Operation - Repair - Parts

G-Flex 1500 Feeder

332462E

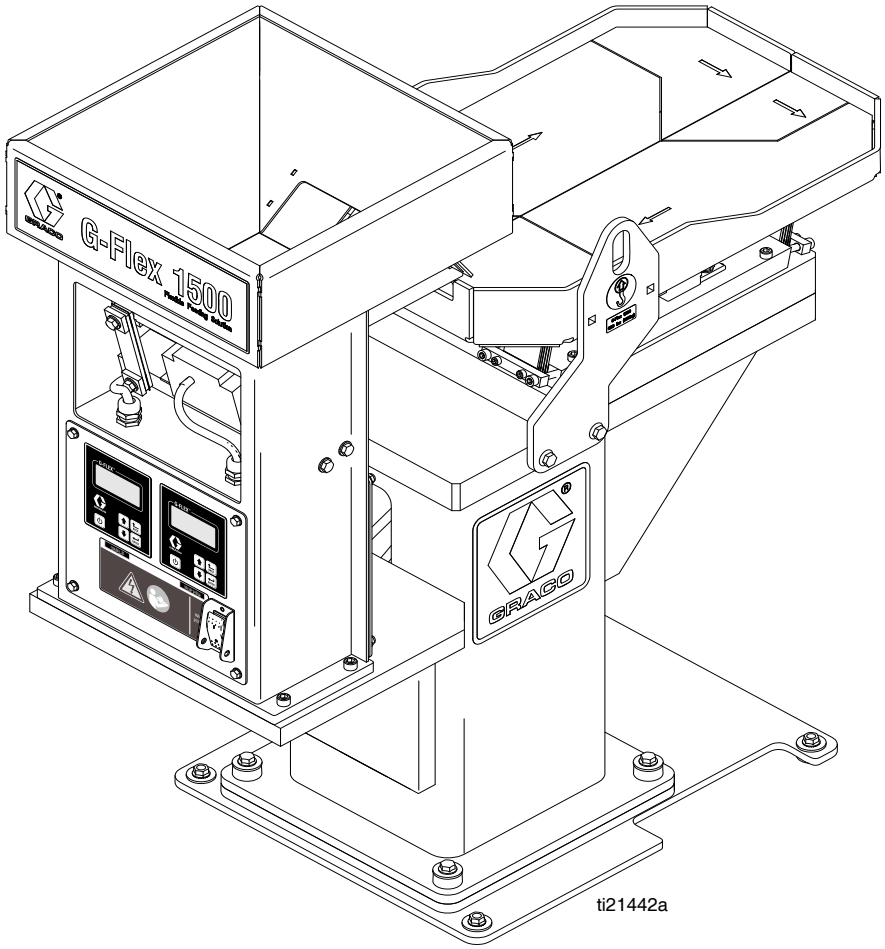
EN

- For professional use only -

Model 16V133 - 120V

Vibratory Parts Feeder for separating and presenting parts.

Important Safety Instructions
Read all warnings and instructions in this manual. Save these instructions.



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PROVEN QUALITY. LEADING TECHNOLOGY.

Contents

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.

⚠WARNING

ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

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

EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- 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 cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

PERSONAL PROTECTIVE EQUIPMENT

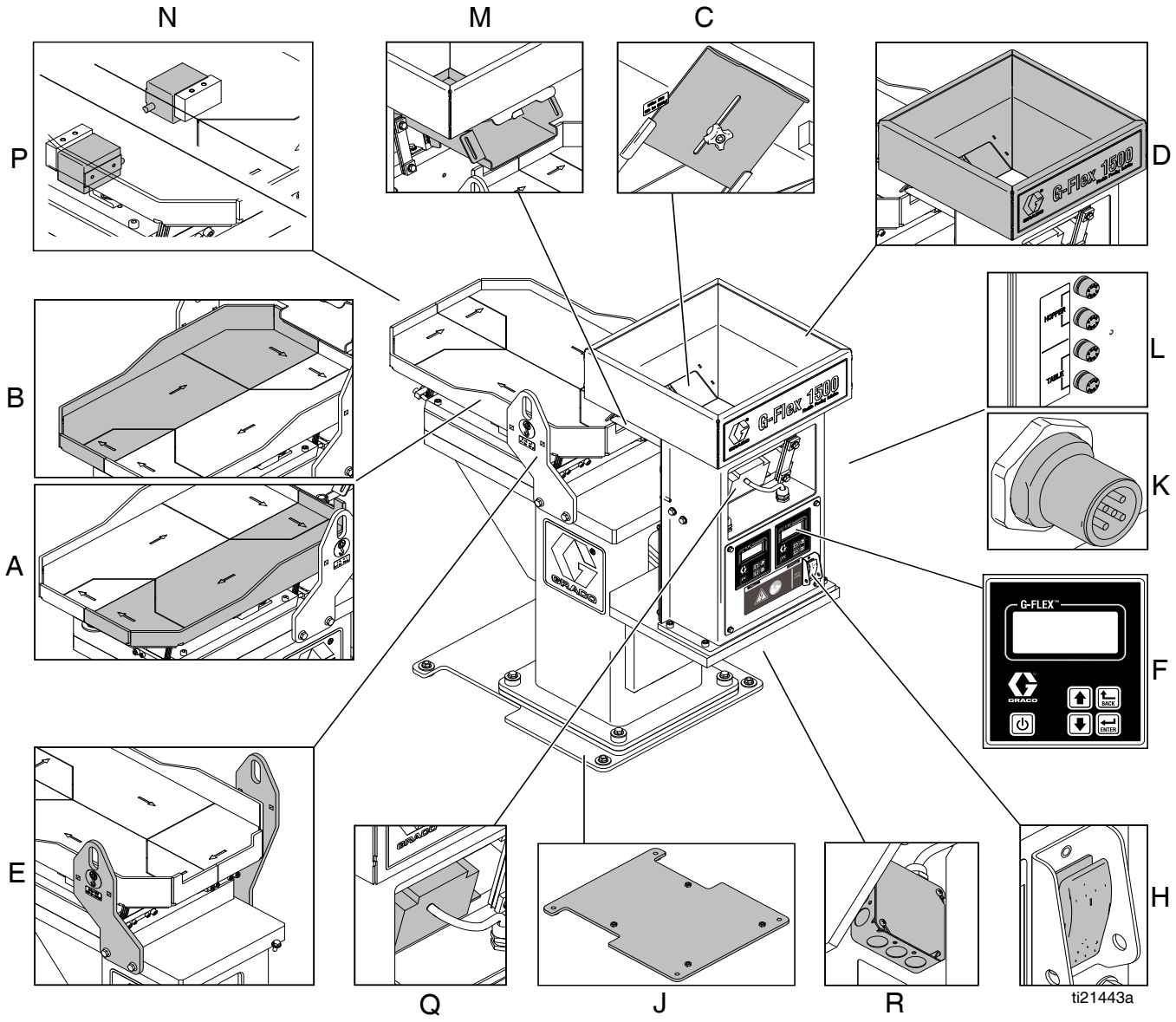
Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, and burns. This protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.

CALIFORNIA PROPOSITION 65

This product contains a chemical known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

Component Identification



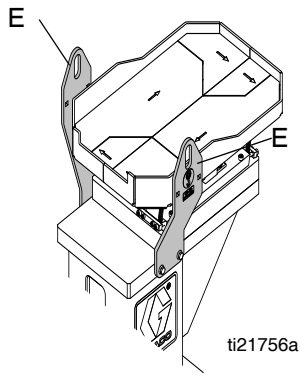
Ref.	Description
A	Parts Table Left Half
B	Parts Table Right Half
C	Adjustable Gate
D	Parts Hopper
E	Lifting Points
F	Control Display and Touch Pad
H	Main Power Switch/Lock Out
J	Floor Mounting Plate

Ref.	Description
K	M12 Connector
L	Fuses
M	Hopper Feed Table
N	Electromagnet Left Half
P	Electromagnet Right Half
Q	Electromagnet Hopper
R	Power-in Junction Box

Lifting Instructions

To prevent crush injury or equipment damage when lifting the G-Flex™ 1500, only use approved (e.g., ANSI) slings and equipment rated for the weight of the G-Flex™ 1500 (see **Technical Specifications**, page 35).

1. Always use BOTH designated Lifting Points (E) when lifting the G-Flex 1500. See **Component Identification**, page 4, for location of lifting points.

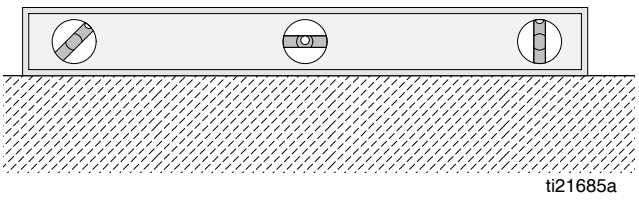


Installation

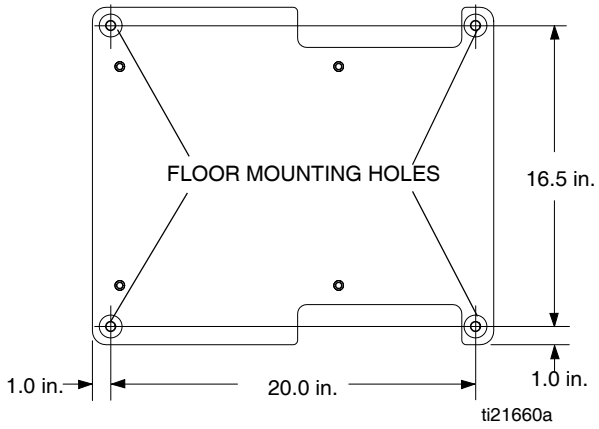
When choosing a location for the G-Flex 1500, make sure the floor mounting plate is a minimum of 4 in. away from any other piece of equipment. Refer to the anchor bolt manufacturer for a minimum edge distance to the concrete slab. Follow local regulations in regards to spacing for control panel access.

Floor Preparation

1. The G-Flex 1500 must be mounted on a level concrete surface.

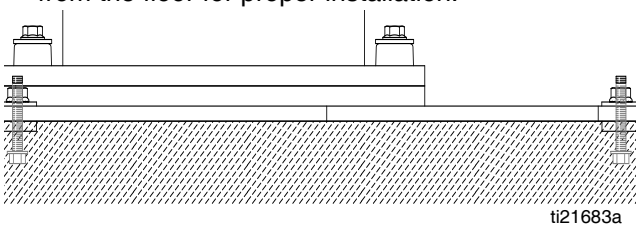


2. To mount the G-Flex 1500 position it in the desired location. The G-Flex 1500 Floor Mounting Plate (J) is designed to be anchored using four 3/8 in. concrete anchor bolts.



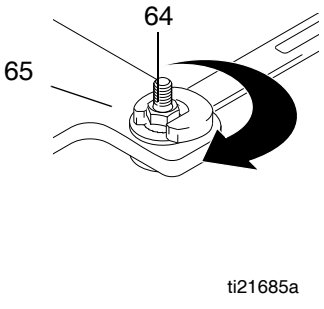
3. Use a concrete drill bit of the size recommended by the anchor bolt manufacturer. Drill 4 holes in the concrete using the Floor Mounting Plate holes as a guide. Install the anchor bolts per the manufacturer's instructions.

4. A minimum of 1 in. of stud length must protrude from the floor for proper installation.



5. Install four washers (64) and four nuts (65) provided to secure the G-Flex 1500 to the concrete surface.

6. Torque to anchor bolt manufacturer recommendation.

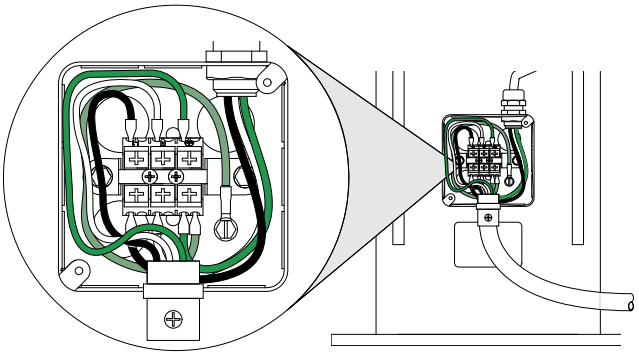


Wiring Connections

Improper grounding setup or usage of the system can cause electric shock. All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Supply Wiring Connections

Connect power to the G-Flex 1500 at the Power-in Junction Box (R). See **Component Identification**, page 4, for location of Junction Box. Use a minimum of 14 AWG solid wires from the power supply. Insulation strip length is 0.43 in. (11 mm). Connect the Hot (L1), Neutral (N), and Ground ⏚ wires to coincide with the G-Flex 1500 wires at the terminal block.



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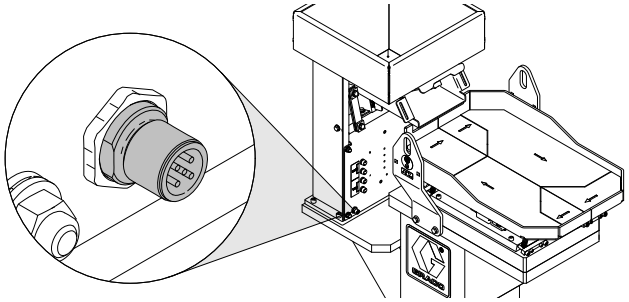
Ensure all connections are secure and install the cover on the junction box.

PLC Interface

The G-Flex 1500 is designed to be PLC controlled through the M12 5-Pin connector. Refer to the M12 Pin Diagram for details about the M12 connector.



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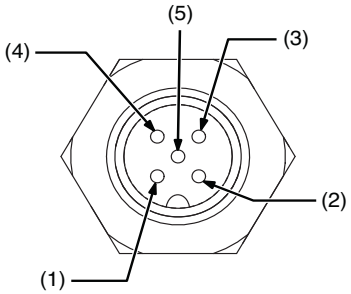
M12 Pin Diagram

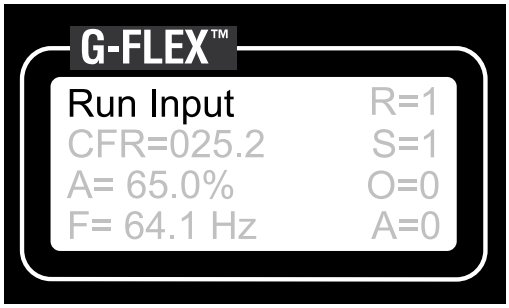
Connector on Housing	Pin-out
	1 Not Used 2 Table Signal (5-30 VDC) 3 Common (0 VDC) 4 Hopper Signal (5-30 VDC) 5 GND

The table and hopper signal must be between 5-30 VDC. The common signal is 0 VDC.

To run the unit without PLC control, see **Manual Operation in Override Mode,** page 14.

To run the unit with PLC control, press the Power Key once.

The control display will then show **Run Input** to indicate PLC control.



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General Information

Control Menu

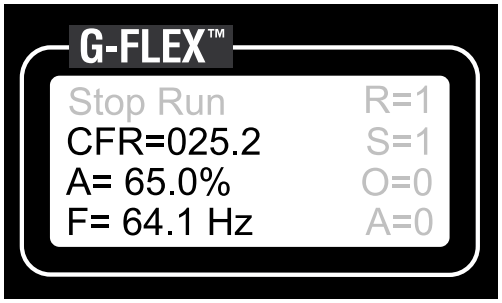
The control uses four programming keys to operate the control. The power key controls manual operation in override mode.

Key	Function
	**ENTER** - Allows entry to menu and access to adjust each setting. Push and hold the enter key to enter program mode. If security feature has been enabled, enter proper code. Once inside the menu, the enter key selects a menu item or a parameter to adjust. Any changes to the settings are saved at power-down.
	**BACK** - Moves the current menu location up one level higher than it was before. It is also used to get back to the normal operating display.
	**Arrow Down** - Allows the user to step down through the program menu or decrease a setting.
	**Arrow Up** - Allows the user to step up through the program menu or increase a setting.
	**Power** - Allows the user to temporarily stop or to start control operation. When the LCD status reads “Stop/Run”, hold the power key down for just over a second and the control will start the override operation. In override mode, the hopper or table turns on regardless of input connection and signal from the PLC at the M12.
NOTE: See **Control Menu Layout**, page 13, for the menu structure. When in menu mode and no keys are pressed for one minute, the display reverts to normal operating display mode.	

Power Setting

The G-Flex 1500 comes from the factory set to “Auto Track” for Amplitude Source. This allows the user to adjust the CFR (Constant Feed Rate) value to the desired feed rate. The control will automatically adjust the Amplitude to ensure a constant feed rate even as the parts load changes. The amplitude and frequency can be changed to Manual adjustment if desired (see **Control Menu Layout**, page 13).

Display Abbreviations



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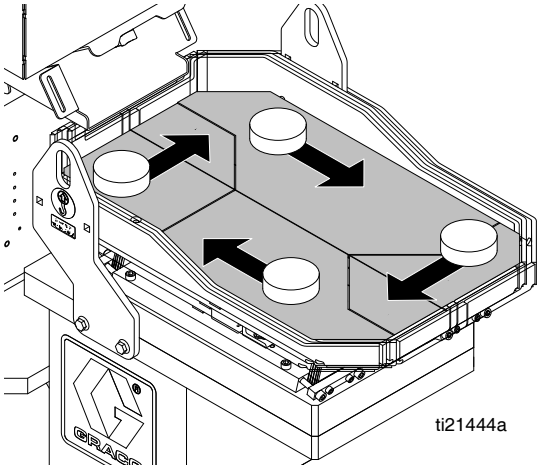
CFR = Constant Feed Rate
A = Amplitude
F = Frequency

Operation

NOTE: The table frequency is set at the manufacturer for optimal part movement. The serial label above the Control Display lists the SET FREQUENCY (Fset) of the table when leaving the manufacturer. This Fset was tested to give optimal movement on the left half and right half of the table. If inconsistent part movement is observed between the left half and right half of the table, refer to **Part Table Frequency**, page 9.

Part Table Feed Rate

1. Place 4 to 20 parts on the table.
2. Turn the table ON either through the PLC M12 input or manually, see **Manual Operation in Override Mode**, page 14.
3. For course adjustment, **PRESS AND HOLD** the UP or DOWN arrow key until the parts are moving close to the desired feed rate. This directly changes the Amplitude value.



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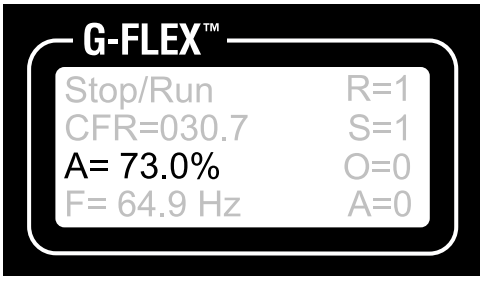

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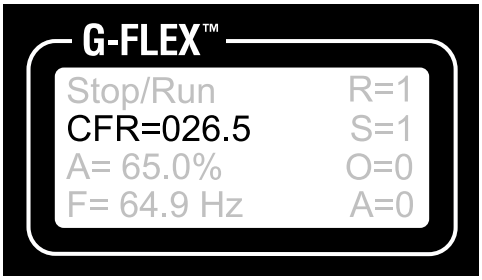
4. For fine tune adjustment REPEATEDLY PRESS the UP or DOWN arrow keys to dial in on the desired feed rate. This directly changes the CFR Value.



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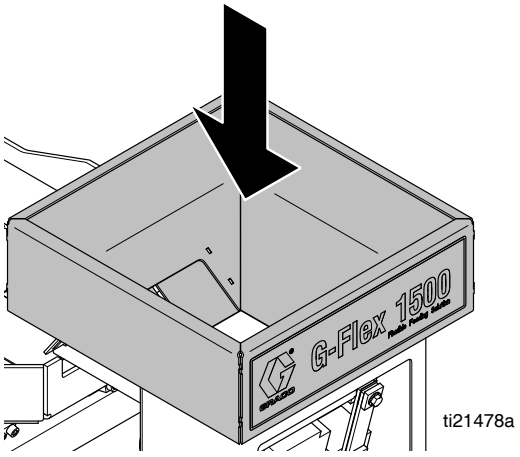
5. Once the feed rate is determined, record the CFR value of the part for future reference on the CFR Value table provided on page 36.
6. When the feed rate is set, turn table OFF.
7. If the part does not move properly on the table, see **Difficult to Move Parts**, page 9.

Hopper Feed Rate

1. Always turn the table ON when adjusting the hopper feed rate.
2. Insert parts into the hopper.



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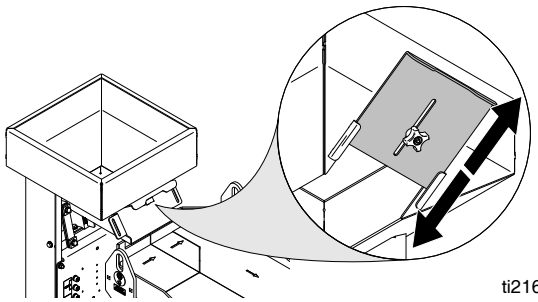
3. Set hopper gate to desired location to control how parts transfer from hopper to feed tray.



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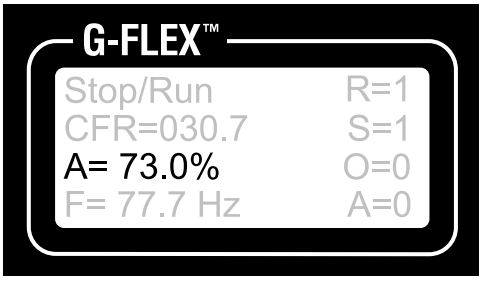
NOTE: If the hopper adjustable gate is set too low, parts can get jammed and not properly feed. If the hopper adjustable gate is set too high, parts can feed onto the table when the hopper is not turned on.

4. Turn the table and hopper ON either through the PLC M12 input or manually, see **Manual Operation in Override Mode**, page 14.

5. For course adjustment, **PRESS AND HOLD** the UP or DOWN arrow keys until the parts are feeding out the Hopper Feed Table close to the desired feed rate. This directly changes the Amplitude value.



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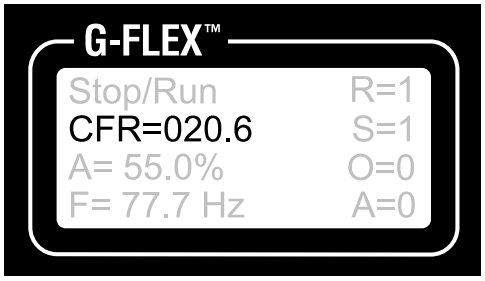
6. For fine tune adjustment, **REPEATEDLY PRESS** the UP or DOWN arrow keys to dial in on the desired feed rate. This directly changes the CFR Value.



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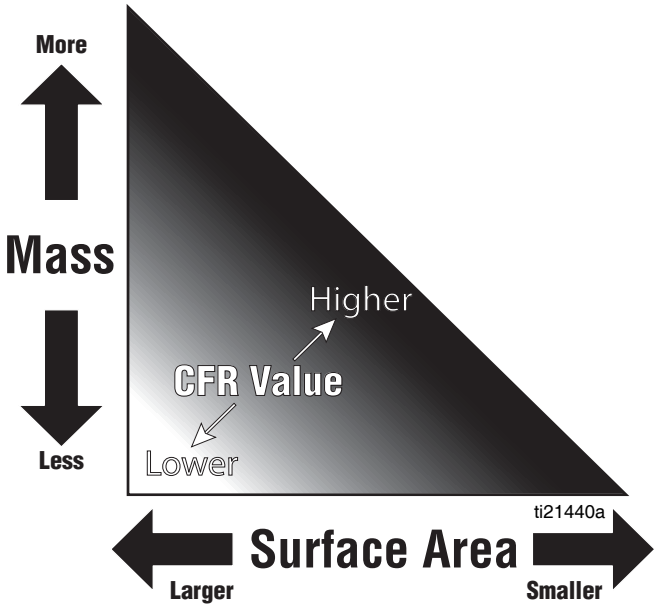
7. Once the feed rate is determined, record the CFR value of the part for future reference on the CFR Value table provided on page 36.

8. When the feed rate is set, turn table and hopper OFF.

9. If the part does not feed out the Hopper Feed Table, see **Difficult to Move Parts**, page 9.

NOTE: The chart below illustrates a general rule for operating the G-Flex 1500. Parts with less surface area and more mass will require a greater CFR to move parts around the table.



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Difficult to Move Parts

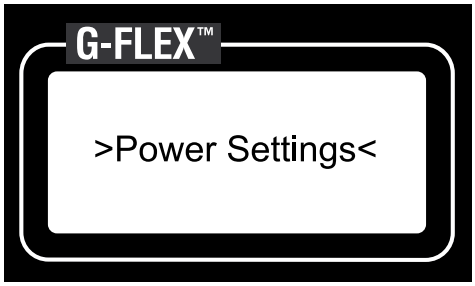
A part may be difficult to move due to its weight, shape or edges. Use these suggestions to improve part movement.

Part Table Frequency

Adjust the part table frequency to improve part movement.

1. Turn the table ON either through the PLC M12 input or manually.

2. PRESS AND HOLD the ENTER key to get the menu.



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3. Press DOWN ARROW once to get to frequency.

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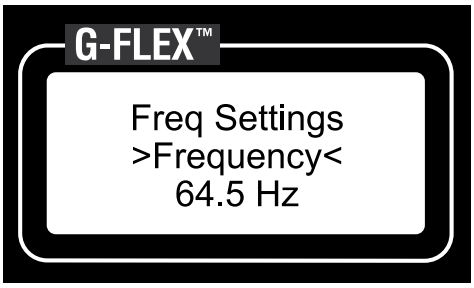
4. Press ENTER once to get frequency sub-menu.



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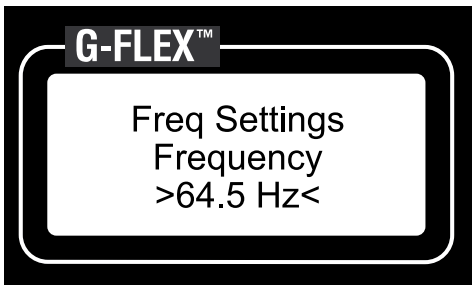
5. Press ENTER once to get to frequency setting.



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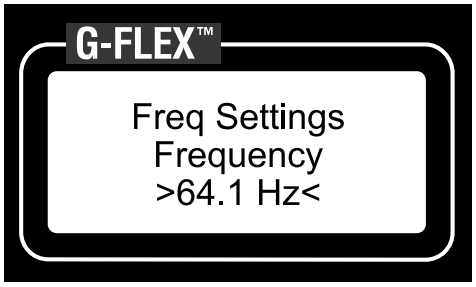
6. Press UP or DOWN ARROWS to adjust frequency by .1 Hz increments to get best part movement. **NOTE:** You will not have to go further than 2.0 Hz in either direction.



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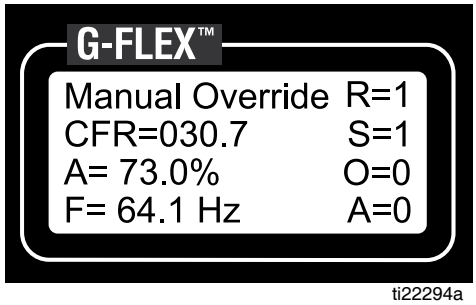
7. Press UP ARROW three times to get out of the menu.



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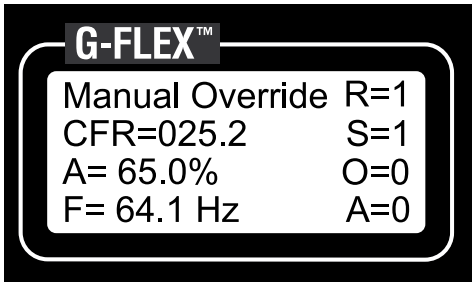
8. Press the UP and DOWN ARROWS to adjust the amplitude for improved part movement.



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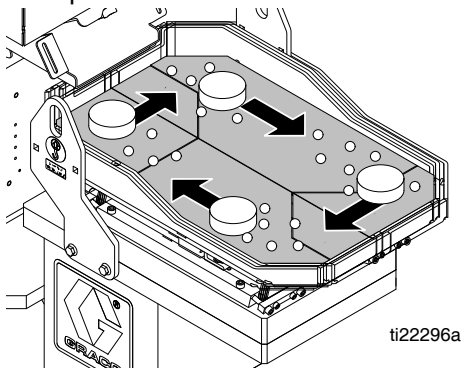
Part Table HELPERS

Some parts are very difficult to move due to their geometry. If changing the **Part Table FREQUENCY** in the previous section did not help, add parts that move well on the table. These HELPERS will keep the difficult to move parts in motion.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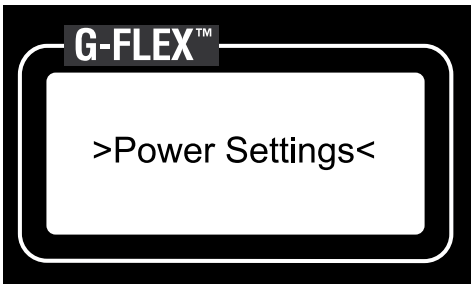
Hopper FREQUENCY

Adjust the hopper frequency to improve part feeding out of the hopper.

1. Turn the table and the hopper ON either through the PLC M12 input or manually.

2. On the hopper touch pad, PRESS AND HOLD the ENTER key to get the menu.



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3. Press DOWN ARROW once to get to frequency.

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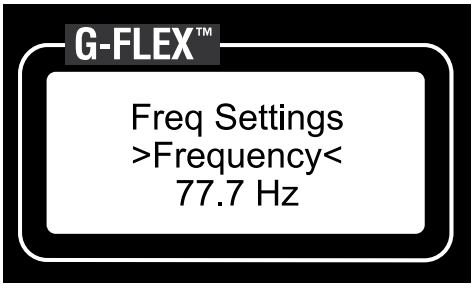
4. Press ENTER once to get frequency sub-menu.



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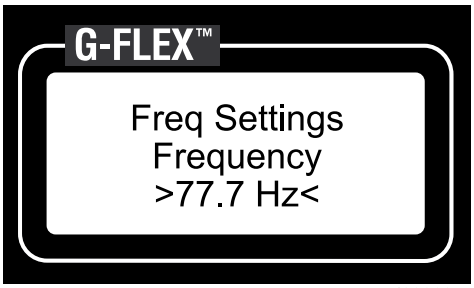
5. Press ENTER once to get to frequency setting.



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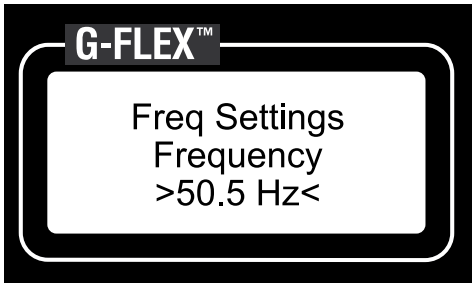
6. Press DOWN ARROW to adjust frequency. Some parts will feed out of the hopper as low as 50 Hz.



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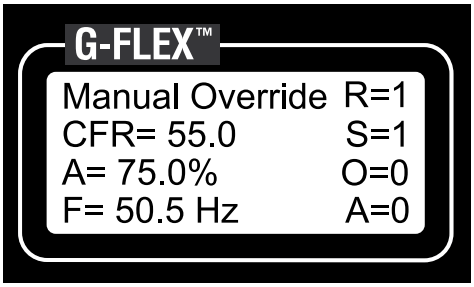
7. Press UP ARROW three times to get out of the menu.



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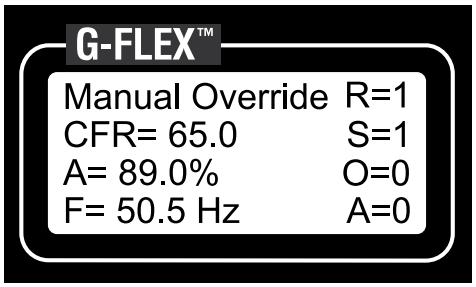
8. Press the UP and DOWN ARROWS to adjust the amplitude for improved part feeding out of the hopper.



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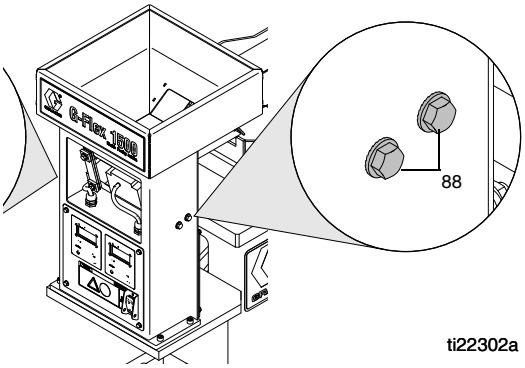
Hopper Feed Table Slope

If parts still don't feed out of the hopper or parts self-feed when the hopper is turned off, adjust the slope of the hopper feed table.

1. Place a level on the hopper feed table.

2. Loosen four screws (88), two on each side of the hopper.

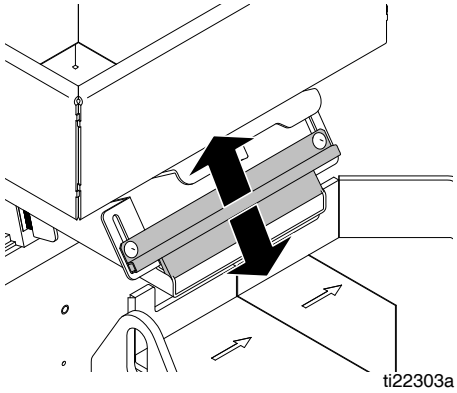


3. Adjust the slope of the hopper feed table. Slope down towards the table to improve the feed rate. Slope up away from the table to reduce self-feeding parts.

4. Tighten four screws (88) to 200±10 in-lb.

Part Feed Optimizer

If parts are self-feeding when the parts table is running, install the Part Feed Optimizer (16W839) accessory.



Adjust the brush to lightly contact the parts being fed out of the hopper.

NOTE: This completes the typical start-up and operation that should be used for most part applications. The following sections cover advanced programming operating instructions that should only be used in highly unique applications.

Control Menu Layout

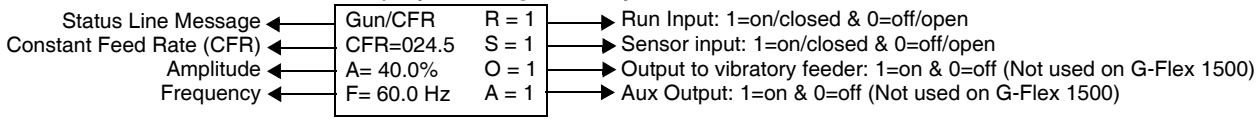
Normal Operation Display

Press and hold 'Enter' to enter the program menu or get the security menu.
Use the arrow up and down keys to adjust the security number. Press enter to test the security number.

Main Menu

Main Menu	Sub Menu	Adjustments
Power Settings	Amplitude	[**0.0** to 100.0]%
	Max Amplitude	[**100.0** to 40.0]%
	Min Amplitude	[**0.0** to 95.0]%
	Soft Start Time	[0.0 to 10.0] Seconds (**0.0** Default)
	Amplitude Source	[**Auto Tracking** Manual, 0-10V, 4-20mA] **Auto Tracking or Manual only on G-Flex 1500
	CFR Positive Gain	[**25** Default]
	CFR Negative Gain	[**5** Default]
Frequency Settings	Frequency	[5.0 to 140.0] Hz (**60.0** Hertz Default)
	Max Frequency	[15.0 to 140.0] Hz (**140.0** Hertz Default)
	Min Frequency	[5.0 to 130.0] Hz (**45.0** Hertz Default)
	Frequency Mode	[**Auto Tracking**, Manual]
	Auto Scan	[Press ENTER to perform an automatic frequency scan]
	Resonate Threshold Level	[**200** Default]
	Auto Track Dead Band	[**64** Default]
Timer Settings	On Delay	[0.0 to 20.0] Seconds (**0.0** Default)
	Off Delay	[0.0 to 20.0] Seconds (**0.0** Default)
	Empty Bowl Timer	[5 to 255] Seconds (**10** Default) **Not used on G-Flex 1500
Power Key Interface	Sensor Polarity	[**Inverted**, Normal]
	Sensor Type	[**Auto**, NPN, PNP]
	Run Mode	[**Normal**, Always On, 2-Speed, High/Low]
	Empty Bowl	[**Normal**, Stop] **Not used on G-Flex 1500
	Aux Output Mode	[**Normal**, Inverted, Alarm, Inv Alarm, Air Jet] **Not used on G-Flex 1500
Diagnostics	Software Version	[Software Revision Level]
	Accelerometer	[data]
	Over Amps	[data, data]
	DC Volts	[data]
	Internal Temperature	[data] °C
Security	Keypad Lock	[**Unlocked**, Amplitude Only, Locked]
	Security Code	[000 to 999]
Defaults	Restore Settings 1	['Enter' Restores User Settings 1]
	Restore Settings 2	['Enter' Restores User Settings 2]
	Restore Settings 3	['Enter' Restores User Settings 3]
	Save Settings 1	['Enter' Saves User Settings 1]
	Save Settings 2	['Enter' Saves User Settings 2]
	Save Settings 3	['Enter' Saves User Settings 3]
	Factory Reset	['Enter' Resets Control to Factory Default Settings (Shown in **bold**)]
Language	Pick Language	[English, Spanish, French, German]

Normal Display Message Priority



The normal operating display shows the status of the control with regard to input signals and control settings. They are listed from highest to lowest in priority. The highest priority message takes precedence over all other messages.

Stop/Run - The Power button has been pushed to disable control operation.

Override - The Power button has been pushed and held so the control will feed without interruption from the "Sensor" or "Run" inputs.

Run Input - The run jumper has not been made.

Zero Speed - The output is off because the output is set to 0.0%.

Run - The feeder is running normally.

Run/CFR - Constant Feed Rate sensor is regulating the feed rate (Autotune®).

Manual Operation in Override Mode

If the PLC is not connected to the M12, the table or hopper may be turned on manually by holding the power key for 1.5 seconds. This will start the override operation and the table or hopper will turn on. To turn off the table or hopper, press the power key again.

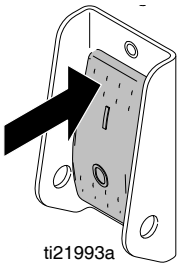
Auto Scan

NOTE: Auto scan should be used to ensure proper repair/assembly was performed on the table. For optimal part movement, the frequency should be manually set.

Perform Auto Scan

Table

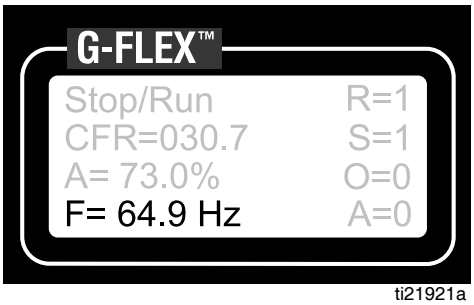
1. Confirm no parts are on the table or in the hopper.
2. Ensure no person or thing is touching the unit.
3. Press main power switch to the ON position.


ti21993a

4. On the TABLE CONTROL TOUCH PAD, press and hold the ENTER key to access the main menu.
5. Press DOWN ARROW to select the Frequency submenu and press the ENTER key.
6. Press the UP ARROW three times to select Auto Scan from the menu.
7. Press the ENTER key to perform an Auto Scan.
8. The table will cycle through different amplitudes and frequency for about 15 seconds until the resonate frequency has been found. If the resonate frequency cannot be found, see **Troubleshooting**, page 26.

NOTE: The table and hopper were Auto Scanned at manufacture. The serial label above the Control Display (Fn) lists the natural frequency of the table and hopper when the G-Flex 1500 was manufactured. The frequencies from Step 9 (**Table**) and Step 1 (**Hopper**) should be close to the frequencies on the serial label.

9. Confirm the resonate frequency is between 60-67 Hz. If it falls outside of this range, see **Troubleshooting**, page 26.



ti21921a

10. Press the POWER key on the TABLE CONTROL TOUCH PAD to turn the part table OFF.

Hopper

1. Repeat the Auto Scan procedure for the hopper using the HOPPER CONTROL TOUCH PAD. The resonate frequency for the hopper should be between 70-95 Hz.
2. Press the POWER key on the HOPPER CONTROL TOUCH PAD to turn the hopper OFF.

For a detailed explanation on all control settings, see **Detailed Control Adjustment**, page 15.

Detailed Control Adjustment

NOTE: The following section covers advanced programming operating instructions that should only be used in highly unique applications.

Amplitude Power Setting

Output power is controlled by the up and down arrow keys. Power setting can be adjusted with the keys unless the security feature lock has been selected. Once the proper security code has been entered, the power setting may be adjusted under **Power** menu. **NOTE:** The power setting may not be above the maximum power setting or below the lower power setting level. The amplitude power setting is displayed in the following manner: “A=50.0%”

Limiting Maximum Output of Control

The **Max Amplitude** setting can be adjusted to keep a vibratory feeder from hammering or vibrating excessively when the control is turned up to full power. The maximum power setting can be found under the **Power** menu. It can be adjusted from 100.0% down to 40.0%.

NOTICE
Amplitude will continue to increase if the system cannot get back to desired vibration level. Use the CFR feature to limit the **Max Output** level to prevent the feeder coil from overheating and damaging the feeder.

Setting Minimum Output of Control

The **Min Amplitude** setting can be adjusted to the desired low level of vibration. The minimum power setting can be found under the **Power** menu. It can be adjusted up from 0.0% to 95.0%. **NOTE:** The software does not allow the minimum level to be within 5.0 counts of the maximum level.

Soft-Start

The start-up of the control output can be adjusted to gradually build up to the desired output level, rather than starting abruptly. The soft start setting can be found under **Power Settings** menu. The soft-start can be set from 0.0 to 10.0 seconds. Factory default is 0. Changing the soft-start can adversely affect the cycle time of the part finding sequence.

CFR Positive and Negative Gain

The CFR Positive and Negative Gain settings control the rate that the feeder vibration level is corrected by the control. When the vibration decreases below the set point, the “CFR Positive Gain” sets the rate at which the output gets boosted to compensate for a vibration decrease. When the vibration increases, the “CFR Negative Gain” sets the rate at which the output gets lowered to compensate for a vibration increase. If either the CFR Positive or Negative gain is set too low, it will take longer than desired to get back to the original feed rate. If either gain is set too high, the control may over-shoot beyond the original feed rate. The CFR Positive and Negative Gain settings effect control operation when the CFR sensor is used, and the “Amplitude Control” is set to “Auto Track”.

Frequency Settings

The “Frequency” menu contains the portion of the menu that controls the frequency settings. The frequency can be adjusted from 30 to 140 Hz. The spring/mass ratio of the hopper/table determines the natural vibrating (resonate) frequency. The control output frequency needs to be adjusted to match the natural frequency. The control can be manually tuned or automatically tuned.

The “Frequency Mode” setting selects either manual frequency adjustment or auto tracking frequency adjustment.

To manually find the resonate frequency of the bowl, set the amplitude to approximately 30%. Then adjust the frequency across its range. The hopper/table should be expected to vibrate the parts at more than one spot across the frequency range. The resonate frequency is the frequency with the most vibration. Once the best feeding frequency has been found, fine tune the frequency for the best parts movement. To increase feeder stability for parts load fluctuations, adjust the frequency down by 0.2 or 0.3 Hz so that the feeder becomes slightly over-tuned.

“Auto Scan” is used to find the resonate frequency of the hopper/table. Once auto tracking has found the resonate frequency, it can maintain resonate frequency and amplitude of the feeder as the parts load changes. The CFR sensor is needed in order for auto tracking to operate, and “Auto Tracking” needs to be turned on under both “Amplitude Source” and “Frequency Mode” menus. To show when frequency “Auto Tracking” is enabled, the normal display menu will show a bold “F”. When “=” is shown in bold, the control is locked onto the resonate frequency of the feeder.

The minimum frequency limit can protect the feeder from feeding at a low frequency if a spring or weld breaks. The Min. or Max. frequency can block out undesirable frequencies during Auto Scan.

Resonate Threshold Level

Resonate Threshold Level sets the minimum level of vibration that the control considers as a resonate condition. The setting should be reduced if an Auto Scan cannot find the resonance frequency within two scan attempts. Adjustment is not normally needed.

AutoTrack Dead Band

Auto Track Dead Band controls how far the resonate frequency of the vibratory feeder can deviate before the output frequency of the control is adjusted to follow it. Decreasing the setting narrows the range, and increasing the settings makes the dead band range larger before a reaction takes place. This setting normally does not need to be changed.

Diagnostics

The first menu item under the diagnostic menu shows the software revision level. The next four items under the software revision level show certain software registers that may be helpful to Graco while troubleshooting over the phone.

Security Settings

The **Security** menu contains the portion of the menu that controls access to the program menu settings. When enabled, the security code is a number from 000 to 999. The preset code is 123, but it can be changed by user.

The control comes with the security setting Unlocked so the control can be set up. The amplitude can be adjusted from the normal operating display. Press and hold Enter to enter the program menu and adjust the software settings.

The amplitude only (Ampl. Only) adjustment allows operators to adjust the amplitude through the normal operating display, but not get to the program menu settings without the security code.

The Lock setting locks the control from any adjustment without the use of the security code. If the security code has been forgotten, enter the security code #010, press and hold Enter until entry has been granted.
NOTE: Ignore the “Wrong Security Code” message. Once in the programming menu, be sure to set the security code.

Default Memory

It may be necessary to get back to a known setting. Once a feed system has been set up properly, the setting should be manually saved into the “Save Settings1” memory. If an operator disturbs the settings, the “Restore Settings1” feature can restore the control to an established set up. When different parts are used on the same feed system, two other memory locations called “Save Settings2” and “Save Setting3” can be used for the second part. Operators can recall settings 1, 2, or 3 based on the part being used. Three memory locations are available for software versions 1.15 and higher. The “Factory Reset” selection will put the original factory settings into the memory.

Language

The run display and programming menus can be set to display in English, Spanish (Espanol), French (Francais), or German (Deutsch).

Over Current Protection

The control has a coarse over-current fault protection that trips when the output is above the rated current. The G-Flex 1500 is rated 1.8A at 120V. The operator should monitor the output current to ensure that it is within the desired range. If an “Over Current” occurs, press the “1/0” key to restart the control. The operator should also monitor the temperature of the coils on the vibratory feeder. The coils should never be too hot to hold.

CFR Set Point

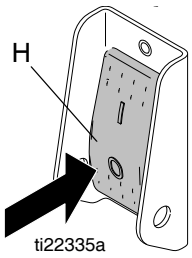
The CFR set point sets the amplitude vibration level that the control regulates to. The G-Flex 1500 control adjusts the amplitude automatically to match the CFR set point. The CFR set point can be adjusted by pressing the UP and DOWN arrow keys. Hold an arrow key down to adjust the amplitude setting instead of the CFR set point.

The CFR set point only appears on the display when the “Amplitude Source” menu under Power Settings is set to “Auto Track” and the CFR sensor is attached. The feature is included on Version 1.05 software and greater.

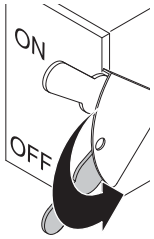
Repair

Power Disconnect

To prevent electric shock, prior to performing any repair procedure, press the **Main Power Switch (H)** to the OFF position and disconnect the power at the main circuit breaker.



Circuit Breaker



Air Gap Specifications

The G-Flex arrives from the factory with certain air gaps specifically designed for optimum performance. Make sure the dimensions shown below are maintained after installation or any time a repair or adjustment is made.

Table and Brush Spacing

The two tables on the G-Flex 1500 need to move independent of each other for optimal operation. It is important to keep a minimum of .020 in. spacing between the tables. This includes the brush that is connected to the tables.

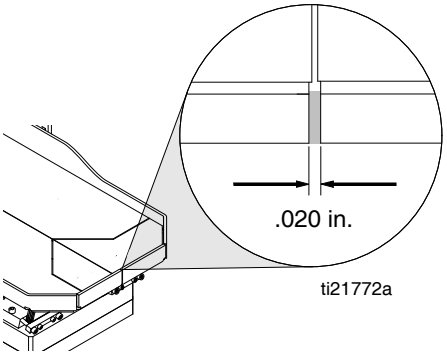
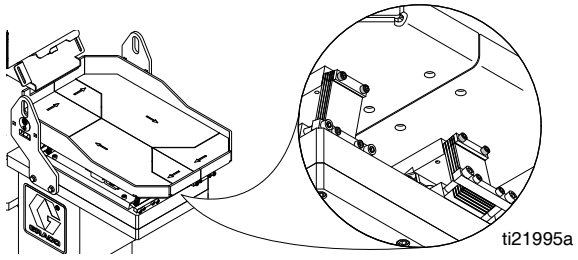
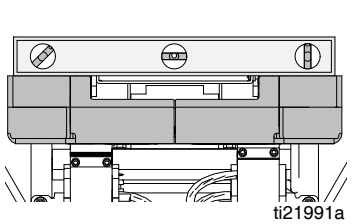


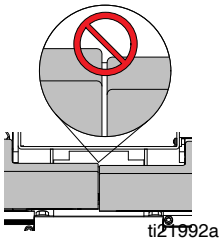
Table Adjustment

1. Loosen the top two bolts of all four spring packs. Adjust the table to minimum spacing.



2. Ensure tables are level with each other.

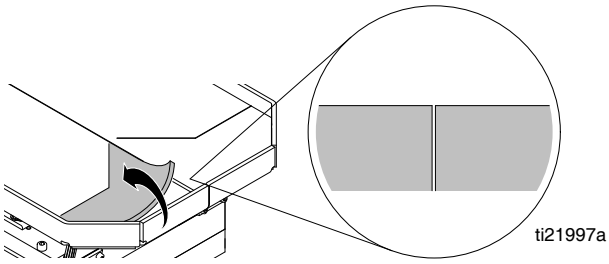




3. When tables are level and spaced correctly, torque all bolts to 150±10 in-lb.

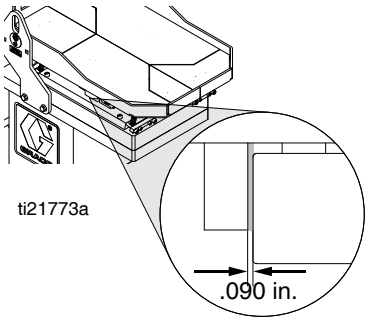
Brush Adjustment

1. If brushes are touching each other from one tray to the other, remove the brush by peeling it off the table.
2. Confirm there is a minimum .020 in. spacing between the tables.
3. Install the brushes so they are lined up just to the edge of their respective table.

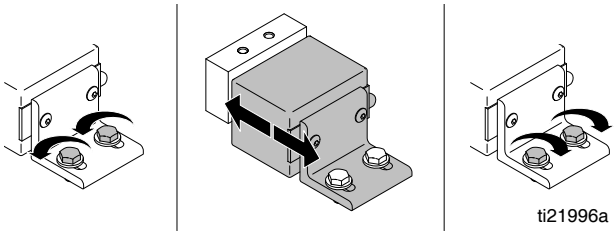


Electromagnet and Armature Spacing

The spacing between the electromagnet and armature must be .090 in.

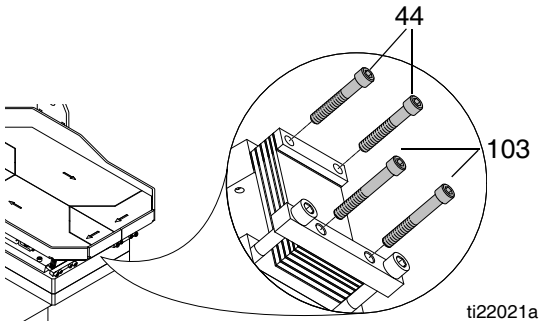


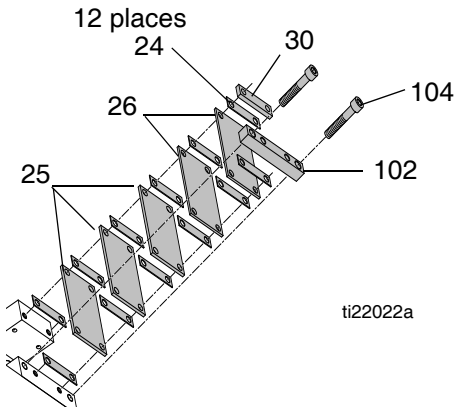
1. To adjust, loosen the two bolts on the electromagnet mount and adjust to appropriate spacing.
2. Retighten the two bolts and torque to 150±10 in-lb.



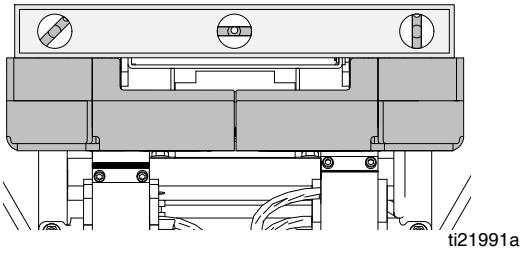
Spring Replacement

Table



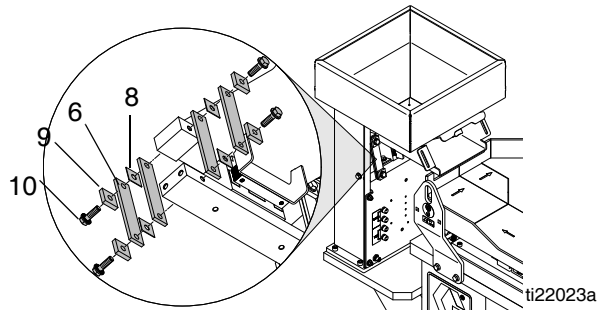


1. Remove screws (44, 103, 104) holding spring pack (30, 24, 26, 25, 102).
2. Remove and replace spring pack, replace screws (44, 103) - hand tighten only. Be sure to install three thicker springs (25) and two thinner springs (26) with spacers (24) in the order shown.
3. Level table front to back and left to right with other table half. Ensure proper spacing between the two halves of the part table.



4. Torque spring mounting screws (44, 103) to 140-160 in-lb.
5. Install and torque screws (104) to 190-210 in-lb.

Hopper

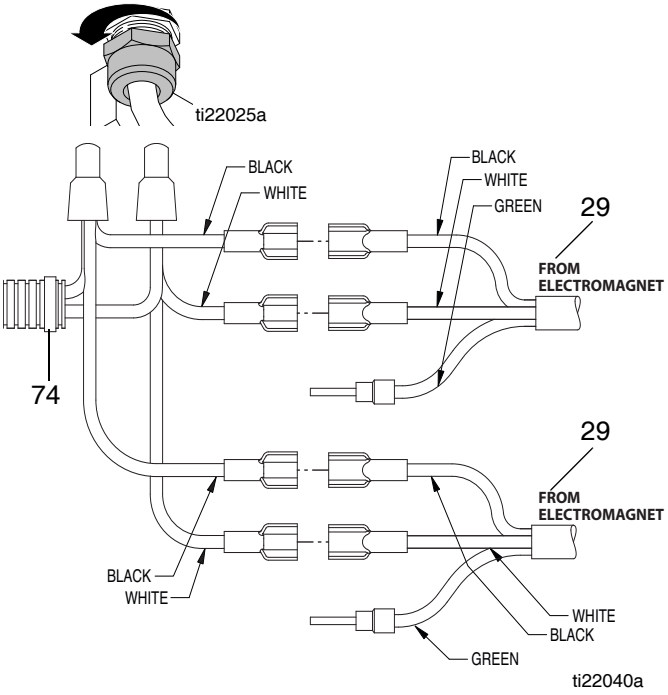


1. Remove screws (10) holding spring pack (9, 6, 8).
2. Remove and replace spring pack, replace screws - torque to 190-210 in-lb. Be sure to install parts in the order shown.

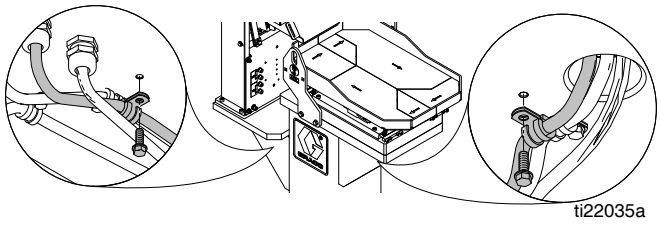
Electromagnet Replacement

Table

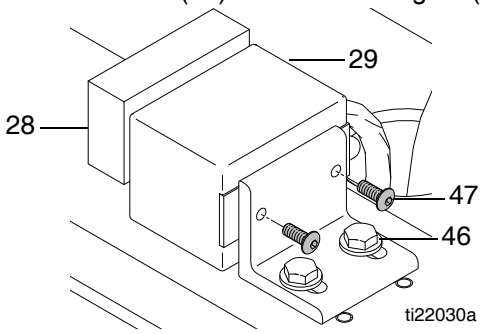
1. Disconnect power to the unit. See **Power Disconnect**, page 18.
2. Remove display panel (11). See **Display (Keypad) Replacement**, page 22.
3. Remove electromagnet wiring (29) from harness (74) for appropriate electromagnet. Disconnect ground pin from ground bar. Loosen strain relief and remove wire from control panel area.



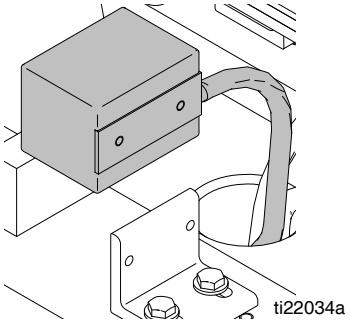
4. Remove wire clamps holding wire to pedestal, pull wire through pedestal.



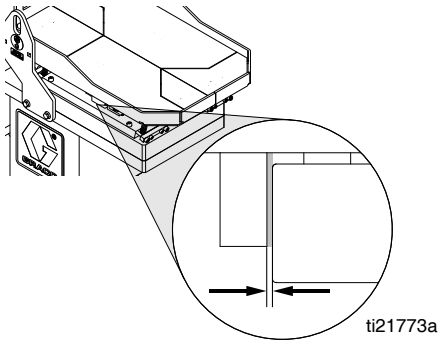
5. Remove screws (47) from electromagnet (29).



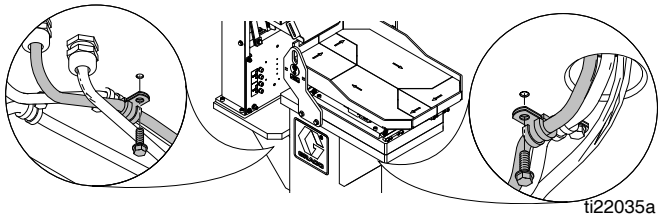
6. Take electromagnet out of unit.



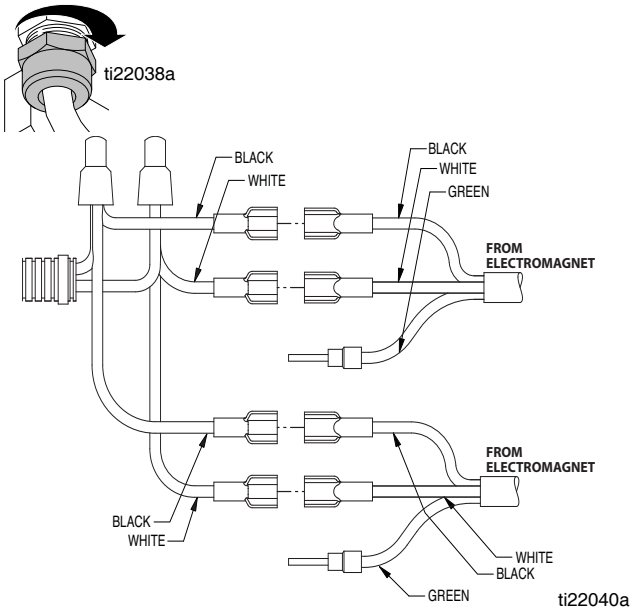
7. Replace electromagnet. Ensure there is an air gap of .090” between electromagnet (29) and armature (28). See **Electromagnet and Armature Spacing**, page 19.
8. Torque screws (47) to 40-50 in-lb. If necessary, loosen screws (46) to adjust air gap, retighten to 140-160 in-lb.



9. Route wire through unit and strain relief. Replace cable clamps.



10. Attach wire ends to harness and ground bar. Tighten strain relief.



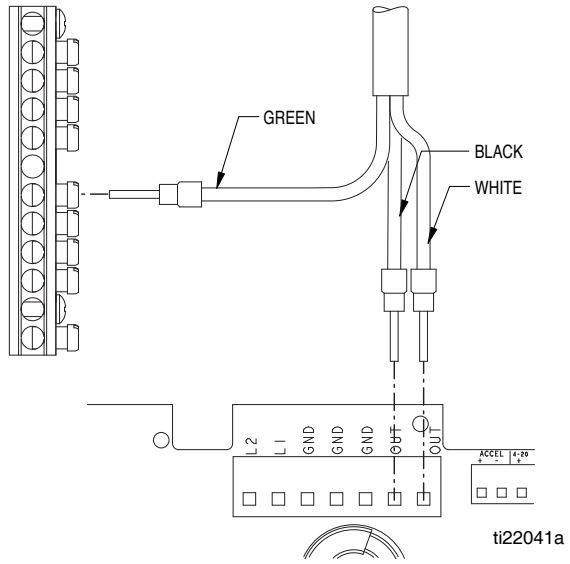
11. Reattach display panel.

Hopper

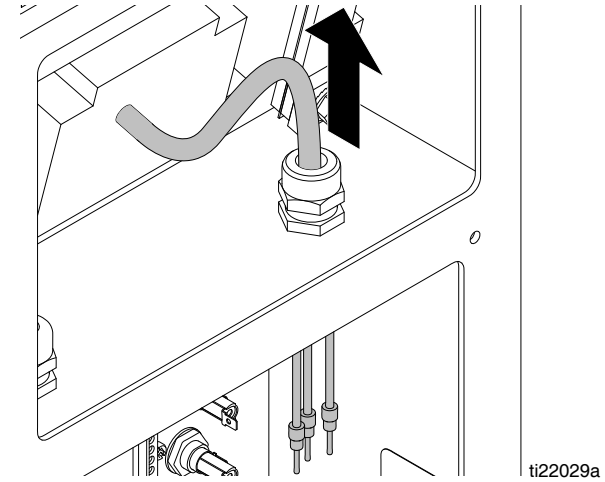
1. Disconnect power to the unit. See **Power Disconnect**, page 18.

2. Remove display panel (11). See **Display (Keypad) Replacement**, page 22.

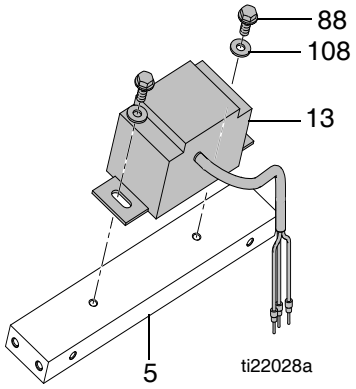
3. Remove electromagnet wiring (13) from hopper control board. Disconnect ground pin from ground bar.



4. Loosen strain relief and remove wire from control panel area.

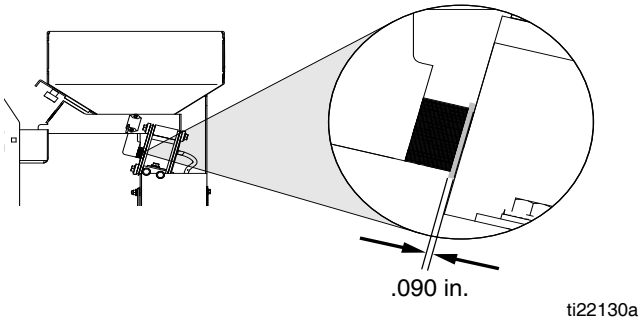


5. Remove screws (88) and washers (108) that attach electromagnet (13) to mounting bar (5).



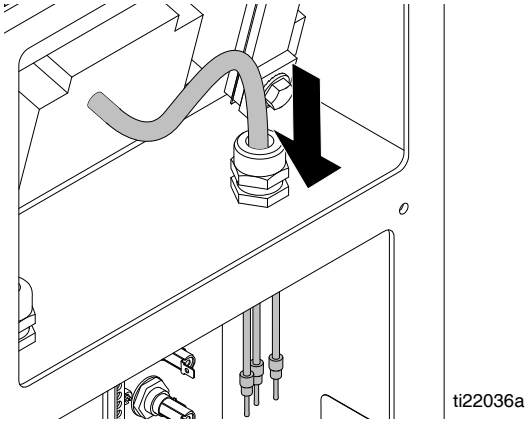
6. Take electromagnet (13) out of unit.

7. Replace electromagnet, ensure there is an air gap of .090” between electromagnet (13) and armature on bottom of part tray (7).

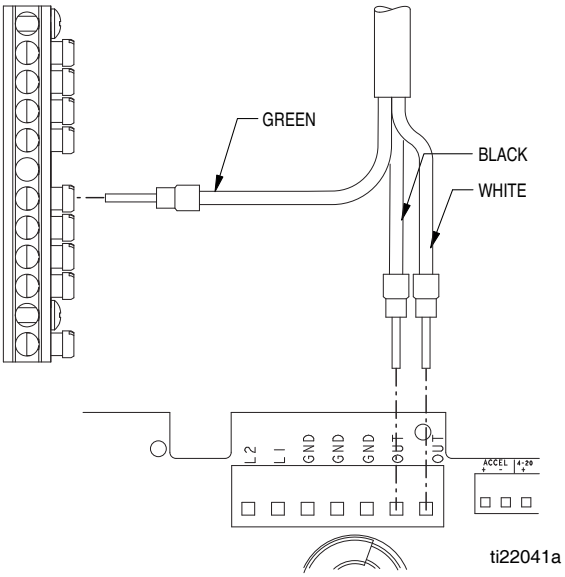


8. Install screws (88) and washers (108). Torque screws (88) to 25-30 ft-lb.

9. Route wire through unit and strain relief.



10. Attach wire ends to control board and ground bar. Tighten strain relief.

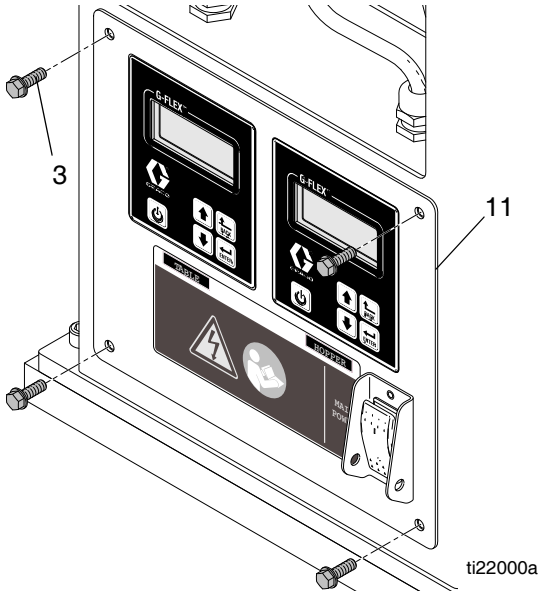


11. Reattach display panel.

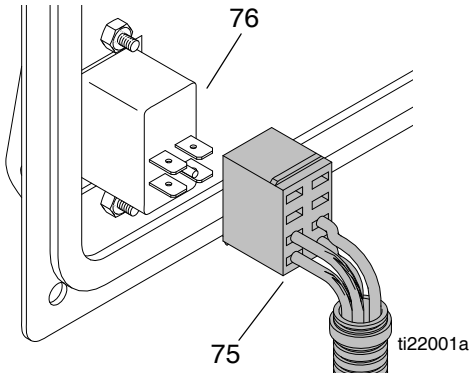
Display (Keypad) Replacement

1. Disconnect power to the unit. See **Power Disconnect**, page 18.

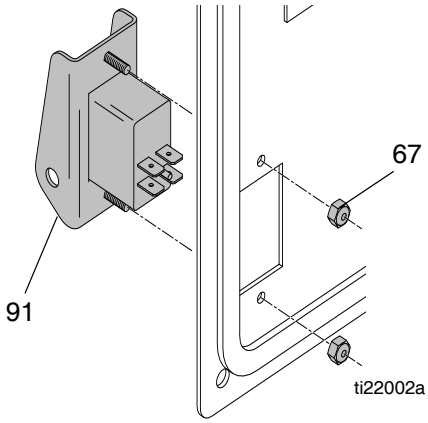
2. Remove screws (3) from panel (11).



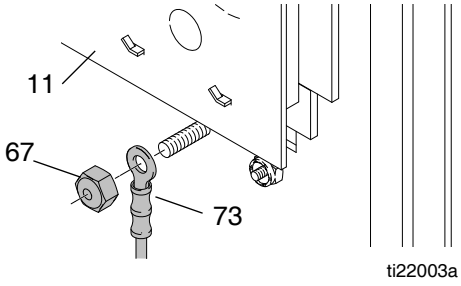
3. Remove switch housing on harness (75) from back of switch (76).



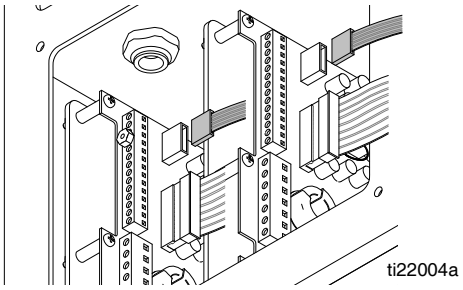
4. Remove nuts (67) holding switch bracket (91).



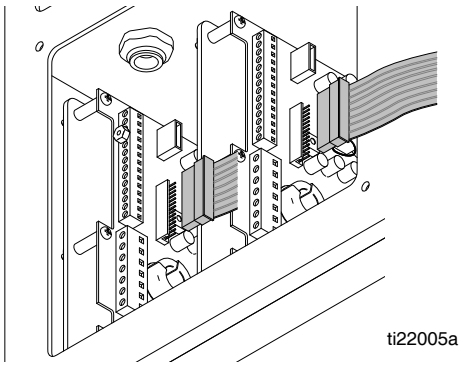
5. Remove nut (67) holding ground wire (73) to panel (11).



6. Disconnect ribbon cables from membrane switch on control board (2 places).



7. Disconnect ribbon cable from display connector on control board (2 places).



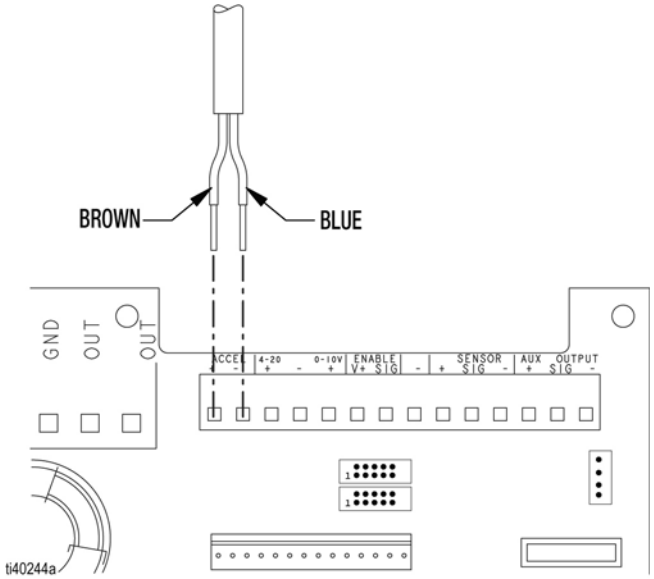
8. Replace display panel.

9. Reverse steps for reassembly.

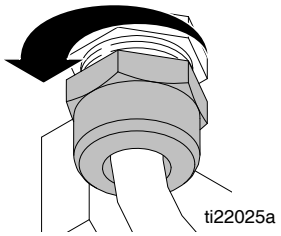
Accelerometer Replacement

Table

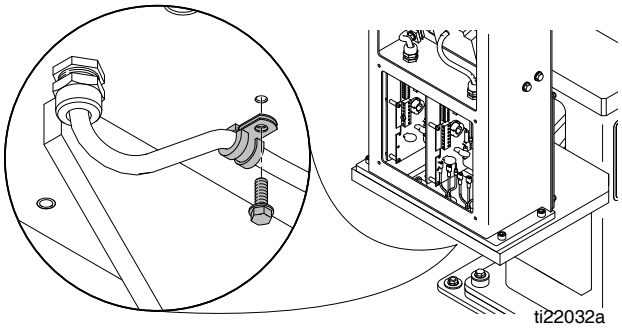
1. Disconnect power to the unit. See **Power Disconnect**, page 18.
2. Remove screws (3) and display panel (11). See **Display (Keypad) Replacement**, page 22.
3. Disconnect sensor wires (69) from table control board (80).



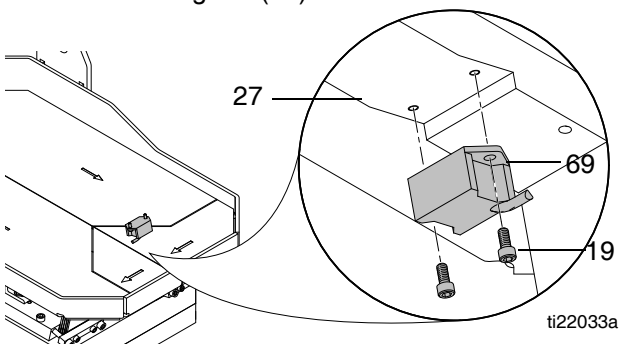
4. Loosen strain relief and remove wire from control panel area.



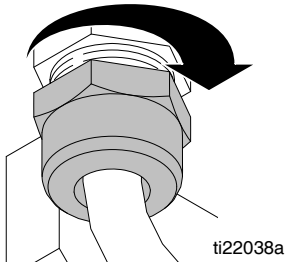
5. Loosen wire clamp and pull wire through pedestal. Remove wire from corrugated sleeving.



6. Remove screws (19) holding accelerometer (69) to table mounting bar (27).



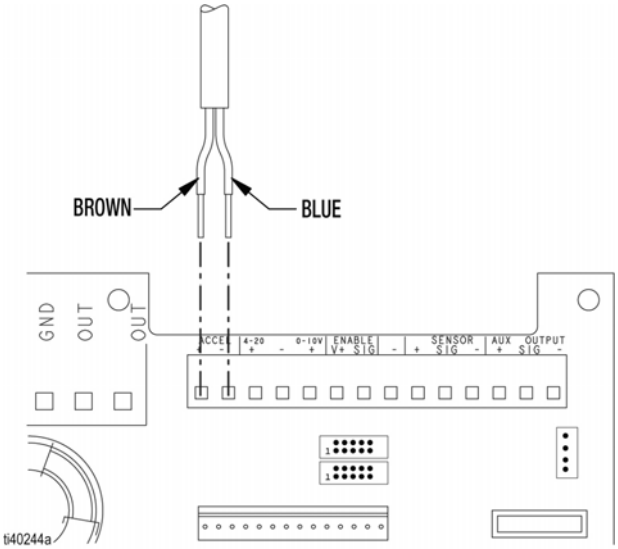
7. Replace accelerometer (69), tighten screws (19) to 25-30 in-lb.
8. Ensure wire is routed in protective sleeving through strain relief.
9. Replace wire clamps.
10. Attach wire to control board.
11. Tighten strain relief.



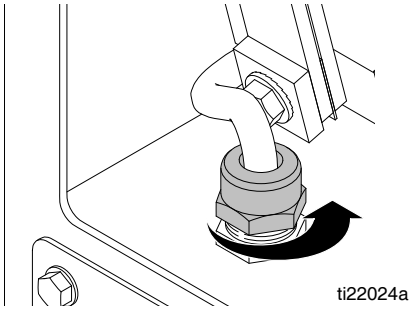
12. Replace display panel and screws.

Hopper

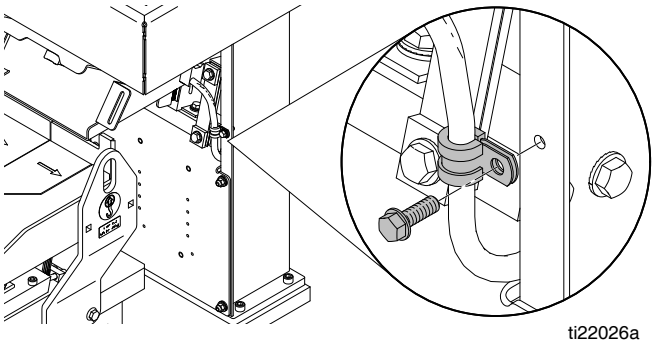
1. Disconnect power to the unit. See **Power Disconnect**, page 18.
2. Remove screws (3) and display panel (11). See **Display (Keypad) Replacement**, page 22.
3. Disconnect sensor wires (18) from hopper control board (80).



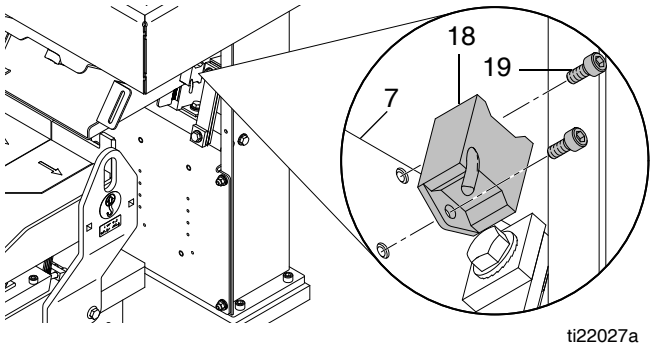
4. Loosen strain relief and remove wire from control panel area.



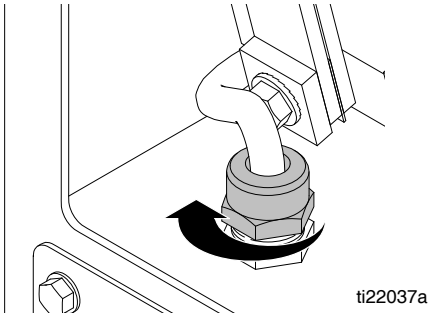
5. Loosen wire clamp. Wire to be removed from corrugated sleeving.



6. Remove screws (19) holding accelerometer (18) to hopper parts feed tray (7).



7. Replace accelerometer (18) tighten screws (19) to 25-30 in-lb.
8. Ensure wire is routed in protective sleeving through strain relief. Install wire clamp.
9. Attach wire to hopper control board.
10. Tighten strain relief.



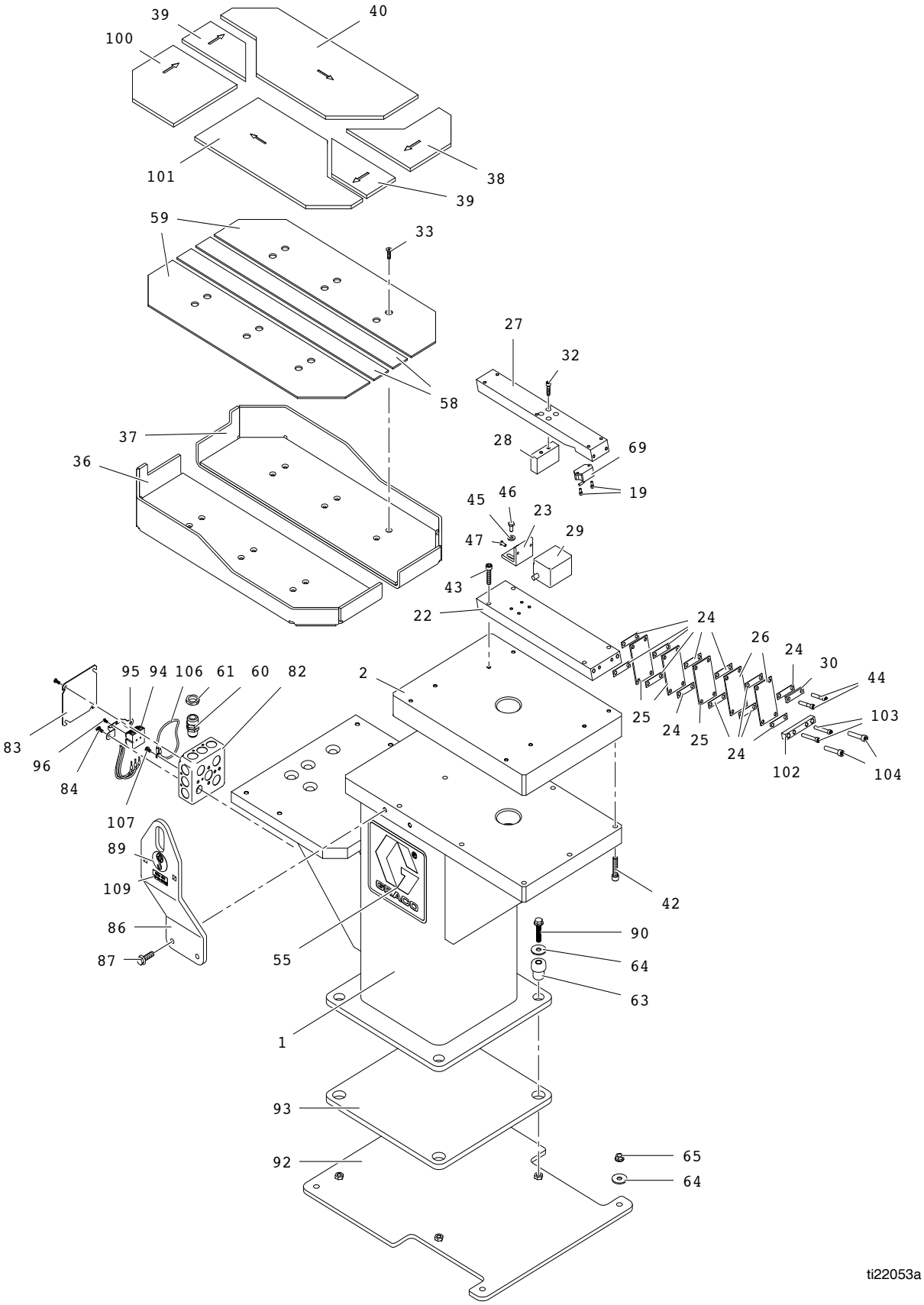
11. Replace display panel and screws.

Troubleshooting

Problem	Possible Cause	Solution
Parts will not circulate on table.	Amplitude setting of table is too low.	Increase amplitude setting of table.
	Frequency setting is not optimal for table.	Manually adjust the Table Frequency to the Fset value located on the serial label above the control display. If problem persists, manually adjust the frequency of the table in increments of 0.1 Hz until parts move uniformly. You will not have to go further than 2.0 Hz in either direction from the Fset value.
	Bolts have loosened up, resulting in poor vibration transfer.	Ensure all bolts are tight on table and spring packs.
	A small part or debris has fallen into the gap between the tables.	Remove small part or debris.
Parts are circulating too fast and hitting the walls of the table.	Amplitude setting is set too high.	Reduce amplitude setting of table.
Table will not AutoTune or resonant frequency falls outside normal range.	Tables are touching each other.	Ensure minimum gap of 0.020" is set between tables.
	Carpet is touching each other between tables.	Ensure a minimum gap is set between carpet.
	An outside object is in contact with the table.	Ensure nothing is touching the unit while Auto-tuning the table.
	A small part or debris has fallen into the gap between the tables.	Remove small part or debris.
Parts move slow on one half of table.	Carpet is not fully engaged with hook and loop.	Take a flat edge and press on carpet to ensure good engagement with the hook and loop.
	Frequency setting is not optimal for table.	Manually adjust the Table Frequency to the Fset value located on the serial label above the control display. If problem persists, manually adjust the frequency of the table in increments of 0.1 Hz until parts move uniformly. You will not have to go further than 2.0 Hz in either direction from the Fset value.
	Bolts holding spring packs together are not properly torqued.	Torque all bolts holding spring packs together to proper value.
	Bolts holding tray to top plate assembly are not properly torqued.	Torque all bolts holding tray to top plate to proper value.

Problem	Possible Cause	Solution
Parts feed from hopper even though the hopper is off.	Vibration from the table is making the hopper vibrate and feed parts.	Adjust the Hopper gate to the optimal height to help restrict parts feeding.
		Reduce the amplitude of the table but still have acceptable part movement.
		Attach the Part Feed Optimizer and adjust it to the proper height to prevent parts from unintentional feeding.
		Adjust Hopper Feed Table Slope up away from the table. See **Hopper Feed Table Slope**, page 11.
Part movement slows as more parts are fed onto table.	Table is not set to Autotrack.	Go into menu and set the table to Autotrack instead of manual mode.
Table will not run.	No Power to unit.	Ensure power is properly connected and turned on.
	M12 Control connection to table is not properly set up.	Check M12 connection and setup. Confirm table turns on in **Manual Operation in Override Mode**, page 14.
	Blown fuse.	Replace with new fuse.

Parts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Parts List

Ref.	Part	Description	Qty.
1	16V339	BASE, pedestal, paint	1
2	16V422	SHIM, drive, flex feeder, paint	1
19	112788	SCREW, cap, socket hd	4
22	16V280	BASE, drive	2
23	16V277	BRACKET, coil mounting	2
24+	16V276	SPACER, spring	48
25+	16V273	SPRING, cantilever	12
26+	16V274	SPRING, cantilever	8
27	16V279	PLATE, top, in-line	2
28	16X271	BLOCK, armature	2
29	16V272	COIL, electromagnetic	2
30	16V275	CLAMP, spring	4
32	C19810	SCREW, cap, socket hd	4
33	119647	SCREW, cap, socket, flthd	12
36#	16W280	TABLE, right, complete	1
37±	16W279	TABLE, left, complete	1
38*	16V250	PAD, nylon fiber, front	1
39*	16V251	PAD, nylon fiber, rear	2
40*	16V252	PAD, nylon fiber, side	1
42	564147	SCREW, 3/8-16 x 1.75 soc hd cap	8
43	113467	SCREW, cap, socket hd	8
44+	107445	SCREW, cap, sch	8
45	110755	WASHER, plain	8
46	100270	SCREW, cap, hex hd	4
47	121803	SCREW, cap, button head	4
55	183682	LABEL, graco logo	2
58#±	16V557	STRIP, reclosable, fastener, a	2
59#±	16V558	STRIP, reclosable, fastener, b	2
60	260067	FITTING, strain relief, 1/2 npt	7
61	117625	NUT, locking	3
63	119695	DAMPENER, engine mount	4
64	108851	WASHER, plain	8
65	112958	NUT, lock	4
66	125220	CLAMP	6
69	16V820	SENSOR, accelerometer, table	1
82	16V896	BOX, junction, elec, duplex	1
83	16V897	COVER, box, junction, elec, duplex	1
84	16M007	SCREW, mach, serrated hex head	2
86	16W531	PLATE, lift paint	2
87	111193	SCREW, cap flange hd	4
89	16W471	LABEL, lift point ISO	2
90	117779	SCREW, hex head, flanged	4
92	16W664	PLATE, mount, paint	1
93	16W662	PAD, isolation	1
94	16W666	BLOCK, Terminal, 3 pole	1
95	16W730	BRACKET, mount, terminal block	1
96	120744	SCREW, #6 Pan	2
100*	16W992	PAD,nylon,fiber,rear,r	1
101*	16W993	PAD,nylon,fiber,side,r	1
102	16X051	BAR,clamp,spring pack	4
103+	120785	SCREW,cap, shc	8
104+	556516	SCREW,shcs, 5/16-24 X 1.75	8
106	16X138	HARNESS,ground	1
107	114391	SCREW,grounding	1
109	16X251	LABEL, identification	2

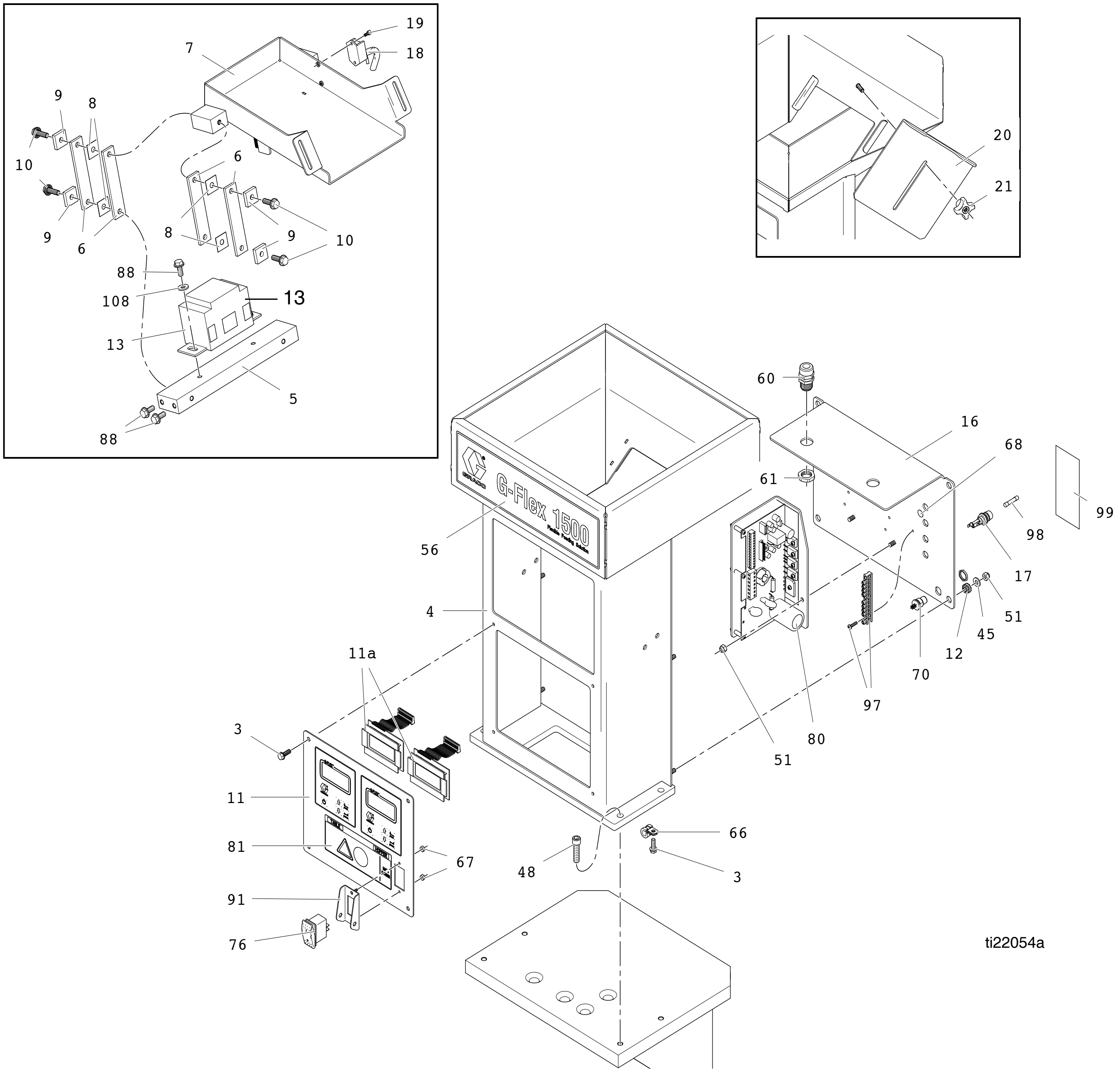
+ Included in kit 16W799 REPAIR, table spring pack (four 16W799 Kits required for complete replacement.)

* Included in kit 16W800 REPAIR, table pad

Included in kit 16W801 REPAIR, right table

± Included in kit 16W802 REPAIR, left table

Parts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Parts List

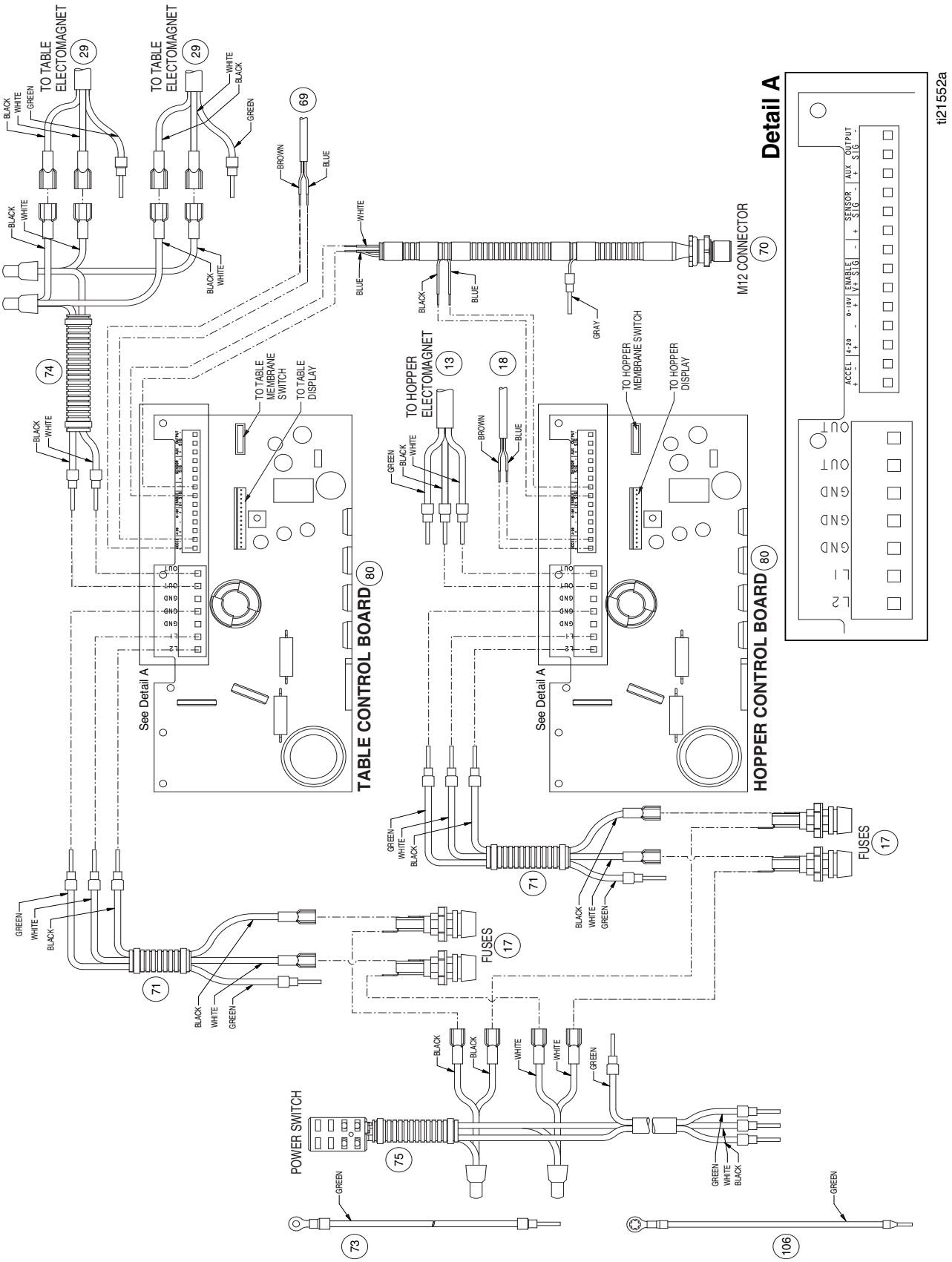
Ref.	Part	Description	Qty.
3	260212	SCREW, thread forming, hex hd	10
4	16V346	HOPPER, flex feeder, paint	1
5	16V373	BAR, mount, coil, paint	1
6+	16V362	SPRING, cantilever, hopper	8
7	16V365	TRAY, parts, flex feeder, paint	1
8+	16V363	SPACER, spring	8
9	16V358	WASHER, 1.0 x 1.0 x .25 thk, 5/16	8
10+	112586	SCREW, cap, hex hd	12
11#	16V765	PANEL, display, complete	1
	254433	PANEL, display, complete	1
11a	16W845	DISPLAY	2
	254432	DISPLAY	2
12	16V776	DAMPENER, vibration	4
13	16V361	COIL, electromagnetic	1
16	16V970	PANEL, control	1
17	16V775	HOLDER, fuse	4
18	16V364	SENSOR, accelerometer, hopper	1
19	112788	SCREW, cap, socket hd	4
20	16V371	GATE, hopper, flex feeder, paint	1
21	16V355	KNOB, 5 prong, 1/4-20, f	1
45	110755	WASHER, plain	6
48	110141	SCREW, cap, sch	4
51*	102040	NUT, lock, hex	8
56	16V888	LABEL, branding, g-flex 1500	1
60	260067	FITTING, strain relief, 1/2 npt	7
61	117625	NUT, locking	3
66	125220	CLAMP, cushion, support, loop	6
67	C19862	NUT, lock, hex	3
68	186620	LABEL, symbol, ground	1
70	16V827	CONNECTOR, m12,5 pin	1
76	16W096	SWITCH, rocker	1
80*	16V764	PANEL, mount, circuit bd, complete	2
	254431	PANEL, mount, circuit bd, complete	2
81#	16V895	LABEL, warning, multiple, control	1
88	110963	SCREW, cap, flange head	6
91	16W661	BRACKET, switch, lock	1
97	16W665	BAR, ground	1
98	16W724	FUSE, 5 AMP	4
99	16W762	Label, ID, FUSE	1
108	100527	WASHER, plain	2

+ Included in kit 16W798 REPAIR, hopper spring pack (four 16W798 Kits required for complete replacement)

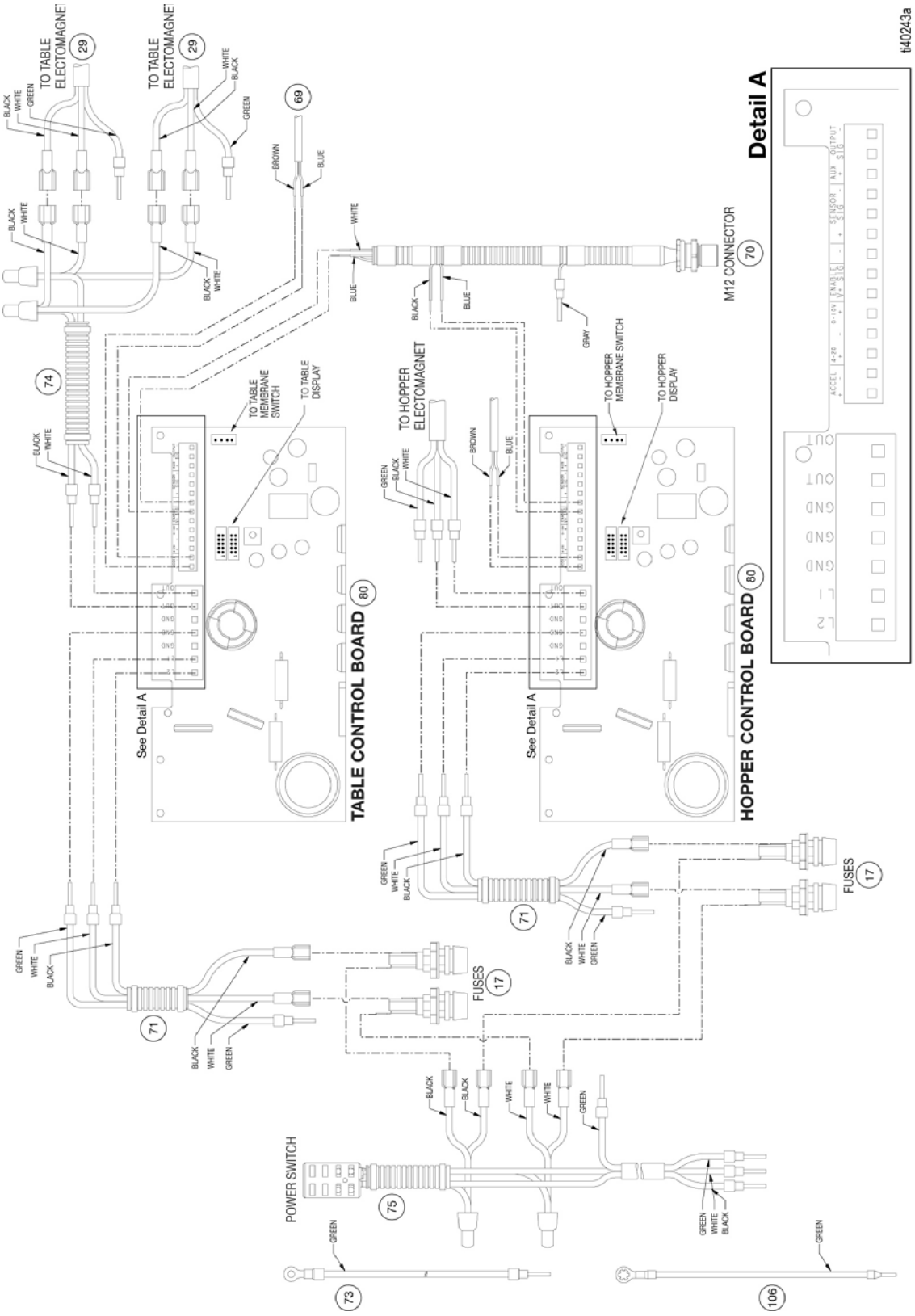
** Included in kit 16W797 or 254436 REPAIR, control board*

 # Included in kit 16W796 or 254435 REPAIR, display

Series A Wiring Diagram

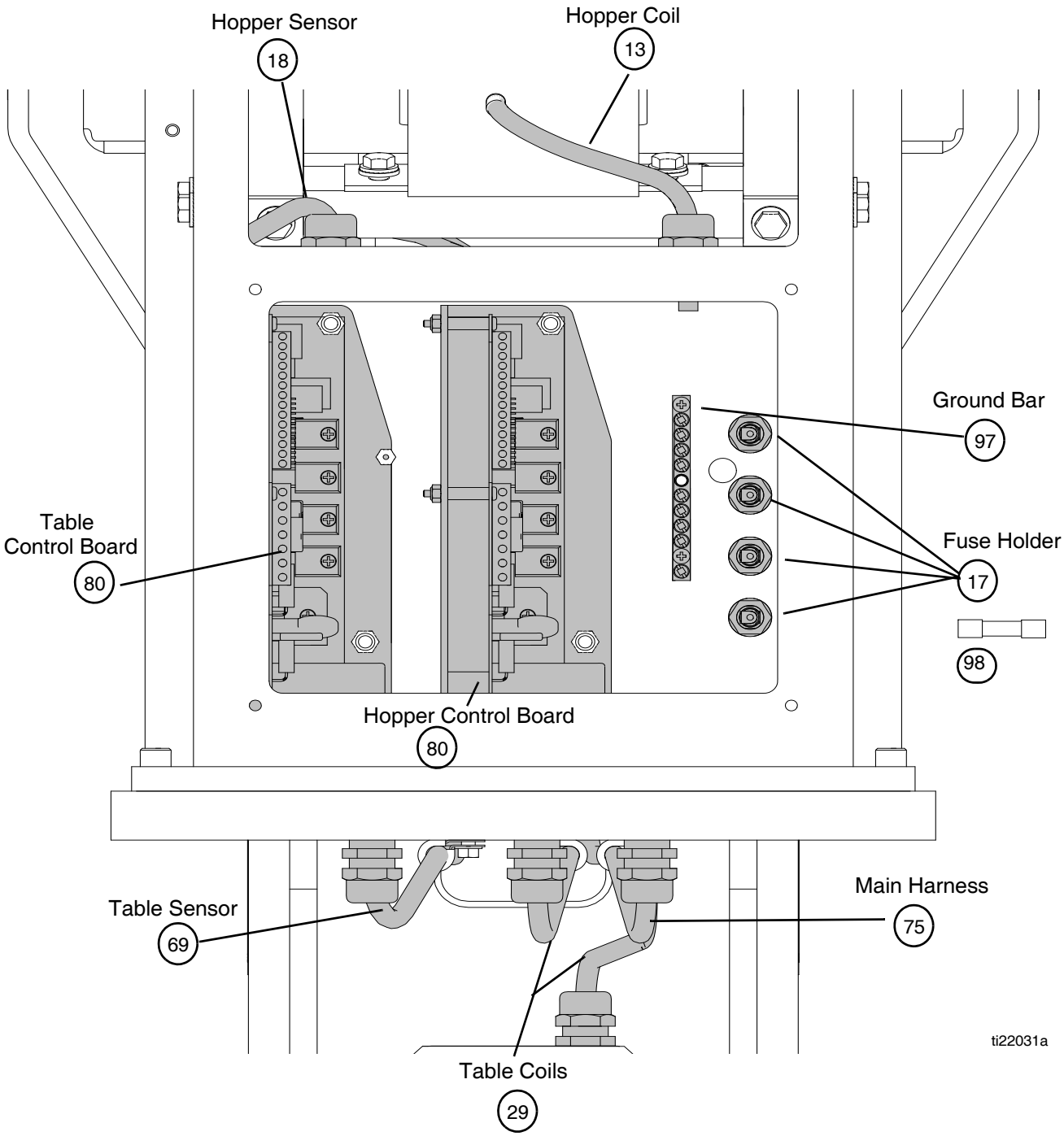


Series B Wiring Diagram



Ref.	Part	Description	Qty.
13	16V361	COIL, electromagnetic	1
17	16V775	HOLDER, fuse	4
18	16V364	SENSOR, accelerometer, hopper	1
29	16V272	COIL, electromagnetic	2
69	16V820	SENSOR, accelerometer,table	1
70	16V827	CONNECTOR,M12,5 pin	1
71	16V826	HARNESS, fuse	2
73	16V823	HARNESS, ground, display	1
74	16V822	HARNESS, power, jumper,table	1
75	16V821	HARNESS, wire, main	1
80	16V764	PANEL, mount, circuit bd, complete	2
	254431	PANEL, mount, circuit bd, complete	2
106	16X138	HARNESS, ground	1

Electrical Component Identification



Ref.	Part	Description	Qty.
13	16V361	COIL, electromagnetic	1
17	16V775	HOLDER, fuse	4
18	16V364	SENSOR, accelerometer, hopper	1
29	16V272	COIL, electromagnetic	2
69	16V820	SENSOR, accelerometer,table	1
75	16V821	HARNESS, wire, main	1
80	16V764	PANEL, mount, circuit bd, complete	2
	254431	PANEL, mount, circuit bd, complete	2
97	16W665	BAR, ground	1
98	16W724	FUSE, 5 AMP	4

Settings Table

Part Reference		Auto Track Mode		Manual Mode	
		CFR Value	Freq.	Freq.	Ampl.
	Table				
	Hopper				
	Table				
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Part Reference		Auto Track Mode		Manual Mode	
		CFR Value	Freq.	Freq.	Ampl.
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Technical Specifications

G-Flex 1500 (Model 16V133)		
	U.S.	**Metric**
Hopper Capacity	0.9 ft^3	.025 m^3
Table Size	15.5 in. x 24 in.	39.4 cm x 61.0 cm
Maximum Part Size	3 in. x 3 in. x 1.5 in.	7.6 cm x 7.6 cm x 3.8 cm
Maximum Weight capacity on table	30 lb	13.6 kg
ElectroMagnet Air Gap	.090 inches	2.28mm
Total Unit Weight	620 lb	280 kg
Operating Voltage	120V	
Total Operating Current	1.8 amps	
Individual Board Current	0.9 amps	
Individual Board Fuse Rating	5A/250V, Fast-Acting	

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

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

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Revision E, June 2021