IN CONSTANT PURSUIT OF EXCELLENCE

An RNG Company

Kraus Group Inc.

BMS™

BULK METERING SYSTEMS INSTALLATION GUIDE

FOR LIQUID GAS FLOW APPLICATIONS.

THIS IS YOUR GUIDE TO INSTALLING KRAUS BULK METERING SYSTEMS (BMS):

MULTIPLEXED BMS

MASTER/SLAVE MULTIPLEXED BMS

SINGLE PRODUCT BMS

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SERVICE AND PRODUCT SUPPORT - CANADA

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 dysfunction
   - 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

1.0 MULTIPLEXED BMS

1.1 Introduction

The Multiplexed bulk meter system multiplexes a series of meters to one MICON 500™ computerized pumphead mounted in a pedestal cabinet. The Multiplexed BMS can retain gross/net volume totals for 1 to 8 liquid fuel products.

Temperature compensation is available for:

1. gasoline
2. diesel
3. propane
4. butane
5. aviation gas
6. jet a
7. jet b
8. anhydrous ammonia (NH_3)
9. ethanol

Push-button product selection switches are located on the front panel of each BMS pedestal cabinet. Cabinet styles are available for operation of 3, 4, 5, 6, 7 and 8 product installations. Each product selection button on the BMS pedestal cabinet corresponds to one individually metered liquid fuel product.

The BMS pedestal serves as a computerized register and is not a dispenser. The Multiplexed BMS is designed to be added onto a newly constructed installation, or as a retrofit to an existing mechanically based installation.

Solenoid valves, pump motors, meters and hoses are located external to the BMS pedestal cabinets, and are not included with BMS manufactured equipment. This, and any additional equipment not specifically supplied with the Kraus Group Inc. BMS, is the responsibility of the user to obtain and install.

The Multiplexed BMS pedestal unit is capable of controlling a maximum of eight individual solenoid valves and a maximum of eight individual motors or motor activation circuits. When motor activation relays or circuits are used, it is necessary to ensure that a minimum 2.7 kΩ load is present on the BMS motor output lines. In such cases, a 2.7 kΩ resistor (10 watt rating) should be connected directly to the input terminal block of the KIL-487 board. The resistor must be connected between the motor output terminal and the neutral terminal.

Each liquid fuel product controlled through the Multiplexed BMS will require the installation of a remote pulser to monitor product flow. The remote pulser for each product will be situated external to any of the BMS pedestal cabinets, and mechanically coupled directly to an existing product flow meter, as described in section 1.4, page 4.

The Multiplexed BMS allows for the dispensing of liquid fuel products which are volume corrected based on the product fuel temperature. Temperature compensated products controlled through the Multiplexed BMS are volume corrected to a temperature of 15 °C (60°F). BMS electronic pumphead registers can be programmed for product temperature compensation or non-compensation by using the BMS INFO-PAC, a hand-held, battery operated pumphead programming device.

ATTENTION

BMS INFO-PAC configuration settings should be made before pumpheads are inspected and sealed by the local *Weights and Measures* authority (e.g., Measurement Canada, an agency of Industry Canada). Configuration changes performed after this point may require the breaking of an existing *Weights and Measures* seal.

The local *Weights and Measures* authority may be required to reinspect the system installation prior to commencement of operations, as per applicable regulations.

1.2 Site Preparation

CAUTION

The following precautions should be followed whenever service is performed on or in proximity to any Kraus BMS installation.

- The main power breaker for the system should be placed in the "OFF" position and marked or locked to prevent accidental activation of the system while service work is in process.
- Extreme caution should be used to ensure that no ignition sources are present when operating in a hazardous environment.

- The dispensing area should be roped off or otherwise isolated from public access for the duration of the service period.

- The dispenser station operator should be made aware that service work is being performed, to prevent accidental activation of the system.

A remote pulser must be mechanically coupled to the product flow meter of each product to be controlled by the Kraus Master/Slave BMS. Some product flow meter styles will require the addition of an adaptor kit for proper remote pulser installation. Please note:

- An adaptor kit (Kraus part # BC 1667) must be used when installing a remote pulser to a **NEPTUNE™** meter.

- A dust cover must be used when installing a remote pulser to an **LC™** (Liquid Control) meter.

- **SMITH™** meters do not require use of adaptor kits or dust covers.

1.2.1 Pedestal Cabinet Location and Mounting

The pedestal cabinet or cabinets should be situated in a location convenient for operator use, at a reasonably close proximity to the product dispensing hoses and product flow meters controlled and monitored by the Kraus BMS. Sufficient clearance should be present around the BMS pedestal cabinet to allow for easy access by service personnel.

The BMS pedestal cabinet has four mounting holes on the cabinet base for securing the cabinet assembly to a refueling platform. The mounting holes on the base of the BMS cabinet are capable of accommodating up to a ½ inch bolt or mounting stud. A minimum bolt or mounting stud size of $^{3}/_{8}$ inch is recommended for all BMS pedestal cabinet installations.

1.3 Installation Requirements

- All wiring must be installed in accordance with National and local electrical codes.
- Electrical installation of this system should be performed by a suitably licensed electrician.
- Any system wiring modifications should be performed by a licensed electrician or other qualified service personnel.
- Liquid fuel dispensing connections should be performed only by properly trained personnel.
- Substitution of components may impair intrinsic safety.
- The potential exists for lethal voltages to be present when explosion-proof junction box covers are removed. Explosion-proof junction box covers should only be removed by a suitably licensed electrician or qualified service personnel. All system power should be removed prior to the removal of any explosion-proof junction box covers.
- The Kraus BMS is rated for operation at a nominal voltage of 120 VAC 50/60 Hz. Operation of this system in excess of the rated voltage could result in damage to the equipment, and void the equipment Warranty.

1.4 Remote Pulser and Temperature Probe Installation

A remote pulser must be installed for each liquid fuel product controlled by the Kraus BMS:

1. Locate the output shaft on the meter which is coupled to a mechanical register.
2. Remove the mechanical register.
3. Couple the meter output shaft to the input shaft of the remote pulser. As outlined in section 1.2, NEPTUNE™ meters require an adaptor mount (Kraus part #BC 1667) and LC™ meters require a dust cover.

4. The remote pulser has a removable panel providing access to pulser terminal block connections, and the W199 temperature probe inlet.

    1) To access connections, remove five ½ inch screws from the front of the remote pulser panel.

    2) Insert the connector end of the W199 temperature probe into the remote pulser inlet connector.

    3) Direct the W199 temperature probe cable into the provided slot in the remote pulser casing. This will allow the temperature probe to exit the remote pulser enclosure while the access cover is in place.

    4) Drill/tap into the fuel pipe and install the sensor end of the W199 temperature probe into the fuel line. Sensor installation should be within reasonable proximity to the remote pulser to ensure that no physical stress is applied to the W199 temperature probe cable.

ATTENTION

5. **It is a requirement of *Measurement Canada*, an agency of *Industry Canada*, that a thermal well be provided next to the installed temperature probe, for inspection purposes. The following guidelines should be observed when installing an inspection test well:**

    1) The thermal well must be positioned to retain thermally conductive fluid. The hole in the fuel line should be drilled so that the extension will be at an angle within 45° of vertical when the extension is installed and the assembly is reconnected.

    2) Install a 1/8 inch NPT test well extension fitting (Kraus part # BC 546) into the hole which was drilled into the fuel line. The inside of the 1/8 inch NPT fitting will be drilled out to accommodate the insertion of the test well (Kraus part # BC 407).

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

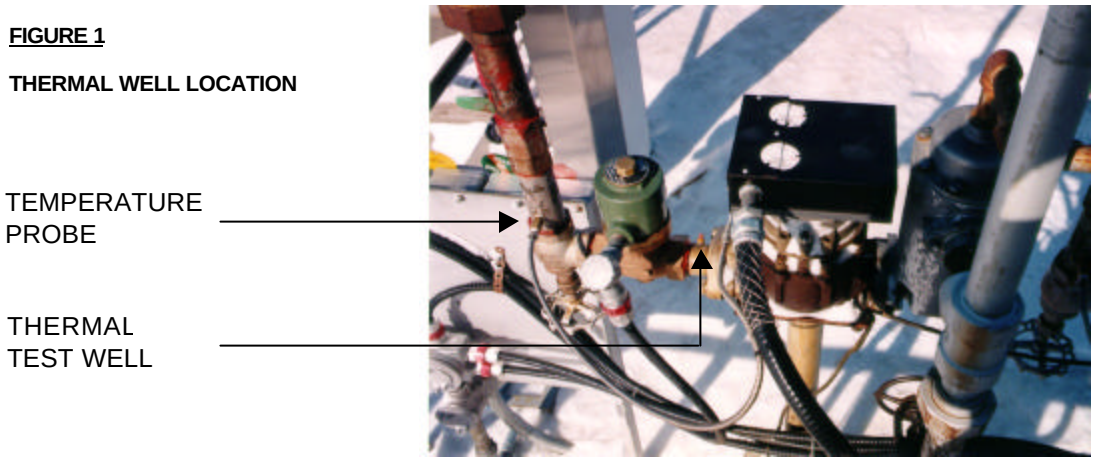
- The fitting should be placed in an appropriate location so as not to hinder reinstallation of the assembly.

3) Install the test well into the extension fitting and tighten into place.

4) Cover the test well assembly with the supplied protective plug.

FIGURE 1

THERMAL WELL LOCATION



ATTENTION

If the connection is made with less than 5 threads fully engaged, it will be necessary to solder the fitting into place. Connections which are in excess of 5 full threads do not require soldering, but must make use of a thread sealing compound suitable for use with the intended fuel type.

6. Connections from the remote pulser to the Kraus BMS are made through conduit. A knock-out exists on the side of the remote pulser enclosure to allow for conduit entry. The conduit run should extend to the interior of the BMS pedestal cabinet to allow for the connection of the remote pulser into the Kraus BMS.

   Connections from the remote pulser to the Kraus BMS are made via a W352 Pulser and Probe cable. The W352 cable terminates at one end in 6 free wires with forked terminals. These forked terminals are used to connect to the terminal block on the remote pulser. The other end of the W352 cable terminates in a 6 position connector inside of the Kraus BMS pedestal cabinet.

NOTE

Ensure that the cable run from the remote pulser into the BMS pedestal cabinet allows sufficient cable extension to reach the lower edge of the BMS MICON 500™ explosion-proof enclosure situated on top of the BMS pedestal cabinet. Excess W352 cable may remain coiled and secured within the BMS pedestal cabinet. In extreme cases, where large quantities of excess cable remain, it may be necessary to cut the W352 cable **AT THE REMOTE PULSER END** and attach new forked terminals to the wire ends.

Each W352 is comprised of 2 separate cables; one 4 conductor cable, and one 2 conductor cable. The 4 conductor cable provides the Kraus BMS with product pulser information; the 2 conductor cable provides fuel temperature data. All 6 conductors of the W352 cable must be properly connected to allow for the proper operation of the Kraus BMS.

These 6 conductors must be connected to the 6 position terminal block located on the remote pulser. The remote pulser will have a label situated underneath the 6 position terminal block identifying each terminal. Wires from the W352 cable should be connected to the corresponding terminal. Connect the 6 conductors of the W352 cable as indicated in Table 1, next page.

FIGURE 2

TEMPERATURE PROBE AND TERMINAL BLOCK CONNECTORS WITHIN REMOTE PULSER

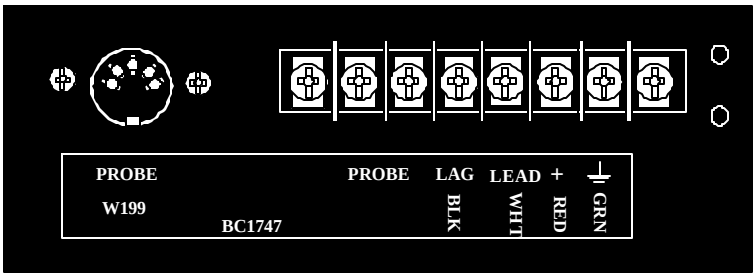


TABLE 1 – REMOTE PULSER AND PROBE CONNECTIONS

W352 CABLE	CABLE LEADS	CONNECT TO REMOTE PULSER 6 POSITION CONNECTOR	
2 CONDUCTOR CABLE (CARRIES PRODUCT FUEL TEMPERATURE DATA)	RED	PROBE	(RED AND BLACK PROBE CABLE LEADS ARE INTERCHANGEABLE)
	BLACK	PROBE	
4 CONDUCTOR CABLE (CARRIES PRODUCT PULSER INFORMATION)	GREEN	GROUND	
	RED	POWER	
	WHITE	LEAD	
	BLACK	LAG	

NOTE

Some remote pulser labels may indicate different wire colours for the probe connections. The probe lines are interchangeable and are not colour dependant. In all cases, the conductor colours used for the pulser connections will be as indicated in Table 1 above.

1.4.1 Multiplexed BMS Pedestal Cabinet – Internal Connections

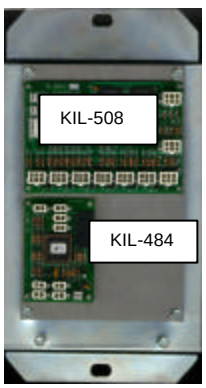
Two Intrinsically Safe (I.S.) circuit boards are located within the Multiplexed BMS Cabinet, mounted behind a protective black rectangular cover. To access these circuit boards, it is necessary to remove the protective cover.

The Multiplexed BMS unit will contain a KIL- 508 and a KIL- 484 circuit board. As indicated in Table 2 (next page), connect pulser outputs 1 to 8 to J1 to J8 on KIL-508.

All connections to KIL-484 circuit board shown in Table 3 (next page) are factory connected and should not require user modifications.

FIGURE 3

MULTIPLEXED BMS I.S. CIRCUIT BOARDS



1.4.1 Multiplexed BMS Pedestal Cabinets – Internal Connections (cont'd)

TABLE 2 – MULTIPLEXED BMS CABINET KIL-508 BMS PULSER MULTIPLEXER CIRCUIT BOARD CONNECTIONS		CONNECT TO KIL-508 BOARD IN BMS CABINET
REMOTE PULSER OUTPUTS	PULSER OUTPUT 1	J1
	PULSER OUTPUT 2	J2
	PULSER OUTPUT 3	J3
	PULSER OUTPUT 4	J4
	PULSER OUTPUT 5	J5
	PULSER OUTPUT 6	J6
	PULSER OUTPUT 7	J7
	PULSER OUTPUT 8	J8
NO CONNECTION		J12
FACTORY CONNECTED—NO MODIFICATIONS NECESSARY		J9
		J10
		J11

TABLE 3 – MULTIPLEXED BMS CABINET KIL-484 BMS 8 PRODUCT SELECTION CIRCUIT BOARD	FACTORY CONNECTIONS TO KIL-484 BOARD IN BMS CABINET
PRESET KEYPAD (OPTIONAL)	J1
COMMUNICATIONS LINE TO KIL-508: J10	J2
PRODUCT SELECTION BUTTONS MOUNTED TO THE FRONT PANEL OF THE BMS PEDESTAL CABINET.	J3 to J10

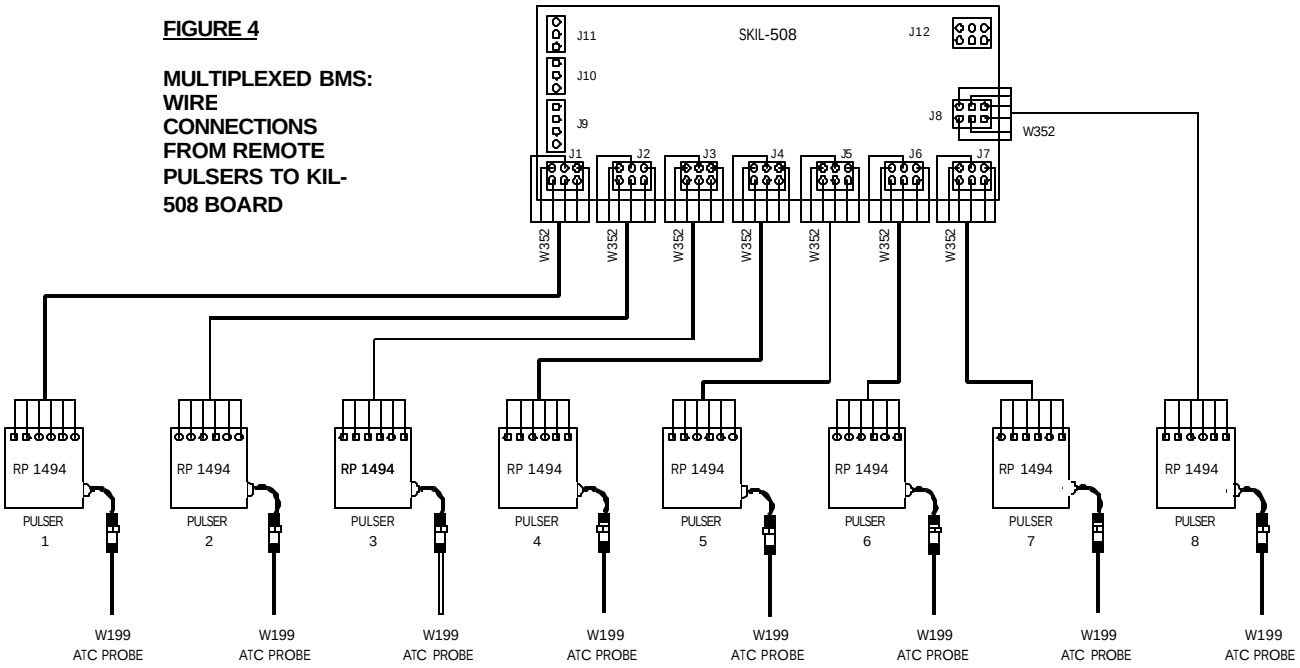
1.4.2 MULTIPLEXED BMS Cabinet - Remote Pulser Connections

Locate the W352 Pulser and Probe cables which enter the Multiplexed BMS pedestal cabinet from the externally mounted remote pulsers. The W352 cable terminates in a 6 position connector within the cabinet enclosure. These connectors mate with connectors J1 through J8 on the KIL-508 circuit board as shown in Figure 4, next page. J1 through J8 correspond to the product selection buttons which are located on the front panel of the BMS pedestal cabinet. The W352 cable ends must be inserted into the provided connectors on the KIL-508 circuit board until they are properly locked into place.

1.4.2 MULTIPLEXED BMS Cabinet - Remote Pulser Connections (cont'd)

FIGURE 4

MULTIPLEXED BMS: WIRE CONNECTIONS FROM REMOTE PULSERS TO KIL-508 BOARD



1.5 I.S. Circuit Board Protective Cover - Reinstallation

After W352 connections to the KIL-508 circuit board are made, the protective circuit board cover for the Multiplexed BMS unit may be reinstalled. All cables which exit the protective cover must do so through the provided allowance on the bottom edge of the cover.

Before reinstalling protective circuit board cover, ensure all system operational testing is complete, and no further installation changes are required.

1.6 System Installation – Non-Intrinsically Safe Components

- All wiring must be installed in accordance with National and local electrical codes.
- Electrical installation of this system should be performed by a suitably licensed electrician.

- Any system wiring modifications should be performed by a licensed electrician or other qualified service personnel.

- Liquid fuel dispensing connections should be performed only by properly trained personnel.

- Substitution of components may impair intrinsic safety.

- The potential exists for lethal voltages to be present when explosion-proof junction box covers are removed. Explosion-proof junction box covers should only be removed by a suitably licensed electrician or qualified service personnel. All system power should be removed prior to the removal of any explosion-proof junction box covers.

- The Kraus BMS is rated for operation at a nominal voltage of 120 VAC 50/60 Hz. Operation of this system in excess of the rated voltage could result in damage to the equipment and void the equipment Warranty.

1.7 Motor and Solenoid Valve Control – Output Selector Board – KIL- 487

The motor and solenoid activation lines are controlled by the Kraus Multiplexed BMS through the use of the KIL-487 circuit board. The KIL-487 Output Selector Board is located within an explosion-proof enclosure which is mounted internal to the BMS pedestal cabinet.

Located on the KIL-487 circuit board is a 6 position terminal strip which is labeled as J3. Each individual terminal of J3 is further labeled to describe the connection that must be made to each terminal. All connections to the J3 terminal strip are factory made and should not require user modification. The factory made connections are shown in greater detail in Figure 5, page 14.

1.7.1 Pump Motor Connection

Located on the KIL-487 circuit board is an 8 position terminal strip labeled J1, used to connect the motor control signal from the BMS MICON 500™ to the selected liquid fuel pump motor. Each of the eight positions of the J1 terminal strip are labeled with a number 1 through 8 which corresponds to products 1 through 8 of the BMS installation. The motor activation lines for each product must be connected to the corresponding terminal on the J1 terminal strip for the proper operation of the BMS installation.

When a motor activation signal from the BMS MICON 500™ is present, the voltage connected to the Motor and Solenoid Power line (Wire #7) of the BMS MICON 500™ will be applied to the appropriate terminal of the J1 terminal strip on the KIL-487 circuit board to activate the correct pump motor. One side of the motor activation circuitry (i.e., motor coil, relay coil, etc.) must be connected to the active J1 terminal. The remaining side of the motor activation circuitry must be connected to the supply neutral. Connect motor outputs as indicated in Table 4 below. The motor output connections are shown in greater detail in Figure 5, page 14.

TABLE 4

MULTIPLEXED BMS: WIRE CONNECTIONS FROM MOTOR OUTPUTS TO KIL-487 BOARD IN BMS CABINET

Motors	Connect to KIL-487 Boards in BMS Cabinet
MOTOR OUTPUT 1	J1, TERMINAL 1
MOTOR OUTPUT 2	J1, TERMINAL 2
MOTOR OUTPUT 3	J1, TERMINAL 3
MOTOR OUTPUT 4	J1, TERMINAL 4
MOTOR OUTPUT 5	J1, TERMINAL 5
MOTOR OUTPUT 6	J1, TERMINAL 6
MOTOR OUTPUT 7	J1, TERMINAL 7
MOTOR OUTPUT 8	J1, TERMINAL 8

1.7.2 Solenoid Valve Connection

Also located on the KIL-487 circuit board is an 8 position terminal strip labeled J2, used to connect the solenoid valve control signal from the BMS MICON 500™ to the solenoid valve controlling the selected product fuel line. Each of the 8 positions of the J2 terminal strip are labeled with a number 1 through 8, which corresponds to products 1 through 8 of the BMS installation. The solenoid valve

activation lines for each product must be connected to the corresponding terminal on the J2 terminal strip for the proper operation of the BMS installation.

When a solenoid valve activation signal from the BMS MICON 500™ is present, the voltage connected to the Motor and Solenoid Power line (Wire #7) of the BMS MICON 500™ will be applied to the appropriate terminal of the J2 terminal strip on the KIL-487 circuit board to activate the correct solenoid valve. One side of the solenoid coil must be connected to the active J2 terminal. The remaining side of the solenoid coil must be connected to the supply neutral. Connect solenoid valve outputs as indicated in Table 5 below. The solenoid output connections are shown in greater detail in Figure 5, page 14.

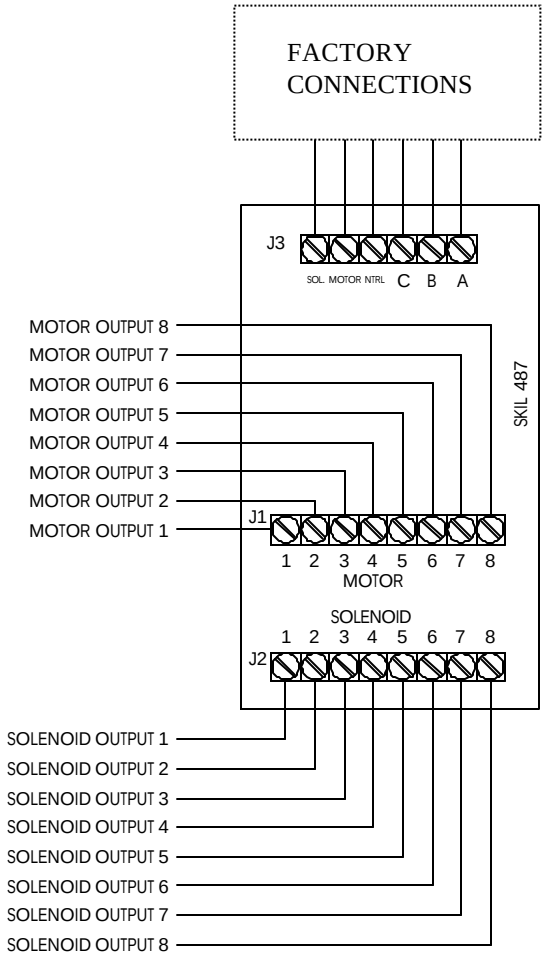
TABLE 5

MULTIPLEXED BMS: WIRE CONNECTIONS FROM SOLENOID VALVE OUTPUTS TO KIL-487 BOARD IN BMS CABINET

Solenoid Valve Outputs	Connect to KIL-487 Board in BMS Cabinet
SOLENOID OUTPUT 1	J2, TERMINAL 1
SOLENOID OUTPUT 2	J2, TERMINAL 2
SOLENOID OUTPUT 3	J2, TERMINAL 3
SOLENOID OUTPUT 4	J2, TERMINAL 4
SOLENOID OUTPUT 5	J2, TERMINAL 5
SOLENOID OUTPUT 6	J2, TERMINAL 6
SOLENOID OUTPUT 7	J2, TERMINAL 7
SOLENOID OUTPUT 8	J2, TERMINAL 8

FIGURE 5

MULTIPLEXED BMS: WIRE CONNECTIONS FROM MOTOR OUTPUTS AND SOLENOID OUTPUTS TO KIL- 487 BOARD



1.8 MICON 500™ Wire Harness Connections

TABLE 6 – MICON 500™ WIRE HARNESS FACTORY CONNECTIONS

WIRE #	FUNCTION	NO CONNECTION NECESSARY
All wires are 18 AWG unless otherwise noted.		
2 (WHT)	Neutral	Already internally connected.
8 (ORN)	Motor	Already internally connected.
21 (WHT/GRN)	Solenoid	Already internally connected.
22 (WHT/YEL)	Output Select A	Already internally connected.
23 (WHT/ORN)	Output Select B	Already internally connected.
24 (WHT/RED)	Output Select C	Already internally connected.

1. Locate the 18 position terminal block within the BMS cabinet.

2. Connect BMS MICON 500™ wire harness 18 position terminal block as outlined in **Table 7, page 17 and Figure 6, page 16 (Eight Product Terminal Wiring Diagram)**.

3. When step 2 above is complete, the pumphead is ready for configuration. To configure MICON 500™ electronic pumphead, refer to *Kraus Group Inc. INFO-PAC BMS Programming Guide*.

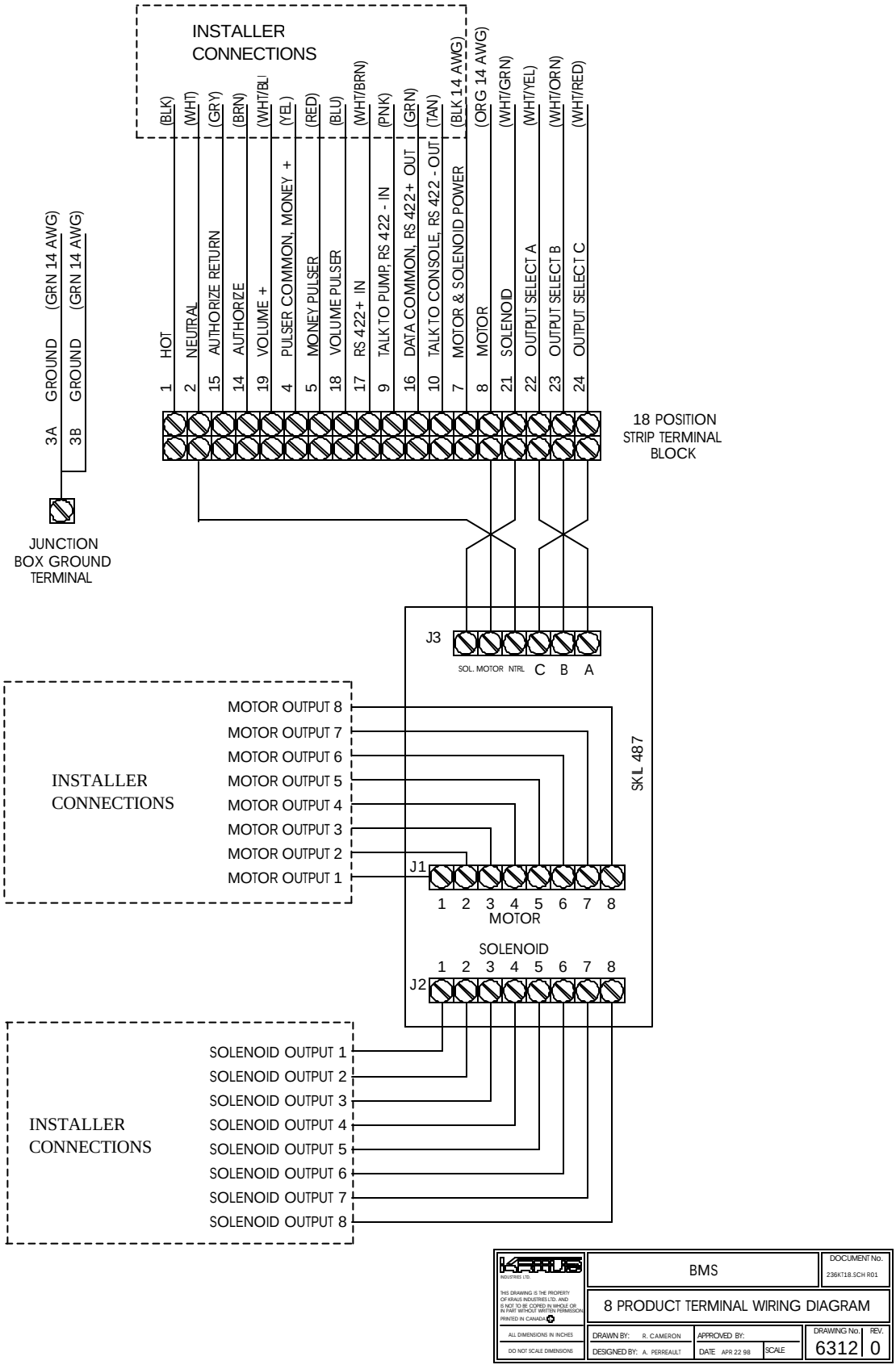
MCIU Installation – North American (optional)

NOTE

An MCIU (MICON Communication Interface Unit) may be installed when using the Multiplexed BMS. MCIU has the capability of communicating with up to sixteen MICON 500™ pumpheads.

Follow installation instructions on pages 18 and 19, section 1.8.1 – MCIU Installation – North American.

8 PRODUCT TERMINAL WIRING DIAGRAM: MOTOR, SOLENOID AND MICON 500™ CUSTOMER HARNESS HOOK-UPS



1.8 MICON 500™ Wire Harness Connections (cont'd)

TABLE 7 - MICON 500™ WIRE HARNESS CONNECTIONS

WIRE #	WIRE COLOUR	DESCRIPTION	CONNECTION
ALL WIRES ARE 18 AWG UNLESS OTHERWISE NOTED.			
1	BLACK	Line Power	Input power "HOT" connection from electrical panel. 120VAC, 50/60 Hz (max.)
2	WHITE	Line Neutral	Input power "NEUTRAL" from electrical panel. Feed-through required from input connection to "NTRL" terminal on KIL-487 circuit board. (KIL-487 is factory connected.)
3A 3B	GREEN **14 AWG**	Earth Ground	System earth ground connection direct to electrical panel ground terminal.
4	YELLOW	Money Pulser Positive	Power supply for money pulser line. Typically not used in BMS configurations.
5	RED	Money Pulser (output)	Output pulse provided for each penny of volume dispensed. Typically not used in BMS configurations.
7	BLACK **14 AWG**	Motor and Solenoid Power	Power supply for the activation of pump motors and solenoid valves. 120 VAC max.
8	ORANGE **14 AWG**	Motor Control Output	**FACTORY CONNECTED**. Output line for motor control. May drive motor directly or motor activation circuitry*. Connect to 'MOTOR" terminal on KIL-487 circuit board. *When using motor activation relays or circuits, it is necessary to connect a 2.7 kΩ (10 watt rating) resistor between the motor input terminal and the neutral terminal on the terminal block of the KIL-487 board. This provides the BMS motor output lines with sufficient load for proper operation.
9	PINK	Talk to Pump / RS 422 - IN	Communications line from MICON 500™ to **MCIU****. Connect to TTP terminal in **MCIU**.
10	TAN	Talk to Console / RS 422 - OUT	Communications line from MICON 500™ to **MCIU****. Connect to TTC terminal in **MCIU**.
14	BROWN	Authorize Input	Authorization line. For stand alone operation, connect to MICON supply voltage. For operation with **MCIU****, no connection is required.
15	GREY	Authorize Return	Console fill indication line. Not used in BMS configurations. **This line MUST remain terminated as high voltages are likely to be present.**
16	GREEN	Data Channel Common / RS 422 + OUT	Console communications common from MICON 500™ to **MCIU****. Connect to DDC terminal of **MCIU**.
17	WHT/BRN	RS 422 + IN	RS-422 communications line 1 of 4. Feature not available in BMS configurations.
18	BLUE	Volume Pulser	Output pulse provided for each specified fraction of a unit volume. Typically not used in BMS configurations.
19	WHT/BLU	Volume Pulser Positive	Power supply for volume pulser line. Typically not used in BMS configurations.
21	WHT/GRN	Solenoid Control Output	Solenoid valve control line. Connect to "SOL" terminal on KIL-487 circuit board.
22	WHT/YEL	Output Select Line A	**FACTORY CONNECTED**. Motor/solenoid selection line A – connect to "A" terminal on KIL-487 circuit board.
23	WHT/ORN	Output Select Line B	**FACTORY CONNECTED**. Motor/solenoid selection line B – connect to "B" terminal on KIL-487 circuit board.
24	WHT/RED	Output Select Line C	**FACTORY CONNECTED**. Motor/solenoid selection line C – connect to "C" terminal on KIL-487 circuit board.

****See next page for description of Kraus Group Inc. MCIU hook-up. The MCIU must be installed when using the Dual System (Master Slave) BMS described in section 2.0, page 22.**

1.8.1 MCIU Installation – North American

(Kraus Group Inc. MICON Communication Interface Unit):

Each MCIU has the capability of communicating with up to sixteen MICON 500™ pumpheads. Each MICON 500™ pumphead must be connected to the MCIU as outlined in steps 1 to 6 below.

1. Locate the wire coming from the MICON 500™ feed-through on 18 position terminal block.

2. Select 3 labeled wires on terminal block:

   PINK wire **# 9**

   TAN wire **# 10**

   GREEN wire **# 16**

3. There are four 12 position terminal blocks on each MCIU board: P1, P2, P3, P4. You will utilize 3 terminals per MICON hook-up: TTP, TTC and DCC, for a total of sixteen MICON 500™ interfaces.

4. Connect wires to terminals as shown in Table 6, below:

TABLE 8 – MCIU WIRE CONNECTIONS – NORTH AMERICAN

From MICON 500™ Wire Conduit	Function	Connect to MCIU Board
PINK wire # 9	talk to pump	TTP1 (P1)
TAN wire # 10	talk to console	TTC1 (P1)
GREEN wire # 16	data channel common	DCC1 (P1)

If you are connecting more than one MICON head to the MCIU, use exactly the same configuration as above for heads 2—16 (i.e., TTP2, TTC2, DCC2, etc.).

5. Plug the RS232 connector on the MCIU into the serial port of your computer. DB 25 pin male connector plugs into the MCIU. DB 9 pin female connector plugs into computer serial port.

6. Connect the power jack into MCIU at J2 as shown in wiring diagram (over). Plug other end with attached 9 VDC adaptor into a 120 VAC outlet.

FIGURE 7

MCIU HOOK-UP DIAGRAM (NORTH AMERICAN)

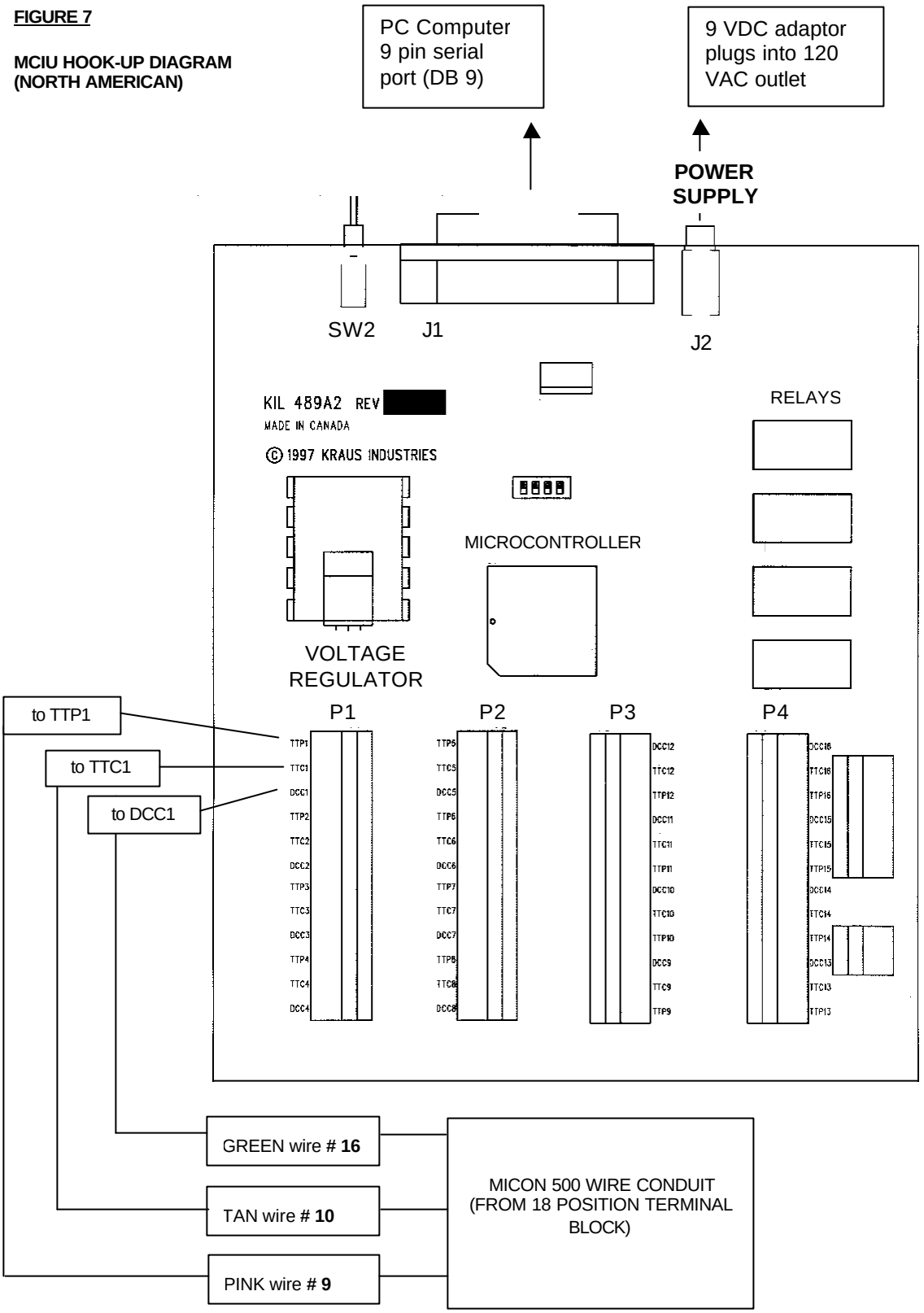
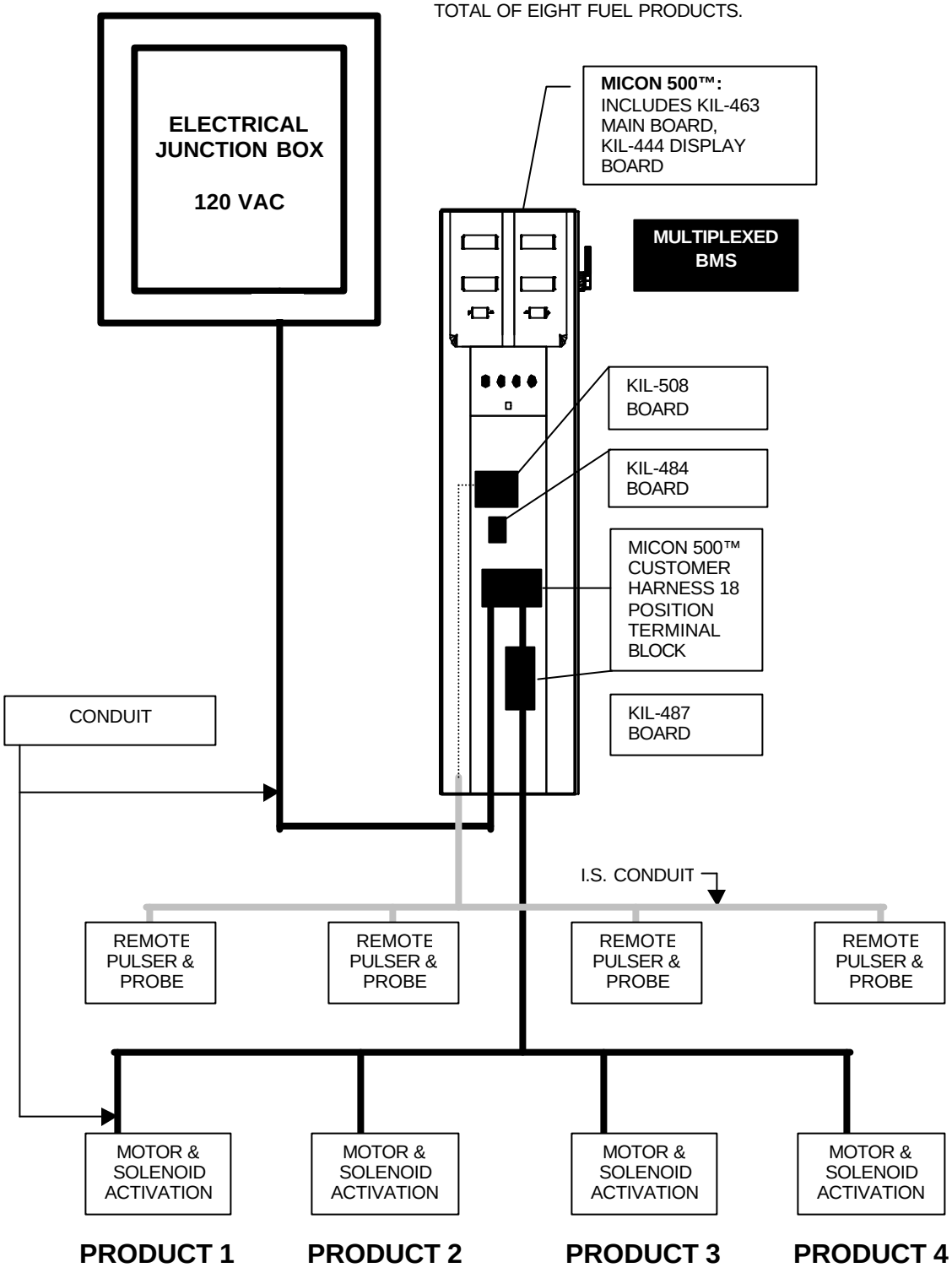


FIGURE 8

OVERVIEW OF BMS MULTIPLEXER

BLOCK DIAGRAM SHOWN IS FOR A FOUR PRODUCT MULTIPLEXED BMS. UP TO FOUR ADDITIONAL PRODUCT LINES MAY BE CONNECTED SIMILARLY TO THE MULTIPLEXED BMS UNIT, FOR A TOTAL OF EIGHT FUEL PRODUCTS.



1.9 *Ticket Pro*™ Software Installation (optional)

IMPORTANT

Ticket Pro software may be installed in conjunction with the MCIU in a Multiplexed BMS installation. The MCIU referenced on pages 18-19 provides interfacing to a PC computer, permitting the software to communicate with the MICON electronic registers installed in the BMS pedestal.

Ticket Pro provides an on-screen and/or printed transaction record each time fuel is dispensed.

Follow installation instructions in section 7.0 – Ticket Pro BMS / Retail Software, commencing page 60.

1.10 Final Installation Procedures

When all of the necessary control lines for the Kraus BMS have been properly connected as indicated in the preceding sections, the unit installation is basically complete.

- Replace all explosion-proof junction box covers and secure using ALL of the provided securing means.
- Pour conduit seals in accordance with National and local electrical codes.
- Remove any installation debris located within the BMS cabinet or in the near vicinity.
- Secure the BMS display panel to the pedestal cabinet through the provided locking mechanism if this was removed during installation.
- Install the BMS pedestal cabinet front panel and secure using the provided locking mechanism.

The Kraus BMS is now completely installed and is ready for operation.

2.0 MASTER/SLAVE – MULTIPLEXED BMS

2.1 Introduction

The Master/Slave bulk meter system monitors and controls a series of meters by using two MICON 500™ computerized pumpheads mounted in two separate pedestal cabinets. The Master/Slave Multiplexed BMS can retain gross/net volume totals for a maximum of eight liquid fuel products.

NOTE

The Master/Slave Multiplexed BMS permits dispensing of two individually metered products simultaneously; one product controlled by each of the two pedestal units. This is how it differs from a standard Multiplexed BMS.

Temperature compensation is available for:

1. gasoline
2. diesel
3. propane
4. butane
5. aviation gas
6. jet a
7. jet b
8. anhydrous ammonia (NH_3)
9. ethanol

Push-button product selection switches are located on the front panel of each BMS pedestal cabinet. Cabinet styles are available for operation of 3, 4, 5, 6, 7 and 8 product installations. Each product selection button on the BMS pedestal cabinet corresponds to one individually metered liquid fuel product.

The BMS pedestal serves as a computerized register and is not a dispenser. The Master/Slave Multiplexed BMS is designed to be added onto a newly constructed installation, or as a retrofit to an existing mechanically based installation.

Solenoid valves, pump motors, meters and hoses are located external to the BMS pedestal cabinets, and are not included with BMS manufactured equipment. This, and any additional equipment not specifically supplied with the Kraus Group Inc. BMS, is the responsibility of the user to obtain and install.

Whenever the same product is selected from each of the pedestal units, the first unit to receive the request will be permitted to fill until the sale is complete. The second unit will not be permitted to dispense this product, and will receive an indication on the BMS display that the selected product is in use. A "BUSY" indication will remain on the BMS display until one of the following circumstances occur:

1. The selected fuel is no longer in use.
2. The BMS Pedestal handle switch is placed in the "OFF" position.
3. An alternative product is selected.

Each of the Master/Slave – Multiplexed BMS pedestal units is capable of controlling a maximum of eight individual solenoid valves and a maximum of eight individual motors or motor activation circuits. When motor activation relays or circuits are used, it is necessary to ensure that a minimum 2.7 kΩ load is present on the BMS motor output lines. In such cases, a 2.7 kΩ resistor (10 watt rating) should be connected directly to the input terminal block of the KIL-487 board. The resistor must be connected between the motor output terminal and the neutral terminal.

Each liquid fuel product controlled through the Master/Slave - Multiplexed BMS will require the installation of a remote pulser to monitor product flow. The remote pulser for each product will be situated external to any of the BMS pedestal cabinets, and mechanically coupled directly to an existing product flow meter, as described in section 2.4, page 26.

The Master/Slave – Multiplexed BMS allows for the dispensing of liquid fuel products which are volume corrected based on the product fuel temperature. Temperature compensated products controlled through the Master/Slave Multiplexed BMS are volume corrected to a temperature of 15 °C (60°F). BMS electronic pumphead registers can be programmed for product temperature compensation or non-compensation by using the BMS INFO-PAC, a hand-held, battery operated pumphead programming device.

ATTENTION

BMS INFO-PAC configuration settings should be made before pumpheads are inspected and sealed by the local *Weights and Measures* authority (e.g., Measurement Canada, an agency of Industry Canada). Configuration changes performed after this point may require the breaking of an existing *Weights and Measures* seal.

The local *Weights and Measures* authority may be required to reinspect the system installation prior to commencement of operations, as per applicable regulations.

2.2 Site Preparation

CAUTION

The following precautions should be followed whenever service is performed on or in proximity to any Kraus BMS installation.

- The main power breaker for the system should be placed in the "OFF" position and marked or locked to prevent accidental activation of the system while service work is in process.
- Extreme caution should be used to ensure that no ignition sources are present when operating in a hazardous environment.
- The dispensing area should be roped off or otherwise isolated from public access for the duration of the service period.
- The dispenser station operator should be made aware that service work is being performed, to prevent accidental activation of the system.

A remote pulser must be mechanically coupled to the product flow meter of each product to be controlled by the Kraus Master/Slave BMS. Some product flow meter styles will require the addition of an adaptor kit for proper remote pulser installation.

- An adaptor kit (Kraus part # BC 1667) must be used when installing a remote pulser to a **NEPTUNE™** meter.

- A dust cover must be used when installing a remote pulser to an **LC™** (Liquid Control) meter.

- **SMITH™** meters do not require use of adaptor kits or dust covers.

2.2.1 Pedestal Cabinet Location and Mounting

The pedestal cabinet or cabinets should be situated in a location convenient for operator use, at a reasonably close proximity to the product dispensing hoses and product flow meters controlled and monitored by the Kraus BMS. Sufficient clearance should be present around the BMS pedestal cabinet to allow for easy access by service personnel.

The BMS pedestal cabinet has four mounting holes on the cabinet base for securing the cabinet assembly to a refueling platform. The mounting holes on the base of the BMS cabinet are capable of accommodating up to a ½ inch bolt or mounting stud. A minimum bolt or mounting stud size of $^{3}/_{8}$ inch is recommended for all BMS pedestal cabinet installations.

2.3 Installation Requirements

- All wiring must be installed in accordance with National and local electrical codes.

- Electrical installation of this system should be performed by a suitably licensed electrician.

- Any system wiring modifications should be performed by a licensed electrician or other qualified service personnel.

- Liquid fuel dispensing connections should be performed only by properly trained personnel.

- Substitution of components may impair intrinsic safety.

- The potential exists for lethal voltages to be present when explosion-proof junction box covers are removed. Explosion-proof junction box covers should only be removed by a suitably licensed electrician or qualified service personnel. All system power should be removed prior to the removal of any explosion-proof junction box covers.

- The Kraus BMS is rated for operation at a nominal voltage of 120 VAC 50/60 Hz. Operation of this system in excess of the rated voltage could result in damage to the equipment, and void the equipment Warranty.

2.4 Remote Pulser and Temperature Probe Installation

A remote pulser must be installed for each liquid fuel product controlled by the Kraus BMS:

1. Locate the output shaft on the meter which is coupled to a mechanical register.

2. Remove the mechanical register.

3. Couple the meter output shaft to the input shaft of the remote pulser. As outlined in section 2.2, NEPTUNE™ meters require an adaptor mount (Kraus part #BC 1667) and LC™ meters require a dust cover.

4. The remote pulser has a removable panel providing access to pulser terminal block connections, and the W199 temperature probe inlet.

    1) To access connections, remove five ½ inch screws from the front of the remote pulser panel.

    2) Insert the connector end of the W199 temperature probe into the remote pulser inlet connector.

    3) Direct the W199 temperature probe cable into the provided slot in the remote pulser casing. This will allow the temperature probe to exit the remote pulser enclosure while the access cover is in place.

4) Drill/tap into the fuel pipe and install the sensor end of the W199 temperature probe into the fuel line. Sensor installation should be within reasonable proximity to the remote pulser to ensure that no physical stress is applied to the W199 temperature probe cable.

ATTENTION

5. **It is a requirement of *Measurement Canada*, an agency of *Industry Canada*, that a thermal well be provided next to the installed temperature probe, for inspection purposes. The following guidelines should be observed when installing an inspection test well:**

   1) The thermal well must be positioned to retain thermally conductive fluid. The hole in the fuel line should be drilled so that the extension will be at an angle within 45° of vertical when the extension is installed and the assembly is reconnected.

   2) Install a 1/8 inch NPT test well extension fitting (Kraus part # BC 546) into the hole which was drilled into the fuel line. The inside of the 1/8 inch NPT fitting will be drilled out to accommodate the insertion of the test well (Kraus part # BC 407).

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

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

   3) Install the test well into the extension fitting and tighten into place.

   4) Cover the test well assembly with the supplied protective plug.

ATTENTION

If the connection is made with less than 5 threads fully engaged, it will be necessary to solder the fitting into place. Connections which are in excess of 5 full threads do not require soldering, but must make use of a thread sealing compound which is suitable for use with the intended fuel type.

6. Connections from the remote pulser to the Kraus BMS are made through conduit. A knock-out exists on the side of the remote pulser enclosure to allow for conduit entry. The conduit run should extend to the interior of the **MASTER** BMS pedestal cabinet to allow for the connection of the remote pulser into the Kraus BMS.

   Connections from the remote pulser to the Kraus BMS are made via a W352 Pulser and Probe cable. The W352 cable terminates at one end in 6 free wires with forked terminals. These forked terminals are used to connect to the terminal block on the remote pulser. The other end of the W352 cable terminates in a 6 position connector inside of the Kraus BMS pedestal cabinet.

NOTE

Ensure that the cable run from the remote pulser into the BMS pedestal cabinet allows sufficient cable extension to reach the lower edge of the BMS MICON 500™ explosion-proof enclosure situated on top of the BMS pedestal cabinet. Excess W352 cable may remain coiled and secured within the BMS pedestal cabinet. In extreme cases, where large quantities of excess cable remain, it may be necessary to cut the W352 cable **AT THE REMOTE PULSER END** and attach new forked terminals to the wire ends.

Each W352 is comprised of two separate cables; one 4 conductor cable, and one 2 conductor cable. The 4 conductor cable provides the Kraus BMS with product pulser information; the 2 conductor cable provides fuel temperature data. All 6 conductors of the W352 cable must be properly connected to allow for the proper operation of the Kraus BMS.

These 6 conductors must be connected to the 6 position terminal block located on the remote pulser. The remote pulser will have a label situated underneath the 6 position terminal block identifying each terminal. Wires from the W352 cable should be connected to the corresponding terminal. Connect the 6 conductors of the W352 cable as indicated in Table 9.

FIGURE 9

TEMPERATURE PROBE AND TERMINAL BLOCK CONNECTORS WITHIN REMOTE PULSER

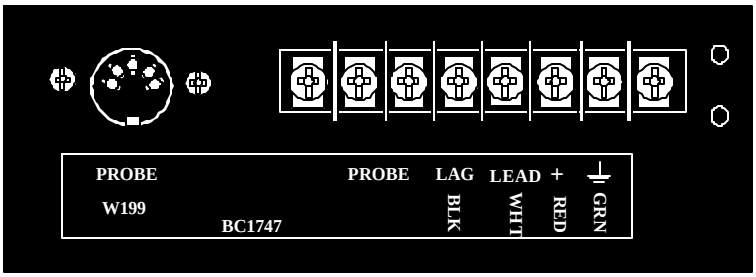


TABLE 9 – REMOTE PULSER AND PROBE CONNECTIONS

W352 CABLE	CABLE LEADS	CONNECT TO REMOTE PULSER 6 POSITION CONNECTOR	
2 CONDUCTOR CABLE (CARRIES PRODUCT FUEL TEMPERATURE DATA)	RED	PROBE	(RED AND BLACK PROBE CABLE LEADS ARE INTERCHANGEABLE)
	BLACK	PROBE	
4 CONDUCTOR CABLE (CARRIES PRODUCT PULSER INFORMATION)	GREEN	GROUND	
	RED	POWER	
	WHITE	LEAD	
	BLACK	LAG	

NOTE

Some remote pulser labels may indicate different wire colours for the probe connections. The probe lines are interchangeable and are not colour dependant. In all cases, the conductor colours used for the pulser connections will be as indicated in Table 9 above.

2.4.1 Master/Slave BMS Pedestal Cabinets – Internal Connections

Located within each of the Master and Slave BMS Cabinets are two Intrinsically Safe (I.S.) circuit boards, mounted behind a protective black rectangular cover. To access these circuit boards, it is necessary to remove the protective cover on both Master and Slave units.

The Master BMS unit will contain the KIL-508 and KIL-484 circuit boards. As indicated in Table 10, connect pulser outputs 1 to 8 to J1 to J8 on KIL-508, and W330 cable to J12.

All connections to KIL-484 circuit board shown in Table 11, page 31 (Master) and page 32 (Slave) are factory connected and should not require user modifications.

FIGURE 10

MASTER BMS I.S. CIRCUIT BOARDS

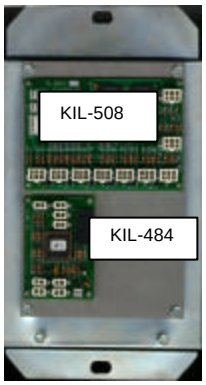


TABLE 10 – MASTER BMS CABINET

KIL-508 BMS PULSER MULTIPLEXER CIRCUIT BOARD CONNECTIONS		**CONNECT TO KIL-508 BOARD IN MASTER BMS CABINET**
REMOTE PULSER OUTPUTS	PULSER OUTPUT 1	J1
	PULSER OUTPUT 2	J2
	PULSER OUTPUT 3	J3
	PULSER OUTPUT 4	J4
	PULSER OUTPUT 5	J5
	PULSER OUTPUT 6	J6
	PULSER OUTPUT 7	J7
	PULSER OUTPUT 8	J8
BMS MASTER/SLAVE INTERCONNECTION CABLE (W330)		J12
FACTORY CONNECTED—NO MODIFICATIONS NECESSARY		J9
		J10
		J11

2.4.1 Master/Slave BMS Pedestal Cabinets – Internal Connections (cont'd)

TABLE 11 – MASTER BMS CABINET KIL-484 BMS 8 PRODUCT SELECTION CIRCUIT BOARD	FACTORY CONNECTIONS TO KIL-484 BOARD IN MASTER BMS CABINET
PRESET KEYPAD (OPTIONAL)	J1
COMMUNICATIONS LINE TO KIL-508: J10	J2
PRODUCT SELECTION BUTTONS MOUNTED TO THE FRONT PANEL OF THE BMS MASTER PEDESTAL CABINET.	J3 to J10

The Slave BMS unit will contain the KIL-521 and KIL-484 circuit boards. As indicated in Table 12 (bottom of this page), connect W330 cable to J4 on KIL-521.

All connections to KIL-484 circuit board shown in Table 13 (next page) are factory connected and should not require user modifications.

FIGURE 11

KIL-521 BOARD IN SLAVE BMS CABINET

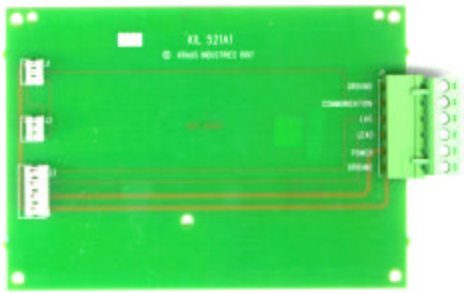


TABLE 12 – SLAVE BMS CABINET KIL-521 "DUMMY" BMS PULSER MULTIPLEXER CIRCUIT BOARD CONNECTIONS	CONNECT TO KIL-521 BOARD IN SLAVE BMS CABINET
FACTORY CONNECTED—NO MODIFICATIONS NECESSARY	J1
	J2
	J3
BMS MASTER/SLAVE INTERCONNECTION CABLE (W330)	J4 (REMOVABLE TERMINAL BLOCK)

2.4.1 Master/Slave BMS Pedestal Cabinets – Internal Connections (cont'd)

TABLE 13 – SLAVE BMS CABINET

KIL-484 BMS 8 PRODUCT SELECTION CIRCUIT BOARD

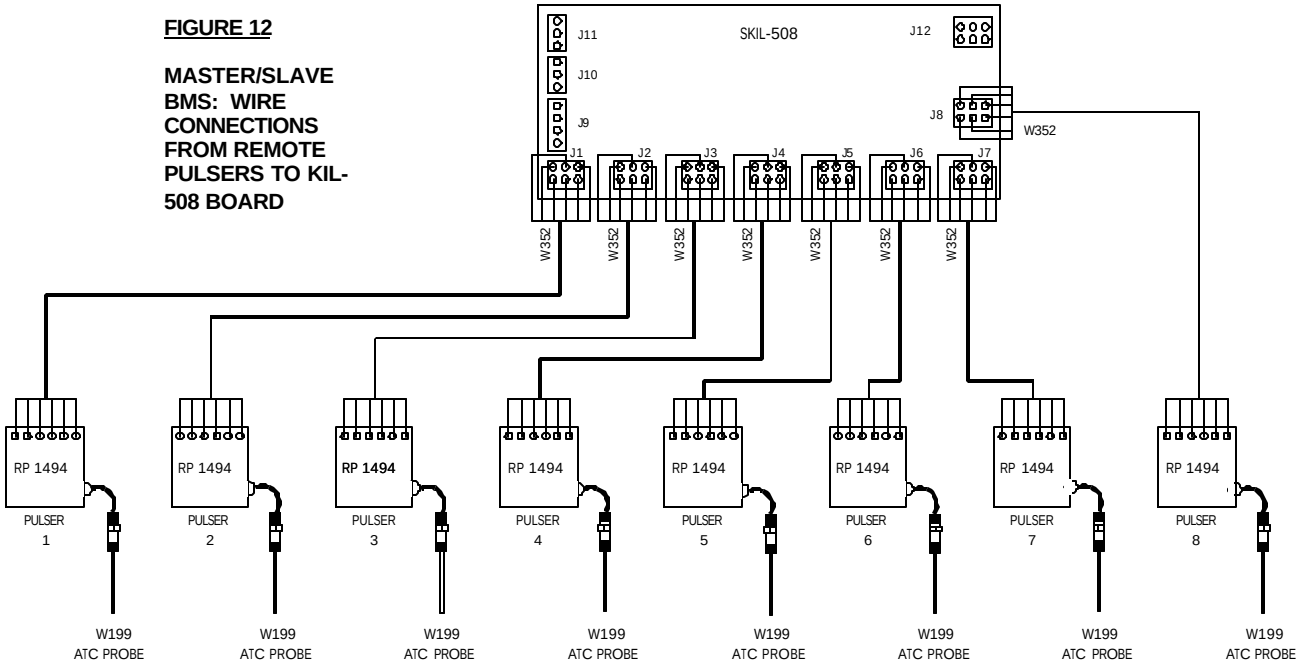
	FACTORY CONNECTIONS TO KIL-484 BOARD IN SLAVE BMS CABINET
PRESET KEYPAD (OPTIONAL)	J1
COMMUNICATIONS LINE TO KIL-521: J2	J2
PRODUCT SELECTION BUTTONS MOUNTED TO THE FRONT PANEL OF THE BMS SLAVE PEDESTAL CABINET.	J3 to J10

2.4.2 MASTER BMS Cabinet - Remote Pulser Connections

Locate the W352 Pulser and Probe cables which enter the Master BMS pedestal cabinet from the externally mounted remote pulsers. The W352 cable terminates in a 6 position connector within the cabinet enclosure. These connectors mate with connectors J1 through J8 on the KIL-508 circuit board as shown in Figure 12 below. J1 through J8 correspond to the product selection buttons which are located on the front panel of the BMS pedestal cabinet. The W352 cable ends must be inserted into the provided connectors on the KIL-508 circuit board until they are properly locked into place.

FIGURE 12

MASTER/SLAVE BMS: WIRE CONNECTIONS FROM REMOTE PULSERS TO KIL-508 BOARD



2.5 MASTER/SLAVE BMS Interconnection

1. Use W330 cable to connect BMS Master and Slave units together. Run the W330 cable through conduit from the Master BMS cabinet into the Slave BMS cabinet.

2. The W330 cable is a 6 conductor cable which terminates with a 6 position connector within the BMS Master cabinet. Connect this end of the W330 cable into connector J12 on the KIL-508 circuit board.

3. **Skip this step if cable from Master unit to Slave unit is already the correct length, and does not require cutting:**

   The end of the cable which enters the Slave BMS cabinet terminates as 6 free wire ends. If the cable is longer than required, cut it **AT THE SLAVE BMS END**.

ATTENTION

   Ensure the cable run from the Master BMS cabinet into the Slave BMS cabinet is long enough to reach the lower edge of the BMS MICON 500™ explosion-proof enclosure situated at the top of the Slave BMS pedestal cabinet.

   If the W330 was cut as a result of excess cable, strip back a section of the cable sheathing (approximately 3 inches) to access the cable conductors. Remove approximately ¼ inch of insulation from each W330 wire end and prepare the bare wire ends for terminal block insertion.

4. Locate the KIL-521 circuit board within the Slave BMS cabinet and remove the detachable portion or the J4 terminal block. Insert the W330 wire ends into the terminal connector and secure the terminals using a small flathead screwdriver. Table 14 below indicates the proper connection of the W330 cable to the terminal block connector:

TABLE 14

SLAVE BMS CABINET W330 CABLE CONNECTIONS TO TERMINAL BLOCK

CONNECTORS ON KIL-521 BOARD IN SLAVE BMS CABINET	TERMINAL BLOCK CONNECTIONS	W330 WIRE ENDS
J4, PIN #6	GROUND	BLUE
J4, PIN #5	COMMUNICATION	ORANGE
J4, PIN #4	LAG	BLACK
J4, PIN #3	LEAD	WHITE
J4, PIN #2	POWER	RED
J4, PIN #1	GROUND	GREEN

When the wire ends from the W330 harness are properly secured to the terminal connector, the connector may be inserted back into the J4 connector on the KIL-521 circuit board.

ATTENTION

Verify that the terminal connections made correspond with the text which is printed directly on the KIL-521 circuit board to ensure that no connections have been reversed.

2.6 I.S. Circuit Board Protective Cover - Reinstallation

After W352 and W330 connections to the KIL-508 and KIL-521 circuit boards are made, the protective circuit board covers for the Master and Slave units may be reinstalled. All cables which exit the protective covers must do so through the provided allowance on the bottom edge of the cover.

Before reinstalling protective circuit board covers, ensure all system operational testing is complete, and no further installation changes are required.

2.7 System Installation – Non-Intrinsically Safe Components

- All wiring must be installed in accordance with National and local electrical codes.
- Electrical installation of this system should be performed by a suitably licensed electrician.
- Any system wiring modifications should be performed by a licensed electrician or other qualified service personnel.
- Liquid fuel dispensing connections should be performed only by properly trained personnel.
- Substitution of components may impair intrinsic safety.

- The potential exists for lethal voltages to be present when explosion-proof junction box covers are removed. Explosion-proof junction box covers should only be removed by a suitably licensed electrician or qualified service personnel. All system power should be removed prior to the removal of any explosion-proof junction box covers.

- The Kraus BMS is rated for operation at a nominal voltage of 120 VAC 50/60 Hz. Operation of this system in excess of the rated voltage could result in damage to the equipment and void the equipment Warranty.

2.8 Motor and Solenoid Valve Control – Output Selector Board – KIL-487

The motor and solenoid activation lines are controlled by the Kraus Master/Slave BMS through the use of the KIL-487 circuit boards. The KIL-487 Output Selector Boards are located within the explosion-proof enclosures mounted internal to the BMS pedestal cabinets.

Located on each KIL-487 circuit board is a six position terminal strip which is labeled as J3. Each individual terminal of J3 is further labeled to describe the connection that must be made to each terminal. All connections to the J3 terminal strip are factory made and should require that no user modification be required. The factory made connections are shown in greater detail in Figure 13, page 40.

2.8.1 Pump Motor Connection

Located on the KIL-487 circuit board is an eight position terminal strip labeled J1, used to connect the motor control signal from the BMS MICON 500™ to the selected liquid fuel pump motor. Each of the eight positions of the J1 terminal strip are labeled with a number 1 through 8 which corresponds to products 1 through 8 of the BMS installation. The motor activation lines for each product must be connected to the corresponding terminal on the J1 terminal strip for the proper operation of the BMS installation.

When a motor activation signal from the BMS MICON 500™ is present, the voltage connected to the Motor and Solenoid Power line (Wire #7) of the BMS MICON 500™ will be applied to the appropriate terminal of the J1 terminal strip on the KIL-487 circuit board to activate the correct pump motor. One side of the motor activation circuitry (i.e., motor coil, relay coil etc.) must be connected to the active J1 terminal. The remaining side of the motor activation circuitry must be connected to the supply neutral. Motor activation line connections must be made for both Master and Slave units in Master/Slave Multiplexed BMS installations. Connect motor outputs as indicated in Table 15 below. The motor output connections are shown in greater detail in Figure 6, page 16 and Figure 13, page 40.

TABLE 15

MASTER/SLAVE: WIRE CONNECTIONS FROM MOTOR OUTPUTS TO KIL-487 BOARDS IN MASTER AND SLAVE BMS CABINETS

Motors	Connect to KIL-487 Boards in BMS Cabinets
MOTOR OUTPUT 1	J1, TERMINAL 1
MOTOR OUTPUT 2	J1, TERMINAL 2
MOTOR OUTPUT 3	J1, TERMINAL 3
MOTOR OUTPUT 4	J1, TERMINAL 4
MOTOR OUTPUT 5	J1, TERMINAL 5
MOTOR OUTPUT 6	J1, TERMINAL 6
MOTOR OUTPUT 7	J1, TERMINAL 7
MOTOR OUTPUT 8	J1, TERMINAL 8

2.8.2 Solenoid Valve Connection

Also located on the KIL-487 circuit board is an 8 position terminal strip labeled J2, used to connect the solenoid valve control signal from the BMS MICON 500™ to the solenoid valve controlling the selected product fuel line. Each of the eight positions of the J2 terminal strip are labeled with a number 1 through 8 which corresponds to products 1 through 8 of the BMS installation. The solenoid valve activation lines for each product must be connected to the corresponding terminal on the J2 terminal strip for the proper operation of the BMS installation.

When a solenoid valve activation signal from the BMS MICON 500™ is present, the voltage connected to the Motor and Solenoid Power line (Wire #7) of the BMS MICON 500™ will be applied to the appropriate terminal of

the J2 terminal strip on the KIL-487 circuit board to activate the correct solenoid valve. One side of the solenoid coil must be connected to the active J2 terminal. The remaining side of the solenoid coil must be connected to the supply neutral. Solenoid valve activation line connections must be made for both Master and Slave units in Master/Slave Multiplexed BMS installations. Connect solenoid valve outputs as indicated in Table 16 below. The solenoid output connections are shown in greater detail in Figure 6, page 16 and Figure 13, page 40.

TABLE 16

MASTER/SLAVE: WIRE CONNECTIONS FROM SOLENOID VALVE OUTPUTS TO KIL-487 BOARDS IN MASTER AND SLAVE BMS CABINETS

Solenoid Valve Outputs	Connect to KIL-487 Boards in BMS Cabinets
SOLENOID OUTPUT 1	J2, TERMINAL 1
SOLENOID OUTPUT 2	J2, TERMINAL 2
SOLENOID OUTPUT 3	J2, TERMINAL 3
SOLENOID OUTPUT 4	J2, TERMINAL 4
SOLENOID OUTPUT 5	J2, TERMINAL 5
SOLENOID OUTPUT 6	J2, TERMINAL 6
SOLENOID OUTPUT 7	J2, TERMINAL 7
SOLENOID OUTPUT 8	J2, TERMINAL 8

2.9 MICON 500™ Wire Harness Connections

1. Locate the 18 position terminal block within the **Master** BMS cabinet.

   Connect **Master** BMS MICON 500™ wire harness 18 position terminal block as outlined in **Table 7, page 17 and Figure 6, page 16 (Eight Product Terminal Wiring Diagram)**.

   Refer also to Figure 13, page 40: 8 Product Dual BMS System Wiring Diagram – Master/Slave Multiplexed BMS.

2. Locate the 18 position terminal block within the **Slave** BMS cabinet.

   Connect **Slave** BMS MICON 500™ wire harness using the same guidelines as above.

IMPORTANT

3. An MCIU (MICON Communication Interface Unit) **must be installed** when using Master/Slave Multiplexed BMS. MCIU has the capability of communicating with up to sixteen MICON 500™ pumpheads.

   Follow installation instructions on pages 18 and 19, section 1.8.1 – MCIU Installation – North American.

IMPORTANT

4. *Ticket Pro* software **must be installed** when using Master/Slave Multiplexed BMS. The MCIU referenced above provides interfacing to a PC computer, permitting the software to communicate with the MICON electronic registers installed in each pedestal.

   Ticket Pro provides an on-screen and/or printed transaction record each time fuel is dispensed.

   Follow installation instructions in section 7.0 – Ticket Pro BMS / Retail Software, commencing page 60.

5. When steps 1 to 4 above are complete, the pumphead is ready for configuration. To configure MICON 500™ electronic pumphead, refer to Kraus Group Inc. INFO-PAC BMS Programming Guide.

2.10 Final Installation Procedures

When all of the necessary control lines for the Kraus BMS have been properly connected as indicated in the proceeding sections, the unit installation is basically complete.

- Replace all explosion proof junction box covers and secure using ALL of the provided securing means.
- Pour conduit seals in accordance with National and local electrical codes.
- Remove any installation debris which is located within the BMS cabinet or in the near vicinity.
- Secure the BMS display panel to the pedestal cabinet through the provided locking mechanism if this was removed during installation.
- Install the BMS pedestal cabinet front panel and secure using the provided locking mechanism.

The Kraus BMS is now completely installed and is ready for operation.

FIGURE 13 – 8 PRODUCT DUAL BMS SYSTEM WIRING DIAGRAM: MASTER/SLAVE MULTIPLEXED BMS

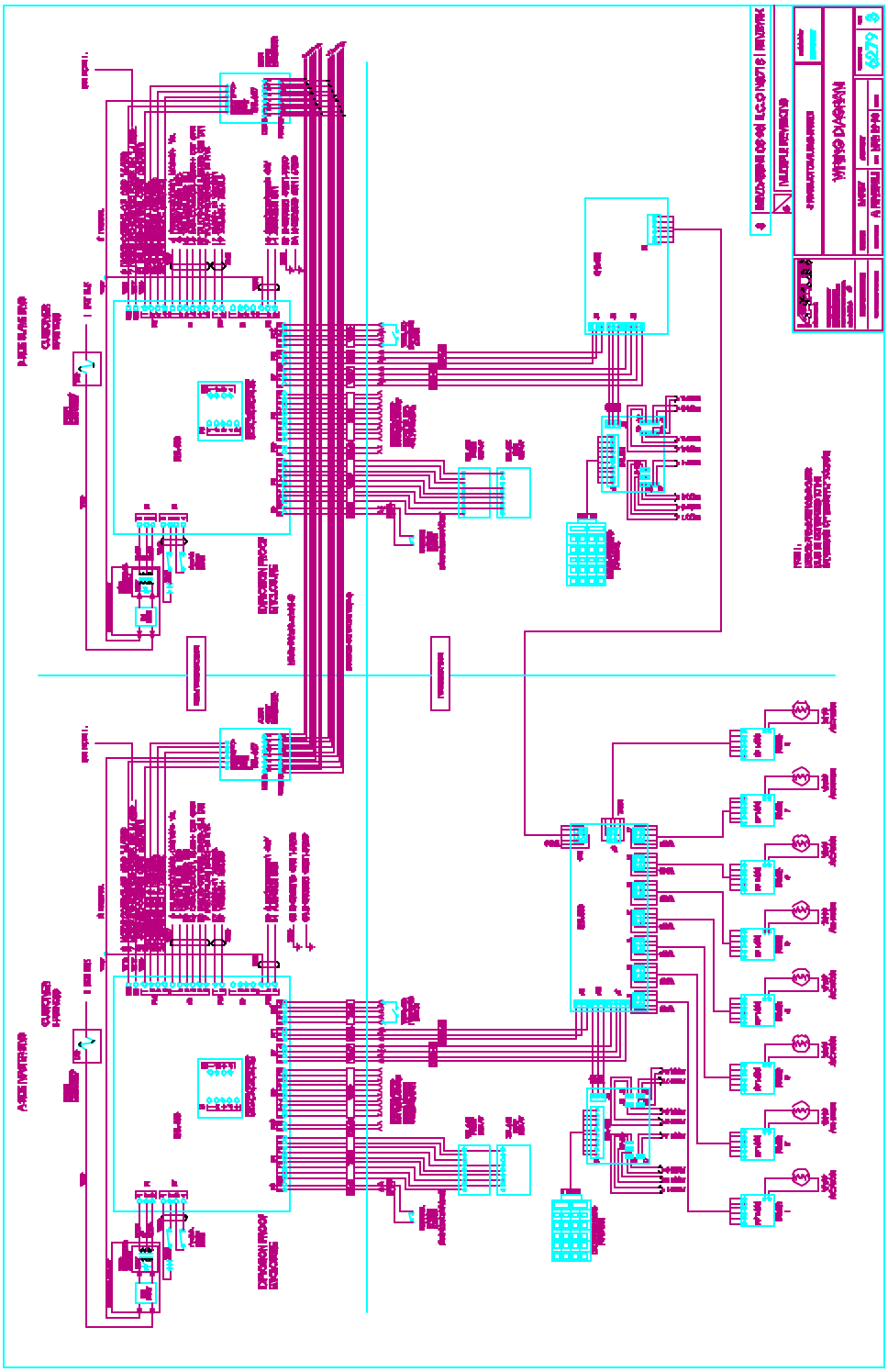
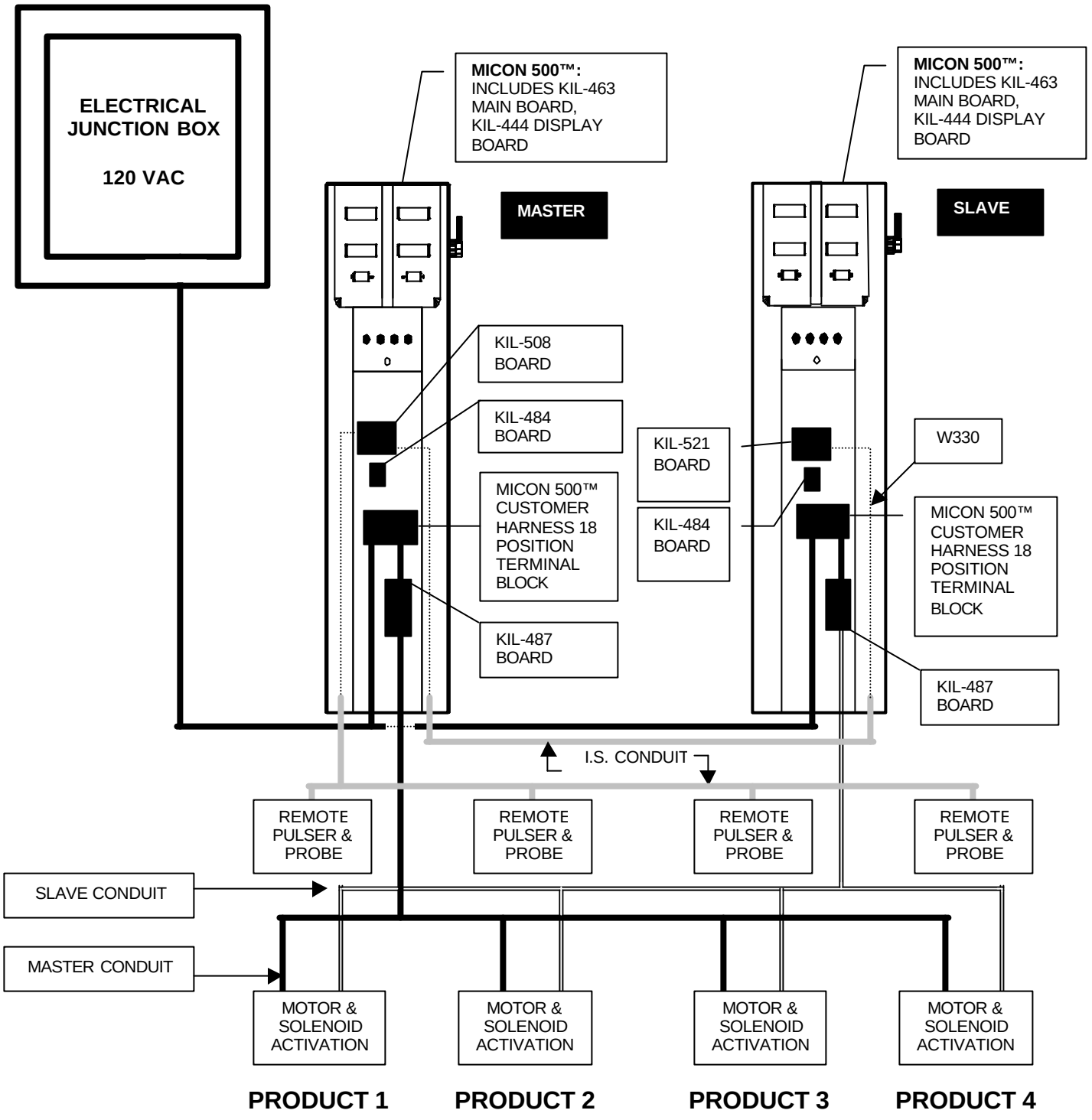


FIGURE 14

OVERVIEW OF BMS MASTER/SLAVE MULTIPLEXED BMS

BLOCK DIAGRAM SHOWN IS FOR A FOUR PRODUCT MASTER/SLAVE MULTIPLEXED BMS. UP TO FOUR ADDITIONAL PRODUCT LINES MAY BE CONNECTED SIMILARLY TO THE MASTER/SLAVE UNIT, FOR A TOTAL OF EIGHT FUEL PRODUCTS.



3.0 SINGLE PRODUCT BMS

3.1 Introduction

The Single Product bulk meter system monitors and controls the dispensing of a single liquid fuel product. The Single Product BMS uses a MICON 500™ computerized pumphead mounted in a pedestal cabinet to retain gross/net volume totals for the liquid fuel product dispensed.

Temperature compensation is available for:

1. gasoline
2. diesel
3. propane
4. butane
5. aviation gas
6. jet a
7. jet b
8. anhydrous ammonia (NH_3)
9. ethanol

The BMS pedestal serves as a computerized register and is not a dispenser. The Single Product BMS is designed to be added onto a newly constructed installation, or as a retrofit to an existing mechanically based installation. Multiple products may be controlled through additional Single Product BMS units or other available BMS configurations.

Solenoid valves, pump motors, meters and hoses are located external to the BMS pedestal cabinets, and are not included with BMS manufactured equipment. This, and any additional equipment not specifically supplied with the Kraus Group Inc. BMS, is the responsibility of the user to obtain and install.

The liquid fuel product controlled through the Single Product BMS will require the installation of a remote pulser to monitor product flow. The remote pulser will be situated external to the BMS pedestal cabinet, and mechanically coupled directly to an existing product flow meter, as described in section 2.3.1, page 47.

The Single Product BMS directly controls the pump motor and solenoid valve for the product being dispensed. When activation relays or circuits are used to drive the motor, it is necessary to ensure that a minimum 2.7 kΩ load is present on the BMS motor output line. In such cases, a 2.7 kΩ

resistor (10 watt rating) should be connected directly across the Motor Output Control line (BMS MICON Wire # 8) and the supply neutral.

The Single Product BMS allows for the dispensing of liquid fuel products which are volume corrected based on the product fuel temperature. Temperature compensated products controlled through the Single Product BMS are volume corrected to a temperature of 15 °C (60°F). BMS electronic pumphead registers can be programmed for product temperature compensation or non-compensation by using the BMS INFO-PAC, a hand-held, battery operated pumphead programming device.

ATTENTION

BMS INFO-PAC configuration settings should be made before pumpheads are inspected and sealed by the local *Weights and Measures* authority (e.g., Measurement Canada, an agency of Industry Canada). Configuration changes performed after this point may require the breaking of an existing *Weights and Measures* seal.

The local *Weights and Measures* authority may be required to reinspect the system installation prior to commencement of operations, as per applicable regulations.

3.2 Available Styles – Single Product BMS

Two Single Product BMS cabinet styles are available:

- Pedestal Style Cabinet (Figure 15).
- Rack Style Cabinet (Figure 16). The Rack Style cabinet can be mounted on a rack meter as shown on page 56.

Installation instructions herein make specific reference to Pedestal Style BMS cabinets. Instructions are also valid for Rack Style cabinets.

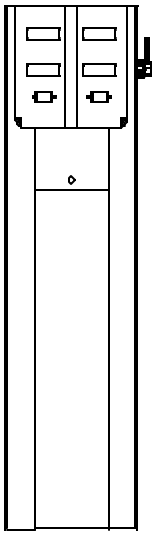


FIGURE 15

PEDESTAL STYLE CABINET

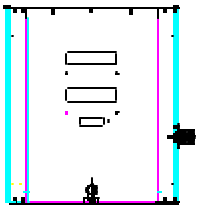


FIGURE 16

RACK METER CABINET

3.3 Site Preparation

CAUTION

The following precautions should be followed whenever service is performed on or in proximity to any Kraus BMS installation.

- The main power breaker for the system should be placed in the “OFF” position and marked or locked to prevent accidental activation of the system while service work is in process.
- Extreme caution should be used to ensure that no ignition sources are present when operating in a hazardous environment.
- The dispensing area should be roped off or otherwise isolated from public access for the duration of the service period.
- The dispenser station operator should be made aware that service work is being performed, to prevent accidental activation of the system.

A remote pulser must be mechanically coupled to the product flow meter of the product to be controlled by the Kraus Single Product BMS. Some product flow meter styles will require the addition of an adapter kit for proper remote pulser installation. Please note:

- An adapter kit (Kraus part # BC 1667) must be used when installing a remote pulser to a **NEPTUNE™** meter.
- A dust cover must be used when installing a remote pulser to an **LC™** (Liquid Control) meter.
- **SMITH™** meters do not require use of adapter kits or dust covers.

3.3.1 Pedestal Cabinet Location and Mounting

The pedestal cabinet or cabinets should be situated in a location convenient for operator use, at a reasonably close proximity to the product dispensing hoses and product flow meters controlled and monitored by the Kraus BMS. Sufficient clearance should be present around the BMS pedestal cabinet to allow for easy access by service personnel.

The BMS pedestal cabinet has four mounting holes on the cabinet base for securing the cabinet assembly to a refueling platform. The mounting holes on the base of the BMS cabinet are capable of accommodating up to a ½ inch bolt or mounting stud. A minimum bolt or mounting stud size of $^{3}/_{8}$ inch is recommended for all BMS pedestal cabinet installations.

3.4 Installation Requirements

- All wiring must be installed in accordance with National and local electrical codes.
- Electrical installation of this system should be performed by a suitably licensed electrician.
- Any system wiring modifications should be performed by a licensed electrician or other qualified service personnel.
- Liquid fuel dispensing connections should be performed only by properly trained personnel.
- Substitution of components may impair intrinsic safety.
- The potential exists for lethal voltages to be present when explosion-proof junction box covers are removed. Explosion-proof junction box covers should only be removed by a suitably licensed electrician or qualified service personnel. All system power should be removed prior to the removal of any explosion-proof junction box covers.
- The Kraus BMS is rated for operation at a nominal voltage of 120 VAC 50/60 Hz. Operation of this system in excess of the rated voltage could result in damage to the equipment, and void the equipment Warranty.

3.5 Remote Pulser and Temperature Probe Installation

A remote pulser must be installed for each liquid fuel product controlled by the Kraus BMS:

1. Locate the output shaft on the meter which is coupled into a mechanical register.

2. Remove the mechanical register.

3. Couple the meter output shaft to the input shaft of the remote pulser. As outlined in section 3.3, NEPTUNE™ meters require an adapter mount (Kraus part #BC 1667) and LC™ meters require a dust cover.

`

4. The remote pulser has a removable panel providing access to pulser terminal block connections, and the W199 temperature probe inlet.

    1) To access connections, remove five ½ inch screws from the front of the remote pulser panel.

    2) Insert the connector end of the W199 temperature probe into the remote pulser inlet connector.

    3) Direct the W199 temperature probe cable into the provided slot in the remote pulser casing. This will allow the temperature probe to exit the remote pulser enclosure while the access cover is in place.

    4) Drill/tap into the fuel pipe and install the sensor end of the W199 temperature probe into the fuel line. Sensor installation should be within reasonable proximity to the remote pulser to ensure that no physical stress is applied to the W199 temperature probe cable.

5. **It is a requirement of *Measurement Canada*, an agency of *Industry Canada*, that a thermal well be provided next to the installed temperature probe, for inspection purposes. The following guidelines should be observed when installing an inspection test well:**

    1) The thermal well must be positioned to retain thermally conductive fluid. The hole in the fuel line should be drilled so that the extension will be at an angle within 45° of vertical when the extension is installed and the assembly is reconnected.

2) Install a 1/8 inch NPT test well extension fitting (Kraus part # BC 546) into the hole which was drilled into the fuel line. The inside of the 1/8 inch NPT fitting will be drilled out to accommodate the insertion of the test well (Kraus part # BC 407).

   - The fitting should provide easy access for the insertion of a thermometer .
   - The fitting should be placed in an appropriate location so as not to hinder reinstallation of the assembly.

3) Install the test well into the extension fitting and tighten into place.

4) Cover the test well assembly with the supplied protective plug.

ATTENTION

If the connection is made with less than 5 threads fully engaged, it will be necessary to solder the fitting into place. Connections which are in excess of 5 full threads do not require soldering, but must make use of a thread sealing compound which is suitable for use with the intended fuel type.

6. Connections from the remote pulser to the Kraus BMS are made through conduit. A knock-out exists on the side of the remote pulser enclosure to allow for conduit entry. The conduit run should extend to the interior of the BMS pedestal cabinet to allow for the connection of the remote pulser into the Kraus BMS.

   Connections from the remote pulser to the Kraus BMS are made via a W313 Pulser and Probe cable. The W313 cable terminates at one end in 6 free wires with forked terminals. These forked terminals are used to connect to the terminal block on the remote pulser. The other end of the W313 cable terminates in a 4 position connector and a 10 position connector inside of the Kraus BMS Pedestal cabinet.

NOTE

Ensure that the cable run from the remote pulser into the BMS pedestal cabinet allows sufficient cable extension to mate with the appropriate Intrinsically Safe wire harnesses which extrude from the BMS MICON 500™ explosion-proof enclosure. Each of the connectors on the W313 harness only mate with the correct I.S. wire harness at the BMS MICON 500™. Excess W313 cable may remain coiled and secured within the BMS pedestal cabinet. In extreme cases, where large quantities of excess cable remain, it may be necessary to cut the W313 cable **AT THE REMOTE PULSER END** and attach new forked terminals to the wire ends.

Each W313 is comprised of a 6 conductor cable. The 6 conductor cable provides the Kraus BMS with product pulser information on 4 of the conductors and the additional 2 conductors provide fuel temperature data. All 6 conductors of the W313 cable must be properly connected to allow for the proper operation of the Kraus BMS.

These 6 conductors must be connected to the 6 position terminal block located on the remote pulser. The remote pulser will have a label situated underneath the 6 position terminal block identifying each terminal. Wires from the W313 cable should be connected to the corresponding terminal.

Connect the 6 conductors of the W313 cable as indicated in Table 17, next page.

FIGURE 17

TEMPERATURE PROBE AND TERMINAL BLOCK CONNECTORS WITHIN REMOTE PULSER

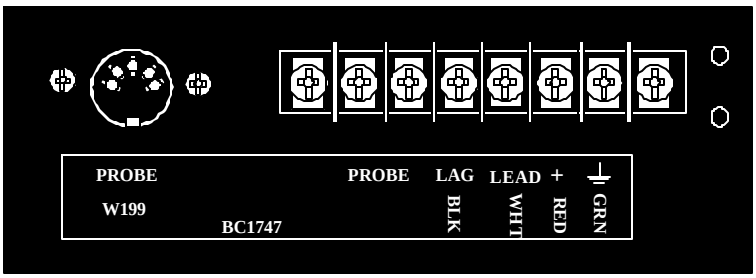


TABLE 17 – REMOTE PULSER AND PROBE CONNECTIONS

W313 CABLE	CABLE LEADS	CONNECT TO REMOTE PULSER 6 POSITION CONNECTOR	
10 POSITION CONNECTOR (CARRIES PRODUCT FUEL TEMPERATURE DATA)	ORANGE	PROBE	BLUE AND ORANGE PROBE CABLE LEADS ARE INTERCHANGEABLE
	BLUE	PROBE	
4 POSITION CONNECTOR (CARRIES PRODUCT PULSER INFORMATION)	GREEN	GROUND	
	RED	POWER	
	WHITE	LEAD	
	BLACK	LAG	

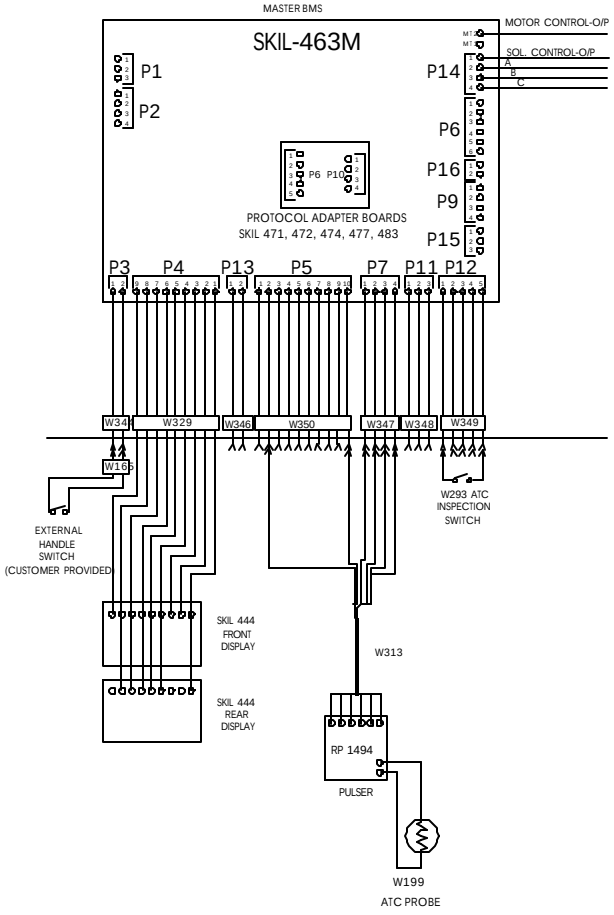
NOTE

Some remote pulser labels may indicate different wire colors for the probe connections. The probe lines are interchangeable and are not color dependant. In all cases, the conductor colors used for the pulser connections will be as indicated in Table 17 above.

Connections should appear as in Figure 18.

FIGURE 18

SINGLE PRODUCT BMS: WIRE CONNECTIONS FROM REMOTE PULSER TO SKIL-463M BOARD



3.6 System Installation – Non-Intrinsically Safe Components

- All wiring must be installed in accordance with National and local electrical codes.
- Electrical installation of this system should be performed by a suitably licensed electrician.
- Any system wiring modifications should be performed by a licensed electrician or other qualified service personnel.
- Liquid fuel dispensing connections should be performed only by properly trained personnel.
- Substitution of components may impair intrinsic safety.
- The potential exists for lethal voltages to be present when explosion-proof junction box covers are removed. Explosion-proof junction box covers should only be removed by a suitably licensed electrician or qualified service personnel. All system power should be removed prior to the removal of any explosion-proof junction box covers.
- The Kraus BMS is rated for operation at a nominal voltage of 120 VAC 50/60 Hz. Operation of this system in excess of the rated voltage could result in damage to the equipment and void the equipment Warranty.

3.6.1 Pump Motor Connection

From the BMS MICON 500™, the Motor Control Output line (Wire # 8) is terminated at the 18 position terminal strip which is located within the BMS cabinet. This line provides the activation signal for the pump motor when dispensing product.

When a motor activation signal from the BMS MICON 500™ is present, the voltage connected to the Motor and Solenoid Power line (Wire #7) of the BMS MICON 500™ will be applied to the Motor Control Output line (Wire #8) of the BMS MICON 500™. One side of the motor activation circuitry (i.e., motor coil, relay coil, etc.) must be connected to the Motor Control Output through-feed from the 18 position terminal strip. The remaining side of the motor control circuitry must be connected to the supply neutral.

3.6.2 Connecting Motor and Solenoid Outputs to Single Product BMS

From the BMS MICON 500™, the Solenoid Control Output line (Wire # 21) is terminated at the 18 position terminal strip located within the BMS cabinet. This line provides the activation signal for the solenoid valve to control the flow of the liquid fuel product.

When a solenoid valve activation signal from the BMS MICON 500™ is present, the voltage connected to the Motor and Solenoid Power line (Wire #7) of the BMS MICON 500™ will be applied to the Solenoid Control Output line (Wire #21) of the BMS MICON 500™. One side of the solenoid coil must be connected to the Solenoid Control Output through-feed from the 18 position terminal strip. The remaining side of the solenoid coil must be connected to the supply neutral.

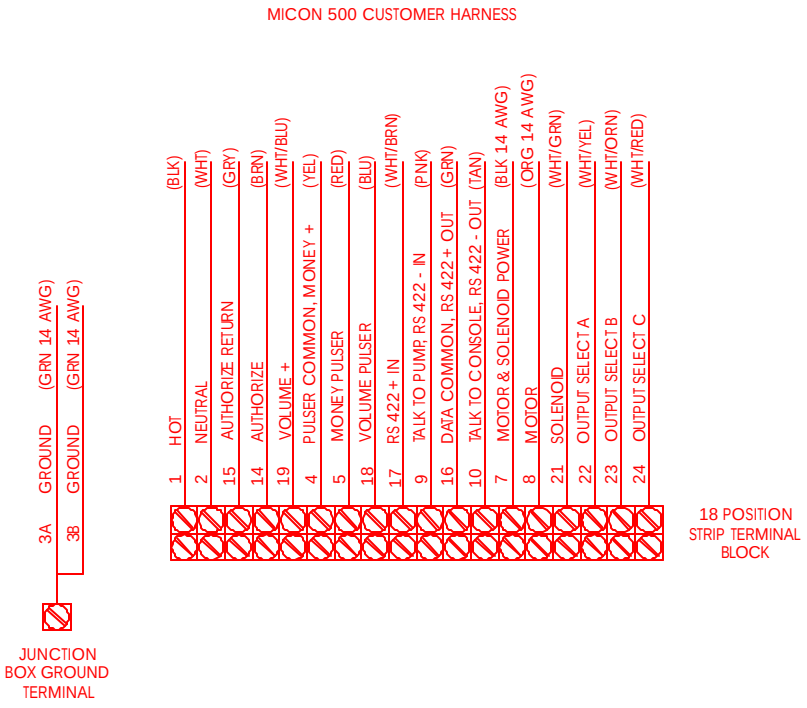
1. Locate customer wire harness descending from the MICON 500™ electronic pumphead in the BMS cabinet. Locate the through-feed on the 18 position strip terminal block. (see Figure 19, below).

2. Connect motor output to terminal #8.

3. Connect solenoid output to terminal #21.

FIGURE 19

SINGLE PRODUCT BMS: MOTOR AND SOLENOID OUTPUT TERMINAL CONNECTIONS



3.7 MICON 500™ Wire Harness Connections

TABLE 18 – MICON 500™ WIRE HARNESS FACTORY CONNECTIONS

WIRE #	FUNCTION	NO CONNECTION NECESSARY
All wires are 18 AWG unless otherwise noted.		
22 (WHT/YEL)	Output Select A	Terminated; not used.
23 (WHT/ORN)	Output Select B	Terminated; not used.
24 (WHT/RED)	Output Select C	Terminated; not used.

1. **The same MICON 500™ wire harness connections are made for Single Product BMS as for standard Multiplexed BMS:**

   CONNECT THE REMAINING MICON WIRES FROM TERMINAL BLOCK AS INDICATED IN TABLE 7, PAGE 17 AND FIGURE 6, PAGE 16 (EIGHT PRODUCT TERMINAL WIRING DIAGRAM).

2. When step 1 above is complete, installation of the pumphead is ready for configuration. To configure MICON 500™ electronic pumphead, refer to *Kraus Group Inc. INFO-PAC BMS Programming Guide*.

MCIU Installation – North American (optional)

NOTE

An MCIU (MICON Communication Interface Unit) may be installed when using the Single Product BMS. MCIU has the capability of communicating with up to sixteen MICON 500™ pumpheads.

Follow installation instructions on pages 18 and 19, section 1.8.1 – MCIU Installation – North American.

3.8 *Ticket Pro*™ Software Installation (optional)

IMPORTANT

Ticket Pro software may be installed in conjunction with the MCIU in a Single Product BMS installation. The MCIU referenced on pages 18-19 provides interfacing to a PC computer, permitting the software to communicate with the MICON electronic registers installed in the BMS pedestal.

Ticket Pro provides an on-screen and/or printed transaction record each time fuel is dispensed.

Follow installation instructions in section 7.0 – Ticket Pro BMS / Retail Software, commencing page 60.

3.9 Final Installation Procedures

When all of the necessary control lines for the Kraus BMS have been properly connected as indicated in the preceding sections, the unit installation is basically complete.

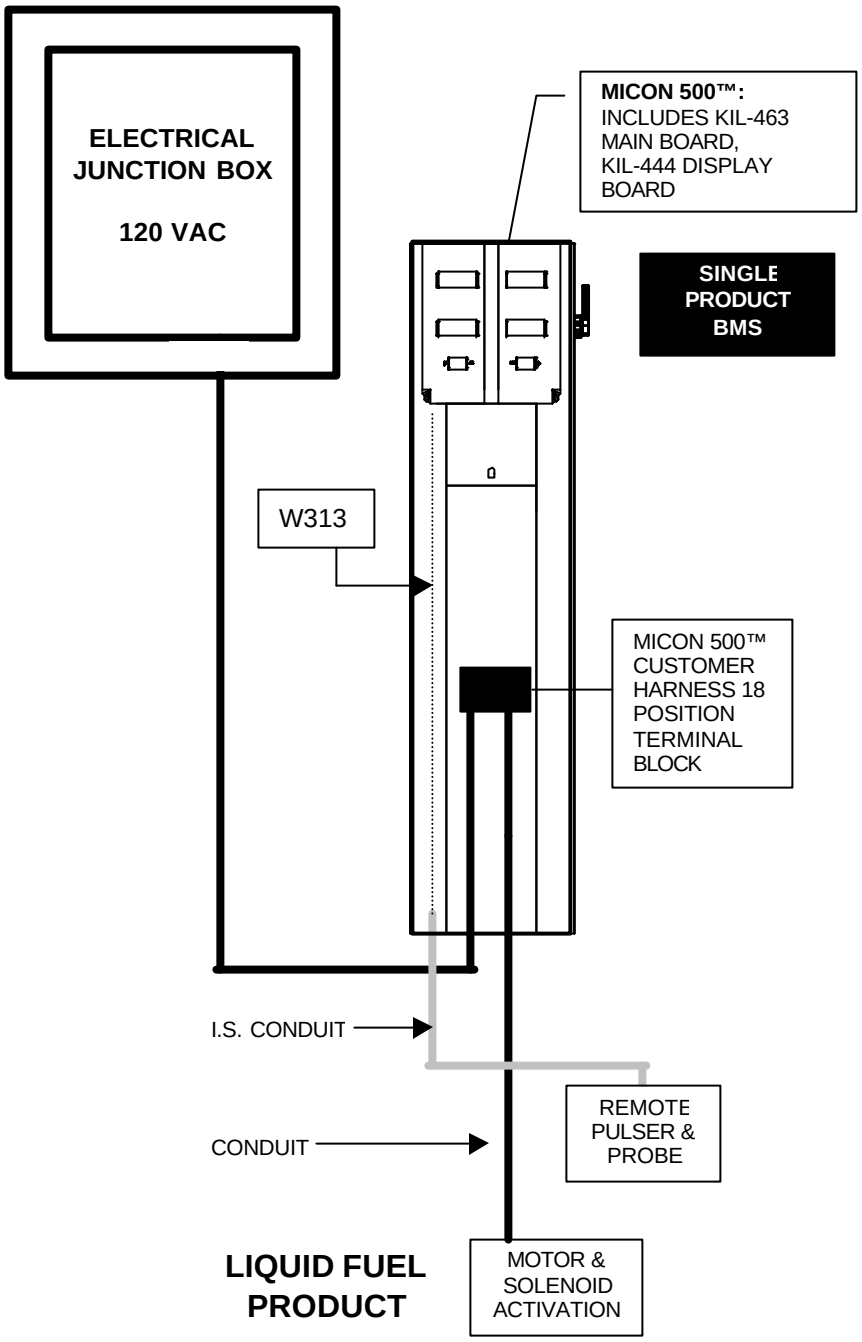
- Replace all explosion proof junction box covers and secure using ALL of the provided securing means.
- Pour conduit seals in accordance with National and local electrical codes.
- Remove any installation debris which is located within the BMS cabinet or in the near vicinity.
- Secure the BMS display panel to the pedestal cabinet through the provided locking mechanism if this was removed during installation.
- Install the BMS pedestal cabinet front panel and secure using the provided locking mechanism.

The Kraus BMS is now completely installed and is ready for operation.

FIGURE 20

OVERVIEW OF SINGLE PRODUCT BMS

THE SINGLE PRODUCT BMS CAN CONTROL A SINGLE LIQUID FUEL PRODUCT. CONTROL OF ADDITIONAL PRODUCTS MAY BE ATTAINED THROUGH THE USE OF MULTIPLE SINGLE PRODUCT BMS UNITS OR OTHER AVAILABLE BMS CONFIGURATIONS.



4.0 SYSTEM 2 RACK METER INSTALLATION

Kraus Group Inc. BMS systems may be installed on loading racks for tanker truck fueling stations. In systems which employ loading racks, each loading arm represents a separately metered fuel product.

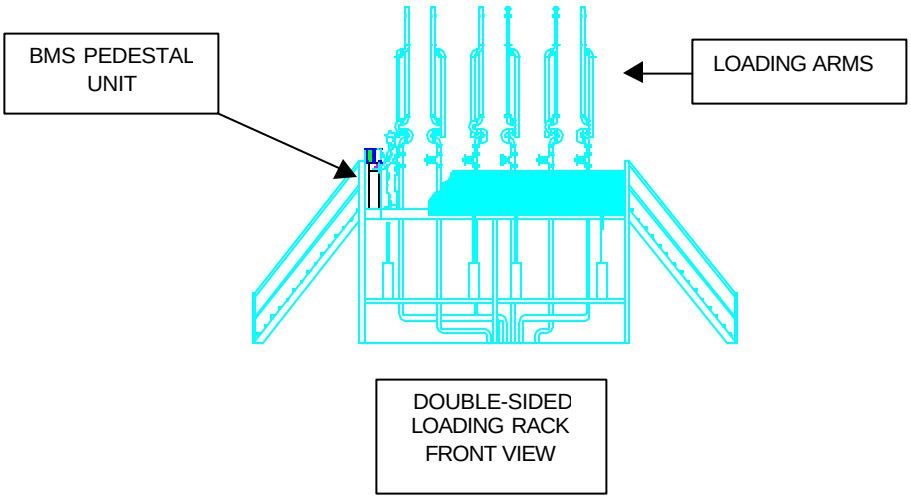
The **Master/Slave** Multiplexed BMS system was designed to be used in double-sided loading rack applications, and can control and monitor up to eight individually metered liquid fuel products. With the **Master/Slave** Multiplexed BMS system, two tanker trucks may be fueled from separate product lines simultaneously. Separate Master and Slave electronic registers maintain gross/net volume totalizers for each fuel product activated and controlled.

NOTE

Loading racks which are used in the refueling of tanker trucks are required to provide a printed record of the transaction. The Master/Slave Multiplexed BMS is supplied with an MCIU and *Ticket Pro* software, which allows a transaction record to be printed through a standard computer.

Tanker truck refueling may be controlled through other available BMS configurations provided that an MCIU and *Ticket Pro* software are ordered in addition to the selected BMS unit.

FIGURE 21 – SYSTEM 2 RACK METER



5.0 PRE-SET KEYPAD

Pre-set membrane keypads are available. These keypads permit the user to pre-select the number of units of fuel to be dispensed, permitting accurate fills.

One keypad per BMS cabinet may be installed. For Master Slave Multiplexed BMS units, separate keypads can be connected to Master cabinet and Slave cabinet.

NOTE

All pre-set keypads are factory installed.

To test pre-set keypad operation:

1) Press PRESET VOLUME button on keypad.

2) Enter number of units of fuel to dispense. One unit is the minimum available setting. Type of units (i.e., litres, U.S. gallons, Imperial gallons) is determined by pumphead INFO-PAC programming, and cannot be controlled using the pre-set keypad.

   If the wrong number of units is entered in the keypad, press CLEAR button. This enables a reset. Press VOLUME button again followed by correct number of fuel units.

3) Press ENTER button.

4) If using a BMS system which dispenses more than one product, press PRODUCT button and select. If using a Single Product BMS, skip this step.

5) Go to the fuel hose of the selected product.

6) Fill tank or container. Fill will cease automatically when pre-set amount has been dispensed.

NOTE

To stop pre-set flow of fuel at any time, shut dispenser handle OFF. This will also end the sale.

After each use of pre-set keypad, system returns to FILL mode.

6.0 MICON DISPLAY FAULT CODES

Should an operational error occur while using the MICON 500™ electronic register, a fault code will show in the bottom display.

Fault codes are interpreted as shown in Table 19, below.

TABLE 19 – MICON 500™ FAULT CODES

DISPLAY CODE	DESCRIPTION OF FAULT	PROBABLE CAUSE	RECOMMENDED ACTION	TO CLEAR FAULT CONDITION
CO26	PULSER FAULT	Missing or disconnected pulser.	Check customer harness lead electrical connections (see section 1.44, Table 5, page 10).	**1. Correct source of error.** **2. Turn handle switch OFF, then ON.**
CO27	PULSER BUFFER OVERFLOW FAULT	Input pulses coming in faster than MICON 500 rated to handle. Meter may be programmed for higher pulse per unit (ppu) number than MICON 500 rating.	Ensure meter and MICON 500 flow rates are compatible.	
CO28	DISPLAY DISCONNECT FAULT	LCD (liquid crystal display) lost connection. Display disconnected or improperly connected.	Check connections. If connections are valid, display may require replacement.	
CO29	EEPROM CHECKSUM FAULT	EEPROM corrupted.	Reset pumphead by turning handle switch OFF, then ON. If reset ineffective, reprogram the MICON, using the INFO-PAC. If reset and reprogramming ineffective, internal processor may require replacing. Contact your service representative.	
CO30	EXCESSIVE REVERSE COUNTS	Pulser connected backwards.	Check customer harness lead electrical connections (see section 1.44, Table 5, page 10).	
CO31	AMBIENT TEMPERATURE PROBE	Probe has open circuit.	Check probe connections / replace probe.	
CO32	AMBIENT TEMPERATURE PROBE	Probe has short circuit.	Check probe connections / replace probe.	
CO36	COMMUNICATION ERROR	KIL-487 board at fault.	Verify board properly connected.	
CO37	COMMUNICATION ERROR	KIL-508 board at fault.	Verify board properly connected.	

FIGURE 22 - FAULT CODE DISPLAYED BY MICON 500™ ELECTRONIC REGISTER

Fault codes listed on previous page show in MICON 500™ ***bottom display***.

7.0 TICKET PRO™ BMS / RETAIL SOFTWARE

For BMS systems interfaced to a PC computer, *Ticket Pro* software provides an on-screen and/or printed transaction record each time fuel is dispensed. Any computer meeting hardware requirements described in section 7.1.1 (next page) and any Epson compatible printer may be used.

BMS transaction records include:

- net volume
- gross volume
- fuel type
- temperature
- density
- meter identification
- hose number
- unit
- time and date of transaction
- optional ticket header and trailer

Ticket Pro software has capability of recognizing both BMS and retail hardware at the same network. Features include:

- *auto detect* function which detects whether system is BMS or retail unit
- *intelligent display* for BMS and Retail
- *log window* (displays all detailed transactions)
- *temperature display*
- *ATC* (automatic temperature compensated/uncompensated) display view

Retail transaction records include the same items as BMS transaction records, with the addition of price per transaction and price totals for each fuel type dispensed:

- **sales amount**
- net volume
- gross volume
- fuel type
- temperature
- density
- meter identification
- hose number
- unit (e.g., Canadian dollars per litre)
- **unit price**
- time and date of transaction
- optional ticket header and trailer

7.1 Hardware Interface Requirement For Ticket Pro™ Software

To interface your BMS system to a PC, an MCIU (Kraus Group Inc. MICON Communication Interface Unit) must be installed (part # 247AY00).

ATTENTION

Ticket Pro Software is designed to record transactions for up to <u>eight</u> pumpheads.

See section 1.8.1, pages 18 and 19, for MCIU installation instructions.

7.1.1 PC Requirements to Support Ticket Pro Software

Computer hardware requirements to support *Ticket Pro* are:

- Pentium 100 or better processor
- 16 MB RAM
- hard drive
- video card
- 1.44 floppy drive
- keyboard
- serial mouse
- 2 serial ports (or 1 serial port and a PS2 mouse)
- 1 parallel port
- tractor feed printer (Epson LX300 or compatible)
- 15” SVGA monitor

Please note: When using a slip printer, 3 serial ports are required, OR 2 serial ports and a PS2 mouse.

Recommended computer hardware options are:

- 28.8 bps (or greater) modem - for remote technical support
- UPS (uninterruptable power supply)

Computer software requirement to support *Ticket Pro* v2.23:

- *Microsoft Windows 95*™ operating system

Recommended software for remote technical support:

- Symantec pcANYWHERE™

7.2 Ticket Pro Software Installation

ATTENTION

1. Before installing software, connect tractor feed printer to computer. Most often this connection is made to the system unit printer port (female socket).

   ***Ticket Pro* will not initialize during setup unless printer is connected and turned ON.**

2. Ensure *Microsoft Windows 95*™ is already installed at computer or workstation. If *Microsoft Windows 95*™ is not installed, run the setup program for *Windows* before installing *Ticket Pro*.

3. Insert *Ticket Pro* (BMS/RETAIL software) Disk 1 into your PC floppy drive.

4. Click on "Start" button in *Windows*. Select "Run".

5. Type "**A:\Setup**".

6. Click "OK" button.

Follow prompts as required to complete software installation.

ATTENTION

Once installed, no file should be removed from the installed TicketPro directory, except TickPro.dat, if desired, which stores transaction log data resulting from use of dispensers.

7.2.1 Ticket Pro Software Configuration

As outlined in setup program notes:

Once installed**, *Ticket Pro's* *ini*** (initialization) file [TickPro.ini] can be edited to select proper communication ports for the printer and MCIU. Edits will be required if your configuration requirements differ from the setup default configurations.

ATTENTION

It is highly desirable to avoid making configuration edits directly within the *ini* file itself. The "Setup" menu item which appears in the *Ticket Pro* program opening screen is specifically designed to set configuration settings, without directly accessing the *ini* file. See *Setup menu*, pages 66 to 68.

ATTENTION

If, for any reason, it is necessary to directly edit TicketPro.ini file, ALWAYS CREATE A BACK-UP FILE FIRST (i.e., copy the original TicketPro.ini file into a separate folder).

Notepad application can then be used to effect edits to *TickPro.ini* file.

If default path was selected during software setup, the path for Ticket Pro file folder is:

C:\Program Files\Kraus Industries\Ticket Pro v2.23\…

Find and open *TickPro.ini* file:

1. Click "Start" in *Windows 95*.
2. Point to "Find".
3. Point to "Files or Folders". Click once.
4. Type **TickPro** in "Named" textbox.
5. Click "Find Now" button.
6. Click **TickPro.ini** twice. File will open automatically in *Notepad* application.

- Under [Printer] heading,

  set "Serial=0" for a serial printer
  set "Serial=1" for a parallel printer
  set "Port=" for printer port number
  valid numbers: 1 to 3

- Under [MCIU] heading,

  set "MCIU Port=" to assign the COM (serial) port for the MCIU (MICON Communication Interface Unit); valid numbers: 1 to 4

- Under [Ticket] heading,

  set "Automatic=1" for auto printing (i.e., all transactions printed automatically without user selecting the "print" command)

  set "Automatic=0" for single ticket printing (i.e., transactions not printed unless user selects "print" command for each individual transaction)

set "SlipAdjust=" to adjust the starting print line for a serial printer; valid numbers are 0 to 30

set "Padjust=" to adjust the starting print position for a parallel printer; valid numbers are 0 to 55

- Under [Language] heading,

  set French=0 for English language text
  set French=1 for French language text
  set French=2 for Spanish language text

7.3 TICKET PRO BASIC SOFTWARE FEATURES

The *Ticket Pro* configuration menu includes the following options:

- multiple language support (English, French and Spanish)
- multiple currency support (U.S. $, Canadian $, Mxn (Peso))
- volume options (litres or gallons)
- user defined ticket header and trailer messages
- ports setup option for MCIU hardware unit and printer
- user defined fuel type option for each hose assigned to a particular pump
- auto print option (ON / OFF)

2. *Ticket Pro* report menu features:

   - daily sales (total sales, total net volume, total gross volume); optional hard copy
   - "print log" : prints all detailed transactions
   - backup log: clears log window; stores transaction log in backup file for future reference

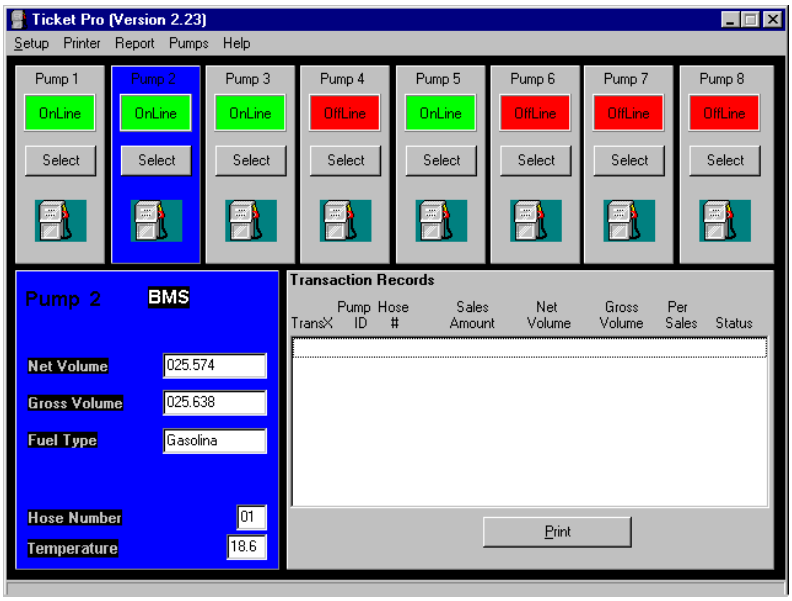
3. Pump menu includes "initialize" feature, enabling program/pump synchronization.

4. "Help" menu is provided with an indexed guide to aid the user.

7.3.1 OVERVIEW OF TICKET PRO SOFTWARE MENU COMMANDS

Open *Ticket Pro* by clicking on your new desktop icon: 

Ticket Pro window will appear.



NOTE

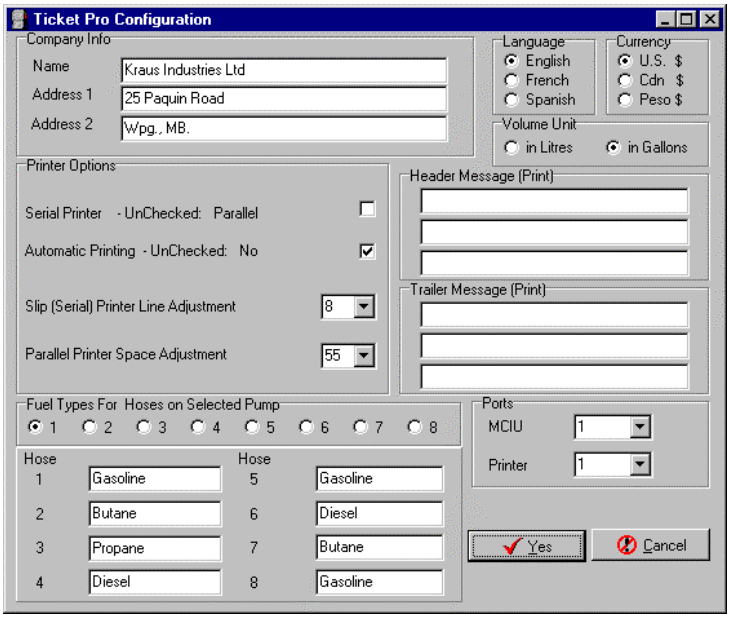
BMS non-retail applications record fuel transfer volume amounts, not prices or dollar sales amounts. Non-retail window differs slightly from retail application shown above.

The main program window reveals two on-screen transaction summaries:

- *Transaction Records* panel summary, which tracks all individual fuel dispensing transactions.
- *Pump* record panel summary. Click “Select” button under ‘Pump 1, Pump 2 ….Pump 8’ to view current information for a particular pump in the pump panel.

1. SETUP MENU

Locate menu bar at top of *Ticket Pro* window. Click "Setup" option. *Ticket Pro Configuration* window appears.



- **"Company Info"** text box is provided for inputting your company name and address. This information then automatically appears as a header in printed "Daily Sales" and "Print Log" reports created using the "Report" option (described on page 68).

- Click on **"Language", "Currency"** and **"Volume Unit**" radio buttons to select Canadian, U.S. or Spanish language, currency type and fuel measurement units.

- Printer options are displayed under **"Printer Options"**. Change options here, if desired. To select an option, click on the button or checkbox provided.

  If using serial printer, select adjacent checkbox; if using parallel printer, do not select checkbox.

To have all fuel transfer transactions printed automatically as they occur, select Automatic Printing checkbox. (This feature is available only in conjunction with a parallel printer.)

If automatic printing of transactions is not desired, do not select checkbox.

Slip [serial] Printer Line Adjustment ranges from 0 to 30. Parallel Printer Space Adjustment ranges from 0 to 55.

- **"Header Message [Print]"** and **"Trailer Message [Print]"** text box is provided for inputting a text message above and below the information on each fuel transaction ticket printed.

NOTE

Text boxes will accept up to 40 characters per field. However, for uniform ticket formatting, header and trailer text should not exceed 20 characters per field.

- **"Fuel Types For Hoses on Selected Pumps"** provides 8 radio buttons representing 8 different pumps.

To use this feature:

Locate **Fuel Types for Hoses on Selected Pump** selection box. Click any one of these 8 radio buttons to edit the fuel type (i.e., gasoline, propane, etc.) for each hose assigned to that particular pump. In the text boxes provided, type in the fuel types assigned to each hose. Up to 8 hoses per pump can be assigned fuel types.

IMPORTANT

IT IS NECESSARY TO EDIT FUEL TYPE FOR EACH HOSE AFTER INSTALLING THIS SOFTWARE. *FUEL TYPE* SECTION ON TRANSACTION TICKET IS DEPENDENT ON THIS FIELD.

- "MCIU" drop down arrow is provided for selecting the computer port connected to MCIU hardware. Default port is 1. Ports 2, 3, or 4 may also be selected.

- "Printer" drop down arrow is provided for selecting the computer port number for use by this software.

Click on "Yes" button to save changes to configuration menu OR click "Cancel" to cancel changes and return to main screen menu.

IMPORTANT

FOR SAVED CONFIGURATION EDITS TO TAKE EFFECT, IT IS NECESSARY TO:

1) **SAVE EDITS BY CLICKING "YES" BUTTON IN CONFIGURATION MENU.**

2) **CLOSE THE *TICKET PRO* PROGRAM BY CLICKING ON "X" IN UPPER RIGHT CORNER OF MAIN SCREEN.**

3) **REOPEN THE PROGRAM.**

2. **PRINTER MENU**

On the main menu click "Printer". Click "Initialize" on the submenu to send an initialization string to the printer; this sets printer formats.

3. **REPORT MENU**

On the main menu click "Report". Click "Daily Sales" on the submenu to produce an on-screen report showing daily sales. Click "OK" to update on-screen record or "Print" to produce hard copy of daily sales report.

CAUTION

DO NOT ACCESS OR PRINT "DAILY SALES" REPORT WHILE CUSTOMER IS PUMPING GAS FROM SYSTEM RETAIL OR BMS UNIT. TO DO SO COULD CAUSE INCORRECT SALES AMOUNTS TO DISPLAY.

"Daily Sales" report includes:

- report header and trailer (defined by user in "Company Info" text box under Setup menu)
- net volume
- gross volume
- net sales

The next item on the "Report" submenu is **"Print Log"** report. Click to print a transaction log. Click "OK" in confirmation dialog box. A transaction log prints, including:

- transaction number [TransX]
- pump number [P]
- hose number [H]
- sales****** (Retail sales only)
- net volume
- gross volume
- units per sale [Per Sales]
- fuel type
- date and time

(******Net volume multiplied by units per sale equals sales.)

The next item on the report submenu is **"Backup Log"** report. Click to backup all detailed transactions shown in log window. A maximum of one backup daily is permitted by the software.

Each daily backup file created is automatically named *Tickfile.CurrentDATE*.

The "CurrentDATE" extension represents yyyy/mm/dd (i.e., year, month, day). For example, if the file extension appears as 19990310, the date is read as March 10, 1999.

NOTE

Ticket Pro software is year 2000 compliant as per document **DISC PD2000-1 *A Definition of Year 2000***. Internet address of this document is:

http://www.bsi.org.uk/disc/year2000/2000.html

The year 2000 is entered as a four digit number. For example, if the file extension appears as 20000310, the date is read as March 10, 2000.

Use the *Find* or *Explore* feature in *Microsoft Windows 95*™ to locate files with the *TickFile* prefix. Such files are normally located in **C:\Program Files\Kraus Industries\Ticket Pro v2.23\…**

To view transaction backups created on a particular date:

1. Find the file with the appropriate date extension.

2. Change this file extension to *.dat* by right-clicking on filename and using the file "Rename" feature which appears in the "pop-up menu". Rename the file to *TickFile.dat*. If there are other existing files with this name, change extensions of these files to date (yyyy/mm/dd) created. (File lists in *Windows* provide a "date modified" heading informing the user of the date each back-up file was created.)

3. Now only one file is named *TickFile.dat*. Close the *Ticket Pro* software, and reopen it. The screen will show all transactions backed up on the date the file renamed "*TickFile.dat*" was created.

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