

Intelligent Vortex Flowmeters

Model 84C Sensor Replacement Kits

Master Instruction

MI 019-223

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Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that accompany this symbol to avoid possible injury or death.

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. Failure to follow these instructions will result in death or serious injury.
⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

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Before You Begin

⚠ DANGER

EXPLOSION HAZARD

Shut down the pipeline and empty it before you loosen the bonnet bolts.

Failure to follow these instructions will result in death or serious injury.

If the flowmeter housing is in a vertical mounting position, you do not need to remove the flowmeter from the pipeline in order to replace the sensor. However, the flowmeter housing must be in a vertical mounting position so that the bonnet bolts can be properly torqued. If the flowmeter housing is not mounted vertically, remove the flowmeter from the line before performing a sensor replacement.

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

Additional Considerations

⚠ CAUTION

RISK OF PERSONAL AND PROPERTY DAMAGE

Personnel involved in the maintenance of vortex flowmeters must be trained and qualified in the use of the equipment required, and in the removal and replacement of the flowmeter in the piping. They must also be qualified for the routine maintenance of the flowmeter's components.

Failure to follow these instructions can result in injury or equipment damage.

⚠ CAUTION

RISK OF PERSONAL INJURY AND PROPERTY DAMAGE

If you change the bonnet, you must use the correct bonnet for your meter required by the applicable agency certifications. Contact Global Customer Support to verify the correct bonnet for your flowmeter and application.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

POTENTIAL EQUIPMENT DAMAGE

Components in your flowmeter are ESD-sensitive, and thus are susceptible to damage resulting from electrostatic discharge. When performing maintenance in the electronics compartment or remote junction box, or when working with the housing cover removed, ground yourself with a conductive wrist strap or stand on an ESD mat.

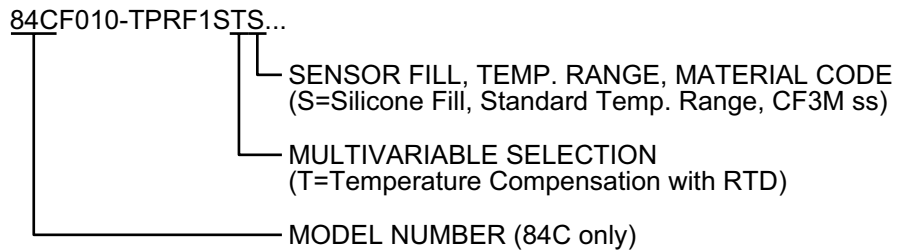
Failure to follow these instructions can result in equipment damage.

Kit Identification

NOTICE
<p>POTENTIAL EQUIPMENT DAMAGE</p> <ul style="list-style-type: none"> Do not use these kits for flowmeters that were purchased with the -H oxygen service cleaning option. These require special cleaning. Contact Global Customer Support for assistance. Do not use these kits for sanitary flowmeters. Sensors in sanitary flowmeters are not user replaceable. Contact Global Customer Support to return the entire flowmeter for repair or replacement. Do not use these kits to replace a gold-plated sensor. Contact Global Customer Support for assistance. <p>Failure to follow these instructions can result in equipment damage.</p>

Select the correct sensor replacement kit based on the flowmeter’s Multivariable Selection and Sensor Code. Refer to the model code on your flowmeter.

Figure 1 - Flowmeter Model Code Example



Kits for 84C Flowmeters with Temperature Compensation (Multivariable Selection = T)

Table 1 - Sensor Replacement Kits for 84C Flowmeters with Temperature Compensation

Kit Description		Kit Contents	
Part No.	Sensor Code	Sensor	Seal Kit ¹
K0169AD	D	K0168FT	K0168RJ
K0169AC	F	K0168FR	
K0169AB	R	K0168FP	
K0169AA	S	K0168FM	
K0169AF	A, E	K0168GC	K0168RL
K0169AE	B, G	K0168GB	K0168RK

Table 2 - Seal Kit Contents for 84C Flowmeters with Temperature Compensation

Seal Kit Part No.	Seal Kit Contents			
	O-Ring or Grafoil Seal	Gasket	Flow Dam	Bonnet Bolts (4)
K0168RJ	X0145CM	L0121DT	L0112KT	X0173SV
K0168RL	K0168RD	K0146PT	K0148VB	X0174EY
K0168RK		K0146HL	K0148VA	

1. See the next table for seal kit contents.

Kits for 84C Flowmeters without Temperature Compensation (Multivariable Selection = N)

Table 3 - Sensor Replacement Kits for 84C Flowmeters without Temperature Compensation

Kit Description		Kit Contents	
Part No.	Sensor Code	Sensor	Seal Kit ²
K0161FL	D	K0148JK	K0161EY
K0161FK	F	K0148JJ	
K0161FJ	R	K0148JH	
K0161FH	S	K0148JG	
K0161FN	A, E	K0148KQ	K0161FA
K0161FM	B, G	K0148KN	K0161EZ

Table 4 - Seal Kit Contents for 84C Flowmeters without Temperature Compensation

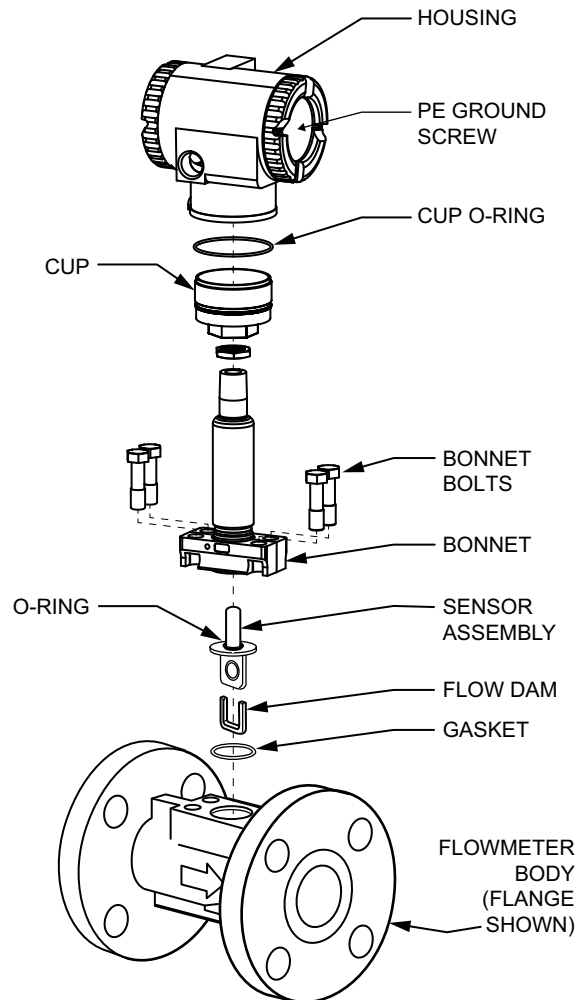
Seal Kit Part No.	Seal Kit Contents			
	O-Ring	Gasket	Flow Dam	Bonnet Bolts (4)
K0161EY	D0100RP	L0121DT	L0112KT	X0173SV
K0161FA	K0147CC	K0146PT	K0148VB	X0174EY
K0161EZ		K0146HL	K0148VA	

2. See the next table for seal kit contents.

Flowmeter with Integrally Mounted Electronics

Refer to the following diagram when replacing the sensor.

Figure 2 - Sensor Replacement — Integrally Mounted Flowmeter



Removing the Sensor Assembly (Integral)

1. Shut off power to the flowmeter.
2. If the flowmeter electronics compartment has a cover lock, rotate the cover lock screw into the housing to unlock the cover.
3. Remove the cover from the electronics compartment. The electronics compartment is the side with the optional display. If you do not have an optional display, the electronics compartment is to the left of the ground symbol on the outside of the housing.
If you cannot remove the cover by hand, insert a flat bar in the cover slot.
4. Loosen the two captive screws, one on each side of the electronics module.
5. Pull the electronics module out of the housing just far enough to be able to reach the cable connectors on the back of the electronics module.
6. Disconnect the cables from the back (and side, if the flowmeter has a temperature sensor) of the electronics module.

7. Remove the electronics module from the housing.
8. If the flowmeter has explosionproof/flameproof electrical certification, disconnect the two green PE ground wires from the PE ground screw in the electronics housing.
9. Remove the red lacquer from the anti-rotation screw.
10. Remove the anti-rotation screw completely, and slide the clip off of the housing. Save the screw and clip.
11. Remove the housing by rotating it counterclockwise as viewed from the top.
12. Remove the two screws on the black potting cup. Save the screws.
13. Remove the module from the cup.
14. Flip the potting cup over to access the two 4-position terminal blocks.
15. Disconnect the wires from the 4-position terminal block(s) on the potted neck module.
16. Remove the bonnet bolts.
17. Lift off the electronics housing, bonnet, and sensor assembly as a unit.
18. Slide the sensor assembly out of the bonnet.
Loosen or remove the neck board, if necessary, to allow the wires to slide through the bonnet.

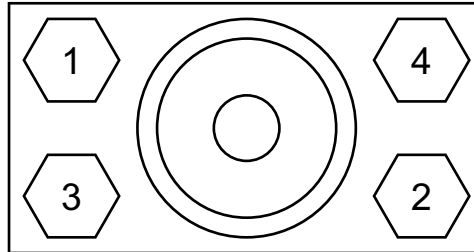
Installing the Sensor Assembly (Integral)

1. Turn off power to the flowmeter and remove the old sensor assembly, if you have not done so already. Refer to *Removing the Sensor Assembly (Integral)*, page 10.
2. Remove the new sensor assembly from its protective packaging.
3. Remove the old flow dam, gasket, and o-ring from the sensor. Clear the groove of any remaining fragments of the old o-ring.
4. Slide the new o-ring over the sensor wires and onto the neck of the sensor.
5. Place the new flat gasket over the sensor, in contact with the serrated sealing surface. Center the gasket.
6. Slide the new flow dam into the groove of the sensor.
7. Feed the sensor wires through the hole in the bonnet until the sensor is touching the bonnet and the wires extend through the gap in the center of the neck board. If the flowmeter has a temperature sensor, separate the temperature sensor wires from the vortex wires when pushing the wires through.
NOTE: It may be helpful to use a drinking straw to do this. Feed the sensor wires through the straw, and feed the straw through the bonnet and neck board. Then remove the straw.
8. Insert the sensor with the bonnet into the flowmeter body.

9. Secure the bonnet with four new bonnet bolts, finger-tight.

▲ CAUTION
RISK OF GASKET LEAKAGE
The gasket must contact the surfaces uniformly to provide a good seal. The next step helps assure a uniform seal.
Failure to follow these instructions can result in injury or equipment damage.

10. Tighten all bonnet bolts in steps of 1.4 N-m (1 lb-ft) up to 2.8 N-m (2 lb-ft), using the sequence shown in the diagram.

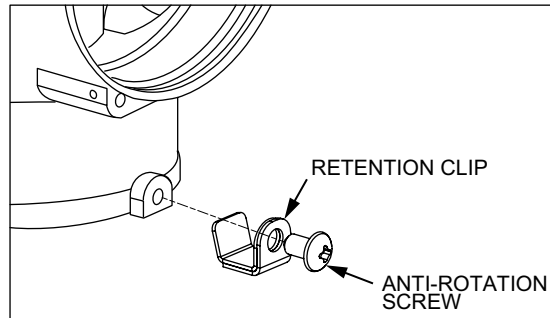


- a. Using the same sequence, tighten the bolts to 7 N-m (5 lb-ft).
 - b. Continue to tighten the bolts in steps of 7 N-m (5 lb-ft) in the same sequence. The maximum torque needed for normal operation is 41 N-m (30 lb-ft).
11. Connect the yellow and brown sensor wires to the 4-position Y/B terminal block on the neck board.
12. If the flowmeter has a temperature sensor, attach the ribbon cable to the R/R/N/N terminal block on the neck board.
13. Verify that the wires are fully engaged in the connectors. Lightly tug each wire to verify that it is firmly held in place by the connector, on the metal conductor and not on the wire insulation. If any wires are not engaged, press the lever in the connector, insert the bare conductor, and release the lever, checking again that the wire is firmly clamped.
14. Feed the electronics cable, temperature sensor cable (if applicable), and PE ground wires (if applicable) through the housing neck and into the electronics compartment.
15. Inspect the cup o-ring for damage. If the o-ring is damaged, replace it with the appropriate o-ring.

▲ WARNING
RISK OF ANSI/ISA NONCOMPLIANCE
Failure to reuse or install the proper cup o-ring for a CSA-labeled product violates ANSI/ISA12.27.01.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

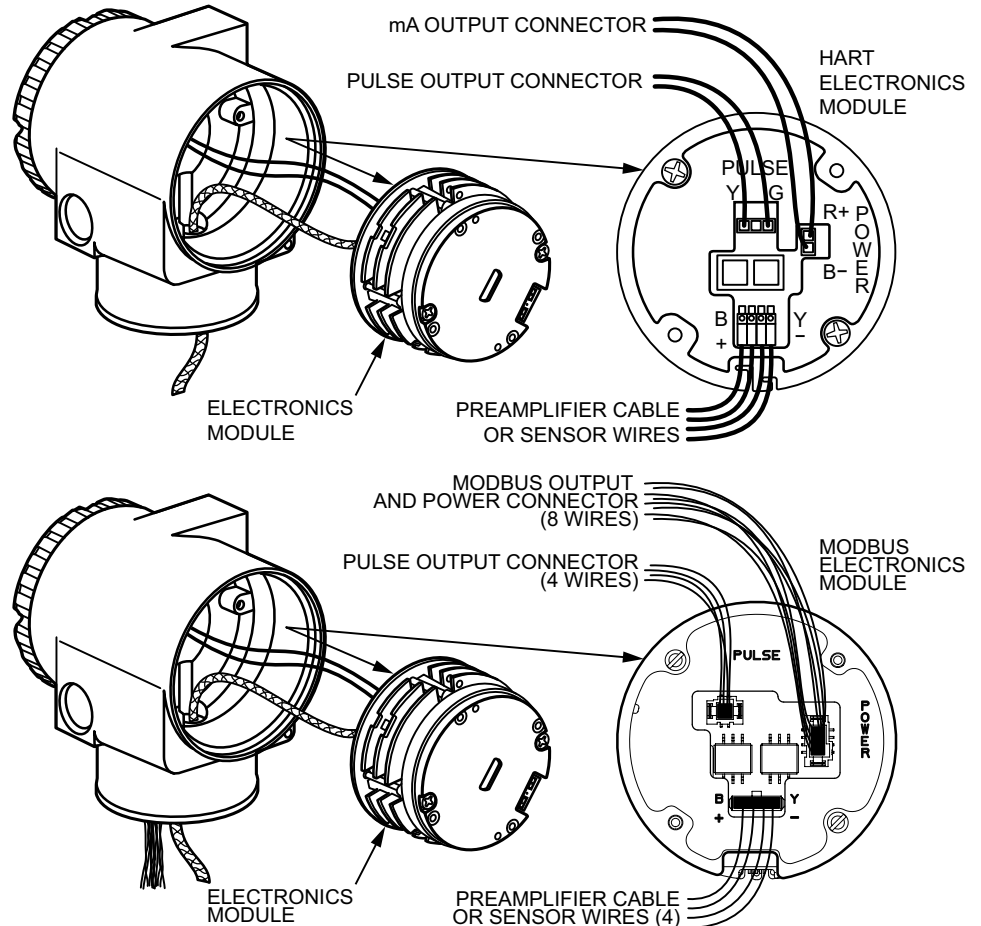
16. Lubricate the o-ring with silicone lubricant (part number 0048130 or equivalent). Verify that the o-ring is situated in the groove of the neck.
17. Screw the housing onto the cup. Hand-tighten until it bottoms. Do not over-tighten.

18. If the flowmeter has explosionproof/flameproof electrical certification, reconnect the two green PE ground wires to the PE ground screw in the electronics housing.
19. Insert the retention clip over the boss in the housing neck so that the hole in the clip is aligned with the hole in the boss. Refer to the diagram.



20. Rotate the housing up to one full turn counterclockwise for optimum access.
21. Tighten the anti-rotation screw (to a torque of 7 lbf-in) and fill the screw recess with red lacquer (part number X0180GS or equivalent).
22. Connect the cables to the terminal blocks on the back (and side, if applicable) of the electronics module. Refer to the diagram.
The connectors are designed to fit only in the correct terminal blocks, and in the correct orientation on the electronics module.

Figure 3 - Electronics Module Connections



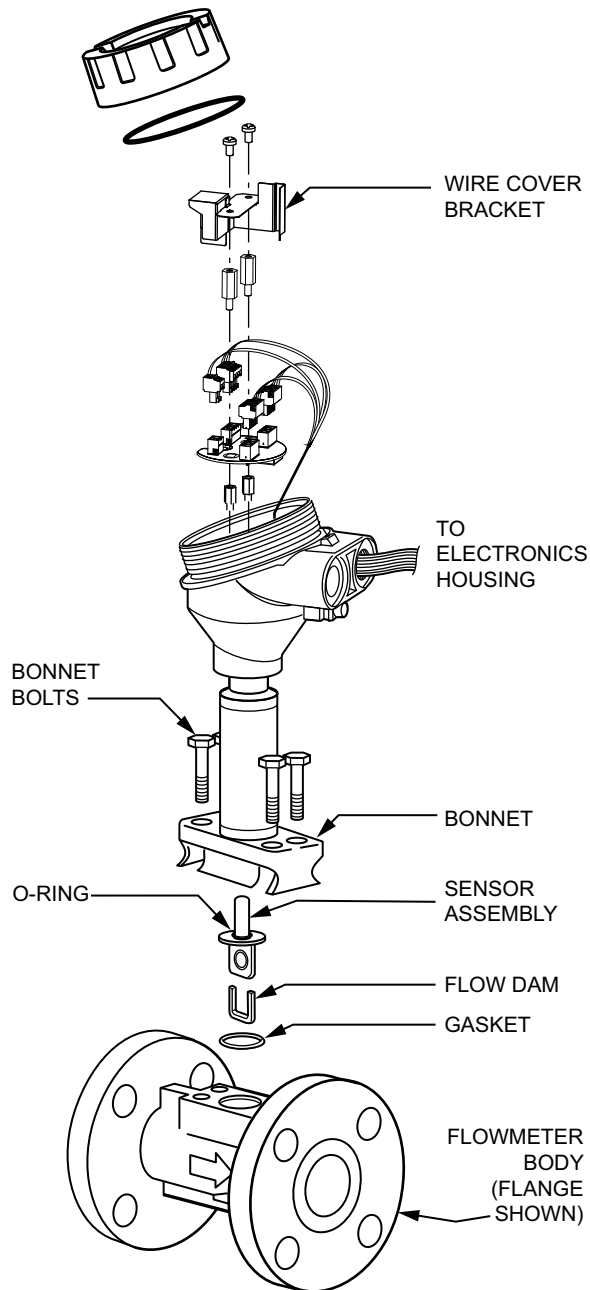
23. Back the two electronics module captive screws out of the module until the screws are captured by the plastic housing.

24. Rotating the electronics module no more than one full turn to take up the slack in the wires, place the module in the housing over the two mounting holes.
25. Tighten the captive mounting screws, taking care that no wires are pinched under the module.
26. Replace the electronics compartment cover before operating the flowmeter. If the housing has a cover lock, rotate the cover lock outwards from the housing to lock the cover.
27. Perform a pressure test. See *Performing a Pressure Test*, page 19.

Flowmeter with Remotely Mounted Electronics

Refer to the following diagram when replacing the sensor.

Figure 4 - Sensor Replacement — Remotely Mounted Flowmeter



Removing the Sensor Assembly (Remote)

1. Shut off power to the flowmeter.
2. Rotate the set screw into the junction box to unlock the cover. Remove the cover.
3. Remove the wire cover bracket. Save the screws.
4. Disconnect the vortex sensor wires from the 2-position Y/B terminal block. If the flowmeter has a temperature sensor, disconnect the two neutral wires and the two red wires from the 4-position R/R/N/N terminal block.
5. Remove the bonnet bolts.
6. Lift off the junction box, bonnet, and sensor assembly as a unit.
7. Slide the sensor assembly out of the bonnet.
Loosen or remove the neck board, if necessary, to allow the wires to slide through the bonnet.

Installing the Sensor Assembly (Remote)

Figure 5 - Terminal Blocks in the Junction Box



1. Turn off power to the flowmeter and remove the old sensor assembly, if you have not done so already. Refer to *Removing the Sensor Assembly (Remote)*, page 16.
2. Remove the new sensor assembly from its protective packaging.
3. Remove the old flow dam, gasket, and o-ring from the sensor. Clear the groove of any remaining fragments of the old o-ring.
4. Slide the new o-ring over the sensor wires and onto the neck of the sensor.
5. Place the new flat gasket over the sensor, in contact with the serrated sealing surface. Center the gasket.

6. Slide the new flow dam into the groove of the sensor.
7. Feed the sensor wires through the hole in the bonnet until the sensor is touching the bonnet and the wires extend through the gap in the center of the neck board. If the flowmeter has a temperature sensor, separate the temperature sensor wires from the vortex wires when pushing the wires through.

NOTE: It may be helpful to use a drinking straw to do this. Feed the sensor wires through the straw, and feed the straw through the bonnet and neck board. Then remove the straw.

8. Insert the sensor with the bonnet into the flowmeter body.
9. Secure the bonnet with four new bonnet bolts, finger-tight.

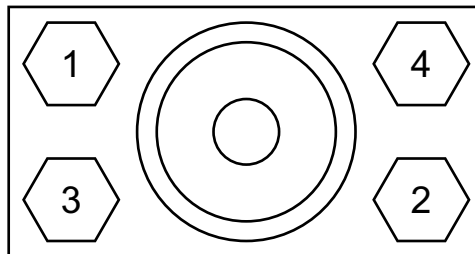
▲ CAUTION

RISK OF GASKET LEAKAGE

The gasket must contact the surfaces uniformly to provide a good seal. The next step helps assure a uniform seal.

Failure to follow these instructions can result in injury or equipment damage.

10. Tighten all bonnet bolts in steps of 1.4 N-m (1 lb-ft) up to 2.8 N-m (2 lb-ft), using the sequence shown in the diagram.



- a. Using the same sequence, tighten the bolts to 7 N-m (5 lb-ft).
 - b. Continue to tighten the bolts in steps of 7 N-m (5 lb-ft) in the same sequence. The maximum torque needed for normal operation is 41 N-m (30 lb-ft).
11. Connect the yellow and brown sensor wires to the 2-position Y/B terminal block on the neck board.
 12. If the flowmeter has a temperature sensor, attach the ribbon cable to the R/R/N/N terminal block on the neck board.
 13. Verify that the wires are fully engaged in the connectors. Lightly tug each wire to verify that it is firmly held in place by the connector, on the metal conductor and not on the wire insulation. If any wires are not engaged, press the lever in the connector, insert the bare conductor, and release the lever, checking again that the wire is firmly clamped.

14. Add the wire cover bracket and secure it with the screws you saved when you removed it.



15. Dress the RTD wires (if applicable) as far as possible from the vortex sensor wires, and tuck the vortex sensor wires under the bracket.
16. Replace the junction box cover. Rotate the set screw outwards from the junction box to lock the cover before operating the flowmeter.
17. Perform a pressure test. See *Performing a Pressure Test*, page 19.

Performing a Pressure Test

<i>NOTICE</i>
POTENTIAL EQUIPMENT DAMAGE
To maintain agency certification of this product and to prove the integrity of the parts and workmanship in containing process pressure, perform a hydrostatic pressure test. The flowmeter must hold the pressure listed in these tables for <u>ten (10) minutes</u> without leaking.
Failure to follow these instructions can result in equipment damage.

Table 5 - Maximum Test Pressure for Model 84CF (Flanged Body)

Flange Size	Test Pressure	
	Standard Temperature Sensor	Extended Temperature Sensor
ANSI Class 150	450 psig	452.4 psig
ANSI Class 300	1,125 psig	1,184.4 psig
ANSI Class 600	2,250 psig	2,368.8 psig
ANSI Class 900	3,375 psig	3,553.2 psig
ANSI Class 1500	5,625 psig	5,922.0 psig
PN 16	2.6 MPag	2.63 MPag
PN 25	3.8 MPag	4.11 MPag
PN 40	6.2 MPag	6.58 MPag
PN 63	10.0 MPag	10.36 MPag
PN 100	15.5 MPag	16.45 MPag
PN 160	23.3 MPag	26.32 MPag

Table 6 - Maximum Test Pressure for Model 84CW (Wafer Body)

Size of Mating Flange	Test Pressure	
	Standard Temperature Sensor	Extended Temperature Sensor
ANSI Class 150	450 psig	433.1 psig
ANSI Class 300	1,125 psig	1,134.0 psig
ANSI Class 600	2,250 psig	2,268.0 psig
ANSI Class 900	3,375 psig	n/a
ANSI Class 1500	5,625 psig	n/a
PN 16	2.6 MPag	2.52 MPag
PN 25	3.8 MPag	n/a
PN 40	6.2 MPag	6.30 MPag
PN 63	10.0 MPag	9.92 MPag
PN 100	15.5 MPag	15.75 MPag

Table 7 - Maximum Test Pressure for Model 84CN (NPT Body)

Line Size Code	Test Pressure	
	Standard Temperature	Extended Temperature
010	38.8 MPag (5,625 psig)	40.8 MPag (5,922.0 psig)
020	23.3 MPag (3,375 psig)	24.5 MPag (3,553.2 psig)

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