C-RED 2 LITE
Quick Start Manual

C-RED 2 Lite_Quick Start_20230622

Thank you for choosing C-RED 2 Lite!

C-RED 2 Lite features and performances are described in detail within the User Manual, that you can find on your USB key or on our website: https://andor.oxinst.com/
Please contact our support team for any question at: https://andor.oxinst.com/support/first-light-imaging
You can also send a mail to fli-support@oxinst.com .

1. WARNINGS

⚠️ *Your 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.

CE	The CE marking indicates the conformity of the camera to the European legislation (pending)
ᴅᴄ	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
RoHS	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: NF C 15-100). This wiring must be protected from overcurrent, overvoltage and ground defaults.

Connected equipments 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.

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 power supply.

5. TECHNICAL SPECIFICATIONS AND OPERATIONAL ENVIRONMENT

Parameters		Values
Power supply	Voltage	100-240 Vac
	Frequency	50/60 Hz
Camera's dimensions	Length	78.1 mm
	Width	65 mm
	Height	65 mm
Operation conditions (Non-condensing condition)	Maximum temperature	60°C (case)*
	Minimum temperature	-40°C
	Humidity	95% **
Storage conditions	Maximum temperature	60°C
	Minimum temperature	-40°C

*Maximum case temperature with the cooling off. With the cooling on, the camera can provide up to 25°C of delta T° between the camera case and the sensor temperature. Thus, to maintain your sensor's temperature setpoint, the case temperature must be less than or equal to the sensor's temperature setpoint + 25°C. For example, with a case temperature of 25°C, the camera can keep the sensor temperature to 0°C.
**Cooling off or cooling on with case temperature above the dew point.*
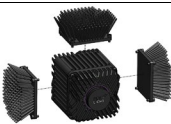
6. CONTENTS OF PACKAGE*

6.1. C-RED 2 Lite Camera Pack

Item name	Quantity	Picture
Camera	1	
Power supply	1	
Power supply cable (IEC or NEMA)	1	
USB3 cable (if USB version)	1	
C-Mount adapter	1	
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
LEMO male connectors for synchronization	1	
Cooling adapter	1	
Heat sinks	1, 2 or 3	

* 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:
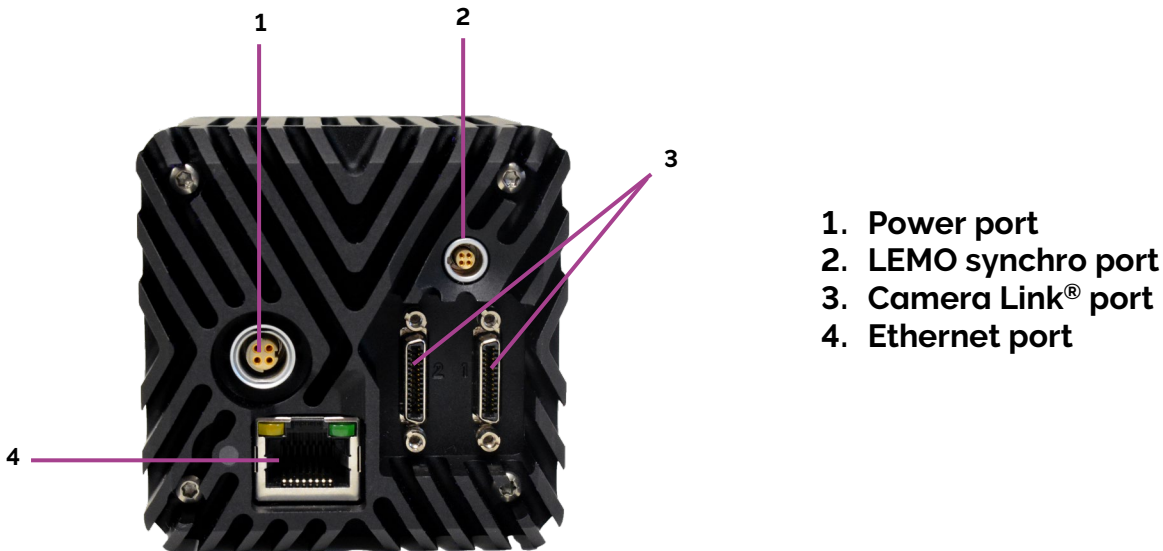
7.1. Camera Link version:

1. **Power port**
2. **LEMO synchro port**
3. **Camera Link® port**
4. **Ethernet port**

7.2. Camera Link® connection

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

The Camera Link® plugs are numbered: CL1 is on the right, CL2 is on the left. Note that the order of the cables depends on the frame grabber that is used

If the cables are reversed, the camera will not be able to send the data properly, however it does not have any harmful effect on the camera, nor the grabber. The Camera Link® connections can be plugged or unplugged either if the camera is ON or OFF.

Please install our software FLI Vision (Graphical User Interface) 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 Radient eV-CL full (drivers available for Linux and Windows)
- EDT VisionLink F4 (drivers available for Linux and Windows)
- Euresys Grablink Full (drivers available for Linux and Windows)
- BITFLOW Axion 1XE (drivers available for Linux and Windows)
- Pleora iPort CL-Ten (drivers available for Linux and Windows)

7.3. USB Version

1. **Power port**
2. **LEMO synchro port**
3. **USB port**
4. **Ethernet port**
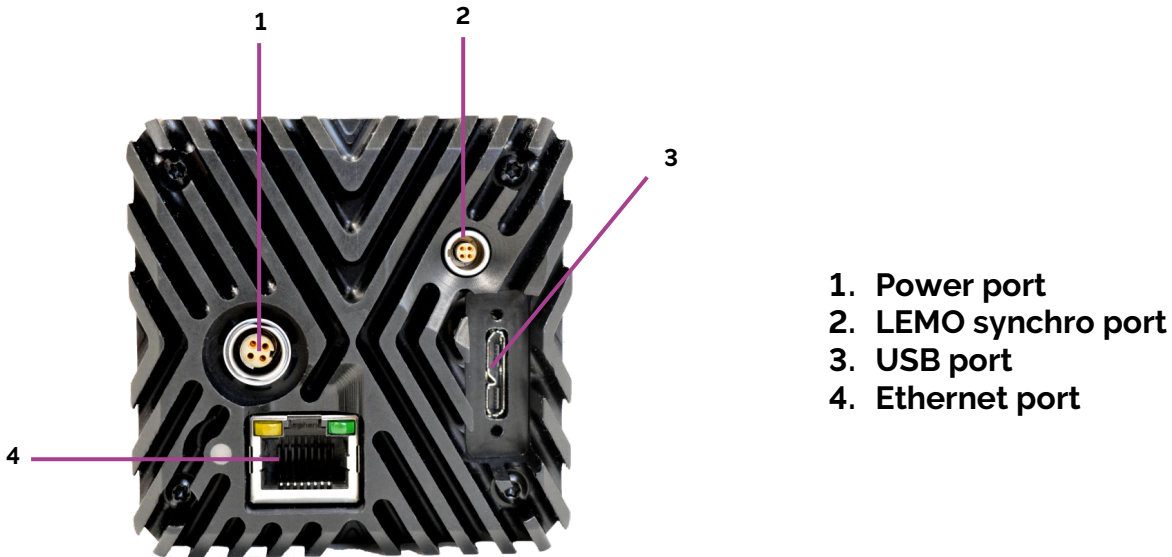
7.4. USB connection

The camera only supports USB3 connection. The USB3 interface requires a standard USB 3.0 Type micro B connector.

⚠️ *Latest Windows® 10 x64 release is highly recommended for USB acquisition on Windows®.*

Also, before using USB3 connection, the C-RED 2 Lite drivers must be installed on the PC.
Please refer to the demo software manual.

⚠️ *We recommend using Ubuntu® 16.04 LTS, 18.04 LTS or 20.04 LTS for USB acquisition on Linux.*

The camera strictly requires USB 3.1 speeds to function properly. Fig. 1 shows an example of the kind of issues you can encounter if the USB port on your computer is not quite up-to-specs. Other examples of issues include outright not detecting the camera and getting frames that seem to be shifted. We call this issue USB desynchronization.

If you suspect you are having issues with your USB connection, there are several steps you can take. First, please make sure the image tag feature is enabled on your camera (see your camera's User Manual for more information on this feature). Our software are designed to automatically check and fix this USB desynchronization, as long as it does not happen too frequently. Otherwise, you can try plugging into different USB ports, or even different computers, to find a port that can deliver the required bandwidth.

This issue, its diagnosing steps and its fixes have been described in detail in the **C-RED 2-2ER-3 TS2 optimizing USB 3.0 bandwidth** technical note, which you can read from your library in your First Light account.
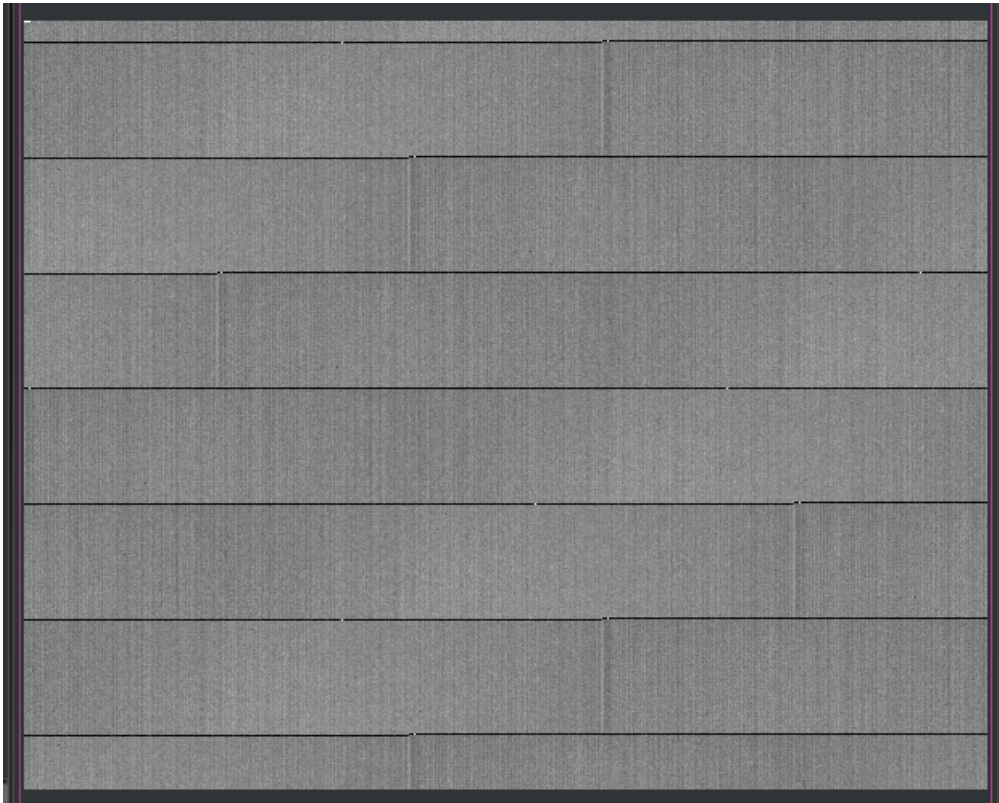
Fig. 1 : *Example of issues related to insufficient USB bandwidth*

8. POWER SUPPLY CONNECTION

Please plug firstly the provided power supply Fischer Connectors cable to the back of the camera (1), then connect it to the line plug.

8.1. Synchro connection (2)

Please refer to the User Manual.

8.2. Ethernet connection (4)

Please refer to the User Manual.

9. POWERING UP/DOWN

9.1. Power ON:

When the power supply Fischer Connectors cable is connected to the camera, and the power supply to the line plug, the camera is ON.

9.2. Power OFF:

Please use your Graphical User Interface, or 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 Fischer Connectors cable from the camera.

10. CAMERA CONTROL

10.1. First Light Imaging Graphical User Interface software

The Graphical User Interface (GUI) demo software is provided in the USB key supplied with the C-RED 2 Lite camera, or available in Your Library on the website. It is a dedicated interface developed by First Light Imaging which allows to control almost all the parameters of the camera. Please refer to the GUI user manual.

10.2. Software Development Kit

A Software Development Kit (SDK) is also provided with your camera.
It will allow developers to code their own interface to control the camera. The source code of a demo software is provided in C/C++, and additional example codes are provided in several languages.
Please refer to the SDK User Manual.

10.3. Camera status

Once the camera is properly powered up the system boots and C-RED 2 Lite is ready to operate.
A purple diode signal, visible on the back of the camera, confirms the operability.

Camera status	Camera's led color	Description
Starting	Blue 🔵	Camera starting
Configuring	Blue 🔵	Camera configuration is applied
Operational	Green 🟢	Camera is operational
Operational cooling	White ⚪	Camera is switching stabilization step
Operational cold	Purple 🟣	Camera has reached stabilization step
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 🟡	
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 🟠🟠	The camera detects a critical error. The camera is unusable, please contact First Light Imaging for support.

Note: A turned off LED does not necessary mean that there is an issue with the camera. Indeed, the camera can be configured to switch off the LED automatically once boot is completed.

11. C-RED 2 Lite OPERATION

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

11.1. Integration/readout function

The acquisition speed can be set to any value from 0.0001 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 fli-support@oxinst.com
 or log in on the support portal: https://andor.oxinst.com/

11.2. Conversion gain

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.

11.3. Bias / Flat Correction

Bias (fix) / 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.

11.4. 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 pixel is replaced by one of the adjacent pixels.

12. PRECAUTIONS

C-RED 2 Lite 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 Lite 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 Lite.

13. MAINTENANCE

13.1. 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 also use a clean cloth dampened with ethanol and gently wipe the window. Please avoid touching the window.

13.2. Storage

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

14. CONTACTS

14.1. For the USA:

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

Phone: + 33 4 42 61 29 20
E-mail: fli-support@oxinst.com
Website: https://andor.oxinst.com/

14.2. For the rest of the world:

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13590 Meyreuil
France

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