

15 / Color 9: Cycles for solenoid 15, the valve for color 9.

Maintenance 14: Color Change Valves Reset and Test

View the color change valve actuation counts, reset those counts, and test the valves.

08/21/20 09:55		←	Calibrate	Maint.	Advanced	→
Standby		No Active Errors				
		Color Change Valves Reset and Test				↑
7 / Color 10		cycles				11
16 / Color 11		cycles				12
8 / Color 12		cycles				13
						14
						15
						1
						2
						↓


7 / Color 10: Cycles for solenoid 7, the valve for color 10.

16 / Color 11: Cycles for solenoid 16, the valve for color 11.

8 / Color 12: Cycles for solenoid 8, the valve for color 12.

Maintenance 15: Color Change Valves Reset and Test

View the color change valve actuation counts, reset those counts, and test the valves.

08/21/20 09:56		←	Calibrate	Maint.	Advanced	→
Standby		No Active Errors				
		Color Change Valves Reset and Test				↑
17 / Color 13		cycles				12
9 / Color 14		cycles				13
18 / Color 15		cycles				14
						15
						1
						2
						3
						↓

17 / Color 13: Cycles for solenoid 17, the valve for color 13.

9 / Color 14: Cycles for solenoid 9, the valve for color 14.

18 / Color 15: Cycles for solenoid 18, the valve for color 15.

System Screen

09/30/20 10:12	←	Advanced	System	Pumps	→
Off		No Active Errors			



Pump Ratio: : 1
 Gun Flush Box: ☐
 Fill Start Delay: sec
 Ground Rod Delay: sec
 Color Change: ☒ Colors
 Dump Enable: ☐
 Restart System: ☐

Pump Ratio: The relationship between the air pressure supplied and the resulting fluid pressure. Choose 30:1 or 15:1 depending on the size of the Merkur AA fluid pump in the system.

Gun Flush Box: Enable if using a gun flush box.

Fill Start Delay: The number of seconds that the system waits after the gun trigger is released before it lowers the isolation valve (G) and the system discharges.

During the course of a spraying operation, the operator may need to briefly release the gun trigger before painting another part. Increase the time if you want the charge to last longer after the gun trigger is released. (Default: 3 seconds.)

The length of time between when the gun trigger is released and system discharge is a combination of

two settings: the Ground Rod Delay time and the Fill Start Delay time.

For example, if the Fill Start Delay is set to 7 and the Ground Rod Delay is set to 5:

1. The gun trigger is released.
2. After 5 seconds the ground rod lowers.
3. In 2 more seconds the isolation valve lowers.

The actual time that the system takes to discharge depends on these settings, the gun type, and the hose length.

Ground Rod Delay: The number of seconds that the system waits after the gun trigger is released before it lowers the ground rod (N), instantly dissipating the charge.








Color Change: Select this box to enable color change capability.

Colors: Select the number of colors that will be used. A system with six color change valves allows 3 colors. A system with 18 color change valves allows 15 colors.

Dump Enable: Select this box if the dump valve is connected to a hose that empties into a waste container. If the dump valve is not connected to a hose, the remaining contents from the isolation fluid pump will spill out of the system.

Restart System: Select this box to restart the entire system. This is primarily used for initiating a token software update without manually cycling the power.

Maintenance

									
<p>Servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly. Moving parts, such as the isolation valve, can cut or amputate fingers.</p> <ul style="list-style-type: none"> • Do not service this equipment unless you are trained and qualified. • To reduce the risk of injury, follow the Pressure Relief Procedure, page 31 before checking, servicing, or repairing any part of the system and whenever you are instructed to relieve the pressure. • Comply with all local codes and regulations. <p>To reduce the risk of fire, explosion, or electric shock, before flushing or servicing the system:</p> <ul style="list-style-type: none"> • Follow the Fluid Voltage Discharge and Grounding Procedure, page 29, and turn OFF (O) the ES On-Off switch before flushing, checking, or servicing the system and whenever you are instructed to discharge the voltage. • Clean all parts with a non-flammable fluid as defined under Models, page 5. • Do not touch the gun nozzle or come within 4 in. (102 mm) of the nozzle during gun operation or until you perform the Fluid Voltage Discharge and Grounding Procedure, page 29. 									


Routine Maintenance

Before performing any maintenance task, prepare the system for service. Follow the [Prepare the System for Service, page 71](#).

Table 8 Service Interval Chart

Maintenance Task	Daily	Weekly
Flush the system regularly. Follow the steps in Flush the System (Systems without Color Change), page 33 or Flush the System (Color Change Enabled Systems), page 35 . Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing equipment, before repairing equipment.	✓	
Check for fluid leaks. Follow the steps in Check for Fluid Leaks, page 71 .	✓	
Wipe off any build-up off of the isolation valve components.	✓	
Check the level of the wash fluid to make sure that it is above the minimum line marked on the wash fluid bottle. Fill or replace, if necessary. Follow the Replace the Wash Fluid, page 72 .	✓	
Clean the gun. See your gun manual.	✓	
Perform a pump stall test. Follow the Pump Stall Test Procedure, page 64 . Perform task any time fluid is seen at the weep holes on the isolation fluid pump, or any time the pump is serviced.		✓
Check the bleed resistor. Follow the steps in Check the Bleed Resistor, page 73 .		
For maintenance of the Merkur AA fluid pump, reference manual 312794. See Related Manuals, page 3 .		

Prepare the System for Service

1. Discharge the voltage in the system. Follow the [Fluid Voltage Discharge and Grounding Procedure](#), page 29.
2. Flush the system. See [Flush the System \(Systems without Color Change\)](#), page 33 or [Flush the System \(Color Change Enabled Systems\)](#), page 35.
3. Relieve the pressure in the system. Follow the [Pressure Relief Procedure](#), page 31.
4. Press the Stop button  on the control interface and unplug the power cord (Y).
5. Service the component or perform the maintenance task.

Check for Fluid Leaks

Check for fluid leaks daily.

NOTICE

Any fluid leaking or pooling inside the system can cause low system voltage or arcing that damages system components. Clean and dry leaks.

1. Prepare the isolation system for service. Follow the steps in [Prepare the Isolation System for Service](#), page 93.
2. Use a flat blade screwdriver to open the isolation cabinet door.
3. Slide the electrostatic shield (82) up to remove.
4. Slide the electrostatic shield (12) to the left to remove.
5. To remove the isolation valve cover (99), loosen the top and bottom screws (99a).
6. Inspect the following locations in the isolation cabinet:
 - Connection to the fluid outlet hose (E) and the hose connection to the fluid filter (131) inside the AA system.
 - Inlet valve (F).
 - Isolation valve (G).
 - Wipe any build-up off of the isolation valve components (211, 222).

NOTICE

Fluid build-up on the isolation valve components can cause seal damage that results in fluid leaks.

- Check the level of the wash fluid. The level should be above the minimum line marked on

the wash fluid bottle. Leaking isolation valve seals can cause the wash fluid level to change.

- Connections to the isolation fluid pump (K) and the inlet at the bottom of the Merkur AA fluid pump (L).
- Fluid weep hole (WH). If the fluid seal has broken, fluid eventually fills up behind the piston and causes fluid to leak out of the weep hole on the left.

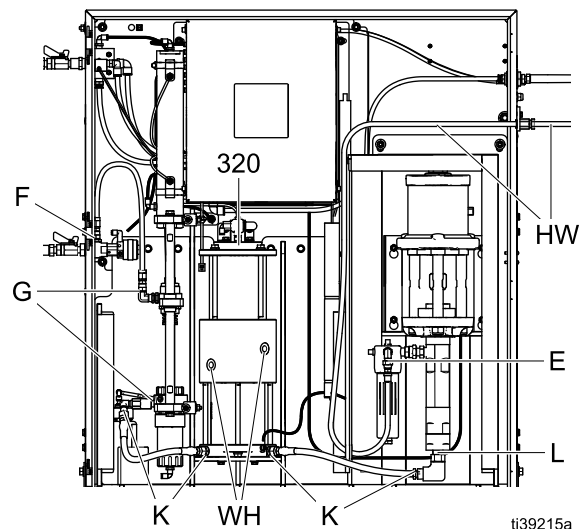


Figure 31 Inspect for Fluid Leaks

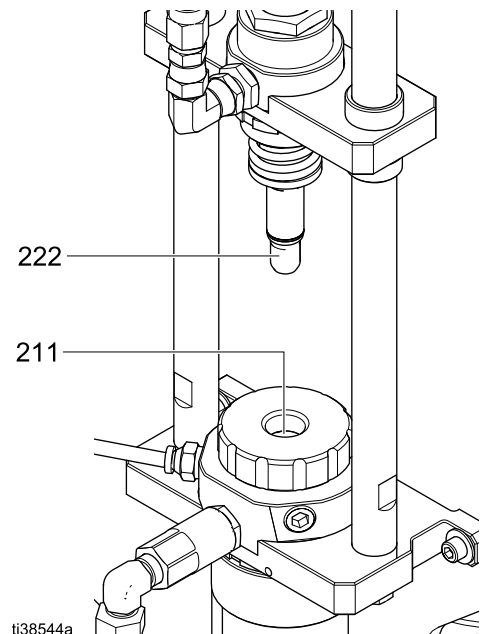


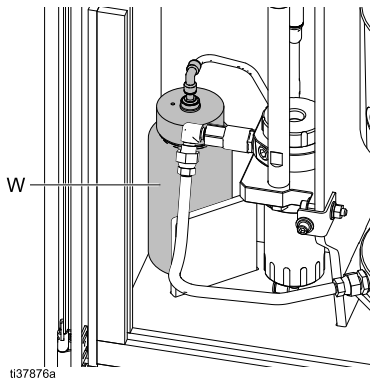
Figure 32 Wipe Off Isolation Valve Components

7. Inspect the fluid hose (HW). Check for any leakage or bulges in the outer cover which may indicate an internal leak.
8. Inspect the gun for fluid leaks. See your gun manual.

Replace the Wash Fluid

Check the wash fluid bottle level. If the level changes, service the isolation valve seals.

1. Prepare the isolation system for service. Follow the [Prepare the Isolation System for Service, page 93](#).
2. Use a flat blade screwdriver to open the cabinet.
3. Slide the electrostatic shield (82) up to remove.
4. Slide the electrostatic shield (12) to the left to remove.
5. To remove the isolation valve cover (99), loosen the top and bottom screws (99a).
6. Disconnect the push-to-connect tube from the bottle cap of the wash fluid bottle (W).
7. Lift the sealed wash fluid bottle (W) out of the system. Fill it with clean HydroShield cleansing solution above the minimum line marked on the bottle. Replace it in the cabinet.



8. Reconnect the push-to-connect tube to the bottle cap of the wash fluid bottle (W).
9. Replace the isolation valve cover (99) and tighten the top and bottom screws (99a).
10. Verify that the electrostatic shields (12 and 82) are in place, and then close and latch the cabinet door.

Check and Lubricate the Ground Rod

1. Check the ground rod (18):
 - a. Use Maintenance screen 5 to raise and lower the ground rod. See [Maintenance 5: Misc Valve Resets and Test, page 65](#).
 - b. Activate the ground rod to raise it and deactivate it to lower it several times. Listen for the sound of the ground rod making contact when raising and lowering. In both cases, the ground rod should fully retract or extend in less than 2 seconds.
2. If the ground rod takes more than 2 seconds to fully retract or extend, use the following steps to lubricate the cylinder.
3. Relieve pressure in the system. Follow the [Pressure Relief Procedure, page 31](#).
4. Slide the electrostatic shield (82) up to remove.
5. Slide the electrostatic shield (12) to the left to remove.
6. Lubricate the ground rod (18):
 - a. Clip the tie straps that hold the bleed resistor (24) and ground rod together.
 - b. Remove the two screws (124), lock washers (22), flat washers (19), and spacers (123) that hold the ground rod to the back panel.
 - c. Tip the ground rod forward and put 5 drops of lubricating oil in the small air exhaust hole at the top of the cylinder.
 - d. To reassemble, tip the ground rod back into the cabinet. Reattach the screws (124), lock washers (22), flat washers (19), and spacers (123). Fasten new tie straps around the bleed resistor and ground rod.
 - e. This process may move the wires at the bottom of the components. After the reassembly is complete, check the continuity between the fluid pressure regulator, bleed resistor, and ground rod.
7. Reinstall electrostatic shields (12 and 82) inside the cabinet.
8. Close the enclosure doors and reapply pressure to the system.
9. Repeat step 1. Activate the cylinder 10 times and then verify that the cylinder speed is less than 2 seconds.

Check the Bleed Resistor

The bleed resistor (24) is used to help discharge the system voltage and to measure system performance. If the displayed voltage appears to be inaccurate, use the following procedure to check the resistance value of the bleed resistor.

Use megohmmeter Part No. 241079 (AB) and an applied voltage of 500 V.



1. Prepare the isolation system for service. See [Prepare the Isolation System for Service, page 93](#).
2. Use a flat blade screwdriver to open the isolation cabinet door.
3. Slide the electrostatic shield (12) up to remove.
4. Slide the electrostatic shield (12) to the left to remove.
5. Follow the wire from the top of the bleed resistor (24) to the kV board (428) and loosen the terminal screw to remove the wire.
6. Attach the positive lead of the megohmmeter to the wire and touch the negative lead to the threaded stud at the bottom end of the bleed resistor (24).
7. Measure the resistance. The resistance should be between 9 and 11 Gigohms.
 - If the value is inside the range, then calibrate the bleed resistor. Follow the procedure in [Calibrate the Bleed Resistor, page 62](#).
 - If the value is lower than 9 Gigohm or higher than 11 Gigohm, then replace the resistor.
8. Reattach the wire in the terminal screw.
9. Reinstall electrostatic shields (12 and 82) inside the cabinet.
10. Close the cabinet door and use a flat blade screwdriver to secure the door shut.




Check the Door Switch

A door switch interlock automatically discharges the system voltage any time the door on the isolation cabinet (1) is open. Use this procedure to determine whether the door switch is working properly.

1. Navigate to Maintenance screen 5 and activate the grounding rod (N). See [Maintenance 5: Misc Valve Resets and Test, page 65](#).
2. Manually depress the door switch. If you hear the ground rod retract and extend within a few seconds, the door switch is working properly.



Troubleshooting

				
<p>Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.</p> <p>Follow the Fluid Voltage Discharge and Grounding Procedure, page 29, before checking or servicing the system and whenever you are instructed to discharge the voltage.</p>				

				
<p>To reduce the risk of an injury, follow the Pressure Relief Procedure, page 31, whenever you are instructed to relieve the pressure.</p>				

General Troubleshooting

Problem	Diagnosis	Solution
Prime		
The system does not prime.	Incorrect mode.	<ol style="list-style-type: none"> 1. Change to Prime mode. 2. Trigger the gun. 3. Turn on the fluid supply and check the incoming fluid pressure.
	Inlet valve is off or stuck.	<p>Test the inlet valve using Maintenance screen 5 as described in Maintenance 5: Misc Valve Resets and Test, page 65.</p> <p>Service the solenoid valve or fluid valve. See Replace a Solenoid Valve, page 109.</p>
	The isolation fluid pump is not calibrated and is not showing as being empty.	Calibrate the pump and try Prime mode again. See Calibrate the Pump, page 61 .
	The fluid pressure supplied to the system is too low.	Increase the supply fluid pressure. Maximum is 100 psi (0.7 MPa, 7.0 bar).
	The fluid pressure to the gun is set to zero or very low.	Adjust the gun fluid pressure setting.
Fluid leaks appear.	Seals are worn or there are loose connections.	See Check for Fluid Leaks, page 71 to locate and correct.

Problem	Diagnosis	Solution
Spray		
The system does not fill.	The system thinks the gun is triggered. An air flow switch signal is seen as being ON.	<p>Check for debris in the air flow switch that may be keeping the switch open.</p> <p>Check for air leaks that may be causing air flow. Check for air leaks at the gun, the hose, or the fittings inside the system.</p>
	The Do Not Fill button  is activated.	Deactivate the Do Not Fill button  on the Home Screen. See Home Screen, page 49 .
	The system is in the wrong mode.	Change to Spray mode.
	The Fill Start Delay setting is long.	Change the Fill Start Delay value as described in System Screen, page 69 .
	The isolation valve does not travel or engage.	Test the isolation valve and travel. See Maintenance 3: Shuttle Valve Resets and Test, page 64 .
	Max Fill setting or Start Fill setting is not accurate.	Adjust Max Fill and Start Fill settings, as described in Pump Screen 1: Pump Volume, page 58 .
	Inlet valve is off or stuck.	<p>Test valve using Maintenance screen 4. See Maintenance 4: Fluid Valve Resets and Test, page 65.</p> <p>Service the solenoid valve or the fluid valve. See Replace a Solenoid Valve, page 109.</p>
	The isolation valve is blocked.	See Service the Isolation Valve, page 94 .
	The check valve is blocked.	See Service the Isolation Valve, page 94 .
System is slow to fill.	The Fill Start Delay setting is long.	Change the Fill Start Delay value as described in System Screen, page 69 .
	Low incoming fluid pressure.	<p>Check incoming fluid pressure during the fill. Limit fluid pressure drop in the supply during fill by limiting supply hose length or increasing supply hose diameters.</p> <p>Turn the fluid pressure up as high as possible without exceeding the maximum limit: 100 psi (0.7 MPa, 7.0 bar).</p>
	Material viscosity is high.	Manage incoming material viscosity.

Problem	Diagnosis	Solution
The system does not spray.	<ol style="list-style-type: none"> 1. The system is not in Spray mode. 2. The isolation fluid pump is empty and there is no material to spray. 3. The fluid pressure is too low or zero. 4. The ball valve (39) at the fluid pressure regulator (21) is closed. 5. The air flow switch is stuck shut or does not recognize air flow. 	<ol style="list-style-type: none"> 1. Change to Spray mode. 2. Give the system time to fill before trying to paint. 3. Increase the gun fluid pressure on the Home screen or Preset screen. 4. Open the manual ball valve (39) attached to the fluid pressure regulator (21). 5. Use the control interface to increase the air pressure. If that does not increase the air pressure, check for debris that is keeping the air flow switch stuck shut. <p>Note</p> <p>Check the Status screen to see if the system detects the gun trigger. See Status Screen 1, page 54.</p>
Air is in the fluid.	Entering Spray mode before the system is primed.	Enter Spray mode after priming the system.
Improper spray pattern or gun operation problem.	Issue with spray gun setup or maintenance.	Refer to your gun manual.
No fluid when gun is triggered (or wrong fluid pressure).	System is in Standby mode.	Change to Prime, Purge, or Spray mode.
	Issue with the regulator that sends air to drive the fluid pressure regulator (21).	<ul style="list-style-type: none"> • Set the gun fluid pressure on the Home screen or Preset screen. • Check the electro/pneumatic regulator (V2P) (415) function using Maintenance screen 9. See Maintenance 9: V/P, page 67.
No air (or low air) at the gun when gun is triggered.	Incorrect system mode selection.	Change to Spray mode.
	Issue with the system gun air regulator.	<ul style="list-style-type: none"> • Set the gun air pressure on the Home screen or Preset screen. • Check the electro/pneumatic regulator (V2P) (415) function using Maintenance screen 9. See Maintenance 9: V/P, page 67.
Poor wrap.	Low spraying voltage.	Increase the air pressure or the voltage setting for the gun.
	Issue with spray gun setup or maintenance.	Refer to your gun manual.

Problem	Diagnosis	Solution
Low or no spraying voltage.	<ul style="list-style-type: none"> The ground rod (18) is not raising. The isolation valve (227) is not raising. The components or cabinet (9) is dirty. The electrostatic shield (12) is not in place. 	See Voltage Loss Troubleshooting, page 79 .
	Air Flow Switch does not recognize the gun trigger and does not raise the ground rod.	Use the Status screen to see whether the system detects the gun trigger. See Status Screen 1, page 54 .
	Incorrect voltage level display	<p>Check system voltage using a probe (236003).</p> <p>Calibrate the bleed resistor as described in Calibrate the Bleed Resistor, page 62.</p> <p>Check or replace the kV board as described in Replace a kV Board, page 109.</p>
Voltage is still present at the gun after the trigger is released.	Ground Rod Delay setting.	Adjust the Ground Rod Delay setting on the System screen. See System Screen, page 69 .
	The ground rod (18) does not lower.	Follow the procedure in Check and Lubricate the Ground Rod, page 72 .
Voltage is still present at the gun after following the Fluid Voltage Discharge and Grounding Procedure, page 29 .	Air pocket in the fluid line leaves fluid isolated near the gun.	Determine cause and correct. Purge air from the fluid line.
	Issue with the door switch.	Check the door switch as described in Check the Door Switch, page 73 .
Paint goes backward toward the paint supply.	Faulty inlet valve and check valve.	<p>With the shuttle down, test the Shuttle Fluid In, Pump Fluid In, and Pump Pressure valves individually on Maintenance Screen 4. If fluid is in valves at the same time as there is pump pressure, this can result in fluid back-flowing if a check valve is not present.</p> <p>See Maintenance 4: Fluid Valve Resets and Test, page 65.</p> <p>Check for a leaky check valve.</p>

Problem	Diagnosis	Solution
Other issues		
Paint build-up on the isolation valve stem.	<ol style="list-style-type: none"> 1. Dirty wash fluid can no longer clean properly. 2. The U-cup seals are not wiping the isolation valve stem clean. 3. The isolation valve stem (222) o-ring is not sealing fully. 	<ol style="list-style-type: none"> 1. Follow the steps in Replace the Wash Fluid, page 72. 2. Replace wash fluid U-cups as seen in repair section. 3. Replace the isolation valve stem o-ring as described in Replace the Isolation Valve Stem O-rings, page 99.

LED Diagnostic Information

The following LED signals, diagnoses, and solutions apply to the control interface.

LED Status Signal	Diagnosis	Solution
Green on	The system is powered up.	—
Yellow	Internal communication is in progress.	—
Red solid	Hardware failure.	Replace module.
Red flashing fast	Software is uploading.	—
Red flashing slow	Token error	Remove token and upload the software token again.
Red flashes three times, pauses, and then repeats	Invalid rotary switch position (FCM and CGM only)	Change the rotary switch position on the control module (inside the air or speed controller) to a valid position, and then restart the system.

Troubleshooting the Control Interface

Problem	Cause	Solution
The control interface is not on.	Power is not on.	Turn power supply on.
	Loose or disconnected CAN cable.	Tighten or connect CAN cable.
The control interface has power but does not function.	Hardware failure.	Replace.
Red module status LED stays on constantly even after power cycle.	Hardware failure.	Replace.

Voltage Loss Troubleshooting

Normal spraying voltage for a system is 45-55 kV. The system voltage is lower than the rated voltage due to spraying current demands and normal isolation system losses.

A loss of spraying voltage can be caused by a problem with the spray gun, the fluid hose, or the voltage isolation system, since all of the system components are electrically connected through the conductive, waterborne fluid.

Note

It is important to keep the inside of the isolation cabinet clean. If the exterior of the isolation fluid pump (K), the isolation valve connecting rods (225), or plastic walls of the cabinet (9) are dirty, voltage will be lost along those paths.

1. Check the isolation system for fluid leaks as described in [Check for Fluid Leaks, page 71](#).
2. Check for connections between high voltage components and grounded components within the isolation system. The figure in [Troubleshooting HydroShield Voltage, page 80](#) identifies the high voltage, the isolation, and the grounded components.
3. Verify that the inlet air supply pressure is above the minimum required 70 psi (0.5 MPa, 4.8 bar) and the inlet air status bar is green. The air inlet field appears on the Home screen. See [Home Screen, page 49](#).
4. Follow the troubleshooting procedure listed in the spray gun manual 3A7503.
5. Dispense enough fluid to expel any air pockets from the fluid line.
6. Verify that the electrostatic shields (12 and 82) are in place, and then close and latch the cabinet door.
7. Put the system in Spray mode. Trigger the gun with the electrostatics on by turning the ES

ON/OFF valve to the ON position. Look at the Volt Level display on the Home screen to see the spraying voltage. Under normal conditions, the spraying voltage should be between 45 and 55 kV. If the display shows 0 kV then continue with the next step. If the voltage is above 0 but lower than expected, continue with step 10.

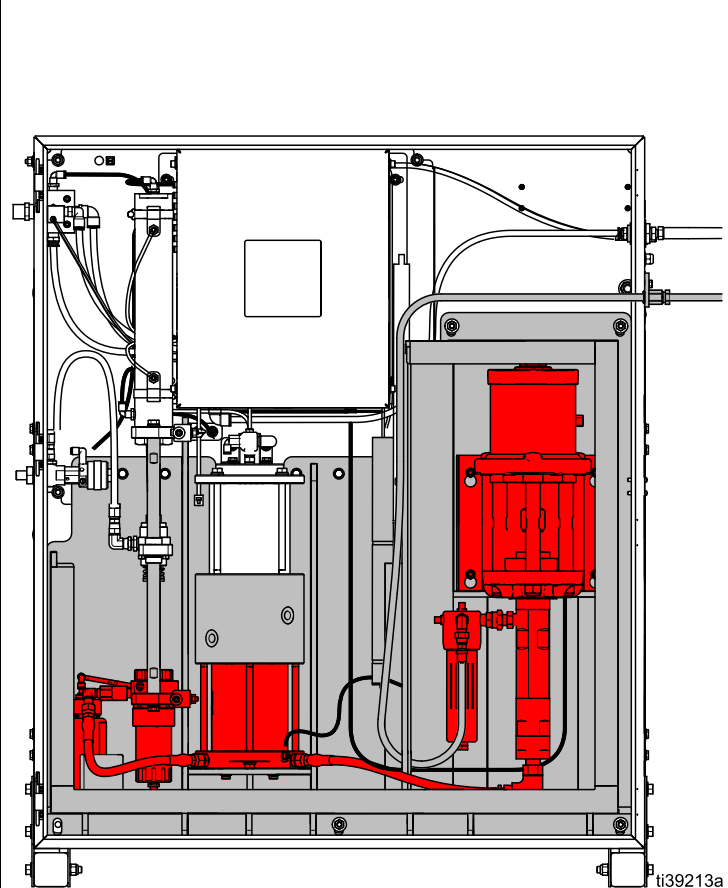
8. If the system is completely shorted out (0 kV) the fault may be with the mechanical operation of the isolation valve, grounding rod, or door switch. Open the cabinet door and go to the maintenance screens on the control interface.
 - Activate the shuttle down and shuttle up valves and verify that the shuttle travels up and down smoothly. See [Maintenance 3: Shuttle Valve Resets and Test, page 64](#) to activate the shuttle.
 - Activate the ground rod and make sure the cylinder is retracting fully. (See [Maintenance 5: Misc Valve Resets and Test, page 65](#).) If both cylinders are working properly, then continue with the next step.

Note

For the ground rod to activate, either the cabinet door must be closed or the door switch must be manually switched.

9. Verify that the door switch is working properly. Follow the procedure in [Check the Door Switch, page 73](#).
10. If the kV is low, verify the accuracy of the kV meter. Use a high voltage measurement probe to measure the kV at the spray gun electrode. The readings should be within a few kV. If they are not, proceed to the next step.
11. Leakage internal to the isolation fluid pump could also cause voltage loss. Check the pump weep holes (WH) in the middle housing (307) for fluid leaks. Service the pump if needed.
12. If voltage is still low, retest the gun and hose.

Troubleshooting HydroShield Voltage

<p>Grounded components:</p> <ul style="list-style-type: none"> • The cabinet. • All the parts mounted in the top half of the cabinet. • The top of the isolation valve. • The fluid inlet valve and hose. • The air section of the isolation fluid pump. • The air cylinder of the ground rod. • The top of the bleed resistor. • The shield of the fluid hose. 	 <p>ti39213a</p>
<p>Isolation components:</p> <ul style="list-style-type: none"> • The tie rods of the isolation valve. • The middle section of the isolation fluid pump. • The body of the bleed resistor. • The body of the ground rod. • The plastic enclosure and stand. • The electrostatic shield that slides in the front. • The waterborne fluid hose. 	
<p>All the fluid components are high voltage:</p> <ul style="list-style-type: none"> • The wash fluid bottle. • The bottom of the isolation valve. • The bottom of the isolation fluid pump. • The fluid hoses. • The ball valve and fluid regulator. • The bottom of the bleed resistor. • The ground rod. 	

Grounded components: unshaded

Isolation components: gray

High voltage: red/dark

Troubleshooting Color Change Solenoid Valves

All color change solenoid valves may be exercised individually for diagnostic purposes through the control interface starting with Maintenance screen 10.

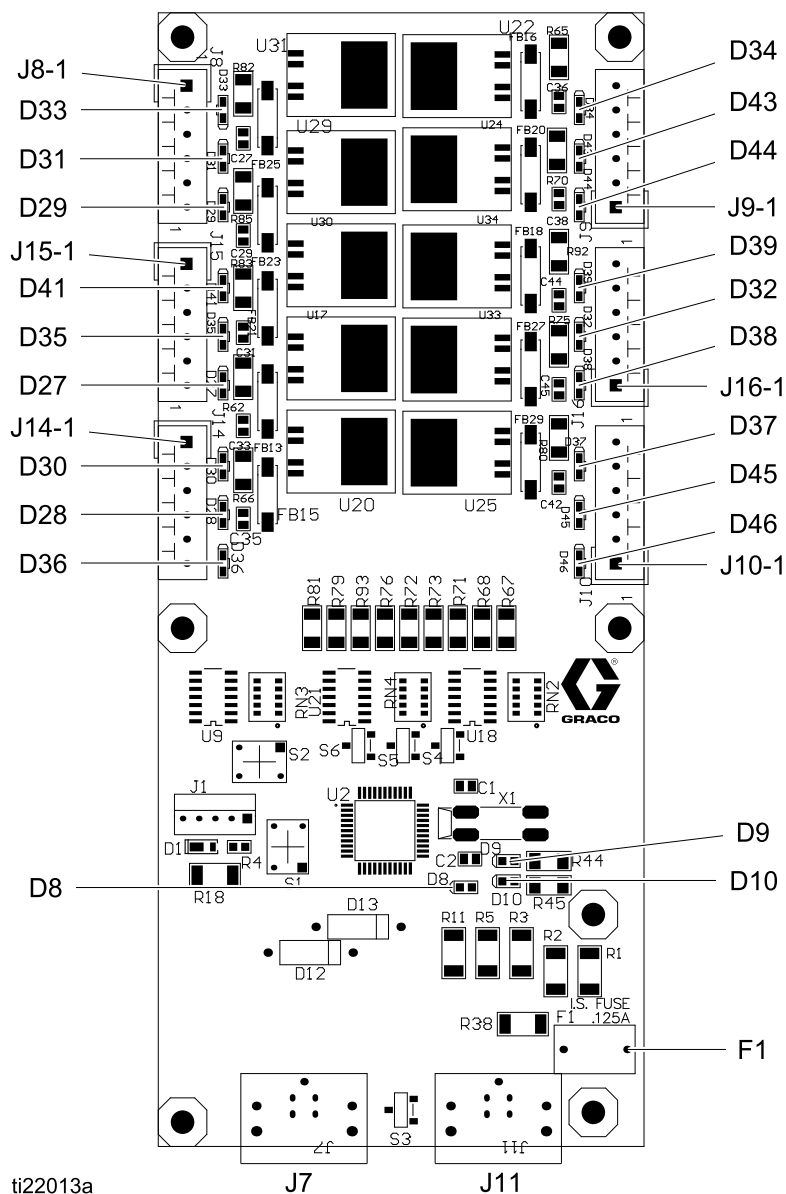
Cause	Solution
1. Air regulator pressure set too high or too low.	Check that air pressure is at least 85 psi (0.6 MPa, 6.0 bar). Do not go above 100 psi (0.7 MPa, 7.0 bar).
2. Air or electrical lines damaged or connections are loose.	Visually inspect air and electrical lines for kinks, damage, or loose connections. Service or replace as needed.
3. Solenoid failure.	<p>Check the applicable solenoid's LED; see Color Change Board, page 82. If lit, proceed with the following checks. If not lit, go to Cause 4.</p> <p>Remove the connector for the applicable solenoid and measure voltage across the pins on the board:</p> <ul style="list-style-type: none"> • In a non-hazardous location, replace the solenoid if voltage is 24 Vdc. <p>Test the valves as explained under the maintenance screens. Valves should open and close quickly. If the valves actuate slowly, it could be caused by:</p> <ul style="list-style-type: none"> • Air pressure to the valve actuators is too low. See Cause 1. • Solenoid is clogged. Make sure the air supply has a 5 micron filter installed. • Something is restricting the solenoid or tubing. Check for air output from the air line for the corresponding solenoid when the valve is actuated. Clear the restriction.
4. Control board or cable failure.	<p>If there is no voltage across the pins on the board or it is less than 9 Vdc, check LEDs D8, D9, and D10. If they are lit and functioning properly, or other solenoids in the module are working properly, replace the color change board.</p> <p>If D9 is not lit:</p> <ul style="list-style-type: none"> • Verify the condition of the fuse (F1) and replace if necessary. See Replace the Color Change Board Fuse, page 111. • Check if the cable is disconnected or damaged. <p>If D8 is not blinking:</p> <ul style="list-style-type: none"> • Cycle the system power. • Check if the cable is disconnected or damaged. <p>If D10 is not occasionally blinking:</p> <ul style="list-style-type: none"> • Check if the cable is disconnected or damaged.

Color Change Board

NOTICE

To avoid damaging the circuit boards, wear Part No. 112190 grounding strap on your wrist and ground appropriately.

To avoid electrical component damage, remove all system power before plugging any connectors.



ti22013a

Figure 33 Color Change Board

Table 9 Color Change Board Diagnostics

Component or Indicator	Description	Diagnosis
D8	LED (green)	Blinks (heartbeat) during normal operation.
D9	LED (green)	Turns on when power is supplied to the board.
D10	LED (yellow)	Turns on when board is communicating with electronic control.
D27–D39, D41, D43–D46	LED (green)	Turn on when a signal is sent to actuate the related solenoid valve.
F1	Fuse, .500 A, 125 V	Used on the 25D312 board. This board is used in the electronics control (14) and the color change control module 25D313-25D327.

Error Codes

System errors alert the operator of a problem in the system. When any error occurs:

- Error buzzer sounds (unless operating in silent mode).
- An error popup screen displays the active error code.
- The Status bar displays the active error code.

The error is saved in the error or event log.

There are four types of error: Alarm, Deviation, Advisory, and Record.

If an **Alarm** occurs, operation stops and an error is recorded in the system.

A **Deviation** records an error in the system but does not shut down the equipment. The deviation must be acknowledged by the user.

An **Advisory** records an event in the system and clears itself after 60 seconds.

A **Record** saves relevant system events in the background. This information can be reviewed on the Error Log Screen.

To Clear Error and Restart

When a deviation or alarm occurs, be sure to determine the error code before resetting it. Go to the Events Screen to view the last 200 errors, with date and time stamps. See [Events Screen, page 54](#).

If an alarm has occurred, correct the cause before resuming operation.

To acknowledge a deviation or clear an alarm, press



Table 10 Control Interface Errors

Code	Type	Name	Description	Solution
EVUX	Advisory	USB Disabled	User installed a USB device in the USB port when USB downloads were disabled.	Go to Advanced Screen 3 and check the field for Enable USB Downloads/Uploads, as described in Advanced Screen 3, page 60 .
WSUX	Advisory	USB Configuration Error	USB configuration file does not match expected; checked on startup.	Reinstall software. Follow the steps in Update the System Software, page 45 .
WXUU	Advisory	USB Upload Error	User installed an incompatible USB device in the Control Interface USB port.	Repeat the process with a compatible USB device.
WXUD		USB Download Error		
WX00	Alarm	Software Error	An unexpected software error has occurred.	Call Graco technical support.

Table 11 Communications Errors

Code	Type	Name	Description	Solution
CAD1	Alarm	Communication Error Fluid Panel	The control interface has lost communication with the fluid panel or FCM cube.	<ul style="list-style-type: none"> • Verify the CAN connection on the system. See Connect the CAN Cables, page 21. • Verify the CAN connection on the FCM cube (412). • The FCM has an incorrect CAN ID. • Check the status LEDs on the FCM cube (412). • Cycle power off and on.
CAC1	Alarm	Communication Error Solenoid Controller	The control interface has lost communication with the solenoid controller.	<ul style="list-style-type: none"> • Verify the CAN connection on the system. See Connect the CAN Cables, page 21. • Verify the CAN connection on the solenoid controller board. • The solenoid controller board has an incorrect CAN ID. • Check the status LEDs on the solenoid controller board. • Cycle the power off and on.
CDD0	Alarm	Duplicate Fluid Panel	The system detects multiple fluid panels set to the same identifier.	<ul style="list-style-type: none"> • The fluid panel FCM has the same CAN ID as another module. • Adjust the selector switch on the control module. See Adjusting Selector Switch in manual 3A3954.
CDC0	Alarm	Duplicate Solenoid Controller	The system detects multiple solenoid controllers set to the same identifier.	<ul style="list-style-type: none"> • The solenoid controller has the same CAN ID as another module. • Adjust the selector switches on the solenoid controller board.
CAO1	Alarm	Communication Error Logic Controller	The system has lost communication with the control interface.	<ul style="list-style-type: none"> • Verify the CAN connection on the bottom of the control interface. • Check the status LEDs on the control interface. See LED Diagnostic Information, page 78.

Code	Type	Name	Description	Solution
CAC2	Alarm	Communication Error Solenoid Controller	The control interface has lost communication with the solenoid controller that is responsible for color change.	<ul style="list-style-type: none"> • Verify CAN connection on the system. • Verify CAN connection on the solenoid controller board. • Check status LEDs on solenoid controller board. • Cycle the power. • Adjust the selector switches on the solenoid controller board.
CDC1	Alarm	Duplicate Solenoid Controller	The system detects multiple solenoid controllers set to the same identifier.	<ul style="list-style-type: none"> • The solenoid controller has the same CAN ID as another module. • Adjust the selector switches on the solenoid controller board.

Table 12 HydroShield Errors

Code	Type	Name	Description	Solution
SIL0	Alarm	Pneumatic System Stop Activated	The system has been stopped using the pneumatic system stop input.	<ul style="list-style-type: none"> • Verify the wiring of the pneumatic system stop pressure switch. • Verify the integrated system installation intended to stop the HydroShield system.
SIL1	Alarm	Digital System Stop Activated	The system has been stopped using the digital system stop input.	<ul style="list-style-type: none"> • Verify the wiring of the pneumatic system stop optocoupler. • Verify the integrated system installation intended to stop the HydroShield system.
P6FX	Alarm	Inlet Air Removed	The system no longer detects inlet air.	Verify that the inlet air pressure is greater than 70 psi (0.5 MPa, 4.8 bar), that air flow is sufficient, and that the wiring on the pressure switch is connected.
PJ11	Alarm	Linear Sensor Failure	Linear sensor is not connected or is reading outside calibrated values.	<ul style="list-style-type: none"> • Verify that the linear sensor is connected. • Calibrate the linear sensor.
P611	Alarm	Gun Air V2P Feedback Error	System cannot detect feedback from air V2P.	<ul style="list-style-type: none"> • Verify that the air V2P is connected. • Verify that the air V2P has power.
P613	Alarm	Fluid V2P Feedback Error	System cannot detect feedback from fluid V2P.	<ul style="list-style-type: none"> • Verify that the fluid V2P is connected. • Verify that the fluid V2P has power.

Code	Type	Name	Description	Solution
N611	Alarm	Isolation Valve Timeout	Isolation valve was not detected in the expected position.	<ul style="list-style-type: none"> • Verify that the isolation valve moves using Maintenance 3: Shuttle Valve Resets and Test, page 64. • Verify that the top sensor is detected using Status screen, page 54. • Verify that the bottom sensor is detected using Status screen, page 54. • Verify that the sensors are connected.
N612	Alarm	Shuttle Top Timeout	Isolation valve was not detected in the expected position.	<ul style="list-style-type: none"> • Verify that the isolation valve moves using the Maintenance screen. • Verify that the top sensor is detected using the Status screen. • Verify that the bottom sensor is detected using the Status screen. • Verify that the sensors are connected.
F7P0	Alarm	Invalid Air Flow	Gun airflow is detected when it should be off.	<ul style="list-style-type: none"> • Determine if there is an air leak in the system. • Check the air flow switch. • Check Air V/P. • Contact Graco technical support.
SGD1	Alarm	Gun Flush Box Open	The gun flush box was left open when the system was trying to attempt a purge.	Close the gun flush box.

Table 13 Calibration Events

Code	Type	Name	Description	Solution
ENA1	Advisory	Linear Sensor Full Calibrated	System successfully calibrated Linear Sensor full reading.	Not applicable.
ENA2	Advisory	Linear Sensor Empty Calibrated	System successfully calibrated Linear Sensor empty reading.	Not applicable.
P511	Alarm	V/P Cal Failed Air	V/P calibration failed for the Air V/P	<ul style="list-style-type: none"> • Check V2P connections. • Verify V2P operation • Contact Graco technical support.
P513	Alarm	V/P Cal Failed Fluid	V/P Calibration failed for the Fluid V/P	<ul style="list-style-type: none"> • Check V2P connections. • Verify V2P operation • Contact Graco technical support.
EN11	Advisory	V/P Cal Air	Air V/P Calibration successful	Not applicable.
EN13	Advisory	V/P Cal Fluid	Fluid V/P Calibration successful	Not applicable.

Table 14 Maintenance Events

Code	Type	Name	Description	Solution
ENT1	Advisory	Stall Test Pass	System successfully completed a stall test.	Not applicable.
DF01	Advisory	Stall Test Full Fail	System failed the full stall test; did not stall when pump is full.	<ul style="list-style-type: none"> Check the system for leaks as described in Check for Fluid Leaks, page 71. Repeat the test as described in Maintenance 2: Pump Stall Test, page 63.
DG01	Advisory	Stall Test Empty Fail	System failed the empty stall test; did not stall when pump is near empty.	
MAD1	Advisory	Maint. Due Pump Volume	Maintenance is due on pump (volume).	<p>Perform maintenance and clear the associated maintenance counter.</p> <p>Stall test maintenance requires that a stall test be completed.</p> <p>For all maintenance counters, see Maintenance Screens, page 63.</p>
MAP1	Advisory	Maint. Due Pump Cycle	Maintenance is due on pump (cycle).	
MAT1	Advisory	Maint. Due Pump Stall Test	Maintenance is due on pump (stall test).	
MJ11	Advisory	Maint. Due Valve Shuttle Down	Maintenance is due on shuttle down valve.	
MJ21	Advisory	Maint. Due Valve Shuttle Up	Maintenance is due on shuttle up valve.	
MJ31	Advisory	Maint. Due Valve Shuttle Eject	Maintenance is due on shuttle eject valve.	
MJ41	Advisory	Maint. Due Valve Shuttle Fluid Inlet	Maintenance is due on shuttle fluid inlet valve.	
MJ51	Advisory	Maint. Due Valve Pump Fluid Inlet	Maintenance is due on pump fluid inlet valve.	
MJ61	Advisory	Maint. Due Valve Pump Pressure	Maintenance is due on pump pressure valve.	
MJ7X	Advisory	Maint. Due Valve Ground Rod	Maintenance is due on ground rod valve.	
MJ8X	Advisory	Maint. Due Valve GFB	Maintenance is due on the gun flush box.	
MCP1	Advisory	Maint. Due Isolation Valve	Maintenance is due on the isolation valve.	
MCD1	Advisory	Maint. Due Isolation Valve Seal	Maintenance is due on the isolation valve seal.	
MCS1	Advisory	Maint. Due Isolation Valve Wash Fluid	Maintenance is due on the isolation valve wash fluid.	
MEF#	Advisory	Maint. Valve Inlet X	Maintenance is due on color change valve x.	

Table 15 System Events

Code	Type	Name	Description	Solution
EL00	Record	System Power On	Record of power cycle (ON).	Not applicable.
EM00	Record	System Power Off	Record of power cycle (OFF).	Not applicable.
EC00	Record	Setup Value(s) Changed	Record of changing setup variables	Not applicable.
ES00	Advisory	Factory Defaults	Record of system settings being reset to factory defaults	Not applicable.
EB00	Record	Stop Button Pressed	Record of stop button press.	Not applicable.
WN0X	Alarm	Key Token Error	User installed incompatible key token.	Remove key token. Repeat process with compatible key token. Follow the steps in Update the System Software, page 45 .
WX00	Alarm	Software Errors	An unexpected software error has occurred.	Call Graco technical support.
WE00	Advisory	Ground Rod Failure	Hydroshield detects electrostatic voltage when the ground rod is down.	Check ground rod operation.








Table 16 USB Events

Code	Type	Name	Description	Solution
EAUX	Advisory	USB Busy	USB drive is inserted, download is in progress.	Not applicable.
EVUX	Advisory	USB Disabled	User installed a USB device in the USB port when USB downloads were disabled.	The configuration of the system is blocking data transfer. Go to Advanced Screen 3 and check the field for Enable USB Downloads/Uploads, as described in Advanced Screen 3, page 60 .
EBUX	Record	USB Drive Removed	USB drive was removed while downloading or uploading.	Configuration parameter on system is enabled to generate this advisory. Complete download to ensure no data is lost.
MMUX	Advisory	Maint. USB Logs Full	USB memory is more than 90% full.	Complete download to ensure no data is lost.
WSUX	Advisory	USB Config. Err.	USB configuration file does not match expected; checked on startup.	A software update was not completed successfully. Reinstall the software.
EQU0	Advisory	USB Idle	USB download completed, drive may be removed.	Remove the USB device.
EQU1	Record	USB Sys. Settings Downloaded	Settings were downloaded to USB drive.	Not applicable.
EQU2	Record	USB Sys. Settings Uploaded	Settings were uploaded to USB drive.	Not applicable.
EQU3	Record	USB Custom Lang. Downloaded	Custom language was downloaded to USB drive	Not applicable.
EQU4	Record	USB Custom Lang. Uploaded	Custom language was uploaded to USB drive.	Not applicable.
EQU5	Record	USB Logs Downloaded	Data logs were downloaded to USB drive.	Not applicable.
WXUD	Advisory	USB Download Err.	User installed an incompatible USB device in the USB port.	Repeat the process with a compatible USB device.
WXUU	Advisory	USB Upload Err.		

Table 17 Color Change Events

Code	Type	Name	Description	Solution
WSF0	Advisory	Rejected Inlet Change	User is unable to change color/inlet valve during operation and is notified via an advisory.	Changing of Color value is not allowed in Spray mode. Change to Off, Standby or Prime to change colors.
WSCX	Advisory	Invalid Presets	User decreases the number of color change valves, creating invalid presets. In this error code, the last digit X means system.	Confirm that the number of color valves is correct, and then correct presets with invalid colors See System Screen, page 69 and Presets, page 56 .
WSC0	Advisory	Invalid Preset Selected	User has invalid presets due to changing the number of color change valves and selects an invalid preset.	The color setting for the current preset is not correct. Confirm that the number of colors valves for the system matches the system setting, confirm that the current preset has the correct color setting. See System Screen, page 69 and Presets, page 56 .
WS##	Record	Invalid Preset ##	User has invalid presets due to changing the number of color change valves and selects and invalid preset. Records in which preset is invalid, ## is the Preset number.	Confirm that the number of color valves is correct, and then correct the presets that contain invalid colors. See System Screen, page 69 and Presets, page 56 .
WSFX	Alarm	Invalid Inlet Valve	User decreased the number of color change valves during system operation, resulting in an invalid selected inlet valve. In this error code, X means system.	Confirm that the number of color valves is correct, and then correct the presets that contain invalid colors. See System Screen, page 69 and Presets, page 56 .
L7F0	Advisory	Flush Fluid In Pump	Flush Fluid is still in the pump when entering Spray Mode.	Empty out the flush fluid from the pump then go back into Spray Mode.
DE00	Alarm	Purge Timeout	Pump volume did not change before the timeout expired.	Determine why the pump volume was not changing and restart the purge sequence. See Purge Screens 1–5, page 57 .

Repair

Servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly. Moving parts, such as the isolation valve, can cut or amputate fingers.


- Do not service this equipment unless you are trained and qualified.
- To reduce the risk of injury, follow the [Pressure Relief Procedure, page 31](#), before checking, servicing, or repairing any part of the system and whenever you are instructed to relieve the pressure.
- Comply with all local codes and regulations.

To reduce the risk of fire, explosion, or electric shock, before flushing or servicing the system:

- Follow the [Fluid Voltage Discharge and Grounding Procedure, page 29](#), and turn OFF (O) the ES On-Off switch before flushing, checking, or servicing the system and whenever you are instructed to discharge the voltage.
- Clean all parts with a non-flammable fluid as defined under [Models, page 5](#).
- Do not touch the gun nozzle or come within 4 in. (102 mm) of the nozzle during gun operation or until you perform the [Fluid Voltage Discharge and Grounding Procedure, page 29](#).

Prepare the Isolation System for Service

Before servicing any component inside the isolation cabinet, perform the following steps:

1. Discharge voltage in the system. Follow all of the steps in the [Fluid Voltage Discharge and Grounding Procedure, page 29](#).
2. Flush the system. See [Flush the System \(Systems without Color Change\), page 33](#) or [Flush the System \(Color Change Enabled Systems\), page 35](#).
3. Relieve pressure in the system. Follow the [Pressure Relief Procedure, page 31](#).
4. Press the Stop button  on the control interface and unplug the power cord (Y).
5. Service the component.

Service the Isolation Valve

Remove the Isolation Valve from the Cabinet

Use this procedure to remove the entire isolation valve (15) from the isolation cabinet for service.

1. Prepare the isolation system for service. See [Prepare the Isolation System for Service, page 93](#).
2. Use a flat blade screwdriver to open the isolation cabinet door.
3. Slide the electrostatic shield (82) up to remove.
4. Slide the electrostatic shield (12) to the left to remove.
5. To remove the isolation valve cover (99), loosen the top and bottom screws (99a).
6. Remove the isolation fluid pump for better access to the isolation valve mounting. Follow the steps in [Remove the Isolation Fluid Pump from the Cabinet, page 104](#).
7. Disconnect the wash fluid bottle (69).
8. Before removing the two sensors from the isolation valve, mark the location of each as a guide when reassembling.
9. Remove the sensors from the isolation valve:
 - a. Loosen the top clamp (101) and slide sensor bracket (102) free of the clamp.
 - b. Loosen the bottom clamp (101) and slide sensor bracket (102) free of the clamp.
10. Disconnect the three push-to-connect air line fittings (239) to the isolation valve: top, middle, bottom.
11. Remove the two fluid lines from the isolation valve:
 - a. Inlet npsm fitting (72).
 - b. Outlet hose (84) that connects to the outlet elbow (71). The outlet hose can also be removed from the isolation fluid pump (K).
12. Disconnect the isolation valve from the cabinet stand (9). On opposing sides of the cabinet stand, use a 3/16 inch Allen wrench and a 7/16 inch wrench to remove:
 - a. The front top and bottom hex nuts (23), lock washers (22), and flat washers (19) on the isolation valve cover bracket (98).
 - b. The back top and bottom hex nuts (23), lock washers (22), and flat washers (19).
13. Lift the isolation valve out of the cabinet.

Reinstall the Isolation Valve into the Cabinet

Use this procedure to reinstall the entire isolation valve (227) into the isolation cabinet after servicing.

NOTICE

Before reassembling, clean the cabinet of residual fluid.

1. Attach the isolation valve to the top of the cabinet stand (9):
 - a. Insert the two screws (54) through flat washers (19), the top block mount (224), and then insert into the top two holes of the cabinet stand (9).
 - b. Thread the washer (19), lock washer (22), and hex nut (23) onto the back screw.
 - c. The front screw (54) also holds the top bracket for the isolation valve cover (99). Slide the bracket (98) onto the front screw, followed by the washer (19), lock washer (22), and hex nut (23).

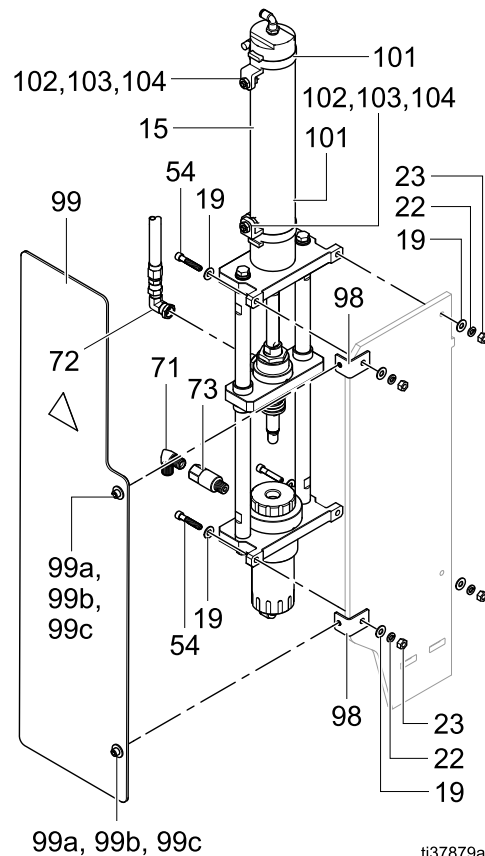


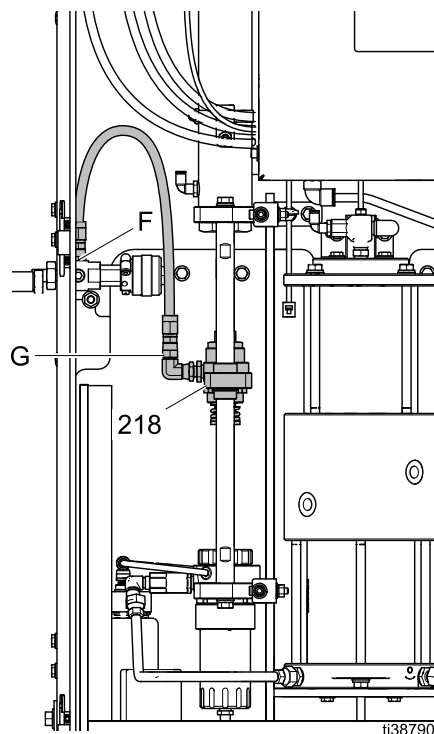
Figure 34 Attach Isolation Valve to Cabinet Stand

2. Attach the isolation valve to the bottom of the cabinet stand (9):
 - a. Insert the two screws (54) through flat washers (19), the base housing (201), and then insert into the bottom two holes of the cabinet stand (9).
 - b. Thread the washer (19), lock washer (22), and hex nut (23) onto the back screw.
 - c. The front screw also holds the bottom bracket for the isolation valve cover (99). Slide the bracket (98) onto the front screw, followed by the washer (19), lock washer (22), and hex nut (23).
- Tighten all 4 screws after they are installed.
3. Attach the inlet fluid tube, using one wrench to orient the elbow fitting (72) and one wrench to tighten it to the housing (218).
 4. If the outlet fluid fitting and/or the check valve were removed, reinstall using thread sealant. Position the outlet so that it is pointed down and slightly forward.

NOTICE

Orient the check valve to maintain air space between the fluid hose and other components.

5. Place the two clamps (101) over the top of the air cylinder (227) and attach the top sensor to the top clamp and the bottom sensor to the bottom clamp.
6. If the sensor positions were indicated during disassembly, attach the clamps into position. If the position was not indicated, follow the steps in [Adjust the Isolation Valve Sensors, page 96](#).
7. Fill the wash fluid bottle (W) with HydroShield cleansing solution above the minimum line marked on the bottle. Replace it in the cabinet. Reconnect the tube (91).
8. Reconnect the three push-to-connect air line fittings (239) to the isolation valve: top, middle, bottom. For connection details, see [Pneumatic Connections, page 114](#).
9. Before enclosing the isolation valve in the isolation valve cover (99), ensure that the isolation valve shuttle (218) has a clear path to travel up and down:
 - Make sure that there are no air lines or cables in the path of the shuttle.
 - Make sure that the flexible hose between the inlet valve (F) and the isolation valve (G) is not curled or hanging in the path of the shuttle. If necessary, loosen the fittings at each end, hold the hose in place as shown below, and retighten the fittings to ensure that the hose doesn't rub on anything.
10. Replace the isolation valve cover (99) and tighten the top and bottom screws (99a).
11. Reinstall the electrostatic shield (12) inside the cabinet.
12. Close the cabinet door and use a flat blade screwdriver to secure the door shut.



Adjust the Isolation Valve Sensors

When disassembling the isolation valve, you may have indicated the positions of the top and bottom valve sensors. If the positions were not indicated, use this procedure to determine the positions of the sensors.

1. Loosen nuts (104) and position the sensor (103) so that the face touches the air cylinder body. Tighten nuts (104).
2. Determine the location of the top sensor:
 - a. On the control interface, enter Off mode. Navigate to the Status menu.
 - b. Raise the isolation valve to the top position.
 - c. Position the sensor and watch the Status menu. When the Shuttle Top circle changes from gray to yellow, attach the clamp in that position.
3. Determine the location of the bottom sensor:
 - a. On the control interface, enter Standby mode. Standby mode drives the isolation valve to the bottom position.
 - b. Position the sensor and watch the Status menu. When the Shuttle Bottom circle changes from gray to yellow, attach the clamp in that position.

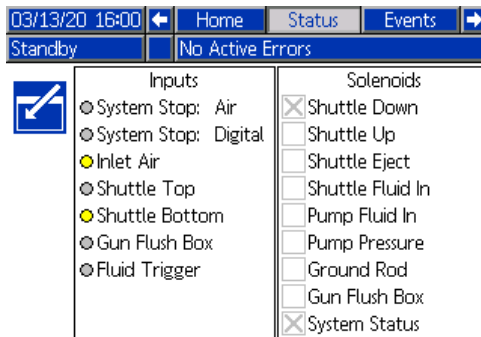


Figure 35 Isolation Valve Sensor Position on Status Menu

Replace an Isolation Valve Sensor

The isolation valve sensor can be replaced while the isolation valve is in the cabinet or while it is removed for service.

1. Remove the sensors from the isolation valve:
 - a. Loosen the top clamp (101) and slide sensor bracket (102) free of the clamp.
 - b. Loosen the bottom clamp (101) and slide sensor bracket (102) free of the clamp.
2. Disconnect the sensor wires from the splitter cable (447) inside the electronic control. See [Wiring Connections, page 116](#).
3. Install the replacement sensor (103) or sensor assembly kit 26B102.
4. Connect sensor wires to splitter cable (447) inside the electronic control. See [Wiring Connections, page 116](#).
5. Adjust the isolation valve sensors.

Disassemble the Isolation Valve Components

Use this procedure to disassemble the air cylinder (227), block mount (224), connecting rods (225), shuttle housing (218), and base housing (201).

1. Prepare the isolation system for service. See [Prepare the Isolation System for Service, page 93](#).
2. Remove the isolation valve from the cabinet. See [Remove the Isolation Valve from the Cabinet, page 94](#).

3. Disconnect the two connecting rods (225) from the base housing (201):
 - a. Grip the flats of a connecting rod with an adjustable wrench. On the opposing side of the base housing, use an adjustable wrench to remove the screw (233), lock washer (237), and flat washer (232).
 - b. Remove the second connecting rod from the base housing.

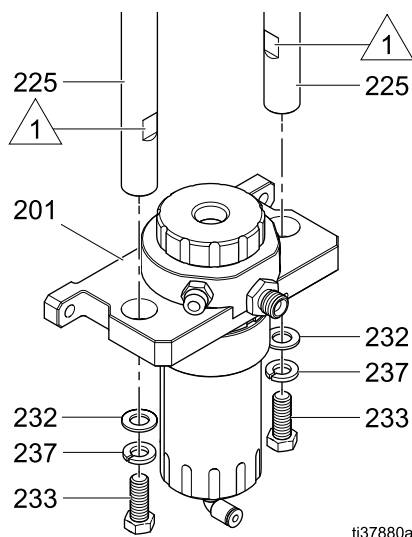


Figure 36 Rods Near the Base Housing

4. Slide the entire base housing (201) off of the connecting rods.
5. Disconnect the two connecting rods (225) from the block mount (224):
 - a. Grip the flats of a connecting rod with an adjustable wrench. On the other side of the block mount, use an adjustable wrench to remove the screw (233), lock washer (237), and washer (232). Pull the connecting rod out through the shuttle housing (218).
 - b. Remove the second connecting rod from the block mount.
6. Replace the two shuttle bearings (223) in the shuttle housing (218).
 - a. Remove the o-ring (231) on the underside of the shuttle housing and pull the bearing out through the top.
 - b. Insert a new shuttle bearing (223) into the shuttle housing through the top, with the o-ring groove pointing down, away from the air cylinder (227). Slide a new o-ring (231) into the groove to hold the shuttle bearing in place.
 - c. Remove and replace the second shuttle bearing (223).

7. Disconnect the shuttle housing (218) assembly from the air cylinder (227):

- a. Locate the flat section on the air cylinder shaft and the flat on the collar.
- b. Grip each flat section with an adjustable wrench and turn in opposing directions to loosen the air cylinder shaft.

Note

Be careful not to scratch the air cylinder rod when extracting and handling.

- c. Turn the cylinder rod until the shuttle housing (218) assembly is removed.
8. Disassemble the shuttle housing (218) assembly.
 - a. Use an adjustable wrench to loosen, and then remove, the retaining nut (235).
 - b. Separate the retaining nut (235) and the coupler (234).
 - c. Remove the wave washer (236) from inside the shuttle housing (218).

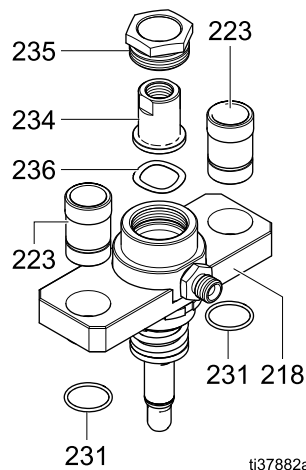


Figure 37 Shuttle Housing Components

9. Reassemble the shuttle housing (218) assembly:
 - a. Replace the wave washer (236).
 - b. Slide the coupler (234) through the retaining nut (235). Apply medium strength thread lock to the retaining nut threads.
 - c. Screw the retaining nut (235) into the shuttle housing (218). Tighten the nut with an adjustable wrench.
10. Disassemble the air cylinder (227) from the block mount (224):
 - a. Place the retaining nut (229) at the bottom of the air cylinder in a vise.
 - b. Use a wrench on the flats on the top of the air cylinder (227) to turn the cylinder until the retaining nut is loose. Remove the nut and block mount (224).

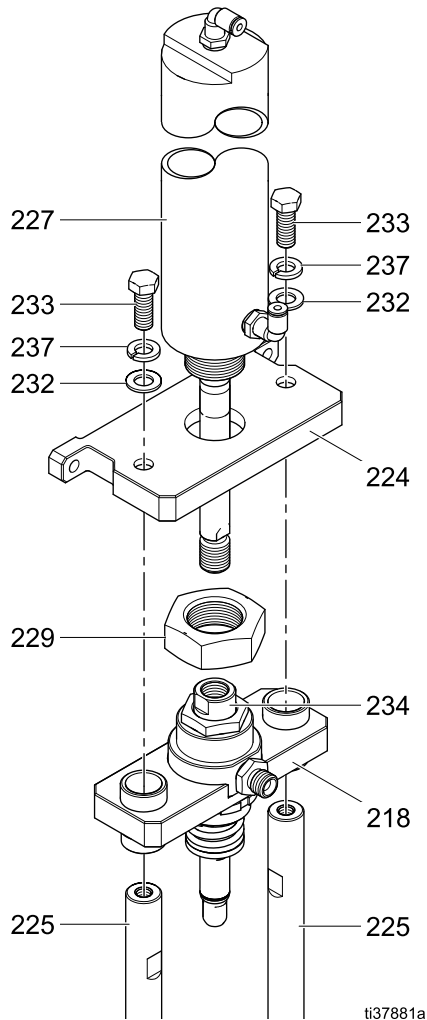


Figure 38 Isolation Valve Components

Reassemble the Isolation Valve Components

Use this procedure to reassemble the air cylinder (227), block mount (224), connecting rods (225), shuttle housing (218), and base housing (201).

Perform this procedure on a flat surface so that the components are aligned. Misaligned components could result in performance issues.

1. Hold the air cylinder (227) so that the air fitting faces forward. Slide the air cylinder through the center of the block mount (224). The block mount should be flat against the cylinder.

2. Apply medium strength, removable thread lock to the threads on the air cylinder (227).
3. Screw the retaining nut (229) onto the air cylinder (227) until it bottoms out. To tighten the nut, place the nut and air cylinder in a vise. Keep the block mount (224) lined up with the air fitting on the cylinder.
4. Use a wrench on the flats on the top of the air cylinder (227) to turn the cylinder until the retaining nut (229) is tight.
5. Apply removable thread lock to the threads on the air cylinder (227) shaft.
6. Assemble the shuttle housing (218) and the air cylinder (227):
 - a. Screw the air cylinder (227) shaft into the shuttle housing (218) assembly until snug.
 - b. To tighten, use a 9/16 inch or adjustable wrench on the flat section on the air cylinder shaft and an adjustable wrench on the shuttle collar. Turn in opposing directions.

Note

Be careful not to scratch the air cylinder shaft.

7. Attach the connecting rods (225) to the block mount (224):
 - a. Slide a connecting rod through the shuttle housing (218) and secure in the block mount (224) with a screw (233), lock washer (237), and flat washer (232).
 - b. Grip the flats of the connecting rod with an adjustable wrench. On the other side of the block mount, tighten the screw to 120 in. lb. (13.6 N•m).
 - c. Attach the second connecting rod.
8. Slide the entire base housing (201) onto the connecting rods (225).
9. Secure the base housing (201) into the connecting rods (225) with a screw (233), lock washer (237), and flat washer (232).
10. Grip the flats of the connecting rod with an adjustable wrench. On the other side of the base housing (201), use an adjustable wrench to tighten the screw to 120 in. lb. (13.6 N•m).

Remove the Isolation Valve Stem

This procedure requires the sleeve tool (112) and stem tool (113). See [Isolation System, page 119](#).

1. Prepare the isolation system for service. See [Prepare the Isolation System for Service, page 93](#).
2. Remove the isolation valve from the cabinet. See [Remove the Isolation Valve from the Cabinet, page 94](#).
3. Place the sleeve tool (112) over the isolation valve sleeve (221) and screw onto the housing (218).
4. Thread the stem tool (113) into the sleeve tool (112) and tighten to interlock.
5. Rotate both tools (112, 113) as one to apply pressure to the spring (220) inside. When both tools are tightened, the valve is opened, allowing the valve stem (222) to come out.
6. Insert a 3/16 inch Allen wrench into the end of the valve stem (222) and turn with moderate force to start.
7. Unscrew until the valve stem (222) can be pulled out.

Note

Be careful not to scratch the valve stem (222) when extracting and handling.

8. Unscrew both tools (112, 113) together until they loosen the spring (220) and come off.
9. Unscrew the stem tool (113) from the sleeve tool (112) and remove the isolation valve sleeve (221) and spring (220).
10. Replace the valve stem o-rings. See [Replace the Isolation Valve Stem O-rings, page 99](#).

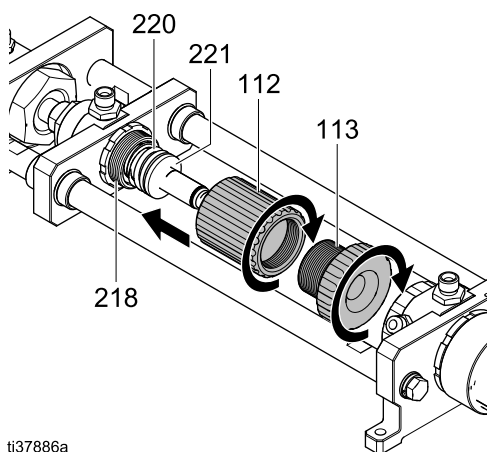


Figure 39 Tools Removing Valve Stem

Replace the Isolation Valve Stem O-rings

Use this procedure to replace the three o-rings (219, 2 x 228) on the isolation valve stem (222). Replacing these o-rings may be necessary if the isolation valve begins to leak.

1. Remove the three o-rings (219, 2 x 228).

Note

Do not pry the o-rings off of the valve stem. You may need to pinch the o-ring to form a loop and then pull it off. You may also cut each o-ring to remove.

2. Replace the o-rings:
 - a. Roll o-ring (219) over the valve stem (222) threads until it fits into the groove.
 - b. Roll one o-ring (228) over the valve stem (222) threads until it fits into the groove.
 - c. From the other end of the valve stem (222), roll the second o-ring (228) onto the shaft until it fits into the groove.
 - d. Grease all 3 o-rings.

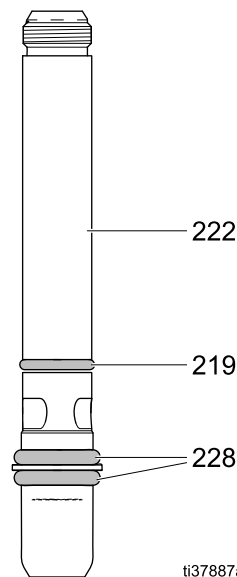
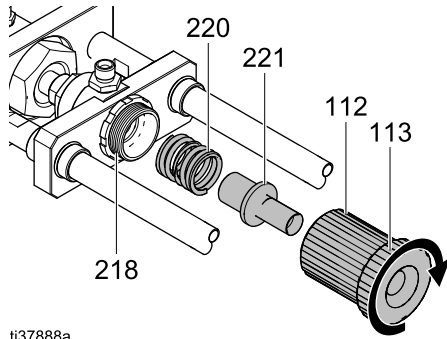


Figure 40 Replacing the Isolation Valve O-rings

3. Inspect the o-ring (219) inside the shuttle housing (218) to make sure that it is still in place. Remove and replace if needed.

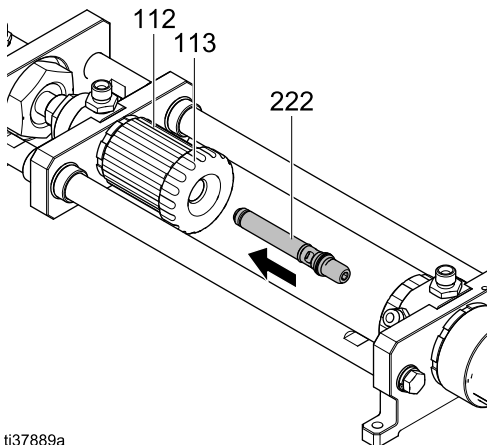
4. To reassemble:

- a. Insert the spring (220) and the sleeve (221) (wider end first) into the sleeve tool (112).



ti37888a
Figure 41 Reassembling Spring and Sleeve into Tool

- b. Place the stem tool (113) over the sleeve (221) and spring (220) and screw into the sleeve tool (112).
- c. Screw both tools into the shuttle housing (218) until tight.
- d. Grease the threaded end of the valve stem. Slide the threaded end of the valve stem (222) into both tools (112, 113) that are mounted on the shuttle housing (218).



ti37889a
Figure 42 Inserting Valve Stem into Tools

- e. When the valve stem (222) reaches the threads, insert a 3/16 inch Allen wrench into the end of the valve stem. Torque to 80 in-lb (9 N•m).
5. To remove the tools from the isolation valve, unscrew both tools as one.

Service the Bottom Piston Housing

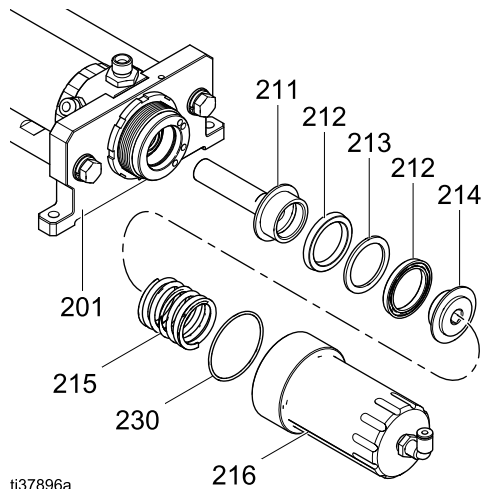
Use this procedure to replace the seals in the lower piston housing.

1. With the isolation valve lying down, remove the check valve assembly (238), if still connected.
2. Unscrew and remove the bottom housing piston cap (216). The housing includes a spring (215) and o-ring (230). Residual wash fluid may appear.
3. Pull out the piston assembly (211-214 and o-rings).

Note

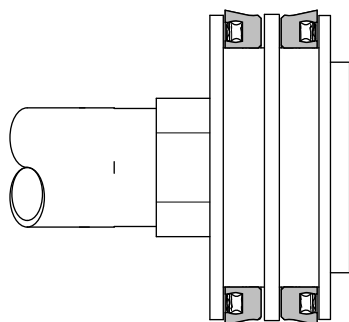
Be careful not to scratch or drop the piston (211) when extracting and handling.

4. To remove the retaining cap from the piston (211), use an adjustable wrench around the flats at the bottom of the piston shaft (211). Use a 3/8 inch hex wrench inside the retaining cap (214).
5. Once loosened, turn the piston shaft (211) to separate all piston assembly pieces.



ti37896a
Figure 43 Removing Retaining Cap from Piston

6. Replace the piston seals:
 - a. Place one U-cup (212) onto the piston (211). The U-cup must face the top (shaft of the piston).
 - b. Place the spacer washer (213) next to the U-cup (212).
 - c. Place the other U-cup (212) onto the piston (211). The U-cup must face the bottom (the retaining cap).
 - d. Use medium strength thread lock on the retaining cap (214).
 - e. Screw the retaining cap (214) into the piston (211).
 - f. To tighten, use an adjustable wrench around the flats at the bottom of the piston shaft (211). Use a 3/8 inch hex wrench inside the retaining cap (214).
8. Remove the retainer (202).
9. Replace the retainer (202) seals:
 - a. Replace the O-ring (208) into the groove next to the threads.
 - b. Replace the U-cup (203) where it sinks into place. The U-cup faces out.
10. Continue disassembling the lower housing: Remove the U-cup spacer (206) and the packing U-cup (204). Residual paint may appear.
11. To replace the seals in the top housing, see [Service and Reassemble the Top Housing of the Isolation Valve, page 102](#).

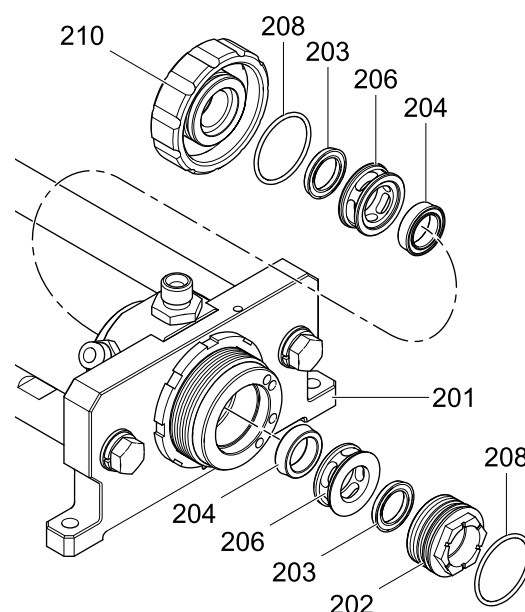


ti37898a

Figure 44 U-cups Facing Opposite Directions

7. Continue disassembling the lower housing:

Use a 15/16 inch socket or wrench to remove the retainer (white) (202) from the housing (201). Be careful not to strip the piece.



ti37897a

Figure 45 Lower Retainer

Service and Reassemble the Top Housing of the Isolation Valve

Use this procedure to replace the seals in the top piston housing. This procedure also covers reassembling the top piston housing.

1. Disassemble the bottom housing of the isolation valve as described in [Service the Bottom Piston Housing, page 100](#). Remove the piston and spring.
2. Unscrew and remove the top housing piston cap (210). The housing includes a U-cup (203) and an o-ring (208).
3. Replace the o-ring (208) and U-cup (203):
 - a. Replace the o-ring (208) into the groove next to the threads.
 - b. Replace the U-cup (203) where it sinks into place. The U-cup faces outwards in the cap.
4. Remove the U-cup spacer (206) and the packing U-cup (204).
5. Replace the U-cup spacer (206) and the packing U-cup (204):
 - a. On the smaller side of the U-cup spacer (206) is a recessed groove that helps align the packing U-cup (204). Snap or set the packing U-cup (204) into the groove on the U-cup spacer (206).
 - b. Grease around the lip of the seal (204) and pop it, seal side first, into the housing (201).
6. In the cap (210), apply grease to the o-ring (208) and U-cup (204).
7. Screw the cap (210) into the housing and tighten by hand.
8. To complete reassembly, see [Reassemble the Bottom Housing of the Isolation Valve, page 103](#).

Reassemble the Bottom Housing of the Isolation Valve

Use this procedure after replacing the seals in the lower piston housing as described in [Service the Bottom Piston Housing, page 100](#).

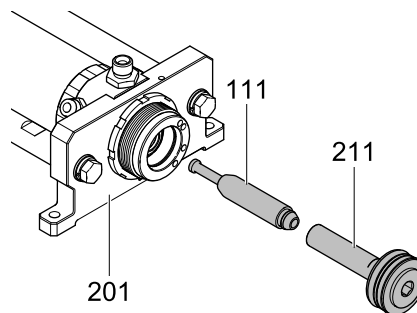
This procedure requires the piston tool (111). See [Isolation System, page 119](#).

NOTICE

Assembly of the piston (211) without the use of the piston tool (111) will damage U-cups within the housing (201).

1. Replace the U-cup spacer (206) and the packing U-cup (204):
 - a. On the smaller side of the U-cup spacer (206) is a recessed groove that helps align the packing U-cup (204). Snap or set the packing U-cup (204) into the groove on the U-cup spacer (206)
 - b. Grease around the lip of the seal (204) and pop, seal side first, into place in the housing (201).
2. Grease around the o-ring (208) and screw into the housing (201). Tighten with a 15/16 inch socket until the retainer (202) bottoms out.
3. Insert the piston tool (111) into the piston (211). Grease the sides of the tool, especially the top, so that it can be pulled past the U-cups in the housing assembly (201) more easily.

4. Together, insert the piston tool (111) and piston (211) into the retainer (202) on the housing (201). Push the piston (211) until the tool comes through the housing (201) and the piston (211) is in place.



ti37904a

Figure 46 Piston Tool Through Lower Housing

Note

If the piston tool (111) and piston (211) come apart within the housing (201), pull the piston tool (111) through the housing. Pull the piston (211) back out. Join the parts and try again.

5. In the piston cap (216), grease the sides and the o-ring (230).
6. Insert the spring (215) into the piston cap (216).
7. Screw the piston cap (216) onto the housing (201). Push forward to overcome the force of the spring. Tighten until the piston cap (216) bottoms out.

Note

Be careful not to cross threads while assembling.

Service the Isolation Fluid Pump

Remove the Isolation Fluid Pump from the Cabinet

1. Prepare the isolation system for service. See [Prepare the Isolation System for Service, page 93](#).
2. Use a flat blade screwdriver to open the isolation cabinet door.
3. Slide the electrostatic shield (12) up to remove.
4. To remove the isolation valve cover (99), loosen the top and bottom screws (99a).
5. Remove the four 3/16 inch hex head screws to open the electronics panel (14).
6. Locate the wire from the pump sensor into the electronics panel. Disconnect the pump sensor (321) from the cable splitter (447). For wiring locations, see [Wiring Connections, page 116](#).

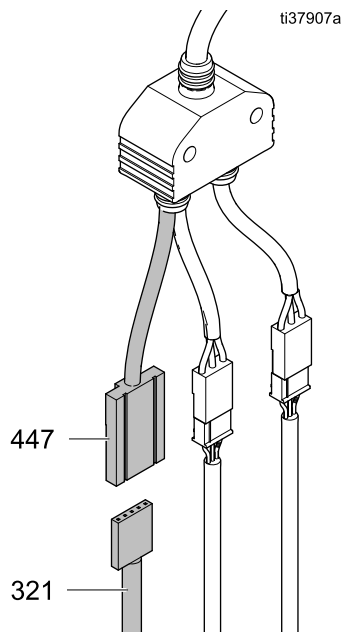


Figure 47 Pump Sensor Connection in Electronics Panel

7. Disconnect the air line from the air fitting (325).

8. Remove the two fluid tubes from the fittings (327) at the base of the pump. Some residual fluid may leak out.
9. A steel bracket (17) holds the pump. To remove the pump, either:
 - Remove the two screws that hold the bracket to the back wall of the cabinet. Use a 3/16 inch socket cap hex head wrench and extension.
 - Remove the two screws that hold the bracket to the pump. Use a 7/16 inch hex head wrench.
10. Remove the two base mounting screws (20), lock washers (22), and washers (19).
11. Lift the pump out of the cabinet.

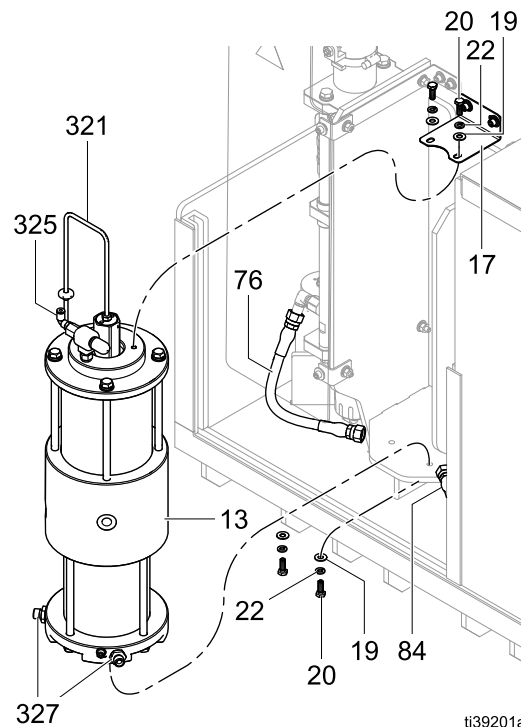


Figure 48 Remove the Isolation Fluid Pump

Reinstall the Isolation Fluid Pump in the Cabinet

NOTICE

Before reassembling, clean the cabinet of residual fluid.

1. Place the isolation fluid pump into the cabinet.
2. Connect the wire from the linear sensor (321) to the cable splitter (427). For wiring locations, see [Wiring Connections, page 116](#).
3. Reinstall the top mounting screws and bottom mounting screws, then tighten all screws.
4. Reconnect the air line hose. For hose locations, see [Pneumatic Connections, page 114](#).
5. Reconnect and tighten the inlet fluid hose fitting at the bottom left of pump.
6. Reconnect and tighten the outlet fluid hose fitting at the bottom right of pump.
7. Calibrate the pump. Follow the steps in [Calibrate the Pump, page 61](#).
8. Perform a pump stall test. Follow the [Pump Stall Test Procedure, page 64](#).
9. Replace the four 3/16 inch hex head screws to close the electronics panel (14).
10. Replace the isolation valve cover (99) and tighten the top and bottom screws (99a).
11. Reinstall the electrostatic shield (12) inside the cabinet.
12. Close the cabinet door and use a flat blade screwdriver to secure the door shut.

Disassemble the Isolation Fluid Pump

1. Remove the isolation fluid pump from the cabinet. See [Remove the Isolation Fluid Pump from the Cabinet, page 104](#).
2. Lay the pump on its side and unscrew the sensor (321) from the top of the pump. Check the o-ring next to the sensor to make sure it is not cracked.
3. Remove the muffler fitting (323).

4. Disassemble the fluid section of the pump:
 - a. Loosen the four tie rod screws (312) with a socket wrench.
 - b. Sit the pump with the fluid side up and remove the tie rod screws (312).
 - c. Lift up and remove the fluid cover (311) and gasket seal (309).
 - d. Wiggle the cylinder (310) off of the middle housing (307).
 - e. Lay the pump on its side.

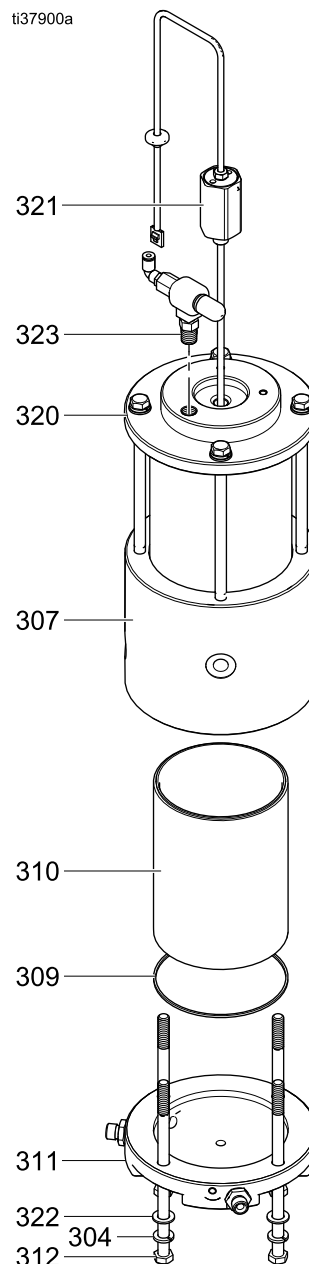


Figure 49 Removing the Fluid Cover

5. Disassemble the air section of the pump:

- a. Loosen the four tie rod screws (312) with a socket wrench and remove.
- b. Remove the air cover (320) and o-ring (318). Inspect the o-ring and replace if the pump has been leaking air.
- c. Wiggle the air cylinder (319) off of the middle housing (307).

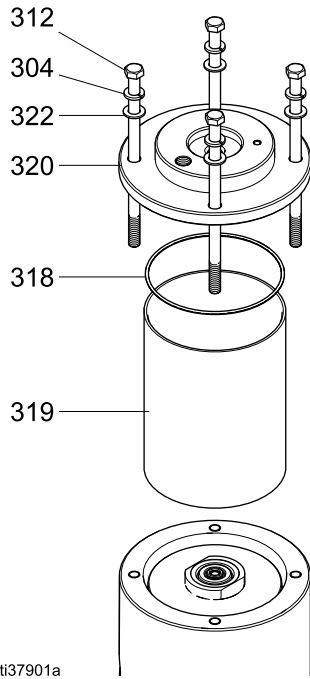


Figure 50 Removing the Air Cover

6. To service the fluid piston (301):

- a. Pry or pick the seal (302) off from the back side of the fluid piston (301) so that the front face of the piston is not damaged. If the front face is damaged, it may not seal completely.
- b. Replace the seal on the fluid piston (301).

7. To service the air piston (316):

- a. Remove the o-ring (317) from the air piston (316).
- b. Apply grease to the o-ring before replacing.

8. To remove the piston rod (305):

- a. On the fluid side, use a 12 inch adjustable wrench on the flats of the piston rod, near the fluid piston (301).
- b. Use a 15 inch adjustable wrench on the flats of the fluid piston (301) to loosen.
- c. Unscrew the fluid piston (301) off of the piston rod (305).
- d. Push the piston rod (305) through the middle housing (307) to remove.

9. To remove the air piston (316) from the piston rod (305):

- a. Use 12 inch wrench on the flats of the piston rod, near the air piston (316).
- b. Use a 15 inch adjustable wrench on the flats of the air piston (316) to loosen.
- c. Unscrew the air piston (316) off of the piston rod (305). Under the air piston is an o-ring (315), magnet holder (313), and magnet (314).

10. If necessary, remove the piston bumpers (308) on each side of the middle housing. Push in one of the three tabs to pop off. The bumpers snap in.

11. To remove and replace the wiper seal (306):

- a. Inside the middle housing (307) on the fluid side, remove the wiper seal (306). Use pliers to grip the seal and pull it out.
- b. When replacing the wiper seal (306), make sure that it is inserted on the fluid side of the middle housing (307). The diameter of the fluid side is slightly smaller than the air side of the housing.
- c. Apply grease to the wiper seal (306) and snap it into the groove in the middle housing (307).

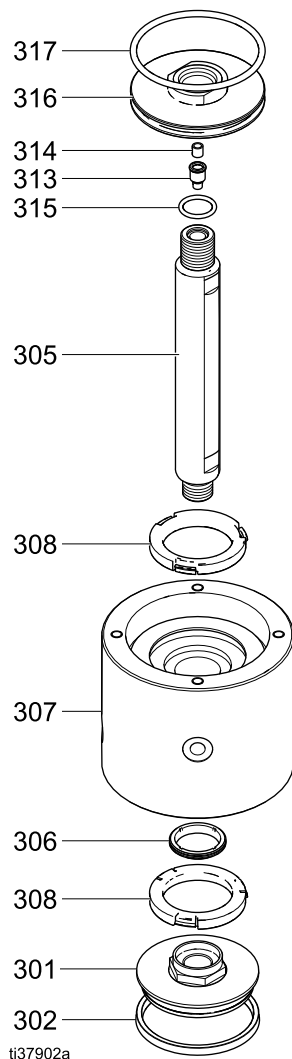


Figure 51 Middle Housing Parts

Reassemble the Isolation Fluid Pump

1. Lay the isolation fluid pump on its side.
2. Grease the wiper seal (306) in the middle housing (307).
3. With the non-sensor end, push the piston rod (305) through the housing (307). The end must go through the air side of the housing. (The air side has the larger diameter.)
4. Assemble the air piston (316):
 - a. Place the o-ring (317) around the air piston (316) and then grease the o-ring.
 - b. Screw the air piston (316) onto the piston rod (305). Tighten with a wrench on the flats of the piston rod (305) and a wrench on the flats of the air piston (316).
 - c. When tightened adequately, the white of the piston rod (305) and the magnet sensor (314), should protrude slightly from the air piston (316).
5. Assemble the fluid piston (301):
 - a. Snap the U-cup seal (302) into place on the fluid piston (301) and then grease the outside of the U-cup seal.
 - b. Screw the fluid piston (301) onto piston rod (305). Tighten with a wrench on the flats of the piston rod (305) and wrench on the flats of the fluid piston (301).
6. Grease the inside of the air cylinder (319) and then wiggle it into place over the air piston (316) and into the middle housing (307).
7. Push the air piston (316) into the middle housing (307) so that the fluid piston (301) extends out of the middle housing.
8. Grease the inside of the fluid cylinder (310) and then place either end over the fluid piston (301). Push it into place into the middle housing (307).
9. With the fluid cylinder (310) up, orient the pump so that you are facing the two weep holes (WH) in the middle housing (307). The holes indicate the front of the system in the isolation cabinet.
10. Place the gasket seal (309) onto the fluid cylinder (310).
11. Place the fluid cover (311) onto the fluid cylinder (310) so that the holes for the fittings line up with the weep holes in the middle housing (307).
12. Spin the tie rod screws (312), lock washer (304), and plain washer (322) into the fluid cover (311). Tighten in a cross pattern only until snug.
13. Lay the pump on its side to tighten the tie rod screws (312) in a cross pattern. Torque to 160 in-lb (18 N•m). Tighten the tie rod screws twice because the plastic pieces relax.

14. With the air cylinder (319) up, place the air cover (320) onto the air cylinder (319). Make sure that o-ring (318) is in place on the cover. Grease the o-ring.
15. Align the air port hole on the air cover with the front of the pump. The hole should align between the fluid port fittings on the fluid cover (311).
16. Spin the tie rod screws (312), lock washer (304), and plain washer (322) into the air cover (320). Tighten in a cross pattern only until snug.
17. Lay the pump on its side to tighten the tie rod screws (312) in a cross pattern. Torque to 160 in-lb (18 N•m).
18. Attach the air valve assembly (323-326) to the air cover (320). Tighten so that the air fitting faces to the left.
19. Grease the o-ring at the base of the linear sensor (321). Insert the sensor (321) into the top of the air cover (320). Screw until tight.

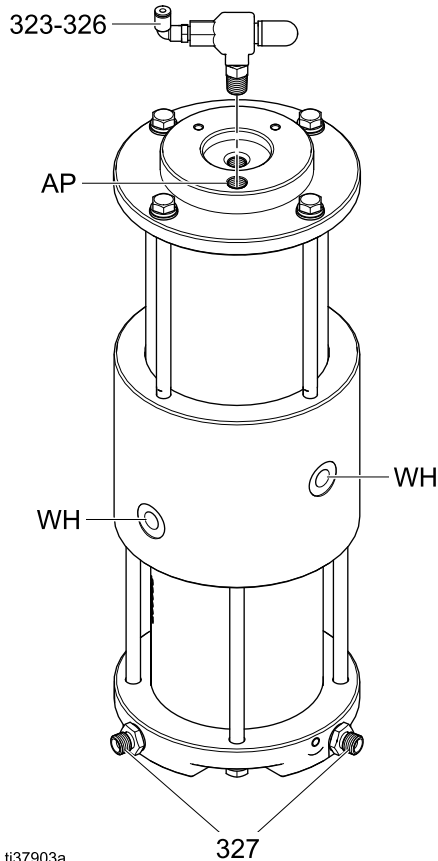


Figure 52 Align Covers with Weep Holes

Remove the Merkur Pump from the Cabinet

Many Merkur AA fluid pump (75) maintenance and repair steps are possible with the pump in the cabinet. See your Merkur manual for details. Use this procedure to remove the entire Merkur AA fluid pump (75) from the isolation cabinet for service.

1. Prepare the isolation system for service. Follow the steps under [Prepare the Isolation System for Service, page 93](#).
2. Use a flat blade screwdriver to open the isolation cabinet door.
3. Slide the electrostatic shield (82) up to remove.
4. Slide the electrostatic shield (12) to the left to remove.
5. Disconnect the air supply line from the Merkur air motor.
6. Disconnect the fluid hose (76) from the inlet of the inlet fittings on the Merkur AA fluid pump (75).
7. Disconnect the fluid hose (116) from the outlet fittings of the fluid filter (131).
8. Loosen four nuts (112) holding the pump bracket (21) in the cabinet. Lift the pump and remove to a workbench.

Reinstall the Merkur Pump in the Cabinet

1. With the nuts (112) loosely installed on the captured mounting bolts (111), install the Merkur AA fluid pump (75) with pump bracket (21) by sliding the slots in the bracket over bolts (111). Tighten nuts (112) to secure.
2. Connect the fluid hose (116) to the fittings on the fluid filter (131).
3. Connect the fluid hose to the inlet fittings on the Merkur AA fluid pump (75).
4. Connect the air supply to the Merkur air motor.
5. Reinstall electrostatic shields (12 and 82) inside the cabinet.

Service the Electrical Controls

Use the procedures in this section to service components of the electrical controls as needed. The procedures refer to the figures in [Electrical Schematics, page 112](#).

Prepare the Electrical Controls for Service

1. Prepare the isolation system for service. Follow of the steps in [Prepare the Isolation System for Service, page 93](#).
2. Remove power from the isolation system.
3. Use a flat blade screwdriver to open the isolation cabinet door.
4. Loosen the cover screws (416) and remove the cover (402).
5. Open the electrical control assembly.

Replace a Solenoid Valve

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Remove the connector (433) from the color change board (403).
3. Disconnect the solenoid wire.
4. Remove the solenoid valve (407) from the manifold (406) by turning it counter clockwise.
5. Install a new solenoid. Lubricate the o-ring.
6. Reconnect the solenoid wire to connector (433). Reinstall connector (433) on the color change board (403). For location details, see [Electrical Schematics, page 112](#).
7. Use Maintenance screens 3-6 to verify the operation of the solenoid.

Replace a kV Board

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Disconnect the wires from the kV board assembly (428).
3. Pull the tab with a screw driver to release the board from the DIN rail (436).
4. Install a new kV board assembly.
5. Snap the board on the DIN rail (436).
6. Reconnect the cable (445) as shown in [Electrical Schematics, page 112](#).
7. Connect the wires to the kV board as shown in [Electrical Schematics, page 112](#).

Replace an Electro/pneumatic (V2P) Regulator

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Disconnect the splitter cable (446).
3. Disconnect the air lines.
4. Remove the screws (408) to remove the regulator bracket (434) and V2P (415) from the panel.
5. Move the regulator bracket (434) and fittings to the new V2P (415).
6. Reinstall the regulator bracket (434) and V2P (415) onto the electronics panel (401).

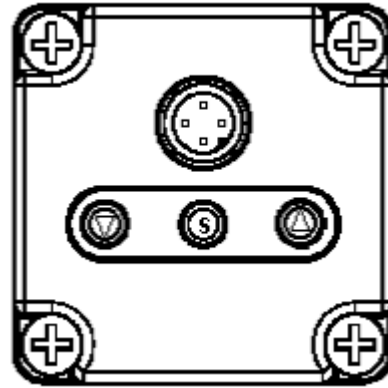
Note

Do not use liquid thread sealant. Use tape instead.

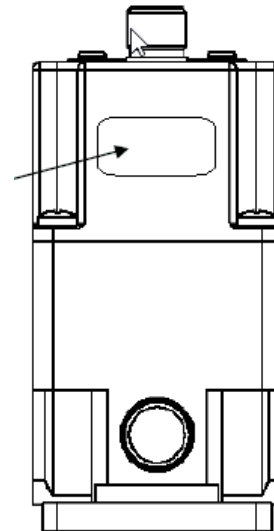
7. Reconnect the air lines as shown in [Pneumatic Connections, page 114](#).

8. Perform the zero clear procedure on the V2P (415):

The top of the V2P (415) contains 3 keys: Down arrow, Set (S), and Up arrow.



- a. To unlock the keys, press the down arrow key for 2 seconds or more until the screen flashes "Loc."



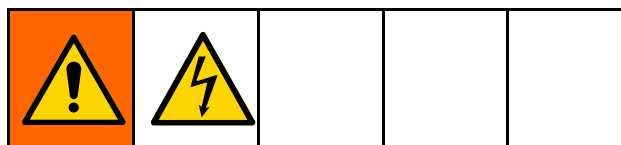
- b. Press the S key once to unlock the keys. The screen displays "unL" for approximately one second when the keys are unlocked.
- c. Press the S key for 2 seconds or more.
- d. Use the up and down arrow keys to go to "F03." The screen alternatively displays "F03" and "0cL."
- e. Press the S key. The screen flashes "0cL."
- f. Press and hold both the up and down arrows at the same time for approximately 3 seconds. The screen displays "0cL."
- g. After 3 seconds, the zero clear is executed and the screen displays "cLr" briefly. This operation also locks the keys again.

Convert a Standard System to be Equipped for a Gun Flush Box

Use Gun Flush Box Installation Kit 26B420 to install a gun flush box on a standard system that was not equipped for a gun flush box. Kit 26B420 is listed in [Accessories, page 132](#).

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. On electrical control (14), install pressure switch (19B745) to the right of the existing pressure switch (420).
3. Connect wires D1 and D2 as shown in [Wiring Connections, page 116](#).
4. Remove the cap plug by the gun flush box icon label on the controls enclosure and install a bulkhead.
5. Use air tubing (598095) to connect the gun flush box pressure switch (19B745) to the bulkhead (121818). See [Pneumatic Connections, page 114](#).
6. Install a solenoid valve (16P316) in the number 8 position on the solenoid manifold. Remove the plug in this location. To install a new solenoid, follow the steps in [Replace a Solenoid Valve, page 109](#).
7. Install an air fitting (114263) at the solenoid manifold.
8. Remove two cap plugs on the right side of the unit next to the gun flush box icon labels. Install two bulkheads (121818) in these locations.
9. Connect the air tubing from the solenoid 8 position to the correct bulkhead. Connect the air tubing from the bulkhead on the controls enclosure to the correct bulkhead. See [Pneumatic Connections, page 114](#).

Replace the Color Change Board Fuse



Fuse	Part No.	Description
F1	17U084	Fuse; 500 mA

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Remove electrical power from the system.
3. Remove the electronic controls cover (402).
4. Locate fuse F1 on the color change board. Pull the fuse away from the board.
5. Install the new fuse.
6. Reinstall the cover. Restore electrical power to the system.

Electrical Schematics

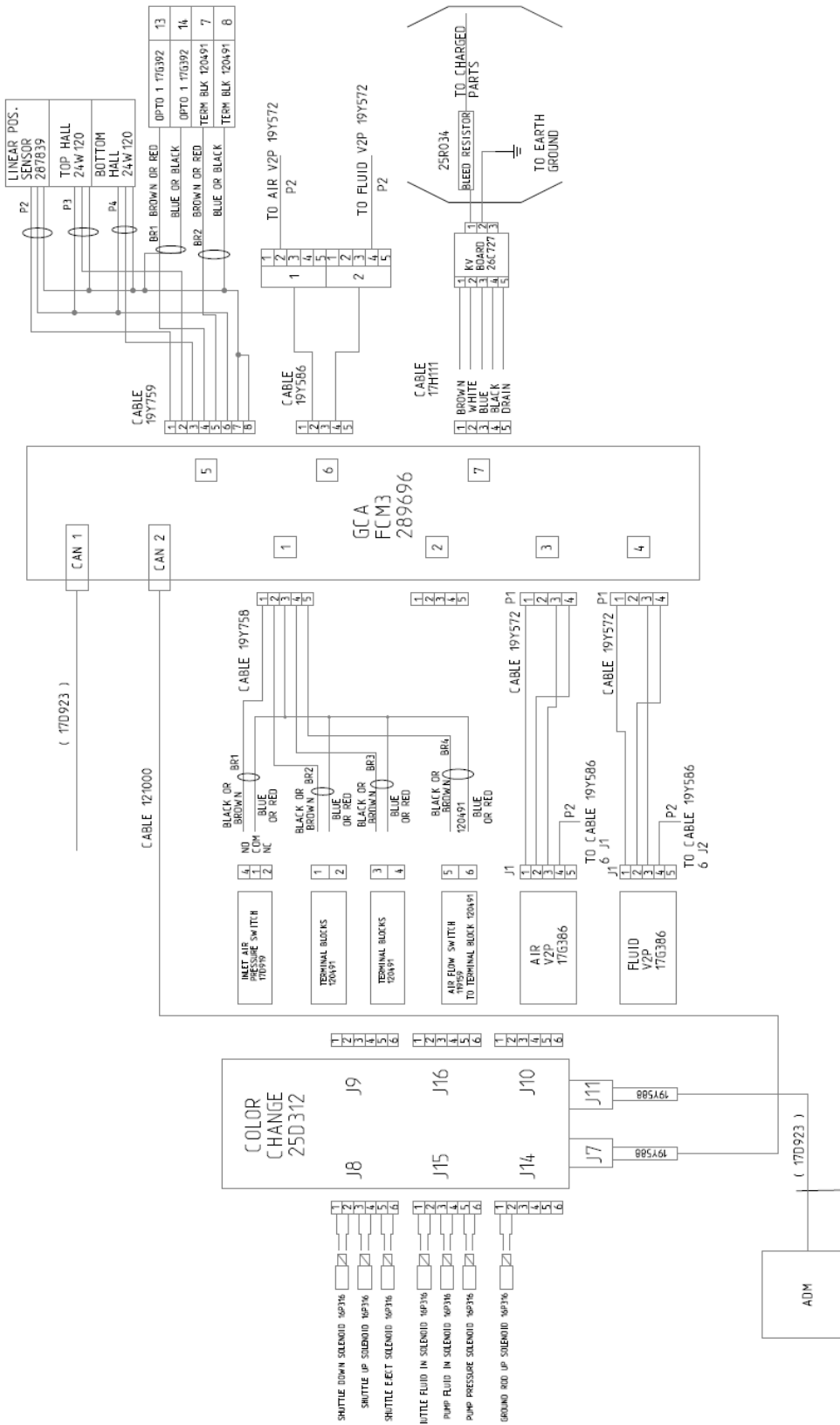


Figure 53 Electrical Schematic for 26C896 Electrical Control (standard, not equipped for gun flush box)

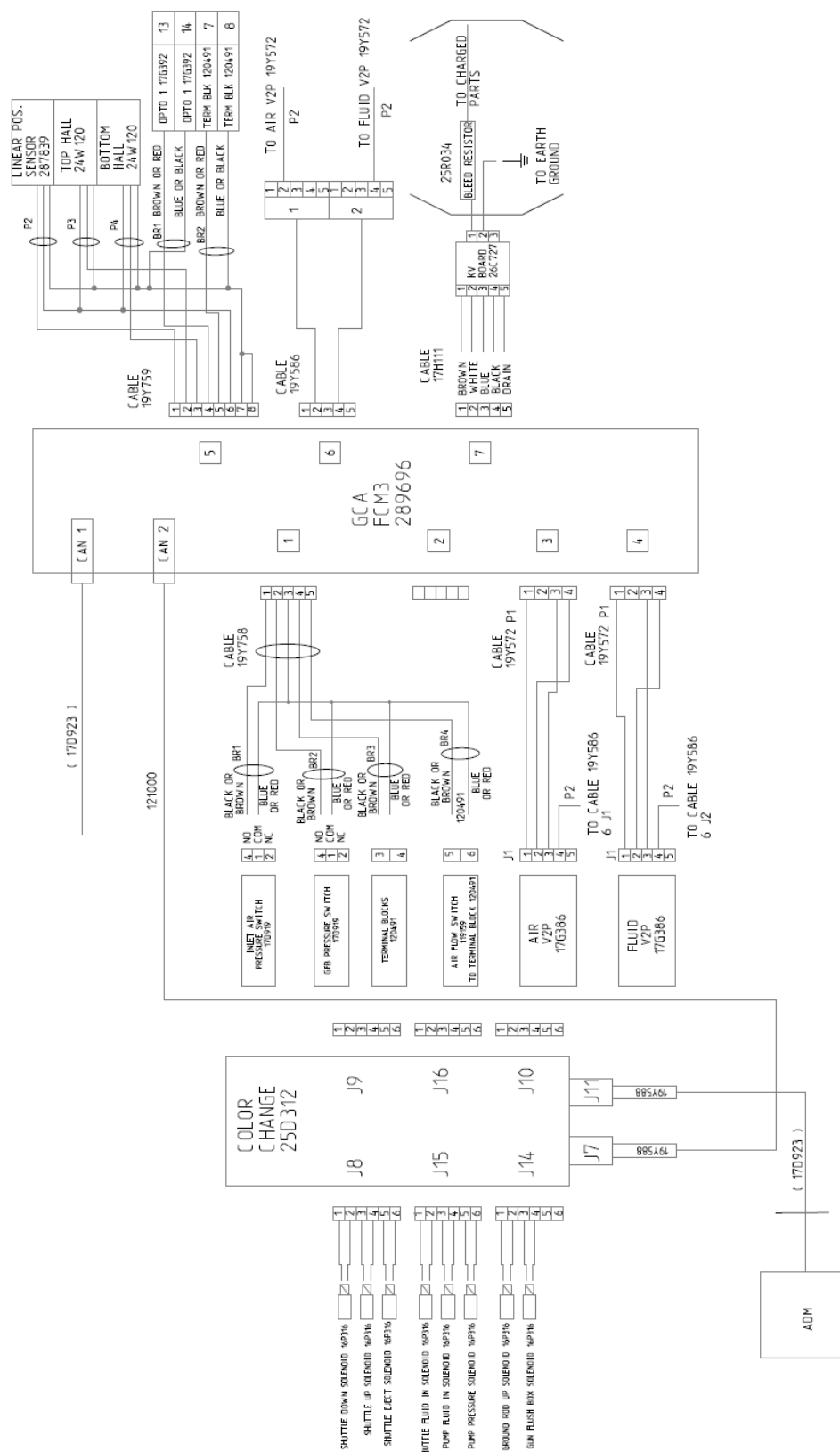


Figure 54 Electrical Schematic for 26C716 Electrical Control (equipped for gun flush box)

Pneumatic Connections

The numbers in the following figure represent point-to-point connections. For example, A4 connects to A4.

Item	Description	Part Number
A n	5/32 inch tubing	598095
B n	3/8 inch tubing	054134

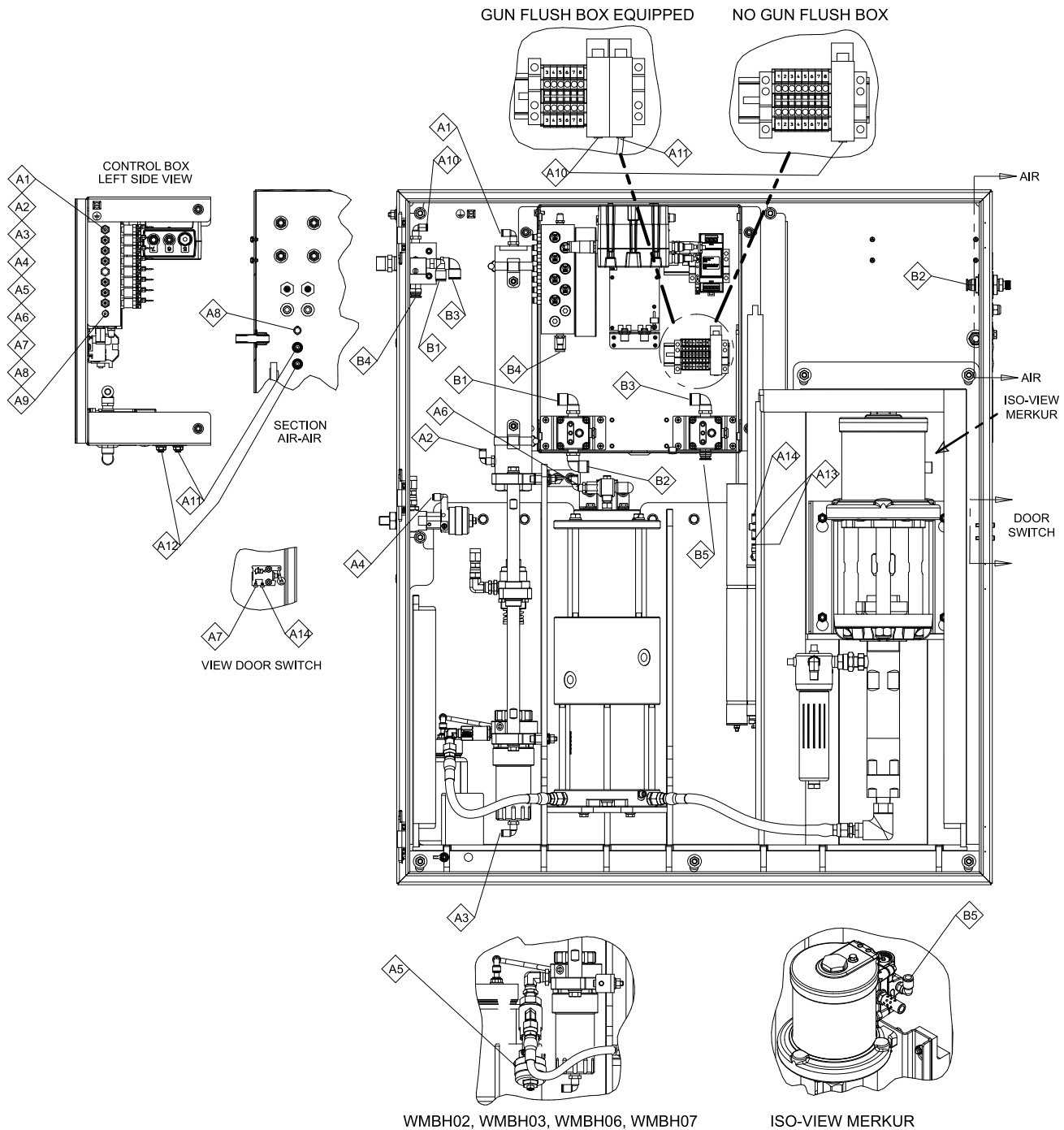


Figure 55 Pneumatic Connections

Table 18 Isolation System Pneumatic Connections Notes

ID	Description
A5	Connects to active fluid valve on valve kit (16A079). Used only for color change enabled systems.
A8	Used only in models equipped with gun flush box capability.
A9	Not used.
A11	Used only in models equipped with gun flush box capability.
A12	Used only for the optional System Stop Pneumatic Input Kit 26B414. To install the stop kit, follow the steps in Install the Optional System Stop Pneumatic Input Kit, page 25 .

Wiring Connections

The numbers in the following figure represent point-to-point connections. For example, C1 connects to C1.

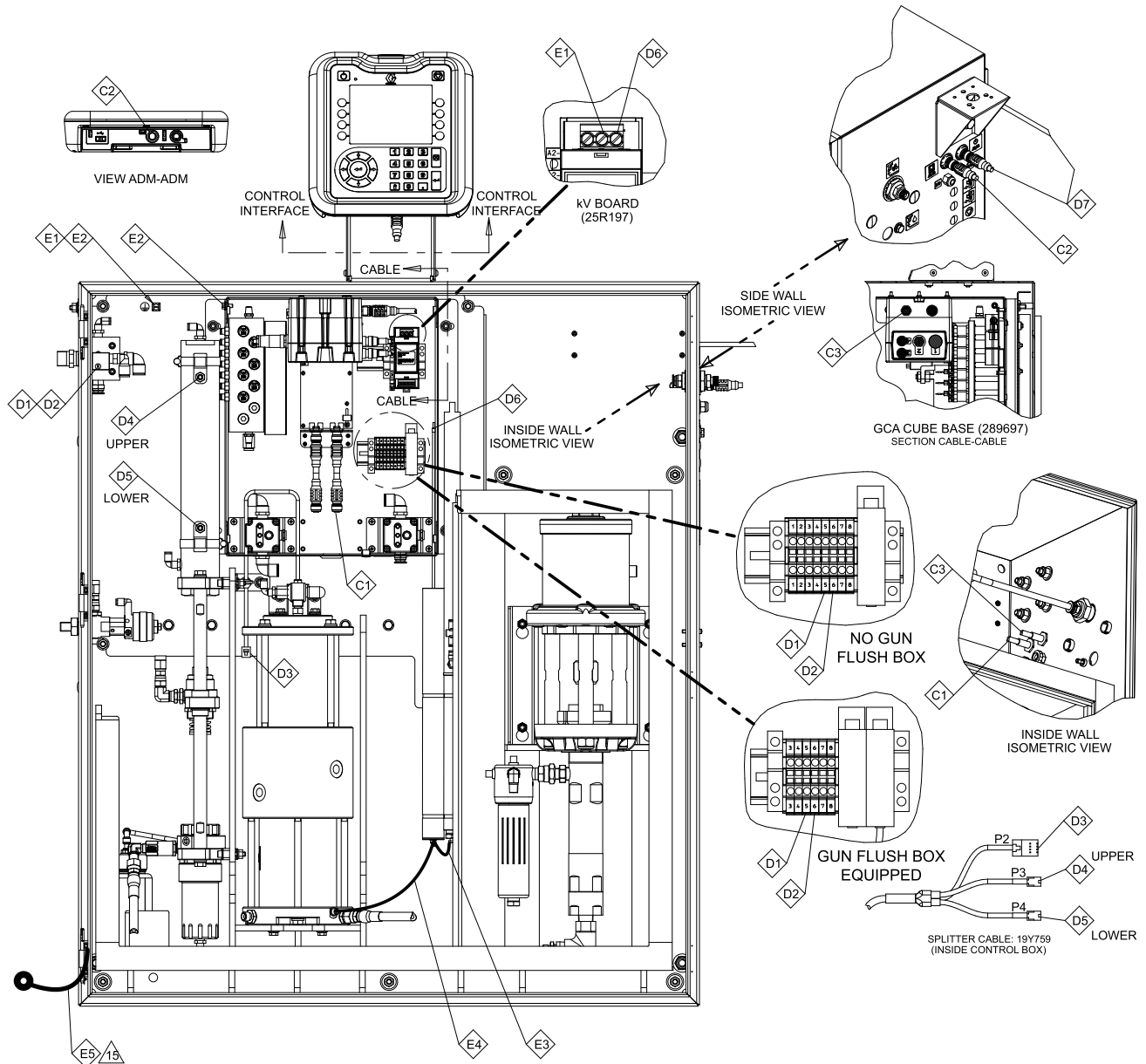


Figure 56 Wiring Connections

ID	Part No.	Description
C1	17D923	Bulkhead Cable (59)
C2	121001	CAN Cable (43)
C3	17D923	Bulkhead Cable (59)
C4	121002	CAN Cable (611) (Used only for color change enabled systems. See Color Change: Pneumatic and Wiring Connections , page 118.)
C5		
D1	119159	Air Flow Sensor (to port 5 or 6; interchangeable) (30)
D2	119159	Air Flow Sensor (to port 5 or 6; interchangeable) (30)
D3	287839	Pump Sensor Assembly (labeled P2) (447)
D4	24W120	Proximity Sensor (upper; labeled P3) (447)

ID	Part No.	Description
D5	24W120	Proximity Sensor (lower; labeled P4) (447)
D6	25R034	Bleed Resistor (24)
D7	26C774	Power Supply (47)
E1	Wire (14 gauge)	Green/Yellow (20 in./50.8 cm)
E2		Green/Yellow (5 in./12.7 cm)
E3		Red (6 in./15.2 cm)
E4		Red (10 in./25.4 cm)
E5	17J191	Green/Yellow (81) Note 1: Tuck the ground wire into the corner of the cabinet so that it doesn't interfere with closing the door.

Color Change: Pneumatic and Wiring Connections

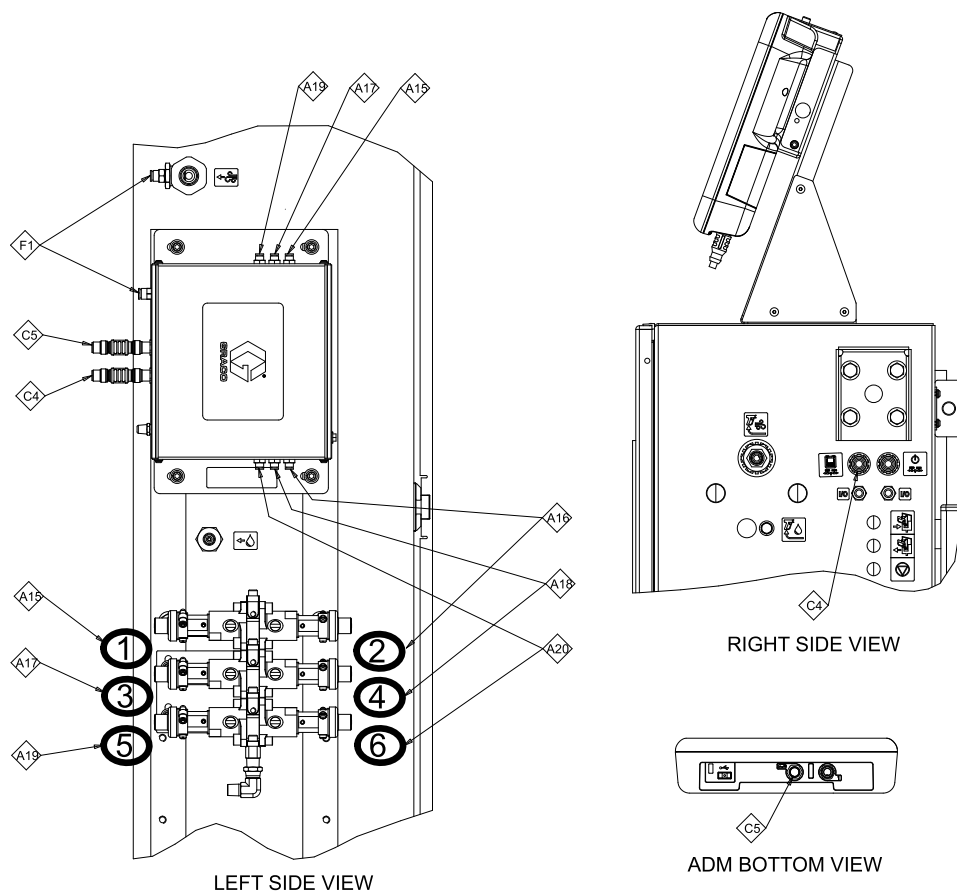


Figure 57 Color Change Module Wiring and Pneumatic Connections

Table 19 Color Change Pneumatic Connections

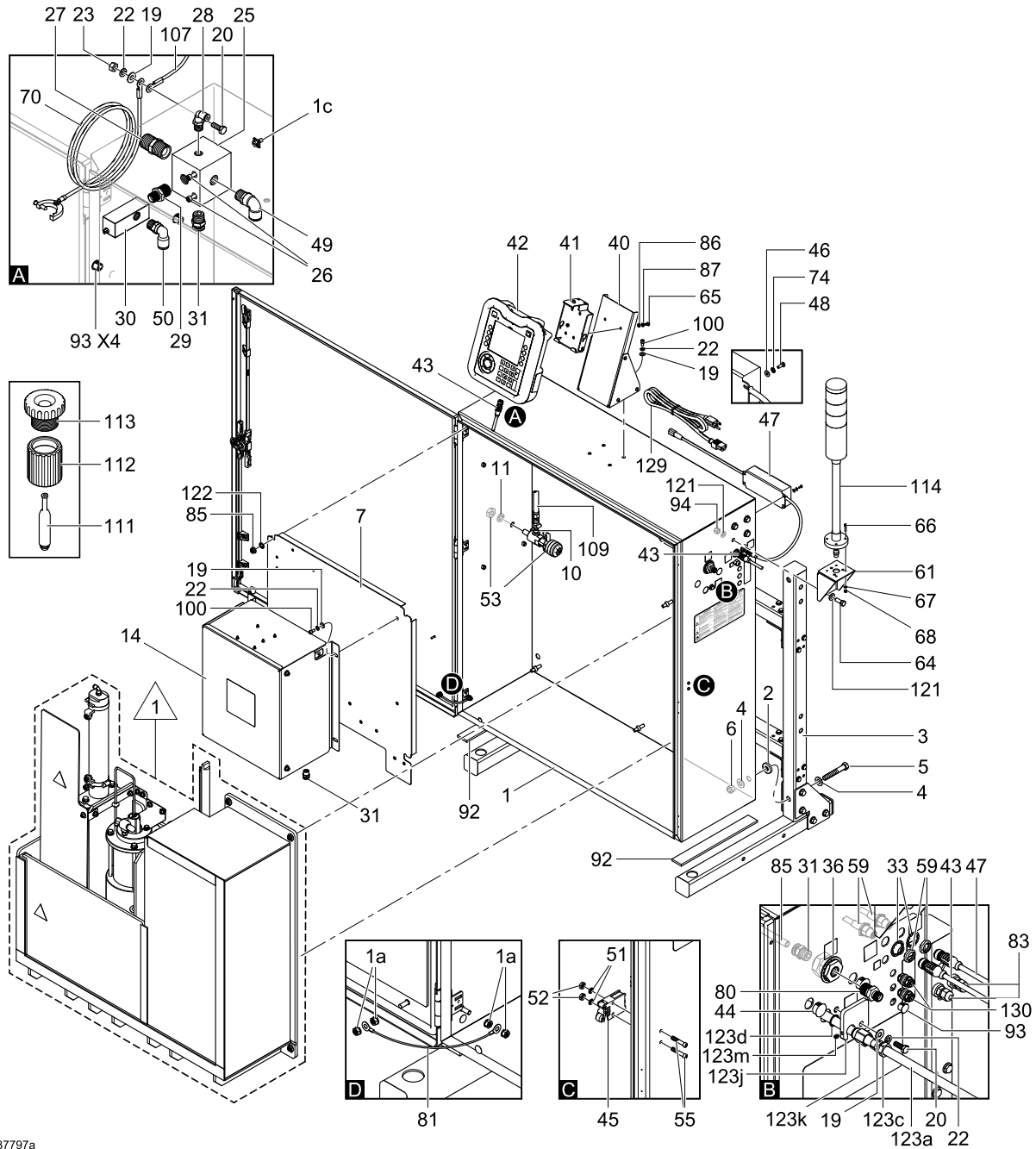
ID	Color Change Module Port	Manifold Valve Stack
A16	1	Valve 1 (Air)
A17	10	Valve 2 (Flush)
A18	2	Valve 3 (Dump)
A19	11	Valve 4 (Color 1)
A20	3	Valve 5 (Color 2)
A21	12	Valve 6 (Color 3)
F1	Air Inlet	System Fitting

Table 20 Color Change Wiring Connections

ID	Part No.	Description
C4	121002	CAN Cable (611)
C5		

Parts

Isolation System



ti37797a

Figure 58 Isolation Cabinet

1 See [Isolation Cabinet Interior](#) for a detailed view.

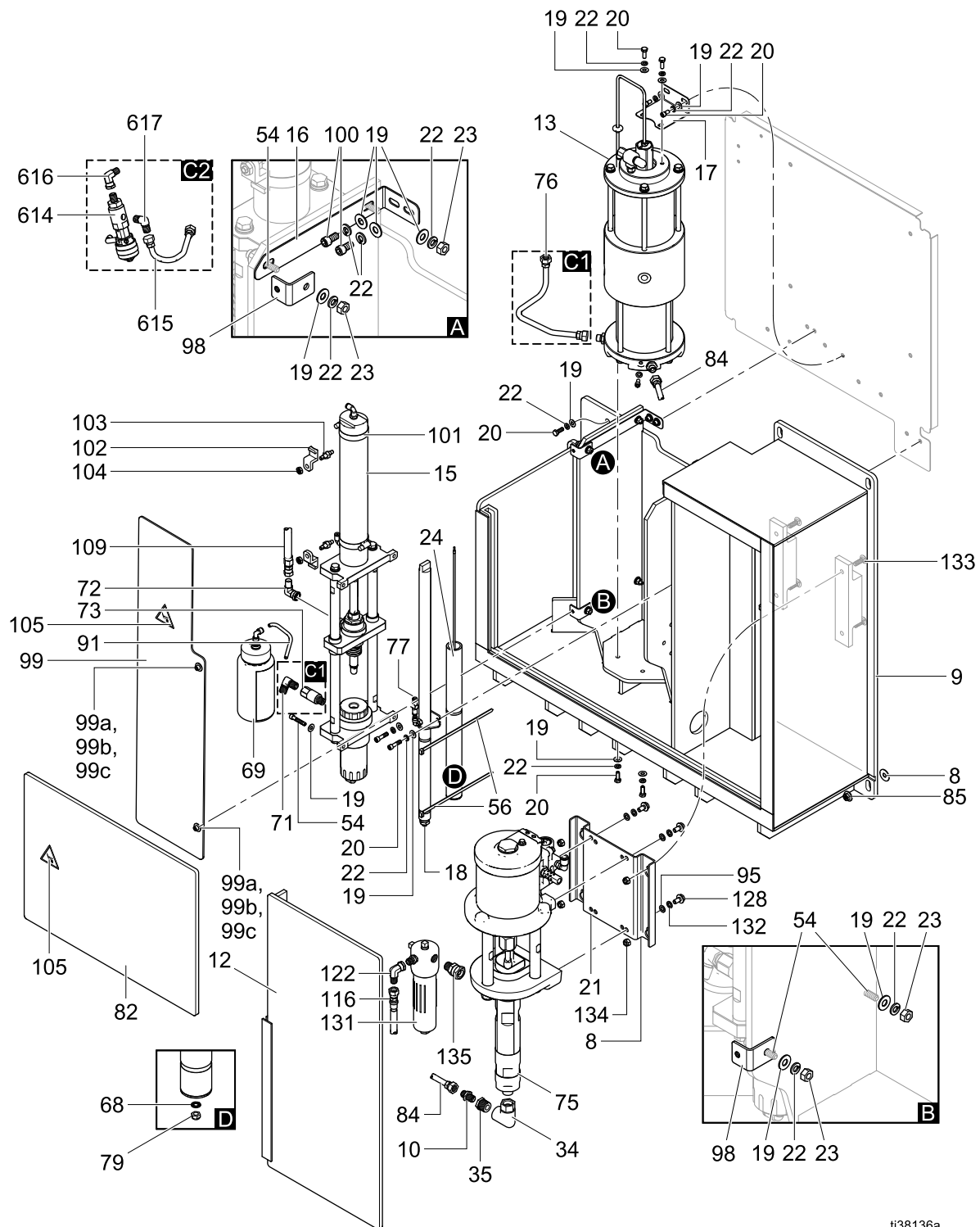


Figure 59 Isolation Cabinet Interior

Details C1 show the parts that come with a standard system. Detail C2 shows the parts that come with a color change system. If adding color change capability to a system, the parts in C1 must be changed out with parts in C2. For more information, see [Color Change Components, page 135](#).

Ref. No.	Part No.	Description	Qty
1	-----	ENCLOSURE, WATERBORNE, BATCH, AA	1
1a	-----	NUT	1
1c	116343	SCREW, GROUND	1
2	164416	WASHER, FLAT	4
3	-----	FRAME, WITH CASTERS, WATERBORNE, AA	1
4	-----	WASHER, 1/2 INCH PLAIN FLAT	8
5	123999	BOLT, CAP, HEX HEAD	4
6	801020	NUT, LOCK, HEX	4
7	-----	BRACKET, ELECTRICAL, WATERBORNE	1
8	-----	WASHER, FLAT	5
9	25R222	CABINET, STAND, WATERBORNE, STAND, AA	1
10	166846	FITTING, ADAPTER	2
11	108525	WASHER, LOCK, SPRING	1
12	25R221	SHIELD, SUB ASSEMBLY, WATERBORNE, AA	1
13	25N031	PUMP, WATERBORNE ISOLATION For details, see 25N031 Isolation Fluid Pump Parts, page 127 .	1
14	26C896	CONTROL, ELECTRICAL; not equipped for a gun flush box See Electronic Control Parts, page 129 .	1
	26C716	CONTROL, ELECTRICAL; equipped for gun flush box	1
15	25N030	VALVE, WATERBORNE ISOLATION For details, see 25N030 Isolation Valve Parts, page 125 .	1
16	19Y100	BRACKET, VALVE, WATERBORNE	1
17	19Y099	BRACKET, PUMP, WATERBORNE	1
18	25P393	ROD, GROUND, WATERBORNE	1
19	115814	WASHER, FLAT, SST Qty 38: Color change enabled systems. Qty 32: All other systems.	38/ 32
20	102023	SCREW, CAP, HEX HEAD	10
21	26B428	BRACKET, WATERBORNE, AA KIT, BRACKET, WATERBORNE, AA (includes items 95, 128, 132, 133, 134)	1

Ref. No.	Part No.	Description	Qty
22	104123	WASHER, LOCK, SPRING Qty 35: Color change enabled systems. Qty 29: All other systems.	35/2 9
23	112223	NUT, HEX, REGULAR	5
24	25R034	RESISTOR, BLEED, ASSY, ISO SYS	1
25	17D918	MANIFOLD, AIR, SPEED CONTROL	1
26	514930	SCREW, CAP, SKT HEAD	2
27	158491	FITTING, NIPPLE, 1/2 NPT	1
28	15T937	FITTING, ELBOW, 1/4 MNPT X 5/32 T	1
29	157350	Q ADAPTER, 3/8 NPT X 1/4 NPT	1
30	119159	SWITCH, AIR FLOW	1
31	15T546	FITTING, STRAIGHT, 3/8 T X 3/8 MNPT	3
33	101390	WASHER, LOCK, INTERNAL	2
34	113934	FITTING, UNION, SWIVEL	1
35	122767	BUSHING, 1/2 X 1/4 NPT, MF, SS, 6K, 316	1
36	16N177	FITTING, BULKHEAD, BRASS, 3/8 INCH	1
40	26C728	BRACKET, ADM, ASSEMBLY, WATERBORNE	1
41	277853	BRACKET, MOUNTING, BOOTH CONTROL	1
42	26B099	KIT, ADM/CONTROL INTERFACE (includes ADM and HydroShield software token)	1
43	121002	CABLE, CAN, FEMALE / FEMALE 1.0M Qty 2: Color change enabled systems. Qty 2: All other systems.	2/1
44	18C027	PLUG, HOLE, .687 INCH	2
45	116172	SWITCH, LIMIT, PNEUMATIC	1
46	151395	WASHER, FLAT	4
47	26B100	POWER SUPPLY, 24VDC, 2.5A, 60W, C13 (includes items 46, 47, 48, 74, 129)	1
48	100518	SCREW, MACH, PNHD	4
49	16F151	FITTING, ELBOW, SWIVEL, 3/8 T 3/8 NPT	1
50	120753	FITTING, PUSH TO CONNECT ELBOW	2
51	157021	WASHER, LOCK	2

Parts

Ref. No.	Part No.	Description	Qty
52	555388	NUT, HEX, JAM, 8-32	2
53	16A079	KIT, VALVE, DUMP, ACCESSORY Qty 2: Color change enabled systems. Qty 1: All other systems.	2/1
54	19A463	SCREW, CAP, SOCKETHEAD	4
55	114406	SCREW, MACH, FILH	2
56	114958	STRAP, TIE	2
57	C50019	TERMINAL, RING	7
59	17D923	CABLE, GCA, M12-5P, M BULKHEAD/F	2
60	598095	TUBE, 5/32 OD, NYLON, 250 PSI (not shown) 26 FEET: On color change enabled systems. 17 FEET: All other systems. For connection details, see Performance, page 142 .	26/1 7
61	16K322	BRACKET, LIGHT TOWER, PAINT	1
62▲	15A682	LABEL, SAFETY	1
63	065108	WIRE, CU, ELEC., 14 AWG, BLACK, 1.2 FEET	1.2
64	123942	FASTENER, SCREW, CAP, HEX HEAD	4
65	106084	SCREW, MACH, PNH	2
68	-----	WASHER, #10 FLAT SST	1
69	25P442	BOTTLE, WASH, WATERBORNE	1
70	223547	WIRE, ASSY, 25 FEET	1
71	114342	FITTING, ELBOW, MALE Qty 2: Color change enabled systems. Qty 1: All other systems.	2/1
72	17R502	FITTING, ELBOW, SWIVEL, 1/4 NPT-NPSM Qty 4: Color change enabled systems. Qty 2: All other systems.	4/2
73	24Y376	VALVE, CHECK, OUTLET, FKM ETP Not used on color change enabled systems.	1
74	103181	WASHER, LOCK EXT	4
75	W30 AAS	PUMP, ASSY, 30:1, 25CC, SS, STD	1
	W15 AAS	PUMP, ASSY, 15:1, 25CC, SS, STD	1

Ref. No.	Part No.	Description	Qty
76	25A517	HOSE, COUPLED, .625 FEET, PTFE Color change enabled systems.	1
	26B162	HOSE, COUPLED, 10.2 INCHES, PTFE Systems not enabled for color change.	1
77	19Y247	VALVE, AIR, QUICK EXHAUST	1
79	107110	NUT, LOCK	1
80	164672	ADAPTER	1
81	17J191	WIRE, GROUND	1
82	26B427	PLATE, WB, SHIELD, AA (includes item 105)	1
83	111987	CONNECTOR, CORD STRAIN RELIEF	2
84	25A721	HOSE, COUPLED, 1.0 FT. PTFE Qty 2: Color change enabled systems. Qty 1: All other systems.	2/1
85	19B503	NUT, HEX, FLANGE, M8	5
86	110874	WASHER, FLAT	2
87	111307	WASHER, LOCK, EXTERNAL	2
92	-----	BAR, NEOPRENE STRIP, ADHESIVE	2
93	18C026	PLUG, HOLE, .437" Qty 1: Color change enabled systems. Qty 7: All other systems.	1/7
94	101566	NUT, LOCK Qty 10: Color change enabled systems. Qty 4: All other systems.	10/4
95	111003	WASHER, FLAT	4
97	112222	SCREW, CAP .SCH	2
98	19A460	BRACKET, SHIELD	2
99	26C922	COVER, ISOLATION VALVE (includes 99a, 99b, 99c, 105)	1
99a	19B478	SCREW, CAPTIVE, SHCS 1/4-20 X .5	2
99b	19B479	RING, RETAINING, PUSH-ON ID .32	2
99c	170772	WASHER	2

Ref. No.	Part No.	Description	Qty
100	551903	SCREW, CAP SCH 1/4-20 X 1/2 Qty 21: Color change enabled systems. Qty 13: All other systems.	21/13
101	-----	CLAMP, HOSE, SIZE 32 Purchase sensor kit 26B102 (includes 101, 102, 103, 104)	2
102	-----	BRACKET, SENSOR Purchase sensor kit 26B102 (includes 101, 102, 103, 104)	2
103	24W120	SENSOR, STROKE POSITION	2
104	19Y538	NUT, HEX, 5/16-24	4
105 ▲	19Y631	LABEL, SAFETY, WARNING, PINCH HAZ	2
107	210084	CONDUCTOR, GROUNDING, HAND HELD	1
109	26B089	HOSE, PAINT, LOW PRESSURE Qty 2: Color change enabled systems. Qty 1: All other systems.	2/1
110	054134	TUBE, NYLON, 3/8 INCH, 15 FEET (not shown) For connection details, see Pneumatic Connections, page 114 .	15
	25B413	KIT, VALVE TOOLS (includes items 111, 112, 113)	1
111	-----	TOOL, ASSY, PISTON ISOLATION	1
112	-----	TOOL, ASSY, SLEEVE ISOLATION	1
113	-----	TOOL, ASSY, STEM, ISOLATION	1
114	15X472	LIGHT, TOWER	1
121	100731	WASHER Qty 20: Color change enabled systems. Qty 8: All other systems.	20/8
122	100639	WASHER, LOCK Qty 10: Color change enabled systems. Qty 4: All other systems.	10/4
128	111799	SCREW, CAP, HEX HD	4
129	245202	POWER CORD with North America NEMA 5-15 male plug (not shown)	1
	124864	POWER CORD with China/Australia AS/NZS 3112 male plug (not shown)	1
	121056	POWER CORD with Continental Europe CEE 7/7 male plug (not shown)	1

Ref. No.	Part No.	Description	Qty
130	121818	BULKHEAD, TUBE, 5/32 INCH (not shown) Color change enabled systems only.	2
131	26B236	FILTER, FLUID	1
132	100214	WASHER, LOCK	4
133	107129	BOLT, ROUND HEAD	4
134	17A237	NUT, HEX	4
135	235208	FITTING, UNION, SWIVEL	1
136	H60T18	GUN, Pro Xp (not shown). Included with some models. See Approved System Components, page 5 .	1
137	25R012/ 25R014	HOSE, FLUID, WATERBORNE (not shown). Included with some models. See Approved System Components, page 5 .	1
138	235070/ 235072	HOSE, AIR (not shown). Included with some models. See Approved System Components, page 5 .	1
140	16F201	CASTER, SWIVEL, WITH BREAK (not shown)	4
141	100018	WASHER, LOCK, SPRING, 1/2 (not shown)	4
142	100321	NUT (not shown)	4
143	121226	CABLE, CAN, MALE/FEMALE, 0.4M (not shown)	
144	25R200	FLUID, CLEANSING, 1 GALLON (not shown)	1
601†	-----	BAR, MOUNTING (Included in kit 24B415) Color change enabled systems only.	2
605†	121592	SCREW, CAP, HEX HEAD Color change enabled systems only.	2
606†	-----	SCREW, CAP Color change enabled systems only.	4
607†	15U927	BRACKET, VALVE, COLOR CHANGE Color change enabled systems only.	1
612†	16T072	ADAPTER, CABLE, CAN, IS TO NON IS	2

Parts

Ref. No.	Part No.	Description	Qty
618†	256292	VALVE, CLR/CAT CHG, LP, 5-CLR Color change enabled systems only.	1
619	25D315	MODULE, CC CONTROL, 6 VALVES Color change enabled systems only.	1
620†	15R873	FITTING, TEE Color change enabled systems only.	1

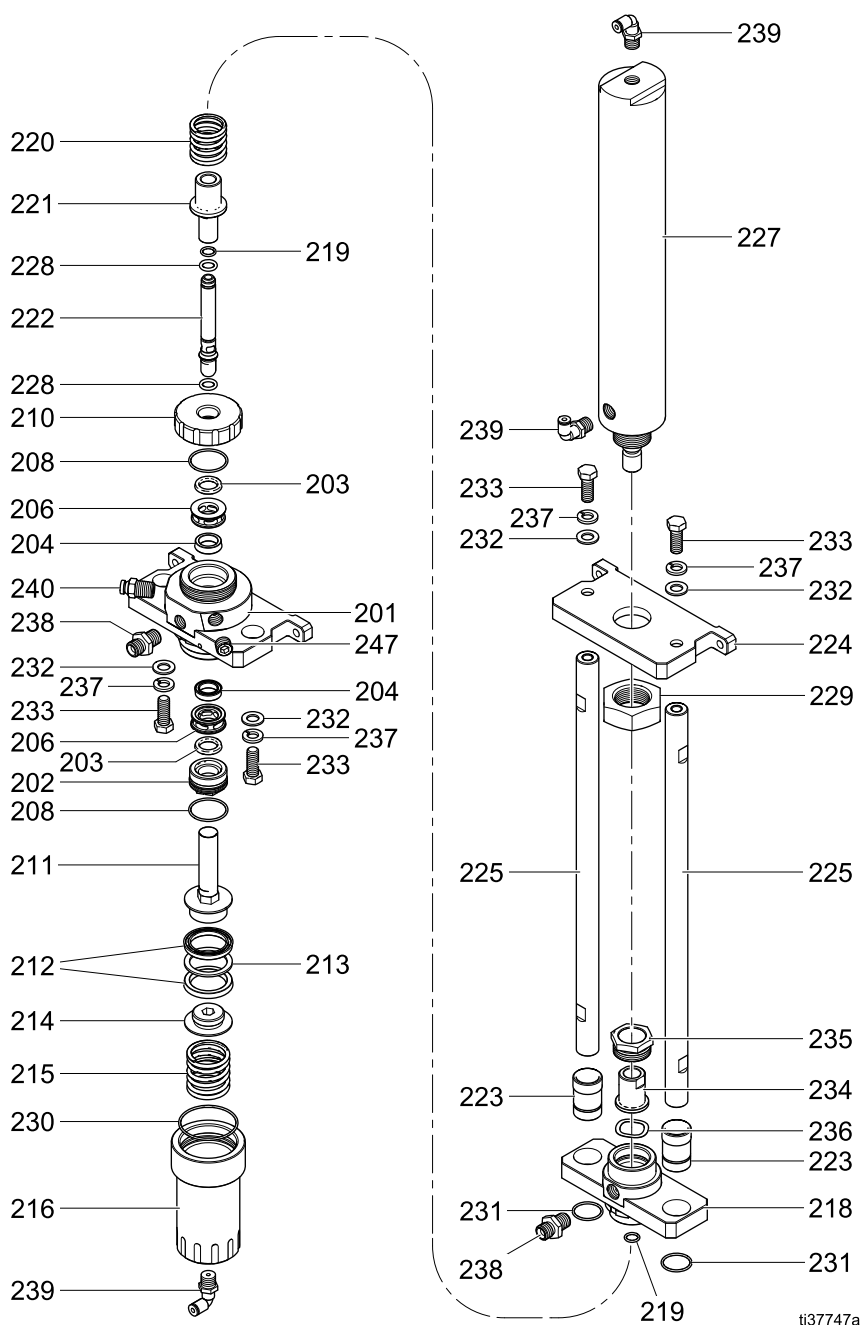
Ref. No.	Part No.	Description	Qty
621†	128820	FITTING, BUSHING Color change enabled systems only.	1
622†	125428	FITTING, CONNECTOR Color change enabled systems only.	1
623†	054175	TUBE, NYLON, 0.7 FEET (not shown) Color change enabled systems only.	1

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

† Reference numbers 600-623 are included in color change enabled systems For an illustration and more information, see [Color Change Components, page 135](#).

Parts labeled ----- are not available separately.

25N030 Isolation Valve Parts



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Figure 60 Isolation Valve

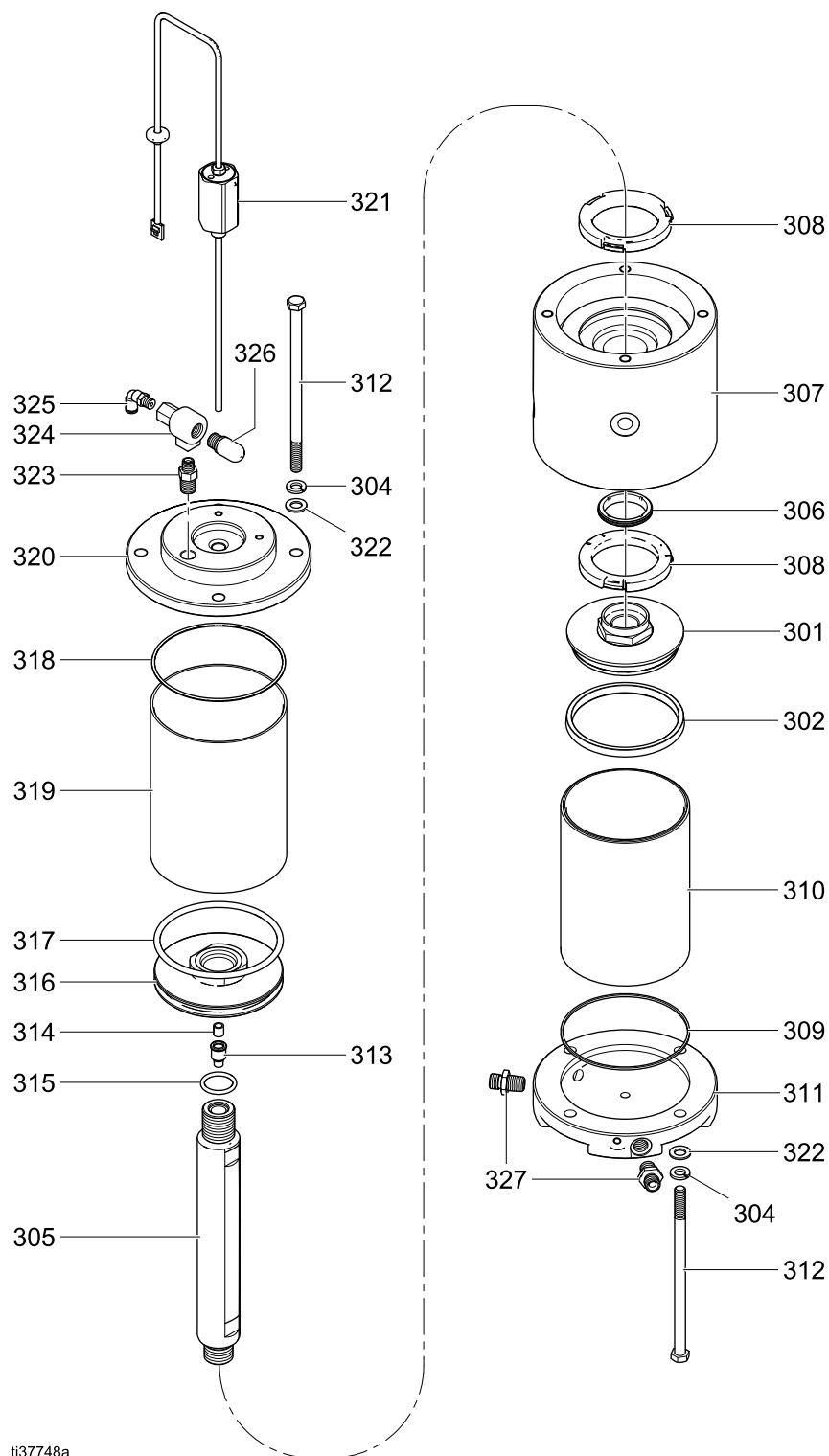
Parts

Ref. No.	Part No.	Description	Qty
201	-----	HOUSING, BASE, ISOLATION VALVE	1
202*	19A375	RETAINER, U-CUP, ISOLATION VALVE	1
203*	129597	SEAL, U-CUP, QUAD RING, .625 ID	2
204*	17X743	PACKING, U-CUP	2
205	-----	BLOCK, MOUNT, HOUSING	1
206*	19A376	SPACER, U-CUP, ISOLATION VALVE	2
207	194381	PIN, DOWEL, 1/8	2
208*	18B866	O-RING, #024, FX75	2
209	-----	RING, LOCK, HOUSING, ISOLATION	1
210	-----	CAP, SEAL RETAINER, ISOLATION	1
211	-----	PISTON, ISOLATION VALVE	1
212*	17X745	PACKING, U-CUP, ID 1.25 X OD 1.63	2
213*	19A379	WASHER, BACKUP, ISOLATION VALVE	1
214*	19A380	RETAINER, PISTON, ISOLATION VALVE	1
215	17X746	SPRING, COMPR, 3.25 X OD 1.43	1
216*	-----	CAP, PISTON, ISOLATION VALVE	1
217	-----	BLOCK, MOUNT, SHUTTLE	1
218	-----	HOUSING, SHUTTLE, ISOLATION VALVE	1
219*	111316	PACKING, O-RING	2
220	17Y486	SPRING, COMPR, 2.0 X OD 1.22	1

Ref. No.	Part No.	Description	Qty
221*	19A448	SLEEVE, ISOLATION VALVE	1
222	-----	STEM, ISOLATION VALVE	1
223	-----	BEARING, SHUTTLE, ISOLATION VALVE, pack of 2, includes item 231	2
224	-----	BLOCK, MOUNT, AIR CYLINDER	1
225	-----	ROD, CONNECTING, ISOLATION VALVE	2
226	-----	RING, LOCK, SHUTTLE, ISOLATION	1
227	-----	CYLINDER, AIR, ID 2.0 X 10.0 includes item 229 and item 239	2
228*	18B106	O-RING, #109, FX75	2
229	19A526	NUT, RETAINER	1
230*	106258	PACKING, O-RING	1
231	103413	PACKING, O-RING	2
232*	112914	WASHER, PLAIN	4
233*	102471	SCREW, CAP HEX HD	4
234	19A457	COUPLER, ISOLATION VALVE	1
235	19A458	NUT, RETAINING, ISOLATION VALVE	1
236	19A459	WASHER, WAVE SPRING	1
237*	103975	WASHER, LOCK	4
238*	166846	FITTING, ADAPTER	2
239	15T937	FITTING, ELBOW, SWIVEL 1/4NPT X 5/32T	3
240*	116658	FITTING, TUBE, MALE (1/4 NPT)	1
247*	101970	PLUG, PIPE, HDLS	1

* These parts can be ordered as part of a kit. See [Isolation Valve Kits, page 139](#).

25N031 Isolation Fluid Pump Parts



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Figure 61 Isolation Fluid Pump

Parts

Ref. No.	Part No.	Description	Qty
301	19A952	PISTON, FLUID, ISOLATION PUMP	1
302*	19A951	PACKING, U-CUP, 4.08 X .335	1
304*	103975	WASHER, LOCK	8
305	-----	ROD, PISTON, ISOLATION PUMP	1
306*	121130	WIPER, CM200 WETCUP COVER	1
307	-----	HOUSING, MIDDLE, ISOLATION PUMP	1
308*	15U254	BUMPER	2
309*	15G881	SEAL, GASKET, CYLINDER	1
310*	15G882	CYLINDER, PUMP, (CHROME, 2000CC)	1
311	17W719	COVER, FLUID, ISOLATION PUMP	1
312*	17Z471	SCREW, CAP, HEX HD, 3/8-16 X 7"	8
313	-----	HOLDER, MAGNET, SENSOR	1

Ref. No.	Part No.	Description	Qty
314*	15G747	MAGNET, LINEAR SENSOR	1
315*	160516	PACKING, O-RING, 214	1
316	-----	PISTON, AIR, ISOLATION PUMP	1
317*	17Z468	O-RING, #346, BUNA-N	1
318*	111624	PACKING, O-RING	1
319*	17X737	CYLINDER, PISTON, 4.5 ID	1
320	-----	COVER, AIR, ISOLATION PUMP	1
321	287839	SENSOR, ASSEMBLY	1
322*	112914	WASHER, PLAIN	8
323	16D939	FITTING, NIPPLE, REDUCING	1
324	104661	VALVE, EXHAUST, QUICK	1
325	15T866	FITTING, ELBOW, SWIVEL, 1/8NPT X 5/32T	1
326	114174	MUFFLER	1
327	166846	FITTING, ADAPTER	2

* These parts can be ordered as part of a kit. See [Pump Kits, page 141](#).

Electronic Control Parts

The following figure shows 26C716.

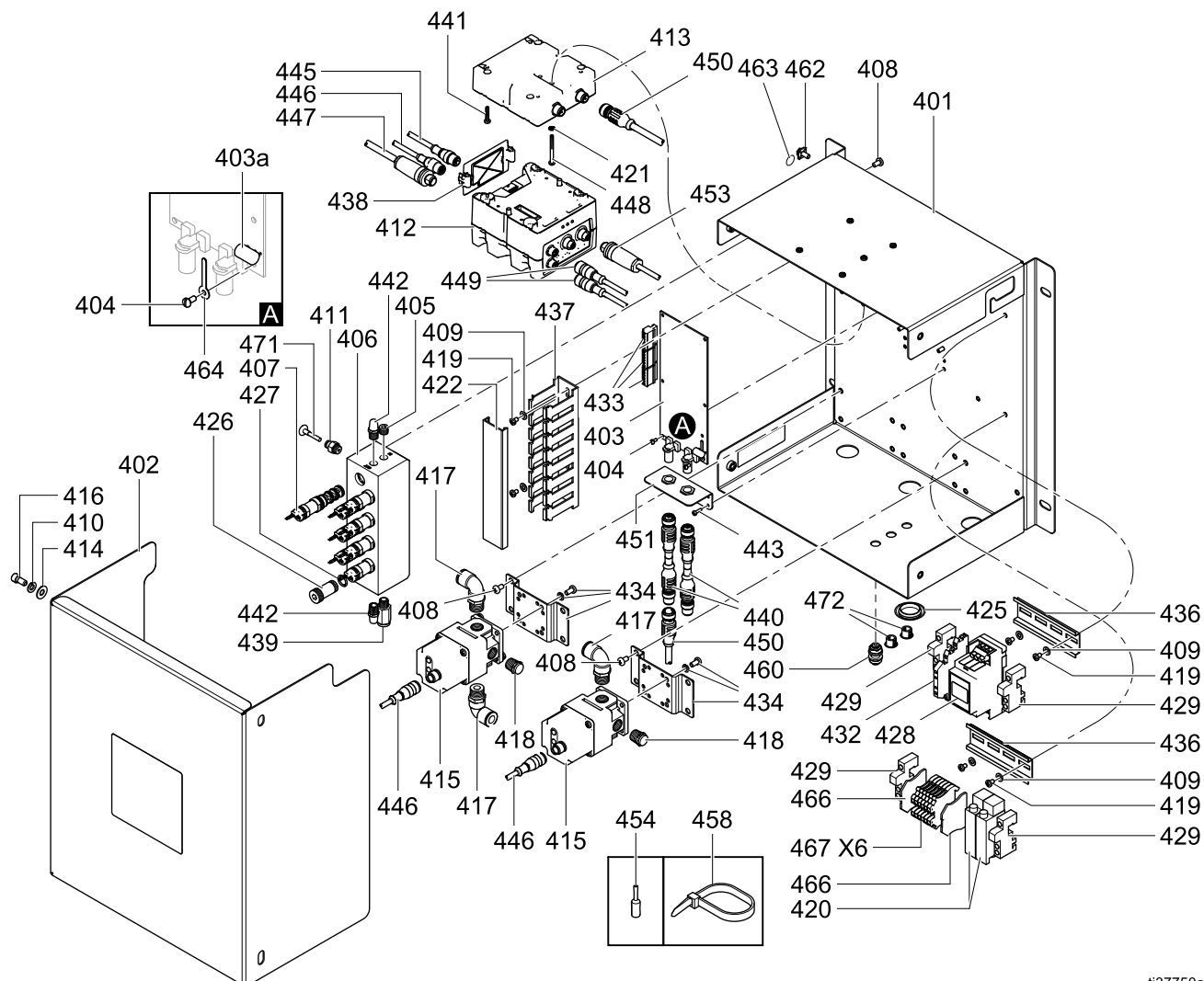


Figure 62 Electronic Controls

Note

Use air tubing (470) to connect the gun flush box pressure switch (420) to the bulkhead (460). 26C716 contains two switches. The gun flush pressure switch is the switch on the right.

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Parts

Ref. No.	Part No.	Description	Qty
401	-----	PANEL, WATERBORNE, PAINTED	1
402	-----	COVER, ELECTRICAL, WATERBORNE	1
403	25D312	BOARD, CIRCUIT, GCA, CC, IS-TBD	1
403a	17U084	FUSE, 500mA	1
404	112324	SCREW, MACH, PN HD, 4X.25	7
405	100139	PLUG, PIPE 1/8-27 NPTF	1
406	-----	MANIFOLD, COLOR CHANGE CONTROL	1
407	16P316	VALVE, SOLENOID Model 26C716: Qty 8 Model 26C896: Qty 7	8/7
408	103833	SCREW, MACH, CRBH	12
409	110874	WASHER, FLAT	6
410	104123	WASHER, LOCK, SPRING	4
411	114263	FITTING, CONNECTOR, MALE Model 26C716: Qty 8 Model 26C896: Qty 7	8/7
412	289696	MODULE, GCA, CUBE, FCM	1
413	289697	MODULE, GCA, CUBE, BASE	1
414	115814	WASHER, FLAT, SST	4
415	17G386	REGULATOR, ELECTRO/PNEUMATIC, 3/8 INCH NPT	2
416	551903	SCREW, CAP SCH 1/4-20 X 1/2	4
417	16F151	FITTING, ELBOW, SWIVEL, 3/8T 3/8 NPT	3
418	112173	MUFFLER	2
419	112144	SCREW, MACH, PAN HD	6
420	17D919	SWITCH, PRESSURE Model 26C716: Qty 2 Model 26C896: Qty 1	2/1
421	100272	WASHER, LOCK, #6	1
422	-----	COVER, WIRE, DUCT	0.55
425	-----	PLUG, 1" ID, ROUND, PLASTIC	1
426	16P916	PLUG, MANIFOLD, COLOR CHANGE Model 26C716: Qty 1 Model 26C896: Qty 2 Includes item 427	1/2

Ref. No.	Part No.	Description	Qty
427	113418	PACKING, O-RING Model 26C716: Qty 1 Model 26C896: Qty 2	1/2
428	25R197	ENCLOSURE, ASSEMBLY, KV BOARD	1
429	112446	BLOCK, CLAMP END	4
432	17G392	BLOCK, TERMINAL, OPTOCOUPLER	1
433	119162	CONNECTOR, PLUG, 6 POSITION	3
434	17D921	BRACKET, REGULATOR	2
436	514014	RAIL, MT (cut to length)	1
437	----	DUCT, WIRE	---
438	277674	ENCLOSURE, CUBE DOOR	1
439	108982	CONNECTOR, TUBE	1
440	19Y588	ADAPTER, CABLE, CAN, IS TO NON-IS	2
441	-----	SCREW, MACH, PAN HD, #6-32 UNC	4
442	C06061	MUFFLER, SINTERED, DIA 1/8	2
443	107388	SCREW, MACH, PNH	4
445	17H111	CABLE, GCA, M12-5P, M/N, 0.5M For detailed information, see Wiring Connections, page 116 .	1
446	19Y586	CABLE, SPLITTER, SNG MALE DBL FE For detailed information, see Wiring Connections, page 116 .	1
447	19Y759	CABLE, SPLITTER, M12-8P For detailed information, see Wiring Connections, page 116 .	1
448	-----	SCREW, MACHINE, PAN, 6-32 X 1-1/2	1
449	19Y572	CABLE, SPLITTER, M12(F) TO M8(M) For detailed information, see Wiring Connections, page 116 .	2
450	121000	CABLE, CAN, FEMALE / FEMALE 0.5M For detailed information, see Wiring Connections, page 116 .	1
451	-----	BRACKET, COLOR CHANGE, WATERBORNE	1
453	19Y758	CABLE, SPLITTER, LEADS, M12-5P	1

Ref. No.	Part No.	Description	Qty
454	112512	FERRULE, WIRE ORANGE Model 26C716: Qty 21 Model 26C896: Qty 19	21/ 19
458	102478	STRAP, TIE WIRING	8
460	121818	BULKHEAD, TUBE, 5/32 Model 26C716: Qty 1 Model 26C896: Qty 0	1/0
462	116343	SCREW, GROUND	1
463	186620	LABEL, SYMBOL, GROUND	1
464	123691	HOLDER, FUSE	1

Ref. No.	Part No.	Description	Qty
466	120490	COVER, END	2
467	120491	BLOCK, TERMINAL Model 26C716: Qty 6 Model 26C896: Qty 8	6/8
470	598095	TUBE, 5/32 OD, NYLON, 250PSI (26C716 only)	16 in.
471	113279	PLUG, FITTING, TUBE, PUSH-IN	1
472	18C026	PLUG, HOLE, .437" Model 26C716: Qty 2 Model 26C896: Qty 3	2/3

Repair Kits and Accessories

Accessories

Grounded Air Hoses

100 psi (0.7 MPa, 7.0 bar) Maximum Working Pressure

0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

Part No.	Description
Grounded Air Hose with stainless steel braid ground path (Red)	
235070	25 ft (7.6 m)
235071	36 ft (11 m)
235072	50 ft (15 m)
235073	75 ft (23 m)
235074	100 ft (30.5 m)

Fluid Hoses

3000 psi (20.7 MPa, 206.8 bar) Maximum Working Pressure

.16 in. (4 mm ID)

Part No.	Description
Shielded Waterborne Fluid Hose	
25R012	25 ft (7.6 m)
25R013	36 ft (11 m)
25R014	50 ft (15 m)
25R015	75 ft (23 m)
25R016	100 ft (30.5 m)

Light Tower Extension Cables

Part No.	Description	Qty
124003	CABLE, CAN, MALE/FEMALE, 5 METERS	1
121005	CABLE, CAN, MALE/FEMALE, 15 METERS	1
121006	CABLE, CAN, MALE/FEMALE, 50 METERS	1

CAN Cables for Control Module

Part No.	Description	Qty
121001	CABLE, CAN, FEMALE / FEMALE, 1 METER Included in the isolation system (43)	1
121002	CABLE, CAN, FEMALE / FEMALE, 1.5 METER	1
19Y641	KIT, SHLD CAN, LF FERRITE, 15 METERS	1
19Y642	KIT, SHLD CAN, LF FERRITE, 40 METERS	1

HydroShield Cleansing Solution

Part No.	Description	Qty
25R200	FLUID, CLEANSING, 1 GALLON	1

Kit 244105, Gun Flush Box Module

See 309227 in [Related Manuals](#), page 3.

Kit 26B420, Gun Flush Box Installation Kit

This kit is required for HydroShield systems that were not equipped for a gun flush box. For installation details, see [Convert a Standard System to be Equipped for a Gun Flush Box](#), page 111.

Part No.	Description	Qty
19B745	SWITCH, PRESSURE	1
598095	TUBE, 5/32 OD, NYLON	1
16P316	VALVE, SOLENOID	1
114263	FITTING, CONNECTOR, MALE	1
121818	BULKHEAD, TUBE, 5/32	1

Kit 24N528, Gun Flush Box Adapter Kit for 60 kV and 85 kV Guns

This kit is required for HydroShield systems equipped for a gun flush box.

Part No.	Description	Qty
16P679	ADAPTER, GUN HOLDER, 60KV, 85KV	1
16T438	YOKE, UPPER, ES GUN	1
17Y357	ADAPTER, AA HOLSTER	1

Kit 26B414, System Stop Pneumatic Input Kit

This kit provides a pneumatic means to signal the HydroShield system to stop. Install kit 26B414 to use the optional System Stop: Air input. For details about this input, see [Status Screen 1, page 54](#).

Part No.	Description	Qty
19B745	SWITCH, PRESSURE	1
598095	TUBE, 5/32 OD, NYLON, 4 FEET	1
121818	BULKHEAD, TUBE, 5/32	2

Kit 24Z226, Optocoupler

This kit is required to use the System Status Output. This feature appears on [Status Screen 1, page 54](#) and [Maintenance 6: Output Resets and Test, page 66](#).

Kit 17Z578, Software Upgrade Token

This kit contains a Graco black software update token with the latest system software. A token is included when a replacement control interface is ordered. To use the token, see [Update the System Software, page 45](#).

Kit 26B236, 100 Mesh Fluid Filter

Part No.	Description	Qty
110740	PLUG, PIPE	1
111697	PLUG, PIPE	2
104361	PACKING, O-RING	1
166846	FITTING, ADAPTER	1
167026	STRAINER, MESH SCREEN 100	1
186075	SUPPORT, FILTER	1
185632	BOWL, FILTER	1
171941	SPRING, COMPRESSION	1
185631	HOUSING, FILTER	1
235208	FITTING, UNION, SWIVEL	1

Kit 26B400, Supply Pump

This kit contains a Triton 1:1 pump to be assembled to the inlet side of the HydroShield system.

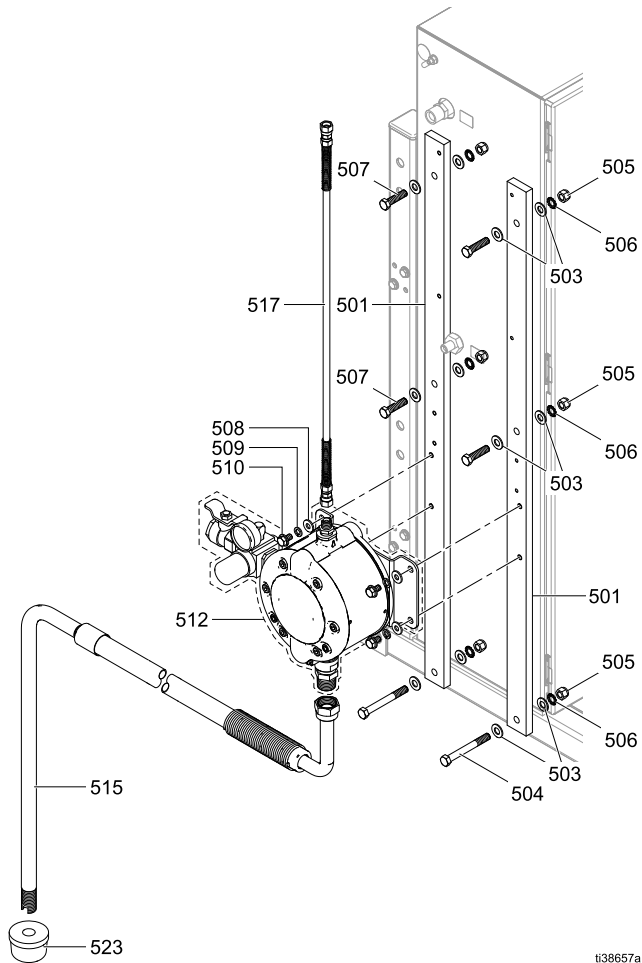


Figure 63 Supply Pump Kit 26B400

Ref. No.	Part No.	Description	Qty
501	19Y578	BAR, MOUNTING	2
503	100731	WASHER, 3/8"	12
504	121592	SCREW, CAP, HEX HEAD, 3/8"	2
505	101566	NUT, LOCK, 3/8"	6
506	100639	WASHER, LOCK, 3/8"	6
507	102637	BOLT, HEX HD, 3/8"	4
508	100527	WASHER, PLAIN	4
509	100214	WASHER, LOCK	4
510	111801	SCREW, CAP, HEX HD, 5/16"	4
512	233501	TRITON 1:1 PUMP WITH BRACKET ASSEMBLY	1
	197426	BRACKET, WALL MOUNT	1
	197449	SPACER	2
	17S252	SCREW, CAP, HEX HEAD, 5/16-18	2
	16R882	FITTING, NIPPLE, 3/4	1
	166863	FITTING, NIPPLE, REDUCING	1
	166421	FITTING, PIPE	2
	116513	REGULATOR, AIR	1
	191892	FITTING, ELBOW, STREET, 90 DEG	1
	108190	GAUGE, PRESSURE, AIR	1
	116473	VALVE, VENTED, 2 WAY	1
515	255871	HOSE, SIPHON, ASSEMBLY	1
517	26B162	HOSE, COUPLED, PTFE, 10.2"	1
523	187146	STRAINER, INLET	1

Color Change Components

Kit 26B415, Color Change

Converts a standard system to a color change system. Kit includes 30 feet of the 5/32" tubing, (598095). Requires a color change control module and a color change valve stack.

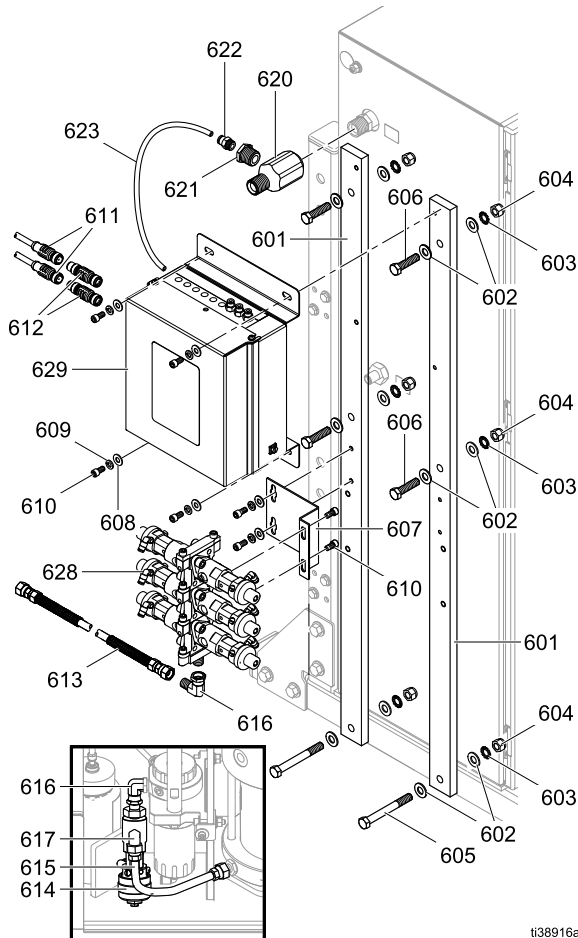


Figure 64 Color Change Kit 26B415

Ref. No.	Part No.	Description	Qty
601	-----	BAR, MOUNTING	2
602	100731	WASHER, 3/8"	12
603	100639	WASHER, LOCK, 3/8"	6
604	101566	NUT, LOCK, 3/8"	6
605	121592	SCREW, CAP, HEX HEAD, 3/8"	2
606	-----	SCREW, CAP, 3/8-16 x 1.5"	4
607	15U927	BRACKET, COLOR CHANGE STACK	1
608	115814	WASHER, FLAT, SST	6
609	104123	WASHER, LOCK, SPRING	6
610	551903	SCREW, CAP, SCH, 1/4 X 1/2"	8
611	121002	CABLE, CAN, FEMALE / FEMALE 1.5M	2
612	16T072	ADAPTER, CABLE, CAN, IS TO NON IS	2
613	26B089	HOSE, PAINT, LOW PRESSURE	1
614	16A079	KIT, VALVE, DUMP, ACCESSORY	1
615	25A517	HOSE, COUPLED, .625 FT, PTFE	1
616	17R502	FITTING, ELBOW, SWIVEL, 1/4 NPT-NPSM	2
617	114342	ELBOW, 1/4-18 NPSM	1
620	15R873	FITTING, TEE	1
621	128820	FITTING, BUSHING	1
622	125428	FITTING, CONNECTOR	1
623	054175	TUBE, NYLON, 0.7 FEET	1
628	-----	VALVE STACK (see the following table for color change module/valve stack combinations)	1
629	-----	COLOR CHANGE MODULE (see the following table for color change module/valve stack combinations)	1

Color Change Control Module and Valve Stack Combinations

Max. Colors	Number of Valves	Control Module	Valve Stack
1	4	25D313	256290
3	6	25D315	256292
5	8	25D317	256294
7	10	25D319	256296

Max. Colors	Number of Valves	Control Module	Valve Stack
9	12	25D321	256298
11	14	25D323	256300
13	16	25D325	256302
15	18	25D327	256304

Color Change Module Configuration

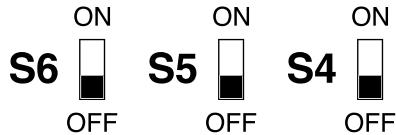
Configure each module according to its designated number, as follows:

NOTICE

To avoid damaging the circuit boards, wear Part No. 112190 grounding strap on your wrist and ground appropriately.

To avoid electrical component damage, remove all system power before plugging any connectors.

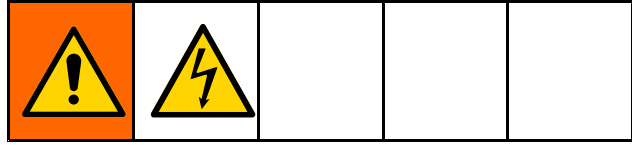
1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Remove electrical power from the system.
3. Open the color change module. Locate switches S4, S5, and S6 on the control module board. The switches are shipped in the OFF position.



4. For each module, set the switches to ON or OFF, as shown in the following table.

Non-IS Control Module Switch Settings			
Control Module	S6	S5	S4
Electronic Controls			
Color Change			

Replace the Color Change Board



NOTICE

To avoid damaging the circuit boards, wear Part No. 112190 grounding strap on your wrist and ground appropriately.

To avoid electrical component damage, remove all system power before plugging any connectors.

1. Prepare the electrical controls for service. Follow the steps in [Prepare the Electrical Controls for Service, page 109](#).
2. Remove electrical power from the system.
3. Remove the color change module cover (704).
4. Note where each cable is connected, then disconnect all cables from the color change board connectors.
5. Remove the seven mounting screws (703) and the board (702).
6. Install the new board. Reinstall the screws.
7. Reconnect the cables to the proper connectors, as noted in step 3.
8. Reinstall the cover (704). Restore electrical power to the system.

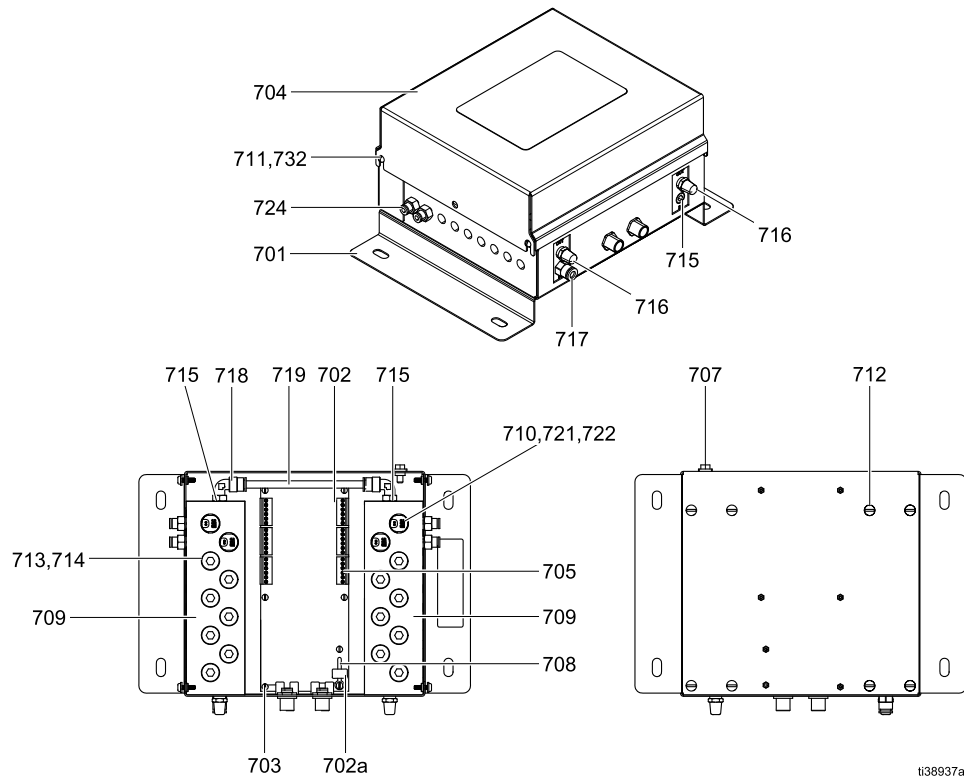


Figure 65 Control Module Repair (Non-IS Module Shown)

Ref. No.	Part No.	Description	Qty
701	16P855	PANEL	1
702	25D312	BOARD, circuit; used with 25D313 - 25D327 control modules	1
702a	17U084	FUSE; 500 mA; used with 25D313 - 25D327 control modules	1
703	112324	SCREW, machine, pan head; 4-40 x 0.25 in. (6 mm)	6
704	24T562	COVER	1
705	119162	CONNECTOR, 6-position	★
707	116343	SCREW, ground; M5 x 0.8	1
708	123691	HOLDER, fuse	1
709	24T563	MANIFOLD	2
710	16P316	SOLENOID	★
711	117831	SCREW, machine, pan head; 6-32 x 0.5 in. (13 mm)	4
712	103833	SCREW, machine, pan head; 10-32 x 0.375 in. (10 mm)	8
713	24T565	PLUG; 5/8-32; includes item 314	★

Ref. No.	Part No.	Description	Qty
714	113418	O-RING; buna-N	14
715	100139	PLUG, pipe; 1/8 npt	3
716	C06061	MUFFLER	2
717	115671	FITTING, connector; 1/8 npt(m) x 1/4 in. (6 mm) OD tube	1
718	112698	ELBOW; 1/8 npt(m) x 1/4 in. (6 mm) OD tube	2
719	590332	TUBE; polyethylene; 1/4 in. (6 mm) OD	1
720	598095	TUBE; nylon; 5/32 in. (4 mm) OD	1
721	-----	STRAP, tie	★
722	-----	FERRULE	★
724	114263	FITTING, connector; 1/8 npt(m) x 5/32 in. (4 mm) OD tube	★
732	151395	WASHER	4

★ See the following table to determine the quantity of each part in your control module kit.

Parts labeled ----- are not available separately.

Non-IS Control Module Part Quantities

Find your module kit number in the left column and the desired reference number in the top row to find the part quantity used in your control module kit.

Module No.	6-Position Connector (705)	Solenoid (710)	Plug (713)	Tie Strap (721)	Ferrule (722)	Connector Fitting (724)
25D313	6	4	14	4	8	4
25D315	6	6	12	4	12	6
25D317	6	8	10	4	16	8
25D319	6	10	8	4	20	10
25D321	6	12	6	4	24	12
25D323	6	14	4	4	28	14
25D325	6	16	2	4	32	16
25D327	6	18	0	4	36	18

Kit 26D031, Color Change Single Valve Add-on

Use when adding a single color valve to a color stack that is already full. Includes color valve, manifold ports, and solenoid.

Kit 26D033, Color Change Valve Replacement

Use when replacing a color valve or adding a single color valve to an open port on the color stack. Includes valve components only.

Kit 26D032, Color Change Double Valve Add-on

Use when adding two color valves to a color stack that is already full. Includes color valves, manifold ports, and solenoids.

Kit 26D034, Color Change Solenoid Replacement

Use when replacing a solenoid in the color valve control module or when adding a single color and using kit 26D033.

Isolation Valve Kits

Kit 26B401, Stem, Sleeve, Piston Replacements

Be careful not to drop or scratch these parts when handling. This kit requires tools 111–113 to install. See [Isolation System, page 119](#).

Ref. No.	Part No.	Description	Qty
202	19A375	RETAINER, U-CUP, ISOLATION VALVE	1
203	129597	SEAL, U-CUP, QUAD RING, .625 ID	2
204	17X743	PACKING, U-CUP	2
206	19A376	SPACER, U-CUP, ISOLATION VALVE	2
208	18B866	O-RING, #024, FX75	2
211	-----	PISTON, ISOLATION VALVE	1
212	17X745	PACKING, U-CUP, ID 1.25 X OD 1.63	2
213	19A379	WASHER, BACKUP, ISOLATION VALVE	1
214	19A380	RETAINER, PISTON, ISOLATION VALVE	1
219	111316	PACKING, O-RING	2
221	19A448	SLEEVE, ISOLATION VALVE	1
222	-----	STEM, ISOLATION VALVE	1
228	18B106	O-RING, #109, FX75	2
230	106258	PACKING, O-RING	1

Kit 26B402, Housing Assembly

Ref. No.	Part No.	Description	Qty
201	-----	HOUSING, BASE, ISOLATION VALVE	1
205	-----	BLOCK, MOUNT, HOUSING	1
207	19A381	CAP, PISTON, ISOLATION VALVE	1
209	-----	RING, LOCK, HOUSING, ISOLATION	1
232	112914	WASHER, PLAIN	2
233	102471	SCREW, CAP HEX HD	2
237	103975	WASHER, LOCK	2
238	166846	FITTING, ADAPTER	1
240	116658	FITTING, TUBE, MALE (1/4 NPT)	1
247	101970	PLUG, PIPE, HDLS	1
19	115814	WASHER, FLAT, SST	4
22	104123	WASHER, LOCK, SPRING	2
23	112223	NUT, HEX, REGULAR	2
54	19A463	SCREW, CAP, SOCKETHEAD	2

Kit 26B403, Retaining Cap Set

Ref. No.	Part No.	Description	Qty
203	129597	SEAL, U-CUP, QUAD RING, .625 ID	1
208	18B866	O-RING, #024, FX75	1
210	-----	CAP, SEAL RETAINER, ISOLATION	1

Kit 26B404, Piston Replacement

Be careful not to drop or scratch these parts when handling. This kit requires tool 111 to install. See [Isolation System, page 119](#).

Ref. No.	Part No.	Description	Qty
211	-----	PISTON, ISOLATION VALVE	1
212	17X745	PACKING, U-CUP, ID 1.25 X OD 1.63	2
213	19A379	WASHER, BACKUP, ISOLATION VALVE	1
214	19A380	RETAINER, PISTON, ISOLATION VALVE	1

Kit 26B405, Cap, Piston Retainer

Bottom housing of the isolation valve. To replace, see [Service the Bottom Piston Housing, page 100](#).

Ref. No.	Part No.	Description	Qty
216	-----	CAP, PISTON, ISOLATION VALVE	1
230	106258	PACKING, O-RING	1
239	15T937	FITTING, ELBOW, SWIVEL 1/4NPTX5/32T	1

Kit 26B406, Stem Replacement

Be careful not to drop or scratch these parts when handling. This kit requires tools 111–113 to install. See [Isolation System, page 119](#).

Ref. No.	Part No.	Description	Qty
219	111316	PACKING, O-RING	2
222	-----	STEM, ISOLATION VALVE	1
228	18B106	O-RING, #109, FX75	2

Kit 26B408, Mount Block Air Cylinder

Ref. No.	Part No.	Description	Qty
224	-----	BLOCK, MOUNT, AIR CYLINDER	1
232	112914	WASHER, PLAIN	2
233	102471	SCREW, CAP HEX HD	2
237	103975	WASHER, LOCK	2
19	115814	WASHER, FLAT, SST	4
22	104123	WASHER, LOCK, SPRING	2
23	112223	NUT, HEX, REGULAR	2
54	19A463	SCREW, CAP, SOCKETHEAD	2

Kit 26B409, Connecting Rod

Ref. No.	Part No.	Description	Qty
225	-----	ROD, CONNECTING. ISOLATION VALVE	2
232	112914	WASHER, PLAIN	4
233	102471	SCREW, CAP HEX HD	4
237	103975	WASHER, LOCK	4

Kit 26B410, Seal Set for Service to Rebuild

Be careful not to drop or scratch these parts when handling. This kit requires tools 111–113 to install. See [Isolation System, page 119](#).

Ref. No.	Part No.	Description	Qty
202	19A375	RETAINER, U-CUP, ISOLATION VALVE	1
203	129597	SEAL, U-CUP, QUAD RING, .625 ID	2
204	17X743	PACKING, U-CUP	2
206	19A376	SPACER, U-CUP, ISOLATION VALVE	2
208	18B866	O-RING, #024, FX75	2
212	17X745	PACKING, U-CUP, ID 1.25 X OD 1.63	2
219	111316	PACKING, O-RING	2
228	18B106	O-RING, #109, FX75	2
230	106258	PACKING, O-RING	1

Kit 26B411, Shuttle Assembly

Ref. No.	Part No.	Description	Qty
207	194381	PIN, DOWEL, 1/8-INCH	1
217	-----	BLOCK, MOUNT, SHUTTLE	1
218	-----	HOUSING, SHUTTLE, ISOLATION VALVE	1
219	111316	O-RING, #012, FX75	1
223	-----	BEARING, SHUTTLE	2
226	-----	RING, LOCK, HOUSING	1
231	103413	O-RING, #020, Viton	2
238	166846	FITTING, ADAPTER	1

Kit 26B413, Service Tools

Ref. No.	Part No.	Description	Qty
111	-----	TOOL, PISTON	1
112	-----	TOOL, ASSY, SLEEVE	1
113	-----	TOOL, SLEEVE REDUCTION NUT	1

Pump Kits

Kit 24A914, Bumpers

Ref. No.	Part No.	Description	Qty
308	15U254	BUMPER	2

Kit 26B421, Seal Set for Service to Rebuild

Ref. No.	Part No.	Description	Qty
302	19A951	PACKING, U-CUP, 4.08 X .335	1
306	121130	WIPER, CM200 WETCUP COVER	1
309	15G881	SEAL, GASKET, CYLINDER	1
315	160516	PACKING, O-RING, 214	1
317	17Z468	O-RING, #346, BUNA-N	1
318	111624	PACKING, O-RING	1

Kit 26B422, Rod Replacement

The kit comes fully assembled, except for part number 306.

Ref. No.	Part No.	Description	Qty
305	-----	ROD, PISTON, ISOLATION PUMP	1
306	121130	WIPER, CM200 WETCUP COVER	1
313	-----	HOLDER, MAGNET, SENSOR	1
314	15G747	MAGNET, LINEAR SENSOR	1
315	160516	PACKING, O-RING, 214	1

Kit 26B423, Fluid Cylinder

Ref. No.	Part No.	Description	Qty
309	15G881	SEAL, GASKET, CYLINDER	1
312	15G882	CYLINDER, PUMP, (CHROME, 2000CC)	1

Kit 26B424, Air Cylinder

Ref. No.	Part No.	Description	Qty
318	111624	PACKING, O-RING	1
319	17X737	CYLINDER, PISTON, 4.5 ID	1

Kit 26B425, Air Piston

Ref. No.	Part No.	Description	Qty
315	160516	PACKING, O-RING, 214	1
316	-----	PISTON, AIR, ISOLATION PUMP	1
317	17Z468	O-RING, #346, BUNA-N	1

Kit 26B426, Bolt Replacement Set

Ref. No.	Part No.	Description	Qty
304	103975	WASHER, LOCK	4
312	17Z471	SCREW, CAP, HEX HD, 3/8-16 X 7"	4
322	112914	WASHER, PLAIN	4

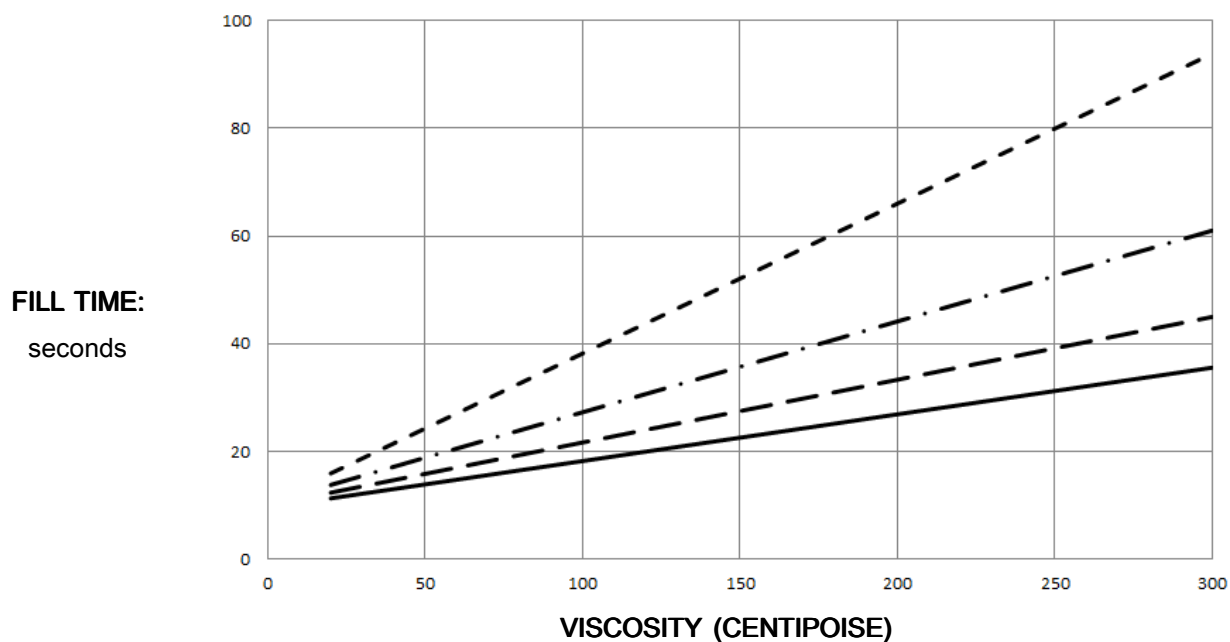
Performance

The following figure shows how long it takes to fill the pump in the isolation system for a range of fluid viscosities.

Dynamic Pressure at Fluid Inlet:

100 psi (.7 MPa, 6.9 bar)	—————
80 psi (.6 MPa, 5.5 bar)	- - - - -
60 psi (.4 MPa, 4.1 bar)	— · — · —
40 psi (.3 MPa, 2.8 bar)	·····

Table 21 Fill Time Based on Viscosity and Dynamic Inlet Pressure



Ignitability of Coating Materials

Per EN 50059

From the Physikalisch-Technische Bundesanstalt, Braunschweig, Germany, June 26, 2019.

General

The fire and explosion protection of spraying systems can be facilitated considerably when processing coating materials with a low portion of solvents and a high flash point (generally water-based paints), provided that the spray cloud of the coating materials are considered to be non-ignitable. Substantial research has shown that the ignitability of spray clouds depends on the composition of the coating materials made mainly of water, solvents, and solids. The following classification has been established:

Non-ignitable coating materials

Coating materials of this group have the following composition:

$$[\% \text{H}_2\text{O}] > 1, 70 \times [\% \text{LM}] + 0,96 \times [\% \text{ORG}], \text{ (all in \% by weight)}$$

where

H₂O: water;

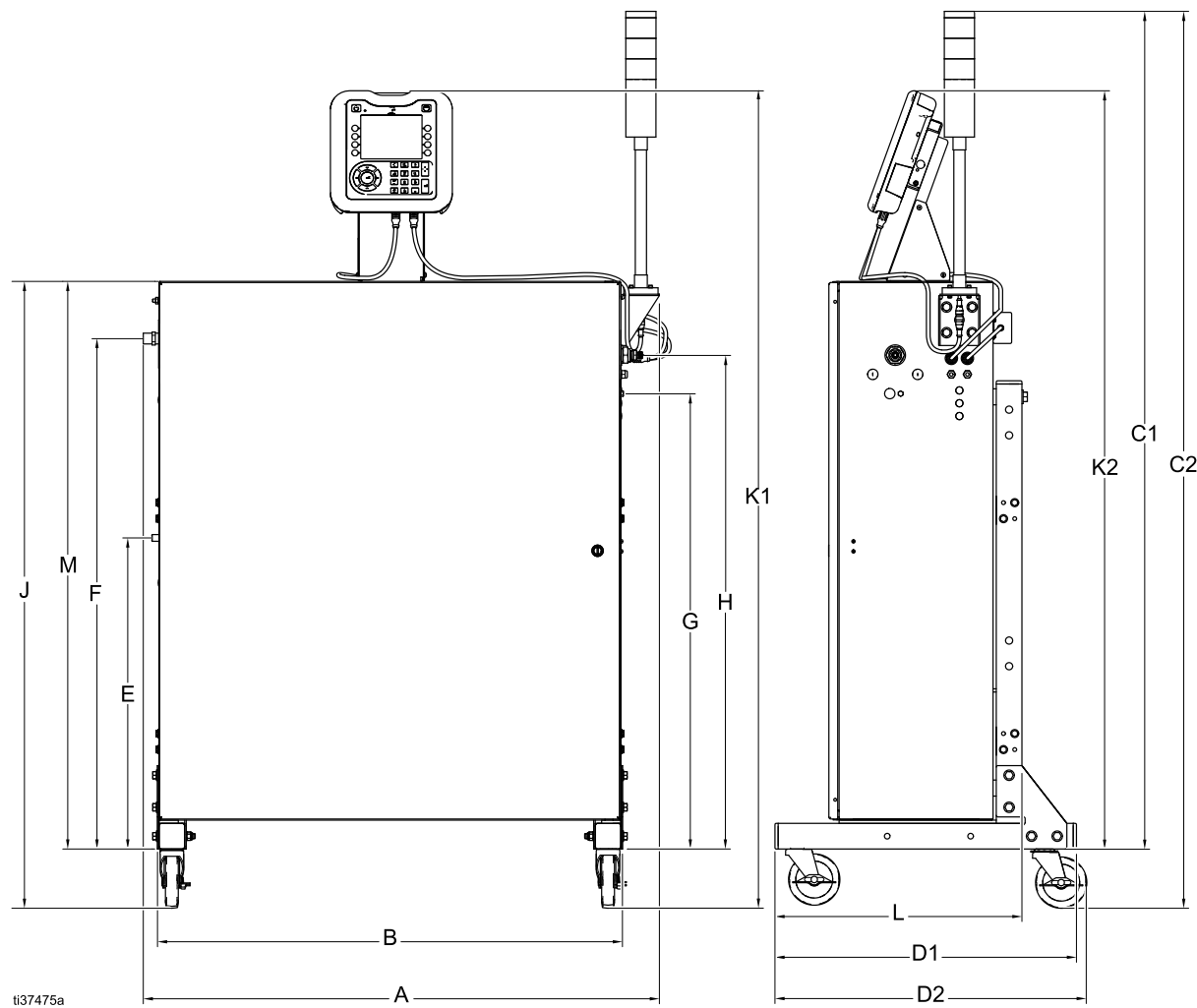
LM: the entire liquid phase, including liquids with flash points above 60 °C and those liquids **not** listed in the safety data sheet, in which case the entire liquid phase is ignitable in the sprayed state;

ORG: solid phase which is ignitable in the sprayed state (ignitable inorganic or ignitable organic solids) including the solids which have an ignitable inorganic or ignitable organic coating.

Non-ignitable coating materials act like water in the liquid phase and in the sprayed state. If the rinsing and thinner liquids correspond to this category, too, no explosion protection is necessary. Coating materials of this group are classified as being non-ignitable liquid coating material.

A fire extinguishing equipment is not required for spraying systems processing coating materials which are classified to be non-ignitable. However, this does not affect the fire protection as a whole. Even these coating materials may resume ignitability after being partially dried. Moreover, water-based coating materials will burn when strongly exposed to a fire which had been initiated by other sources, and thus present a certain fire load.

Dimensions



ti37475a

Reference	U.S.	Metric
A	40.2 in.	102.2 cm
B	36.2 in.	92.1 cm
C1	65.3 in.	165.9 cm
C2	69.9 in.	177.6 cm
D1	23.5 in.	59.7 cm
D2	24.3 in.	61.8 cm
E	24.3 in.	61.6 cm
F	39.8 in.	101.1 cm

Reference	U.S.	Metric
G	35.5 in.	85.1 cm
H	38.5 in.	97.8 cm
J	48.9 in.	124.1 cm
K1	63.7 in.	161.9 cm
K2	59.1 in.	150.1 cm
L	19.2 in.	48.9 cm
M	44.3 in.	112.4 cm
N	in.	cm

[illegible]

Technical Specifications

Air-Assisted Waterborne Isolation System		
	U.S.	Metric
Maximum Fluid Working Pressure	3000 psi: WMBH00, WMBH01, WMBH20, WMBH40, WMBH41 1500 psi: WMBH04, WMBH05, WMBH44, WMBH45	20.7 MPa, 206.8 bar: WMBH00, WMBH01, WMBH20, WMBH40, WMBH41 10.3 MPa, 103.4 bar: WMBH04, WMBH05, WMBH44, WMBH45
Maximum Fluid Inlet Pressure	100 psi	0.7 MPa, 7.0 bar
Maximum Air Working Pressure	100 psi	0.7 MPa, 7.0 bar
Minimum System Inlet Air Pressure	70 psi	0.48 MPa, 4.8 bar
Maximum System Inlet Air Pressure	100 psi	0.7 MPa, 7.0 bar
Maximum Fluid Operating Temperature	120°F	48°C
Short Circuit Current Output	150 microamperes maximum	
Voltage Output	H60T18: 60 kV H60M18: 30-60 kV	
Sound Power (measured per ISO Standard 9216)	at 40 psi: 90.4 dB(A) at 100 psi: 105.4 dB(A)	at 0.28 MPa, 2.8 bar: 90.4 dB(A) at 0.7 MPa, 7.0 bar: 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi: 87.0 dB(A) at 100 psi: 99.0 dB(A)	at 0.28 MPa, 2.8 bar: 87.0 dB(A) at 0.7 MPa, 7.0 bar: 99.0 dB(A)
Gun Air Outlet Fitting	1/4 npsm(m)	
Gun Fluid Outlet Fitting	1/4 NPSM	
Isolation System Air Inlet Fitting	1/2 npt	
Isolation System Fluid Inlet Fitting	1/4 in. npsm(m)	
Wetted Parts	Gun: Stainless Steel, PEEK, UHMWPE, Fluoroelastomer, Acetal, Nylon, Polyethylene, Tungsten Wire Waterborne Fluid Hose: FEP Isolation System: Polyethylene, Stainless Steel, Acetal, Fluoroelastomer, PTFE, UHMWPE, Polyurethane, Tungsten carbide with 6% nickel	
Maximum Fluid Conductivity	2000 µS/cm	
Maximum Fluid Hose Length, Maximum Inside Dimension	100 ft., .16 in.	30.5 m, 4 mm
Weight	322 lb	146 kg
Ambient temperature range	41F–122F	5C–50C
System Air Consumption (including gun)	Required turbine air flow: 6 scfm 170 l/min Range of total air flow under normal spraying conditions: 15–20 scfm 425–565 l/min	

Air-Assisted Waterborne Isolation System		
	U.S.	Metric
Power Connection	Straight IEC 320–C13 male connector. Also included: North America NEMA 5-15 male plug China / Australia AS/NZS 3112 male plug Continental Europe CEE 7/7 male plug	
External Power Requirements	100-240VAC, 50-60Hz, 2 amp maximum draw, 15 amp maximum circuit breaker recommended	

California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm — www.P65warnings.ca.gov.

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.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

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In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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For the latest information about Graco products, visit www.graco.com.
For patent information, see www.graco.com/patents.

To place an order, contact your Graco Distributor or call to identify the nearest distributor.

Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

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Graco reserves the right to make changes at any time without notice.

Original Instructions. This manual contains English. MM 3A7370

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

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