Model 83 to 84 I/A Series® Intelligent Vortex Flowmeter
Conversion Kit Installation Procedure

Introduction

This document describes the recommended procedure for using the 83CV84 Conversion Kit to convert an integral or remote Model 83 flanged or wafer Vortex flowmeter (Model 83F or 83W) to an equivalent flanged or wafer Model 84 Vortex flowmeter (Model 84F or 84W). The resulting flowmeter will be a HART communication protocol version with 4-20 mA and pulse output capability.

Qualification of Personnel

Personnel involved in maintenance of Vortex meters should be trained and qualified in the use of the equipment required and in the removal and replacement of meter components described in this document.

In addition, Model 84 flowmeters must be installed to meet all applicable local installation regulations, such as hazardous location requirements, electrical wiring codes, and mechanical piping codes. Persons involved in the installation should be trained in these code requirements. Only factory authorized service personnel or other approved site leaders should perform this installation.

Required Tools and Documentation

The following tools are required for disassembly of the Model 83 flowmeter and installation of the Model 84 topworks:

♦ 3/8 inch wrench
♦ Precision torque wrench

--- NOTE ---
For best results, use the bonnet bolt torque adapter (Part Number 0305557) available. This tool has been customized for Vortex bonnet bolts.
In addition to this instruction manual, it is recommended that you have the following documents available for reference:

- *Models 83F-T and 83W-T Installation, Configuration, Troubleshooting, and Maintenance* (MI 019-199)
- *Models 84F and 84W Installation, Operation, and Maintenance* (MI 019-202)
- *Model 83 to 84 I/A Series® Intelligent Vortex Flowmeter Conversion Kit Ordering Procedures* (TI 027-070)

## Kit Contents

The conversion kit contents are shipped according to the model code of the conversion kit you ordered. Refer to TI 027-070 for detailed information on ordering the conversion kit based on your existing equipment and descriptions of the 83CV84F and 83CV84W conversion kit model codes. Kits will include the following components.

### Table 1. Kit Contents

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions (this document and the FoxDoc DVD)</td>
<td>1</td>
</tr>
<tr>
<td>Bonnet bolts</td>
<td>4</td>
</tr>
<tr>
<td>Sensor gasket</td>
<td>1</td>
</tr>
<tr>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>Flow dam</td>
<td>1</td>
</tr>
<tr>
<td>Model 84 housing (topworks), with or without Vortex sensor attached. Includes:</td>
<td></td>
</tr>
<tr>
<td>› Model 84 electronics module</td>
<td>1</td>
</tr>
<tr>
<td>› Model 84 bonnet</td>
<td></td>
</tr>
<tr>
<td>› Data plate</td>
<td></td>
</tr>
<tr>
<td>Data plate for junction box (for remotely mounted flowmeters)</td>
<td>1</td>
</tr>
</tbody>
</table>

(a). Quantities are for single measurement. Two kits are provided for dual measurement.

## Model 84 Flowmeter Conversion Kit Installation

### Quick Overview

1. Unpack the kit and identify the contents.
2. Check the flowmeter to be converted and make sure that the serial number and K-factor on the original data plate match the serial number and K-factor of the new 83CV84 kit data plate you have.
3. Remove the original Model 83 data plate and return it.
4. Capture the original configuration data from the existing Model 83 flowmeter's configuration database.
5. Shut down the process, de-pressurize the line, and bring the temperature down to ambient conditions.
6. Disassemble the Model 83 flowmeter.
7. Re-assemble using the 83CV84 kit.
8. Perform a pressure test.
9. Reconfigure the new Model 84 Vortex flowmeter with the configuration data retrieved from the original Model 83 process parameters. The new 83CV84 kit comes partially preconfigured with the new model code, serial number, and K-factor for the new Model 84 flowmeter.

The following sections provide the detailed instructions for each of the steps listed above.

Unpacking and Preparing for Conversion

⚠️ **CAUTION**

Please note that the Model 84 electronics module has a higher compliance voltage than the existing Model 83 electronics module. Make sure your site accommodates the voltage requirements of the Model 84 electronics module.

1. Remove the contents of the kit from the shipping carton. Refer to Table 1 to make sure you have all required kit contents.
2. If you ordered a conversion kit with a pre-installed sensor, remove the packing material around the sensor, taking care not to damage the sensor or flow dam.

Managing Data Plates

When converting a Model 83 to Model 84 flowmeter in the field, it is critical that the correct data plate is installed on the equipment.

⚠️ **CAUTION**

To maintain equipment traceability and agency certifications, ensure that the correct data plate(s) are installed on the topworks, the flowmeter body, and the junction box (if using remote electronics).

1. Check the existing Model 83 data labels to ensure the information matches the new Model 84 data label. Make sure the serial number (REF NO or S/N) and Reference K-factor (FACTOR REF or REF K-FACT) match on all three labels.
### Figure 1. Flowmeter Data Label Management

<table>
<thead>
<tr>
<th>Model 83 Flowmeter</th>
<th>Model 83 Data Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 83 F-T3QS1SSTJF</td>
<td>REF NO. 12345678</td>
</tr>
<tr>
<td>REF NO. 12345678</td>
<td>ORIGIN 2A0704</td>
</tr>
<tr>
<td>SUPPLY 12.5-42 V dc</td>
<td>MWP @ 100 °F</td>
</tr>
<tr>
<td>METER BODY MATL</td>
<td>TEMP. LIMIT</td>
</tr>
<tr>
<td>MAX AMB TEMP 85 °C</td>
<td>REF K-FACT 258</td>
</tr>
<tr>
<td>TEMP. LIMIT</td>
<td>PULSES /</td>
</tr>
<tr>
<td>REF K-FACT 258</td>
<td>PULSES /</td>
</tr>
<tr>
<td>CUST. DATA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model 84 Flowmeter</th>
<th>Model 84 Data Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 84 F-T3QS1SSTJF</td>
<td>S/N 99999999 (12345678)</td>
</tr>
<tr>
<td>S/N 99999999 (12345678)</td>
<td>ORIGIN 2A0713</td>
</tr>
<tr>
<td>SUPPLY 24 V dc nom., 22 mA max.</td>
<td>MWP @ 100 °F (38 °C)</td>
</tr>
<tr>
<td>MAX. AMB. TEMP. 176°F (80°C)</td>
<td>MAX. PROC. TEMP. 800°F</td>
</tr>
<tr>
<td>REF K-FACT. 258</td>
<td>PULSES / ft³ - 9.11 PULSES / liter</td>
</tr>
<tr>
<td>K-FACTOR</td>
<td>CUST. TAG</td>
</tr>
<tr>
<td>CUST. TAG</td>
<td></td>
</tr>
</tbody>
</table>

**THIS PRODUCT IS PROTECTED BY ONE OR MORE U.S. PATENTS AND OTHERS PENDING. CORRESPONDING PATENTS HAVE BEEN ISSUED OR ARE PENDING IN OTHER COUNTRIES.**

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**Figure 1. Flowmeter Data Label Management**
2. Remove the existing data labels from the Model 83 flowmeter topworks (Figure 1) and junction box (Figure 2), and return the label(s) to Global Customer Support. Call 1-866-746-6477 inside the U.S. or 1-508-549-2424 outside the U.S. and choose the Repair option when prompted.

3. For remotely mounted flowmeters, install the new data plate that is provided with the conversion kit on the junction box.

**Recording the Model 83 Configuration Database**

Prior to installation, record the configuration parameters of the current Model 83 flowmeter. For proper operation of the Model 84 flowmeter after installation, you must reconfigure the Model 84 flowmeter with the correct settings.

- If you are using a HART Communicator, display and record the current database settings using the **Review** menu.

- If you are using the local configurator, display and record the current database settings using the **Display** menu.

Be sure to note the model code and K-factor of your existing equipment. Refer to MI 019-199 and MI 019-194 for detailed instructions.
Shutting Down the Process

In all cases, the pipeline must be shut down and emptied before loosening the bonnet bolts.

Disassembling the Model 83 Flowmeter

Perform the following procedure to disassemble the Model 83 flowmeter.

**WARNING**

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

Removing the Topworks

1. If the flowmeter is equipped with an isolation valve, make sure it is in the off position.
2. Remove the four bolts that connect the topworks to the flowmeter body.
3. Pull the topworks away from the flowmeter body.

![Figure 3. Removing the Model 83 Topworks](image)

After removing the topworks, remove the sensor assembly.

- For integrally mounted flowmeters, perform the steps in the following section.
- For remotely mounted flowmeters, perform the steps in “Removing the Sensor Assembly from a Remote Flowmeter” on page 8.
Removing the Sensor Assembly from an Integral Flowmeter

Refer to Figure 4 and perform the following steps to remove the existing sensor from an integrally mounted Model 83 flowmeter. These steps apply to flanged (83F) and wafer (83W) models.

**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.
   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. Unscrew 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/flame proof electrical certification, disconnect the two wires from the PE ground screw in the electronics housing.

3. Remove the housing as follows:
   a. Unscrew the housing locknut to bottom of thread.
   b. The square locking plate should slip down the shaft. If it does not, pry it out with a screwdriver.
   c. Remove the housing by rotating it counterclockwise (when viewed from the top).

4. 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.

5. Remove the bonnet bolts and lift off the electronic housing, bonnet, and sensor assembly as a unit.

6. Slide the sensor assembly out of the bonnet.

7. If the flow dam has remained in the flowmeter body, remove it before storing the Model 83 topworks. Also make sure that the O-ring chamfer in the bonnet is clean and does not contain any pieces of the old O-ring.

8. Repeat the procedure in this section for dual measurement configurations.
Removing the Sensor Assembly from a Remote Flowmeter

Perform the following steps to remove the existing sensor from a remotely mounted Model 83 flowmeter. These steps apply to flanged (83F) and wafer (83W) models.

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

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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.
6. If the flow dam has remained in the flowmeter body, remove it. Also make sure that the gasket surface at the bonnet is clean and does not contain any pieces of the old gasket.

Assembling the Model 84 Flowmeter

If you ordered a sensor with the Model 84 flowmeter, it is preinstalled at the factory. Proceed to the following section to connect the Model 84 topworks to the flowmeter body.

If you did not order a sensor with the Model 84 conversion kit and plan to use the sensor previously installed in the Model 83 flowmeter, perform the steps in “Assembling Flowmeters without Preinstalled Sensors” on page 9.

Assembling Flowmeters with Preinstalled Sensors

Perform the following steps to connect the Model 84 topworks to the flowmeter body:

1. Place the new flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket.
2. Slide the new flow dam into the groove of the sensor.
3. Line up the topworks assembly and slip it into the flowmeter body.
4. Remove the four bolts from the zip top bag provided with the conversion kit.
5. Using a precision torque wrench, tighten the four bonnet bolts to 2.8 N•m (2 lb•ft) per the sequence shown in Figure 5.

![Figure 5. Bonnet Bolt Torquing Sequence](image-url)

6. Continue to tighten the bolts to 7 N•m (5 lb•ft) using the torquing sequence above.
7. Using the same sequence, continue to tighten the bolts in steps of 7 N•m (5 lb•ft) up to the desired torque of 34 N•m (25 lb•ft).

Assembling Flowmeters without Preinstalled Sensors

If you did not order a sensor with the Model 84 flowmeter and plan to use the sensor you had previously removed from the Model 83 flowmeter:

- For integrally mounted flowmeters, perform the steps in the following section.
- For remotely mounted flowmeters, perform the steps in “Remotely Mounted Flowmeters” on page 13.
Integrally Mounted Flowmeters

Refer to Figure 6 and perform the following steps to install the sensor removed from an integrally mounted Model 83 flowmeter into a Model 84 flowmeter. These steps apply to flanged (84F) and wafer (84W) models.

**WARNING**

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

1. Slide the new O-ring over the sensor wires and onto the neck of the sensor.
2. Place the new flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket.
3. 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.
Figure 6. Installing the Sensor Assembly into an Integrally Mounted Model 84 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 7.

![Figure 7. Bonnet Bolt Torquing Sequence](image)

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) using the same sequence. The maximum torque needed for safe operation is 34 N•m (25 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 optimal 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.

**Remotely Mounted Flowmeters**

Refer to Figure 8 and perform the following steps to install the sensor removed from a remotely mounted Model 83 flowmeter into a Model 84 flowmeter. These steps apply to flanged (84F) and wafer (84W) models.

1. Slide the new O-ring over the sensor lead and onto the neck of the sensor.

2. Place the new flat gasket over the sensor in contact with the serrated sealing surface. Center the gasket.

3. 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.

![Figure 8. Sensor Replacement - Remotely Mounted Flowmeter](image)

**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 7.

7. 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).

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.
Performing a Pressure Test

**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 2 for one minute without leaking.

### Table 2. Maximum Test Pressure (Model 84F and 84W)

<table>
<thead>
<tr>
<th>Model</th>
<th>End Connection</th>
<th>Test Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>316 SS (1.5X MWP)</td>
</tr>
<tr>
<td>84F</td>
<td>ANSI Class 150</td>
<td>413 psi</td>
</tr>
<tr>
<td></td>
<td>ANSI Class 300</td>
<td>1080 psi</td>
</tr>
<tr>
<td></td>
<td>ANSI Class 600</td>
<td>2160 psi</td>
</tr>
<tr>
<td></td>
<td>ANSI Class 900</td>
<td>3240 psi</td>
</tr>
<tr>
<td></td>
<td>ANSI Class 1500</td>
<td>5400 psi</td>
</tr>
<tr>
<td></td>
<td>PN 16</td>
<td>2.4 Mpa</td>
</tr>
<tr>
<td></td>
<td>PN 25</td>
<td>3.8 Mpa</td>
</tr>
<tr>
<td></td>
<td>PN 40</td>
<td>6.0 Mpa</td>
</tr>
<tr>
<td></td>
<td>PN 63</td>
<td>9.5 Mpa</td>
</tr>
<tr>
<td></td>
<td>PN 100</td>
<td>15.0 Mpa</td>
</tr>
<tr>
<td></td>
<td>PN 160</td>
<td>24.0 Mpa</td>
</tr>
<tr>
<td>84W</td>
<td>All</td>
<td>15 MPa (2250 psi)</td>
</tr>
</tbody>
</table>

(a) Nickel alloy is equivalent to Hastelloy® C-22. Hastelloy® is a registered trademark of Haynes International Inc.

Reconfiguring the Model 84 Vortex Flowmeter

For proper operation of the Model 84 flowmeter after installation, you must reconfigure the Model 84 flowmeter with the settings you previously recorded.

Using the HART Communicator, the PC50 configurator, or the local configurator, make sure the process parameters are set appropriately for your application.

The following process parameters are preconfigured in the Model 84 flowmeter’s database when shipped from the factory:

1. Model Code
2. Serial Number
3. Reference K-Factor

As a final check, make sure the serial numbers and K-Factor values match on all data plates and in the flowmeter database.

For more information on configuring Model 84 flowmeters, refer to MI 019-202.
Returning the Data Plates

After removing the existing data labels from the Model 83 flowmeter topworks (Figure 1) and junction box (Figure 2), return the label(s). Call 1-866-746-6477 inside the U.S. or 1-508-549-2424 outside the U.S. and choose the Repair option when prompted.