Innovative operator interface, measurement, monitoring and control solutions
The Trusted Source for Innovative Control Solutions
# QUICK Specs

## Preset Counters

<table>
<thead>
<tr>
<th>Description</th>
<th>CUB5</th>
<th>C48C</th>
<th>PAXLCR</th>
<th>PAXC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (Height)x(Width)</td>
<td>39 mm (H) x 75 mm (W)</td>
<td>50 mm (H) x 50 mm (W)</td>
<td>50 mm (H) x 97 mm (W)</td>
<td>50 mm (H) x 97 mm (W)</td>
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<tr>
<td>Display</td>
<td>8 Digit, .46&quot; (12mm) Reflective, Green and Red Backlight LCD</td>
<td>2 x 6 Digit, Main Display .3&quot; (7mm) Sec. Display .2&quot; (5mm) Reflective and Backlight LCD</td>
<td>6 Digit, .56&quot; (14mm) Reflective and Backlight LCD</td>
<td>6 Digit, .56&quot; (14mm) Standard Green or Sunlight Readable Red LED, Adjustable Intensity</td>
</tr>
<tr>
<td>Counting Capability</td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch</td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch</td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch</td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch</td>
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<tr>
<td>Max. Input Frequency</td>
<td>20,000 Counts/Sec. Program Dependent</td>
<td>12,000 Counts/Sec. Model and Program Dependent</td>
<td>20,000 Counts/Sec. Program Dependent</td>
<td>34,000 Counts/Sec. Program Dependent</td>
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<tr>
<td>Input Scaling &amp; Decimal Points</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Reset Capability</td>
<td>Front Panel, Remote</td>
<td>Front Panel, Remote</td>
<td>Front Panel, Remote</td>
<td>Front Panel, Remote</td>
</tr>
<tr>
<td>Sensor Power</td>
<td>Yes, with Micro Line Power Supply</td>
<td>12 VDC @ 100 mA</td>
<td>24 VDC @ 100 mA, over 50 V 24 VDC @ 50 mA, under 50 V</td>
<td>12 VDC @ 100 mA</td>
</tr>
<tr>
<td>Setpoint Capability</td>
<td>Single Form C Relay Dual Sinking</td>
<td>Single Form A Dual Form A Current Sinking</td>
<td>Dual Form C Relays</td>
<td>Dual Form C Quad Form A Quad Sinking Quad Sourcing</td>
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<tr>
<td>Communications</td>
<td>RS485</td>
<td>RS485</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Power Source</td>
<td>9 to 28 VDC</td>
<td>85 to 250 VAC 18 to 36 VDC 24 VAC</td>
<td>50 to 250 VAC 21.6 to 250 VDC</td>
<td>85 to 250 VAC 11 to 36 VDC 24 VAC</td>
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# QUICK Specs

## Preset Counters

<table>
<thead>
<tr>
<th>Description</th>
<th>Multi Outputs</th>
<th>Dual Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8 DIN Counter/Rate Meter With Output Optic Card Capability</td>
<td>Counter/Rate Meter</td>
<td>Counter or Rate Meter</td>
</tr>
<tr>
<td><strong>Dimensions (Height)x(Width)</strong></td>
<td>50 mm (H) x 97 mm (W)</td>
<td>75 mm (H) x 75 mm (W)</td>
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<tr>
<td><strong>Display</strong></td>
<td>6 Digit, .56&quot; (14mm) Standard Green or Sunlight Readable Red LED, Adjustable Intensity</td>
<td>2 x 8 Digit, 3’ (7mm) Backlight LCD</td>
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<tr>
<td><strong>Counting Capability</strong></td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch</td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch</td>
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<td><strong>Max. Input Frequency</strong></td>
<td>34,000 Counts/Sec. Program Dependent</td>
<td>23,000 Counts/Sec. Model and Program Dependent</td>
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<tr>
<td><strong>Input Scaling &amp; Decimal Points</strong></td>
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<td>Yes</td>
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<td><strong>Reset Capability</strong></td>
<td>Front Panel, Remote</td>
<td>Front Panel, Remote</td>
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<tr>
<td><strong>Sensor Power</strong></td>
<td>12 VDC @ 100 mA</td>
<td>12 VDC @ 100 mA</td>
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<td><strong>Setpoint Capability</strong></td>
<td>Dual Form C Quad Form A Quad Sinking Quad Sourcing</td>
<td>1,2,4 or 6 Preset Capability, Dual Relay Current Sinking</td>
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<tr>
<td><strong>Communications</strong></td>
<td>RS232 RS485 Modbus DeviceNet Profibus Ethernet w/ICM8</td>
<td>RS485</td>
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<tr>
<td><strong>Power Source</strong></td>
<td>85 to 250 VAC 11 to 36 VDC 24 VAC</td>
<td>115/230 VAC 12 VDC</td>
</tr>
<tr>
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<td>Page 187</td>
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*See website for product information.
## QUICK Specs

### Preset Counters

<table>
<thead>
<tr>
<th>Description</th>
<th>Counter/Rate Meter or Dual Count Capability</th>
<th>Batch Counter</th>
<th>Counter</th>
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<td>Dimensions (Height)x(Width)</td>
<td>69 mm (H) x 133 mm (W)</td>
<td>69 mm (H) x 133 mm (W)</td>
<td>72 mm (H) x 72 mm (W)</td>
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<td>6 Digit, .56&quot; (14mm) LED</td>
<td>6 Digit, .56&quot; (14mm) LED</td>
<td>4 Digit, .4&quot; (10mm) LED, 4 Digit, .5&quot; (13mm) LCD</td>
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<td>Counting Capability</td>
<td>Uni-Directional Up/Down Inhibit Add/Subtract Quadrature Dual Count</td>
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<td>Max. Input Frequency</td>
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<td>Reset Capability</td>
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<td>Front Panel, Remote</td>
<td>Front Panel, Remote</td>
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<tr>
<td>Sensor Power</td>
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<td>12 VDC @ 100 mA</td>
<td>12 VDC @ 100 mA</td>
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<tr>
<td>Setpoint Capability</td>
<td>Single or Dual Form C Current Sinking</td>
<td>Single or Dual Form C Current Sinking</td>
<td>Single or Dual Form C, Solid State</td>
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<td>Communications</td>
<td>20 mA Current Loop</td>
<td>20 mA Current Loop</td>
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<td>Power Source</td>
<td>115/230 VAC 11 to 14 VDC</td>
<td>115/230 VAC 11 to 14 VDC</td>
<td>115/230 VAC 11 to 14 VDC</td>
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*See website for product information.*
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<thead>
<tr>
<th>MODEL NUMBER</th>
<th>FEATURES</th>
<th>MODEL NUMBER</th>
<th>FEATURES</th>
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<tr>
<td>CUBC</td>
<td>Display: 2' (5 mm) Reflective LCD</td>
<td>C48C</td>
<td>Display: 2 x 6, Main Display 3' (7 mm), Secondary Display 2' (5 mm) Reflective LCD</td>
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<tr>
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<td>Power Source: 115/230 VAC, 10 to 28 VDC, 10 to 28 VAC</td>
<td></td>
<td>Power Source: 85 to 250 VAC, 11 to 36 VDC</td>
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<tr>
<td></td>
<td>Count Speed: 12 KHz Max.</td>
<td></td>
<td>Count Speed: 12 KHz Max.</td>
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<tr>
<td>LYNX</td>
<td>Display: .3' (8 mm) Reflective LCD</td>
<td>C48C</td>
<td>Display: 2 x 6, Main Display 3' (7 mm), Secondary Display 2' (5 mm) Reflective LCD</td>
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<tr>
<td></td>
<td>Power Source: 115/230 VAC, 11 to 14 VDC, 21.5 to 30 VDC</td>
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<td>Power Source: 85 to 250 VAC, 11 to 36 VDC</td>
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<tr>
<td></td>
<td>Count Speed: 2500 Hz Max.</td>
<td></td>
<td>Count Speed: 12 KHz Max.</td>
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<td>SCP</td>
<td>Display: None</td>
<td>SCP</td>
<td>Display: 6 Digit, 56' (14 mm) Red LED</td>
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<td>Power Source: 115/230 VAC, 12 VDC</td>
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<td>Power Source: 50 to 250 VAC, 21.6 to 250 VDC</td>
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<td></td>
<td>Count Speed: 10 KHz Max.</td>
<td></td>
<td>Count Speed: 20 KHz Max.</td>
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<td>SCD</td>
<td>Display: 6 Digit, .43' (11 mm) Red LED</td>
<td>PAXLCR</td>
<td>Display: 6 Digit, 56' (14 mm) Red LED</td>
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<td>Power Source: 50 to 250 VAC, 21.6 to 250 VDC</td>
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<td>Count Speed: 10 KHz Max.</td>
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<td>Count Speed: 20 KHz Max.</td>
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<tr>
<td>SC2</td>
<td>Display: 6 Digit, .43' (11 mm) Red LED</td>
<td>PAXLCR</td>
<td>Display: 6 Digit, 56' (14 mm) Red LED</td>
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<tr>
<td></td>
<td>Power Source: 115/230 VAC, 12 VDC</td>
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<td>Power Source: 50 to 250 VAC, 21.6 to 250 VDC</td>
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<tr>
<td></td>
<td>Count Speed: 10 KHz Max.</td>
<td></td>
<td>Count Speed: 20 KHz Max.</td>
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<tr>
<td>GEM1, 2, 33, 41 and 42</td>
<td>Display: 4 Digit, 4' (10 mm) LED or .5' (13 mm) LCD</td>
<td>PAXI</td>
<td>Display: 6 Digit, 56' (14 mm) Red LED</td>
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<tr>
<td></td>
<td>Power Source: 115/230 VAC or 11 to 14 VDC</td>
<td></td>
<td>Power Source: 115/230 VAC, 11 to 36 VDC</td>
</tr>
<tr>
<td></td>
<td>Count Speed: 10 KHz Max.</td>
<td></td>
<td>Count Speed: 34 KHz Max.</td>
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<tr>
<td></td>
<td>Requires Appropriate Option Card</td>
<td></td>
<td>Requires Appropriate Option Card</td>
</tr>
<tr>
<td>LIBRA</td>
<td>Display: 6 Digit, .56' (14 mm) Red LED</td>
<td>PAXI</td>
<td>Display: 6 Digit, .56' (14 mm) Red LED</td>
</tr>
<tr>
<td></td>
<td>Power Source: 115/230 VAC</td>
<td></td>
<td>Power Source: 115/230 VAC, 11 to 36 VDC</td>
</tr>
<tr>
<td></td>
<td>Count Speed: 50 KHz Max.</td>
<td></td>
<td>Count Speed: 34 KHz Max.</td>
</tr>
<tr>
<td></td>
<td>Requires Appropriate Option Card</td>
<td></td>
<td>Requires Appropriate Option Card</td>
</tr>
</tbody>
</table>

Note: Refer to the current product literature, as some differences may exist.
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MODEL CUB5 - MINIATURE ELECTRONIC 8-DIGIT DUAL COUNTER AND RATE INDICATOR

This is a brief overview of the CUB5. For complete specifications and programming information, see the CUB5 Bulletin starting on page 102.

- LCD, REFLECTIVE OR GREEN/RED LED BACKLIGHTING
- 0.46” (11.7 mm) HIGH DIGITS
- OPTIONAL RELAY OUTPUT MODULE
- OPTIONAL COMMS OUTPUT MODULES
- COUNT SPEEDS UP TO 20 KHZ
- OPERATES FROM 9 TO 28 VDC POWER SOURCE
- PROGRAMMABLE SCALING FOR COUNT AND RATE
- BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL
- QUADRATURE SENSING (UP TO 4 TIMES RESOLUTION)
- ANTI-COINCIDENCE COUNTING (ADD/ADD & ADD/SUB)
- NEMA 4X/IP65 SEALED FRONT BEZEL

SPECIFICATIONS

COUNTER DISPLAYS:
Counter A: 8-digits, enabled in all count modes
  Display Range: -9999999 to 99999999
  Overflow Indication: Display flashes "Cnt OVEr"
Counter B: 7-digits, enabled in Dual Counter mode only
  Display Designator: "b" to the left side of the display
  Display Range: 0 to 9999999 (positive count only)
  Overflow Indication: Display flashes "bCntOVEr"

Maximum Count Rates: 50% duty cycle
Without setpoint option card: 20 KHz (all count modes)
With setpoint option card: 20 KHz for any count mode except Quadrature
  x4 (18 KHz) and Dual Counter (17 KHz)

RATE DISPLAY: 6-digits, may be enabled or disabled in any mode
Display Designator: "R" to the left side of the display
Display Range: 0 to 999999
Over Range Display: "R OLOLOL"
Maximum Frequency: 20 KHz
Minimum Frequency: 0.01 Hz
Accuracy: ±0.01%

COUNT/RATE SIGNAL INPUTS (INP A and INP B):
Input A: DIP switch selectable to accept pulses from a variety of sources.
  See Section 2.0 Setting the DIP Switches for Input A specifications.
Input B: Logic signals only
  Trigger levels: \( V_{IL} = 1.0 \text{ V max; } V_{IH} = 2.4 \text{ V min; } V_{MAX} = 28 \text{ VDC} \)
  Current sinking: Internal 10KΩ pull-up resistor to +9 to 28 VDC
  Filter (LO Freq.): Damping capacitor provided for switch contact bounce.
  Limits input frequency to 50 Hz and input pulse widths to 10 msec min.
C48C SERIES - 1/16 DIN COUNTERS

MODEL C48CS - SINGLE PRESET
MODEL C48CD - DUAL PRESET
MODEL C48CB - THREE PRESET BATCH

- LCD, 7 SEGMENT, 2 LINE, 6 DIGIT DISPLAY, POSITIVE REFLECTIVE OR NEGATIVE TRANSMISSIVE MODELS WITH RED TOP LINE AND GREEN BOTTOM LINE BACKLIT
- QUADRATURE SENSING (Up to 4 times resolution)
- BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL
- FIELD REPLACEABLE RELAY OUTPUT BOARDS
- STATUS INDICATORS FOR OUTPUTS
- NEMA 4X/IP65 SEALED BEZEL
- PARAMETER SECURITY VIA PROGRAMMABLE OPERATOR ACCESS PRIVILEGES AND PROTECTED VALUE MENU
- PROGRAMMABLE USER INPUTS AND FRONT PANEL FUNCTION KEY

DESCRIPTION

The Model C48 Counter is available as a Standard Counter or a Batch Counter. The Standard Counter is available with single or dual presets. The Batch Counter has a main process counter with dual presets and a secondary counter with a single preset. The secondary counter can be selected to function as a batch or a total counter.

The C48C features a 7 segment, 2 line by 6 digit reflective or backlit LCD display. For the backlit versions, the main display line is red and shows the count value or the Batch/Total value when preset 3 or output 3 is viewed in the secondary display. The smaller secondary display line is green and can be used to view the prescaler value, preset values, output time values or Batch/Total count values (Batch model).

The C48C offers a choice of nine programmable counting modes for use in applications requiring bi-directional, anti-coincidence, and quadrature counting. The unit may be programmed to register counts on both edges of the input signal providing frequency doubling capability. DIP switches are used for input configuration set-up and to provide a Program Disable function.

Four front panel push-buttons are used for programming the operating modes and data values, changing the viewed display, and performing user programmable functions, e.g., reset, etc. The C48C can be configured for one of two numeric data entry methods, digit entry or automatic scrolling. The digit entry method allows for the selection and incrementing of digits individually. The automatic scrolling method allows for the progressive change of one digit position by pressing and holding the “up” or “down” button.

The Program Disable DIP switch, a user-programmable code value, and an upload, downloaded, and saved to a file for later use or multi-unit programming.

The Standard Counter with Dual Presets is available with solid-state or Relay outputs. The Single Preset model has a solid-state and relay output. The Batch Counter has relay outputs for Output 2 and the Batch/Total Output 3, with Output 1 available as solid-state. The Batch Counter is also available with three solid-state outputs. For all C48 Counters, the solid-state outputs are available in a choice of NPN current sinking or PNP current sourcing, open-collector transistor outputs. All relay output boards are field replaceable.

The Standard Counter with Dual Presets is available with solid-state or Relay outputs. The Single Preset model has a solid-state and relay output. The Batch Counter has relay outputs for Output 2 and the Batch/Total Output 3, with Output 1 available as solid-state. The Batch Counter is also available with three solid-state outputs. For all C48 Counters, the solid-state outputs are available in a choice of NPN current sinking or PNP current sourcing, open-collector transistor outputs. All relay output boards are field replaceable.

A Prescaler Output model is available as a Dual Preset, with solid-state outputs. The Prescaler Output is useful for providing a lower frequency scaled pulse train to a PLC or another external totaling counter. The Prescaler Output provides a programmable width output pulse for every count or every 10 counts registered on the display.

The optional RS-485 serial communication interface provides two-way communication between a C48 and other compatible equipment such as a printer, PLC, HMI, or a host computer. In multipoint applications (up to thirty-two), the address number of each C48 on the line can be programmed from 0 to 99. Data from the C48 can be interrogated or changed, and alarm output(s) may be reset by sending the proper command code via serial communications. PC software, SFC48, allows for easy configuration of controller parameters. These settings can be saved to disk for later use or used for multi-controller down loading. On-line help is provided within the software.

Optional programming software (SFC48) is available to program all unit configuration parameters. The software allows unit configurations to be created, uploaded, downloaded, and saved to a file for later use or multi-unit programming.

The unit is constructed of a lightweight, high impact plastic case with a textured front panel and a clear display window. The front panel meets NEMA 4X/IP65 specifications when properly installed. Multiple units can be stacked horizontally or vertically. Modern surface-mount technology, extensive testing, plus high immunity to noise interference makes the C48 Counters extremely reliable in industrial environments.
**POWER REQUIREMENTS**

**AC Power:** 85 to 250 VAC, 50/60 Hz, 9 VA max.
**DC Power:** 11 to 14 VDC @ 150 mA max. (Non PNP output models)

*Note: Models with PNP current sourcing outputs must be powered from AC.*

**DC Versions (C48XXX):**

- **CONTINUOUS**
  - DC Power: 18 to 36 VDC, 5.5 W max.
- **AC Power:** 24 VAC ±10%; 50/60 Hz; 7 VA max.

*Note: The +10% tolerance range on AC input voltage must be strictly adhered to. DO NOT EXCEED 26.4 VAC.*

**PEAK (START-UP CURRENT):**

- **AC or DC Power:** 500 mA peak start-up current for 10 msec max.

**DC OUT (V<sub>SRG-IN</sub>) - Terminal 10**

- **For units which do not have PNP current sourcing outputs,** this terminal provides a DC output for sensor power (+12 VDC ±15%). The maximum sensor current is 100 mA.
- **For units with PNP current sourcing outputs,** this terminal serves a dual purpose depending on the application’s PNP output voltage level and current requirements.
  1. The terminal may be used as a +12 VDC output for sensor power.
  2. If a higher PNP output voltage level or additional output sourcing current is desired, an external DC supply may be connected between the “DC OUT (V<sub>SRG-IN</sub>)” and “COMM.” terminals. This supply will determine the PNP output voltage level, and must be in the range of +13 to +30 VDC.

An external DC supply can also provide the additional output sourcing current required in applications where two or more PNP outputs are “ON” simultaneously. However, the maximum current rating of 100 mA per individual output must not be exceeded, regardless of external supply capacity.

**MEMORY:** Nonvolatile E²PROM retains all programmable parameters and count values.

**SENSOR POWER:** +12 VDC (±15%) @ 100 mA max.

**COUNT INPUTS A & B:** Accepts count pulses from a variety of sources, DIP switch selectable.

- **Current Sourcing:** 3.9KΩ pull-down, V<sub>IN</sub> max = 30 VDC
- **Current Sinking:** 7.8KΩ pull-up to 12 VDC; I<sub>SNK</sub> = 1.8 mA max.
- **Debounce:** 50 Hz max.
- **Lo Bias:** V<sub>IL</sub> = 1.5 VDC max., V<sub>IH</sub> = 3.75 VDC min.
- **Hi Bias:** V<sub>IL</sub> = 5.5 VDC max., V<sub>IH</sub> = 7.5 VDC min.

**MAX. COUNT RATE:** Model dependent. All listed values are in KHz.

*Note: Max. count rates for X2 & X4 modes are given for 50% duty cycle signals and quad signals with 90° phase shift.*

- **Single Preset Model C48CS**
- **Dual Preset Model C48CD**
- **Batch Model C48CB**
- **Batch Model C48CB**
- **Preset Output Model C48CP**

**Dual Preset Model C48CD**

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<tr>
<th>Prescaler Value</th>
<th>C1-Usr C1-Ud</th>
<th>C2-Usr C2-Ud</th>
<th>Ad-Sub Ad-Ad</th>
<th>X1</th>
<th>X2</th>
<th>X4</th>
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<tr>
<td>0.00000-1-0.99999</td>
<td>8.4</td>
<td>4.1</td>
<td>1.9</td>
<td>5.4</td>
<td>5.3</td>
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<td>1.00000</td>
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<td>9.2</td>
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<td>3.2</td>
<td>6.8</td>
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<td>2.4</td>
<td>1.8</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>9.00001-9.99999</td>
<td>2.1</td>
<td>1</td>
<td>2.3</td>
<td>1.7</td>
<td>1.1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**Batch Model C48CB**

<table>
<thead>
<tr>
<th>Prescaler Value</th>
<th>C1-Usr C1-Ud</th>
<th>C2-Usr C2-Ud</th>
<th>Ad-Sub Ad-Ad</th>
<th>X1</th>
<th>X2</th>
<th>X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00000-1-0.99999</td>
<td>6.3</td>
<td>4.1</td>
<td>1.8</td>
<td>5.4</td>
<td>4.1</td>
<td>2.1</td>
</tr>
<tr>
<td>1.00000</td>
<td>11.5</td>
<td>5.7</td>
<td>11.5</td>
<td>6</td>
<td>5.8</td>
<td>3</td>
</tr>
<tr>
<td>1.00001-2</td>
<td>6.5</td>
<td>3.2</td>
<td>6.6</td>
<td>4</td>
<td>3.2</td>
<td>1.6</td>
</tr>
<tr>
<td>2.00000-3</td>
<td>5</td>
<td>2.4</td>
<td>5.2</td>
<td>3.4</td>
<td>2.5</td>
<td>1.3</td>
</tr>
<tr>
<td>3.00000-4</td>
<td>4.1</td>
<td>2</td>
<td>4.4</td>
<td>2.8</td>
<td>2</td>
<td>1</td>
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<tr>
<td>4.00001-5</td>
<td>3.4</td>
<td>1.7</td>
<td>3.8</td>
<td>2.5</td>
<td>1.7</td>
<td>0.8</td>
</tr>
<tr>
<td>5.00000-6</td>
<td>2.9</td>
<td>1.4</td>
<td>3.2</td>
<td>2.2</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>6.00000-7</td>
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<td>1.3</td>
<td>0.6</td>
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<tr>
<td>7.00001-8</td>
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<td>2.4</td>
<td>1.8</td>
<td>1.2</td>
<td>0.6</td>
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<td>8.00001-9</td>
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<td>0.9</td>
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<td>1.6</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>9.00001-9.99999</td>
<td>1.9</td>
<td>0.9</td>
<td>2</td>
<td>1.5</td>
<td>0.9</td>
<td>0.4</td>
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</tbody>
</table>

**Batch Model C48CB**

<table>
<thead>
<tr>
<th>Prescaler Value</th>
<th>C1-Usr C1-Ud</th>
<th>C2-Usr C2-Ud</th>
<th>Ad-Sub Ad-Ad</th>
<th>X1</th>
<th>X2</th>
<th>X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00000-1-0.99999</td>
<td>6.3</td>
<td>3.3</td>
<td>6.6</td>
<td>3.5</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>1.00000</td>
<td>8.5</td>
<td>3.6</td>
<td>8.6</td>
<td>4</td>
<td>4</td>
<td>2.1</td>
</tr>
</tbody>
</table>

**Preset Output Model C48CP**

<table>
<thead>
<tr>
<th>Prescaler Value</th>
<th>C1-Usr C1-Ud</th>
<th>C2-Usr C2-Ud</th>
<th>Ad-Sub Ad-Ad</th>
<th>X1</th>
<th>X2</th>
<th>X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00000-1-0.99999</td>
<td>6.2</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>1.00000</td>
<td>8</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* - Inputs A & B rates summed.

**USER INPUTS:** Configurable as current sinking (active low) or current sourcing (active high) inputs via a single plug jumper.

- **Current Sinking:** V<sub>IL</sub> = 1.5 VDC max., 22 KΩ pull-up to 5 VDC.
- **Current Sourcing:** V<sub>IH</sub> = 3.5 VDC min., V<sub>IN</sub> max = 30 VDC; 22 KΩ pull-down.

**Response Time** = 10 msec max.

**Inhibit Response Time** = 250 μsec max.

**OUTPUTS:** (Output type and quantity, model dependent)

**Solid-State:**

- **PNP Open Collector:** I<sub>SNK</sub> = 100 mA max. @ V<sub>OL</sub> = 1.1 VDC max.; V<sub>OH</sub> = 30 VDC max.
- **PNP Open Collector:** I<sub>SRC</sub> = 100 mA max. (See note); V<sub>OH</sub> = 12 VDC ±15% (using internal supply); V<sub>OH</sub> = 13 to 30 VDC (using external supply).

*Note: The internal supply of the C48C can provide a total of 100 mA for the combination of sensor current and PNP output sourcing current. The supply voltage is ±12 VDC (±15%), which will be the PNP output voltage level when only using the internal supply.*

- If additional PNP output sourcing current or a higher output voltage level is desired, an external DC supply may be connected between the “DC OUT (V<sub>SRG-IN</sub>)” and “COMM.” terminals. This supply will determine the PNP output voltage level and must be in the range of +13 to +30 VDC.

An external supply can provide the additional output sourcing current required in applications where two or more outputs are “ON” simultaneously. However, the maximum rating of 100 mA per individual output must not be exceeded, regardless of external supply capacity.
8. OUTPUTS: (Output type and quantity, model dependent) Cont’d
   Relay: Form A contact, Rating = 5 A @ 250 VAC, 30 VDC (resistive load), 1/10 HP @ 120 VAC (inductive load)
   Relay Life Expectancy: 100,000 cycles min. at max. load rating
   Programmable Timed Output: User selectable output time resolution.
      0.01 Second Resolution: 0.01 to 99.99 sec, ± 0.01% +20 msec max. (Prescalers less than 2)
      0.1 Second Resolution: 0.1 to 999.9 sec, ± 0.01% + 100 msec (Prescalers less than 2)
   Note: For Prescaler values above 2, the timed delay output is affected by the count speed (rate).
9. RS485 SERIAL COMMUNICATIONS (Optional): Up to 32 units can be connected.
   Baud Rate: Programmable from 1200 to 9600 baud
   Data Format: 10 Bit Frame, 1 start bit, 7 or 8 data bits, 1 or No Parity bit, and 1 stop bit
   Parity: Programmable for Odd (7 data bits), Even (7 data bits), or None (8 data bits)
10. CERTIFICATIONS AND COMPLIANCES:
    UL Recognized Component, File #E137808
    Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.

**ELECTROMAGNETIC COMPATIBILITY**

**Immunity to EN 50082-2**

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Level or Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge</td>
<td>EN 61000-4-2 Level 2; 4 Kv contact</td>
</tr>
<tr>
<td>Electromagnetic RF fields</td>
<td>EN 61000-4-3 Level 3; 10 V/m</td>
</tr>
<tr>
<td>Fast transients (burst)</td>
<td>EN 61000-4-4 Level 4; 2 Kv I/O</td>
</tr>
<tr>
<td>RF conducted interference</td>
<td>EN 61000-4-6 Level 3; 10 V/rms</td>
</tr>
<tr>
<td>Simulation of cordless telephone</td>
<td>ENV 50204 Level 3; 10 V/m</td>
</tr>
<tr>
<td>Emissions to EN 50081-2</td>
<td>EN 55011 Enclosure class A</td>
</tr>
</tbody>
</table>

**Notes:**

**AC VERSIONS**

1. A power line filter, RLC#LFIL000 or equivalent, was installed when the unit was DC powered.

**DC VERSIONS**

To insure compliance with the EMC standards listed above, do not connect any wires from the terminal(s) labeled “COMM.” to the “DC-” supply terminal (12), when powering the unit from a DC supply.

Refer to EMC Installation Guidelines section of the manual for additional information.

11. ENVIRONMENTAL CONDITIONS:

   **Operating Temperature:** 0°C to 50°C
   **Storage Temperature:** -40°C to 70°C
   **Operating and Storage Humidity:** 85% max. relative humidity (non-condensing) from 0°C to 50°C.
   **Altitude:** Up to 2000 meters


13. CONSTRUCTION: Black plastic case with collar style panel latch. The panel latch can be installed for horizontal or vertical stacking. Black plastic textured bezel with clear display viewing window. Unit assembly with circuit boards can be removed from the case without removing the case from the panel or disconnecting the wiring. Front panel meets NEMA 4X/IP65 requirements for indoor use, when properly installed. Installation Category II, Pollution Degree 2.

14. WEIGHT: 6.0 oz (170 g)

**SINGLE PRESET MODELS**

The C48CS has a solid-state output that operates in parallel with a relay output. The solid-state output is available as an NPN or PNP open collector transistor.

**DUAL PRESET MODELS**

The C48CP has two outputs that are activated from presets 1 and 2 respectively. These outputs can be relay outputs, or solid-state outputs. The solid-state outputs are available as NPN or PNP open-collector transistors. Units with solid-state outputs can be ordered with an optional prescaler output (C48CP).

**3 PRESET BATCH MODELS**

The C48CB has a secondary counter that can be used for batch counting, or to keep a total count. This secondary counter can be programmed to operate in one of eight operating modes. Outputs 1 and 2 are assigned to the primary process counter (C1). Output 3 is assigned to the secondary Batch/Total counter (C2). The three preset batch unit can be ordered with solid-state or relay outputs. Units with solid-state outputs have a User Input 2 terminal available. The relay model has a relay output for Output 2 and Output 3 (Batch/Total). Output 1 is available only as solid-state.

**PRESCALER OUTPUT MODELS**

The C48CP is a dual preset counter with solid-state outputs. These models have an additional output configured as a prescaler output. Each time the least significant digit of the display increments, the Prescaler output provides a pulse. The width of this pulse is variable in that the output will turn off after a programmed number of count input pulses has occurred (1-9). The Prescaler output can also be programmed to activate when the 10’s digit of the display increments, rather than the least significant digit.

**FRONT PANEL FEATURES**

The C48 Counters feature a dual line display. In the normal operating mode (main display), the count or total value is shown on the top line and presets, prescaler, or output time values are shown on the bottom line. The bottom line values can be programmed to be viewable only, viewable and changeable, or locked (not viewable) from the main display.

In the operating mode, the presets, prescaler, and output time values are accessible providing that these values are not programmed for ‘L’ocked. Values that are accessible (changeable) can be changed immediately when viewed in the secondary display.

**FRONT PANEL KEYPAD**

- Performs user programmed function
- Cycles through secondary displays.
- Enters Protected Value Menu or Programming Mode when pressed and held for 2 seconds.
- Scrolls through programming parameters.
- Enters Data Values.
- Selects next available mode in programming mode.
- Increments digit in Digit Entry mode.
- Increments value in Auto Scrolling entry mode.
- Selects Digit to right when in Digit Entry mode.
- Decrements value in Auto Scrolling entry mode.
USER INTERFACE/PROGRAMMING MODES

The operating modes of the C48C are programmed using the front panel keypad. To enter the programming menu, the  key is pushed and held for 2 seconds. Within the programming menu, the  key is used to sequence through the list of programming parameters.

PROGRAMMING MENU

**Entry**  - Digit or Auto Scrolling Data Entry Mode

**Rec 5**  - Accessibility of Prescaler Value

**PSclRe**  - Prescaler Value

**dEC Ph**  - Decimal Point Position

**Cnt In**  - Count Input Modes

**DPEr 1**  - Counter 1 Operating Mode

**C2 R5**  - Counter 2 Assignment (C48CB only)

**DPEr 2**  - Counter 2 Operating Mode (C48CB only)

**Rc Pr**  - Accessibility of Preset Values

**PSEt**  - Preset 1, 2, and 3 Values

**Pt**  - P1 Track P2 (not available on C48CS)

**Rc Out**  - Accessibility of Output Time Values

**OutrES**  - Output Resolution

**OutPu**  - Output 1, 2, and 3 Time Values

**reEOut**  - Reverse Output/Relay Logic

**reEAn**  - Reverse Output Annunciator Logic

**OutPuP**  - Power Up Output State

**USr In 1**  - User Input 1

**USr In 2**  - User Input 2 (Not available on Batch Relay Models)

**USr In b**  - User Input b

**USr F 1**  - User F1 Key

**Code**  - Programming/Protected Parameter menu Code

**Scroll**  - Scroll Display

**SERSe**  - Serial Baud Rate & Parity Settings

**SERAdd**  - Serial Unit Address

**SERAb**  - Abbreviate Serial Mnemonics

**PrnOp**  - Print Options

**PrnSt**  - Print & Reset Count Value

**PSclOP**  - Prescaler Output Pulse (C48CP only)

**PSclLen**  - Prescaler Output Pulse Length (C48CP only)

**FRcSe**  - Load Factory Default Settings

Program Security/Operator Accessible Values

The Program Disable DIP switch, programmable code value, User Input (programmed for Program Disable), and the Accessible Value parameters provide various levels of security against unauthorized programming changes. The accessible values parameters provide individual access or locking of each value.

Protected Value Menu

The Protected Value Menu allows access to selected presets, prescaler and timed output values without having them viewable or changeable from the main display. To enter the protected menu, the  key is pressed and held, and a programmed code value is entered.

Programming Numeric Data Values

The Presets may be accessible when the unit is in its operating mode. Pressing the  key will sequence the secondary display through the available preset, prescaler and Batch/Total count values.

To change a data value it must be visible on the secondary display. Pressing the  or  key will allow changing of the value. If the data entry method has been set to “digit entry”, pressing the  key multiple times will select other digits. Pressing the  key will increment the selected digit. If the data entry method is set to “Auto scrolling”, the data value can be changed by pressing and holding the  or  keys to change one or all digits of the display. The data value will be entered when the  key is pushed, or the old value will be retained if no key activity is detected for 10 seconds.

Count Input Modes -  

This parameter controls the count/control function of Inputs A and B. It also allows Input B to be used as a User Input with the same programmable functions as the dedicated User Inputs.

<table>
<thead>
<tr>
<th>MODE</th>
<th>INPUT A</th>
<th>INPUT B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-USr</td>
<td>Count</td>
<td>User Input *</td>
</tr>
<tr>
<td>C2-USr</td>
<td>Count (X2)</td>
<td>User Input</td>
</tr>
<tr>
<td>C1-Ud</td>
<td>Count</td>
<td>Up/Dn Control *</td>
</tr>
<tr>
<td>C2-Ud</td>
<td>Count (X2)</td>
<td>Up/Dn Control</td>
</tr>
</tbody>
</table>

* These are the only count input modes available on the Prescaler Output Model.

Programmable Operating Modes -  

These modes determine the operational characteristics of the counter. In the tables, 01, 02, and 03, refer to Outputs 1,2, and 3 respectively.

**SINGLE PRESET OPERATING MODES**

<table>
<thead>
<tr>
<th>MODE</th>
<th>INPUT A</th>
<th>INPUT B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual Reset to Zero, Latched Output</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Manual Reset to Zero, Timed Output</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Manual Reset to Preset, Latched Output</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Manual Reset to Preset, Timed Output</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Auto Reset to Zero, Timed Output</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Auto Reset to Preset, Timed Output</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Auto Reset to Zero at Timed Output End</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Auto Reset to Preset at Timed Output End</td>
<td></td>
</tr>
</tbody>
</table>

**DUAL PRESET AND BATCH COUNTER 1 OPERATING MODES**

<table>
<thead>
<tr>
<th>MODE</th>
<th>INPUT A</th>
<th>INPUT B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual Reset to Zero, Latched Outputs</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Manual Reset to Zero, 01 Timed, 02 Latched</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Manual Reset to Zero, 01 and 02 Timed</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Manual Reset to Zero, 01 off at 02, 02 Latched</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Manual Reset to Zero, 01 off at 02, 02 Timed</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Manual Reset to Preset 2, Latched Outputs</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Manual Reset to Preset 2, 01 Timed, 02 Latched</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Manual Reset to Preset 2, 01 and 02 Timed</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Manual Reset to Preset 2, 01 off at 02, 02 Latched</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Manual Reset to Preset 2, 01 off at 02, 02 Timed</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Auto Reset to Zero, 01 and 02 Timed</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Auto Reset to Zero, 01 off at 02, 02 Timed</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Auto Reset to Preset 2, 01 and 02 Timed</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Auto Reset to Preset 2, 01 off at 02, 02 Timed</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Auto Reset to Zero at 02 End, 01 and 02 Timed</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Auto Reset to Zero at 02 End, 01 off at 02, 02 Timed</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Auto Reset to Preset 2 at 02 End, 01 and 02 Timed</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Auto Reset to Preset 2 at 02 End, 01 off at 02, 02 Timed</td>
<td></td>
</tr>
</tbody>
</table>

**COUNTER 2 OPERATING MODES (C48CB Only)**

<table>
<thead>
<tr>
<th>MODE</th>
<th>INPUT A</th>
<th>INPUT B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual Reset to Zero, 03 Latched</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Manual Reset to Zero, 03 Timed</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Manual Reset to Preset 3, 03 Latched</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Manual Reset to Preset 3, 03 Timed</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Auto Reset to Zero, 03 Timed</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Auto Reset to Zero at 03 Timed Output End</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Auto Reset to Preset 3, 03 Timed</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Auto Reset to Preset 3 at 03 Timed Output End</td>
<td></td>
</tr>
</tbody>
</table>
MULTIPLE UNIT STACKING

The C48C is designed for close spacing of multiple units. Units can be stacked either horizontally or vertically. For vertical stacking, install the panel latch with the screws to the sides of the unit. For horizontal stacking, the panel latch screws should be at the top and bottom of the unit. The minimum spacing from center line to center line of the units is 1.96" (49.8 mm). This spacing is the same for vertical or horizontal stacking.

Note: When stacking units, provide adequate panel ventilation to ensure that the maximum operating temperature range is not exceeded.

SLOW DOWN & CUT TO LENGTH WITH TOTAL FOOTAGE

To improve production efficiency, a wallpaper manufacturing plant is installing cut to length counters on the roll form machines. Currently, electro-mechanical counters are used for length measurements. The operator slows the machine down upon arriving at the desired length, stops and then cuts. The addition of the C48CB batch counters eliminates the operator’s manual observation and control.

The operator programs the required cut length as Preset 2. Preset 1 is preprogrammed for tracking and will automatically follow Preset 2. Preset 1 is used as the slow down, and is set for a value 0.25 yards less than Preset 2. The process count is programmed to automatically reset at the Preset 2 cut length of 11.00 yards, and begin counting for the next roll. Counter 2 is programmed as a totalizer and is recorded and reset (via key switch) at the end of the operator’s shift. The C48CB was ordered with the RS-485 serial communication option. Future plans include a data acquisition program to interrogate the C48CB’s.

A 100 ppr rotary pulse generator is shaft coupled to a 4” pinch roller for length measurement. Display units desired is 0.01 yards. Program Security features are set to allow access to Preset 2 only. This allows the operator to change the required cut length, but prevents accidental changes to other programming parameters that may adversely affect process operation.

After all programming is complete, the Program Disable DIP switch is moved to the up position to enable the Program Security function.

Circumference Of Pinch Roller:

\[
\text{Circumference} = \pi \times \text{diameter}
\]

\[
12.56636 = 3.14159 \times 4.00
\]

Pulses Per Yard:

\[
\frac{36 \text{ inches}}{1 \text{ yard}} \times \frac{1 \text{ rev}}{12.56636\text{ inches}} = 2.8647913 \text{ rev/yard}
\]

\[
2.8647913 \text{ rev/yard} \times 100 \text{ ppr/rev} = 286.47913 \text{ pulses/yard}
\]

Prescaler:

\[
\text{Prescaler} = \frac{\text{Display units}}{100} = \frac{\text{number of pulses}}{286.47913}
\]

\[
\text{Prescaler} = 0.34907
\]

Products:

C48CB108
RPGQ0100

PROGRAMMING

<table>
<thead>
<tr>
<th>Entry</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R36s</td>
<td>2</td>
</tr>
<tr>
<td>R3Fs</td>
<td>1</td>
</tr>
<tr>
<td>R3Pl</td>
<td>1</td>
</tr>
<tr>
<td>R3Prs</td>
<td>1</td>
</tr>
<tr>
<td>R3Prs</td>
<td>0</td>
</tr>
<tr>
<td>R3Pls</td>
<td>0</td>
</tr>
<tr>
<td>R3Pls</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: When stacking units, provide adequate panel ventilation to ensure that the maximum operating temperature range is not exceeded.
### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>νPNP O.C. OUTPUT(S)</th>
<th>RELAY OUTPUT(S)</th>
<th>RS485</th>
<th>PART NUMBERS FOR AVAILABLE SUPPLY VOLTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Note)</td>
<td></td>
<td></td>
<td>18-36 VDC/24 VAC</td>
</tr>
<tr>
<td>C48CS</td>
<td>1 Preset Counter, Reflective LCD</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>C48CS013</td>
</tr>
<tr>
<td></td>
<td>1 Preset Counter, Backlit LCD</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>C48CS113</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter, Reflective LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>C48CD015</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter, Reflective LCD</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>C48CD012</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>C48CD017</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter, Backlit LCD</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>C48CD110</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>C48CD115</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter, Backlit LCD</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>C48CD112</td>
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<tr>
<td></td>
<td>2 Preset Counter, Backlit LCD</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>C48CD117</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter w/Prescaler Output, Reflective LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>C48CP015</td>
</tr>
<tr>
<td></td>
<td>2 Preset Counter w/Prescaler Output, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>C48CP110</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Reflective LCD</td>
<td>Yes (O1)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>C48CD</td>
<td>3 Preset Batch Counter, Reflective LCD</td>
<td>Yes (O1)</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Reflective LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes (O1)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes (O1)</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, BacklitLCD</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>C48CB110</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>C48CP</td>
<td>3 Preset Batch Counter w/Prescaler Output, Reflective LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>C48CP015</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter w/Prescaler Output, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>C48CP110</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter w/Prescaler Output, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>C48CP115</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Reflective LCD</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes (O1)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes (O1)</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>C48CB110</td>
</tr>
<tr>
<td></td>
<td>3 Preset Batch Counter, Backlit LCD</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Note: On Batch Relay Models, Outputs 2 and 3 are Relays, and Output 1 (O1) is a solid-state output.

*PNP O.C. output(s) versions available, contact the factory.

### RELAY OUTPUT BOARDS

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>NPN O.C. OUTPUT(S)</th>
<th>PNP O.C. OUTPUT(S)</th>
<th>RELAY OUTPUT(S)</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC48</td>
<td>Single Preset</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>RBC48001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>RBC48002</td>
</tr>
<tr>
<td></td>
<td>Dual Preset</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>RBC48003</td>
</tr>
<tr>
<td></td>
<td>Batch</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>RBC48004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>RBC48005</td>
</tr>
</tbody>
</table>

### ACCESSORIES

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFC48</td>
<td>PC Configuration Software for Windows 3.x and 95 (3.5&quot; disk) (for RS-485 Models)</td>
<td>SFC48</td>
</tr>
</tbody>
</table>
MODEL PAXLCR - 1/8 DIN PAX LITE DUAL COUNTER AND RATE METER

This is a brief overview of the PAXLCR. For complete specifications and programming information, see the PAX Lite Dual Counter and Rate Meter Bulletin starting on page 125.

- 6 DIGIT, 0.56" HIGH RED LED DISPLAY
- PROGRAMMABLE SCALING FOR COUNT AND RATE
- BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL
- QUADRATURE SENSING (UP TO 4 TIMES RESOLUTION)
- BUILT-IN BATCH COUNTING CAPABILITY
- PROGRAMMABLE USER INPUT
- DUAL 5 AMP FORM C RELAYS
- UNIVERSALLY POWERED
- NEMA 4X/IP65 SEALED FRONT BEZEL

ANNUNCIATORS:
A - Counter A value
B - Counter B value (dual count or batch)
- Rate value is displayed with no designator
SP1 - Indicates setpoint 1 output status
SP2 - Indicates setpoint 2 output status

COUNTER DISPLAYS:
Counter A: 6-digits, enabled in all count modes
Display Designator: “A” to the left side of the display
Display Range: -999999 to 999999
Counter B: 6-digits, enabled in Dual Count mode or Batch Counter
Display Designator: “B” to the left side of the display
Display Range: 0 to 999999 (positive count only)
Overflow Indication: Display “0-0-” alternates with overflowed count value
Maximum Count Rates: 50% duty cycle, count mode dependent.
With setpoints disabled: 25 KHz, all modes except Quadrature x4 (23 KHz).
With setpoint(s) enabled: 20 KHz, all modes except Dual Counter (14 KHz), Quadrature x2 (13 KHz) and Quadrature x4 (12 KHz).

RATE DISPLAY: 6-digits, may be enabled or disabled in any count mode
Display Range: 0 to 999999
Over Range Display: “0-0-”
Maximum Frequency: 25 KHz
Minimum Frequency: 0.01 Hz
Accuracy: ±0.01%

COUNT/RATE SIGNAL INPUTS (INPUT A and INPUT B):
See Section 2.0 Setting the DIP Switches for complete Input specifications.
DIP switch selectable inputs accept pulses from a variety of sources. Both inputs allow selectable active low or active high logic, and selectable input filtering for low frequency signals or switch contact debounce.
Input A: Logic level or magnetic pickup signals.
Trigger levels: $V_{IL} = 1.25 \text{ V max} \quad V_{IH} = 2.75 \text{ V min}; V_{MAX} = 28 \text{ VDC}$
Mag. pickup sensitivity: 200 mV peak, 100 mV hysteresis, 40 V peak max.
Input B: Logic level signals only
Trigger levels: $V_{IL} = 1.0 \text{ V max}; V_{IH} = 2.4 \text{ V min}; V_{MAX} = 28 \text{ VDC}$
MODEL PAXC - 1/8 DIN COUNTER

This is a brief overview of the PAXC. For complete specifications and programming information, see the PAX Digital Input Panel Meters Bulletin starting on page 137.

PAXC SPECIFICATIONS

MAXIMUM SIGNAL FREQUENCIES:
To determine the maximum frequency for the input(s), first answer the questions with a yes (Y) or no (N). Next determine the Count Mode to be used for the counter(s). If dual counters are used with different Count Modes, then the lowest frequency applies to both counters.

<table>
<thead>
<tr>
<th>FUNCTION QUESTIONS</th>
<th>Single: Counter A or B</th>
<th>Dual: Counter A &amp; B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any setpoints used?</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Is Counter C used?</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>COUNT MODE (Values are in KHz)</td>
<td>34</td>
<td>17</td>
</tr>
</tbody>
</table>

Notes:
1. Counter Modes are explained in the Module 1 programming section.
2. Listed values are with frequency DIP switch set on HI frequency.

ANNUNCIATORS:
- A - Counter A
- B - Counter B
- C - Counter C
- SP1 - setpoint 1 output state
- SP2 - setpoint 2 output state
- SP3 - setpoint 3 output state
- SP4 - setpoint 4 output state

COUNTER DISPLAYS:
Maximum display: 8 digits: ± 99999999 (greater than 6 digits display Alternates between high order and low order.)

DUAL COUNT QUAD INPUTS

FOUR SETPOINT ALARM OUTPUTS (W/Plug-in card)

- 6-DIGIT 0.56" RED SUNLIGHT READABLE OR STANDARD GREEN DISPLAY (Alternating 8 digits for counting)
- DUAL COUNT QUAD INPUTS
- UP TO 3 COUNT DISPLAYS

FUNCTION QUESTIONS
- Dual: Counter A & B
- Single: Counter A or B
- COUNT MODE (Values are in KHz)

Notes:
1. Counter Modes are explained in the Module 1 programming section.
2. Listed values are with frequency DIP switch set on HI frequency.

Maximum display: 8 digits: ± 99999999 (greater than 6 digits display Alternates between high order and low order.)

INPUTS A and B:
- DIP switch selectable to accept pulses from a variety of sources including switch contacts, TTL outputs, magnetic pickups and all standard RLC sensors.

LOGIC: Input trigger levels VIL = 1.5 V max.; VIH = 3.75 V min.
Current sinking: Internal 7.8 KΩ pull-up to +12 VDC, IMAX = 1.9 mA.
Current sourcing: Internal 3.9 KΩ pull-down, 7.3 mA max. at 28 VDC, VMAX = 30 VDC.
Filter: Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec. minimum.

DUAL COUNT MODES:
When any dual count mode is used, then User Inputs 1 and/or 2 will accept the second signal of each signal pair. The user inputs do not have the Logic/Mag, HI/LO Freq. and Sink/Source input setup switches. The user inputs are inherently a logic input with no low frequency filtering. Any mechanical contacts used for these inputs in a dual count mode must be debounced externally. The user input may only be selected for sink/source by the User Jumper placement.

This document provided by Barr-Thorp Electric Co., Inc.  800-473-9123   www.barr-thorp.com
MODEL PAXI - 1/8 DIN DUAL COUNTER/RATE METER

This is a brief overview of the PAXI. For complete specifications and programming information, see the PAX Digital Input Panel Meters Bulletin starting on page 137.

PAXI SPECIFICATIONS

MAXIMUM SIGNAL FREQUENCIES TABLE

To determine the maximum frequency for the input(s), first answer the questions with a yes (Y) or no (N). Next determine the Count Mode to be used for the counter(s). If dual counters are used with different Count Modes, then the lowest frequency applies to both counters.

<table>
<thead>
<tr>
<th>FUNCTION QUESTIONS</th>
<th>Single: Counter A or B (with/without rate) or Rate only</th>
<th>Dual: Counter A &amp; B or Rate not assigned to active single counter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any setpoints used?</td>
<td>N N N N Y Y Y Y</td>
<td>N N N N Y Y Y Y</td>
</tr>
<tr>
<td>Is Prescaler Output used?</td>
<td>N N Y Y N N Y Y</td>
<td>N N Y Y N N Y Y</td>
</tr>
<tr>
<td>Is Counter C used?</td>
<td>N Y N Y N Y N Y</td>
<td>N Y N Y N Y N Y</td>
</tr>
<tr>
<td>COUNT MODE</td>
<td>(Values are in KHz)</td>
<td>(Values are in KHz)</td>
</tr>
<tr>
<td>Count x1</td>
<td>34 25 21 17</td>
<td>13 12 13 11</td>
</tr>
<tr>
<td>Count x2</td>
<td>17 13 16 12</td>
<td>9 7 8 7</td>
</tr>
<tr>
<td>Quadrature x1</td>
<td>22 19 20 17</td>
<td>7 * 6 * 6 * 5 *</td>
</tr>
<tr>
<td>Quadrature x2</td>
<td>17 13 16 12</td>
<td>7 * 6 * 6 * 5 *</td>
</tr>
<tr>
<td>Quadrature x4</td>
<td>8 6 8 6</td>
<td>4 3 4 3</td>
</tr>
<tr>
<td>Rate Only</td>
<td>34 N/A 21 N/A 34 N/A 21 N/A</td>
<td></td>
</tr>
</tbody>
</table>

ANNUNCIATORS:

- A - Counter A
- B - Counter B
- C - Counter C
- r - Rate
- H - Maximum (High) Rate
- L - Minimum (Low) Rate
- DF - Upper significant digit display of counter
- SP1 - setpoint 1 output state
- SP2 - setpoint 2 output state
- SP3 - setpoint 3 output state
- SP4 - setpoint 4 output state

RATE DISPLAY:

- Accuracy: ±0.01%
- Minimum Frequency: 0.01 Hz
- Maximum Frequency: see Max Signal Frequencies Table.
- Maximum Display: 5 Digits: 99999
- Adjustable Display (low) Update: 0.1 to 99.9 seconds
- Over Range Display: “~ ULUL”

COUNTER DISPLAYS:

- Maximum display: 8 digits: ±99999999 (greater than 6 digits display
- Alternates between high order and low order.

INPUTS A and B:

- DIP switch selectable to accept pulses from a variety of sources
  including switch contacts, TTL outputs, magnetic pickups and all standard RLC sensors.
- LOGIC: Input trigger levels VIL = 1.5 V max.; VIH = 3.75 V min.
- Current sinking: Internal 7.8 KΩ pull-up to +12 VDC, ISNK = 100 mA max.
- Current sourcing: Internal 3.9 KΩ pull-down, 7.3 mA max. @ 28 VDC,
  VMAX = 30 VDC.
- Filter: Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec minimum.

MAGNETIC PICKUP:

- Sensitivity: 200 mV peak
- Hysteresis: 100 mV
- Input impedance: 3.9 KΩ @ 60 Hz
- Maximum input voltage: ±40 V peak, 30 Vrms

DUAL COUNT MODES:

- When any dual count mode is used, then User Inputs 1 and/or 2 will accept the second signal of each signal pair. The user inputs do not have the Logic/Mag, HI/LO Freq, and Sink/Source input setup switches. The user inputs are inherently a logic input with no low frequency filtering.
- Any mechanical contacts used for these inputs in a dual count mode must be debounced externally. The user input may only be selected for sink/source by the User Jumper placement.

PRESCALER OUTPUT:

- NPN Open Collector: ISNK = 100 mA max. @ VDL = 1 VDC max, VOH = 30 VDC max. With duty cycle of 25% min. and 50 % max.
LEGEND SERIES

MODEL LGS - Single Preset Counter/Rate Indicator
MODEL LGD - Dual Preset Counter/Rate Indicator
MODEL LGB - Four Preset Batch/Counter/Rate Indicator
MODEL LGM - Six Preset Counter/Rate Indicator

DESCRIPTION

The Legend Series consist of four different models that are multi-function count and rate indicators. There can be up to six presets and six programmable outputs depending upon the unit. The count and rate displays have separate programmable decimal point settings. The unit also has rate peak and valley displays that show the highest and lowest rate readings since they were reset (peak and valley readings are not retained when power is removed). There are five Programmable User Inputs, three external remote inputs and two front panel function keys, which allow the user to select from a variety of functions. The two line by eight character alphanumeric display with English menus, allows for easy viewing and simple programming of the units. The four scroll through indication displays can be programmed to show other parameters and if desired, automatically scroll at one of the two programmable rates. A program disable DIP switch used with an external User Input can be utilized to protect the settings and guarantee that no unwanted changes occur during operation.

The standard RS485 serial communication feature provides the capability of two-way communication between the Legend unit and other compatible equipment such as a printer, a programmable controller, or a host computer. The Baud Rate is programmable and ranges from 1200 to 9600. The unit address number can be programmed from 00-99. Up to thirty-two units can be installed on a single pair of wires, each with an individual address. The Count value(s), Preset(s), Rate, Peak, Valley, etc can all be interrogated or changed. The output(s), counters(s), rate and peak readings can be reset, by sending the proper command codes via serial communications or by activating a programmable user input. When a user input, selected for the print request function, is activated, the values specified in the Program Print Options module can be transmitted to a printer.

Optional Programming Software (SFLGP) for IBM® compatible PCs is available to program all of the Legend configuration parameters such as User Inputs, count modes, etc. The software allows unit configurations to be created, uploaded, downloaded, and saved to a file for rapid programming of the Legend.

All count values and program setting are retained when unit power is removed in nonvolatile memory.

DIMENSIONS  In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 3.0" (76.2) H x 4.0" (101.6) W.

2X8 TRANSMISSIVE LCD, NEGATIVE IMAGE, WITH LED BACKLIGHTING
FOUR USER PROGRAMMABLE INDICATION DISPLAYS
OPTIONAL PROGRAMMING SOFTWARE
ENGLISH PROGRAMMING MENUS
RATE, PEAK & VALLEY INDICATION
ABILITY TO LOCKOUT OPERATOR ACCESS TO PROGRAMMING PARAMETERS
ACCEPTS COUNT RATES UP TO 23 KHz (for Model LGS)
BI-DIRECTIONAL COUNTING UP/DOWN CONTROL
QUADRATURE SENSING (Up to 4 times resolution)
COUNT INHIBIT PIN AVAILABLE FOR ALL COUNT MODES
SEPARATE INPUT SCALING FOR RATE & COUNT
PROGRAMMABLE CONTROL INPUTS
INPUTS ARE SWITCH SELECTABLE FOR MAGNETIC PICKUPS
RELAY OUTPUT(S) (Field Replaceable)
OUTPUT(S) ASSIGNABLE TO COUNT OR RATE
SOLID STATE CURRENT SINKING OUTPUT(S)
NONVOLATILE MEMORY
NEMA 4X/IP65 SEALED FRONT PANEL BEZEL

UL Recognized Component, File # E137808
### DESCRIPTION (Cont’d)

A Legend unit will indicate an overflow condition when the capacity of a Count display (Process, Batch, or Total) is exceeded, by flashing the word “OVERFLOW” in the appropriate display.

All count values and program setting are retained when unit power is removed in nonvolatile memory.

The choice of several reset cycle modes along with the compatibility of count and control inputs to other RLC products, provides added versatility for standalone and system counter needs.

The rate input uses the time interval method (1/τ) to calculate the rate value. This method ensures high resolution at all input rates. The unit counts input pulses and after the programmable minimum update time elapses and the next count edge occurs, the unit will take the number of edges that occurred during the elapsed time to calculate the rate value. The minimum update time can be as low as 0.1 second per update, enabling quick response to rate changes. At slower rates, averaging can be accomplished by programming the Minimum and Maximum Update Time for the desired response. Extensive scaling capabilities allow practically any reading at very slow input rates.

The construction of the Legend series is a light weight high impact plastic case with a clear viewing window. The sealed front panel with the silicone rubber keypad meets NEMA 4x/IP65 specifications for wash-down and/or dusty environments, when properly installed. Plug-in style terminal blocks simplify installation and wiring change-outs.

### 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.

### MODELS - LGS & LGD

The single preset unit has one NPN open collector output and the dual preset unit has two outputs which are activated from presets 1 and 2 respectively. Each output can be assigned to either Rate or Count display. An optional relay board can be installed that operates in parallel with the solid state output(s).

### MODEL - LGB

The process counter is used to monitor the progress of the count within the batch. Presets 1 and 2 are assigned to the Process Counter and activate relay outputs 1 and 2 respectively.

Presets 3 and 4 can be assigned to either the Batch Counter, Totalizer, or Rate indicator. Presets 3 and 4 activate the NPN open collector outputs O3-SNK and O4-SNK respectively.

### MODEL - LGM

The Multi Preset unit has six Presets (1-6) which control NPN open collector outputs 01-SNK to 06-SNK respectively. Preset one through four are assigned to the count display. Presets 5 and 6 can be assigned to either the Rate or Count display.

### AVAILABLE INDICATION DISPLAYS AND PRESETS FOR EACH MODEL

<table>
<thead>
<tr>
<th>LGS RATE</th>
<th>LGS PEAK</th>
<th>LGS VALLEY</th>
<th>LGS COUNT</th>
<th>LGM RATE</th>
<th>LGM PEAK</th>
<th>LGM VALLEY</th>
<th>LGM COUNT</th>
<th>LGM TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1 Preset)</td>
<td>(1 Preset)</td>
<td>(1 Preset)</td>
<td>(2 Presets)</td>
<td>(2 Presets)</td>
<td>(2 Presets)</td>
<td>(2 Presets)</td>
<td>(2 Presets)</td>
<td>(2 Presets)</td>
</tr>
</tbody>
</table>

### SPECIFICATIONS

1. **DISPLAY:** 2x8, 0.3” (7 mm) high characters, negative image transmissive LCD, with yellow/green or red LED backlighting.

2. **POWER:**
   - **AC Operation:** 115/230 VAC ±10%, 50/60 Hz, 10 VA, switch selectable.
   - **DC Operation:** +12 VDC ±20% @ 250 mA.

3. **MEMORY:** Non-volatile memory retains all programming information. Count and Preset values are written to non-volatile memory when power is interrupted. All other programming parameters are written to memory when programming mode is exited. If power is removed while in the programming menus, the parameters are restored to previously saved settings.

4. **Data Retention:** 10 years minimum

5. **Sensors:**
   - **AC Operation:** +12 VDC ±25% @ 100 mA.
   - **DC Operation:** +12 VDC ±20% @ 250 mA.

6. **INPUTS A and B:**
   - **DIP Switch select:** to Switch count pulses from a variety of sources including switch contacts, outputs from CMOS or TTL circuits, and all standard RLC sensors.
   - **Logic:** Input trigger levels VIL = 1.5 VMIN; VIL = 3.75 VMIN
   - **Current sinking:** Internal 7.8 KΩ pulled up internally to +12 VDC, IMAX = 1.6 mA.

7. **Outputs:**
   - **Current sourcing:** Internal 3.9 KΩ pull-down, 7.3 mA @ 28 VDCMAX
   - **Debounce:** Damping capacitor provided for switch contact bounce. Limits count speed to 50 Hz and input pulse widths to 10 msec min.

### MAGNETIC PICKUP

- **Sensitivity:** 200 mV peak.
- **Hysteresis:** 100 mV.
- **Input Impedance:** 3.9 KΩ @ 60 Hz.
- **Maximum input voltage:** ±50 Vp

**Note:** For magnetic pickup input, the sink/source DIP switch must be in the SRC position.

6. **RATe ACCURACY:** ±0.01%

7. **RATe MINIMUM INPUT FREQUENCY:** 0.01 Hz.

8. **MAXIMUM COUNT RATE IN KHz:**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>CNT + DIR</th>
<th>QUAD</th>
<th>ADD/ADD</th>
<th>ADD/SUB</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGS (Single Preset)</td>
<td>23</td>
<td>11</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>LGB (Dual Preset)</td>
<td>20</td>
<td>10</td>
<td>8.5</td>
<td>7</td>
</tr>
<tr>
<td>LGB (Batch)</td>
<td>17</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>LGM (Six Preset)</td>
<td>15</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

**Notes:**
1. Maximum count rates given are for Process counter set for Auto reset with the auto cycle preset set to an equivalent of 100 count pulses or greater.
2. Maximum count rate given for X2 & X4 count modes are given for 50% duty cycle signals and Quadrant settings with 90° phase shift.

9. **CONTROL INPUTS:**

- **Programmable user inputs (3):** Internal 10 KΩ pull-up to +5 VDC.
  - **VIL:** 1.0 VMIN; **VIH:** 4.0 VMAX; response time = 10 msec.
  - **Inhibit:** Internal 10 KΩ pull-up to +5 VDC.
  - **Maximum Addresses:** Programmable from 00 to 99.

10. **SERIAL COMMUNICATIONS:**

- **Type:** RS-485 Multi-point Balanced Interface (2 Wire).
- **Band Rate:** Programmable from 1200 to 9600.
- **Maximum Addresses:** Programmable from 00 to 99.

**Specifications:**
- **Transmit Delay:** Programmable for 0.002 to 0.100 second.
- **Data Format:** 10 Bit Frame; 1 start bit, 7 data bits, 1 parity bit, and 1 stop bit. Parity is programmable for either ODD, EVEN, or No Parity.

11. **OUTPUT(S):**

- **Solid-State:** Current sinking NPN open collector transistor.
  - **VCE:** 1.5 VSAT @ 100 mA max.
  - **VIL:** 30 VDC max.
  - **Internal Zener Diode Protection.**

12. **OUTPUT(S):**

- **Relay(s):** Mounted on field-replaceable P.C. board. Form C contacts rated at 5 amps @ 120 VAC/240 VAC or 28 VDC (inductive load), 1/8 H.P. @ 120 VAC (inductive load), 1/8 H.P. @ 28 VDC (capacitive load).

13. **Programmable Timer Output(s):** Programmable time ranges from 0.01 to 99.99 seconds, ±0.05% - 11 mSec max.

14. **CERTIFICATIONS AND COMPLIANCE:**

- **SAFETY:**
  - **UL Recognized Component:** File #E137808, UL508, CSA 22.2 No. 14
  - **Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.**
  - **IEC61 CB Scheme Test Certificate # UL1581-176245/USA, CB Scheme Test Report # 97ME50052-081391
  - **Issued by Underwriters Laboratories, Inc.**
  - **IEC 61010-1, 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:** 2 kV contact
  - **Level 3:** 8 kV air

- **Fast transients (burst)**
  - **EN 61000-4-4**
  - **Level 4:** 2 kV min
  - **Level 3:** 2 kV min

- **Power frequency magnetic fields**
  - **EN 61000-4-8**
  - **Level 4:** 30 A/m

**Emissions to EN 55011-2**

- **RF interference**
  - **EN 55011**
  - **Enclosure class A
  - **Power mains class A**
SPECIFICATIONS (Cont’d)

Note:

1. When the unit is DC powered from terminal TBA pin 5 (common) and terminal TBA pin 3 (DC OUT/IN) 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 section of the manual for additional information.

13. 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.
   Vibration According to IEC 68-2-6: 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g’s.
   Shock According to IEC 68-2-27: Operational 20 g’s (10g relay), 11 msec in 3 directions.
   Altitude: Up to 2000 meters

14. CONSTRUCTION: High impact plastic case with clear viewing window.
   The front panel meets NEMA 4X/IP65 requirements for indoor use when installed properly. Installation Category II, Pollution Degree 2. Panel gasket and mounting clips included.

15. WEIGHT: 1.5 lbs. (0.68 Kg)

PROGRAMMING

The Legend Series provides an easy to use, menu driven programming interface. The English prompts, the front panel keypad, and the flashing display aids the operator during programming. In the normal run mode, the main display loop allows the user to scroll through the four programmable indication displays, using the direction keys. From the main loop, presets and scale factors can be accessed directly for changing parameters. All other parameters are accessed through the programming loop. In the programming loop, parameters can be viewed or changed and the operator can exit anywhere in the loop. Shown to the side is part of the main display loop and part of the programming loop of a Dual Preset Legend (LGD) unit. Also shown are four different views of the indication displays.

PROGRAMMABLE FUNCTIONS

PRESET(S)
   Ranges from -99999 to 999999
   Counter Load ranges from -99999 to 999999

SCALE FACTORS (RATE & COUNT)
   Range from 0.0001 to 5.9999

COUNT SCALE MULTIPLIER
   Multiplies the contents of the 9-digit internal counter or the 11-digit internal totalizer by a factor of 1, 0.1, 0.01 or 0.001 to view the desired number of significant digits on the 6-digit Counter display or the 8-digit Totalizer display.

DECIMAL POINT
   Separate decimal point location for Count and Rate displays.
   0
   0.0
   0.00
   0.000
   0.0000
   0.00000

RATE SCALE MULTIPLIERS
   Multiplies the contents of the actual internal rate, pulses per second (PPS), by a factor of 0.01, 0.1, 1, 10, 100, or 1000 to view the desired number of significant digits on the 6-digit Rate display. The desired time units that the rate is to be displayed, can also be programmed as per Second (x1), per Minute (x60), or per Hour (x3600).

UPDATE TIME
   The Rate Minimum/Maximum Update Times range from 0.1 to 99.9 seconds which provides averaging capability for non-consistent pulse spacing.

COUNTING MODES
   Count with Direction
   Count with Direction (X2)
   Quadrature
   Quadrature (X2)
   Quadrature (X4)
   2-Input Anti-coincidence Add/Add
   2-Input Anti-coincidence Add/Subtract
   A separate Inhibit input, is available for all count modes.

RESET MODES
   Manual Reset
   Automatic Reset at Preset
   Reset at Beginning Of Output 1
   Reset at End Of Timed Output 1
   Reset at Beginning Of Output 2
   Reset at End Of Timed Output 2
   Reset at Beginning Of Output 1 or Output 2
   Reset at End Of Timed Output 1 or Output 2
   MODEL LGB ONLY
   Reset at Beginning Of Output 3
   Reset at End Of Timed Output 3
   Reset at Beginning Of Output 4
   Reset at End Of Timed Output 4
   Reset at Beginning Of Output 3 or Output 4
   Reset at End Of Timed Output 3 or Output 4
**PROGRAMMABLE FUNCTIONS (Cont’d)**

**RESET ACTION**
- **Reset to Zero**: Output activates when the count equals the preset value. Count display value returns to zero when reset.
- **Reset to Preset**: Output activates when the count equals zero. Count display value returns to preset value when reset.
- **Reset to Counter Load**: Output activates when count equals the preset value. Count display value returns to counter load value when reset.

**USER INPUTS**
- There are three external user inputs and two front panel Function keys that are programmable. When activated each User Input can be programmed to perform one of the following functions:
  - **Maintained Reset or Momentary Reset**:
    - Can reset Rate, Peak, Valley, Process*, Batch*, Total*, or Count* display values and/or any output associated with that display.
    - *Models with the available display.
  - **Reset Output(s)**:
    - Places the output(s) in their inactive state. (Momentary action)
  - **Set Output(s)**:
    - Places the output(s) in their active state. (Momentary action)
  - **View Display 1-4**:
    - Will cause the selected indication display (1, 2, 3, or 4) to be displayed and held from anywhere in the main display loop.
  - **Change Display**:
    - Will cause the indication display to toggle to the next indication display.
  - **Counter Load**:
    - Loads the counter load value into the count display.
  - **Print Request**:
    - Transmits the values specified in the Program Print Options module over the serial port.
  - **Skip Preset 1, Skip Preset 3 (LGB Only)**:
    - Keeps the output from activating and automatic reset from occurring, if programmed, when the count value equals the preset value.
  - **Program Disable**:
    - Operates in conjunction with the program disable DIP switch, to provide a variety of program disable modes.

**OUTPUT(S)**
- **Output Assignment**:
  - The LGS can have its Output assigned to the Count or the Rate.
  - The LGD can have Outputs 1 & 2 assigned to the Count or the Rate.
  - The LGB has Outputs 1 & 2 assigned to the Process. Outputs 3 and 4 can be assigned to the Batch, Total, or Rate.
  - The LGM can have Outputs 5 and 6 assigned to either Count or Rate and Outputs 1-4 are assigned to the Counter.
- **Output Reset Mode**:
  - **Outputs 1 & 2 Only**:
    - End Output 1 @ Output 2 Start
    - End Output 1 @ Timed Output 2 End
    - End Output 2 @ Output 1 Start
    - End Output 2 @ Timed Output 1 End
  - **Output(s) Power Up or Power Down State**:
    - The Output’s state can be set to be Off (Inactive) @ power up.
    - OR
    - The Output’s state can be saved @ power down and restored at power-up.
    - *Note: Power down state for Latched Mode Only.

**INDICATION DISPLAYS**
- There are four configurable indication displays are programmed individually. Each line of each indication display can be programmed to show one of the following Mnemonics: COUNT*, PROCESS*, BATCH*, TOTAL*, PEAK, VALLEY, OR RATE, and a Numeric value, Output status, Preset value, or the Counter Load value. A single or dual character Mnemonic is displayed to the left of the appropriate Numeric value if the other line is not programmed to display the full mnemonic. Also the indication displays can be set to scroll automatically at a 2.5 or 5 second rate, if desired.
  - *Models with the available display.

**COMMUNICATION PORT**
- **Baud Rate** - 1200 to 9600
- **Parity** - Odd, Even, or No parity
- **Unit Address** - 00 to 99
- **Transmit Delay** - 0.002 or 0.100 seconds

**PRINT OPTIONS**
- The programmable print options specify which values will be transmitted when a print request is issued. The available options are; Rate, Peak, Valley, Count*, Totalizer*, Process*, Batch*, Scale Factors, Preset(s), and Counter Load values.
  - *Models with the available display.
- The unit can be programmed to transmit or NOT transmit mnemonics (unit address & value identifiers).

**OPERATOR ACCESS TO FRONT PANEL**
- There are several program disable modes that can be used to limit the operator from programming the parameter values via the front panel keypad. The Program Disable DIP switch can be used alone or in conjunction with a User Input, programmed for the program disable function, to provide the desired level of security.

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**LGB APPLICATION**

An order requires that sheets of material be cut in two different lengths. The operator would like to change the settings for the second length to be cut with no down time. A Legend series LGB *(Four Preset Batch Counter/Rate Indicator)* is used to satisfy the requirement.

A Lenght Sensor (LSQ) with a 100 pulse per revolution (PPR) quadrature output is coupled with an LSAHC hinge clamp assembly and a one foot circumference wheel. The LEGEND series LGB is set to the Quadrature X1 mode. With a one foot wheel, the information becomes 100 pulses/foot and allows the material to be cut to the nearest 1/100 of a foot. The counter display is programmed for two decimal places to provide a readout in 1/100 of a foot increments.

Preset value $P_1$ *(Process count)* is programmed for the first length to be cut for the order and Preset value $P_2$ *(Process count)* for the second length.

The outputs are used to control power to the cutting knife and the counter is programmed to reset when Preset 1 or Preset 2 is reached.

Preset value $P_3$ *(Batch count)* is programmed to activate User Input 1 *(skip P1)* when the total number of pieces is reached for the first order. Preset value $P_4$ *(Batch count)* is programmed to stop the process after the second order is complete. The totalizer will keep track of the total amount of feet used.
**LGM APPLICATION**

A process performs five different procedures to a piece of raw stock at five different locations. The Legend series LGM with six presets and six solid state outputs is used for this application.

The raw stock comes in ten foot sections and requires five various operations to be performed at 9.00", 23.00", 72.00", 83.00", & 111.00". A rotary pulse generator (RPGB) with a 600 pulse per revolution (PPR) quadrature output is coupled to a 1 foot circumference wheel. A quadrature sensor is specified because the stock must be reversed after stations #1 and #4. This allows the Legend to keep track of true position.

The Legend is set to the quadrature X2 mode which increases the pulses to 1200 PPR. This gives a measurement resolution of 1/100 of an inch. The five Presets are programmed with the proper values and the solid state outputs control pilot relays that control the actuators. As the material passes each station, a signal is sent to the proper equipment and the process is performed. Also, the outputs are programmed so that if a power outage occurs they will save the state that they were in at power down.

The sixth output is assigned to rate so that if the rate drops below a predetermined value the output will activate a warning indicator.

---

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>OPTION w/RELAY BOARD</th>
<th>PART NUMBERS 115/230 VAC &amp; +12 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGS</td>
<td>Single Preset Legend w/Yel-Grn Backlighting</td>
<td>No</td>
<td>LGS00001</td>
</tr>
<tr>
<td></td>
<td>Single Preset Legend w/Yel-Grn Backlighting</td>
<td>Yes</td>
<td>LGS00000</td>
</tr>
<tr>
<td></td>
<td>Single Preset Legend w/Red Backlighting</td>
<td>No</td>
<td>LGS00101</td>
</tr>
<tr>
<td></td>
<td>Single Preset Legend w/Red Backlighting</td>
<td>Yes</td>
<td>LGS00010</td>
</tr>
<tr>
<td>LGD</td>
<td>Dual Preset Legend w/Yel-Grn Backlighting</td>
<td>No</td>
<td>LGD00001</td>
</tr>
<tr>
<td></td>
<td>Dual Preset Legend w/Yel-Grn Backlighting</td>
<td>Yes</td>
<td>LGD00000</td>
</tr>
<tr>
<td></td>
<td>Dual Preset Legend w/Red Backlighting</td>
<td>No</td>
<td>LGD00101</td>
</tr>
<tr>
<td></td>
<td>Dual Preset Legend w/Red Backlighting</td>
<td>Yes</td>
<td>LGD00010</td>
</tr>
<tr>
<td>LGB</td>
<td>Four Preset Batch Legend w/Yel-Grn Backlighting</td>
<td>Yes</td>
<td>LGB00000</td>
</tr>
<tr>
<td></td>
<td>Four Preset Batch Legend w/Red Backlighting</td>
<td>Yes</td>
<td>LGB00100</td>
</tr>
<tr>
<td>LGM</td>
<td>Multi Preset (6) Legend w/Yel-Grn Backlighting</td>
<td>N/A</td>
<td>LGM00001</td>
</tr>
<tr>
<td></td>
<td>Multi Preset (6) Legend w/Red Backlighting</td>
<td>N/A</td>
<td>LGM00101</td>
</tr>
<tr>
<td>Legend Programming Software, 3.5&quot;, 1.44 M disk</td>
<td>N/A</td>
<td>SFLGP</td>
<td></td>
</tr>
<tr>
<td>Single Relay Board</td>
<td>N/A</td>
<td>RLYLG001</td>
<td></td>
</tr>
<tr>
<td>Dual Relay Board</td>
<td>N/A</td>
<td>RLYLG002</td>
<td></td>
</tr>
</tbody>
</table>
DESCRIPTION

The Legend Plus Series consists of two models that are multi-input count and rate indicators. The LGPB features process, batch, and total counting, as well as a time interval rate indicator. The four available presets can be assigned to the process counter or the rate indicator. Outputs three and four can also be assigned to the batch or total indicator. The Legend Plus foot-inch counter provides Process and Total count read-outs in feet and inches. A decimal point is used to separate the foot and inch units. All Process and Total presets are also displayed in feet and inches. The LGPM features six presets, which can be assigned to either the rate or count display.

The Legend Plus has advanced features which allow the units to be more closely coupled to the application. The units feature a 2 line by 8 character alpha-numeric display, allowing the value mnemonics and programming menus to be easily read. The units are available in single or dual color display models. The four scroll-through indication displays can be programmed to show various parameters and automatically scroll, if desired. On dual color models, each indication display can be programmed for either color. The mnemonics corresponding to the main display values (RATE, PROCESS, BATCH, TOTAL) can be individually programmed and modified as desired. For example, the RATE mnemonic can be reprogrammed to display the word SPEED, so that when the rate mnemonic is to be displayed, the mnemonic SPEED is displayed instead.

Two custom display lines are available which enable the user to specify the number of digits of a value to be displayed on the line, along with any alpha-numeric prefix or suffix. This capability allows displays such as: ‘1000 RPM’, ‘99999 Ft’, ‘PRC 9999’, etc.

The Legend Plus also features messaging capabilities that can inform the user of output actions or other events that occur in a system. Up to ten messages can be programmed. Messages can be requested by an output status change, user input(s), or through serial communications. The messages can be programmed to blink, scroll, time out, and to alternately flash between message and indication display.

On dual color models, the message can be programmed to be displayed in either color. This capability is very useful in drawing the operator’s attention to particular messages.

LEGEND PLUS SERIES

MODEL LGPB - Four Preset Batch/Counter/Rate Indicator
MODEL LGPM - Six Preset Counter/Rate Indicator
MODEL LGPBF - Four Preset Foot-Inch Length Counter

- 2X8 TRANSMISSIVE LCD, NEGATIVE IMAGE, WITH L.E.D. BACKLIGHTING
- PROGRAMMABLE DISPLAY INTENSITY
- OPTIONAL DUAL COLOR DISPLAY (Red and Green)
- FOUR USER PROGRAMMABLE INDICATION DISPLAYS WITH CUSTOMIZABLE MNEMONICS AND DISPLAY LINES
- PROGRAMMABLE MESSAGE CAPABILITIES
- ENGLISH PROGRAMMING MENUS
- RS485 OR RS232 SERIAL COMMUNICATIONS
- OPTIONAL PROGRAMMING SOFTWARE FOR PROGRAMMING MULTIPLE UNITS
- ABILITY TO LOCKOUT OPERATOR ACCESS TO PROGRAMMING PARAMETERS
- PROGRAMMABLE CONTROL INPUTS
- COUNT INPUTS ARE SWITCH SELECTABLE FOR VARIOUS SENSOR OUTPUTS
- BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL
- QUADRATURE SENSING (Up to 4 times resolution)
- COUNT INHIBIT TERMINAL AVAILABLE FOR ALL COUNT MODES
- ACCEPTS COUNT RATES UP TO 15 KHz
- ALL OUTPUT(S) ASSIGNABLE TO COUNT OR RATE
- ON & OFF DELAY FOR RATE OUTPUTS
- SOLID STATE CURRENT SINKING OUTPUT(S)
- RELAY OUTPUTS (LGPB only; Field Replaceable)
- SEPARATE INPUT SCALING FOR RATE, COUNT, & TOTAL
- 115/230 VAC SWITCH SELECTABLE
- NEMA 4X/IP65 SEALED FRONT PANEL BEZEL

UL Recognized Component, File # E137808

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 3.0” (76.2)H x 4.0” (101.6)W.
DESCRIPTION (Cont’d)

The program disable DIP switch, the code value, and an external user input selected for Program Disable can be utilized to provide multi-level protection against unwanted changes to data values and unit configuration.

The Legend Plus features enhanced serial communications. The serial port can be configured for connection to RS485 or RS232 devices. It can be used for data retrieval and for programming various data values.

Optional Legend Plus Programming Software for IBM® compatible PCs is available to program all the Legend configuration parameters, such as messages, count modes, etc. The software allows unit configurations to be created, uploaded, downloaded and saved to a file for rapid programming of the Legend unit.

The six programmable User Inputs can be configured to provide a variety of functions. Four user inputs are located on the upper rear terminal block and the other two inputs are front panel function keys. The User Inputs can be configured to provide functions such as:

- Count Inhibit
- Message Request
- Output Activation
- Program Disable
- Print Request
- User Inputs

The units offer a choice of seven programmable counting modes for use in applications requiring Bi-directional, Anti-coincidence, and Quadrature counting. The count inhibit function can be utilized with all of these input response modes by programming User Input 4 for the Inhibit Count function. The input circuitry is switch selectable to accept signals from a variety of sources. In the Anti-coincidence mode both inputs are monitored simultaneously, so that no counts are missed, and the final count can be chosen as the sum or difference of the two inputs.

Rate, Process and Total displays have separate scaling and decimal point placement, for readouts in different units. The Counter Load feature enables the operator to modify the count value. This is useful when flawed material has been counted and it is necessary to adjust the count value accordingly.

The rate operates in the time interval method (1/t) to calculate the rate value. This method insures high resolution at all input rates. Averaging can be accomplished by programming the Minimum and Maximum Update Time for the desired response. Extensive scaling capabilities allow practically any reading at very slow input rates.

The construction of the Legend Plus unit is a lightweight, high impact plastic case with a clear viewing window. The sealed front panel with silicone rubber keypad meets NEMA 4X/IP65 specifications for wash-down and/or dusty environments, when properly installed. Plug-in style terminal blocks simplify installation and wiring change-outs.

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.

MODEL - LGPB

The process counter is used to monitor the count within the batch. Presets 1 through 4 can be assigned to the process counter or the rate indicator. Presets 3 and 4 can also be assigned to either the batch counter or totalizer.

Presets 1 and 2 can activate relay outputs 1 and 2 respectively. Presets 3 and 4 can activate the NPN open collector outputs O3-SNK and O4-SNK respectively.

MODEL - LGPM

The Multi Preset unit has 6 presets which can control NPN open collector outputs 01-SNK to 06-SNK respectively. Presets 1 through 6 can be assigned to either the rate or count display.

<table>
<thead>
<tr>
<th>STANDARD INDICATION DISPLAYS &amp; PRESETS FOR EACH MODEL</th>
<th>LGPB &amp; LGPBF</th>
<th>LGPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATE PEAK</td>
<td>RATE PEAK</td>
<td></td>
</tr>
<tr>
<td>VALLEY PROCESS</td>
<td>VALLEY</td>
<td></td>
</tr>
<tr>
<td>BATCH TOTAL</td>
<td>COUNT</td>
<td></td>
</tr>
<tr>
<td>(4 Presets)</td>
<td>(6 Presets)</td>
<td></td>
</tr>
</tbody>
</table>

SPECIFICATIONS

1. DISPLAY: 2x8, 0.3” (7 mm) high characters, negative image transmissive LCD, with Single (green or red) or Dual Color (green and red) LED backlighting.

2. POWER: AC Operation: 115/230 VAC ±10%, 50/60 Hz, 10 VA, switch selectable. DC Operation: ±12 VDC ±20% @ 250 mA max.

3. MEMORY: Non-volatile memory retains all programming information. Count and Preset values are written to non-volatile memory when power is interrupted. All other programming parameters are written to memory when programming mode is exited. If power is removed while in the programming menu’s the parameters are stored to previously saved settings.

Data Retention: 10 yr. min.

Message/Mnemonics Memory:

792 (LGPB) / 804 (LGPM) bytes available (with factory settings loaded).

4. SENSOR POWER: ±12 VDC ±25% @ 100 mA.

5. INPUTS A and B: DIP Switch selectable to accept count pulses from a variety of sources including switch contacts, outputs from CMOS or TTL circuits, magnetic pickups and all standard RLC sensors.

LOGIC: Input trigger levels

- \( V_{IL} = 1.5\ V_{MAX} \)
- \( V_{IH} = 3.75\ V_{MIN} \)

Current sinking: Internal 7.8 KΩ pull-down, 7.3 mA @ 28 VDC. Current sourcing: Internal 3.9 KΩ pull-down, 7.3 mA @ 28 VDC. Debounce: Damping capacitor provided for switch contact bounce. Limits count speed to 50 Hz and input pulse widths to 10 msec.

MAGNETIC PICKUP:

- Sensitivity: 200 mV peak.
- Hysteresis: 100 mV.
- Input impedance: 3.9 KΩ @ 60 Hz.
- Minimum input voltage: ±50 Vp

Note: For magnetic pickup input, the sink/source DIP switch must be in the SRC position.

6. RATE ACCURACY: ±0.01%.

7. RATE MINIMUM INPUT FREQUENCY: 0.01Hz.

8. MAXIMUM COUNT RATE IN KHz:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>CNT + DIR</th>
<th>QUAD</th>
<th>ADD/ADD</th>
<th>ADD/SUB</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGPB (Batch)</td>
<td>15</td>
<td>7</td>
<td>7</td>
<td>5.5</td>
</tr>
<tr>
<td>LGPM (Six Preset)</td>
<td>13</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>LGPB (Foot-Inch)</td>
<td>15</td>
<td>7</td>
<td>7</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Notes:

1. Maximum count rates given are for Process counter set for Auto reset with the auto cycle preset set to an equivalent of 100 count pulses or greater. With auto cycle presets less than 100 counts the maximum count rates may be lower. The actual Preset value for 100 count pulses, with Count SF=0.5000 and Count Scale Multiplier=1, would be 50.

2. Maximum count rate given for X2 & X4 count modes are given for 50% duty cycle signals and Quad signals with 90° phase shift.


9. MAXIMUM COUNTER CAPACITY:

Process or Count: 9 digits internal (non-scaled), 6 digits displayable (scaled)

Batch Count: 6 digits

Total Count: 11 digits internal (non-scaled), 8 digits displayable (scaled)

10. CONTROL INPUTS:

Programmable user inputs (4):

- USR INP 1 to 3: Internal 10 KΩ pull-up to +5 VDC, \( V_{IL} = 1.5\ V_{MAX} \); \( V_{IH} = 3.5\ V_{MIN} \).
- Response time = 30 msec typical, 100 msec max. (count rate dependent).
- USR INP 4: Internal 10 KΩ pull-up to +5 VDC, \( V_{IL} = 1.5\ V_{MAX} \); \( V_{IH} = 3.0\ V_{MIN} \).
- Response time = 30 msec typical, 100 msec max. (count rate dependent).
- INHIBIT Response time = 50usec max.
- User Inputs Programmed for Binary Message Request: Debounce = 100msec. (Binary message request inputs must be stable for 100 msec before a message is requested).

11. SERIAL COMMUNICATIONS:

- Type: Jumper selectable RS485 or RS232.
- Can connect up to 32 units when using RS485 interface.
- Baud Rate: Programmable from 1200 to 9600.
- Maximum Addresses: Programmable from 00 to 99. (Actual number on a line is limited by hardware specifications)
- Transmit Delay: Programmable for 0.002 or 0.100 second.
- Data Format: 1 start bit, 7 or 8 data bits, 1 or no parity bit, and 1 stop bit. Parity is programmable for ODD (7 data bits), EVEN (7 data bits), or NO Parity (8 data bits).
- OUTPUTS:

  | Solid-State Current sinking NPN open collector transistor. \( V_{CE} = 1.1\ V_{SAT} \) @ 100 mA max. \( V_{OH} = 30\ V_{DAC} \) max. (Internal Zener Diode Protection).
12. OUTPUT(S): (Cont’d)
   Relay(s): Mounted on field-replaceable P.C. board. Form C contacts rated at 5 amps @ 120 VAC/240 VAC or 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.
   Programmable Timed Output(s): Programmable time ranges from 0.01 to 99.99 seconds, ±0.05% - 11 msec max.
   Output Time Required To Request Message: 50 msec.

13. 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.
   Vibration According to IEC 68-2-6: 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g’s.
   Shock According to IEC 68-2-27: Operational 20 g’s (10g relay), 11 msec in 3 directions.
   Altitude: Up to 2000 meters

14. CERTIFICATIONS AND COMPLIANCES:
   UL Recognized Component, File # E137808, UL508, CSA22.2 No. 14
   Recognized to U.S and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc. Type 4X Indoor Enclosure rating (Face only), UL50
   IECEE CB Scheme Test Certificate #UL1581-176645/USA,
   CB Scheme Test Report #97ME50052-081391
   Issued by Underwriters Laboratories, Inc.

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   OUTPUT(S):
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PROGRAMMING

The Legend Plus Series provides an easy to use, menu driven programming interface. The English prompts, the front panel keypad, and the flashing display aid the operator during programming. In the normal operating mode, the main display loop allows the user to scroll through the four programmable indication displays using the direction keys. From the main loop, presets and scale factors can be accessed directly. All other parameters are accessed through the programming loop, which can be set to require an access code number to enter the loop. In the programming loop, parameters can be viewed or changed and the operator can exit anywhere in the loop. The drawing above shows the main display loop and part of the programming loop of a Legend Plus unit. Also shown above right are four different views of the indication displays.

IEC 61010- 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
   Level 3; 8 Kv air
   Electromagnetic RF fields EN 61000-4-3 Level 3; 10 V/m
   Level 3; 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/m
   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 A
   Power mains class A
   Note: 1. When the unit is DC powered from terminal TBA pin 5 (common) and terminal TBA pin 3 (DC OUT/ IN) 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 section of the manual for additional information.

15. 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 II, Pollution Degree 2. (Panel gasket, mounting clips, nut fasteners and screws included with unit.)

16. WEIGHT: 1.5 lbs. (0.68 Kg)
**PROGRAMMABLE FUNCTIONS (Cont’d)**

**UPDATE TIME**

The Rate Minimum and Maximum Update Times range from 0.1 to 99.9 seconds. This provides averaging capability for non-consistent pulse spacing.

*Note: The maximum update time must be larger than the minimum update time.*

**COUNTING MODES**

- Count with Direction
- Count with Direction (X2)
- Quadrature
- Quadrature (X2)
- Quadrature (X4)
- 2-Input Anti-coincidence Add/Subtract
- 2-Input Anti-coincidence Add/Add

A separate Inhibit input is available for all count modes.

**RESET MODES**

- Manual Reset
- Automatic Reset at Preset
- Reset at Beginning Of Output 1
- Reset at End Of Timed Output 1
- Reset at Beginning Of Output 2
- Reset at End Of Timed Output 2
- Reset at Beginning Of Output 1 or Output 2
- Reset at End Of Timed Output 1 or Output 2

**RESET ACTION**

- Reset to Zero: Count display value returns to zero when reset. Output activates, if programmed, when the counter equals the preset value.
- Reset to Preset: Count display value returns to preset value when reset. Output assigned to the specified preset activates, if programmed, when the counter equals zero.
- Reset to Counter Load: Count display value returns to counter load value when reset. Output activates, if programmed, when counter equals the preset value.

**USER INPUTS**

There are four external user inputs and two front panel Function keys that are programmable. When activated, each user input can be programmed to perform one of the following functions:

- Reset Output or Momentary Reset:
  - Can reset Rate, Peak, Valley, Process*, Batch*, Total*, or Count* display values and/or any output associated with that display.
  - * On Models with these available display options.

- Reset Output(s):
  - Places the output(s) in their inactive state. (Momentary action)

- Set Output(s):
  - Places the output(s) in their active state. (Momentary action)

**View Display 1-4:**

- Causes the selected indication display (1, 2, 3, or 4) to be displayed and held from anywhere in the main display loop. The current display value is frozen (not updated) while the display is held.

**Change Display:**

- Causes the indication display to toggle to the next indication display.

**Request Message:**

- Requests a specific programmed message to activate.

**Clear Message:**

- Causes the displayed message to be canceled. (Maintained action)

**Skip Preset:**

- Keeps the output from activating and automatic reset from occurring, if programmed, when the count value equals the preset value.

**Counter Load:**

- Places the counter load value into the count display and operates from that value. (Maintained action)

**Print Request:**

- Transmits the values specified in the Program Print Options module over the serial port. (Maintained action)

**Program Disable:**

- Can be used alone, or in conjunction with the program disable DIP switch, to provide a variety of program security modes. (External User Input only)

**Inhibit Count:**

- Prevents pulses from being counted on Inputs A and B. (User Input 4 only).
- The rate input is not affected by the inhibit setting and continues to display the rate of the signal at Input A.

**OUTPUT(S)**

**Output Assignment:**

- The LGPB can have outputs 1 through 4 assigned to the process or the rate.
- Outputs 3 and 4 can also be assigned to the batch or total.
- The LGPM can have outputs 1 through 6 assigned to either count or rate.

**Phase:**

- Each output can have its active logic state set for positive phase (normally off) or negative phase (normally on).

**Output Activation Mode:**

- Latched
- Boundary
- Timed - 0.01 to 99.99 seconds

**Hi/Lo Acting:**

- This mode is used in conjunction with all Rate modes and the Boundary count modes. A Lo acting output would perform the Output action when the count/rate is lower than the preset. A Hi acting output would perform the Output action when the count/rate is higher than or equal to the preset.

**Rate Output On/Off Delay:**

- Used to prevent output chatter. Output condition must be satisfied for a period of time longer than delay period for output state to change.

**On Delay:**

- Prevents activation of output(s) for the amount of time programmed.

**Off Delay:**

- Prevents deactivation of output(s) for the amount of time programmed.

**On & Off Delay:**

- This mode prevents output state change for specified delay period when turning on or off.

**Output Reset Mode:**

- Outputs 1 & 2 Only:
  - End Output 1 @ Output 2 Start
  - End Output 1 @ Timed Output 2 End
  - End Output 2 @ Output 1 Start
  - End Output 2 @ Timed Output 1 End

- Outputs Power Up or Power Down State:

**The Output’s state can be set to be Off (Inactive) @ power up.**

**OR**

**The Output’s state can be saved @ power down and restored at power-up.**

**OR**

**The Output’s state can be set to be On (Active) @ power up.**

**Note: Power down state for Latched Mode Only.**

**Reset Output when Count is Reset:**

- This feature can be enabled or disabled.

**Request Message:**

- Each output can be programmed to request a specific message when the output conditions are satisfied.

**INDICATION DISPLAYS**

- Each of the four indication displays is programmed individually. Each line of each indication display can be programmed to show a value mnemonic, a numeric value, the output status, a preset value, the counter load value, or a custom display line. The mnemonics are factory set to: RATE, PEAK, VALLEY, COUNT*, PROCESS*, BATCH*, TOTAL*, and OVERFLOW. Each mnemonic can be individually changed to a mnemonic tailored to a specific application. The first character of the full mnemonic is displayed to the left of each indication display. The brightness of the display is fixed at the left of the appropriate numeric value if the other line is not programmed to display the full mnemonic. Each of the 4 indication displays can be programmed to be green or red on dual color models.

- * On Models with these available display options.

**Scroll Speed:**

- None
- 2.5 Seconds
- 5.0 Seconds

**Display Intensity:**

- The brightness of the display can be adjusted from 1 to 5, with 5 as the brightest. There is a separate adjustment for each color.
PROGRAMMABLE FUNCTIONS (Cont’d)

INDICATION DISPLAYS (Cont’d)

Custom Display Line:
The Legend Plus has two Custom Display Lines which allow the user to
specify the number of digits to be displayed on the line, along with any alpha-
numeric prefix or suffix.

Program Mnemonic:
Allows the user to modify the mnemonics (RATE, PROCESS, BATCH, etc.)
to a mnemonic of your choice. For example, RATE can be changed to read
SPEED.

MESSAGES
There are ten messages that can be programmed in the Legend. The following
attributes can be set for each message.

Message Text:
- Standard Characters - Lower/Upper case letters, numbers, punctuation
  symbols
- Extended Characters (Including most European characters)

Message Priority:
1 to 8 (1 = highest priority)

Message Type:
- 1 line block - message scrolls in block fashion on the top line of the display,
bottom line contains programmed indication display.
- 2 line block - message scrolls in block fashion on both lines of the display.
- 1 line scroll - message scrolls right to left on the top line of the display,
bottom line contains programmed indication display.
- 2 line scroll - Top line scrolls right to left, bottom line is blanked

Maintained/Momentary Request:
A Maintained Request setting enables messages to be restored or
redisplayed, when the display is available if the input/output action
requesting the message is still active.

A Momentary Message setting will allow only one request per message
requesting input/output action. Lower priority messages will be canceled by
higher priority messages.

Blinking Message:
Enables the message to blink when displayed. Only available with 1 or 2 line
block messages.

Multiplex:
Setting this parameter to yes will cause the unit to display the message for
2 seconds, then display the programmed display for 2 seconds. Only available
with 1 or 2 line block messages.

MODEL LGPB APPLICATION

A local canning plant wishes to improve the display and control capabilities of
its nine process lines. There is a requirement to add message interaction for
the operators during process operation. The following application facts and
requirements have been specified by the plant engineers:

1. The cans are sensed by a photo-electric device specially suited for can
manufacturing. The device produces one pulse per can.
2. The can count for the process of boxing the cans is the first requirement. The
can count is never changed, there are always 24 cans to each box. An output
is required at 20 cans to slow the line temporarily until the second output is
turned on. The second output changes the gate direction to begin the next
grouping of 24. The second output has a time delay output of 2 seconds. After
the time delay, both outputs are reset and ready for the next process cycle.
3. A count of the number of batches is required for each 8-hour shift. This count
is recorded and reset by the manufacturing computer.
4. A total count of cans produced per 24-hour period is required. This count is
also transmitted to the manufacturing computer, and reset as required via the
communication link.
5. A display of cans per minute is required with minimum and maximum speed
limits. Output 3 activates below 100 counts per minute and Output 4
activates above 500 counts per minute.
6. The four desired displays are process, batch, total, and rate. These are to be
scrolled via the front panel.
7. The customer also wants the following messages displayed when the listed
events occur:
   - Output 5 - Line #4 Slow
   - Output 4 - Overspd STOP! (Wants this display to stand out and have top
     priority)
   - Proximity 1 - Check Label Glue
   - Proximity 2 - Check Top Supply
   - Proximity 3 - System Fault! Stop Line #4! (Wants this display to stand out
     and have top priority)

8. Once the unit is set up, the only front panel access should be for a reset of
the process count and viewing of the displays.

The following page is a chart of the necessary programming for the Legend
Plus unit.
LEGEND PLUS PROGRAM SHEET

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGPB</td>
<td>Four Preset Batch Legend Plus w/Gm Backlighting</td>
<td>LGPB0000</td>
</tr>
<tr>
<td></td>
<td>Four Preset Batch Legend Plus w/Red Backlighting</td>
<td>LGPB0100</td>
</tr>
<tr>
<td></td>
<td>Four Preset Batch Legend Plus w/Dual Color Backlighting</td>
<td>LGPB0200</td>
</tr>
<tr>
<td>LGPM</td>
<td>Multi-Preset (6) Legend Plus w/Gm Backlighting</td>
<td>LGPM0001</td>
</tr>
<tr>
<td></td>
<td>Multi-Preset (6) Legend Plus w/Red Backlighting</td>
<td>LGPM0101</td>
</tr>
<tr>
<td></td>
<td>Multi-Preset (6) Legend Plus w/Dual Color Backlighting</td>
<td>LGPM0201</td>
</tr>
<tr>
<td>LGPBFS</td>
<td>Four Preset Foot-Inch Counter w/Red Backlighting</td>
<td>LGPBFS000</td>
</tr>
<tr>
<td>SFLGP</td>
<td>Legend Plus Programming Software, 3 1/2&quot;, 1.44 M Disk</td>
<td>SFLGP0001</td>
</tr>
<tr>
<td></td>
<td>Dual Relay Board (Model LGPBs only)</td>
<td>RLYLG0002</td>
</tr>
</tbody>
</table>

SCALING
- COUNT SF: 1.0000
- RATE SF: 1.0000
- TOT SF: 1.0000
- CNT. SCM: X1.0
- CNT. D. P: 0
- RATE PER: X1.0
- RATE D. P: 0
- TOT D. P: 0
- CHG. CNT: YES

RATE
- MAX. TIME: 5.0

COUNTER
- PRIORITY: 8
- TYPE: 2L BLOCK
- BLINKING: NO
- MULTIPLEX: NO
- CANCEL: TIL END
- TIME SEC.: 1
- COLOR: GREEN

USER INPUTS
- BIN. MSG. REQ.: NONE
- USER INP. 1: REQMSG#5
- USER INP. 2: REQMSG#6
- USER INP. 3: REQMSG#4
- USER INP. 4: REQMSG#5
- USER F1: NO MODE
- USER F2: NO MODE

OUTPUTS
- OUTPUT 1
  - ASSIGNED: TO PRG
  - PHASE: +
  - TYPE: LATCHED
  - ACT/TIME: 2.00
  - OUTPUT END: OFF@P,P
  - RST/C: EN
  - REQ MSG #: 2
- OUTPUT 2
  - ASSIGNED: TO PRG
  - PHASE: +
  - TYPE: TIMED
  - ACT/TIME: 2.00
  - OUTPUT END: OFF@P,P
  - RST/C: EN
  - REQ MSG #: 2

PRESETS
- P1: NO
- P2: NO
- P3: NO
- P4: NO
- CTLD: NO
- SF'S: NO

OPTIONS
- ACCESS
- PRESETS
- P1: 20
- P2: 24
- P3: 100
- P4: 500
- CTLD: 0
- SF'S: 2

DISPLAY
- DISPLY 1: CUSTOM 2
- DISPLY 2: CUSTOM 2
- DISPLY 3: CUSTOM 1
- DISPLY 4: CUSTOM 1

SCROLLING
- OVERFLOW: TOT-MNE
- PEAK: VALLEY
- VALLEY: PROCENT
- BATCH: CASES
- TOTAL: TOTCANS
- OVERFLOW: OVERFLOW

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