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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, including technical illustrations and connection diagrams.

3. TECHNICAL DATA

Gives information on products that make up the system.

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 Introduction

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:

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 Disfunctions
- 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.

1.2 Product Information

1.2.1 System Components

The following is a list of operating components used in this installation, along with a brief explanation of their function:

ATC Board

Takes the signals from the temperature probe and flow meter, compensates for temperature deviation from 15 ^{O}C (60 ^{O}F), then sends the compensated signal back to the main processor board.

Intrinsic Safety (I.S.) Barrier

Energy limits the temperature probe signal, then sends the same signal on to the ATC board.

Temperature Probes

Converts temperature of the product to a corresponding voltage signal that is sent to the ATC board, via the I.S. Barrier.

Thermal Test Well

Provides a mechanical-thermal connection to accommodate a remote temperature probe, for calibration purposes, to give a true reading of product temperature.

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.

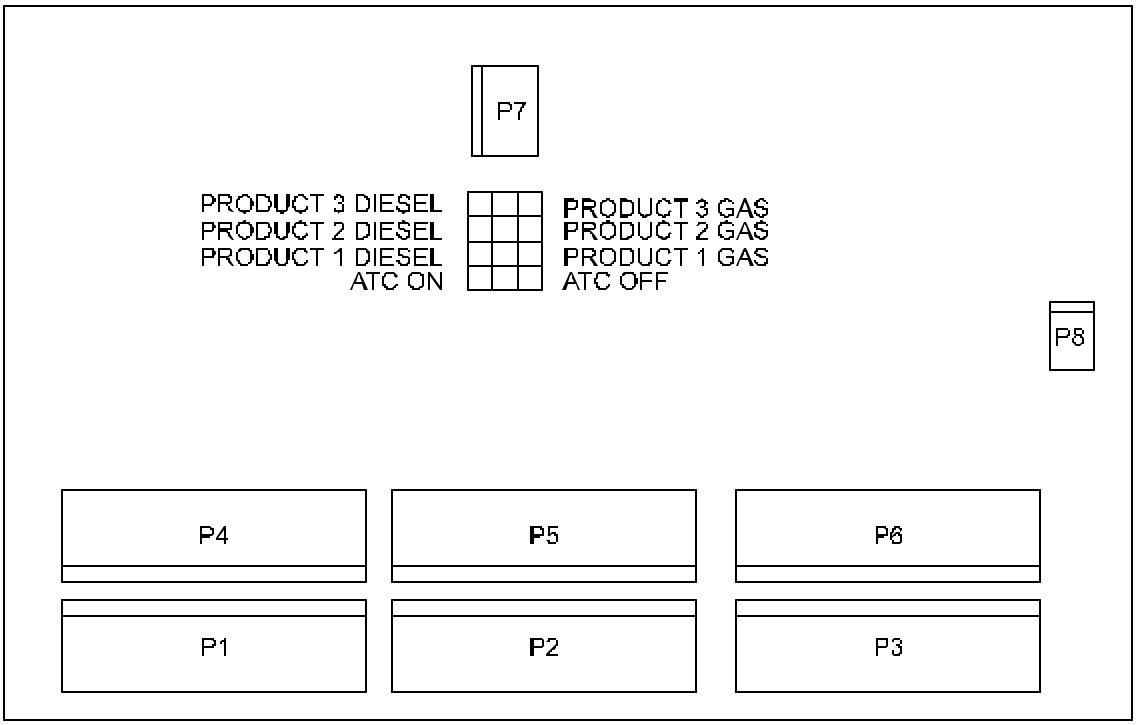
2.1.2 Installation Requirements

- 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 TMMD100 unit must be configured for installation. This is accomplished by setting jumper plugs on the circuit board as seen in Figure 1 below.

Figure 1 TMMD100 Circuit Board Jumper Layout



Options for configuration can be set in accordance with Table 1 as follows:

Table 1 ATC Board Jumper Settings TMMD100

JUMPER#	OPTION	SWITCH STATUS
1	Selects whether temperature compensation is enabled or disabled	ON = ENABLED
2	Selects whether product 1 is gasoline or diesel	LEFT = GAS
3	Selects whether product 2 is gasoline or diesel	LEFT = GAS
4	Selects whether product 3 is gasoline or diesel	LEFT = GAS

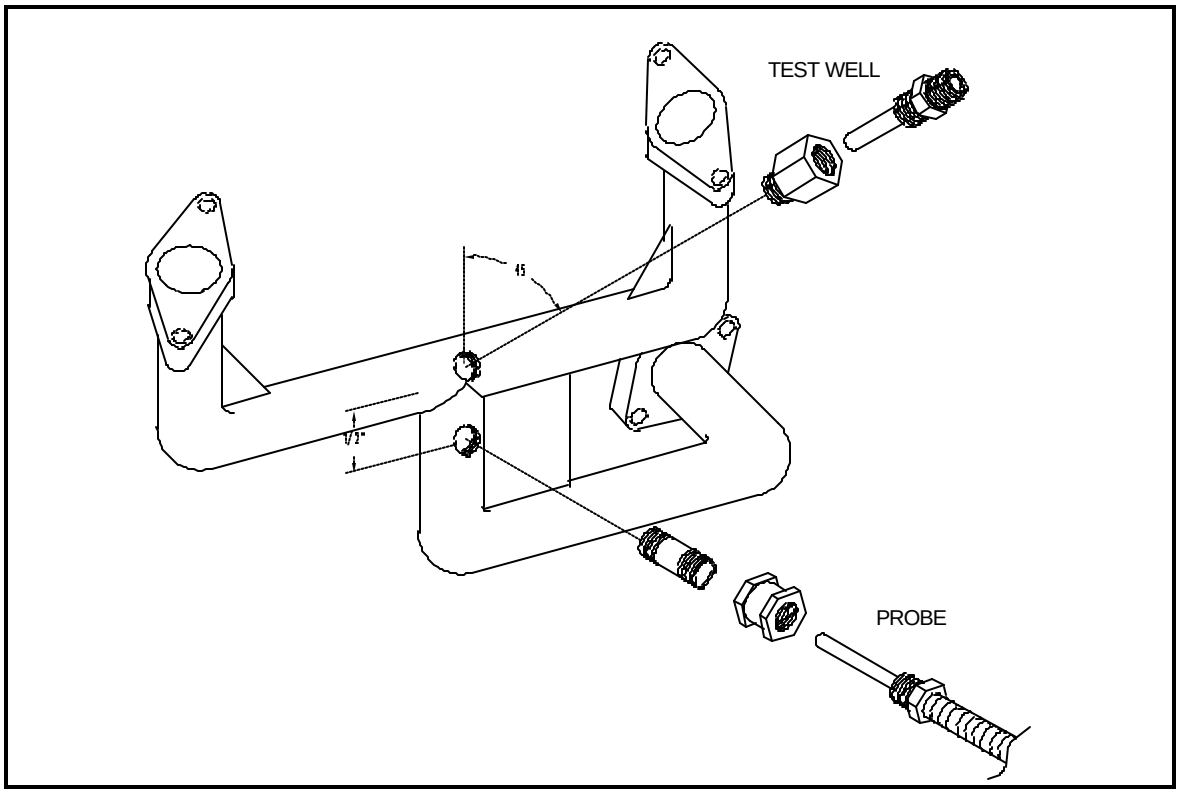
2.2 Component Installation

2.2.1 Test Well and Temperature Probes

2.2.1.1 In a Suction Unit

1. Remove the lower panels.
2. Locate the Y-manifold that connects the pump and the meters as shown in Figure 2 below.

Figure 2 Single Product Y-Manifold Assembly



3. Remove Y-manifold.

2.2 Component Installation

2.2.1 Test Well and Temperature Probes

2.2.1.1 In a Suction Unit (Cont'd)

4. With the manifold mounted securely, drill two holes of size Q (0.332") and tap for 1/8" NPT. Holes should be located near the center of the manifold.

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 manifold is reconnected to the pump assembly. 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 not to hinder reinstallation of the assembly.

5. Install the temperature probes and test wells in their respective holes and tighten. Cover test well with thermal well plug.

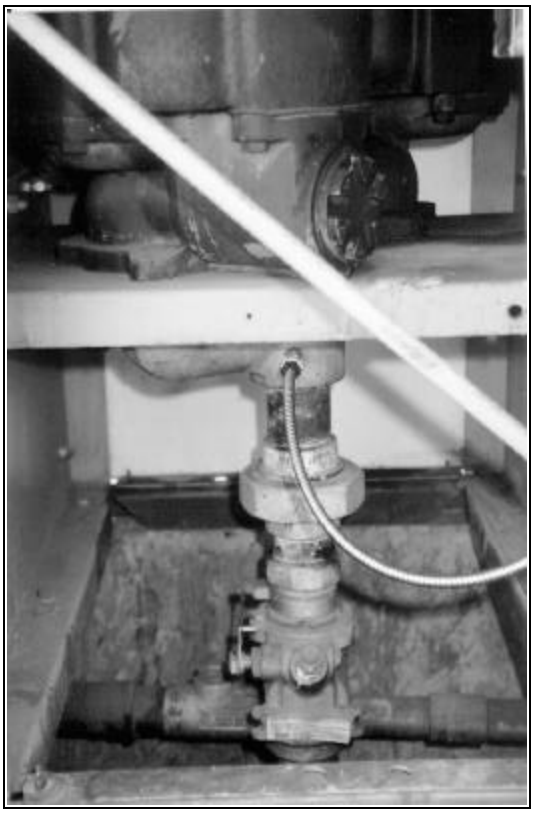
6. Reinstall manifold to pump assembly.

2.2 Component Installation

2.2.1 Test Well and Temperature Probes

2.2.1.2 In a Dispensing Unit

1. Remove the lower panels.
2. Locate the shear valve and fuel manifold as shown in Figure 3.



2.2 Component Installation

2.2.1 Test Well and Temperature Probes

2.2.1.2 In a Dispensing Unit (Cont'd)

3. WITH THE SHEAR VALVE IN THE CLOSED POSITION, remove manifold.

4. With the manifold mounted securely, drill one hole of size Q (0.332") and tap for 1/8" NPT, male thread. Hole should be located near the center of the manifold.

5. Insert probe extension fitting into the hole and tighten.

6. Insert the temperature probe into the extension fitting and tighten.

7. Remove plug and replace with the test well provided.

The following guidelines should be followed for installing the test well.

- The well should be at an angle within 45^{o} of vertical, when attached to the valve. This is so that it will hold thermally conductive fluid for measuring purposes.

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

8. Cover test well with thermal well plug.

9. Reinstall manifold to pump assembly.

2.2 Component Installation

2.2.2 I.S. Barriers

(Complete Connection Diagrams shown in Section 2.2.5)

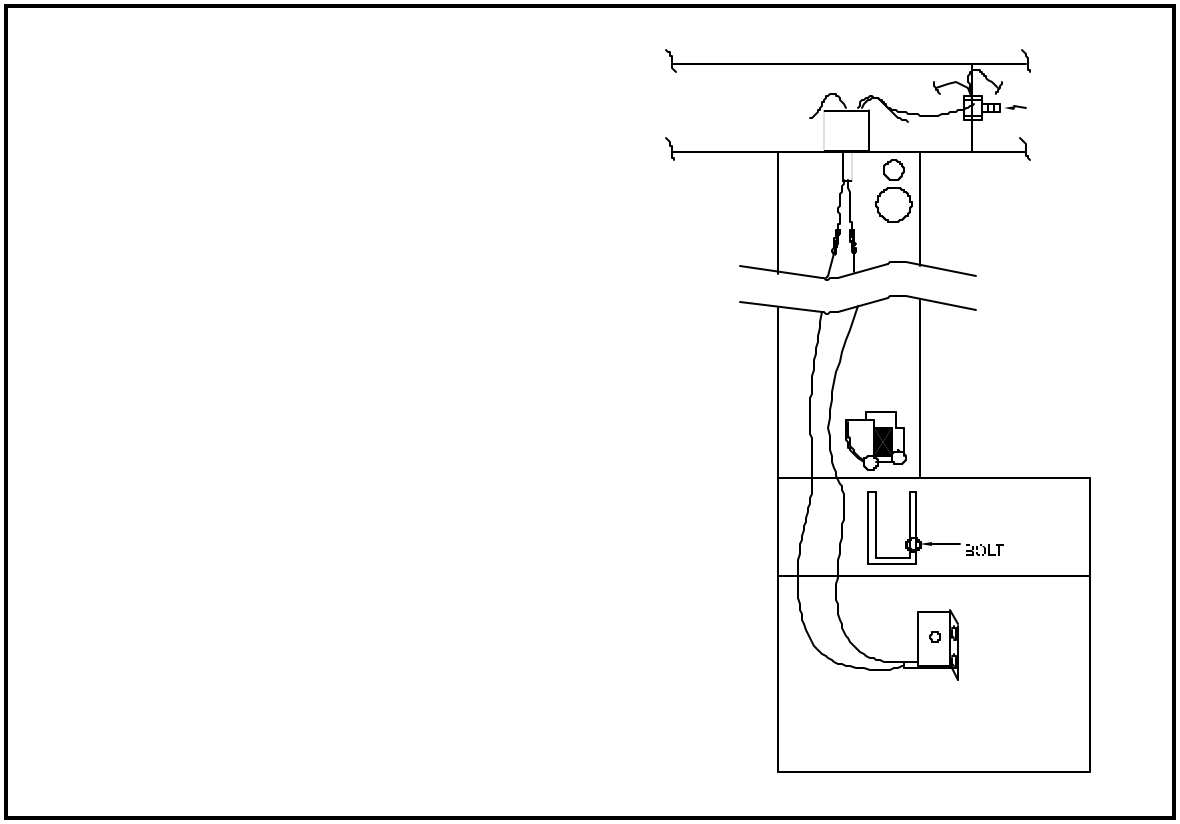
1. Remove the cover from the front side of the head. (The front is the side from which the head is towards the left of the pump)

2. Remove the top cover from the canopy.

3. Drill 5/16" holes through the bottom of the canopy into the centre of each of the three hose enclosures in order to install the intrinsic safety barriers.

4. Install the barriers in the holes from the top as shown in Figure 4 below:

Figure 4 I.S. Barrier Installation



2.2.2 I.S. Barriers (Cont'd)

5. Connect the yellow, green, and blue wires of the W82 harness to the yellow wires from the barriers as follows: yellow to product #1, green to product #2, and blue to product #3. (Product #1 is the one on the left when viewed from the "A" side)

6. Connect the four remaining red wires together. (A 5' piece of red wire is provided for this)

7. Lower the plug end of the W82 harness down the front support tube and into the head on a smart unit, or into the "A" side display on a dumb unit.

8. Connect the ground wires, coming out of the top of the barriers, (green 20 AWG) to the vertical flange in the canopy using the 8-32 nut, bolt, and paint piercing lockwasher provided, as shown in Figure 4. There should be a hole available for this purpose, but if not, one must be drilled.

9. Remove the bolt from the nozzle holster in each of the three lower compartments and install the probe connectors as shown in Figure 4.

10. Feed the wires from the probe connectors up into the hose enclosure and connect them to the wires from the I.S. barriers using crimp on wire nuts or butt connectors only.

11. Plug the temperature sensors into the probe connectors.

12. Coil and suitably fasten the armoured cable to take up the excess, and to prevent the weight of the cables from pulling on the plugs.

2.2 Component Installation

2.2.3 Infrared LED Assembly

1. Remove the screw below the volume readout and install the I.R. LED assembly as shown in Figure 5 below:

Figure 5 Infrared LED Mounting Location

2.2 Component Installation

2.2.4 TMMD100 ATC Board Installation

(Complete Connection Diagrams shown in Section 2.2.5)

2.2.4.1 In a SMART Unit

1. Remove the three 8 pin plugs from P21-23 on the mother board in the head, and plug them into P1-3 respectively on the TMMD100 (Refer to Figure 1).

2. Plug the three W72 harnesses supplied into P4-6 on the TMMD100, and onto P21-23 respectively on the mother board.

3. Plug the 4 pin plug from the I.S. barriers into P7.

4. Plug the 2 pin plug from the LED into P8.

5. The TMMD100 unit may now be installed on the battery enclosure using the double sided adhesive foam tape provided, with the small 4 pin connector P7 to the front.

2.2 Component Installation

2.2.4 TMMD100 ATC Board Installation

(Complete Connection Diagrams shown in Section 2.2.5)

2.2.4.2 In a DUMB Unit

1. Remove PC and PD from JC and JD on the selector logic board in the display enclosure and plug them into PCA1 and PDA1 respectively on the adapter harness, observing that the polarizing clip on the plugs are on the same side. (See Figure 6)

2. Plug PCA and PDA on the W96 adapter harness onto JC and JD on the selector logic board respectively.

3. Plug P1-6 on the W96 adapter harness onto P1-6 on the TMMD100.

4. Plug the 4 pin plug from the I.S. barriers into P7 on the TMMD100, and plug the 2 pin plug from the LED into P8 on the TMMD100.

5. The TMMD100 unit may now be secured in place on the back of the “A” side display enclosure using the double sided adhesive foam tape provided, making sure that the board does not interfere with the existing electronics when the panel is closed. (See Figure 7)

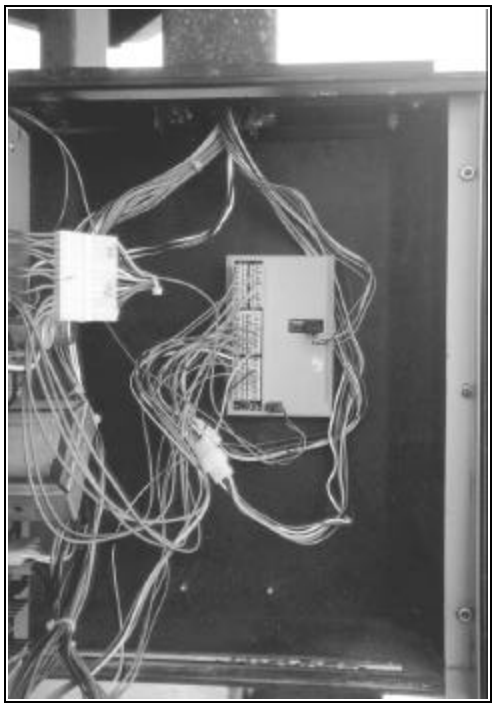
6. If the pump has a “B” side, (i.e. hose on both sides) follow these additional steps:

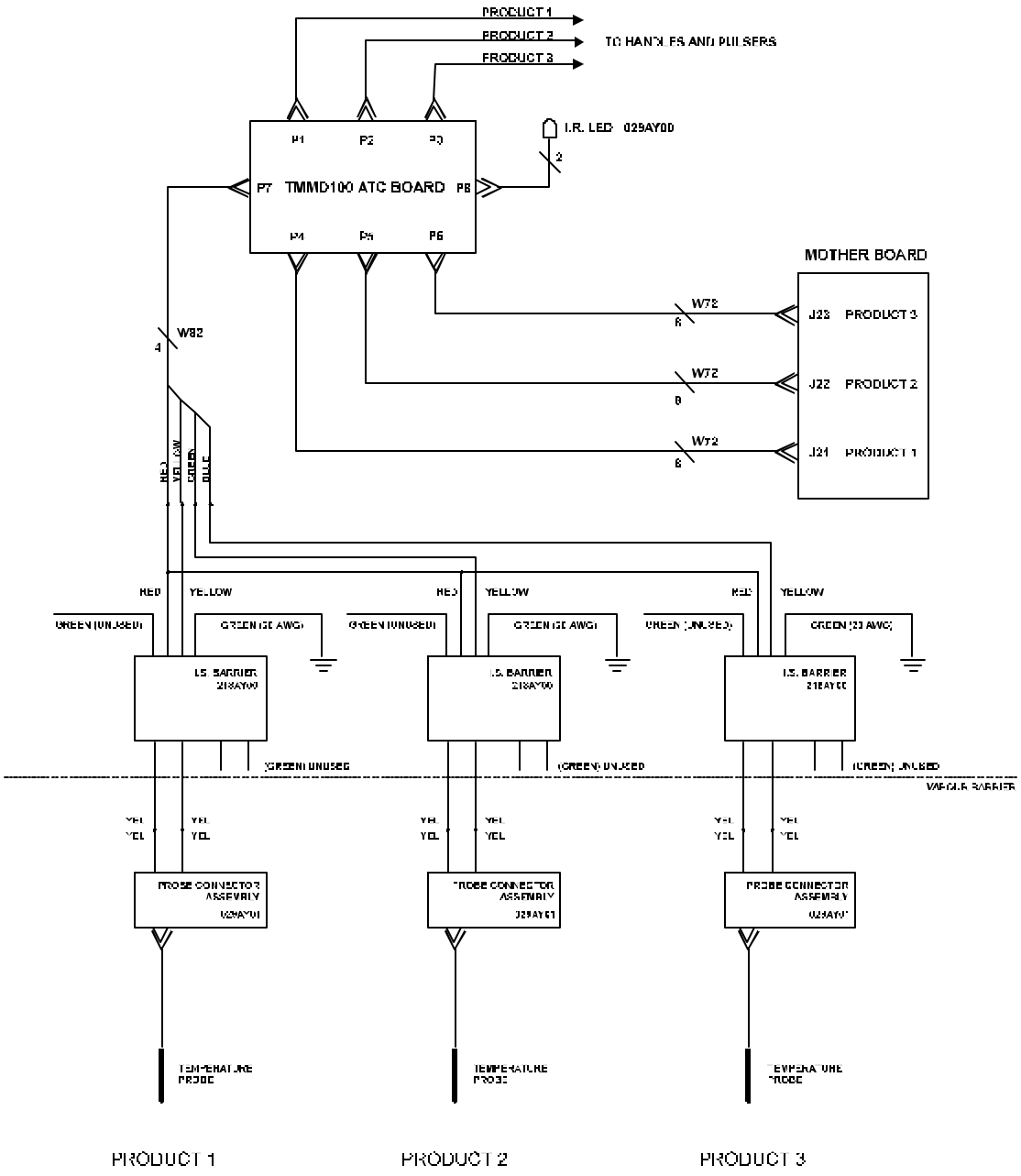
7. Remove the cover from the rear, or “B” side display panel.

8. Feed the W187 and W188 harness square 6 and 9 pin plugs up to the canopy from the “B” side to the ”A” side display enclosure. The two square plugs mate with the corresponding plugs on the W96 harness.

9. Remove PC and PD from JC and JD on the selector logic board in the “B” display enclosure and plug them into PCA1 and PDA1 respectively on the W187 and W188 “B” side extension harnesses, observing that the polarizing clips on the plugs are on the same side.

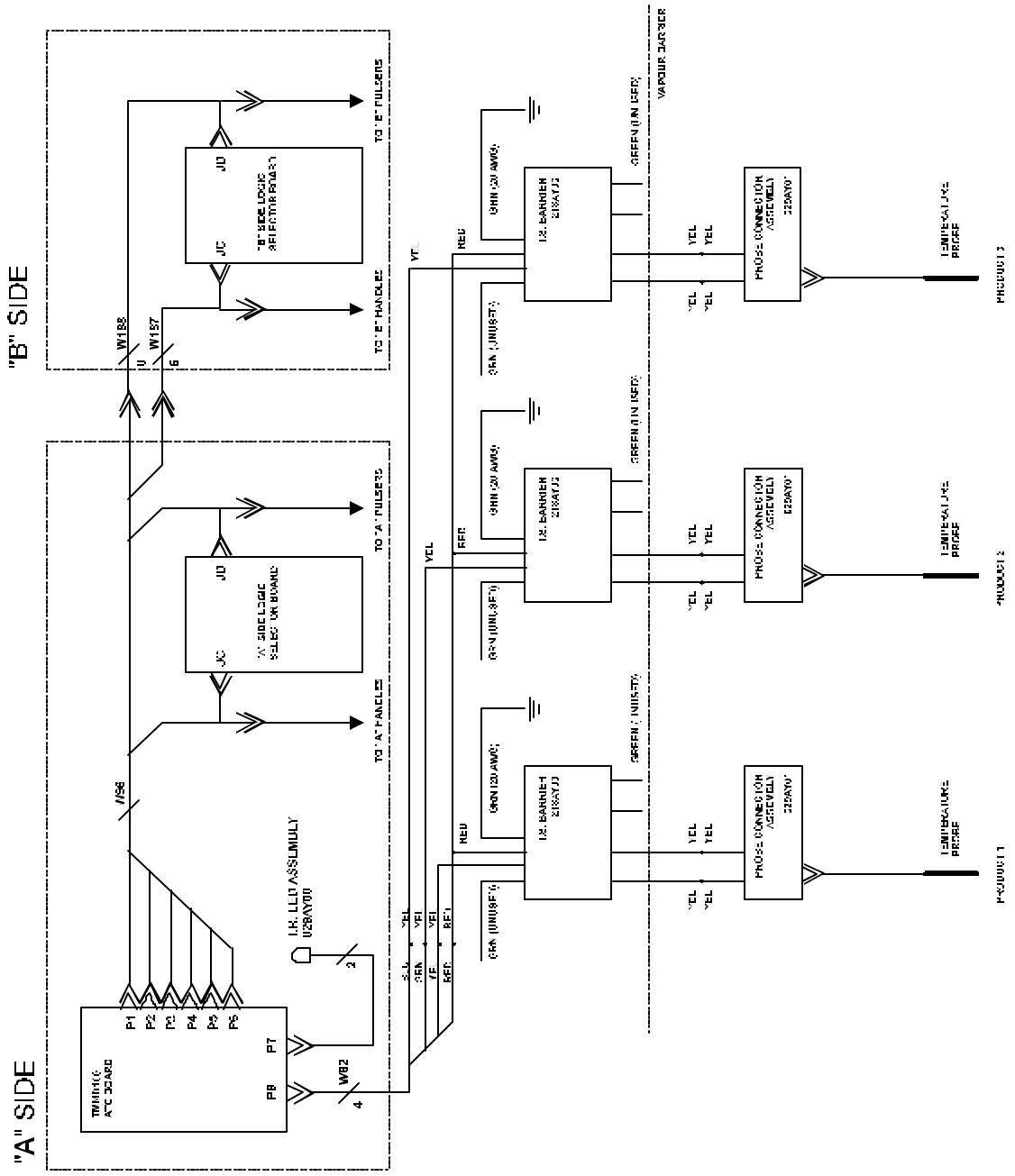
10. Plug PCA and PDA on the W187 and W188 “B” side extension harnesses onto JC and JD on the selector logic board respectively.




PRODUCT 1
PRODUCT 2
PRODUCT 3
TO HANDSETS AND PULSERS
I.R. LED 029AY00
P1
P2
P3
P7 TMMD100 ATC BOARD P8
P4
P5
P6
2
MOTHER BOARD
W72
8
J23 PRODUCT 3
W72
8
J22 PRODUCT 2
W72
8
J21 PRODUCT 1
W82
4
RED
YELLOW
GREEN
BLUE
RED
YELLOW
GREEN (UNUSED)
GREEN (22 AWG)
I.S. BARRIER
218AY00
(GREEN) UNUSED
YEL
PROBE CONNECTOR ASSEMBLY
029AY01
TEMPERATURE PROBE
PRODUCT 1
PRODUCT 2
PRODUCT 3

2.2 Component Installation

2.2.5 Connection Diagrams



2.3 Post Installation

2.3.1 Probe Connection Verification

With the dispenser now ready to be tested:

1. Apply power to the unit, and initialize the system as per the Tokheim instructions.

Try to use the Info-Pac as per the document "Info-Pac Operation Manual". Note that the "A" side is the side of the dispenser with the infrared LED. The temperature displayed will be for whichever product is selected by turning on a handle switch. The LED should be transmitting all of the information. (If the LED isn't working, the plug may be reversed)

2. Run a delivery into a test can.

The ratio of the net volume on the dispenser and the gross volume on the Info-Pac should be the correct VCF for the temperature displayed and the product selected. Now unplug the probe to the selected product. The pump should stop delivering fuel, and the status on the Info-Pac should indicate a temperature probe failure, as per the Info-Pac manual.

3. Repeat the test procedure for each product on both sides of the dispenser.

2.3 Post Installation 2.3.2 Enabling ATC

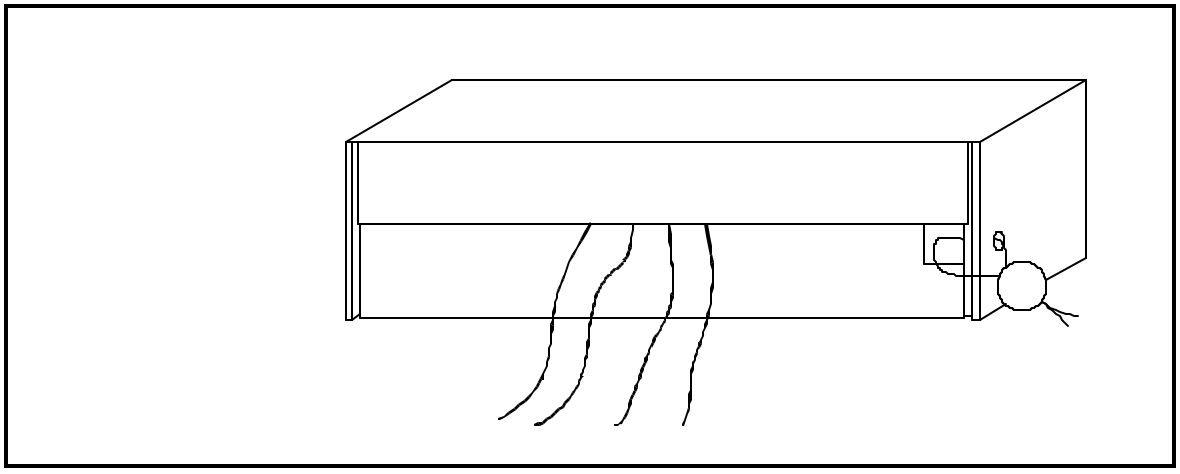
Before the dispenser can be used in trade in the ATC mode, it must be inspected by Canada Weights and Measures.

The BC655 AV-2198 plate then must be applied to the side of the dispenser.

The ATC function must be disabled with jumper plug #1 until the pump is inspected.

Once the inspector approves the pump, the BC686 seal plate may be installed over the TMMD100 so that the inspector can seal the unit as shown in Figure 10. The BC256B "VOLUME CORRECTED TO 15° C" labels can then be applied to the faceplates adjacent to the volume displays, and the plate with the S.WA number must be applied to the side of the dispenser.

Figure 10 Seal Plate Mounting Location



An Info-Pac in working order with a good battery must be available at the station at all times for use by Weights and Measures inspectors. **Failure to do this will result in the station being closed down by Weights and Measures inspectors.**

When the meters are calibrated in a pump with an ATC, it will be necessary to use either the gross volume reading from the Info- Pac or the mechanical counter. The temperature compensated volume on the pump display can not be used for this purpose.

3.1 Components

3.1.1 List of Components

3.1.1.1 Tokheim Two Product Smart MMD

The following is an itemized account of components supplied to complete ATC installation on Tokheim Two Product MMD:

Table 2 List of Components

TOKHEIM TWO PRODUCT SMART MMD ATC

QTY	PART #	DESCRIPTION
1	029AY02	TMMD100 ATC BOARD AND BRACKET ASSEMBLY
1	BC686	SEAL PLATE
2	218AY00	DUAL INTRINSIC SAFETY BARRIERS
1	029AY00	TMMD I.R. LED ASSEMBLY
2	029AY01	PROBE CONNECTOR ASSEMBLIES
1	W82	4 WIRE HARNESS FOR I.S. BARRIERS
2	W72	8 WIRE HARNESSES
1		22 AWG STRANDED WIRE, RED, 60” LONG
2	W199	TEMPERATURE PROBES
2	BC407	THERMAL WELLS
2	BC546	120-B 1/8” NPT ADAPTER DRILLED TO 17/64” I.D.
2	113-B	1/8” NPT X 1 1/2” HEX NIPPLE
2	103-B	1/8” NPT COUPLING
2	235-C	THERMOWELL PLUG
2	BC256A	WHITE “VOLUME CORRECTED TO 15^{o} C” LABELS
1	BC655	AV-2198 NAMEPLATE
1		8-32 X 1/2” ROBERTSON MACHINE SCREW
1		8-32 HEX NUT
1		#8 PAINT PIERCING LOCKWASHER
16		18-22 AWG CRIMP SPLICES
2		5/6” HEX NUT
2		5/16” FLAT WASHER
1	029AY00.INS R04	TMMD100 ATC INSTALLATION MANUAL

3.1 Components

3.1.1 List of Components

3.1.1.2 Tokheim Three Product Smart MMD

The following is an itemized account of components supplied to complete ATC installation on Tokheim Three Product MMD:

Table 3 List of Components

TOKHEIM THREE PRODUCT SMART MMD ATC

QTY	PART #	DESCRIPTION
1	029AY02	ATC BOARD AND BRACKET ASSEMBLY
1	BC686	SEAL PLATE
3	218AY00	DUAL INTRINSIC SAFETY BARRIERS
1	029AY00	TMMD I.R. LED ASSEMBLY
3	029AY01	PROBE CONNECTOR ASSEMBLIES
1	W82	4 WIRE HARNESS FOR I.S. BARRIERS
3	W72	8 WIRE HARNESSES
1		22 AWG STRANDED WIRE, RED, 60” LONG
3	W199	TEMPERATURE PROBES
3	BC407	THERMAL WELLS
3	BC546	120-B 1/8” NPT ADAPTER DRILLED TO 17/64” I.D.
3	113-B	1/8” NPT X 1 1/2” HEX NIPPLE
3	103-B	1/8” NPT COUPLING
3	235-C	THERMOWELL PLUG
2	BC256A	WHITE “VOLUME CORRECTED TO 15^{o} C” LABELS
1	BC655	AV-2198 NAMEPLATE
1		8-32 X 1/2” ROBERTSON MACHINE SCREW
1		8-32 HEX NUT
1		#8 PAINT PIERCING LOCKWASHER
16		18-22 AWG CRIMP SPLICES
3		5/6” HEX NUT
3		5/16” FLAT WASHER
1	029AY00.INS R04	TMMD100 ATC INSTALLATION MANUAL

3.1 Components

3.1.1 List of Components

3.1.1.3 Tokheim Two Product Dumb MMD

The following is an itemized account of components supplied to complete ATC installation on Tokheim Two Product Dumb MMD:

Table 3 List of Components

TOKHEIM TWO PRODUCT DUMB MMD ATC

QTY	PART #	DESCRIPTION
1	029AY02	ATC BOARD AND BRACKET ASSEMBLY
1	BC686	SEAL PLATE
2	218AY00	DUAL INTRINSIC SAFETY BARRIERS
1	029AY00	TMMD I.R. LED ASSEMBLY
2	029AY01	PROBE CONNECTOR ASSEMBLIES
1	W82	4 WIRE HARNESS FOR I.S. BARRIERS
1	W96	DUMB MMD ATC HARNESS
1		22 AWG STRANDED WIRE, RED, 60” LONG
2	W199	TEMPERATURE PROBES
2	BC407	THERMAL WELLS
2	BC546	120-B 1/8” NPT ADAPTER DRILLED TO 17/64” I.D.
2	113-B	1/8” NPT X 1 1/2” HEX NIPPLE
2	103-B	1/8” NPT COUPLING
2	235-C	THERMOWELL PLUG
2	BC256A	WHITE “VOLUME CORRECTED TO 15^{o} C” LABELS
1	BC655	AV-2198 NAMEPLATE
1		8-32 X 1/2” ROBERTSON MACHINE SCREW
1		8-32 HEX NUT
1		#8 PAINT PIERCING LOCKWASHER
16		18-22 AWG CRIMP SPLICES
3		5/6” HEX NUT
3		5/16” FLAT WASHER
1	W187	B-SIDE HANDLE ADAPTER HARNESS
1	W188	B-SIDE PULSER ADAPTER HARNESS
1	029AY00.INS R04	TMMD100 ATC INSTALLATION MANUAL

3.1 Components

3.1.1 List of Components

3.1.1.4 Tokheim Three Product Dumb MMD

The following is an itemized account of components supplied to complete ATC installation on Tokheim Three Product Dumb MMD:

Table 4 List of Components

TOKHEIM THREE PRODUCT DUMB MMD ATC

QTY	PART #	DESCRIPTION
1	029AY02	ATC BOARD AND BRACKET ASSEMBLY
1	BC686	SEAL PLATE
3	218AY00	DUAL INTRINSIC SAFETY BARRIERS
1	029AY00	TMMD I.R. LED ASSEMBLY
3	029AY01	PROBE CONNECTOR ASSEMBLIES
1	W82	4 WIRE HARNESS FOR I.S. BARRIERS
1	W96	DUMB MMD ATC HARNESS
1		22 AWG STRANDED WIRE, RED, 60” LONG
3	W199	TEMPERATURE PROBES
3	BC407	THERMAL WELLS
3	BC546	120-B 1/8” NPT ADAPTER DRILLED TO 17/64” I.D.
3	113-B	1/8” NPT X 1 1/2” HEX NIPPLE
3	103-B	1/8” NPT COUPLING
3	235-C	THERMOWELL PLUG
2	BC256A	WHITE “VOLUME CORRECTED TO 15^{o} C” LABELS
1	BC655	AV-2198 NAMEPLATE
1		8-32 X 1/2” ROBERTSON MACHINE SCREW
1		8-32 HEX NUT
1		#8 PAINT PIERCING LOCKWASHER
16		18-22 AWG CRIMP SPLICES
3		5/6” HEX NUT
1	W187	B-SIDE HANDLE ADAPTER HARNESS
1	W188	B SIDE PULSER ADAPTER HARNESS
3		5/16” FLAT WASHER
1	029AY00.INS R04	TMMD100 ATC INSTALLATION MANUAL