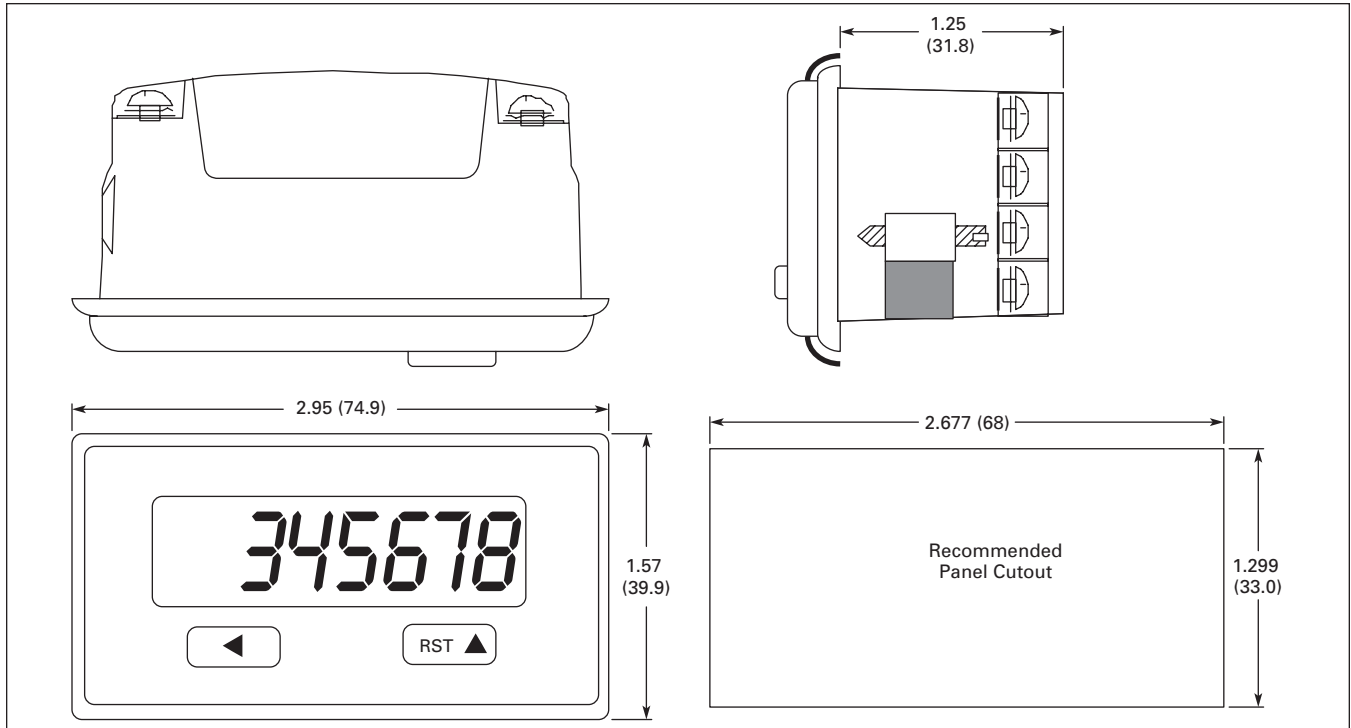


**Courier™ Add/Subtract Totalizer Instructions for Models  
Solid-State Inputs 53300-401, Contact Inputs 53300-402,  
Solid-State Inputs w/Backlight 53302-401 and  
Contact Inputs w/Backlight 53302-402**



**Figure 1. Dimensions in Inches (mm)**

**POWER**

Internal Battery: 3V, Lithium.  
Life expectancy: 5 years +.  
Replacement Part: 36367-202.

**BACKLIGHT**

10 – 30V DC @ 30 mA max.  
(Derate operating temperature 1°C/Volt above 17V DC.)  
Reverse polarity protected.

**PHYSICAL**

Operating Temperatures: 53300 is -20° to 70°C.  
53302 is -20° to 55°C with backlight on.  
Storage Temperature: -20° to 70°C.  
Operating Humidity: 60% Non-condensing.  
Weight: 2.2 oz. net.  
Display Size: 0.43" high.  
Front Panel Rating: NEMA 4X when mounted with gasket provided.  
Case Material: Cycolac X-17.

**TOTALIZER**

Type: Up/Down Counting.  
Digits: 8 digits positive/minus sign and 7 digits negative.  
Scaler: 0.0001 – 100.0000.  
(0.0000 scales by 100 in the Courier Series).  
Decimal Point: 5 positions, programmable.

**COUNT ACCURACY**

100% when operated within specifications.

**DC COMMON (Terminal 1)**

**RESET INPUT (Terminal 4)**

Resets totalizer when connected to DC common.  
Min. Low Time: 0.25 to 1.0 sec. (maintained).  
The required pulse width varies with count speed, scale factor and number of digits displayed.  
Voltage Thresholds: Low 0 to 0.4V DC.  
High 2.0 to 28V DC.

**COUNT INPUT A (SUBTRACT); COUNT INPUT B (ADD) (Terminals 2 & 3)**

**Model -401**

Inputs A & B require a voltage source, such as a current sourcing sensor or a current sinking sensor used with the provided pull up resistors.

Speed: 0 to 10 kHz.  
Min Low Time: 80 microseconds.  
Min High Time: 20 microseconds.  
(These times are with a 0.0V to 5.0V swing).  
Input Impedance: 2 kΩ above 5V DC.  
Voltage Thresholds: Low 0 to 1.2V DC.  
High 2.0 to 28V DC.  
Max High 28V DC.

**Model -402**

Inputs A & B are designed for contact closures to DC common.

Speed: 0 to 20 Hz.  
Min Low Time: 10 milliseconds.  
Min High Time: 40 milliseconds.  
Input Impedance: 101 kΩ.  
Voltage Thresholds: Low 0 to 0.4V DC.  
High 2.0 to 28V DC.  
Max High 28V DC.

**PROGRAM ENABLE INPUT (Terminal 5)**

Operation: Level sensitive (maintained).

## Introduction

Your 5330X-401/402 is a counter with an eight-digit LCD display. A programmable scaler and decimal point allow for display in any engineering unit.

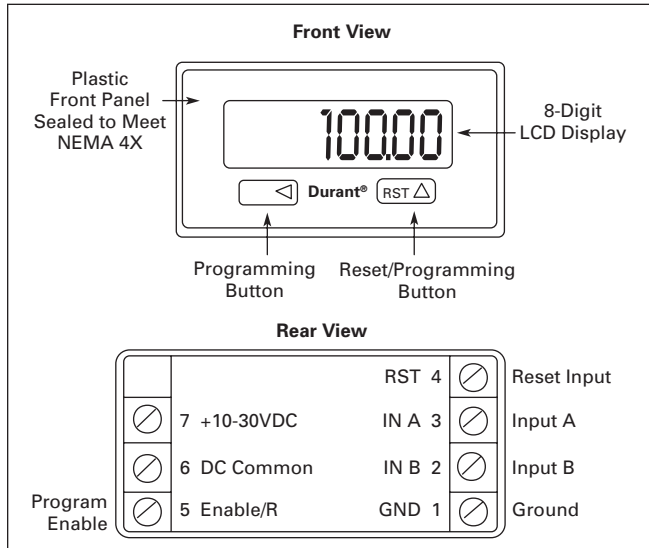


Figure 2. Add/Subtract Totalizer

## Applications

Certain programming and wiring choices must be made to accomplish your application. We recommend the following sequence:

1. Answer the following questions:
  - What type of sensor will be used?
  - To what engineering units should the counter be scaled?
  - How many pulses per item is the sensor providing?
  - Is a decimal point needed on the display?
2. Calculate the scale factor.

## Mounting

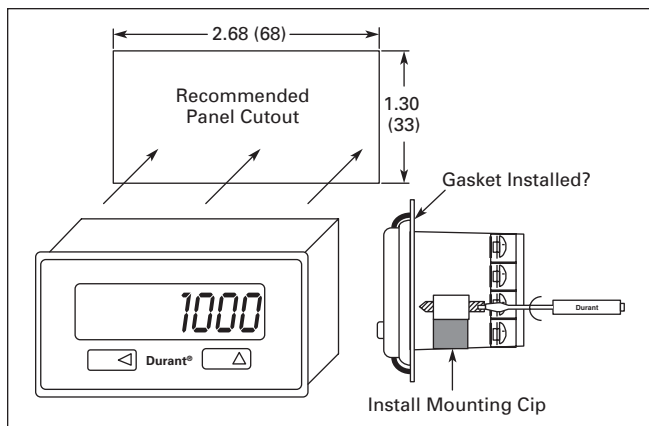


Figure 3. Mounting

## Program Mode

To enter the program mode, a connection must be made between terminals 1 and 5 (see Figure 8).

### Screens

There are four program-mode screens in the 5330X-401/402. Upon entering the setup mode, the counter will display screen 1. Press and hold the key while repeatedly pressing the key to advance to successive screens.

Programming Screens	
Screen	Function
1	Count Scale Factor
2	Count Decimal Point
3	Reset to Offset Value
4	Reset Key Enable / Disable

## Operation

### Add/Subtract Counting

There are two count input terminals on the rear of the totalizer. Count pulses entering Input A (terminal 3) cause the total to decrement (count down). Count pulses entering Input B (terminal 2) cause the total to increment (count up). The totalizer may start counting from zero, when reset, or may start from a user-programmed offset value. The offset value is a positive number and may be up to six digits.

If only one of the count inputs is used, the totalizer becomes an up counter with a range of zero to 99,999,999, or a down counter with a range of zero to -9,999,999. If both inputs are used, the totalizer displays the difference count between the two inputs — counts at Input B are added, counts at Input A are subtracted. In this mode of operation, the totalizer's range is -9,999,999 to 99,999,999. Positive numbers are not indicated with a plus sign(+). Both inputs may occur simultaneously, in which case the displayed total does not change.

### Count Inputs

Model 5330X-401 has hi-speed inputs and can accept pulses from solid-state, current sourcing sensors at up to 10 kHz per input. The sensor must supply at least +2.0V DC, but not more than +24V DC to the input. Counts are entered on the positive-going edge of the pulse.

Model 5330X-402 has low speed inputs and can accept pulses from solid-state, current sinking sensors or contact closures to ground at up to 20 Hz per input. These inputs are internally pulled up to +3V DC. The sensor must be capable of sinking current from the input to bring the input voltage down to +0.4V DC or less. Counts are entered on the negative-going edge of the pulse.

**Count Scaler**

**Calculating the Count Scale Factor**

The count scale factor is used to convert the incoming count pulses to the desired unit of measure to be displayed (feet, gallons, etc.) or to correct for a known amount of error (wheel wear, viscosity, etc.). This scaler has six digits available with a fixed decimal point.

Count Scaler Range: 0.0001 to 99.9999. (Setting the count scale factor to 0.0000 will allow scaling by 100 in the Courier Series).

Count Scaler (CS) Formula:

$$CS = \frac{DPF}{PPI} \text{ where:}$$

DPF is the decimal point factor corresponding to the desired decimal point location.

DISPLAY	DPF	DISPLAY	DPF
XXXXXX	= 1	XXX.XXX	= 1,000
XXXXX.X	= 10	XX.XXXX	= 10,000
XXXX.XX	= 100		

PPI is the number of pulses per item from the sensor.

Example 1: A sensor produces 20 pulses per inch of material travel. Calculate the count scaler required to indicate material used in whole inches (XXXXXX).

$$CS = \frac{1}{20} = 0.05000$$

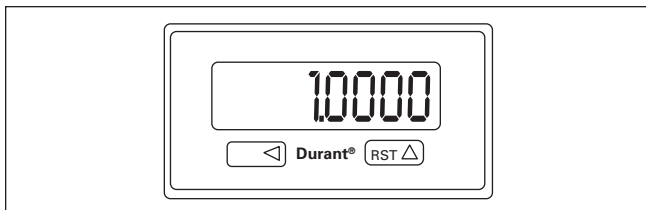
Example 2: An encoder produces 120 pulses per foot. Calculate the count scaler required to indicate material usage in 1/100s of a foot (XXXX.XX).

$$CS = \frac{100}{120} = 0.8333$$

(Select the XXXX.XX position on the totalizer decimal point menu.)

**Programming Count Scale Factor**

The first screen in the program mode is used to enter the count scale factor:



**Figure 4. Entering Count Scale Factor**

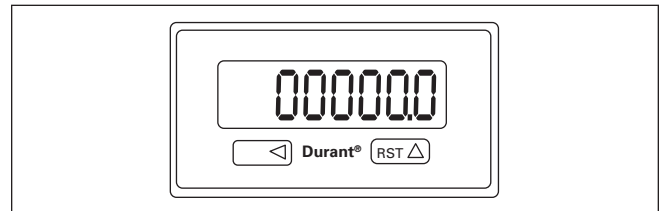
The far right digit will be flashing. Press the **RST** key until reaching the desired digit value.

**NOTE:** Pressing and holding the **RST** key will cause the numbers to autoscroll.

Next press the **←** key to move the flashing digit one place to the left. Change this digit to the desired value with the **RST** key. Repeat this process until all digits are set correctly.

**Programming Decimal Point**

The second screen is used to enter the decimal point display on the totalizer screen. Press and hold the **←** key and then press the **RST** key to move from screen one to screen two.



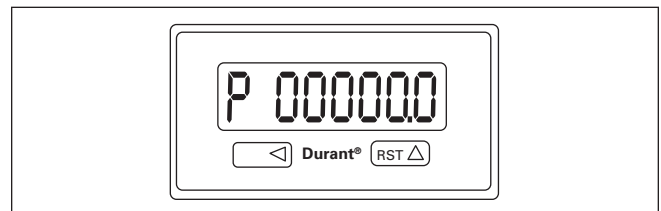
**Figure 5. Moving Decimal Point**

Press the **RST** key to move the decimal point to the desired position.

**Programming Offset Value**

Programming an offset value allows the counter to reset to a value other than zero. The offset may be up to six digits. The offset cannot be a negative number.

The third screen in the program mode is used to enter the offset value.



**Figure 6. Entering the Offset Value**

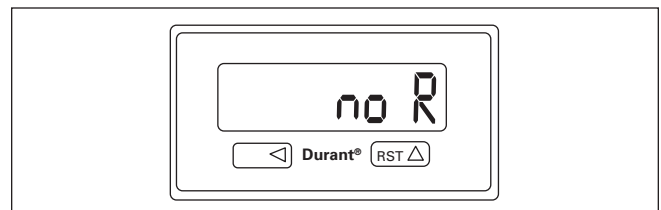
The far right digit will be flashing. Press the **RST** key until reaching the desired digit value.

**NOTE:** Pressing and holding the **RST** key will cause the numbers to autoscroll.

Next press the **←** key to move the flashing digit one place to the left. Change this digit to the desired value with the **RST** key. Repeat this process until all digits are set correctly.

**Enabling the Front Panel Reset Key**

The fourth screen in the program mode allows the user to enable or disable the front panel reset key.



**Figure 7. Enabling Reset**

Press the **RST** key to choose the option you want.

**NOTE:** The reset terminal on the rear panel is still active when the front reset button is disabled.

To exit the program mode, break the connection between terminals 1 and 5.

### Wiring Recommendations

Following these suggestions will increase noise immunity and lengthen unit life.

**Cable:** The connection between the count source and the ratemeter should be made with a two-conductor shielded cable. The shield should be connected to earth ground at one end only. The connecting cable should not be run in conduits with cables switching high inductive loads.

**Relay Coil Suppression:** If a relay contact is used as a count source, the relay coil should be suppressed. This can be accomplished with an RC network for AC coils or a diode for DC coils. The Durant RC suppressor (38091-400) may be used.

**Mounting:** The totalizer should not be mounted near a solenoid or other inductive devices. Enough ventilation

should be supplied to keep the ratemeter operating within the temperature specifications. Do not mount this unit in a heavy vibration area.

### Battery Safety

The lithium battery that powers your device contains inflammable materials such as lithium organic solvent, and other chemical ingredients. Explosion or fire may result if the battery is not handled correctly. To avoid an accident follow these guidelines:

- Do not heat batteries above 95°C
- Do not recharge lithium batteries
- Do not dispose of batteries in fire
- Insert battery with correct polarity

### Wiring Diagrams

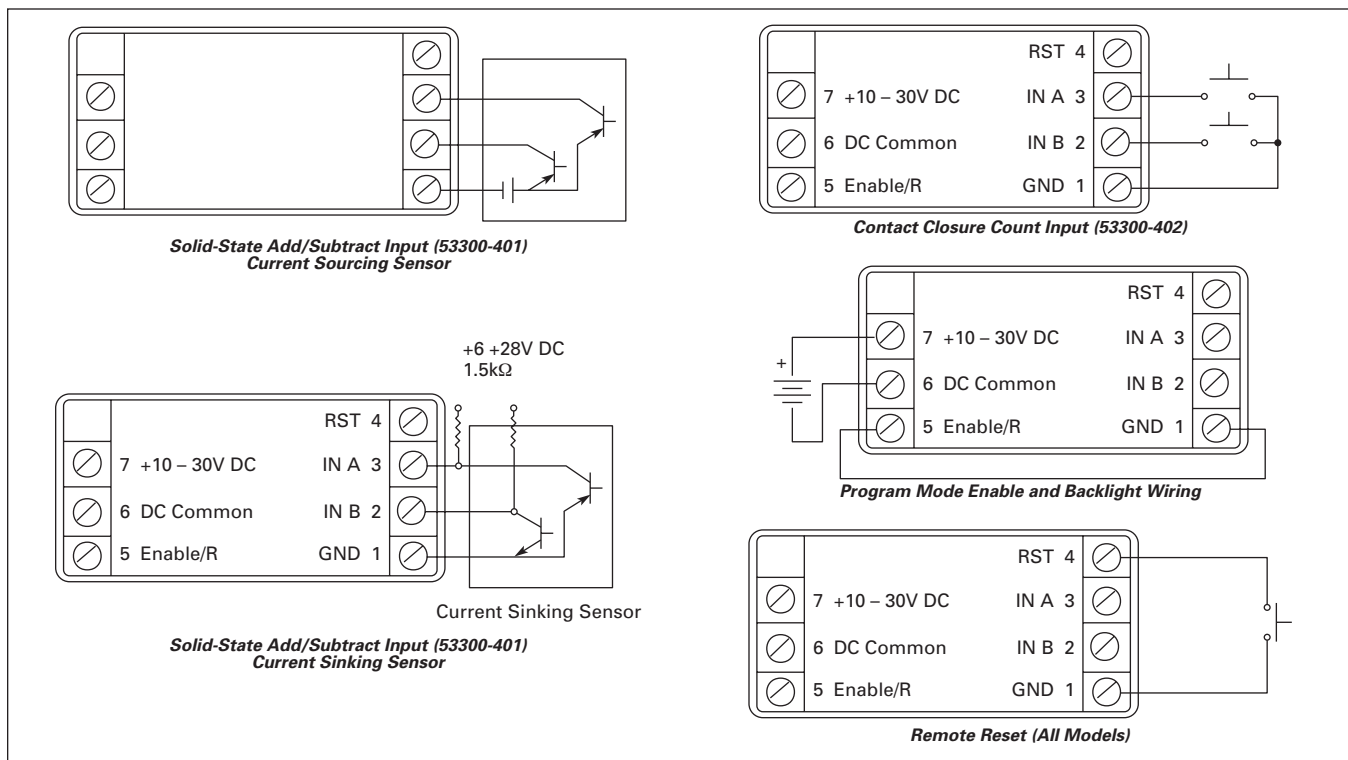


Figure 8. Wiring Diagrams

Table 1. Terminal Functions

Terminal	Function	Operation
1	Ground	
2	Input B Count Input	Current Source Input (401) Current Sink Input (402)
3	Input A Count Input	Current Source Input (401) Current Sink Input (402)
4	Reset	Connect through Contact Closure to Ground
5	Program Enable	Connect to Ground to Enter Program Mode
6	Backlight Common	
7	Backlight Power	Connect to Power to Light Display

Table 2. Replacement Parts

Description	Catalog Number
Battery	36367-202
Gasket	46066-210
Mounting Clip	53300-241
Mounting Screw	28772-200

**Table 3. Courier Series Accessories**

Description	Catalog Number
Power Supply (+15V DC, 300 mA)	49750-400
Count Source RC Suppressor	38091-400
<b>Devices Requiring External Power for Proper Operation</b>	
Inductive Proximity Sensor (8mm, 12mm, 18mm)	48770-401, -402
Diffuse-Reflective Photoelectric Sensor	48771-400
Retro-Reflective Photoelectric Sensor	48771-401
Thru-Beam Photoelectric Sensor Emitter	48771-402
Thru-Beam Photoelectric Sensor Receiver (Thru-beam emitter and receiver must be used together)	48771-404
Standard Duty, Quadrature Shaft Encoder (XXX denotes pulses per revolution. Example: 38151-060 for 60 pulses/rev).	38151-XXX
Heavy Duty, Quadrature Shaft Encoder (XXX denotes pulses per revolution. Example: 48371-060 for 60 pulses/rev).	48371-XXX

**Table 4. Other Courier Series Products**

Description	Catalog Number
Totalizer	53300-400
Quadrature Indicator/Totalizer	53300-403
Ratemeter	53300-404
Totalizer/Ratemeter	53300-405
Totalizer — Extended Temperature	53301-400
Add/Subtract Totalizer (Solid-State Input)	53301-401
Add/Subtract Totalizer (Contact Input)	53301-402
Ratemeter — Extended Temperature	53301-404
Totalizer/Ratemeter Extended Temperature	53301-405
Totalizer w/Backlight	53302-400
Add/Subtract Totalizer w/Backlight (Solid-State Inputs)	53302-401
Add/Subtract Totalizer w/Backlight (Contact Inputs)	53302-402
Ratemeter w/Backlight	53302-404
Totalizer/Ratemeter w/Backlight	53302-405

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Eaton Corporation  
Electrical Group  
1000 Cherrington Parkway  
Moon Township, PA 15108  
United States  
877-ETN CARE (877-386-2273)  
Eaton.com



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