

## MODEL CUB3L & CUB3LR - General Purpose, Miniature Electronic Counters With Lithium Battery - Economical Replacement For Electro-Mechanical Counters



- WIDE TEMPERATURE RANGE (-30° to +75°C)
- IDEAL FOR PORTABLE, MOBILE, OR STATIONARY INDUSTRIAL APPLICATIONS
- AVAILABLE IN TWO VERSIONS:  
FRONT PANEL RESET OR REMOTE RESET
- LOW COST/HIGH PERFORMANCE
- OPERATES FROM SWITCH CONTACT OR OPEN COLLECTOR INPUTS
- PROVIDES YEARS OF SILENT OPERATION WITHOUT MECHANICAL WEAR
- SELF POWERED, ELIMINATES POWER WIRING
- BUILT-IN STRAIN RELIEF
- EASY SNAP-IN MOUNTING IN 1" X 2" (25 mm x 50 mm) PANEL OPENING



### DESCRIPTION

The CUB3Ls are miniature electronic counters. The CUB3L has front panel reset, while the CUB3LR has remote reset. These units fill a wide variety of applications.

The CUB3Ls feature a rugged reinforced nylon case that snap-fits into a standard rectangular opening without screws or other hardware. Hook-up is simply a matter of connecting two wires, and since the operating voltage is only 3.6 V and with currents in microamps, almost any kind of wire can be used. No external power is required since the internal batteries provide years of uninterrupted service. In addition to these advantages, the CUB3Ls offer the inherent ruggedness, reliability, and permanence of completely integrated circuitry, embedded in a single monolithic, silicon, micro-chip.

### SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



**CAUTION:** Read complete instructions prior to installation and operation of the unit.

**WARNING:** Lithium battery may explode if incinerated. Signal input voltage should not exceed 3.6 VDC to prevent damage to the battery.

### ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBERS
CUB3L	CUB3L (Front Panel Reset Only) w/Lith Bat.	CUB3L000
CUB3LR	CUB3LR (Remote Reset Only) w/Lith Bat.	CUB3LR00

### SPECIFICATIONS

- DISPLAY:** 6-Digit, LCD, 0.2" (5.1 mm) High.
- POWER:** 3.6 V supplied by a lithium battery. Nominal battery life 7 years, depending on usage.
- RESET:**  
CUB3L - Via front panel reset button only.  
CUB3LR - (Remote Reset Only) Switch Contact or Solid State Transistor Switch (See Connections). Contact burden 5  $\mu$ A; Max. OFF-State leakage current must be less than 1  $\mu$ A. Counter resets with negative pulse on a min. pulse width of 5 msec.

- COUNT INPUT:** Switch Contact or Solid-State Transistor Switch (See Connections). Contact burden 5  $\mu$ A; Max. OFF-State leakage current must be less than 1  $\mu$ A. Counter increments on negative going edge of input.
- COUNT SPEED:** 100 counts/sec (6000 counts/min). Min. input pulse width 5 msec, with 5 msec spacing between count pulses.
- ENVIRONMENTAL CONDITIONS:**  
Operating Temperature: -30° to +75 °C  
Storage Temperature: -40° to +80 °C  
Vibration According to IEC 68-2-6: Operational 5 to 500 Hz, in X, Y, Z direction for 1.5 hours, 5 g.  
Shock According to IEC 68-2-27: Operational 30 g, 11 msec in 3 directions.  
Operating and Storage Humidity: 85% max. relative humidity (non-condensing) from 0 °C to 50 °C.  
Altitude: Up to 2000 meters
- CERTIFICATIONS AND COMPLIANCES:**

#### SAFETY

IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.

#### ELECTROMAGNETIC COMPATIBILITY

Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

#### Immunity to Industrial Locations:

Electrostatic discharge	EN61000-4-2	Criterion A 4kV contact discharge 8kV air discharge
Electromagnetic RF fields	EN61000-4-3	Criterion A 10V/m (80 MHz to 1 GHz) 3 V/m (1.4 GHz to 2 GHz) 1 V/m (2 GHz to 2.7 GHz)
Fast transients (burst)	EN61000-4-4	Criterion A 2kV power 1kV I/O signal
Surge	EN61000-4-5	Criterion A 1 kV signal
RF conducted interference	EN61000-4-6	Criterion A 3Vrms
Power frequency magnetic fields	EN61000-4-8	Criterion A 30A/m

#### Emissions:

Emissions	EN55011	Class B
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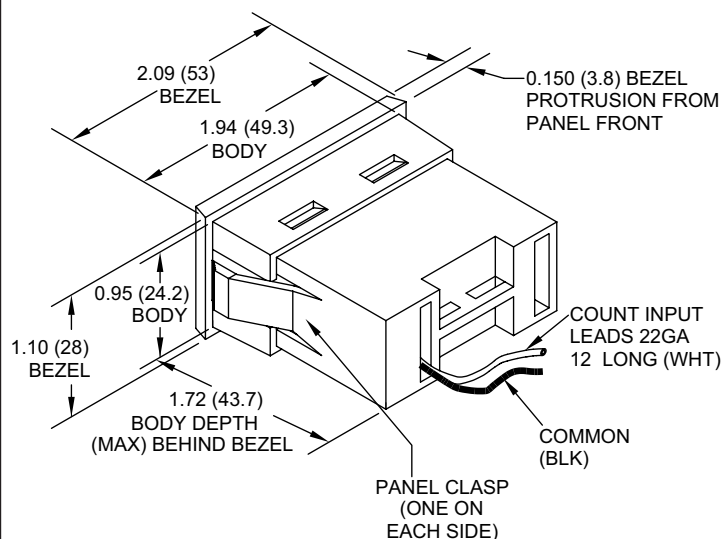
#### Notes:

1. Criterion A: Normal operation within specified limits.

8. **CONSTRUCTION:** Installation Category I, Pollution Degree 2

9. **WEIGHT:** 3 oz. (85 g) [less batteries]

## DIMENSIONS In inches (mm) & INSTALLATION



## INSTALLATION ENVIRONMENT

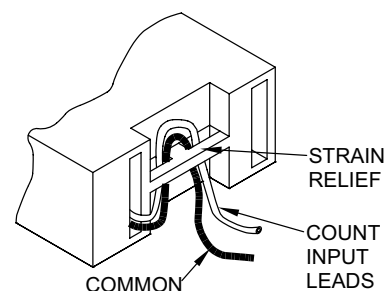
The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation. Placing the unit near devices that generate excessive heat should be avoided.

The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents. Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.

**PANEL CUT-OUT**  
1" x 2" or 25 mm x 50 mm

**PANEL THICKNESS**  
0.05" to 0.125"



## EMC COMPLIANCE INSTALLATION

This unit complies with the Electromagnetic Compatibility (EMC) standards listed in the specifications. Compliance to the EMC standards was demonstrated by means of a test set-up using the following installation methods:

- Unit installed in a metal panel mounted to an open aluminum rack connected to earth ground (protective earth).
- Shielded (screened) cables for Signal and Control inputs with shield drain wire connected to earth ground at the mounting panel only.

Multi-conductor Cable	Function Used For
Belden #8451 - 2 conductor, #22 AWG twisted pair w/ foil shield and drain wire	Count and Reset Inputs

It should be noted that the methods listed above may not be necessary for every unit installation. For the purpose of EMC testing, the input line on the unit was connected with 25 feet (8 m) of cable. In extremely high EMI environments, additional measures may be needed. Cable length, routing and shield termination are very important and can mean the difference between a successful installation or a troublesome installation.

## ADDITIONAL EMC INSTALLATION GUIDELINES

Although this unit is designed with a high degree of immunity to ElectroMagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the unit may be different for various installations. Listed below are some additional EMC guidelines for successful installation in an industrial environment.

- Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
  - Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
  - Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
  - Connect the shield to common of the unit and leave the other end of the shield unconnected and insulated from earth ground.
- Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.

- Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
- In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. The following EMI suppression devices (or equivalent) are recommended:

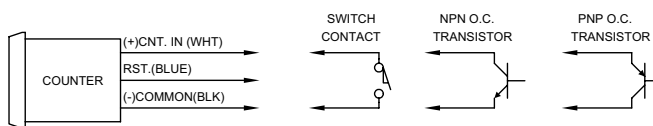
### Ferrite Suppression Cores for signal and control cables:

Fair-Rite # 0443167251 (RLC #FCOR0000)  
TDK # ZCAT3035-1330A  
Steward #28B2029-0A0

- Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

## ELECTRICAL CONNECTIONS & COUNT INPUTS

The CUB3Ls can be supplied with count input signals from mechanical switch contacts or solid-state switches (*NPN or PNP transistors*) as shown in the diagrams below. Reed switches, mercury-wetted contacts, snap-action limit switches, and silver alloy contacts with wiping action are usually satisfactory choices for mechanical switch input. Heavy "clapper-type" contacts such as used in contactors or large machine tool relays, tungsten contacts, or brush type contacts are not recommended as count input devices.



## TROUBLESHOOTING

For further technical assistance, contact technical support at the appropriate company numbers listed.

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