



 <b>INSTRUCTIONS</b>	This manual contains important warnings and information. <b>READ AND RETAIN FOR REFERENCE</b>
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## Precision Pulse Volumetric Fluid Flow Meter

**Models Suitable for Class I, Division 2 Use**

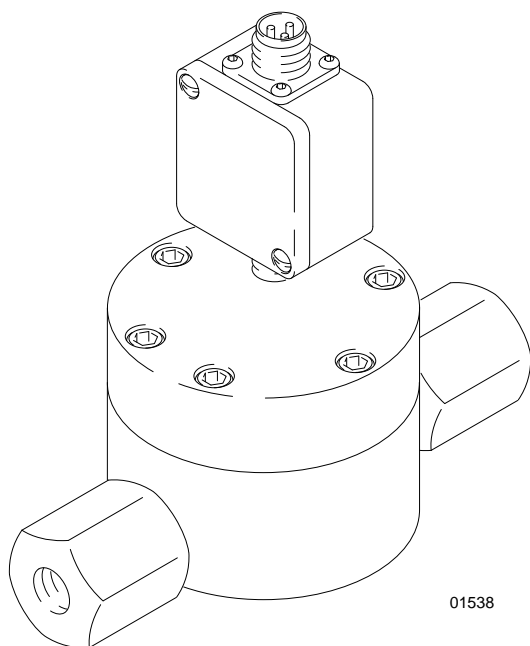
*2000 psi (140 bar) Maximum Fluid Working Pressure*

MODEL NO.	PART NO.	FLUID VOLUME FLOW	FLOW RANGE <i>gal/min (cc/min)</i>
PPM 3050	235-587	0.1136 cc per tooth	0.01-0.5 (38-1900)
PPM 3100	235-588	0.2294 cc per tooth	0.02-1.0 (75-3800)
PPM 3550	235-592	0.5883 cc per tooth	0.1-5.5 (380-21,000)

**Models Suitable for Class I, Division 1 Use**

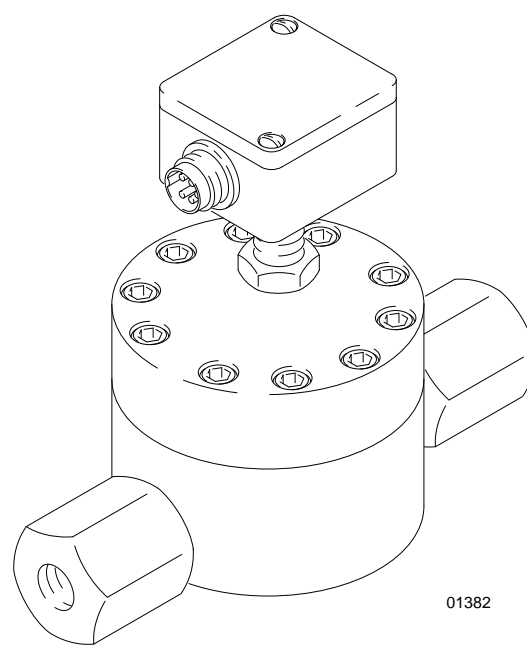
*3000 psi (210 bar) Maximum Fluid Working Pressure*

MODEL NO.	PART NO.	FLUID VOLUME FLOW	FLOW RANGE <i>gal/min (cc/min)</i>
PPM 3050H	235-593	0.1136 cc per tooth	0.01-0.5 (38-1900)
PPM 3100H	235-594	0.2294 cc per tooth	0.02-1.0 (75-3800)
PPM 3550H	235-589	0.5883 cc per tooth	0.1-5.5 (380-21,000)



01538

**Model PPM 3550 shown**



01382

**Model PPM 3550H shown**

# WARNINGS

**Serious injury, explosion, fire or electric shock can occur if the precautions below are not followed. Read and understand all instruction manuals, tags, and warning labels before operating equipment.**

**Electrical equipment shall only be installed, operated, and serviced by trained, qualified personnel who shall be fully conversant with the requirements stated within this instruction manual.**

## FIRE, EXPLOSION OR ELECTRIC SHOCK HAZARD

All parts of the fluid system must be properly grounded to reduce the risk of static electricity discharge. Sparks can ignite fumes from solvents and the fluid being dispensed, dust particles and other flammable substances, whether you are spraying indoors or outdoors, and can cause a fire or explosion and serious injury and property damage.

If you experience any static sparking or feel even a slight shock, **turn off the power to the meter immediately**. Check the entire system for proper grounding. Do not use the system again until the problem has been identified and corrected.

Meter Models PPM 3050H, 3100H, and 3550H are intrinsically safe for Class I, Division 1, Group D hazardous indoor (NEMA 1) locations.

Meter Models PPM 3050, 3100, and 3550 are suitable for Class I, Division 2, Group D hazardous indoor (NEMA 1) locations.

*To reduce the risk of fire, explosion, or electric shock:*

1. Always ensure proper grounding of the flow meter through connection of a grounded cable to the sensor.
2. Always ground the fluid supply unit and the fluid supply line.
3. Never use the flow meter with an isolation stand.
4. Do not spill water or other liquids on the electronic sensor device.
5. Always follow the material suppliers' Material Specification Data Sheets whenever flushing or servicing this meter.
6. Do not service the electronic sensor. If the sensor is not operating properly, you must return it to Graco for service.
7. *Models PPM 3050, 3100, and 3550 only:*  
Do not disconnect the cable while the circuit is live unless the location is known to be non-hazardous.

## EQUIPMENT MISUSE HAZARD

### General Safety

Any misuse of the meter such as over-pressurizing, modifying or substituting parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause parts to rupture, and can result in serious injury, electric shock, fire, explosion, or property damage.

Always follow the **Pressure Relief Procedure**, at right, before servicing or flushing the meter.

Never alter or modify any electrical components or circuits as this could cause a fire or explosion.

Use only genuine Graco replacement parts. Substitution of components may impair intrinsic safety.

Repair or replace worn or damaged parts immediately.

### Fluid Compatibility

Be sure all fluids and solvents used are chemically compatible with the "Wetted Parts" shown in the **Technical Data**. Check the material data sheet or the fluid manufacturer's literature to see if the fluid is compatible with the meter's wetted parts.

### System Pressure

The *Maximum Working Pressure* of Meter Models PPM 3050, 3100, and 3550 is 2000 psi (140 bar).

The *Maximum Working Pressure* of Meter Models PPM 3050H, 3100H, and 3550H is 3000 psi (210 bar).

Never exceed the maximum working pressure of the meter or of any component or accessory in your system.

Never pressurize the flow meter without the electronic sensor installed.

### Pressure Relief Procedure

To reduce the risk of serious injury, including splashing in the eyes or on the skin, or injury from moving parts, fire, explosion, or electric shock, always follow this procedure when shutting off the system, when checking or servicing any part of the spray system, and whenever you stop operation.

1. Turn off the fluid supply to the meter.
2. Shut off all electrical power to the fluid system.
3. Follow the Pressure Relief Procedure for your fluid system dispensing device.

## IMPORTANT

United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards—particularly the General Standards, Part 1910 and the Construction Standards, Part 1926—should be consulted.

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# Installation

## WARNING

To reduce the risk of fire, explosion, or electric shock, all electrical equipment must only be installed by a qualified electrician.

Never install Models PPM 3050, 3100, and 3550 in a Class I, Division 1 hazardous location. Only Models PPM 3050H, 3100H, and 3550H are suitable for Class I, Division 1 hazardous location.

## Dust and Foreign Matter

Avoid allowing dust or foreign matter from entering the flow meter by taking the following precautions:

- Thoroughly flush the fluid supply lines before installing the flow meter.
- When installing fittings, make sure that no sealing tape overlaps into the inside of the pipe.
- Install a 100 mesh fluid filter upstream of the flow meter. See **Accessories**.

## Installing the Flow Meter

**NOTE:** Flow volume can only be measured at the location where the flow meter is installed.

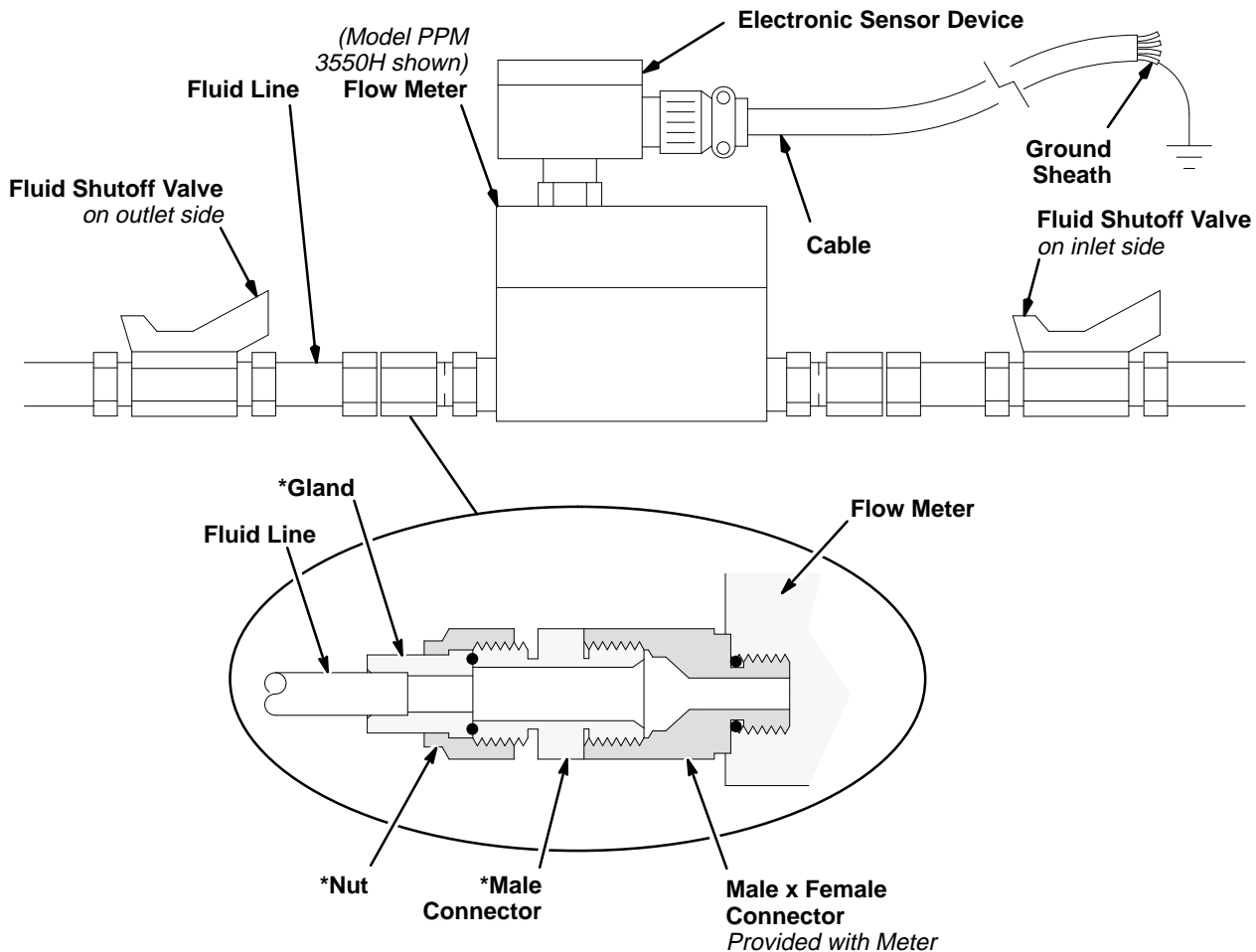
Refer to Fig. 1 to locate and install the flow meter, connectors, and fluid shutoff valves.

The shutoff valves allow you to isolate the meter for service. The gland, nut, and female connector shown in Fig. 1 will ease removal of the flow meter from the fluid line.

See **Accessories** to order these parts and other system components.

Refer to the **Technical Data** and **Dimensional Drawings** for dimension, inlet/outlet size, temperature and other specifications.

**NOTE:** Do not use more than 200 ft. (61 m) of cable.



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Fig. 1 TYPICAL RIGID TUBING INSTALLATION

\*Not provided. See **Accessories** to order.

# Installation

## Check the Electrical Grounding

### WARNING

Proper electrical grounding of your system is essential. For your safety, read the warning section, **FIRE, EXPLOSION, OR ELECTRIC SHOCK HAZARD**, on page 2.

Have a qualified electrician check the electrical grounding continuity between the flow meter sensor and a true earth ground. If the resistance is greater than 25 ohms, check the cable ground connection; refer to the Fig. 2 wiring schematic. Reconnect the ground sheath or replace the cable. Do not operate the system until the problem is corrected.

## Remote Monitoring

The flow meters are designed for use with the Graco PPD 200 Remote Displays. See **Accessories** for part numbers and descriptions.

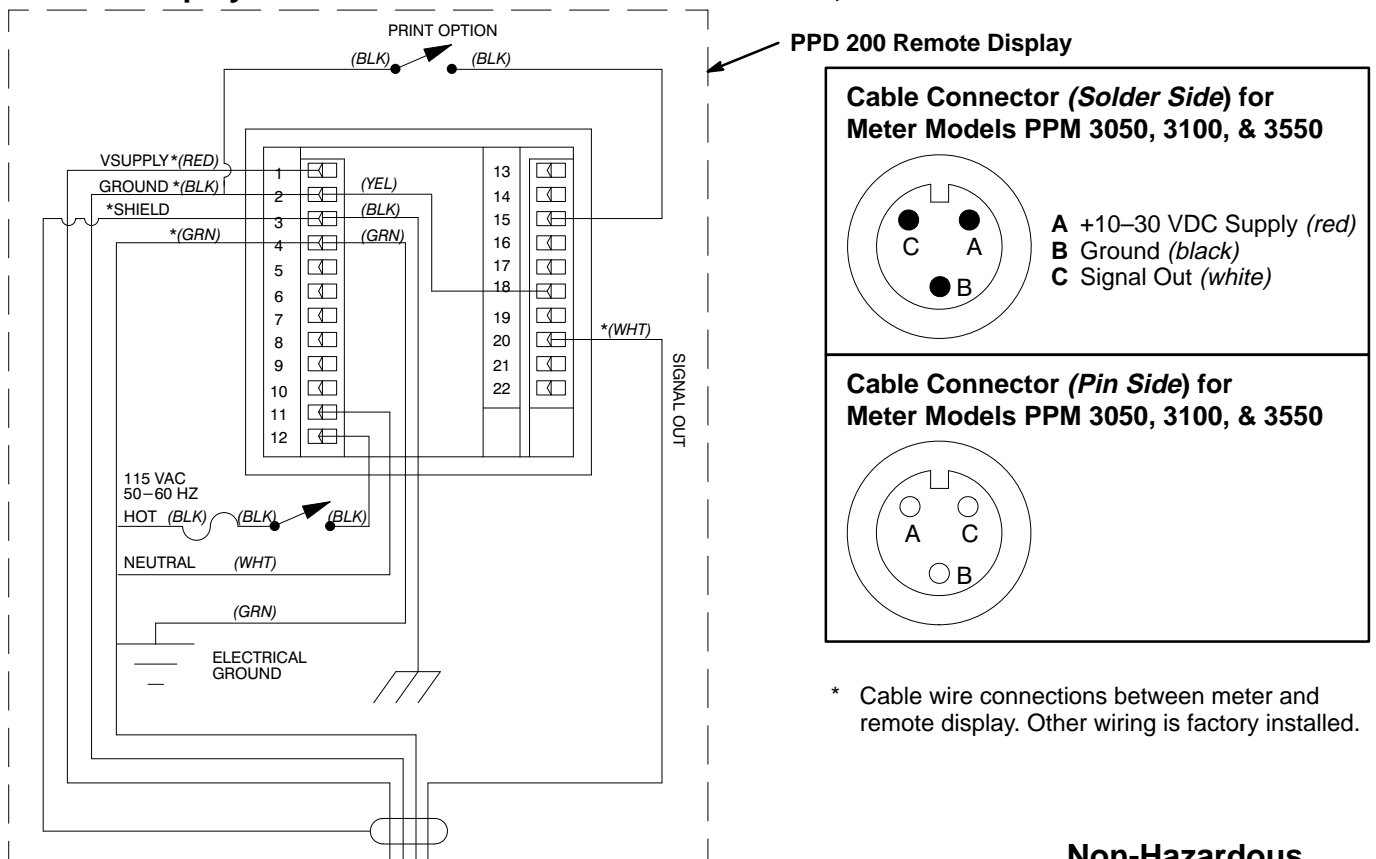
See **Fig. 2** to connect the remote display to meter models PPM 3050, 3100, and 3550.

See **Fig. 3** to connect the remote display to meter models PPM 3050H, 3100H, and 3550H.

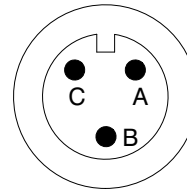
See **instruction manual 308–242** for more detailed information on installing and connecting the PPD 200 Remote Display.

*Remote Monitoring continued on next page.*

## Remote Display Connections for Meter used in Class I, Division 2 Location

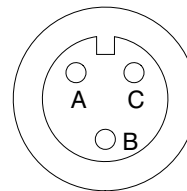


### Cable Connector (Solder Side) for Meter Models PPM 3050, 3100, & 3550



- A +10–30 VDC Supply (red)
- B Ground (black)
- C Signal Out (white)

### Cable Connector (Pin Side) for Meter Models PPM 3050, 3100, & 3550



\* Cable wire connections between meter and remote display. Other wiring is factory installed.

**Non-Hazardous Location**

**Class I, Division 2 Hazardous Location**

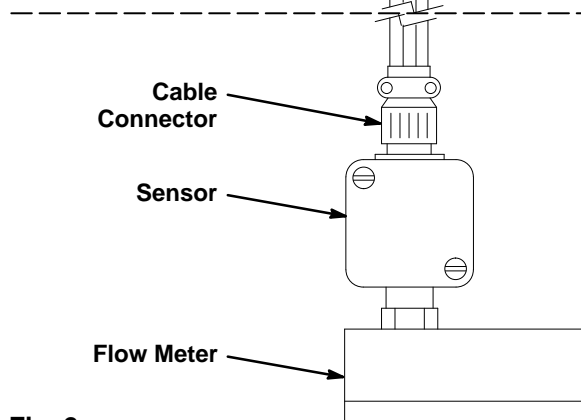


Fig. 2

**Meter Models PPM 3050, 3100, and 3550**

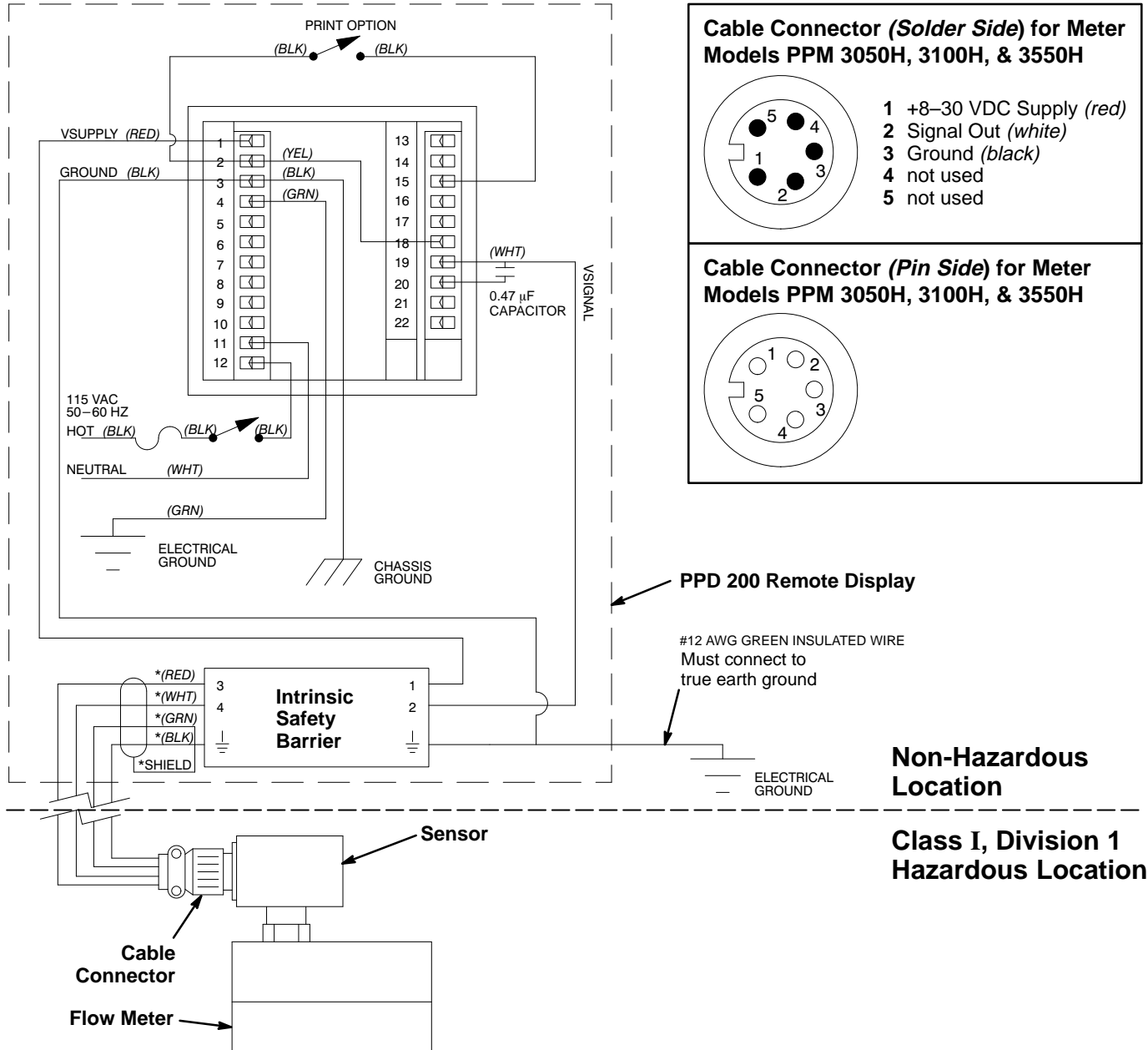
# Installation

## Remote Monitoring

The flow meter will send an output pulse for each gear tooth that passes the sensor. The actual K-factor for your meter is marked on the data sheet included with the meter. The approximate flow volume per one pulse (*K-factor*) is shown at right.

METER MODEL NO.	K-FACTOR
PPM 3050 & 3050H	0.1136 cc per pulse
PPM 3100 & 3100H	0.2294 cc per pulse
PPM 3550 & 3550H	0.5883 cc per pulse

## Remote Display Connections for Meter used in Class I, Division 1 Location



\* Cable wire connections between meter and remote display. Other wiring is factory installed.

Fig. 3 Meter Models PPM 3050H, 3100H, and 3550H

# Installation

## Remote Monitoring When Meter is in a Class I, Division 1 Hazardous Location

### **Models PPM 3050H, 3100H, and 3550H ONLY**

#### **WARNING**

To reduce the risk of fire and explosion and serious injury:

Be sure to understand and follow **Hazardous Location Wiring of Intrinsically Safe Circuits** instructions.

When meter models PPM 3050H, 3100H, and 3550H are installed in a Class I, Division 1, Group D hazardous location and a remote monitor is in a non-hazardous location, a barrier module must be used.

#### **Hazardous (classified) Location Wiring of Intrinsically Safe Circuits**

The PPD 200 Remote Displays 235–613, 235–614, and 235–615 have a barrier module installed. If using another remote monitor, see the **Safety Barrier Specifications** on page 22.

The PPD 200 Remote Display barrier module has 6 terminals. Terminals 1 and 2 are for the non-hazardous side connections. Terminals 3 and 4 are the intrinsically safe connections to the hazardous location.

Wiring beyond terminals 3 and 4 should maintain at least a 2 inch (50 mm) separation from any non-intrinsically safe wiring and must be marked as Intrinsically Safe Wiring at the required intervals. Field junction boxes may be used as long as this separation is maintained.

#### **WARNING**

The transmitting of flammable atmosphere from one area to another through a multi-conductor cable can cause fire or explosion and result in serious injury and property damage. Follow the instructions below and refer also to NEC Article 504 and 4.3 of ANSI standards ISA-RP12.6.

The cable must be sealed or vented at the point where the cable enters and leaves the non-hazardous area. (See **Accessories** for Graco cable seal, part no. 110–458.)

The purpose of such sealing or venting is to prevent the cable from transmitting the flammable atmosphere from one area of a hazardous location to another or from a hazardous location to a non-hazardous location at a rate of more than 198 cm<sup>3</sup> of air per hour (h) at a pressure of 1493 Pa (0.007 ft<sup>3</sup>/h of air at a pressure of 6 in. of water), with both ends of the cable at atmospheric pressure.

Along with terminals 1, 2, 3, and 4, two extra screw terminals are provided, one on each side of the barrier. They are conductively connected to the mounting rail once properly installed.

Without grounding, Intrinsic Safety Barriers will not provide voltage protection. Therefore, they must be grounded to a designated grounding electrode. This electrode should be the same potential as that used for the non-hazardous location side instrumentation. The ground conductor must be insulated from adjacent grounded metal objects and no smaller than a #12 AWG. The grounding path resistance from the barrier to this ground point must not exceed 1 ohm.

For further information on installation and wiring, refer to ANSI standards ISA-RP12.6 *Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations*, NEC Article 504 and the Canadian Electrical Code Appendix F.

# Operation

## WARNING

### Pressure Relief Procedure

To reduce the risk of serious injury, including splashing in the eyes or on the skin, or injury from moving parts, fire, explosion, or electric shock, always follow this procedure when shutting off the system, when checking or servicing any part of the spray system, and whenever you stop operation.

1. Turn off the fluid supply to the meter.
2. Shut off all electrical power to the fluid system.
3. Follow the Pressure Relief Procedure for your fluid system dispensing device.

## WARNING

To reduce the risk of component rupture, which could cause serious injury, including fluid injection, never pressurize the flow meter without the electronic sensor device installed.

Do not exceed the maximum working pressure of your meter or any component or accessory in your system.

## Flow Volume Range

### CAUTION

The flow meter gear can be damaged if it rotates at too high a speed. To avoid high speed rotation, open the fluid valve gradually. Do not over-speed the gear with air or solvent. To prolong meter life, Do not use the meter above its maximum flow rate.

METER MODEL NO.	FLOW RANGE <i>gal/min (cc/min)</i>
PPM 3050 & 3050H	0.01–0.5 (38–1900)
PPM 3100 & 3100H	0.02–1.0 (75–3800)
PPM 3550 & 3550H	0.1–5.5 (380–21,000)

## Checking the Meter Accuracy

1. To check the accuracy of the meter, turn your gun fan and atomizing air off, then trigger the fluid into a graduated cylinder; dispense at least 500 cc of fluid.
2. Measure the volume of fluid in the beaker in cubic-centimeters (cc) and read the volume on the flow meter monitor.

If the flow meter accuracy is outside of your acceptable limit, clean the meter as instructed in **Maintenance**. If the problem continues, return the meter to Graco for re-calibration or parts replacement.

## Flow Meter Function

This is a positive displacement, gear flow meter. The gear flow meter is highly accurate, even with low flow rates. The fluid flowing through the meter rotates the gears. The gear tooth is picked up by a sensor device, which produces an impulse for every gear tooth passing by.

## Recommended Usage

- See the **Technical Data** for fluid and ambient temperature limits.
- Only use the flow meter with fluids that are compatible with the “Wetted Parts” listed in the **Technical Data**.
- Do not allow the fluid to set in the flow meter. Before shutting down the system, flush the meter as instructed in **Maintenance**.

## PROBLEM: No Flow Volume Display

If there is no flow volume displayed at your monitor, check the following:

CAUSE	SOLUTION
1. Flow volume is too low to be measured	1. Increase flow volume.
2. Fluid is not flowing	2. Check for clogs in fluid line or in the meter itself.
3. Poor cable connection	3. Check connection to ensure it is tight and free of contaminants.
4. Damaged cable.	4. Replace cable.
5. Damaged sensor unit.	5. Replace sensor.*

\* Do not service the electronic sensor. If the sensor is not operating properly, you must return it to Graco for service.

**NOTE:** See the PPD 200 instruction manual 308–242 for detailed information on the remote monitor.



# Maintenance

## CAUTION

Do not immerse the meter in solvent. Solvent could damage the meter's electrical components.

**NOTE:** Clean the outside of the meter with a soft cloth dampened in a compatible solvent as needed.

## Residue Build-up on the Meter Gears

Residue build-up affects the flow meter performance by decreasing the meter accuracy and making meter recalibration necessary. As more build-up occurs, recalibration is required more often.

The frequency that your meter requires cleaning depends on the type of fluid being used. Check the meter routinely to develop a cleaning schedule.

## Gear Rotation Binding

When using water-based fluids, residue build-up may cause the meter gears to bind or stop rotating. This usually means that improper cleaning solvents and/or cleaning sequences or processes are being used.

Check the cleaning cycle sequence or cleaning process. Correct them if necessary. Be sure to use the proper cleaning solvent for the fluid being metered.

## Fluid Line Air Purges

If using air purges, remember that air purges do not provide the lubrication the meter gears require. The metered fluid normally provides lubrication.

## CAUTION

Excessively long air purges can over-speed the flow meter gears and cause over-heating of the gears and gear shaft. This can result in premature gear and shaft failure.

If the gears or shafts show signs of over-heating (bluish discoloration), excessive wear, or binding, check the cycle times and the air pressures used for the air purges. Determine and resolve the cause of the problem before installing another meter in the system.

## Flushing the Meter

Flush the fluid supply line and meter fluid reservoir daily with a compatible solvent as instructed below.

1. Follow the **Pressure Relief Procedure**, on page 8.
2. Connect the fluid line to the solvent supply unit.
3. Flush the meter until it is clean.
4. Follow the **Pressure Relief Procedure**, then disconnect the fluid line from the solvent supply unit.
5. Reconnect the fluid line to the fluid (*paint*) supply.
6. Turn on the fluid supply.
7. Operate until the meter and fluid line are free of solvent.

*Maintenance continued on next page.*

# Maintenance

## Cleaning or Servicing the Meter Chamber

### WARNING

Installing and servicing this equipment requires access to parts that may cause electric shock or other serious injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.

### WARNING

Use only genuine Graco replacement parts. Substitution of components may impair intrinsic safety. This could result in a failure which causes serious injury and/or substantial property damage.

**NOTE:** Clean and service the meter at a clean workbench. Use only lint-free cloth on parts.

1. Follow the **Pressure Relief Procedure Warning**, on page 8. Then close the fluid shut-off valve on each side of the meter.

### WARNING

*Models PPM 3050, 3100, and 3550 only:*  
To reduce the risk of fire or explosion, DO NOT disconnect the cable while the circuit is live unless the location is known to be non-hazardous.

2. Disconnect the cable from the electronic sensor device.
3. Disconnect both fluid line fittings and remove the meter from the fluid line.
4. Remove the electronic sensor device (1) from the flow meter upper housing (2) by using a light wrench on the sensor keyway. Do not twist the meter housings (2 & 3). Refer to Fig. 4.
5. Loosen the hex bolts (9). Keep a few threads of two opposing bolts engaged to minimize the torque stress on the shafts when you separate the meter housings.
6. Hold onto the upper housing (2) and gently tap the opposing bolts to separate the lower housing (3).

### CAUTION

To avoid damaging the shafts (5), keep the housings parallel to each other when separating them; do not rock the housings from side to side. Do not use chisels or screwdrivers to split and pry apart the housings.

7. Mark the positions of the gears (4) and shafts (5) before removing them from the lower housing (3).
8. Remove and inspect the gears (4) and shafts (5). Clean the meter parts with solvent.

**NOTE:** Replace the o-ring (8) whenever the meter is disassembled.

9. Reassemble the gears and shafts into the lower housing in the position they were removed from. Check the gears for free and easy rotation.
10. Make sure the dowels (A) are in place.
11. Align the index marks (B). Then assemble the two meter housings, making sure to keep them parallel to each other.
12. Install the hex bolts (9). Tighten them oppositely and evenly, hand-tight (11 ft-lb [15 N•m]). Do not over-tighten.
13. After re-assembly, test the gear rotation by applying a brief air blast to the meter inlet. You should clearly hear the gears spin.
14. *Models PPM 3050, 3100, & 3550:* Screw the electronic sensor device into the meter hand-tight; do not over-tighten.

*Model PPM 3050H, 3100H, & 3550H:* Screw the electronic sensor device all the way into the meter, then back off 1/4 turn and tighten the locknut; do not over-tighten.

**NOTE:** Avoid forcefully twisting the meter housings during assembly.

# Maintenance

Model PPM 3050 shown

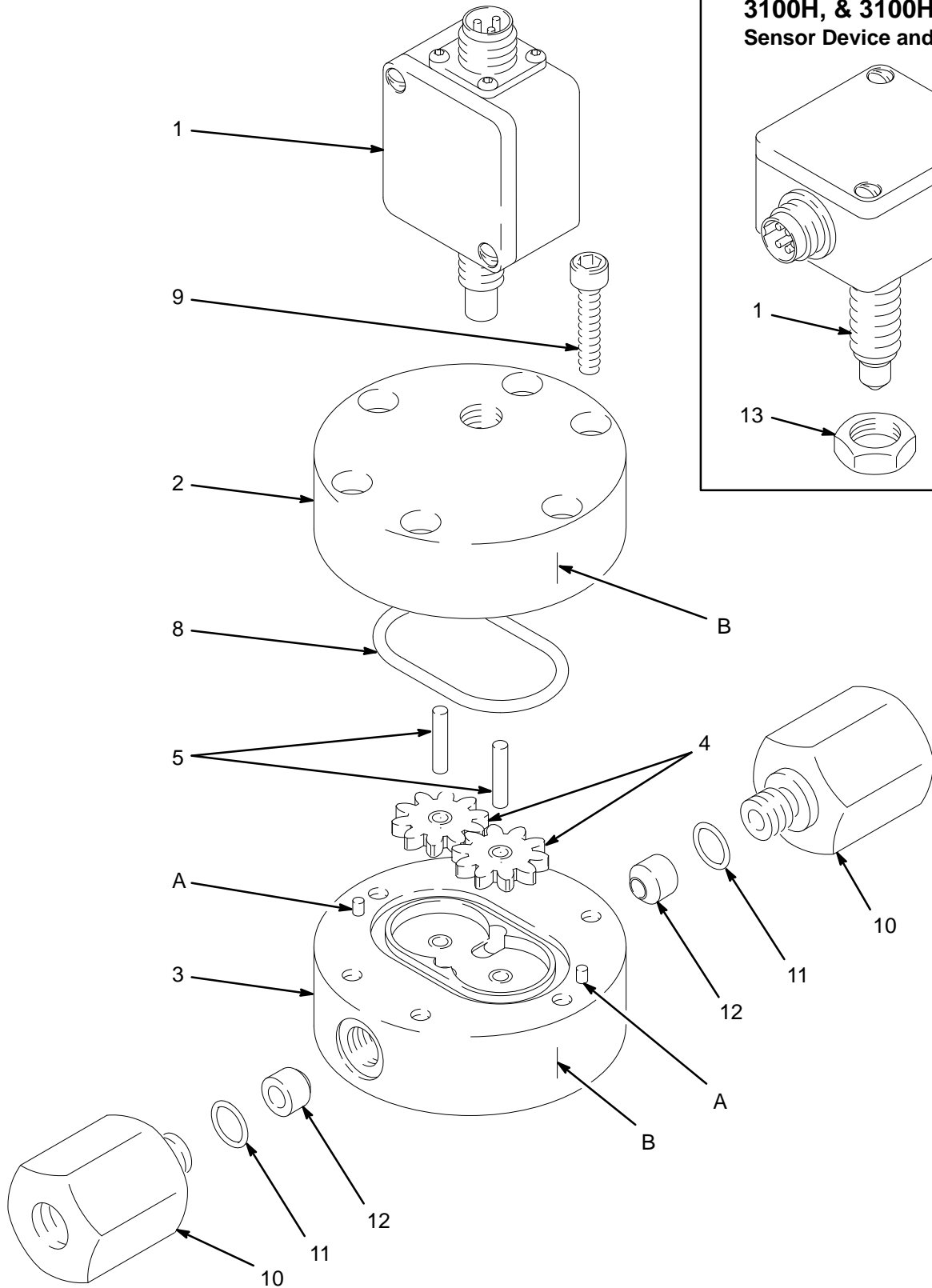


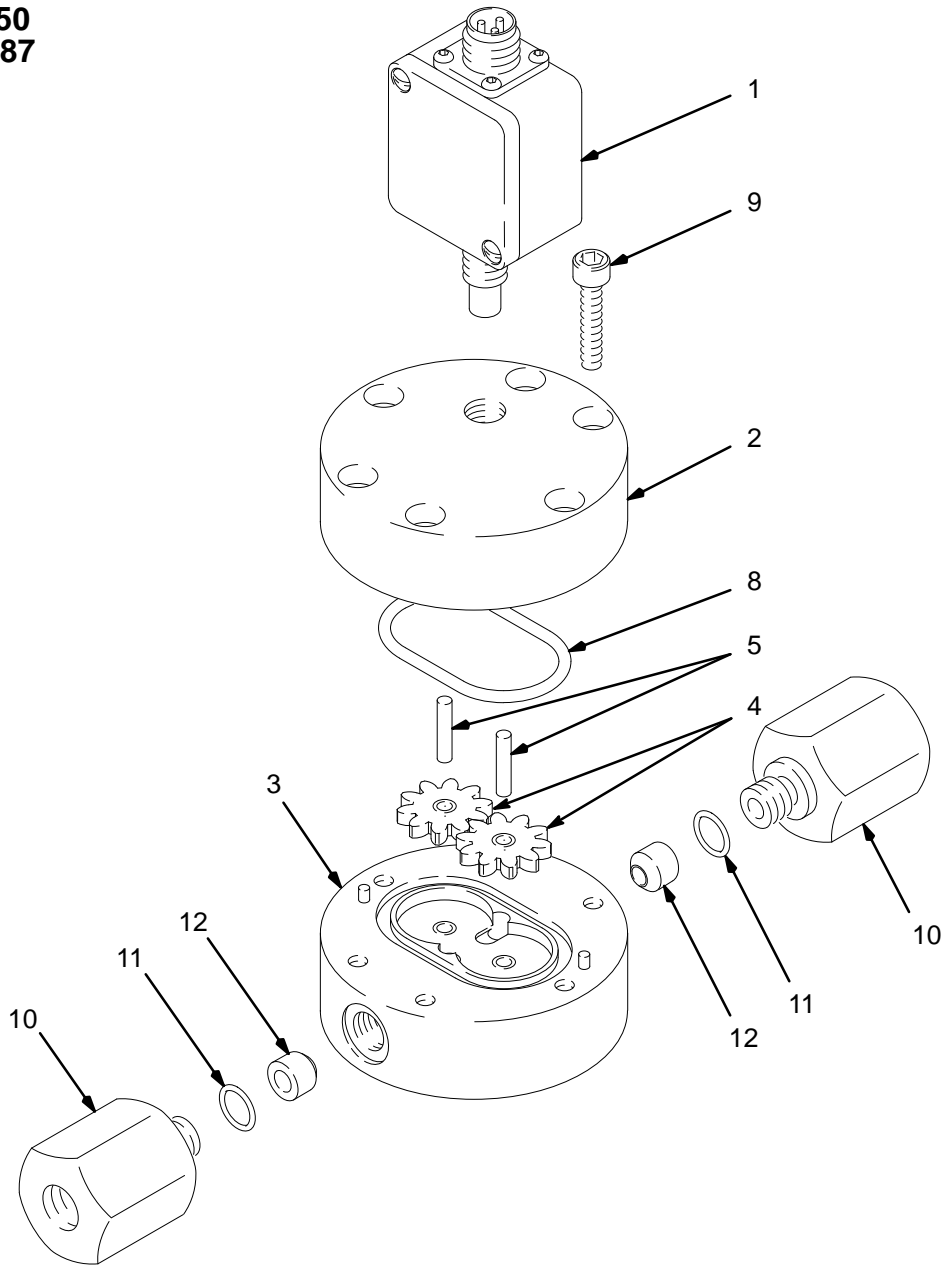
Fig. 4

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# Parts

Use Only Genuine Graco Parts and Accessories

Model PPM 3050  
Part No. 235-587



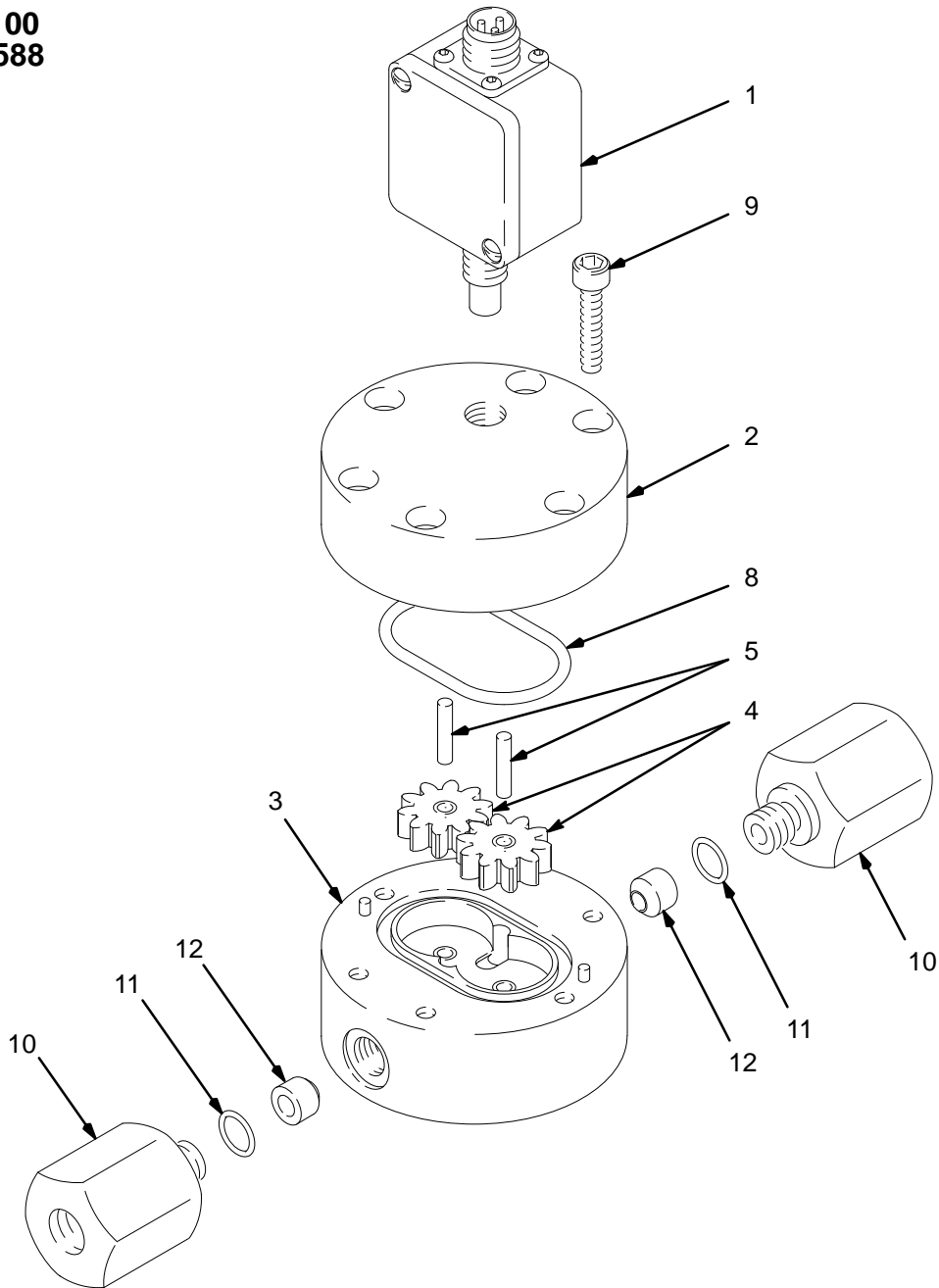
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Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	110-571	ELECTRONIC SENSOR	1	7	110-579	PIN, locating; <i>not shown</i>	1
2		HOUSING, upper; <i>not a replacement part</i>	1	8	110-588	O-RING; PTFE	1
3		HOUSING, lower; <i>not a replacement part</i>	1	9	110-580	SCREW	6
4	110-573	GEAR	2	10	188-323	ADAPTOR; 1/4" bsp(m) x 1/4" npt(f)	2
5	110-575	SHAFT	2	11	103-338	O-RING; Viton®	2
				12	185-886	SPACER, PTFE	2

# Parts

Use Only Genuine Graco Parts and Accessories

Model PPM 3100  
Part No. 235-588



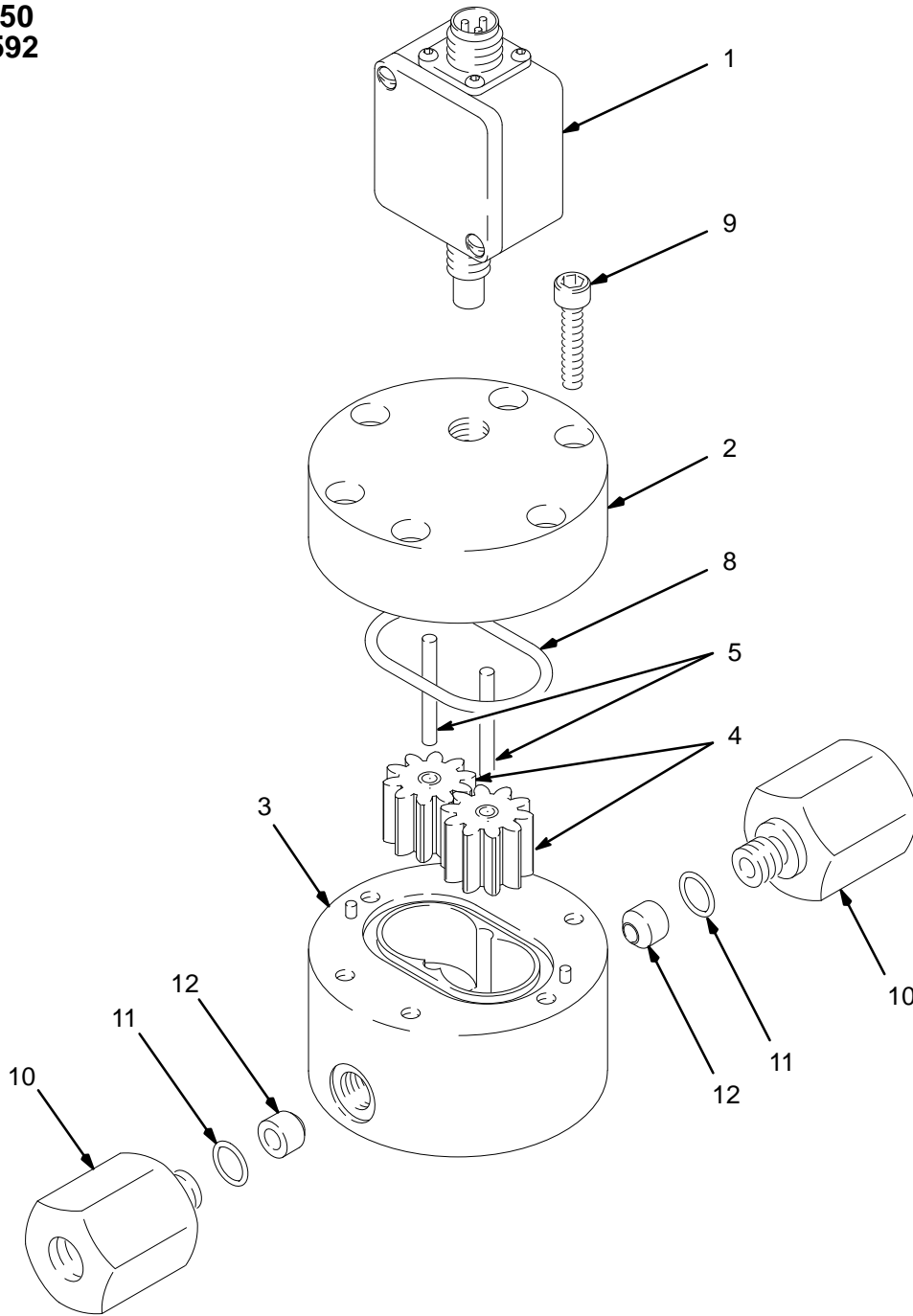
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Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	110-571	ELECTRONIC SENSOR	1	7	110-579	PIN, locating; <i>not shown</i>	1
2		HOUSING, upper; <i>not a replacement part</i>	1	8	110-588	O-RING; PTFE	1
3		HOUSING, lower; <i>not a replacement part</i>	1	9	110-580	SCREW	6
4	110-574	GEAR	2	10	188-323	ADAPTOR; 1/4" bsp(m) x 1/4" npt(f)	2
5	110-576	SHAFT	2	11	103-338	O-RING; Viton®	2
				12	185-886	SPACER, PTFE	2

# Parts

Use Only Genuine Graco Parts and Accessories

Model PPM 3550  
Part No. 235-592



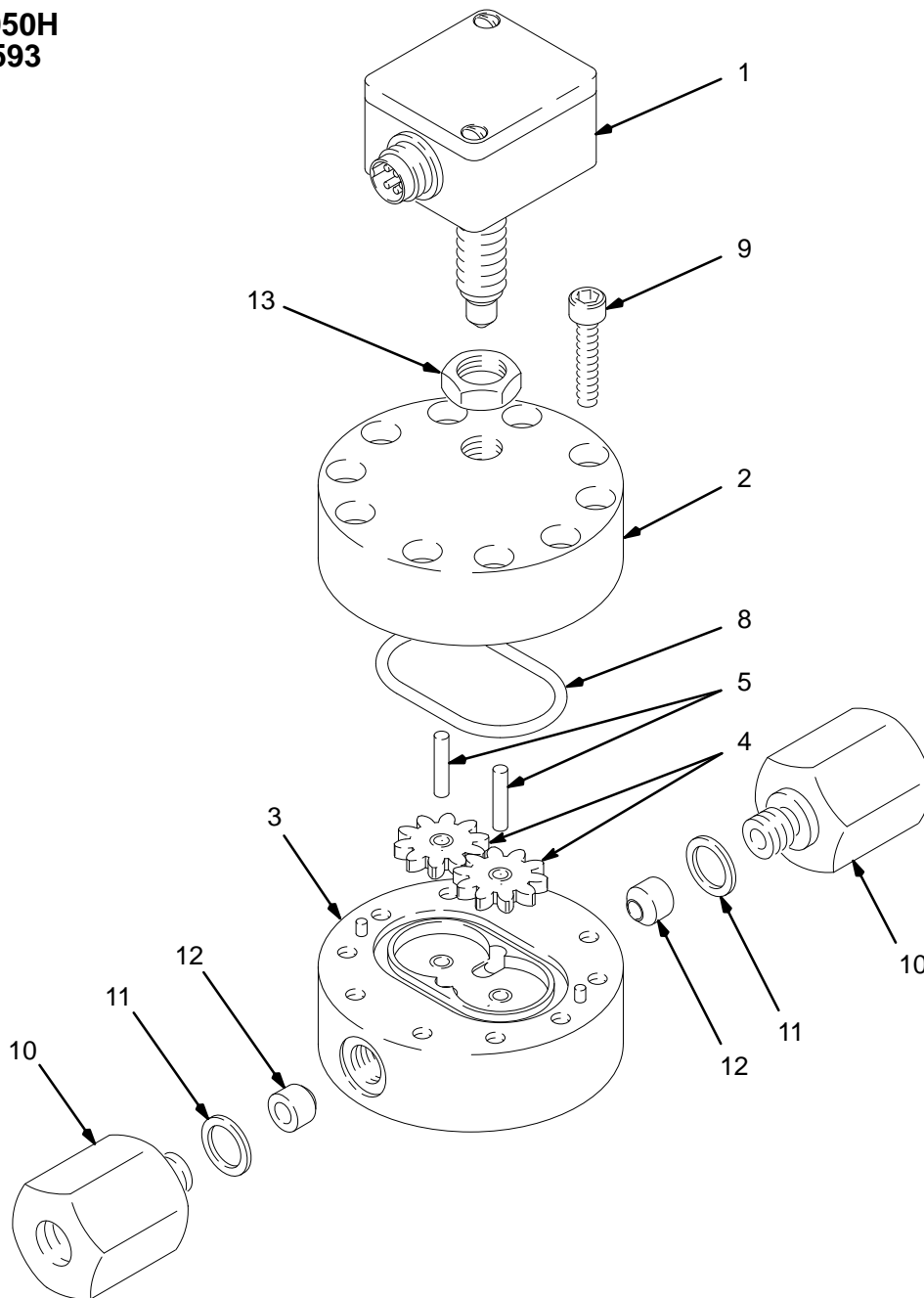
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Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	110-571	ELECTRONIC SENSOR	1	7	110-579	PIN, locating; <i>not shown</i>	1
2		HOUSING, upper; <i>not a replacement part</i>	1	8	110-588	O-RING; PTFE	1
3		HOUSING, lower; <i>not a replacement part</i>	1	9	110-580	SCREW	6
4	110-583	GEAR	2	10	188-323	ADAPTOR; 1/4" bsp(m) x 1/4" npt(f)	2
5	110-584	SHAFT	2	11	103-338	O-RING; Viton®	2
				12	185-886	SPACER, PTFE	2

# Parts

Use Only Genuine Graco Parts and Accessories

Model PPM 3050H  
Part No. 235-593



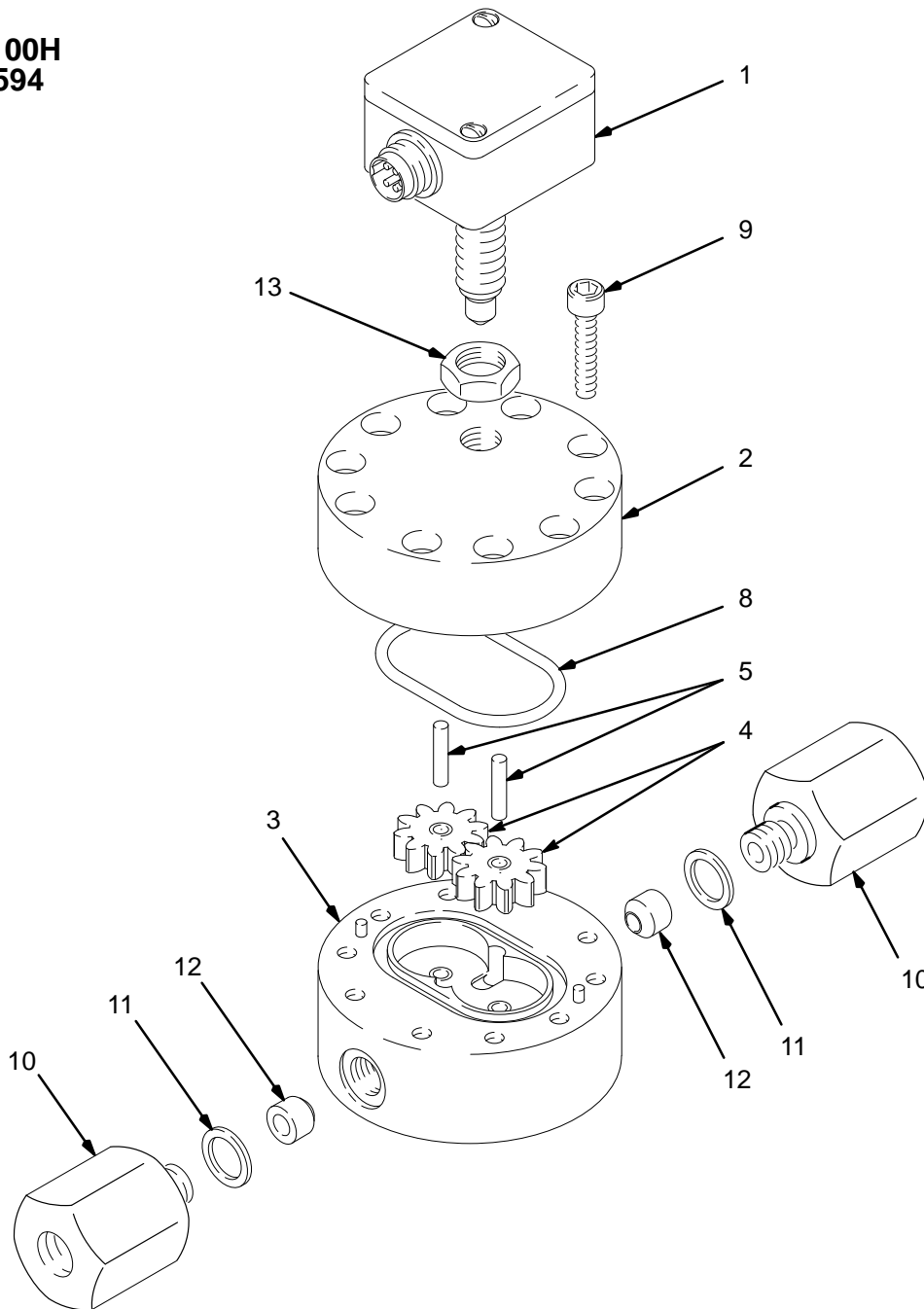
01536

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	110-581	ELECTRONIC SENSOR	1	8	110-588	O-RING; PTFE	1
2		HOUSING, upper; <i>not a replacement part</i>	1	9	110-580	SCREW	10
3		HOUSING, lower; <i>not a replacement part</i>	1	10	110-586	ADAPTOR; M12 x 1.5(m) x 1/4" npt(f)	2
4	110-573	GEAR	2	11	110-587	WASHER	2
5	110-575	SHAFT	2	12	185-885	SPACER, PTFE	2
7	110-579	PIN, locating; <i>not shown</i>	1	13	105-776	LOCK NUT	1

# Parts

Use Only Genuine Graco Parts and Accessories

Model PPM 3100H  
Part No. 235-594



01537

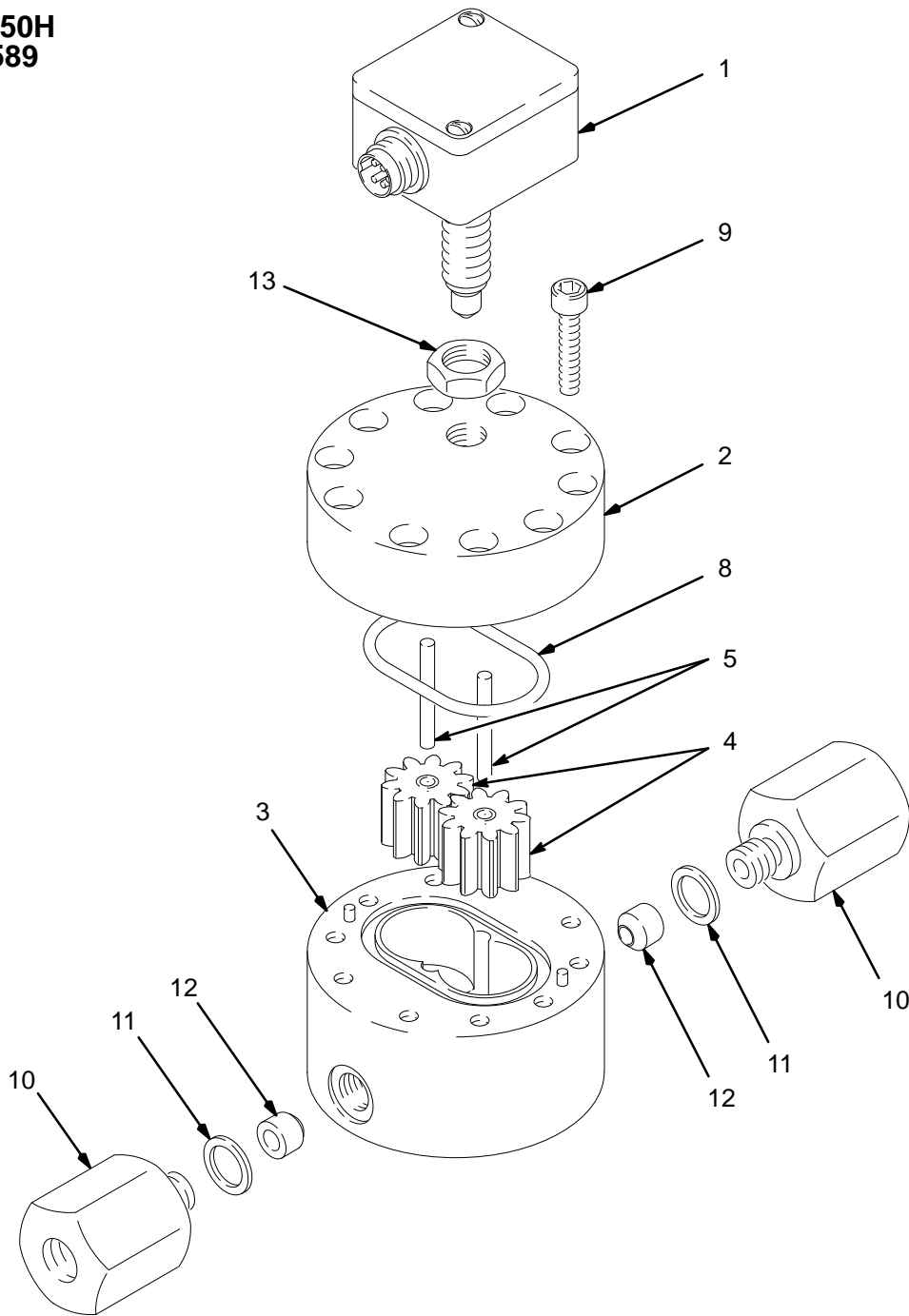
Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	110-581	ELECTRONIC SENSOR	1	8	110-588	O-RING; PTFE	1
2		HOUSING, upper; <i>not a replacement part</i>	1	9	110-580	SCREW	10
3		HOUSING, lower; <i>not a replacement part</i>	1	10	110-586	ADAPTOR; M12 x 1.5(m) x 1/4" npt(f)	2
4	110-574	GEAR	2	11	110-587	WASHER	2
5	110-576	SHAFT	2	12	185-885	SPACER, PTFE	2
7	110-579	PIN, locating; <i>not shown</i>	1	13	105-776	LOCK NUT	1



# Parts

Use Only Genuine Graco Parts and Accessories

Model PPM 3550H  
Part No. 235-589



01535

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	110-581	ELECTRONIC SENSOR	1	8	110-588	O-RING; PTFE	1
2		HOUSING, upper; <i>not a replacement part</i>	1	9	110-580	SCREW	10
3		HOUSING, lower; <i>not a replacement part</i>	1	10	110-586	ADAPTOR; M12 x 1.5(m) x 1/4" npt(f)	2
4	110-583	GEAR	2	11	110-587	WASHER	2
5	110-584	SHAFT	2	12	185-885	SPACER, PTFE	2
7	110-579	PIN, locating; <i>not shown</i>	1	13	105-776	LOCK NUT	1

# Accessories

*Use Only Genuine Graco Parts and Accessories*

## Meter Mounting Bracket 188–330

For mounting the meter to a wall or table.

## Fluid Filter 223–160

*5000 psi (350 bar) Maximum Working Pressure*  
With stainless steel bowl and polyethylene support

**NOTE:** Filter 223–160 has a 60 mesh screen. To help prevent premature meter wear, the use of a 100 mesh screen is recommended. **Order Part No. 167–026 (100 mesh screen) when you order the filter.**

## 100 Mesh Filter Screen 167–026

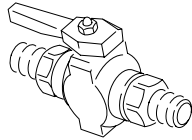
Recommended for use with Fluid Filter 223–160.

## Fluid Shutoff Valve

*5000 psi (350 bar) Maximum Working Pressure*  
For shutting off the fluid and isolating the flow meter for service or replacement. See page 4.

### **PART NO. DESCRIPTION**

<b>210–657</b>	1/4 npt(mbe)
<b>210–658</b>	3/8 npt(mbe)
<b>210–659</b>	1/4 npt(m) x 3/8 npt(m)



## Female Nut 111–969

For connecting between 1/4 inch gland 111–970 and 1/4 npt(m) connector 111–972. See page 4.

## Gland 111–970

*7700 psi (531 bar) Maximum Working Pressure*  
For connecting rigid tubing to meter. See page 4.  
1/4 inch tube socket

## Connector 111–972

*7300 psi (511 bar) Maximum Working Pressure*  
For connecting between flow meter adapter and nut 111–969. See page 4. PTFE o-ring face seal.  
1/4 npt(mbe)

## Cable Seal 110–458

For intrinsically safe electrical cable. Provides a sealed passageway for the cable from the Hazardous to the Non-hazardous Locations.

## Electrical Cables

For connecting to sensor

<i>For Models PPM 3050, 3100, &amp; 3550</i>	<i>For Models PPM 3050H, 3100H, &amp; 3550H</i>	
<b>Cable Part No.</b>	<b>Cable Part No.</b>	<b>Cable Length</b>
948–920	235–600	6 ft (1.83 m)
948–921	235–601	15 ft (4.58 m)
948–922	235–602	25 ft (7.63 m)
948–923	235–603	36 ft (10.98 m)
948–924	235–604	50 ft (15.25 m)
948–925	235–605	75 ft (22.88 m)
948–926	235–606	100 ft (30.5 m)
948–927	235–607	125 ft (38.13 m)
948–928	235–608	150 ft (45.75 m)
948–929	235–609	200 ft (61 m)

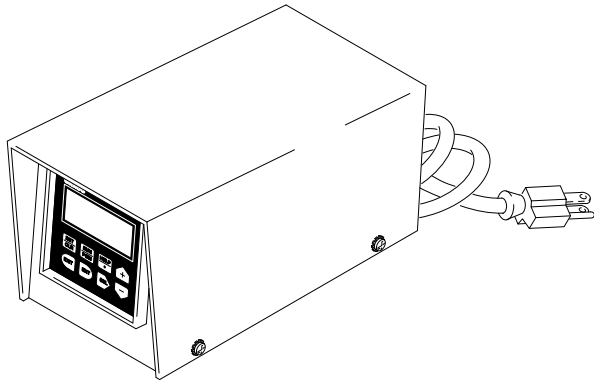
# Accessories

Use Only Genuine Graco Parts and Accessories

## PPD 200 Remote Display

For use with Flow Meters Located in Class I, Division 1 Hazardous Locations

PPD 200 PART NO.	FOR USE WITH METER MODEL NO.
235-610	PPM 3050
235-611	PPM 3100
235-612	PPM 3550



## PPD 200 Remote Display

For use with Flow Meters Located in Class I, Division 1 Hazardous Locations

PPD 200 PART NO.	FOR USE WITH METER MODEL NO.
235-613	PPM 3050H
235-614	PPM 3100H
235-615	PPM 3550H

## Rack Mounting Kit 235-590

Kit for rack mounting PPD 200 Display. Includes face-plate for display and instructions on how to install the PPD 200 in a rack.

## Remote Display, Flow Meter, & Cable Packages

For use with Flow Meters Located in Class I, Division 2 Hazardous Locations

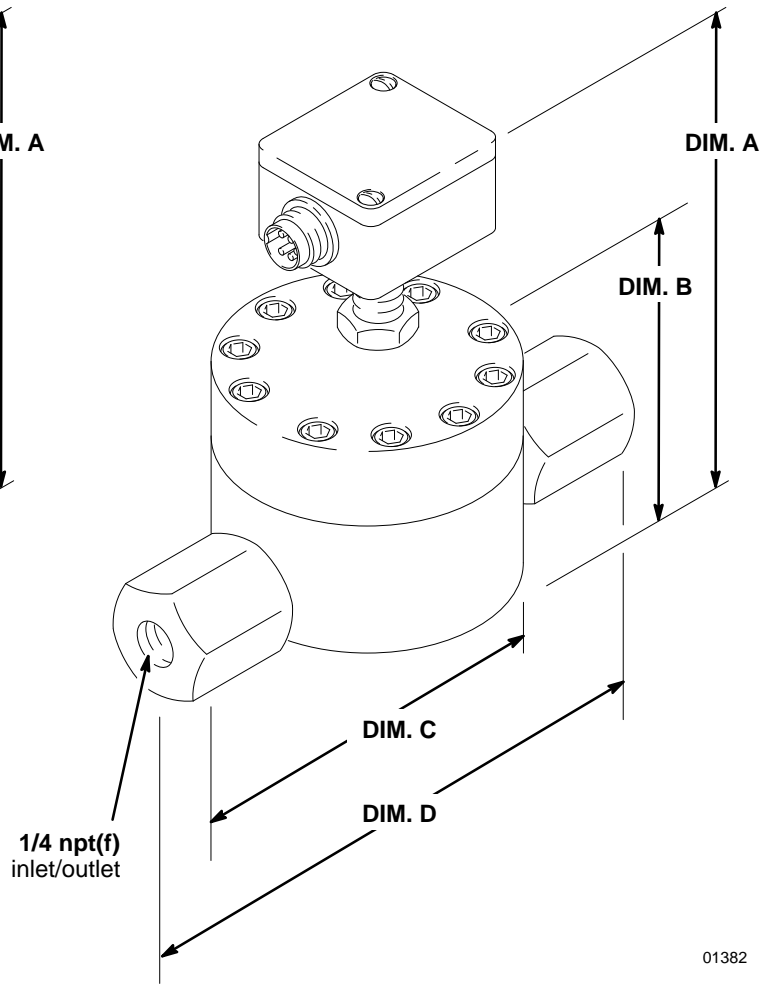
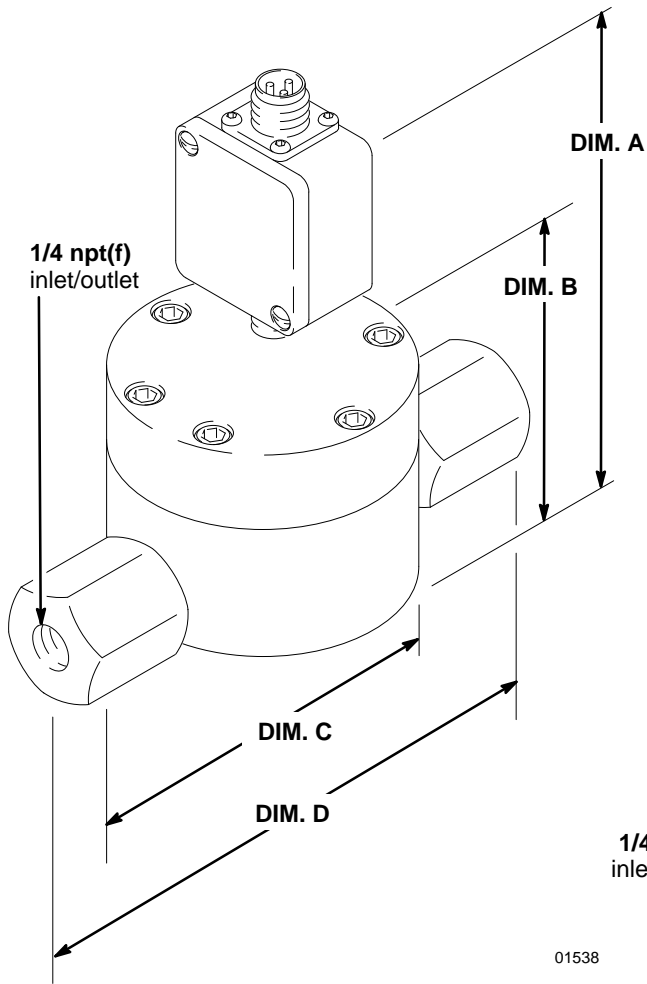
PACKAGE PART NO.	Includes:		
	METER MODEL	DISPLAY PART NO.	CABLE LENGTH <i>ft (m)</i>
235-750	PPM 3050	235-610	25 (7.63)
235-751	PPM 3050	235-610	50 (15.25)
235-752	PPM 3050	235-610	100 (30.5)
235-753	PPM 3100	235-611	25 (7.63)
235-754	PPM 3100	235-611	50 (15.25)
235-755	PPM 3100	235-611	100 (30.5)
235-756	PPM 3550	235-612	25 (7.63)
235-757	PPM 3550	235-612	50 (15.25)
235-728	PPM 3550	235-612	100 (30.5)

## Remote Display, Flow Meter, & Cable Packages

For use with Flow Meters Located in Class I, Division 1 Hazardous Locations

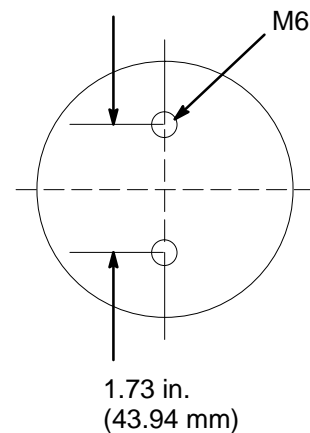
PACKAGE PART NO.	Includes:		
	METER MODEL	DISPLAY PART NO.	CABLE LENGTH <i>ft (m)</i>
235-770	PPM 3050H	235-613	25 (7.63)
235-771	PPM 3050H	235-613	50 (15.25)
235-772	PPM 3050H	235-613	100 (30.5)
235-773	PPM 3100H	235-614	25 (7.63)
235-774	PPM 3100H	235-614	50 (15.25)
235-775	PPM 3100H	235-614	100 (30.5)
235-776	PPM 3550H	235-615	25 (7.63)
235-777	PPM 3550H	235-615	50 (15.25)
235-778	PPM 3550H	235-615	100 (30.5)

# Dimensions



Model No.	Dim. A	Dim. B	Dim. C	Dim. D
<b>PPM 3050</b>	4.24 in. (107.70 mm)	2.00 in. (50.80 mm)	3.33 in. (84.58 mm)	5.90 in. (149.86 mm)
<b>PPM 3100</b>	4.36 in. (110.74 mm)	2.16 in. (54.86 mm)	3.33 in. (84.58 mm)	5.90 in. (149.86 mm)
<b>PPM 3550</b>	4.83 in. (122.68 mm)	2.63 in. (66.80 mm)	3.33 in. (84.58 mm)	5.90 in. (149.86 mm)
<b>PPM 3050H</b>	5.10 in. (129.54 mm)	2.00 in. (50.80 mm)	3.33 in. (84.58 mm)	5.90 in. (149.86 mm)
<b>PPM 3100H</b>	5.26 in. (133.60 mm)	2.16 in. (54.86 mm)	3.33 in. (84.58 mm)	5.90 in. (149.86 mm)
<b>PPM 3550H</b>	5.73 in. (145.54 mm)	2.63 in. (66.80 mm)	3.33 in. (84.58 mm)	5.90 in. (149.86 mm)

**Flow Meter Mounting Holes  
(BOTTOM VIEW)**



# Technical Data

## Maximum Working Fluid Pressure

Models PPM 3050, 3100, 3550 . . . 2000 psi (140 bar)  
 Models PPM 3050H, 3100H, 3550H . . . . . 3000 psi  
 (210 bar)

## Flow Range

Models PPM 3050/3050H . . . . . 0.01–0.5 gal/min  
 (38–1900 cc/min)  
  
 Models PPM 3100/3100H . . . . . 0.02–1.0 gal/min  
 (75–3800 cc/min)  
  
 Models PPM 3550/3550H . . . . . 0.1–5.5 gal/min  
 (380–21,000 cc/min)

## Flow Meter Connector Size

Models PPM 3050, 3100, 3550 . . . . . 1/4 bsp(m)  
 x 1/4 npt(f)  
  
 Models PPM 3050H, 3100H, 3550H . . M12 x 1.5(m)  
 x 1/4 npt(f)

## Flow Meter Inlet/Outlet Size without Connector

Models PPM 3050, 3100, 3550 . . . . . 1/4 bsp(m)  
 Models PPM 3050H, 3100H, 3550H . . M12 x 1.5(m)

## Maximum Fluid Temperature

Models PPM 3050, 3100, 3550 . . . 180° F (80° C)  
 Models PPM 3050H, 3100H, 3550H . . . . . 250° F  
 (120° C)

## Maximum Ambient Temperature . . . 113° F (45° C)

## Fluid Viscosity Range . . . . . 15,000 cps (Refer to the Pressure Drop Curve, below)

## Maximum Cable Length . . . . . 200 ft (61 m)

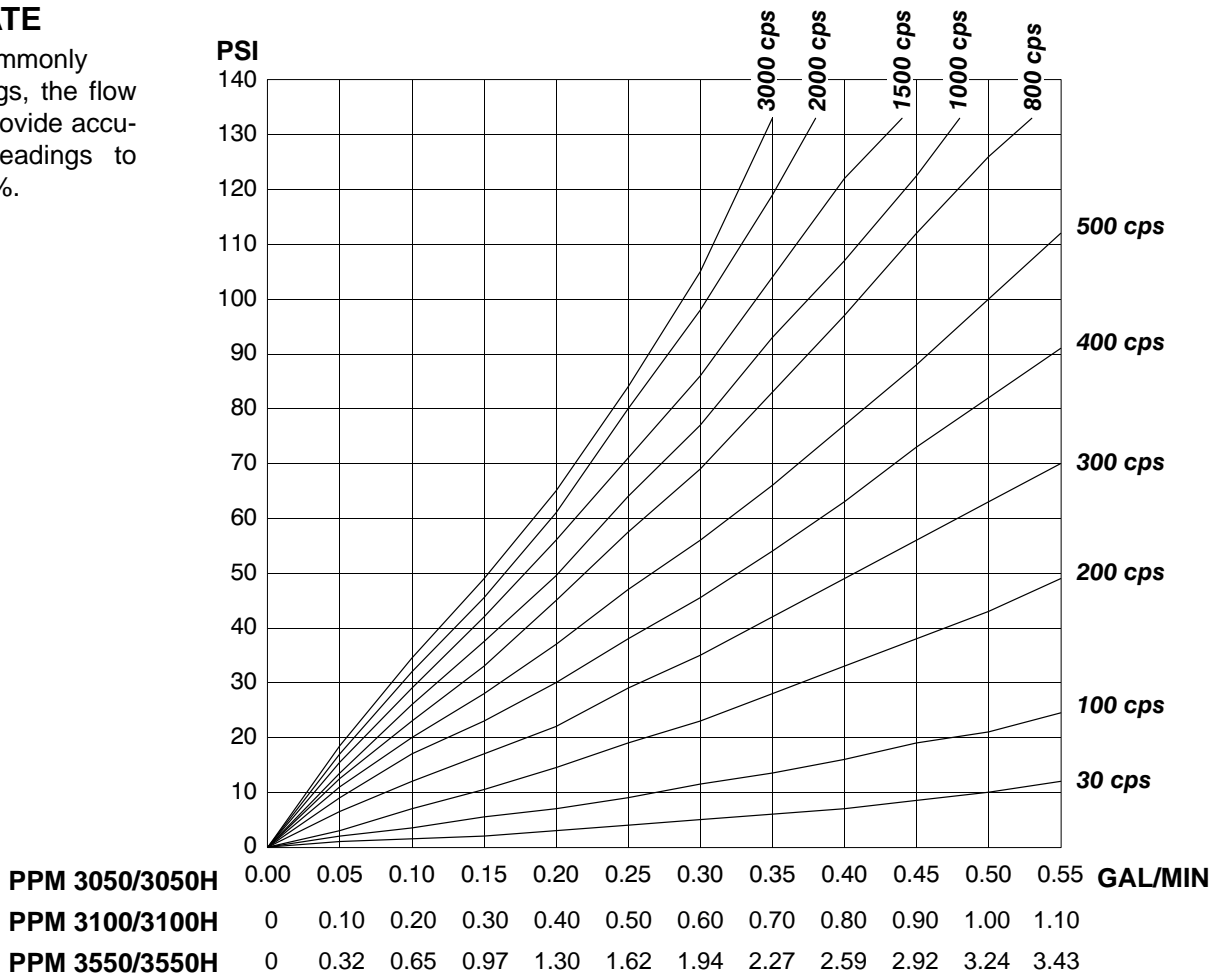
## Wetted Parts . . . . . 303 & 321 Stainless Steel, Tungsten Carbide, PTFE

PTFE® is a registered trademark

# Pressure Drop Curve

## FLOW RATE

For most commonly used coatings, the flow meter will provide accurate flow readings to within ± 0.5%.



# Safety Barrier Specifications

## WARNING

To maintain intrinsic safety of your installation, only replace the Stahl barrier fuse with 160 mA replacement fuse, Stahl Part No. 011239.

## Stahl Model No. 9002/13–280–110–00

R. Stahl, Inc.  
Intrinsic Safety Barrier

Outputs are Intrinsically Safe for Class I, Division 1, Groups A, B, C, D at 40° C.

**NOTE:** This barrier is included with Graco PPD 200 Remote Displays 235–613, 235–614, and 235–615.

## Terminal Connections

- Terminal 1:* Non-hazardous connection for supply voltage  
*Terminal 2:* Non-hazardous connection for signal  
*Terminal 3:* Hazardous connection for supply voltage  
*Terminal 4:* Hazardous connection for signal

## Channel I Operational Data

*Rated Voltage:* 24 VDC  
*Maximum Voltage:* 26 VDC  
*Fuse Current (I):* 160 mA  
*End-to-End Resistance (R):* 280 Ω

Safety Description in accordance to standards issued by Factory Mutual–Class No. 3610–October 1988 (entity concept parameters) for Channel I, terminal 3, supply voltage to ground

*Open Circuit Voltage (V oc):* 28 VDC  
*Short Circuit Current (I sc):* 109.1 mA  
*Allowed External Capacitance (Ca):* 0.39 μF  
*Allowed External Inductance (La):* 11.6 mH

Safety Description in accordance to standards issued by CSA–22.2 No. 157

*Open Circuit Voltage (V oc):* 28.4 VDC  
*Minimum Resistance (R):* 257 Ω

## Channel II Operational Data

*Rated Voltage:* 24 VDC  
*Maximum Voltage:* 26 VDC  
*Fuse Current (I):* 160 mA  
*End-to-End Resistance (R):* 1 V ≤ 22 mA  
2 V > 22 mA

Safety Description in accordance to standards issued by Factory Mutual–Class No. 3610–October 1988 (entity concept parameters) for Channel II, terminal 4, signal to ground

*Open Circuit Voltage (V oc):* 28 VDC  
*Short Circuit Current (I sc):* 0.0 mA  
*Allowed External Capacitance (Ca):* 0.39 μF  
*Allowed External Inductance (La):* 1000 mH

Safety Description in accordance to standards issued by CSA–22.2 No. 157

*Open Circuit Voltage (V oc):* 28.4 V  
*Minimum Resistance (R):* diode



# The Graco Warranty and Disclaimers

## 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 by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven 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, 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 two (2) 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.

## Graco Phone Numbers

**TO PLACE AN ORDER**, contact your Graco distributor, or call Graco: **1-800-328-0211 Toll Free**

**FOR TECHNICAL ASSISTANCE**, service repair information or answers about the application of Graco equipment, call: **1-800-543-0339 Toll Free**

## Manual Change Summary

The manual was changed from Rev. A to Rev. B to eliminate the part numbers for the upper and lower housings on all meter models as they are not replacement parts.

**Sales Offices:** Atlanta, Chicago, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)  
**Foreign Offices:** Canada; England; Korea; Switzerland; France; Germany; Hong Kong; Japan

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

PRINTED IN U.S.A. 308-243 10/92 Revised 9/93