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1.1 Introduction

1.1.1 About This Manual

This manual introduces the functions and operations, as well as installation and maintenance procedures for the KRAUS Automatic Temperature Compensation system.

In an effort to help our customers take full advantage of our state-of-the-art products, we have provided this handbook to aid in initial set up and later to be used as a reference guide should the need arise.

The three divided sections are:

1. INFORMATION

Gives general information on system functions as well as cautionary advice.

2. INSTALLATION

Gives all information needed to successfully install and operate the system, as well as technical advice to aid in troubleshooting.

3. TECHNICAL DATA

Gives information on products that make up the system, in the form of drawings, manufacturer's literature, and references to related systems and products.

These three sections are set up in such a way that information is easily understood and instantly available to those who need it, whether they are an engineer, technician or supply manager.

Due to different environmental conditions this manual may be subject to, it has been designed to fit neatly in a protective three holed binder. This also serves the function of containing information from other related products in one convenient package.

1.1.2 Helpful Hints and Warnings

Throughout this manual, in the left hand margin, there will be indicators, with text, to give various hints and warnings. The following are examples of what you will see, and their meanings:

SUGGESTION

Gives a hint on how to best use the equipment or advice on proper procedures.

ATTENTION

Gives notice to an important aspect of system operation.

CAUTION

Gives a warning to prevent damage to equipment or cause human injury.

Kraus Industries Ltd. assumes no responsibility for personal injury or equipment damage caused by non-observance of the safety warnings.

1.1.3 Service and Product Support

Should you experience any difficulties in system operation customer assistance is available.

The procedure to receive such assistance is as follows:

1. Document the following information:

- System Disfunction
- Corrective Measures Taken
- System Model Number
- System Serial Number
- Purchase Order Information
- Date of Installation
- Equipment Location (i.e. City, Address, etc...)

2. Call or Fax our Product Service line at:

Company Service number	1 204 988 1234
Company Fax number	1 204 654 2881

One of our qualified personnel will provide assistance in getting your system operational.

2.1 Pre-Installation

2.1.1 Site Preparation

- Extreme caution should be used to ensure that no ignition sources exist.
- The dispensing area should be roped off or isolated from public use.
- Dispenser station operator should be made aware of the work that needs to be completed to prevent accidental “turn on” of the pump.
- Any main electrical disconnection should be labeled or locked to prevent accidental power up.

2.1.2 Installation Requirements

To complete the installation, the following points should be taken into consideration:

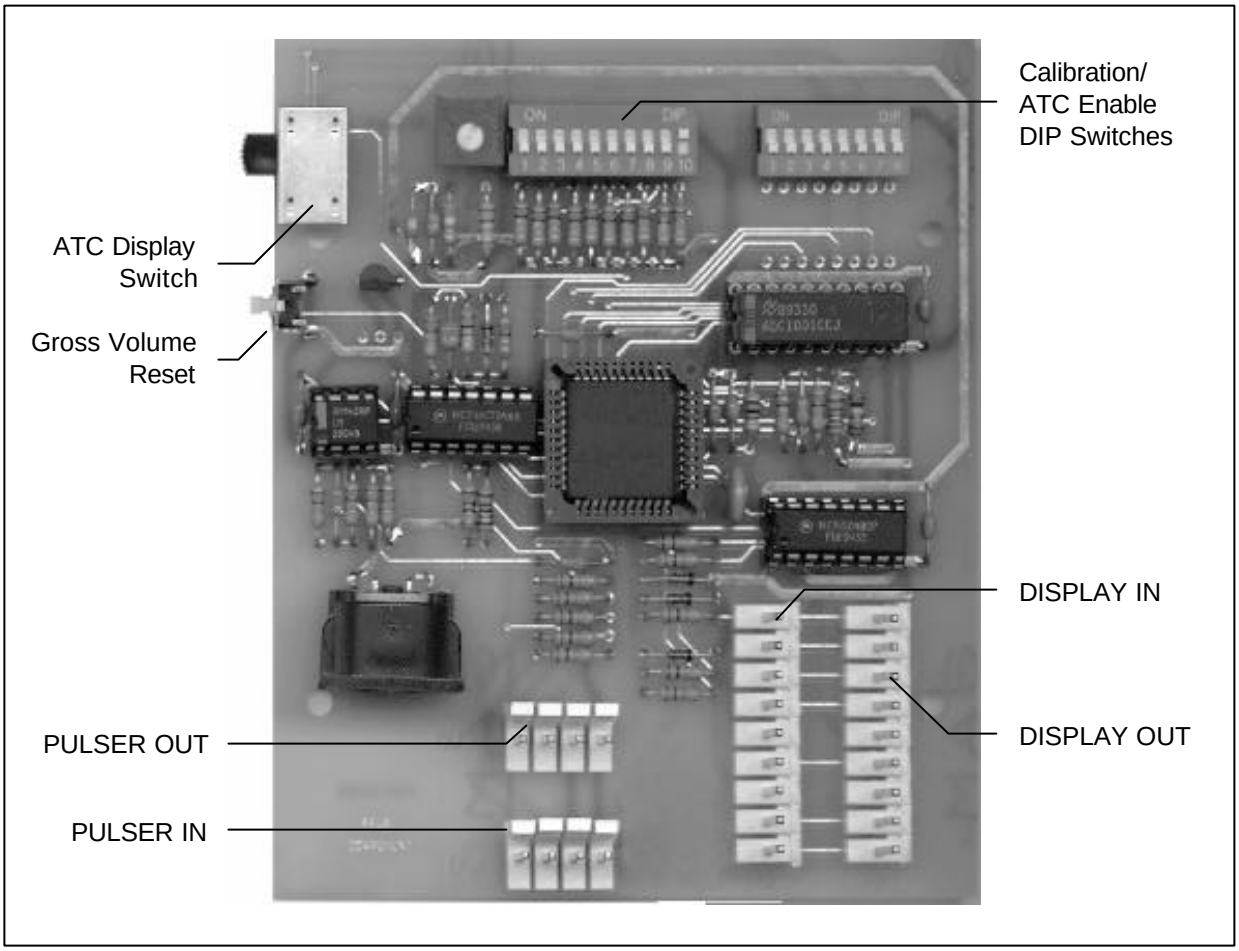
- Any electrical installation should be carried out by a registered electrician.
- Any fuel dispensing connections should be made by qualified and experienced personnel.
- Installation must be performed in accordance with the relevant standards, laws and by-laws governing the type of application.

2.1 Pre-Installation 2.1.3 Unit Configuration

The MTC 100 must be configured for installation. This is accomplished by setting the DIP switches on the ATC circuit board.

ATC board DIP Switch Settings **MTC 100**

SWITCH #	OPTION	SWITCH STATUS
1-8	Calibration Settings	SEE SECTION 2.3.2
9	Not Used	(N/A)
10	Selects whether ATC is enabled or disabled	ON = DISABLED



2.2 Component Installation

2.2.1 Thermal Test Well and Temperature Probe

1. Locate a suitable point in the metering line of the dispenser to install the test well and temperature probe. *(There should be no pumps, etc... between the temperature probe and flow meter.)*

2. After locating a suitable installation point, remove that section of pipe.

3. With pipe section mounted securely, drill and tap two holes as close together as practical to accept the fittings (Drill size Q - 0.332" and tap for 1/8" NPT).

CAUTION

Due to the presence of combustible gasses, DO NOT drill probe holes or solder fittings to parts directly connected to any piping.

The following guidelines should also be followed for installing the test well:

- The hole should be drilled so that the extension will be at an angle within 45^{o} of vertical when the extension is installed and assembly is reconnected. This is so that it will hold thermally conductive fluid for measuring purposes.

- The fitting should provide easy access for insertion of a thermometer.

- The fitting should be placed in an appropriate position so as to not hinder reinstallation of the assembly.

ATTENTION

Any connections must be made using thread sealing compound suitable for use with gasoline. Any connections having less than five (5) threads should be soldered.

4. Install fittings into holes and tighten using pipe sealant suitable for use with gasoline. (The temperature probe should be inserted so that the probe end is in the center of fuel flow.)

ATTENTION

In order to prevent cuttings from entering the dispensing system, make sure the pipe section is thoroughly cleaned prior to reassembly.

5. Reconnect pipe section to dispenser.

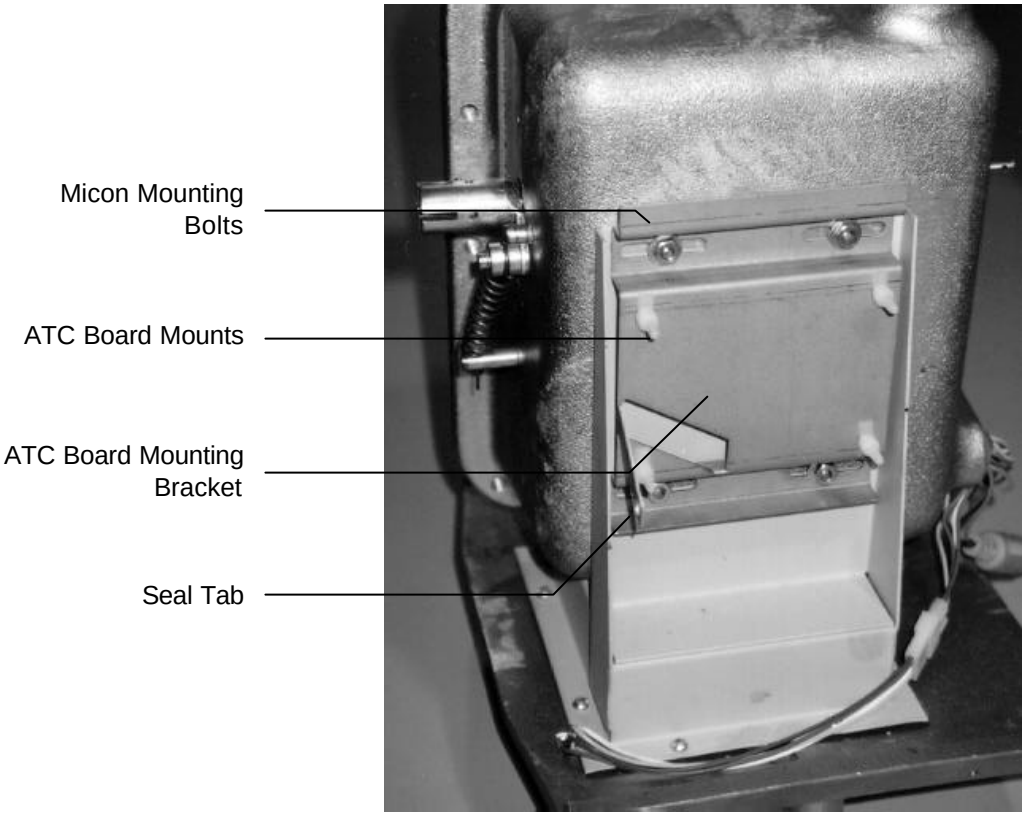
2.2 Component Installation

2.2.2 ATC Board

ATTENTION

Before connecting ATC board, power should be shut off to the dispenser.

1. Remove the Micon display to better access the mounting bolts on the back of the explosion proof enclosure.
2. Remove the four mounting nuts from the back of the Micon head.
3. Align the four holes of the ATC mounting bracket to the Micon head mounting bolts, and mount accordingly. (See Figure 2)

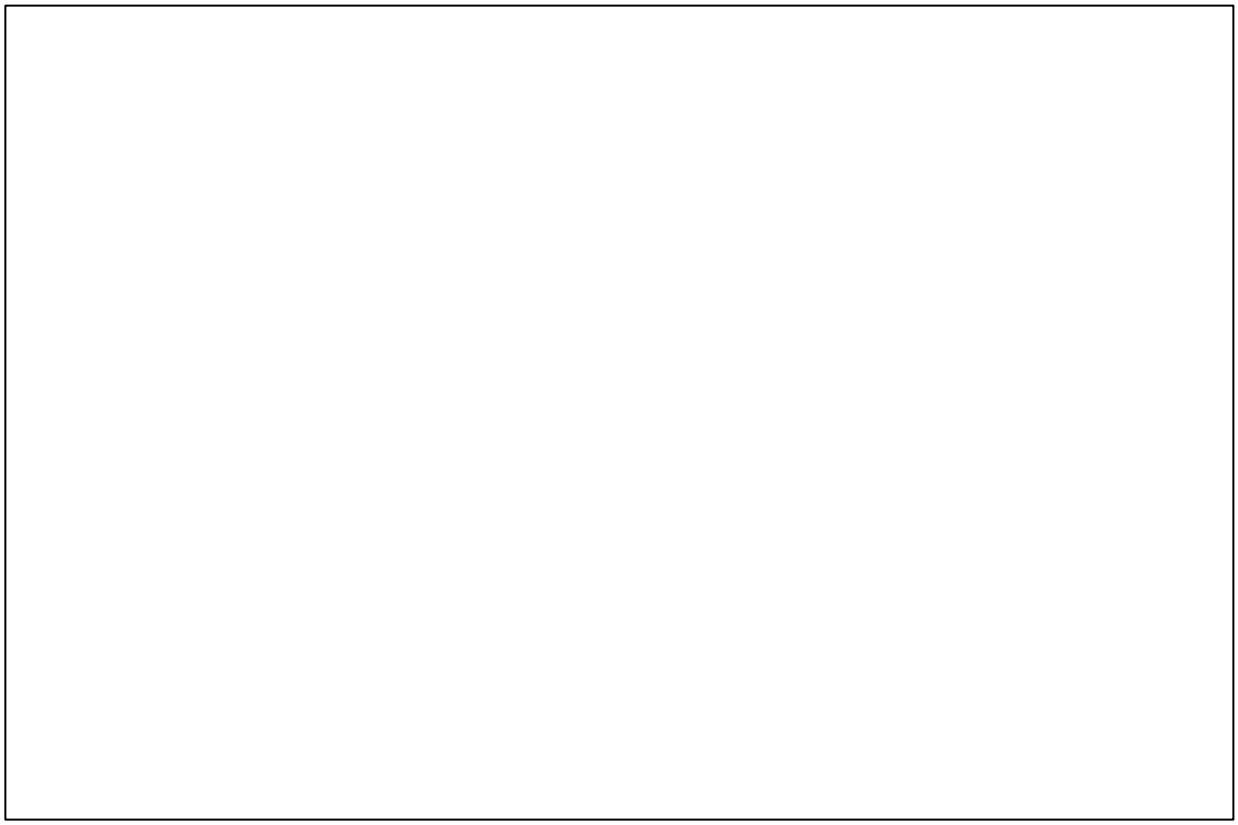


4. Secure the ATC board to the mounting bracket .

2.2 Component Installation

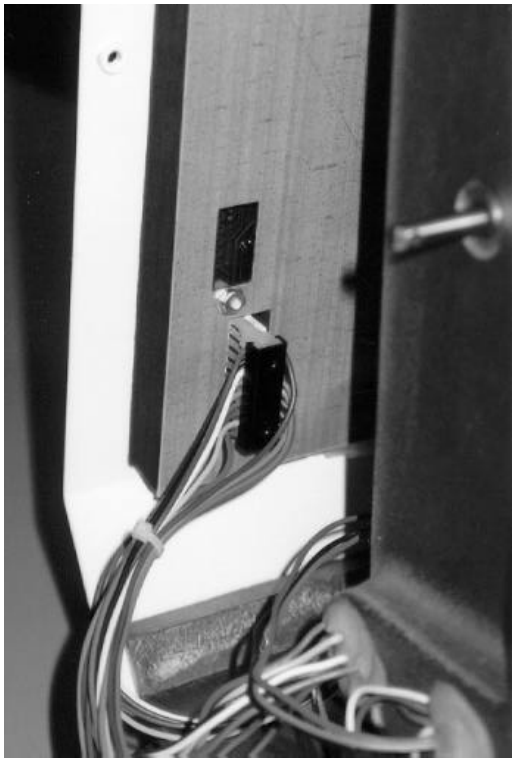
2.2.2 ATC Board

5. Disconnect the harness from the back of the Micon display, adjacent to ATC bracket (See Figure 3).



Micon Display

Dual Wired Display Harness

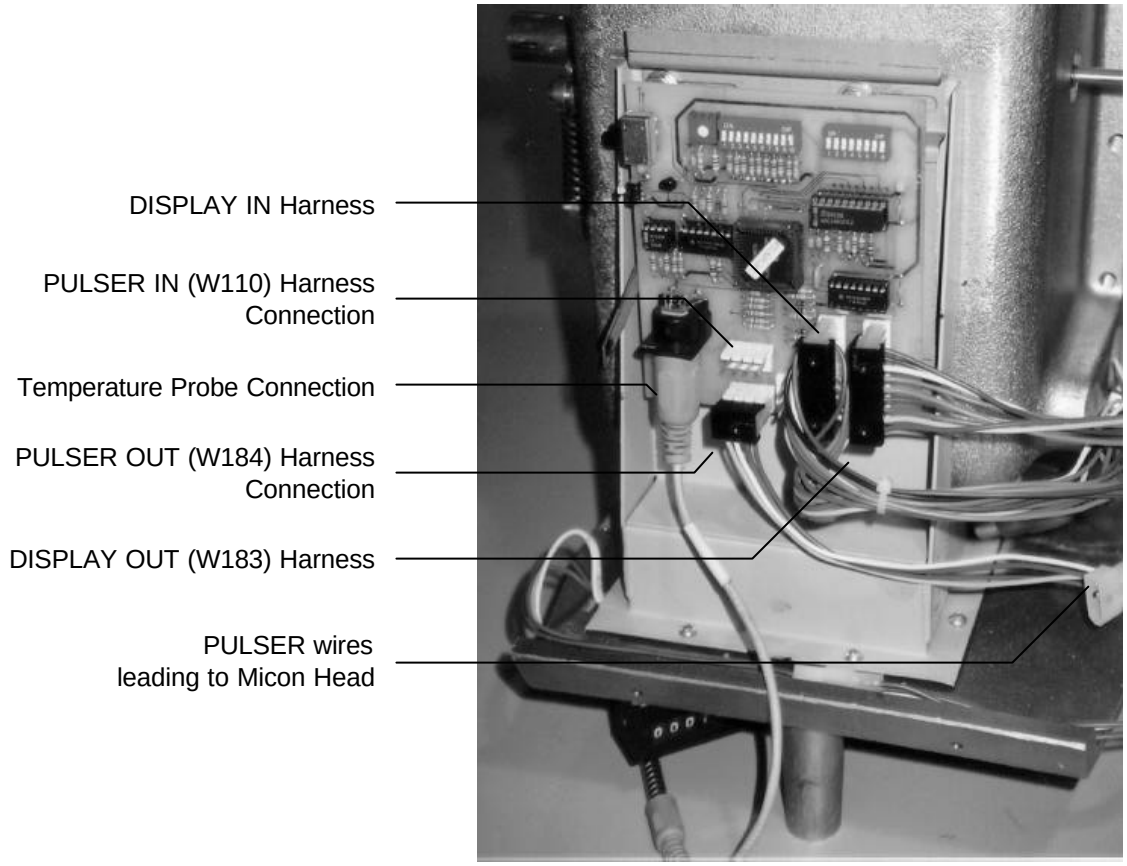


6. Reconnect the plug to the DISPLAY IN connector on the ATC board. The wires of the plug should be in the same vertical order as when connected to the display.

2.2 Component Installation

2.2.2 ATC Board

7. Disconnect the pulser wires leading from the pulser to the Micon head. (See Figure 4)



8. Connect one end of the W110 (4 wire) harness to the wires coming from the pulser (male end).

9. Connect the other end to the PULSER IN connector on the ATC board.

10. Connect the W184 (4 wire) harness to the female end of the pulser wires leading to the Micon head.

11. Connect the other end to the PULSER OUT connector on the ATC board.

12. Connect Wiring harness W183 between the DISPLAY OUT connector on the ATC board and the Micon head display.

13. Connect the DIN plug from the temperature probe to the temperature probe DIN jack on the ATC board.

2.3 Post Installation

2.3.1 Display Messages

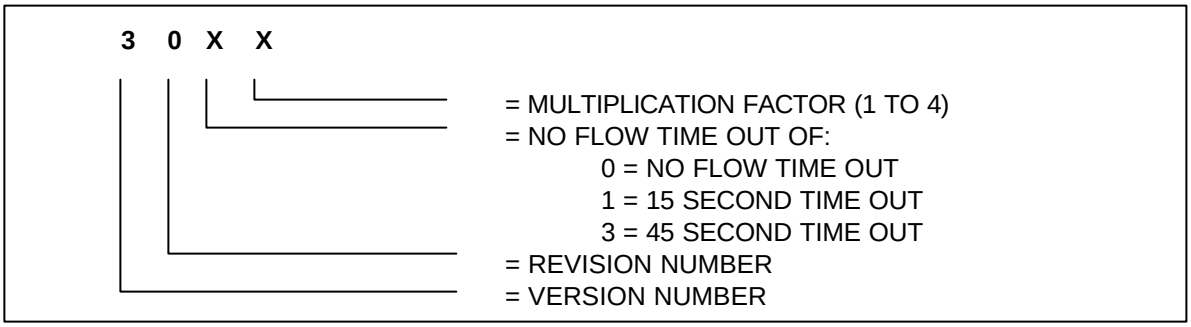
If pump calibration is required, it can be accomplished electronically by configuring the DIP switches on the ATC board. (Note: The calibration factor programmed with the DIP switches is not applied to the mechanical totalizer, if so equipped.)

The required calibration error is programmed into the ATC via the first 8 DIP switches located on the ATC board. (See Figure 1) These switches are factory set for 0% calibration error. If the meter is correctly calibrated, no further adjustment is necessary.

When the switch on the front display is in the UP, or "ATC" position, the ATC readings are shown on the display. The display then indicates as follows:

TOP DISPLAY	% CALIBRATION (WITH SWITCH 10 "ON") TEMPERATURE (WITH SWITCH 10 "OFF")
CENTER DISPLAY	UNCOMPENSATED VOLUME (GROSS)
BOTTOM DISPLAY	FLOW RATE/SHUT DOWN REASON

5 seconds after reset, a software I.D. message will be displayed on the bottom display as follows:



5 seconds after reset and until/unless FLOW BEGINS or a shut down error occurs, the product compensation type will be displayed for one of the following products:

GAS = Gasoline
PROP = Propane
DESL = Diesel Fuel

If normal flow begins, the flow rate display will be displayed continuously until/unless an error occurs. If a pump shut down occurs, the "Reason" code will replace the above message with one of:

Bad = Temperature probe defect (Valid only if ATC is ON)
Flo = If there is a shut down due to no flow time out
Err = If pulser error causes a shut down

2.3 Post Installation

2.3.2 Electronic Calibrator Adjustment

If electronic calibration is required, the following method may be used to calibrate the system:

1. Remove the cover from the housing and place DIP switch #10 and the ATC display switch, on the ATC board, in the ON position (UP=ON for ATC display switch). Ensure all other switches are set for 0% calibration (factory setting - see tables in this section or observe calibration reading on display).

2. Place the handle switch in the ON position and observe that the Micon 200 dollars and volume displays reset to zero.

3. Dispense a known volume of product and record the reading on the volume display.

4. Use following formula to calculate percentage correction required:

$$\% \text{ CORRECTION} = \frac{(\text{ACTUAL VOLUME} - \text{REGISTER VOLUME})}{\text{REGISTER VOLUME}} \times 100$$

5. Refer to tables on the following pages for the closest correction value and set switches 1 through 8 accordingly.

Example: Product Dispensed = 25.00 litres
Register Reading = 26.360 litres

$$\% \text{ CORRECTION} = \frac{(25.000 - 26.360)}{26.360} \times 100 = -5.159\%$$

DIP Switch Setting = OOOCCOOC (O = OPEN, C = CLOSED)

6. Place the ATC switch on the ATC board in the UP position. The dollars display on the front display will now show the meter calibration error which you have programmed into the Micon. For the above example, the display will show “-5.15”. If the value shown is not correct, one or more of the switches was incorrectly set.

7. Repeat steps 3-5 above to verify unit calibration.

8. Return switch 10 to the OFF position if the Micon is to be used in the ATC mode. When the ATC feature is used, a temperature probe of the proper type must be connected.

9. If ATC is not going to be used (i.e. Calibration only), leave DIP switch #10 in the ON position.

Switch Setting	Compensation	Switch Setting	Compensation
oooooooo	0.00%	cooooooo	+6.40%
ooooooоc	+0.05%	cooooooc	+6.45%
oooooоco	+0.10%	cooooоco	+6.50%
oooooоcc	+0.15%	cooooоcc	+6.55%
ooooоcoo	+0.20%	coooocoo	+6.60%
ooooococ	+0.25%	coooococ	+6.65%
ooooocco	+0.30%	coooocco	+6.70%
ooooоccc	+0,35%	cooooccc	+6.75%
oooocooo	+0.40%	cooocooo	+6.80%
oooocooc	+0.45%	cooocooc	+6.85%
oooococo	+0.50%	cooococo	+6.90%
oooococc	+0.55%	cooococc	+6.95%
oooоccoo	+0.60%	cooоccoo	+7.00%
oooоccoc	+0.65%	cooоccoc	+7.05%
oooоccco	+0.70%	cooоccco	+7.10%
oooоcccc	+0.75%	cooоcccc	+7.15%
ooocoooo	+0.80%	coocoooo	+7.20%
ooocoooc	+0.85%	coocoooc	+7.25%
ooocooco	+0.90%	coocooco	+7.30%
ooocoocc	+0.95%	coocoocc	+7.35%
ooococoo	+1.00%	coococoo	+7.40%
ooocococ	+1.05%	coocococ	+7.45%
ooococco	+1.10%	coococco	+7.50%
ooococcc	+1.15%	coococcc	+7.55%
ooоccooo	+1.20%	cooccooo	+7.60%
ooоccooc	+1.25%	cooccooc	+7.65%
ooоccoco	+1.30%	cooccoco	+7.70%
ooоccocc	+1.35%	cooccocc	+7.75%
ooоcccoo	+1.40%	coocccoo	+7.80%
ooоcccoc	+1.45%	coocccoc	+7.85%
ooоcccco	+1.50%	coocccco	+7.90%
ooоccccc	+1.55%	coocccccc	+7.95%
oocoooоo	+1.60%	cocoooоo	+8.00%
oocoooоc	+1.65%	cocoooоc	+8.05%
oocoooco	+1.70%	cocoooco	+8.10%
oocoоocc	+1.75%	cocoоocc	+8.15%
oocoocoo	+1.80%	cocoocoo	+8.20%
oocoococ	+1.85%	cocoococ	+8.25%
oocoocco	+1.90%	cocoocco	+8.30%

oocooccc	+1.95%	cocooccc	+8.35%
oococooo	+2.00%	cococooo	+8.40%
oococooc	+2.05%	cococooc	+8.45%
oocococo	+2.10%	cocococo	+8.50%
oocococc	+2.15%	cocococc	+8.55%
oococcoo	+2.20%	cococcoo	+8.60%
oococcoc	+2.25%	cococcoc	+8.65%
oocococco	+2.30%	cocococco	+8.70%
oocococcc	+2.35%	cocococcc	+8.75%
ooccoooo	+2.40%	coccoooo	+8.80%
ooccoooc	+2.45%	coccoooc	+8.85%
ooccooco	+2.50%	coccooco	+8.90%
ooccoocc	+2.55%	coccoocc	+8.95%
ooccocoo	+2.60%	coccocoo	+9.00%
ooccococ	+2.65%	coccococ	+9.05%
ooccocco	+2.70%	coccocco	+9.10%
ooccoccc	+2.75%	coccoccc	+9.15%
oocccooo	+2.80%	cocccooo	+9.20%
oocccooc	+2.85%	cocccooc	+9.25%
oocccoco	+2.90%	cocccoco	+9.30%
oocccocc	+2.95%	cocccocc	+9.35%
oocccoo	+3.00%	cocccoo	+9.40%
oocccoc	+3.05%	cocccoc	+9.45%
oocccco	+3.10%	coccccco	+9.50%
oocccccc	+3.15%	coccccccc	+9.55%
ocooooo	+3.20%	ccoooooo	+9.60%
ocoooooc	+3.25%	ccoooooc	+9.65%
ocooooco	+3.30%	ccooooco	+9.70%
ocoooocc	+3.35%	ccoooocc	+9.75%
ocooocoo	+3.40%	ccooocoo	+9.80%
ocooococ	+3.45%	ccooococ	+9.85%
ocooocco	+3.50%	ccooocco	+9.90%
ocoooccc	+3.55%	ccoooccc	+9.95%
ocoocooo	+3.60%	ccoocooo	+10.00%
ocoocooc	+3.65%	ccoocooc	+10.05%
ocoococo	+3.70%	ccoococo	+10.10%
ocoococc	+3.75%	ccoococc	+10.15%
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ocoooccco	+3.90%	ccooccco	+10.30%
ocooocccc	+3.95%	ccoocccc	+10.35%
ococoooo	+4.00%	ccocoooo	+10.40%

ococoooc	+4.05%	ccocoooc	+10.45%
ococooco	+4.10%	ccocooco	+10.50%
ococoocc	+4.15%	ccocoocc	+10.55%
ocococoo	+4.20%	ccococoo	+10.60%
ococococ	+4.25%	ccocococ	+10.65%
ocococco	+4.30%	ccococco	+10.70%
ocococcc	+4.35%	ccococcc	+10.75%
ococcooo	+4.40%	ccoccooo	+10.80%
ococcooc	+4.45%	ccoccooc	+10.85%
ococcoco	+4.50%	ccoccoco	+10.90%
ococcocc	+4.55%	ccoccocc	+10.95%
ococccoo	+4.60%	ccocccoo	+11.00%
ococccoc	+4.65%	ccocccoc	+11.05%
ococccco	+4.70%	ccocccco	+11.10%
ococcccc	+4.75%	ccoccccc	+11.15%
occooooo	+4.80%	cccooooo	+11.20%
occooooc	+4.85%	cccooooc	+11.25%
occooooco	+4.90%	cccoooco	+11.30%
occoooocc	+4.95%	cccoooocc	+11.35%
occoocoo	+5.00%	cccoocoo	+11.40%
occoococ	+5.05%	cccoococ	+11.45%
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occocooc	+5.25%	cccocooc	+11.65%
occococo	+5.30%	cccococo	+11.70%
occococc	+5.35%	cccococc	+11.75%
occoccoo	+5.40%	cccoccoo	+11.80%
occoccoc	+5.45%	cccoccoc	+11.85%
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occoccccc	+5.55%	cccocccc	+11.95%
occcoooo	+5.60%	ccccoooo	+12.00%
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oocoooco	-4.70%	cocoooco	+1.70%
oocooocc	-4.65%	cocooocc	+1.75%
oocoocoo	-4.60%	cocoocoo	+1.80%
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oocooccc	-4.45%	cocooccc	+1.95%

oococooo	-4.40%	cococooo	+2.00%
oococooc	-4.35%	cococooc	+2.05%
oocococo	-4.30%	cocococo	+2.10%
oocococc	-4.25%	cocococc	+2.15%
oococcoo	-4.20%	cococcoo	+2.20%
oococcoc	-4.15%	cococcoc	+2.25%
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oocococc	-4.05%	cocococc	+2.35%
ooccoooo	-4.00%	coccoooo	+2.40%
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ooccocoo	-3.80%	coccocco	+2.60%
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ooccoccc	-3.65%	coccoccc	+2.75%
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oocccoco	-3.50%	cocccoco	+2.90%
oocccocc	-3.45%	cocccocc	+2.95%
oocccoo	-3.40%	cocccoo	+3.00%
oocccoc	-3.35%	cocccoc	+3.05%
oocccco	-3.30%	cocccco	+3.10%
oocccccc	-3.25%	coccccc	+3.15%
ocoooooo	-3.20%	ccoooooo	+3.20%
ocoooooo	-3.10%	ccoooooo	+3.30%
ocooooc	-3.05%	ccooooc	+3.35%
ocoooco	-3.00%	ccoooco	+3.40%
ocooococ	-2.95%	ccooococ	+3.45%
ocooocco	-2.90%	ccooocco	+3.50%
ocoooccc	-2.85%	ccoooccc	+3.55%
ocoocooo	-2.80%	ccoocooo	+3.60%
ocoocooc	-2.75%	ccoocooc	+3.65%
ocoococo	-2.70%	ccoococo	+3.70%
ocoococc	-2.65%	ccoococc	+3.75%
ocooccoo	-2.60%	ccooccoo	+3.80%
ocooccoc	-2.55%	ccooccoc	+3.85%
ocooccco	-2.50%	ccooccco	+3.90%
ocooccccc	-2.45%	ccooccccc	+3.95%
ocococooo	-2.40%	ccococooo	+4.00%
ocococooc	-2.35%	ccococooc	+4.05%

ococooco	-2.30%	ccocooco	+4.10%
ococoocc	-2.25%	ccocoocc	+4.15%
ocococoo	-2.20%	ccococoo	+4.20%
ococococ	-2.15%	ccocococ	+4.25%
ocococco	-2.10%	ccococco	+4.30%
ocococcc	-2.05%	ccococcc	+4.35%
ococcooo	-2.00%	ccoccooo	+4.40%
ococcooc	-1.95%	ccoccooc	+4.45%
ococcoco	-1.90%	ccoccoco	+4.50%
ococcocc	-1.85%	ccoccocc	+4.55%
ococccoo	-1.80%	ccocccoo	+4.60%
ococccoc	-1.75%	ccocccoc	+4.65%
ococccco	-1.70%	ccocccco	+4.70%
ococcccc	-1.65%	ccoccccc	+4.75%
occooooo	-1.60%	cccooooo	+4.80%
occooooc	-1.55%	cccooooc	+4.85%
occoooco	-1.50%	cccoooco	+4.90%
occooocc	-1.45%	cccooocc	+4.95%
occoocoo	-1.40%	cccoocoo	+5.00%
occoococ	-1.35%	cccoococ	+5.05%
occoocco	-1.30%	cccoocco	+5.10%
occooccc	-1.25%	cccooccc	+5.15%
occocooo	-1.20%	cccocooo	+5.20%
occocooc	-1.15%	cccocooc	+5.25%
occococo	-1.10%	cccococo	+5.30%
occococc	-1.05%	cccococc	+5.35%
occoccoo	-1.00%	cccoccoo	+5.40%
occoccoc	-0.95%	cccoccoc	+5.45%
occoccco	-0.90%	cccoccco	+5.50%
occocccc	-0.85%	cccocccc	+5.55%
occcoooo	-0.80%	ccccoooo	+5.60%
occcoooc	-0.75%	ccccoooc	+5.65%
occcooco	-0.70%	ccccooco	+5.70%
occcoocc	-0.65%	ccccoocc	+5.75%
occcocoo	-0.60%	ccccocoo	+5.80%
occcococ	-0.55%	ccccococ	+5.85%
occcocco	-0.50%	ccccocco	+5.90%
occcoccc	-0.45%	ccccoccc	+5.95%
occccooo	-0.40%	ccccccoo	+6.00%
occccooc	-0.35%	ccccccoc	+6.05%
occcccoco	-0.30%	ccccccoco	+6.10%
occcccocc	-0.25%	ccccccocc	+6.15%

occccoo	-0.20%	ccccccoo	+6.20%
occccoc	-0.15%	cccccoc	+6.25%
occcccco	-0.10%	cccccco	+6.30%
occccccc	-0.05%	ccccccc	+6.35%

2.3 Post Installation 2.3.2 ATC Installation Check

1. Place the ATC selector DIP switch #10 located on the ATC board, in the UP position.

2. Stablize the fuel temperature.

3. Dispense a convenient volume of product into a test can and record the temperature and volume of the product in the can.

4. The volume indicated on the ATC display of the Micon is the uncompensated volume. This volume should agree directly with the volume measured in the test can. If it does not agree, the meter is out of calibration.

5. Calculate the compensated volume in the test can using the actual volume and the temperature of the product in the test can and the appropriate correction tables. The calculated compensated volume should agree with the compensated volume shown on the other display of the Micon. If the values do not agree, a problem exists in the ATC board, or its installation.

6. Return the switch on the ATC board to the down position for “Normal” display position.

ATTENTION

Before the dispenser can be used in trade, in the ATC mode, it must be inspected and approved by Weights and Measures Canada.

The ATC function must be disabled to OFF until the pump is inspected.

Once the inspector approves the pump, the BC256A “VOLUME CORRECTED TO 15 ^{o}C” labels should then be applied to the faceplates adjacent to the volume displays.

Failure to do so could result in the station being closed down by Weights and Measures inspectors.

3.1 Components

3.1.1 List of Components

The following is an itemized account of components supplied for the MTC 100 ATC installation:

List of Components

MTC 100 ATC Kit

QTY	PART #	DESCRIPTION
1	SKIL-440	MTC 100 ATC BOARD
2	BC256A	WHITE “VOLUME CORRECTED TO 15^{o}C” LABEL
1	BC407	THERMOWELL
1	BC546	120-B 1/8” NPT ADAPTER DRILLED TO 17/64” I.D.
1	BC1225	SEAL COVER #4904
1	BC1224	ATC BOARD MOUNTING PLATE #4903
1	W110	4 WIRE HARNESS
1	W184	4 WIRE HARNESS
1	W111	3 WIRE HARNESS
1	W183	9 WIRE HARNESS
4	LCBS-4N	PCB MOUNT
1	18115	PROBE
1	235-C	THERMOWELL PLUG
1	122-B	1/8” NPT X 1” HEX NIPPLE
1	103-B	1/8” NPT COUPLING
1	221KT00	MTC 100 ATC INSTALLATION MANUAL