Parts

INSTRUCTIONS

This manual contains important warnings and information.
READ AND KEEP FOR REFERENCE.

GRACO

First choice when quality counts.™

309114

Rev. B

2 kW (2.7 HP)

TRIUMPH™ DC Motor

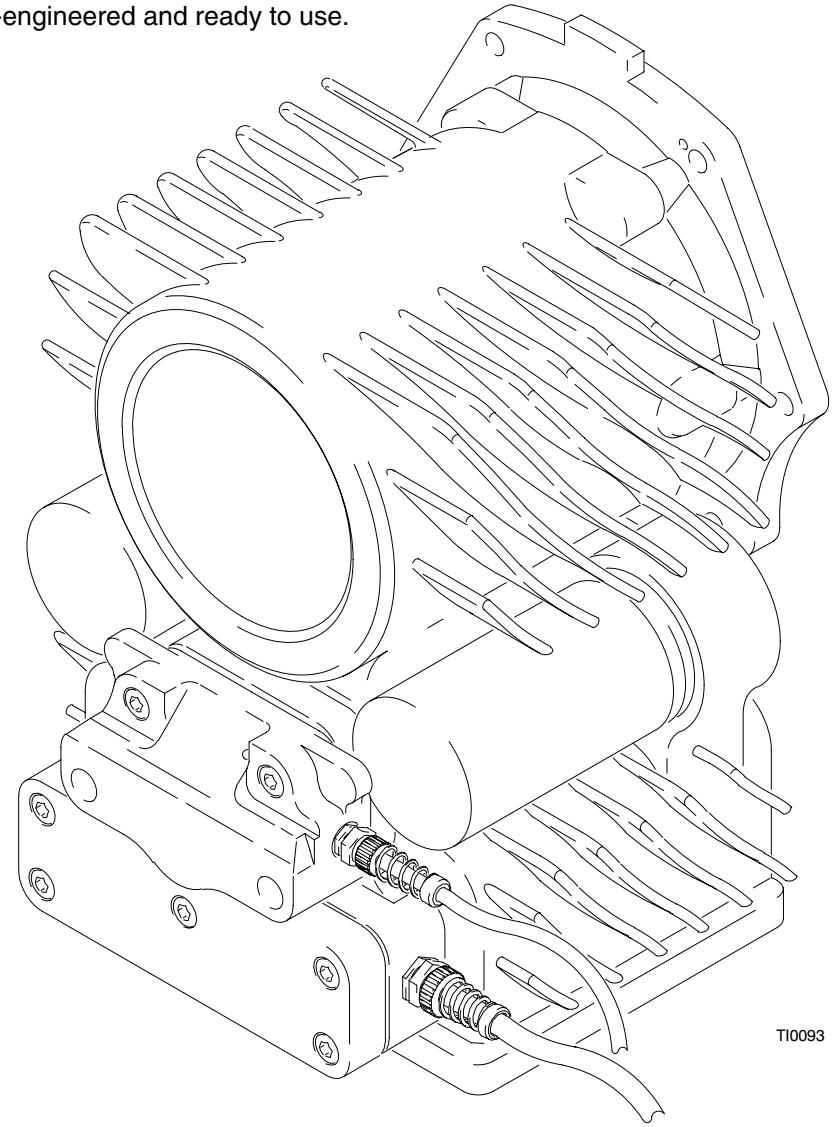
FOR USE WITH THE GRACO 9000 RECIPROCATOR IN REMOTE OPERATED, NON–HAZORDOUS APPLICATIONS

Includes adjustable torque motor with gear output, electronic controls, power and signal access junction boxes. Pre-engineered and ready to use.

Part No. 280413, Series A
100 to 240VAC, 15 Ampere, 50/60 Hz, single-phase

For use with 233035 system only
For application information, reference Form 309113

US Patent No. 5,220,259.
Other US and Foreign Patents Pending.



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metric SI

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

Graco Inc. is registered to ISIS. EN IPSO 9001

Table of Contents

Symbols

Warning Symbol

⚠ WARNING

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

Caution Symbol

⚠ CAUTION

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

⚠ WARNING

INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not attempt to repair the electronic control module. To service the module, replace the entire assembly.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below –40°C (–40°F).
- Wear hearing protection when operating this equipment.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

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

- Electrical equipment must be installed, operated, and serviced only by trained, qualified personnel who fully understand the requirements stated in this instruction manual.
- Ground the equipment and all other electrically conductive objects in the spray area. Refer to **Ground the System** on page 9.
- Keep all covers tight while the motor is energized.

HOT SURFACE HAZARD

- The electric motor becomes hot during operation, and the heat may be transferred to other connected equipment. To reduce the risk of burning yourself, do not touch the motor surfaces while it is operating. Before servicing, allow the motor to cool.
- Keep flammable material and debris away from the equipment.

Introduction

Introduction

Read this manual and all separate component manuals thoroughly before installing or operating the motor or any other system equipment.

Reference letters and numbers used in the text refer to the callouts in the illustrations and the parts lists on page 17.

Component Description

Major components of the Triumph Electric Motor are the electronic control module (1), signal cover (12), power access cover (13), capacitors (15), torque control located on separate control box, power indicator (L), power inlet (M), and motor housing (D). See Fig. 1.

Typical Installation

Fig. 2 is only a guide to help you select system components and accessories. Contact your Graco distributor for assistance in designing a system to meet your particular needs. Also refer to manual 309113.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire or explosion, disconnect electric power and wait 15 minutes, to reduce the risk of electric shock.

KEY

1 Electronic Control Module
12 Signal Cover
13 Power Access Cover
14 Capacitor Covers
15 Capacitors
D Motor Housing
E Torque Control (Located on separate control box)
L Power Indicator
M Power Inlet

△1 Capacitors (15) are located inside the covers (14).

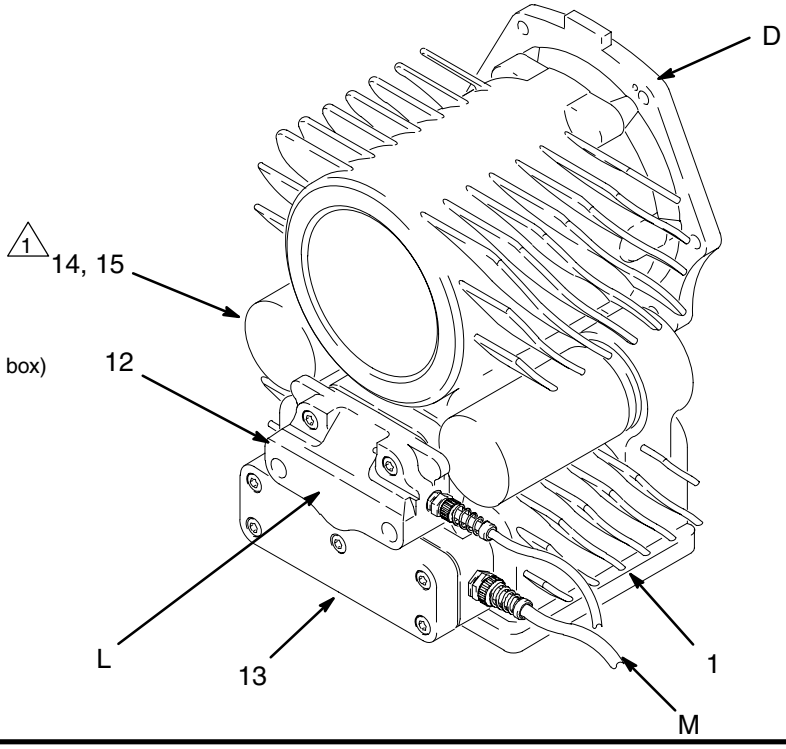

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Fig. 1

Typical Installation

Installation Using a Power Cord, for Non-Hazardous Areas Only

KEY

A Flexible Power Cord
C EMI Line Filter if required.
Refer to page 8 for specifications for different voltages.
H Wall Outlet
J Fused Safety Switch, with lock
K Strain Relief
N MTorque control potentiometer (10K ohm)
P Start/Emergency Stop Pushbutton
R Standard Electrical Plug
S Surge Tank
Y Ground Wires for Pump and Surge Tank

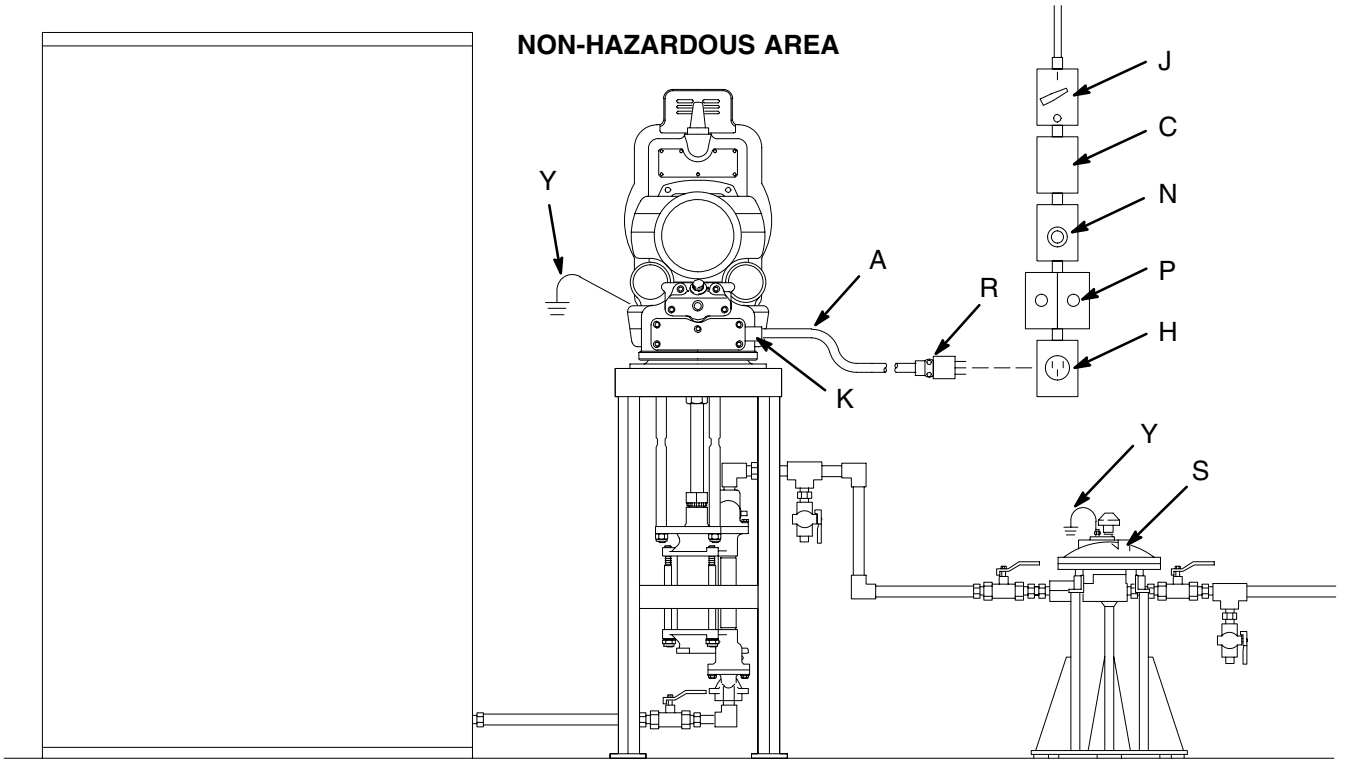

Fig. 2

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110427

Installation

Startup Check List

Before installing and operating the motor, perform the following checks. Detailed instructions for each follow.

1. Mount the motor in the desired location. See **Motor Location** below.
2. Install the electrical service. See below.
3. Connect the electrical wiring. See page 9.
4. Ground the system. See page 9.

Motor Location

Locate the motor so there is sufficient space around it for easy operating and service access, and for adequate ventilation to reduce buildup of heat in the motor.

Route all cables and electrical lines away from traffic areas.

Electrical Service

Electrical power to the pump may be supplied by a power cord (A, see Fig. 2) or it may be hardwired.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
The electrical wiring shall be performed only by trained and qualified personnel to reduce the risk of serious injury and electric shock.

The minimum operating voltage is 100VAC; the maximum operating voltage is 240VAC. This motor requires a 50/60 Hz, single-phase, 15 Ampere grounded power supply.

Use 14 gauge grounded 3–wire cable per the installation category to bring power to the motor. The electric motor is grounded through the cable.

Continued on page 8.

Installation

Install the following components on the motor circuit:

- Install a fused safety switch (J) on the circuit to the motor, to lock out power to the motor when it is being serviced or when it is shut down. This switch must be lockable and must be in a non-hazardous area.

- To comply with EMC directive EN 50081–2 (1994) for line-conducted noise, install an EMI line filter (C) in the system. Part No. F1760AA20 is available from Curtis Industries, P.O. Box 343925, Milwaukee, WI, 43234–3925, USA; telephone 414–649–4200.

  This filter is rated for 240VAC, 15 Ampere. See the following table for minimum insertion losses. If you use an equivalent filter, the limits on line-conducted emissions in EN5011 must be met and verified.

Minimum Insertion Losses

MHz					
0.15	**0.50**	**1.00**	**5.00**	**10.0**	**30.0**
15 dB	25 dB	31 dB	42 dB	47 dB	40 dB

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

If using a power cord plugged into a wall socket, a motor starter switch must be installed to control power to the plug. Use only a 3–terminal ground plug. Do not alter the plug by removing the grounding terminal. Do not use with an adapter or extension cord.

- Install a motor starter switch (N) on the circuit to the motor. This switch must be in a non-hazardous area. Use a 2–pole magnetic AC contactor, size NEMA 1, 30 Ampere. The switch is not required when the motor is hardwired.

- Install a start/emergency stop pushbutton (P) within reach of the motor.

Installation

Connect the Electrical Wiring

1. Remove the power access cover (13) to expose the wiring terminals.

2. Install a strain relief (K) in the 1/2 npt(f) power inlet. Bring the power cable into the power compartment. See Fig. 3.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

If using a power cord plugged into a wall socket, a motor starter switch must be installed to control power to the plug. Use only a 3–terminal ground plug. Do not alter the plug by removing the grounding terminal. Do not use with an adapter or extension cord.

3. Connect the common and the neutral leadwires (B, W) of the cable to the top two terminals (T).

4. Connect the green ground wire (G) of the cable to the bottom ground terminal (U). ***The ground wire must be connected to the bottom terminal, and must be longer than the line leads, to prevent pullout.***

5. Reattach the power access cover (13). Torque screws (22) to 10–15 N•m (89–133 in-lb).

Ground the System

The electric motor is grounded through the electrical wiring (see the instructions at left). Redundant grounding of any equipment connected to the motor is recommended to further reduce the risk of electric shock.

To reduce the risk of static sparking, ground all equipment used or located in the work area. Check your local electrical code for detailed grounding instructions for your area and type of equipment.

Equipment connected to the motor should be redundantly grounded. Use Graco Part No. 237569 Ground Wire and Clamp (Y, Fig. 2), connected to a true earth ground.

KEY

- B Common Leadwire (black)
- D Motor Housing
- F Control Signal Connections (see technical data on page 18)
- G Ground Wire (green)
- K Power Inlet and Strain Relief
- T Power Terminals
- U Ground Terminal
- W Neutral Leadwire (white)

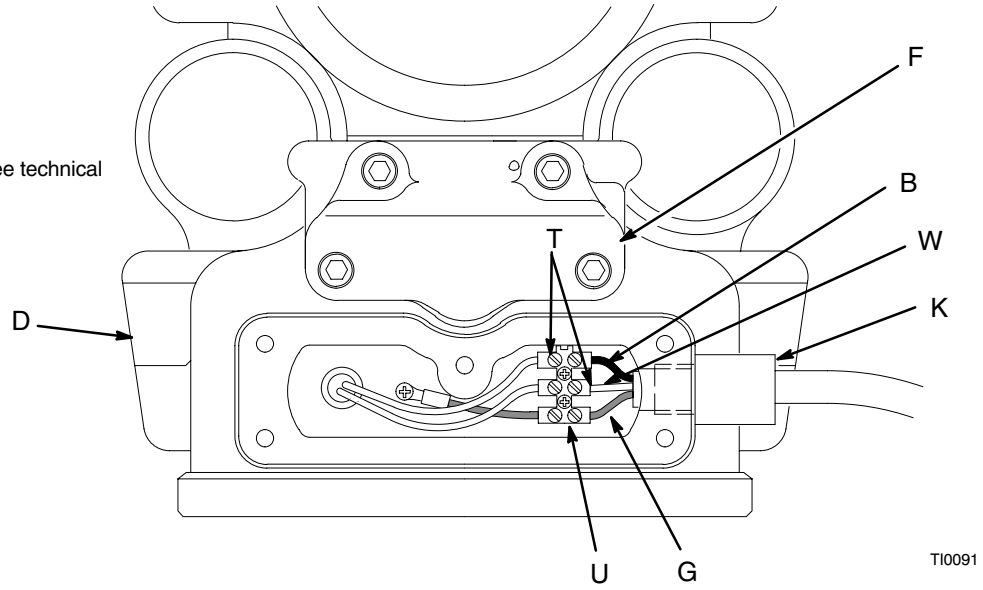


Fig. 3

Operation

Starting and Adjusting the Motor

1. Set your torque control to zero (0). See Fig. 4.

2. Turn on the power source to the motor. The power indicator (L) will light.

NOTE: The motor requires about 1 second to start after applying power, to allow the circuit boards to power up.

3. Turn your torque control slowly clockwise until the pump starts.

4. Use the torque control knob located on the control panel to adjust the speed of the pump. Always use the lowest speed necessary to get the desired results. At speeds over 60 cycles per minute the motor will shut off automatically to prevent premature wear. To restart, shut off power to the motor, set the torque control to zero (0), turn on power to the motor, and turn the torque control slowly clockwise until the pump runs at less than 60 cycles per minute.

Shutdown

1. Follow the shutdown procedure for the pump. Refer to the separate instructions provided with the pump.

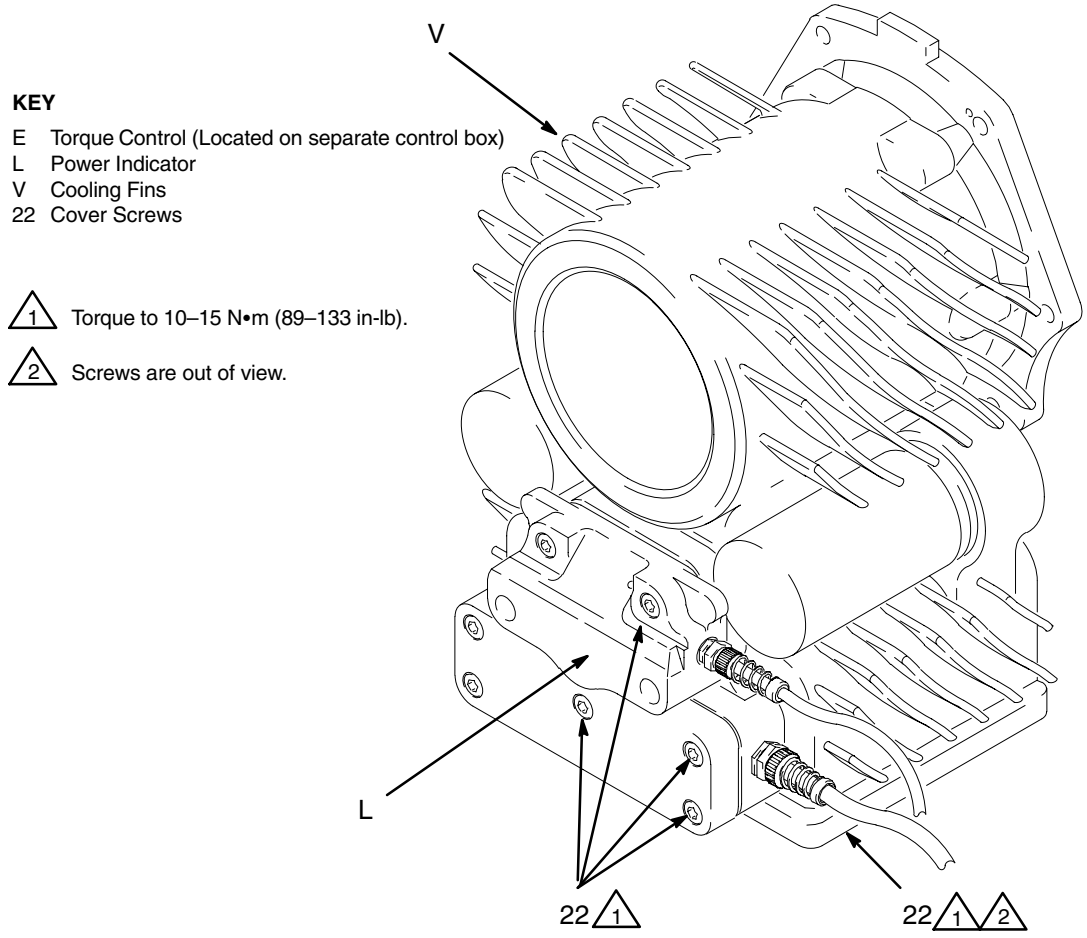
2. Turn your torque control to zero (0). See Fig. 4.

3. Shut off the electrical power source to the motor.

Maintenance

Always set the torque control to zero (0) and disconnect power when shutting down the motor.

Keep dirt and dust from accumulating on the motor. Clean the cooling fins (V) as required.



KEY

E Torque Control (Located on separate control box)
L Power Indicator
V Cooling Fins
22 Cover Screws

1 Torque to 10–15 N•m (89–133 in-lb).

2 Screws are out of view.

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Fig. 4

Troubleshooting

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire or explosion disconnect electric power and wait 15 minutes, to reduce the risk of electric shock.

PROBLEM	CAUSE	SOLUTION
Motor does not run	Power source is shut off.	Turn power source on.
	Defective electronic control module.	Contact your Graco distributor for proper service.
	Power wires hooked up incorrectly.	Refer to page 9 for proper installation.
	Motor has shut off because pump speed exceeded 60 cycles per minute.	Correct system causes of excessive pump speed (exhausted fluid supply, broken supply line, worn seals, etc.). To restart, shut off power to the motor, set the torque control to zero (0), turn on power to the motor, and turn the torque control slowly clockwise until the pump runs at less than 60 cycles per minute.
Motor is vibrating.	Bad capacitor.	Replace capacitors. See page 15.
Motor running slowly.	Motor has overheated and has automatically slowed down to reduce temperature.	Motor will return to normal speed when temperature drops to factory set level. You may shut off motor and allow it to cool, or reduce the ambient temperature in the operating area.
	Motor external surfaces are dirty.	Clean motor surfaces and cooling fins, for proper cooling.
Motor running slowly or erratically.	Motor sensors (optos) are bad.	Contact your Graco distributor for proper service.

Service

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Only the electronic control module (1), signal cover (12), and capacitors (15) are user-replaceable parts. See below for replacement procedures for these parts.

Do not attempt to repair the electronic control module (1) or the signal cover (12). If service is required, replace these assemblies.

There are no user-serviceable parts in the motor housing (D). For housing replacement, contact your Graco distributor.

Tools Required

- 6 mm allen wrench
- Torque wrench
- Graco Part No. 110293 Lithium Base Grease
  Use to repack bearings (34, 35, see the parts drawing on page 17) and gears. For complete rebuild, order two 0.38 pint (0.18 liter) containers.

Replacing the Electronic Control Module

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire or explosion disconnect electric power and wait 15 minutes, to reduce the risk of electric shock.

1. Before removing any covers or performing any service, disconnect power and wait for the capacitors to discharge. See the **WARNING** at left.
2. Remove the screws (22) and washers (23) holding the control module (1) to the motor housing (D). Carefully move the module away from the housing. See Fig. 5.
3. Pull the two power leads (J1, K1) off the tabs (J2, K2) on the module.
4. Disconnect the 6–pin (M1) and 7–pin (P1) connectors from their mating connectors (M2, P2) on the module (1).
5. Disconnect the two halves of the large green connector (S1, S2).
6. Remove the electronic control module (1). There are no user-serviceable parts on the module.
7. Install the new electronic control module (1) in the reverse order of disassembly. Push all the wires well up into the motor housing (D), to avoid pinching them when reattaching the module.

Service

KEY

1 Electronic Control Module
12 Signal Cover
14 Capacitor Covers
15 Capacitors
22 Screws
23 Washers
31 Capacitor Insulators
D Motor Housing
J1, K1 Power Leads
J2, K2 Power Tabs
M1, M2 6-Pin Connectors
P1, P2 7-Pin Connectors
S1, S2 Green Connectors
V1, V2 Signal Cover Connectors
R2 Bleed Resistor
X Capacitor + Wires
Z Capacitor – Wires

1 Torque to 10–15 N•m (89–133 in-lb).

2 Torque to 2.7–3.4 N•m (24–30 in-lb).

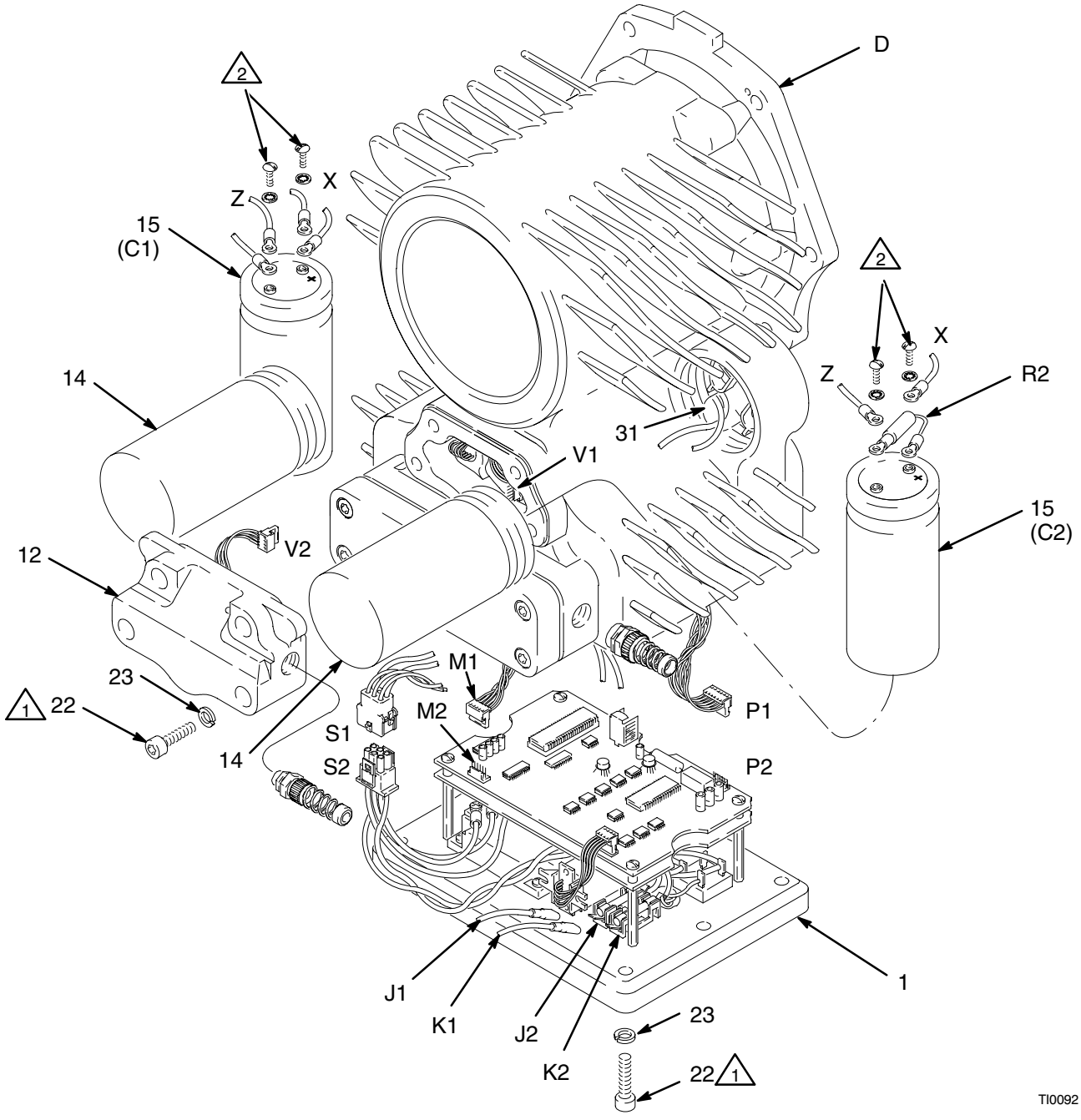


Fig. 5

Service

Replacing the Signal Cover

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire or explosion disconnect electric power and wait 15 minutes, to reduce the risk of electric shock.

1. Before removing any covers or performing any service, disconnect power and wait for the capacitors to discharge. See the **WARNING** at left.
2. Remove the screws (22) and washers (23) holding the signal cover (12) to the motor. Carefully move the cover away from the motor. See Fig. 5.
3. Disconnect the signal cover connector (V2) from its mating connector (V1) in the motor housing (D).
4. Remove the signal cover (12). There are no user-serviceable parts on the signal cover.
5. Install the new signal cover (12) in the reverse order of disassembly. Push all the wires well into the motor housing (D), to avoid pinching them when reattaching the cover. Make sure the capacitor covers (14) do not obstruct the signal cover.

Service

Replacing the Capacitors

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire or explosion disconnect electric power and wait 15 minutes, to reduce the risk of electric shock.

Be sure to reinstall the bleed resistor (R2) when you replace the capacitors. The resistor discharges the capacitors. Failure to reinstall the resistor will cause the capacitors to retain up to 600V.

1. Before removing any covers or performing any service, disconnect power and wait for the capacitors to discharge. See the **WARNING** above.

2. Remove the signal cover (12) as explained under **Replacing the Signal Cover.** Set the cover aside.

3. Unscrew the two capacitor covers (14) from the motor housing (D). See Fig. 5.

4. Carefully pull the capacitors (15; C1 and C2) away from the motor housing, enough to see the wire connections. The capacitors are wired together in parallel. Note that one capacitor (C2) has one + wire (X), one – wire (Z), and a bleed resistor (R2) connected to it; disconnect this capacitor first.

5. The free wires of capacitor C2 will allow you to pull capacitor C1 away from the motor housing far enough to access the wire connections. Be sure not to pull the free wires all the way out of the capacitor C2 cavity.

NOTE: If you pull the free wires out of the capacitor C2 cavity, you may have to remove the electronic control module (1) to retrieve them.

6. Disconnect capacitor C1.

7. Install the capacitors in the reverse order of removal. Be sure the wires feed through the slot in the plastic insulators (31). Be sure to connect the + wires (X) to the + terminals and the – wires (Z) to the – terminals. Be sure to reinstall the bleed resistor (R2) on capacitor C2, as shown in Fig. 5. Torque the terminal screws to 2.7–3.4 N•m (24–30 in-lb). See Fig. 6 for the capacitor wiring diagram.

8. Turn the capacitor covers (14) in completely to ensure that they do not prevent the signal cover (12) and housing flanges from mating.

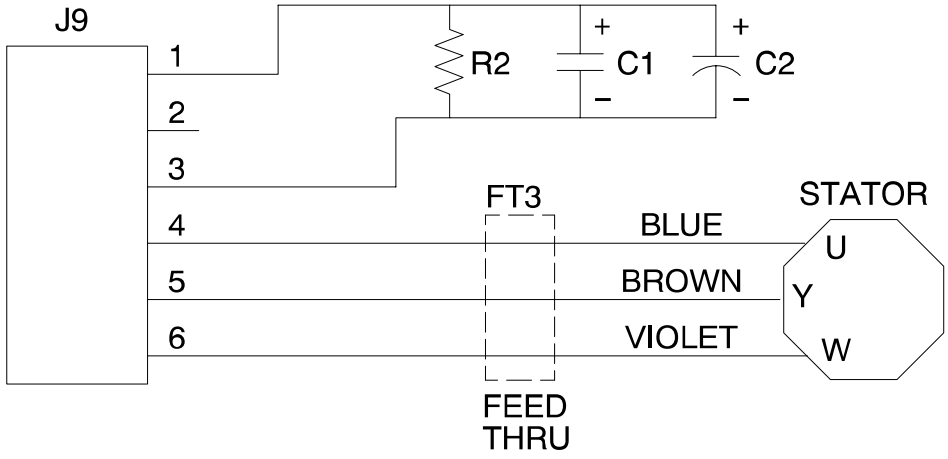


Fig. 6

Notes

Parts

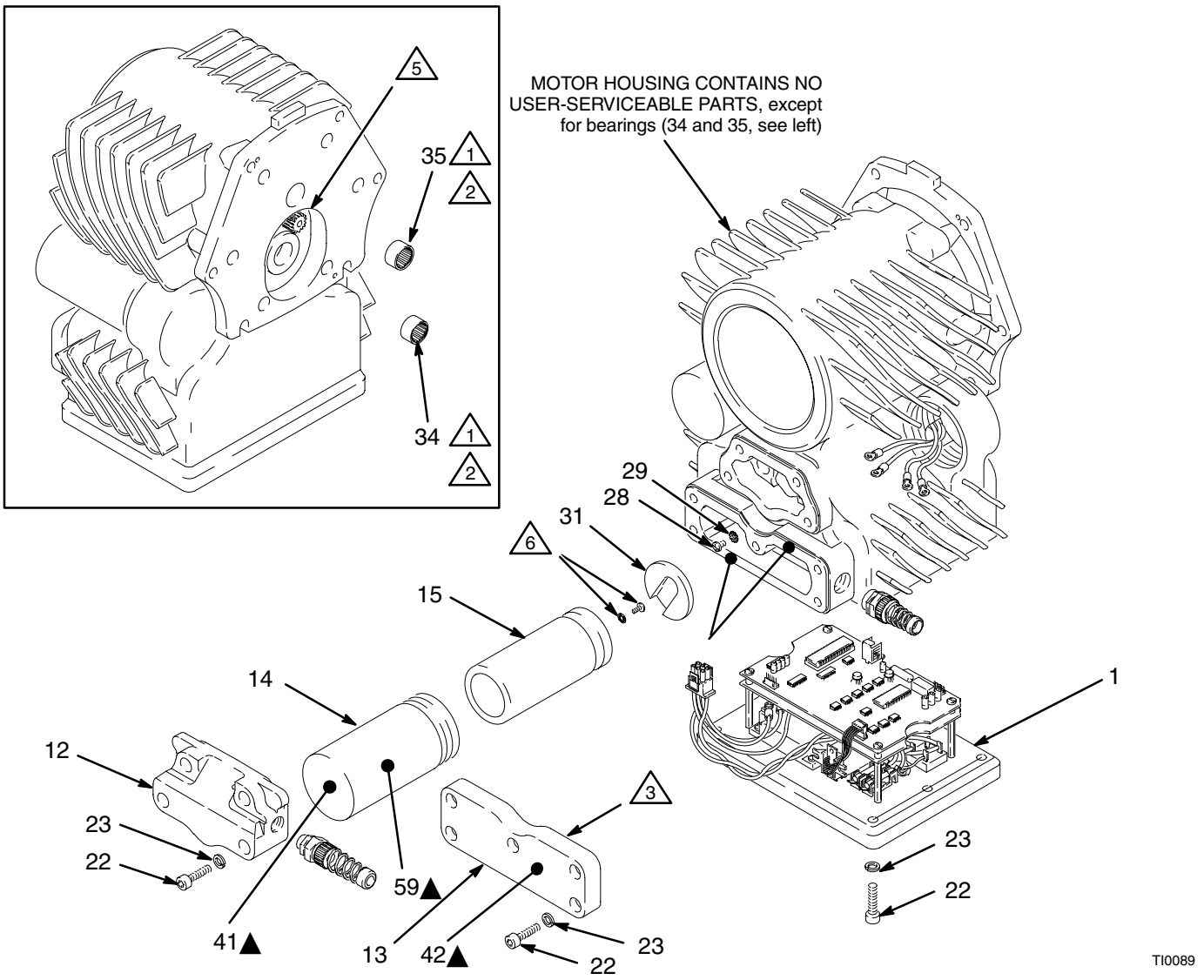
280413 TRIUMPH® Electric Motor, Series A

1 Press fit.

2 Pack with lithium base grease.

5 Lubricate gear teeth.

6 Part of item 15.



Ref No.	Part No.	Description	Qty
1	243681	MODULE, electronic control	1
12	243480	CONTROL, interface assembly	1
13	192251	COVER, power access	1
14	187012	COVER, capacitor	2
15	111398	CAPACITOR, main motor	2
22	109114	SCREW, socket hd; M8 x 1.25; 30 mm long	27
23	104008	WASHER, lock; 8 mm	27
28	112414	SCREW, ground; M5 x 8; 6 mm long	1
29	100718	WASHER, lock; no. 10	1
31	276482	INSULATOR, capacitor	2
34	107088	BEARING, needle	1
35	108692	BEARING, roller	1
41▲	188069	LABEL, caution	2
42▲	187305	LABEL, warning	1
59▲	189285	LABEL, caution	2

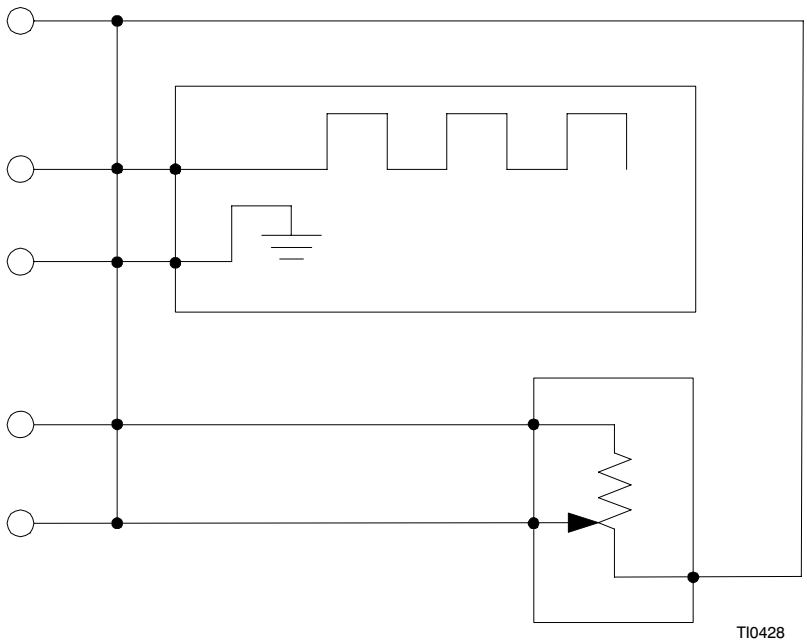
▲ *Replacement Danger and Warning labels, tags and cards are available at no cost.*

Technical Data

Category	Data
Operating Voltage Range	100 to 240 VAC
Cycles	50/60 Hz, single-phase
Maximum Current Draw	15 Amperes rms
Power Output at 2500 rpm, 25°C ambient	2.7 H.P. (2 kW) out
Power Output at 2500 rpm, 40°C ambient	1.7 H.P. (1.3 kW) out
Torque	8.5 N•m (75 in-lb) continuous
Ambient Temperature Range	–40 to 40°C (–40 to 104°F)
Maximum Operating Temperature	85°C (185°F) (motor automatically slows down to cool down, then returns to speed)
Output Shaft	16 tooth gear mates to 239398 Gear Reducer
Control Signal Required	0–5 VDC 10K Ω Potentiometer
Available Rate Pulse Stream	0–5 VDC Square Wave

Remote Signal Control Connections

Wire Color	Signal
Red	5 VDC out
Blue	Control out
Green	Ground
White	0 VDC common
Black	0 – 5 VDC Control Signal



Manual Change Summary

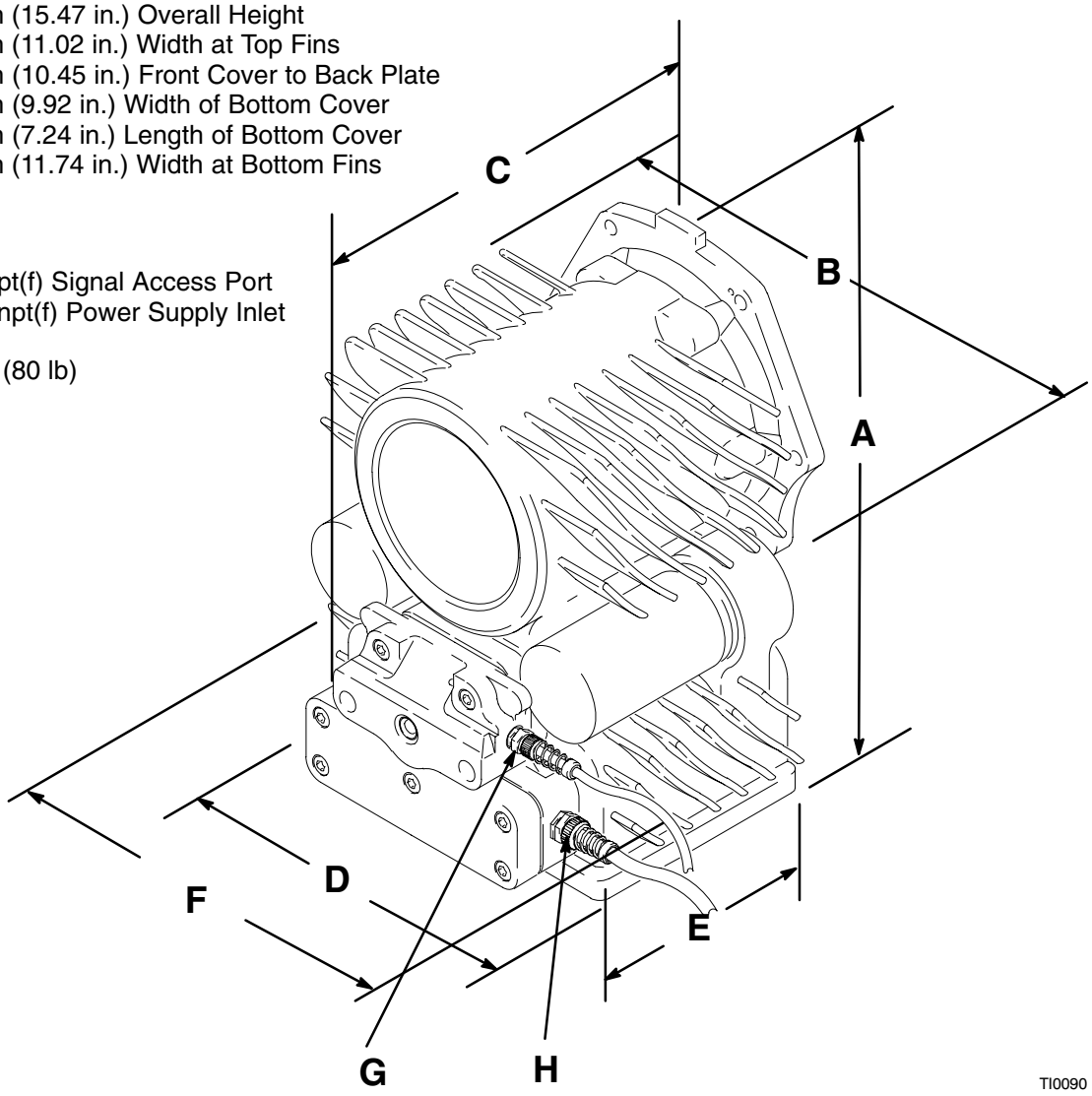
New release.

Dimensions

A 393 mm (15.47 in.) Overall Height
B 280 mm (11.02 in.) Width at Top Fins
C 266 mm (10.45 in.) Front Cover to Back Plate
D 252 mm (9.92 in.) Width of Bottom Cover
E 184 mm (7.24 in.) Length of Bottom Cover
F 298 mm (11.74 in.) Width at Bottom Fins

Port Sizes
G 3/818 npt(f) Signal Access Port
H 1/2–14 npt(f) Power Supply Inlet

Weight 36.3 kg (80 lb)



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Graco Standard Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor 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.

Graco makes no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose in connection with accessories, equipment, materials or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

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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Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you:
1–800–367–4023 Toll Free

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Sales Offices: Minneapolis, Detroit
International Offices: Belgium, Korea, Hong Kong, Japan

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www.graco.com

PRINTED IN U.S.A. 309114 January 2000, Revised June 2000