MODEL PAXLPT - PAX® LITE PROCESS TIME METER

- PROCESS TIME INDICATION
- 6-DIGIT, 0.56" (14.2 mm) HIGH RED LED DISPLAYS
- DISPLAY MODES 999999 OR 999-59
- INPUT RATES UP TO 25 KHZ
- ACCEPTS A WIDE VARIETY OF SENSORS
- PROGRAMMABLE SCALING
- PROGRAMMABLE DECIMAL POINTS
- NEMA 4X/IP65 SEALED FRONT BEZEL

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PROC. CONT. EQ.
E179259

CE

GENERAL DESCRIPTION

The PAX® Lite Process Time Meter, Model PAXLPT, displays a value representing the time between a beginning and end point of a process, such as a conveyor oven.

The PAXLPT's display will update inversely in relation to the input signal frequency. As input frequency increases (representing speed), the PAXLPT time display will decrease indicating a reduction in the duration of process time. For example, the bake time through an oven will decrease the faster the conveyor runs.

The display can be programmed for two operating modes. Operating in the 6 digit mode, the PAXLPT can readout in any whole value, such as seconds, minutes, or hours. This mode also provides capability for decimal points. The 5 digit mode functions as a chronometer, which has a maximum display value of 999-59. This formats the display to allow the meter to readout in hours and minutes, minutes and seconds, etc.

The PAX Lite Process Time Indicator also has a feature called "moving window average". This allows one time disturbances, or irregularly spaced items to be averaged over eight inputs, thus keeping display fluctuations to a minimum while still updating the display on every pulse. This feature can be enabled or disabled by a rear DIP switch.

The PAXLPT can accept many different types of sensors including magnetic pickups, logic sensors, and NPN open collector sensors, as well as switch contact closure sensors.

The meter has been specifically designed for harsh industrial environments. With a NEMA 4X/IP65 sealed bezel and extensive testing to meet CE requirements, the meter provides a tough yet reliable application solution.

SAFETY SUMMARY

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

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

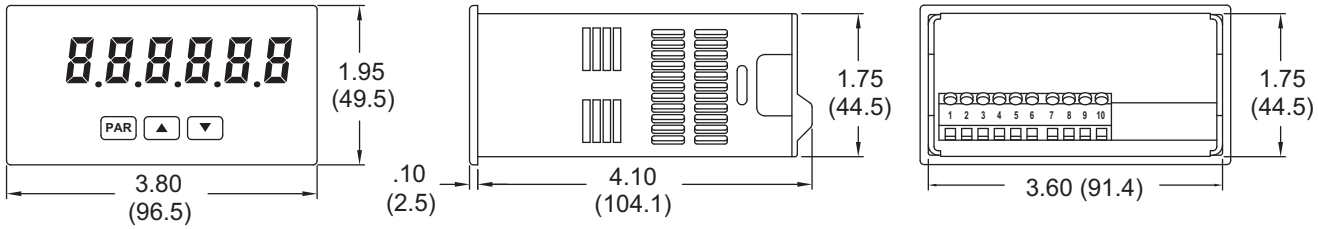
CAUTION: Risk of electric shock.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
PAXLPT	6 Digit Process Time Meter	PAXLPT00

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.4) H x 5.0" (127) W.



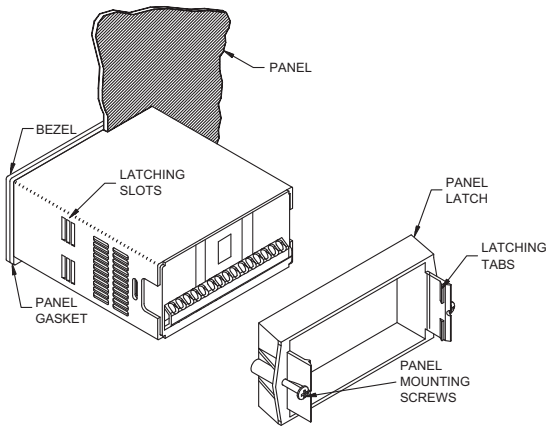
GENERAL METER SPECIFICATIONS

1. **DISPLAY**: 6-digit, 0.56" (14.2 mm), 7-segment red LED.
   Decimal points are programmed by front panel keys (6 digit mode only)
2. **POWER**:
   AC Power: 115/230 VAC, switch selectable. Allowable power line variation ±10%, 50/60 Hz, 6 VA.
   Isolation: 2300 Vrms for 1 min. to input and DC Out/In.
   DC Power: 10 to 16 VDC @ 0.1 A max.
3. **SENSOR POWER**: 9 to 17.5 VDC @ 100 mA max.
4. **KEYPAD**: 3 programming keys
5. **INPUT**: (DIP switch selectable)
   Accepts pulses from a variety of sources including NPN-OC, PNP-OC, TTL Outputs, Magnetic Pickups and all standard Red Lion® sensors.
   Logic State: Active Low
   Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V min.
   Current Sinking: Internal 7.8 KΩ pull-up to +12 VDC, I_{MAX} = 1.9 mA
   Current Sourcing: Internal 3.9 KΩ pull-down, 8 mA max. @ 30 VDC max.
   MAGNETIC PICK-UP:
   Sensitivity: 200 mV peak
   Hysteresis: 100 mV
   Input impedance: 3.9KΩ @ 60 Hz
   Maximum input voltage: ±40 V peak, 30 Vrms
6. **INPUT FREQUENCY RANGE**:
   Max Frequency: 25 KHz
   Min Frequency: 0.05 Hz
   Accuracy: ±0.02%
   Note: When the input pulse rate is 3 Hz or lower, the unit will utilize, if enabled, a technique known as a "moving window average." (This continually averages the last eight input pulses.)
7. **MEMORY**: Nonvolatile E^2PROM retains all programmable parameters.
8. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature: 0 ° to 60 °C
   Storage Temperature: -40 ° to 60 °C
   Operating and Storage Humidity: 0 to 85% max. relative humidity (non-condensing)
   Vibration to IEC 68-2-6: Operational 5 to 150 Hz, 2 g.
   Shock to IEC 68-2-27: Operational 30 g.
   Altitude: Up to 2000 meters
9. **CERTIFICATIONS AND COMPLIANCES**:
   CE Approved
   EN 61326-1 Immunity to Industrial Locations
   Emission CISPR 11 Class A
   Safety requirements for electrical equipment for measurement, control, and laboratory use:
   EN 61010-1: General Requirements
   RoHS Compliant
   UL Listed: File #E179259
   Type 4X Enclosure rating (Face only)
   IP65 Enclosure rating (Face only)
   IP20 Enclosure rating (Rear of unit)
10. **CONNECTIONS**: High compression cage-clamp terminal block
    Wire Strip Length: 0.3" (7.5 mm)
    Wire Gage Capacity: 30-14 AWG copper wire.
    Torque: 4.5 inch-lbs (0.51 N-m) max.
11. **CONSTRUCTION**: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.
12. **WEIGHT**: 12 oz (340 g)

1.0 INSTALLING THE METER

Installation

The PAX Lite meets NEMA 4X/IP65 requirements when properly installed. The unit is intended to be mounted into an enclosed panel. Prepare the panel cutout to the dimensions shown. Remove the panel latch from the unit. Slide the panel gasket over the rear of the unit to the back of the bezel. The unit should be installed fully assembled. Insert the unit into the panel cutout.



While holding the unit in place, push the panel latch over the rear of the unit so that the tabs of the panel latch engage in the slots on the case. The panel latch should be engaged in the farthest forward slot possible. To achieve a proper seal, tighten the latch screws evenly until the unit is snug in the panel (Torque to approximately 7 in-lbs [79N-cm]). Do not over-tighten the screws.

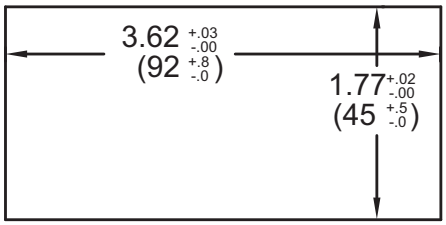
Installation Environment

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

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

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

PANEL CUT-OUT



2.0 SETTING THE JUMPER AND SWITCHES

The meter has a jumper and switches, which must be checked and/or changed prior to applying power. To access the power switch and the jumper, remove the meter base from the case by firmly squeezing and pulling back on the side rear finger tabs. This should lower the latch below the case slot (which is located just in front of the finger tabs). It is recommended to release the latch on one side, then start the other side latch.

Power Selection Switch

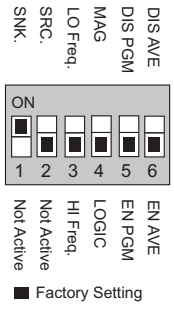
Caution: Ensure that the AC power selection switch is set for the proper voltage before powering-up the meter. The meter is shipped from the factory in the 230 VAC position.

6-Digit / 5-Digit Mode Selection Jumper

Inside the meter is also the Mode Selection Jumper, located near the display board. This jumper will select operation in the 6-digit mode or 5-digit (chronometer) mode. When the jumper is positioned toward the display board, the unit will be in the 6-digit mode of operation. With the jumper positioned away from the display board, the meter is in the 5-digit (chronometer) mode. The unit ships from the factory in the 6-digit mode.

Set-Up DIP Switches

A DIP switch is located at the rear of the meter, and is fully accessible when the unit is in the case. It is used for the selection of the input parameters and program disable. For the correct input setup, refer to 3.2 Input Wiring.



SWITCH 1

SNK.: Adds internal 7.8 KΩ pull-up resistor to + 12 VDC, I_{MAX} = 1.9 mA.

SWITCH 2

SRC.: Adds internal 3.9 KΩ pull-down resistor, 8 mA max. @ 30 VDC max.

SWITCH 3

HI Frequency: Removes damping capacitor and allows max. frequency.

LO Frequency: Limits input frequency to 50 Hz and input pulse widths to 10 msec.

SWITCH 4

LOGIC: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V max.

MAG: 200 mV peak input (must have SRC on)

SWITCH 5

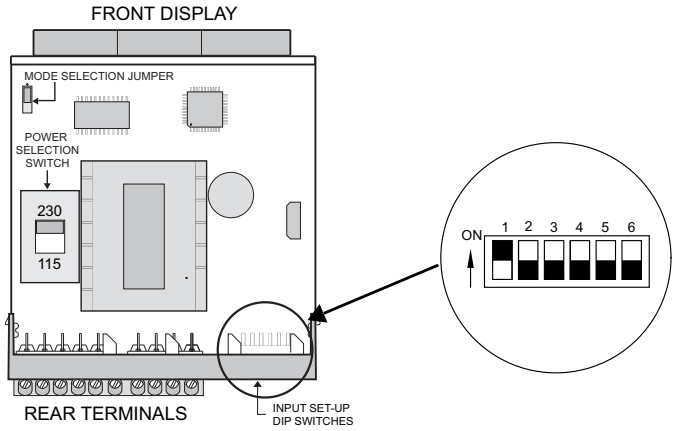
Enable Programming: Enables programming through the front panel buttons

Disables Programming: Disables the front panel buttons from any programming changes

SWITCH 6

Enable Averaging: Enables moving windows averaging feature.

Disable Averaging: Disables moving windows averaging feature.



3.0 WIRING THE METER

WIRING OVERVIEW

Electrical connections are made via screw-clamp terminals located on the back of the meter. All conductors should conform to the meter's voltage and current ratings. All cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that the power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker.

When wiring the meter, compare the numbers embossed on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.3" (7.5 mm) bare lead exposed (stranded wires should be tinned with solder.) Insert the lead under the correct screw-clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.)

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

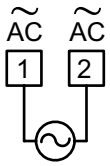
1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
2. Use shielded cables for all Signal and Control inputs. The shield connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs.
5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite # 0443167251 (RLC part number FCOR0000)
   Line Filters for input power cables:
   Schaffner # FN2010-1/07 (Red Lion Controls # LFIL0000)
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most RLC products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
   RLC part numbers: Snubber: SNUB0000
   Varistor: ILS11500 or ILS23000
7. Care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could affect the instrument's operation.

Visit www.redlion.net/emi for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.

3.1 POWER WIRING

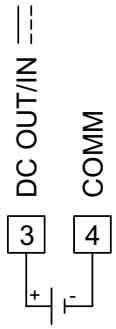
AC Power

Terminal 1: VAC
Terminal 2: VAC



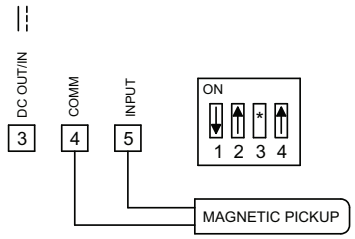
DC Power

Terminal 3: +VDC
Terminal 4: COMM

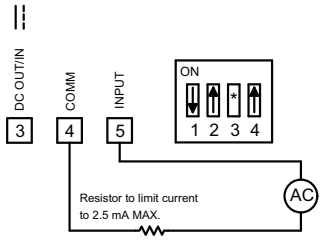


3.2 INPUT WIRING

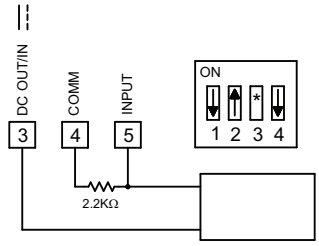
Magnetic Pickup



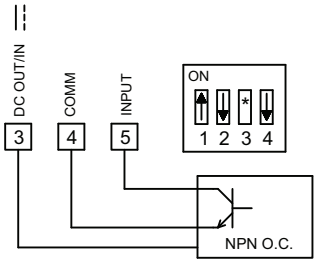
AC Inputs From Tach Generators, Etc.



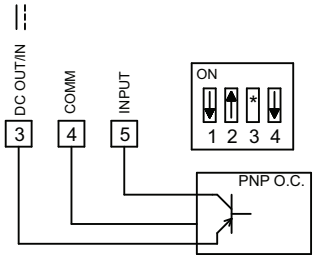
Two Wire Proximity, Current Source



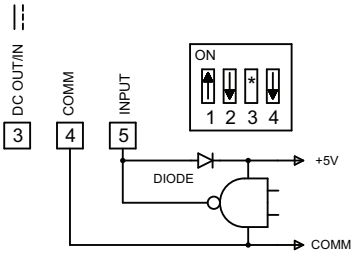
Current Sinking Output



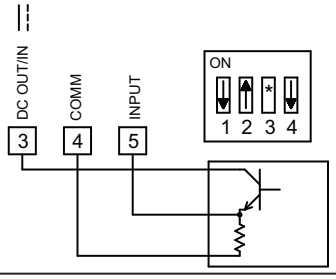
Current Sourcing Output



Interfacing With TTL



Emitter Follower; Current Source

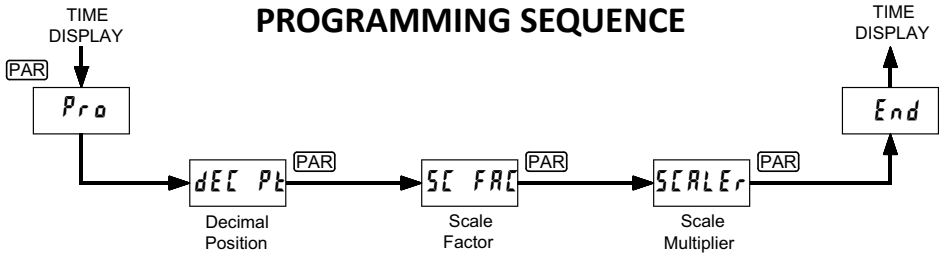


*Switch position is application dependent.

4.0 REVIEWING THE FRONT BUTTONS AND DISPLAY

KEY	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
▲	No Function	Increment selected digit of parameter value
▼	No Function	Select digit position in parameter value

5.0 PROGRAMMING THE METER



The Process Time Indicator has three programmable parameters which are entered in the sequence shown above, using the front panel push buttons.

Before programming, please refer to the section on Scaling the Meter to determine the Decimal Position, Scale Factor and Scale Multiplier to use for the specific application.

Note: Programming mode can be locked out with the Program Disable DIP switch. With the switch in the Disabled (up) position the meter will not enter programming mode. Refer to the section on DIP switch setup.

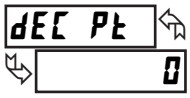
PROGRAMMING MODE ENTRY

Press the **PAR** key to enter Programming Mode. The meter briefly displays Pro followed by the first programming parameter described below.

PROGRAMMING PARAMETERS

In programming mode, the display alternates between the parameter and the current selection or value for that parameter. The dual display with arrows is used below to illustrate the alternating display. The selection choices or value range for each parameter is shown to the right of the alternating display.

DECIMAL POSITION (6-digit mode only)



0 0.0 0.00 0.000

This parameter selects the decimal point position on the display. The selection is used when calculating the Scale Factor. This parameter only appears when the meter is configured for the 6-digit mode.

Press the arrow keys (▲ or ▼) to sequence through the selection list until the desired selection is shown. Press the **PAR** key to save the displayed selection and advance to the next parameter.

SCALE FACTOR

0000.1 to 59999

The Scale Factor is used in combination with the Scale Multiplier to obtain the desired process time readout. (See details on Scaling the Meter.)

The Scale Factor is displayed as a five-digit value with one selected digit flashing (initially digit 5). Press the ▲ (up arrow) key to increment the value of the selected (flashing) digit. Holding the ▲ key automatically scrolls the value of the selected digit.

Press the ▼ (down arrow) key to select the next digit position to the right. Use the ▲ key to increment the value of this digit to the desired number. Press the ▼ key again to select the next digit to be changed. Repeat the "select and set" sequence until all digits are displaying the desired Scale Factor value. Press the **PAR** key to save the displayed value and advance to the next parameter. Holding the ▼ key automatically scrolls through each digit position.

SCALE MULTIPLIER

1 10 100 1000

The Scale Multiplier is used in combination with the Scale Factor to obtain the desired process time readout. (See details on Scaling the Meter.)

Press the arrow keys (▲ or ▼ to sequence through the selection list until the desired selection is displayed. Press the **PAR** key to save the selection and exit programming mode.

PROGRAMMING MODE EXIT

The meter exits Programming Mode when the **PAR** key is pressed to save the Scale Multiplier selection. The meter briefly displays End upon exiting Programming Mode. All programmed selections are now transferred to the non-volatile memory and the meter returns to the Process Time display.

(If power loss occurs during programming mode, verify parameter changes and reprogram, if necessary, when power is restored.)

PROGRAMMING MODE TIME OUT

The Programming Mode has an automatic time out feature. If no keypad activity is detected for approximately 60 seconds, the meter automatically exits Programming Mode. The meter briefly displays End and returns to the Process Time display. When automatic timeout occurs, any changes that were made to the parameter currently being programmed, will not be saved.

FACTORY SETTINGS

The factory settings for the programming parameters are shown above in the alternating display illustrations. The factory settings can be easily restored by removing power from the meter, and then pressing and holding the **PAR** key while power is reapplied. The meter displays rESEt until the **PAR** key is released. The normal power-up sequence then resumes, with the factory settings loaded and saved in non-volatile memory.

Note: The Program Disable DIP switch must be in the Enabled (down) position to allow loading factory settings. See section on DIP switch setup.

6.0 SCALING THE METER

In many industrial applications, a meter is required to display the process time of an operation or event. The pulses from a sensor are received by the PAXLPT, and then scaled to produce just such a readout. The following formula will help provide the scaling values to achieve the desired readout.

SF = DR x PPS

WHERE:

SF = Scale Factor
DR = Desired Readout*
PPS = Pulses per Second

To calculate the PPS multiply the RPM (Revolutions per Minute) by the PPR (Pulses per Revolution) and divide by 60.

$$\frac{RPM \times PPR}{60}$$

*When calculating the scale factor, do not use decimal points in the Desired Readout. Use the whole value of the number to be displayed, for example, 50.0 minutes, the Desired Readout in this case is 500.

For calculated SF values less than 59,999

If the Scale Factor is a value less than 59,999, it can be entered directly into the meter as the Scale Factor and the Scale Multiplier can be left at 1.

For calculated SF values greater than 59,999

If the Scale Factor is a value over 59,999 (maximum value), the Scale Multiplier must be used to reduce the calculated Scale Factor value until it is less than 59,999. The Scale Multiplier divides the calculated Scale Factor value by 1, 10, 100 and 1000, thus reducing the calculated value accordingly. Select the appropriate Scale Multiplier value that allows the Scale Factor to be a value under 59,999. Both the Scale Factor and Scale Multiplier can then be entered into the meter.

EXAMPLE 1 (6 DIGIT):

DR = 150 minutes

$$PPS = \frac{450\ RPM \times 60\ PPR}{60}$$

PPS = 450

SF = DR x PPS

SF = 150 x 450

SF = 67,500

Since the SF value is greater than 59,999, the SM will be needed to reduce the calculated value to value less than 59,999. Using the SM of 10, the 67,500 value is divide by 10, reducing the SF to a value of 6750. The meter can be programmed for a SF of 6750 and a SM of 10.

EXAMPLE 2 (5 DIGIT):

DR = 2 hours and 23 minutes (2-23)

$$PPS = \frac{138\ RPM \times 100\ PPR}{60}$$

PPS = 230

To calculate the Scale Factor for a 5 Digit application, first convert the DR to its base units.

DR = 2 (hours) x 60 + 23

DR = 120 + 23

DR = 143 minutes

SF = DR x PPS

SF = 143 x 230

SF = 32,890

Since the SF value is less than 59,999, it can be entered directly as the SF and the SM will be 1. Note: When programmed for the 5 Digit mode, the meter will convert the D.R. back to the hours and minutes format.

LIMITED WARRANTY

(a) Red Lion Controls Inc., (the "Company") warrants that all Products shall be free from defects in material and workmanship under normal use for the period of time provided in "Statement of Warranty Periods" (available at www.redlion.net) current at the time of shipment of the Products (the "Warranty Period"). **EXCEPT FOR THE ABOVE-STATED WARRANTY, COMPANY MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE PRODUCTS, INCLUDING ANY (A) WARRANTY OF MERCHANTABILITY; (B) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; OR (C) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** Customer shall be responsible for determining that a Product is suitable for Customer's use and that such use complies with any applicable local, state or federal law.

(b) The Company shall not be liable for a breach of the warranty set forth in paragraph (a) if (i) the defect is a result of Customer's failure to store, install, commission or maintain the Product according to specifications; (ii) Customer alters or repairs such Product without the prior written consent of Company.

(c) Subject to paragraph (b), with respect to any such Product during the Warranty Period, Company shall, in its sole discretion, either (i) repair or replace the Product; or (ii) credit or refund the price of Product provided that, if Company so requests, Customer shall, at Company's expense, return such Product to Company.

(d) **THE REMEDIES SET FORTH IN PARAGRAPH (c) SHALL BE THE CUSTOMER'S SOLE AND EXCLUSIVE REMEDY AND COMPANY'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTY SET FORTH IN PARAGRAPH (a).**