McCROMETER

Operation Manual For Models

EA230-00 and EA230-10

Flow Computers

TOTAL   9 8 7 6 5 4 3 2 1 0

PROGRAM

| 1 TOTAL | 2 TOTAL SET PT. | 3 RATE | 4 LO RATE | 5 HI RATE | CLR |
| 6 | 7 | 8 | 9 | 0 DISPLAY | HELP / ENT |

< DP

>

∧

Reset
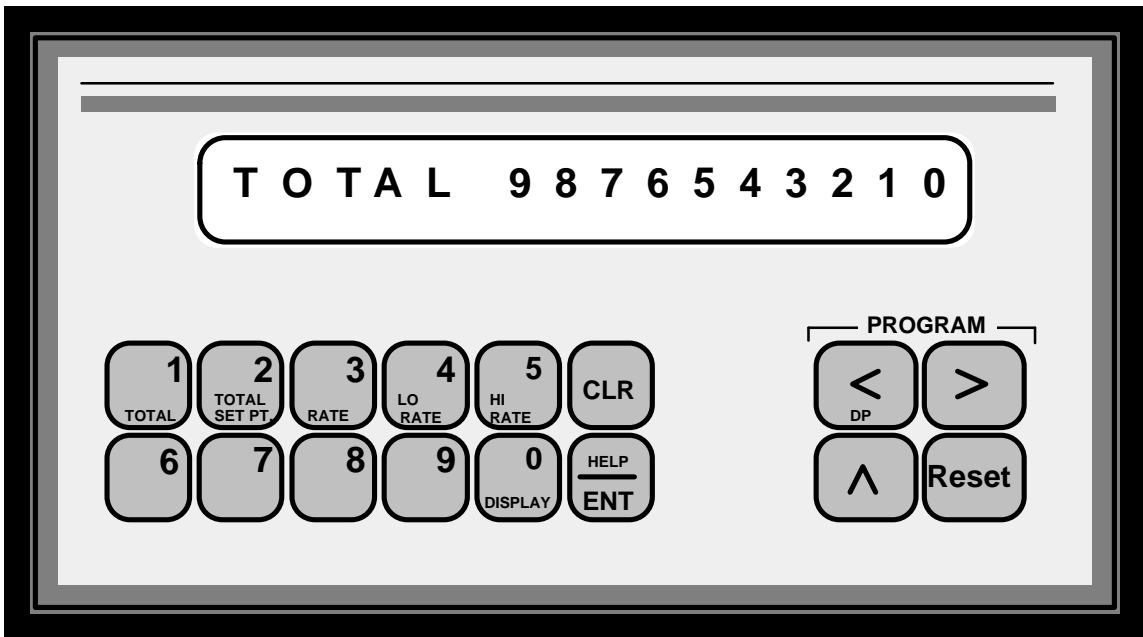
INTRODUCTION

MODELS

There are two different models of the Flow Rate Totalizer, an EA230-00 and a EA230-10. The -00 does not have a 4 to 20 mA rate output whereas the -10 has this output feature.

FUNCTIONS

The Flow Rate Totalizer performs two basic functions:

- Totalizes all flow
- Displays Flow Rate with high and low alarm outputs

TOTALIZER

Operation
The Totalizer is a ten-digit flow totalizer equipped with a scalar to accept Kpv values from 0.0001 to 99999 and automatically converts this number to Kmf. The Reset key can be programmed to reset the Totalizer count. The Totalizer is unidirectional; it counts up only.

Outputs
Two transistor outputs and two relay outputs are available from the Totalizer. Transistor 1 provides a scaled output pulse for remote totalizing applications. The pulse output duration can be programmed for Fast (125µ sec), Medium (2 msec.) or Slow (50 mesc.). The Totalizer has a buffer capable of storing 255 scaled counts if the Totalizer count rate temporarily exceeds the scaled output rate. If the buffer capacity is exceeded, any Totalizer count attempting to cause the buffer to 256 will be lost from the scaled pulse output, and the message PULSE OVERFLOW will appear on the display. The contents of this buffer are saved if the power is removed from the unit before all of the counts have been put out. This buffer is reset when the totalizer is reset.

Transistor 2 is the Totalizer setpoint output which turns on when the Totalizer count reaches the Totalizer setpoint. The output can be programmed to time out (turn off) from 0.01 to 99.99 seconds after it turns on. Programming the timer to a value of 0.00 disables the time and causes the output to remain on until an input or key board command unlatches it.

Relays K1 and K2 can be programmed to switch on the totalizer setpoint. The output will switch when the Totalizer count reaches the Totalizer setpoint. The output can be programmed to time out (turn off) from 0.01 to 99.99 seconds after it turns on. Programming the timer to a value of 0.00 disables the time and causes the output to remain on until an input or key board command unlatches it.

RATEMETER

Operation
The ratemeter has six-digits of display and calculates flow by measuring the time interval between input pulses or average time between groups of pulses and then reciprocating the time. the calculated rate is multiplied by Kmf and a rate multiplier to provide Rate readings in the desired units of measure. The Reset key can be programmed to act on the Ratemeter.

Smoothing

The smoothing function allows the ratemeter to average rate readings from 1.0 seconds to 7.5 seconds in .5 second steps. There is no smoothing when programmed for 0.5 seconds.

High/Low Outputs

The Rate HI and LO setpoints are used to set Rate values at which the rate output alarms turn on both transistor and relay outputs. The HI output is turned on if the Rate is greater than the HI setpoint, the LO output is turned on if the rate is lower than the LO setpoint. The outputs can be programmed to follow, time out, or to latch until a keyboard or input signal is received. In the follow mode of operation, the rate is compared to the HI and LO setpoints after each rate update. If an output is turned on, it remains on until the next rate update occurs and then the output is either left on or turned off depending on the comparison of the new rate reading with the setpoints. In the time out mode of operation, the outputs can be programmed to turn on for .01 to 99.99 seconds. Programming a value of 0.00 disables the timer and causes the outputs to latch until unlatched by a keyboard or input signal.
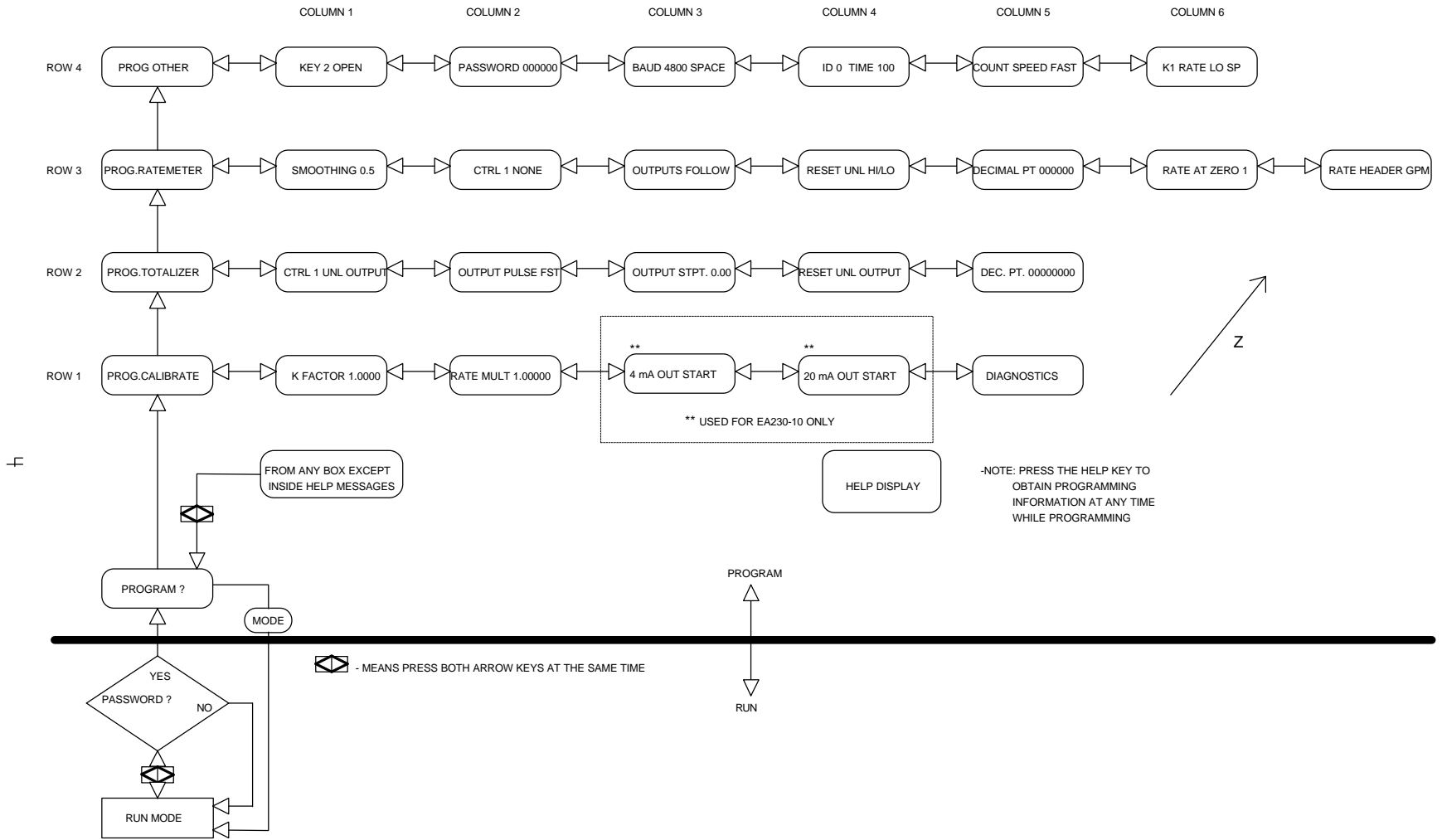
Rate at Zero

The Ratemeter displays zero rate when the time interval between input pulses exceed the programmed Rate Zero time. The timer can be set from 1 to 15 seconds.

Rate Header

The Rate units of measure (up to three characters) can be programmed into the unit and will be shown along with the rate value and rate setpoints on the display. If the Rate data exceeds four digits, the rate header will be shifted off the display in the split display mode.

Rate 4-20 mA Output (Used for EA230-10 only)

The analog rate output range can be programmed at both the 4 mA and 20 mA points. This permits analog rate indications from 0 to full scale rate or to select a portion of the rate range. The analog output can be digitally calibrated in the program mode. The analog output goes to a value of 4 mA when the unit is being programmed and during power-up diagnostic tests.

	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6
ROW 4	PROG OTHER	KEY 2 OPEN	PASSWORD 000000	BAUD 4800 SPACE	ID 0 TIME 100	COUNT SPEED FAST	K1 RATE LO SP
ROW 3	PROG.RATEMETER	SMOOTHING 0.5	CTRL 1 NONE	OUTPUTS FOLLOW	RESET UNL HI/LO	DECIMAL PT 000000	RATE AT ZERO 1	RATE HEADER GPM
ROW 2	PROG.TOTALIZER	CTRL 1 UNL OUTPUT	OUTPUT PULSE FST	OUTPUT STPT. 0.00	RESET UNL OUTPUT	DEC. PT. 00000000
ROW 1	PROG.CALIBRATE	K FACTOR 1.0000	RATE MULT 1.00000	** 4 mA OUT START	** 20 mA OUT START	DIAGNOSTICS

** USED FOR EA230-10 ONLY

Z

FROM ANY BOX EXCEPT
INSIDE HELP MESSAGES

HELP DISPLAY

-NOTE: PRESS THE HELP KEY TO
OBTAIN PROGRAMMING
INFORMATION AT ANY TIME
WHILE PROGRAMMING

PROGRAM ?

MODE

PROGRAM

RUN

YES
PASSWORD ?
NO

◇ - MEANS PRESS BOTH ARROW KEYS AT THE SAME TIME

RUN MODE

PROGRAM MODE

Caution: All count and rate functions are inhibited when in the program mode.

Accessing Programming Mode
Pressing the < and > keys down at the same time causes the display to prompt the user for a PASSWORD. When the correct password is entered, the unit enters into the program mode and displays the message PROGRAM?. The password is not displayed but an underscore is shown for each digit entered. Note: The unit comes from the factory with the Password of 000000. When the password is set to zeros, the unit enters the program mode directly after pressing the < and > keys.

From the program mode entry/exit display, access to submenu items can be obtained in two ways.

$$\boxed{\text{PROGRAM ?}}$$

1. A. Press the ^ (up) key to scroll through the main menu items (row X).

    B. Press the < or > key to scroll through the submenu items (column Y).

2. From the program menu chart, identify the row (x) and column (y) of the submenu desired. Access is gained without scrolling with the arrow keys.

In some cases, submenus are "layered" (Z-axis). Access is gained from the "top" layer of the submenu by pressing the appropriate front panel key. All submenus are mapped out in detail with their definitions in the pages following the Program Menus chart. The HELP key will provide programming information when pressed at any time during programming.

In any submenu of the program mode, pressing the < and > keys at the same time returns the unit to the program mode entry/exit display.

$$\boxed{\text{PROGRAM ?}}$$

Pressing the Reset key at this time causes the unit to go to the run mode.

PROG. CALIBRATE

Sub Menu 11 - K Factor

$$\boxed{\text{K FACTOR 1.0000}}$$

CLR key enables entry of new K factor.
0 to 9 and DP keys are used to write the number of flowmeter pulses per unit volume (Kpv) to the display.

ENT writes the new K factor to memory.

Kpv is the number of flowmeter pulses per whole unit of volume. It may be desirable to program a decimal point on the counter's display in order to read totals to the nearest tenth, hundredth, etc. of a whole unit. The counter does not account for the displayed decimal point location when it calculates Kmf, therefore, the user must account for the decimal point when K factor is entered. If the counter is intended to count in increments of tenths of units, the K factor to be programmed is Kpv divided by ten; for hundredths of units, the K factor to be programmed is Kpv divided by 100, etc.

Sub Menu 12 - Rate Multiplier

(RATE MULT. 1.00000)   Range .00001 to 999999

CLR key enables entry of new rate multiplier.
0 to 9 and DP keys are used to write the rate multiplier to the display.

ENT writes the new multiplier to memory.

The rate multiplier is calculated by the formula:

$$Rm - \frac{\text{\# of seconds in time unit X DPF}}{\text{Totalizer DPF}}$$

where

Rm is the rate multiplier
# of seconds is 60 for display of units per minute, 3600 for a display of units per hour, etc.

DPF is the decimal point factor. The totalizer and/or rate displays may have a decimal point programmed to show better resolution than whole units of volume. Totalizer and rate decimal points are programmed independently of each other, but both must be included in the rate multiplier calculation. The following table list the proper DPF selection.
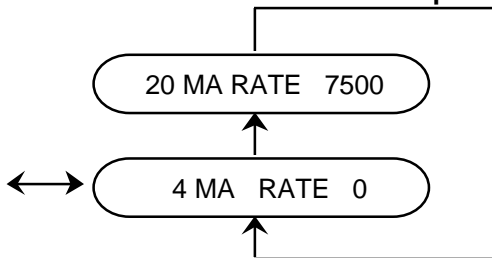
RATE DISPLAY	DPF	TOTALIZER DISPLAY	TOTALIZER DPF
XXXXXX	1	XXXXXX	1
XXXXX.X	10	XXXXX.X	10
XXXX.XX	100	XXXX.XX	100
XXX.XXX	1000	XXX.XXX	1000
XX.XXXX	10000	XX.XXXX	10000
X.XXXXX	100000	X.XXXXX	100000

Sub Menu 13 - Rate 4 - 20 mA Output Calibration (Used for EA230-10 only)
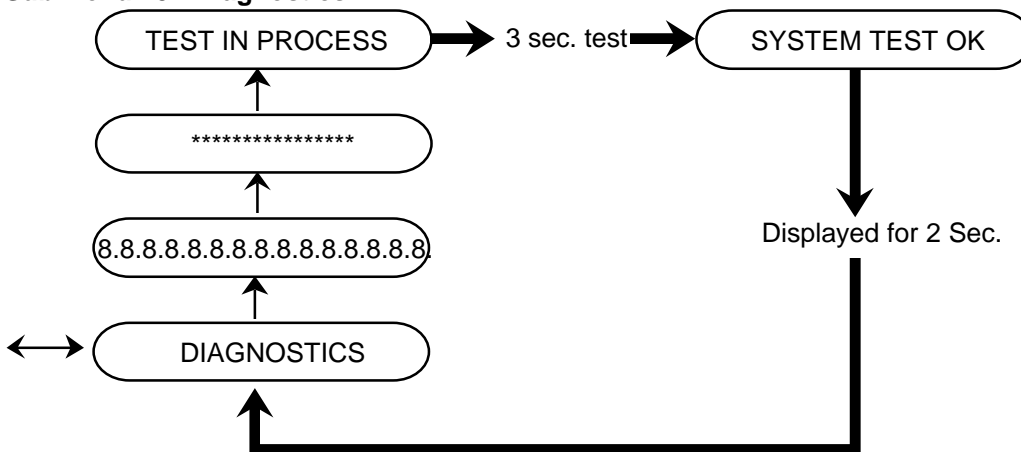
(20 MA OUT START?)

←→ (4 MA OUT START?)
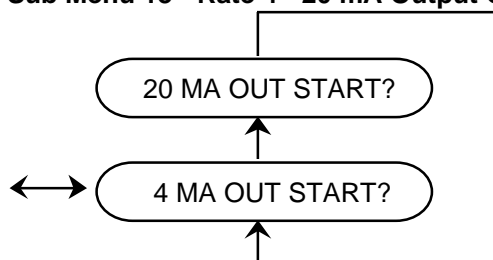
To calibrate the analog output signal, first turn off all power and then connect the analog output "+" terminal and the 24VDC ground terminal to a current meter. Turn power back on and select menu 13. Press the CLR key to start the calibration process and use the left /. Right arrow keys to adjust the current to 4 mA, then press the ENT key to enter the 4 mA calibration point. Use the up arrow key to select the 20 mA setpoint. Press the CLR key to start the calibration process and use the Left/Right arrow keys to adjust the current to 20 mA, then press the ENT key to enter the 20 mA calibration point.

Sub Menu 14 - Rate 4 - 20 mA Output Range (Used for EA230-10 only)

```
        ┌──────────────────────┐
        │   20 MA RATE   7500  │
        └──────────────────────┘
                  ↑
        ┌──────────────────────┐
←→      │   4 MA   RATE   0    │
        └──────────────────────┘
```

The rate output range is programmed at both the 4 mA and 20 mA points. This permit analog rate indications from 0 to full scale of the digitally displayed Rate or to select a portion of the Rate range. Use the up arrow key to select the 4 mA setpoints and then use the CLR, NUMBER and ENT keys to enter a Rate Value at each setpoint.

Sub Menu 15 - Diagnostics

```
   TEST IN PROCESS  ──► 3 sec. test ──►   SYSTEM TEST OK
          ↑                                      │
   ****************                               │
          ↑                                       ▼
 8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8       Displayed for 2 Sec.
          ↑                                       │
←→     DIAGNOSTICS  ◄───────────────────────────┘
```

The diagnostics allow the user to test the control's display and internal memory. Press the up arrow key for display test 1. Each of the display's 16 characters will go to 8 with the decimal point lit. Press the up arrow key for display test 2. Each character will go to *. Press the up arrow key for the internal memory test. The display will read "TEST IN PROCESS" for three seconds while the tests are being run. The display will read "SYSTEM TEST OK" for two seconds, and then go back to 'DIAGNOSTICS" if no memory errors were detected. If the unit detects a memory error, the display will hold an error message. the error messages are:

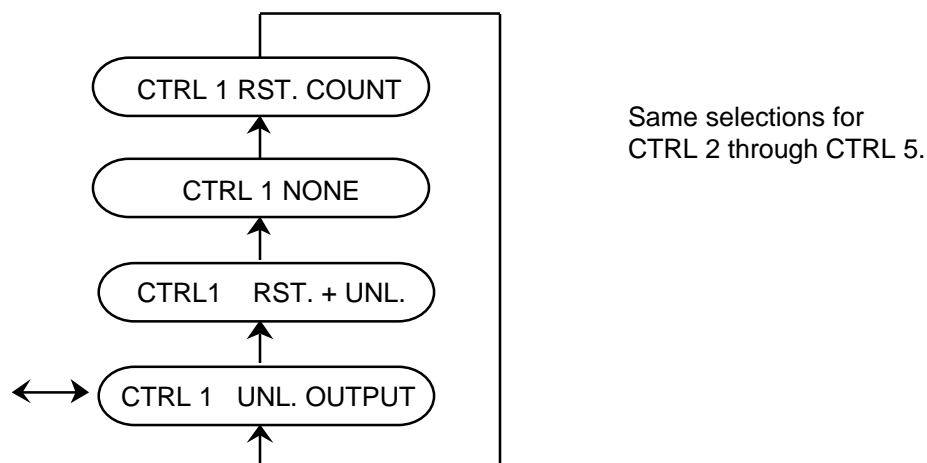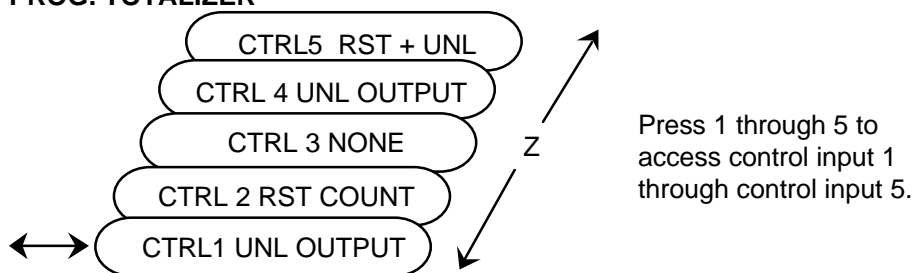ROM ERROR
INTERNAL ERROR
EXTERNAL ERROR

These errors are non-recoverable. It is possible that electrical noise caused the diagnostic failure, so the power to the unit should be cycled (turned off and then turned back on). The memory tests are always performed at power up. If the same test fails at power up, the unit likely needs repair. If a different test fails, or if the unit powers up normally, it is likely that the unit is experiencing electrical noise problems. Not that the error messages for the power up memory test may be different that the error messages for the program mode diagnostic memory tests. The following table lists each test failure and its associated error message in each test mode.

ERROR MESSAGES

TEST FAILURE	PROGRAM DIAGNOSTICS	POWERUP DIAGNOSTICS
ROM checksum error	ROM ERROR	ROM ERROR
Int. RAM bit error	INTERNAL ERROR	RAM ERROR
Ext. RAM bit error	EXTERNAL ERROR	EXT RAM ERROR
EXT. RAM checksum	N/A	STORE ERROR

Note that the power up diagnostic memory test performs an additional test, the external RAM checksum. If the calculated checksum of the external RAM (the memory which holds the user program) does not match the stored checksum, the user program has been corrupted and the message STORE ERROR appears on the display. This error is recoverable by pressing the Reset key. The message VERIFY PGM DATA then appears on the display for one second to prompt the user to locate and correct program mode item(s) which may have been altered.
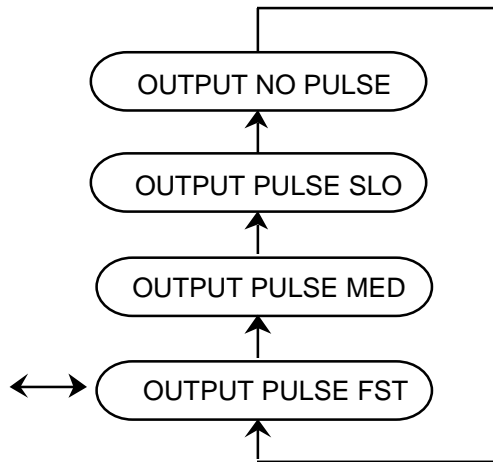
PROG. TOTALIZER

CTRL5 RST + UNL

CTRL 4 UNL OUTPUT

CTRL 3 NONE

CTRL 2 RST COUNT

CTRL1 UNL OUTPUT

Z

Press 1 through 5 to access control input 1 through control input 5.

CTRL 1 RST. COUNT

CTRL 1 NONE

CTRL1   RST. + UNL.

CTRL 1   UNL. OUTPUT

Same selections for CTRL 2 through CTRL 5.

Any of the five rear terminal control inputs can be programmed to perform a function on the Totalizing operation of this control. A control input is selected by pressing from panel keys 1, 2, 3, 4 or 5. Key 1 selects control input 1, key 2 selects control input 2, etc. When a control input terminal has been selected, it is shown on the left hand side of the display and its function is shown on the right hand side of the display. The function that a control input terminal performs can be changed by pressing the up arrow key. The functions that can be assigned to an input are: None, Reset Count, Unlatch output, or Reset Count & Unlatch Output. Note: an input assigned to perform a function to the Totalizer can also be assigned to perform additional functions to the Ratemeter in the Ratemeter menu row. A chart is shown on page 15 to provide a convenient means of recording the tasks each control input has been assigned.

Sub Menu 22 - Totalizer Scaled Pulse Output

```
            ┌──────────────────────────┐
            │   ( OUTPUT NO PULSE )     │
            │          ↑               │
            │   ( OUTPUT PULSE SLO )    │
            │          ↑               │
            │   ( OUTPUT PULSE MED )    │
            │          ↑               │
   ←──→  ( OUTPUT PULSE FST )          │
            │          ↑               │
            └──────────────────────────┘
```

The totalizer pulse output transistor can be programmed for fast, medium, or slow pulse widths. It can also be programmed to not output pulses.

Frequency Range of Output

Fast - 125 μ sec on, 125 μ sec off, 1500 Hz max. output freq.
Medium - 2 msec on, 2 msec off, 200 Hz max. output freq.
Slow - 50 msec on, 50 msec off, 10 Hz max. output freq.
No pulse - Off Continuously

This output has a 255 count buffer. The buffer is save at power down, and is reset when the Totalizer is reset. Use the up arrow key to select the mode of operation of the scaled pulse output.

Sub Menu 23 - Totalizer Setpoint Timeout

(OUTPUT STPT. 0.00) Range 0.01 - 99.99 seconds

The totalizer setpoint output transistor can be programmed to time out in the range of 0.01 to 99.99 seconds. To enter a time value, press the CLR key, enter the time with the 0 through 9 keys, and press the ENT key. The timer can be disabled by setting a time value of 0.00 seconds. When the timer is disabled, the output remains latched until an input or keyboard command unlatches it.

Sub Menu 24 - Reset Key

```
        ┌──────────────────────┐
        │   ( RESET RST. COUNT )│
        │          ↑            │
        │   ( RESET NONE )      │
        │          ↑            │
        │   ( RESET RST. + UNL. )│
        │          ↑            │
  ←→ ( RESET UNL. OUTPUT )      │
        └──────────────────────┘
```
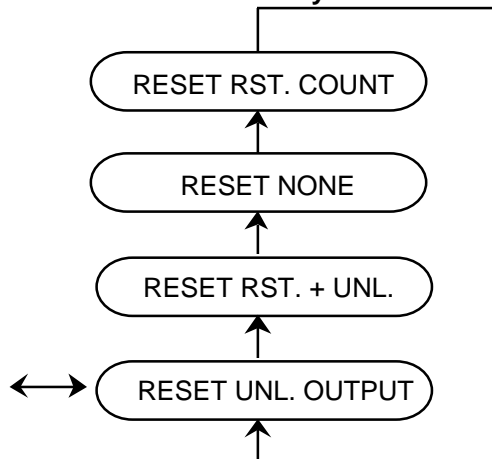
The reset key can be programmed to perform various functions on the Totalizer operation. The name of the key is shown on the left side of the display and the function it performs is shown on the right hand side of the display. The function can be changed by pressing the up arrow key. Keys assigned to perform a function on the Totalizing operation may also be assigned to perform additional functions to the Ratemeter. A chart is shown on page 15 to provide a convenient means of recording the tasks of the Reset Key.

Sub Menu 25- Totalizer Decimal Key

←→ (DEC. PT. 0000000000)
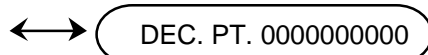
The totalizer display can have a decimal point programmed in any of six positions. Use the 0-5 keys to select the desired position. The decimal point selected here is shown in the Total count and Totalizer setpoint displays.
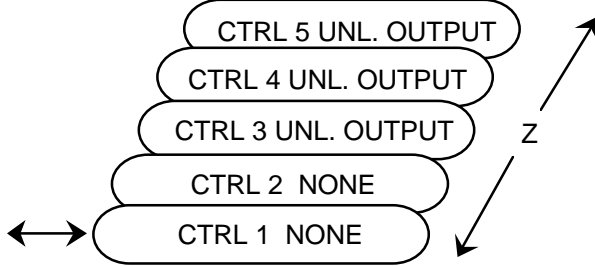
PROG. RATEMETER

Sub Menu 31 - Smoothing

```
        ┌──────────────────────┐
        │   ( SMOOTHING  7.5 )  │
        │          ↑            │
        │          ┊            │
        │   ( SMOOTHING  1.0 )  │
        │          ↑            │
  ←→ ( SMOOTHING  0.5 )        │
        └──────────────────────┘
```
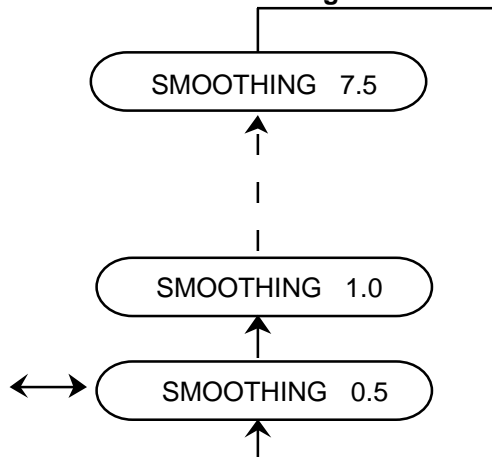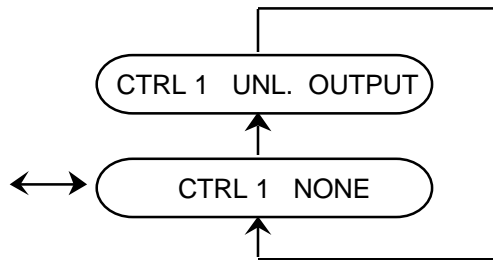
Rate is calculated and the rate display is updated every 0.5 seconds. Wen rate smoothing is selected to be greater than 0.5 seconds, the most recent rate calculation is averaged with the previous rate calculations that were made in the smoothing period. Use the up arrow key to select the amount of smoothing desired.
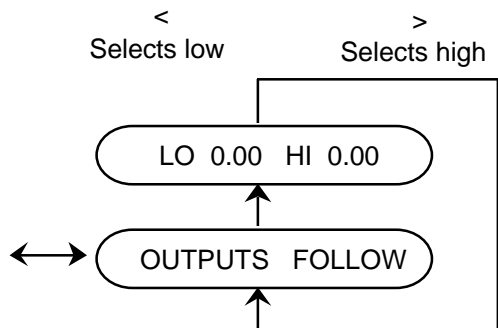
Sub Menu 32 - Ratemeter Control Inputs

```
      ( CTRL 5 UNL. OUTPUT )          ↗
    ( CTRL 4 UNL. OUTPUT )           ╱
  ( CTRL 3 UNL. OUTPUT )      Z     Press 1 through 5 to
 ( CTRL 2  NONE )                   access control input 1
↔ ( CTRL 1  NONE )          ↓       through control input 5.
```

```
    ┌──────────────────────┐
    │  ( CTRL 1   UNL.  OUTPUT )
    │        ↑                        Same selections for
  ↔ │  ( CTRL 1   NONE )              CTRL 2 through CTRL 5.
    │        ↑
    └──────────────────────┘
```

Any of the five rear terminal control inputs can be programmed to perform a function on the Ratemeter operation of this control. A control input is selected by pressing front panel keys 1,2,3, 4 or 5. Key 1 selects control input 1, key 2 control input 2 etc. When a control input terminal has been selected, it is shown on the left hand side of the display and its function is shown on the right hand side of the display. The function that a control input terminal performs can be changed by pressing the up arrow key. The functions that can be assigned to an input are: None, Unlatch HI/LO output Alarms. Note: an input assigned to perform a function to the Ratemeter can also be assigned to perform additional functions to the Totalizer in the Totalizer Program menu row. A chart is shown on page 15 to provide a convenient means of recording tasks each control input has been assigned.
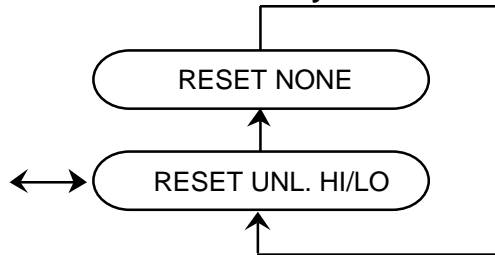
Sub Menu 33 - Ratemeter High and Low Outputs

```
        <                    >
    Selects low          Selects high
    ┌──────────────────────┐
    │  ( LO  0.00   HI  0.00 )
    │        ↑
  ↔ │  ( OUTPUTS   FOLLOW )
    │        ↑
    └──────────────────────┘
```

The Rate Hi and Low setpoints are used to set Rate values at which the rate output alarms turn on. The Hi output is turned on if the Rate is greater than the high setpoint, the LO output is turned on if the rate is lower than the LO setpoint. The outputs can be programmed to follow, time out, or to latch until a keyboard or input signal is received. In the follow mode of operation, the rate is compared to the HI and LO setpoints after each rate update. if an output is turned on, it remains on until the next rate update occurs and then the output is either left on or turned off depending on the comparison of the new rate reading with the setpoints. In the time out mode of operation, the outputs can be programmed to turn on for .01 to 99.99 seconds. Programming a value of 0.00 disables the timer and causes the outputs to latch until unlatched by the keyboard or input signal. Use the up arrow key to select the output mode of operation. The LO setpoint can be programmed greater than the HI setpoint if desired.

Use the < or > key to select the high or low output. The word LO or HI will flash when selected. Use the CLR, NUMBER and ENT keys to enter timer values for both outputs.

Sub Menu 34 - Reset Key

```
            ┌─────────────────────┐
            │  ┌───────────────┐   │
            │  │  RESET NONE   │   │
            │  └───────────────┘   │
            │         ↑            │
  ←────→ ┌───────────────────┐     │
         │  RESET UNL. HI/LO │─────┘
         └───────────────────┘
                  ↑
```

The Reset key can be programmed to unlatch the Ratemeter high and low alarms, or it can be programmed to have not effect on the alarms. Select the function of the reset key on the Ratemeter operation by pressing the up arrow key. The Reset key can be programmed for additional functions on the Totalizer operation. A chart is shown on page 15 to provide a convenient means of recording the tasks of the Reset key.

Sub Menu 35 - Ratemeter Decimal Point

←──→ (DEC. PT. 000000)

The ratemeter can have a decimal point set in any of six positions. Use the up arrow key to select the desired decimal point position. The decimal point selected here is shown in the rate display, the rate HI/LO setpoint and the rate 4 - 20 mA output setpoints.

Sub Menu 36 - Ratemeter Zero Timeout
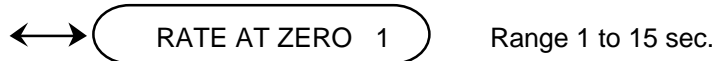
←──→ (RATE AT ZERO 1)   Range 1 to 15 sec.

The Ratemeter displays zero rate when the time interval between input pulses exceed the programmed Rate Zero time. The timer can be set from 1 to 15 seconds. Use the CLR, NUMBER and ENT keys to enter a new timer value.

Sub Menu 37 - Rate Display Header
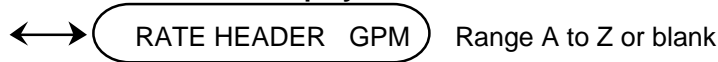
←──→ (RATE HEADER GPM) Range A to Z or blank

The Rate units of measure (up to three characters) can be programmed into the unit and will be shown along with the rate value and rate setpoints on the display. If the Rate data exceeds four digits, the rate header will be shifted off the display in the dual display mode of viewing data.

Use the < and > ? keys to cause the selected character to blink. then use the ^ key to scroll through the alphabet. Blank (no character) is between Z and A.

Sub Menu 41 - Setpoint Lock

KEY 5 OPEN

KEY 4 OPEN   Z

↔ KEY 2 OPEN
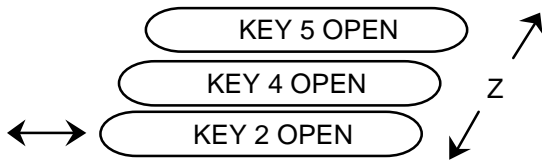
Press 2, 4, 5 to access keys 2, 4, 5.

KEY 2 LOCKED

↔ KEY 2 OPEN
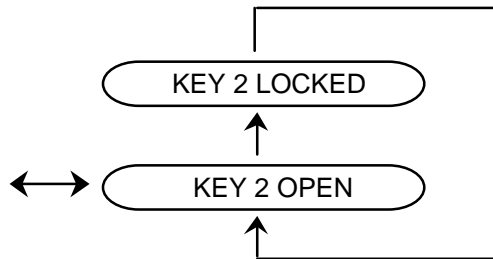
Same selections for keys 4 and 5.

The Totalizer and Ratemeter HI/LO setpoints can be selectively locked to their current value by locking them in the program mode. Use number keys 2, 4 and 5 to select a setpoint. Use the up arrow key to select if the setpoint should be locked to its current value or left open for operator changeability.

Sub Menu 42 - Password

↔ PASSWORD 000000   Range 0 to 999999
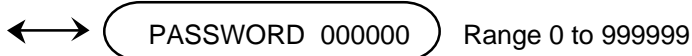
A password can be programmed into the unit to provide password access to the program mode. The unit as it comes from the factory does not require the entry of a password to gain access to the program mode. This is accomplished by programming all zeros into the password data field. Entering a number from 1 to 6 digits in length into the password data field activates the password access to the program mode.
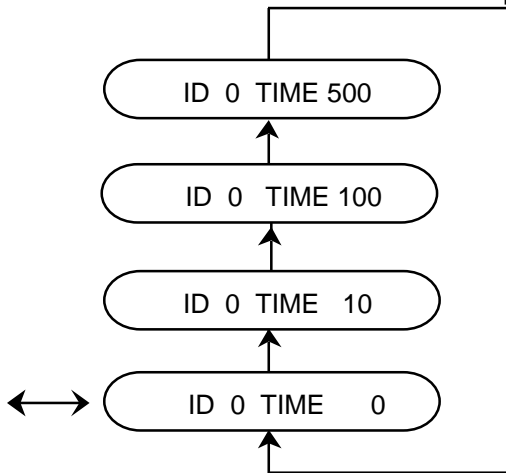
In the run mode of operation, a means of entering into the program mode is provided if the password was lost. When the unit prompts the user for PASSWORD key in 9999999999 ENT.

Sub Menu 43 - Communication Baud Rate and Parity

BAUD 4800 ODD
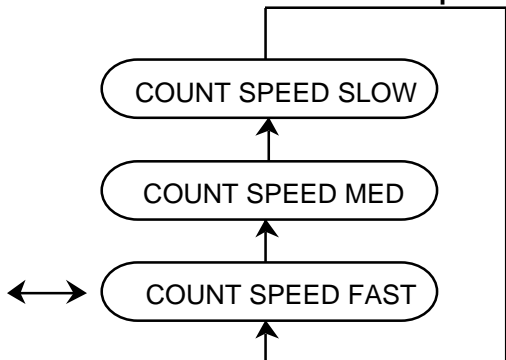
BAUD 4800 SPACE

↔ BAUD 4800 EVEN
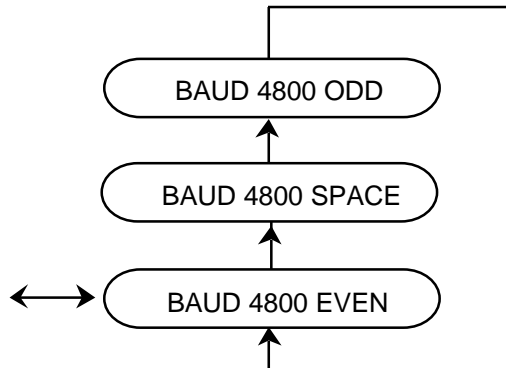
The baud rate and parity are set in this menu. Enter a baud rate of 300, 600, 1200, 2400, 4800, 9600 or 19200 by using the CLR, NUMBER and ENT keys. Enter EVEN, ODD or SPACE parity by using the up arrow key.

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Sub Menu 44 - Unit ID number and Response Delay Time

```
        ┌──────────────────────┐
        │  ( ID  0  TIME 500 )  │
        │         ▲             │
        │  ( ID  0   TIME 100 ) │
        │         ▲             │
        │  ( ID  0  TIME   10 ) │
        │         ▲             │
  ←───→ │  ( ID  0  TIME    0 ) │
        │         ▲             │
        └──────────────────────┘
```

The unit identification number is set in this menu. Each unit on the communication bus must
have a unique identifying number, 1 through 255. Enter the units ID by using the CLR, NUMBER
and ENT keys. The length of time before the control response to communication requests can
set to accommodate various types of computer equipment. Delay times of 0, 10, 100 and 500
milliseconds can be selected by using the up arrow key.

Sub Menu 45 - Maximum Count Input Speed

```
        ┌──────────────────────┐
        │ ( COUNT SPEED SLOW )  │
        │         ▲             │
        │ ( COUNT SPEED MED )   │
        │         ▲             │
  ←───→ │ ( COUNT SPEED FAST )  │
        │         ▲             │
        └──────────────────────┘
```

The maximum count input speed is selected in this menu. Use the up arrow key to select from
FAST - 7.5 kHz max.
MED - 400 Hz max.
SLOW - 40 Hz max.

Sub Menu 46 - Relay Setup

```
                ┌──────────────────────────┐
                │                          │
       ( K1 NONE )                         │
           ↑                               │
    ( K1 RATE LO/HI )                      │
           ↑                               │
    ( K1 RATE HI SP )                      │
           ↑                               │
    ( K1 RATE LO SP )                      │
           ↑                               │
  ←→  ( K1 TOTAL SP )                      │
           ↑                               │
                └──────────────────────────┘
```

```
      ( K2 RATE LO SP )              ↗
                                   Z        Press 1,and 2 to access relays
  ←→  ( K1 RATE LO SP )              ↘
```
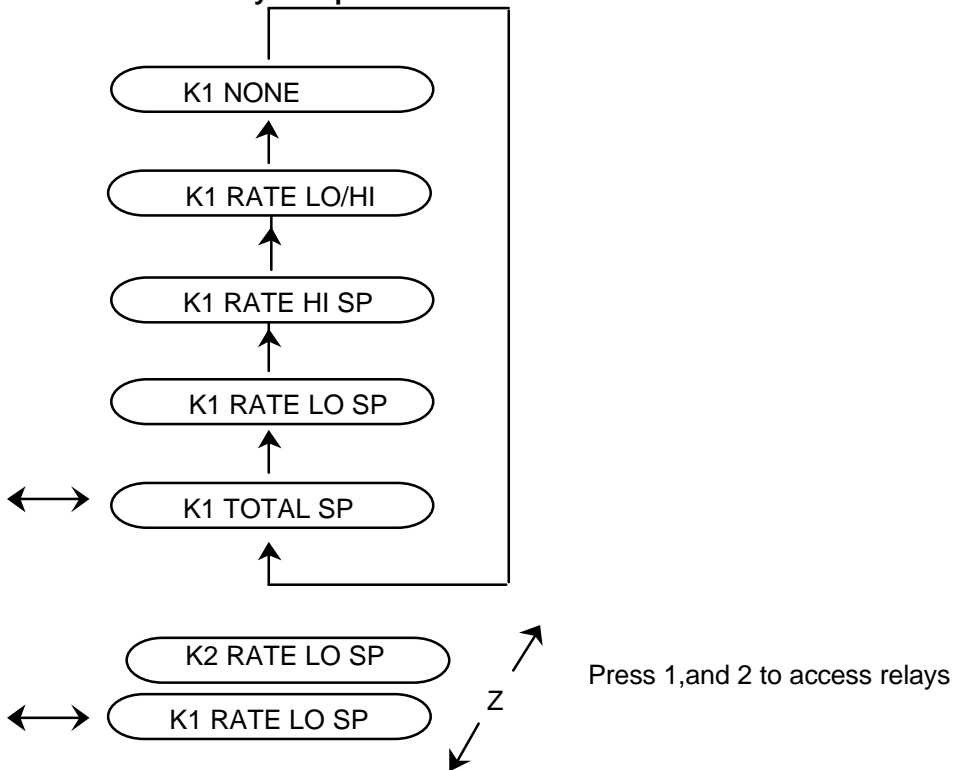
There are two relays, K1 and K2 that have normally open and normally closed connections. Pressing the 1 and 2 keys selects the relay for programming. When a relay input is selected , it is shown on the left hand side of the display and its function is shown on the right hand side of the display. The function that a relay performs can be changed by pressing the up arrow key. The functions that can be assigned to the relays are: rate low setpoint, rate high setpoint, rate low and high setpoint, totalizer set point and relay output disabled.

The relay outputs (K1 and K2) are used in conjunction with the total set point, rate low set point, rate high set point and rate LO/HI setpoints. The K1 and K2 relays follow the function of the transistor outputs as shown in the following table.

Setpoint Mode	Relays	Transistor(s)
NONE	K1, K2 not programmed	-
TOTAL SP	K1, K2 ON	# 2 ON
RATE LO SP	K1, K2 ON	# 3 ON
RATE HI SP	K1, K2 ON	# 4 ON
RATE LO/HI	K1, K2 ON	# 3 or 4 ON

The relay outputs provide additional drive capability (current and voltage) that the transistors do not offer.

User Programming Reference Chart

Reset Key
The reset key is programmable to perform different tasks for the Totalizer and Ratemeter functions of the unit. The Reset key can perform on task under each of the two major control functions shown below. The following table lists the tasks that can be selected.

KEY	CONTROL FUNCTION	
	RATE	TOTAL
Reset	☐ None ☐ Unlatch Hi/Lo Alarms	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch

Control Inputs
There are 5 control inputs which can be programmed to any of the functions shown in the chart below. An input can be assigned up to two tasks but only one task can be assigned under each of the two control functions shown below. The following table lists the tasks that can be selected.

CONTROL INPUT	CONTROL FUNCTION	
	RATE	TOTAL
1	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
2	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
3	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
4	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
5	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch

RUN MODE

KEYS

Viewing Data
Press the following keys in any order to display the data contained in the control.

Key Pressed	Shown on Display (example)
TOTAL	TOTAL 68148
TOTAL SETPOINT	TOT P 1234567890
RATE	RATE 115 GPM
LO RATE	LO RATE 100 GPM
HI RATE	HI RATE 9600 GPM
DISPLAY (SHOWS 2 VALUES)	H 937 115 GPM

The display key shows two items displayed at the same time. The items are identified with the first letter of the full identifier except for rate, which is identified by the rate header, if programmed. Pressing the DP key momentarily will display the full identifiers for both values being displayed for about 1 second. The items displayed by the display key can be changed by pressing and holding down the DP key until the left side of the display starts to blink. Use the "up arrow" key to scroll through the items that can be displayed stopping at the desired item.   Use the > key to select the right data display (blinks) and use the "UP arrow" key to select the data to be displayed. Return to the normal display by pressing the DISPLAY or any numeric key.

Display Hold
Pressing the following keys causes the display to "freeze" the current value for approximately 1 second:

0 - dual display
1 - totalizer count
3 - rate

Counting continues in the background. After the hold time elapses, the display updates to the new current value(s) and continues normal run mode updating thereafter.

Entering Setpoints
Setpoint data can be entered into the following items:

TOTAL SETPOINT
LO RATE
HI RATE

To enter data, select the setpoint to be changed by pressing the desired key. The setpoint label and data should now be shown on the display. Press CLR, 0-9 (key in the new number), and ENT key. The new value for the setpoint is now entered into the control. The setpoints can be locked in the Program Mode such that the value cannot be changed in the Run Mode.

2nd Function Keys
Five different control parameters and the current version of software can be viewed by using the second function key. The selected item is shown for five seconds and then the display is returned to its prior state. To use the second function key, press the "up arrow" key follow by one of the number keys. The number key must be pressed within 3 seconds of pressing the up arrow key.

1 - K Factor
2 - KMF HIGH
3 - KMF LOW
4 - R Factor (0.00001 - 999999)
5 - Analog Out
6 - Current Version of Software

Reset Key
The reset key is programmable to perform different tasks for the Totalizer and Ratemeter functions of the unit. The key can be programmed to perform only one task under each of the two major control functions shown below. The following table lists the tasks that can be selected.

KEY	CONTROL FUNCTION	
	RATE	TOTAL
Reset	☐ None ☐ Unlatch Hi/Lo Alarms	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch

CONTROL INPUTS

There are 5 control inputs which can be programmed to any of the functions shown in the chart below. An input can be assigned up to two tasks but only one task can be assigned under each of the two control functions shown below.

CONTROL INPUT	CONTROL FUNCTION	
	RATE	TOTAL
1	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
2	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
3	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
4	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch
5	☐ None ☐ Unlatch Output	☐ None ☐ Reset Count ☐ Unlatch Output ☐ Reset & Unlatch

Program Mode

ALL CTRL INPUTS are disabled in the PROGRAM MODE. The RESET key performs programming functions only.

TRANSISTOR OUTPUTS

T1   Scaled pulse output transistor. As a scaled pulse output, this transistor provides a count pulse out to a second counter while that totalizer is counting.

T2   Totalizer setpoint. This transistor turns on when the Totalizer setpoint is reached.

T3   Rate high alarm output transistor. This transistor turns on at the rate update if the calculated rate is greater than the high rate setpoint.

T4   Rate low alarm output transistor. This transistor turns on at the rate update if the calculated rate is less than the low rate setpoint.

RELAY OUTPUTS

K1   Scaled switch output. As a scaled switch output, this relay provides a switch closure or opening as programmed to the total setpoint, rate LO setpoint, rate HI setpoint or rate LO/HI setpoint.

K2   Scaled switch output. As a scaled switch output, this relay provides a switch closure or opening as programmed to the total setpoint, rate LO setpoint, rate HI setpoint or rate LO/HI setpoint.

The detailed submenu descriptions in the program mode section give the options for turning the transistors off.

MESSAGES

A number of messages are available for display during the run mode or while the unit is entering the run mode from a power up or exit from program mode condition.   Diagnostic messages may also be displayed while the unit is running self-test.

Run Mode Messages

INV - Invalid Key

ANA OUTPUT ERROR - The 4 mA output rate is greater than the 20 mA output rate.

OVERFLOW - If the calculated rate is greater than 999999, the word OVERFLOW will appear in the rate display.

SERIAL COMMUNICATIONS

INTRODUCTION TO SERIAL COMMUNICATIONS

PURPOSE

The Flow Rate Totalizer is equipped with an RS-485 serial communication port for the purpose of allowing a computer to:

1. Issue control commands such as reset.

2. Ad..cc (acknowledge with data, d...., and checksum of the data, cc)

3. Nee (not acknowledge with a two digit error code, ee).

4. Query and program all program mode sub menus except numbers 13, 15, 42, 43 & 44.

The serial format follows the Opto 22 Optomux protocol. this consists of a start character (>), a two character unit ID number, a three character command, data for the command, if applicable, a two character checksum and a termination character.

Each character is ten bits. The first bit is the start bit, followed by seven data bits (ASCII code), followed by the parity bit and the tenth bit is the stop bit. If the unit is programmed to space parity, the unit ignores the received parity and transmits space parity. The unit ID number and the checksum are in ASCII hexadecimal and have a rage of 00 to FF. The checksum id the two least significant hex digits of the sum of the ASCII values of the unit ID number, the command and the data. All hex characters A through F must be in upper case. All leading zeros in data field must be sent. Decimal points within the data field are indicated by and ASCII comma. Commas within the data fields sent to the control are ignored. The termination character may by an ASCII carriage of an ASCII decimal point.

Responses by the control consist of three possibilities:

1. A(acknowledge)

2. Ad..co(acknowledge with data, d..., and checksum of the data, cc)

3. Nee (not acknowledge with two digit error code, ee)

Example:

Command sent to control - >01RST18B.

Where;
>   is the start character,
01 is the unit ID number,
RST is the three character command (reset),
1 is applicable data (reset option - reset only),
8B is the two least significant digits of the hexadecimal checksum,

0	1	R	S	T	1

 30+31+52+53+54+31   = 18B hexadecimal

Error Codes

ERROR CODES CONSIST OF THE FOLLOWING:

01 Invalid Command
02 Communication Checksum Error
03 Buffer Overrun Error
05 Data Format Error
08 Parity or Framing Error
10 In Run Mode, Command not Allowed
12 In Program Mode, Command not Allowed
13 Mode Already Active. Command not Allowed
21 Data out of Range
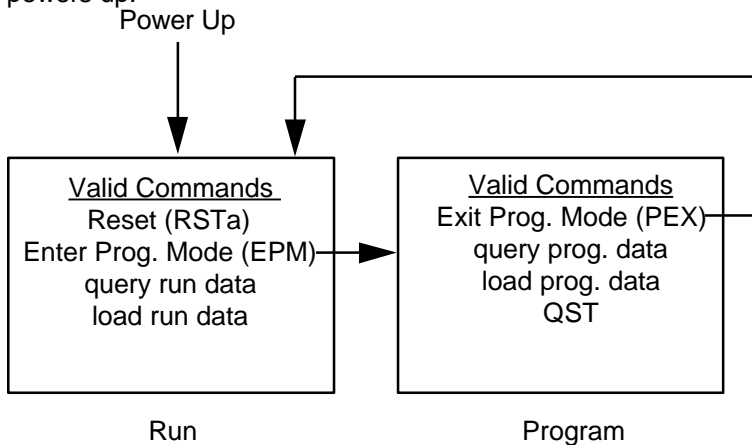

CLASSIFICATIONS

All serial commands fall into one of five classifications. These classifications are:

1. Control Commands
2. Query Run Data
3. Load Run Data
4. Query Program Data
5. Load Program Data

The control has two modes of operation; run mode and program mode. The control will respond to specific commands only if the command is valid for the mode of operation the control is in when the command is received. Command validity is addressed in the following section and all specific commands are described in detail in the following tables.

Control Commands

There are three control commands. Two of them, Enter Program Mode and Exit Program Mode are used to change the control's mode of operation.   The following flow chart illustrates the validity and function of each control command and the validity of the other four command classification in each mode of operation. Note that the control goes into the run mode when it powers up.

Power Up

Valid Commands	Valid Commands
Reset (RSTa)	Exit Prog. Mode (PEX)
Enter Prog. Mode (EPM)	query prog. data
query run data	load prog. data
load run data	QST

Run   Program

The third control command, reset, does not change the control's mode of operation, but merely performs a reset and/or unlatch function while leaving the control in the run mode. the Rest control command is suffixed by one digit (a) which allows for secondary functions to occur along

with the Reset function. All secondary functions are listed in the following control command table.

All commands in the following tables are precede by the start character (>) and unit number and succeeded by the two character checksum and carriage return.

The following control commands are supported by this control:

Command	Response	Description
RSTa	A	RESET COMMAND
		Where "a" determine functions to be performed
Digit "a"	1	Reset Totalizer
	2	Unlatch Totalizer
	3	Reset Totalizer & Unlatch Totalizer Output
	4	Unlatch Rate Alarms
	5	Reset Totalizer & Unlatch Rate Alarms
	6	Unlatch Totalizer Output & Rate Alarms
	7	Reset Totalizer, and Unlatch Totalizer Output and Rate Alarm
EPM	A	ENTER PROGRAM MODE
PEX	A	EXIT PROGRAM MODE

QUERY RUN DATA COMMANDS

This classification of commands allows the computer to read run data information such as status, count, rate, setpoint, etc. These commands are valid in run mode only, except for QST (query status), which is valid in all modes of operation.

The following Query Run Data commands are supported:

Command	Response	Description
QST	AST abcde	QUERY STATUS
		Where a = Current Mode
		R - Run Mode
		P - Program Mode
		b = Totalizer Output Status
		A - Output On
		N - Output Off
		c = Rate High Alarm Status
		A - Alarm On
		N - No Alarm
		d = Rate Low Alarm Status
		A - Alarm On
		N - No alarm
QRT	ART aaaaaa	Query Rate
		where aaaaa = Rate
QTC	ATC aaaaaaaaaa	QUERY TOTALIZER COUNT
		where aaaaaaaaaa + Totalizer Count
QRH	ARH aaaaaa	QUERY STATE HI SETPOINT
		where aaaaaa = Rate Hi Setpoint

QRL	ARL aaaaaa	QUERY STATE LO SETPOINT
		where aaaaaa = Rate Lo Setpoint
QTS	ATS aaaaaaaaaa	QUERY TOTALIZER SETPOINT
		where aaaaaaaaaa = Totalizer Stpnt.
		(totalizer mode)
QMD	Aa...	QUERY MENU DATA
		where a... = Data Specified in Current
		Menu
QAP	Aab c... ab c... ...	QUERY ALL PROGRAM DATA
		where a = Program Menu Row
		b = Program Menu Column
		c = Applicable Data

LOAD RUN DATA COMMANDS

This classification of commands allows the computer to write setpoints to the control and specify the control's response to the QMD command. These commands are valid only in the run mode.

The following Load Run Data Commands are supported:

Command	Response	Description
LRHaaaaaa	A	LOAD RATE HI SETPOINT
		where aaaaaa = Rate Hi Setpoint
LRLaaaaaa	A	LOAD RATE LO SETPOINT
		where aaaaaa = Rate Lo Setpoint
LTSaaaaaaaaaa	A	LOAD TOTALIZER SETPOINT
		where aaaaaaaaaa = Totalizer Stpnt.
		(totalizer mode)
LCMab	A	LOAD COMMUNICATION MENU
		where ab determine the information that will be sent by the control when it is issued a QMD command. The following table illustrates the bit assignments for the available data. Setting the appropriate bits will cause that data to be sent.
Digit "a"	Bit 0	Status
(0-F)	Bit 1	Flow Rate
	Bit 2	Rate Low Setpoint
	Bit 3	Rate High Setpoint
Digit "b"	Bit 0	Totalizer Count
(0-F)	Bit 1	Totalizer Setpoint
	Bit 2	K Factor
	Bit 3	Rate Multiplier

QUERY PROGRAM DATA/LOAD PROGRAM DATA COMMANDS

Query commands allow the computer to read program data from the control and load commands allow the computer to write program data to the control. Each command consists of a L (load) or a Q (query) and the two digit submenu number of the program mode sub menu illustrated on page 5. All program mode sub menus are serially accessible except numbers 13, 15, 42, 43 and 44. These commands are valid only in the program mode.

The following program mode commands are supported by this control. Decimal Points are not required by the command except for those program blocks which allow for a floating decimal point. All other program blocks will insert the decimal point in the correct location.

Command	Response	Description
L11 aaaaa	A	Load K Factor where aaaaa = K Factor (D.P. valid)
Q11	A11 aaaaa	Query K Factor where aaaaa = K Factor
L12 aaaaaa	A	Load Rate Multiplier where aaaaaa = Multiplier (D.P. valid)
Q12	A12 aaaaaa	Query Rate Multiplier where aaaaaa = Multiplier
L14 aaaaaa bbbbbb	A	Load Analog Rate where aaaaaa = 4 mA rate bbbbbb = 20 mA Rate
Q14	A14 aaaaaa bbbbbb	Query Analog Rate where aaaaaa = 4 mA rate bbbbbb = 20 mA rate
L21 a b	A	Load Totalizer Control Input where a = Control Input (1-5) b = 0 No Function 1 Reset Totalizer 2 Unlatch Output 3 Reset & Unlatch
Q21	A21 a b ...	Query All Totalizer Control Inputs where A = Control Input B = 0 - No Function 1 - Reset Totalizer 2 - Unlatch Output 3 - Reset and Unlatch
L22 a	A	Load Totalizer Pulse Output Speed where a = 0 - No Pulse 1 - Pulse Fast 2 - Pulse Medium 3 - Pulse Slow
Q22	A22 a	Query Totalizer Pulse Output Speed where a = 0 - No Pulse 1 - Pulse Fast 2 - Pulse Medium 3 - Pulse Slow
L23 aaaa	A	Load Totalizer Output Time where aaaa = Output Time
Q23	A23 aaaa	Query Totalizer Output Time where aaaa = Output Time
L24 a	A	Load Totalizer Reset Key Function where a = Reset Key Function = 1 - Reset Totalizer 2 - Unlatch Output 3 - Reset & Unlatch

Q24	A24 a	Query Totalizer Reset Key Function where
		a = Reset Key Function
		  = 0 - No Function
		    1 - Reset Totalizer
		    2 - Unlatch Output
		    3 - Reset and Unlatch

L25 a	A	Load Totalizer D.P. Location where
		a = 0 - No Dec. Pt.
		    1 - XXXXXXXXX.X
		    2 - XXXXXXXX.XX
		    3 - XXXXXXX.XXX
		    4 - XXXXX.XXXX
		    5 - XXXX.XXXXX

Q25	A25 A	Query Totalizer D.P. Location where
		a = 0 - No Dec. Pt.
		    1 - XXXXXXXXX.X
		    2 - XXXXXXXX.XX
		    3 - XXXXXXX.XXX
		    4 - XXXXX.XXXX
		    5 - XXXX.XXXXX

L31 aa	A	Load Ratemeter Smoothing where aa = Smoothing Fact. (0.5-7.5) (Must be .5 sec. resolution)
Q31	A31 aa	Query Ratemeter Smoothing where aa = Smoothing Factor
l32 a b	A	Load Ratemeter Control Input where a = Control input (1-5) b = 0 - No Function = 1 - Unlatch Alarms
L33 a bbbb cccc	A	Load Ratemeter Output Function where a = 0 - Time Outputs bbbb = Low Rate Output time cccc = High Rate Output Time
or L33 a		a = 1 - Outputs Follow
Q33	A33 a bbbb cccc	Query Ratemeter Output Function where a = 0 - Timed Outputs bbbb = Low Rate Output Time cccc = High Rate Output Time
or Q33	A33 a	Where a = 1 - Outputs Follow

L34 a	A	Load Ratemeter Reset Key Function where
		a = Reset Key Function
		    0 - No Function
		      1 - Unlatch Outputs

Q34	A34 a	Query Ratemeter Reset Key Function where
		a = Reset Key Function
		    0 - No Function
		    1 - Unlatch Outputs

L35 a	A	Load Ratemeter D.P. Location where
		a = 0 - No Dec. Pt.
		    1 - XXXXX.X
		    2 - XXXX.XX
		    3 - XXX.XXX
		    4 - XX.XXXX
		    5 - X.XXXXX

Q35	A35 a	Query Ratemeter D.P. Location where
		a = 0 - No Dec. Pt.
		    1 - XXXXX.X
		    2 - XXXX.XX
		    3 - XXX.XXX
		    4 - XX.XXXX
		    5 - X.XXXXX

L36 aa	A	Load zero Rate Time where aa = Zero Time (01-15)
Q36	A36 aa	Query Zero Rate Time where aa = Zero Time
L37 aaa	A	Load Rate Display Header where aaa = Rate Display Header (Space or Uppercase letters)
Q37	A37 aaa	Query Rate Display Header where aaa = Rate Display Header
L41 a b	A	Load Key Lock (Keys 2,4,5) where a = Key Number (2,4,5) b = 0 - Unlocked 1 - Locked

Q41	A41 a b	Query Key Lock (Keys 2,4,5) where
		    a = Key Number (2,4,5)
		    b = 0 - Unkocked
		    = 1 - Locked

L45 a	A	Load Count Speed where
		a = 0 - Low - 40 Hz Max.
		    1 - Med 400 Hz Max
		    2 - High 7500 Hz Max.

Q45	A45 a	Query Count Speed where
		a = 0 - Low 40 Hz Max.
		    1 - Med 400 Hz Max.
		    2 - High 7500 Hz Max.

L46 a b	A	Load Programmable Relay K1 or K2
		  where a = Relay K1 or K2
		        b = 0 - 4

where 0 = NONE (not prog)
    1 = TOTAL SP
    2 = RATE LO SP
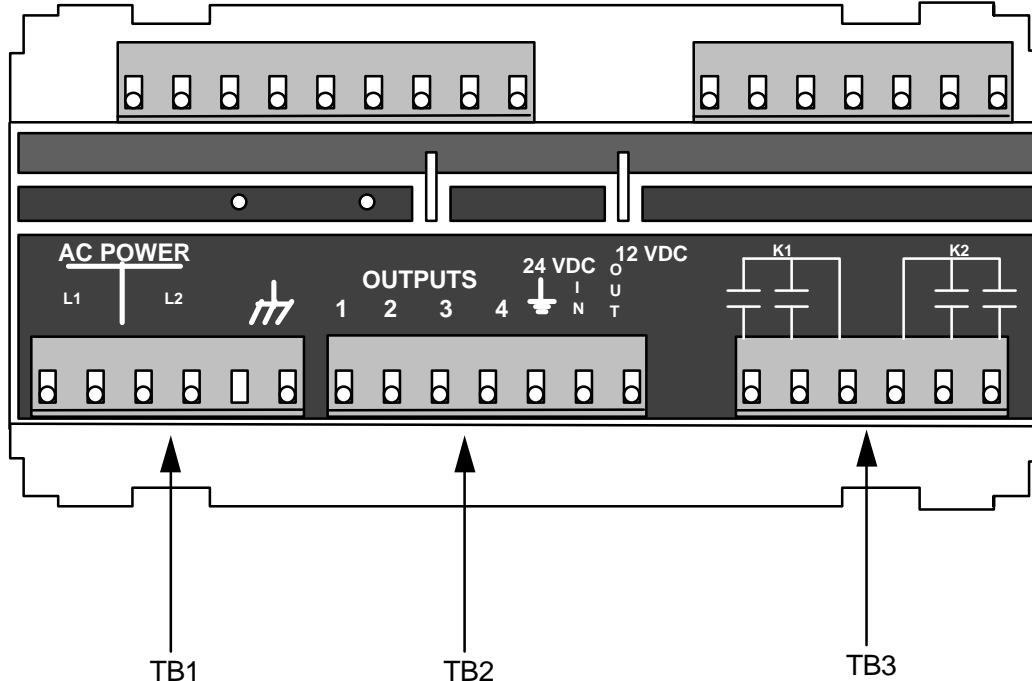   3 = RATE HI SP
    4 = RATE LO/HI

q46	a46 a b a b	Load Programmable Relay K1 or K2
		where a = Relay K1 or K2
		b = 0 - 4

I/O TERMINAL DESCRIPTION

TB1   TB2   TB3

TB1 AC POWER INPUT

AC POWER L1 Terminal connection for 120 VAC.

AC POWER L2 Terminal connection for 120 VAC.

Chassis ground. This terminal should be connected to earth ground.

TB2 TRANSISTOR OUTPUTS, 24 and 12 VDC POWER

OUTPUT 1	Totalizer scaled pulse output.
OUTPUT 2	Totalizer setpoint output.
OUTPUT 3	Rate low alarm output.
OUTPUT 4	Rate high alarm output.
24 VDC	DC common. When unit is powered by DC, connect minus side of 18 - 27 VDC power supply to this terminal. When unit is supplies 24 VDC power for accessories, connect accessory DC common to this terminal.
24 VDC IN	When unit is powered by DC, connect plus side of 18 - 27 VDC power supply to this terminal.
12 VDC OUT	Plus 12 VDC accessory power. Connect this terminal to the accessory plus 12 VDC input. Accessory power is available only if the unit is powered by AC.

RELAY OUTPUTS

K1	Normally open and closed relay scaled pulse output.
K2	Normally open and closed relay scaled pulse output.

TB4   TB5

TB4 ANALOG OUTPUT(EA230-10), FLOWMETER INPUT, COMMUNICATIONS OUTPUT

ANLG OUT +   The analog output positive terminal is connected to the analog circuit
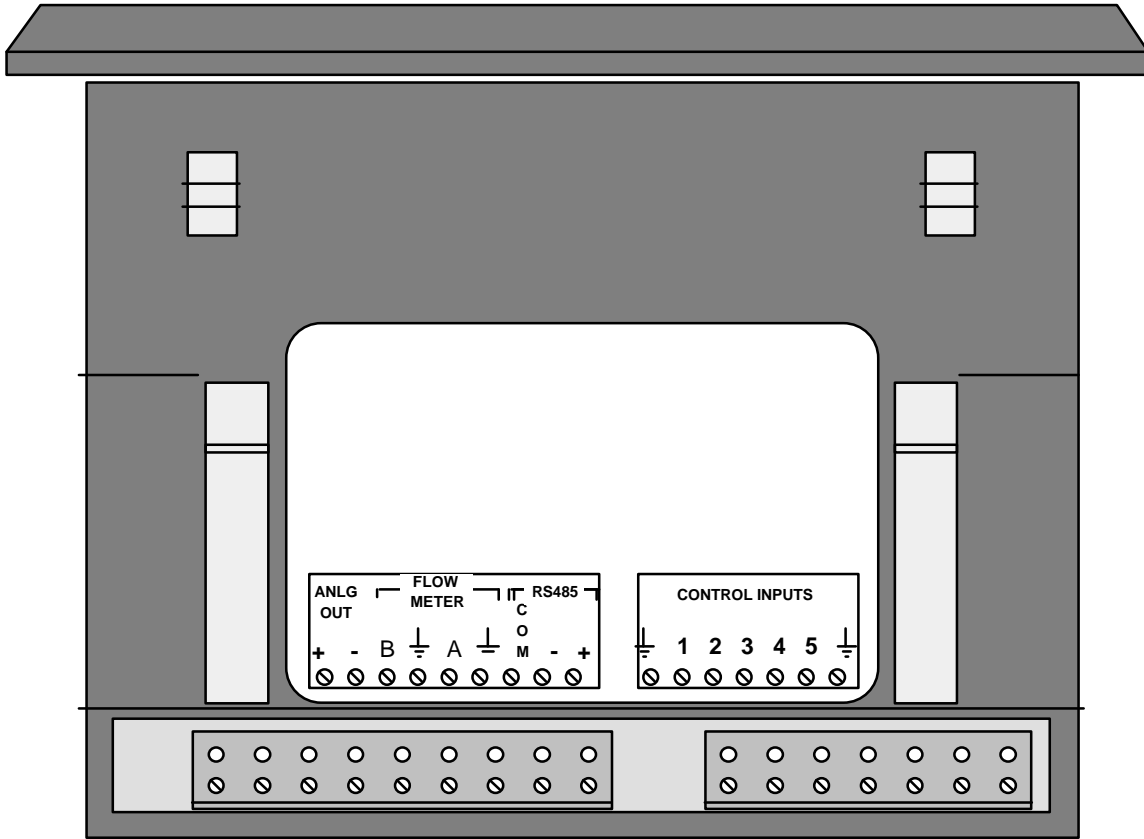   power supply positive or the 24 VDC out terminal on TB2.
                   Maximum voltage applied to ANLG OUT + IS 27 VDC.
                   MINIMUM VOLTAGE IS 12 VDC + LOAD DROP @ 20 mA.

ANLG OUT -   The analog output negative terminal is connected to the analog load
                   positive terminal. The 4 - 20 mA signal with respect to common is
                   put out at the ANLG OUT - terminal.

FLOWMETER B   This is the inhibit input.

FLOWMETER $\perp$ DC common. DC common is the reference level for the flowmeter
                   and control inputs (input active when connected to DC common) and
                   transistor outputs conduct to DC common when in the "on" state.
                   DC Common is not connected to chassis ground.

FLOWMETER A   This terminal is the count input.

RS 485 COM   Communications common terminal. Connected to DC common by

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a 100 Ω internal resistor.

RS 485-/RS 485+   Communications differential signal input/output.

TB5 CONTROL INPUTS

CONTROL INPUTS⏚   DC Common. Control inputs are active when connected to DC
common.

CONTROL INPUTS
1, 2, 3, 4, 5 mode   Programmable inputs which may be assigned to various functions
as explained in the program mode.

WIRING

AC Power Input

AC POWER

L1 L2

OUTPUTS
1 2 3 4

24 VDC 12 VDC

Safety
Ground

Neutral

Hot

120 VAC
Power In

1. Fuse: .2A Slow-Blow
2. The two terminals marked L1 are internally connected together.
3. The two terminals marked L2 are internally connected together.

DC Power Input

AC POWER

L1 L2

OUTPUTS
1 2 3 4

24 VDC 12 VDC

+V

Common

Safety
Ground

18 to 27 VDC
Power In

1. Fuse: .5A Slow-Blow
2. Safety ground optional, only required if relays are switching AC Power.

Flow Input Sensor with External Power Supply

Current Sinking NPN Transistor Output with Pull Up Resistor

MADE IN U.S.A.

ANLG OUT + −   **FLOW METER** B ⏚ A ⏚   **RS485** C O M − +   **CONTROL INPUTS** ⏚ 1 2 3 4 5 ⏚

+5 to 24VDC

Power Supply

Common

AC POWER L1 L2   **OUTPUTS** 1 2 3 4   **24 VDC** I N   **12 VDC** O U T
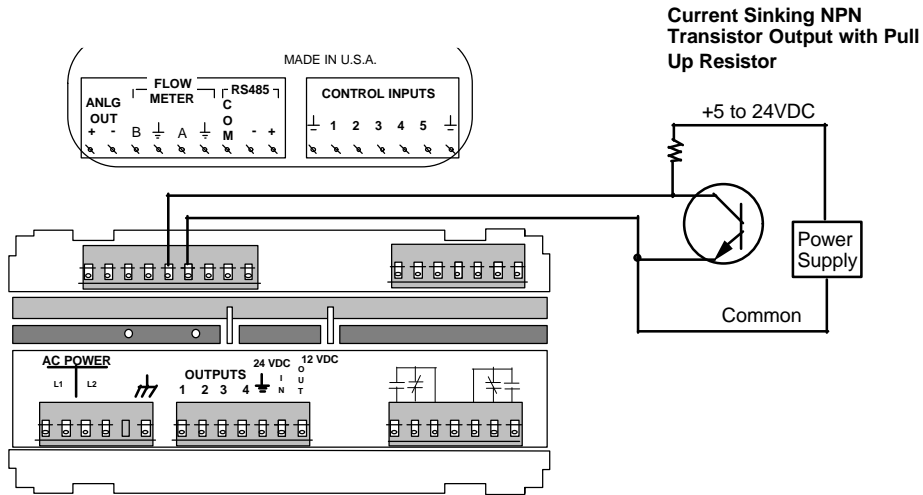
Flow Input Sensor with Control Power Supply

Current Sinking with Open Collector NPN Transistor

MADE IN U.S.A.

ANLG OUT + −   **FLOW METER** B ⏚ A ⏚   **RS485** C O M − +   **CONTROL INPUTS** ⏚ 1 2 3 4 5 ⏚

AC POWER L1 L2   **OUTPUTS** 1 2 3 4   **24 VDC** I N   **12 VDC** O U T

+12VDC   100 mA max.
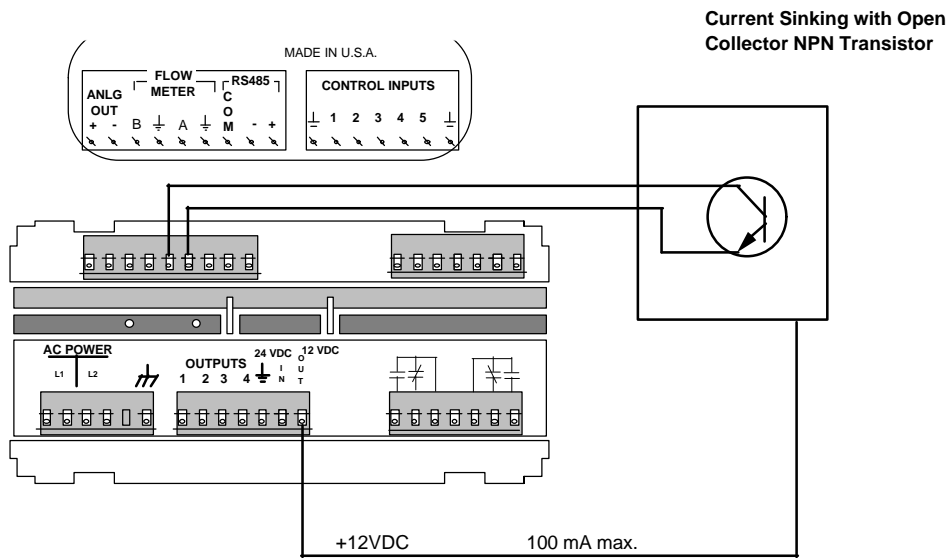
Do not connect the 12VDC out terminal to the sensor if the sensor is powered from another source.

Inhibit Input

MADE IN U.S.A.

ANLG OUT
+ -

FLOW METER
B A

RS485
C O M - +

CONTROL INPUTS
1 2 3 4 5

AC POWER
L1 L2

OUTPUTS
1 2 3 4

24 VDC
IN

12 VDC
OUT
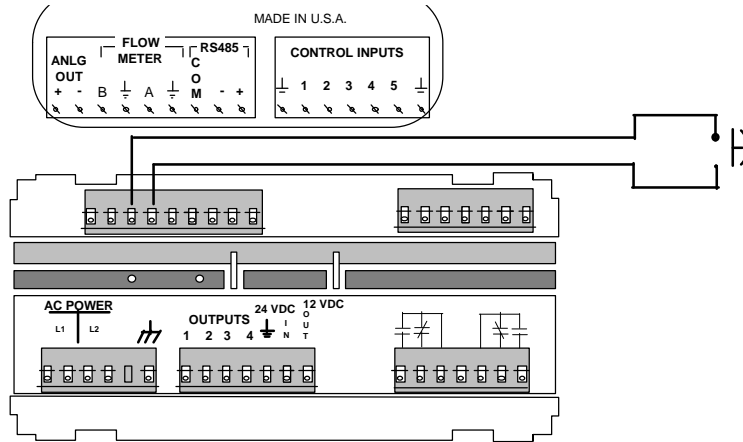
1. Inhibit input device may be a switch or an NPN transistor.

Wiring Control Inputs

MADE IN U.S.A.

ANLG OUT
+ -

FLOW METER
B A

RS485
C O M - +

CONTROL INPUTS
1 2 3 4 5

AC POWER
L1 L2

OUTPUTS
1 2 3 4

24 VDC
IN

12 VDC
OUT
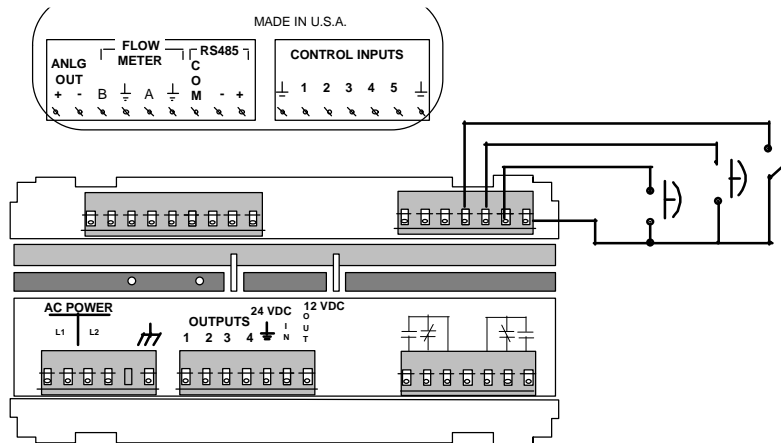
1. Control input device may be a switch or an NPN transistor.
2. Control inputs 1 and 2 wired in a similar manner.

Analog Rate Output (Non-Isolated)

MADE IN U.S.A.

FLOW METER — RS485
ANLG OUT
+ - B ⏚ A ⏚ C O M - +
CONTROL INPUTS
⏚ 1 2 3 4 5 ⏚

AC POWER
L1 L2 ⏚
OUTPUTS
1 2 3 4 24 VDC 12 VDC
I N O U T

+ -
Monitoring Equipment

Note: 24 VDC Power Supply Is Integrated into Analog Loop
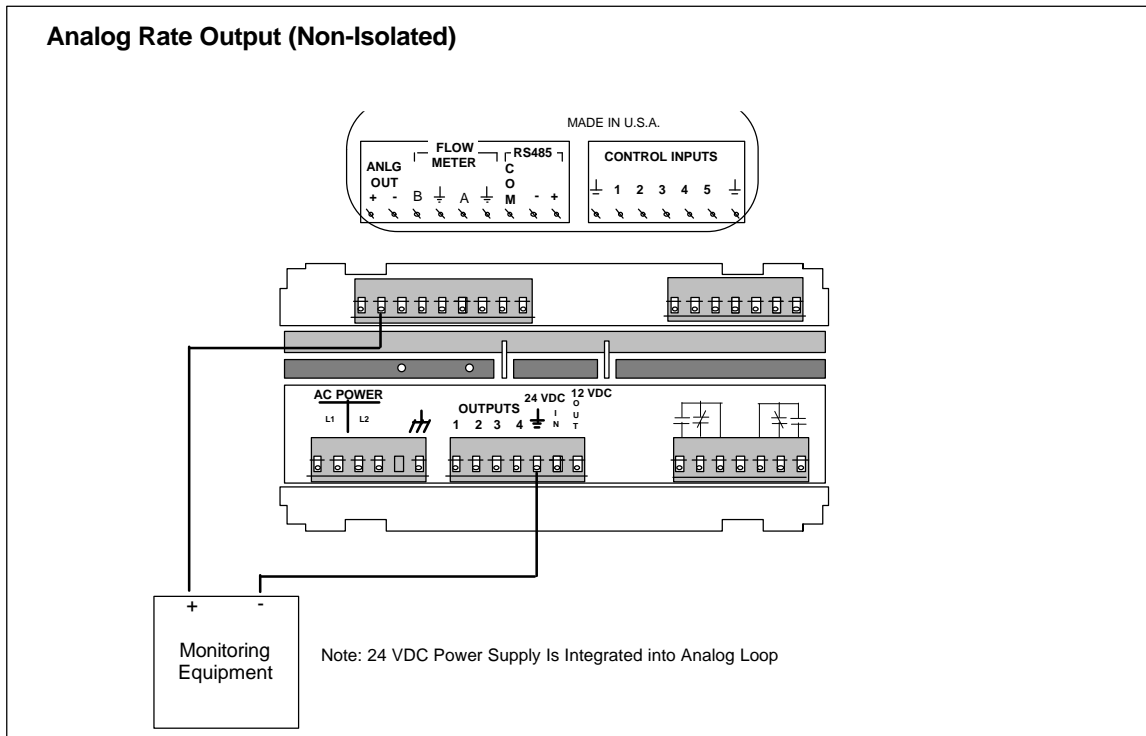
**Wiring DC Loads
To Transistor Outputs**

AC POWER
L1 L2 ⏚
OUTPUTS
1 2 3 4 24 VDC 12 VDC
I N O U T

Common

30 VDC max.voltage

+VDC

1. The load must not draw more than 150 mA of current.
2. Outputs 3 and 4 wired in the same manner as outputs 1 and 2.

34
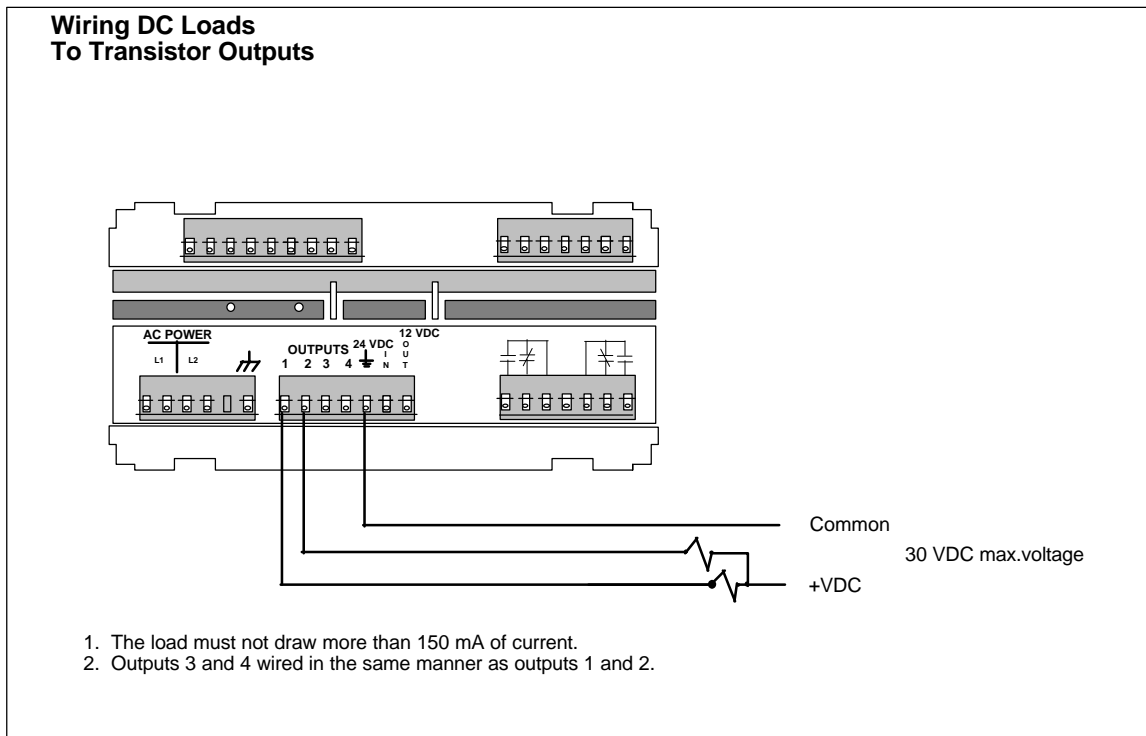
**Wiring Loads
To Relay Outputs**

AC POWER
L1 L2

OUTPUTS 24 VDC 12 VDC
1 2 3 4   I N   O U T

K1   K2

Common

277 VAC, 30 VDC max.voltage

Load   +V

150   0.25
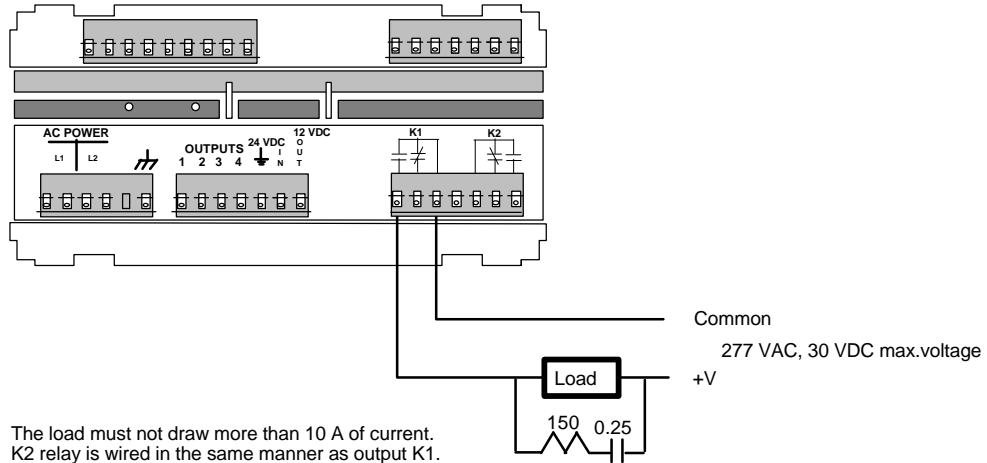
1. The load must not draw more than 10 A of current.
2. K2 relay is wired in the same manner as output K1.
3. Load is shown for normally open operation, if normally closed operation is desired, connect to other terminal.

SPECIFICATIONS

ENVIRONMENTAL

Temp:	Operating 0 to 55 C
	Storage -40 to 70 C
Humidity:	0 to 85% RH non-condensing
Front Panel:	Sealed to Nema 4X

INPUTS

Power:	120 VAC+10%, -15%, 50/60 Hz @ 0.2 amps or 18 to 27 VDC @ .4 amps max. 5 watts max.
Control Inputs:	
Number:	5
Type:	Requires current sinking device such as contact closure to ground or NPN transistor to ground.
Impedance:	5.8k to +5 VDC
Voltage:	High 3.5 To 24 VDC
	Low 0.0 to 1.3 VDC
Response	Min Low 30 ms., min. high 30 ms.
Flow Inputs:	
Number:	2
Type:	Count with Inhibit. Requires current sinking device such as contact closure to ground or NPN transistor to ground.
Impedance:	5.8 to +5 VDC
Voltage:	High 2.8 to 24 VDC
	Low 0.0 to 1.3 VDC
Response:	High 0 - 7.5 kHz, min. pulse width 50 µsec.
	Med. 0- 400 Hz, min. Pulse width 1.25 msec.
	Low 0 - 40 Hz, min. Pulse width 10 msec.

OUTPUTS

Accessory Power:	12 VDC+5%, 100 mA max.
Totalizer Setpoint	
Type:	1 NPN transistor.
Rating:	150 mA maximum, 30 VDC blocking maximum
Operation:	Latched or timed from 00..1 to 99.99 seconds
Rate Alarms:	
Type:	2 NPN transistors for indicating Rate outside High/Low setpoints.
Rating:	150 mA maximum 30 VDC blocking maximum
Operation:	Follows, latched or timed from 00.01 to 99.99 seconds
Scaled Pulse:	
Type:	1 NPN transistor for remote totalizing
Rating:	150 mA maximum,, 30 VDC blocking maximum.
Operation:	Outputs pulse for every increment of the internal totalizer.
	Output pulse width selectable from:
	Fast - 125 µsec. pulse width, 1.5 kHz max. frequency
	Med - 2 msec. pulse width 200 Hz max. frequency.
	Slow - 50 msec. pulse width, 10 Hz max. frequency.
Flow Rate (EA230-10):	
Type:	4-20 mA current loop, optically isolated.
Voltage:	Compliance voltage 12 - 27 VDC
Response:	2 Hz.
Accuracy:	$\pm$ 1% @ 25 C, $\pm$.25% over temp.
Resolution:	11 bits

RATEMETER
 Type: 1/Tau.
 Display: 6 digits with 3 character units of measure identifier.
 Accuracy: $\pm$.05%
 Rate Multiplier: .00001 to 999999.
 Rate Smoothing: .5 to 7.5 sec. in .5 sec steps.

K FACTOR
 Range: .0001 to 99999.

COMMUNICATIONS
 Type: RS-485 multidrop.
 Baud Rate: 300, 600, 1200, 2400, 4800, 9600, 19200.
 Parity: Space, Even, Odd
 Protocol: Opto-22 compatible.

DIMENSIONS

ANLG OUT + - **FLOW METER** B ⏚ A ⏚ **RS485** C O M - + **CONTROL INPUTS** ⏚ 1 2 3 4 5 ⏚

4.125

2.62"

3.42"

AC POWER L1 L2 **OUTPUTS** 1 2 3 4 **24 VDC** O U T **12 VDC** I N **K1** **K2**

5.38"

6.18"