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Eldridge Products, Inc.

EPITerm (Terminal)

For use with EPI Flow Meters

Interface User Manual

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Introduction

Applicable Models:

The EPI meter command list within this manual is only applicable to flow meters with firmware revisions vAA through vAE.

Please contact service@epiflow.com for manuals detailing the EPI meter command list for previous firmware revisions

EPITerm (Terminal):

A proprietary terminal emulation program which presents EPI flow meters for real-time monitoring and control. EPITerm utilizes the RS232 communication protocol to connect an EPI flow meter to a PC running a Windows® operating system.

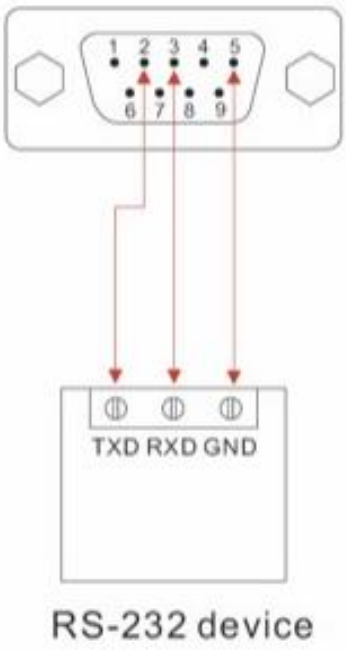
Installing EPITerm

The EPITerm v2.2 .zip file contains the basic files required for the proper operation of the software. To install EPITerm, first create a folder into which the .zip file will be extracted. The name of this folder is not critical to the installation process. Extract all the files to the folder. No other installation steps are required.

EPITerm Software

Please follow link for EPITerm Software

RS232 / USB Adapter 9-pin Serial Connector Setup



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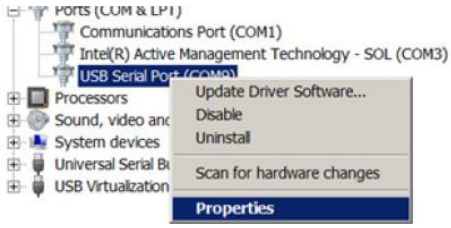
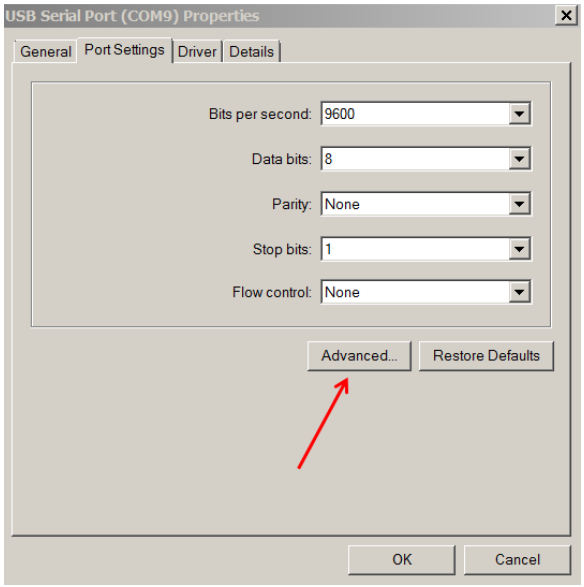
Connection

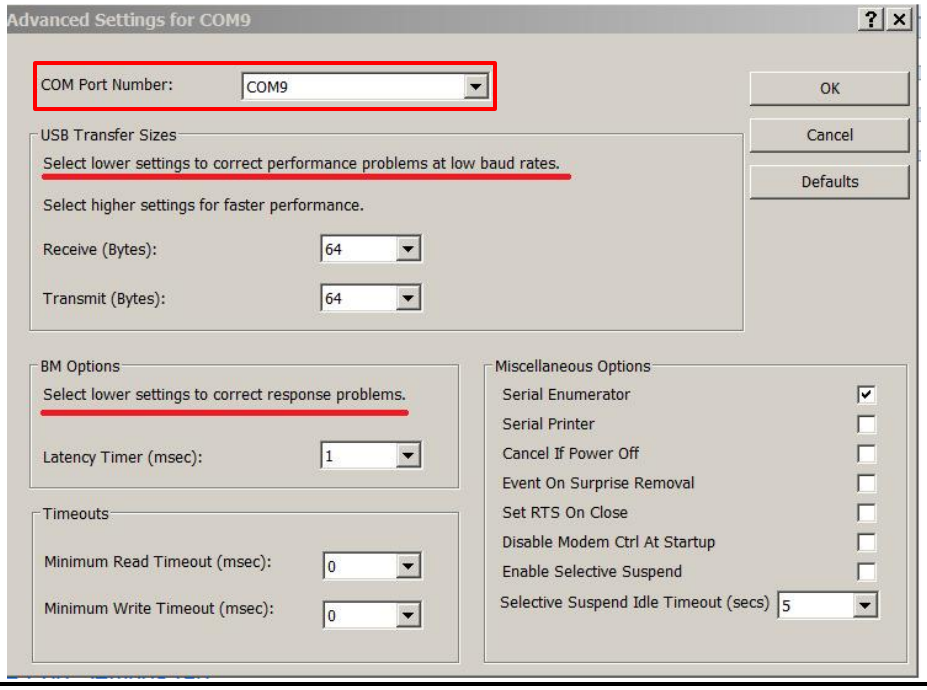
PC COM Port Setup

EPI recommends using a COM Port ≤ 9, and safe settings on the PC USB port configuration to prevent potential port communication issues. (See images below)

To determine or configure the COM Port your RS232 / USB Adapter utilizes: access the device manager, and select the advanced port settings, and configure. (see images below)







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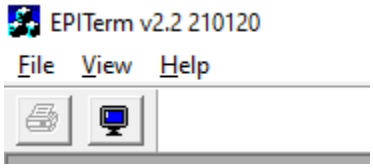
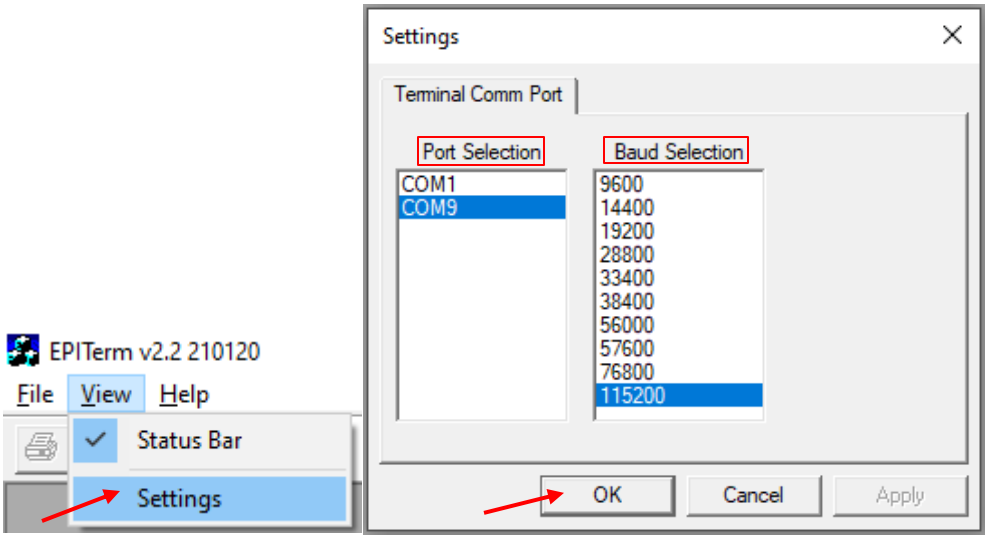
Starting EPITerm

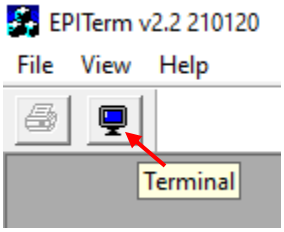
1. Open the EPITerm Folder.
2. Double-click on EPITerm executable application file or its icon.
3. EPITerm will open to a blank screen with a menu bar.



4. Confirm your settings are identical or configure them to match the PC settings for the RS232 port or the USB serial port for your RS232 to USB adapter.
   Note: 115200 is the factory set Baud rate, unless specified at time of order.



5. Click the Terminal icon



6. The Real-Time Terminal Display will appear (example below)
   Note: If a connection is not established, please check your RS232 connection and COM port settings.

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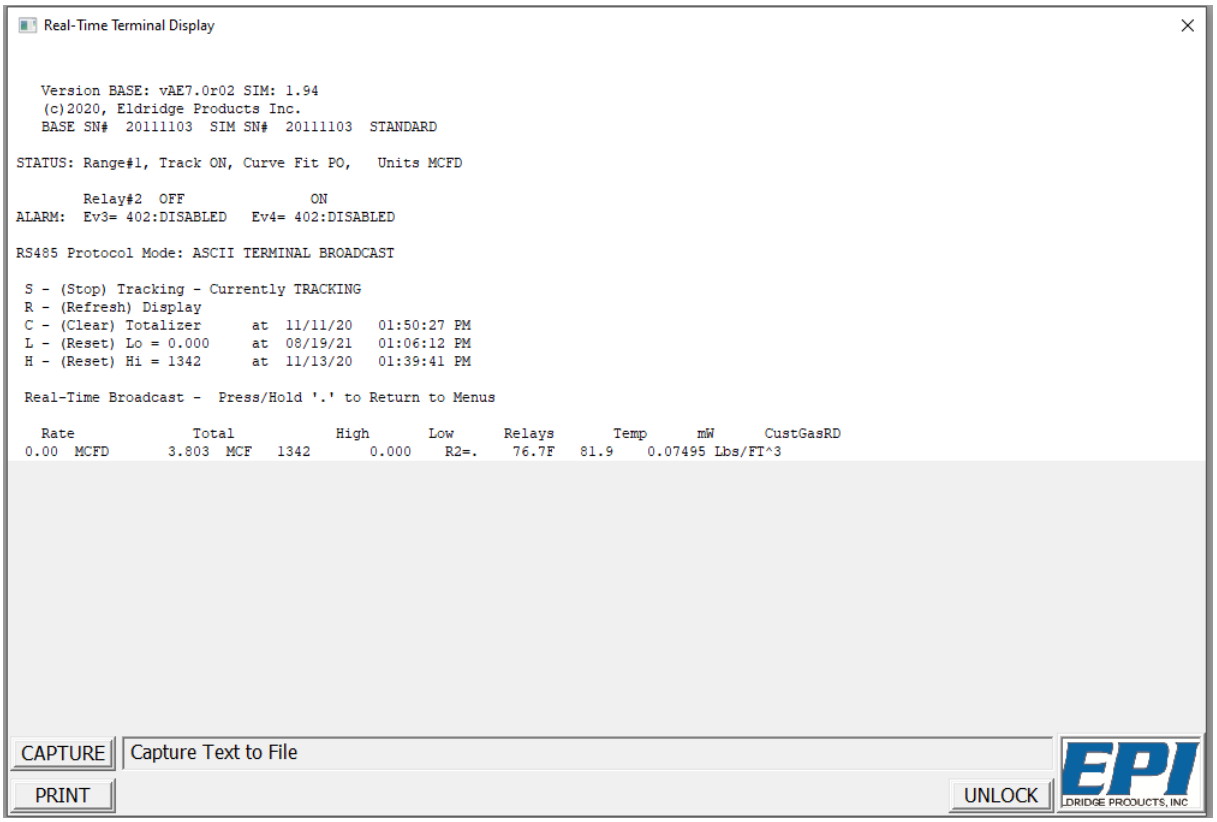

7. The Terminal Display opens in Run Mode (500 *Run* Menu)

The Real-Time Data line is updated as the values change without any need to refresh the screen:

• Rate: The current flow rate in configured engineering units

• Total: The accumulated flow total since the last Total reset

• High: The highest flow rate since the last High reset

• Low: The lowest flow rate since the last Low reset

• R1: The status of Relay #1 (. = de-energized, * = energized)

Note: (Relay 1 not included in Valumass flow meters with Frequency output)

• R2: The status of Relay #2 (. = de-energized, * = energized)

• Temp: The process gas temperature.

• mW: Milliwatt representation linear to current flow rate.

• GasRD: Gas reference density.

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Meter Commands

Real-Time Readout Commands are accessible without unlocking the flow meter, all other meter commands require the flow meter to be unlocked via command 219 – Unlock

Command 219 – Unlock

1. With the Real-Time Terminal Display active:
    a. type ". . ." (three periods) then press enter
    b. type "9001" then press enter to unlock the flow meter.

```
Enter Selection > 9001
```

    c. ">>" will be displayed showing the flow meter is unlocked and ready for configuration.

```
Enter Selection >> _
```

Real-Time Readout Commands

Note: Ensure UPPER case is used for the commands below

These commands are available when the meter is in basic Run Mode:

- **R** Press "**R**" three times to refresh the information displayed in the 500 *Run* screen
- **C** Press "**C**" three times to clear the accumulated total flow value and record the time stamp for the most recent reset of this value, and then press "**R**" three times to refresh the displayed information; Pushing "CCC" will also create a new line to show the old values and the new values after the clear was executed.
- **L** Press "**L**" three times to clear the low flow value and the time stamp for the most recent reset of this value, and then press "**R**" three times to refresh the displayed information.
- **H** Press "**H**" three times to clear the high flow value and the time stamp for the most recent reset of this value, and then press "**R**" three times to refresh the displayed information.
- **9** Press "**9**" three times will cause the flow meter to restart.

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The **"CAPTURE"** button will start a capture of the real-time data in txt. format and allow you to select the location to save and filename to save to. The button will change to **"STOP"**, meaning it is capturing. Push the button to stop capture and open the captured file.

The **"PRINT"** button will print the real-time data that has been registered since opening the terminal display. If the display has been open for an extended period, there will be many lines, but will still print if you use the print button. If you do not want many lines of displayed data, you can close the window and re-open it, then print and it should only show a few lines of display data. Note that printing to a file is not supported.

Overview of Menu's

The **500 *Run* Menu** displays the real-time flow rate, total flow, high flow, low flow, relay(s) status, temperature, milliwatt, and gas relative density. This is the basic operating mode for flow measurement.

The **100 *Meter* Menu** provides easy access to change the engineering units for the flow rate and total.

The **200 *Utility* Menu** is used to unlock the flow meter and supports such functions as changing the signal filtering (to smooth out pulsation or unwanted flow noise), monitoring the digital and analog voltage signals, EPIVal Log, and selecting the meter calibration range.

The **400 *Alarm* Menu** is utilized to set the flow alarm relays to respond to a wide variety of process conditions and situations. (View meter documentation to determine if your meter has one or two alarm relays. Typically, the ValuMass™ product has one while the Master-Touch™ has two)

The **450 *E-Logger* Menu** supports real-time data logging

The **750 *PW-Curve Fit* Menu** is used to apply specific adjustments to the factory calibration in increments of 5% of the Full Scale.

The **800 *P-Curve* Menu** is reserved for factory calibration configuration and variables, although some menu items, such as the Full Scale, C-Factor, SetXSect, and Auto Zero, may be used for field adjustments.

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*100 *Meter* Menu*

The 100 *Meter* Menu of the EPI Flow meter includes a series of submenu items which allow you to easily change the engineering units for the flow rate and elapsed total.

Menu items 101 through 139 are used to change the operational engineering units. With the meter settings unlocked, select the desired engineering units by entering the menu item number, i.e., “102” (SCFM), at the prompt, then press Enter. The flow meter will restart using new operational engineering units. The Full Scale will be recalculated as part of this process

The conversion of engineering units is “1:1” — the flow meter does not adjust for differences in Reference Conditions between imperial and metric units, nor does it adjust for volume to weight conversions for gases other than Air or Nitrogen. Changing units between imperial and metric will require command 231 to be changes as appropriate. Consult the factory for help with the additional adjustments required for these situations.

```
100 *Meter*
101-SCFS        102-SCFM        103-SCFH        104-SCFD        105-LB/S
106-LB/M        107-LB/H        108-LB/D        109-STPM        110-SCIM
111-SCIH        112-SFPS        113-SFPM        114-BTUM        115-BTUH
116-MCFD        117-MMCFD       118-NCMS        119-NCMM        120-NCMH
121-NCMD        122-SLPS        123-SLPM        124-SLPH        125-SCCM
126-KG/S        127-KG/M        128-KG/H        129-KG/D        130-MTPM
131-NMPS        132-NMPM        133-NMPH        134-Nm/s        135-Nm/m
136-Nm/h        137-SCMH        138-NLPM        139-NLPH
```

101-SCFS	Standard Cubic Feet / Second
102-SCFM	Standard Cubic Feet / Minute
103-SCFH	Standard Cubic Feet / Hour
104-SCFD	Standard Cubic Feet / Day
105-LB/S	Pounds / Second
106-LB/M	Pounds / Minute
107-LB/H	Pounds / Hour
108-LB/D	Pounds / Day
109-STPM	Short Tons / Minute
110-SCIM	Standard Cubic Inches / Minute
111-SCIH	Standard Cubic Inches / Hour
112-SFPS	Standard Feet / Second
113-SFPM	Standard Feet / Minute
114-BTUH	British Thermal Units / Minute

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115-BTUH	British Thermal Units / Hour
116-MCFD	Thousands of Cubic Feet / Day
117-MMCFD	Millions of Cubic Feet / Day
118-NCMS	Normal Cubic Meters / Second
119-NCMM	Normal Cubic Meters / Minute
120-NCMH	Normal Cubic Meters / Hour
121-NCMD	Normal Cubic Meters / Day
122-SLPS	Standard Liters / Second
123-SLPM	Standard Liters / Minute
124-SLPH	Standard Liters / Hour
125-SCCM	Standard Cubic Centimeters / Minute
126-KG/S	Kilograms / Second
127-KG/M	Kilograms / Minute
128-KG/H	Kilograms / Hour
129-KG/D	Kilograms / Day
130-MTPM	Metric Tons / Minute
131-NMPS	Normal Meters / Second
132-NMPM	Normal Meters / Minute
133-NMPH	Normal Meters / Hour
134-Nm/s	Normal Meters / Second
135-Nm/m	Normal Meters / Minute
136-Nm/h	Normal Meters / Hour
137-SCMH	Standard Cubic Meters / Hour
138-NLPM	Normal Liters / Minute
139-NLPH	Normal Liters / Hour

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*200 *Utility* Menu*

The 200 *Utility* Menu of the EPI Flow meter includes a series of submenu items which allow you to easily change a wide variety of microprocessor parameters, such as the display update rate, the internal date and time, the analog-to-digital (ADC) and digital-to-analog (DAC) signal conversion filters, etc. Although most of these settings are accessible after unlocking the meter, some of the commands require a factory diagnostic password to prevent accidental change of critical settings.

After making your desired changes, type "500" and press enter to save the changes, the meter will restart and enter back into run mode.

```
200 *Utility*
201-Set DAC Out     202-DAC Refresh      203-DAC Filter       204-DAC Readout
205-mW Filter       206-BV Readout       207-LCD Refresh      208-LCD Contrast
209-mW Readout      210-MB BN Address    211-Reset L,H,C,A    212-Track Hold
213-Set Range       214-Set Date         215-Set Time         216-Gas Temp Offset
217-PW Enable       218-Reset Lock#      219-UnLock Meter     220-Set MB Endian
221-SetCalDate      222-Hold Duration    223-Set WD Timer     224-Protocol Mode
225-SetRS232Baud    226-SetRS485Baud     227-Flow 0-5,10      228-Temp 0-5,10
229-LCD Options     230-Temp Zero        231-Temp Span        232-Terminal Options
233-RS485Parity     234-LCD Toggle Rate  235-Reserved         236-Reserved
237-SetPSWDMode     238-Reserved         239-Reserved         240-BiDir Mode
241-Reserved        242-Reserved         243-Reserved         244-EpiVal Sensor
245-EpiVal Log      246-Config 4-20mA    247-Accuracy Mode    248-Reserved
249-Reserved        250-Multi Point      251-CustRefCondition 252-Frequency Polarity
253-Frequency PW    254-NAMUR Enable     255-Clear Totalizer  256-Bacnet Setup
```

201-Set DAC Out	This menu item is used to manually set the Digital-to-Analog Converter (DAC) output voltage to specific value, i.e., 0 = 0VDC and 4mA outputs, 2.5 = 2.5VDC and 12mA outputs, etc. When in use, the system tracking is placed on hold, the totalizer stops accumulating, and the DC output pin will reflect the DAC voltage. This function may be used to aid in troubleshooting a complex system, or to verify that external devices, such as values or recorders, are properly responding to the flow meters output signals.
202-DAC Refresh	This menu item is used to adjust the Digital-to-Analog converter (DAC) response time interval. The value entered here is multiplied by 50ms to establish the rate at which the DAC generates new output voltages to the DC output pin, system totalizer, and current flow rate conversions. For example, a value of 20 adjusts the DAC to generate new voltages at one second intervals (20 x 50ms = 1 second). Acceptable values are 1 – 63.
203-DAC Filter	This menu item provides a smoothed DAC response to compensate for erratic input signals caused by flow fluctuations. Higher values result in greater dampening or smoothing; lower values result in a rapid response to changing signals from the internal curve linearizer. Acceptable values are 1 – 127. To view output results of changing this filter, menu 204 is used.

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204-DAC Readout	This menu item functions like an onboard voltmeter by generating a real-time readout of both the DAC filtered output voltage (Direct) and its **input signal** before filtering (Filtered) which corresponds to the linear 0-5 VDC output of the flowmeter. This menu item is used to verify a complex system's operation or in troubleshooting. To exit this mode from the PC terminal, press period Enter. This menu shows the filtered output value based on menu 203 setting.
205-mW Filter	This menu item provides a smoothed Analog-to-Digital Converter (ADC) response to compensate for erratic input sensor signals caused by flow fluctuations. Higher values result in greater dampening or smoothing; lower values result in a rapid response to changing signals. Acceptable values are 1 – 255. To view output results of changing this filter, menu 209 is used.
206-BV Readout	Displays output bridge voltage
207-LCD Refresh	***This menu option will set the time frame between refreshing the LCD screen to reflect the new displayed values. Increments in 500ms units. Valid values are 1 through 10.***
208-LCD Contrast	This menu item sets the LCD panel contrast value. Minimum value = 80 for Darkest display. Maximum 128 value for lightest display.

209-mW Readout	`Flow Sensor mWatts`
	`Direct  Filtered`
	`218.4mW  217.5mW  (Press Enter to exit)`
	This menu shows the filtered output value based on menu 205 setting.

210-MB BN Address	This menu item sets the Modbus or BACnet Slave Address for this flow meter. A value of 1-127 is the flow meter's address. See Modbus or BACnet manual for more details. See Menu 233 for RS485 Parity and Menu 226 for RS485 Baud rate and Menu 256 for BACnet. See menu 224 for protocol setting.

211- Reset L, H,C,A	Reset readings. Low flow, high flow, total, All.
	`Reset L,H,C,A`
	`1 - Reset Low Flow Reading`
	`2 - Reset High Flow Reading`
	`3 - Reset Total`
	`4 - Reset All the Above`
	The numeric values above are required when utilizing the button keypad.
	An alternate way to reset total if the Total Mode is = 0 and not in EXT Range mode, is to Press and Hold SHIFT and then press MAX+MIN while Holding SHIFT such that all three LCD buttons are pressed at the same time.

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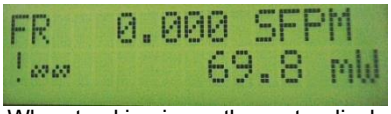
212-Track Hold	*Tracking means that flow, total, 0-5V, and 4-20mA are held at the value they are at when requested to Track Hold.* Enable / Disable. Upon enabling tracking hold, the flow rate is held. This may be desired if a purge cycle is to be run and you do not want the purge to affect the totalizer or affect the flow rate going to the PLC. Temporary track hold can be done by typing “SSSRRR” and is not stored and defaults back to tracking upon reset (typing …, <password>, 500). (see section under 500 Run Menu for explanation) See menu 222 for tracking duration.  When tracking is on, the meter display should show “!” in the range position on the LCD display.
213-Set Range	This menu item is used to select the active meter range. All EPI flow meters can store configuration and parameter data for five separate meter ranges. A specific meter range is selected by entering 1–5 in this menu item. If a flow meter has only one calibrated meter range, the factory will program it as meter range #1 and meter ranges #2–5 will not be valid. The flow meter can also be set up to allow external switching between stored ranges by entering “0” at the prompt. However, this disables the keypad functions.: Careful, putting the meter in this state will allow anyone to push the MIN / MAX buttons which will temporarily change the meter range if they are pushed during run mode. Upon setting this menu to a specific range, the meter will be restarted. Note: Terminal mode will show “EXTERNAL RANGE MODE” on the screen to reflect when option ‘0’ is selected. Only 4 ranges are allowed with external control. See below. *External terminal Mode 1 and Mode 2 will be used for external control of ranges. It is a bit format where:* *Mode 1 open, Mode 2 open = range 1 (binary 00)* *Mode 1 open, Mode 2 grounded = range 2 (binary 01)* *Mode 1 grounded, Mode 2 open = range 3 (binary 10)* *Mode 1 grounded, Mode 2 grounded = range 4 (binary 11)* LCD display will show the range number on the left side of the bottom line in front of the relay energized indicators. See LCD section of this document.

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214-Set Date	⚠ The meter Date can be changed 6 times. Attempting to change it 7 times will not work. This was done to help prevent hackers to attempt Epi-Val fraudulent field validations. If your meter no longer allows date changes, contact the factory. This menu item sets the time stamp functions to the current date for accurate reporting. The menu supports both **MM**/DD/YY and DD.**MM**.YY time formats where: • MM = month (01–12) • DD = day (01–31) • YY = year (00–99) Include a slash (/) as the delimiter between values for MM/DD/YY format, or a period (.) as the delimiter between values for DD.MM.YY format. The date will not be set if these formats are not followed exactly.

215-Set Time	This menu item sets the time stamp functions to the current time for accurate reporting. The time prompt indicates HH:MM:SS where:
	• HH = hour (00–23)
	• MM = minutes (00–59)
	• SS = seconds (00–59)
	By default, 24-hour format will be used. To switch to AM/PM, enter “p” or “a”
	`Enter Selection >> 215`
	`Enter HH:MM:SS = 09:00:02 => 11:00:00a`
	`Enter Selection >> 215`
	`Enter HH:MM:SS = 11:00:24 AM =>`
	after the date. Example:
	Include a colon (:) as the delimiter between values. The time will not be set if this format is not followed exactly.

216-Gas Temp Offset	This menu allows the user to change the display temperature of gas to a more positive or more negative number. This is to adjust the display only and will not affect flow calibration in any way.
217-PW Enable	Enable / Disable pointwise correction 0 = Disable, 1 = Enable See 750 menus for pointwise correction details.
218-Reset Lock#	This menu allows the four-digit numeric password to be changed. The flow meter must be unlocked prior to accessing this menu item. To unlock, see 219 menu. All flow meters are shipped with an initial password of 9001 unless otherwise specified at the time of purchase. The range of valid passwords is 1000–9999. After changing this menu with the new password, type “500” in order to save the password, which the meter will restart and enter back into run mode. ***If you set your own password, save it in a secure place to prevent loss and lockout from user variables.***

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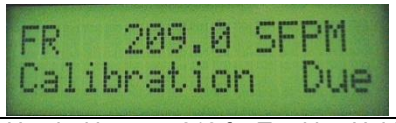
219-UnLock **(For meter keypad functionality only)**	This menu can be used to unlock the meter. It takes more key strokes vs simply typing the menu 218 password from being typed in at the > prompt (triggered by typing … (three dots). You can access any number of menu items while the settings are unlocked. If you enter a menu that you do not intend to make changes, then simply enter one period "." And push <Enter> key to back out of the menu. **See section of this document that discusses meter button functionality for how to use this menu to unlock the meter using the meter keypad.** **Menu 237 will override this menu password.**
220-Set MB Endian	This menu can be used to select the Modbus data format to be either Big or Little Endian. 0 = Little Endian 1 = Big Endian. Big Endian Byte order: 01 02 03 04 Little Endian Byte order: 03 04 01 02
221-SetCalDate	This menu item can be set to act as a reminder for periodic recalibrations. Enter the date of the next calibration reminder using the date format or enter a zero-zero (00) for either the month or day to disable the reminder. When calibration is due, it will flash on the meter display. 
222-Hold Duration	Used with menu 212 for Tracking Hold. This menu is the hold duration in minutes. See menu 212 for further explanation.
223-Set WD Timer	This timer is used for no-activity timeout and to exit all menus after the time-out period. This menu item allows the user to change the Watchdog (WD) timer "time-out" period. Value is entered as minutes.
224- Protocol Mode	Select the protocol that is used for the meter. HART and Profibus may only be selected at the Factory and is not changeable by the User. Protocol Mode 0 - ASCII Terminal Mode 1 - Modbus RTU 2 - Hart 3 - Profibus 4 - Bacnet
225-SetRS232Baud	This menu item adjusts the baud rate of the RS232 port. 1 = 9600 2 = 14400 3 = 19200 4 = 28800 5 = 33400 6 = 38400 7 = 56000 8 = 57600 9 = 76800 10 = 115200

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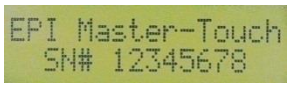
226-SetRS485Baud	This menu item adjusts the baud rate of the RS485 port. 1 = 9600 2 = 14400 3 = 19200 4 = 28800 5 = 33400 6 = 38400 7 = 56000 8 = 57600 9 = 76800 10 = 115200 ***RS485 communications require an RS485-to-RS232 or RS485-to-USB protocol converter for connecting the flow meter to a PC running EPICommunicator or similar software.*** ***See menu 233 for RS485 Parity*** ***This menu is not used for Profibus DP. The Profibus DP PCA will autodetect the network baud rate.*** ***This menu is also not used for Hart. The baud rate will be fixed. It uses Frequency Shift Keying (FSK).***
227-Flow 0-5,10	This menu item adjusts the Flow Output Voltage from either 0 to 5 or 0 to 10 Volts out: 0 = 0-5V Output;1 = 0-10V Output.
228-Temp 0-5,10	This menu item switches the Temperature Output Voltage from either 0 to 5 or 0 to 10 Volts out: 0 = 0-5V Output; 1 = 0-10V Output.

229-LCD Options	This menu item controls the microprocessor signal to the LCD to display various outputs as mentioned below. Each option can be disabled or enabled.
	`1: NO LCD - DISABLED`
	`2: SPLASH ONLY - DISABLED`
	`3: PERCENT - ENABLED`
	`4: TOTAL - ENABLED`
	`5: RELAY/RANGE - ENABLED`
	`6: TEMPERATURE - ENABLED`
	`7: mW - ENABLED`
	`Enter Option Number to Change = LCD Options =>`
	If 1 is enabled, there will be no LCD display (Blank)
	If 2 is enabled, it will show the splash screen like below.
	 
	Options 3 through 7 have options to be enabled or disabled. If one is enabled, it should be shown on the bottom line of the display while the flow rate is shown on the top line. If multiple options are enabled, the options should be toggled (rotated through) in the bottom line of the display.
	(Note, option 5 for relays. The first number in the display is the active meter range, 1 out of 5. The infinity sign will change to an asterisk * to represent that relay being activated)
	See menu 207 for LCD refresh rate for all displays.
	See menu 234 for time between toggling the LCD displays for different display values.
	See menu 232 for terminal output control for these same values.

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230-Temp Zero	This menu item sets the gas temperature value (°F or °C) for the 0 VDC output. The factory default is 0. Typically, this value should not be changed. ***Works in conjunction with menu 231.***
231-Temp Span	This menu item sets the gas temperature maximum value (°F or °C) for the 5 VDC output. If Units are currently set for metric (such as NCMH) then the value entered for this command should be entered as °C value, otherwise if imperial units, the value should be entered as °F. ***If flow units are changed between Imperial and Metric, then this value should be converted to °C or °F as required.*** ***This menu does not affect the temperature compensation range for the process gas.*** ***Works in conjunction with menu 230***

232-Terminal Option	This menu controls the terminal display output for removing or adding various outputs on the screen.
	`Terminal Options`
	`0 - Both mW and Temperature are Displayed`
	`1 - mW not Displayed`
	`2 - Temperature not Displayed`
	`3 - mW and Temperature not Displayed`
	`4 - No Terminal Updates`
	`Current Setting = 0 =>`
	Value 0
	`Rate Total High Low Relays Temp mW GasRD`
	`185.4 SCFM 14136 SCF 1000 0.000 R1=. R2=. 71.4F 185.3 0.07484 Lbs/FT^3`
	Value 1
	`Rate Total High Low Relays Temp GasRD`
	`184.8 SCFM 14320 SCF 1000 0.000 R1=. R2=. 71.5F 0.07484 Lbs/FT^3`
	Value 2
	`Rate Total High Low Relays mW GasRD`
	`185.3 SCFM 14441 SCF 1000 0.000 R1=. R2=. 185.3 0.07484 Lbs/FT^3`
	Value 3
	`Rate Total High Low Relays GasRD`
	`185.1 SCFM 14548 SCF 1000 0.000 R1=. R2=. 0.07484 Lbs/FT^3`
	Value 4
	`NO TERMINAL MODE`
	See menu 229 for LCD display options for these same values.

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233-RS485Parity	This menu sets the Parity on the RS 485 communications port. RS485Parity 0 = 1-Stop 8-Bits No-Parity 1-Stop 1 = 1-Stop 8-Bits Even-Parity 1-Stop 2 = 1-Stop 8-Bits Odd-Parity 1-Stop 3 = 1-Stop 8-Bits No-Parity 2-Stop Current Setting = 1 => _ See Menu 226 for RS485 Baud rate.
234-LCD Toggle Rate	This menu is used to set the time delay between displaying different LCD display values which were enabled in menu 229. Valid entries are 1 through 10. Time increments of 500ms.
235- Reserved	Not used
236- Reserved	Not used.
237-SetPSWDMode	Password Mode will allow different password control. Mode 0 will utilize the password that was established in menu 218. Mode 1 will prompt for a new password that can be up to 8 digits and will then be required to unlock the meter and the password in menu 218 will not be used. Mode 2 will leave the meter open with no password required. (This mode is not recommended since it allows for unauthorized access to make meter changes) Note: When using the EPICom MTR user menu to change to an alternate password, you will get a popup to re-select the alternate password pulldown a few times until you enter your 8-digit password.
238-Reserved	Not used
239-Reserved	Not used
240-BiDir Mode	This menu sets the meter into Bi-Directional mode. This requires a special probe designed specifically for this feature. Contact factory for details. This should be set to 0 for standard meters. This either activates or deactivates bi-directional mode. Set at factory. This menu is only used with EPI's Bi-Directional flow meter design.
241- Reserved	Not Used
242- Reserved	Not Used
243- Reserved	Not Used
244- EPIVal Sensor	Epi-Val™ (In-Situ field validation) See the Epi-Val™ manual for explanation of this menu
245- EPIVal Log	Epi-Val™ (In-Situ field validation) See the Epi-Val™ manual for explanation of this menu

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246-Config 4-20mA	This menu will setup output 1 and output 2 for either Flow or Temperature. (Special wiring considerations done at the factory based on customer choice) Enter Selection > 246 Config4-20mA Output1 4-20mA Output2 4-20mA 0 = Flow Temperature 1 = Flow Flow 2 = Temperature Flow 3 = Temperature Temperature Default is 0
247-Accuracy Mode	This menu can be used to compare the initial calibration accuracy check list that was shipped with the meter against how the meter is doing at the time of this accuracy test. The meter output for 0-5VDC or 4-20mA should reflect entered value based on calibration. Flow Rate – 1, Enter flow rate from the accuracy sheet and the output of the meter should align closely with the accuracy sheet 0-5vdc or 4-20mA. mW – 2, (used when communicating with the factory) Temperature – 3, This test will be used in conjunction with how menus 230 (Temp Zero) and 231 (Temp Span). Entering a temperature value should cause the meter output for temperature (either voltage or mA) to have the same proportional output of menu 230 / 231. Once the meter is reset (Typing “500” or power cycled), it will be taken out of accuracy mode.
248- Reserved	Not Used
249- Reserved	Not Used
250-Multi Point	This menu sets the meter into multi-Point mode. This requires a special probe designed specifically for this feature. Contact factory for details. This should be set to 0 for standard meters. This menu is only used with EPI’s Multipoint flow meter design.
251-CustRefCondition	This read-only menu displays the gas reference conditions for this meter.

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252-Frequency Polarity

Frequency Polarity. Only available on 1 relay board set.

This menu item is used to set the Frequency Output polarity

0 = LOW @ No Flow with Low to High pulse at flow;
1 = HIGH @ No Flow with High to Low pulse at flow.

Provides 0 – 1 kHz frequency output proportional to the calibrated flow rate. The signal is both Sink and Source capable. The following specifications apply when this option is ordered:

Sinking (User provides power input)	40 VDC max. 200mA max.
Sourcing (ValuMass™ provides power input)	15 VDC 50mA max. 300-ohm min.

Frequency Output Formula:

Frequency Span x (Actual Flow Rate / Full Scale) = Frequency Output

Examples:

1. Full Scale = 1000 SCFM
   Flow Rate = 150 SCFM
   Frequency Span = 1 kHz
   1 kHz x (150 / 1000) = 0.15 kHz

2. Full Scale = 500 NCMH
   Flow Rate = 425 NCMH
   Frequency Span = 1 kHz
   1 kHz x (425 / 500) = 0.85 kHz

Works in conjunction with menu 253.

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253-Frequency PW	Frequency Pulse width. Only available on 1 relay board set. This menu item is used to set the pulse width of the Frequency Output in 50µs (50 microseconds) increments between 50µs and 950µs. Entry is rounded to the nearest 50µs increment. ---------- Frequency Span x (Actual Flow Rate / Full Scale) = Frequency Output Examples: 1. Full Scale = 1000 SCFM Flow Rate = 150 SCFM Frequency Span = 1 kHz 1 kHz x (150 / 1000) = 0.15 kHz 2. Full Scale = 500 NCMH Flow Rate = 425 NCMH Frequency Span = 1 kHz 1 kHz x (425 / 500) = 0.85 kHz Works in conjunction with menu 252.
254-NAMUR Enable	This menu item 1 – Enable or 0 – Disables NAMUR If the mW reading goes below 10% of the calibrated mW value for no flow, the 4-20mA output will drop to 0mA If the flow rate value goes above 10% of the full scale, the 4-20mA output will jump to 24mA

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255-Clear Totalizer	This menu item allows the user to manage how the total is cleared or not Enter Selection >> 255 0 is UNLOCKED Mode 1 is LOCKED Mode 2 is PASSWORD Mode Clear Totalizer Mode = 0 Enter 0 = Change Modes or Enter 1 = Clear Totalizer => 0 Enter 0 for UNLOCKED Mode Enter 1 for LOCKED Mode Enter 2 for PASSWORD Mode Enter Any Other Key to Exit **Option 0** allows the user to clear the totalizer through the terminal window by typing “CCC” while the meter is in run mode. **Option 1** This mode will prevent the totalizer from being reset. It requires a password to be set so changing the mode to either 0 or 2 later on will require this password for changing out of mode 1. **Option 2** will allow the user to set a password (if password already established, it must be re-entered to change modes) that will then be required upon attempting to clear (user typing CCC in run mode) the flow totalizer back to a value of 0. If the password is ever lost or forgotten you will need to contact the factory to reset the password. There may be a fee associated with this activity, so it is highly recommended to record all your passwords in a safe place.
256-Bacnet Setup	Example settings below for BACnet. Ensure meter power is turned off while connecting any communication wires to the meter. 1 - Device Name = MT8000 2 - Device Description = EPI Master-Touch 3 - Device Location = 4 - Device ID = 4194302 5 - MS/TP Mac (Meter) Address = 1 6 - MS/TP MAX_Master = 127 7 - Set to Default Values 8 - Save and Exit 9 - No Save and Exit = Bacnet Setup =>

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*400 *Alarms* Menu*

EPI flow meters have two 1-amp SPDT relays that provide four relay Events (Ev1–Ev4):
(One relay for ValuMass™ meters with frequency output – Relay #2)

- Relay 1 OFF (**Ev1**) — the relay coil is de-energized with the Common and Normally Closed connected
- Relay 1 ON (**Ev2**) — the relay coil is energized with the Common and Normally Open connected
- Relay 2 OFF (**Ev3**) — the relay coil is de-energized with the Common and Normally Closed connected
- Relay 2 ON (**Ev4**) — the relay coil is energized with the Common and Normally Open connected

These events can be used to activate other devices in response to user-defined flow conditions, or to provide pulsed outputs based on flow rate or flow total. There are user-selectable conditions which will trigger an alarm relay response from an EPI flow meter. Some of the most used response conditions are:

- **Trip High** — an alarm relay is triggered by a flow rate that is higher than the set value.
- **Trip Low** — an alarm relay is triggered by a flow rate that is lower than the set value.
- **Total** — an alarm relay is triggered by an accumulated flow total that is higher than the set value.
- **Timer** — an alarm relay is triggered after a preset time delay value.
- **Trip Delay** — the relay trigger is delayed to ensure the programmed condition continues for this period of time.
- **Proportional Pulse Output** — an alarm relay is triggered by a flow rate that is equal to a set proportion of the value in menu item **840–FScale**.
- **Pulse Output** — an alarm relay is triggered after the set value of accumulated flow total.
- **MAX Button** — an alarm relay is triggered by momentarily pressing the **MAX** display button.
- **MIN Button** — an alarm relay is triggered by momentarily pressing the **MIN** display button.
- **Flow Hold 1 & 2** — the ADC input voltage is maintained at constant value, typically during gas purge cycle.

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- **Temp High** - This menu item sets the gas temperature value for the high temperature trip point.
- **Temp Low –** This menu item sets the gas temperature value for the low temperature trip point.
- **BiDir Relay -** This menu item is used to indicate which direction the flow is traveling and when it changes direction. (Bi-Directional meter only)

Additionally, the alarm relays can be **Disabled** so they do not trigger on any Event. The Disabled function is also used to latch or hold the relay at its current condition. If no Event programming has been requested at the time of purchase, Disabled is the default condition for the alarm relays.

After making your desired changes, type "500" and press enter to save the changes, the meter will restart and enter back into run mode.

```
400 *Alarm*
401-Set Event          402-Disabled          403-Flow High
404-Flow Low           405-MAX Key           406-MIN Key
407-Timer              408-Total             409-PulseOut
410-Trip Delay         411-Temp High         412-Temp Low
413-System Fault       414-Fail Safe         415-Flow Holdl
416-Flow Hold2         417-BiDir Relay
```

401-Set Event	This menu item selects the specific relay Event (Ev1–Ev4) to which a response condition is assigned.
402-Disabled	This menu item causes the current active Event to ignore all response conditions.
403-Flow High	This menu item sets the current active Event to respond to a flow rate that is higher than the set value.
404-Flow Low	This menu item sets the current active Event to respond to a flow rate that is lower than the set value.
405-Max Key	This menu item sets the current active Event to respond when the MAX key on the LCD panel is pressed or when Mode 1 is grounded.
406-Min Key	This menu item sets the current active Event to respond when the MIN key on the LCD panel is pressed or when Mode 2 is grounded.
407-Timer	This menu item sets current active Event to release the relay after the time expires for this 407-Timer setting. Enter the desired preset duration value in units of 50ms.
408-Total	This menu item sets the current active Event to respond to an elapsed total. Enter the desired preset value in the current engineering units (whole numbers only – no decimals).

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409-PulseOut	This menu item sets the current active Event to respond to an elapsed flow total. This function is used with remote data collection systems which count the pulses to generate an elapsed flow total. Enter a value to activate a relay for every X number of units on the totalized flow. Example: If Menu 100 has submenu 102 (SCFH) selected then if 1000 is entered for this submenu 409-PulseOut then this event will trip the relay for each 1000 SCFH of flow. Any whole number between 1 and 65535 may be entered at the prompt (>), but we recommend decimal values (1, 10, 100, . . .). A timer function must be associated with this menu item to release the relay from the active state (*see menu item 407–Timer*). The timer must be set fast enough to release the relay before the next preset total value is reached.
410-Trip Delay	This menu item sets the response delay for triggering the relay for the current active Event. Enter the desired value in increments of 50ms (20 = 1 second). The acceptable values are 1– 255.
411-Temp High	This menu item sets the gas temperature value for the high temperature trip point.
412-Temp Low	This menu item sets the gas temperature value for the low temperature trip point.
413 – System fault	Multipoint system related menu. If internal cable disconnects then a system fault shows on meter LCD display and terminal screen. This fault is also a Relay/Alarm function event that can be set for relay contact notification. When using this fault, it will utilize both events for the relay. When using this alarm feature, one relay will have its events set for SYSTEM_FAULT and the other DISABLED. Setting this alarm through EPICom Terminal mode will set the events up properly.
414 Fail Safe	This is used for energizing a relay if power fails, it de-energizes the relay for contact control for remote monitoring. When using this alarm feature, the relay events will have its events set for FAIL_SAFE and the other DISABLED.
415-Flow Hold1	This menu item holds the flow rate while Relay 1 Event 2 is active. When the value is set to one (1), it will hold the flow at its current value. A value of zero (0) will disable this feature. Example: Can be used with events “PulseOut” or “Max Button” event. Example: This option may be desired to hold the flow rate during a purge gas cycle to prevent flow rate spike during the purge.
416-Flow Hold2	This menu item holds the flow rate while Relay 2 Event 2 is active. When the value is set to one (1), it will hold the flow at its current value. A value of zero (0) will disable this feature. Example: Can be used with events “PulseOut” or “Max Button” event. Example: This option may be desired to hold the flow rate during a purge gas cycle to prevent flow rate spike during the purge.

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417-BiDir Relay	This menu item is used to indicate via the relay, which direction the flow is traveling and when it changes direction. **This menu is only used with EPI's Bi-Directional flow meter design.**

Alarm Programming

The alarm relays only operate while the flow meter is the Run Mode. To select and program alarm relay Events, use the 400 *Alarms* menu items. First, select the specific Event (Ev1**–**Ev4) in menu item **401–Set Event**. After selecting an Event, a condition is assigned (Timer, Max, Frequency Out, etc.). Unless setting the **MAX** or **MIN** buttons for manual operation or to **Disable** an Event, each condition requires a numeric value to control the response. Depending upon the selected condition, these values refer to 50 millisecond (ms) increments or to the currently selected engineering units.

The flow meter accepts settings for the Event until it returns to Run Mode, or until another Event is selected by returning to menu item 401.

After making your desired changes, type "500" and press enter to save the changes, the meter will restart and enter back into run mode.

Examples

Example 1 — Meter is programmed to show SCFM Units

Set Alarm Relay 2 to activate for each accumulated flow total of 100 SCF with a 4000ms pulse width:

- Unlock the flow meter settings and go to the **400 *Alarms*** menu;
- Select menu item **401–Set Event**, then enter **3** at the prompt (3 = Ev 3, Relay 2 OFF);
- Select menu item **407–Timer**, then enter **80** at prompt (80 x 50ms = 4000ms = 4 seconds);
- Select menu item **401–Set Event**, then enter **4** at the prompt (4 = Ev 4, Relay 2 ON);
- Select menu item **409–PulseOut**, then enter **100** (SCF) at menu prompt;
- Select menu item **500 *Run Mode*** to lock the flow meter and return to Run Mode.

Rate		Total		High	Low	Relays	Temp	mW	GasRD
214.5	SCFM	7223	SCF	1000	0.000	R1=. R2=*	65.9F	214.4	0.07484 Lbs/FT^3

Notice above that the terminal broadcast string shows R2 relay with an Asterix "*" indicating the relay is active. The Asterix will show active for 4 seconds upon reaching each 100 SCF of flow.

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Relay	Event	Function	Relay Energized	Relay Position	Value
Off	3	407	No	COM-NC	80
On	4	409	Yes (Until Timer expires)	NO-COM	100

Example 2 — Meter is programmed to show SCFM Units

Set Alarm Relay 1 to activate if the flow rate falls below 10 SCFM for a period of four seconds:

- Unlock the flow meter settings and go to the **400 *Alarms*** menu;
- Select menu item **401–Set Event**, then enter **1** at the prompt (1 = Ev 1, Relay 1 OFF);
- Select menu item **407–Timer**, then enter **20** at prompt (20 x 50ms = 1s);
- Select menu item **401–Set Event**, then enter **2** at the prompt (2 = Ev 2, Relay 1 ON);
- Select menu item **404–Trip Low**, then enter **10** (SCFM) at menu prompt;
- Select menu item **410–Trip Delay**, then enter **80** at prompt (80 x 50ms = 4s);
- Select menu item **500 *Run Mode*** to lock the flow meter and return to Run Mode.

As an example of the results of this programming, assume that during Run Mode, the flow reads approximately 18 SCFM. Therefore Relay 1 is inactive. Then the flow decreases to 8 SCFM for 1.25 seconds but returns to 18 SCFM 1 second later. No alarm is generated because the total duration of the increased flow was less than the Trip Delay value (4 seconds). If the duration of the low flow (i.e., < 10 SCFM) exceeded 4 seconds, Relay 1 would activate for 1 second (the value for menu item 407–Timer) and then reset. The alarm relay will not be activated again until the flow increases above 10 SCFM and then falls below 10 SCFM.

*450 *E-Log* Menu*

450 *E-Log* Menu is only applicable for EPICom Live

For capturing real-time flow data: use the CAPTURE AND PRINT options mentioned in the Real-Time Meter Commands section

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*800 *P-Curve Fit* Menu*

The EPI meter software stores the Primary Curve (P-Curve) coefficients which are generated by the factory NIST calibration, C-Factor, process line cross-sectional area, etc. Although most of these settings are accessible after unlocking the meter, some of the commands require a factory diagnostic password to prevent accidental change of critical settings.

After making your desired changes, type "500" and press enter to save the changes, the meter will restart and enter back into run mode.

```
800 *P-Curve Fit*
801-CoeffTermA          802-CoeffTermB          803-CoeffTermC
804-CoeffTermD          805-CoeffTermE          806-CoeffTermF
807-CoeffTermG          808-CoeffTermH          809-CoeffTermI
810-CoeffTermJ          811-C Factor            812-Reserved
813-Pipe Area           814-Pipe ID             815-Pipe List
816-FlowCutoff%         840-Full Scale
```

801-CoeffTermA	Factory Calibration Coefficient. ***Factory Only. This menu item requires the Diagnostic Password for access.***
Through	
810-CoeffTermJ	Factory Calibration Coefficient. ***Factory Only. This menu item requires the Diagnostic Password for access.***
811-C Factor	This value is a multiplier used to adjust the P-Curve linearization. It is normally set to 1.0, but may be adjusted based the *Installation Guidelines*, or to correct for aberrations in sensor readings. The C Factor can also be used to change standard conditions (STP) or to apply a density factor (vapor density) when changing the engineering units from volumetric units (SCFM, NCMH, etc.) to gravimetric units (Lbs/Hr, Kg/Hr, etc.) in flow meters calibrated for gases other than air.
812- Reserved	Not Used
813-Pipe Area	This value is the cross-sectional area of the flow section or process line. The units of measure are determined by the engineering units selected (*see menu items 101–136*). For example, if the current engineering units are SCFM, then the menu item 813 value must represent square feet (F^2). A value of one (1) may be used if the current engineering units represent velocity (SFPM, NMPS, etc.) or if the flow meter is an "inline" style with its own flow section. Changing this menu will recalculate menu 814. Menu 815 will select the indexed pipe size in the list that menu 813 will change.

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814-Pipe ID	Use this menu to change the pipe ID of the selected pipe entry from menu 815. Changing this menu will recalculate menu 813. Menu 815 will select the indexed pipe size in the list that menu 814 will change.
815-Pipe List	This menu allows the user to select the pipe of interest up to 10 pipe selections. The area is calculated from the I.D. placed in the flow meter (by user or factory when requested by user). The area multiplied by velocity is flow rate in whatever engineering units are selected Use CMD 813 Change Area or CMD 814 to Change the Diameter
816-FlowCutoff	This menu item is used to set a percentage of the Full-Scale value (*menu item 840–FScale*) as the minimum readable flow rate. Actual flow rates below this minimum value will be treated as No Flow. The display will show “Low” instead of the real-time flow rate, no additional elapsed flow will be recorded, the 0–5VDC signal will drop to 0VDC, and the 4–20mA signal will drop to 4mA. For example, if the full scale is 1000 SCFM, a value of 10 (10%) will cause the flow meter to ignore flow rates below 100 SCFM or less. When the actual flow rate increases above this value, all of the flow meter’s functions will resume.
840-FScale	This menu item is used to adjust the scaling of the 0 – 5VDC and 4 – 20mA output signals. To change this value, enter the desired value at the prompt, and then press Enter. (The meter settings must be unlocked to make this change.) The meter will accept the new value and return to the data entry prompt. To verify the change, return to this menu. EPI does not recommend going above the factory established FS by more than +20% and does not specify the accuracy above +10% of FS. It is also ok to adjust this value below FS as needed for external equipment requirements.

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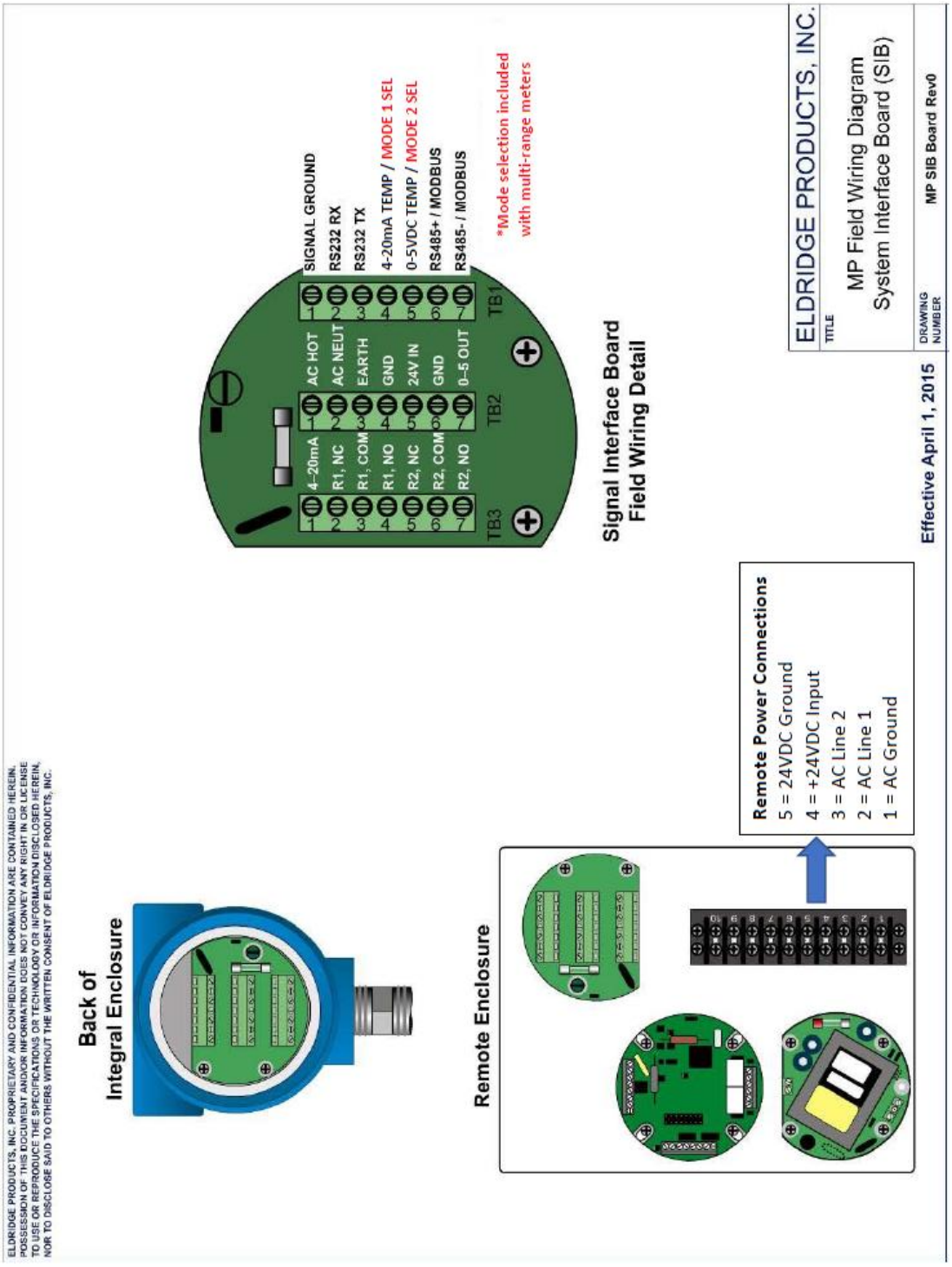
Wiring Diagrams

MP Series



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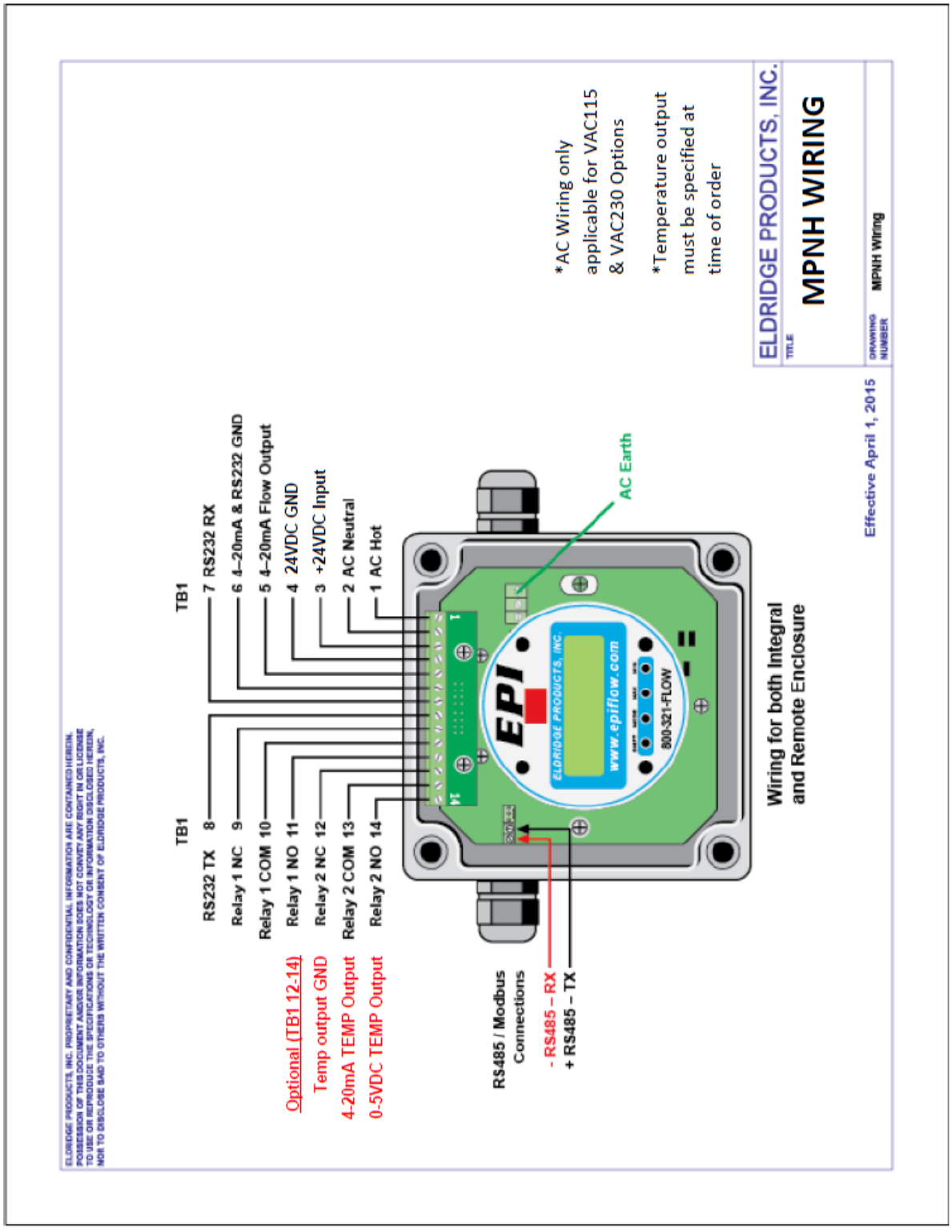
MPNH Series



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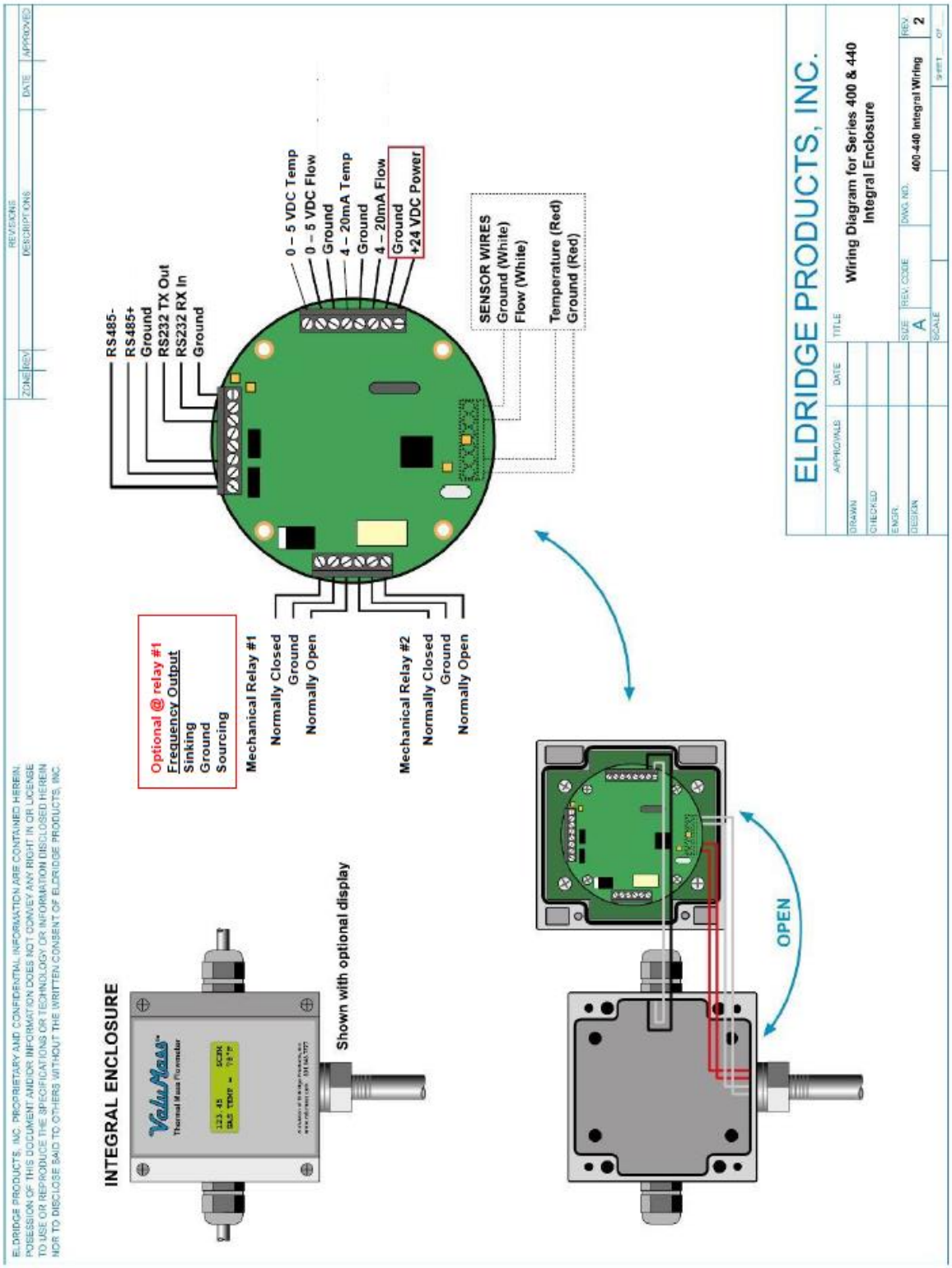
400 & 440 Series



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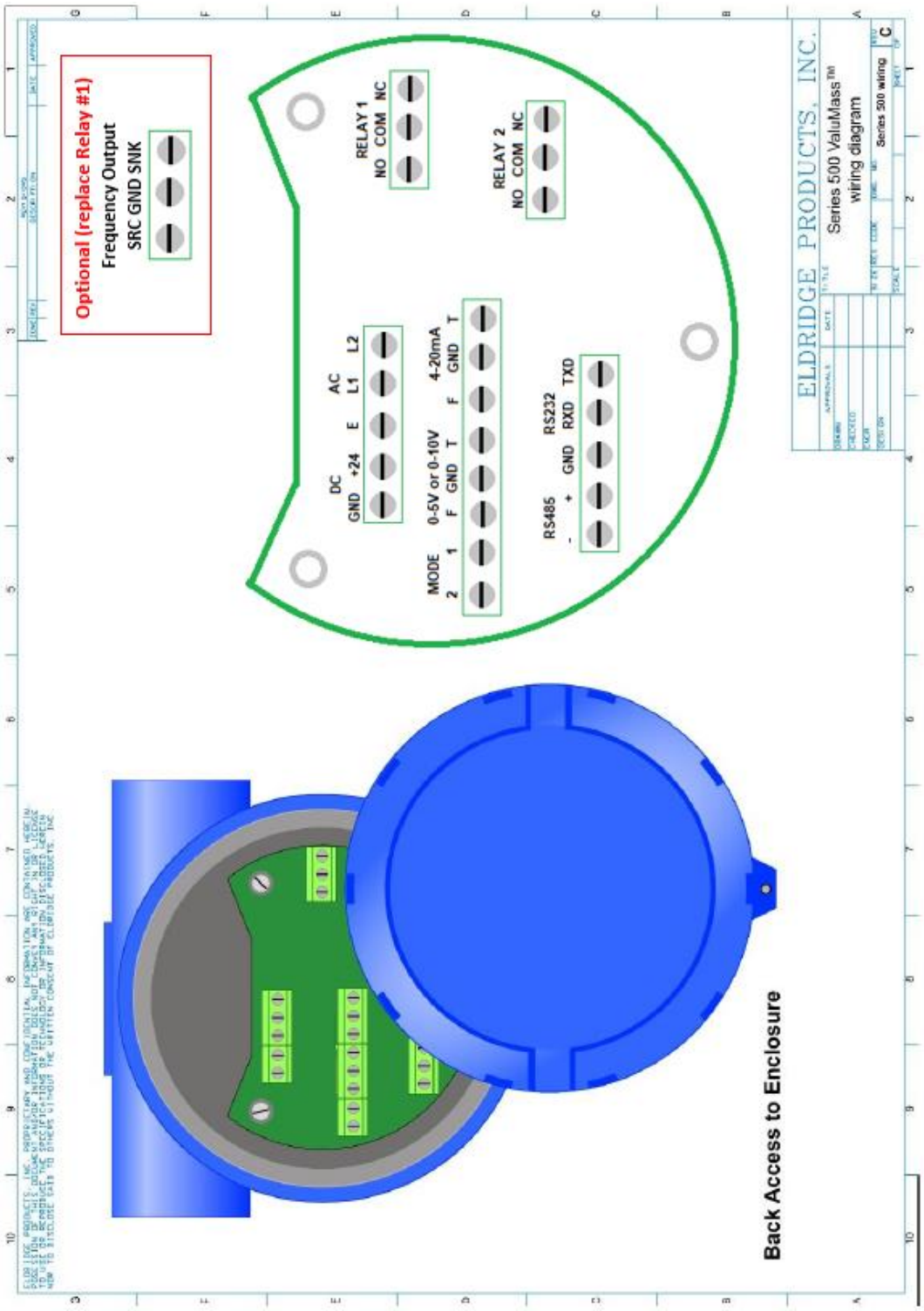
500 & 540 Series



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Additional References

ValuMass™ Manual

Please follow link for ValuMass™ Manual

EPICom Live User Manual

Please follow link for EPICom Live User Manual

EPI Live Modbus User Manual

Please follow link for EPI LIVE Modbus User Manual

EPIVal Quick Start Guide

Please follow link for EPIVal Quick Start Guide

BACnet Quick Start Guide

Please follow link for BACnet Quick Start Guide

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