

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.

The Legend offers a choice of seven programmable counting modes for use in applications requiring Bi-directional, Anti-coincidence, and Quadrature counting. A separate external inhibit terminal can be used in conjunction with any of the count modes. The input circuitry is switch selectable to accept signals from a variety of input sources. A unit may be programmed to register counts on both edges of the input signal providing frequency doubling capability.

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.

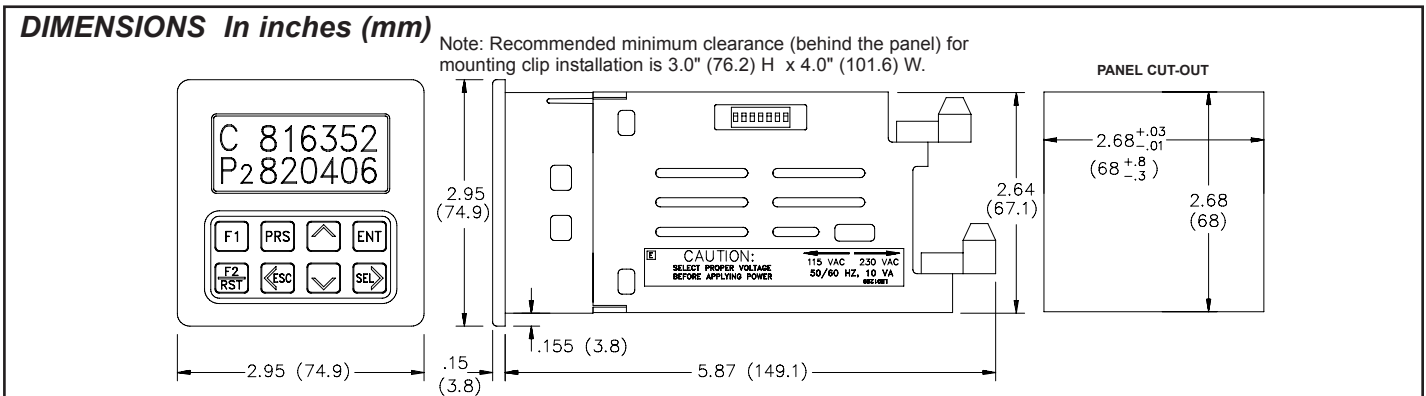
All count values and program setting are retained when unit power is removed in nonvolatile memory.



- 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)
- 115/230 VAC SWITCH SELECTABLE
- RS485 SERIAL COMMUNICATIONS
- 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 stand-alone and system counter needs.

The rate input uses the time interval method (1/tau) to calculate the rate value. This method insures 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			
LGS	LGD	LGB	LGM
RATE PEAK VALLEY COUNT (1 Preset)	RATE PEAK VALLEY COUNT (2 Presets)	RATE PEAK VALLEY PROCESS BATCH TOTAL (4 Presets)	RATE PEAK VALLEY COUNT (6 Presets)

SPECIFICATIONS

- DISPLAY:** 2x8, 0.3" (7 mm) high characters, negative image transmissive LCD, with yellow/green or red LED backlighting.
- POWER:**
AC Operation: 115/230 VAC $\pm 10\%$, 50/60 Hz, 10 VA, switch selectable.
DC Operation: +12 VDC $\pm 20\%$ @ 250 mA.
- 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.
Data Retention: 10 years minimum
- SENSOR POWER:** +12 VDC $\pm 25\%$ @ 100 mA.
- 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, 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 K Ω pulled up internally to +12 VDC, $I_{MAX} = 1.6$ mA.

Current sourcing: Internal 3.9 K Ω pull-down, 7.3 mA @ 28 VDC_{MAX}.
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 K Ω @ 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:** $\pm 0.01\%$

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

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

MODEL	CNT + DIR		QUAD			ADD/ADD	ADD/SUB
	X1	X2	X1	X2	X4	X1*	X1*
LGS (Single Preset)	23	11	9	7	5.5	23	12
LGD (Dual Preset)	20	10	8.5	7	5	20	10
LGB (Batch)	17	8	7	7	4	17	9
LGM (Six Preset)	15	7	7	7	3	15	8

Notes:

- 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 count pulses, with Count SF = 0.5000 and Count Scale Multiplier = X1, would be 50.
- Maximum count rate given for X2 & X4 count modes are given for 50% duty cycle signals and Quad signals with 90° phase shift.
**Inputs A & B count rates summed.*

9. CONTROL INPUTS:

Programmable user inputs (3): Internal 10 K Ω pull-up to +5 VDC,

$V_{IL} = 1.0 V_{MAX}$; $V_{IH} = 4.0 V_{MIN}$, response time = 10 msec.

Inhibit: Internal 10 K Ω pull-up to +5 VDC, $V_{IL} = 1.0 V_{MAX}$; $V_{IH} = 4.0 V_{MIN}$.

10. SERIAL COMMUNICATIONS:

Type: RS-485 Multi-point Balanced Interface (2 Wire).

(Can connect up to 32 units on a single pair of wires)

Baud Rate: Programmable from 1200 to 9600.

Maximum Addresses: Programmable from 00 to 99.

(Actual number on a single pair of wires is limited by serial hardware specifications)

Transmit Delay: Programmable for 0.002 or 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.

$V_{CE} = 1V_{SAT}$ @ 100 mA max. $V_{OH} = 30$ VDC max.

(Internal Zener Diode Protection).

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, $\pm 0.05\%$ - 11 msec max.

12. CERTIFICATIONS AND COMPLIANCES:

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.

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.,

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

IP65 Enclosure rating (Face only), IEC529

ELECTROMAGNETIC COMPATIBILITY

Immunity to EN 50082-2

Electrostatic discharge	EN 61000-4-2	Level 2; 4 Kv contact Level 3; 8 Kv air
Electromagnetic RF fields	EN 61000-4-3	Level 3; 10 V/m 80 MHz - 1 GHz
Fast transients (burst)	EN 61000-4-4	Level 4; 2 Kv I/O ¹ Level 3; 2 Kv power
RF conducted interference	EN 61000-4-6	Level 3; 10 V/rms ¹ 150 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
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SPECIFICATIONS (Cont'd)

Note:

- 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.

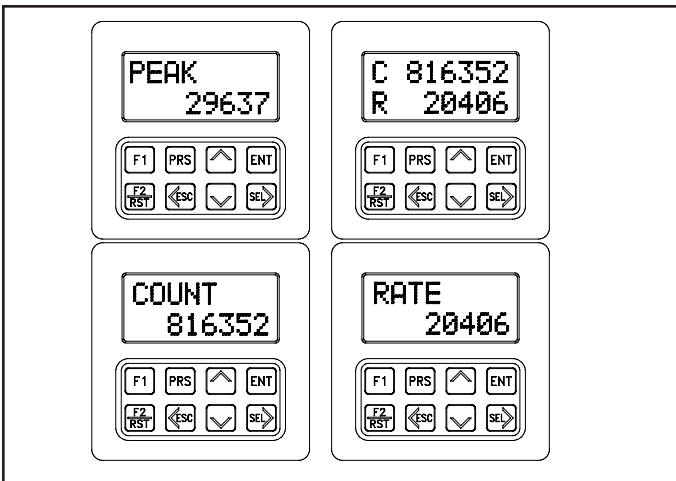
Altitude: Up to 2000 meters

- 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.

- 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.

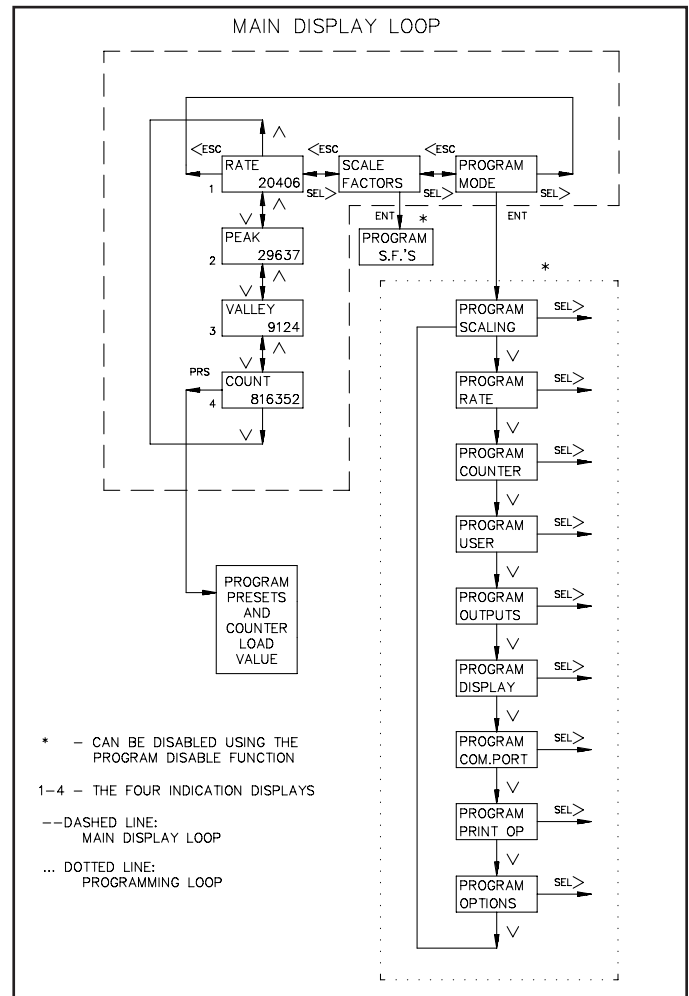
DECIMAL POINT

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 Activation Mode:

Latched

Boundary

Timed - 0.01 to 99.99 seconds

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.

Reset Output when Count is Reset:

This feature can be enabled or disabled.

Phase:

Each Output can have its logic state set for Positive (*ON*) Phase or

Negative (*OFF*) Phase.

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*).

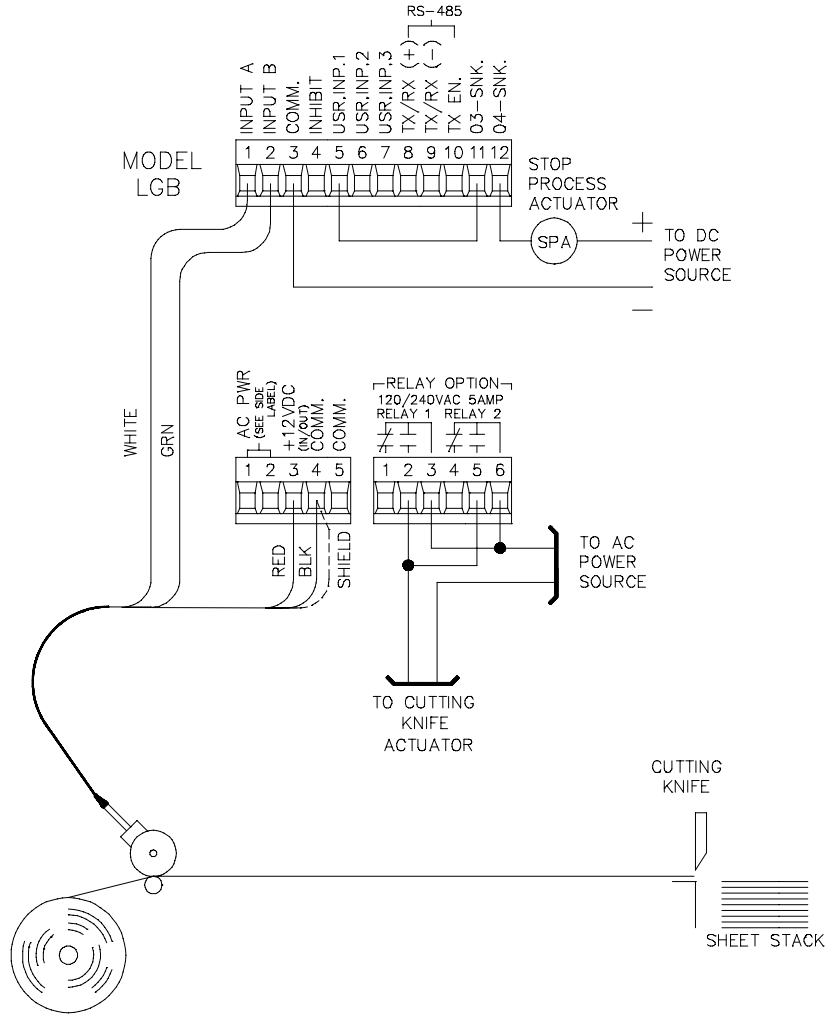
OPERATOR ACCESS TO FRONT PANEL

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.

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 Length 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 100pulses/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.

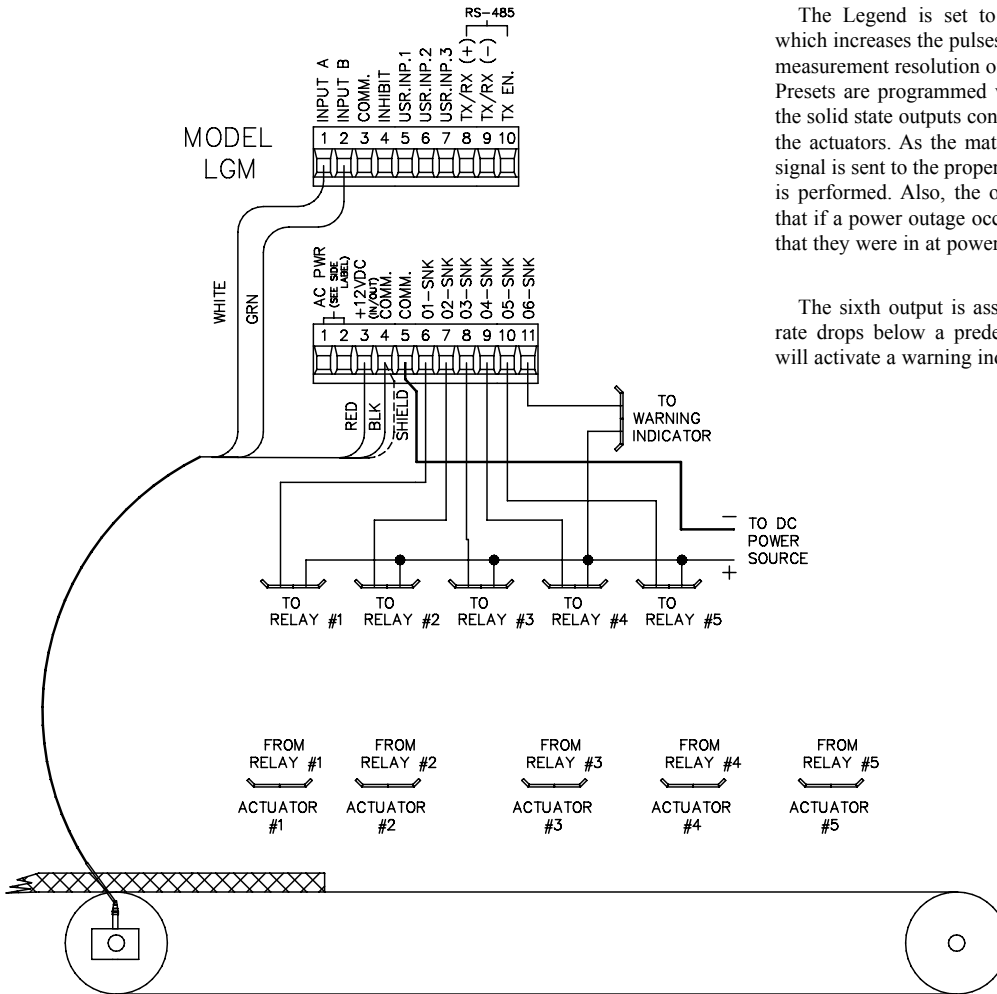
The outputs are used to control power to the cutting knife and the counter is programmed to reset when Preset 1 or Preset 2 is reached.

Preset value P_3 (*Batch count*) is programmed to activate User Input 1 (*skip P_1*) 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 (RPG) 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

MODEL NO.	DESCRIPTION	OPTION w/RELAY BOARD	PART NUMBERS 115/230 VAC & +12 VDC
LGS	Single Preset Legend w/Yel-Grn Backlighting	No	LGS00001
	Single Preset Legend w/Yel-Grn Backlighting	Yes	LGS00000
	Single Preset Legend w/Red Backlighting	No	LGS00101
	Single Preset Legend w/Red Backlighting	Yes	LGS00100
LGD	Dual Preset Legend w/Yel-Grn Backlighting	No	LGD00001
	Dual Preset Legend w/Yel-Grn Backlighting	Yes	LGD00000
	Dual Preset Legend w/Red Backlighting	No	LGD00101
	Dual Preset Legend w/Red Backlighting	Yes	LGD00100
LGB	Four Preset Batch Legend w/Yel-Grn Backlighting	Yes	LGB00000
	Four Preset Batch Legend w/Red Backlighting	Yes	LGB00100
LGM	Multi Preset (6) Legend w/Yel-Grn Backlighting	N/A	LGM00001
	Multi Preset (6) Legend w/Red Backlighting	N/A	LGM00101
-	Legend Programming Software, 3.5", 1.44 M disk	N/A	SFLGP
-	Single Relay Board	N/A	RLYL001
-	Dual Relay Board	N/A	RLYL002

LIMITED WARRANTY

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

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

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