

## MODEL LIBC - LIBRA SERIES COUNTERS (LCD & LED)



- ABILITY TO LOCK OUT FRONT PANEL FUNCTIONS
- SEALED FRONT PANEL CONSTRUCTION (NEMA 4/IP65)
- ONE OR TWO PRESET VERSIONS
- 0.5" HIGH LIQUID CRYSTAL DISPLAY OR 0.4" HIGH LED DISPLAY
- ACCEPTS INPUT COUNT RATE UP TO 2500 CPS
- BI-DIRECTIONAL COUNTING
- SOLID-STATE CURRENT SINK OUTPUT(S)
- FORM C RELAY OUTPUT(S)
- PROGRAMMABLE TIMED OUTPUT (0.01 sec to 99.99 sec.)
- SIMPLE FRONT PANEL FOR PROGRAMMING EASE
- FRONT PANEL PROGRAMMABLE DECIMAL POINTS
- MEETS DIN PANEL MOUNT SPECIFICATIONS
- REMOTE RESET CAPABILITY
- NON-VOLATILE MEMORY (E<sup>2</sup>PROM)
- ON-LINE SELF-TEST



### DESCRIPTION

The Libra Series of presettable counters is an economical and reliable solution to one or two preset level requirements. The LIBC1 and LIBC1E are the single preset versions and the LIBC2 and LIBC2E are the dual preset versions. All four units have a solid-state output and a Form C relay output for each preset. These units feature input configuration programmability, a full complement of control inputs, programmable timed outputs, non-volatile memory, and many other features which will satisfy most any single or dual preset level requirement.

The Libra counters have two main counting actions, Reset to Zero (RTZ) and Reset to Preset (RTP). With RTZ, the counter resets to zero and counts up (if UP/DN terminal is at high level) and activates the outputs when the preset value(s) are reached. When RTP is used, the unit starts at the preset value and counts down (if the UP/DN terminal is at low level) and activates the output when zero is reached. For the 2-preset version, the count starts at preset 2 and counts toward zero. Output 1 fires when preset 1 value is reached and output 2 fires when the count reaches zero. There are eight modes of operation for the single preset unit and sixteen modes of operation for the dual preset unit.

The timed output is programmed through the front panel buttons and can be programmed from 0.01 sec. to 99.99 sec. (The unit's timed output is set at the factory to be 0.1 sec.) The Libra counters have an internal non-volatile memory

device which eliminates the need for battery back-up. When input power is removed, this device will maintain all data necessary for system operation. A Program Disable terminal is available, which is used to prevent accidental changes or tampering by unauthorized personnel to the preset(s) or timed output value(s). The front panel reset button can also be enabled or disabled by a rear panel DIP switch. These counters also have an on-line self-test, which checks all display driver and micro-processor hardware. The self-test can be run at any time without losing counts or missing a preset value.


Power, input, and output connections are made via removable terminal strips located at the rear of the unit. These strips can accept one #14 AWG stripped wire. DIP switches at the rear of the unit are used to program the input configuration and to set the desired operating modes.

The Libra Series counters have a metal die-cast front bezel, which is sealed, and meets NEMA 4/IP65 specifications for wash-down and/or dust when properly installed. Mounting clips are provided for easy panel installation.


### 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.

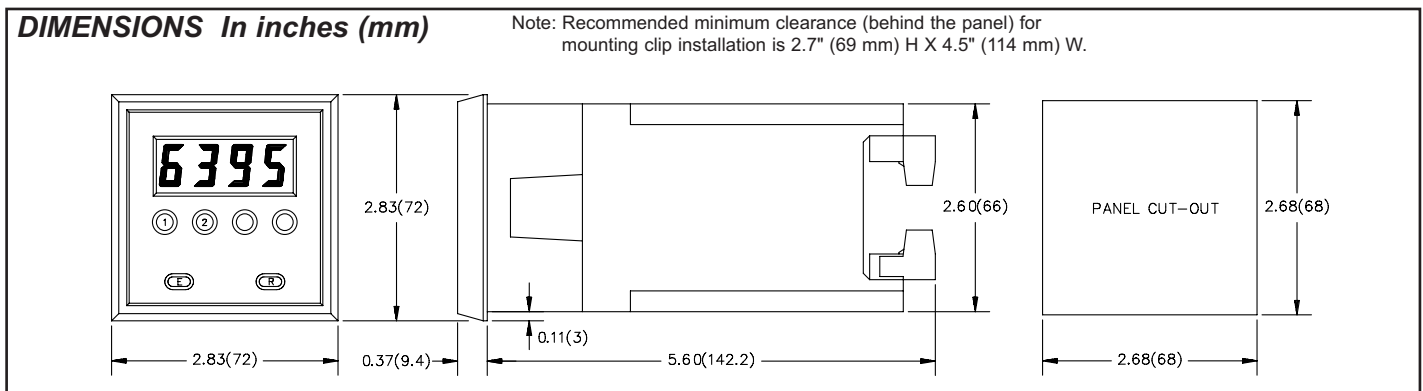
Do not use this unit to directly command motors, valves, or other actuators not equipped with safeguards. To do so, can be potentially harmful to persons or equipment in the event of a fault to the unit.

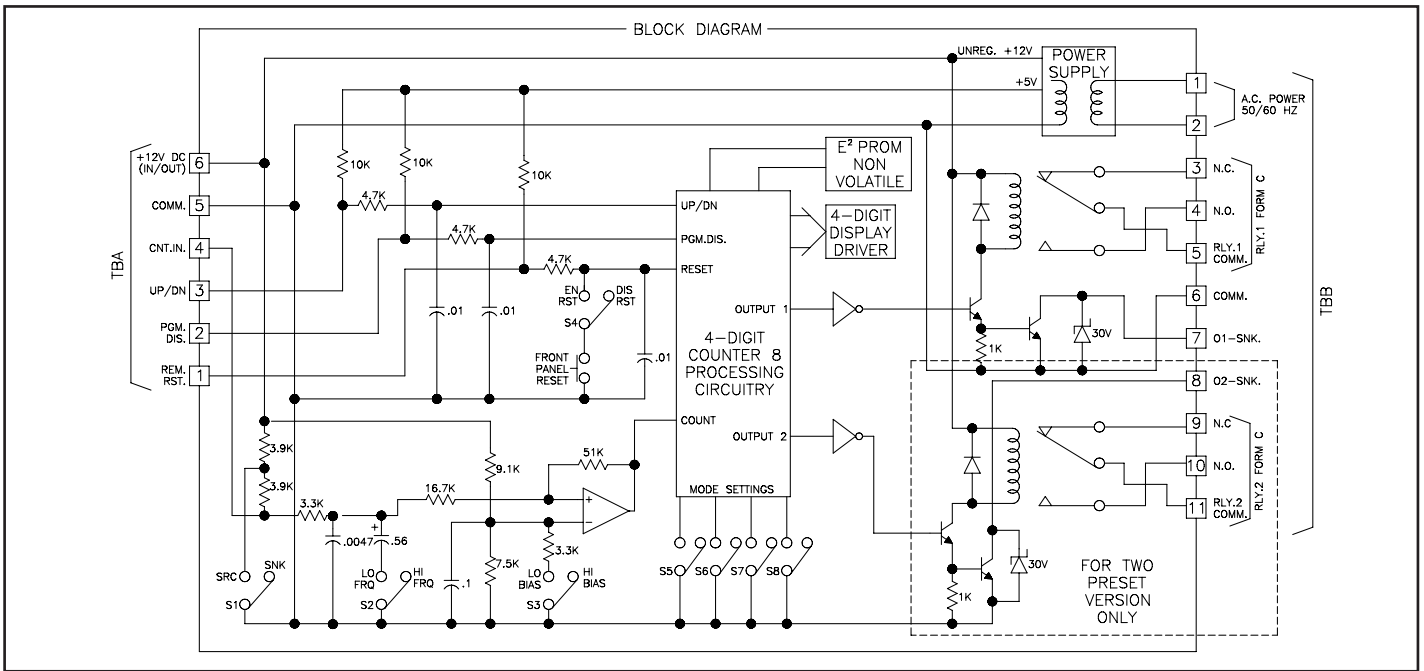


**CAUTION:** Read complete instructions prior to installation and operation of the unit.



**CAUTION:** Risk of electric shock.





## SPECIFICATIONS

- DISPLAY:** 4-digit, 0.5" (12.7 mm) high LCD display.  
4-digit, 0.4" (10.2 mm) high LED display.
- POWER REQUIREMENTS:**  
**AC Operation:** 115/230 VAC ( $\pm 10\%$ ), 50/60 Hz, 6 VA (LCD) or 9 VA (LED).  
**DC Operation:** 11 to 14 VDC @ 0.2 A max. (LCD) or 0.3 A max. (LED).
- SENSOR POWER:** +10 to 16 VDC @ 150 mA.
- COUNT INPUT:** Switch selectable to accept count pulses from a variety of sources including switch contacts, outputs from CMOS or TTL circuits, and all standard RLC sensors.  
**Current Sourcing** - Unit provides 3.9 K $\Omega$  pull-down load for sensors with current sourcing outputs. (Max. input voltage 28 VDC @ 7 mA)  
**Current Sinking** - Unit provides 7.8 K $\Omega$  pull-up load for sensors with current sinking outputs. (Max. sensor current, 1.6 mA)  
**Debounce** - Damping capacitor provided for switch contact debounce. Limits count speed to 100 Hz max. and input pulse widths of 5 msec min.  
**Lo Bias** - Input Trigger levels  $V_{IL} = 1.5$  V,  $V_{IH} = 3.75$  V.  
**Hi Bias** - Input Trigger levels  $V_{IL} = 5.5$  V,  $V_{IH} = 7.5$  V.  
*Note: Bias levels  $\pm 10\%$  @ 12 VDC sensor voltage. These levels vary proportionally with the sensor supply voltage.*
- MAXIMUM COUNT RATES:**  
**High Frequency** - 2.5 KHz max. for all electronic sensors under all modes of operation. Signals can be square wave inputs or inputs with negative going pulse widths, as short as 50  $\mu$ sec, with a total min. period of 400  $\mu$ sec.  
**Low Frequency** - 100 Hz for switch contact closures. (*Note: These units will operate with VCM [E-H] modules.*)
- CONTROL INPUTS:**  
**Remote Reset** - Active low ( $V_{IL} = 0.5$  V max.), internally pulled up to 5 VDC through a 10 K $\Omega$  resistor ( $I_{SNK} = 0.5$  mA). Response time = 10 msec. A low will reset the unit and deactivate outputs.  
**Program Disable** - Active low ( $V_{IL} = 0.5$  V max.), internally pulled up to 5 VDC through a 10 K $\Omega$  resistor ( $I_{SNK} = 0.5$  mA). A low will inhibit the changing of presets, decimal point selection, and timed outputs, as well as testing outputs in self-test.  
**Up/Dn Control** - Active low ( $V_{IL} = 0.5$  V max.), internally pulled up to 5 VDC through a 10 K $\Omega$  resistor ( $I_{SNK} = 0.5$  mA) Response Time = 150  $\mu$ sec. This input determines the direction of the count and is independent of Reset to Zero or Reset to Preset modes of operation. When input is low, count is down.
- OUTPUTS:**  
**Solid-State** - Current sinking NPN open collector transistors.  $I_{SNK} = 100$  mA max.  $V_{OH} = 30$  VDC max. (Internal Zener diode protection). One solid-state output for each preset level.  $V_{OL} = 1$  VDC max. @ 100 mA.  
**Relay(s)** - Form C contacts max. rating 5 amps @ 120/240 VAC, 28 VDC (resistive load), 1/8 H.P. @ 120 VAC (inductive load). The operate time is 5 msec nominal and the release time is 3 msec nominal.  
**Relay Life Expectancy** - 100,000 cycles at max. rating. (As load level decreases, life expectancy increases.)

**Programmable Timed Output** - The timed output can be programmed from 0.01 sec to 99.99 sec,  $\pm 0.01\%$  - 10 msec. The timed output is set for 0.1 sec at the factory.

- MEMORY RETENTION:** The Libra counters have a "no power E<sup>2</sup>PROM" which maintains all information when the input power is removed. The life expectancy of this device is at least 100,000 power down cycles and length of memory retention for a single power down can be as long as 10 years.
- INPUT, POWER, AND OUTPUT CONNECTIONS:** There are two plug-in, compression type, barrier strips located at the rear of the unit. These strips can be removed from the rear of the unit for ease of wiring. After wiring is complete, the connector can be plugged back into the unit.
- CERTIFICATIONS AND COMPLIANCES:**

### SAFETY

Type 4 Indoor Enclosure rating (Face only), UL50

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

### ELECTROMAGNETIC COMPATIBILITY

#### Immunity to EN 50082-2

Electrostatic discharge	EN 61000-4-2	Level 2; 4 Kv contact <sup>1</sup> 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 <sup>2</sup> Level 3; 2 Kv power
RF conducted interference	EN 61000-4-6	Level 3; 10 V/rms <sup>2</sup> 150 KHz - 80 MHz
Power frequency magnetic fields	EN 61000-4-8	Level 4; 30 A/m

#### Emissions to EN 50081-2

RF interference	EN 55011	Enclosure class B Power mains class B
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#### Notes:

- Metal bezel of unit connected with ground lead from rear bezel screw to metal mounting panel.
- When the unit is DC powered from terminal TBA pin 5 (common) and terminal TBB pin 6 (+12 VDC) a power line filter was installed, RLC #LFIL0000 or equivalent, so as not to impair the function of the unit.

Refer to the EMC Installation Guidelines for additional information.

### 11. ENVIRONMENTAL CONDITIONS:

**Operating Temperature:** 0 to 50°C

**Storage Temperature:** -40 to 70°C

**Operating and Storage Humidity:** 85% max. (non-condensing) from 0°C to 50°C.

**Altitude:** Up to 2000 meters

- CONSTRUCTION:** Metal die-cast bezel with black, high impact plastic insert. Front panel meets NEMA 4/IP65 requirements for indoor use when properly installed. (Panel gasket and mounting clips included with unit.) Installation Category II, Pollution Degree 2.

- WEIGHT:** 1.5 lbs. (0.68 k) [LCD], 1.75 lbs. (0.79 k) [LED]

## MODES OF OPERATION

Mode settings of the switches are shown to the right of the text below. The mode number corresponds to a binary code, represented by the DIP switch positions. When the switch is "UP", it is equivalent to a zero. When the switch is "DOWN", it is equivalent to a one. The mode switch settings can be easily observed from the panel front by using the self-test. At the end of self-test, the state of these mode switches are displayed.

### NOTES:

1. For all the following modes of operation, when the unit is set for a Reset to Zero mode, the UP/DN terminal (count direction) is normally left high (in

"UP" position). When the unit is set for a Reset to Preset mode, the UP/DN terminal is normally tied to common (in "DOWN" position). However, even though these are the usual conditions for the UP/DN terminal, it does not have to operate in this fashion. For example: the unit can count down in a Reset to Zero mode or count up in a Reset to Preset mode and still maintain normal operating functions.

2. The timed output must be less than the time required to count from the reset condition to the preset point. Otherwise, the output will appear to be latched-on.

## MODES OF OPERATION FOR SINGLE PRESET LIBRA COUNTER

### MODE 0 LATCH OUTPUT AT PRESET, MANUAL RESET TO ZERO

In this mode, as the unit counts from zero, the output will latch on when the preset is reached. When a manual reset occurs, the unit will Reset to Zero and the output, if latched on, will unlatch. Counts will continue to accumulate after the output has turned on.



### MODE 1 TIMED OUTPUT AT PRESET, MANUAL RESET TO ZERO

In this mode, as the unit counts from zero, the output will turn on when the preset is reached. The output will turn off after its programmed time value has occurred. When a manual reset occurs, the unit will Reset to Zero. Manual reset will terminate the timed output, if the output is still activated. Counts will continue to accumulate after the preset level has been reached.



### MODE 2 & 3 - ♦♦

### MODE 4 TIMED OUTPUT AT PRESET, AUTOMATIC RESET TO ZERO AT PRESET

In this mode, as the unit counts from zero, the output will turn on when the preset is reached. At the same time, the unit will automatically Reset to Zero and start the cycle over again. The output will turn off after its programmed time value has occurred. Manual reset will turn off the output, if turned on, and reset the count to zero. During automatic reset, no counts will be lost if the count rate does not exceed 2,500 cps.



### MODE 5 - ♦♦

### MODE 6 TIMED OUTPUT AT PRESET, AUTOMATIC RESET TO ZERO AFTER THE TIMED OUTPUT

In this mode, as the unit counts from zero, the output will turn on when preset 1 is reached. The output will turn off after its programmed time value has occurred. At the end of the timed output, the unit will automatically Reset to Zero and start the cycle over again. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps. Manual reset will turn off the output, if turned on, and reset the count to zero.



### MODE 7 - ♦♦

♦ Manual reset, either by front panel reset (if enabled) or remote reset, is always active, and will override any condition or state the counter is presently in.

### MODE 8 LATCH OUTPUT AT ZERO, MANUAL RESET TO PRESET †

In this mode, as the unit counts from preset, the output will turn on when zero is reached. The output will turn off after its programmed time value has occurred. When a manual reset occurs, the unit will Reset to Preset and the output, if latched on, will unlatch. Counts will continue to register after the outputs turn on.



### MODE 9 TIMED OUTPUT AT ZERO, MANUAL RESET TO PRESET †

In this mode, as the unit counts from preset, the output will turn on when zero is reached. The output will turn off after its programmed time value has occurred. When a manual reset occurs, the unit will Reset to Preset. Manual reset will terminate the timed output if the output is still activated. Counts will continue to accumulate after the output has activated.



### MODE 10 & 11 - ♦♦

### MODE 12 TIMED OUTPUT AT ZERO, AUTOMATIC RESET TO PRESET AT ZERO †

In this mode, as the unit counts from preset, the output will turn on when zero is reached. At this time, the unit will automatically Reset to Preset. The output will turn off after its programmed time value has occurred. Manual reset will turn off the output, if turned on, and reset the count to preset. During automatic reset, no counts will be lost if the count rate does not exceed 2,500 cps.



### MODE 13 - ♦♦

### MODE 14 TIMED OUTPUT AT ZERO, AUTOMATIC RESET TO PRESET AFTER THE TIMED OUTPUT †

In this mode, as the unit counts from preset, the output will turn on when zero is reached. The output will turn off after its programmed time value has occurred. At the end of the timed output, the unit will automatically Reset to Preset and start the cycle over. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps. Manual reset will turn off the output, if turned on, and reset the count to preset.



### MODE 15 - ♦♦

† When down count is desired, (such as reset to preset modes of operation) the "UP/DN" terminal must be tied to the "COMM." terminal.

♦♦ These modes are not applicable to the single preset Libra counter (they are used only for the two preset counter unit).

## MODES OF OPERATION FOR DUAL PRESET LIBRA COUNTER

### MODE 0 LATCH OUTPUT AT PRESET, MANUAL RESET TO ZERO

In this mode, as the unit counts from zero, output 1 will latch on when preset 1 is reached, and output 2 will latch on when preset 2 is reached. When a manual reset occurs, the unit will Reset to Zero and the outputs, if latched on, will unlatch. Counts will continue to accumulate after the outputs have turned on.



### MODE 1 TIMED OUTPUTS AT PRESETS, MANUAL RESET TO ZERO

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached, and output 2 will turn on when preset 2 is reached. The outputs will turn off after their respective programmed time values have occurred. When a manual reset occurs, the unit will Reset to Zero. Manual reset will terminate the timed outputs, if the outputs are still turned on. Counts will continue to accumulate after the preset levels have been reached.



♦ Manual reset, either by front panel reset (if enabled) or remote reset, is always active, and will override any condition or state the counter is presently in.

### MODE 2 OUTPUT 1 TURN OFF AT PRESET 2, LATCH OUTPUT 2 AT PRESET 2, MANUAL RESET TO ZERO

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached. When preset 2 is reached, output 2 will turn on and output 1 will turn off. Output 2 will remain latched on until a manual reset occurs. Manual reset will turn off both outputs and the unit will Reset to Zero. Counts will continue to accumulate after the preset levels have been reached.



### MODE 3 OUTPUT 1 TURN OFF AT PRESET 2, TIMED OUTPUT 2 AT PRESET 2, MANUAL RESET TO ZERO

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached. When preset 2 is reached, output 2 will turn on and output 1 will turn off. Output 2 will turn off after its programmed time value has occurred. When a manual reset occurs, the unit will Reset to Zero. Manual reset will also turn off both outputs if they are still activated. Counts will continue to accumulate after preset levels have been reached.



(Modes Cont'd)

## MODES OF OPERATION FOR DUAL PRESET LIBRA COUNTER (Cont'd)

### MODE 4 OUTPUT 1 TURN OFF AT PRESET 2, TIMED OUTPUT 2 AT PRESET 2, AUTOMATIC RESET TO ZERO AT PRESET 2

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached. When preset 2 is reached, output 2 will turn on, output 1 will turn off, and the unit will automatically Reset to Zero. Output 2 will turn off after its programmed time value has occurred. Manual reset<sup>†</sup> will turn off both outputs, if activated, and reset the count to zero. During automatic reset, no counts will be lost as long as the count rate does not exceed 2,500 cps.



### MODE 5 TIMED OUTPUTS AT PRESETS, AUTOMATIC RESET TO ZERO AT PRESET 2

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached and output 2 will turn on when preset 2 is reached. The outputs will turn off after their respective programmed time values have occurred. Also, when preset 2 is reached, the unit will automatically reset the count to zero and start the cycle over. (Output 2 will remain on until its time value has occurred.) Manual reset<sup>†</sup> will turn off both outputs and reset the count to zero. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps.



### MODE 6 OUTPUT 1 TURN OFF AT PRESET 2, TIMED OUTPUT 2 AT PRESET 2, AUTOMATIC RESET TO ZERO AFTER TIMED OUTPUT 2

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached. When preset 2 is reached, output 2 will turn on and output 1 will turn off. Output 2 will turn off after its programmed time value has occurred. At the end of timed output 2, the unit will automatically Reset to Zero and start the cycle over again. During automatic reset, no counts will be lost as long as the count rate does not exceed 2,500 cps. Manual reset<sup>†</sup> will turn off both outputs, if turned on, and reset the count to zero.



### MODE 7 TIMED OUTPUTS AT PRESETS, AUTOMATIC RESET TO ZERO AFTER TIMED OUTPUT 2

In this mode, as the unit counts from zero, output 1 will turn on when preset 1 is reached and output 2 will turn on when preset 2 is reached. The outputs will turn off after their respective programmed time values have occurred. At the end of timed output 2, the unit will automatically Reset to Zero and start the cycle over again. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps. Manual reset<sup>†</sup> will turn off both outputs, if turned on, and reset the count to zero.



### MODE 8 LATCH OUTPUT AT PRESET 1 AND ZERO, MANUAL RESET TO PRESET 2 †

In this mode, as the unit counts from preset 2, output 1 will latch on when preset 1 is reached and output 2 will latch on when zero is reached. When a manual reset<sup>†</sup> occurs, the unit will Reset to Preset 2 and the output, if latched on, will unlatch. Counts will continue to register after the outputs have turned on.



### MODE 9 TIMED OUTPUT AT PRESET 1 AND ZERO, MANUAL RESET TO PRESET 2 †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached and output 2 will turn on when zero is reached. The outputs will turn off after their respective programmed time values have occurred. When a manual reset<sup>†</sup> occurs, the unit will Reset to Preset 2. Manual reset will terminate the timed outputs, if the outputs are still activated. Counts will continue to accumulate after the outputs have activated.



† When down count is desired, (such as reset to preset modes of operation) the "UP/DN" terminal must be tied to the "COMM." terminal.

♦ Manual reset, either by front panel reset (if enabled) or remote reset, is always active, and will override any condition or state the counter is presently in.

### MODE 10 OUTPUT 1 TURN OFF AT ZERO, LATCH OUTPUT 2 AT ZERO, MANUAL RESET TO PRESET 2 †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached. When zero is reached, output 2 will turn on and output 1 will turn off. Output 2 will remain latched on until a manual reset occurs. Counts will continue to accumulate after preset levels have been reached. Manual reset<sup>†</sup> will turn off all outputs if activated and the unit Resets to Preset 2.



### MODE 11 OUTPUT 1 TURN OFF AT ZERO, TIMED OUTPUT 2 AT ZERO, MANUAL RESET TO PRESET 2 †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached. When zero is reached, output 2 will turn on and output 1 will turn off. Output 2 will turn off after its programmed time value has occurred. Counts will continue to accumulate after preset levels have been reached. When a manual reset<sup>†</sup> occurs, the unit will Reset to Preset 2. Manual reset will also turn off both outputs, if still activated.



### MODE 12 OUTPUT 1 TURN OFF AT ZERO, TIMED OUTPUT 2 AT ZERO, AUTOMATIC RESET TO PRESET 2 AT ZERO †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached. When zero is reached, output 2 will turn on, output 1 will turn off, and the unit will automatically Reset to Preset 2. Output 2 will turn off after its programmed time value has occurred. Manual reset<sup>†</sup> will turn off both outputs, if turned on, and reset the count to preset 2. During automatic reset, no counts will be lost if the count rate does not exceed 2,500 cps.



### MODE 13 TIMED OUTPUTS AT PRESET 1 AND ZERO, AUTOMATIC RESET TO PRESET 2 AT ZERO †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached and output 2 will turn on when zero is reached. The outputs will turn off after their respective programmed time values have occurred. Also, when zero is reached, the unit will automatically reset the count to preset 2 and start the cycle over. (Output 2 will remain on until its time value has occurred.) Manual reset<sup>†</sup> will turn off both outputs, if turned on, and reset the count to preset 2. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps.



### MODE 14 OUTPUT 1 TURN OFF AT ZERO, TIMED OUTPUT 2 AT ZERO, AUTOMATIC RESET TO PRESET 2 AFTER TIMED OUTPUT 2 †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached. When zero is reached, output 2 will turn on and output 1 will turn off. Output 2 will turn off after its programmed time value has occurred. At the end of timed output 2, the unit will automatically Reset to Preset 2 and start the cycle over. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps. Manual reset<sup>†</sup> will turn off both outputs, if activated, and reset the count to preset 2.



### MODE 15 TIMED OUTPUTS AT PRESET 1 AND ZERO, AUTOMATIC RESET TO PRESET 2 AFTER TIMED OUTPUT 2 †

In this mode, as the unit counts from preset 2, output 1 will turn on when preset 1 is reached and output 2 will turn on when zero is reached. The outputs will turn off after their respective programmed time values have occurred. At the end of timed output 2, the unit will automatically Reset to Preset 2 and start the cycle over. During automatic reset, no counts will be lost, as long as the count rate does not exceed 2,500 cps. Manual reset<sup>†</sup> will turn off either output, if turned on, and reset the count to preset 2.



## SELECTION OF INPUT SET-UP & MODES OF OPERATION

The selection of Input Set-up and Modes of Operation is accomplished by eight DIP switches, located at the rear of the unit, in the upper right-hand corner. DIP switches 1 to 3 are used to configure the input, and DIP switches 5 to 8 are used to determine the modes of operation. DIP switch 4 is used to enable or disable the front panel reset button. The input set-up and reset enable switches will be discussed first. Refer to the block diagram of the unit for the details of count and control circuitry.

### SWITCH SET-UP

**S1 - SNK:** Provides a 7.8 K $\Omega$  pull-up resistor for sensors with sinking outputs.

**SRC:** Provides a 3.9 K $\Omega$  pull-down resistor for sensors with sourcing outputs.

**S2 - HI FRQ:** Removes damping capacitor and allows operation up to 2.5 KHz. Minimum count OFF times - 50  $\mu$ sec.

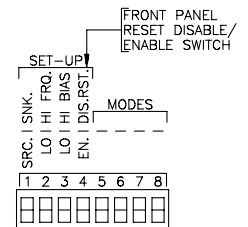
**LO FRQ:** Connects damping capacitor for switch contact debounce. Limits count speed to 100 Hz. Minimum count pulses ON/OFF times - 5 msec.

**S3 - BIAS:** Sets input trigger levels at mid-range to accept outputs from 2-wire proximity sensors, resistive photo-cells, and logic pulses with full 0 to +12 V swings. ( $V_{IL} = 5.5$  V,  $V_{IH} = 7.5$  V)

**LO BIAS:** Sets input trigger levels to the low range to accept logic pulses with 0 to 5 V swings. ( $V_{IL} = 1.5$  V,  $V_{IH} = 3.75$  V)

**S4 - DIS RST:** Disables front panel reset.

**EN RST:** Enables front panel reset.



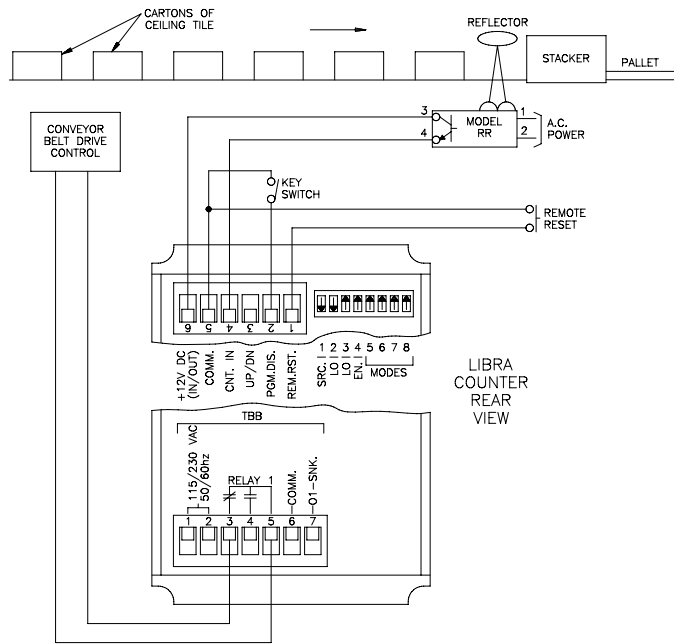
## APPLICATION FOR SINGLE PRESET LIBRA COUNTER

### BOX STACKING CONTROL

A typical application requires the control of a conveyor belt which feeds a mechanical stacker. The stacker can stack 12, 24, 32, or 48 cartons of ceiling tile onto each pallet (depending on pallet size). When the required number of cartons have been stacked, the conveyor is stopped until the loaded pallet is removed and an empty pallet is placed onto the loading area. Also, it is required that only the foreman be allowed to change the number of cartons per pallet.

A single preset Libra counter is used to satisfy all the above requirements. Terminal 3 and terminal 4 of a Model RR Photo-electric sensor (which feeds a count pulse to the Libra after each carton passes by) are respectively connected to the "+12 VDC" and "CNT. IN" terminals of the Libra counter. The normally closed contact of relay 1 is connected to the conveyor belt drive control. A remote reset button is connected to the "REM. RST." terminal of the Libra counter, which allows the operator to reset the system from the forklift, after an empty pallet is placed onto the loading area. Also, a key switch is connected to the "PGM. DIS." terminal, which allows only the foreman to change the preset value. The DIP switches are set as follows: DIP switch 1 is set to "SRC." so the count will increment after the box has passed by the sensor (count on dark to light transition). DIP switch 2 is set to "LO. FRQ." and DIP switch 3 is set to "HI BIAS", both of which provide extra noise immunity on the input. DIP switch 4 is set to "DIS. RST." position, which prevents resetting the unit from the front panel. The unit is set for Mode 0 operation, switches 5 through 8 are in the "UP" position (Latch Output at Preset, Manual Reset to Zero).

The system operation is as follows: as the trailing edge of the box passes the photo-electric, a count is registered on the Libra display. When the preset value is reached, the conveyor belt will turn off. The forklift operator removes the loaded pallet. After the empty pallet is in position, the forklift operator presses the remote reset switch, which then starts the whole cycle over again.



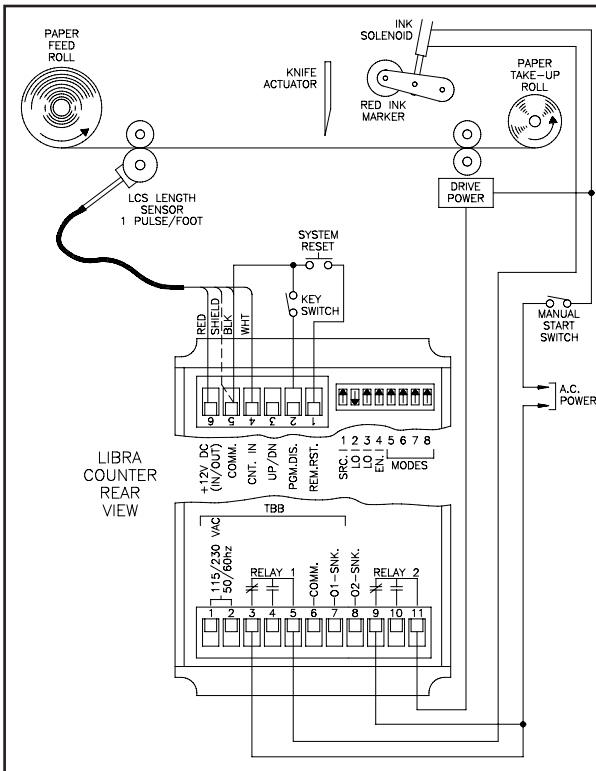
## APPLICATION FOR DUAL LEVEL PRESET LIBRA COUNTER

### THE CONTROL OF A PAPER ROLL MANUFACTURING PROCESS

In a paper production process, the requirement exists to control a solenoid which places a red ink marking at the end of a roll of printing paper (this marking is used to indicate when the end of the roll is near). The unit must also stop the system when the proper amount of paper is wound onto the roll. Then, the cutting knife is manually actuated which shears off the paper. The full roll is taken off the spool and a new roll is loaded on. The system is then started up again. The Libra two preset counter satisfies these requirements.

The Libra set-up is as follows: Preset 1 is set to 30 (30 ft. {9 M} is desired length of red marking at the end of the roll). When the system is started, the ink marker solenoid is activated which starts marking the paper (this is connected to the normally closed contact of relay 1). When 30 is reached, output 1 fires which de-energizes the ink solenoid. Preset 2 is set to 3400 feet. (3400 ft. {1036 M} is the total desired length of paper wound onto the roll). When the unit reaches 3400 feet, preset 2 fires which de-energizes the entire system (the system control is connected to the normally closed contact of output 2). The operator then activates the knife, which shears off the paper and at the same time, the Libra counter is reset and is ready for the next cycle.

An LSC (length sensor) with a 1 pulse/foot wheel is connected to the Libra counter. The red (+12 V), black (COMM.) and white (COUNT) of the LSC are connected to the Libra "+12 VDC", "COMM.", and "CNT. IN" terminals respectively. The "PGM. DIS." terminal is left unconnected so preset values can be changed (a key switch can be used if desired). "RESET" is connected to the knife actuator so when the knife shears off the paper, the Libra counter is reset. DIP switch 1 is set to current sinking to match the LSC output. DIP switch 2 is set to "LO FRQ." because the count speed cannot be greater than 100 Hz. DIP switch 3 is set to "HI BIAS". The front panel reset enable switch (DIP switch 4) is set to "DIS.". All the mode switches are set "UP", which is mode 0 (Latch Outputs at Presets and Manual Reset to Zero). The relay contacts are connected as previously discussed.



## ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBERS FOR AVAILABLE SUPPLY VOLTAGES	
		230 VAC	115 VAC
LIBC1	Single Preset LCD Libra Counter	LIBC1010	LIBC1000
LIBC2	Dual Preset LCD Libra Counter	LIBC2010	LIBC2000
LIBC1E	Single Preset LED Libra Counter	LIBC1E10	LIBC1E00
LIBC2E	Dual Preset LED Libra Counter	LIBC2E10	LIBC2E00

For more information on Pricing, Enclosures & Panel Mount Kits refer to the RLC Catalog or contact your local RLC distributor.