

# MS-287

## MINitrol Special for Timer & Counter Combo w/ Rate Option

### Features

- Timer Available From Line Frequency 60Hz (50Hz) Signal on Terminal 10
- Separate Scaling Factors For A & B Inputs
- Display Elapsed Time, Total (Rate on MRT)
- Pulse Input - 10 kHz Max.
- RS422/RS232 Serial Communication (optional)
- Modbus RTU RS422/RS485/RS232 (optional)
- NEMA 4X / IP65 Front Panel
- 4-20mA or 0-20mA Analog Output (optional)
- CSA Listed



### Description:

The MS287 is a special version of our Minitrol series counter/ratemeter. The standard Minitrol is modified to bring a 60Hz (50Hz) signal to pin 10 (AC powered units only). The user has the option of connecting this signal to the A input, B input or both. By entering the proper scaling factor, the user can scale the input to read the desired time base. EXAMPLE: If the unit is powered with 115VAC @ 60Hz, The scaling factor for A can be set to yield different time bases: i.e. 60 yields seconds, 360 yields minutes & 1/ 10, 3600 yields minutes, etc. Input B can be scaled the same way or used as a separate counter. With a little imagination, this special can be used in many applications involving time/count control. To order this special, add the prefix "MS287" to the standard Minitrol part number, i.e. MS287MC2A3.

### 60Hz (50Hz) Output Usage (Terminal 10):

#### Test Signal

If a malfunction occurs, it's easy to test to see whether the sensor or MS287 is faulty. Disconnect the sensor and apply a jumper or switch from terminal 10 to Input A or B to see if the display advances when the signal is applied.

#### Time Base For Timer Functions

Feed the signal from terminal 10 into either Input A or Input B and adjust the Factors for A and B accordingly.

60 yields seconds, 360 yields minutes & 1/ 10, 3600 yields minutes, 86400 yields Hours, 8640 yields Hours &1/10, 864 yields Hours &1/100.

### Specifications:

**Display:** 6 digit, 0.55" High LED

#### Input Power:

110 VAC  $\pm$  15% or 12 to 15 VDC  
220 VAC  $\pm$  15% or 12 to 15 VDC  
24VAC  $\pm$  15% or 12 to 15 VDC

**Current:** 250 mA DC max. or 6.5 VA AC

**Output Power:** (AC powered units only)  
+12 VDC @ 50 mA, unregulated -10 + 50%

#### Temperature:

Operating:

+32°F (0°C) to +130 F (+54°C)

Storage:

-40 F (-40°C) to +200°F (93°C)

**Humidity:** 0-90% Noncondensing

**Memory:** EEPROM stores data for 10 years if power is lost.

#### Inputs:

3: High Impedance DC pulse input 4-30 VDC (high), Open or 0-1 VDC (low), 10 K $\Omega$  imp. 10 kHz max. speed. Accepts simultaneous inputs.

**Approvals:** CSA File# LR91109-7, CE Compliant

#### Reset:

Front Panel:

Resets displayed value and control output

Remote:

4-30 VDC negative edge resets Totalizer "A" and control output



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### **Control Outputs:**

#### **Relays:**

2 each N.O. Relay; 5 Amps 120/240 VAC or 28 VDC. (N.C. relay contacts and NPN transistor output available with solder jumpers. Transistor output is internally pulled up to 10 VDC through relay coil, sinks from 10 VDC to .5 V @ 100 mA)

#### **Analog Output:**

An optional 4-20mA (0-20mA) output is available for the Minitrol series. The output can be programmed to track rate or total. This feature is available by adding suffix A to the part number. Connections are via a 2 terminal pluggable screw connector. Programming is accomplished by using the front panel in conjunction with rear dip switches.

Accuracy:  $\pm .25\%$  FS worst case.

Compliance Voltage: 3 to 30 VDC non inductive.

**Scaling Factor (K-Factor):** In the standard unit, a user programmable K-Factor is used to convert the input pulses to engineering units. The 5 digit K-Factor dividers, with decimal keyed into any position, allow easy direct entry of any K-Factor from 0.0001 to 99999. Separate factors may be entered for the 2 separate input channels.

**Presets:** Two control outputs are provided. To set relay values, press "menu" button until "Relay" appears on the display, the A and B outputs can be assigned to the ratemeter (high/low), one preset for rate and one for total, or two presets on the A and B totalizers. A 5 digit value can be entered for both presets and the decimal point location is the same as the counter. The outputs can be set to energize from 0.1 to 99.9 seconds or latch (0.0). If a value other than 0.0 is entered, the totalizers will auto reset at the preset. In the A-B or A+B versions, the relays will be assigned to either net total or A rate.

**Lockout:** Unauthorized front panel changes can be prevented by entering a user selected 5 digit code in the "LOC" mode. The front panel can be completely locked out or the presets can remain accessible.

**Ratemeter:** Accuracy: 0.01% FS ( $\pm 1$  display digit).

The rate display updates once per second. The rate meter can be programmed to accept almost any number of pulses per unit of measurement, sample from 2 to 24 seconds maximum, and auto-range up to 5 digits of significant information. In the "RPS" mode, the ratemeter displays in units per second, and in the "scale" mode, units per hour or per minute. The unit will display the rate of the A Input only.

**Totalizer:** The two 6-digit totalizers can count at 10 kHz max. Each can have a 5-digit dividing scale factor. The totalizer advances on the positive edge of each pulse. Count up or down modes available, as are quadrature inputs from encoders for position or flow measurement. The unit can be programmed to view the net value of "A+B" or "A-B", or A and B as separate totalizers.

### **RS232/RS422 with KEP Protocol:**

If the serial interface option is supplied, multiple units can be linked together. (The terminal addressing the unit must be capable of driving all loads in the loop.) Unit status and new set points can be communicated by serial communication. Mode changes, however, must always be made on the front panel. Data is received and transmitted over standard EIA RS232 or RS422 levels. Unit number, baud rate and parity are entered in the "Program Setting" set up mode and remain in memory even if power is off.

### **RS232/RS422/RS485 with Modbus RTU Protocol:**

The serial port can be used for serial printing or also for data acquisition. The unit can assign addresses up to 247 units (The terminal addressing the unit must be capable of driving all loads in the loop.) The unit can communicate with a master device through a Modbus-RTU protocol. The data given for each parameter is in IEEE float format comprising of 2 words. The unit can be connected in a network.

Device ID: 01-247

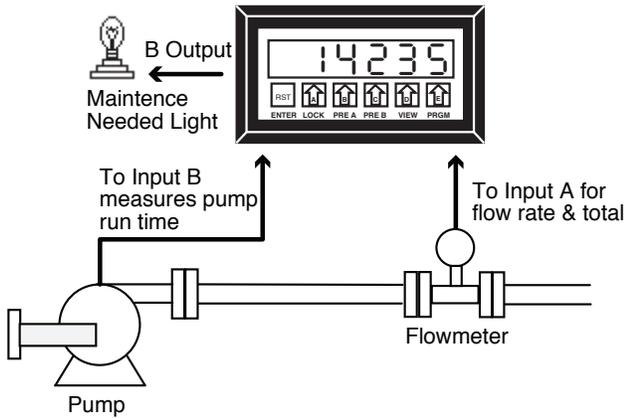
Baud Rates: 300, 600, 1200, 2400, 4800, 9600

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

## APPLICATIONS

### Flow Ratemeter & Totalizer with Pump Runtime Hour Meter



#### Description

Input A is used to show flow rate and total of a water being pumped through a water line. The B Input is used to count the hours of run time for the pump in the system. After every 2,000 hours of run time the pump needs routine maintenance. The operator will get notified by a light when the pump needs routine maintenance.

**Model Number:** MS287MRTA3

The unit is programmed as follows:

#### Factor:

Factor of A = 150 (150 pulses per gallon),

Factor of B = 86400 for Hours

(8640 for Hrs & 1/10, 864 for Hrs & 1/100).

#### Count:

rst 0 (reset to 0),

A sep B (A & B are separate counters),

Hi CPS (0-10KHz input speed).

#### Relay:

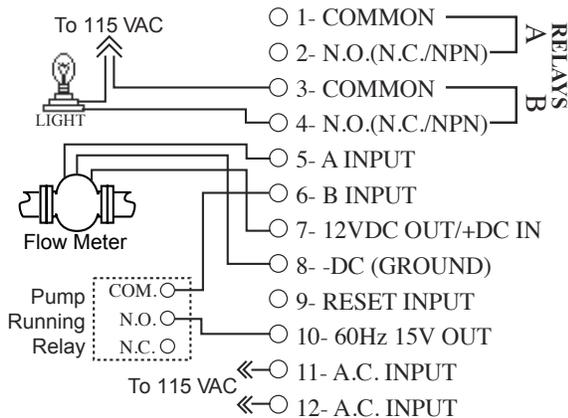
A = 0.0 (A relay is latched until reset, if used),

B = 0.0 (Warning light will remain on until Count B is reset).

Presets: Preset B = 2000,

Preset B = 12.00 (every twelve hours)

#### Wiring:



### Periodic Timed Relay Output with Counter Function

This product special is especially useful for combined counter and timer control functions. It has been used in applications such as controlling the lubrication of a gear box in a drilling machine. The gear box has to be lubricated for 5 seconds every 10 minutes. The lubricating fluid needs to be changed after 75,000 lubrications. This is easily accomplished using the MS287MC2A3.

The unit is programmed as follows:

**Factor:** factor of A = 3600, factor of B = 1.

#### Count:

rst 0 (reset to 0), A sep B (A & B are separate counters),

Hi CPS (0-10KHz input speed).

#### Relay:

A = 5.0 (duration of A relay is 5 seconds), B = 0.0 (duration of B relay is latched till reset).

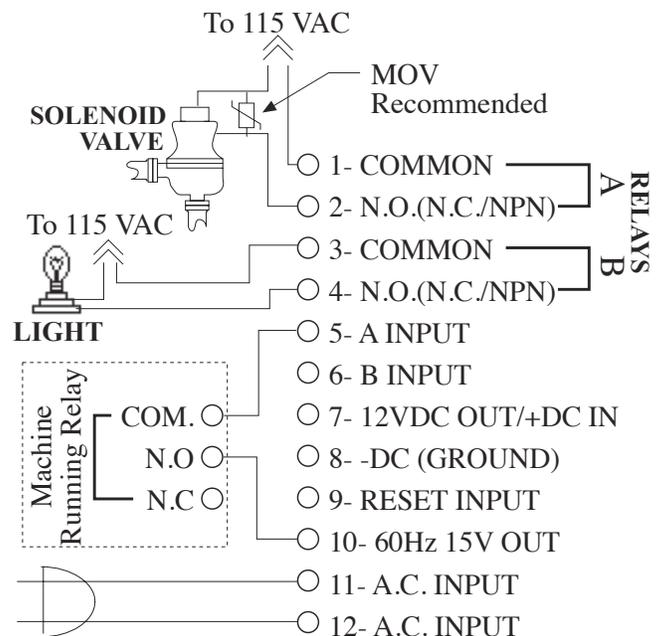
#### Presets:

Preset A = 10, Preset B = 75,000

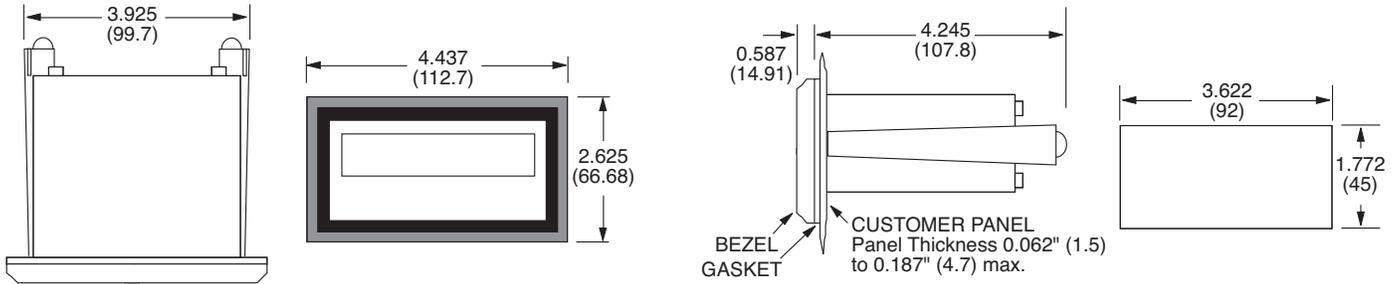
The relay on the machine which is energized when the machine is running is connected between pin 10 (60Hz) and pin 5 (input A). A simple solder jumper modification is made on the PC board to make B a "batch" counter. Counter B will advance once for each output of A. Relay A is connected to a solenoid valve which controls the lubricating fluid. 115VAC/60Hz is connected to pins 11 & 12.

This system operates as follows:

When the machine is running, the relay on the machine is energized and the A counter starts to accumulate time. When the A counter (timer) reaches 10 (preset A), the A counter resets, the A Relay energizes and opens the solenoid valve for 5 seconds and the B counter advances one. The system will run this cycle until the B counter reaches 75,000. When the B counter reaches 75,000, the B Relay energizes and turns on a light to signal that the fluid needs to be changed.



**Mounting:**



**Termination:**

- 1- COMMON
  - 2- N.O.(N.C./NPN)
  - 3- COMMON
  - 4- N.O.(N.C./NPN)
  - 5- A INPUT
  - 6- B INPUT
  - 7- 12VDC OUT/+DC IN
  - 8- -DC (GROUND)
  - 9- RESET INPUT
  - 10- 60Hz 15V OUT
  - 11- A.C. INPUT
  - 12- A.C. INPUT
- RELAYS**  
A  
B

**Ordering Information**

<b>Example:</b>	<b>MS287</b>	<b>MC2</b>	<b>A</b>	<b>3</b>	<b>1</b>
Special:					
Type:					
MRT=	6 digits, ratemeter/totalizer with presets and scaling.				
MC2=	6 digits, totalizer only with presets and scaling.				
Operating Voltage:					
A=	110 VAC ± 15% or 12 to 15 VDC				
B=	220 VAC ± 15% or 12 to 15 VDC				
C=	24 VAC ± 15% or 12 to 15 VDC				
Count Inputs:					
3 =	Standard, 4-30 VDC simultaneous inputs.				
Options:					
1=	RS232 Communications				
2=	RS422 Communications				
3=	Modbus RTU RS232				
4=	Modbus RTU RS422/RS485				
A=	Analog Output (4-20/0-20 mA)				
<b>NOTE:</b>	RS232/RS422/RS485 & Analog Output options can not be combined				
<b>Accessories</b>					
	Separate non keyboard panel order #34235				
	Separate keyboard panel - order #34234				
	NEMA4 wall mount enclosure available see LCN4X & MS821				
	Explosion proof enclosure available, see XHV				
	Serial printer available, see P20, P220, P295				
	Ethernet Port Server available, see IEPS				
	RS-422/485 to RS-232 Communication Adaptor available, see CA285				
	Modbus DDE/OPC Server available, see KEPServer				