

# Helical Gear Fluid Flow Meters

309834W

EN

**Positive displacement helical gear flow meters designed for higher flow rates and higher viscosity materials. For professional use only.**

**Not approved for use in European explosive atmosphere locations.**

*6000 psi (41 MPa, 410 bar) Maximum Fluid Working Pressure*

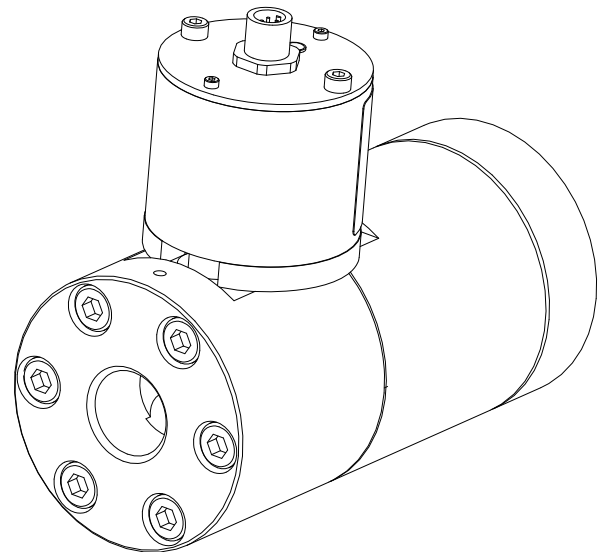
See page 2 for a list of models.



**Important Safety Instructions**

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

**HG6000 Meter Shown**



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## Models

### HG6000 Meter, Part No. 246190

Standard Resolution  
0.05 to 6.0 gpm (190 to 22,712 cc/min) Flow Range\*\*  
180°F (82°C) Maximum Operating Temperature

### HG6000HR Meter, Part No. 246652

High Resolution  
0.05 to 2.0 gpm (190 to 7571 cc/min) Flow Range\*\*  
180°F (82°C) Maximum Operating Temperature

### HG6000HR-FM Meter, Part No. 24P688

High Resolution for Filled Materials  
0.05 to 2.0 gpm (190 to 7571 cc/min) Flow Range\*\*  
180°F (82°C) Maximum Operating Temperature

### HG6000HT Meter, Part No. 246340

Heated, Standard Resolution  
0.05 to 6.0 gpm (190 to 22,712 cc/min) Flow Range\*\*  
240 VAC, 400 Watts, 1.67 Amps  
400°F (204°C) Maximum Operating Temperature

### HG6000HT-FM Meter, Part No. 24R174

Heated, Standard Resolution for Filled Materials  
0.05 to 6.0 gpm (190 to 22,712 cc/min) Flow Range\*\*  
240 VAC, 400 Watts, 1.67 Amps  
400°F (204°C) Maximum Operating Temperature

### HG6000 Meter, Part No. 280560

Standard Resolution  
0.05 to 6.0 gpm (190 to 22,712 cc/min) Flow Range\*\*  
140°F (60°C) Maximum Operating Temperature

### \* HG6000 Meter, Part No. 15V820

Standard Resolution  
0.05 to 6.0 gpm (190 to 22,712 cc/min) Flow Range\*\*  
140°F (60°C) Maximum Operating Temperature

\* Uses sensor approved for use on ProMix 2KS Control Platform.






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\*\* The Flow Range is a generic rating meant to cover a wide variety of materials and applications. However, the Flow Range may be different depending on the Graco system in which the Flow Meter is used. To find the Flow Range for a specific Graco system, refer to that system's Operation Manual.

# Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 <b>WARNING</b>	
	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.</p> <ul style="list-style-type: none"> <li>• This equipment is for professional use only.</li> <li>• Use the equipment only for its intended purpose. Call your Graco distributor for information.</li> <li>• Read all instruction manuals, tags, and labels before operating equipment.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately.</li> <li>• Do not alter or modify this equipment. Use only Graco parts and accessories.</li> <li>• <b>Do not exceed the maximum working pressure of the lowest rated system component.</b></li> <li>• Be sure that all spray/dispensing equipment and accessories are rated to withstand the maximum working pressure of the pump. Do not exceed the maximum working pressure of any component or accessory used in the system.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not exceed the maximum temperature rating of any system component.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See <b>Technical Data</b> in all equipment manuals. Read fluid and solvent manufacturer's warnings.</li> <li>• Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer.</li> <li>• Comply with all applicable local, state, and national fire, electrical, and safety regulations.</li> </ul>
	<p><b>FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD</b></p> <p>Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in fire or explosion and serious injury.</p> <ul style="list-style-type: none"> <li>• Ground the equipment and the object being dispensed.</li> <li>• Do not use this equipment with flammable liquids.</li> <li>• Keep the dispense area free of debris, including solvent, rags, and gasoline.</li> <li>• If there is any static sparking or you feel an electric shock while using the equipment, <b>stop dispensing immediately</b>. Do not use the equipment until you have identified and corrected the problem.</li> <li>• Be sure all electrical work is performed by a qualified electrician only.</li> <li>• Have any checks, installation, or service to electrical equipment performed by a qualified electrician only.</li> <li>• Be sure all electrical equipment is installed and operated in compliance with applicable codes</li> <li>• Be sure power is disconnected when servicing and repairing equipment</li> <li>• Before operating the equipment, extinguish all open flames or pilot lights in the dispense area</li> <li>• Do not smoke in the dispensing area.</li> <li>• Keep liquids away from the electrical components</li> <li>• Disconnect electrical power at the main switch before servicing the equipment.</li> </ul>

 **WARNING**



**SKIN INJECTION HAZARD**

Spray from the gun, leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate surgical treatment.**
- Do not stop or deflect fluid leaks with you hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** in your separate equipment manuals whenever you are instructed to: relieve pressure; stop dispensing; clean, check, or service the equipment; or install or clean a nozzle.
- Tighten all the fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.
- Always wear eye protection and protective clothing when installing, operating, or servicing this dispensing equipment.
- Never wipe off build-up around the nozzle or inlet cap until pressure is fully relieved.



**TOXIC FLUID OR FUMES HAZARD**

Hazardous fluids or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled.

- Provide fresh air ventilation to avoid the buildup of vapors from the fluid being dispensed.
- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.
- Avoid exposure to heated material fumes.

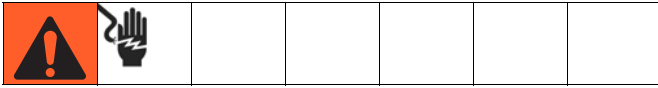


**HOT SURFACE AND FLUID HAZARD**

Heated fluid can cause severe burns and can cause equipment surfaces to become very hot.

- Wear protective gloves and clothing when operating this equipment in a heated system.
- Do not touch the metal heat sink when the surface is hot.
- Allow the equipment to cool thoroughly before servicing.
- Some heated systems are designed to dispense Polyurethane (PUR) heated materials. PUR Systems are supplied with ventilation hoods, and require proper ventilation and specifically designed system components.

# Installation



## Dust and Foreign Matter

Avoid having dust or foreign matter enter 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 30 mesh fluid filter upstream of the flow meter.
- The flow meter was calibrated in oil. Flush the meter with a compatible solvent prior to use.

**CAUTION**

The use of PTFE tape or pipe seal on fluid fittings upstream of this meter should be avoided if possible. Contaminants from sealing material may damage the meter.

## Installing the Flow Meter

- Flow volume can only be measured at the location where the flow meter is installed.
- Do not use more than 200 ft. (61 m) of cable.
- Refer to FIG. 1 to locate and install the flow meter, connectors, and fluid shutoff valves. Install a check valve to prevent backflow. The arrows on the flow meter and check valve show the direction of fluid flow.
- The shutoff valves allow you to isolate the meter for service.
- Refer to the **Technical Data** and **Dimensional Drawings** for dimension, inlet/outlet size, temperature and other specifications.

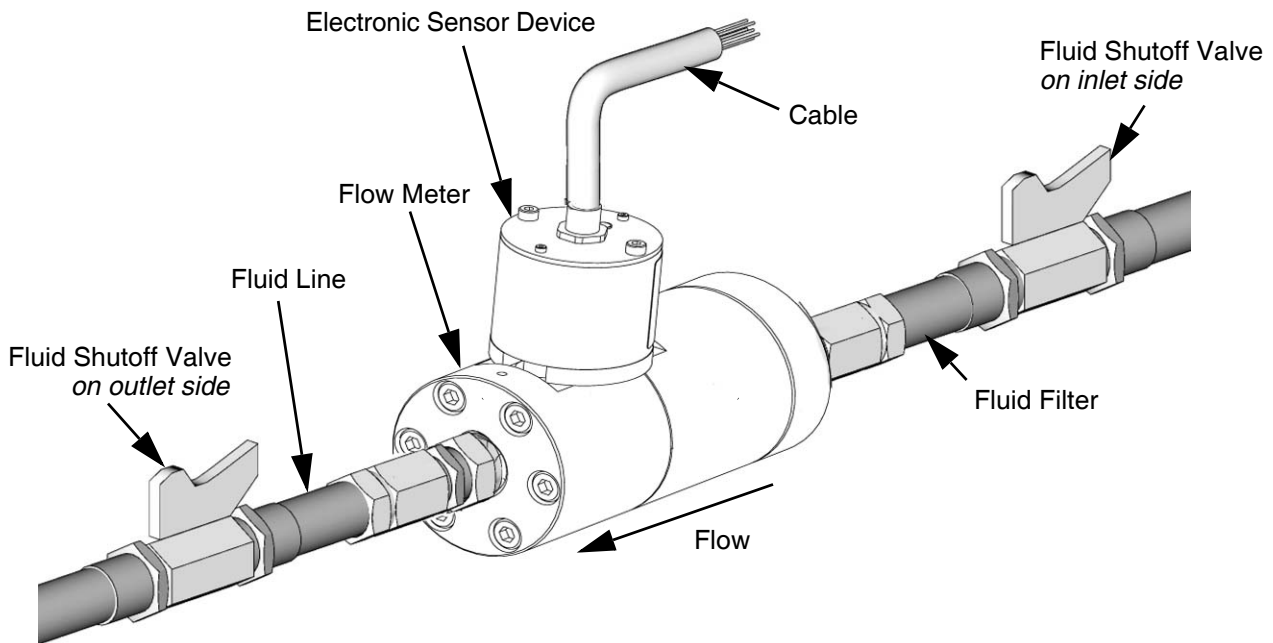
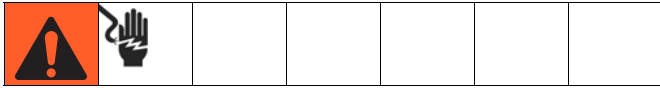


FIG. 1

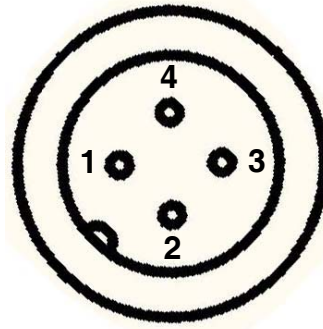
## Grounding



1. Always ground the fluid supply unit, using one of the following options:
  - a. Mount the meter to a grounded conductive surface, or
  - b. Connect the conductive fluid hose to the meter inlet and outlet.
  - c. Connect a ground wire to the meter's M6 mounting holes.

2. Never use the flow meter with an electrostatic gun isolation stand.

### Sensor Connector Pin-out



- Pin 1: +10-30 Vdc Supply
- Pin 2: Signal Out
- Pin 3: Ground
- Pin 4: No Connection

**NOTE:** This drawing shows the pin connector used on meters 246190 Series D, 246340 Series D, 246652 Series C, and newer. Older meters used a 5-pin connector.

Sensor Kit 246786 now includes a cable with a 4-pin connector, to replace the existing cable connection.

**FIG. 2**

# Operation



## Pressure Relief Procedure

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.

## 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 position is monitored by a sensor device. An electrical impulse is produced by the sensor each time a gear tooth moves past it.

## 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**.

## Flow Volume Range

See **Technical Data** on page 18 for flow volume range.

<b>CAUTION</b>
The flow meter gears and bearings can be damaged if they rotate 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.

## Flow Meter Verification


The factory calibration factor (k factor) for the flow meter is stated in the **Technical Data** section of the manual. This calibration factor is the number of flow meter pulses per liter, as determined by a measurement with oil.

Most sealant and adhesive materials are compressible and, since the flow meter is measuring the material under high pressure, the actual volume of material may vary slightly from the measured volume due to this compressibility.

To adjust the flow meter k factor to reflect the uncompressed volume dispensed more accurately, perform the following steps:

1. Obtain a beaker, 500 cc or larger, and measure the mass of the empty beaker.
2. Manually dispense material into the beaker.
3. Record both the volume displayed and the current flow meter k factor (pulses per liter).
4. Measure the mass of the full beaker.
5. Subtract the weight of the empty beaker to determine the fluid mass.
6. Calculate the actual volume dispensed:
 
$$\text{fluid mass (g)} = \text{volume (cc)} \times \text{density (g/cc)}$$
7. Calculate the new flow meter k factor:
 
$$\text{k factor} = \frac{\text{displayed volume (cc)} \times \text{k factor (old)}}{\text{measured volume (cc)}}$$
8. Repeat steps 1-7 to validate the k factor.

# Troubleshooting

 The sensor is not a serviceable part. Replace it if it is malfunctioning.

Problem	Cause	Solution
No flow volume displayed at monitoring unit	Flow volume is too low to measure	Increase flow volume.
	Fluid is not flowing	See <b>Problem:</b> Fluid is not flowing, below.
	Damaged cable	Replace cable.
	Improper input voltage to sensor	Make sure input power is 10-30 Vdc.
	Damaged sensor	Replace sensor if it is malfunctioning.
Fluid is not flowing	Clogs in fluid line or in meter	Clean fluid line and/or meter; see <b>Maintenance</b> section.
	Gears worn or damaged	Service meter; see <b>Maintenance</b> section.



# Maintenance



## CAUTION

Do not immerse the meter in solvent with the electronic sensor installed. Solvent could damage the electrical components.

Air purge is not recommended for any gear-type flow meter. Air purges do not provide the lubrication the meter gears require.

## Residue Build-up on the Meter Gears

Residue build-up may cause the meter gears to bind or stop rotating, which decreases the meter accuracy and makes 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. Excessive residue build-up usually means that you are using improper cleaning solvents and/or cleaning sequences or processes.

- Check the meter routinely to develop the correct cleaning schedule.
- Use the proper cleaning solvent for the fluid being metered.

## 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 7.
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 supply.
6. Turn on the fluid supply.
7. Operate until the meter and fluid line are free of solvent.

## CAUTION

It is not recommended that the meter be operated or flushed with water. Should this occur, residual water should be removed with alcohol and the internal components of the meter should be coated with a light film of oil. If the device is to remain inoperative for an extended period of time, internal components of the meter should be coated with a light film of oil.

## Disassembly



 Clean and service the meter at a clean work-bench. Use only lint-free cloth on parts.

1. Follow the **Pressure Relief Procedure**, on page 7. Then close the fluid shut-off valve on each side of the meter.
2. Disassemble the sensor assembly (19) and sensor pad (17) from the flow meter housing by removing M4 screws (18 & 20). See page 11.
3. Loosen the six M8 screws (2) from the end housing (1) of the flow meter.
4. Remove four of the six screws (2) from the end housing (1) keeping the two opposite bolts engaged by several threads.

## CAUTION

To avoid damaging the shafts (4 & 8), 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.

5. Hold the end housing (1) and gently alternately tap on the two screws (2) with a hammer to separate the middle housing (11).
6. Remove the last two screws (2) and carefully separate the end (1) and middle housings (11) completely.
7. Remove and inspect the helical gear assemblies (4 & 8), gear bearings (5 & 7), and gear spacer (9) by lifting the gears straight out.
8. Check that the ball bearings (6) and dowel pins (13) did not fall out of their locations.
9. Unscrew the six M8 screws (15) and remove the end cap (14).
7. Insert the 3-tooth helical gear (8) into the gear bearing (5), making sure the two helical gears mesh with each other.
8. Line up the holes in the middle housing (11) with the helical gears, and **carefully** slide the housing over the gears.

Use locating dowel pins (13). Choose dowel length based on the depth of the dowel holes in the housings. If both housings have 0.19 in. deep dowel holes, use 0.312 in. dowels. If one housing has 0.19 in. deep dowel holes and the other housing has 0.4 in. deep dowel holes, use 0.55 in. dowels. If both housings have 0.4 in. deep dowel holes, use .75 in. dowels.

## Inspection

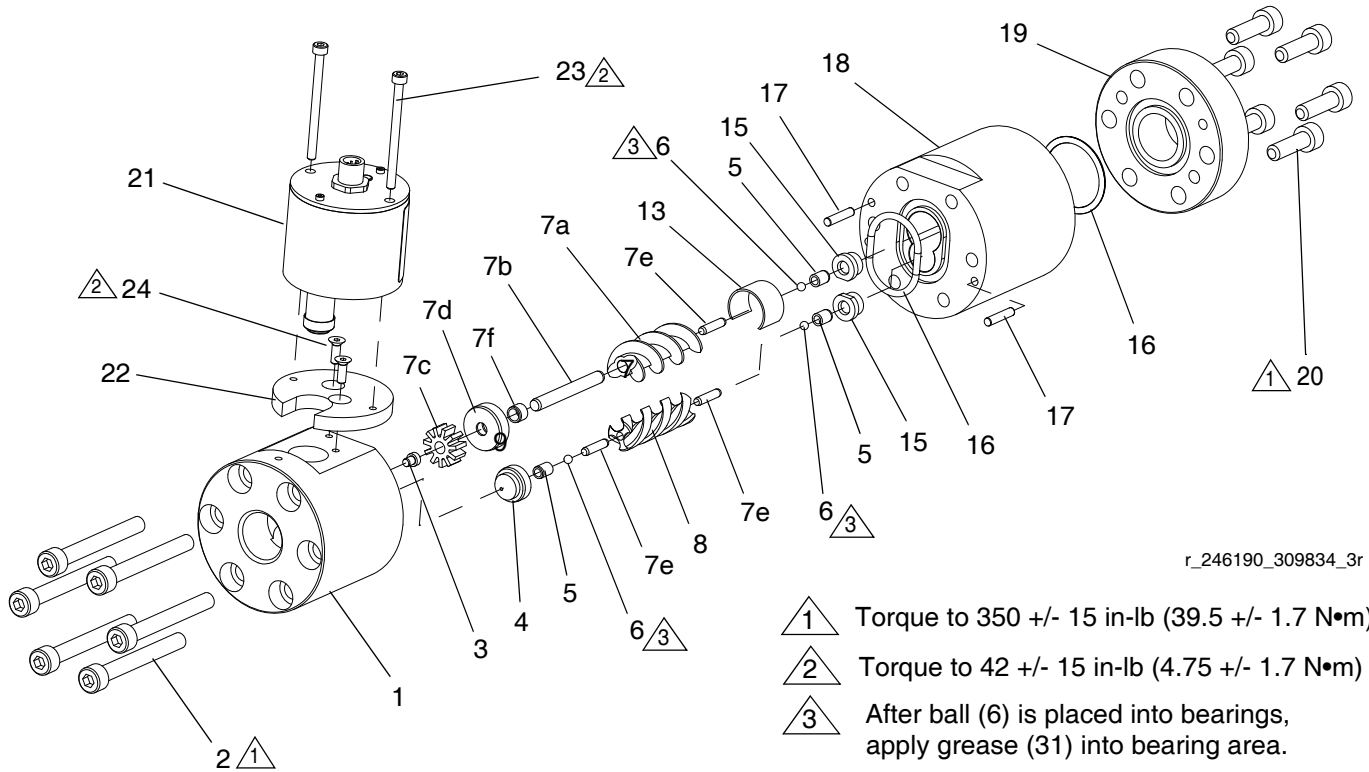
1. Inspect the gears, shafts and bearings.
2. Inspect the housings.
3. Check the o-ring (12) condition, replace the o-ring if necessary.
4. Clean the meter parts with compatible solvent.

## Assembly

1. With the middle housing (11) inlet side pointing up, check that the o-ring (12) is seated snugly on the end cap (14). Screw the end cap (14) to the middle housing (11) using M8 screws (15) and hand tighten. Make sure the four index holes on the housing line up. Torque the six screws (15) to 350 +/- 15 in-lb. (39.5 +/- 1.7 N•m). Do not overtighten.
2. Flip the middle housing (11) and end cap (14), so the outlet side is facing up. Check that o-ring (12) is seated snugly in its groove.
3. With the end housing (1) facing up, insert the 2-tooth helical gear assembly (4) including the centering spacer bearing into the larger bore of the end housing (1) with the spur gear end going first.
4. Slide the shaft spacer (9) over the 2-tooth helical gear (4) and place it into the large bore of the end housing (1) above the centering spacer bearing.
5. Press the shaft spacer (9) down until it sits flush in the end housing (1).
6. Install the gear bearing (5) into its hole in the end cap (1), lifting the 2-tooth helical gear (4) if necessary.
9. Insert the two opposing screws (2) in the end housing (1) and alternately tighten each down until the two housing parts (1 and 11) are together.
10. Insert and tighten the remaining four screws (2) in the end housing (1).
11. Torque the six screws (2) in the end housing (1) to 350 +/- in-lb (39.5 +/- 1.7 N•m). Do not overtighten. Assemble the sensor assembly (19) and sensor pad (17) to the flow meter using M4 screws (18 & 20). Tighten the M4 screws (18 & 20) to 42 +/- 15 in-lb (4.75 +/- 1.7 N•m). Do not overtighten.

# Parts

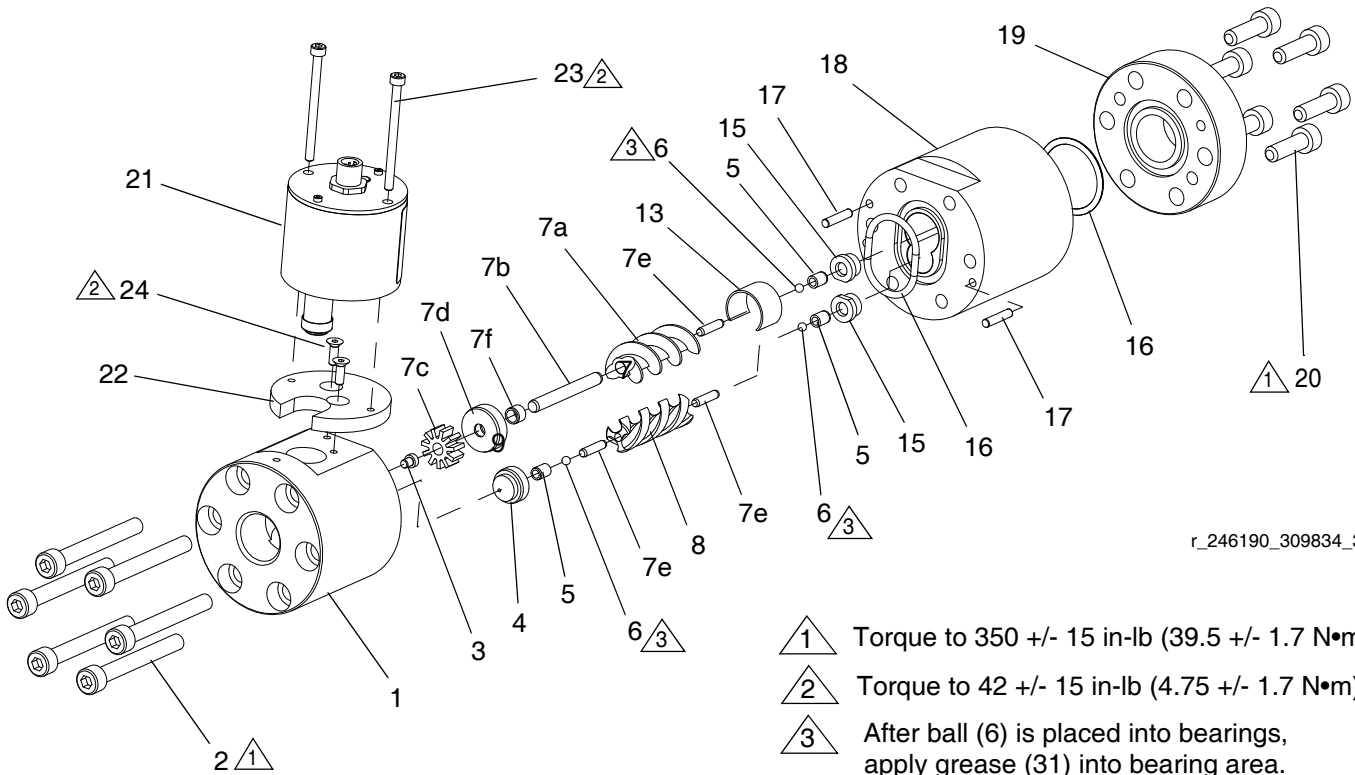
## Model 246190, HG6000 Meter



Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
1		HOUSING, end	1	16*†	117541	SEAL	2
2	117535	SCREW, cap, socket head	6	17†		PIN, dowel, 0.75 in.	2
3		GUIDE, gear	1	18†		HOUSING, middle	1
4†		INSERT, bearing	1	19		CAP, end	1
5†	246594	BEARING, gear (includes 4)	3	20	117536	SCREW, cap, socket head	6
6†	101680	BALL, bearing	3	21	24U114	SENSOR, Model 246190 only	1
7*	234052	GEAR, sub-assembly; 2-tooth (includes 7a-7f)	1	239717		SENSOR, Model 280560 only	1
7a		GEAR	1	22	15B413	PAD, sensor	1
7b		ROD, gear	1	23	114100	SCREW, cap, socket head	2
7c		GEAR, spur	1	24	106371	SCREW, mach, hex flat head	2
7d		GUIDE, rod	1	31†		LUBRICANT, grease	1
7e		ROD, gear	3	★			
7f		BEARING	1				
8*	234053	GEAR, sub-assembly; 3-tooth (includes 7e)	1				
13*		SPACER, shaft, gear	1				
15†		INSERT, bearing	2				

\* Included in Gear Replacement Kit 246596.  
 † Included in Bearing Replacement Kit 253215.  
 ★ Not shown.

# Model 280560, HG6000 Meter



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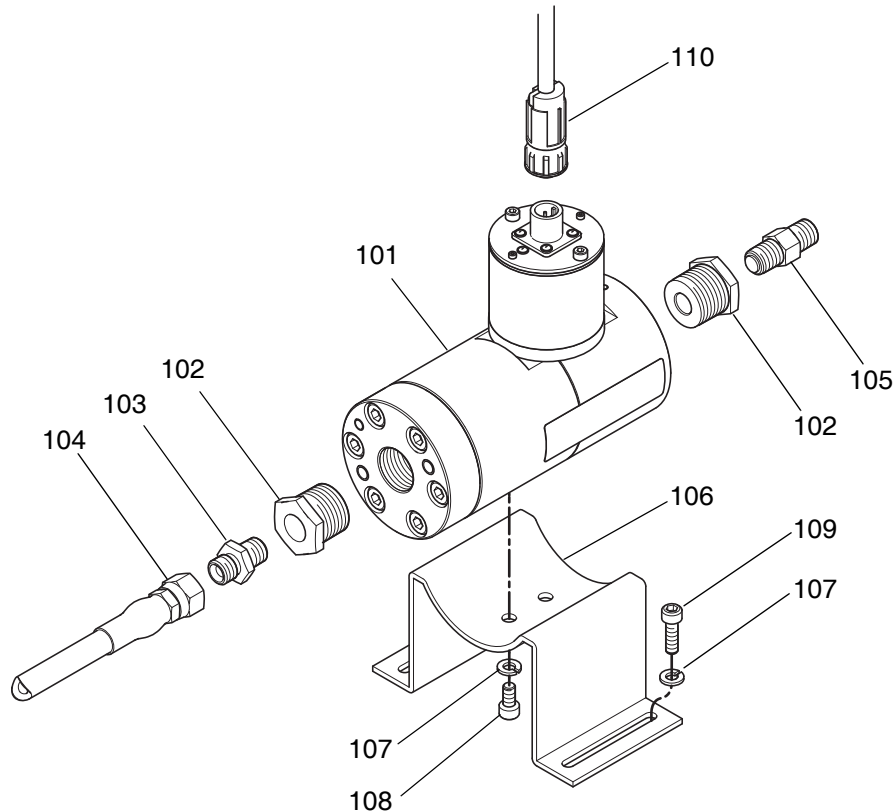
- Torque to 350 +/- 15 in-lb (39.5 +/- 1.7 N•m)
- Torque to 42 +/- 15 in-lb (4.75 +/- 1.7 N•m)
- After ball (6) is placed into bearings, apply grease (31) into bearing area.

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
1		HOUSING, end	1	16*†	117541	SEAL	2
2	117535	SCREW, cap, socket head	6	17†		PIN, dowel, 0.75 in.	2
3		GUIDE, gear	1	18†		HOUSING, middle	1
4†		INSERT, bearing	1	19		CAP, end	1
5†	246594	BEARING, gear (includes 4)	3	20	117536	SCREW, cap, socket head	6
6†	101680	BALL, bearing	3	21	239717	SENSOR	1
7*	234052	GEAR, sub-assembly; 2-tooth (includes 7a-7f)	1	22	15B413	PAD, sensor	1
7a		GEAR	1	23	114100	SCREW, cap, socket head	2
7b		ROD, gear	1	24	106371	SCREW, mach, hex flat head	2
7c		GEAR, spur	1	31†		LUBRICANT, grease	1
7d		GUIDE, rod	1	★			
7e		ROD, gear	3				
7f		BEARING	1				
8*	234053	GEAR, sub-assembly; 3-tooth (includes 7e)	1				
13*		SPACER, shaft, gear	1				
15†		INSERT, bearing	2				

\* Included in Gear Replacement Kit 246596.  
 † Included in Bearing Replacement Kit 253215.  
 ★ Not shown.

# Part No. 15V820 Helical Gear Fluid Flow Meter Assembly

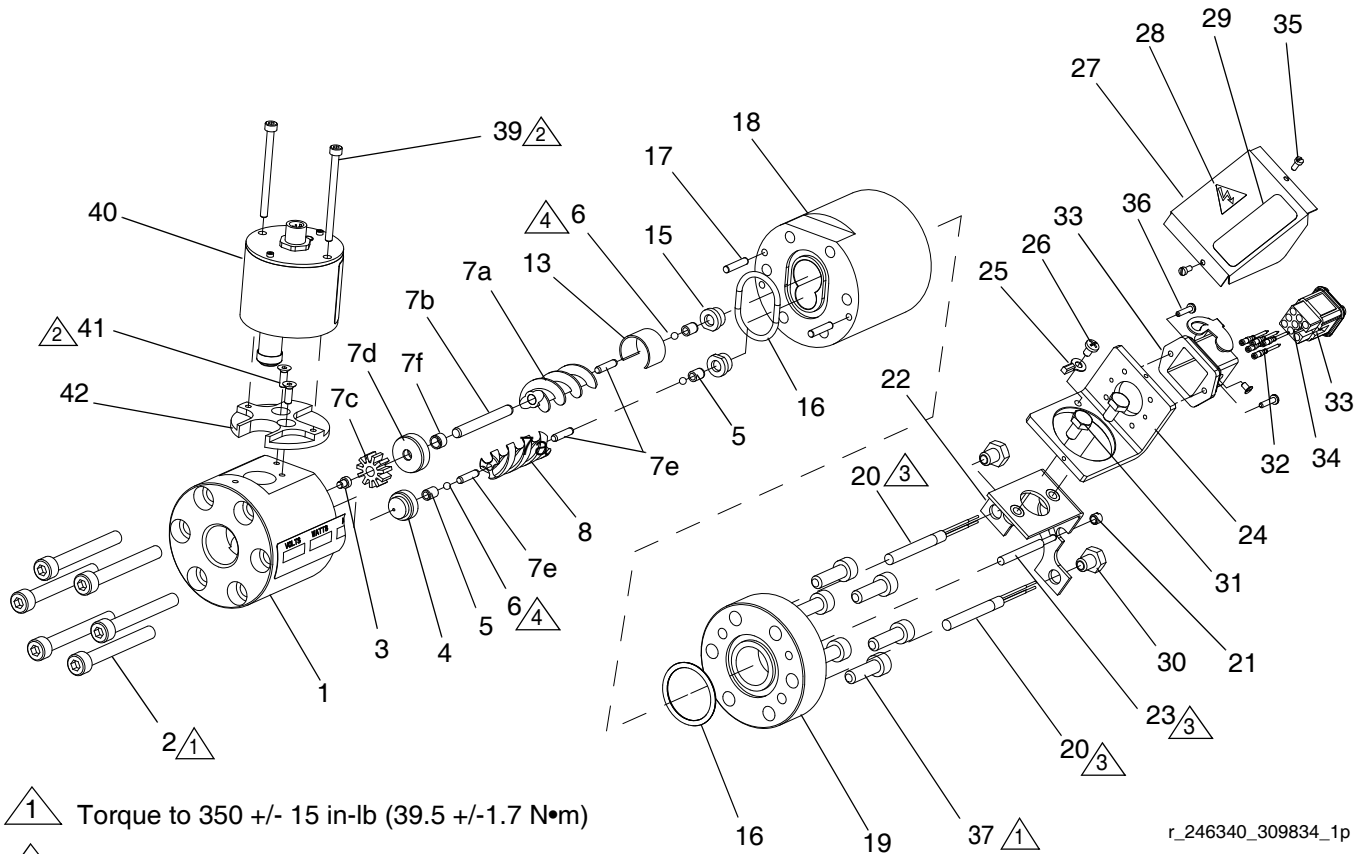
(uses sensor approved for use on ProMix 2KS Control Platform)



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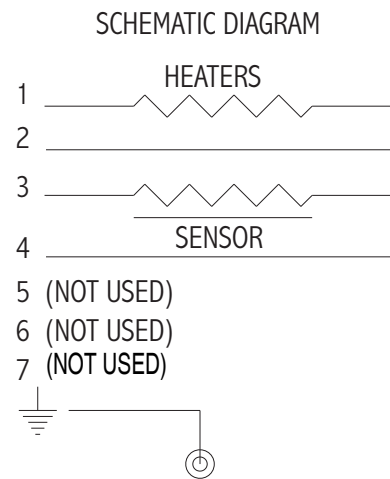
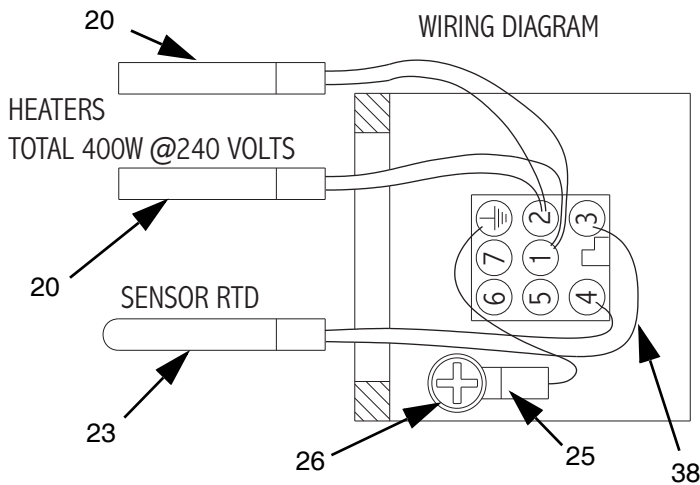
Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
101	280560	METER, HG6000; see page 12	1	106	117670	BRACKET, mounting	1
102	15M861	REDUCER, pipe; 3/4 npt(m) x 1/4 npt(f)	2	107	115226	WASHER, lock; M6	6
103	166846	ADAPTER; 1/4 npt x 1/4 npsm	1	108	107530	SCREW, cap, socket head; M6 x 12 mm	2
104	205099	HOSE, fluid, high pressure; ptfe; 2.5 ft (0.76 m); 1/4 npsm(fbe)	1	109	108328	SCREW, cap, socket head; M6 x 20 mm	4
105	501867	VALVE, check; 1/4 npt(mbe)	1	110	241799	CABLE, meter; 5 ft (1.52 m)	1

# Model 246340, HG6000HT Meter and Model 24R174, HG6000HT-FM Meter



r\_246340\_309834\_1p

- 1 Torque to 350 +/- 15 in-lb (39.5 +/- 1.7 N•m)
- 2 Torque to 45 +/- 15 in-lb (5.09 +/- 1.7 N•m)
- 3 Apply thermal lubricant (45)
- 4 After ball (6) is placed into bearings, apply grease (52) into bearing area.



**NOTE:** This flow meter is controlled by the system controls.

**Model 246340, HG6000HT Meter and  
Model 24R174, HG6000HT-FM Meter**

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
1		HOUSING, end	1	30	15B773	INSERT, threaded; m8	2
2	117535	SCREW, cap, socket head	6	31	102235	SCREW, cap, hex head	2
3		GUIDE, gear	1	32	115862	CONNECTOR, male, crimp	5
4†		INSERT, bearing	1	33	115861	BULKHEAD, housing, insulating	1
5†	246594	BEARING, gear (includes 4)	3	34	115860	INSERT, male	1
6†	101680	BALL, bearing	3	35	C19269	SCREW, mach, slotted head	2
7*	234052	GEAR, sub-assembly; 2-tooth (includes 7a-7f); <i>Model 246340 only</i>	1	36	100171	SCREW, mach, pan head	2
7**	24R205	GEAR, sub-assembly; 2-tooth, (includes 7a-7f); <i>Model 24R174 only</i>	1	37	117536	SCREW, cap, socket head	6
7a		GEAR	1	38	065345	WIRE, copper, electrical; 16AWG, 0.5	
7b		ROD, gear	1	39	114100	SCREW, cap, socket head	2
7c		GEAR, spur	1	40	24U114	SENSOR, heli gear, hi resolution	1
7d		GUIDE, rod	1	41	106371	SCREW, mach, hex flat head	2
7e		ROD, gear	3	42	15C506	PAD, sensor	1
7f		BEARING	1	45★		LUBRICANT, thermal	1
8*	234053	GEAR, sub-assembly; 3-tooth (includes 7e); <i>Model 246340 only</i>	1	50★		TUBE, polyolefin, shrinkable	1
8**	24R690	GEAR, sub-assembly; 3-tooth (includes 7e); <i>Model 24P690 only</i>	1	52†		LUBRICANT, grease	1
13*		SPACER, shaft	1	★			
15†		INSERT, bearing	2				
16*†	117541	SEAL	2				
17†		PIN, dowel; 0.75 in.	2				
18†		HOUSING, middle	1				
19		CAP, end	1				
20	116614	HEATER, cartridge; 240V	2				
21	15B774	INSERT, threaded; m6 x 0.75	1				
22	15C336	BRACKET, mounting, electric connector	1				
23	C32255	SENSOR, temperature	1				
24	C34043	BRACKET	1				
25	101674	TERMINAL	1				
26	112144	SCREW, mach, pan head	1				
27	C34040	COVER	1				
28	189930	LABEL, caution	1				
29	290228	LABEL, caution	1				

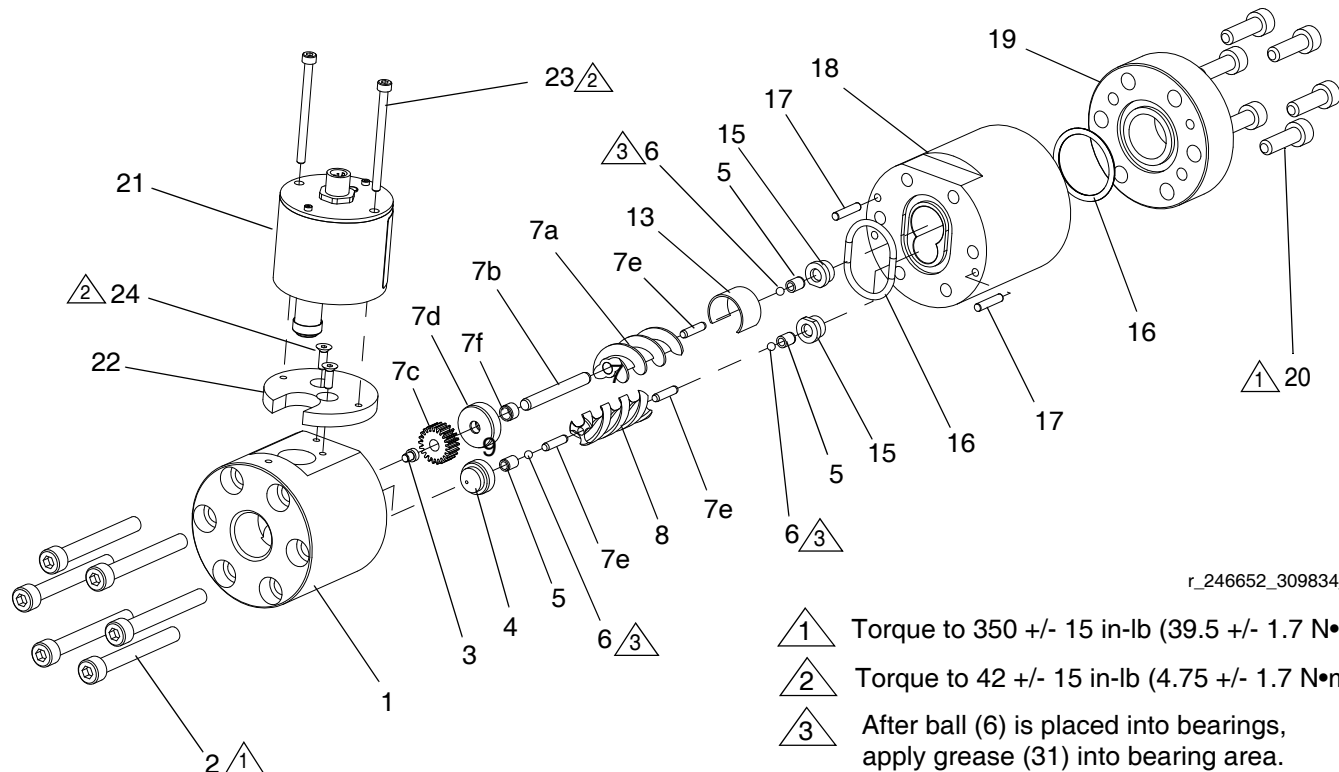
\* Included in HG6000HT Gear Replacement Kit 246596.

\*\* Included in HG6000HT-FM Gear Replacement Kit 16U675.

† Included in Bearing Replacement Kit 253215.

★ Not shown.

# Model 246652, HG6000HR Meter and Model 24P688, HG6000HR-FM Meter



r\_246652\_309834\_11

- Torque to 350 +/- 15 in-lb (39.5 +/- 1.7 N•m)
- Torque to 42 +/- 15 in-lb (4.75 +/- 1.7 N•m)
- After ball (6) is placed into bearings, apply grease (31) into bearing area.

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
1		HOUSING, end	1	13*		SPACER, shaft	1
2	117535	SCREW, cap, socket head	6	15†		INSERT, bearing	2
3		GUIDE, gear	1	16*†	117541	SEAL	2
4†		INSERT, bearing	1	17†		PIN, dowel; 0.75 in.	2
5†	246594	BEARING, gear (includes 4)	3	18†		HOUSING, middle	1
6†	101680	BALL, bearing	3	19		CAP, end	1
7*	246686	GEAR, sub-assembly; 2-tooth (includes 7a-7f); Model 246652 only	1	20	117536	SCREW, cap, socket head	6
7**	24P689	GEAR, sub-assembly; 2-tooth (includes 7a-7f); Model 24P688 only	1	21	24U114	SENSOR	1
7a		GEAR	1	22	15B413	PAD, sensor	1
7b		ROD, gear	1	23	114100	SCREW, cap, socket head	2
7c		GUIDE, rod	1	24	106371	SCREW, mach, hex flat head	2
7d		ROD, gear	3	31†		LUBRICANT, grease	1
7e		BEARING	1	★			
7f		GEAR, spur, 22 teeth	1				
8*	234053	GEAR; sub-assembly; 3-tooth (includes 7d); Model 246652 only	1				
8**	24P690	GEAR; sub-assembly; 3-tooth (includes 7d); Model 24P688 only	1				

\* Included in HG6000HR Gear Replacement Kit 246949.

\*\* Included in HG6000HR-FM Gear Replacement Kit 16U006.

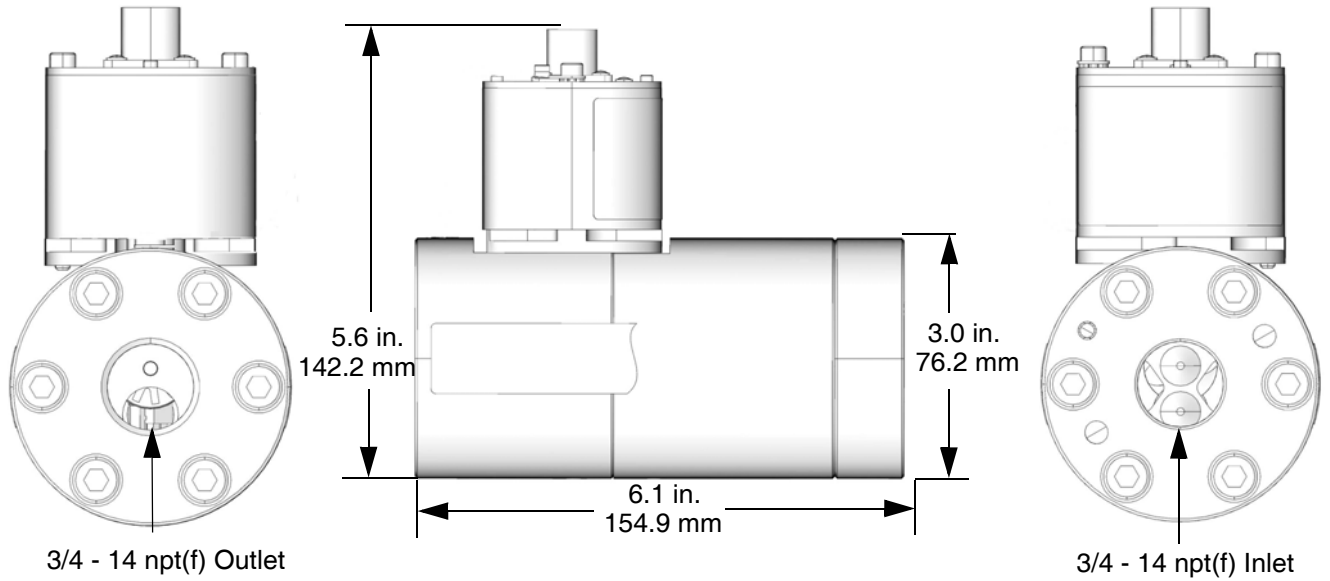
† Included in Bearing Replacement Kit 253215.

★ Not shown.

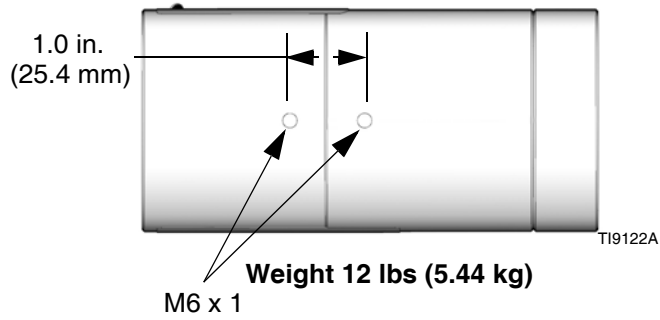


# Dimensions

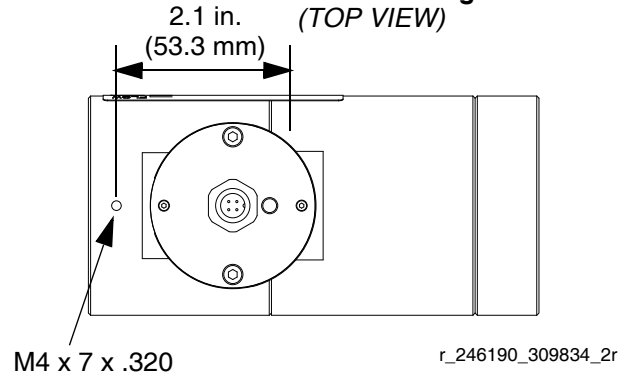
## Flow Meter Port Size



## Flow Meter Mounting Holes (BOTTOM VIEW)



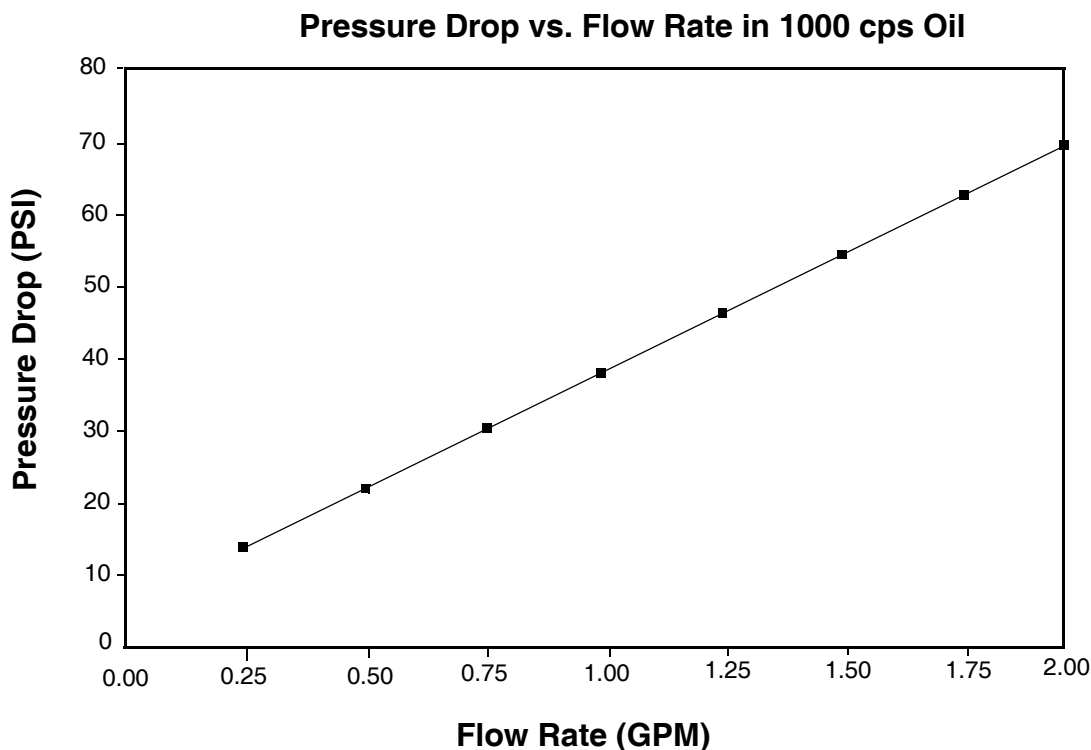
## Flow Meter Mounting Holes (TOP VIEW)



# Technical Data

Category	Data
Maximum Working Fluid Pressure	6000 psi (41 MPa, 410 bar)
Flow Range**	Models 246190, 246340, 280560, 15V820, and 24R174: 0.05 to 6.0 gpm (190 to 22,712 cc/min) Models 246652 and 24P688: 0.05 to 2.0 gpm (190 to 7571 cc/min.)
Maximum Operating Temperature	Models 246190, 246652, and 24P688: 180° F (82° C) Models 280560 and 15V820: 140° F (60° C) Models 246340 and 24R174: 400° F (204° C)
Maximum Ambient Temperature	Models 246190, 246652, 246340, 24P688, and 24R174: 180° F (80° C) Models 280560 and 15V820: 140° F (60° C)
Fluid Viscosity Range	30 - 1,000,000 cps
Maximum Cable Length	200 ft (61 m)
Flow Meter Inlet/Outlet	3/4 npt(f)
Resolution (K-Factor)	Models 246190, 246340, 280560, 15V820, and 24R174 - (0.286 cc/pulse) (3500 pulses/liter) Models 246652 and 24P688 - (0.143 cc/pulse) (7000 pulses/liter)
Accuracy	+/- 0.25%*
Repeatability	+/- 0.1%
Supply Voltage	10 - 30 Vdc
Typical Current	15 mA
Approvals	CE: Models 246190, 246652, 246340, 280560, 24P688, and 24R174 EX: Model 15V820 only.
Wetted Parts	303 Stainless Steel, 440 SST, Carpenter Technology 7-mo Plus® Duplex SST, Tungsten Carbide, PTFE
* For most commonly used coatings, the flow meter reading will be accurate to within +/- 0.25%. Accuracy will diminish at low viscosities and low flow rates.	

\*\* The Flow Range is a generic rating meant to cover a wide variety of materials and applications. However, the Flow Range may be different depending on the Graco system in which the Flow Meter is used. To find the Flow Range for a specific Graco system, refer to that system's Operation Manual.



## Accessories

*Use Only Genuine Graco Parts and Accessories*

### **Fluid Filter C58997 (30 mesh)**

5000 psi (350 bar) Maximum Working Pressure

With cast iron head and bowl

### **30 Mesh Filter Screen 515222**

Recommended for use with Fluid Filter C58997.

### **Filter Bank C59547**

5000 psi (350 bar) *Maximum Working Pressure*

C58997 Filter with Mounting Bracket, Shutoff Valves, and 30 Mesh Filter Screen

### **Fluid Shutoff Valve 521477**

5000 psi (350 bar) *Maximum Working Pressure*

1 in. npt(f). For shutting off the fluid and isolating the flow meter for service or replacement. See page 5.

### **High Resolution Meter Sensor Replacement Kit 246786**

The sensor update has been made to meters 246190 Series D, 246340 Series D, 246652 Series C, and newer. Cable 123409 is added to this kit (Series B) to replace the existing sensor cable used on older series meters than those listed above.

### **Electrical Cable 123409**

For connecting to sensor (included in Sensor Replacement Kit 246786, Series B).

20 in. (.51 m) cable with one end terminated for connection to the sensor and the other end is left bare for connection to a junction box or special connector.

# Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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

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

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

**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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For patent information, see [www.graco.com/patents](http://www.graco.com/patents).

**TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.  
Phone: 612-623-6921 or Toll Free: 1-800-328-0211 Fax: 612-378-3505**

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Original instructions. This manual contains English. MM 309834

**Graco Headquarters:** Minneapolis

**International Offices:** Belgium, China, Japan, Korea

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