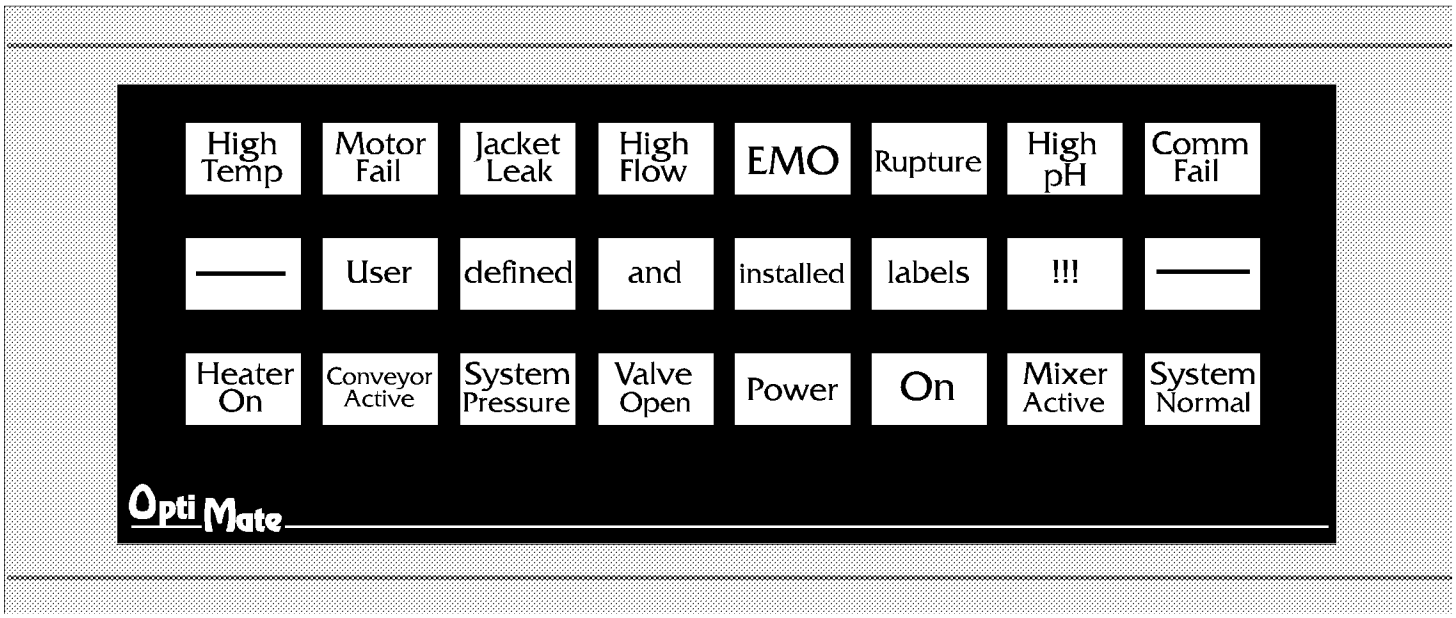


OM1124 Annunciator/ Lamp Module

General Overview

The OM1124 Annunciator/Lamp Panel provides a standard modular solution to custom panel indicator requirements. The panel features 24 user-legendable, high intensity LED light bars arranged in three rows of eight lamps. Each of the lamps can be individually controlled to be on, off, or flash.

Lamps can be custom labeled by the user with a plastic insert. The insert can be legended with text and/or graphics, and slipped into a protective pocket behind the faceplate.

The OM1124 Annunciator/Lamp Panel is part of Optimation's **OptiMate**® series. Each OptiMate module is designed to connect to a microprocessor or most PLC's with a single cable connection. OptiMate modules can be used individually, or together with any combination of other OptiMate modules.

When used with a microprocessor system, simple communications over either an RS232 or RS422 communications cable allow the microprocessor to directly control each lamp.

When used with a PLC, operation is transparent to the user. All the user must do to totally control lamp operation is write the required lamp states to PLC registers. The OM1124 takes care of the rest.

Applications

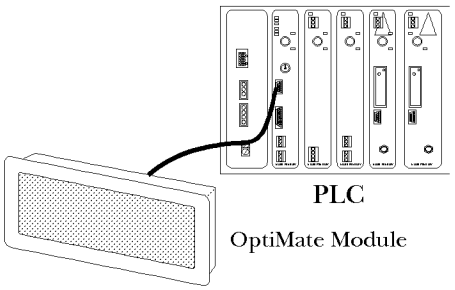
- Machine control
- Process control
- Security systems
- HVAC
- Plant monitoring/control
- PLC applications
- Microprocessor applications

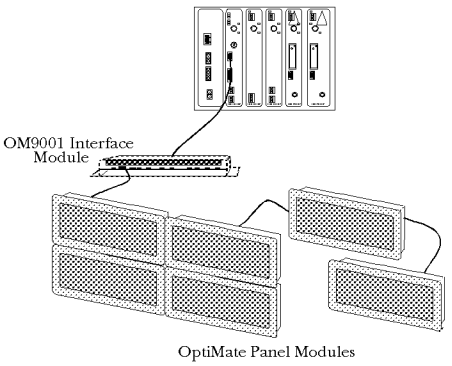
Features

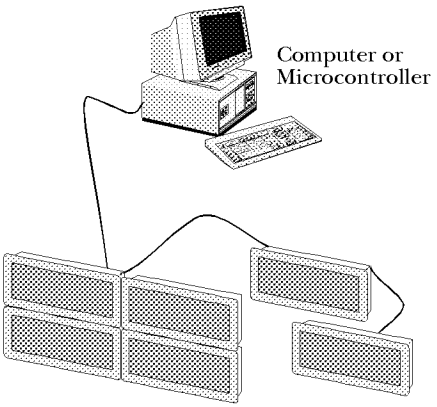
- 24 Plug-In LED Light Bars
- Steady on or synchronized flash mode
- Red, green, or yellow colors
- PLC compatible
- RS232/RS422 communications
- Stand alone operation capable
- Multimodule operation capable

Contents

Configuration Options







PLC Stand Alone

OptiMate modules plug directly into most PLCs. A simple cable connection allows you to interface and control the OptiMate module via PLC data registers.

The OM1124 annunciator module uses a bank of PLC registers. The exact number of registers used depends on the options selected. A fully implemented configuration uses a total of 4 PLC registers to control lamp on/off and flash conditions. The OM1124 continuously reads the PLC registers and updates lamp operation on a real time basis.

PLCs are slave devices on their standard communications ports. This means that a panel attached to the standard port must control the transfer of information by reading and writing the PLC registers. OptiMate modules will perform these communications for most major PLC protocols. Configuration for particular PLC protocols and interconnect cabling is covered in the following pages.

PLC Multi Modules

Larger systems involving operator panels can be successfully addressed using OptiMate modules. These applications utilize the OM9001 Communications Master to transfer data between the PLC and the individual OptiMate modules. OptiMate modules can be located together to form custom panels or they can be distributed anywhere within 4000 feet.

The OM9001 Communications Master provides a transparent interface between the PLC and a group of OptiMate modules. The communication interface between modules requires only four wires.

System configuration is simple via an interactive configuration program that runs on any IBM PC compatible computer.

This modular approach to custom applications provides a nearly limitless number of possibilities.

Microprocessor Based Systems

OptiMate modules can interface directly to most computers or microcontrollers. The modules communicate over either RS422 or RS232 serial communications. All that is required to interface OptiMate modules is a serial port. The OptiMate Hex communications protocol, detailed in this document, allows the user to directly control lamp on/off and flash states.

Since each module has its own unique address, up to 31 modules can be interfaced on one communications cable.

In a microprocessor-based system, the host microprocessor is the system master. The OptiMate modules are slave devices that respond to commands from the host. In the case of the OM1124, these commands are control messages that dictate which lamps will be on and if flash is selected.

Communications over RS422 allows placement of modules anywhere within a 4000 foot cable distance. Modules can be grouped together to form a panel. Modules can be grouped in several clusters all on the same communications cable.

Use with a PLC

Memory Mapping

Memory mapping is a technique that "maps" the memory of an OptiMate module into the holding registers of the programmable controller. By knowing where the data of the specific OptiMate module is mapped, this data can be moved, changed or monitored using ladder logic.

The term PLC register is used by Optimation for the area of memory within the programmable controller that can be used for data storage. PLC registers are sometimes known as data registers or internal registers.

MSB															LSB
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

PLC Register

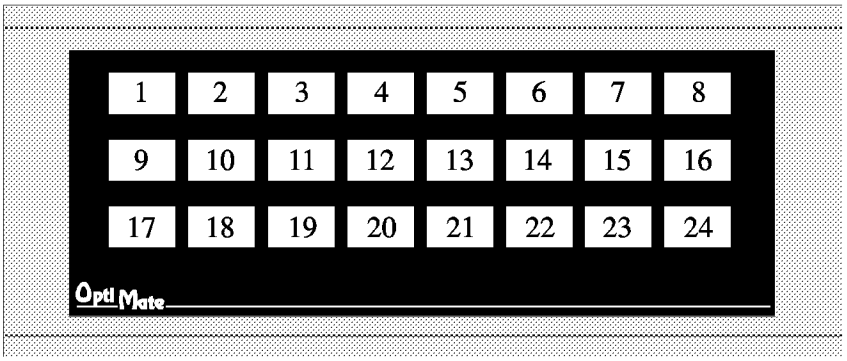
The OM1124 Annunciator/Lamp Module uses a bank of 2 to 4 contiguous holding registers (depending on the configuration selected by the user). The register set definition is shown in the table below.

OM1124 Annunciator/Lamp Module PLC Register Map

Holding Register	Register Function
X (first register of bank)	Lamps 1-16 on/off control
X+1	Lamps 17-24 on/off control
X+2	Lamps 1-16 flash
X+3	Lamps 17-24 flash

Register	MSB															LSB	
X	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	On/Off Control
X+1									24	23	22	21	20	19	18	17	
X+2	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Flash Control
X+3									24	23	22	21	20	19	18	17	

Register Bit/Lamp Association



Configuration

Configuration of the OM1124 or system of OptiMate modules is performed via an IBM PC compatible computer. Optimation supplies configuration software that will allow you to select module configuration, system configuration and PLC protocol definition.

Every OM1124 module uses at least two registers for on/off control. Two additional registers may be selected for flash control (.5 seconds on .25 seconds off). Regardless of the number of registers selected they will always be contiguous as shown in the tables.

If the module is to be operated in stand alone mode, with a PLC, the configuration selections must be made to select the proper PLC protocol information. If the module is part of a multi-module system, the configuration editor will automatically configure the module for the following

- OptiMate Hex (serial slave, 19200 baud, 8 bits, 2 stop bits, no parity)

When configuring, always remember to set the module address to address 31 (switches 1-5 on). ***Once configured, change the address setting***. If the module operates stand alone, change the address to anything other than 31. If the module is part of a multi-module system, change the address to whatever you have configured the module for.

Further configuration details are covered in the Optimate Configuration Editor manual.

Turning on a Lamp

Once the module is configured and connected to the PLC, turning on a lamp simply requires the writing of a '1' to the appropriate register bit. The register bit association is shown in the table on the lower left-hand section of this page. The OptiMate module will automatically retrieve the register data and light any lamps whose bits are set.

A lamp must be turned on in order for the flash control bits to have any effect.

Turning on Lamp Flash

As shown in the table to the left, the second pair of registers will initiate lamp flash. To flash a lamp, both the lamp on and lamp flash bits must be set.

Lamp flash is approximately .5 seconds on and .25 seconds off.

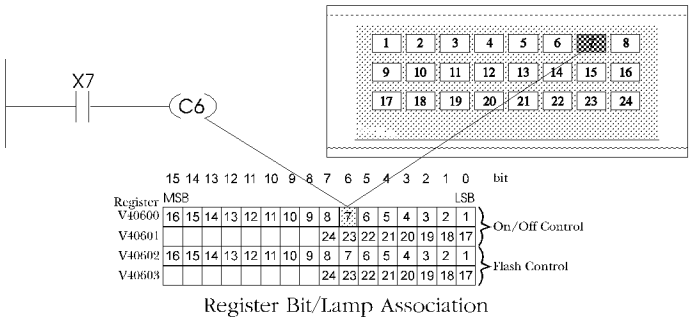
Examples of Use with a PLC Direct PLC

Turning on a Lamp

The simplest method of turning on a lamp in a PLC Direct PLC program is to configure the module base address in the PLC's control relay memory. The following table lists the address for various PLC Direct PLCs.

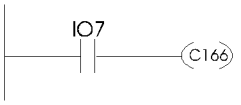
PLC Direct CPU	Control Relay Register address range
DL230	V40600-V40617
DL240	V40600-V40617
DL330	R016-R037
DL330P	R016-R017 and R020-R027
DL340	R016-R037 and R100-R106
DL430	V40600-V40635
DL440	V40600-V40677

The following example illustrates the use of an OM1124 with a DL205 or DL405 PLC. In this example, the module has been configured with a PLC base register address of 40600. When input X7 is energized, C6 will become active and turn on Lamp 7.

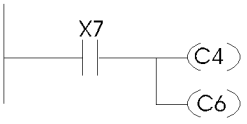


Register Bit/Lamp Association

The illustration on the right is the same example for a DL305 PLC with base adress 16.



The example to the right illustrates the control of two lamps, lamps 5 and 7, based on the state of input X7.



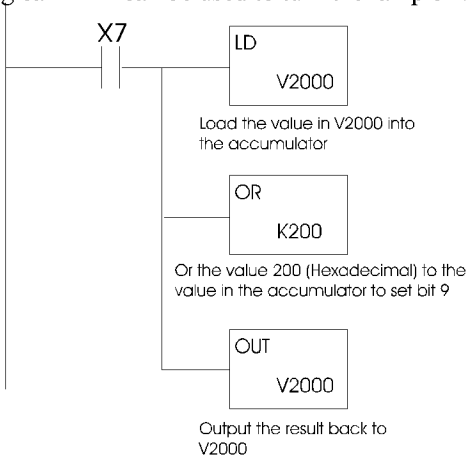
Using General Data Registers

The OM1124 can be mapped to general data registers (V memory in the 205/405 families and data words in the 305). If you configure the OM1124 to use this type of general purpose memory, to turn on a particular light you simply need to set the appropriate register bit. This can be done by using the OR instruction. To turn off the light, clear the bit (use the AND instruction.

The following table lists the general data register memory for various PLC Direct CPUs.

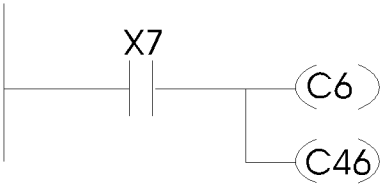
PLC Direct CPU	Data Register Memory address Range
DL230	V2000-V2377 and V4000-V4177
DL240	V2000-V3777 and V4000-V4377
DL330	R400-R563
DL330P	R400-R563
DL340	R400-R563 and R700-R767
DL430	V1400-V7377
DL440	V1400-V7377 & V10000-V17777

The example (below) shows a 205/405 PLC with the OM1124 configured for a PLC base address of 2000. When X7 is energized, lamp 10 will be turned on. An equivalent set of logic, using a logical AND can be used to turn the lamp off.



Flashing a Lamp

To flash a lamp, you turn it on and also set the associated flash bit. The example below shows a 205/405 program used to flash lamp 7 whenever X7 is energized.



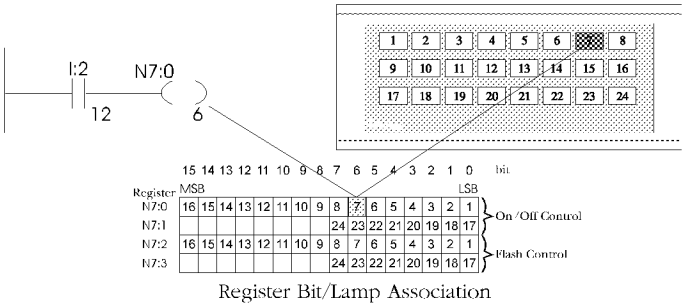
Examples of Use with an Allen Bradley PLC

Interfacing to A/B PLC Memory

OptiMate modules interface to Allen Bradley SLC 5/03, SLC 5/04 and Micrologix PLCs via integer file type N. The 5/03 and 5/04 have file type N7 as standard. Other "N" type files can be created. The Micrologix has a fixed file type N7. Please refer to Allen Bradley programming documentation for information on setting up and using "N" type files.

Turning on a Lamp

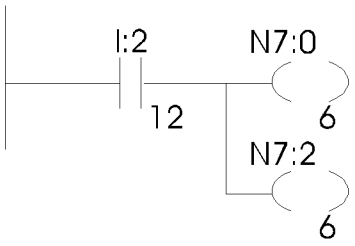
The following example illustrates the use of an OM1124 with a SLC or Micrologix PLC. In this example, the module has been configured with a PLC file number of 7 and base register address of 0. When input I:2/12 is energized, N7:0/6 will become active and turn on Lamp 7.



Register Bit/Lamp Association

Flashing a Lamp

To flash a lamp, turn it on and also set the associated flash bit. The example below shows a SLC or Micrologix program used to flash lamp 7 whenever I:2/12 is energized.



Use in a Microprocessor-Based System

OptiMate modules can interface a microprocessor based controller over a serial link. This link can be either RS232 (for point to point) or RS422 (for multidrop or point to point). In either case the microprocessor acts as the master. It can write data to the module or read data from the module.

Module Address

Switches 1 through 5 of a six position DIP switch on the back of each OptiMate module provides a method for setting the address. By use of this DIP switch you can set the module address to any number between 0 and 31. Since address 31 is used for configuration, addresses 0 - 30 are available for system use. See the addressing section of this manual for more information.

Communications Protocols

To use an OptiMate module as a slave device in a microprocessor-based system, the module must be configured for OptiMate Hex protocol. The other options that must be set are baud rate, parity and number of stop bits (note; if parity is set to even or odd, only one stop bit is allowed). Once selected, it must be downloaded to the module.

OptiMate Hex Protocol

General Format

STX Module function row1 row2 row3 row1 row2 row3 checksum
address |——— on ———| |—— flash ——-|

where	Module address	= 0 to 30
	Function	= 0xA0 ; Write Lamp states
	rowx	= Corresponds to lamps. LSB of data character corresponds to Leftmost lamp. Bits are in sequence. Row numbers are 1 to 3 - top to bottom.
	on	= Lamp on/off state. If flash not set, on will cause on solid. If not on (0), lamp willl be off regardless of flash bits.
	flash	= Flash .5 sec on, .25 sec off (must be on in order to flash)
	checksum	= 8 bit sum of all characters after address until checksum
	example :	0x02 0x04 0xA0 0x07 0x00 0x10 0x01 0x00 0x00 0xB8 will turn on lamps 1,2,3 and 21 and flash lamp 1.

Response

ACK **if message received and processed OK**
or
NAK **if any errors in message**

Broadcast message (sent to all modules)
Synchronize lamp flashing (between all system lamp modules)

STX **Broadcast function checksum**
address

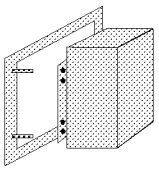
where	broadcast address	= 99
	function	= 0

Set Up and Interconnect

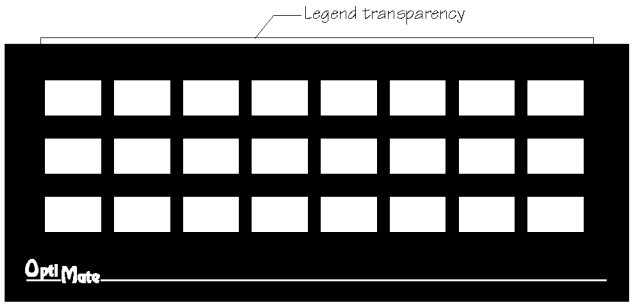
Legending the Lamps

Legending the OM1124 module is a relatively simple process that basically involves sliding a legend transparency into a pocket in the panel overlay. Use the following procedure.

- Remove the bezel from the module. The bezel snaps to the module box along the top and bottom edges. Pull the bezel out and over the snaps to remove.



- Create a legend transparency. There are a number of available options for doing so. A pattern is provided on the specification sheet of this document.
  - > Use a computer graphics program and a laser printer to create the transparency directly. Alternately print onto paper and photocopy to a transparency.
  - > Use press-on letters onto a transparency sheet.
  - > Use a typewriter or lettering machine to letter onto paper, then photocopy onto transparency film.



- Cut along outline. Place into overlay pocket. The OM1124 overlay is not glued to the faceplate. This facilitates changing of LED light bars. The legend transparency should be placed between the overlay and the faceplate. The faceplate and overlay are keyed on both ends to ensure proper alignment when reassembled. (If LED colors do not need to be changed, the overlay may be glued permanently to the faceplate by pulling off the backing and pressing the overlay onto the faceplate)

- Re-attach bezel. Push bezel onto box until it snaps together.

Lamp Colors

The OM1124 module comes with red LED light bars. Any light may be replaced by a yellow or green LED light bar. All light bars are socketed. Light bars are available from Optimation in packets of four.

Replacing a light bar involves removing the bezel and overlay (as in the labeling procedure on the left). Once the bezel and overlay are removed, individual LED light bars may be extracted by use of needle nose pliers. Replacement light bars can then be pushed into place. (The light bars are symmetrical, so orientation is not important.)

Connection to the System

OptiMate modules are designed for communications connection to system devices. The module can be connected to a computer, PLC or communication master over the serial port (RS232 or RS422).

Connection to a Computer or PLC

Connection of an OptiMate module to a computer or PLC can be accomplished over either an RS232 or RS422 link. RS232 is limited to one OptiMate module to one computer serial port. RS422 allows up to 31 modules to be connected to one computer port. Since PLCs are slave devices, the RS422 link for a PLC is limited to one OptiMate module.

Refer to manufacturer's documentation for PLC or computer serial link connector pinouts.

OptiMate Module RS232

Host Computer/PLC	OptiMate Module DB-15 Male
TX	3 RS232 RX
RX	2 RS232 TX
Sig Gnd	5 Sig Gnd

OptiMate Module RS422

Host Computer/PLC	OptiMate Module DB-15 Male
TX+	9 RS422 RX+
TX-	10 RS422 RX-
RX+	11 RS422 TX+
RX-	12 RS422 TX-

Optimation sells interface cables for connection to several different PLCs as well as to IBM PCAT compatible ports.

Serial Connection to Communications Master

Connection to an Optimation Communications Master over a serial link is via RS422. The Communication master port connections are reversed from the module ports to enable direct pin to pin connection. For distances under 50 feet (in a low electrical noise environment), a ribbon cable connection works quite well. For longer distances or in noisy environments, a two pair shielded RS422 cable is recommended.

Configuration

Configuration Selections

OptiMate modules can be configured for the specific application by using the OptiMate Configuration Editor. The Configuration Editor runs on any IBM PC compatible computer. It allows the user to select the exact functionality to meet application requirements.

For the OM1124 module, the following are important configuration parameters. Further configuration details are covered in the OptiMate Configuration Editor manual.

Computer-Based Systems

Decision	Selection
Single/Multi Module	Choose Single module even if the system will contain several modules. The Multi module selection applies only to systems using a communications master. In computer-based systems, each module is configured independently. After configuration, multiple modules can be connected together to form a system.
Configuration starting point	First-time configuration, start with defaults for module. Subsequent configurations can utilize disk files you create.
PLC Type	Select OptiMate Hex
Protocol	Select appropriate baud rate, # data bits, #stop bits & parity. Note that if 8 data bits and even or odd parity selected, only 1 stop bit is available. Hex protocol requires 8 data bits.
Flash option	Flash capability is always available for computer-based systems.

Single Module PLC Based Systems

Decision	Selection
Single/Multi Module	Choose single module configuration
Configuration starting point	First-time configuration start with defaults for module. Subsequent configurations can utilize disk files you create.
PLC Type	Select appropriate PLC type.
Protocol	Select appropriate baud rate, # data bits, # stop bits & parity. Note that if 8 data bits and even or odd parity selected, only 1 stop bit is available.
Flash option	Select as appropriate for the application. Uses 2 sixteen-bit registers.

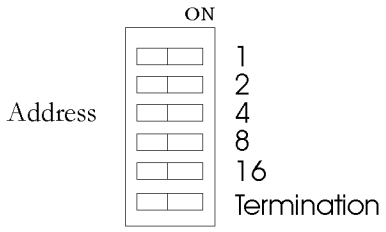
Multi Module PLC Applications (Uses Communications Master)

Decision	Selection
Single/Multi Module	Choose Multi module
PLC Type	This applies to the Communications master. Choose appropriate type
Protocol	This applies to the Communications master. Choose appropriate baud rate, # bits, # stop bits & parity. Note that if 8 data bits and even or odd parity are selected, only 1 stop bit is available.
Module Protocol	Choose OptiMate Hex.
Flash Option	Select as required for application. Uses 2 16-bit registers.

Configuration must be downloaded from the IBM PC compatible to each module over the serial link. Module address must be set to 31 prior to application of power for module to accept configuration data. Communication cable is available from Optimation.

Addressing

Setting the module address is a matter of turning the module over and pressing the appropriate DIP switches. There are 6 DIP switches; 5 of which have a numeric value listed next to the switch. To select an address, push (with a pencil or small screwdriver) the appropriate combination of switches down to the right.



For example to select address 14, the 2, 4 and 8 switches should be pressed down to the right and the 1 and 16 switches down to the left.

Remember that for configuration, address 31 (numeric switches 1-16 on) must be selected first, then apply power to the module.

The termination switch must always remain in the OFF position unless the module is the last, and only the last, module on the cable in an RS422 system.

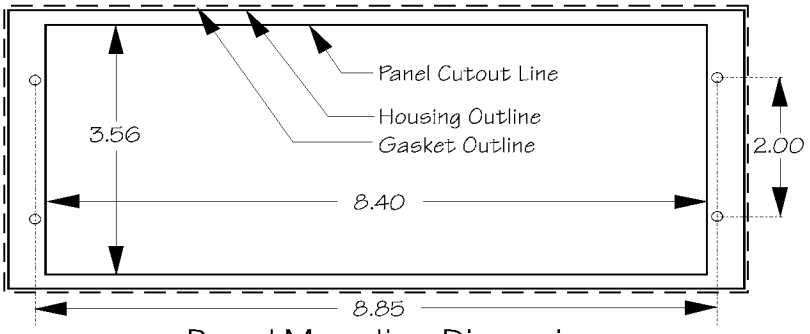
Power

OptiMate modules can operate on any voltage between 8 and 30 VDC. Power must be connected to the terminal plug located on the back of the module.

Specifications

Physical

- Recessed Mount Housing 9.5"L x 4.0"H x 1.75"D
- Cutout size for above
  3.55"Hx8.45"L



Panel Mounting Dimensions

- Panel Fasteners : Four, 6x32 threaded studs, shown above (on ends, symmetrical about center line)
- Weight : 18 ounces
- Colors : Dark Gray housing with black panel
- Lamp Colors Available : Red, Geen, Yellow
  (Standard unit contains all red LED lights. LED's are sockted and can be replaced with any LED color listed)
- Lamp window size : .7" x .4"

Electrical

- Power (all lamps on) : 8 - 30VDC @ 10VA
  800 mA @ 12VDC
  400 mA @ 24VDC
- Power connector : Pluggable terminal block, 2 position

Communications

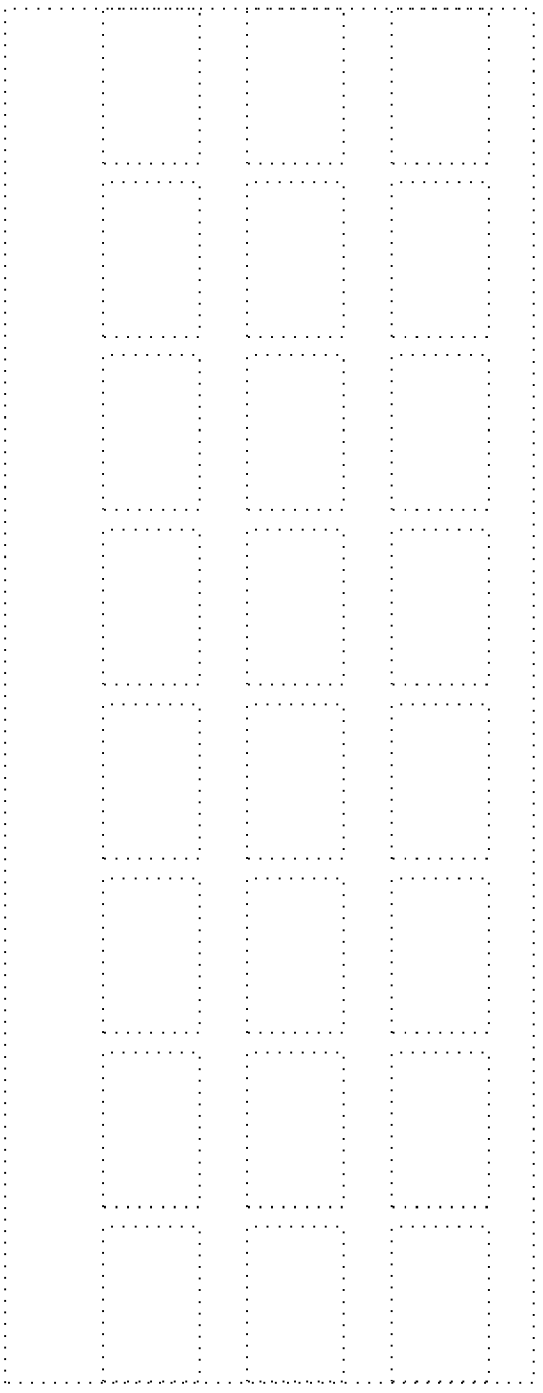
- RS232 and RS422
- 4800 to 19200 baud
- Compatible with most major PLC protocols
- Microprocessor compatible OptiMate Hex protocol
- 15 pin female 'D' shell connector (screw terminal adapter available)

Communication Failure Operation :

Should the module (when set to any address other than 31) ever fail to communicate successfully for a period of 12 consecutive seconds, all lamps will flash rapidly.

Environmental

- Enclosure - NEMA 4 recessed mount
- Temperature - 0 to 50 C
- Humidity - 95% Non-condensing



Label Strip Pattern