

83 and 84 I/A Series® Intelligent Vortex Flowmeter Sensor Replacement Kits

Kit Identification

The sensor replacement kit varies with the electrical safety certification. It also varies with the sensor material, fill fluid and temperature range.



Table 1. Kit Parts for 84 (Style A) Series Flowmeters With ATEX, CSA, IECEx, and NEPSI Certification Codes H, D, B, and S

Sensor Material, Fill Fluid, and Temperature Range	Sensor Replacement Kit	Sensor	Seal Kit (a)	Tie Wraps (2)	Instruction
D	K0152KV	K0148JK	K0148VF	N0139FR	MI 019-209
F	K0152KW	K0148JJ	K0148VF		
R	K0152KX	K0148JH	K0148VF		
S	K0152KY	K0148JG	K0148VF		
C	K0152KZ	K0148KQ	K0148VH		
T	K0152LA	K0148KN	K0148VG		

a. See Table 5 for contents of Seal Kits.

Table 2. Kit Parts for all 83 Series Flowmeters and 84 (Style A) Series Flowmeters for Other Than ATEX, CSA, IECEx, and NEPSI Certification Codes H, D, B, and S

Sensor Material, Fill Fluid, and Temperature Range	Kit	Sensor	Seal Kit (a)	Tie Wraps (2)	Instruction
D	K0148KV	K0148JF	K0148VF	N0139FR	MI 019-209
F	K0148KU	K0148JE	K0148VF		
R	K0148KS	K0148JD	K0148VF		
S	K0148KR	K0148JC	K0148VF		
C	K0148KY	K0148KM	K0148VH		
T	K0148KX	K0148KK	K0148VG		

a. See Table 5 for contents of Seal Kits.

Table 3. Kit Parts for Model 84F (Style B) Series Flowmeters With ATEX, CSA, IECEx, and NEPSI Certification Codes H, D, B, and S

Sensor Material, Fill Fluid, and Temperature Range	Kit	Sensor	Seal Kit (a)	Tie Wraps (2)	Instruction
D	K0161FL	K0148JK	K0161EY	N0139FR	MI 019-209
F	K0161FK	K0148JJ	K0161EY		
R	K0161FJ	K0148JH	K0161EY		
S	K0161FH	K0148JG	K0161EY		
A and E	K0161FN	K0148KQ	K0161FA		
B and G	K0161FM	K0148KN	K0161EZ		

a. See Table 6 for contents of Seal Kits.

Table 4. Kit Parts for Model 84F (Style B) Series Flowmeters for Other Than ATEX, CSA, IECEx, and NEPSI Certification Codes H, D, B, and S

Sensor Material, Fill Fluid, and Temperature Range	Kit	Sensor	Seal Kit (a)	Tie Wraps (2)	Instruction
D	K0161FE	K0148JF	K0161EY	N0139FR	MI 019-209
F	K0161FD	K0148JE	K0161EY		
R	K0161FC	K0148JD	K0161EY		
S	K0161FB	K0148JC	K0161EY		
A and E	K0161FG	K0148KM	K0161FA		
B and G	K0161FF	K0148KK	K0161EZ		

a. See Table 6 for contents of Seal Kits.

Table 5. Seal Kit Contents for Model 84F (Style A)

Sensor Material, Fill Fluid, and Temperature Range	Seal Kit	O-Ring	Gasket	Flow Dam	Bonnet Bolts (4)
D	K0148VF	D0100RP	L0121DT	L0112KT	X0173MC
F	K0148VF	D0100RP	L0121DT	L0112KT	X0173MC
R	K0148VF	D0100RP	L0121DT	L0112KT	X0173MC
S	K0148VF	D0100RP	L0121DT	L0112KT	X0173MC
C	K0148VH	K0147CC	K0146PT	K0148VB	X0173MC
T	K0148VG	K0147CC	K0146HL	K0148VA	X0173MC

Table 6. Seal Kit Contents for Model 84F (Style B)

Sensor Material, Fill Fluid, and Temperature Range	Seal Kit	O-Ring	Gasket	Flow Dam	Bonnet Bolts (4)
D	K0161EY	D0100RP	L0121DT	L0112KT	X0173SV
F	K0161EY	D0100RP	L0121DT	L0112KT	X0173SV
R	K0161EY	D0100RP	L0121DT	L0112KT	X0173SV
S	K0161EY	D0100RP	L0121DT	L0112KT	X0173SV
A and E	K0161FA	K0147CC	K0146PT	K0148VB	X0174EY
B and G	K0161EZ	K0147CC	K0146HL	K0148VA	X0174EY

⚠ WARNING

1. Do **not** use these kits for 83W Flowmeters with CENELEC flameproof certification. Contact Global Customer Support for assistance.
2. Do not use these kits for sensors used in flowmeters purchased with a -H oxygen service cleaning option. These require special cleaning. Contact Global Customer Support for assistance.

⚠ CAUTION

1. Do **not** use the bonnet bolts in these kits for 84F-xxxxxL flowmeters (dual measurement with isolation valves). Use four X0173TF bolts as shown in the parts list.
2. Do **not** use these kits for 83S or 84S Flowmeters. Sensors in these flowmeters are not user replaceable. Return the entire flowmeter for repair or replacement.
3. Do not use these kits to replace a gold plated sensor. Contact Global Customer Support for assistance.
4. For model 84F (Style B), use Table 3, Table 4, and Table 6 for corresponding sensor replacement kits.

Model 84 Flowmeter Sensor Replacement Procedure

The flowmeter housing must be in a vertical mounting position (as shown in Figure 1) so that the bonnet bolts can be properly torqued. Therefore, if the flowmeter housing is not in the vertical position, remove the flowmeter from the line while doing a sensor replacement. In all cases, the pipeline must be shut down and emptied before loosening the bonnet bolts.

Replacing the sensor does not cause a shift in the K-factor. Therefore, the flowmeter does not require recalibration.

⚠ WARNING

In the event you need to change the bonnet, it is imperative that you use the correct bonnet for your meter required by the applicable agency certifications. Failure to use the correct bonnet could result in personal and property damage. Consult Global Customer Support (GCS) to ensure the correct bonnet is used for your Vortex meter and application.

Integrally Mounted Flowmeter

Refer to Figure 1.

Sensor Assembly Removal

▲ WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. Remove the electronic module as follows:
 - a. For flowmeters with housing cover locks, screw the electronic compartment cover lock screw into the housing to unlock the cover.
 - b. Remove electronic module compartment threaded cover.

— NOTE

If the cover cannot be removed by hand, insert a flat bar in the cover slot.

- c. If a display is mounted to the electronic module, remove the display by loosening the two mounting screws and unplugging the ribbon cable from the electronic module.
 - d. Unscrew the two captive screws, one on each side of the electronic module.
 - e. Pull the electronic module out of the housing far enough to be able to unplug the connectors from the terminal blocks on the back of the electronic module.
 - f. Unplug the mA output (red - blue), pulse output (yellow - green), and preamplifier/sensor (blue - red - orange - yellow) cable connectors from the 2-, 3-, and 4-pin terminal blocks respectively.
 - g. Remove the electronic module from the housing.
2. If your flowmeter has explosionproof/flameproof electrical certification, disconnect the two wires from the PE ground screw in the electronics housing.
3. If your housing has an anti-rotation screw, remove the red lacquer from the screw recess. Turn the screw three full turns counterclockwise (see Figure 1 for location). Remove the housing by rotating it counterclockwise (when viewed from the top).
4. If your housing has a retention clip, remove the red lacquer from the screw recess. Remove the screw completely, and slide the clip off the housing. Save the clip and screw for future use. Remove the housing by rotating it counterclockwise (when viewed from the top).
5. Disconnect the (yellow and brown) sensor wires from the 4-position terminal block on the neck board. If your flowmeter has explosionproof/flameproof electrical certification, loosen the screw and rotate the metal barrier out of the way first.
6. Remove the bonnet bolts and lift off the electronic housing, bonnet, and sensor assembly as a unit.
7. Slide the sensor assembly out of the bonnet.

Sensor Assembly Installation

WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. If the flow dam has remained in the flowmeter body, remove it before starting to re-assemble. Also make sure that the O-ring chamfer in the bonnet is clean and doesn't contain any pieces of the old O-ring.
2. Slide the **new** O-ring over the sensor wires and onto the neck of the sensor.
3. Place the **new** flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket. Slide the **new** flow dam into the groove of the sensor.
4. Feed the sensor wires through the hole in the bonnet until the sensor is touching the bonnet and the wires extend through the hole in the center of the neck board.

— **NOTE** —

It may be helpful to use a straw as a tool to do this. Slide a straw over the sensor wires and feed the straw through the bonnet and neck board. Then remove the straw.

5. Insert the sensor with the bonnet into the flowmeter body and secure with four **new** bonnet bolts finger tight.

CAUTION

Do **not** use the bonnet bolts in these kits for 84F-xxxxxL flowmeters (dual measurement with isolation valves). Use four X0173TF bolts as shown in the parts list.

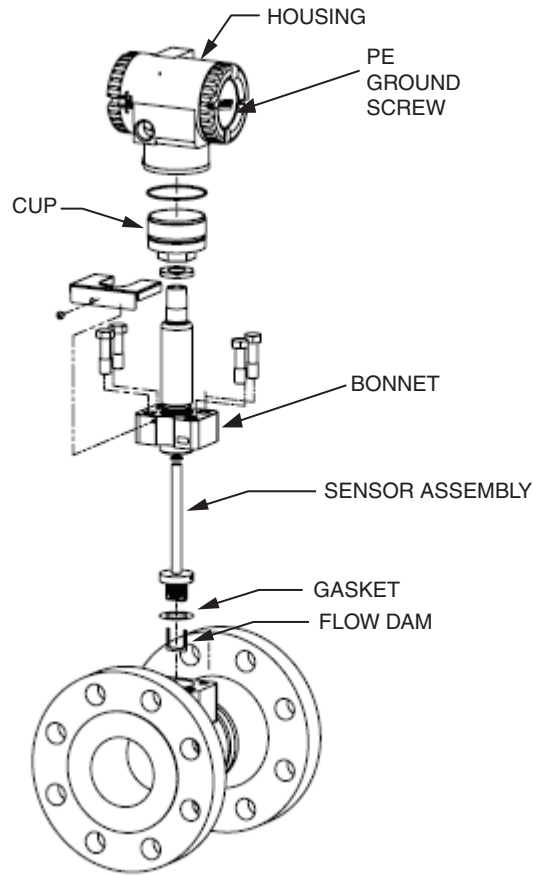


Figure 1. Sensor Replacement - Integrally Mounted Flowmeter

⚠ WARNING

It is important that the gasket be sealed uniformly to provide a good seal. The following two steps assure a uniform seal. Failure to follow these steps could result in personal injury due to gasket leakage.

6. Tighten all bonnet bolts to 2.8 N•m (2 lb•ft) per the sequence shown in Figure 2.

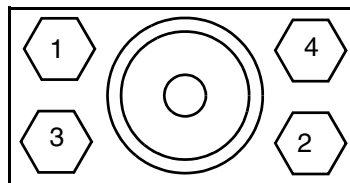


Figure 2. Bonnet Bolt Torquing Sequence

7. Continue to tighten to 7 N•m (5 lb•ft) using the same sequence.
8. Continue to tighten as follows:
 - a. For Model 84 (Style A) flowmeter, continue to tighten in steps of 7 N•m (5 lb•ft) using the same sequence. The maximum torque needed for safe operation is 34 N•m (25 lb•ft).
 - b. For Model 84F (Style B) flowmeter, tighten to 40.7 N•m (30 lb•ft).
9. Connect the (yellow and brown) sensor wires to the 4-position terminal block on the neck board. If your flowmeter has explosionproof/flameproof electrical certification, rotate the metal barrier into place and tighten its mounting screw. Lightly tug on each sensor wire to assure that the wire is firmly clamped in the terminal block. Also check that it is clamped on the metal conductor and not on the insulation.
10. Feed the electronics cable (and the PE ground wire if applicable) through the housing neck and into the electronics compartment.
11. Inspect the cup O-ring for damage. If the O-ring is damaged, replace it with the appropriate O-ring. (See parts list for your transmitter). Lubricate the O-ring with silicone lubricant (Part Number 0048130 or equivalent). Verify that the O-ring is situated in the groove of the neck.

⚠ WARNING

Failure to reuse or install the proper “Cup” O-ring for CSA labeled product violates ANSI / ISA 12.27.01.

12. Screw the housing onto the cup. Hand tighten until it bottoms. Do not over tighten.
13. If your housing has an anti-rotation screw, engage the anti-rotation screw until it touches the cup and back it off 1/8th turn. It is important that the screw is not touching the cup. Fill the screw recess with red lacquer (Part Number X0180GS or equivalent). the housing may then be rotated up to one full turn counterclockwise for optimum access.
14. If your housing has a retention clip, insert the clip over the boss in the housing neck so that the hole in the clip is aligned with the hole in the boss. Install the screw but do not tighten. The housing may then be rotated one full turn counterclockwise for optimum access. Tighten the retention clip screw and fill the screw recess with red lacquer (Part Number X0180GS or equivalent). The housing may then be rotated up to one full turn counterclockwise for optimum access.
15. If your flowmeter has explosionproof/flameproof electrical certification, reconnect the two (green) PE ground wires to the PE ground screw in the electronics housing.
16. Connect the mA output (red - blue) and pulse output (yellow - green), and electronics (blue - red - orange - yellow) cable connectors to the 2-, 3-, and 4-pin terminal blocks respectively on the back of the electronics module. Apply tie wraps as required.
17. Back the two electronic module captive screws out of the module until the screws are captured by the plastic housing.
18. Turn the module one turn maximum to take up the slack in the wires. Locate the electronics module over the mounting holes and making sure that no wires are pinched under the plastic housing, tighten the captive mounting screws.

19. If the electronic module was equipped with a display, reinstall the display. Carefully fold the ribbon cable in the space between the display and the electronic module so that it is not pinched. The display molding should rest firmly against the module molding before tightening the screws.
20. Reconnect the conduit to the housing and the wiring to the field wiring terminal block.
21. Replace the electronic compartment and terminal compartment covers. On flowmeters with housing cover locks, relock the covers **before** operating the flowmeter.

⚠ WARNING

In order to maintain agency certification of this product and to prove the integrity of the parts and workmanship in containing process pressure, a hydrostatic pressure test **must** be performed. The flowmeter must hold the pressure listed in Table 7 for one minute without leaking.

Table 7. Maximum Test Pressure (Model 84 F)

Model	End Connection	Test Pressure		
		316 SS (1.5X MWP)	Duplex SS, Nickel alloy CX2MW (equivalent to Hastelloy® C-22 (a)) (1.5X MWP)	Carbon Steel (MWP)
84F	ANSI Class 150	413 psi	435 psi	428 psi
	ANSI Class 300	1080 psi	1125 psi	1110 psi
	ANSI Class 600	2160 psi	2250 psi	2220 psi
	ANSI Class 900	3240 psi	3375 psi	3330 psi
	ANSI Class 1500	5400 psi	5625 psi	5558 psi
	PN 16	2.4 Mpa	2.4 Mpa	2.4 Mpa
	PN 25	3.8Mpa	3.8Mpa	3.8Mpa
	PN 40	6.0 Mpa	6.0 Mpa	6.0 Mpa
	PN 63	9.5 Mpa	9.5 Mpa	9.5 Mpa
	PN 100	15.0 Mpa	15.0 Mpa	15.0 Mpa
	PN 160	24.0 Mpa	24.0 Mpa	24.0 Mpa
84W	All	15 MPa (2250 psi)		

a. Hastelloy® is a registered trademark of Haynes International Inc.

Remotely Mounted Flowmeter

Refer to Figure 3.

Sensor Assembly Removal

⚠ WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. Remove the junction box threaded cover.

— NOTE

If the cover cannot be removed by hand, insert a flat bar in the cover slot.

2. Disconnect the (yellow and brown) sensor wires from the 2-position terminal block on the preamplifier.
3. Remove the bonnet bolts.
4. Lift off the junction box, bonnet, and sensor assembly as a unit.
5. Slide the sensor assembly out of the bonnet.

Sensor Assembly Installation

1. If the flow dam has remained in the flowmeter body, remove it before starting to reassemble. Also make sure that the O-ring chamfer in the bonnet is clean and doesn't contain any pieces of the old O-ring.
2. Slide the **new** O-ring over the sensor lead and onto the neck of the sensor.
3. Place the **new** flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket. Slide the **new** flow dam into the groove of the sensor.
4. Feed the sensor wires through the hole in the bonnet until the sensor is touching the bonnet and the wires extend through the slot in the center of the preamplifier board.

— NOTE

It may be helpful to use a straw as a tool to do this. Slide a straw over the sensor wires and feed the straw through the bonnet and neck board. Then remove the straw.

5. Insert the sensor with the bonnet into the flowmeter body and secure with four **new** bonnet bolts finger tight.

⚠ WARNING

Do **not** use the bonnet bolts in these kits for 84F-xxxxxL flowmeters (dual measurement with isolation valves). Use four X0173TF bolts as shown in the parts list.

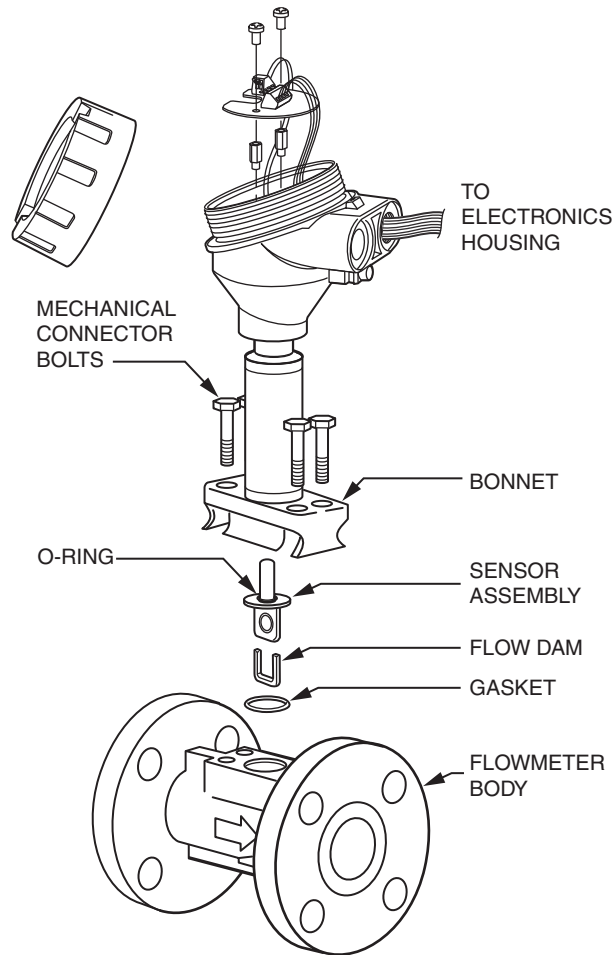


Figure 3. Sensor Replacement - Remotely Mounted Flowmeter

⚠ WARNING

It is important that the gasket be sealed uniformly to provide a good seal. The following two steps assure a uniform seal. Failure to follow these steps could result in personal injury due to gasket leakage.

6. Tighten all bonnet bolts in steps of 1.4 N•m (1 lb•ft) up to 2.8 N•m (2 lb•ft) per the sequence shown in Figure 2.
7. Continue to tighten as follows:
 - a. For Model 84 Style A flowmeter, continue to tighten in steps of 7 N•m (5 lb•ft) using the same sequence. The maximum torque needed for safe operation is 34 N•m (25 lb•ft).
 - b. For Model 84F Style B flowmeter, tighten to 40.7 N•m (30 lb•ft).
8. Connect the (yellow and brown) sensor wires to the 2-position preamplifier terminal block. Lightly tug on each sensor wire to assure that the wire is firmly clamped in the terminal block. Also check that it is clamped on the metal conductor and not on the insulation.
9. Replace the threaded junction box cover.

⚠ WARNING

In order to maintain agency certification of this product and prove integrity of the parts and workmanship in containing process pressure, a hydrostatic pressure test must be performed. The flowmeter must hold the pressure listed in Table 7 for one minute without leaking.

Model 83 Flowmeter Sensor Replacement Procedure

The flowmeter housing must be in a vertical mounting position (as shown in Figure 4) so that the bonnet bolts can be properly torqued. Therefore, if the flowmeter housing is not in the vertical position, remove the flowmeter from the line while doing a sensor replacement. In all cases, the pipeline must be shut down and emptied before loosening the bonnet bolts.

Replacing the sensor does not cause a shift in the K-factor. Therefore, the flowmeter does not require recalibration.

⚠ CAUTION

The placement of colored wires in the correct position in the terminal blocks is important. Verify correctness.

Integrally Mounted Flowmeter

See Figure 4.

Sensor Assembly Removal

⚠ WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. Remove the electronic module compartment threaded cover.

— NOTE

If the cover cannot be removed by hand, insert a flat bar in the cover slot.

2. If a display is mounted to the electronic module, remove the display by loosening the two mounting screws and unplugging the ribbon cable from the electronic module.
3. Unscrew the two captive screws, one on each side of the electronic module.
4. Pull the electronic module out of the housing far enough to be able to disconnect the brown and yellow sensor wires from the electronic module (if standard temperature range) or the preamplifier (if extended temperature range). To access the preamplifier, remove the sheet metal cover,
5. Remove the bonnet bolts and lift off the electrical housing, bonnet, and sensor as a unit.
6. Slide the sensor assembly out of the bonnet.

Sensor Assembly Installation

⚠ WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. If the flow dam has remained in the meter body, remove it before starting to re-assemble. Also make sure that the O-ring chamfer in the bonnet is clean and doesn't contain any pieces of the old O-ring.
2. Slide the **new** O-ring over the sensor lead and onto the neck of the sensor.
3. Place the **new** flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket. Slide the **new** flow dam into the groove of the sensor.
4. Feed the sensor lead through hole in bonnet and gently pull the sensor lead out of electrical housing until sensor is touching the bonnet.

— NOTE

It may be helpful to use a straw as a tool to do this. Slide a straw over the sensor wires and feed the straw through the bonnet. Then remove the straw.

5. Insert the sensor with the bonnet into the flowmeter body and secure with four **new** bonnet bolts finger tight.

⚠ WARNING

Do **not** use the bonnet bolts in these kits for 83F-xxxxxL flowmeters (dual measurement with isolation valves). Use four X0173TF bolts as shown in the parts list.

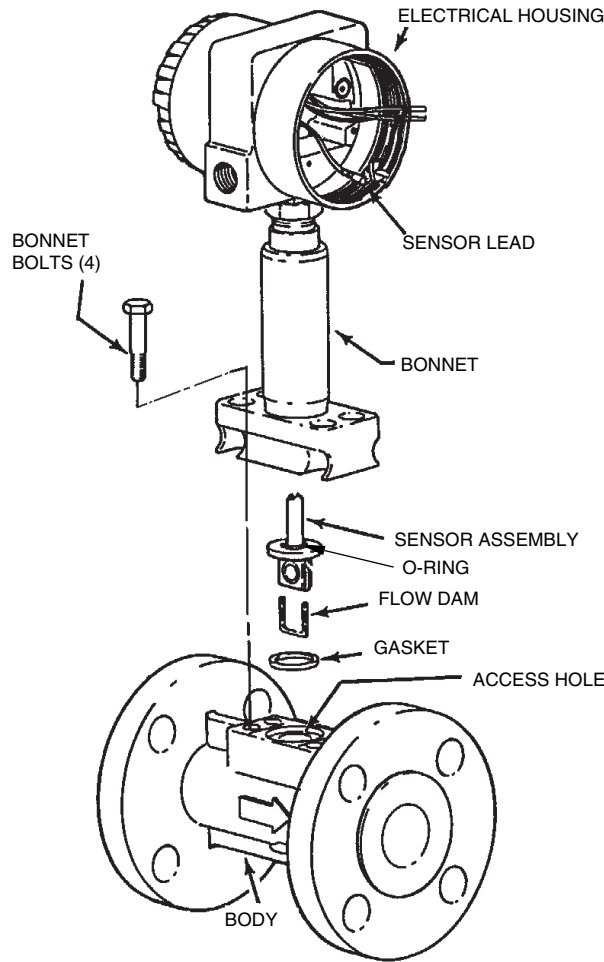


Figure 4. Sensor Replacement - Integrally Mounted Flowmeter

⚠ WARNING

It is important that the gasket be sealed uniformly to provide a good seal. The following steps will assure a uniform seal. Failure to follow these steps could result in personal injury due to gasket leakage.

6. Tighten all bonnet bolts to 2.8 N·m (2 lb·ft) per the sequence shown in Figure 5.

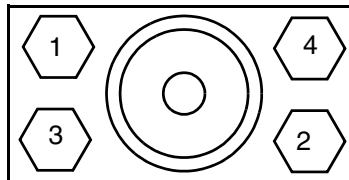


Figure 5. Bonnet Bolt Torquing Sequence

7. Continue to tighten to 7 N•m (5 lb•ft) using the same sequence.
8. Continue to tighten in steps of 7 N•m (5 lb•ft) up to 34 N•m (25 lb•ft) using the same sequence.
9. Connect the brown and yellow sensor wires to the electronic module or preamplifier as applicable. Lightly tug on each sensor wire to assure that the wire is firmly clamped in the terminal block. Also check that it is clamped on the metal conductor and not on the insulation. Replace the preamplifier sheet metal cover (if applicable).
10. Back the two electronic module captive screws out of the module until the screws are captured by the plastic housing.
11. Turn the module one turn maximum to take up the slack in the wires. Locate the electronics module over the mounting holes and making sure that no wires are pinched under the plastic housing, tighten the captive mounting screws.
12. If the electronic module was equipped with a display, reinstall the display. Carefully fold the ribbon cable in the space between the display and the electronic module so that it is not pinched. The display molding should rest firmly against the module molding before tightening the screws.
13. Reinstall the electronic module compartment threaded cover.

⚠ WARNING

In order to maintain agency certification of this product and to prove the integrity of the parts and workmanship in containing process pressure, a hydrostatic pressure test must be performed. The flowmeter must hold the pressure listed in Table 7 for one minute without leaking.

Remotely Mounted Flowmeter

See Figure 6.

Sensor Assembly Removal

⚠ WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. Remove junction box cover.
2. Disconnect the brown and yellow sensor wires from the terminal block on the preamplifier. Do not disconnect the interconnecting wiring to the remote electronics housing.
3. Remove bonnet bolts and lift off the junction box, bonnet and sensor as a unit.
4. Slide the sensor assembly out of the bonnet as shown in Figure 6.

Sensor Assembly Installation

⚠ WARNING

Before proceeding, ensure that power is removed from the flowmeter.

1. If the flow dam has remained in the meter body, remove it before starting to reassemble. Also make sure that the O-ring chamfer in the bonnet is clean and doesn't contain any pieces of the old O-ring.
2. Slide the **new** O-ring over the sensor lead and onto the neck of the sensor.
3. Place the **new** flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket. Slide the **new** flow dam into the groove on the sensor.
4. Carefully feed the sensor lead through the hole in the bonnet and gently pull the sensor lead out of the junction box until the sensor is touching the bonnet.

— NOTE

It may be helpful to use a straw as a tool to do this. Slide a straw over the sensor wires and feed the straw through the bonnet. Then remove the straw.

5. Insert the sensor with the bonnet into the flowmeter body and secure with four new bolts finger tight.

⚠ WARNING

Do **not** use the bonnet bolts in these kits for 83F-xxxxxL flowmeters (dual measurement with isolation valves). Use four X0173TF bolts as shown in the parts list.

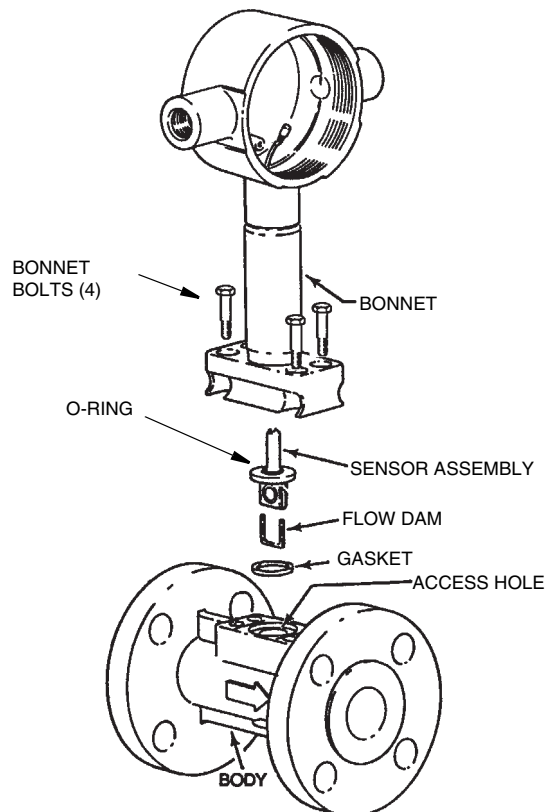


Figure 6. Sensor Replacement - Remotely Mounted Flowmeter

⚠ WARNING

It is important that the gasket be sealed uniformly to provide a good seal. The following steps will assure a uniform seal. Failure to follow these steps could result in personal injury due to gasket leakage.

6. Tighten all bonnet bolts to 2.8 N•m (2 lb•ft) per the sequence shown in Figure 5.
7. Continue to tighten to 7 N•m (5 lb•ft) using the same sequence.
8. Continue to tighten as follows:
 - a. For Model 84 (Style A) flowmeter, continue to tighten in steps of 7 N•m (5 lb•ft) using the same sequence. The maximum torque needed for safe operation is 34 N•m (25 lb•ft).
 - b. For Model 84F (Style B) flowmeter, tighten to 40.7 N•m (30 lb•ft).
9. Connect the sensor wires to the brown and yellow sensor wires to the terminal block on the preamplifier. Lightly tug on each sensor wire to assure that the wire is firmly clamped in the terminal block. Also check that it is clamped on the metal conductor and not on the insulation.
10. Replace junction box cover.

⚠ WARNING

In order to maintain agency certification of this product and prove integrity of the parts and workmanship in containing process pressure, a hydrostatic pressure test must be performed. The flowmeter must hold the pressure listed in Table 7 for one minute without leaking.

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Vertical lines to the right of text or illustrations indicate areas changed at last issue date.