INTRODUCTION

Ozone LED Driver stands for an extremely flexible LED Driver, Designed for fast and easy configuration.

This Application Note "**AN3_Ozone Setting**" illustrates the setting options of the Ozone LED driver in order to allow a fast and easy setting, performed by the lamp manufacturer and /or installer.

An external dedicated and portable programming tool (available as optional, ordering code: **RSOZ070-PTOOL**), permits to customize different Ozone LED driver key parameters. This guarantees extreme flexibility during final products (lamps) production process, because all OEMs will be able to directly personalize their products during the production process, avoiding managing different LED driver models and their stocking inventory.

In addition to the several benefits that this feature allows during the production process, it permits also to operate directly in the lamp installation field, avoiding wasting of time due to product's replacement.

OZONE PROGRAMMING TOOL

The battery powered unit (see **Figure 1**), is a friendly user remote programmer that permits the user to manage the following settings:

- Output Constant Current Setting
- Light Fade Time Setting
- DALI communication enabling/disabling
- PWM dimming enabling/disabling
- Output current shape Constant Amplitude or PWM

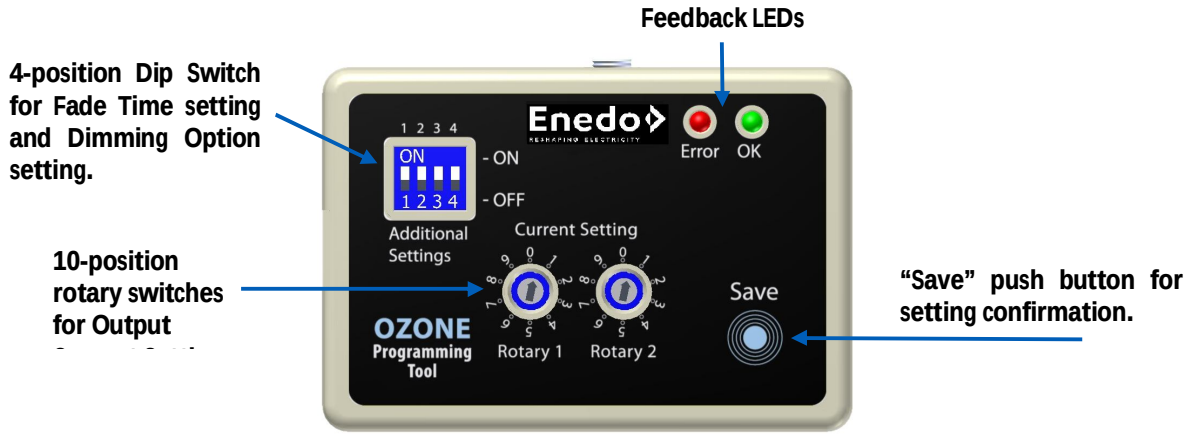

Figure 1
Ozone Programming Tool (code RSOZ070-PTOOL)

PROGRAMMING CONNECTIONS

The Ozone programming tool is easily connectable with Ozone LED driver by the 3-wire cable (**Figure 2**). The cable is included in the code **RSOZ070-PTOOL**)
The three programming wires are selectable by colored collars near the metal end terminal.
Follow the connection table below for a correct programming connections correspondence, between programming wires and Ozone output connector pins involved.

OUTPUT connector	Programming Wire
Ts	**RED** collar wire
RTN	**BLACK** wire
0-10 V Dimm	**WHITE** collar wire

Table 1
External programming tool connections correspondence

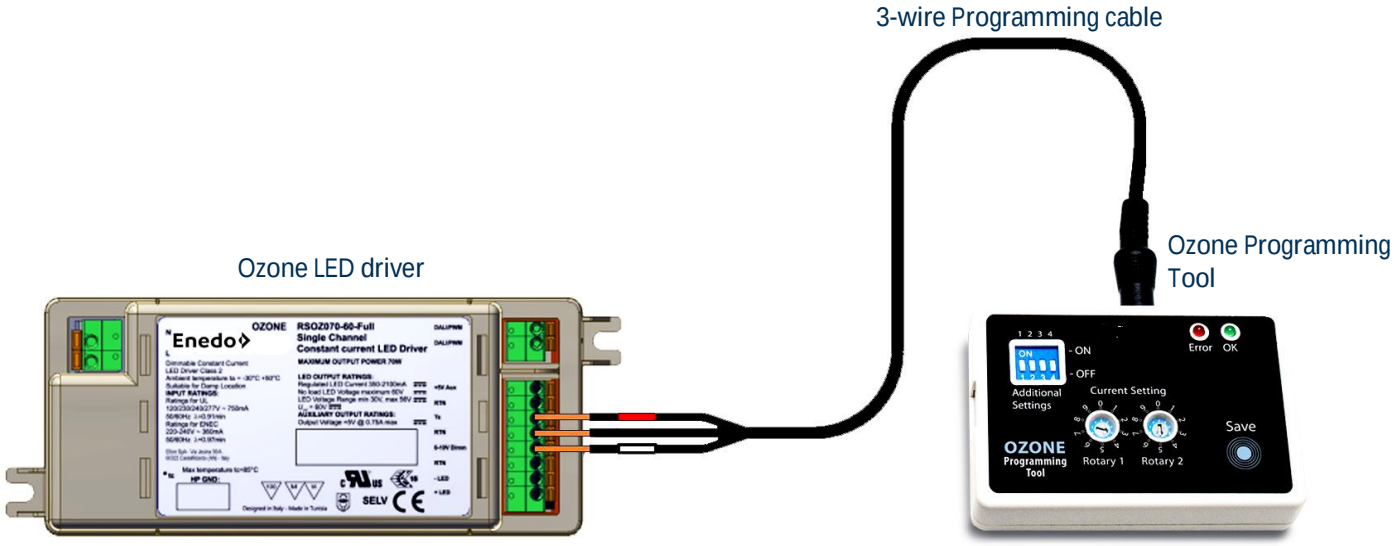

Figure 2
Ozone Programming Tool connection

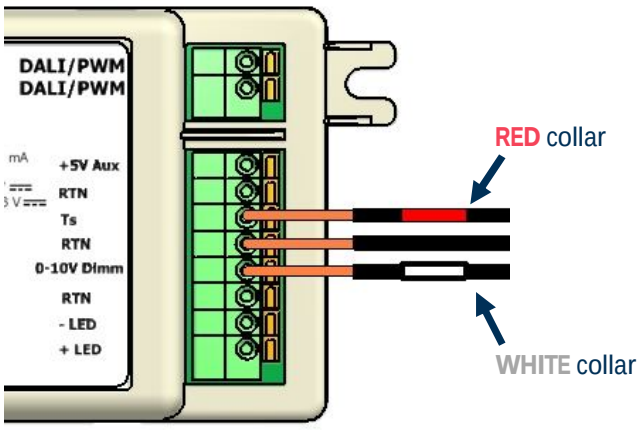

Figure 3
Programming wires connection to the LED Driver

DIP-SWITCH SETTINGS (FADING, DALI, DIMMING, CURRENT SHAPE)

The 4-position dip-switch on the remote programming tool permits to set the light fade time in addition to DALI/PWM enabling/disabling and output current shape.

Follow the dip-switch settings combination table (**Table 2**) below to select the requested configuration. Each switch can stand in ON or OFF position, the combination of the four switches positions determines the product configuration as reported in the table.

ON

OFF

Sw. 1	Sw.2	Fade time (s)
OFF	OFF	0
ON	OFF	2
OFF	ON	5
ON	ON	10

Sw. 3	Dimming Option
OFF	DALI enabled; PWM disabled
ON	DALI disabled; PWM enabled

Sw. 4	Output current shape
OFF	Constant Amplitude
ON	PWM

Red = factory pre-set values

Table 2
Dip-switch settings combinations

Fade Time: Required time (in seconds) to raise linearly the output LED current from 0A (OFF state) to the nominal set current (I_{SET}) and vice versa.
Fade Time will affect either the 0-10 V or DALI dimming if set in Constant Amplitude mode (see "**AN2_Ozone Temperature Sense & 0-10V dimming**" for details).

Output Current shape[1]**:** This setting allows the user to set the desired output current waveform for DALI dimming control. The factory default setting is Constant Amplitude shape, but it can be set to a PWM waveform with a fixed frequency of 600 Hz. This setting only affects DALI control; 0-10 V control can be set, independently from DALI, using Ozone ToolSet software rev 1.6 or above.

Example**:** Considering a 10 seconds fade time: if the user dims the output current down from 100 % I_{SET} to 50% I_{SET}, the transition time will be 5 s.

[1] The output current shape can be set via dip-switches on OZONE 70W models with FW 3.1 and above. Alternatively, it can be done using the Ozone ToolSet software rev 1.6 or above.

ROTARY SWITCHES SETTINGS (OUTPUT CURRENT)

By combining the two 10-way rotary switches positions, it is possible to set the output constant current value. A very wide output current range of values, from 350 mA to 2100 mA, can be selected in 50 mA steps, for a 70 W total maximum output power. See the table below to select the right rotary switches positions corresponding to the required output current.

Output Current I_{SET} mA	Rotary Position R1 - R2	RSOZ070-35		RSOZ070-60		RSOZ070-120		RSOZ070-200	
		V_{OUT} Min[3] V_{DC}	V_{OUT} Max[3] V_{DC}	V_{OUT} Min[3] V_{DC}	V_{OUT} Max[3] V_{DC}	V_{OUT} Min[3] V_{DC}	V_{OUT} Max[3] V_{DC}	V_{OUT} Min[3] V_{DC}	V_{OUT} Max[3] V_{DC}
350[2]	0-0			30	56	60	115	**120**	**195**
400	0-1			30	56	60	115	120	175
450	0-2			30	56	60	115	120	155.6
500	0-3			30	56	60	115	120	140
550	0-4			30	56	60	115	120	127.3
600[2]	0-5			30	56	**60**	**115**		
650	0-6			30	56	60	107.7		
700	0-7			30	56	60	100		
750	0-8			30	56	60	93.3		
800	0-9			30	56	60	87.5		
850	1-0			30	56	60	82.4		
900	1-1			30	56	60	77.8		
950	1-2			30	56	60	73.7		
1000	1-3	20	33	30	56	60	70.0		
1050	1-4	20	33	30	56	60	66.7		
1100	1-5	20	33	30	56	60	63.6		
1150	1-6	20	33	30	56				
1200	1-7	20	33	30	56				
1250[2]	1-8	20	33	**30**	**56**				
1300	1-9	20	33	30	53.8				
1350	2-0	20	33	30	51.9				
1400	2-1	20	33	30	50.0				
1450	2-2	20	33	30	48.3				
1500	2-3	20	33	30	46.7				
1550	2-4	20	33	30	45.2				
1600	2-5	20	33	30	43.8				
1650	2-6	20	33	30	42.4				
1700	2-7	20	33	30	41.2				
1750	2-8	20	33	30	40.0				
1800	2-9	20	33	30	38.9				
1850	3-0	20	33	30	37.8				
1900	3-1	20	33	30	36.8				
1950	3-2	20	33	30	35.9				
2000	3-3	20	33	30	35.0				
2050	3-4	20	33	30	**34.1***				
2100[2]	3-5	**20**	**33**	30	**33.3***				
2150	3-6	20	32.6						
2200	3-7	20	31.8						
2250	3-8	20	31.1						
2300	3-9	20	30.4						
2350	4-0	20	29.8						
2400	4-1	20	29.2						
2450	4-2	20	28.6						
2500	4-3	20	28.0						
2550	4-4	20	27.5						
2600	4-5	20	26.9						

[2] Ozone 70W LED Drivers are **factory pre-set** to have the maximum output power in the widest Output Voltage Range.

I_{SET} = **2100 mA** for **RSOZ070-35**
I_{SET} = **1250 mA** for **RSOZ070-60**
I_{SET} = **600 mA** for **RSOZ070-120**
I_{SET} = **350 mA** for **RSOZ070-200**

[3] Care should be taken during the design phase to assure the alignment between the Total Forward Voltage of the LED string (V_F total) when the Output is not dimmed and the LED Driver Output Voltage Range (V_{OUT} min, V_{OUT} max).

The value (V_F total @ NO dimming) has to be within the Output Voltage Range (V_{OUT} min, V_{OUT} max), considering also V_F modifications due to thermal effects and V_F tolerance.

Please note that when dimming is present the Driver works also below its V_{OUT} min.
In the conditions marked with **(*)** the Driver is still within the spec. but consider that they are difficult to maintain by the LED string due to the V_F variation caused by thermal effects and V_F tolerance.

Table 3
Output current settings combinations

PROGRAMMING OPERATIONS SEQUENCE

Run the following 10-step sequence for Ozone LED driver programming, using the "**RSOZ070-PTOOL**" external programming tool.

1. If connected, unplug AC power from the Ozone input AC connector.
2. If connected, unplug all wires from the secondary connectors (DALI, LED board, $+5V_{AUX}$, Ts).
3. Connect the 3-wire cable of the external programming tool to the Ozone output connector, as shown in **Figure 2** and **Figure 3**.
4. Reconnect the AC power to the Ozone input AC connector.
5. Select and run the correct Dip-switch settings combinations according to **Table 2**.
6. Choose the output Constant Current value and place the correspondent rotary switches positions, according to **Table 3**.
7. Press "Save" push button.
8. Verify the feedback green LED blinks (2 fast blinks followed by 1 longer blink).
9. Verify that the error red LED remains OFF after the green LED blinking.
10. First disconnect the AC cable and then the 3-wire programming cable from the Ozone output connector.

Now the new settings are installed and they will be active at the next Ozone power-on.

WARNINGS:

If the error red LED turns-on after the two green LED fast blinks, it means that the programming operation failed. In this case, repeat the programming sequence from the beginning paying particular attention to wires connections and rotary switches combination.

Any rotary switches combination not shown in **Table 3** must be considered as not allowed.

Additional red LED fast blinks after the programming phase, indicate a low battery level.

OZONE TOOLSET SOFTWARE

The Ozone micro controller technology permits to implement additional features that have a main rule especially in outdoor lighting applications.

The optional programmable functions are:

1. Driver general hardware settings (PWM, DALI, current settings)
2. Adjustable Dimmer function
3. Constant Light function

These features can be programmed and stored in the Ozone Programming Tool by connecting it to a laptop with a USB cable, and using the dedicated Ozone Toolset Software (provided with the Ozone Programming Tool).

See "**UM2_Ozone Toolset Software Manual**" for further details.

MECHANICAL DIMENSIONS AND BATTERY REPLACEMENT

Ozone Programming Tool **RSOZ070-PTOOL**:

Dimensions: 80 x 55 x 19 mm (3.15 x 2.16 x 0.75 in)

Weight: 75 gr (2.64 oz)

3-wire Programming Cable length 750 mm (29.5 in)

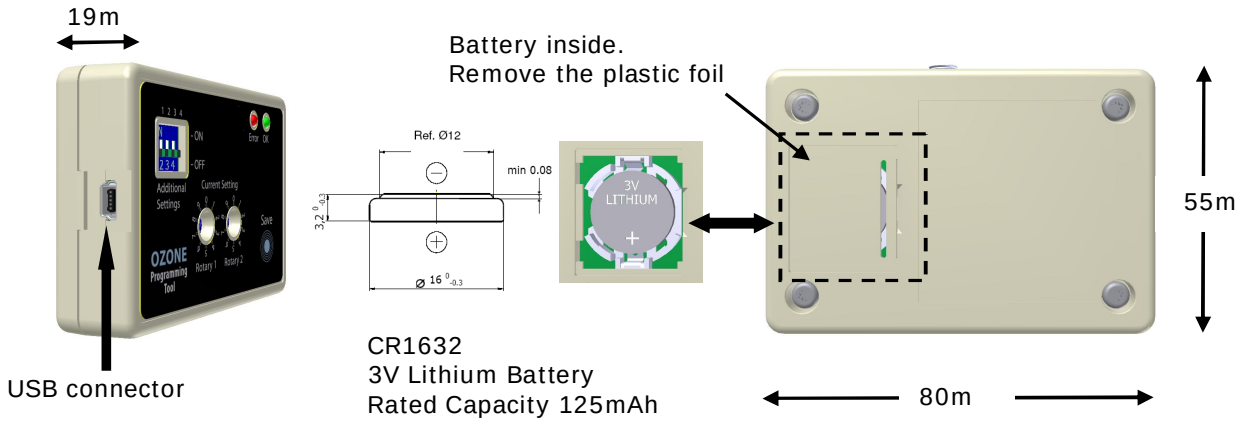

Figure 4
Mechanical Dimensions and battery replacement