

MID:COM

E:COUNT MCR-05 AND E:COUNT LT MCR-09 MULTIPOINT CALIBRATION

MULTIPOINT CALIBRATION may be used to enhance a meter's accuracy over its approved flow range, usually at the high and low flow rates. By Weights & Measures regulations the meter must be tested and must be in tolerance over the approved flow range of the meter before multi-point calibration can be applied.

E:Count Menu Items are shown in uppercase, bold, and italics:

MENUITEM

E:Count Keys are shown in uppercase, bold, and surrounded by brackets:

<KEY>

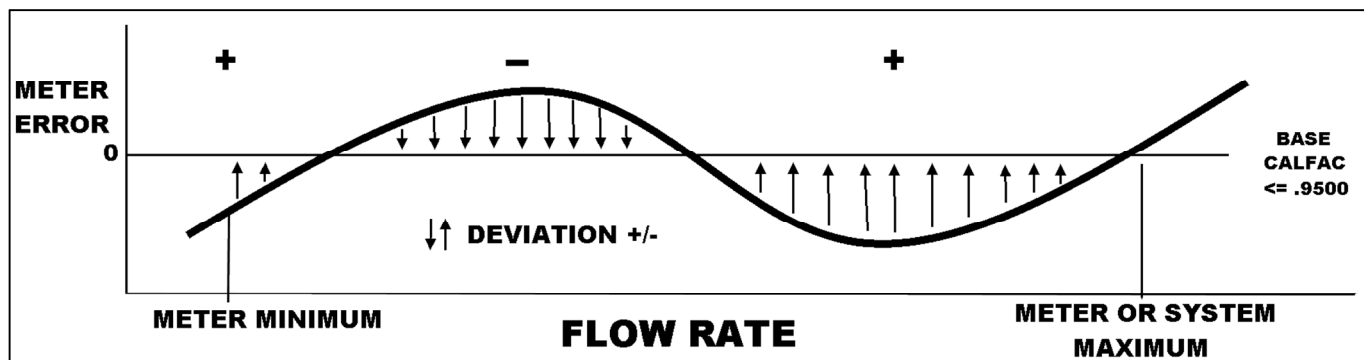
THEORY OF OPERATION

Each of the 99 possible products in the E:Count may have a unique Calibration Factor. The Calibration Factor for the currently selected Product (***PRCODE***) is displayed under the ***CALFAC*** menu screen in the Calibration Menu. When using Multipoint Calibration the ***CALFAC*** becomes the "base" Calibration Factor for each product. The ***MP CAL*** setting (only available in Calibration Mode) in the Calibration Menu controls the Multipoint Calibration mode in both Calibration and Delivery Modes. Note: The E:Count LT MCR-09 only supports 1 Product Code.

During the proving process the E:Count ***ATOCAL*** feature is used to determine up to 10 calibration points at various flow rates. When all calibration points have been determined the E:Count computes the plus or minus "deviation" from the base ***CALFAC*** for each point. The points are sorted in ascending flowrate order and then stored. The calibration points are applied to all of the possible 99 product code ***CALFAC***s.

Multi-Point Calibration can only be used with flowrates not exceeding 500 units/min. The 0 to 500 unit/min flow range is divided into 250 possible flowrates. During the calibration process the flowrate **must** be observed at least one time by pressing the **<MODE>** key while the prover is being filled. Observing the flow rate is how the E:Count records the 1 of 250 flowrate points to the 1 of 10 possible calibration points.

The figure below shows an exaggerated meter accuracy graph and illustrates how the calibration points are applied:



MULTIPOINT CALIBRATION

STEP 1. SETUP

1. IF RE-CALIBRATING PRINT A CALIBRATION TICKET TO SAVE A COPY OF EXISTING MULTIPOINT CALIBRATION DATA
 - PRESS <START/STOP> ON **CALTKT** IN THE DELIVERY MENU TO PRINT THE CALIBRATION TICKET
 - THE MIDCOM MATRIX MAY ALSO BE USED TO QUERY FOR MPC DATA
2. IF TEMPERATURE COMPENSATION IS INSTALLED, SET **CMPTBL** TO 00 TO DISABLE THE COMPENSATOR PRIOR TO DETERMINING THE CALFAC AND DURING THE REST OF THE PROCESS
 - IN THE LT THE SETTING IS CALLED **TMPCMP** AND IS EITHER ON OR OFF
 - NOTE: YOU MUST SET **CMPTBL** BACK TO WHAT IT WAS (**TMPCMP** IN THE LT) AFTER THE MULTIPOINT CALIBRATION PROCESS IS COMPLETE.
3. CONFIRM CALFAC IS 0.9500 OR LOWER AND MPCAL IS OFF

BEFORE THE MULTIPOINT PROCESS IS STARTED THE CALFAC FOR THE PRODUCT MUST BE DETERMINED WHILE MPCAL IS OFF.

- IN CALIBRATION MENU SELECT **MP CAL**, **ON** OR **OFF** WILL APPEAR
- IF **ON** PRESS THE <▼> KEYS TO DISPLAY **OFF**
- PRESS <START/STOP> TO SAVE **OFF** - **MP CAL** WILL BE SHOWN

THE INITIAL CALIBRATION MAY CAN BE DONE MANUALLY OR WITH THE ATOCAL FEATURE, BUT IT SHOULD BE DONE AT THE HIGHEST FLOWRATE THE SYSTEM IS CAPABLE OF

- ADJUST **MRATIO** IF NECESSARY TO LOWER **CALFAC**
- MULTIPOINT CALIBRATION WILL NOT WORK FOR **CALFAC**'S ABOVE 0.9999
- ADJUST **MRATIO** SO THAT THE **CALFAC** IS EQUAL TO OR LESS THAN 0.9500
- ALLOWS FOR POSITIVE DEVIATIONS NOT TO EXCEED A FACTOR OF 0.9999
- ALSO, A **CALFAC** LESS THAN 1.0000 IMPROVES RESOLUTION EVEN IF MULTIPOINT IS NOT USED

Example:

- A 2" LC Meter requires an **MRATIO** of **55** for a **CALFAC** near 1.0000
- To lower **CALFAC** set the **MRATIO** to **50**, the resulting **CALFAC** will be about 0.9000

STEP 2. MULTIPOINT CALIBRATION

******* IMPORTANT: Make sure the INITIAL CALIBRATION has been done and confirm that the CALFAC is equal to or less than 0.9500 *******

1. Enable and Initialize MPCAL

- a. In Calibration Menu press and hold <MODE> until **MP CAL** is shown
- b. Press <START/STOP> to select **MP CAL** **OFF** will appear
- c. Press the <▲> key to display **ON**
- d. Press <PRESET> **RESET** will splash on screen and all calibration points will be cleared.

Note: If *DONE* appears go back to step b, the previous *MP CAL* session was not finished

- e. Press the <▶> to quick-jump to **EXIT**
- f. Press <START/STOP> to exit the Calibration Menu

Note: Pressing the <▶> key is a quick jump to **EXIT** in all E:Count Menus

2. Perform as many Calibration Deliveries as necessary, up to 10 MultiPoint Calibration Flow Rates Adjustment Factors may be stored

- a. In Calibration Mode press <START/STOP> to begin a Calibration Delivery
- b. Begin filling the prover
- c. At least once during the delivery observe the flowrate using the <MODE> key to record this flowrate
- d. If you adjust the flowrate during the delivery press <MODE> to observe the new flow rate and store the new value

Note: You must always wait 6 seconds before checking the Flow Rate again

- e. When flow has stopped press <START/STOP> to end the delivery
- f. Press and hold <MODE> until **ATOCAL** is shown
- g. Press <START/STOP> to select **ATOCAL**
- h. Use the **Arrow keys** to enter the **Prover Amount**
- i. Press <START/STOP> to save the **Prover Amount** (see RECOMMENDATIONS)
- j. **WAIT** will be shown while the E:Count is calculating and the Calibration Factor is stored for the current flowrate and
- k. Press the <▶> to quick-jump to **EXIT**
- l. Press <START/STOP> to exit the Calibration Menu

Repeat the Calibration Delivery steps above for each Calibration Point. During the multi-point calibration procedure any number of deliveries or prover 'zeroings' may be done without affecting the outcome of the multi-point procedure. Only the **ATOCAL** procedure records the current prover volume with the associated flowrate.

3. After all Calibration Points have been established you must finish the MPCAL procedure to sort and store the Multipoint Calibration Adjustment Factors

- a. In Calibration Menu press and hold <MODE> until **MP CAL** is shown
- b. Press <START/STOP> to select **MP CAL** **ON** will appear
- c. Press <PRESET> **DONE** will splash on the screen and the Multipoint proving session has ended and all calibration points and flowrates have been stored and sorted into deviations from the base calibration factor.

4. IMPORTANT: If temperature compensation is installed, you must set **CMPTBL back to what it was (**TMPCMP** in the LT) after the Multipoint Calibration process is complete.**

STEP 3. REVIEWING AND EDITING CALIBRATION POINTS

The ten Calibration Points are numbered 00 to 09. After the Multipoint Calibration session is over the Calibration Points are sorted from lowest to highest flowrate with Calibration Point 00 being the lowest flowrate. In the editing procedure the Deviation Factors will be represented as 0.XXXX or 1.XXXX.

The '1' represents a positive deviation which will be added to the base **CALFAC**

The '0' represents a negative deviation which will be subtracted from the base **CALFAC**

OPTION 1: VIEW ON CALIBRATION TICKET

1. Press **<START/STOP>** on **CALTKT** in the **DELIVERY MENU** to print the **Calibration Ticket**
2. The **Calibration Ticket** will list all 10 Calibration Points, each with a plus sign "+" or a minus sign "-" to indicate the deviation.

OPTION 2: VIEW AND EDIT IN ECOUNT OR ECOUNT LT

1. In Calibration Mode Press and hold **<MODE>** until **MP CAL** is shown
2. Press **<START/STOP>** to select **MP CAL**
3. Press **<MODE>**
 - a. **CALPT** then **00** through **09** (the current **CALPT**) will be shown
 - b. Next the value of the **Deviation** will be shown
 - c. If necessary edit the **Deviation** value using arrow keys
 - d. Press **<START/STOP>** until the display stops blinking
 - e. Press **<MODE>** to view the next **CALPT**
 - f. Repeat for each successive Calibration Point
4. When editing is complete:
 - a. Press **<START/STOP>** to **ON**
 - b. Press **<START/STOP>** to **MP CAL**
 - c. Press **<▶>** to jump to **EXIT**
 - d. Press **<START/STOP>** to exit the Calibration Menu

OPTION 3: VIEW AND EDIT IN MIDCOM MATRIX SOFTWARE

1. Requires that the PC be connected to the ECount/LT in Delivery Mode with no delivery active.
2. The Matrix software has a function "**Get Calibration Ticket**" on the **Debug Tab** to request the **Calibration Report** text.
3. The Matrix software has functions "**Get MPC**", "**Edit MPC**", and "**Send MPC**" ON THE Calibration Tab to Request, Edit, and Send the Multipoint Calibration data.
4. The Matrix software may be downloaded from the Midcom website at www.midcomcorp.com
5. Contact your distributor or the Midcom factory for more information.

MULTIPOINT CALIBRATION RECOMMENDATIONS

- ❖ Follow the Multipoint Calibration procedure exactly as described. If a step is missed simply start over.

Example: If you forgot to observe the flow rate during a delivery simply end the delivery and start a new one - only the **ATOCAL** feature will reload a Calibration Point.

- ❖ During the Multipoint Calibration proving session each delivery will use the base **CALFAC**. The volume registered vs the prover reading is the error that will be corrected for at the recorded flowrate. Do not try to “TWEAK” the prover reading. Calibration Points may be edited when the Multipoint Calibration proving session is complete.
- ❖ Occasionally reading the flowrate with the **<MODE>** key will result with no flowrate reading because the E:Count is in the middle of a calculation. This is noted by the fact that counting stops for 1 second but **FR** does **not** appear in the left two digits. If this occurs, wait about 5 seconds and press **<MODE>** again. If **FR** appears the current flowrate for the Calibration Point is recorded.
- ❖ Before starting the Multipoint Calibration process it is wise to create a table on paper for the flowrates that you use for each calibration point. It's not important that during the process that you calibrate in increasing or decreasing flowrates since the E:Count sorts them in the end. However, when it comes time to edit, your lowest flowrate will be **CALPT 00**, next **CALPT 01**, etc. A **Multipoint Calibration Worksheet** is on the following pages.
- ❖ During a normal delivery the Calibration Factor being used is the one determined at the next higher flowrate point.

Example: If Calibration Points have been saved at 20 units/min and 30 units/min, a flowrate of 25 units/min will use the Calibration Factor determined for 30 units/min point. When rechecking calibration use a flowrate that is on one side of a point or the other.

MULTIPOINT CALIBRATION WORKSHEET

CUSTOMER _____

DATE _____

TRUCK _____

METER MODEL AND SIZE _____

METER MIN/MAX FLOWRATE _____

SYSTEM MAX FLOW RATE FOR CALIBRATION _____

INITIAL CALIBRATION FACTOR ≤ 0.9500 _____

TEST #	FLOW RATE	REGISTER	PROVER
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			

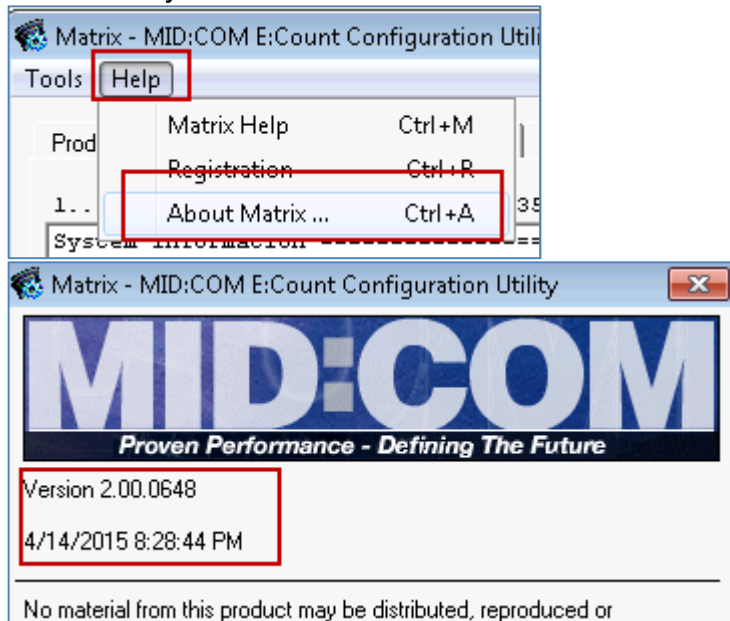
SORTED DEVIATIONS

	STORED	MODIFIED
CALPT 00		
CALPT 01		
CALPT 02		
CALPT 03		
CALPT 04		
CALPT 05		
CALPT 06		
CALPT 07		
CALPT 08		
CALPT 09		

Viewing ECount and ECount LT Calibration and Shift Ticket Text

Make sure your laptop, serial cable, usb-serial adapter, printer, and register are all connected and ready.

Make sure your Matrix Version is AT LEAST 2.00.0648 dated 04/14/2015:



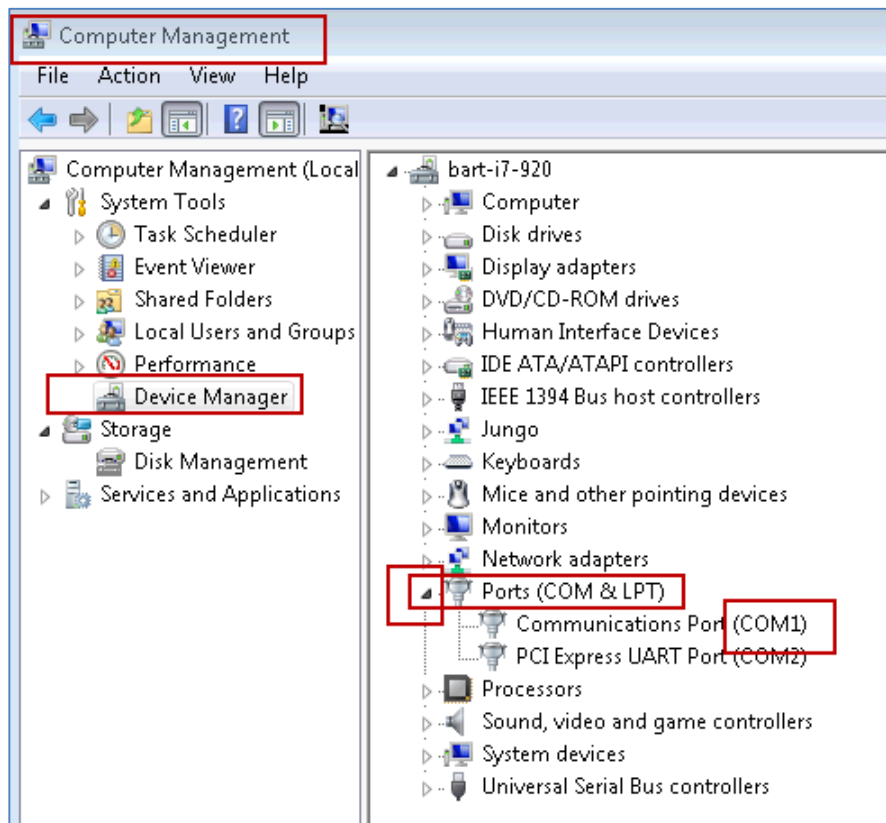
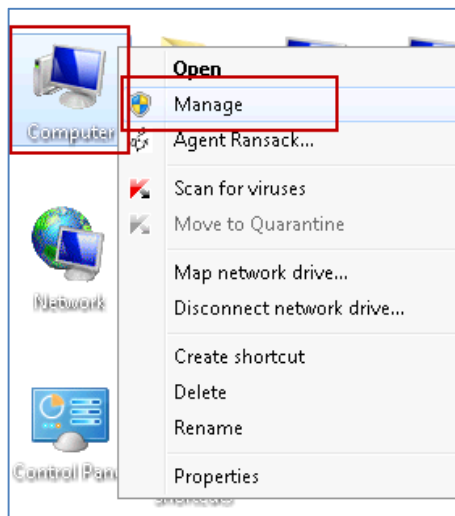
Download the latest version from the Midcom Support Website:

<http://www.midcomcorp.com/Support.html>

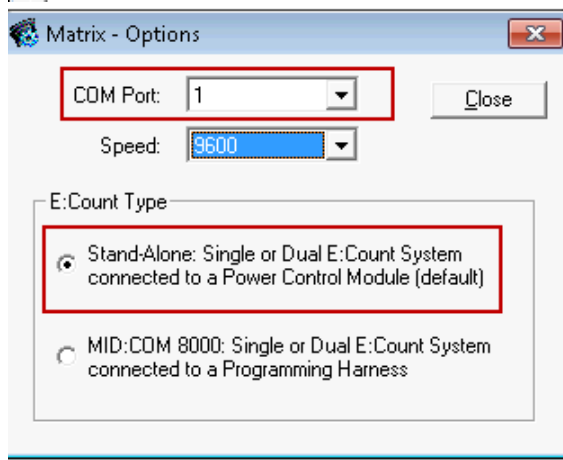
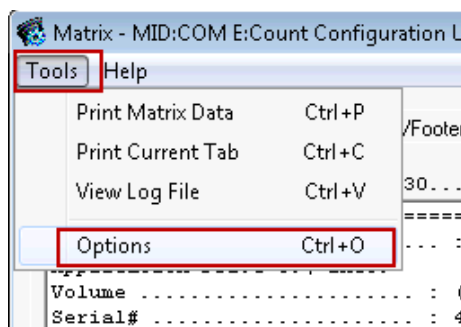


If you get no response make sure the cables and adapters are connected correctly.

Make sure the COM Port in Tools-Options matches the Device Manager “Ports”.



Matrix Tools, Options, Com Port setting



To view the Ticket Text:

- Select the DEBUG tab,
- Select **Get Shift Ticket** or **Get Calibration Ticket**
- The Selected Report will be retrieved from the register and displayed on the screen.

The screenshot displays a software window with a terminal-like interface on the left and a control panel on the right. The terminal shows a 'CALIBRATION REPORT' with various fields such as TRUCK#, DRIVER#, DATE, SERIAL #, and METROLOGICAL VER. The control panel includes a menu bar with 'Debug' selected, and several buttons: 'Print Duplicate Ticket', 'Print Shift Ticket', 'Print Calibration Ticket', 'Get Shift Ticket', 'Get Calibration Ticket' (highlighted with a red box), 'Get Date-Time', 'Set Date-Time', 'Show Matrix v 1.0', 'Export Pricing to CSV', 'Load from Matrix File', 'Send All to E:Count', 'Export Pricing from CSV', 'Save to Matrix File', 'Get All from E:Count', and 'Exit'.

```

9 CALIBRATION REPORT 1
10
11 TRUCK# 0000 DRIVER# 0000
12 DATE 09/16/15 FTIME 07:29
13 FINISH TOT.00000000000.0
14
15 USER SOFTWARE VER. E180E0
16 METROLOGICAL VER. M 17A
17 SERIAL # 001114
18 SALE # 000000
19 PRINTER THERML
20 METER RATIO 10
21 TMPSET 26 PLSREV 100
22 STAGE1 00 CHANNL DUAL
23 SWAUTH 0 FLODIR CW
24 COPIES 1 HOSEPK 0
25 PS RQD 0 SS KEY ON
26 REGNUM 2 TIMER 3MN FL
27 AIRSEN 0 PGROSS OFF
28 DECMAL 1 DEMO OFF
29 PROBE 1 HOSTFX OFF
30 BRKVLV 1 P KEYS BOTHON
31 U TYPE 0 EMULAT OFF
32 UNITS 0
33
34 ADJUSTMENT EVENT # 000001
35 CONFIGURE EVENT # 000001
36
37 PRODUCT # 01
38 PRODUCT PROPANE
39 CALIBRATION FACTOR 0.9426
40 PRESET VALVE DWELL 000.0
41 COMPENSATOR STATUS ON
42 COMPENSATION TABLE # 01
43
44 MULTI-POINT CALIB. ON
45 0 19 +0.0228
46 1 00 -0.0000
47 2 00 -0.0000
48 3 00 -0.0000
49 4 00 -0.0000
50 5 00 -0.0000
51 6 00 -0.0000
52 7 00 -0.0000
53 8 00 -0.0000
54 9 00 -0.0000
55 * END CALIBRATION REPORT*
  
```

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