LPE & LPM
Users Manual
(VERSION 2.2, DATED OCTOBER 2012)

LPM- GREEN LCD

LPE- SHOWN WITH OPTIONAL SANITARY CASE

LPM-REFLECTIVE

LPE-GREEN LED

LPE-RED LED

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HOW TO USE THIS MANUAL

This manual details the operation of the LPE & LPM. This includes both the microcontroller and non-microcontroller versions. Due to the different configurations that can be ordered some portions of this manual may not apply to the unit you have purchased. The portions that do not apply should be skipped. Material is presented in four different sections: Introduction, Hardware Options, General Operation, and Quick Reference.

DESCRIPTION OF MODELS:

1. The **LPE** (**L**oop **P**owered L**E**D) uses unique circuitry to allow it to be Loop Powered (Powerless™) and its RS232**E** (if included) is only "**E**" complaint (± 5V Logic Levels). The **LPE** can also be powered by **USB** or other voltages including VAC & VDC.

2. The **LPM** (**L**oop **P**owered **M**eter) is the **LCD** equivalent of the **LPE** and it offers as an optional green or red loop powered backlite or none. Other than this, it is identical to the **LPE**. The **LPM** also has the same RS232E specs.

Once you learn one of the models, you have learned all!

Introduction – This section covers the basics of using the meters. All information necessary to unpack the unit and establish communications can be found here.

Hardware Options – Detailed connection diagrams for the meters showing how to hook up power, inputs, outputs and serial communication for the different models.

General Operation – This section explains the general operation of the meters. It explains how to calibrate the unit. If a ***microcontrolled*** unit is present the programming section can be found here.

Quick Reference – A troubleshooting guide, ASCII codes, application notes and technical data can be found here.

Tip: Should any problems arise while setting up the meters, refer to Sections 6.1 & 5.2.2.

CONTENTS

I. Introduction **5**
1. Loop Power Meter (LPM) **5**
1.1 LPE, LPM Features 5
1.2 Functional Overview 5
1.3 Common Questions 6
1.4 Revision History 7
2. Quick Start Guide **7**
2.1 Unpacking the Unit 7
2.2 Power Requirements 7
2.3 Applying Power to the Unit 8
2.4 Configuring the Serial Communication 8
2.5 Changing the Default Communication Settings 8

II. Hardware Options **10**
3. Power Options **10**
3.1 Non-Isolated Power Input 10
3.1.1 Loop Powered Model 11
3.1.2 5VDC Powered Non-Isolated 11
3.1.3 6-14VDC Powered Non-Isolated 11
3.1.4 USB Powered Non-Isolated 11
3.2 Isolated Power Input 11
3.2.1 5, 12, 24 & 48 VDC Isolated Model 11
3.3 Isolated 90-265VAC Powered Model 12
4. Serial Communication **12**
4.1 RS-232 Serial Communication 12
4.1.1 Hardware Handshaking 13
4.2 RS-485 Serial Communication 13
4.3 USB Communication 13

III. General Operation **14**
5. Hardware Calibration **14**
5.1 Zero Offset & Full Scale 14
5.1.1 NEMA 4X & Non-NEMA 4X Adjustment 14
5.2 Programming 14
5.2.1 Important Concepts 14
5.2.2 Resetting to Factory Defaults 15
5.2.3 Programming Instructions 15

CONTENTS

5.2.3.1 Command Format 15
5.2.3.2 LPM & LPE Command Set 16

IV. Quick Reference Guide 19
6. Quick Reference Guide.....19
6.1 Troubleshooting 19
6.2 ASCII Table 19
6.3 Mechanical Drawings…….....20-21
6.4 Ordering Information……..……...22-23

I. Introduction

This section begins with an overview of the features and options. It continues with a quick guide for unpacking, Communication setup is then discussed, along with commands for changing communication parameters.

Notes: 1. Also see description of models on page 2.

2. For ease of description, the **LPM** it is referred to here, but the instruction apply to all models.

1. Loop Power Meter (LPM)

The LPM Series of meters offers the latest technology in one easy-to-use package. The LPM has the ability to function as a stand-alone unit to display important process information. When the serial I/O option is included, the LPM becomes a powerful microprocessor-based DPM with scaling, zero offset, decimal point selection, and more. The LPM can also be used as a serial input remote display when interfaced with an appropriate device.

1.1 Features

- 4 ½ Digits (1.9.9.9.9) ½" LED or LCD
- Loop Powered, Low Burden or Externally Powered
- Mil-Spec, Nuclear & Industrial Grades
- Plastic or 100% Metal Housing Nickel Plated
- Captive Screw Terminal Connector
- Wide Zero & Span Adjustments
- Loop Powered Backlight
- NEMA 4X, EMI/RFI Gaskets
- RS232, 485, or USB I/O
- Remote Display with Serial Input
- No Input-Reflected Noise
- Stand Alone/SCADA/DCS Use

1.2 Functional Overview

A block diagram of the LPM is shown in ***Figure 1***. The unit is either loop powered or powered from an external voltage source. Analog inputs are conditioned, converted to digital and then sent to the CPU for processing. The CPU handles all data processing such as scaling and averaging. The data to display is then sent to a Display Coprocessor and finally to the display. Both incoming and outgoing serial communication is handled directly by the CPU.

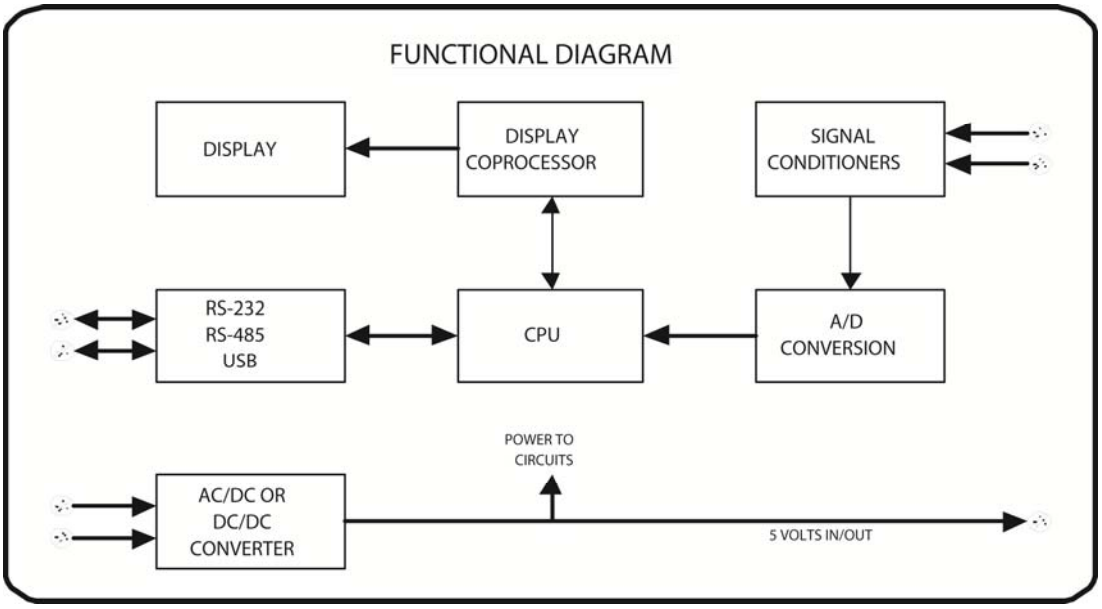


Figure 1: A simplified internal structure of the LPM series controller

1.3. Common Questions

Where can a LPM be used?

The LPM is extremely versatile and can be used in any number of situations where a Loop Powered Meter or remote display is needed.

Do I have to learn a programming language to use a LPM?

No. If serial I/O is not included with your unit, all that you need to do is connect + & - loop (loop powered) or your voltage supply and + & - signal. For units with serial I/O, the LPM comes preprogrammed, and all you need to learn are simple commands that change values such as scale and offset inside the software. The LPM uses commands similar to those found in our other products. Once you know the commands for one model, changing to another model is a snap.

Do I need a terminal to configure and communicate with a LPM?

Yes, but only when serial I/O is present. The more advanced functions found in the LPM must be accessed and changed through a terminal or other handheld device that can communicate in ASCII characters via RS-232, RS-485 or USB protocols.

What if I need a feature not found in the LPM?

OTEK offers software and product development. Our software, hardware and product lines are continuously expanding so custom features you want may already have been implemented. Dial (520) 748-7900 to speak to a representative and see how OTEK can address your needs. FAX your needs to OTEK Corporation at (520) 790-2808, or email sales@OTEKCORP.com.

1.4 Revision History

Date	Edition	Description	Software Revision
June, 2005	1st	New Publication	LPM V2.3/LEDPM V1.9
Aug. 2006	2nd	Discontinued	LEDPM/LPE Merged into One Product
April 2012	3rd	Update Entire Manual	LPM V2.3/LPE V.2.2
October 2012	4th	Update page 13 and 16	LPM V2.3/LPE V.2.2

2. Quick Start Guide

This section explains how to remove the LPM, from its box and put it into operation. The goal is to familiarize the user with the basic function of the LPM.

2.1 Unpacking the Unit

While unpacking the LPM, inspect it carefully for damage or missing items. If an item is missing or broken, contact your place of purchase immediately. The LPM shipping package contains:

(1) LPM
(1) User's Manual (this manual)

2.2 Power Requirements

Loop Powered Models:

- Maximum voltage drop: 4.5V (with red backlight)
- Maximum voltage drop: 5.5V (with backlight and serial I/O)
- Maximum input current: 36mA
- Minimum input current: 3.6mA (with microcontroller)
- Minimum input current: 3.0mA (without microcontroller)

VDC Powered Models:

- Loop burden: 0.5V @ 20mA; 25Ω
- Current requirement @ 5V: 1mA + backlight (20mA) (without microcontroller)
- Current requirement @ 5V: 10mA + backlight (20mA) (with microcontroller)
- Power input: USB, 5V, 6-28VDC (90-265VAC on request)

2.3 Applying Power to the Unit

Refer to the Power Supply Options in section 3 and the Ordering Information to determine which terminals power your particular model. To reduce the risk of shock or damage to the LPM make all connections with the power off.

NOTE: Non-microprocessor based models (no serial I/O) only require the "+" & "-" loop (2 wires).

2.4 Configuring the Serial Communication

The LPM supports the use of RS-232 ("**D**" & "**E**") (**E** only for LPM & LPE when Loop Powered), RS-485 and USB protocols. Refer to section 4 for a wiring diagram showing how to connect the communication network. The default settings for communication are:

9600 baud, 1 start bit, 8 data pits, no parity, 1 stop bit, no flow control

Any terminal program (emulator) that can receive and send serial I/O can be used such as Microsoft HyperTerminal™, Procomm, etc. With the serial lines properly connected apply power to the unit. The following power-on message will be transmitted:

LPM by OTEK
Version X.X
Address : 000

warming up.....

If this message does not appear, check to make sure the proper connections have been made to the unit. If you are having problems remember these facts:

- For RS-232 your TX is connected to the computer's RX & vice versa
- For RS-485 & USB the connections are 1:1
- For RS-485 don't forget the terminating resistor (120Ω)

Also check to make sure that the correct baud rate, flow control, and COM port settings are set in any communications software being used.

If necessary, hardware flow control may be used with serial communication. The wiring diagram in section 4.1 shows how to wire the LPM to simulate hardware handshaking. While true handshake signals are not being generated, a PC will send and receive serial data as if the LPM is generating the proper signals.

2.5 Changing the Default Communications settings

Note: Make sure you write down the new baud rate and address before the "WRITE" command is entered.

If a baud rate other than 9600 is desired, follow these simple steps to change the baud rate to a new setting.

1. Decide desired baud rate: 1200, 2400, 9600 or 19200.

2. Send the command:

   S000BAUDXXXX

   Where XXXX is the desired baud rate.

   The unit will respond with:

   R000*

   if the command is successful. The unit will show

   R000?

   if the command was not understood.

3. Switch the terminal emulator communications baud rate to the new baud rate.

4. Send the command:

   S000WRITE

   This will write the setting to the EEPROM making it the default when the unit is powered on.

   The unit will respond with:

   R000*

   if the command is successful. The unit will show

   R000?

   if the command was not understood.

This is the end to the quick start guide. For more information on functionality and programming of the unit, please refer to the Hardware and Programming sections.

II. Hardware Options

3. Power Options

This section covers the different hardware configurations of the LPM. It contains wiring diagrams for power, inputs and serial communication. This section should be used to verify that all connections are made properly and that the appropriate signal levels are being used.

The LPM has several different models, and not all models have the same functionality please refer only to the options specified for the particular unit being connected, per complete MODEL# vs. ordering information in section 6.4.

3.1 Non-Isolated Power Input

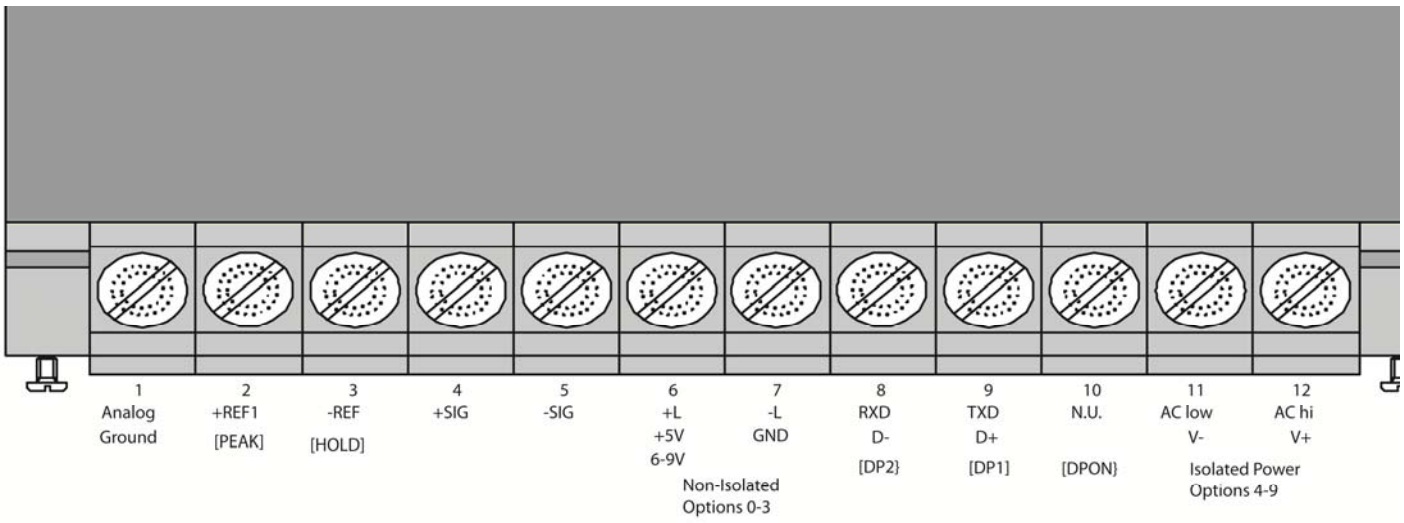
This section will explain how to power on your LPM. How your LPM receives power is dependent upon which model you have purchased. The following figure shows the terminal block on the back of the unit. This figure should be used to aid you in wiring the LPM. Remember, some power input options are not isolated from the signal inputs (see isolated power options section 3.2).

TERMINAL BLOCK

NOTE: Accepts Gauges 26-18

(With Serial I/O Mod: LPM-XXX-X1 through 4XX)

[Without Serial I/O Mod: LPM-XXX-X0XX]



Dec. Point	DPON	DP1	DP2
None	0	X	X
1.XXXX	1	1	1
1X.XXX	1	1	0
1XX.XX	1	0	1
1XXX.X	1	0	0

3.1.1 Loop Powered Model

WARNING: DO NOT connect to LPM with LIVE loop.

The loop powered model uses the terminals 6(+L) & 7(-L) for power and monitoring of the loop. The loop negative is attached to terminal 7 and loop positive to terminal 6. Terminal 7 is also the RS-232 ground; make grounding connections at only one point to avoid ground loops. **Do not connect to other terminals**.

TIP: An RS-232 isolator can be used to isolate the loop from the remote terminal.
Decimal Points: Connect per table and use Pin 7 (ground) for Logic "0" leave floating for Logic "1".
Peak, Hold: Leave open for no action, connect to terminal #10 (DPON) for enable. "DPON" must be floating (open).

3.1.2 Non-Isolated 5VDC Powered Model

The 5 volt DC powered unit uses terminals 7(GND) & 6(+5V) for power. The 5 volt source's ground is attached to terminal 7, and its positive 5 volts is attached to terminal 6. Pin 7 is also the serial I/O ground. On this model, "+" signal is connected to terminal 4 and "-" signal is connected to terminal 5. Terminals 5 & 7 (-Signal & Ground) are internally connected.

NOTE: Do not connect to terminal pins 1,2, 3 &10. This might affect the meter or damage it (Pins 1, 2, 3 & 10).

3.1.3 Non Isolated 6-14VDC Powered Model

The 6-14 volt DC powered unit uses terminals 7(GND) & 6(6-28V) for power. The voltage source's ground is attached to terminal 7 and its positive voltage is attached to terminal 6. Its input voltage range is 6-14VDC for the LPM and 6-9V DC for the LPE.

3.1.4 USB Powered Model

The USB-powered model receives its power from the computer USB port. The USB cable should be attached to terminals 8(D-), 9(D+), 7(GND) & 6(+5V). Terminal 8 is connected to D-, terminal 9 is connected to D+, terminal 7 is connected to ground and terminal 6 is connected to +5V of your **USB** port. Typical power drawn is 25mA for the **LPM** & **LPE.**

Note: If unit is USB powered, then the computer supplying power must always be on when the unit is to be used.

3.2 Isolated Power Inputs

3.2.1 5, 12, 24 & 48VDC Isolated Model

The 24VDC isolated power model has internal isolation between its signal input and power input. The negative voltage is attached to terminal 11(V-), and the positive voltage is connected to pin 12(V+). All inputs are ± 10% and power consumption is approximately 0.2W for the **LPE** & **LPM** .

3.3 Isolated 90-265VAC Powered Model

The A.C. power unit supplies the needed 5VDC to your unit from an A.C. source. The A.C. low is connected to terminal 11 and A.C. high is connected to terminal 12. Power consumption is approximately 0.2W for both the **LPE** & **LPM.**

4. Serial Communication

This section will explain how to hook up the serial communication on the LPM to a computer or any compatible device. The LPM has several serial communication options (USB, RS-232 and RS-485). The type of communication is model specific, so please refer to your ordering information to find out which, if any, is supported by your LPM. Since the LPM only has screw connectors, you must make an interface cable to your specific connector.

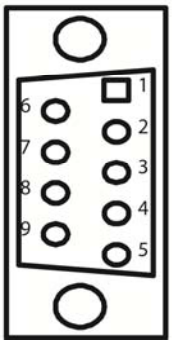
NOTE: The only difference between RS232**D** and RS232**E** is the output logic level of the meter. For RS232**D**, the output level is ±15V; RS232**E** has an output level of ±5V. Most computers and other equipment accept logic levels as low as ± 4V. When **Loop Powered**, the meter can only comply with RS232**E** (Parasitic).

4.1 RS-232 Serial Communication

The following figures will aid in connecting serial communication.

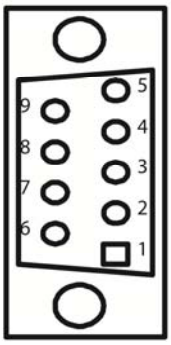
MALE

1. No Connection
2. RXD Receive Data
3. TXD Transmit Data
4. No Connection
5. Ground
6. No Connection
7. RTS Request To Send
8. CTS Clear To Send
9. No Connection



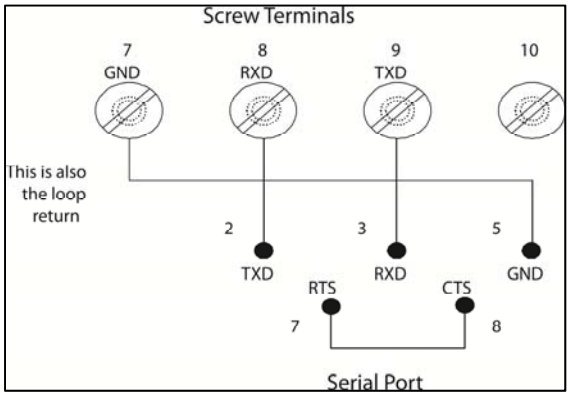
FEMALE

1. No Connection
2. RXD Receive Data
3. TXD Transmit Data
4. No Connection
5. Ground
6. No Connection
7. RTS Request To Send
8. CTS Clear To Send
9. No Connection



CONNECTION DIAGRAM

Note: RTS (#7) and CTS (#8) only required for RS232 E (Digit 5, Option 1) Parsitic.



The connections for RS-232 are as follows:

- Pin 5(ground) on the serial port goes to terminal 7(ground) on the LPM
- Pin 2(RXD) on the serial port is connected to terminal 9(TXD) on the LPM.
- Pin 3(TXD) on the serial port is connected to terminal 8(RXD) on the LPM.

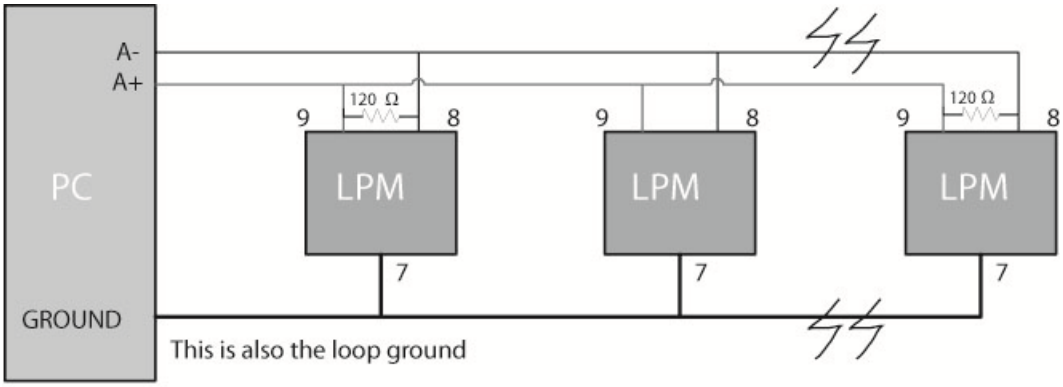
TIP: If the meter is not communicating, try reversing the RXD and TXD lines.

4.2 Hardware Handshaking

The LPM does not generate the hardware-handshaking signals RTS and CTS. However, these signals can be simulated if needed for your particular application. On the serial port connector on the computer side, connect the RTS and CTS lines together. This way, whenever the computer requests to send, it will immediately get a clear to send and communication will occur.

4.3 RS-485 Serial Communication

The normal value for the **terminating resistor** for RS-485 is 120Ω.



The connections for RS-485 are as follows:

- Computer Ground goes to terminal 7(ground) on the LPM
- Computer A- is connected to terminal 8(D-) on the LPM
- Computer A+ is connected to terminal 9(D+) on the LPM.

TIP: If the meter is not communicating, check to make sure A+ and A- are wired correctly.

4.4 USB Communication

The LPM is considered a "client" and your PC or HUB the "host." Modern computers should have no issues with communication. With older computers, you will need to download the drivers from our website (http://www.otekcorp.com). Once the drivers are installed, you will be able to use a terminal emulation program to communicate with the meter. It will appear as an additional comport on your computer.

The connections for USB are as follows:

- Terminal 8 is connected to D-
- Terminal 9 is connected to D+
- Terminal 7 is connected to ground
- Terminal 6 is connected to +5V (only if the computer will be supplying power to the unit)

NOTE: If you power the meter with **USB** (Option 3) and turn the PC off, you will be powering off the meters. **USB** normally can supply 0.5A per port. Theoretically, you could power up to 20 LPEs or LPMs from one **USB** port.

III. General Operation

5. Hardware Calibration

The LPM can be calibrated in software when the serial communication option is ordered. Otherwise, calibration and offset can be manually adjusted as described in section 5.1.

5.1 Zero Offset & Full Scale

5.1.1. NEMA 4X & Non-NEMA 4X adjustment

The adjustment screws can be found inside the two holes on the front of the panel near the display. If you have ordered a NEMA *4X compliant unit, the screw holes will be missing. Remove the unit from its housing.* ***Full scale adjustment is on the left, and*** **zero/offset is on the right**. A small, flat-tip screw driver is used to turn the screws: clockwise to increase, and counter-clockwise to decrease. For example, if you are measuring a 4-20mA loop but you want a zero offset of 200 units and a span of 10000 units (maximum reading being 10000 at 20mA), you would do the following:

Apply power to the unit and supply the signal that corresponds to 0 (in this case 4mA). Adjust the ZERO screw until the unit reads 200, this offsets the zero point. You would then supply the signal that corresponds to the maximum signal (in this case 20mA). Adjust the span screw until the unit reads 10000. In this way you have calibrated the unit for the desired zero offset and span. If you have a NEMA 4X unit replace it in its housing at this time.

Note: Always calibrate for zero before span and check midpoints for linearity check.

5.2 Programming

Only units with built-in serial communication have the ability to be programmed via a terminal. The default communication settings are:

9600baud, 1 start bit, 8 data pits, no parity, 1 stop bit, no flow control.

5.2.1 Important Concepts

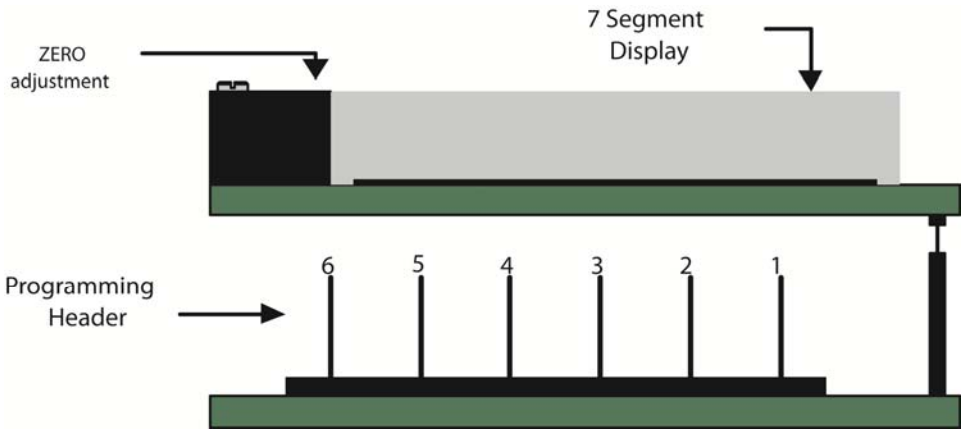
- The LPM communicates using ASCII.
- Every unit has a default address of 000. Even after this address is changed to another value, the unit will still respond to 000 or the new address. This feature can be used if the user has forgotten the address that was assigned, or to program multiple units at that same time.

5.2.2 Resetting to Factory Defaults

If it is desired that the unit be reset to its factory defaults because of an unknown communication error, there are two ways to do this.

A) If communication is still present, send the command S000default.

B) If communication is not present, you must power off the unit and remove it from its casing. A jumper wire can then be used to jumper pin 6 on the programming header to pin 1 on the programming header. The programming header is located right below the zero adjustment on the second board. The following illustrations show the location of the programming header:



Turn power off to the unit. After the jumper wire is in place, power the unit on and off again. This will cause the unit to reset back to factory defaults. Remove the jumper wire and return the unit to its casing.

5.2.3 Programming Instructions

The letter 'S' and the unit's address must precede all commands sent to the LPM. Commands are not case-sensitive. After receiving a command successfully, the unit will respond with "r<addr>*." If the unit doesn't understand the command, it will respond "r<addr>?."

5.2.3.1 Command Format

S[XXX][COMMAND][ARGUMENT]

'S'	precedes every command sent to the unit
'XXX'	is the unit's address
'COMMAND'	is the command to be executed
'ARGUMENT'	is used if the command accepts an argument

5.2.3.2 Command Set

WARNING: Before changing settings, print the present configuration using the **"SHOW"** command for backup purposes.

COMMAND	WHAT IT DOES	EXAMPLE
ADDR[address]	This command changes the unit's address. The address must be in ASCII and have a minimum of two and a maximum of six characters. If the command is given without an argument, the address is changed to NULL, i.e. meaning the unit has no address. Leading zeros are stripped from the assigned address.	S000ADDR045 This command changes the units address from 000 to 45. The unit will now only respond when S45 or S000 precedes a command. S45ADDR This sets the unit's address to NULL. Even though the address is now NULL 'S' must still precede every command sent to the unit.
AVG[X]	This command is used to average x number of samples before displaying them on the LCD. Valid arguments are 0, 4 and 16.	S000AVG0 This turns the built in averaging off. S000AVG4 This activates the running averager for 4 samples.
BAUD[baudrate]	This command changes the baud rate of the unit. After execution of this command unit changes its baud rate immediately, so the subsequent commands must be sent with the new baud rate. The default baud rate is 9600 and valid arguments are 1200, 2400, 4800, 9600, 19200 or 19.2K**. Don't forget to change your PC's baud rate**.	S000BAUD19.2K This changes the unit's baud rate from 9600 to 19200.
CH1[ON/OFF]	This command will turn on or off the A/D conversions being sent to the display. To use as a remote display, turn this off. Otherwise turn it on.	S000CH1ON This will send the A/D conversions to the display.
CHN1[XXXX]	This command will display on the LCD an alphanumeric value that is 4 characters long. To switch back to normal display, send CHN1 with no argument. Note: If the character is invalid (cannot be shown on 7 segments), the LPM will not accept it.	S000CHN1PASS This command will display the word PASS on the LCD. S000CHN1 This command will switch the LCD back to displaying A/D values.
DEFAULT	This command resets the unit to its factory defaults. This command has no arguments.	S000DEFAULT **WARNING!** This will reset the unit and erase the EEPROM date. All user settings will be lost upon execution of this command.
DFIX1[n]	This command sets the number of digits after the decimal point. Valid arguments are 1, 2, 3 and 4.	S000DFIX1 This will select the first decimal point on the display (1XXX.X).

DIAG	This command runs the diagnostic test on the display. This command does not have any arguments.	S000DIAG This will test the LCD by running through a display diagnostic.
ECHO[ON/OFF]	This command turns echoing on or off. If echo is turned off, the LPM will not relay back any command information but will still accept commands. When turned on, the LPM will echo back the commands that are sent to it. Valid arguments are ON or OFF.	S000ECHOOFF This will turn off the echoing of commands.
HELP	This command prints a list of valid commands. This command does not have any arguments.	S000HELP The unit will respond with a list of all commands.
HOLD[ON/OFF]	This command holds the LCD display value by turning off the A/D conversion. Valid commands are ON or OFF.	S000HOLDON This command will cause the unit to hold the last value in the LCD.
LIN1	This command turns linearization on and off. Options are: OFF, USER TABLE, RTPC, ANSI, USER POLY, JC, KC, TC, EXP, LOG and POW.	S00 LIN1TC
OFFSET[n]	This command adds the offset specified to the value processed by the A/D conversion. This command can be used just like the hardware offset. Valid arguments are any number in the range -19999 to 19999. Offset will also accept the decimal representation of a fraction.	S000OFFSET100 This will offset the number displayed by positive 100
PEAK[ON/OFF]	This command turns peak detection on or off. With peak detection off, the LCD constantly changes to reflect the changing A/D result. When peak detection is on, the LCD will only display the peak value i.e. the highest value currently detected. Valid arguments are ON or OFF. **When you use the command SHOW and peak is on, the peak value will be shown.**	S000PEAKON The unit will now only display the largest value thus far obtained from the A/D conversion.
POLL[ON/OFF]	This command is used to enable/disable the polling-for-status command. If poll is off, then a continuous serial representation of the LCD information is broadcast (**in a RS-485 network no polling "POLLOFF" is not advised;** the constant transmission of data will overwhelm the network). If poll is on, then the unit is awaiting the status command to send LCD data. Valid arguments are ON and OFF **(see status command)**.	S000POLLON This command will cease the constant broadcast of serial data from the unit. The unit will still accept all commands but will only send A/D information when the **status** command is used.
SETBASE	Sets base of Log and POW.	S000SETBASE10
SETA<n> [ffff]	Sets user polynomial coefficients []= Shows current value of A<n> [ffff]= Sets A<n> value to [ffff] $0 \le n \le 9$	
SETX<n> [ffff]	Sets user table X coordinates []= Shows current value of X<n> [ffff]= Sets X<n> value to [ffff] $0 \le n \le 24$	

SETY<n> [ffff]	Sets user table Y coordinates []= Shows current value of Y<n> [ffff]= Sets Y<n> value to [ffff] $0 \leq n \leq 24$	
SCALE[n]	This command scales the output displayed on the LCD using a multiplying factor. This can be used in a similar way as the hardware scale. The final result is in the form: (A/D result) * (scale) = displayed value Valid arguments are -19999 to 19999.	S000SCALE2 This command will multiply the final A/D result by a factor of 2 and display it on the LCD.
SHOW	This command will show the settings for all user-programmable features on the LPM. The command accepts no arguments.	S000SHOW The unit will then respond with a listing off all programmed settings and their current value.
SHOWPOLY	Shows user-defined polynomial	
SHOWTABLE	Shows user-defined linearization table	
STATUS[n]	This command triggers the unit to send the last 'n' numbers processed by the A/D conversion. The valid inputs are in the range from 1 to 9.	S000STATUS4 After executing this command the LPM will send back the last 4 values processed by the A/D conversion. **(See POLL)**
TARE[ON/OFF]	This is the tare value, which is subtracted from the processes A/D conversion. When tare is set the current processed value is taken as the tare value. From this point on, the tare value is subtracted from every processed A/D value. When tare is off the subtraction no longer occurs. Valid arguments are ON or OFF.	S000TAREON If the current A/D value was 200 and a subsequent value after the command was issued was 400 then the unit would show and transmit 200.
WRITE	This command writes the current configuration data to the EEPROM. This allows the unit to go back to its user-programmed settings when power is lost. Otherwise, a loss power means these settings will be lost. There are no arguments for this command.	S000WRITE This command saves the user configurable settings to EEPROM. These settings are address, baud, averaging, echo, tare, scale, offset, polling and decimal point.

IV. Quick Reference Guide

6. Quick Reference Guide

This section contains a troubleshooting guide, accepted ASCII codes, mechanical drawings, application notes and ordering information.

6.1 Troubleshooting

SYMPTOM	SOLUTION
No startup message on serial port	Check power connections. Make sure the TXD, RXD or D-, D+ lines are wired properly. Verify communications protocol for baud rate, parity, number of start/data/stop bits. (8N1)
Garbage appears instead of a startup message	Check communications protocol for proper baud rate, parity, number of start/data/stop bits. Standard settings are 8N1, 9600 baud.
Characters sent to unit appear twice on terminal	Turn off LOCAL ECHO.
After the startup message, the unit does not respond to the commands	Make sure the RXD or D- line is properly connected. Check communications software for proper settings.
Analog input reading does not change	Check connections between unit and input signal. Check connections between unit and input. Unit on hold? Peak?

6.2 Accepted ASCII TABLE

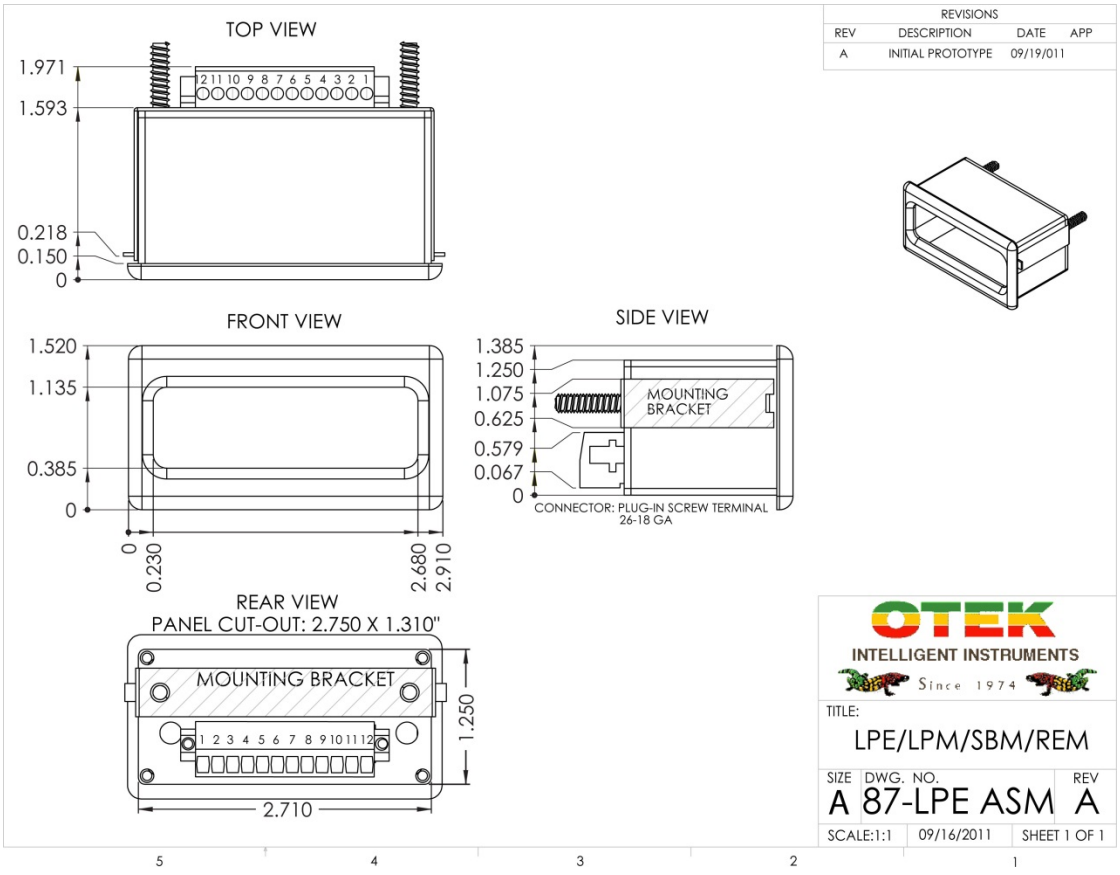
This table shows the ASCII equivalent of decimal and hexadecimal inputs that the LPM can understand and display. Some values not shown are understood by the LPM but cannot be displayed on the 7 segment display. Both the upper and lowercase decimal and hexadecimal values are shown for the alphabetic characters but only the ASCII characters shown will be displayed (the displayed characters are not case sensitive). **NOTE:** The 7 segment display **cannot** display the G character.

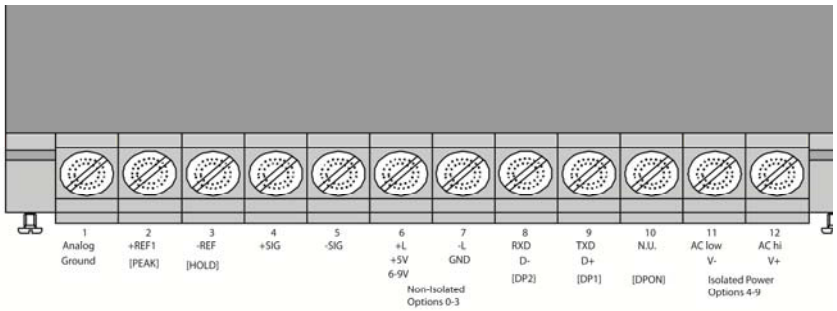
Decimal	Hexa-decimal	ASCII
48	30	0
49	31	1
50	32	2
51	33	3
42	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9

Decimal		Hexa-decimal		ASCII
65	97	41	61	A
66	98	42	62	b
67	99	43	63	C
68	100	44	64	d
69	101	45	65	E
70	102	46	66	F
72	104	48	68	H
73	105	49	69	I
74	106	4A	6A	J
75	107	4B	6B	K
76	108	4C	6C	L
77	109	4D	6D	M
78	110	4E	6E	n

Decimal		Hexa-decimal		ASCII
79	111	4F	6F	o
80	112	50	70	P
81	113	51	71	q
82	114	52	72	r
83	115	53	73	S
84	116	54	74	t
85	117	55	75	U
86	118	56	76	v
87	119	57	77	W
88	120	58	78	X
89	121	59	79	y
90	122	5A	7A	Z

6.3 Mechanical Drawings





Dec. Point	DPON	DP1	DP2
None	0	X	X
1.XXXX	1	1	1
1X.XXX	1	1	0
1XX.XX	1	0	1
1XXX.X	1	0	0

6.4 Ordering Information

LPE SERIES ORDERING INFORMATION 11-10-11

NOTE: Please READ BEFORE building part number:

1. If digit 3 is 0 or 6, then digit 2 must be 0,8, A, B, Y or Z (and conversely) and digits 5 & 6 must be 0.
2. See notes on bottom of page.

Model: LPE - 1 2 3 4 5 6 7 8

GRADE (1)
- I.....Industrial
- M.....Mil-Spec
- N.....Nuclear (Contact Otek)
- S.....Intrinsically Safe
- 9.....Custom (Contact OTEK)

INPUT TYPE FULL SCALE (2)
- 0.....4-20mA Loop Powered
- 1.....External Power 4-20mA
- 2.....External Power 2mA F.S.
- 3.....External Power 20mA F.S.
- 4.....External Power 200mA F.S.
- 5.....External Power 2V F.S.
- 6.....External Power 20V F.S.
- 7.....External Power 200V F.S.
- 8.....50-440 Hz Signal Powered
- 9.....Custom (Contact OTEK)
- A.....Signal Powered 4-30VDC
- B.....AC Watts Signal Powered
- C.....±200mVDC
- D.....±50mVDC
- E.....200mV RMS
- F.....2V RMS
- G.....20V RMS
- H.....200V RMS
- J.....50mV RMS
- K.....2mA RMS
- L.....20mA RMS
- M.....200mA RMS
- N.....5 Amp RMS
- P.....Strain-Gage (<1 K Ohm)
- Q.....Strain-Gage (>1K Ohm)
- R.....RTD (PT100)
- S.....TC (Type J)
- T.....Frequency (40-20 K Hz Line)
- U.....% RH (Specify Sensor)
- V.....pH (0-14.00)
- W.....ORP (0-2000mV)
- X.....High Speed Peak & Hold (2VDC)
- Y.....VAC Signal Powered (P.T.)
- Z.....AAC Signal Powered (P.T. & C.T.)

RANGE/CALIBRATION
- 0.....Standard
- 9.....Custom (Contact OTEK)

CASE STYLE (5)
- 0.....Metal
- 1.....Metal NEMA 4X
- 2.....Sanitary
- 4.....Standard Plastic
- 9.....Custom (Contact OTEK)

POWER FOR TRANSMITTER (3)
- 0.....None
- 1.....(200mA).....Included

SERIAL I/O (2, 4)
- 0.....None
- 1.....Parasitic (Loop Powered) RS232E
- 2.....Powered RS232D
- 3.....Powered RS485
- 4.....Powered USB
- 9.....Custom (Contact OTEK)

POWER INPUT (4)
- 0.....Non-Isolated Powerless™
- 1.....Non-Isolated 5VDC
- 2.....Non-Isolated 6-32VDC
- 3.....Non-Isolated USB Powered
- 4.....Isolated 5VDC +/- 10%
- 5.....Isolated 6-32VDC +/- 10%
- 6.....Signal Powered(For 8,B,Y,Z on Dig 2)
- 8.....Isolated 90-265VAC
- 9.....Custom (Contact OTEK)

NEW: 2-500 VDC Multirange! Use #9 on 2nd digit & specify multirange.

Other Case Compatible Models:
PM, BCDPM, LPM, LPE,
HI-QREM, SBM

NOTES:

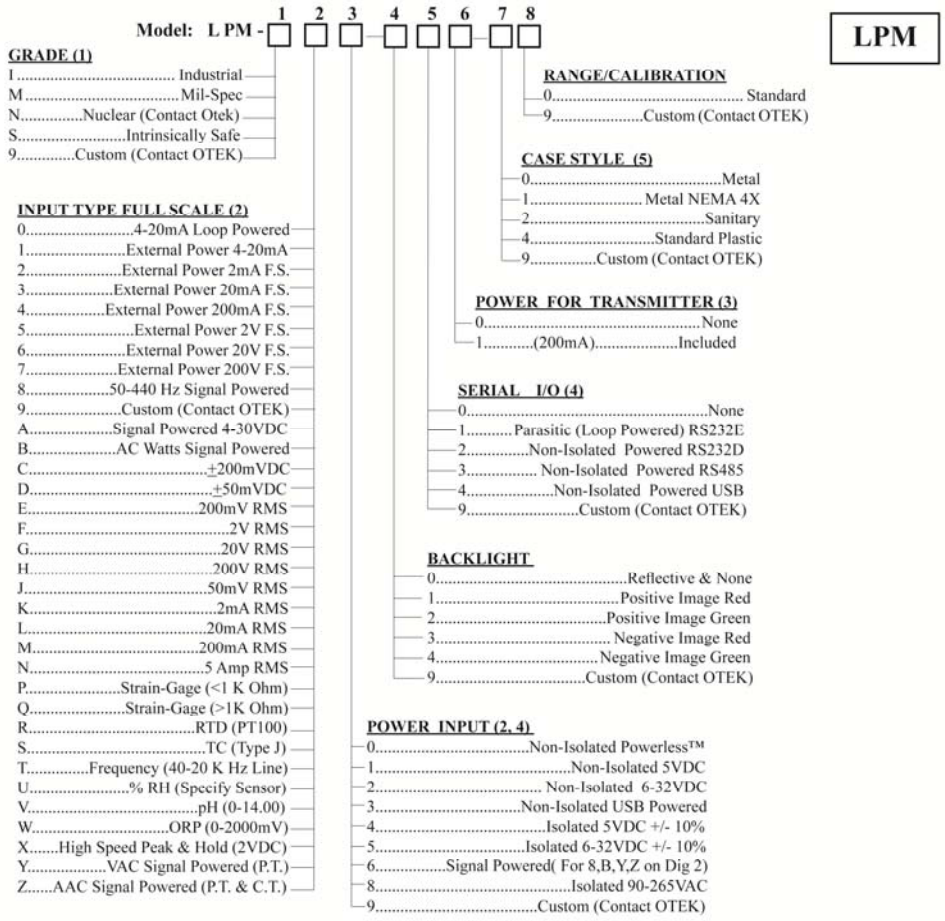
1. Contact OTEK for M, N & S Grades. **"Intrinsically Safe"** by design. No Certificate Available Until Further Notice. Otek will build to certain nuclear or MIL-standards but testing and confirmation of compliance, if required, will need to be done by a third party and at customer's expense.
2. Option S must specify range of interest within 300° (F or C) span. Contact OTEK for other RTD/TC types. For Pwerless AC Watts use #9 and specify.
3. Power for transmitter (28VDC@20mA) NOT available with powerless input.
4. Only RS232E is available with **Signal Powered**, others powered. Must have serial I/O to implement processor's functions (if required).
5. Maximum of 3 Units Inside Sanitary Case. Specify Option 9 and Describe.

*See User's Manual at www.otekcorp.com/otekdwnld/lpm-ledpmmanual.pdf

LPM SERIES ORDERING INFORMATION 11-10-11

NOTE: Please READ BEFORE building part number:

1. If digit 3 is 0 or 6, then digit 2 must be 0,8, A, B, Y or Z (and conversely) and digits 5 & 6 must be 0.
2. See notes on bottom of page.



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