Rosemount® Model 8705/8712C Magnetic Flow Meter
Using Model 268 Smart Family Interface

Tank Farm Maintenance Procedure

Effluent Treatment Facility

USQ Not Required – ETF is a Hazard Category 3 Radiological Facility

### Change History (≤ Last 5 Rev-Mods)

<table>
<thead>
<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
<th>Justification</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>10/03/2017</td>
<td>Inconsequential change from Periodic Review.</td>
<td>Update Records Section to comply with writer’s standard.</td>
</tr>
<tr>
<td>A-1</td>
<td>07/25/2016</td>
<td>Correct Use Type</td>
<td>Change from continuous use to reference use per document owner’s direction.</td>
</tr>
<tr>
<td>A-0</td>
<td>09/17/2015</td>
<td>Converting to WRPS Format</td>
<td>New Procedure; Supersedes ETF-PRO-MN-51425 (EL18061)</td>
</tr>
</tbody>
</table>

### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Purpose and Scope</td>
<td>3</td>
</tr>
<tr>
<td>1.1 Purpose</td>
<td>3</td>
</tr>
<tr>
<td>1.2 Scope</td>
<td>3</td>
</tr>
<tr>
<td>2.0 Information</td>
<td>3</td>
</tr>
<tr>
<td>2.1 General Information</td>
<td>3</td>
</tr>
<tr>
<td>3.0 Precautions and Limitations</td>
<td>3</td>
</tr>
<tr>
<td>3.1 Radiation and Contamination Control</td>
<td>3</td>
</tr>
<tr>
<td>3.2 Environmental Compliance</td>
<td>3</td>
</tr>
<tr>
<td>4.0 Prerequisites</td>
<td>4</td>
</tr>
<tr>
<td>4.1 Special Tools, Equipment, and Materials</td>
<td>4</td>
</tr>
<tr>
<td>4.2 Performance Documents</td>
<td>4</td>
</tr>
<tr>
<td>5.0 Procedure</td>
<td>5</td>
</tr>
<tr>
<td>5.1 Initial Set Up</td>
<td>5</td>
</tr>
<tr>
<td>5.2 As-Found Data</td>
<td>6</td>
</tr>
<tr>
<td>5.3 4-20 mA Trim</td>
<td>7</td>
</tr>
<tr>
<td>5.4 Restoration</td>
<td>8</td>
</tr>
<tr>
<td>5.5 Acceptance Criteria</td>
<td>8</td>
</tr>
<tr>
<td>5.6 Review</td>
<td>9</td>
</tr>
<tr>
<td>5.7 Records</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure 1 - Model 268 Interface | 10
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides a safe, uniform method for calibration of Rosemount® Model 8705/8712C magnetic flow meter using Model 268 (M268) Smart Family Interface.

1.2 Scope

This procedure provides instructions for calibrating the Rosemount Model 8705/8712C using M268 Smart Family Interface.

2.0 INFORMATION

2.1 General Information

2.1.1 Transmitters are calibrated using either a hardwired LOI or Rosemount M268 interface. This instruction assumes use of M268. If unit being calibrated is LOI equipped, steps referring to M268 (except loop connection) are performed on LOI. There may be minor differences between M268 (shown) and LOI menus. Users not familiar with operation of M268 should read Attachment 1 in this instruction.

2.1.2 Unused M268/LOI menu choices/screens are not explained.

2.1.3 Figure 1 - Model 268 Interface and Figure 2 - Loop Test Connections depict M&TE connections and information.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Radiation and Contamination Control

3.1.1 Work in radiological areas will be performed using a radiological work permit following review by Radiological Control per ALARA Work Planning procedure, TFC-ESH-RP_RWP-C-03.

3.2 Environmental Compliance

3.2.1 In the event of a spill/leak/release, notify the SOM/FWS and respond per ETF-ERP-85B-003, Emergency Spill or Release at ETF.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Materials

NOTE - M&TE used to collect acceptance criteria data during performance of this procedure shall meet the following requirements:

- Be within its current calibration cycle as evidenced by an affixed calibration label
- Be capable of desired range
- Accuracy is equal to or greater than M&TE tolerance specified on PM data sheet or is at least four times greater than specified device tolerance.

The following supplies may be needed to perform this procedure:

- Rosemount M268 smart family interface or equivalent
- CMD capable of accurately measuring 4 to 20 mA, or equivalent.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- Vendor information, Rosemount Model 8705 Magnetic Flowmeter Flowtube, MAN 4644
- Vendor information, Rosemount Model 8712C Magnetic Flowmeter Transmitter, MAN 4668.
5.0 PROCEDURE

Special Instructions

There must be a minimum of 250 ohms resistance in the loop for the M268 to work properly.

5.1 Initial Set Up

NOTE - Figure 2 provides additional information to perform this procedure.

5.1.1 LIFT negative loop lead (Terminal 8) at transmitter.

5.1.2 CONNECT CMD (mADC) in series with lifted lead and Terminal 8.

5.1.3 CONNECT M268 in parallel with loop.

5.1.4 TURN ON M268 AND WAIT for M268 to perform self-test.

5.1.5 WHEN M268 displays option to SAVE or RECALL transmitter configuration data in Safe Memory, PRESS SAVE (F2).
5.2 As-Found Data

Transmitter Test

5.2.1 PRESS TEST (F2) to initiate testing.
5.2.2 PRESS XMTR TEST (F2) to select transmitter test.
5.2.3 PRESS PROCEED (F4) to set loop to manual.
5.2.4 WAIT (approximately 40 seconds) for 8712C to complete self-test.
5.2.5 PRESS EXIT (F4) to end test session.
5.2.6 PRESS PROCEED (F4) to return loop to automatic control.

Loop Test

5.2.7 PRESS LOOP TEST (F3) to select test of loop system.
5.2.8 PRESS PROCEED (F4) to set loop to manual control.
5.2.9 PRESS OUTPUT (F1) to test 4-20 mA current output.
5.2.10 PRESS 4 mA (F1) to select test of 4 mA current output.
5.2.11 PRESS PROCEED (F4) to execute 4 mA test.
5.2.12 RECORD minimum values (4 mA) indicated on as-found column of PM/S data sheet.
5.2.13 PRESS END (F4) to return to current output loop test screen.
5.2.14 PRESS 20 mA (F2) to select test of 20 mA current output.
5.2.15 PRESS PROCEED (F4) to execute 20 mA test.
5.2.16 RECORD maximum values (20 mA) indicated on as-found column of PM/S data sheet.
5.2.17 PRESS END (F4) to return to current output loop test screen.
5.2.18 PRESS END (F4) to complete loop test.
5.2.19 PRESS END (F4) to return to test function screen.
5.2.20 PRESS EXIT (F4) to return loop to automatic control.
5.2.21 PRESS PROCEED (F4) to return loop to automatic control.
5.3 4-20 mA Trim

5.3.1 PRESS FORMAT (F4).

5.3.2 PRESS PROCEED (F4) to set loop to manual.

5.3.3 PRESS DGTL TRIM (F3) to adjust 4-20 mA output circuitry.

5.3.4 PRESS OPUT TRIM (F1) to perform 4-20 mA trim.

5.3.5 PRESS 4 to 20 mA (F1) to select standard 4-20 mA scale.

5.3.6 PRESS PROCEED (F4) to obtain value presented by CMD.

5.3.7 PRESS PROCEED (F4) to set transmitter output to 4 mA.

5.3.8 PRESS <- and -> keys to move underline cursor AND

ENTER CMD value using alphanumeric keys of M268.

5.3.9 PRESS ENTR (F4) after value is keyed.

5.3.10 IF transmitter output indicated in next screen is equal to CMD reading,
PERFORM the following:

5.3.10.1 PRESS YES (F4).

5.3.10.2 RECORD value(s) in as-left column of PM/S data sheet.

5.3.10.3 GO TO Step 5.3.12.

5.3.11 REPEAT Steps 5.3.8 through 5.3.10 until values are equal.

5.3.12 PRESS PROCEED (F4) to obtain value presented by CMD.

5.3.13 PRESS <- and -> keys to move underline cursor AND

ENTER CMD value using alphanumeric keys of M268.

5.3.14 PRESS ENTR (F4) after value is keyed.
5.3 4-20 mA Trim (Cont.)

5.3.15 IF transmitter output indicated in next screen is equal to CMD reading, PERFORM the following:

5.3.15.1 PRESS YES (F4).

5.3.15.2 RECORD value(s) in as-left column of PM/S data sheet.

5.3.15.3 GO TO Step 5.3.17.

5.3.16 REPEAT Steps 5.3.13 through 5.3.15 until values are equal.

5.3.17 PRESS ABORT (F4) to exit 4-20 trim.

5.3.18 PRESS END (F4).

5.3.19 PRESS EXIT (F4).

5.3.20 PRESS PROCEED (F4) to return loop to Manual.

5.4 Restoration

5.4.1 RESTORE to as-found conditions.

5.4.2 ENSURE alarms are reset or cleared.

5.4.3 INFORM SOM that test is complete instrument/equipment/system may be returned to service.

5.5 Acceptance Criteria

Acceptance criteria has been met when steps in this procedure have been satisfactorily performed and results are recorded on the data sheet(s).
5.6 Review

5.6.1 INFORM FWS test is complete.

5.6.2 (FWS) REVIEW AND ENSURE the following:
- Completed data sheets meet the acceptance criteria
- Comments sections are filled out appropriately
- Work requests needed as a result of this procedure are identified and generated
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the data sheet.

5.7 Records

This procedure is performed within a work package, as such, the procedure in its entirety will be maintained as a record per the Work Control process.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
Figure 1 - Model 268 Interface
Figure 2 - Loop Test Connections

MODEL 268 MAY BE CONNECTED AT ANY TERMINATION POINT IN THE SIGNAL LOOP.
SIGNAL LOOP MUST HAVE 280 OHMS MINIMUM LOAD FOR COMMUNICATIONS.

SIGNAL LOOP MAY BE GROUNDED AT ANY POINT OR LEFT UNGROUNDED.
ATTACHMENT 1 - MODEL 268 SMART FAMILY INTERFACE OPERATION

GENERAL

The Rosemount Model 268 Smart Family Interface provides a common communications link to the Rosemount Smart Family of microprocessor-based instruments. Model 268 can communicate with any Rosemount Smart instrument from any wiring termination point in the loop.

The Model 268 communicates with Smart Family instrument via Bell 202 Frequency Shift Keying (FSK). FSK uses high frequency digital communication signals superimposed over the standard 4 to 20 mA instrument output. Information is communicated by varying frequency of the signals. Because net energy added to the loop is zero, communication does not disturb the 4 to 20 mA signal.

NOTE - Transmitter (TX) refers to any Rosemount Smart Family instrument.

This section introduces the M268 display, keypad, and the different memory locations in the TX and M268.

M268 Display

The display is a four-line by 20-character LCD that allows flexible, easy communication between the TX and the user. Top two lines display user prompts, information about the communication session, and user-entered values. Bottom two lines usually display dynamic labels for F1-F4 keys directly below display. These labels reflect currently available choices, and lead user through operation sequences involved in communication between M268 and TX.

Key Pad Functions

M268 contains a complete alphanumeric keypad, six pink (salmon) dedicated keys, and four green software-defined keys. Dedicated key functions are always the same while software-defined key functions vary with the current task.

(Continued on Next Page)
DEDICATED KEYS:

On/Off

Turns M268 on/off. When turned ON, M268 displays its software revision level and performs self-diagnostic routines. M268 then searches for TX on the loop. If no Smart TX is found, M268 offers opportunity to try again (F1) or to perform other off-line operations.

In Rev. 4.0+, user can either press RETRY (F1), try connection under another address using multidrop function (F2), or perform off-line functions (F4).

If no key is pressed for 20 min. (Rev. 4.0+), M268 automatically shuts OFF. Shutoff function disabled if displaying process variable or error message.

Process Variable (PV)

Displays up-to-date PV readings from TX in engineering units and as percentage of calibrated span. Displayed PV is updated on ~1 sec. intervals.

M268 can also display currently selected 4 and 20 mA range points for connected TX via menu item on PV display.

Review

Allows user to step through all information currently held in the four memory locations in the TX and M268; SAFE MEM, CONF MEM, WORK REG, and XMTR MEM. Memory locations described later.

Help

Explains software-defined key functions (F1-F4) in order. HELP CONT steps through help screens. HELP END cancels help and returns to original screen.

Restart

Initiate communication with a Smart TX while M268 is still turned on. Upon connection to a new TX, pressing this key loads information from new TX into M268 Working Register.

(Continued on Next Page)
Previous Function

Return to last decision level and select different function. (i.e., user wants to configure TX but accidentally presses TEST on top-level screen. Pressing PREVIOUS FUNCTION returns to top-level screen for new choice). Also useful for returning to familiar screen if user loses place in unfamiliar operation.

Software-Defined Keys:

Software-defined keys (F1 through F4) just below the screen of M268 are used for functions appropriate to current screen. This allows M268 to perform many functions with only a few keys and a minimum of confusion. (See HELP key).

Alphanumeric Keys:

Alphanumeric keys are used to enter information into M268 when updating TX parameters. Pressing key by itself enters numeric value of that key. To enter a letter, first press shift key associated with letter position on the alphanumeric key, then press the alphanumeric key (i.e.: to enter letter R, press right-hand shift key, then press "6" key. Do not press keys simultaneously; press one, then the other).

Memory Locations

Together, TX and M268 have four memory locations (three in M268, one in TX). Only direct data path between M268 and TX Memory is Working Register.

(Continued on Next Page)
SAFE MEM

Memory location in M268 where existing TX information parameters can be saved upon start-up. If user wants to "undo" changes to TX configuration, information from Safe Memory can be recalled to return TX to original configuration. Safe Memory can be used only to restore data to same TX from which it was obtained. Safe Memory is nonvolatile: data remains even if M268 is turned OFF. If M268 battery pack is discharged or removed, contents of Safe Memory will be lost.

OFLN MEM

Off-line Memory stores configuration information that was entered into the M268 off-line for later downloading to a TX. This location can also be used to clone a TX by uploading its configuration data, and then downloading it to a number of other TXs. Off-line Memory is nonvolatile.

(Continued on Next Page)
Attachment 1 - Model 268 Smart Family Interface Operation (Cont.)

Work Reg

Working Register is memory location in M268 that stores data as it is being entered. It receives TX's configuration data upon start-up or restarting. Configuration changes are first made in the Working Register. Data in Working Register not automatically sent to TX, must be transferred with SEND DATA key.

**CAUTION**

Be sure to enter TX serial number. M268 uses serial number to distinguish one TX from another. If two TXs have no serial number entered, M268 has no way of distinguishing between them and may allow data from Working Register of one to be transferred to the other. This would send calibration values for one TX to the other, causing serious measurement errors.

XMTR MEM

Nonvolatile memory in TX. TX uses contents of this memory to determine how it operates. Data in TX Memory is never accessed directly; must be uploaded into Working Register before it may be reviewed or changed. TX Memory information may be different from that in Working Register, since Working Register may contain changed data not yet sent to TX. Therefore, M268 warns that REVIEWing TX memory erases information currently held in M268 Working Register.

M268 Connections

M268 can communicate with TX from control room, TX site, any other wiring termination point in loop. M268 must be connected in parallel with TX. For M268 to function properly, loop must have 250 ohms resistance minimum.

Power Supply

M268 comes with battery pack for five "AA" alkaline cells or with rechargeable nickel-cadmium power pack.

Battery life:  alkaline, approximately 150 hours  nickel-cadmium, approximately 60 hours

"LB" (low-battery) appears in lower right-hand corner of display when there is approximately one-half hour of battery life remaining.

To conserve battery life, M268 automatically shuts itself OFF after 20 minutes (Rev. 4.0+) without a keystroke.