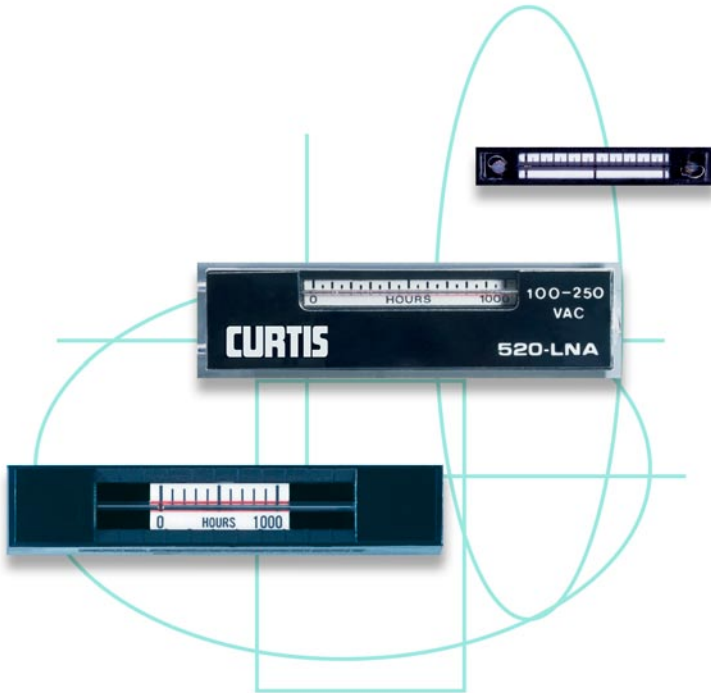


# ELECTRO-CHEMICAL ELAPSED TIME INDICATORS

## COULOMETER



CURTIS



### DESCRIPTION

Curtis coulometers are analog Elapsed Time Indicators (ETIs) which use an electro-chemical plating process to integrate current over time.

### APPLICATION

Curtis coulometers are used to measure use time/counts for preventive maintenance scheduling, warranty witness and MTBF measurement on medical and scientific lamps, power supplies and telecommunication equipment. These devices can also be used to integrate current for solar cells and portable, battery-powered equipment.



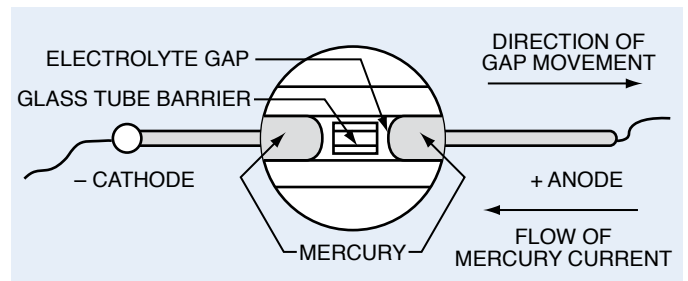
*Curtis hour meters were used by NASA in the Apollo project to monitor all major electronic systems. More than 40 Curtis hour meters were installed in the space vehicles and over 20 are still on the moon today, left behind on the moon with the descent module.*

### FEATURES

- The extremely small size and low weight provides flexibility in application without adding weight to the system.
- Panel, PC board or adhesive-back mounting allows quick and easy installation.
- Operation from continuous or pulsed DC (regulated or unregulated), AC or a current source ensures that these units will match your power supply.
- Versatility of display scales (hours, percentage) allows the user to optimize the timer for the scheduled maintenance cycle or warranty period of their particular equipment.
- Availability in both non-reset and resettable configurations allows for tamper-proof or field resettable designs.
- Wire leads, PC board pins, threaded studs and solderable turret terminals are available on various models which provides flexibility in termination choices.
- The coulometer will withstand a higher level of shock or vibration than that of the host equipment.
- No failure mode will affect the function of the parent equipment.

### HOW THEY WORK

The integral is achieved by passing current through a precision-bore glass capillary tube. The glass tube is filled with two columns of mercury, which are separated by an electrolyte gap. Application of current causes the mercury at the anode to be electrochemically transferred across the gap to the cathode at a rate which is proportional to the current. Thus the gap moves along the capillary tube and provides a visual indication of the current/time integral.



# COULOMETER

## MODEL DESCRIPTION

### 120 Series:

Operates from continuous or pulsed DC current. Customer supplies an external resistor which provides a constant current to achieve the desired time scale. For example, a constant current of 4.16  $\mu$ A is required to achieve a time scale of 1000 hours on Model 120PC. If a 5 VDC supply is used, a 1.2 M $\Omega$  external resistor is required.

### 420 Series:

Operates from a regulated continuous or pulsed DC voltage. The 420 Series incorporates an internal resistor to achieve the standard time scales with a 5 VDC supply.

### 520 Series:

Operates from standard AC line voltages from 50 to 400 Hz. The 520 Series incorporates a zener diode and resistor to achieve the standard time scales at voltages from 100 to 250 VAC.

### PC Series:

Zytel nylon case with a water-clear epoxy encapsulation and gold-plated dumet leads for PC board mounting.

### LNA Series:

Black polycarbonate case with a clear polycarbonate cover. Mounting is via an adhesive backing and terminations are PVC-insulated, 26 AWG, tinned-copper leads, 8" long (minimum).

### LC Series:

White ABS flame retardant high modulus case with a clear acrylic window. Mounting and termination are via two 0.025" diameter tinned-copper leads exiting from the rear of the case.

### CP3 Series:

To allow for resettability, the coulometer is mounted into the removable cover and the scale is fitted into the base. This allows the user to remove and reverse the cover and align the gap in the glass tube with the zero point on the scale. The case is black ABS flame retardant high modulus with a clear acrylic window. Mounting is via an adhesive backing and terminations are PVC-insulated, 26 AWG, tinned-copper leads, 8" long (minimum).

### N Series:

Black, glass-filled nylon case with a water-clear epoxy encapsulation. Mounting is via two 0.125" diameter screw holes (hardware supplied by user) and terminations are solderable turret terminals.

## PRODUCT SELECTION GUIDE

Model	Input*	Mounting	Standard Scale	Resettable	Full Scale
120PC	Current	PC Board	Unnumbered	NO	4.167 mAHr
120LNA	Current	Adhesive	1,2,5,10000 Hrs	NO	6.41 mAHr
120LC	Current	PC Board	1,2,5,10000 Hrs	NO	6.41 mAHr
120CP3	Current	Adhesive	1,2,5,10000 Hrs	YES	3.2 mAHr
420LNA	5 VDC	Adhesive	1,2,5,10000 Hrs	NO	N/A
420LC	5 VDC	PC Board	1,2,5,10000 Hrs	NO	N/A
420CP3	5 VDC	Adhesive	1,2,5,10000 Hrs	YES	N/A
520LNA	100-250 VAC	Adhesive	1,2,5,10000 Hrs	NO	N/A
520CP3	100-250 VAC	Adhesive	1,2,5,10000 Hrs	YES	N/A
620PC	Current	PC Board	1,5,10000 Hrs	NO	4.21 mAHr
620NB(H)	5 VDC, 28 VDC, 115 VAC	Below Panel	1,5000 Hrs	NO	N/A
620NT(H)	5 VDC, 28 VDC, 115 VAC	Above Panel	1,5000 Hrs	NO	N/A

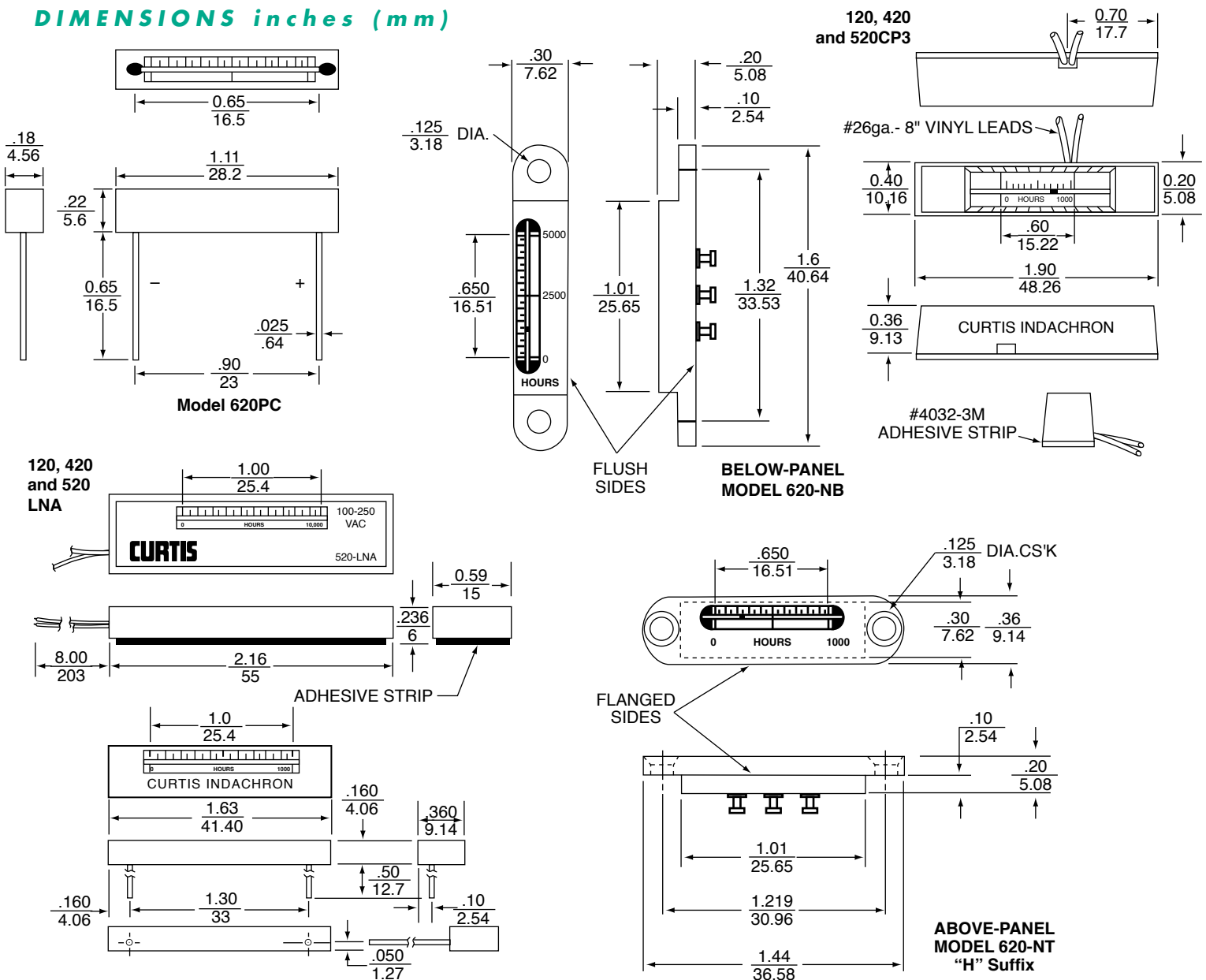
\*28 VDC AND ALL AC UNITS ARE REGULATED

# COULOMETER

## SPECIFICATIONS

<b>OPERATING TEMPERATURE RANGE</b>	0°C to 50°C (120PC, LNA, LC, CP3 Series) -20°C to 85°C (620 Series)
<b>STORAGE TEMPERATURE RANGE</b>	0°C to 50°C (120PC, LNA, LC, CP3 Series) -35°C to 85°C (620 Series)
<b>SHOCK</b>	150 g, 6 msec. (120PC, LNA, LC, CP3 Series) 50 g, 11 msec. (620 Series)
<b>VIBRATION</b>	10 g, 20-2000 Hz (120PC, LNA, LC, CP3 Series) 20 g, 10-2000 Hz (620 Series)
<b>MAXIMUM CURRENT</b>	50 µA (120PC, LNA, LC, CP3 Series) 250 µA (620PC) 2 mA (620N Series)

## DIMENSIONS inches (mm)



**WARRANTY** One-year replacement warranty.

