POWER
Internal Battery: 3V, Lithium.
Life expectancy: 5 years +.

PHYSICAL
Operating Temperatures:
Model 53301-475: -20° to 70°C.
Storage Temperature: -40° to 70°C.
Operating Humidity: 90% Non-condensing.
Weight: 2.2 oz. net.
Display Size: .43 high.
Front Panel Rating: NEMA 4X when mounted with gasket provided.
Case Material: Cycolac X-17.

TOTALIZER
Type: UP counting.
Digits: 6.
Scaler: 0.0001 - 100,000.
(0.0000 scales by 100 in the Courier Series.)
Decimal Point: 5 positions, programmable.

RATE INDICATOR
Type: 1/Tau.
Digits: 4/5, (4 calculated, 5 displayed with fixed 0 in LSD).
Scaler Range: .991 to 9999.
Decimal Point: 5 positions, programmable.
Accuracy: ±0.2%.
Update Time: .7 seconds.
Zero Time: 10 seconds.

DC COMMON (Terminal 1)
COUNT / RATE INPUTS
Input A (Terminal 2) and (Terminal 3) Magnetic Pickup Input
Speed: .1 to 3000 Hz @ 50% Duty Cycle
70 Hz maximum @ 0.02 Volts peak to peak
Voltage Range: 0.020 to 100 Volts peak to peak
0.50 Vp-p minimum @ 3000 Hz
VRMS Max. = 35.4 Volts
Vpk Max. = 60 Volts
Maximum Sensor Cable Length: 10' Shielded twisted pair

RESET INPUT (Terminal 4)
Resets totalizer to zero 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 0.4 VDC.
High: 2.0 to 28 VDC.

PROGRAM ENABLE INPUT (Terminal 5)
Operation: Level sensitive (maintained).

COUNT ACCURACY
100% when operated within specifications.
INTRODUCTION

The 53301-475 is a combination UP counting totalizer and ratemeter. The totalizer has an eight digit display. The front-panel reset key can be disabled. A remote-reset terminal is provided. The count scaler and decimal point can be programmed.

The ratemeter has a 4/5 digit LCD display. A programmable rate scaler and decimal point allow for display of rate in any engineering terms.

OPERATION

Count Inputs

Input A3 and A2 form a mag input circuit which allows direct input from flow turbine meters and motor or gear systems equipped with mag sensors. The input will count the frequency of a sinusoidal wave form with a voltage as small as 0.020 Volts peak-to-peak and as high as 100 Volts peak-to-peak.

The Maximum frequency that the unit will count is dependent on the voltage of the signal. The maximum count speed of 3000 Hz cannot be reached unless the input voltage is at least 0.50 Volts peak-to-peak.

RUN MODE

Screens

Two screens are available on the 5330X-405.

Totalizer: This 8-digit screen shows you the accumulated scaled count inputs. The totalizer has lead-zero blanking.

Ratemeter: This 4/5 digit screen shows current process rate.

Front Panel Keys

Press the [ ] key on the front panel to toggle between the totalizer and ratemeter screens.

Press the [ ] key to reset the totalizer display to zero. This button has no effect on the ratemeter screen.

The front panel reset key provides an edge-sensitive (momentary) reset.

Note: The [ ] key may be disabled. See program mode.

APPLICATIONS

The 53301-475 is designed to show both total and process rate. Certain programming and wiring decisions must be made to complete your application. We recommend the following sequence:

1. Answer the following questions:
   - What engineering units should the ratemeter be scaled to?
   - How many pulses per item is the sensor providing?
   - Is a decimal point needed on the count and/or rate display?
   - Should the front-panel reset key be active or inactive?

2. Calculate the count scale factor and the rate scale factor.

MOUNTING

The Mounting section provides details on the installation of the 53301-475 unit.
PROGRAM MODE

To enter the program mode, a connection must be made between terminals 1 and 5.

Screens
There are six program-mode screens in the 53301-475. Press and hold the TR key while repeatedly pressing the RST key to advance to successive screens.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Count Scale Factor</td>
</tr>
<tr>
<td>2</td>
<td>Totalizer Decimal Point</td>
</tr>
<tr>
<td>3</td>
<td>Rate Scale Factor</td>
</tr>
<tr>
<td>4</td>
<td>Ratemeter Decimal Point</td>
</tr>
<tr>
<td>5</td>
<td>Rate x1/x10</td>
</tr>
<tr>
<td>6</td>
<td>Reset Key Enable/Disable</td>
</tr>
</tbody>
</table>

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

Count Scaler (CS) Formula:

\[
CS = \frac{DPF}{PPI}
\]

where:

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

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>DPF</th>
<th>DISPLAY</th>
<th>DPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXXXXX</td>
<td>1</td>
<td>XXX.XXX</td>
<td>1,000</td>
</tr>
<tr>
<td>XXXXX.X</td>
<td>10</td>
<td>XX.XXX</td>
<td>10,000</td>
</tr>
<tr>
<td>XXXXX.XX</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PPI is the number of pulses per item from the sensor (times 2 if doubled count mode).

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

\[
CS = \frac{1}{20} = 0.05000
\]

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

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 TR 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.

(Setting the count scale factor to 0.0000 will allow scaling by 100 in the Courier Series)

Programming Totalizer Decimal Point

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

Press the RST key to move the decimal point to the desired position.
RATE SCALER

Calculating the Rate Scale Factor

This 1/Tau ratemeter calculates rate by measuring the time interval between input pulses, converting to a frequency (F = 1/Tau), and multiplying the product by the rate scaler. The rate scaler is user programmed to convert the input count frequency into the desired rate units for display (feet/minute, inches/second, gallons/hour, etc.)

Rate Scaler Range: 0.001 to 9999

Rate Scaler (RS) formula:

\[ RS = \frac{\text{Sec} \times \text{DPF}}{\text{PPI} \times 10} \text{ for } R \times 10 \]

where:

- SEC is the number of seconds in the rate time unit (items/second = 1, items/minute = 60, items/hour = 3600, etc.)
- DPF is the decimal point factor corresponding to the desired decimal point location on the run mode screen:
  - Display DPF
    - XXXX: 1
    - XXX.X: 10
    - XX.XX: 100
    - X.XXX: 1000
- PPI is the number of pulses per item from the sensor.

Example 1: A sensor produces 10 pulses per foot of material travel. Display rate in whole feet per minute (XXXX).

\[ RS = \frac{60 \times 1}{10} = 6.000 \]

Example 2: A flow sensor produces 400 pulses per gallon. Display flow rate in tenths of gallons per hour.

\[ RS = \frac{3600 \times 10}{400} = 90.00 \]

Programming Rate Scale Factor

The third program mode screen allows you to enter the rate scale factor.

The lower case "d" appears on the right of the display when it is time to enter the decimal point position for the rate scaler.

Note: This decimal point is used for the rate scaler only and will not appear on the ratemeter screen.

Press the [RST] key to change the first digit to the correct value. Press the [INC] key to select the next digit to be changed. Repeat this process until all the digits are correct. When the "d" appears, press the [RST] key until the decimal point is in the desired location.

Ratemeter Decimal Point

The fourth program mode screen is used to enter the decimal point position for the ratemeter run-mode display.

The display will show the screen number (4) and four zero's.

Press the [RST] key until the decimal point is in the correct position.

Rate x1 or x10

The fifth screen is used to select the rate display multiplier of one or ten. Selecting rate x10 will add a zero to the far right of the display. This zero will not change value and does not affect the decimal point position.

The display will show the screen number (5) and a 1 at the right.

Press the [RST] key to select 1 or 10.

Front Reset Key Enable/Disable

The last screen in the program mode is used to determine whether the front panel reset key will function. The screen will show a number 6 on the left and an R on the right.

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 totalizer / rate meter 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.

**Mounting:** This totalizer / rate meter should not be mounted near a solenoid or other inductive devices. Enough ventilation should be supplied to keep the totalizer 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 stack or jumble up batteries
* Do not heat batteries above 95°C
* Do not disassemble batteries
* Do not recharge lithium batteries
* Do not apply pressure to, or deform batteries
* Do not solder to batteries
* Do not dispose of batteries in fire
* Insert battery with correct polarity

WIRING DIAGRAMS

### SOLID STATE COUNT / RATE INPUT MAGNETIC PICKUP

- **Terminal:** Ground
- **Function:** Magnetic Pickup Input
- **Operation:** Connect to Ground to Reset Totalizer. This is a maintained or Level Sensitive Reset.

### PROGRAM MODE ENABLE

### REMOTE RESET