FINGERTOUCH DMX CONTROLLER P1L

# USER AND REFERENCE MANUAL


LUX
LUXURY
LIGHTING
APPLIANCES

This manual is meant for anybody who wish to use the LUX P1L Controller. It contains technical specifications, and describes the connection, programming and how to properly configure and use the P1L.

Although all the information contained herein has been carefully verified, LUX Italia assumes no responsibility for errors that might appear in this document, or for damage to property or persons resulting from an improper use of this manual and of the related equipment. LUX Italia reserves the right to change the contents and form of this document, as well as the features and specifications of its products at any time, without notice.

Trademarks and registered trademarks appearing in this document are the property of their respective owners.

## The P1L Packaging contents

Before to proceed, please verify contents of the P1L packaging contents:

1 - P1L DMX Controller
2 - Mounting Wall Plate
3 - User and Reference manual and Limited Warranty Sheet

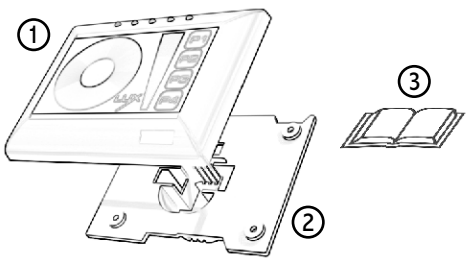



Fig. 1 - The P1L Package contents

**Congratulations!**

You have chosen the world's most sophisticated and refined wall mounting full color light DMX controller. The P1L has a plenty of features, such as:

- Simple finger touch regulation
- Full color light regulator
- White color regulation
- 1 - 100% dimming control
- Four User configurable program buttons
- 32KB User program memory space
- DMX and OpenDMX protocol support
- Master and Slave operation
- 8-30V AC/DC low voltage power supply
- Isolated DMX bus

Your P1L has been designed and produced according to highest LUX quality standards. In order to be able to use all P1L functions, please read carefully this manual.

## 1.0 Introduction

The P1L is full color finger touch DMX light controller for wall mounting, shown on fig. 2:


Fig. 2 - The P1L Controller

It implements a finger touch sensor to decode the movement of the user finger and translate it into a color of the light. The P1L can be used in any full color DMX and OpenDMX system, but it is specially suitable for 4-channel LED lighting devices, such as LUX lamps. It can drive directly DMX drivers (operating in Master Mode), or it can be used as remote control device for more complex systems (when running in Slave Mode). The user dynamic light change programs can be downloaded to the P1L using OpenDMX protocol. In that case P1L will become full featured DMX controller unit.

## 1.1 Principle of operation

Before to configure and install your P1L, you must understand the principle of its operating within a DMX system. The P1L can be installed in both DMX512A and OpenDMX networks. In both cases, up to 9 different P1L can be connected to the same trunk of DMX, but only one can be configured as Master.

### Master Mode

In the Master Mode, P1L is the control device of the DMX network. In this mode the whole DMX network is controlled by Master P1L. If other P1 devices are connected to the same network, all them must be configured as Slave devices. In Master Mode P1L will continue to interrogate all other Slave P1L present in the system.

### Slave Mode

In the Slave mode, P1L will wat for the valid OpenDMX request from the DMX bus, after wich it will reply with the current status.

When used as a remote control device of the more complex DMX network, P1L must be configured as a Slave.

## 1.2 Configuration switches

The P1L has ten configuration dip switches on the back panel. Using those switches you can change the operating mode, device address, communication protocol and so on.

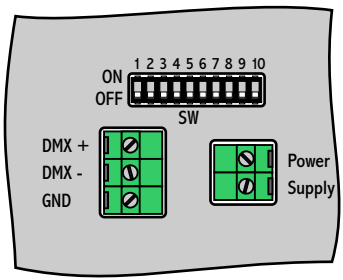



Fig 3 - The P1L Connector and Dip Switch

### 1.2.1 Switch SW1 - DMX Line termination

This switch is used to enable DMX line termination. When activated (in ON position), a 120 oHm resistor will be connected between DMX+ and DMX- signals. Activate this

switch only in case when the P1L is physically the first or the last device in the DMX network. For more information, please refer to DMX512A specification.

Factory default: OFF (120 oHm line termination disabled)

### 1.2.2 Switch SW2 - Master/Slave

The S2 is used to Configure P1L as a Master or a Slave device. When configured as Master (S2 = OFF), P1L will drive whole DMX network, while when configured as Slave (S2 = ON), P1L will wait for the call of the other Master P1L on the network.

Factory default: OFF (P1L is a Master device)

### 1.2.3 Switch SW3 - Disable Stand By Function

The S3 is used to Enable / Disable Stand By function. The P1L can be turned OFF by tipping twice over the front panel. You can disable this function by placing switch S3 to ON.

Factory default: OFF (OFF/ON function enabled)

### 1.2.4 Switch SW4 - Program buttons change disable

The S4 is used to Enable / Disable P1-P4 program button function change. When in OFF position, user can swap the functionality of the P1-P4 program button from static to dynamic program and back. For more information on program button functionality change, please refer to par. 2.6.

When the S4 is in ON position, the change of program buttons will be disabled: user will not be able to change the usage of the program buttons. The P1-P4 program button functionality will remain the one selected before switch disable.

Factory default: OFF (Program button functionality can be modified)

### 1.2.5 Switch SW5 - Child block disable

The S5 is used to Enable / Disable Child Block function. When in Child Block state, no change of the light color and intensity can be done. To disable Child Block, put S5 in ON. If Child Block is active in that moment, it will remain active.

Factory default: OFF (Child Block toggle Enabled)

### 1.2.6 Switch SW6-7 - Color Mode Selection

The S6 and S7 switches are used to select output color mode:

| Mode | S6 | S7 | |
|---|---|---|---|
| RGBY | OFF | OFF | 4 channel R,G,B,Y. 4 DMX addresses |
| RGB | ON | OFF | 3 channel R,G,B. 3 DMX addresses |
| RGBW | OFF | ON | 4 channel R,G,B,W. 4 DMX addresses |
| RGB-8 | ON | ON | 3 channel R,G,B. 8 DMX addresses |

#### RGBY mode

In RGBY mode P1L will generate 4 color schematic. All colors will be created using standard RGB with the addition of Yellow. The DMX frame will have the following contents:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ... | n-2 | n-1 | n |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R | G | B | Y | R | G | B | Y | ... | G | B | Y |

#### RGB mode

RGB mode is the basic color mode. The DMX frame will have the following contents:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ... | n-2 | n-1 | n |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R | G | B | R | G | B | R | G | ... | R | G | B |

#### RGBW mode

In RGBW mode, the fourth channel will be the support to white color. The DMX frame will have the following contents:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ... | n-2 | n-1 | n |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R | G | B | W | R | G | B | W | ... | G | B | W |

#### RGB - 8 mode

This mode has been created for a compatibility purpose. In this mode each lamp will be allocated with 8 bytes. First three bytes will contain RGB information. Fourth byte is fixed value, 0xFF. Other three bytes are 0x00:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ... | n-2 | n-1 | n |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R | G | B | 255 | 0 | 0 | 0 | 0 | ... | 0 | 0 | 0 |

### 1.2.7 Switch SW8 in Master mode - OpenDMX Enable/Disable

In Master mode there is a possibility to connect up to 9 P1L to the same DMX network. Their communication is done via OpenDMX protocol.

The majority of DMX drivers on the market are respecting DMX512A specification. In those cases OpenDMX protocol

used for inter-P1L communication will not create any problem. Unfortunately, not all drivers present on the market are respecting completely DMX512A specification. When using those drivers, OpenDMX protocol will create flickering problems.

To avoid those problems, you can disable OpenDMX protocol. Please note that when you disable OpenDMX protocol, you will not be able to drive any slave device or to do the User program Download. To dowload User dynamic programs, enable temporary OpenDMX protocol, do the programming using LX630 USB/DMX interface and disable again OpenDMX.

To disable OpenDMX protocol, switch ON the S8.

Factory default: OFF (OpenDMX enabled)

### 1.2.8 Switch SW8 in Slave mode - Slave Address Selection

Refer to Par. 1.2.12

### 1.2.9 Switch SW9 in Master mode - Channel 0 position

This switch has a different purpose in Master and Slave mode.

This switch select the position of the Channel 0. When in OFF position, DMX channel sequence will start from the byte 1, while when in ON, it will start from the byte 2:

SW9 = OFF

| 0 | 1 | 2 | 3 | ... |
|---|---|---|---|---|
| R | G | B | R | ... |

SW9 = ON

| 0 | 1 | 2 | 3 | 4 | ... |
|---|---|---|---|---|---|
| 0 | R | G | B | R | ... |

Factory default: OFF (Channel 0 is on the 1st position)

### 1.2.10 Switch SW9 in Slave mode - Slave Address Selection

Refer to Par. 1.2.12.

### 1.2.11 Switch SW10 in Master mode - Frame length

This switch has a different purpose in Master and Slave mode.

Standard DMX512A frame can have up to 513 bytes (control byte and 512 channels). When used all channels, 44 frames per second can be transmitted. This frame rate is very low for fine light regulation.

In those cases when a reduced number of lamps is used, a 64 channel mode can be selected. In this mode up to 21 different RGB lamps can be controlled, with the frame rate on 333 transmission per second can be obtained, offering 256 levels smooth dimmering.

Factory default: OFF (64 channel frame length)

#### 1.2.12 Switch SW8,9,10 in Slave mode Slave Address Selection

In slave mode, switches 8, 9 and 10 are used to select Slave device address:

Up to nine P1L devices can be connected to the same DMX network. One of them must be configured as MASTER, while all other will be configured as SLAVES. Each slave must have an unique address in the network. Using S8, S9 and S10 switches, you can select addresses from 0 to 7. Note that it is not important which device get which address. The important is that there must not be address overlap.

| Device address | S8 | S9 | S10 |
|---|---|---|---|
| Address 0 | OFF | OFF | OFF |
| Address 1 | ON | OFF | OFF |
| Address 2 | OFF | ON | OFF |
| Address 3 | ON | ON | OFF |
| Address 4 | OFF | OFF | ON |
| Address 5 | ON | OFF | ON |
| Address 6 | OFF | ON | ON |
| Address 7 | ON | ON | ON |

### 1.3 Power Supply

The P1L can be powered by either AC or DC low voltage power supply. Although the power required by P1L is rather low, it is very important that the power supply used to power P1L must be reliable to guarantee continuous supply of the electric energy to the device.

If used AC power supply, the range from 6 to 26V can be applied. If used DC power supply, you can use range from 8 to 36V DC. In both cases, consumption is below 0.6W. The polarity of the DC power supply doesn't matter.

### 1.4 DMX connection

The P1L has bi-directional DMX interface. The DMX port is 2.0 P1L Usage

The usage of the P1L is rather intuitive. Yet, there are some functions that are almost “hidden”, so it is important to read carefully following paragraphs.

2.1 Front panel description

The figure 4 shows P1L front panel:

physically separated from the rest of the electronic. There is also integrated line termination resistor (see par. 1.2.1). Note that DMX network is polarized network. We recommend the twisted, shielded, 2 x 22 AWG cable. Use only high quality cables for the connection.

### 1.5 Device Installation

Before to connect device to the system, ensure that all other devices are switched OFF, and that the power supply cable dedicated to the P1L is without power.

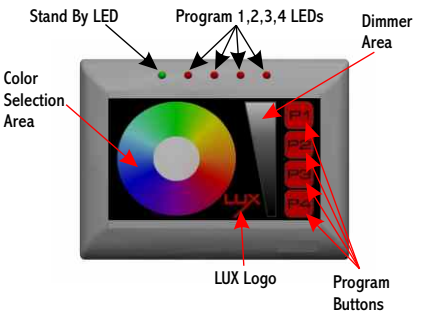
Configure device according to the instructions from par. 1.2.

## 2.0 P1L Usage

The usage of the P1L is rather intuitive. Yet, there are some functions that are almost “hidden”, so it is important to read carefully following paragraphs.

### 2.1 Front panel description

The figure 4 shows P1L front panel:



### 2.2 Switching the system OFF/ON

In OFF condition the Stand by LED is illuminated briefly. This very low level light is used to indicate the position of the P1L in the dark.

To switch ON the P1L, just touch the surface of the front panel, without taking care about the position of the finger. The P1L will turn ON the light using the last configuration before the switch OFF. This means that if you set the red color light and then turn OFF the light, when you will turn ON again, P1L will restore the red color light.

To switch OFF, you have to tip twice the surface of the front panel of the P1L. Note that if you remain for the long time in contact with the front panel, you will have to repeat the procedure of switching OFF. In order to be decoded as switch OFF command, your first tip must not take more then 150 mS, and the next one must arrive within 300 mS from the first one.

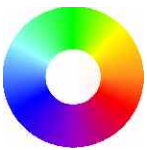
When switched ON, Stand by LED is illuminated with the full intensity, indicating that the system is activated.

The P1L will memorize the light color and intensity 2 seconds from the last finger touch, even if not turned OFF. In case of black-out, when the energy will return, the P1L will restore the last light scheme.

### 2.3 Light color regulation

To regulate light color, touch the colored area of the front panel over desired color. Note that you must not remove the finger from the panel before expiring the period of 150 mS, otherwise P1L will think that you want to turn it OFF.

The colored area is divided in two regions - colored and white region:



The white area is used to regulate white light color. Even if not indicated, this area is divided in different levels of the white color, as indicated in figure:

When you point to the center of the white circle, the P1L will regulate to the full white color. By moving the finger to the red color, light will start to change from white to the white/red color. In this way you can trim your white color as you like.

### 2.4 Light intensity regulation

The P1L has a dimmer area used to regulate light intensity. The dimmer is capable to modify light intensity from 1 to 100%, regardless of the selected color.

To regulate light intensity, simply point the finger over dimmer area.

### 2.5 Child block - protected mode

The P1L has a special feature of protection against undesired color regulation. In this mode, you will be able to turn it OFF/ON and nothing else.

In order to enter protect mode, touch and keep the finger over LUX logo for more then 6 seconds. After 2 seconds, green Stand by LED will start to blink. When 6 seconds period is expired, Stand by LED will stop to blink and P1L will enter protected mode.

In protected mode there will be no possibility to modify light color, intensity or to choose programs. The P1L will behave as a simple OFF/ON switch, using the light color and intensity selected before the entrance to the protected mode.

To exit the protected mode, repeat the same procedure used to enter the protected mode.

### 2.6 Program modes

The P1L has four user program buttons, indicated with P1-P4. Those buttons are used to select user program, and to memorize particular light settings. When one of the programs is selected, a red LED indicator is lit ON.

To memorize one light settings, just press the program button for more then 3 seconds. When pressed a program button, red LED indicator will start to blink rapidly. After 3 seconds it will start to blink slowly, indicating that the new settings has been memorized. You can continue to memorize new settings over the previous one.

To select one of the four programs, just press the program button for less then 3 seconds. A program LED indicator will switch ON.

To exit program mode, press the color selection area.

The P1L can memorize up to four dynamic color changing programs. Those programs can be downloaded via DMX bus from an external remote controller unit, such as PC. For more information on how to create user programs, refer to the technical reference section in this manual and to L.E.T. - LX630 USB/DMX Software manual.

Once when downloaded, user programs will be memorized “below” the color settings programs. To select dynamic programs, press and keep pressed program button for more then 6 seconds. During this period, red LED indicator will start to blink rapidly for the first 3 seconds, and then it will continue to blink slowly for the next 3 seconds. At the end of the 6 seconds period, it will stop blinking and fix the light ON, indicating that a new program mode has been selected.

When memorized new light settings by pressing the program button for 3 seconds, a dynamic program is not lost, but rather it will be “pushed” to the background. To recall the dynamic program, just press the program button for 6 seconds.

During dynamic program execution, it is possible to regulate program execution speed. For that purpose a dimmer area is used. The program execution speed can be regulated from 10% up to 250% of the original speed. The regulated speed will remain for all programs until device will be placed in stand by (OFF).

### 2.7 Maintenance

The P1L does not need the special, particular care. Although, it is important to follow some simple cautions in order to guarantee long operating life.

Never clean the device with wet duster, water or any other liquid. To remove dust, use only clean and dry duster.

# P1L Technical Reference

## 1.0 Introduction

This section gives the full information about P1L technical features, and it is meant for system integrators, installers and other technical personal.

The P1L is finger touch color regulator and DMX controller. The core of the device is a custom 16-bit MCU, implementing DMX512A and OpenDMX. The latter is based on DMX512A, but offers more possibilities such as file transfer, synchronous operation, and diagnostics, and it is a public-domain, license-free document. For more information about OpenDMX protocol, please refer to www.luxitalia.eu.

The MCU uses a proprietary algorithm to translate finger position on the color wheel into a DMX signal, with a response time of 40 Hz. Four channels – red, green, blue and yellow – are used, called RGBY color scheme.

## 1.1 DMX512A Data Transfer

During regulation, finger position is translated into four channel color scheme - Red, Green, Blue and Yellow (RGBY). Then, the color intensity is calculated according to the dimmer settings, and at the end a final four channel information is transmitted using DMX512A protocol.

The standard DMX512A protocol offers 512 bytes for a data transfer. The P1L will send the following DMX frame:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | | Byte n-3 | Byte n-2 | Byte n-1 | Byte n |
|---|---|---|---|---|---|---|---|---|
| Red | Green | Blue | Yellow | | Red | Green | Blue | Yellow |

As shown, the same information is repeated every four channels. The first byte transmitted is Red, then Green, Blue and Yellow. Using dip switch S2.6 you can select to skip the first byte (byte 0) of the DMX frame (that will have value 0), used as service byte, and then transmit the data frame as shown:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | | Byte n-3 | Byte n-2 | Byte n-1 | Byte n |
|---|---|---|---|---|---|---|---|---|
| 0 | Red | Green | Blue | | Red | Green | Blue | Yellow |

The length of the DMX512A frame is defined using dip switch S2.4 and S2.5.

## 1.2 OpenDMX Data Transfer

When operating using OpenDMX protocol, the P1L will use

following command set:

| | |
|---|---|
| Color settings command: | ODMX_SETPWM |
| Stand by mode: | ODMX_STDBY |
| Program transfer: | ODMX_FILESEND |
| Slave switch inquery: | ODMX_GETSWITCH |

All light regulation commands will be transmitted as BROADCAST message.

#### 1.2.1 Light Regulation - ODMX_SETPWM

For ODMX_SETPWM command, the P1L will use 8 bit data transfer. Lower 8 bits will be used to transmit color intensity from 0 to 255, while upper 8 bits will be 0.

The PWM_DATA structure will have following meaning:
PWM_DATA.Channel_1 = Red color
PWM_DATA.Channel_2 = Green color
PWM_DATA.Channel_3 = Blue color
PWM_DATA.Channel_4 = Yellow color

#### 1.2.1 Stand by mode - ODMX_STDBY

The Stand by command will be send during OFF/ON of the P1L. When in OFF condition (stand by mode activated), P1L will send ODMX_STDBY command frame every 1 second as refresh to the network. During stand by mode, the ODMX_GETSWITCH frame will continue to exist with the same frequency as during active mode.

### 1.3 The P1L Programming

The P1L is a full DMX control central unit that can memorize up to four different user programs. The programming is done via DMX network and using OpenDMX protocol. Only P1L in MASTER mode can be programmed.

The user program has a specific defined structure described here below. Four user programs must be joined in one file that will be transferred to P1L as described after.

#### 1.3.1 Programming Mechanism

The Master P1L will issue a ODMX_SRVREQ frame every 900 mS. The remote PC (or other device) must answer within 10 mS with ODMX_SRVANW command where SERVICE_ID must be set to 0x01. At this point, P1L will stop any other activity (including finger sensing) for the next 10 mS. If within this time remote PC will start file transfer, the P1L will start to receive data. At the end of the file transfer, P1L will restart with the normal activity.

### 1.3.2 Program structure

User program structure has the following format:

| Address | Length | Description |
|---|---|---|
| 0x00 | 0x02 | Record size |
| 0x02 | 0x02 | Address offset of the program |
| 0x04 | 0x02 | Number of records in the program |
| 0x06 | 0x02 | CHNNUM (Number of channels of the in the record structure) |
| 0x08 | 0x02 | Total size of the story (header excluded) |
| 0x10 | ---- | Records[...] |

```
typedef struct {
    BYTE        RecordType;
    BYTE        Parameter;
    INT         FadeTime;
    INT         WaitTime;
    BYTE        Outputs[CHNNUM];
}RECORD;
```

You must transfer four programs all together. The first to be transfered is all four program headers, then all records.

For more information about program structure and the meaning of each parameter, please refer to the OpenDMX specification.

Note that total length of the four programs cannot exceed 31KB, and that max. CHNNUM = 512 (171 RGB lamps or 128 RGBY/RGBW lamps)

### 1.3.3 File transfer

File transfer will occur after ODMX_SRVANW frame transmission. The USER PROGRAM file cannot be longer then 31 KB and must contain all four user programs. User program can have no records. In that case program button on P1L will be continuously used to memorize static color set.

The file will be transferred using standard ODMX_FILESEND command, with the FileType filed set to 0.

## 1.4 Technical Data

| | | |
|---|---|---|
| Power supply range | AC | 6 ... 26 V AC |
| | DC | +8 ... 36 V DC |
| Power consumption | Active mode | 1.3 W |
| | Stand By mode | 1.1 W |
| DMX interface isolation | | 100V |
| DMX Refresh rate | | 44 Hz |
| CPU | | 16 bit RISC |
| User program memory | | 32 KB |

## 1.5 Troubleshooting Guide

| | |
|---|---|
| Green LED is ON, but when touching the pad there is no regulation | The P1L might be in “Child Block” mode. See par. 2.5 |
| When connected to the DMX network, light is flickering and strobing | The lamp drivers you are using are not compatible to the original DMX specifications. You must use drivers that recognize ZERO START code and not ignoring it. |
| When selecting Green color, light become RED, Blue is Green and so on | Try to switch Channel Zero position. See par. 1.2.9 |
| When connect more P1L to the same network, no one of them is working properly | Only one of them must be a MASTER device, while all other must become SLAVE. See par. 1.1 |

If you cannot resolve the problem, contact info@luxitalia.eu

# Table of contents

## P1L USER MANUAL


| | | |
|---|---|---|
| 1.0 | Introduction | 3 |
| 1.1 | Principle of operation | 4 |
| 1.2 | Configuration switches | 4 |
| 1.2.1 | Switch 1 - DMX Line termination | 4 |
| 1.2.2 | Switch 2 - Master/Slave | 5 |
| 1.2.3 | Switch 3 - Disable Stand By Function | 5 |
| 1.2.4 | Switch 4 - Program buttons change disable | 5 |
| 1.2.5 | Switch 5 - Child block disable | 5 |
| 1.2.6 | Switch 6-7 - Color Mode Selection | 6 |
| 1.2.7 | Switch 8 in Master mode - OpenDMX Enable/Disable | 7 |
| 1.2.8 | Switch 8 in Slave mode - Slave Address Selection | 7 |
| 1.2.9 | Switch 9 in Master mode - Channel 0 position | 7 |
| 1.2.10 | Switch 9 in Slave mode - Slave Address Selection | 7 |
| 1.2.11 | Switch 10 in Master mode - Frame length | 7 |
| 1.2.12 | Switch 8,9,10 in Slave mode Slave Addr. Selection | 8 |
| 1.3 | Power Supply | 8 |
| 1.4 | DMX Connection | 9 |
| 1.5 | Device installation | 9 |
| 2.0 | P1L Usage | 9 |
| 2.1 | Front panel description | 9 |
| 2.2 | Switching the system OFF/ON | 10 |
| 2.3 | Light color regulation | 10 |
| 2.4 | Light intensity regulation | 11 |
| 2.5 | Children block - protected mode | 11 |
| 2.6 | Program modes | 11 |
| 2.7 | Maintanance | 12 |


## P1L TECHNICAL REFERENCE


| | | |
|---|---|---|
| 1.0 | Introduction | 13 |
| 1.1 | DMX512A Data Transfer | 13 |
| 1.2 | OpenDMX Data Transfer | 13 |
| 1.2.1 | Light regulation - ODMX_SETPWM | 14 |
| 1.2.2 | Stand by mode - ODMX_STDBY | 14 |
| 1.3 | The P1L Programming | 14 |
| 1.3.1 | Programming mechanism | 14 |
| 1.3.2 | Program structure | 15 |
| 1.3.3 | File transfer | 15 |
| 1.4 | Technical data | 16 |
| 1.5 | Troubleshooting guide | 16 |

# NOTES

LUX
LUXURY
LIGHTING
APPLIANCES

**LUX Italia**
Via Firenze 18
20060 Trezzano Rosa
Milan, ITALY
Phone ++39 02 9202 0427
Fax ++39 02 9096 7253
e-mail: info@luxitalia.eu