Durant®

INSTALLATION AND OPERATION
MANUAL NUMBER 53300-974-00

Courier Model: 53301-474 Ratemeter with Magnetic Pickup Input

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

PHYSICAL
Operating Temperature:
Model 53301-474: -20° to 70°C.
Storage Temperature: -40° to 70°C.
Operating Humidity: 90% R. H. (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.

RATE INDICATOR
Type: 1/τau.
Digits: 4/5 (4 calculated, 5 displayed with fixed 0 in LSD).
Scaler Range: .001 to 5999
Decimal Point: 5 positions, programmable.
Accuracy: ±0.2%
Update Time: .7 seconds
Zero Time: 10 seconds.

DC COMMON (Terminal 1)
RATE INPUTS
Terminals 2 and 3 Magnetic Pickup Input

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Program Enable Input (Terminal 5)
Operation: Level sensitive (maintained).

COUNT ACCURACY
100% when operated within specifications.
INTRODUCTION

Your 53301-474 is a ratemeter with a 4/5 digit LCD display. A programmable rate scaler and decimal point allow for display of rate in any engineering term.

APPLICATIONS

The 53301-474 is designed to show you process rate. Certain programming and wiring choices must be made to accomplish your application. We recommend the following sequence:

1. Answer the following questions:
   - To what engineering units should the ratemeter be scaled?
   - How many pulses per item is the sensor providing?
   - Is a decimal point needed on the rate display?

2. Calculate the rate scale factor.

OPERATION

Rate 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.

PROGRAM MODE

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

Screens

There are three program-mode screens in the 53301-474. Press and hold the key while repeatedly pressing the key to advance to successive screens.

<table>
<thead>
<tr>
<th>Programming Screens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>
RATE SCALER

Calculating the Rate Scale Factor

This 1/Tau rate meter 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 count input 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:

\[
RS = \frac{SEC \times DPF}{PPI}
\]

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
  - XXXX 10
  - XX.X 100
  - X.XX 1000

Use the rate display decimal point screen to program the desired decimal point position.

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).

\[
RS = \frac{60 \times 1}{10} = \frac{60}{10} = 6
\]

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

\[
RS = \frac{3600 \times 10}{400} = \frac{36,000}{400} = 90
\]

Programming Rate Scale Factor

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

Ratemeter Decimal Point

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

Press the \[ \text{key} \] until the decimal point is in the correct position.

Rate x1 or x10

The third 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.

Press the \[ \text{key} \] to select 1 or 10.
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.

Mounting: The ratemeter 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 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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Input A Rate</td>
<td>Magnetic Pickup Input</td>
</tr>
<tr>
<td></td>
<td>Input Rate</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Input A Rate</td>
<td>Magnetic Pickup Input</td>
</tr>
<tr>
<td></td>
<td>Input Rate</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Program Enable</td>
<td>Connect to Ground to Enter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Program Mode</td>
</tr>
</tbody>
</table>

SOLID STATE RATE INPUT
MAGNETIC PICKUP

PROGRAM MODE ENABLE

Shielded twisted pair not to exceed 10F1
### REPLACEMENT PARTS
- 36367-202 Battery
- 46066-210 Gasket
- 53300-241 Mounting Clip
- 28772-200 Mounting Screw

### COURIER SERIES ACCESSORIES
- 47004-400 Magnetic Sensor Pickup Assembly
- 28433-400 30 tooth gear for use with mag pickup

### OTHER COURIER SERIES PRODUCTS
- 53300-400 Totalizer
- 53300-401 Add/Subtract Totalizer (Solid State Inputs)
- 53300-402 Add/Subtract Totalizer (Quad Indicate/Totalizer)
- 53300-404 Ratemeter
- 53300-405 Totalizer/Ratemeter
- 53301-400 Totalizer - Extended Temperature
- 53301-401 Add/Subtract Totalizer (Solid State Input)
- 53301-402 Add/Subtract Totalizer (Contact Input)
- 53301-403 Totalizer/Ratemeter
- 53301-475 Totalizer/Ratemeter with Magnetic Pickup Input
- 53302-400 Totalizer w/Backlight
- 53302-401 Add/Subtract Totalizer w/Backlight (Solid State Inputs)
- 53302-402 Add/Subtract Totalizer w/Backlight (Contact Inputs)
- 53302-403 Quad Indicate/Totalizer w/Backlight
- 53302-405 Totalizer/Ratemeter w/Backlight

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