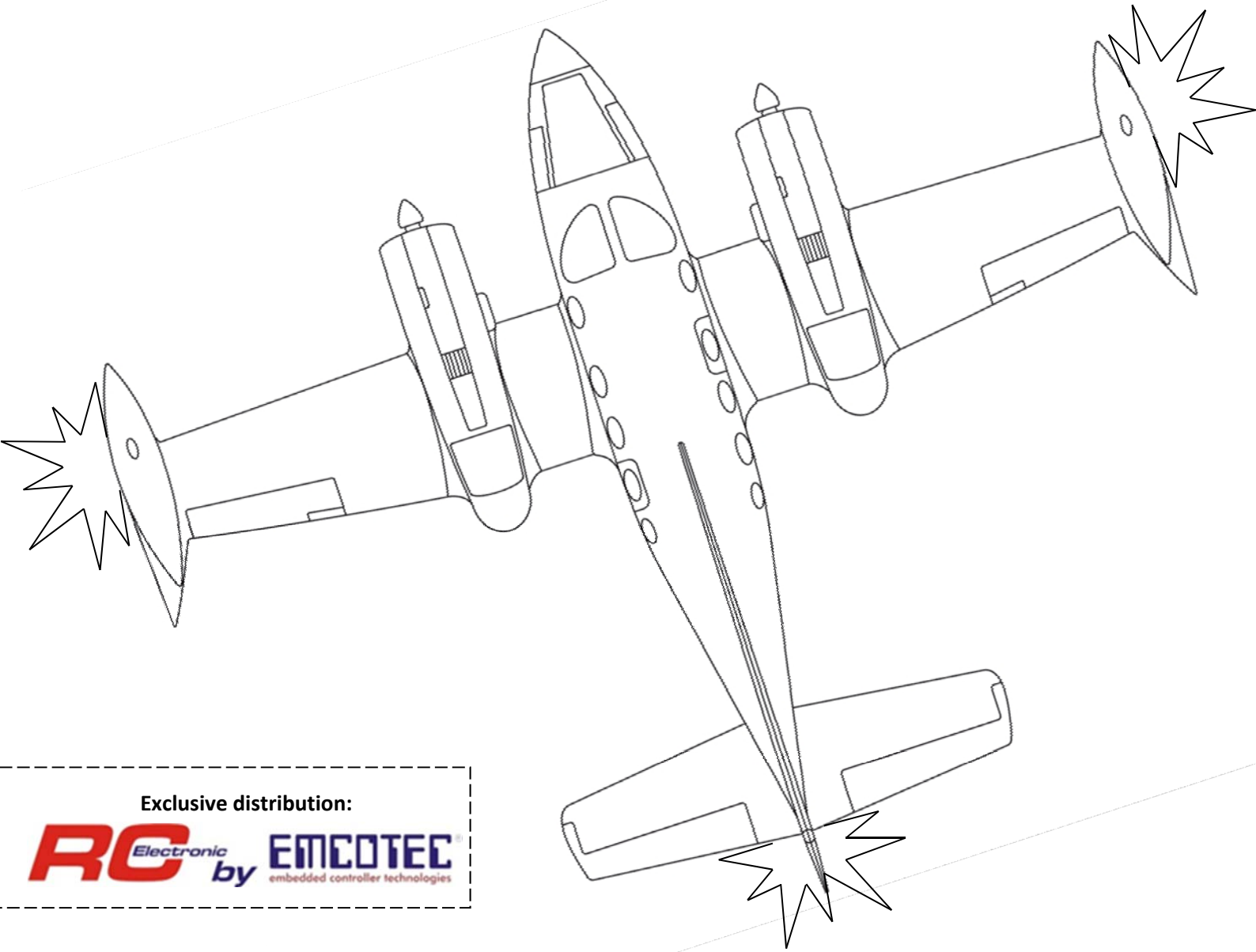
OPTOTRONIX

FINEST SCALE LIGHTING TECHNICS.

FIREFLY LCU

Programmable Light Control Unit



Exclusive distribution:

RC Electronic by EMCOTEC embedded controller technologies

Manual

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Pay attention to notes marked with a ! <u>before</u> first operation of the lighting-system!

Preamble

With the **FIREFLY LCU** you purchased a high-quality and modern lighting system. We hope you enjoy lighting up your aircraft and ask you to read the following instructions carefully.

Technical Data

Dimension	40x16mm
Height	5mm
Weight	11g
Supply	3,1V … 8,4V (supply by signal cable)
Signal Input	with puls-booster
Output	4x Permanent / Flash / Beacon
Output Power	1,5A permanent / 2,5A flash
Total Output Power	max. 3,0A permanent / 6A flash Caution: Take care of max. receiver current! [1]
Galvanically isolated	No
Stand-Alone Operation	Yes
Programmable	on every Output: Function & Activation-Point

Features

These are the features of the **FIREFLY LCU:**

- 4 Outputs (Permanent / Flash / Beacon)
- 1,5A / output (e.g. up to 2x 3Watt LEDs permanent / output)
- 2,5A / output in flash-operation
- 6 different flash sequences @ 3 different points of time
- Beacon function
- Every Output fully programmable
    - Activation Point
    - Flash Sequence
    - Automatic detection of switch direction
- Adaptive (learns behaviour of transceiver)
- Permanent Lipo / LiFe battery guarding with battery-test function and savety shut-down
- Signal-Input with Servo-Puls-Booster
- Stand-Alone Mode (e.g. for exhibition and showroom) at push of button

[1] **Caution:** Supply via receiver system (signal cable). Take care of the max. current of your receiver circuit or BEC system!

Anschluss von Spannungsversorgung und Empfänger

The **FIREFLY LCU** is powered directly via the receiver circuit (using the signal cable). The BEC voltage has to be 3,1V to 8,4V.
It is also possible to use by 1-2 cells Lipo[2] batteries, 1-2 cells LiFePO[3] batteries, 3-6 cells NiMh[4] batteries, in case the receiver is powered directly by a battery.
Don't connect other battery-technologies to the FIREFLY LCU.
The most efficient operation (Least power dissipation at resistors, least development of heat) works with 1 cell Lipo, 1cell LiFePO or 3-4 cells MiMh (recommendation for NiMh: Sanyo Eneloop Cells).
Attention: 1s LiFePO batteries are not recommended for powering Power LEDs (1Watt / 3Watt) because the little lower battery voltage means a little lower brightness of LEDs.

The used battery-type has to be programmed at first use to offer a reliable deep-discharge-protection and battery-test function, see "Programming Mode".
After programming the used battery will be protected and the batteries condition can be checked with battery-test function.

If the programmed battery voltage becomes critical, the **FIREFLY LCU** shuts down after a fast flashing-sequence of the **blue Info LED** and can only be restarted by reconnecting the battery. So, the receiver supply has priority.

The following battery capacities are recommended for a one-hour permanent operation *of all 4 outputs* (permanent operation of one LED at each output).

Battery Recommendation

LEDs connected to outputs	Rec. capacity for >1h operation
Standard LEDs (20-30mA)	**120 mAh**
Power LEDs (~60mA)	**240 mAh**
1Watt Power LEDs (350mA)	**1400 mAh**
3Watt Power LEDs (700mA)	**2800 mAh**

CAUTION:
During setting up your models lighting system, take care of the max. allowed current of the receiver circuit / BEC!

[2] Lithium Polymer Akkumulator
[3] Lithium Eisenphosphat Akkumulator
[4] Nickel Metallhydrid Akkumulator

Connecting Receiver

Connect the signal cable for the receiver (twisted pair cable **yellow** - **red** - **brown**, see labeling **receiver**) to your receiver. To become familiar with the operation of the **FIREFLY LCU**, you can also connect to a servo tester.
If there is no signal (no receiver is connected or invalid signal / defective signalwire) the **blue Info LED** is flashing.

If there is no valid signal for more than 60 minutes, the **FIREFLY LCU** shuts down and can only be restarted by reconnecting the battery.

LED - Outputs

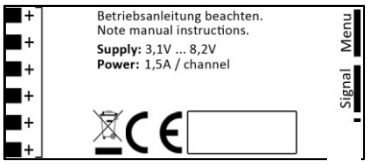
Pin-assignment of Outputs

The **FIREFLY LCU** offers **4** Outputs (each with **Plus / Minus**).

The following chart shows the assignment in view of the socket (the electronic labeling to the top):

Ausgänge				
	4	3	2	1
	-	-	-	-
	+	+	+	+

Top Side



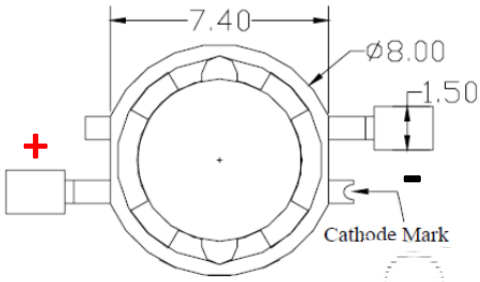
Bottom Side

Button

Receiver

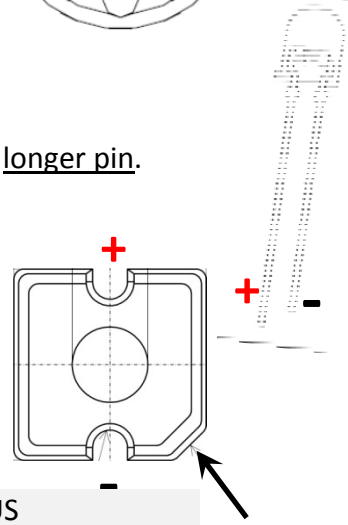
Connecting LEDs

The **FIREFLY LCU** offers operation of all typical LEDs with a resistor in series. Every Output can be operated with up to 1,5A (2,5A in flashing mode). Multiple LEDs can be connected in parallel, in this case every LED needs its own resistor.



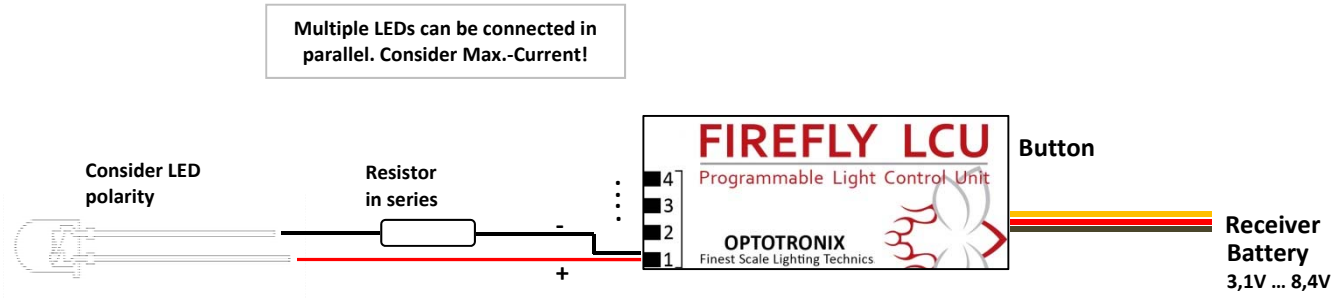
The right-hand chart shows the polarity of the SEOUL 1Watt / 3Watt power LEDs: Next to each pole is a small brass stub, which is scored on the minus side, but not on the plus side.

The classic 3mm / 5mm LED types mark the plus terminal with a longer pin.



The classic SuperFLux LEDs are marked with flattened corner which shows the minus terminals. There are four pins for increasing stability on printed circuit boards, so plus and minus are available twice but have to be connected only at one pin.

If multiple LEDs are connected to one Output in parallel, the PLUS wires can be combined to one.



Only connect LEDs to the **FIREFLY LCU**, if all Outputs are finally programmed. So it is avoided, that LEDs that are configured for flash operation burn, because they are connected to an Output, which still is programmed for permanent light.

Resistor Table

The required resistor for your desired LED Type can be gathered from the following table. The values can be used both for operation directly at a battery and for operation at the **FIREFLY LCU**. Also pay attention to the required power-rating of the resistor.

For choosing the supply generally consider: The voltage should be as small as possible, because LEDs do not need more than 3,5V (red/ yellow only 2,4V). Everything above that voltage has to be converted into heat in the series-resistor. That is why the operation at 3,6V/4,8V (3s/4s NiMh) or 3,7V (2s Lipo) has to be preferred.

Leuchtmittel Illuminant	Versorgung Supply	4s NiMh	5s NiMh	1s Lipo	2s Lipo
LEDs (3mm - 5mm - SuperFLUX – BlitzLED) **Weiß / Grün / Blau / Violett**		75	130	27	200
LEDs (3mm - 5mm – SuperFLUX – BlitzLED) **Rot / Gelb / Orange**		120	160	68	240
3-Chip SuperFlux LEDs **Weiss**		22	39	7,5	56
3-Chip SuperFlux LEDs **Rot / Grün**		43	62	20	91
10mm 4-Chip Power LEDs **Weiß / Warmweiß / Grün**		22	39	7,5	56
10mm 4-Chip Power LEDs **Rot**		36	56	22	68
SEOUL 1Watt **Weiß / warmweiß / Grün**		4,7	8,2	1,5	12
SEOUL 1Watt **Rot**		8,2	12	4,7	18
SEOUL 3Watt **Weiß / Warmweiß / Grün**		2,7	4,7	1,0	6,8
SEOUL 3Watt **Rot**		4,7	6,8	2,7	8,2
Legende		0,5Watt	2Watt	3Watt	4Watt

Operating the FIREFLY LCU

Startup Sequence

When you connect the power supply to the **FIREFLY LCU**, you will notice the following behavior of the status LEDs:

	**9x Startup Sequence**	The LCU is started.
	Pause	One second pause.
	**Battery Test**	The Battery is tested (see bellow)
	Pause	One second pause.

Now, the **FIREFLY LCU** is ready to operate and can be controlled by your transceiver. The activation points of the outputs can be defined in the programming mode.

Battery Test

During the startup sequence the connected battery will be tested. This battery test function can also be started at any time by short pressing the menu button, during the battery test (about 3 seconds) the connected LEDs are disabled!

The voltage level of the battery can be read with the 4 status LEDs of the **FIREFLY LCU**. If all 4 LEDs are active, the battery is fully loaded. If no LED is active any more, the battery should be disconnected and reloaded.

If the programmed battery voltage becomes critical, the **FIREFLY LCU** shuts down after a fast flashing-sequence of the **blue Info LED** to protect the battery. It can only be restarted by reconnecting the battery.

Stand Alone Modus

This “autonomous operation mode” mode allows to operate the model lighting, even if the receiving system is not switched on (e.g. exhibitions or showroom), or may not be switched on (e.g. Building competition).

*Activate all light outputs which should be active and then push the button for at least 2 seconds. The 2-second-long-push always will be confirmed by flashing the **blue Info LED** three times. The **blue Info LED** now starts to blink, the **Stand Alone mode** is active and the electronic is no longer controlled by the receiver signal!*
*Exit the **Stand Alone mode** by pushing the button 2 seconds again.*

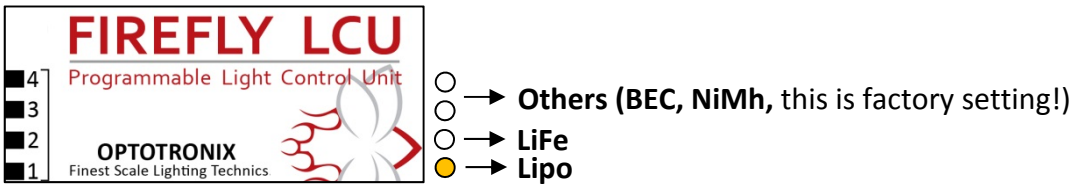
Programming Mode

Starting the Programming Mode

Connect power supply and receiver signal to the **FIREFLY LCU**. Hold the button permanently pressed before the startup sequence is completed.
If the programming mode has been successfully started, all Outputs are flashing very quickly for 3 seconds. Now you enter the Programming Mode.

Programming the Battery-Type

At first you have to program the used power supply (Lipo, LiFePO, "others"). Before programming connect the fully loaded battery to the **FIREFLY LCU**. By pressing the Button short ("zapping") you can choose between the offered three types. To signal the battery type, always two status LEDs are activated (see graphic below). Save the choosed battery type by pressing the Button **for two seconds**. The number of used cells will be detected automatically.
If you choose "others" (e.g. for BEC-supply), the safety-shutdown will be deactivated, it will be displayed the supply voltage in six steps from 3,1V to 8,4V.



Programming the Outputs

The first status LED lights up and is now waiting for programming activation point and function. By pressing the Button short ("zapping") you can choose out of the different flash, beacon and afterburner functions and view it with the status LEDs.

Activationpoint Save Activation Points for every Output.

Zap through the different flash sequences by short-pressing the button. Put the switch or proportional slider on the transceiver to the position at which the selected output should be active. Hold the button for 2 seconds to save activation-point and function and edit the next Output. This step is executed for all 4 outputs. The 2-second-long-push always will be confirmed by flashing the ***blue Info LED*** *three times.*

For each flash sequence, you can choose if it should flash at the beginning, some time delayed, or long time delayed. This allows you to flash three positions on the model successively.

The following table shows the functions provided by the **FIREFLY LCU**:

Nr.	Function	…delayed	…long delayed	Factory Setting:
0	**Permanent Light**			**A3, A4**
1	Single Flash			
2		Single Flash		
3			Single Flash	
4	Single Blink			
5		Single Blink		
6			Single Blink	
7	Double Flash			
8		Double Flash		**A2**
9			Double Flash	
10	Double Flash + late ignition			
11		Double Flash + late ignition		
12			Double Flash + late ignition	
13	Tripple Flash			
14		Tripple Flash		
15			Tripple Flash	
16	Strobo Flash			**A1**
17		Strobo Flash		
18			Strobo Flash	
19	**Beacon** fast			

After the program mode is completed, the **FIREFLY LCU** restarts.
COMPLETE – The FIREFLY LCU is programmed an can be used.

IMPORTANT
Connect Landing Lights beginning with Output 4 and Flashlights beginning with Output 1. So the **FIREFLY LCU** identifies the switching direction of the transceivers channel and adapts automatically.
Programmed flash sequences and activation-points are only stored, if the programming mode was executed completely.

Set back to factory settings

You can set all parameters of the **FIREFLY LCU** back to factory settings:

*Connect the Supply to the **FIREFLY LCU**. Hold the button permanently before the startup sequence has finished (this takes 2 seconds). Starting the programming mode is confirmed with very fast flashing of all LEDs for 2 seconds, **still hold the button permanently**! Hold the button till the **FIREFLY LCU** restarts, now loose the button. The electronic is set back to factory settings.*

Overview Button Functions

	Operating Mode	Programming Mode
Short push	Battery Test	Choose function
Pushing 2 seconds[5]	Stand-Alone Mode	Save, edit next output

Overview blue INFO-LED

	Operating Mode	Programming Mode
Permanent ON	Ready for operation	-
Blinking ON / OFF	Stand-Alone Mode	-
Blinking dimm. 50% / 100%	No (valid) signal	
Blinking 3x short	Confirmation for *2-second-long-push*	
Blinking 20x short	Safety-shutdown, battery empty	

Transceiver Range Test

Before using the **FIREFLY LCU** the first time in a model, you have to do a transceiver range test just as for every new built in electronic.

The distance of the **FIREFLY LCU** to the receiver has to be maximized, just as for every built in electronic.

[5] *The 2-second-long-push always will be confirmed by flashing the **blue Info LED** three times.*

Warranty and legal information

Optotronix issues a 24-month warranty for the FIREFLY LCU. There is no right to repair, Optotronix reserves the right to share in case of warranty the device against an equivalent product if a repair is not possible.
This warranty expires when the module takes damage resulting from misuse, because the manufacturer has no influence on adherence to the manual, proper installation, use, maintenance and operation, no liability is assumed for the non-proper operation of the FIREFLY LCU. The customer himself is responsible, because this product is installed into the corresponding model without checking of the manufacturer. For consequential damages, caused by a proven defect in the operation of FIREFLY LCU we assume no liability. Further claims are excluded. The product is used only for model aircrafts.
The FIREFLY LCU has been suppressed by constructive measures. Negative influences on the quality of receiving cannot be completely ruled out. Therefore, before each use a trouble-free function should be checked. A receiver range test has to be carried out. General advise for RC-models: the distance of an electronic module and the cables which are laid in the model to the receiver and the antenna should be maximized!

Optotronix reserves the right to amend this document without prior notice. We assume no responsibility for possible mistakes contained in this manual or for damages resulting from the provision of these instructions.

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WEEE-Reg.-Nr.: DE 34157317
VerpackV Reg.-Nr.: 200900732

Developed & made in Germany.

Exclusive distribution: