



EMR³ USER GUIDE - SUPPLEMENT TO INSTALLATION AND SET-UP AND OPERATION MANUALS

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1. Getting Started

Connections:

- A good Ground to the Truck chassis or earth ground to the Interconnect Box is a good idea.
- Pay close attention to the connections on the terminal strip on the back of the display head.

Caution: Do not power up the system until all connections have been verified. The IB is protected by a fuse for incorrect power into the box, however the Intrinsically Safe side of the IB that powers and communicates with the head does not have this type of “replaceable” protection due to Agency Approval constraints.

Temperature probe cable length:

Additional length can be added to the temperature probe cable. The cable splice must be protected and the additional cable should be protected from physical and liquid damage. Calibration of the temperature probe as outline in the set-up manual will account for the extra cable.

Start-up:

The Display Head self-tests itself, if a failure occurs, an error code number shows. If this occurs, see the Troubleshooting Guide in the Setup and Operations Manual.

The IB has lights inside box showing self-check and indicating activities. See the Troubleshooting Guide for details.

Software Conflicts:

When the system is powered up, following the self tests, the IB will look for the software in the Head. If the Head software is not the same as the IB, “Download Mgr” will be displayed on the head. Open the C&C switch/jumper, and the IB will download software into the head to “make them equal”. When the download is complete, reconnect the jumper/switch.

Initial start-up for Two Head operation

Connect one head and get it communicating with the IB. Power down, disconnect that head, connect the second head and get it communicating. Then power down and connect both heads. On start-up after the heads have self-tested, you will get an E50 – IB COMM FAILURE. The SYSTEM ADDRESS, HEAD ADDRESS for one of the heads will need to be assigned HEAD 2. Once this is done and the power cycled,



the error will clear. If not, then disconnect head 1, bring up head 2 and give it Head Address 2, power down and then connect both heads.

Possible Error at Start-up

For Single Head operation and/or after assigning two heads different addresses, if an E50 – IB COMM FAILURE occurs as shown on the display, the first thing to do is to cycle the power, turn the power off for 20 seconds and back on. If the error returns, turn the power off and make sure the connections of the wire between the IB and Display Head are good. Pay particular attention to the connections at the terminal strip in the Display Head. If this does not clear the error, see the Troubleshooting Guide.

2. Initial set-up

General

In Set-up Mode, all set-up information can be read including C&C protected information. The C&C protected information cannot be changed unless the C&C jumper or optional switch is open.

Navigating the menus

The Set-Up and Operation Manual describes the functions of the various display buttons. The key for navigating the menus is NEXT gets you into the next menu or selectable location under the particular item. The ENTER key accepts the selection or displayed information and is used to get back to other menus.

IMPORTANT NOTE: When operating under C&C mode, it is necessary to push the ENTER button and get back to the Main C&C Menu before closing the C&C jumper or switch. If this is not done, the entered information may not be saved.

If during set-up the screens do not stay on long enough to accomplish your activities, under TIME DELAYS you can set the screens to stay on a longer. This is done without having to open the C&C switch.

Go to the C&C Protected Set-up Section of the manual.

To make changes, the C&C jumper wire or optional switch needs to be open. If the C&C jumper or switch is open, the only mode available is SETUP. If in SETUP Mode with the C&C switch closed, the unit will go back to Volume Mode after 30 seconds unless the TIME DELAY for Volume is increased.

Working down through the C&C Main Menu.

LANGUAGE allows for changes in labels including the Volume, Printer, Currency, and Tank(Customer) ID(if enabled).

DISPLAY SYNTAX – Whole or Tenths of a unit? Other Decimals are available.



3. Product Set-up

TEMPERATURE will be available in the C&C menu if the Display Head was purchased with Temperature Compensation. The Temperature Probe will need to be calibrated using an ice bath as explained in the manual.

FUEL SOURCE

Here is where the METER ID can be entered.

The INPUT TYPE defaults to Quadrature which is the Veeder-Root Pulse Generator. If you know the shaft input direction it can be set up here. CW is the default. If the register output is negative when run, then change the direction here.

PRODUCT DESCRIPTION – PRODUCT SET-UP

For Temperature Compensation, the default table is Density. For using the Coefficient Table, select Coefficient under Temperature Compensation in the DELIVERY OPTIONS section in the C&C menu.

For Product 1, NEXT, then go to PRODUCT TYPE, then NEXT. Select the Product from the menu and push ENTER. This selects the Product and for Temperature Compensation the associated tables. The PRODUCT NAME is automatically assigned after selecting the PRODUCT TYPE. If you want to customize the PRODUCT NAME, that field is editable. The PRODUCT TYPE will not change with a name change.

The DENSITY or COEFFICIENT tables are displayed under that feature. Changes can be made, but the default tables for the pre-loaded Product Types are Weights and Measures approved.

User Defined Product: A product not available in the tables can be set-up under User Defined. For Temperature Compensation of the product, Density or Coefficient information will need to be loaded under that menu item.

Remember to Always “ENTER” back to the Main Menu to save changes in C&C mode after making your selections.



4. Meter Calibration

If using Temperature Compensation, calibrate the Temperature Probe first as noted previously.

The system calibration is running a known Non-Compensated volume through the meter and having the register electronics calculate the Calibration Factor. The calibration factor is “Encoder Counts per Unit Volume”. During the Auto or Multi calibrate procedures, the register remembers the number of counts during flow (meter turning). Once the Non-Temperature Compensated volume, Gross Volume, of the Prover vessel is entered, the register calculates the Calibration factor.

The actual “Proof” of Gross and Compensated Volumes is NOT done under the Meter Calibration. Once the meter is calibrated, close the C&C switch, and return to Volume Mode where the Proof run is made. Here the register applies the Density or Coefficients to obtain the Compensated Volume. If the displayed volume is Compensated, the thermometer icon to the right of the delivered volume is displayed. The Gross volume is displayed by pushing an arrow button. These Compensated and Gross Volumes are compared to the Prover Volume and W&M tables to verify the meter calibration.

AUTO CALIBRATE is the easiest option. If the system will normally be run at only one flow rate, then Auto Calibrate at that flow rate will be fine. Follow the procedure noted in the Auto Calibrate section of the Setup and Operation Manual.

IMPORTANT: Once the GROSS prover volume is entered and the ENTER button is pushed and the Register calculates the calibration factor (the Descriptor Field changes and a new calibration factor shows), RECORD THIS FACTOR for future reference. Then push ENTER UNTIL YOU RETURN TO “METER CALIBRATION”. Returning to METER CALIBRATION saves the Calibration Factor.

MULTI CALIBRATE is used for systems that will be run at more than one flow rate. For large meters that will be run at low flow rates, more than one calibration in the low flow rate range is recommended. It is not necessary to return to Meter Calibration between rates, however once done, push ENTER to get back to Meter Calibration.

MANUAL CALIBRATION is an option available as outlined in the Manual.

If for some reason the display head is replaced, or Restart is selected and the stored information in the display head is lost, the Calibration Factor, if recorded, is entered under Manual Calibration.

Note: For Large Volume prover applications, a prover vessel metal expansion factor may need to be applied per the local Weights and Measures regulations.

Recommend “tenths” resolution on Calibration even if whole units on Register for Delivery

To get the best “accuracy” on the calibration, Both register resolution and preset resolution (for k-factor) should be temporarily set to “Tenths”. For calibration, the seal must be broken anyway, so the resolution can be changed for the calibration and proof, then set back to whole units if that is the delivered resolution.

With C&C switch open, go to DISPLAY SYNTAX. Go to PRESET RES, PRESET VOLUME and move decimal using NEXT, the ENTER back to PRESET RES to save. Do the same with REGISTER RES, REGISTER VOL.

Remember To Go Back To Whole Units When Complete With Calibration And Proofs.



5. Ticket Output –Report Formats

Under Set-up with the C&C switch/jumper open:

REPORT FORMATS

You should decide what you want on your ticket, and in what order, in preparation for setting up the ticket output.

Once at REPORT FORMATS, press NEXT to Delivery, select Compose Report, then Next to the Actual Ticket.

In the center of the display is the Ticket Label Item and to the right LINE x in the Preset field. This is line x on the ticket.

ADVANCE is always LINE 1 on the ticket.

Arrow down gets to Ticket Line 2, etc.

Note that you do not erase the existing lines, only place the Label that you want on the line. To place what you want on each line, go to that line as noted by the LINE x. Unless the Label is what you want ignore the existing name. Push NEXT, and arrow down or up to find the NAME/LABEL of what you want on that line. Ignore the large Number in the Register Volume field and focus on the Name. Once you have found the Name or Label push ENTER to place that in the LINE x where you were on the Ticket. Repeat for all the lines you want printed on the ticket.

Once you have all the lines on the ticket you want, then go to the next line, push NEXT, and then place “END OF REPORT” in that line. Anything between line 1 Advance and End of Report is printed on the ticket.

Hit ENTER all the way back to the REPORTS FORMAT line to save your new ticket format.

You can then go in and

For the actual location of the printing up-and-down the ticket, the Ticket Advance under the non-C&C, Set-up item PRINTER OPTION. This is where you enable the printer, usually select Slip Printer, Select Advance, and then enter the amount the ticket moves before it begins to print.

Note:

- You can edit the actual printer labels under the LANGUAGE category before setting up the ticket.
- For multiple tickets of the same type, we have available a small program that can download the ticket format via RS-232.



6. Security Codes

The security code system can be used to prevent access to changes in the set-up, or allow only certain features to be changeable, for example allowing price changes if the Currency Feature has been purchased. Up to 3 users with different security codes can be set-up.

The use of security codes is enabled under C&C, SECURITY CODE. The actual user security codes are entered under Setup SECURITY after the Security Code feature is enabled.

User 1 is always the “Supervisor”. The Supervisor has a passcode, can change all three passcodes, and has default “yes” access to all Set-Up changes, but controls access to set-up changes of Users 2 and 3. (C&C is still controlled by “Sealing” of the Head). All the User Accesses to Setup changes are “yes” unless changed.

Logging in:

When Security Codes are enabled, the user is prompted when going to Set-Up for their Security Code.

At the ENTER SECURITY CODE PROMPT, Select the USER. Next gets to LOGGED OUT. Once the Security Code is entered and ENTER is pushed, LOGGED IN, appears. If LOGGED IN appears for any user, then that user is Logged in. The specific USER is logged in until LOGGED OUT is selected under that user and ENTER pushed. At that time LOGGED OUT will be the only situation that appears under that user.

Notes:

- Upon Powering down, the Security Code Status for all users is returned to LOGGED OUT.
- User 1, Supervisor, must log out or the capability of Changes will remain active if power is not cycled.
- Only one user can be logged in at a time. If another User logs in, other users are automatically logged out.

Important Note: Security Codes do not prevent Dispensing, they only control Setup options.

7. Tank ID

The individual transaction can be tagged with a Customer or Tank identification number. This number is entered by the operator through the standard display or optional keypad. This feature is enabled under C&C in DELIVERY OPTIONS. If Enabled, an ID must be entered.

8. Label changing

Note that the EMR³ Display and Printer labels can be changed by the user to any language which uses the Latin Alphabet. The Labels/Names for Volume, Currency, Printer, and Tank ID can be edited under LANGUAGE. French is available as a overall Label language substitute.



9. Price and Tax Setting

If a lot of price setting will occur, the Optional Keypad is recommended. This option can be added at anytime.

For register Display Heads purchased with Currency, there are significant options available for Pricing transactions including the ability to pre-load up to 15 price codes. Each of these price codes can contain Price, taxes by percent of the currency or by volume, a surcharge, and/or Discounts in percent or by volume.

The Total Price can be used as a preset. For Example, if the customer wants \$100 of fuel oil, the Price/gallon is entered or the price code for that customer is selected in the Currency Mode. Then the Preset button is pushed and the "100" is entered in the preset field.

Note also that the currency multiplier can be used as a product density to obtain the weight of the fluid delivered.

For example: 9150 gallons of aviation gas @ a "price" of 5.88 lbs/gallon = 53,802 lbs of fuel.

Price and Tax Setting examples

Loaded at the time of the transaction by the operator

The price can be loaded by the operator at the time of the transaction directly using the display or the optional keypad. The operator simply changes the mode to Currency where the price is displayed, pushes the NEXT key to be able to change the price, and uses the NEXT key and either the arrow keys or the optional keypad to enter the transaction price.

Pre-loaded Price Codes

Go to the PRICING and TAX/DISCOUNT Section of the Setup and Operation Manual

Up to 15 Price Codes can be pre-loaded using the display or optional keypad. Each price will have a base price, and can have any of 15 Tax/Discount codes. Each of the 15 Tax/Discount codes can have up to 6 lines of taxes and discounts applied to either the price, volume, or as a transaction surcharge or discount. The taxes/discounts percents can be assigned to specific lines. A line is the line of the transaction beginning with Price.



Examples:

Example 1

- Base price is \$1.10 per gallon
- The tax is 6% on the price per gallon
- There is a discount of 5% on the Sale for Cash.

Line Assignments:

Line 0 is Subtotal, Volume x base price

Line 1 is the Tax/unit

Under PRICING, select PRICE CODE 1. Change the PRICE to 1.10. and Assign TAX/DIS 1 to this PRICE CODE 1.

Under TAX/DISCOUNT, select T/D CODE 1, T/D LINE 1 and CHNG T/D VALUE to TAX PERCENT 6.0000 and ENTER. CHNG T/D ASSIGN to 0.

Go to T/D LINE 2 and CHNG T/D VALUE to DIS PERCENT 5.0000 and ENTER. CHNG T/D ASSIGN TO both LINES 0,1. And ENTER back to main menu. You assign the 5% Cash Discount to the transaction by assigning the discount to both the base price and tax.

Printer Output Example 1:

Net Volume Finish	100.0
PRICE/GALLON	\$ 1.1000
SUBTOTAL	\$ 110.0000
% TAX T/D 1	% 6.0000
TAX/UNIT	\$ 0.0660
AMOUNT	\$ 6.6000
% DISCOUNT T/D 2	% 5.0000
DISCOUNT/UNIT	\$ -0.0583
AMOUNT SUB+T/D 1	\$ -5.8300
FINAL PRICE/GALLON	\$ 1.1077
TOTAL NON-TAX LINES	\$ -5.50
TAX THIS DELIVERY	\$ 6.27
GRAND TOTAL	\$ 110.77
(Same as $\{(1.10 \times 1.06) \times 0.95\} \times 100$)	

When PRICE CODE 1 is selected under CURRENCY, the FINAL PRICE displayed in the PRESET display location is 1.1077.



Example 2:

- Base price is \$1.05 per gallon
- The tax is 6% on the price per gallon
- There is a discount of 5% on the Sale for Cash.

In this example, the base price changes, but the tax and discounts do not. A new PRICE CODE is set up with a NEW price, PRICE CODE 2, but T/D CODE 1, which is already set up, is assigned.

Net Volume Finish	100.0
PRICE/GALLON	\$ 1.0500
SUBTOTAL	\$ 105.0000
% TAX T/D 1	% 6.0000
TAX/UNIT	\$ 0.0630
AMOUNT	\$ 6.3000
% DISCOUNT T/D 2	% 5.0000
DISCOUNT/UNIT	\$ -0.0557
AMOUNT SUB+T/D 1	\$ -5.5700
FINAL PRICE/GALLON	\$ 1.0573
TOTAL NON-TAX LINES	\$ -5.25
TAX THIS DELIVERY	\$ 5.98
GRAND TOTAL	\$ 105.73
(Same as $\{(1.05 \times 1.06) \times 0.95\} \times 100$)	

Under PRICING, select PRICE CODE 2. Change the PRICE to 1.05. and Assign TAX/DIS 1 to this PRICE CODE 2.



Example 3:

- Base price is \$1.10 per gallon
- The tax is 6% on the price per gallon
- Delivery Surcharge of \$15.00 for “Emergency Response”.

Net Volume Finish	100.0
PRICE/GALLON	\$ 1.1000
SUBTOTAL	\$ 110.0000
% TAX T/D 1	% 6.0000
TAX/UNIT	\$ 0.0660
AMOUNT	\$ 6.600
SURCHARGE T/D 2	\$ 15.0000
AMOUNT	\$ 15.0000
FINAL PRICE/GALLON	\$ 1.1660
TOTAL NON-TAX LINES	\$ 15.00
TAX THIS DELIVERY	\$ 6.60
GRAND TOTAL	\$ 131.60
(Same as $\{(1.10 \times 1.06) \times 100\} + 15.00$)	

Line Assignments:

Line 0 is Subtotal, Volume x base price
Line 1 is the Tax/unit

Under PRICING, select PRICE CODE 3. Change the PRICE to 1.10. and Assign TAX/DIS CODE 2 to this PRICE CODE 3. TAX/DIS CODE 2 has not been set up yet.

Under TAX/DISCOUNT, select T/D CODE 2, T/D LINE 1 and CHNG T/D VALUE to TAX PERCENT 6.0000 and ENTER. CHNG T/D ASSIGN to 0.

Go to T/D LINE 2 and CHNG T/D VALUE to SURCHARGE, NEXT, and enter 15.0000 as the surcharge. Because this is a Delivery Surcharge, it is not assigned to a specific line.

Note that a Delivery DISCOUNT SURCHARGE works the same way, but the Register assigns the DISCOUNT a minus value.

Protecting Pre-loaded Price Codes

Avoid operator changes to the pre-programmed price codes by using the SECURITY feature. The operator will still have the capability to select price codes, but not make changes.

10. Networking/Connecting IBs Together

Multiple IB's with their heads can be networked together and talk to one printer or get commands from one external device. Th IB's are connected via the RS-485 terminals A and B labeled “IB Network” in each IB. Each IB is given a unique address as noted under SYSTEM ADDRESS in the Setup and Operation instructions. The Printer Address, i.e. which IB and port the printer is connected and assigned is defined in the Printer Address section of SYSTEM ADDRESS. This is where on the Network each head needs to be directed via the “Printer Address” for printing. **Before Connecting the IB's together, each individual system needs to be set-up independently and working properly. For two head operation, follow the set-up for two heads information in the “Getting Started” Section. Power down the systems before making connections or changes.**



11. EMR³ PULSE OUTPUT – CONNECTIONS AND SET-UP

Pulse Output can be done from one or two heads.

Interconnect Box Connections

Table 6. Power Side Wiring for IB Box

Input	Terminal Label
Input Power	Ground
	V+
Pulse Input	Pulse In (-)
	Pulse In (+)
	Input Voltage
	5 V Out
Switch Inputs	12 V Out
	24 V Out
	Ground
	Stop DH1
	Ground
	Start DH1
	Ground
	Stop DH2
Analog Signal	Ground
	AS (-)
	AS (+)
	Ground
Pulse Output	POUT -1
	Ground
IB Network	RS-485 B
	RS-485 A
	Ground
Port 2 Slip Printer Roll Printer OBC AUX	RX
	TX
	Ground
	CTS
	POUT-2/RTS
Port 1 Slip Printer Roll Printer OBC AUX	Ground
	Power
	PRN-RX
	PRN-TX
DH 1 Relays	Relay 2
	COM
	N.O.
	Relay 1
DH 2 Relays	Relay 2
	COM
	N.O.
	Relay 1
	COM
	N.O.

User Selectable Jumper for Power for Pulse Output or Pulse Input Voltage of 5, 12, or 24 Vdc

Pulse Output from Head 1
5, 12, or 24 Vdc

Head 1:
Wire Size:
16-24 AWG (1.32 - 0.22 mm²)
Distance maximum:
5V Out – 250ft. (76.2 m)
12V Out – 500 ft. (152.4 m)
24V Out – 1,000 ft (304.8m)

Pulse Output from Head 2
12V Only

Head 2 :
Wire size:
22-28 AWG (.32-.081 mm²)
Distance maximum:
50ft (15.24m)

Set-Up: C&C Mode - Configure I/O - page 41 of Rev's E and F of Manual

Enable Pulse Output and set Pulses per unit volume for each Head.