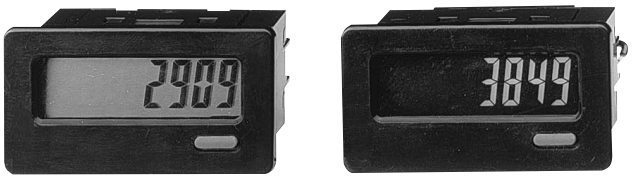
red lion
Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion-controls.com

Bulletin No. CUB7W-G
Drawing No. LP0384
Released 10/01

MODEL CUB7W - MINIATURE ELECTRONIC 8 DIGIT COUNTER w/VOLTAGE INPUT

- *COUNT INPUT FROM 10 to 300 VAC/DC*
- *LCD, POSITIVE IMAGE REFLECTIVE OR NEGATIVE IMAGE TRANSMISSIVE WITH YELLOW/GREEN OR RED LED BACKLIGHTING (9 to 28 VDC power supply required for versions with LED backlighting)*
- *0.35" (8.90 mm) HIGH DIGITS*
- *REPLACEABLE INTERNAL LITHIUM BATTERY PROVIDES UP TO 7 YEARS OF UNINTERRUPTED OPERATION*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*
- *FRONT PANEL RESET OR REMOTE RESET*
- *WIRE CONNECTION MADE VIA SCREW CLAMP TYPE TERMINALS*
- *FITS DIN STANDARD CUT-OUT 1.77" (45 mm) x 0.874" (22.2 mm)*



DESCRIPTION

The CUB7W is an 8-digit miniature counter with large 0.35 inch (8.90 mm) high digits. It has an LCD read-out available in Positive Image Reflective (CUB7W000), Negative Image Transmissive with yellow/green backlighting (CUB7W010) or red backlighting (CUB7W020). The backlight versions require an external 9 to 28 VDC power supply.

The CUB7W accepts most machine control voltage signals. The input accepts AC (50/60 Hz) or DC control voltages from 10 to 300 V at count speeds up to 30 counts per second (cps).

The CUB7W counters use a CMOS LSI counter circuit chip, mounted on a gold-plated substrate, that is electrically connected by ultrasonic wire-bonding. Proven micro-electronic assembly and manufacturing techniques provide these units with the reliability and dependability required for industrial service.

The CUB7W series is housed in a lightweight, high impact plastic case with a clear viewing window. The sealed front panel with the silicone rubber reset button meets NEMA 4X/IP65 specifications for wash-down and/or dusty environments, when properly installed.

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.

SPECIFICATIONS

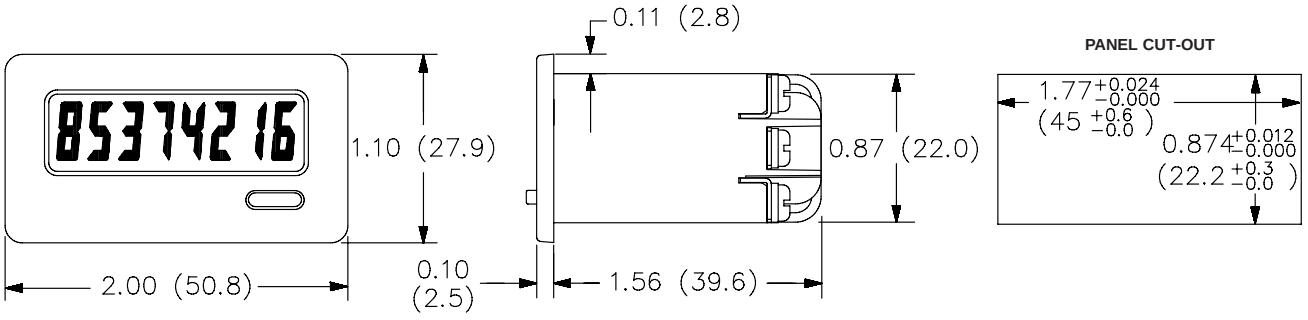
1. **DISPLAY:** 8-digit LCD, 0.35" (8.90 mm) high digits.
2. **POWER SOURCE:** Replaceable Internal 3.0 V lithium battery to provide up to 7 years of continuous operation. (Battery life is dependent upon usage. Reset contacts that remain closed for long periods of time reduce battery life.)
3. **BACKLIGHT POWER REQUIREMENTS:** 9 to 28 VDC; 35 mA. typical, 50 mA max. Above 26 VDC, derate max. operating temperature to 40°C.
4. **L. S. INPUT:** 10 to 300 VAC/DC, 50/60 Hz, 30 cps max. 150 V max. for backlight versions. V_{IL} = 0.5 VDC max. Unit counts on the positive going edge.
   Note: For triac inputs, use the standard CUB7 with a TCM module.
5. **REMOTE RESET:** 15 msec min. pulse width (active low) from 3.0 V bipolar output, an open collector transistor, or a switch contact to common. V_{IH} = 2.0 V min. (3 V max), V_{IL} = 0.5 V max.
6. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to 50°C. Derate max. operating temperature to 40°C above 26 VDC (Backlight versions).
   Storage Temperature: -30 to 80°C
   Operating and Storage Humidity: 85% max.relative humidity (non-condensing) from 0°C to 50°C.
   Altitude: Up to 2000 meters

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

CAUTION: Risk of electric shock.

DIMENSIONS *In inches (mm)*

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.15" (54.6) H x 3.00" (76.2) W.



SPECIFICATIONS (Cont'd)

7. **CERTIFICATIONS AND COMPLIANCES**:

SAFETY

IEC 1010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
IP65 Enclosure rating (Face only), IEC 529
Type 4X Enclosure rating (Face only), UL50

ELECTROMAGNETIC COMPATIBILITY

Immunity to EN 50082-2

Electrostatic discharge	EN 61000-4-2	Level 2; 4 Kv contact Level 3; 8 Kv air
Electromagnetic RF fields	EN 61000-4-3	Level 3; 10 V/m 80 MHz - 1 GHz
Fast transients (burst)	EN 61000-4-4	Level 4; 2 Kv I/O Level 3; 2 Kv power
RF conducted interference	EN 61000-4-6	Level 3; 10 V/rms [1] 150 KHz - 80 MHz
Simulation of cordless telephone	ENV 50204	Level 3; 10 V/m 900 MHz ± 5 MHz 200 Hz, 50% duty cycle

Emissions to EN 50081-2

RF interference	EN 55011	Enclosure class A Power mains class A

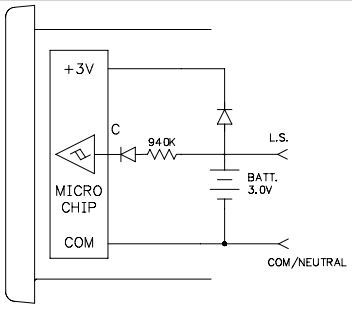
1. No loss of performance during EMI disturbance at 8 Vrms.
Permissible loss of performance during EMI disturbance at 10 Vrms: Segments may turn on and off.
For operation without loss of performance: Install power line filter, RLC#LFIL0000 or equivalent.
Refer to EMC Installation Guidelines section of this bulletin for additional information.

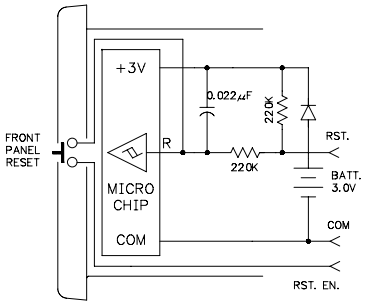
8. **CONSTRUCTION:** High impact plastic case with clear viewing window. The front panel meets NEMA 4X/IP65 requirements for indoor use when properly installed. Installation Category I, Pollution Degree 2. Panel gasket and mounting clip included.
9. **WEIGHT:** 2 oz. (57 grams) [with battery]

L. S. INPUT, 30 CPS MAX.

The CUB7W accepts most machine control voltage signals. The input accepts AC (50/60 Hz) or DC control voltages from 10 to 300 V at count speeds up to 30 cps. The unit counts on the positive going edge of the input signal.

WARNING: Any lead may be at hazardous live input potential. External wiring and devices connected to the unit must be rated the same as applied signal input voltage and be properly isolated from Class 2 or SELV circuitry.





RESET OPTIONS

Connecting a wire from the RST. EN. (Reset Enable) Input terminal to Common will enable the front panel Reset button.

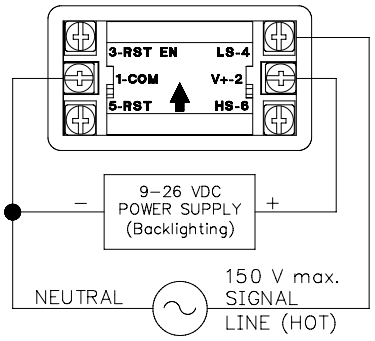
Pulling the "RST." input low causes the counter to reset. The "RST." can be pulled low by either a mechanical switch or solid-state transistor switch. The Switch load is 15 µA (max. voltage drop 0.5 V) when ON. The OFF-state leakage current must be less than 2 µA.

Note: The RC protection circuit on the "RST." Input causes a delay of approximately 15 msec in Reset response.

BACKLIGHT OPTION

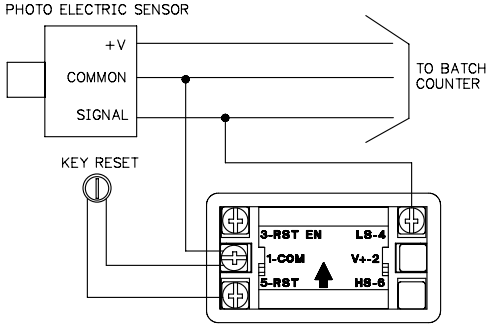
Optional backlight versions of the CUB7W require an external 9 to 26 VDC power supply. The external supply is connected between the V+ and common terminals as shown in the drawing.

WARNING: When connecting the wiring for a backlit CUB7W measuring an AC input voltage, the neutral of the single phase AC signal is connected to Terminal 1 (COM), and line (hot) is connected to Terminal 4 (LS). The DC supply for the backlighting is connected as shown in the drawing. Three phase AC applications require an isolation transformer.

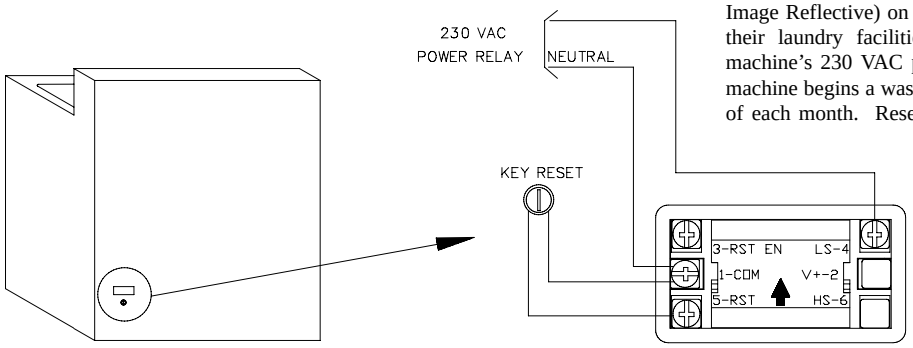


ENVELOPE PACKAGING APPLICATION

A customer has 18 envelope packaging machines to be upgraded. These machines have existing preset counters for batching purposes. The customer now wants to add totalizing capabilities. The CUB7W000's low cost, battery power operation, and 10 to 300 VAC/VDC input capabilities are perfect for the upgrade. The existing photo-electric sensor's 24 VDC signal, for the batch counter, is paralleled to the CUB7W. Battery power is an advantage due to the fact that no additional power supply lines are required. At the end of each shift, the count is reset by a key switch RLC PT# (PKS10000) connected to the Remote Reset input (5-RST).



LAUNDRY FACILITIES APPLICATION



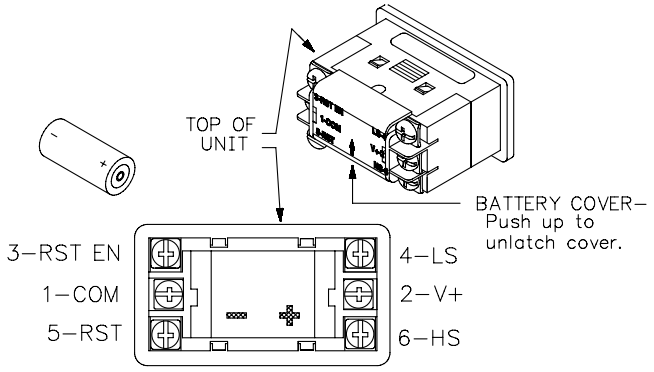
A family owned coin operated laundry installed a CUB7W000 (Positive Image Reflective) on each of the 25 industrial washing machines in one of their laundry facilities. The CUB7W000 was wired into the washing machine's 230 VAC power relay and increments one count each time the machine begins a washing cycle. The count is recorded and reset at the end of each month. Reset is accomplished with an external key switch. The count value is used to compare the number of times the machine was used against the money collected for that machine. In addition, the usage data collected is invaluable in determining the location of the high traffic areas because of tables or door locations. Rotating the machines within the facility maximized the mechanical life of all machines.

BATTERY INSTALLATION

1. Remove all power to the unit before removing battery cover.
2. To remove the battery cover, push upward in the direction of the arrow on the rear cover (See drawing at right), until the cover unlatches. Pull the cover straight out from unit to fully remove.
3. Remove old battery* and replace it with an RLC battery (BNL10000). Observe proper polarity when replacing the battery as shown in the drawing.
4. Replace the cover. The battery cover is keyed so that it cannot be placed upside down. The arrow on the rear of the cover should point toward the top of the CUB7W when properly installed.

* - Dispose of properly.

WARNING: Lithium battery may explode if incinerated.



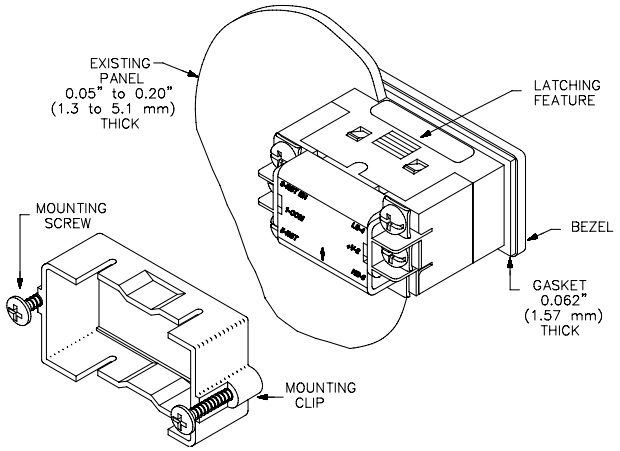
INSTALLATION ENVIRONMENT

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.



Installation

The CUB7W meets NEMA 4X/IP65 requirements, for indoor use when properly installed. The units are intended to be mounted into an enclosed panel. The viewing window and reset button are factory sealed for a washdown environment. A sponge rubber gasket and mounting clip are provided for installing the unit in the panel cut-out.

The following procedure assures proper installation:

1. Cut panel opening to specified dimensions. Remove burrs and clean around panel opening.
2. Carefully remove and discard the center section of the gasket.
3. Slide the panel gasket over the rear of the counter body to the back of the bezel. Install CUB7W unit through the panel cut-out.
4. Insert the mounting screws onto both sides of mounting clip. Tip of screw should **NOT** project from hole in mounting clip.
5. Slide the mounting clip over the rear of the unit until the clip is against the back of the panel. The mounting clip has latching features which engage into mating features on the CUB7W housing.
   Note: It is necessary to hold the unit in place when sliding mounting clip into position.
6. Alternately tighten each screw to ensure uniform gasket pressure. Visually inspect the front panel gasket. The gasket should be compressed to about 75 to 80% of its original thickness. If not, gradually turn mounting screws to further compress gasket.
7. If the gasket is not adequately compressed and the mounting screws can no longer be turned, loosen mounting screws, and check that the mounting clip is latched as close as possible to the panel.
8. Repeat from step #5 for tightening mounting screws.

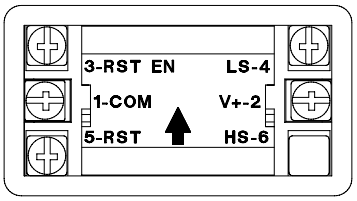
EMC INSTALLATION GUIDELINES

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. In extremely high EMI environments, additional measures may be needed. The unit becomes more immune to EMI with fewer I/O connections. Cable length, routing and shield termination are very important and can mean the difference between a successful or a troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. 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.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the unit and leave the other end of the shield unconnected and insulated from earth ground.
2. 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.
3. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. 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. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. 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
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC #LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom #1VR3
   Note: *Reference manufacturer's instructions when installing a line filter.*
5. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

WIRING CONNECTIONS

The electrical connections are made via screw-clamp terminals located on the back of the unit. All conductors should meet voltage and current ratings for each terminal. Also cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that power supplied to the unit be protected by a fuse or circuit breaker. When wiring the unit, use the battery cover to identify the wire position with the proper function. Strip the wire, leaving approximately 1/4" bare wire exposed (stranded wires should be tinned with solder). Insert the wire under the screw-clamp and tighten down the screw until the wire is clamped in tightly. Each terminal can accept up to two #14 AWG wires.



Warning*: Lithium battery may explode if incinerated.*
Caution*: All leads will be at the same line potential as the input leads.*

TROUBLESHOOTING

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

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBERS
* CUB7W	Counter Positive Image Reflective	CUB7W000
	Counter w/Yel-Grn Backlighting	CUB7W010
	Counter w/Red Backlighting	CUB7W020
BNL	3 V Lithium Battery	BNL10000
For more information on Pricing, Enclosures & Panel Mount Kits refer to the RLC Catalog or contact your local RLC distributor.		

* Battery is included with unit.

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to one year from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained hererin and relies on no other warranties or affirmations.

Red Lion Controls
20 Willow Springs Circle
York PA 17402
Tel +1 (717) 767-6511
Fax +1 (717) 764-0839

Red Lion Controls France
56 Boulevard du Courcerin, Batiment 21,
ZI Pariest F-77183 Croissy Beaubourg
Tel +33 (64) 80 12 12
Fax +33 (64) 80 12 13

Red Lion UK Ltd
Tapton Park
Chesterfield S41 OTZ
Tel +44 (1246) 22 21 22
Fax +44 (1246) 22 12 22