

Instructions – Parts List



STANDARD

EM5™ Electronic Metered Dispense Valves

308487 rev.P

For dispensing petroleum-based lubricants and antifreeze.

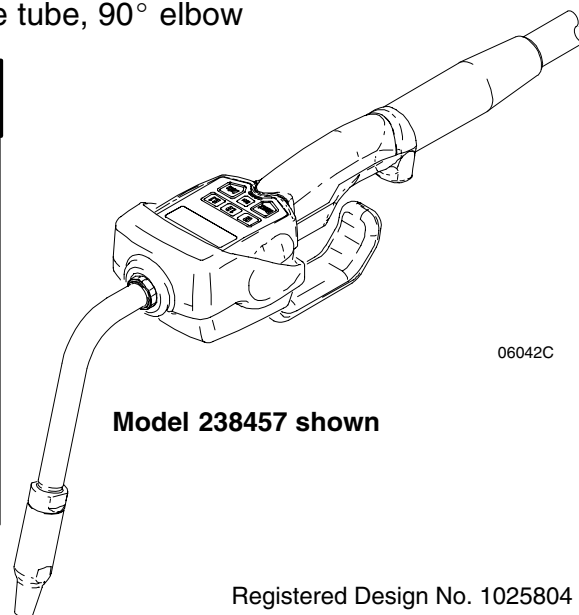
*1000 psi (7 MPa, 69 bar) Maximum Working Pressure
5 gpm (18.9 lpm) Maximum Flow Rate*

**Factory-Set to Measure in Liters
Canadian Weights & Measures approved**

Model 238457 75° bend 3/8-in. rigid tube
Model 238458 3/8-in. coupled flexible hose
Model 238459 15° bend 3/8-in. gear lube tube, 90° elbow

CAUTION

- This dispense valve is designed to dispense petroleum-based lubricants and antifreeze only. **Do not dispense windshield washer solvent with this dispense valve.**
- This dispense valve is designed for indoor use only.
- This dispense valve is not designed for in-line installation. Do not install with a shut-off valve on the outlet side of the meter. Such installation could result in damage to the meter housing cover.



Model 238457 shown

Registered Design No. 1025804



Important Safety Instructions.

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



97D.122550

EExia II A/B T3



**INTRINSICALLY SAFE FOR
HAZARDOUS LOCATIONS
CLASS 1, DIV. 1, GROUP D**



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Symbols

Warning Symbol



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

Caution Symbol



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 you operate this equipment.
- Use the equipment only for its intended purpose. If you are not sure, 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 exceed the maximum working pressure of the lowest rated system component. See the **Technical Data** on page 22 for the maximum working pressure of this component.
- Use fluids and solvents that are compatible with the equipment wetted parts. See the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180° F (82° C) or below -40° F (-40° C).
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.
- Do not point the dispense valve at anyone or at any part of the body.
- Do not put your hand or fingers over the end of the dispense valve.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Use only extensions and nozzles that are designed for use with your dispense valve.
- Follow the **Pressure Relief Procedure** on page 5 before you clean, check, or service this equipment.
- Tighten all fluid connections before you operate this equipment.
- Check the hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.



WARNING



FIRE AND EXPLOSION HAZARD

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

- Be sure the entire fluid system is properly grounded. Refer to your pump instruction manual for complete details. See **Grounding** on page 7.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop dispensing immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being dispensed.
- Keep the dispensing area free of debris, including solvent, rags, and spilled gasoline.
- Do not smoke while flammable fluids or fumes are in the dispensing area.
- You must use one of the battery types as specified in **Replacing the Battery** on page 18. Use of any other batteries than those specified could affect the intrinsic safety of this unit.

Installation

Typical Installations

Fig. 1 shows a typical hose reel installation. Fig. 2 shows how these dispense valves can be installed on a console.

⚠ CAUTION

Do not use this electronic metered dispense valve on non-Graco consoles. Such use could result in the trigger becoming inadvertently pressed while the dispense valve is stowed.

⚠ CAUTION

This dispense valve is not designed for in-line installation. Do not install with a shut-off valve on the outlet side of the meter. Such installation could result in damage to the meter housing cover.

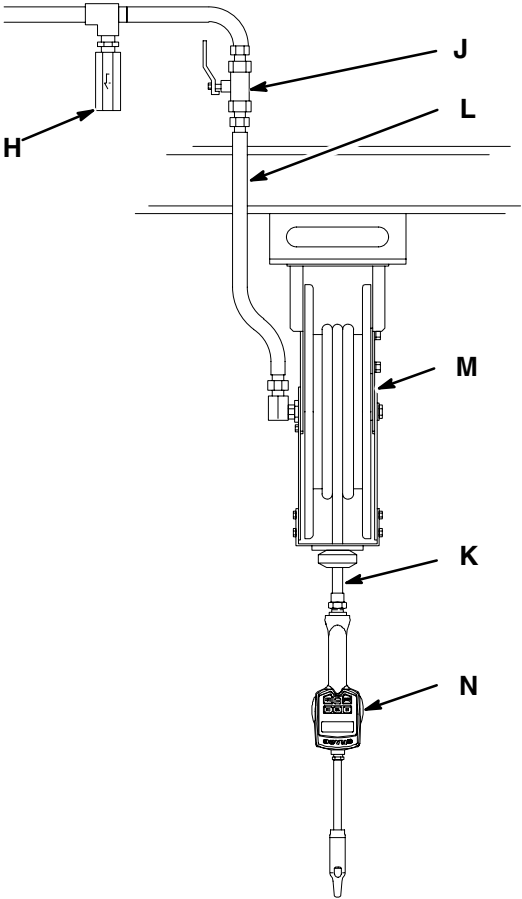


Fig. 1 06174B

| KEY | DESCRIPTION |
|-----|---|
| H | Thermal relief kit (required) Part No. 235998 <i>Install downstream from pump.</i> |
| J | Fluid shut-off valve |
| K | Hose |
| L | Hose reel fluid inlet hose |
| M | Hose reel |
| N | Metered dispense valve |

Mounting Bracket

Mounting bracket 196471 is available for resting an EM5 dispense valve on a console. See Fig. 2.

⚠ CAUTION

Do not obstruct the trigger of this dispense valve, and do not set the unit down resting on its trigger, or it might not stop dispensing.

NOTE: When using the EM5 with the rigid oil extension on a dispense console, the rigid tube (5a) should be oriented with the 75° bend closest to the nozzle, as shown below. This prevents interference when used with a dispense console.

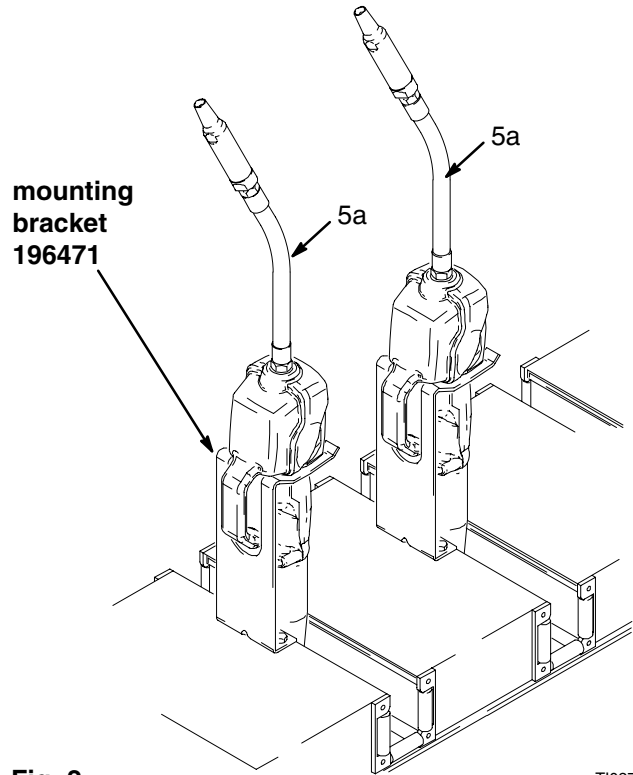


Fig. 2 TI0274

Installation

WARNING

PRESSURIZED EQUIPMENT HAZARD

The equipment stays pressurized until pressure is manually relieved. To reduce the risk of serious injury from pressurized fluid, accidental spray from the dispense valve, or splashing fluid, follow the **Pressure Relief Procedure** when you

- Are instructed to relieve pressure
- Check, clean, or service any system equipment
- Install or clean fluid nozzles or filter

Pressure Relief Procedure

1. Turn off the power supply to the pump.
2. Trigger the dispense valve into a waste container to relieve pressure.
3. Open any bleed-type master air valves and fluid drain valves in the system.
4. Leave the drain valve open until you are ready to pressurize the system.

Pre-Installation Procedure

1. Install the battery. See **Replacing the Battery** on page 18.
2. **Relieve the pressure.**

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** above.

3. Close the shut-off valve (item J in Fig. 1).
4. Ground the hose and reel or console. See **Grounding** on page 7.

NOTE: Do not use PTFE tape on the pipe joints; it may cause a loss of ground across the pipe joint.

Installation Procedure

CAUTION

If this is a new installation, or if the fluid in the lines is contaminated, flush the lines before you install the metered valve. Contaminated lines could cause the valve to leak.

1. If this is an existing installation, go to step 7.

*Steps 3 through 6 are the **Flushing Procedure**.*

2. Make sure the main fluid outlet valve at the pump is closed, the air pressure to the pump motor is adjusted, and the air valve is open. Slowly open main fluid valve.
3. Close the fluid shut-off valve (J) at each dispense position.
4. Place the hose end (with no dispense valve connected) into a container for waste oil. Secure the hose in the container so it will not come out during flushing. If you have multiple dispense positions, first flush the dispense position farthest from the pump, and work your way toward the pump.
5. Slowly open the shut-off valve (J) at the dispense position. Flush out a sufficient amount of oil to ensure that the entire system is clean, and close the valve.
6. Repeat step 5 at all other dispense positions.
7. **Relieve the pressure.**

WARNING

To reduce the risk of serious injury, whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** at left.

8. Slide the swivel cover (4) of the EM5 onto the hose, small end first. See Fig. 3.
9. Apply thread sealant to the the male threads of the hose fitting, thread the hose fitting into the swivel (3) of the EM5, and tighten firmly. See Fig. 3.

NOTE: Make sure you let the sealant cure to the manufacturer's recommendations before you let fluid into the system.

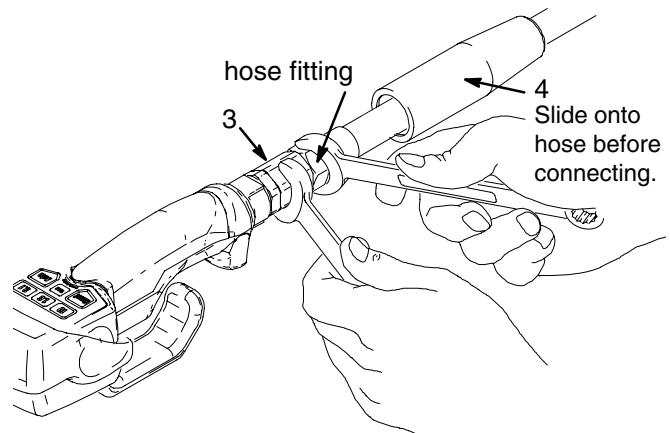


Fig. 3

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Installation

10. Model 238457

See Fig. 4.

- Thread the sealing nut (5c) onto the extension (5a) with the PTFE side facing out.
- Thread the extension (5a) into the meter outlet at least three full turns, position it for proper alignment, and tighten the sealing nut against the meter outlet.

Model 238458

See Fig. 4.

- Thread the sealing nut (6c) onto the elbow (6d) with the PTFE side facing out.
- Thread the elbow (6d) into the meter outlet at least three full turns, position it for proper alignment, and tighten the sealing nut (6c) against the meter outlet.
- Thread the flexible hose (6a) into the elbow, and tighten it.

NOTE: The flexible hose (6a) can also be threaded directly into the meter outlet without the elbow or sealing nut.

Model 238459

This nozzle assembly can be configured two ways.
See Fig. 4.

- Thread a sealing nut (7c) onto the tube (7a) with the PTFE side facing out.
- Thread the tube (7a) into the meter outlet at least three full turns, position it for proper alignment, and tighten the sealing nut (7c) against the meter outlet.
- Thread the other sealing nut (7c) onto the other end of the tube (7a) with the PTFE side facing out.
- Thread the elbow (7d) onto the end of the tube (7a) at least full turns, position it for proper alignment, and tighten the sealing nut (7c) against the elbow.

OR

- Thread a sealing nut (7c) onto the elbow (7d) with the PTFE side facing out.
- Thread the elbow (7d) into the meter outlet at least three full turns, position it for proper alignment, and tighten the sealing nut (7c) against the meter outlet.
- Thread the other sealing nut (7c) onto the tube (7a) with the PTFE side facing out.
- Thread the tube (7a) into the elbow (7d) at least three full turns, position it for proper alignment, and tighten the sealing nut (7c) against the elbow (7d).

Either end of this rigid tube can be threaded into the meter outlet. This is the best orientation for use with a dispense console.

This flexible extension can also be threaded directly into the meter outlet without the street elbow (6d) or sealing nut (6c).

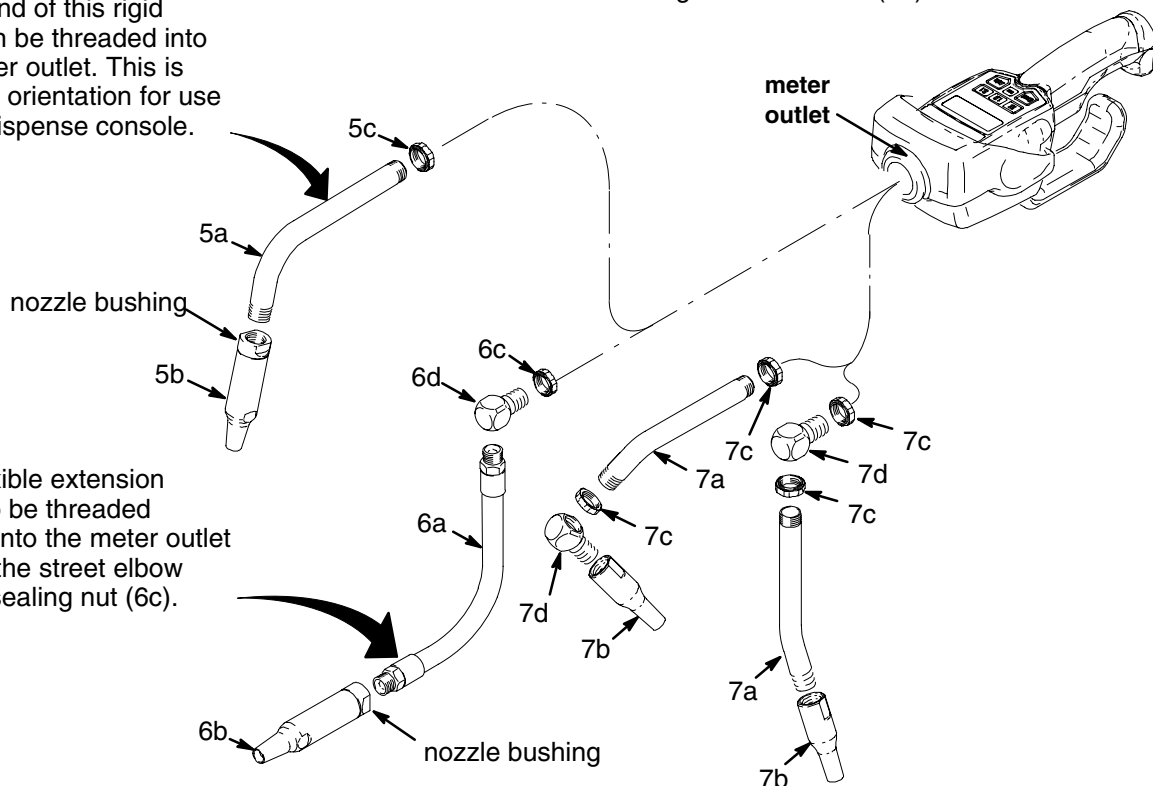


Fig. 4

Installation

11. Thread the new nozzle (5b, 6b, or 7b) onto the extension, and, with an open-end adjustable wrench, tighten it firmly. See Fig. 4.

NOTE: On Models with automatic nozzle 239829 (5b or 6b), tighten the nozzle with the wrench on the flats of the nozzle bushing. **Do not disassemble the nozzle bushing from the nozzle.** Disassembly will affect the performance of the nozzle.

CAUTION

Do not use Graco's old nozzle (Part No. 203655) or any other manual shut-off nozzle on the EM5 extension. You must use the nozzle that is provided with the EM5, or the meter could be damaged. Do not use any sealant material.

12. Open all dispense position shut-off valves, and start the pump to pressurize the system. See the **Operation** section for proper operation of the EM5.
13. To ensure dispensing accuracy, purge all air from the fluid lines and dispense valve before you use it. Set the system flow to the desired flow rate, which is typically 1.5 gpm. Do not exceed a 5-gpm flow rate.

Grounding

WARNING



FIRE AND EXPLOSION HAZARD

The movement of fluids through the dispensing system generates static electricity. The static electricity can cause volatile fumes to ignite, resulting in explosion and fire. The dispensing system must grounded.

Proper grounding is an essential part of maintaining a safe system.

To reduce the risk of static sparking, ground all system components per local and national electrical codes. Refer to the user manuals for the pump and other system components to ground the following:

- *Pump:* Follow manufacturer's recommendations.
- *Air and Fluid hoses:* Use only grounded hoses.
- *Air compressor:* Follow the manufacturer's recommendations.
- *Fluid supply container:* Follow the local code.

To maintain grounding continuity when flushing or relieving pressure, always hold a metal part of the valve firmly to the side of a grounded metal pail, then trigger the valve.

Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Setup

Terms

The following terms are shown on the display and/or used often in this instruction manual.

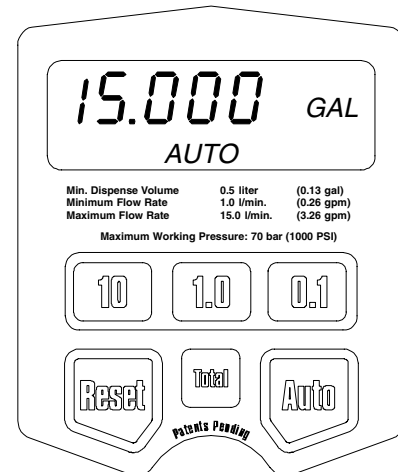
- **R-TOTAL: Resettable Total**
Displayed to show the cumulative amount that the dispense valve has dispensed. It can be reset to zero.
- **TOTAL: Non-Resettable Total**
Displayed to show the cumulative amount that the dispense valve has dispensed for the history of the unit. It cannot be reset.
- **Standard Dispense Mode**
The dispense mode in which the display always counts up from zero or from where it recently stopped in Standard dispense mode. There are no warning beeps for predetermined dispense amounts.
- **Auto Alarm Dispense Mode**
The dispense mode in which the unit beeps to indicate that the predetermined amount has been dispensed. **It does not automatically stop dispensing.**
- **Predetermined Dispense Amount**
A user-entered amount to be dispensed, in which the display can be set to count up from zero or down from the entered amount in Auto Alarm mode. The unit beeps to indicate that the predetermined amount has been dispensed. **It does not automatically stop dispensing.**
- **Asleep / Awake**
Asleep is a battery-saving mode in which the display goes blank after two minutes of inactivity. The display comes *awake* from sleep mode when you press any button on the keypad or when you squeeze the trigger to dispense fluid.

Keypad Buttons

The buttons on the keypad and their functions are as follows (see the figure below):

- **10, 1.0, and 0.1**
Used to enter dispense amounts.
- **TOTAL**
Used to see the resettable total, non-resettable total, and calibration factor.
- **RESET ***
Used to reset the displayed amount to zero and to enter the Standard dispense mode.
- **AUTO ***
Used to enter the Auto Alarm dispense mode, in which you enter an amount, and the unit beeps to indicate when that amount is dispensed. **It does not automatically stop dispensing.**
- * The Auto and Reset buttons are used together (pressed simultaneously) to access the setup menus, in which you select dispensing options.

NOTE: All buttons are disabled while fluid is being dispensed.



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Setup

Selecting Dispensing Options

This is the procedure for setting or changing the resettable total, units of measurement, predetermined dispense amount, and the reset-to-zero option:

1. If the display is asleep, wake it up by pressing any button on the keypad.
2. To enter the dispensing options menus, **press and hold the Reset and Auto buttons simultaneously** for two seconds.

The first menu is the Resettable Total menu, which is described in the first subsection below. You can advance through the menus by pressing the Auto button repeatedly. You will know which menu you are in, because a menu indicator will be blinking in the display. The value that is displayed when you leave each menu and advance to the next is the value that gets stored.

Resettable Total

In this menu, you can reset the resettable total to zero or leave it unchanged. The resettable total accumulates until the next time it is manually reset.

1. If you have not already entered the dispensing options menus, do steps 1 and 2 in **Selecting Dispensing Options** above.
2. With **R-TOTAL** blinking and the current resettable total displayed, as shown below, do **ONE** of the following two options:

- Press the Reset button.

*The resettable total is set to zero, and **00000 GAL** or **00000 LITERS** is displayed.*

You can press the Reset button again to toggle between zero and the previously displayed resettable total. To lock in the displayed value and advance to the Units of Measurement menu, press the Auto button.

OR

- Press the Auto button.

The currently displayed value is stored, and the display advances to the Units of Measurement menu.

Units of Measurement

In this menu, you can set the units of measurement to quarts, gallons, pints, or liters.

1. If you have not already entered the dispensing options menus, do steps 1 and 2 in **Selecting Dispensing Options** above.
2. Press the Auto button repeatedly until **QTS**, **GAL**, **LITERS**, or **PTS** blinks to indicate that you are in the Units-of Measurement menu.
3. With **QTS**, **GAL**, **LITERS**, or **PTS** blinking, as shown below, do **ONE** of the following two options:

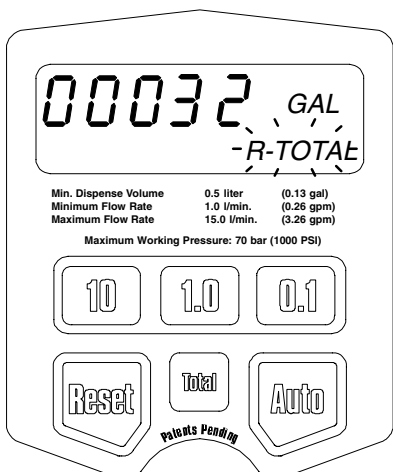
- Press the Reset button.

Each time you press the Reset button, the display scrolls to the next unit of measurement. To lock in the new unit of measurement and advance to the Calibration Factor menu, press the Auto button.

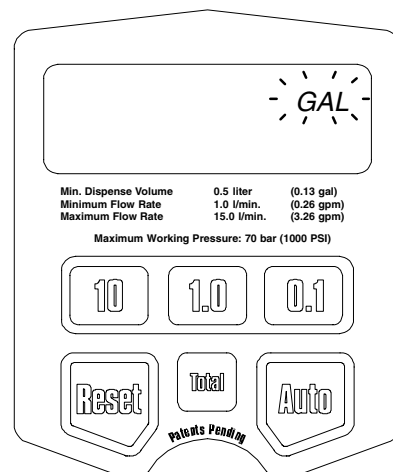
OR

- Press the Auto button.

The displayed unit of measurement is retained, and the display advances to the Predetermined Dispense Amount menu.



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Setup

Predetermined Dispense Amount

In this menu, you can specify an amount to be displayed when you enter the Auto Alarm dispense mode. Typically, you would enter the amount you most frequently dispense.

1. If you have not already entered the dispensing options menus, do steps 1 and 2 in **Selecting Dispensing Options** on page 10.
2. Press the Auto button repeatedly until **AUTO** and a dispense amount blink to indicate that you are in the Predetermined Dispense Amount menu. This is the amount that is displayed when the Auto button is pressed during normal operation.
3. With **AUTO** blinking and the stored auto preset amount displayed, as shown below, do **ONE** of the following two options:
 - Press the 10 button to change the 10s digit, the 1.0 button to change the 1s digit, and the 0.1 button the change the first decimal digit. What you enter is the new predetermined dispense amount.

In the figure below, the arrows point from the numbered buttons on the keypad to the corresponding digits in the display.

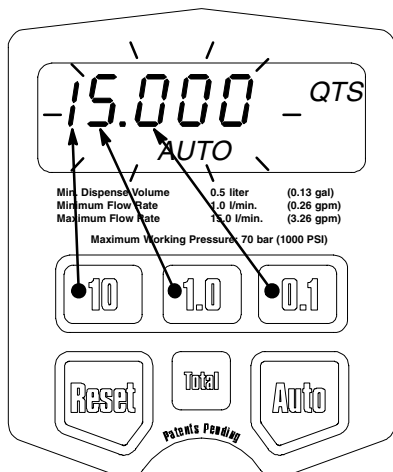
NOTE: If you press and hold the 10, 1.0, or 0.1 buttons, the digits advance rapidly.

To store the displayed predetermined dispense amount in memory and advance to the Reset-to-Zero Option menu, press the Auto button.

OR

- Press the Auto button.

The displayed predetermined dispense amount is retained, and the display advances to the Reset-to-Zero Option menu.



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Reset-to-Zero Option

In this menu, you can set whether or not the unit will automatically reset to zero after two minutes of inactivity. **On** means that the unit will automatically reset to zero after two minutes of inactivity. **OFF** means that the unit will remain at the current total indefinitely, or until the Reset button is pushed.

1. If you have not already entered the dispensing options menus, do steps 1 and 2 in **Selecting Dispensing Options** on page 10.
2. Press the Reset button repeatedly until the clock icon and either **On** or **OFF** is displayed to indicate that you are in the Reset-to-Zero Option menu.
3. With the clock icon and either **On** or **OFF** displayed, as shown below, do **ONE** of the following two options:

- Press the Reset button.

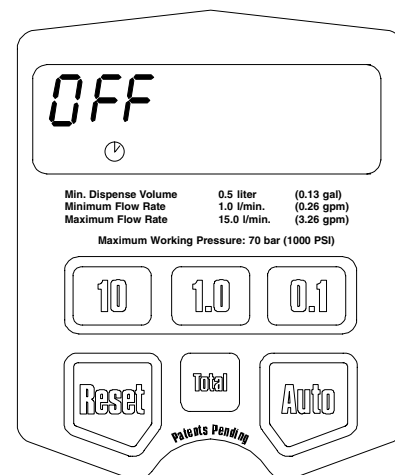
You can press the Reset button again to toggle between **On** and **OFF**. To lock in the displayed value, press the Auto button.

The EM5 beeps and returns to the Standard dispense mode to indicate that you have exited the dispensing options menus.

OR

- Press the Auto button.

The EM5 beeps and returns to the Standard dispense mode to indicate that you have exited the dispensing options menus.



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Setup

Calculating the Calibration Factor

Use the following tables and formulas to calculate the change to make to the calibration factor.

Example of Calibration Factor Change

Dispense until the display reads 1 liter (1000 ml) into a clean, calibrated, volumetric measuring flask. For increased accuracy, submerge the nozzle, and let the air settle out of the fluid for ten minutes before you note the volume. In this example, reading the flask shows the volume to be 11 ml less than 1000 ml. See the left column of the **Metric Measurement** table below, and find the number closest to –11, which is –9,34. Look for the corresponding number in the right column, which is –17. Thus, the calibration factor should change by –17. If the current calibration factor is 6815, subtract 17 to get the new calibration factor of 6798, and change 6815 to 6798. See **Calibrating the Meter** on page 13 for instructions on changing the calibration factor.

| Metric Measurement Measuring in liters, and 1 liter is dispensed | |
|---|-------------------------------|
| Error in Cubic Centimeters (cm ³) | Change Calibration Factor by: |
| +56,69 | +102 |
| +47,19 | +85 |
| +37,69 | +68 |
| +28,35 | +51 |
| +18,84 | +34 |
| +9,34 | +17 |
| 0,000 | no change |
| –9,34 | –17 |
| –18,84 | –34 |
| –28,35 | –51 |
| –37,69 | –68 |
| –47,19 | –85 |
| –56,69 | –102 |

Formulas:

If the dispensed amount according to the markings on the flask is greater than the displayed amount:

$$\text{New CF} = \text{Old CF} + (\text{Error in cm}^3 / 0,555)$$

If the dispensed amount according to the markings on the flask is less than the displayed amount:

$$\text{New CF} = \text{Old CF} - (\text{Error in cm}^3 / 0,555)$$

where:

CF = calibration factor

0,555 = constant

| US Measurement Measuring in quarts, and 1 quart is dispensed | |
|---|-------------------------------|
| Error in Cubic Inches (in. ³) | Change Calibration Factor by: |
| +3.46 | +102 |
| +2.88 | +85 |
| +2.30 | +68 |
| +1.73 | +51 |
| +1.15 | +34 |
| +0.57 | +17 |
| 0.000 | no change |
| –0.57 | –17 |
| –1.15 | –34 |
| –1.73 | –51 |
| –2.30 | –68 |
| –2.88 | –85 |
| –3.46 | –102 |

Formulas:

If the dispensed amount according to the markings on the flask is greater than the displayed amount:

$$\text{New CF} = \text{Old CF} + (\text{Error in in.}^3 / 0.0339)$$

If the dispensed amount according to the markings on the flask is less than the displayed amount:

$$\text{New CF} = \text{Old CF} - (\text{Error in in.}^3 / 0.0339)$$

where:

CF = calibration factor

0.0339 = constant

Setup

Calibrating the Meter

NOTE: This unit has been calibrated at the factory to dispense lubricating oils; it should not require additional calibration during installation. If this unit will be used to dispense antifreeze, and accuracy must be greater than plus or minus 2 percent, it is recommended that you use a calibration factor of 7230.

CAUTION

You must ground yourself to a true earth ground while calibrating the meter. You must keep yourself constantly grounded when you touch any electronic components inside the cover of the dispense valve. To order a grounding wrist strap, order Part No. 112190.

This is the procedure for calibrating the meter and setting whether the display counts up from zero or down from the predetermined amount in Auto Alarm mode.

NOTE: All units count up from zero in Standard mode.

See **Calculating the Calibration Factor** on page 12 for instructions on assessing the accuracy of the meter and calculating the proper calibration factor.

1. Remove the six screws (21) (see the **Parts Drawing** on page 21) that hold the two halves of the cover together, and open the unit to gain access to the Calibration button.
2. Locate the calibration button inside the unit, as shown in Fig. 5.

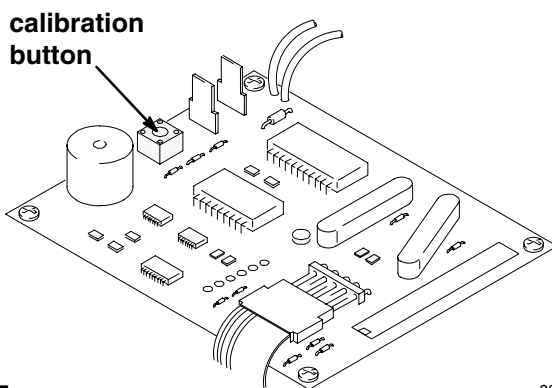


Fig. 5

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3. Press the Calibration button.

The calibration factor is shown on the display, as shown below.



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4. Press the Calibration button again.

The first digit blinks, which indicates that you can change it.

5. Press the 10, 1.0, and 0.1 buttons to advance the blinking digits until the calibration factor is set to the desired amount. Pressing any other button will clear the calibration display without saving.

6. Press the Calibration button again.

The next digit blinks, which indicates that you can change it.

7. Repeat steps 5 and 6 until all the digits are set.

Steps 8 through 10 are the the UP On / UPOFF Selection Procedure.

When all the digits are set in step 7, above, either UP On or UPOFF is shown on the display. In UP On mode, the unit counts up from zero during an Auto Alarm dispense cycle. In UPOFF mode, the unit counts down from the predetermined amount during an Auto Alarm mode dispense cycle.

8. Press the 10, 1.0, or 0.1 button to toggle between UP On mode and UPOFF mode.

9. Press the Calibration button again.

The unit returns to Standard mode.

10. Press the Calibration button again.

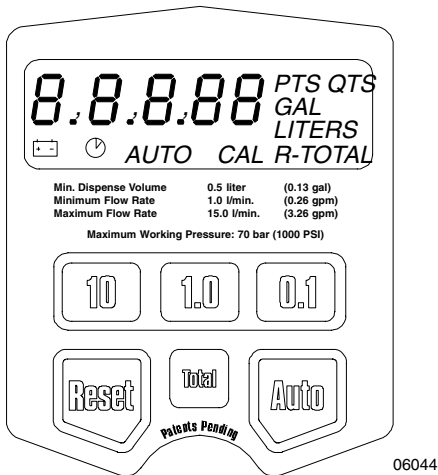
After about 15 seconds, the unit makes an audible beep to indicate that the changes have been saved.

NOTE: You can view the calibration factor at any time: Press the Total button repeatedly to see the Total, the R-Total, and the calibration factor.

Operation

Checking Segments in the Display

When you press the Reset button when the display is awake, the Segment Check is displayed briefly. This display allows you to check for burned out segments in the display. Press the Reset button repeatedly to get a good look at each segment in the display. The Segment Check should show all of the segments shown below.



Dispensing Fluid in Standard Mode

NOTE: All buttons are disabled while fluid is being dispensed.

1. Press the Reset button.

0.000 is shown on the display.

2. Squeeze the trigger.

Fluid begins to flow, and the amount shown on the display counts up from zero.

3. Release the trigger when you have dispensed the desired amount of fluid.

Fluid flow stops, and the amount you have dispensed is shown on the display.

NOTE: When you release the trigger, the nozzle should prevent fluid from running out of the extension. If fluid does run out, see **Replacing the Nozzle** on page 19.

Dispensing Fluid in Auto Alarm Mode

NOTE: All buttons are disabled while fluid is being dispensed.

1. Press the Auto button.

The stored predetermined dispense amount is shown on the display if an amount is stored.

2. If you do not want to change the predetermined dispense amount shown on the display, skip this step. If you want to change the amount, do the following:

Press the 10 button to change the 10s digit, press the 1.0 button to change the 1s digit, and press the 0.1 button the change the first decimal digit.

3. Squeeze the trigger.

*Fluid begins to flow, and the amount shown on the display counts down from the predetermined amount if the unit is in UPOFF mode. The amount counts up from zero if the unit is in UP ON mode. See **UP On / UPOFF Selection Procedure** on page 13.*

The unit makes three short audible beeps shortly before it dispenses the predetermined amount. Then it makes one long audible beep when the predetermined amount of fluid is dispensed.

NOTE: The three short beeps occur within a certain volume of the predetermined amount, as follows:

QTS or LITERS: Unit beeps within 0.4 quarts or liters of predetermined amount.

PTS: Unit beeps within 0.5 pints of predetermined amount.

GAL: Unit beeps within 0.1 gallons of predetermined amount.

To stop dispensing, you must release the trigger. Fluid flow does not stop automatically.

4. Release the trigger.

The amount dispensed is shown on the display.

5. If you want to resume dispensing **toward** the predetermined dispense amount, squeeze the trigger again. If you want to dispense **from zero**, press the Reset button.

Operation

Viewing Totals and the Calibration Factor

This is the procedure for viewing the non-resettable and resettable totals in the current units and for viewing the calibration factor.

1. If the display is blank, press the Total button to wake it up. If the display is already awake, go to step 2.

The Standard mode display is shown.

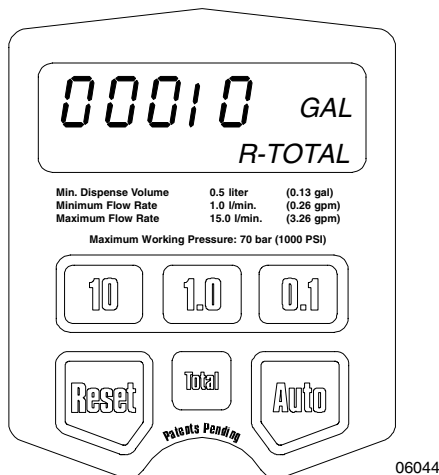
2. Press the Total button.

The non-resettable total amount is shown on the display in the current units, as shown below.



3. Press the Total button again.

The resettable total amount is shown on the display in the current units, as shown below.



4. Press the Total button again.

The calibration factor is shown on the display, as shown below.



5. Press the Reset button.

The unit returns to Standard dispense mode, and the Standard mode display is shown.

Troubleshooting

Relieve the pressure before you check or repair the meter. Be sure all other valves and controls and the pump are operating properly.



WARNING

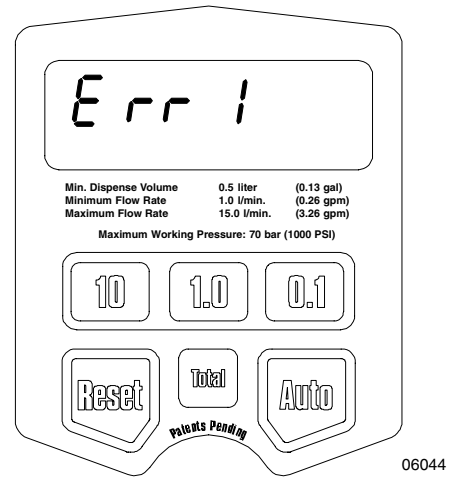
To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 5.

| Problem | Cause | Solution |
|---|--|---|
| Display does not activate or is showing unintelligent characters. | Battery is defective or dead. Electronic control is malfunctioning. | Replace the battery. See Replacing the Battery on page 18. Replace the entire unit. |
| Battery icon continually blinks. | Battery is low. | Replace the battery. See Replacing the Battery on page 18. If the problem remains, contact your Graco distributor for repair or replacement. |
| Slow or no fluid flow | Filter is clogged. Pump pressure is low. Shut-off valve is not fully open. Foreign material is jammed in the metering element. | Clean or replace the filter. See Replacing the Filter on page 18. Turn up the pump pressure. Open the shut-off valve. If the problem remains, contact your Graco distributor for repair or replacement. |
| Displayed dispensed amount is not accurate. | Unit needs to be calibrated for the fluid that is being dispensed. | Calibrate the meter for the fluid that is being dispensed. See Calibrating the Meter on page 13. |
| Oil leaks from swivel, swivel boot, or plastic housing. | Swivel (3) connection to meter is loose. Hose connection to swivel (3) is loose. | Torque the fitting to 20 to 25 ft-lb (27 to 34 N.m). Apply sealant to threads of hose, and tighten the connection. See step 9 in Installation Procedure on page 5. |
| Oil leaks from where fluid outlet tube connects to housing. | Outlet tube or sealing nut or street elbow is loose. See Parts Drawing on page 21. | Check outlet tube and/or sealing nut for tightness and proper assembly. Also, make sure the PTFE seal on the sealing nut is facing the valve housing. |
| Automatic nozzle leaks. NOTE: It is important to distinguish between the two causes of this problem. A new nozzle will not correct a fluid leak caused by a faulty valve. | Automatic nozzle (5b, 6b, or 7b) has a damaged seal*. Valve (16) has damaged or obstructed seals. * Some fluid weepage is possible in applications where thermal expansion of fluid is possible. | Replace the nozzle. See Replacing the Automatic Nozzle on page 19. Replace or clean valve stem and o-rings. See Servicing the Valve on page 19. |
| Oil leaks from where fluid outlet tube connects to housing. | Outlet tube (5a, 6a, or 7a) or sealing nut (5c, 6c, or 7c) or street elbow (6d or 7d) is loose or damaged. Sealing nut (5c, 6c, or 7c) is oriented the wrong way. | Check outlet tube, sealing nut, and street elbow for looseness or damage, and tighten or replace. Make sure the PTFE seal on the sealing nut is facing the surface against which it is tightened. |

Troubleshooting

Error Codes

If an error code is shown on the display, as shown at right, you can press the Reset button to clear the error code and see the dispensed amount. Even in an error condition, the unit keeps track of the amount dispensed.



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| | | |
|--------------|---|--|
| Err 1 | <p>Flow rate is higher than 5 gpm.</p> <p>OR</p> <p>Air was pumped through the line.</p> | <p>Adjust the flow rate so it is not higher than 5 gpm.</p> <p>Purge air from the line.</p> |
| Err 2 | <p>Switch Error: Error occurred with pick-up in internal gear, or flow range is too high.</p> <p>OR</p> <p>Air was pumped through the line.</p> <p>OR</p> <p>Unit was dropped, or unit encountered excessive vibration during shipping.</p> | <p>Ensure that your flow rate is not higher than 5 gpm. For further assistance, contact your Graco distributor.</p> <p>Purge air from the line.</p> <p>Press the Reset button at start-up.</p> |
| Err 3 | <p>Unit had to default to factory-set values for calibration factors. <i>This error can occur only after you replace the battery, and only if the unit detects an input calibration factor that is out of the acceptable range.</i></p> | <p>If you changed the calibration factor from the factory-set value, ensure that it is correct according to the tables in Calculating the Calibration Factor on page 12.</p> |

Service

Replacing the Battery

CAUTION

Do not change the battery while anything is shown on the display. You must wait until the unit falls asleep and the display is blank before you remove the battery. If you remove the battery while something is shown on the display, the unit will lose that information from memory.

WARNING



FIRE AND EXPLOSION HAZARD

Only replace the battery in a non-hazardous location, away from flammable fluids or fumes.

Battery required to meet safety approvals:

Duracell® MN1604, PC1604

or

Eveready® EN22, 522

To change the battery (8), remove the battery cover (2), and put a new battery in place of the old one.

Security Seal Option

The security seal is used to prevent access to the inside of the meter and tampering with the meter settings. Sealing provisions accommodate typical Weights and Measures official seal wires and security requirements. See Fig. 6.

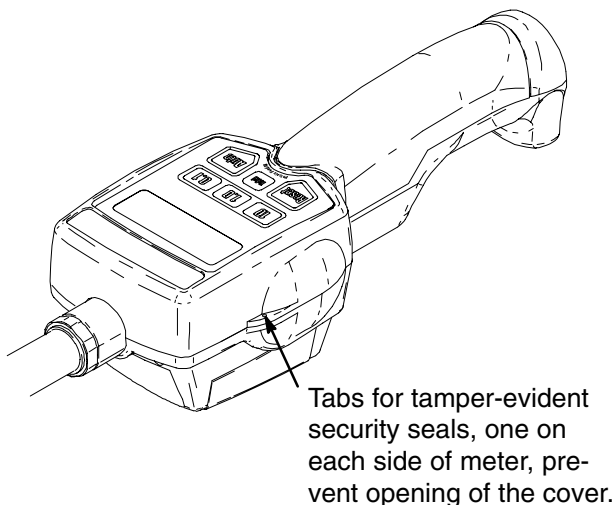


Fig. 6

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Replacing the Filter

The filter (25) is replaceable. To replace the filter, do the following:

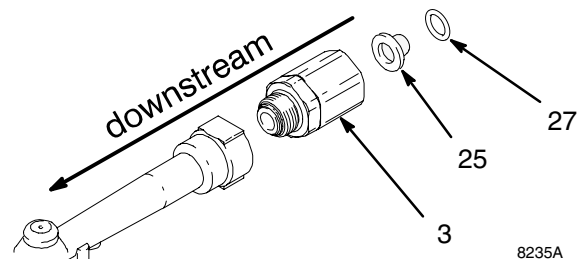
1. **Relieve the pressure.**

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 5.

2. Unscrew the hose from the swivel (3).
3. Remove the o-ring (27) and the filter (25) from inside of the swivel (3) with an o-ring pick.
4. Push the new filter (25) into the swivel (3), and make sure it is properly seated.

NOTE: Orient the new filter (25) so the concave side of the screen points downstream, as shown below.



5. Replace the o-ring (26).
6. Thread the hose back into the swivel (3).

Service

Servicing the Valve

Valve Repair Kit 240453 is available and can be ordered separately. See the **Parts Drawing** on page 21. The parts with asterisks next to their reference numbers are available in the Valve Repair Kit.

When repairing the valve with new parts from the Valve Repair Kit, use **all** of the new parts. To replace the parts, do the following:

1. **Relieve the pressure.**

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 5.

2. Remove the six screws (21) that hold the cover (1) together, and open the cover.
3. Remove the trigger (15) from the valve stem assembly (16b*).
4. Unscrew the valve seat (16e*), remove the valve seat and valve stem assembly (16b*) from the meter housing, and pull the valve stem assembly out of the valve seat.
5. Discard the old valve stem assembly (16b) and the spring (16a).
6. Apply lubricant to all new parts. Place the new spring (16a*) in the new valve stem assembly (16b*), push the new valve stem assembly back into the valve seat (16e*), place the valve stem assembly, seat, and spring into the meter housing, thread the valve seat into the meter housing, and torque to 140 to 150 in-lb (16 to 17 N.m).

NOTE: Take care that the spring (16a*) does not get pinched when you install the valve stem assembly (16) into the meter housing.

7. Place the trigger (15) on the valve stem assembly (16b*), put the cover (1) together, thread in the six screws that hold the cover together, and torque to 7 to 10 in-lb (0.8 to 1.1 N.m).

Replacing the Nozzle

If the nozzle (5b, 6b, or 7b) begins to leak, replace it as follows:

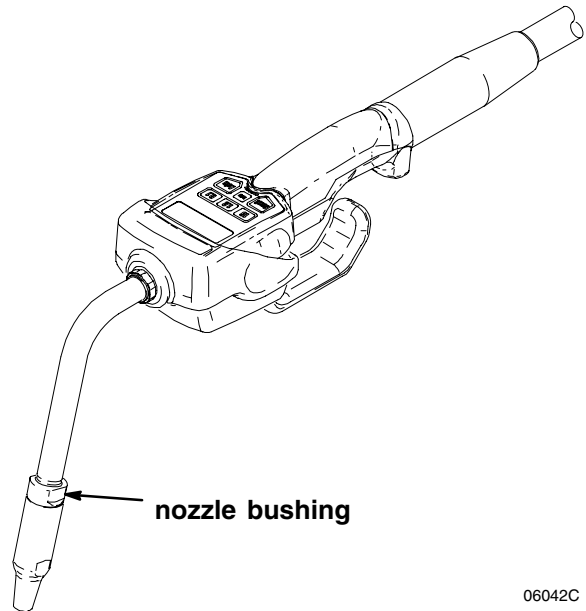
1. **Relieve the pressure.**

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 5.

2. Remove the old nozzle from the extension with an open-end adjustable wrench on the flats of the nozzle or nozzle bushing.

NOTE: On Models with automatic nozzle 239829 (5b or 6b), remove and tighten the nozzle with the wrench on the flats of the nozzle bushing. **Do not disassemble the nozzle bushing from the nozzle.** Disassembly will affect the performance of the nozzle. See below.



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3. Thread the new nozzle (5b, 6b, or 7b) onto the extension, and, with an open-end adjustable wrench on the flats of the nozzle or nozzle bushing, tighten it firmly.

CAUTION

Do not use Graco's old nozzle (Part No. 203655) or any other manual shut-off nozzle on the EM5 extension. You must use the nozzle that is provided with the EM5, or the meter could be damaged. Do not use any sealant material.

Parts List

| Ref. No. | Part No. | Description | Qty. | Ref. No. | Part No. | Description | Qty. |
|----------|----------|---|------|----------|----------|--|------|
| 1 | 238553 | COVER, electronics (does not include 6 screws (item 21/PN 113412) which may be ordered separately) | 1 | 7 | 238887 | NOZZLE ASSEMBLY <i>For Model 238459</i> <i>(includes 7a to 7d)</i> | |
| 2 | 191350 | COVER, battery (included with 238553) | 1 | 7a | 191038 | .TUBE, rigid, 15° bend; 3/8 in. | 1 |
| 3 | 240416 | SWIVEL, straight | 1 | 7b | 238371 | .NOZZLE, gear lube | 1 |
| 4 | 191286 | SWIVEL COVER, black | | 7c | 113419 | .NUT, seal; 3/8 in.—18 NPT | 2 |
| | 191287 | SWIVEL COVER, red | | 7d | 155699 | .ELBOW, street | 1 |
| | 191288 | SWIVEL COVER, blue | | 8 | 113716 | BATTERY; standard 9V, alkaline | 1 |
| | 191289 | SWIVEL COVER, green | | 15 | 191046 | TRIGGER | 1 |
| | 191290 | SWIVEL COVER, yellow | 1 | 16 | 240453 | KIT, valve repair <i>(includes 16a to 16e, 25, and 26)</i> | |
| 5 | 239949 | NOZZLE ASSEMBLY <i>For Model 38457 (includes 5a to 5c)</i> | | 16a* | | SPRING, compression | 1 |
| 5a | 191036 | .TUBE, rigid; 75° bend | 1 | 16b* | | VALVE STEM ASSEMBLY | 1 |
| 5b | 239829 | .NOZZLE, automatic | 1 | 16c* | | O-RING, packing | 1 |
| 5c | 113419 | .NUT, seal; 3/8 in.—18 NPT | 1 | 16d* | | O-RING, packing | 1 |
| 6 | 239951 | NOZZLE ASSEMBLY <i>For Model 238458</i> <i>(includes 6a to 6c)</i> | | 16e* | | SEAT, valve | 1 |
| 6a | 238370 | .HOSE, flexible; 3/8 in. coupled | 1 | 21 | 113412 | SCREW, pan-head; 6—19x3/4 | 6 |
| 6b | 239829 | .NOZZLE, automatic | 1 | 24▲ | 290205 | LABEL, warning | 1 |
| 6c | 113419 | .NUT, seal; 3/8 in.—18 NPT | 1 | 25* | 114017 | FILTER | 1 |
| 6d | 155699 | .ELBOW, street | 1 | 27* | 109018 | O-RING | 1 |
| | | | | 28 | 243758 | GUARD, impact | 1 |

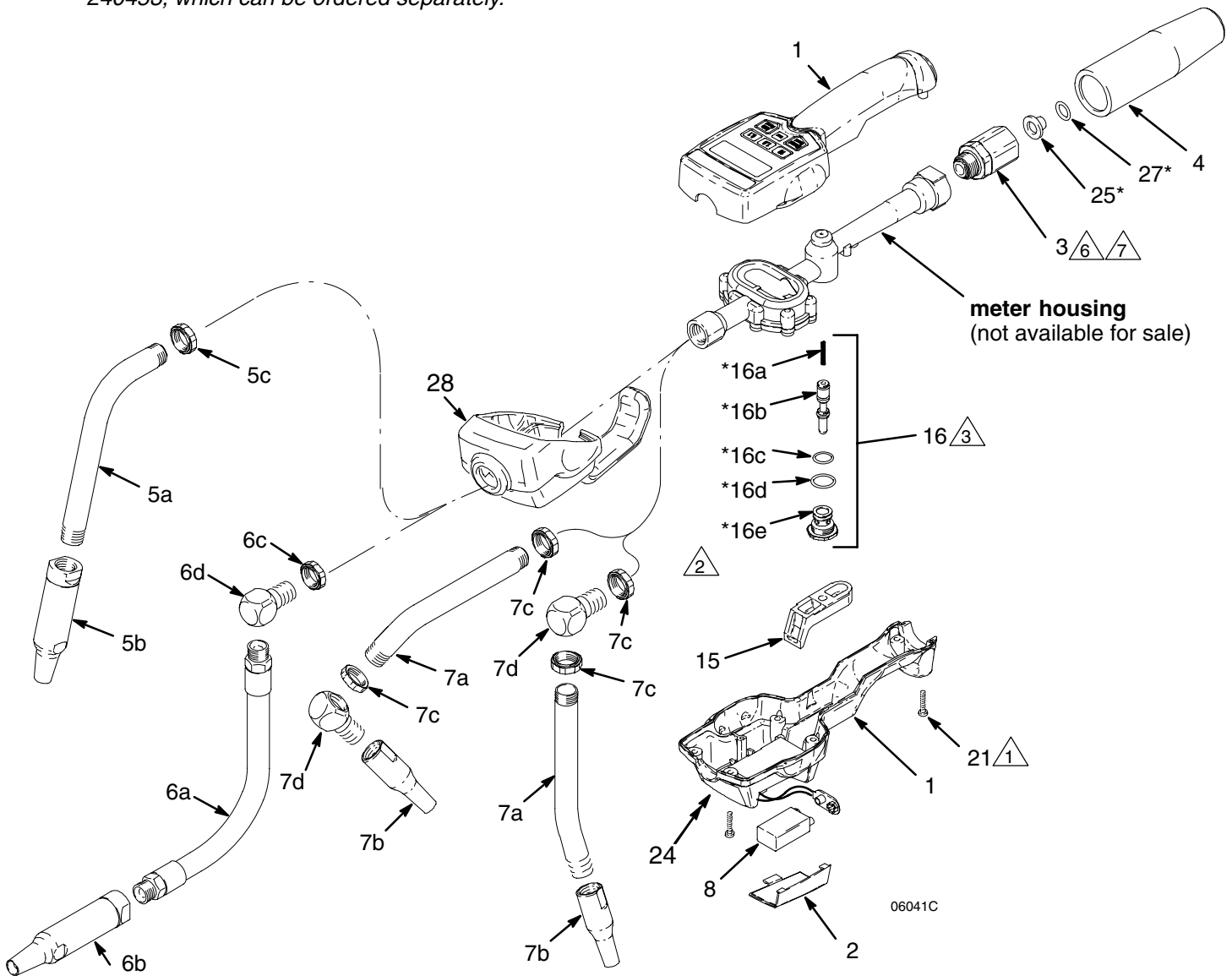
▲ *Extra Warning labels are available for free.*

* *These parts are included in Valve Repair Kit 240453, which can be ordered separately.*

Parts Drawing

- △1 Torque to 7 to 10 in-lb (0.79 to 1.13 N.m).
- △2 Torque to 140 to 150 in-lb (15.8 to 16.9 N.m).
- △3 Apply lubricant when reassembling.
- △6 Apply thread sealant when reassembling.
- △7 Torque to 20 to 25 ft-lb (27 to 34 N.m).

* These parts are included in Valve Repair Kit 240453, which can be ordered separately.



Technical Data

Flow range* 0.26 to 5 gpm
(1 to 18.9 lpm)

Operating pressure range
Gear lube units 32 to 1000 psi
(0.2 to 7 MPa, 2.2 to 69 bar)
Motor Oil units 45 to 1000 psi
(0.29 to 7 MPa, 2.9 to 69 bar)

Weight 2.5 lb (1.14 kg)

Units of measurement . . . factory-set in quarts or liters
Maximum totalizer amount=99,999 units
Maximum recorded dispensed volume=999.99 units
Maximum predetermined volume=99.999 units

Inlet 1/2 npt
Outlet 3/8 npt

Operating temperature range 32° F to 120° F
(0° C to 49° C)

Storage temperature range -30° F to 120° F
(-34° C to 49° C)

Battery** standard 9 volt alkaline

Expected battery life in
typical shop environment 1 year

Wetted parts zinc, stainless steel #304, LCP,
carbon steel, polyurethane, nitrile rubber

Fluid compatibility lubricating oils,
antifreeze mixtures

Meter valve assembly pressure loss
*At 1.5 gpm (5.7 lpm) with 30-weight oil
at 70° F (21° C) 17 psi (0.12 MPa, 1.2 bar)*

Accuracy[†] +/- 0.5 percent

Repeatability[‡] +/- 0.15 percent

Default settings for calibration factor
10W 30 oil 6815
antifreeze 7230

* Tested in No. 10 motor oil. Flow rates vary with
fluid pressure and viscosity.

** Battery required to meet safety approvals:
Duracell® MN 1604, PC1604 or
Eveready® EN22, 522

† At 2.5 gpm (9.5 lpm), at 70° F (21° C), with
10-weight oil, and 1 gallon dispensed. May
require calibration; out-of-box accuracy is +/- 1.25
percent.

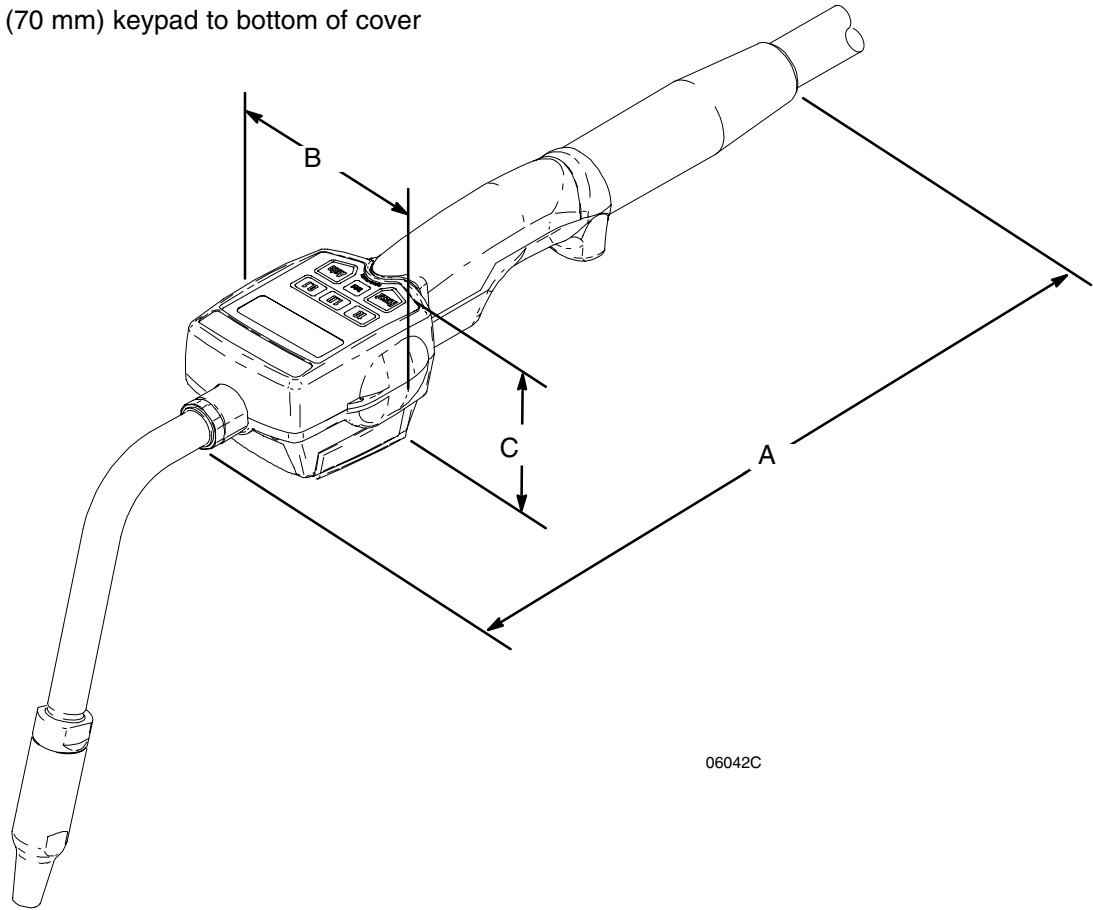
‡ At 2.5 gpm (9.5 lpm), at 70° F (21° C), with
10-weight oil, and 1 gallon dispensed.

Duracell® is a registered trademark of Duracell Inc.

*Eveready® is a registered trademark of the Eveready
Battery Co., Inc.*

Dimensional Drawing

- A 14.0 in. (356 mm) outlet to end of swivel cover
- B 3.25 in. (83 mm) widest cross section
- C 2.75 in. (70 mm) keypad to bottom of cover



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Graco Electronic Dispense Valve Warranty

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of two (2) years from the date of sale, repair or replace any part of the equipment proven defective, including defects in the electronic meter control, which will be repaired or replaced for two (2) years from the date of sale. 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, 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 with Graco equipment of 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 claim. 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.

Disclaimers and Limitations. The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within three (3) years of the date of sale.

Equipment not covered by Graco Warranty. Graco makes **no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, 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.

FOR GRACO CANADA CUSTOMERS

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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:

1-800-533-9655 Toll Free

612-623-6928

612-378-3590 FAX

*All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.*

MM 308487

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

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

www.graco.com

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