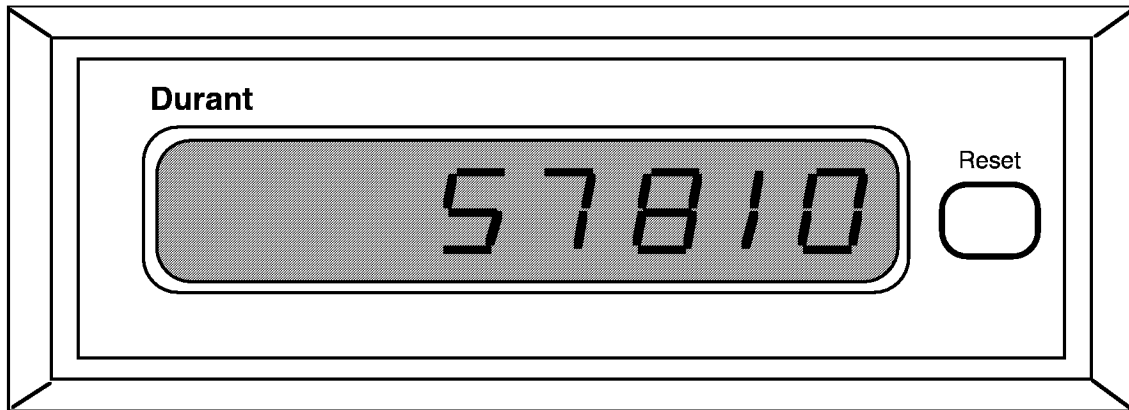


## PRESIDENT SERIES COUNTER/RATEMETER

MODEL:

57810-400/401



### TABLE OF CONTENTS

1	General Description
2	Application Procedure/Installation/Setup Procedures
3	Count Modes
6	Wiring Diagrams
10	Rate Meter Operation & Sample Time
11	Troubleshooting
12	Specifications
13	Count Signal Terminology
14	Quick Reference/Replacement Parts
16	Warranty



# INTRODUCTION

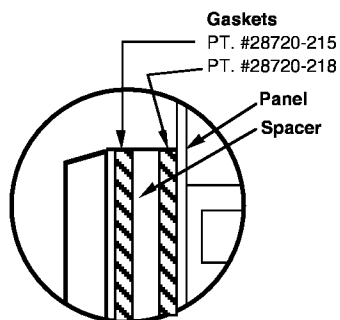
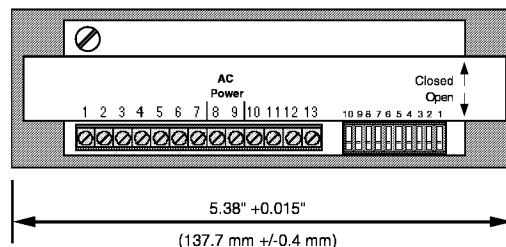
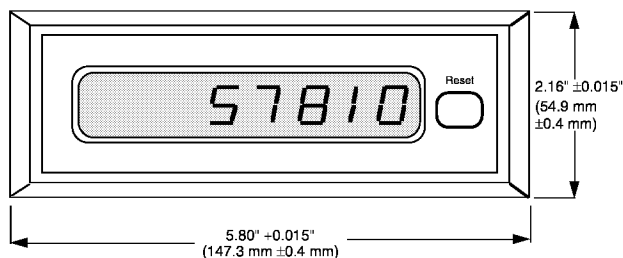
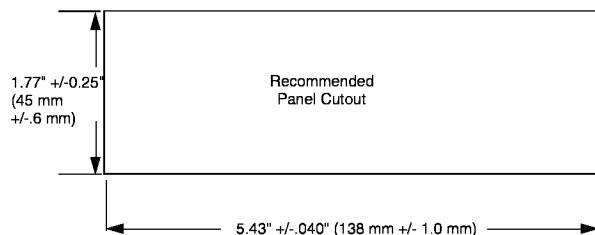
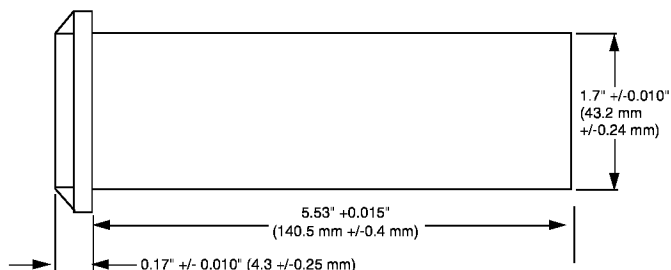
## General Description

Model 5781 is a seven (7) digit bidirectional counter and ratemeter with a memory that retains all information when power is off. The adjustable sample time of the rate function allows the rate display to indicate meaningful engineering units such as feet/minute, gallons/minute, inches/second, etc. A remote switch wired to the display allows the display to be switched between count and rate information that is being measured simultaneously. A decimal point can be programmed between any two digits for both count and rate displays.

The 14 different count modes enable the unit to totalize information from two (2) different count sources without the use of a simultaneous input processor.

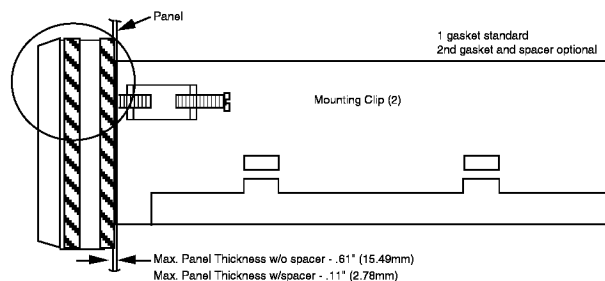
The display and keyboard are sealed behind a special mylar label. When properly panel mounted with the gasket supplied, it will meet Nema 4 standards.

All wiring, solid or stranded, from 14 to 28 ga. is connected with screw terminals to the rear terminal strip.



**Note:** Use of optional spacer and gasket reduces unit depth from 5.53" (140.5mm) to 5.03" (127.8mm)

Spacer Kit PT. #38810-400



# APPLICATION/SETUP PROCEDURES

Applying the Model 5781 counter to any given situation requires that the tasks shown below be performed. It is recommended that the counter be set up for the particular application desired before installation if the dip switches on the rear of the counter are not readily accessible once the counter is installed.

## Analyze the Application

	<u>Page</u>
1. Determining the count input frequency	2
2. Select count mode (two most common count modes are shown below.) All count modes	3 to 6
3. Determine the decimal point location	3
4. Determine the rate display decimal point location	3
5. Calculate the rate sample time	11
6. Determine if reset is to be maintained or momentary	3

## Setup Counter Options

Following the setup procedures on pages 2 and 3, set up the codes that had been determined when analyzing the application.

Set up the front panel reset disable per instructions on page 3.

## Install the Counter

Mount the Counter following cutout dimensions shown on page 1. Wire the counter following wiring diagrams on pages 6 through 10.

## Two Most Common Count Modes

### Count Mode 2 - Quadrature

Input 1: The most common quadrature signal source is a Quadrature Shaft Encoder. The counter counts up when the encoder rotates in one direction, down in the other direction. Reversing the input wiring reverses the count direction.

Rate Measurement: # low transitions on input 1 during the sample time. (Direction of rotation does not affect Rate Measurement.)

### Count Mode 0 - Add/Subtract

Input 1: Low transitions each result in one (1) count added.

Input 2: Low transitions each result in one (1) count subtracted.

Rate Measurement: #low transitions on input 1 during the sample time.

## GENERAL SETUP INFORMATION

Power must be supplied to the counter to perform the setup of the count modes, decimal points, and rate sample time. The non volatile memory will retain the setup information when the power is removed.

The count input frequency, maintained or momentary reset, and front panel reset disable setups are determined by the position of the corresponding dip switches. Changes to these setups are made by simply changing the position of the switches, with or without power applied.

## SETUP PROCEDURES

### Factory Setups

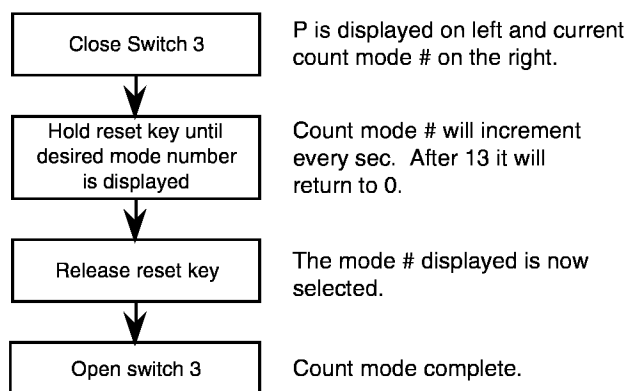
Count Mode = 0  
Count Decimal Point = None  
Rate Sample Time = 1.000 sec.  
Rate Decimal Point = None

### Count Input Frequency Setup

Use the low frequency mode whenever the input signal speed is less than 150 Hz to increase noise immunity and debounce mechanical contacts. (When a count input is unused set it in the Low Frequency Mode.)

Switch 1 - Input 1: Closed = Low Frequency  
Open = High Frequency  
Switch 2 - Input 2: Closed = Low Frequency  
Open = High Frequency

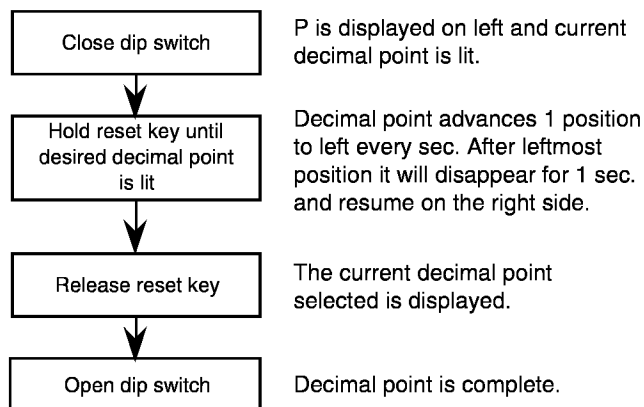
### Count Mode Setup\*



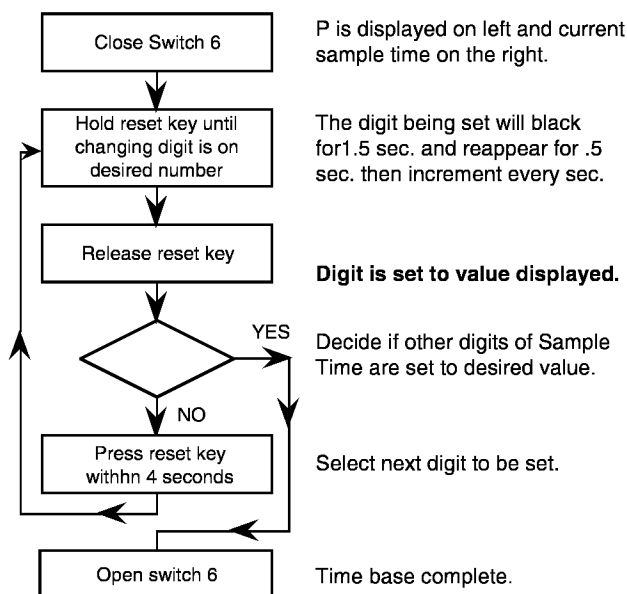
# SETUP PROCEDURES/COUNT MODES

## Decimal Point Setup\*

Switch 4: Set Count Display Decimal Point  
Switch 5 - Set Rate Display Decimal Point



## Rate Sample Time Setup\*



## Maintained or Momentary Reset Setup

Maintained reset - switch 7 open

Count will reset to 0 and incoming count signals will be ignored while the reset key or terminal is held on.

Momentary reset - switch 7 closed

Count will reset to 0 to the instant the reset key or terminal turns on. Incoming count signals are counted immediately after the count resets, even if the reset is held on.

## Front Panel Reset Disable Setup

The front panel reset key can be disabled. The only way to reset the counter when the front panel key is disabled is by energizing the remote reset terminal (11).

Reset key enabled - switch 9 close  
Reset key disabled - switch 9 open

\*Open switch 9 during setup if count reset must be avoided.

## COUNT MODES

### Add/Subtract Counting Mode

#### Count Mode 0: Add Subtract

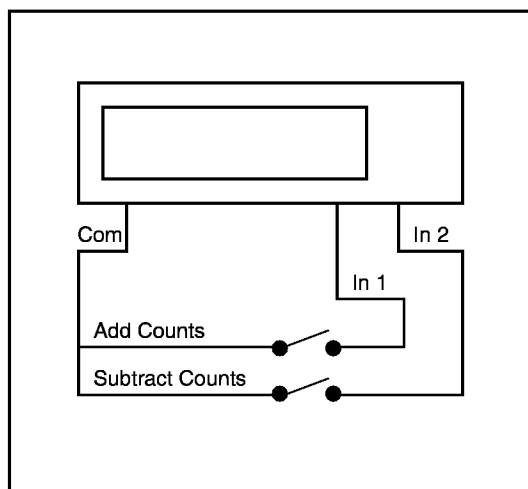
Input 1: low transitions each result in one (1) count added.  
Input 2: low transitions each result in one (1) count subtracted.

Rate measured: # of low transitions on Input 1 during the sample time.

#### Count Mode 1: Add/Subtract Doubled

Input 1: low and high transitions each result in one (1) count added.  
Input 2: low and high transitions each result in one (1) count subtracted.

Rate measured: # of low and high transitions on input 1 during the sample time.



## APPLICATIONS

- Two sensor systems where one sensor adds counts and the other sensor subtracts counts.

## COUNT MODES

2. Single sensor systems where count corrections must be entered while the normal count signal is being counted.
3. Single sensor systems where counts are added only (sensor connected to input 1) or subtracted only (sensor connected to input 2).

### QUADRATURE COUNTING MODE

#### Count Mode 2: Quadrature

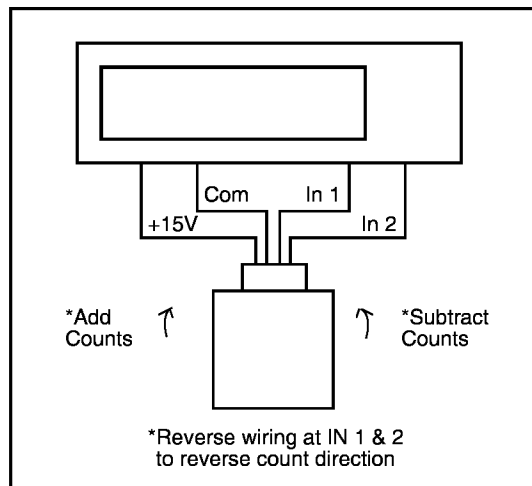
The most common quadrature signal source is a Quadrature Shaft Encoder. The counter counts up when the encoder rotates in one direction down in the other direction. One (1) count is registered per encoder pulse. Reversing the input wiring reverses the count direction.

Rate measured: # of low transitions on input 1 during the sample time. (Direction of rotation does not affect rate measurement. Jitter is cancelled out.)

#### Count Mode 3: Quadrature Doubled

Doubled quadrature operates like non doubled quadrature except that two (2) counts are registered per encoder pulse. Because encoders have a 50/50 output signal, resolution is doubled.

Rate measured: # of low and high transitions on input 1 during the sample time. (Direction of rotation does not affect rate measurement. Jitter is cancelled out.)



### APPLICATIONS

**Note:** The characteristic of adding and subtracting counts based on the direction of rotation in the Quadrature Shaft Encoder eliminates the false counts that would be caused by encoder vibration (jitter).

1. Where the amount of material that passes a given point must be measured. If the material backs up, that amount will automatically subtract from the count value.
2. Where the position of an object with a bidirectional movement must be monitored.

### COUNT WITH DIRECTION CONTROL MODES

#### Count Mode 4: Count with Direction Control

Input 1: Low transitions result in one (1) count each. (Add or subtract determined by input 2.)

Input 2: High state: adds counts.

Low state: subtracts counts.

Rate Measured: # low and high transitions on input 1 during the sample time (rate ignores input 2.)

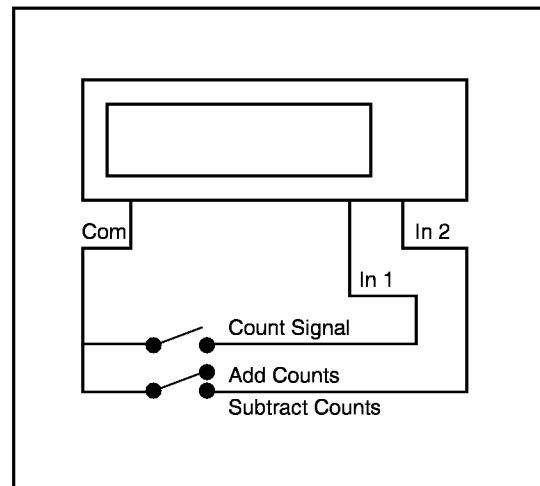
#### Count Mode 5: Count doubled with Direction Control

Input 1: Low and high transitions result in one (1) count each. (Add or subtract determined by input 2.)

Input 2: High state: adds counts.

Low state: subtracts counts.

Rate Measured: # low and high transitions on input 1 during the sample time (rate ignores input 2.)



### APPLICATIONS

1. Where material that can move bidirectionally is being measured and the accuracy of a quadrature system is not required. A logic signal must be present to indicate direction.
2. Where the position of an object with bidirectional movement must be monitored and the accuracy of a quadrature system is not required. A logic signal must be present to indicate direction.

# COUNT MODES

## COUNT WITH INHIBIT MODE

### Count Mode 6: Count up with Inhibit Control

Input 1: Low transitions each result in one (1) count added if input 2 is in the high state.

Input 2: High state: adds counts.

Low state: ignores counts.

Rate Measured: # of low transitions on input 1 during the sample time while input 2 was in the high state.

### Count Mode 7: Count up doubled with Inhibit Control

Input 1: Low and high transitions each result in one (1) count added if input 2 is in the high state.

Input 2: High state: adds counts.

Low state: counts ignored.

Rate Measured: # of low and high transitions on input 1 during the sample time while input 2 was in the high state.

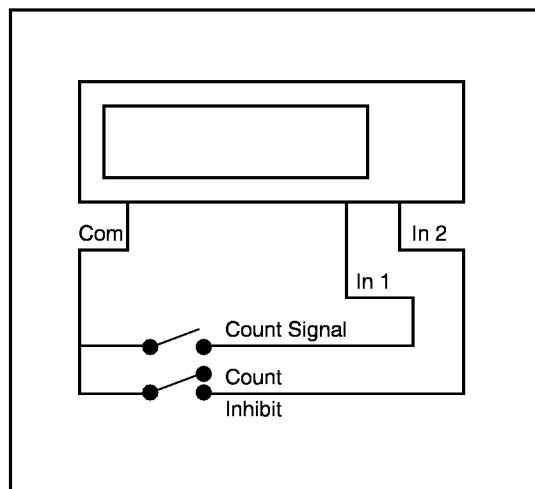
### Count Mode 8: Count down with Inhibit Control

Input 1: Low transitions each result in one (1) count subtracted if input 2 is in the high state.

Input 2: High state: subtracts counts.

Low state: ignores counts.

Rate Measured: # of low transitions on input 1 during the sample time while input 2 was in the high state.



### Count Mode 9: Count down doubled with Inhibit Control

Input 1: Low and high transitions each result in one (1) count subtracted if input 2 is in the high state.

Input 2: High state: subtracts counts.

Low state: ignores counts.

Rate Measured: # of low and high transitions on input 1 during the sample time while input 2 was in the high state.

## APPLICATIONS

1. Where scrap material or parts must not be counted. A logic signal must be present to indicate direction.

2. Where a count signal is still generated even though the material or items being measured are not present. A logic signal must be supplied to indicate the absence of materials.

## ADD/ADD and SUBTRACT/SUBTRACT MODES

### Count Mode 10: Add/Add

Input 1: Low transitions each result in one (1) count added.

Input 2: Low transitions each result in one (1) count added.

Low state: ignores counts.

Rate Measured: # of low transitions on input 1 and input 2 during the sample time.

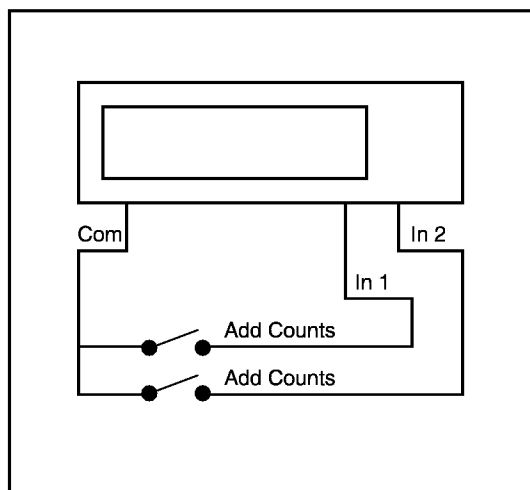
### Count Mode 11: Add/Add Doubled

Input 1: Low and high transitions each result in one (1) count added.

Input 2: Low and high transitions each result in one (1) count added.

Low state: ignores counts.

Rate Measured: # of low and high transitions on input 1 and input 2 during the sample time.



### Count Mode 12: Subtract/Subtract

Input 1: Low transitions each result in one (1) count subtracted.

Input 2: Low transitions each result in one (1) count subtracted.

Low state: ignores counts.

Rate Measured: # of low transitions on input 1 and input 2 during the sample time.

## COUNT MODES/WIRING

### Count Mode 13: Subtract/Subtract Doubled

Input 1: Low and high transitions each result in one (1) count subtracted.

Input 2: Low and high transitions each result in one (1) count subtracted.

Low state: ignores counts.

Rate Measured: # of low and high transitions on input 1 and input 2 during the sample time.

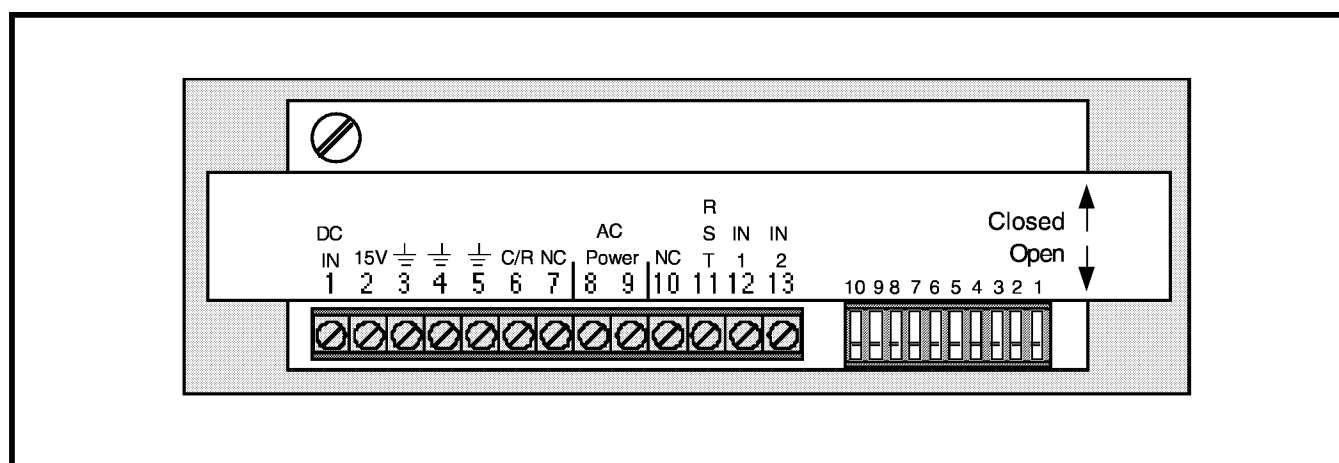
### APPLICATIONS

1. Where the counts from two (2) separate sensors must be combined into one (1) count value.

2. Where count corrections must be entered while the counter is counting the normal signal.

### WIRING INSTRUCTIONS

#### Terminal Strip Identification



- 1 - 11-28 VDC Input
- 2 - 15V DC Output
- 3 - DC Common/Ground
- 4 - DC Common/Ground
- 5 - DC Common/Ground
- \*6 - Count/Rate Display Select
- 7 - Not Connected

- 8 - AC Input
- 9 - AC Input
- 10 - Not Connected
- \*11 - Reset Input
- \*12 - Count Input 1
- \*13 - Count Input 2

\* - Signal Lines: Count Inputs, Reset Input and Count/Rate Display Select. These inputs are energized when in the Low State (connected to DC Common).

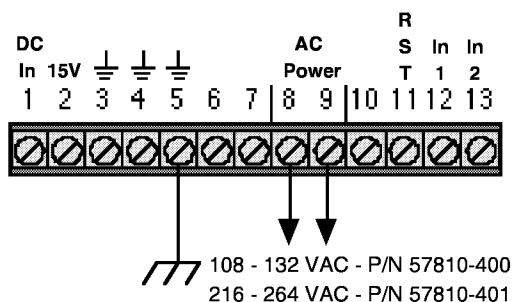
### GENERAL WIRING PRACTICES

1. Keep signal lines as short as possible.
2. Do not bundle or route signal lines with power carrying lines.
3. Use shielded cable for signal lines wherever possible. Connect shield at counter end to Terminal 3; leave other end of shield unconnected.



# WIRING

## AC Power



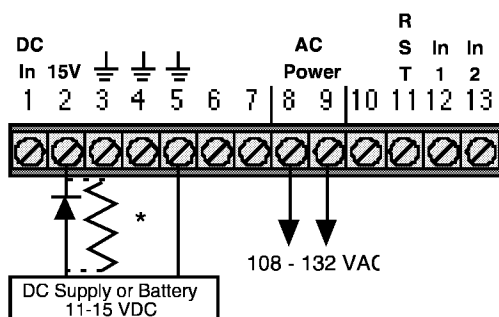
Fusing: this counter is not fused internally. Where fusing is required, use the following fuze sizes:

120 VAC - 1/4 amp  
240 VAC - 1/4 amp



Warning: Eaton P/N 57810-400 must only be used with 120 VAC and P/N 57810-401 must only be used with 240 VAC. Used other than specified will cause extreme damage to the counter.

## 11-15 VDC as Primary or Standby Power



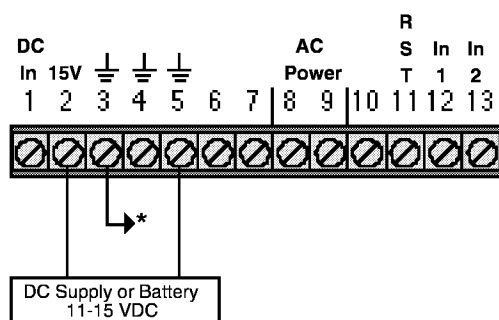
Sensor power at Terminal 2 will be 0.7V less than the DC supply voltage when operating from DC Supply.

Sensor power at Terminal 2 will be 15 VDC (+1, -2) when operating from AC Supply.

\*When using AC Voltage as Supply Power, this resistor provides a trickle charge to a 12V rechargeable battery used as standby power. Do not use resistor in DC only applications.

Diode: 1 Amp, 1N4001 or equivalent  
Resistor: 100 Ohms, 1 W  
Fusing: For 11-15 VDC use 1 amp

## 15-30 VDC Input Power



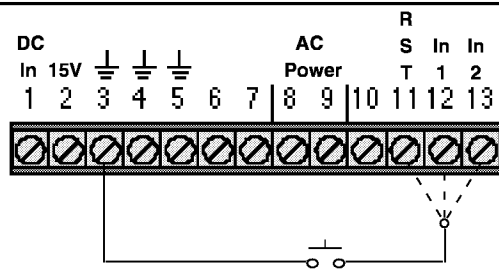
\*Sensor power at Terminal 2 will be 15 VDC (+1, -2) if the DC supply voltage does not drop below 15 VDC.

AC Power cannot be connected simultaneously.

Fusing: Unit is not fused internally. For 15-30 VDC use a 1 amp fuse.

Note: when Count Input(s) Speed is less than 150 Hz on Input 1, close dip switch 1 and if less than 150 Hz on Input 2, close Dip Switch 2.

## Contact Closures

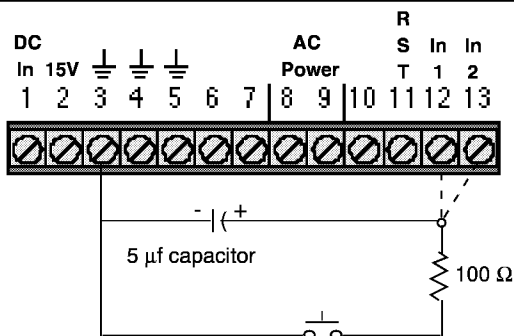


Contact closures include: push buttons, limit switches, relay contacts, reed switches, and any other mechanical contact device.

The Count Inhibit and Reset inputs cannot be tied together.

## WIRING

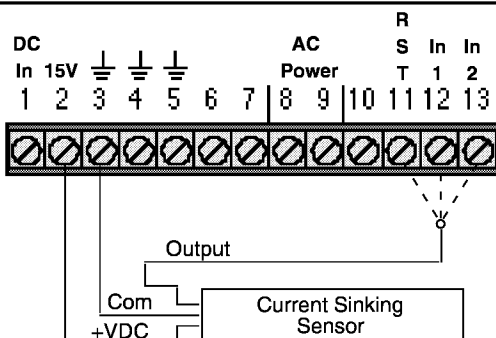
### Eliminating Contact Bounce



Contact closures with excessive contact bounce may cause multiple counts per contact closure, even when the Low Frequency Switches are closed. A capacitor and resistor can be used to eliminate this problem.

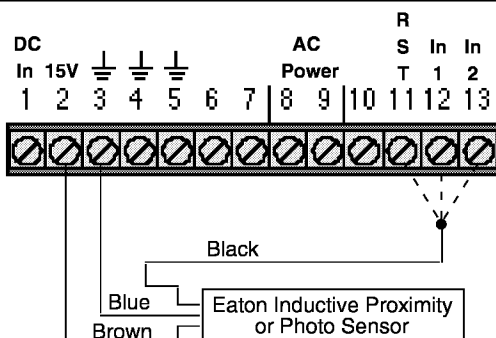
Capacitor: 5 microfarad, 30VDC minimum.  
Resistor: 100 Ohms, 1/4W minimum.

### Current Sinking Sensors



Current Sinking Sensors conduct current to Common when turned on. The terms "Current Sinking" and "NPN Open Collector" are the most common ways of indicating this type of output signal.

### Cutler-Hammer Inductive Proximity and Photo Sensors



Cutler-Hammer Proximity Sensors:

E57LAL8T110 8mm  
E57LAL12T110 12mm  
E57LAL18T110 18mm

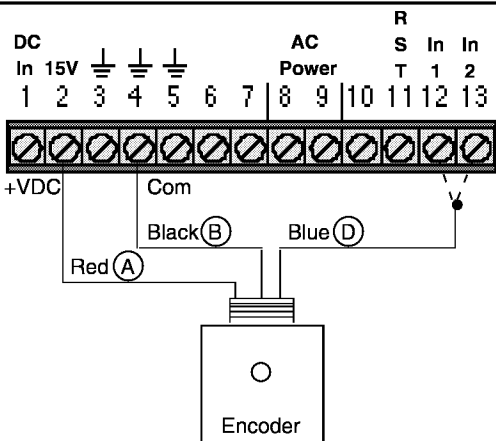
Cutler-Hammer Photo Sensors:

13100A6517  
14102A6517

3" Reflector:

6200A6501

### Single Channel Encoder



The Count Mode selected and Input used determine count direction. Direction of Encoder rotation does not affect count direction (see pages 3 through 6 for listing of Count Modes).

Durant Single Channel Encoders:

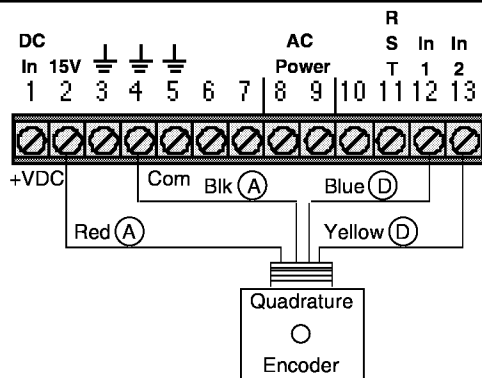
38150-XXX  
48370-XXX  
(XXX = # of pulses/revolution.)

Circled letters indicate encoder connector pin designations.

Wire colors shown correspond to Durant Encoder Cable P/N 29665-300.

# WIRING

## Quadrature Encoder



If the counter counts in the wrong direction relative to the direction of Encoder rotation, interchange the signals at Input 1 and Input 2.

Durant Quadrature Encoders:

38150-XXX

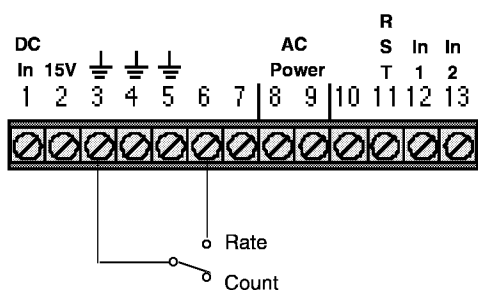
48370-XXX

(XXX = # of pulses/revolution.)

Circled letters indicate encoder connector pin designations.

Wire colors shown correspond to Durant Encoder Cable P/N 29665-300.

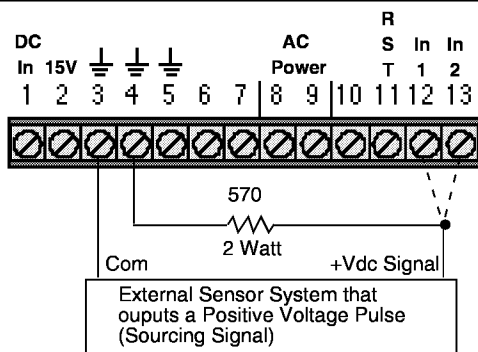
## Count/Rate Display Select Switch



The Count and Rate functions are being performed by the Counter simultaneously at all times. The Count/Rate Select determines whether Count or Rate appears on the display.

Rate is still being measured while Count is displayed and Counts are being totalized while Rate is being displayed.

## DC Sourcing Count Signals



A Sourcing Signal is one that supplies a voltage when in the High State.

Sourcing signal requirements:

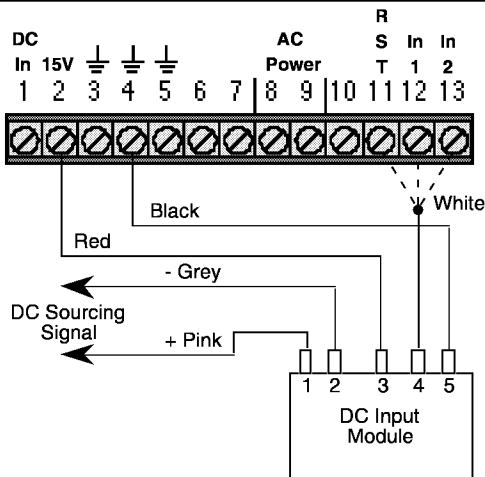
Current: 21 mA minimum

High state: 10.6 - 30 VDC (500 load)

Low state: 0-45 VDC (500 load)

High and low state times must comply with count input specifications.

## DC Sourcing Cunt Signals Using DC Input Module (Eaton P/N 36059-451)



A Sourcing Signal is one that supplies a voltage when in the High State.

The DC Input Module provides isolation between the counter and the signal source.

DC signal voltage = 10 - 32 VDC

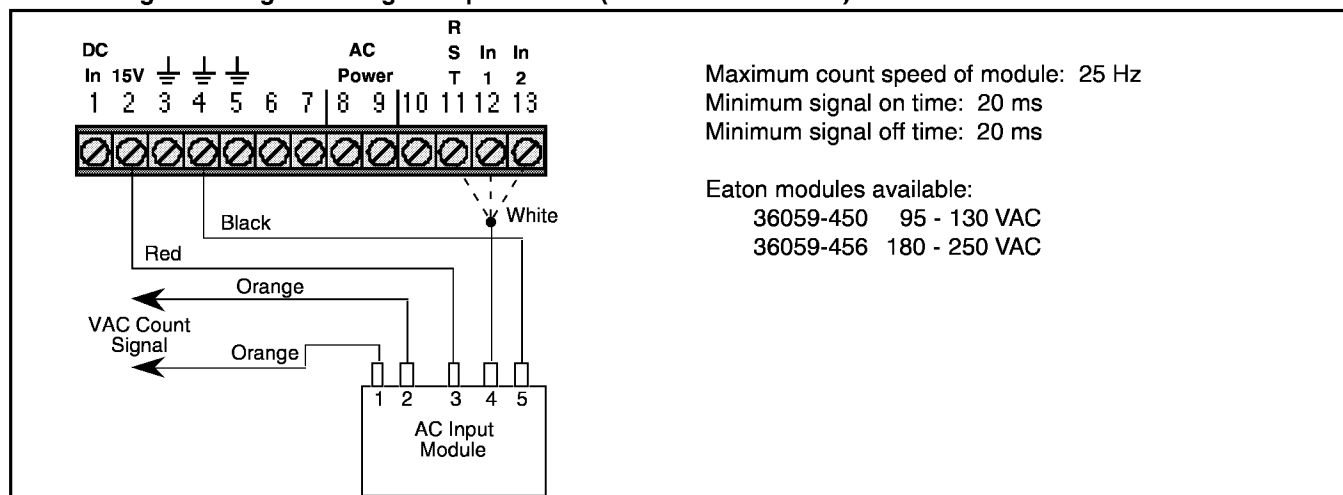
Maximum count speed: 100 Hz

Minimum signal on time: 5 ms

Minimum signal off time: 5 ms

# WIRING/RATEMETER

## DC Sourcing Count Signals Using DC Input Module (Eaton P/N 36059-451)



## RATE METER OPERATION

The Rate Meter function measures the number of counts registered in a fixed time span (Sample Time). At the end of the Sample Time Period the new Sample Count replaces the previous Sample Count (Current Rate) and the next Sample Time Period begins. The Current Rate information is available to display while the next sample is being taken. The rate data updates immediately at the end of each Sample Time Period; however, when Rate is being displayed the display will not update more often than once/second. This is done to eliminate undesirable flashing of the display when Sample Times are less than 1 second.

## SAMPLE TIME RANGE

The Sample Time Range for Model 5781 is 0.001 to 9.999 seconds. Sample Times can be programmed to the nearest 0.001 seconds.

Factory default is set at 1.000 second.

## VERIFYING RATE MEASUREMENT FEASIBILITY

In most applications more than one (1) count per item (ft., gal., rev., etc.) is required to achieve the desired rate display. The number of counts/item required is determined by the Time Unit the rate specifies (items/sec., items/min., etc.) and the number of decimal places to which the rate measurement is carried out. The table below can be used to determine the minimum number of counts per item required for different combinations of time units and decimal places.

# Decimal Places	Minimum # of Counts/Item		
	Items/Sec.	Items/Min.	Items/Hr.
0 (xxxxxx.)	1	6	360
1 (xxxxx.x)	1	60	3,600
2 (xxxx.xx)	10	600	36,000
3 (xxx.xxx)	100	6,000	360,000

The table is based on using the max. sample time of 9.9999 seconds.

From the table it can be seen that a minimum of six (6) counts/item would be required for the rate function to show whole items/min. (xxxxxx.). A minimum of 60 counts/item are required to measure items/min. to one decimal place (tenths - xxxxx.x). Before calculating a sample time, verify that an adequate number of counts/item are available. The DOUBLED Count Mode generates two (2) counts/input pulse and it is the number of counts/item, not pulses/item, that determines the rate measurement feasibility.

## CALCULATING RATE METER SAMPLE TIME

The following formula can be used to calculate the required sample time of any rate measurement application:

$$\frac{\text{Time Factor} \times \text{Decimal Factor}}{\# \text{ Counts/Item}} = \text{Sample Time in sec.}$$

### Time Factor

Select one of the following Time Factors relating to the Rate time:

$$\begin{aligned} \text{Items or Units/Second} &= 1 \text{ sec.} \\ \text{Items or Units/Minute} &= 60 \text{ sec.} \\ \text{Items or Units/Hour} &= 3600 \text{ sec.} \end{aligned}$$

**Decimal Factor** ----- The number corresponding to the Decimal Point Position that is to be displayed:

$$\begin{aligned} \text{xxxxxx.} &= 1 \\ \text{xxxxx.x} &= 10 \\ \text{xxxx.xx} &= 100 \\ \text{xxx.xxx} &= 1,000 \\ \text{xx.xxxx} &= 10,000 \end{aligned}$$

# RATEMETER/TROUBLESHOOTING

---

**# Counts/Item or Unit -----** # of Counts entered on the Counter for each item or unit (foot, gallon, piece, revolution, etc.) measured. If a Doubling Count Mode is used, the # of Counts is 2 x the # of Pulses/Item or unit produced by the Transducer.

**Example 1:** Calculate the Sample Time required to measure gallons/minute. The Flow Meter produces 10 pulses/gallon and Count Doubling is not used.

$$\frac{60 \times 1}{10} = 6.000 \text{ sec.}$$

**Example 2:** Calculate the Sample Time required to measure the ft./min. travel rate, in tenths of a ft./min. (xxxxx.x) of the material going through a roll former. The encoder generates 600 pulses/ft. and the Count Mode selected is Quadrature Doubled.

$$\frac{60 \times 10}{1200} = 0.500 \text{ sec.}$$

The Sample Time of .500 sec. could be extended to 5.000 sec. and rate would then be measured in hundredths of a ft./min. (xxxx.xx). The longer Sample Time will yield more accurate and more stable measurements since momentary speed fluctuations will be averaged over a 5 sec. interval rather than a .5 sec. interval. The display will update every 1 sec. if the .500 sec. Sample Time is used (1 sec. is the minimum display update time). The display will update every 5 sec. if the 5.00 Sample Time is used.

## TROUBLESHOOTING GUIDE

### Display Does Not Work When Power Is On

1. Remove and restore power to Counter.
2. Verify power is correctly wired.
3. Verify voltage is within spec.
4. Remove wires from Term. 2 to check for overloading of 15V supply.

### Counter Does not Count

1. Remove and Restore power to Counter.
2. Verify correct Count Mode.
3. Verify sensor is correctly wired and connections are tight.
4. If sensor is wired to term. 2, check for 15V (+1, -2) between term. @ and term. 3, 4, or 5.
5. The voltage between term. 13 and term. 3, 4, or 5 must be greater than 10.5V when using a Count with Inhibit Mode.
6. Voltage between count input(s) and term. 3, 4, or 5 should be greater than 10.5V and less than 4.5V when sensor is in high and low states.
7. Go to Counter Checkout Procedure

### Counter Counts In Wrong Direction

1. Review Correct Count Mode.
2. If using Quadrature or Add/Subtract Count Mode, reverse wires on term. 12 & 13.
3. Check voltage between term. 13 & 3, 4, or 5 for count with Direction Control.

### Front Panel Reset Key Inoperative

1. Verify that Switch 9 is closed.
2. If voltage between term. 11 & 3, 4, or 5 is less than 3.5V, check circuit wired to term. 11.

### Rate Measurement Incorrect

1. Verify the Sample Time calculation and setup is correct.

### Counter Accumulates Extra Counts

1. Verify correct count mode.
2. Low frequency switches must be closed for count speed < 150 Hz.
3. Check that count signal wires are not bundled with other wiring.
4. Verify that all count signal connections are tight.
5. If count signal is mechanical contacts see Page 8 "Eliminating Contact Bounce".
6. Shield count signal wires and connect shield to term. 5.

### Counter Checkout Procedure

1. Remove wiring from term. 6, 11, 12, and 13.
2. Apply power to Counter.
3. Setup Count Mode = 0 (Add/Subtract).
4. Make and break jumper connection between term. 3, 4, or 5 and 12. **Counter should count up.**
5. Make and break jumper connection between term. 3, 4, or 5 and 13. **Counter should count down.**
6. Make and break jumper connection between term. 3, 4, or 5 and 11. **Counter should reset to 0.**

If the Counter checks good, restore the required setups for the specific application before retrying it.

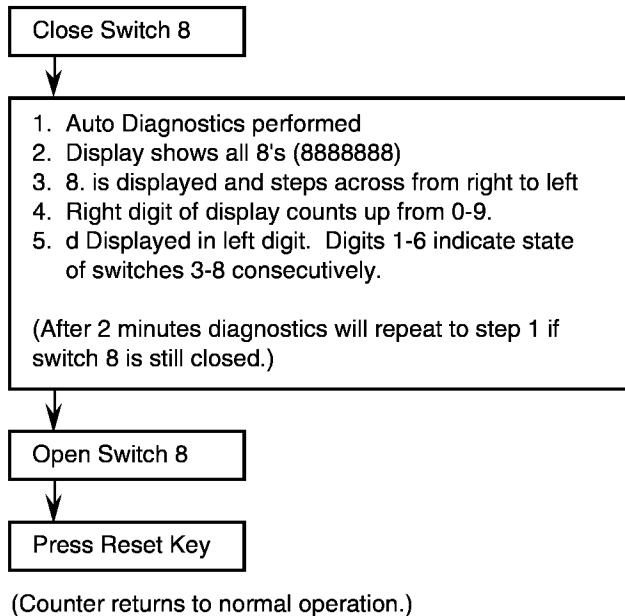
If the Counter fails to count in the checkout procedure, return it to the factory for repair.

### Manual Diagnostics

The operation of the counter can be tested at any time by activating the Manual Diagnostics. During Manual Diagnostics, the Count and Rate functions do not operate.

# TROUBLESHOOTING/SPECIFICATIONS

Manual Diagnostics operate as follows:



## Auto Diagnostics

The Counter automatically checks the validity of the data stored in the following components on every power up cycle:

- Test #1. Read only memory
- Test #2. Internal Ram memory
- Test #5. Non volatile Ram memory

If one of these diagnostic tests fail the associated number will flash on the display. If a failure occurs press the Reset Key, then power the Counter down and back up. Check setup of Counter before continuing to operate. Repeated failure of diagnostic tests indicate that the Counter should be returned to the factory for repair.

During the normal operation the Counter is continuously checking itself by performing a Watch Dog Timer diagnostic test. If a failure occurs, a 6 will flash on the display. Press the Reset Key and power down and back up. DO NOT assume the Counter needs repair until the following three possible causes are investigated.

1. Count speed higher than specifications.
2. Severe electrical noise spikes.
3. Set up procedure needs to be repeated.

**CAUTION!** Before applying power to the equipment, recheck all wiring to insure proper connections. Make sure the AC Line Voltage is connected only to screw terminals #8 and #9. Connecting AC Power to any other signal terminals will cause severe damage to the Counter.

## SPECIFICATIONS

### AC Power input

Voltage Range: 108-132 VAC (Model #57810-400) or 216-264 VAC (Model #57810-401)  
Frequency Range: 47-63 Hz.  
Power Consumption: 8W  
Fuse (external): 1/4 amp.

### Environment

Operating Temp.: 0-55° C  
Storage Temp.: -40 to 70° C  
Operating Humidity: 95% maximum non condensing

### Count Speed

Quadrature Modes: 6,000 counts/sec.  
All other Modes: 12,000 counts/sec.

Above specifications are in counts/second. The doubled Count Modes have a maximum incoming pulse rate of 1/2 the number of counts/second. The Count Speed of 12,000 counts/second for Count Modes 0, 1, 10-13 is the combined total from both count inputs.

A pullup resistance of 1.7 k  $\Omega$  or less is required for pulse input speeds greater than 8 kHz. If the sensor being used does not have an internal pullup resistor an external resistor can be added between +15V and the count input.

### DC Power Input

Voltage Range: 11-30 VDC  
Power Consumption: 5W

Fuse (external): 1 amp

### Physical

Case Dimension: 5.38" W x 1.74" H x 5.53" D  
Bezel Dimension: 5.80" W x 2.16" H  
Panel Cutout: 5.43" W x 1.77" H  
Case Material: Noryl SE1  
Label Material: Mylar  
Display: 7 digits, .56" H  
Weight: 1.0 lbs. (.46 Kg)

### Count Input Voltages

High State: 10.5 to 30 VDC  
Low State: 0 to 4.5 VDC  
(Count Inputs are pulled high through a 6.8 resistor to +15 VDC.)

When operating from 12-15 VDC power:

High State: 70% applied DC voltage  
Low State: 30% applied DC voltage

# SPECIFICATIONS/COUNT SIGNAL TERMINOLOGY

## Ratemeter

Sample Time Range: 0.00-9.999 sec.  
Rate Accuracy: 0.001-9.999 (0-5 kHz)  
Count Modes 0, 1, 10-13: -2.0%, +1.5%  
Count Modes 2-9: -1.0%, +7%

## DC Power Output

15 VDC +1, -2 at 85 mA maximum

## Count Input Response

	Low Freq. Mode		High Freq. Mode	
	no pullup	1.7K pullup	no pullup	1.7K pullup
Minimum high time:	5.0 ms	1.5 ms	100.0 $\mu$ s	30.0 $\mu$ s
Minimum low time:	.7 ms	.7 ms	20.0 $\mu$ s	20.0 $\mu$ s

## Reset Input Voltages and Response

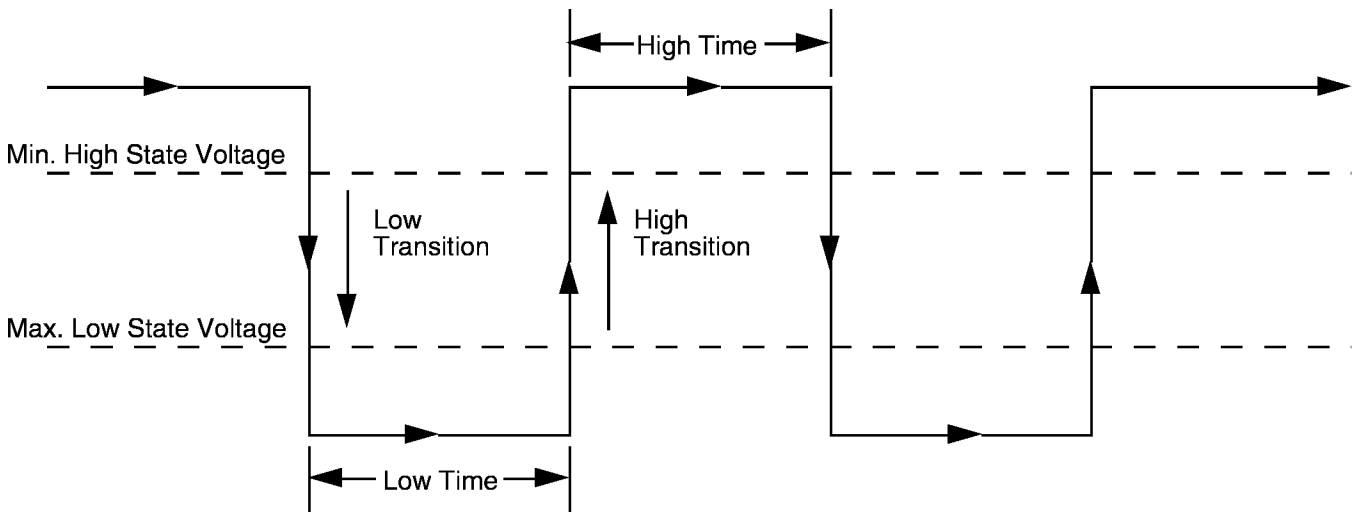
High State Voltage: 4-28 VDC      Min. High Time: 8.0 ms  
Low State Voltage: 0.1 VDC      Min. Low Time: 1.0 ms

The Reset input is pulled through a 6.8K resistor to +5 VDC.

## COUNT SIGNAL TERMINOLOGY

In order to understand the 14 Count Modes of the Model 5781 counter, it is necessary to understand what a Count Signal is and the terminology used.

The following illustration shows the wave form of a typical count signal and the terms associated with it:



**Min. High State Volt** - The minimum voltage at which the input will be considered to be in the High State.

**Max. Low State Volt** - The maximum voltage at which the input will be considered to be in the Low State.

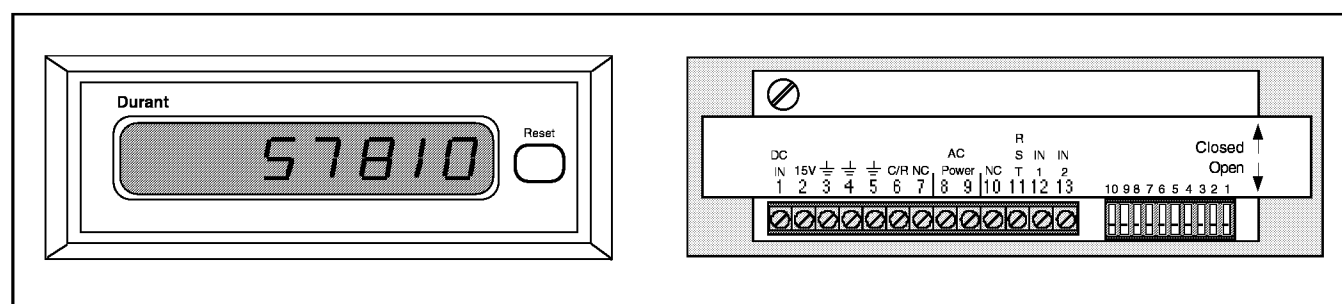
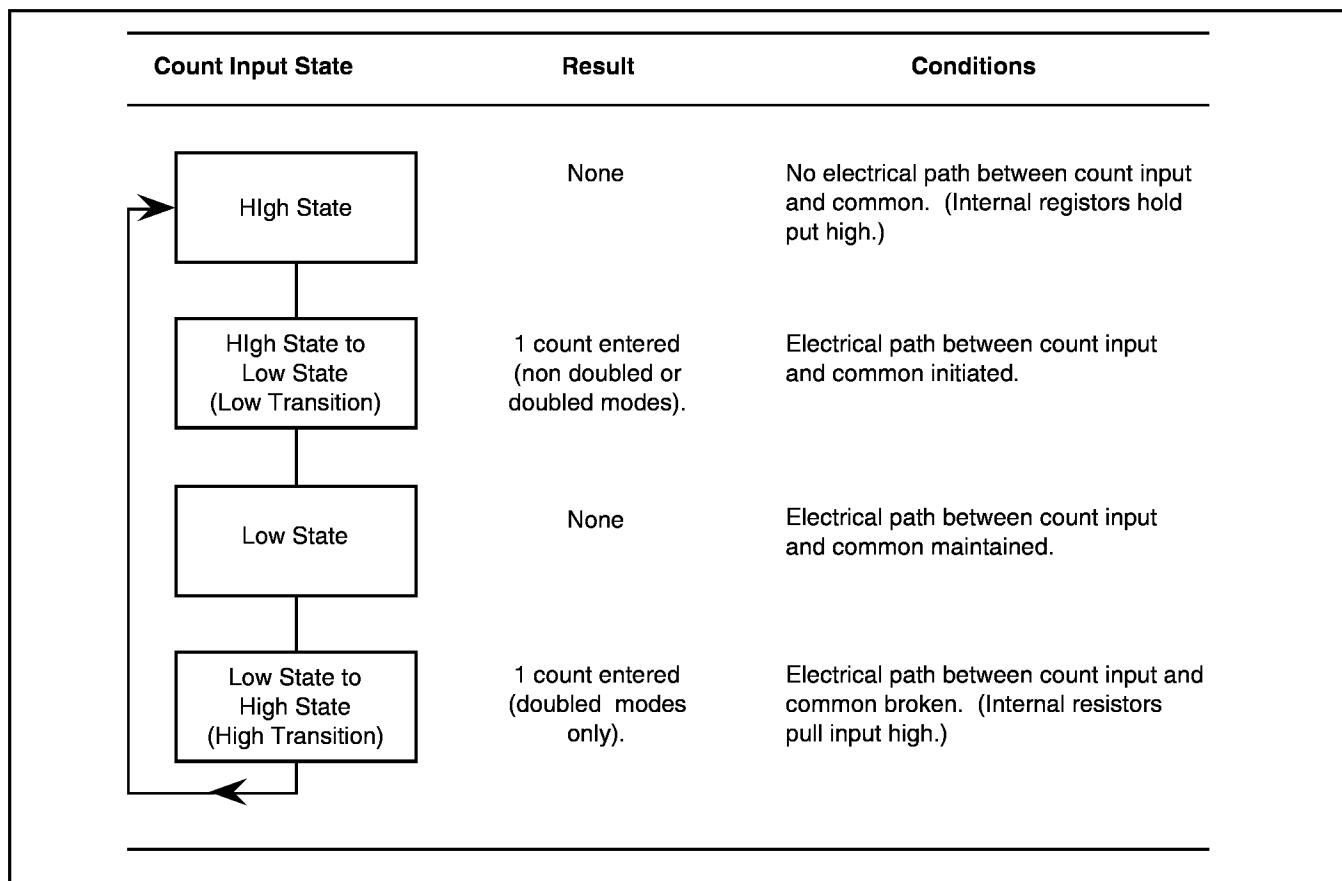
**Min. High Time** - The minimum time the count signal must be in the High State before switching to the Low State.

**Min. Low Time** - The minimum time the count signal must be in the Low State before switching to the High State.

**Low Transition** - Change in input voltage from the High State to the Low State.

**High Transition** - Change in input voltage from the Low State to the High State.

## BASIC COUNTING OPERATION/QUICK REFERENCE



Terminal Identification

1. DC Power Input (11-30 VDC)
2. +15 VDC Output (85 ma max.)
3. Earth Ground/DC Common
4. Earth Ground/DC Common
5. Earth Ground/DC Common
6. Count Rate Display Select
7. No connection
8. AC Voltage Input
9. AC Voltage Input
10. No connection
11. Reset Input
12. Count Input 1
13. Count Input 2

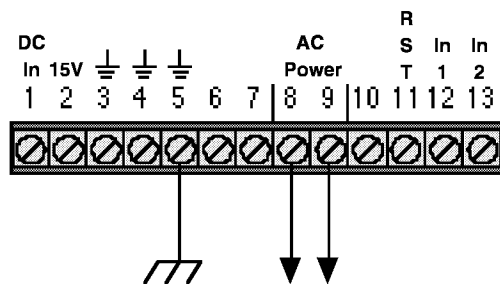
Dip Switch Functions

1. Low Frequency on Input 1
2. Low Frequency on Input 2
3. Count Mode Select
4. Count Mode Decimal Point Select
5. Rate Mde Decimal Point Select
6. Rate Sample Time Select
7. Momentary Reset
8. Diagnostics
9. Front Panel Reset Enabled



## QUICK REFERENCE

### AC Wiring



108 - 132 VAC - P/N 57810-400

216 - 264 VAC - P/N 57810-401



**Warning:** Eaton P/N 57810-400 must only be used with 120 VAC and P/N 57810-401 must only be used with 240 VAC. Used other than specified will cause extreme damage to the Counter.

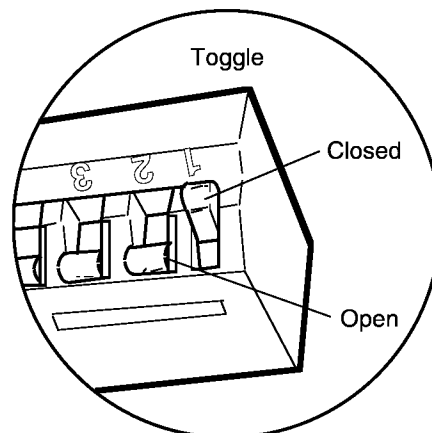
Setup Procedures - pages 2 to 3.

Count Modes and Description - pages 3 to 6.

### Keyboard Functions

Reset Key - provides reset capability when Dip Switch 9 is closed.

### Dip Switch Operation



Wiring Diagrams - pages 6 to 10.

Troubleshooting Guide - pages 11 to 12.

### REPLACEMENT PARTS

**Mounting Clip**  
38720-200

**Front Panel Spacer**  
Adapter to JIC enclosures

**Screw**  
29801-187

Totalizer (58810-400)

**Front Panel Gaskets**  
Totalizer (58810-400)  
28720-215

## WARRANTY

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**Warning -** This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.



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