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# Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

Bulletin No. APLPT-J
Drawing No. LP0141
Released 9/05

# *MODELS APLPT - APOLLO PROCESS TIME INDICATOR AND PBLPT - 4/5 DIGIT MODULE FOR USE WITH THE LARGE DIGIT DISPLAY (LDD)*

- *DISPLAYS INVERSE OF INPUT RATE*
- *2 MODELS: 9999 & 999-59*
- *0.56" (14.2 mm) HIGH LED DISPLAY (APLPT)*
- *EASY SELECTION OF DISPLAY & SCALE MULTIPLIER VALUES*
- *PROGRAMMABLE INPUT CIRCUIT. ACCEPTS OUTPUTS FROM A WIDE VARIETY OF SENSORS*
- *DECIMAL MODE SELECT (9999 Model Only)*
- *POWER-UP SELF-TEST*
- *0.02% ACCURACY*
- *INPUT RATE 0.05 CPS TO 10,000 CPS*
- *8 PULSE MOVING WINDOW AVERAGE BELOW 3 CPS (Selectable)*
- *NEMA 4/IP65 SEALED FRONT METAL BEZEL*


## *DESCRIPTION*

The Apollo Process Time Indicator (Model APLPT) and Module (Model PBLPT) displays a value representing the time between a beginning and end point of a process, such as a conveyor oven.

The unit's display will update inversely in relation to the input signal frequency. As input frequency increases (representing speed), the APLPT/PBLPT time display decreases, indicating a reduction in the duration of process time. For example, the baking time through an oven is inversely proportional to the conveyor speed.

The APLPT/PBLPT is available in two versions: The Decimal Point version, APLPT4/PBLPT4, that has 4 digits with different modes that provide for decimal points; and the chronometer display version, APLPT5/PBLPT5, which will show as its maximum value, 999-59.

The units have a feature called "*moving window average*". This allows one time disturbances, or irregularly spaced items to be averaged over eight input pulses, thus keeping display fluctuations to a minimum while still updating the display on every input pulse. This feature can be enabled or disabled by a side panel DIP switch.

The units can accommodate magnetic pickups, logic sensors, and NPN open collector sensors, as well as switch contact closure sensors.

These units have a self-test feature, which checks all the micro-processor and display driver circuitry at power-up (if enabled). This self-test can also be used to test display and scale multiplier select DIP switches to make certain all switches are functioning properly.

Power and input connections are made via a removable terminal strip, located at the rear of the unit. This strip can accept one #14 AWG wire. DIP switches at the side of the unit are used to program the input configuration and to set the scale multiplier value.

The Model APLPT has a sealed metal die-cast bezel which meets NEMA 4/IP65 specifications for wash-down and/or dust, when properly installed. Two mounting clips are provided for easy installation. The Model APLPT has a 0.56" high LED display, which is readable to 23 feet (7 M).

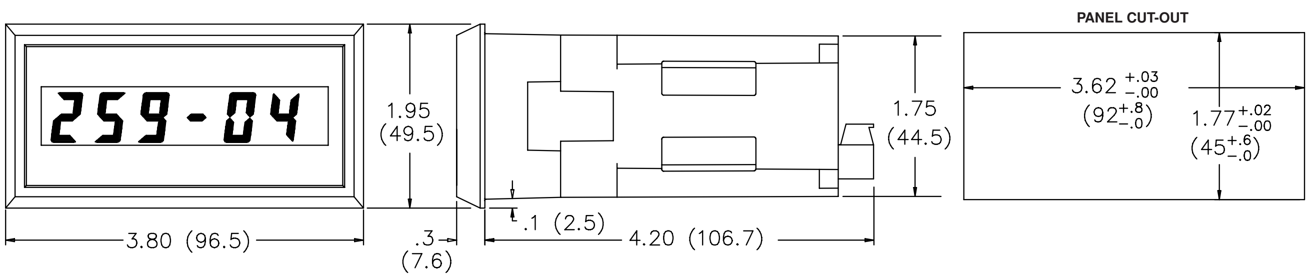
## *SAFETY SUMMARY*

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.

| | |
|---|---|
| **CAUTION: Risk of Danger.** Read complete instructions prior to installation and operation of the unit. | **CAUTION:** Risk of electric shock. |

## *DIMENSIONS In inches (mm)*

Note: Recommended minimum clearance (behind the panel) formounting clip installation is 2.1" (53.4) H x 5.5" (140) W.



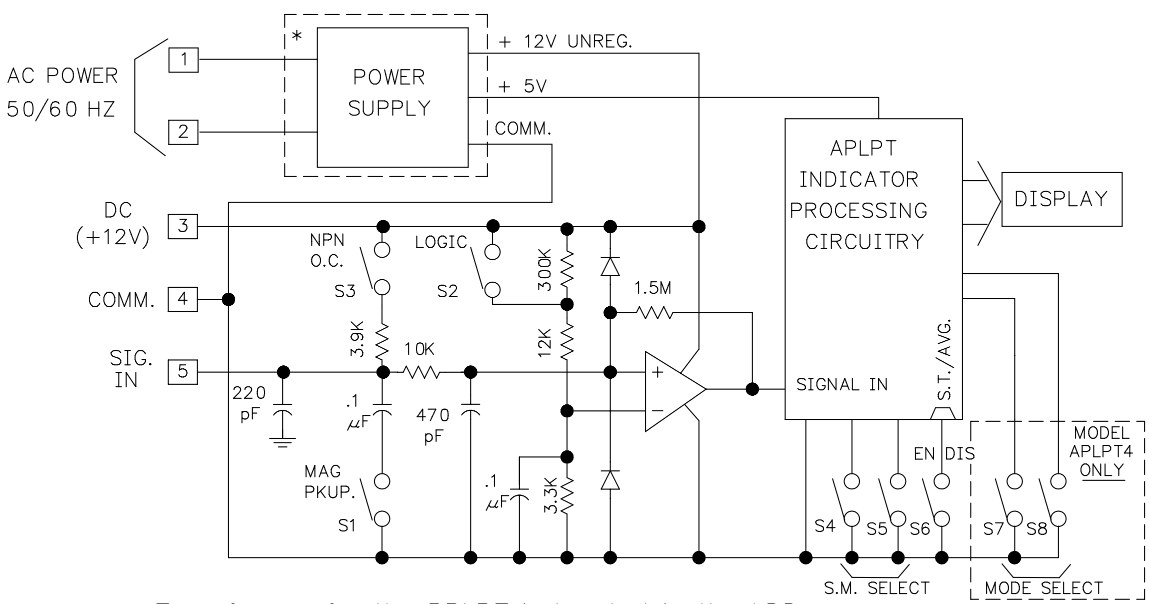
## SPECIFICATIONS

1. **DISPLAY:** 4 or 5-digit, 0.56" (14.2 mm) high LED, display. (APLPT)
2. **POWER REQUIREMENTS:**
   **APLPT**
   **AC Operation**: Available in two voltage ranges. 115 VAC (±10%) or 230 VAC (±10%), 50/60 Hz, 14 VA.
   **DC Operation**: 11 to 14 VDC @ 0.6A max.
   **PBLPT**
   **AC Operation**: Switch selected via the LDD power supply board, 115/230 (±10%), 50/60 Hz, 10 VA for 4-digit, 15 VA for 6-digit *(including LDD)*.
3. **SENSOR POWER:** +12 VDC, ±25% @ 100 mA max.
4. **OPERATING FREQUENCY RANGE:** 0.05 pulse/sec. to 10,000 pulse/sec.
   *Note: When the value to be displayed exceeds the full scale display capacity, all dashes are displayed. If input rate is too low, the unit will display a zero.*
5. **ACCURACY AND REPEATABILITY:** 0.02%
6. **DISPLAY MULTIPLIER INCREMENT TOTAL, SELECTION RANGE:** From 1 to 16,383.
7. **SCALE MULTIPLIER VALUES:** 1, 10, 100, 1000.
8. **DISPLAY UPDATE TIME:** The display will update every 0.65 sec. plus one input pulse when the input pulse rate is 1.54 PPS or higher. When the input pulse rate is below 1.54 PPS, the display will update on every input pulse.
   *Note: When the input pulse rate is 3 PPS or lower, the unit will utilize, if selected, a technique known as a "moving window average". (This continually averages the last eight input pulses.)*
9. **MAXIMUM INPUT VOLTAGE AND CURRENT:** When the "SIG. IN" (Terminal 5) is driven from external signal voltages, maximum allowable voltage swing is ±50 V peak. Input voltage can be dropped by an external series resistance that limits input current to ±5 mA. (These ratings are for S3 "OFF".)
10. **INPUT IMPEDANCE:** When S1 and S3 "OFF", the resistive input impedance exceeds 1 megohm as long as the "SIG. IN" (Terminal 5) input voltage is between zero and +12 VDC. Beyond these levels, the high and low clamping diode will start to conduct, thus decreasing the input impedance. With S3 "ON" the maximum input voltage to Terminal 5 must be limited to 28 VDC.
11. **PARALLELING WITH APOLLO TOTALIZER INPUTS (RLC standard count input):** Apollo Process Time Indicators may be parallel connected with counters having the RLC standard count input circuitry. These can operate from a common current sink or source sensor by connecting the appropriate terminals in common. S3 on the APLPT/PBLPT should be turned "OFF" since pull-up or pull-down resistors are already present in the counter. The unit will not add appreciable sensor load with this arrangement.
    *Note: The APLPT/PBLPT cannot be operated in parallel with standard input counters when 2-wire proximity sensors are used.*
12. **INPUT AND POWER CONNECTIONS:**
    There is a plug-in, compression-type, barrier strip located at the rear of the unit. This strip can be removed from the rear of the unit for ease of wiring. After wiring is complete, the connector can be plugged back onto the unit.
13. **CERTIFICATIONS AND COMPLIANCES:**
    **SAFETY**
    IEC 1010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    IP65 Enclosure rating (Face only), IEC 529
    Type 4 Enclosure rating (Face only), UL50
    **ELECTROMAGNETIC COMPATIBILITY**

| | | |
|---|---|---|
| **Immunity to EN 50082-2** | | |
| Electrostatic discharge | EN 61000-4-2 | Level 2; 4 Kv contact[1]<br>Level 3; 8 Kv air |
| Electromagnetic RF fields | EN 61000-4-3 | Level 3; 10 V/m<br>80 MHz - 1 GHz |
| Fast transients (burst) | EN 61000-4-4 | Level 4; 2 Kv I/O[2]<br>Level 3; 2 Kv power |
| RF conducted interference | EN 61000-4-6 | Level 3; 10 V/rms<br>150 KHz - 80 MHz |
| Power frequency magnetic fields | EN 61000-4-8 | Level 4; 10 A/m |
| Simulation of cordless telephone | ENV 50204 | Level 3; 10 V/m<br>900 MHz ± 5 MHz<br>200 Hz, 50% duty cycle |
| **Emissions to EN 50081-2** | | |
| RF interference | EN 55011 | Enclosure class A<br>Power mains class A |

    ***Notes for APLPT only:***
    *1. Metal bezel of unit connected to earth ground (protective earth) at the mounting panel.*
    *2. EMI filter placed on the DC power supply, when DC powered: Corcom #1VB3 or Schaffner #FN610-1/07 (RLC #LFIL0000).*
    *Refer to the EMC Installation Guidelines section of this bulletin for additional information.*
14. **ENVIRONMENTAL CONDITIONS:**
    **Operating Temperature Range**: 0 to 50°C
    **Storage Temperature Range**: -40 to 70°C
    **Operating and Storage Humidity**: 85% max. relative humidity (non-condensing) from 0°C to 50°C.
    **Altitude**: Up to 2000 meters
15. **CONSTRUCTION:** Die-cast metal front bezel with black, high impact plastic insert. Front panel meets NEMA 4/IP65 requirements for indoor use when properly installed. Installation Category II, Pollution Degree 2. (Panel gasket and mounting clips included with unit.)
16. **WEIGHT:**
    **APLPT**: 1.5 lbs. (0.8 Kg)
    **PBLPT**: 0.4 lbs (0.18 Kg)

### BLOCK DIAGRAM

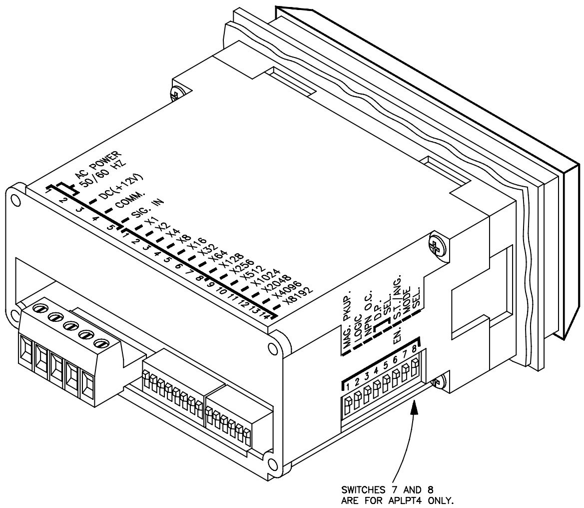



* Transformer for the PBLPT is located in the LDD.

## INPUT SET-UP

The selection of input set-up is accomplished by the first three DIP switches, located along the side of the unit. DIP switches 1-3 are used to configure the input. Each of these switches are discussed below.

*Note: Rate type indicators frequently use magnetic pickups for input devices. Consequently, there are basic differences between counter and rate-indicator input circuits. In the Model APLPT/PBLPT input circuit, the hysteresis level is quite small and the bias levels are significantly different to accommodate both magnetic pickup inputs, as well as the +5 V and higher logic levels. The APLPT/PBLPT can work with switch contact closures because of the low count rate capability. S1 should be closed when switch contact closures are used as inputs to the unit.*




**S1 - ON [MAG.PKUP.]:** Connects a 0.1µf damping input capacitor from input to common. This capacitor is commonly used with magnetic pickup inputs and serves to filter out high frequency noise. It can also be used to filter switch contact closures.

*Note: If excessive contact "bounce" or system "noise" is encountered, an additional external filter capacitor may be necessary. Reed switches, mercury wetted contacts, snap action limit switches, and silver alloy relay contacts with wiping action are usually satisfactory for generating count input signals. Motor starter contacts, tungsten contacts, and brush type contacts should not be used.*

**S2 - ON [LOGIC]:** Sets the bias reference so that input logic signals trigger count pulses as they cross a level of approximately +2.5 V.

**OFF:** Sets the bias reference so that a signal of 150 millivolts or more will trigger count pulses. This provides the sensitivity required for low speed magnetic pickup sensors.

*Note: Hysteresis for both S2 "ON" and "OFF" conditions is about 25 millivolts. This means the difference between $V_{IL}$ and $V_{IH}$ with logic inputs (S2) is almost insignificant and only a very small signal swing about the 2.5 V bias level will trigger the input.*

**S3 - ON [NPN O.C.]:** Connects a 3.9 K pull-up load resistor for sensors or circuits with current sink outputs. Sensor output must sink 4 mA @ $V_{OL}$ of 1V or less.

## SCALE MULTIPLIER SELECTION

The selection of the scale multiplier value is accomplished by DIP switches 4 and 5. The table at right shows what combination of switches is needed to obtain the desired value.

| SW 4 | SW 5 | SCALE MULTIPLIER |
|---|---|---|
| ↓ (0) | ↓ (0) | 1 |
| ↑ (1) | ↓ (0) | 10 |
| ↓ (0) | ↑ (1) | 100 |
| ↑ (1) | ↑ (1) | 1000 |

## MODE SELECT
## (Decimal Point Selection For 9999 unit only)

The selection of a decimal point location using DIP switches 7 and 8 is shown in the table at right. *(This feature is available only on the APLPT4/PBLPT4.)* In the APLPT4/PBLPT4, the proper DIP switches must be selected before the unit is powered up. To change a decimal point location, the unit must be powered down, the DIP switches changed, then powered up. The decimal point will appear as soon as the display reappears.

| SW 7 | SW 8 | D.P. LOCATION |
|---|---|---|
| ↓ (0) | ↓ (0) | 0 |
| ↑ (1) | ↓ (0) | 0.0 |
| ↓ (0) | ↑ (1) | 0.00 |
| ↑ (1) | ↑ (1) | 0.00 |

## MOVING WINDOW AVERAGING AND SELF-TEST

DIP switch 6, the S.T./AVG. switch, serves a dual function of disabling or enabling the *"moving window average" (MWA)* function and the self-test function. When the switch is up, MWA and self-test are both disabled. When the switch is down, MWA and self-test are both enabled.

## MOVING WINDOW AVERAGING

This allows the unit to *"collect"* and average the last eight input pulses which is continually updated whenever a new pulse occurs. The oldest input data is discarded and replaced with the new input data.

## SELF-TEST

This unit has a built-in self-test feature which can only be activated immediately after power-up *(the unit will not measure time while in self-test)*. To activate self-test, set the S.T./AVG. DIP switch (D.S. 6) to the enable position. Then apply power to the unit. With this test, all digits are cycled through starting with a string of zeros. This will be shown for about half a second, then a string of ones will appear for about the same time duration. Following these, a string of twos and so on, up to nines will be displayed. After the nines are shown, a string of decimal points will appear. Next, an interlace pattern of 1, 0, 1, 0, (1, 0,) then 1, 2, 1, 2, (1, 2,) and so on, until all digits from zero to nine have been displayed.

The next portion of self-test will display four groups of zeros and/or ones. *(The first two digits from the left, in each group, will always show zeros if it is an APLPT5/PBLPT5. If it is an APLPT4/PBLPT4, the first two digits will be blank.)* In the first group, the third digit represents the 13th *(X4096)* DIP switch setting. The fourth and fifth digits show the setting for the Scale Multiplier select DIP switches. *(The fourth position digit represents DIP switch 4 and the fifth position digit represents DIP switch 5.)* The state of these digits coincides with the table listed under the *"Scale Multiplier Selection"* section. The last digit will always show a one for the APLPT5/PBLPT5. But for the APLPT4/PBLPT4, if both switches 7 and 8 are off, it will then display a zero.

The next three groups are shown on the right, and correspond to the DIP switch shown directly above it. *(Note: The first two digits in each group are always shown as zeros or blanks.)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 9 | 10 | 11 | 12 | (DIP SWITCH) |
| Group 2: | 0 | 0 | X | X | X | X | |
| | | | 5 | 6 | 7 | 8 | (DIP SWITCH) |
| Group 3: | 0 | 0 | X | X | X | X | |
| | | | 1 | 2 | 3 | 4 | (DIP SWITCH) |
| Group 4: | 0 | 0 | X | X | X | X | |

The X's represent a zero or one *(depending on the setting of the DIP switch)* in the display. Self-test is automatically exited 8 seconds after the last DIP switch is changed.

## EMC INSTALLATION GUIDELINES

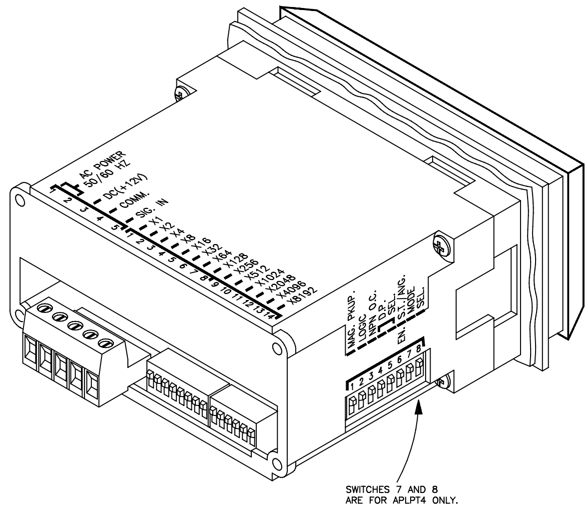
Although this unit is designed with a high degree of immunity to ElectroMagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the unit may be different for various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

1. The unit should be mounted in a metal enclosure, that is properly connected to protective earth.
   a. If the bezel is exposed to high Electro-Static Discharge (ESD) levels, above 4 Kv, it should be connected to protective earth. This can be done by making sure the metal bezel makes proper contact to the panel cut-out or connecting the bezel screw with a spade terminal and wire to protective earth.
2. Use shielded *(screened)* cables for all Signal and Control inputs. The shield *(screen)* pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground *(protective earth)*.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the unit and leave the other end of the shield unconnected and insulated from earth ground.
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.
4. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices *(or equivalent)* are recommended:

   **Ferrite Suppression Cores for signal and control cables:**
   Fair-Rite # 0443167251 (RLC #FCOR0000)
   TDK # ZCAT3035-1330A
   Steward #28B2029-0A0

   **Line Filters for input power cables:**
   Schaffner # FN610-1/07 (RLC #LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom #1VB3
   Corcom #1VR3

   ***Note:*** *Reference manufacturer's instructions when installing a line filter.*
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.




## WIRING CONNECTIONS

As depicted in the drawing showing the rear view of the Apollo Process Time Indicator, there is a terminal block where all wiring connections are made. All conductors should meet voltage and current ratings for each terminal. Also cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that power supplied to the unit (AC or DC) be protected by a fuse or circuit breaker. Remove the block for easy access to the terminal screws. To remove the block, pull from the back of the block until it slides clear of the terminal block shroud.

Enclosed with the PBLPT module is an adhesive backed label(s) showing the terminal block pin-out. This label is for wiring reference only, do not use for specifications. This label should be applied to the appropriate location by the user.

*CAUTION: The terminal block should NOT be removed with power applied to the unit. The module should not be removed from the LDD with power applied to the LDD or the module.*

## INPUT & POWER CONNECTIONS

Primary AC power is connected to Terminals 1 and 2 *(marked A.C. Power, located on the left-hand side of the block)*. For best results, the AC power should be relatively "clean" and within the specified ±10% variation limit. Drawing power from heavily loaded circuits or from circuits that also power loads that cycle on and off should be avoided.

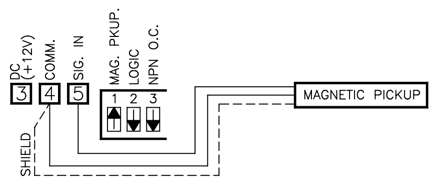
Terminal 3 is the *"DC" (+12 V)* terminal. This terminal is for sensor supply and can provide up to 100 mA of current. An external +11 V to +14 VDC can also be applied to this terminal to power the unit in the absence of A.C. power. Terminal 4 is the *"COMM." (common)* terminal, which is the common line to which the sensor and other input commons are connected. Terminal 5 is the *"SIG. IN" (signal in)* terminal. When the signal at this terminal goes low, a count will be registered in the unit. *(See "Input Ratings" under "Specifications" section.)*

## REAR PANEL DIP SWITCHES

As can be seen from the rear of the unit, there is a row of 14 DIP switches located beside the input and power terminal block. All of these DIP switches are Display Multiplier Increment Total *(DMIT)* switches. When the switch is *"ON"*, it will multiply the measured time between input pulses by the display multiplier it represents.

## CONNECTIONS & CONFIGURATION SWITCH SET-UP FOR VARIOUS SENSOR OUTPUTS

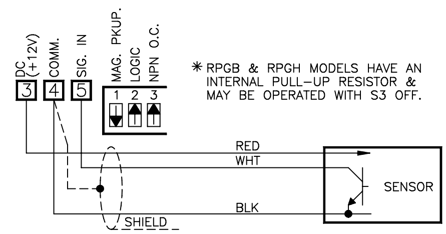
**MAGNETIC PICKUPS**



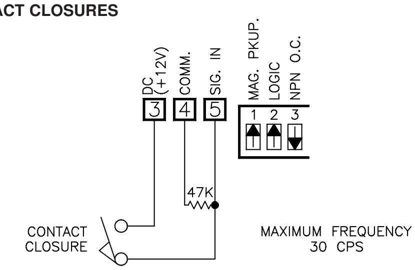

*Use 2-wire shielded cable for magnetic pickup signal leads.*

**SENSORS WITH CURRENT SINK OUTPUT (NPN O.C.)**

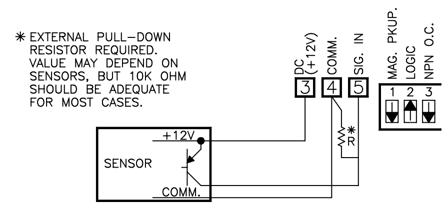
[Includes ASTC, LMPC, PSAC, RPGC, (RPGB, RPGH) * , LSC]



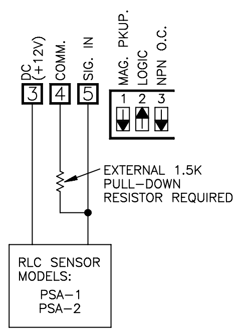

**INPUT FROM CONTACT CLOSURES**



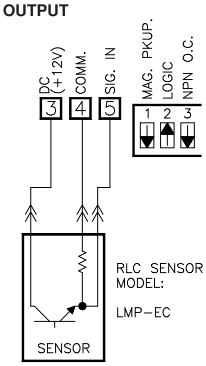

**SENSORS WITH CURRENT SOURCE OUTPUT (PNP O.C.)**



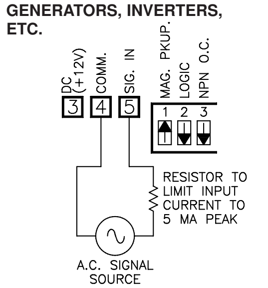

**TWO WIRE PROXIMITY SENSORS**




**SENSORS WITH -EF OUTPUT**

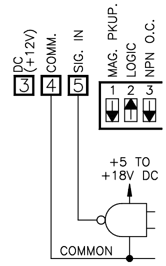



**A.C. INPUTS FROM TACH. GENERATORS, INVERTERS, ETC.**

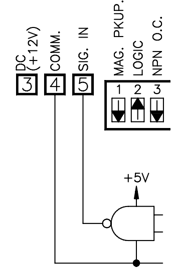



A.C. POWER SOURCE SUCH AS INVERTERS WITH MORE THAN 50V OUTPUT, SHOULD BE COUPLED WITH A STEP-DOWN ISOLATION TRANSFORMER.

**INPUT FROM CMOS & OTHER BI-POLAR OUTPUTS**




**INPUT FROM TTL**

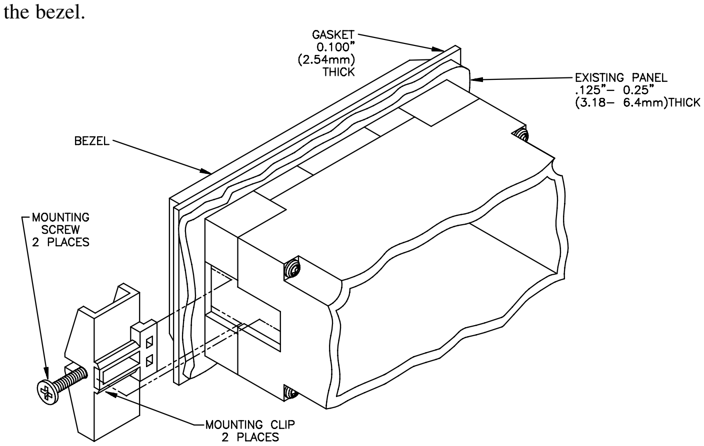



## INSTALLATION ENVIRONMENT

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.




## INSTALLATION

PBLPT installation information is contained in the LDD Bulletin. Refer to that bulletin for instructions on installing the module.

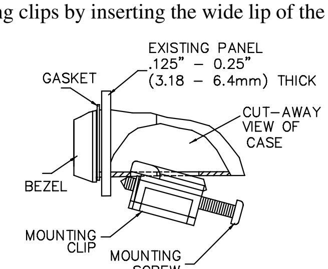
The unit meets NEMA 4/IP65 requirements for indoor use, when properly installed. The Apollo Indicators are intended to be mounted into an enclosed panel with a gasket to provide a water-tight seal. Two mounting clips and screws are provided for easy installation. Consideration should be given to the thickness of the panel. A panel which is too thin may distort and not provide a water-tight seal. (Recommended minimum panel thickness is 1/8".)

After the panel cut-out has been completed and deburred, carefully slide the panel gasket over the rear of the unit to the back of the bezel. Insert the unit into the panel. As depicted in the drawing, install the screws into the narrow end of the mounting clips.

Thread the screws into the clips until the pointed end just protrudes through the other side. Install each of the mounting clips by inserting the wide lip of the clips into the wide end of the hole, located on either side of the case. Then snap the clip onto the case.

Tighten the screws evenly to apply uniform compression, thus providing a water-tight seal.

*CAUTION: Only minimum pressure is required to seal panel. Do* ***NOT*** *overtighten screws.*



## DISPLAY MULTIPLIER SELECTION PROCEDURE

The APLPT/PBLPT has a Display Multiplier Selection range from 1 to 16,383. For the minimum scaled reading, the X1 DIP switch would be set to “ON”. For the maximum scaled reading (16,383 times the measured time between input pulses), all of the rear panel DMIT DIP switches would be turned “ON”. Therefore, a specific Display Multiplier Increment Total is achieved by adding up the appropriate individual display multiplier values.

Also available are four scale multiplier (SM) values of X1, X10, X100, and X1000, which are controlled by DIP switches 4 and 5 on the side of the unit. The X10, X100, and X1000 scale multiplier values can be used when the required DMIT exceeds 16,383. *Note: Always use the smallest SM value possible*. Below is a formula to compute the DMIT. *Note: This same basic formula applies to all units.* However, for the APLPT5/PBLPT5 the D.R. must be converted to a base unit of measurement.

DMIT = D.R. x P.P.S.
DMIT = Display Multiplier Increment Total
DR = Desired Reading (In hrs., mins., sec., days, etc.)
PPS = Pulses Per Second (input)

**NOTES:**

1. For the APLPT5/PBLPT5, the display value must be converted to its base units. To do this, multiply the value to the left of the dash by 60 and add it to the value to the right of the dash.
2. If the required DMIT value exceeds 16,383, then a scale multiplier value greater than 1 will be needed. But always use the smallest SM possible.

### EXAMPLE 1 (for APLPT4):

DESIRED READING = 18 minutes
PULSES PER SECOND = 450 pulses per second
DMIT = 18 x 450 P.P.S.
= 8100
DMIT = 8100

The required DMIT does not exceed 16,383, therefore, use a value of 1 for the S.M.

The appropriate display multiplier switches (which together add up to 8100), are then set to “ON”. Start by selecting the first increment which is greater than half the desired DMIT, and add subsequent increments that are more than half the difference needed.

DMIT = 8100

| | | | |
|---|---|---|---|
| DIP switch 13 . . . . . - | 4096 | Needed = | 4004 |
| DIP switch 12 . . . . . - | 2048 | Needed = | 1956 |
| DIP switch 11 . . . . . - | 1024 | Needed = | 932 |
| DIP switch 10 . . . . . - | 512 | Needed = | 420 |
| DIP switch 9 . . . . . - | 256 | Needed = | 164 |
| DIP switch 8 . . . . . - | 128 | Needed = | 36 |
| DIP switch 6 . . . . . - | 32 | Needed = | 4 |
| DIP switch 3 . . . . . - | 4 | | |

Therefore, DIP switches 3, 6, 8, 9, 10, 11, 12, and 13 would be set to “ON”.

*Note: If the desired reading is 18.0, the SM can be set for a value of 10. (To get the D.P. required, the unit must be powered down, then switches 7 and 8 set appropriately, then powered back up.)*

### EXAMPLE 2 (for APLPT5):

DESIRED READING = 2 hours and 23 minutes (2-23)
PULSES PER SECOND = 230 pulses per second

**First convert the D.R. to its base units.**

D.R. = 2 (hours) x 60 + 23
= 120 + 23
= 143

DMIT = 143 x 230 PPS
= 32,890
DMIT = 32,890 ÷ 10*
DMIT = 3,289

** Since the required DMIT does exceed 16,383, a value of 10 is used for the S.M.*

DMIT = 3289

| | | | |
|---|---|---|---|
| DIP switch 12 . . . . . - | 2048 | Needed = | 1241 |
| DIP switch 11 . . . . . - | 1024 | Needed = | 217 |
| DIP switch 8 . . . . . - | 128 | Needed = | 89 |
| DIP switch 7 . . . . . - | 64 | Needed = | 25 |
| DIP switch 5 . . . . . - | 16 | Needed = | 9 |
| DIP switch 4 . . . . . - | 8 | Needed = | 1 |
| DIP switch 1 . . . . . - | 1 | | |

Therefore, DIP switches 1, 4, 5, 7, 8, 11, and 12 would be set to “ON” for a display of 2-23. DIP switch 4 on the side panel must be set to “ON” to obtain the S.M. value of 10.

### BREAD BAKING APPLICATION

Loaves of bread are being baked in a continuous baking oven. It has been determined that 10 minutes and 30 seconds is normally required for a loaf to progress through the oven (this provides enough time for the loaves to be baked). An RPGC, with 60 PPR, is attached to one of the conveyor belt shafts. When the conveyor belt moves at the 10 min.-30 sec. rate, the shaft turns at 35 RPM. An APLPT5 is used to display the value of 10 min. and 30 sec. Using the formula, the required DIP switch settings are obtained.

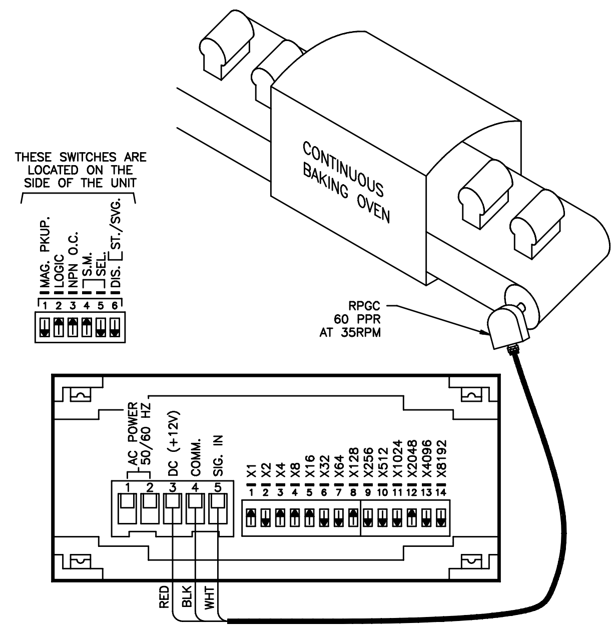
PPS = 60 PPR x 35 RPM = 2100 PPM ÷ 60
PPS = 35
DR = 10 min. & 30 sec. (convert min. to sec.)
DR = (10 min. x 60) + 30
DR = 630

DMIT = D.R. x P.P.S.
= 630 x 35
DMIT = 22,050
DMIT = 22,050 ÷ 10*
DMIT = 2,205

* A scale multiplier of 10 is selected because a value greater than 16,383 is required.

| | | | |
|---|---|---|---|
| DIP switch 12 . . . . . - | 2048 | Needed = | 157 |
| DIP switch 8 . . . . . - | 128 | Needed = | 29 |
| DIP switch 5 . . . . . - | 16 | Needed = | 13 |
| DIP switch 4 . . . . . - | 8 | Needed = | 5 |
| DIP switch 3 . . . . . - | 4 | Needed = | 1 |
| DIP switch 1 . . . . . - | 1 | | |

Therefore, DIP switches 1, 3, 4, 5, 8, and 12 must be turned “ON”. Also, DIP switch 4 on the side panel must be set “ON” to get a multiplier value of 10.



## *ORDERING INFORMATION*

| MODEL NO. | DESCRIPTION | PART NUMBERS FOR AVAILABLE SUPPLY VOLTAGES | |
|---|---|---|---|
| | | 230 VAC | 115 VAC |
| APLPT | Apollo 4-Digit Process Time Indicator | APLPT410 | APLPT400 |
| | Apollo 5-Digit Process Time Indicator | APLPT510 | APLPT500 |
| For more information on Pricing, Enclosures & Panel Mount Kits refer to the RLC Catalog or contact your local RLC distributor. | | | |

## PERSONALITY MODULE

| MODEL NO. | DESCRIPTION | PART NUMBERS |
|---|---|---|
| | | 115/230 VAC |
| PBLPT * | Apollo 4-Digit Process Time Module for use with the 4 digit Large Digit Display | PBLPT400 |
| | Apollo 5-Digit Process Time Module for use with the 6 digit Large Digit Display | PBLPT500 |

* Requires an LDD for use.

# *TROUBLESHOOTING*

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

## 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.

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

Red Lion Controls BV
Basicweg 11b
NL - 3821 BR Amersfoort
Tel +31 (0) 334 723 225
Fax +31 (0) 334 893 793

Red Lion Controls AP
31, Kaki Bukit Road 3,
#06-04/05 TechLink
Singapore 417818
Tel +65 6744-6613
Fax +65 6743-3360