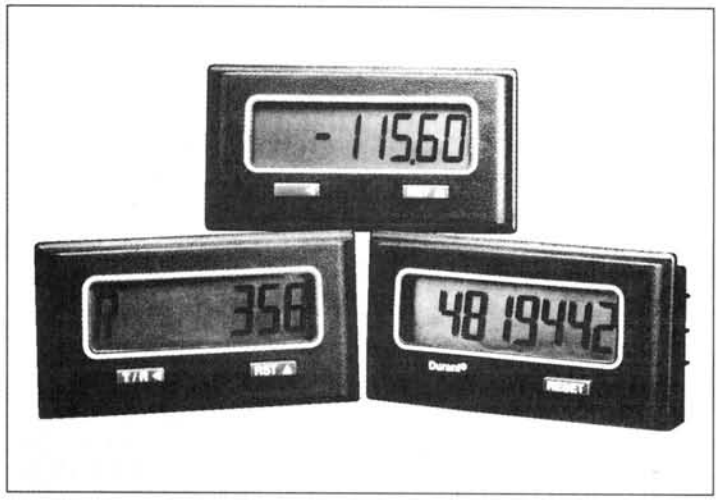
COURIER SERIES

- .43" LCD Display
- 8 Digit Totalizer
- 1/Tau Ratemeter
- Scaling Capabilities
- Remote Reset Terminal
- Front Panel Reset
- NEMA 4X



The Courier series of totalizers and 1/Tau ratemeters was designed with one thing in mind — the user. Everything about the Courier series, starting with the easy to use rear panel screw terminals down to the large .43 inch supertwist LCD display was designed to be user friendly.

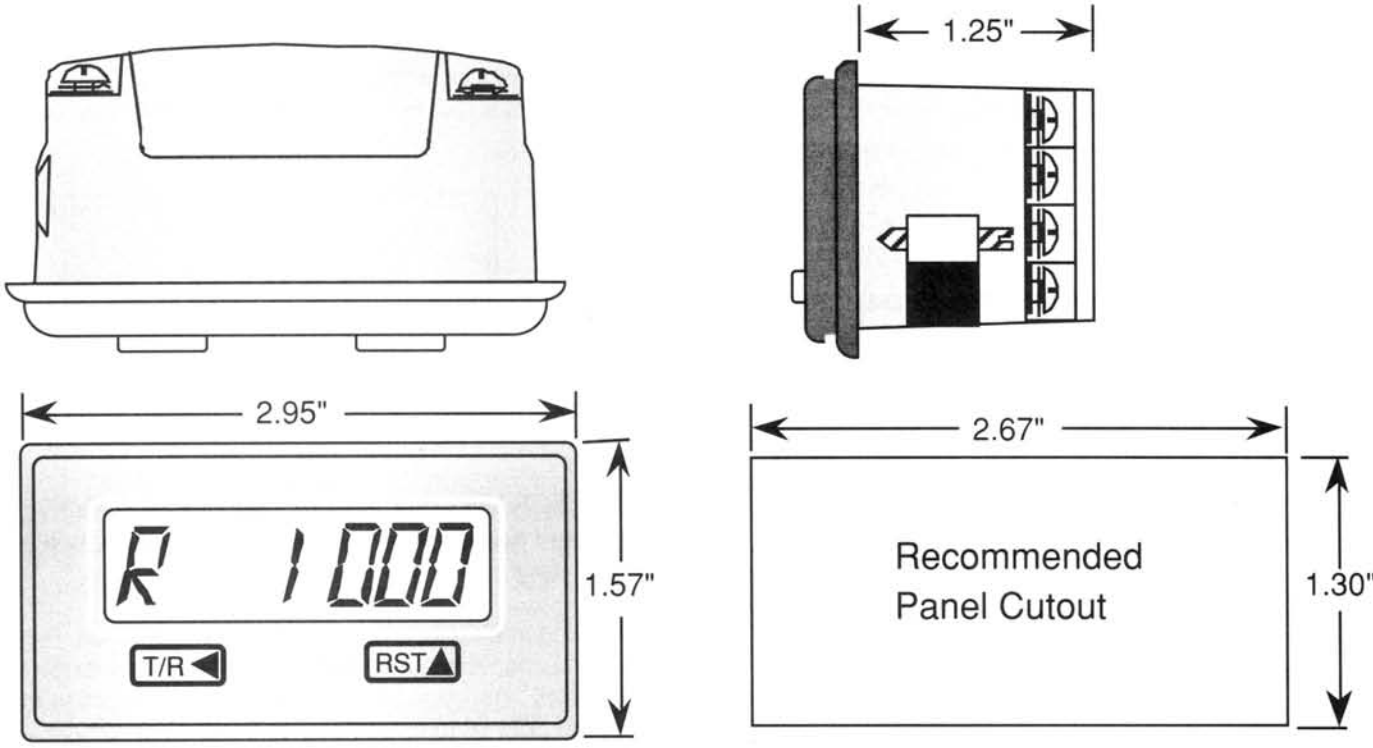
The Courier offers high-tech simplicity and application versatility. Models provide piece or flow totalization, rate monitoring, and even a combination of both. There is even an add / subtract and quadrature unit for bi-directional counting and position indication.

Our Eurostyle case design has resulted in a device that is both attractive and efficient in form. The Courier is designed for a NEMA 4X rated front panel seal to service in the most demanding environments.

With the largest display and unbeatable contrast, no other device in its class is as easy-to-read. There's even an alpha character representation for process rate that makes the Courier's message easy to understand!

With our exclusive slide-on mounting clips and protective panel gasket, installation is a snap. DIN dimensions mean that the Courier will slide into a standard panel cutout. Also, the rear panel screw terminals make for easy input wiring. No messing with cumbersome clips and connectors.

Dimensions / Selection Guide

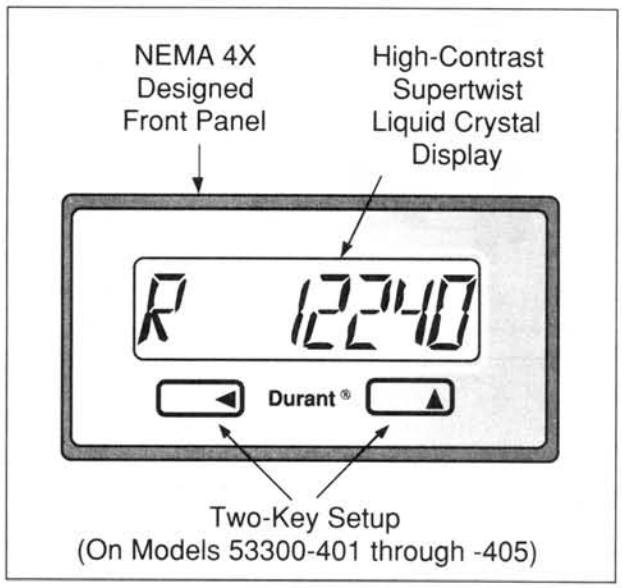


(Dimensions shown in actual size)

Courier Selection Chart

MODEL NUMBER	COUNT	SCALING	RATE	PROGRAMMABLE DECIMAL	Comments/Description
53300-400	•				8-Digit Totalizer
53300-401	•	•		•	Add / Subtract (Solid State Input)
53300-402	•	•		•	Add / Subtract (Contact Input)
53300-403	•	•		•	Quadrature Totalizer
53300-404		•	•	•	1/Tau Ratemeter
53300-405	•	•	•	•	Totalizer / 1/Tau Ratemeter
53301-400	•				8-Digit Totalizer - Extended Temperature Range
53301-404		•	•	•	1/Tau Ratemeter - Extended Temperature Range
53301-405	•	•	•	•	Totalizer / 1/Tau Ratemeter - Extended Temperature Range

Features

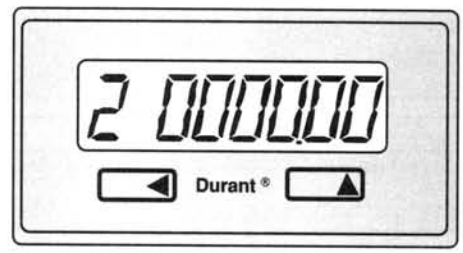


Two - Key Setup...

The ratemeter, totalizer / ratemeter, quadrature and add / subtract models contain configuration choices like count and rate scaling, decimal point locations, count reset selection, and more. Setup is easy, involving the use of two front panel keys to select from a maximum of six (6) menu choices, depending on the model you choose. Here are the six available selections for the totalizer/ratemeter model 53300-405:

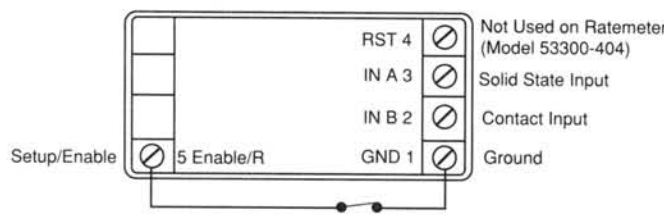
Programming Screens	
Screen	**Function**
1	Count Scale Factor
2	Totalizer Decimal Point
3	Rate Scale Factor
4	Ratemeter Decimal Point
5	Rate x1/x10
6	Reset Key Enable/Disable

The following example shows Menu 2 which is used to enter the decimal point location for the 53300-405 ratemeter display:

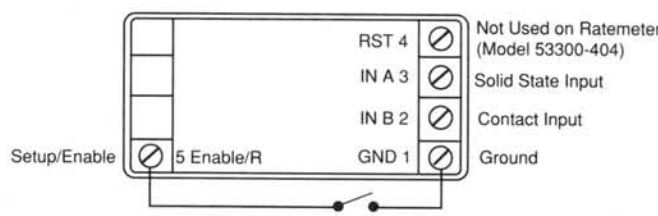


By simply pressing the ▲ key until reaching the desired position, the decimal point setup is complete. It's that easy!

Moving in and out of the setup mode is easy too, requiring only a connection between the Setup Enable terminal and Ground. Removing the connection returns you to the run mode and automatically enters selected values. This method prevents unintentional setup entries.



Enters Setup Mode



Returns to Run Mode and Enters Selected Values

Specifications

Physical Specifications

Display
Type: Seven segment LCD.
Character Height: 0.43".

Package
Material: Cycolac X-17.
Mounting: Panel mount (mounting clips & gasket provided).
Connections: Screw terminals.

Environment
Storage Temperature: -20° to 70°C.
Operating Temperature:
53300-40X Models: 0° to 55°C.
53301-40X Models: -20° to 70°C.
Operating Humidity: 90%, non-condensing.
Front Panel Design: NEMA 4X when mounted with gasket provided.

Operational Specifications

Totalizer
(Models -400, -401, -402, -403, -405)
No. of Decades: 8 up, all models; 7 down with minus sign, **(Models -401, -402, -403)**
Decimal Point: 4 places or none displayed. Model -400 does not have decimal point.
Scaler Range: 0.0001 to 99.9999.
Entering 0.0000 scales by 100.0000.
Count Modes (Models -400, -405) up only; high or low speed.
(Model -401) high speed add/subtract.
(Model -402) low speed add/subtract.
(Model -403) high speed quadrature.

Rate Indicator
(Models -404, -405)
No. of Decades: 4 calculated; 5 displayed with fixed 0 in least significant digit.
Decimal Point: 4 positions or none displayed.
Scaler Range: 0.001 to 9999.
Method of Calculation: 1/Tau.
Accuracy: ± 0.2%.
Update Time: 0.7 second minimum.
Zero Time: 10 second fixed.

Electrical Specifications

Power Source
User replaceable 3V lithium battery.
Battery Life: Approximately 5 years depending on application.

Count Inputs
Low speed input: Designed for contact closures to DC common.
Speed: 0 to 20 Hz.
Minimum Low Time: 10 milliseconds.
Minimum High Time: 40 milliseconds.
Impedance: 101K ohm.
Voltage Thresholds:
Low 0 to 0.4 VDC.
High 2.0 to 28 VDC.
Maximum High 28 VDC.

High speed input: Requires 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.
Minimum High Time: 20 microseconds.
(The above times are with a 0 to 5.0 V swing.)
Input Impedance: 2kΩ above 5 VDC.
Voltage Thresholds:
Low 0 to 1.2 VDC.
High 2.0 to 28 VDC.
Maximum High 28 VDC.
Reset Input: Designed for contact closures to DC common.
Minimum Low: 0.25 to 1 second (reset is maintained).
The required pulse width varies with count speed, scale factor and number of digits displayed.
Voltage Thresholds:
Low 0 to 0.4 VDC.
High 2.0 to 28 VDC.

Dimensional Specifications

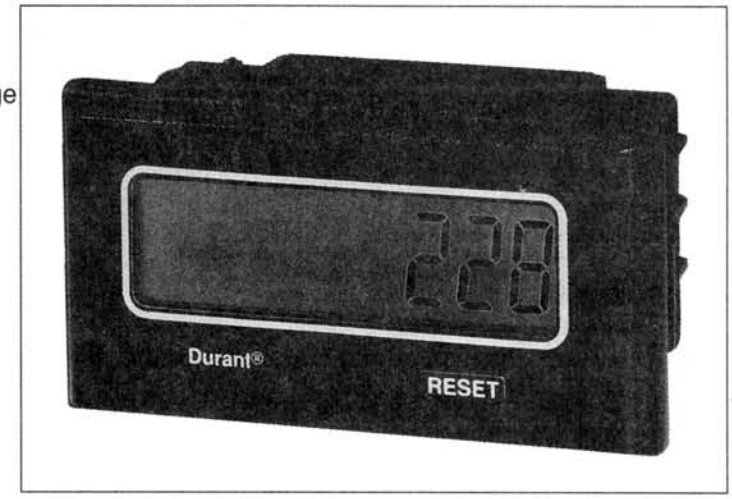
Height: 1.57" (39.87 mm).
Width: 2.95" (74.93 mm).
Depth: 1.25" (31.75 mm).
Panel Cutout: 2.677" (68 mm) x 1.30" (33 mm).

Totalizers

MODEL

53300-400 Totalizer
53301-400 Totalizer - Extented Temperature Range

- 8 Digit Display
- .43" LCD Display
- Remote Reset Terminal
- High Speed and Low Speed Inputs
- NEMA 4X

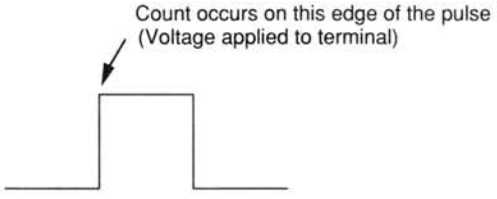


Model 53300-400

The 5330X-400 is an UP counting totalizer with a high contrast eight-digit display. The front-panel reset key can be disabled or enabled by connecting two terminals together on the back of the unit. A remote-reset terminal is also provided.

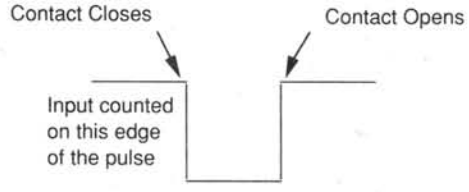
This totalizer is intended for simple totalizing applications. One count input pulse per item is necessary. Separate contact and solid state inputs are provided. The solid state input (terminal 3) requires a current-sourcing sensor and can accept inputs up to 10 kHz. Input pulses to this terminal are counted on the positive-going edge.

Terminal 3 is pulled down to common internally. When a sensor output supplies voltage to this terminal, one count is registered on the display. The sourcing signal must supply at least +2.0VDC but no more than +28VDC.



Note: When a sourcing signal is applied to terminal 3, a power assist feature of the Courier extends the life of the battery.

Terminal 2 is the low-speed, current-sinking count input designed to be used with a contact closure to ground. It has a maximum count speed of 20 Hz. Inputs into this terminal are counted on the negative-going edge.



Terminal 2 is pulled up to +3VDC internally. When a contact closes, pulling the voltage down to .3 VDC or less, one count is registered.

COURIER SERIES

Add / Subtract Totalizers

MODEL

53300-401	Add/Subtract (Solid State Input)
53300-402	Add/Subtract (Contact Input)

- Count Scaling
- Remote Reset Terminal
- Front Panel Reset
- Minus Sign for Negative Count Values
- Reset to 0 or an Offset Value
- Programmable Decimal Point
- NEMA 4X

Model 53300-401

The 53300-401/402 is a counter with an eight-digit LCD display. A programmable scaler and decimal point allow for display in any engineering unit. One of the programming options allows the front panel reset key to be enabled or disabled.

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, 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 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 53300-401 has high-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 +2.0 VDC, but not more than +28VDC to the input. Counts are entered on the positive-going edge of the pulse.

Model 53300-402 has low speed inputs and can accept pulses from solid state current sinking sensors or contact closures to ground up to 20 Hz per input. These terminals are internally pulled up to +3 VDC. The sensor must be capable of sinking current from the input to bring the input voltage down to +0.4 VDC or less. Counts are entered on the negative-going edge of the pulse.

Why Add/Subtract?

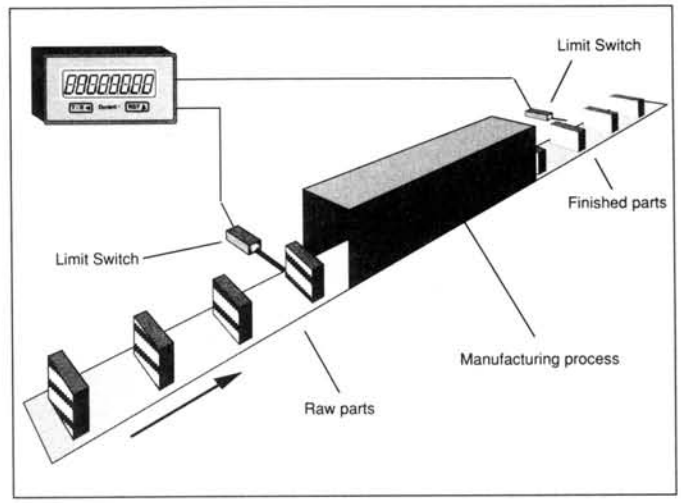
With an add/subtract totalizer, two sensors or signals are required to perform the up/down counting sequence.

The add/subtract version of the Courier allows many jobs to be performed that can not be performed by an UP only counter.

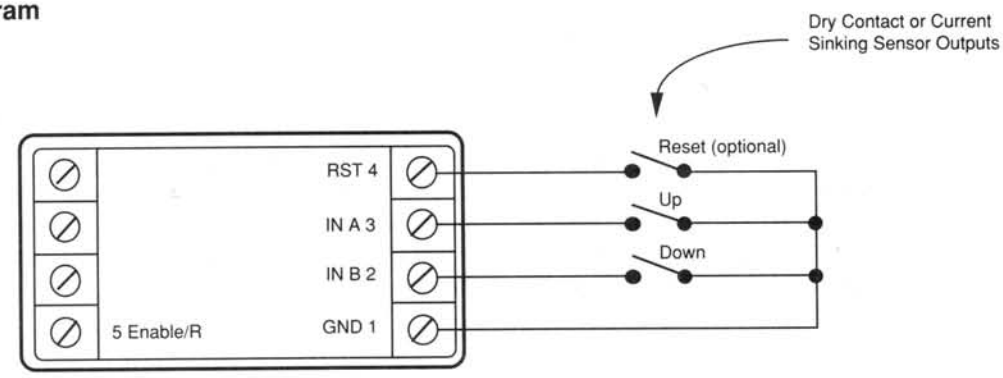
The "parts in process" application on the following page along with "bad parts vs. good parts", "subtracting a bad part from the total parts", and "keeping track of the number of cars in a parking lot as they go in and out" are just a few of the applications the 53300-401/402 can handle.

Add / Subtract Totalizer Application Example

In the illustration at right, parts are fed into a machine or process, an operation is performed, and the finished parts exit the machine or process. The Courier add/subtract totalizer is used to indicate the number of parts in process. A sensor at the start of the process provides a pulse to the add input of the totalizer. When a part leaves the machine, the end of the process, a sensor provides a pulse to the subtract input of the totalizer.



Wiring Diagram



Courier Series 53300-402

ORDERING INFORMATION

Model Number	Product Description
53300-401	Add/Subtract Totalizer (Solid State Input)
53300-402	Add/Subtract Totalizer (Contact Input)

COURIER SERIES

Quadrature Totalizer

MODEL 53300-403

- Count Scaling
- Remote Reset Terminal
- Front Panel Reset
- Minus Sign for Negative Count Values
- Reset to 0 or an Offset Value
- Programmable Decimal Point
- NEMA 4X

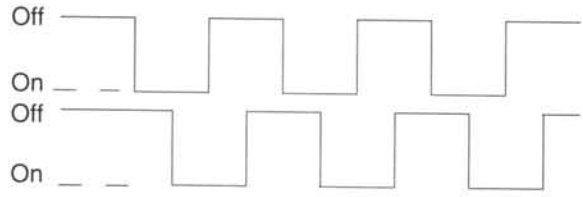
Model 53300-403

The 53300-403 is a counter with an 8-digit LCD display. A programmable scaler and decimal point allows for display in any engineering unit.

One of the programming options allows the front panel reset key to be enabled or disabled. The totalizer has high speed inputs only and is capable of receiving pulses at 10 kHz per channel if each signal is a square wave and there is a 90° phase shift between the two signals. For this reason, it is recommended that solid state sensors (PNP output or NPN output with a pull-up resistor) be used.

Quadrature Counting

Quadrature is a bi-directional count mode requiring an input signal at each of the totalizer's two count inputs. Quadrature counting is typically accomplished by using a quadrature encoder as the count source, although any two sensors with single channel outputs may be used if the sensors are positioned correctly. In either case, both sensor outputs must produce pulses at the same frequency and there must be a phase shift between the signals. The totalizer recognizes the phase shift and uses it to determine if it should be counting up, or counting down. Finally, the signal channels must alternate changes of state. This produces the four distinct input conditions from which the term quadrature is derived. These conditions are off-off, on-off, on-on, and off-on.



Why Quadrature?

Using a quadrature count source is the most accurate way of positioning or counting especially when a high degree of resolution is needed.

It is also the desired count source to eliminate the effects of jitter in a process.

Durant counters that accept quadrature count signals determine the phase shift of the signals. This shift is what determines the direction of the count (up, down or none). Therefore, any unwanted movement (jitter, backup, etc.) is properly accounted for.

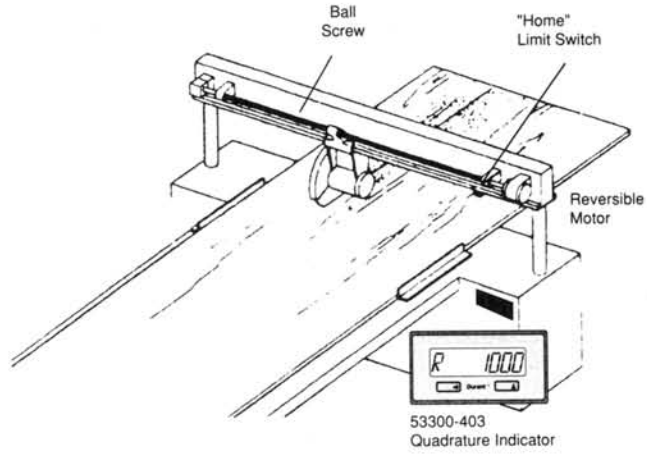
The ability to count forward and backward with the quadrature Courier adds another dimension to the already diverse Courier family.

Quadrature Totalizer Application Example

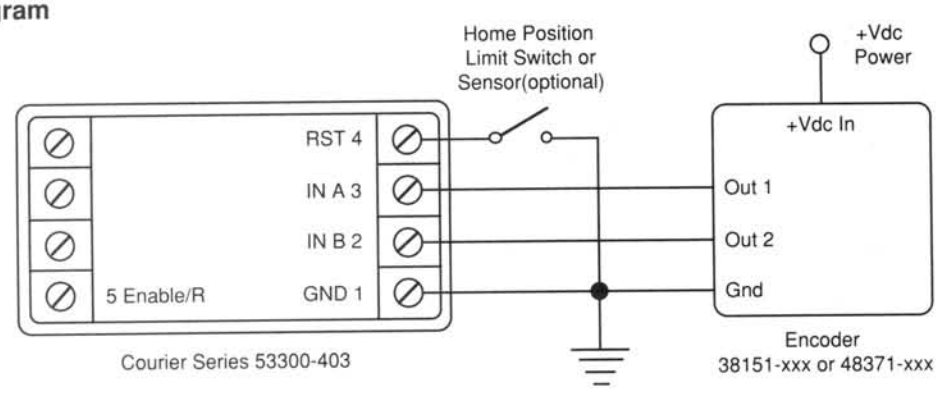
Saw Blade Position Application

Many processes require an operator to monitor and/or set a position. Examples are the distance between two rollers (shut height), the position of a back stop with respect to a shear, and the position of a saw blade with respect to a fence.

In the illustration at right, a motor-driven ball screw moves a saw to an operator set position. The ball screw also drives a quadrature shaft encoder which provides pulses to the totalizer. The encoder also provides directional information to the totalizer. A "home" limit switch references the totalizer to a known value in case the screw is turned while DC power to the encoder is removed.



Wiring Diagram



ORDERING INFORMATION

Model Number	Product Description
53300-403	Quadrature Totalizer

Totalizer / Ratemeter

MODEL

53300-405 Totalizer/Ratemeter
53301-405 Totalizer/Ratemeter - Extended Temperature Control

- Count and Rate Scaling
- High and Low Speed Inputs
- 8 Digit Totalizer
- 1/Tau Ratemeter
- Programmable Decimal Points
- NEMA 4X

Model 53300-405

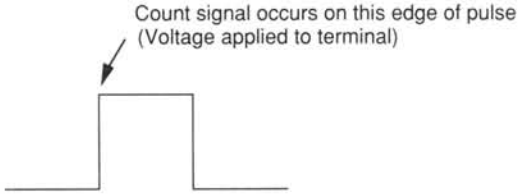
The 5330X-405 is a combination UP counting totalizer and ratemeter. The ratemeter/totalizer has a .43" LCD display. Programmable count/rate scalers and decimal points allow for display of rate and count in any engineering terms.

The 5330X-405 is designed to show both total and process rate. By simply pushing the mode select button, you alternate between the two. One of the programming options allows the front panel reset to be enabled or disabled. The 5330X-405 has individual scalers for rate and total along with individual programmable decimal points.

Count Inputs

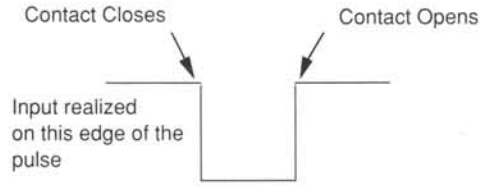
Separate contact and solid state count inputs are provided. The solid state input (terminal 3) requires a current-sourcing sensor and can count up to 10 kHz. Inputs into this terminal are counted on the positive-going edge.

Terminal 3 is pulled down to common internally. When a sensor output supplies voltage to this terminal, one count is registered on the display. The sourcing signal must supply at least +2.0 VDC but no more than +28 VDC.



Note: When a sourcing signal is applied to terminal 3, a power assist feature of the Courier extends the life of the battery.

Terminal 2 is the low-speed, current sinking count input designed to be used with a contact closure to ground. It has a maximum count speed of 20 Hz. Inputs into this terminal are counted on the negative-going edge.



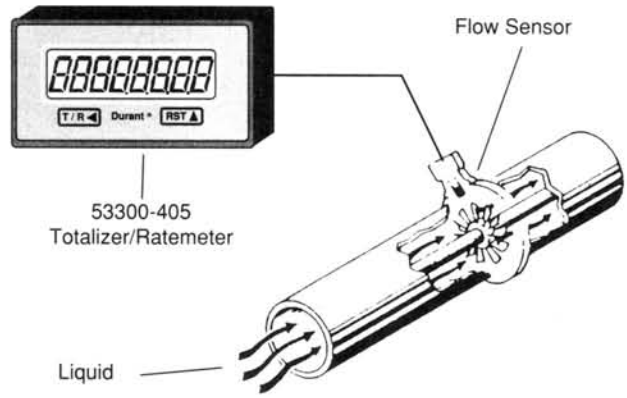
Terminal 2 is pulled up to +3VDC internally. When a contact closes, pulling the voltage down to .4 VDC or less, one count is registered.

Totalizer / Ratemeter Application Example

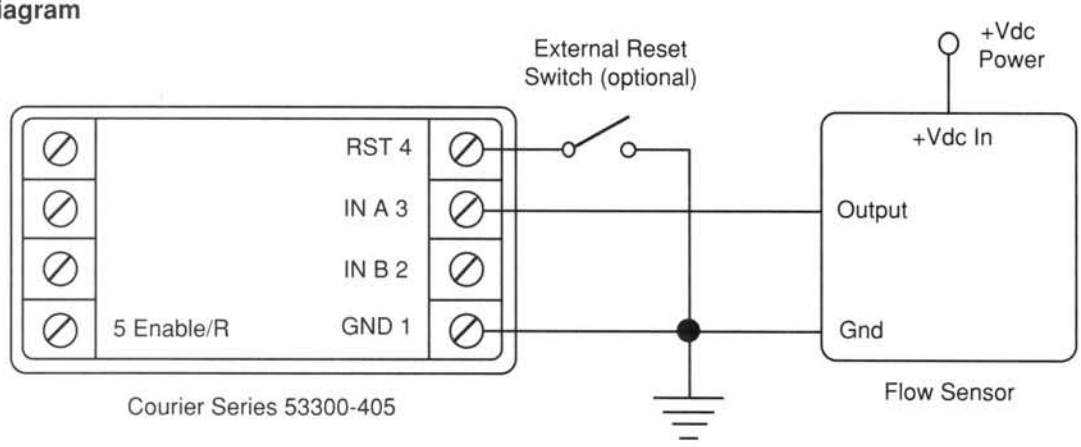
Flow Quantity and Rate Indication Application

In many processes, it is desirable to know both the total quantity of product produced and the rate at which the product is being produced.

In the illustration at right, the output of a turbine flow sensor is connected to a Courier totalizer/ratemeter. The flow sensor produces a known number of pulses per gallon (or other unit of measure). This number is usually multiplied by some factor or factors to make the totalizer and ratemeter indicate the desired units of measure.



Wiring Diagram



ORDERING INFORMATION

Model Number	Product Description
53300-405	Totalizer/Ratemeter
53301-405	Totalizer/Ratemeter - Extended Temperature Range

1 / Tau Ratemeters

MODEL

53300-404 1/Tau Ratemeter
53301-404 1/Tau Ratemeter - Extended Temperature

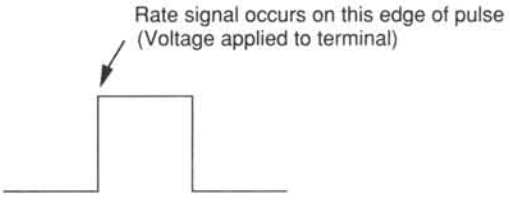
- High and Low Speed Inputs
- Rate Scaling
- 1/Tau Ratemeter
- 10 Second Zero Time
- Programmable Decimal Point
- NEMA 4X

Model 53300-404

The 5330X-404 is a ratemeter with a .43" LCD display. A programmable rate scaler and decimal point allow for display of rate in any engineering term.

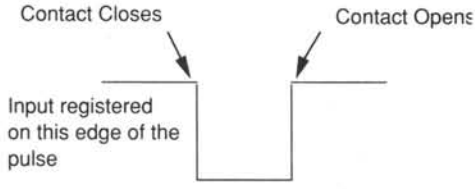
Rate Inputs

Terminal 3 is pulled down to common internally. When a sensor output supplies voltage to this terminal, a rate pulse is internally registered. The sourcing signal must supply at least +2.0 VDC but no more than +28 VDC.



Note: When a sourcing signal is applied to terminal 3, a power assist feature of the Courier extends the life of the battery.

Terminal 2 is the low-speed, current-sinking rate input designed to be used with a contact closure to ground. It has a maximum input speed of 20 Hz. Inputs into this terminal are registered on the negative-going edge.



Terminal 2 is pulled up to +3 VDC internally. When a contact closes, pulling the voltage down to .4 VDC or less, one rate pulse is registered.

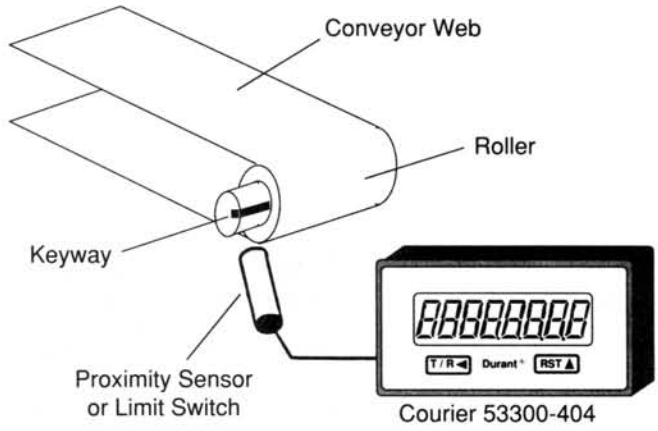
What is 1/Tau?

The 1/Tau method of rate calculation is based on accurately measuring the time period between consecutive input pulses. This time period is called "Tau". Durant ratemeters measure Tau in microseconds. Since the frequency of the pulse and the time period of the pulse are inversely proportional, inverting time (1/Tau) yields a natural rate in frequency (pulses per second). The rate scaler feature is a multiplier which converts the pulse per second rate into almost any familiar rate unit such as revolutions per minute, feet per minute, barrels per hours, or buggywhips per fortnight.

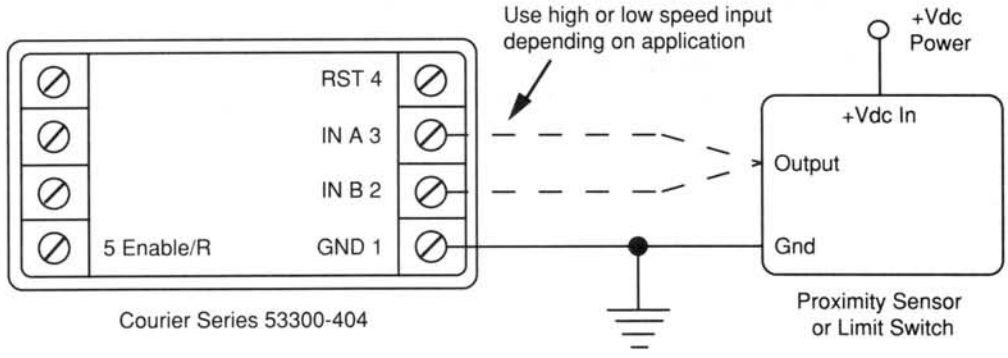
1 / Tau Ratemeter Application Example

Rate Indication Application

The illustration at right shows a common application for the Courier rate indicator. The conveyor web is driven by a roller which is connected to a shaft. The shaft contains a keyway which the proximity sensor can detect. Web speed is displayed in feet/minute or meters/minute.



Wiring Diagram



ORDERING INFORMATION

Model Number	Product Description
53300-404	1/Tau Ratemeter
53301-404	1/Tau Ratemeter - Extended Temperature Range