

# C-RED 2

## Quick Start Manual

C-RED 2 Quick Start\_20190611







# Thank you for choosing C-RED 2!

C-RED 2 features and performances are described in detail within the User Manual, that you can find on your USB key or on our website: [www.first-light.fr/downloads/](http://www.first-light.fr/downloads/)

Please contact our support for any question at: [support@first-light.fr](mailto:support@first-light.fr)

## 1. WARNINGS

 *Your C-RED 2 camera contains fragile components, handle it with care.*

 *Do not open the camera, your warranty will be void.*

 *Always use the supplied power unit.*

 *Always follow the instructions of use.*

## 2. SYMBOLS AND INDICATIONS

Please read this Quick Start guide and the following definitions carefully to understand the potential dangers and the precautions to take.

Please refer to the User Manual if a WARNING symbol is marked on the camera.



The CE marking indicates the conformity of the camera to the European legislation



This pictogram indicates a direct current operation



This pictogram invites the user to refer to the instructions / user manual



This pictogram refers to indoor use



This pictogram refers to Protection class category 1



This pictogram indicates that the product is compliant with the RoHS limitation

## 3. DISPOSAL



*In case of disposal, do not throw your camera in waste disposal and send it back to First Light Imaging*

## 4. WARNINGS

### 4.1. General warnings

The equipment must be plugged on an electrical wiring compliant with the relevant standards in the country (in France: NFC 15-100). This wiring must be protected from overcurrent, overvoltage and ground defaults.

Equipments connected must be compliant with the EN 60950-1 Ed.2006 standard, or to their own standards.

The power cable plug serves as a disconnection device and should be easily accessible.

Do not place the equipment close to a heating source or a humidity source.

Do not close the ventilation system to avoid any overheating.

The security of the system which integrates the equipment is the responsibility of the system assembler only.

For your safety, the equipment must be **TURNED OFF AND UNPLUGGED** before any technical intervention.

The security provided with this equipment is only guaranteed with a use in accordance with the specified purpose. Only use the provided (XPPower, model AJM90PS12) power supply.

The use of a Polymer Lithium battery involves fire hazard which can seriously harm goods and persons. The user fully agrees to accept the risks and responsibility.

The manufacturer and the distributor cannot be held responsible for any damage to goods and persons as they cannot control the proper use of the battery (charge, discharge, storage).

**IMPORTANT NOTE:** For Switzerland: the annex 4.10 of the SR 814.013 standard is applicable to batteries.








## 5. TECHNICAL SPECIFICATIONS

Power supply	Voltage	100 – 240 VAC
	Frequency	50 – 60 Hz
	Current	1.5 A – 0.6A
Camera's dimensions	Length	143 mm
	Width	74.91 mm
	Height	55 mm
Operation conditions	Maximum temperature	35°C
	Humidity	80 %

## 6. CONTENTS OF PACKAGE\*






### 6.1.C-RED 2 Camera Pack

Item name	Quantity	Picture
Camera	1	
Power supply	1	
Power cable	1	
USB-C to USB-A cable	1	
Male cooling hoses connectors	2	
USB key with User manual + Demo software + Test report	1	
Quick start Manual	1	

### 6.2.Accessories

Please note that accessories can be ordered separately. Please contact your sales representative for details and pricing of our different accessory packs.

Item name	Quantity	Picture
M6 Adapter with 1 kit x screws	1	
LEMO male connectors for synchronization	2	
Industrial USB cable (2, 3 or 5m length)	1	

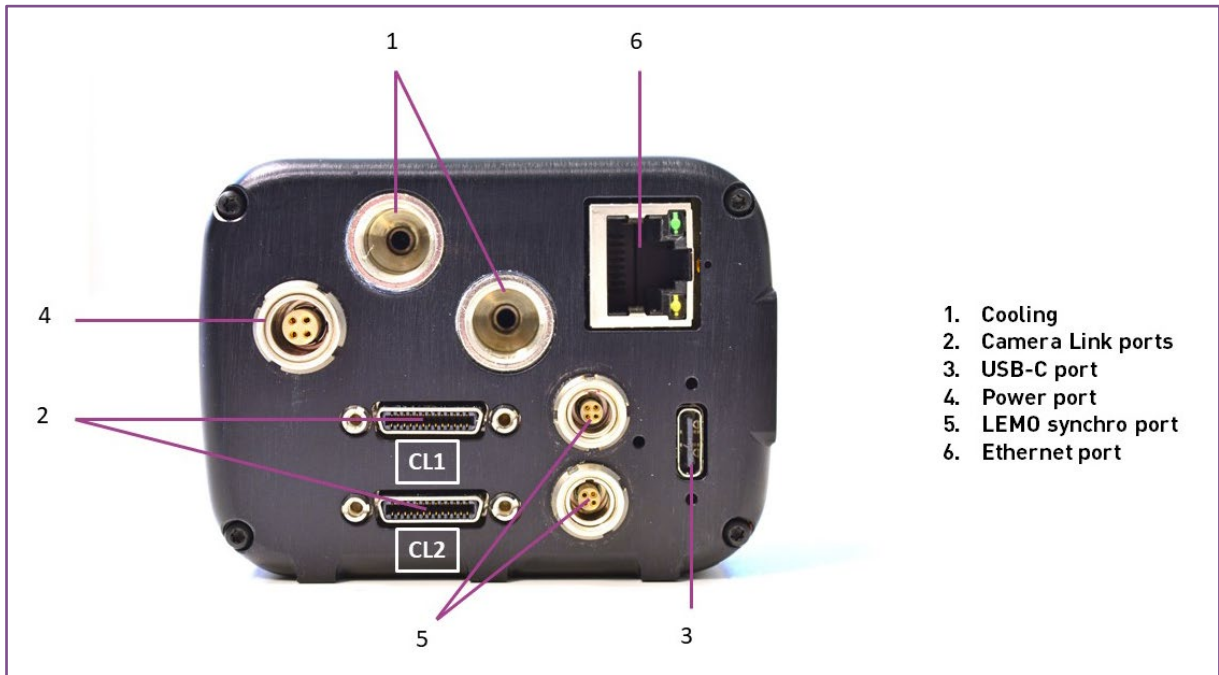
\* Items may differ from pictures.



# 7. CAMERA DESCRIPTION AND START UP



Please refer to the following figure and follow the order listed below, before connecting your camera:



## 7.1. Cooling

The camera can be air cooled or liquid cooled (no liquid nitrogen) (1).  
By default, the camera activates its fan.

Air cooling allows to cool the detector down to nominal  $-15^{\circ}\text{C}$  with a maximum room temperature of  $35^{\circ}\text{C}$ .  
Air cooling is ensured by the fan, and the fan speed can be controlled in automatic mode or manual mode.

Liquid cooling (1) allows to cool the detector down to nominal  $-40^{\circ}\text{C}$  with the following conditions.  
Water cooling with water at  $35^{\circ}\text{C}$  requires the fan to run a bit, even at minimum speed.

Cooling System Parameters	Value
Flow rate	$\geq 0.5$ L/min
Pressure	10 bar max
Liquid Temperature	$35^{\circ}\text{C}$ max
Approved Fluids	Ethylen Glycol aqueous solution (Max concentration: 50%) Distilled water or deionized water (Min temperature $10^{\circ}\text{C}$ )
Cooling capacity	100 W minimum

Heat is evacuated by circulating a cooling fluid through two ports (G1/8 thread). To fasten your connectors, First Light Imaging recommends using Loctite 577 thread sealant.  
The cooling hoses can be fastened in any order.

**⚠ When connecting the cooling unit, please make sure that there is no water spraying on the connectors or the camera**

**⚠ After turning on the cooling unit, please check that no leaks are visible.**

**⚠ First Light Imaging recommends turning on the cooling BEFORE turning on the camera.**

## 7.2. Data connection



The camera can operate either with Camera Link® or USB-3.1 Gen 1.

### 7.2.1. Camera Link® connection (2)

The camera is compliant with Camera Link® Full and requires two data cables with male SDR-26 Mini Camera Link® connectors.

The Camera Link® plugs are numbered: CL1 is on top, CL2 is below.

The Camera Link® connectors can be plugged and fastened in any order but reversing the order will prevent camera operation. The Camera Link® connections can be plugged or unplugged either if the camera is ON or OFF.

Please install the demo software for the acquisition board which is provided on the USB key.

Please note that our cameras have been developed and tested with specific grabbers that we highly recommend using. Please refer to the demo software manual.

List of tested recommended grabbers:

- MATROX Radiant eV-cl full
- Teledyne DALSA X64 Xcelera-CL (Windows only)

### 7.2.2. USB connection (3)

The camera only supports USB-3.1 Gen 1 connection. The USB-3 interface requires a standard USB-C connector.



***To use the camera USB connection, please use a windows 10 OS.***

Also before using USB-3.1 Gen 1 connection, the C-RED 2 USB-3.1 Gen 1 drivers must be installed on the PC. Please refer to the demo software manual.

## 8. POWER SUPPLY CONNECTION (4)

Please plug firstly the provided power supply LEMO cable to the back of the camera (4), then connect it to the line plug.



***First Light Imaging recommends turning the cooling system on BEFORE turning on the camera.***

### 8.1. Synchro connection (5) and Ethernet connection (6)

Please refer to the User Manual.



# 9. POWERING UP/DOWN



## 9.1. Power ON:

When the power LEMO is connected to the camera, and the power supply to the line plug, the camera is ON.

## 9.2. Power OFF:

Please use the CLI command “shutdown” from a simple terminal before turning off the camera. First unplug the power supply from the line plug, then unplug the LEMO cable from the camera.

# 10. CAMERA CONTROL

## 10.1. Demo GUI software

The Graphical User Interface (GUI) demo software is provided in the USB key supplied with C-RED 2, or available on demand at [support@first-light.fr](mailto:support@first-light.fr).

## 10.2. Camera status

Once the camera is properly powered up the system boots and C-RED 2 is ready to operate. A white or purple diode signal, visible through the camera’s body holes, confirms the operability.

Camera status	Camera’s led color	Description
Configuring	Blue ●	Camera starting
Operational	Green ●	Camera configuration is applied
Operational (cooling)	White ○	Camera is cooling down
Operational (cold)	Purple ●	Camera has reached target temperature
Operational (throttling)	Purple double blink ●●	Because of temperature environment, the camera can’t reach the set point and is limiting itself to the lower possible temperature
Safe	Red double blink ●●	The camera detects an error. The detector is turned off. To be able to reuse the camera, you must restart it.
Prevsafe	Yellow ●	When you restart the camera after a safe state, the camera will be stopped in prevsafe state. You have to use the <b>continue</b> command to resume the camera starting.
Locked	Red ●	The camera detects a critical error. The camera is unusable, please contact First Light Imaging for support.
Safe (rescue FW)	Orange double blink ●●	Recovery Software mode: the camera needs a new firmware. The camera is unusable. Please contact First Light Imaging for support.





# 11. OPERATIONAL ENVIRONMENT



Maximum cooling fluid temperature:	35°C
Minimum cooling fluid temperature:	Dew point of the room (recommended)

Maximum Use / Storage temperature:	45°C
Minimum Use / Storage temperature:	10°C

Maximum Relative Humidity:	0% to 80%*
<i>*If the camera uses liquid cooling, be careful to the dew point</i>	

Absolute pressure:	500 mbar* to 2 bar
<i>* First Light Imaging recommends using liquid cooling for pressure lower than 1 bar</i>	

## Dew point:

Please use the cooling fluid at a temperature above the dew point. If the dew point is unknown, use a cooling fluid at a temperature which is not below the room temperature.

# 12. OPERATION

By default, the camera operates in CDS mode. It can also operate in IMRO mode.  
The camera can operate in full frame or in cropping mode.

## 12.1. Integration/readout function

The acquisition speed can be set to any value from 0.001 to 600 fps.  
The integration time can also be set. The integration time range is [50µs - ~1/fps] \*

\*For integration time below 50µs, please contact First Light Imaging at [support@first-light.fr](mailto:support@first-light.fr)

## 12.2. Sensibility scale mode

Signal can be integrated in low, medium or high gain corresponding to high, medium and small integration capacity, respectively. The modification of the integration capacity impacts the dynamic of the signal and thus implies a change of the noise level.

## 12.3. Bias/Flat Correction

Bias/Flat correction can be done on the fly by the camera.  
Flat and Bias correction files can be computed automatically by the camera Alternatively, custom correction files can be uploaded to the camera using serial connection (either USB or CL).

To apply the image corrections: First, build the bias file and apply it, then, build the flat file and apply it.

Please refer to the software demo user manual for further details.



## 12.4. Bad Pixel Correction



Bad pixel correction can be done on the fly by the camera.

When enabled, bad pixel correction is the first correction applied on pixel values received from the sensor. The bad pixels' value is replaced by the mean value of the adjacent pixels.

## 13. PRECAUTIONS

C-RED 2 is a high end scientific instrument and should not be exposed to shocks, extreme temperatures, humidity, dusty environment, and static shocks.

Any electronic equipment that has to be connected to C-RED 2 should be fitted with appropriate protection on all power lines.

Any connected equipment should be powered off before removing any connection between the computer and C-RED 2.

 ***Please make sure to respect the voltage requirements for synchro signals – please refer to the User Manual of your C-RED 2 Camera.***

## 14. MAINTENANCE

### 14.1. Cleaning of window

Never use an unclean cloth to wipe the window of the camera.

The window should be cleaned with a dry and soft cloth, you can use water or ethanol and gently wipe the window.

Please avoid touching the window.

### 14.2. Storage

When not in use, please store your camera in a dry place, in its box.



## 15. CONTACTS



### 15.1. For the USA:

FIRST LIGHT IMAGING Corp.  
185 Alewife Brook Parkway, Ste 210  
Cambridge, MA 02138  
USA

Tel.: + 33 4 42 61 29 20  
E-mail: [support@first-light.fr](mailto:support@first-light.fr)  
Website: [www.first-light-imaging.com](http://www.first-light-imaging.com)

### 15.2. For the rest of the world:

FIRST LIGHT IMAGING SAS  
Europarc Sainte Victoire, Bât. 6  
Route de Valbrillant, Le Canet  
13590 Meyreuil  
France

Tel.: + 33 4 42 61 29 20  
E-mail: [support@first-light.fr](mailto:support@first-light.fr)  
Website: [www.first-light-imaging.com](http://www.first-light-imaging.com)



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