*compact*LCS User Guide

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Imprint & Disclaimer

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Before Use

Dear Customer, we would like to take this opportunity to thank you for purchasing the *compact* Lens & Camera Control System. Please read these Operating Instructions carefully and keep them handy for future reference.

Information for Your Safety

- Danger of operational error!
- Danger of injury!
- Damage to equipment possible!

General Safety Precautions

- In order to ensure optimal performance, please read the instructions!
- Do not put your fingers near the motors while motors are moving!
- Make sure all components (*camin*, lens motors, etc.) are securely mounted!
- Remove batteries from components before transport or storage!
- Repairs should only be made only by authorized service centers!
- Use only original cmotion replacement parts!
- In the case of wet weather, routine safety precautions for handling electrical equipment in wet weather should be taken!
- Do not remove any screws that are secured with paint!
- Do not remove any warranty seals!

Important

- If you have questions, or you need to order parts, please note the components‘ model and serial number.
- For support requests, also supply the installed firmware number of all system components.
- **WARNING**: cmotion can only guarantee operation if original cmotion products are used.

Using this Guide

This manual is split in three parts. The first introduces you to the *compact* lens control system, explaining components and concepts. The second takes you step by step through the setup of the system. The third part guides you through operation and menu options. The table of contents on page 3 provides a reference guide to specific sections of this user guide for quick information.

> **Note**: Notes indicate important information related to the respective sections of this user's guide.
>
> **Warning**: Warnings indicate important safety information. Ignoring these could lead to equipment damage or injury.

All cmotion components are written in italics throughout this manual.

Cables

When a cable is referred to in this user's manual, it will be referred to by its connectors. E.g. Le 10p, Fi 3p. Connectors are manufactured by W. W. Fisher, Lemo or Hirose and are referred to as Fi, Le and Hi respectively. The cable identification begins with the connector that is attached to the *camin* unit followed by the connector which is attached to non-cmotion unit or cmotion accessory. Each connector also takes reference from the number of pins it has. E.g. Le 10p, Fi 3p means that the cmotion connector is a 10pin Lemo and the other end is a 3pin Fischer.

Cables may also be referred to by their commonly used names e.g. LBUS (Le 4p, Le 4p). Occasionally, cable connectors are referred to as 'm' or 'f' to identify whether the connector is male or female. For a full overview of cables, please download the cmotion cable guide available from www.cmotion.eu.

Necessary Tools

4mm Allen keys may be required to complete steps laid out in the manual.

Frequently Used Terms

To Power Cycle: Turn your unit off and on again

1. Component Overview

This section of the User Guide deals with the description of the components and their respective functions, LEDs and buttons.

1.1. compact hand unit

The *compact hand unit* is an ergonomic, lightweight and intuitive 3 axis controller for *compact* LCS. It is available for either right or left handed operators.

The integrated 2.3” colour screen clearly displays important data and menu options, even in direct sunlight. Thoughtfully laid out function buttons make it quick and convenient to configure settings.

The *compact hand unit* is equipped with three controllers:

- a focus knob similar to the basic knob on the *cvolutionLCS*
- a pressure sensitive joystick
- a rocker switch

The *compact hand* unit can control up to 3 motors in either wireless or cabled configurations.

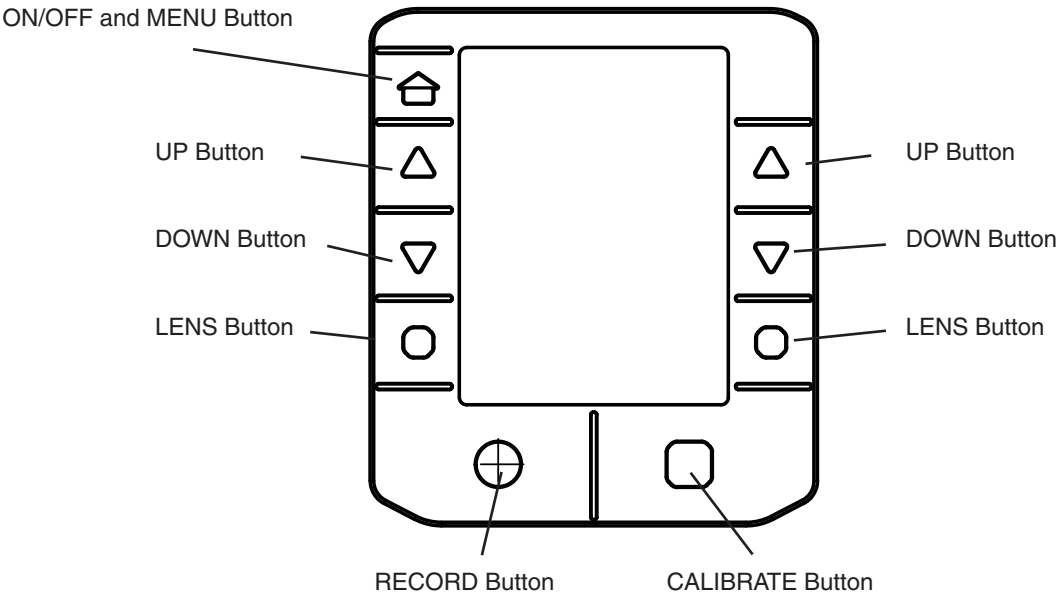
1.1.1. Connectors and Buttons on the *compact hand unit*

Connectors

LBUS port	The *compact hand unit* has an LBUS port underneath. This allows you to connect the *hand unit* directly to a *cforce* motor (or *camin* for firmware updates) using an LCB-x cable. („x“ denotes the length of cable).
cmotion locking disc	The *compact hand unit* features a standard 27mm locking disc to attach various accessories and fastening tools.
Battery port	Insert the cmotion battery in the battery port to power the *hand unit*.

Buttons

The buttons on the *compact hand unit* are laid out as follows:



1.2. *compact camin*

The *compact camin* is a small and lightweight box which offers wireless control for up to 3 motors plus a universal interface for camera start/stop control. Having parts of the electronics in the motor enables us to keep this unit *compact*, simple and flexible.

Note: When mounting a *camin*, make sure that all cables can be connected without strain

1.2.1. *compact camin* wireless system

The *compact camin* uses a 2.4 Ghz wireless radio module to communicate with the *compact hand unit*. Most important technical specs are:

- Selectable RF channels: 0-7
- Wireless frequency: 2.4 Ghz
- Max active wireless operators: 1
- Wireless range: up to 150m (495 feet) outdoor and 30m (98 feet) indoor
- Transmission delay: <10ms

1.2.2. Connectors of the *compact camin*

Le f10p	The Le f10p connector provides a run/stop interface for various cameras using optional cmotion cables
Fi m3p	The Fi m3p connector is used to supply power to the *camin* and motors from either a battery or camera where applicable. Note: Also provides run/stop control for ARRI cameras.
LBUS port	The Le f4p 'LBUS' connector allows you to connect the *cforce* / *cforce mini* motors to the *camin* or the *camin* to the *hand unit* for firmware updates.
cmotion locking disc	The 27mm locking disc allows the *camin* to be mounted on any 19mm or 15mm rod using the cfast rod connector.
1/4" threaded hole	A standard 1/4" threaded hole is positioned on one side of the *camin* for optional mounting solutions.

1.3. *cforce* motor

cforce are intelligent/active motors with built-in driver electronics and offer a daisy-chain style connection through their twin LBUS connectors. And, whilst being virtually silent, can run as fast as any top end motor in the market. Developed in collaboration with ARRI, *cforce* motors offer 3 flexible mounting options: rod-to-rod, Hill bracket locking disc and the “standard” 15mm/19mm rod brackets, which itself offers 2 clamp versions.

cforce motors can be connected in a daisy-chain fashion, i.e. an LBUS cable connects the first motor to the *camin*, the second motor is connected to the first, and the third connected to the second. This allows a less cluttered and expedite set up.

cforce motors can also be used with the cvolution system, the knob solo and cmotion’s broadcast solutions.

Status LED

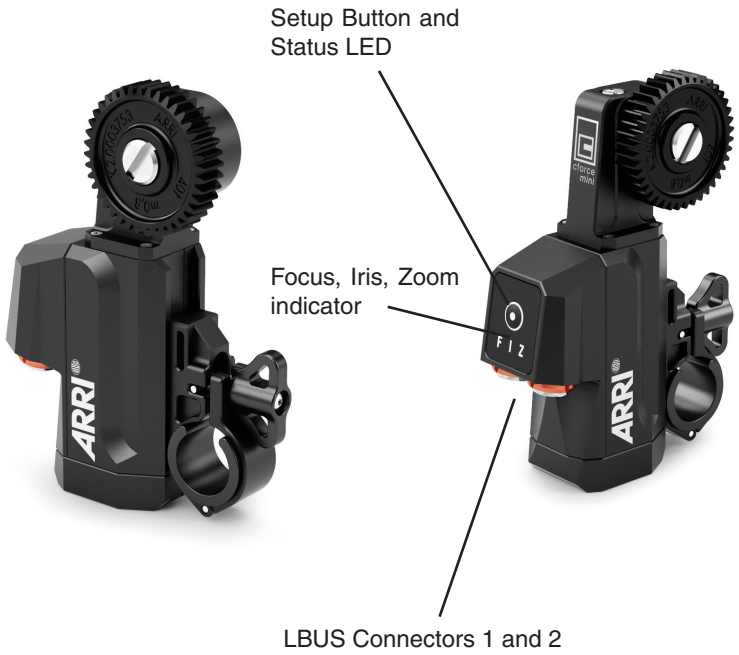
Red	Voltage below 10 Volts, motor won’t function
Flashing Red	No LBUS data, i.e. no *camin* or no other LBUS device present
Flashing Red/Green	No controller assigned to motor
Flashing Yellow/Green	Motor Calibration Request
Flashing Yellow	Motor Calibration in progress
Flashing Green	Motor in manual mode, i.e. for manual calibration
Green	Everything normal

1.4. *cforce mini*

cforce mini are intelligent/active motors with built-in driver electronics and offer daisy-chain style connection through their twin LBUS connectors. And, whilst being virtually silent, can run as fast as any top end motor in the market. Developed in collaboration with ARRI, the *cforce mini* motor features the “standard” 15mm/19mm rod bracket.

cforce mini motors can be connected in a daisy-chain fashion, i.e. an LBUS cable connects the first motor to the *camin*, the second motor is connected to the first, and the third connected to the second. This allows a less cluttered and expedite set up.

cforce mini motors can also be used with the cvolution system, the knob solo and cmotion’s broadcast solutions.



Status LED

Red	Voltage below 10 Volts, motor won’t function
Flashing Red	No LBUS data, i.e. no *camin* or no other LBUS device present
Flashing Red/Green	No controller assigned to motor
Flashing Yellow/Green	Motor Calibration Request
Flashing Yellow	Motor Calibration in progress
Yellow	Motor is in calibration timeout state
Flashing Green	Motor in manual mode, i.e. for manual calibration
Green	Motor is ready and calibrated, no warnings

2. *compact* system Accessories

2.1. Battery

Battery 2400mAh 7.2V for all cmotion controllers and the cdisplay II.

2.2. Battery Charger

Battery charger for all cmotion batteries. Optional worldwide socket adapters available.

2.3. cstrap

The *cstrap* allows the *hand unit* to be carried around the neck or over a shoulder between takes. The locking mechanism allows the unit to turn freely without the risk of coming loose.

2.4. rod connector

The cfast rod connector is compatible with all cmotion products fitted with standard cmotion locking disc. This simple and lightweight clamp allows you to mount the *camin* or *hand unit* securely to any 19mm rod or 15 mm rod when using the adapter ring. For more mounting options, please visit www.cmotion.eu or contact: sales@cmotion.eu

2.5. Marker Ring

Marker ring for *compact*LCS and cvolutionLCS focus knobs.

3. System Setup

This section will guide you through the compactLCS system setup. Starting with a quick setup, then proceeding with the *compact hand unit*s to *compact camin* and *cforce* motors.

3.1. Mounting *cforce* and *cforce mini* Motors

The *cforce mini* motor is supplied with a height adjustable 19mm butterfly rod clamp. A 15mm adapter is also included which can be clipped directly onto any 15mm rod before mounting and securing the motor in position.

The regular *cforce* motor has 3 mounting options:

3.1.1. Rod bracket

The *cforce* can be mounted to 15 and19 mm diameter rods.

- Slide the motor onto the rod.
- Align the motor gear with the gear ring on the lens.
- Connect the teeth on both rings and hold the motor in place while tightening the clamp. Be careful not to over tighten the screw.

3.1.2. Rod-to-rod

To mount *cforce* on a secondary rod, use the cmotion Rod-to-Rod adapter.

3.1.3. Hill Bracket

cforce can be mounted to a Hill bracket via the cmotion Hill bracket adapter.

> **Note**: When mounting motors make sure the lens scale isn't set to either limit before engaging the lens gear and calibrating.

3.2. Mounting the *camin*

The *camin* can be mounted on any 15mm or 19mm rod using the cfast rod connector supplied with the system. Alternatively, the 1/4“ threaded hole can be used with other industry standard fastening tools.

3.3. Connecting the Motors to the *camin*

- Using the LCB cables supplied with the system, connect the first *cforce*/*cforce mini* motor to the *camin*. If using two or three motors, connect the second motor to the first, and the third motor to the second.

3.4. Power Supply

Connect the RRS-7 cable to the RS 3pin connector on the *camin* and the Anton Bauer P-Tap/D-Tap connector to a P-Tap/D-Tap battery. Optional cables are also available for XLR batteries, ARRI standard RS 3pin connectors and stabilizing systems such as Steadicam and gimbals.

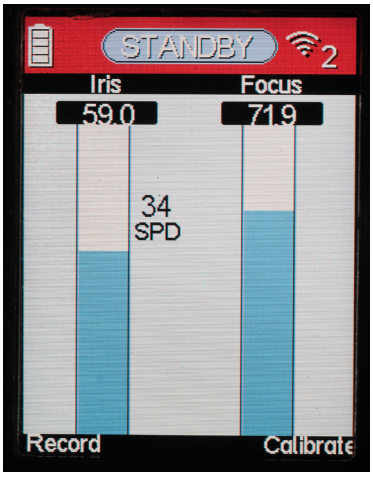
4. System Operation

4.1. Powering up the System

- Make sure the *camin* is powered via the RS port and a fully charged battery is inserted into the *hand unit*.
- Power up the *camin* by switching the ON/OFF switch to on.
- Power up the *hand unit* by pressing the Menu button.

4.2. *hand unit* Main Display

The *compact hand unit* clearly displays important operating information. On the top left, the *hand unit*s battery status is displayed. In the middle „Standby“ is displayed if the camera is not running. This will change to „Record“ or “Record Simul” when the camera is running. In the right corner the selected RF channel is displayed along with the signal strength. If the *hand unit* is connected via an LCB cable, the RF module is automatically deactivated and the RF channel is replaced by the letter “C”.

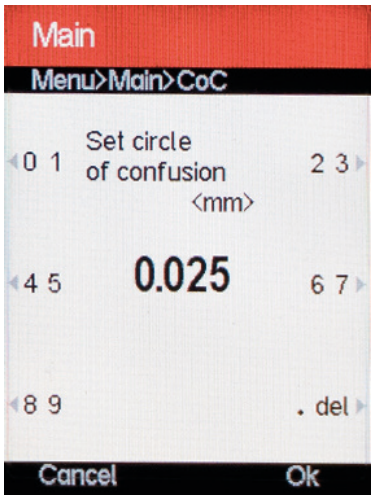


4.3. Entering the Menu

To enter the menu press the Home Menu button (top left side button). For detailed information refer to the Menu Section.

4.4. Numeric Entry

When using some of the advanced features available on *compact*LCS, you will need to select and enter numbers and values:

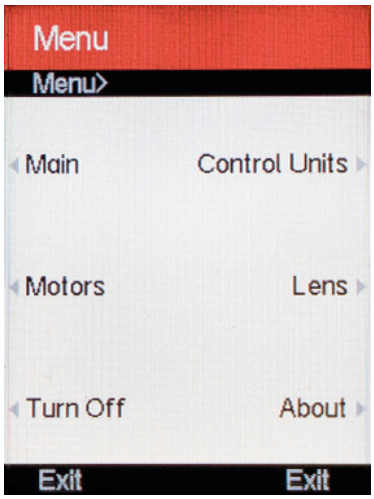


- Similar to an alphanumeric keypad, press the corresponding button once or twice to select the number associated with that button.
- To delete the last entered number, simply press the lower right side button twice.
- Press “OK” to save the entered value, or “Cancel” to clear.

4.5. *hand unit* Menu Guide

Note: When you select a menu item you will automatically return to the sub menu one level higher.

Use the menu buttons to the left and right of the display to navigate. “Back” will return to a higher menu level, “Exit” will return to the main screen.



4.5.1. Main

RF Channel

To select or change the *hand unit*’s RF channel, select Main, then RF Channel followed by the corresponding number. Although the RF will turn off automatically when the *hand unit* is connected using a cable, you can also switch the RF channel “OFF” manually. *Make sure the *camin* and the *hand unit* are set to the same channel for RF operation.

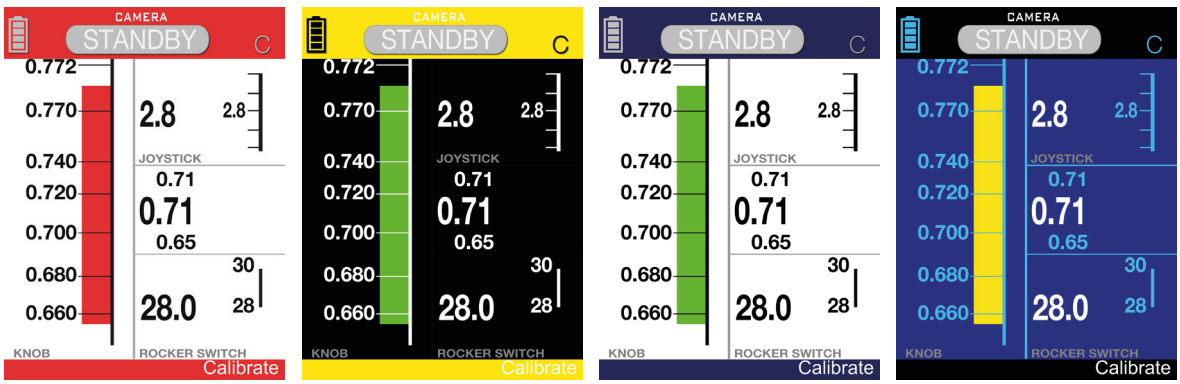
Brightness

Select the desired brightness by pressing the corresponding side buttons.

Note: When you enter the menu the brightness is automatically set to maximum.

Color Theme

Select the desired color theme by pressing the corresponding side buttons. There are 5 color themes to choose from. Each has been created to suit specific shooting situations such as low light or bright conditions.



Run Simulation

Run Simulation (displayed as “Run Simul”) provides a visual feedback on the *hand unit* to confirm the ‘Record’ button has been pressed when triggering cameras that do not provide a real-time run/stop feedback.This feature is used for cameras that do not offer record feedback

- To activate Run Simul, ensure the camera in NOT recording. Select Run Simul and turn ON. When you press the “Record” button once, please check the camera is recording. Press again to stop recording.

  Note: If the camera stops recording while “Run Simul” is being displayed, turn Run Simul OFF, ensure the camera is not recording and re-activate “Run Simul”

CoC (Circle of Confusion)

To set the appropriate CoC for accurate Depth of Field calculations, use the numeric entry process as explained in section 4.4 on page 15.

Note: CoC can be created and displayed in either metric or imperial units. This can be changed through LENS > SYSTEM UNIT.

Note: CoC will only be displayed if the optional ‘Lens Data License Key’ is installed and a lens file is active.

4.5.2. Control Units

This sub menu allows you to assign the knob, pressure sensitive joystick and rocker switch to control motors assigned to Focus, Iris and Zoom. First, select the controller, then select the required scale.

Note: When changing the function of a control unit, the original scale will automatically swap to the control unit assigned with the newly selected scale.

Note: It is also possible to turn each control unit OFF.

4.5.3. Motors

In the motors menu, each *cforce* / *cforce mini* motor is identified by it’s serial number. By selecting individual motors, you can change the following settings; scale, direction, torque, ramp and speed limiter. Each setting is stored within the individual memory of each motor.

Note: The menu shows the motor name (only *cforce* and *cforce mini* motors can be used at the time of writing) and the serial number of the motor in blue.

Scale

Select the desired scale from the menu by pressing the corresponding side button. You can assign a motor to Focus, Iris or Zoom.

Direction

To change motor direction select the Direction side button. Select left or right by pressing the

appropriate side button.

Torque

Note: To prevent the lens from being damaged, adjust the torque to the lens barrels friction (high friction = more torque and vice versa).

To adjust motor torque select the correct torque setting by pressing the corresponding side button. Available settings are “min”, “weak”, “strong” and “max”.

Ramp

To adjust motor ramp select “min”, “short”, “long” or “max” from the menu by pressing the corresponding side button. The motor will start and stop slowly when set to “max”, and more instant when set to “min”.

Speed Limiter

When the speed limit is set to ‘ON’ the motor can turn up to 2 revolutions per second (depending on power supply and lens resistance). When the speed limit is set to ‘OFF’ the motor is capable of 3 revolutions per second when supplied with a minimum of 18V.

Note: The motor runs quieter when the speed limit is turned ON.

Note: It is recommended to keep the speed limit ON when HIGH SPEED is not required.

Note: Keeping the speed limit OFF can reduce the life expectancy of the motor.

4.5.4. About

The about menu will show all units present in the system. It lists the units‘ names, serial numbers and software versions. This information is very important when contacting support.

> **Note**: If a Lens Data license key has been entered into the system via the *cworld* “lens handling active” will be displayed in the About Menu. If no key is present this be shown as “inactive”

4.5.5. Turn Off

Pressing this button will turn off the system. Alternatively press and hold the “Menu” button for 4 seconds.

4.5.6. Button Info

This button will exit the menu and display information on button functions on the main screen.

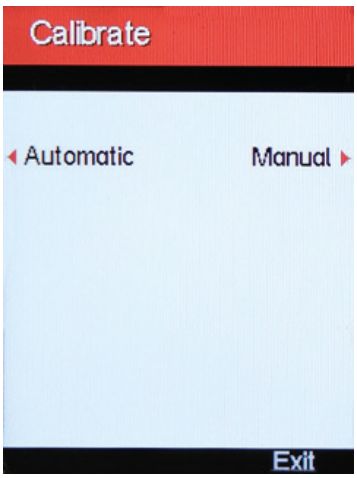
4.5.7. Exit

Press one of the two bottom buttons to exit the menu.

4.6. Motor Calibration

4.6.1. Automatic Motor Calibration

- To calibrate motors press the side button marked “Calibrate”.
- On the calibration screen select a single motor or “All motors”.
- Select “Automatic”” to start calibration.



4.6.2. Manual Motor Calibration

Manual motor calibration is used when working with lenses without physical scale stops such as photo lenses. To manually calibrate a scale proceed as follows:

- To calibrate motors press the side button marked “Calibrate”. On the calibration screen select the motor you want to calibrate.
- Select Manual.
- Move the motor to the minimum scale limit using the side buttons. The left side buttons control motor speed and the right side enables you to stop and reverse direction.
- When you have reached the desired minimum motor position press “set”.
- Repeat the procedure for the maximum scale limit and press “set” again.

4.7. Setting Controller Speed

The speed for the joystick and rocker switch can be set on a range from 1 to 99 to suit different shooting needs. To set the joystick/rocker switch speed:

- To increase the controller speed press the corresponding UP side button. Keep the button pressed for large speed changes.
- To decrease the controller speed press the corresponding DOWN side button. Keep the button pressed for large speed changes.

  Note: The left side buttons are controlling the joystick. The right side controls the rocker switch. When only the knob and one other controller is enabled the right side buttons are disabled.

  Note: If the motor being controlled by the pressure sensitive button or rocker is not moving, check the corresponding speed setting.

4.8. Setting Lens Limits

To set a Lens Limit for a controller:

- Move the controller to the first lens limit.
- Press and hold the joystick or knob lens side button.
- Move the motor to the second limit while keeping the side button pressed.
- Release to side button. The Lens Limit will be indicated by two black bars over the scale graph on the display.

  Note: To set a limit for the rocker switch you need to press the rocker switch while moving to the second limit.

To remove a Lens Limit:

- Press the Lens side button.
- The Limit is now reset and the black bars are removed from the scale on the display.

4.9. Starting and Stopping the Camera

You can start a connected camera with the side button marked „Record“. The camera control cables are connected to the *camin*’s EXT Le10p connector. For a list of compatible cameras and cables, please refer to the cmotion webshop at www.cmotion.eu.

4.10. Turning the System off

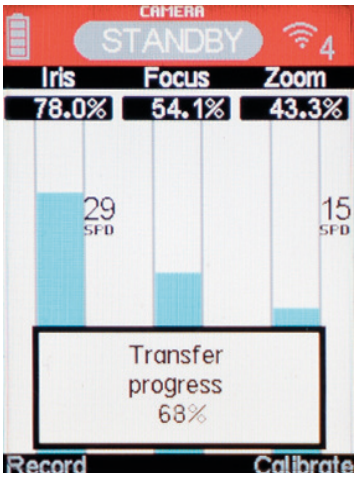
- Switch off the *hand unit* by pressing the Menu button for 4 seconds or by entering the menu by pressing the menu button and pressing the „Turn off“ side button.
- Switch off the *camin* by setting the On/Off switch to off.

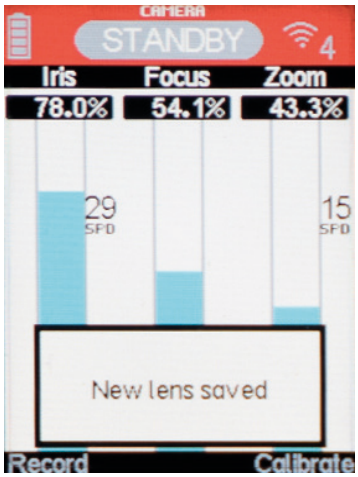
5. Lens Data

If you have purchased and activated a 'Lens Data Handling License Key' for your *compact*LCS via cworld, your system will be capable of creating, storing and displaying information including; real-time focus, iris and zoom positions, Depth of Field and Hyperfocal distance.

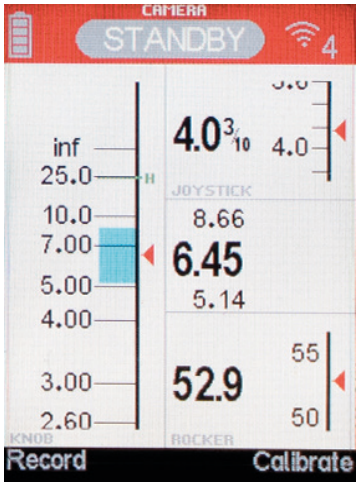
5.1. Loading Lens Data into the System

Lens data files that have been created using cworld can be transferred and saved directly on any *compact* LCS *hand unit* with the lens data handling feature 'active'. With cworld connected to the end motor in the daisy-chain configuration (using cable LCB-7), up to 14 individual lens files can be selected using a wireless smart device, and sent to the LBUS connected device - *compact* LCS *camin*. This data is then sent from the *camin* to the *hand unit* via the RF connection. Please refer to our video tutorials and cworld documentation for further information.





When using Lens Data, the *compactLCS hand unit* can display a wealth of useful lens information:



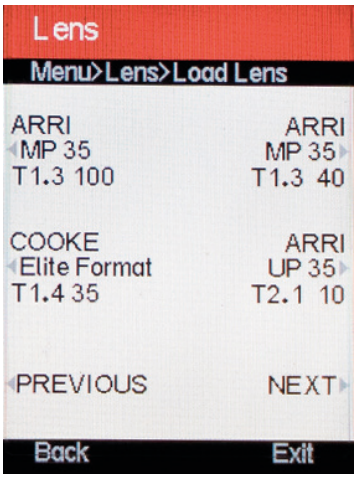
This data includes

- Depth of Field is calculated using the pre-assigned Circle of Confusion value and the real-time or 'set' iris vale. This is displayed as a blue rectangle on the focus scale and in numerics as near and far DOF limits above and below the current focus value respectively.
- Hyperfocal Distance. The current hyperfocal distance is indicited by a green line and the letter "H".

5.2. The Lens Menu

5.2.1. Load Lens

After transferring Lens Data into the system via the cworld you can selected the desired lens from the Load Lens Menu by pressing the correct side button or pressing “Next” to cycle through the available lenses.



Note: The “NEXT” and “PREV” buttons will only be visible if there are more than 5 lenses in the system.

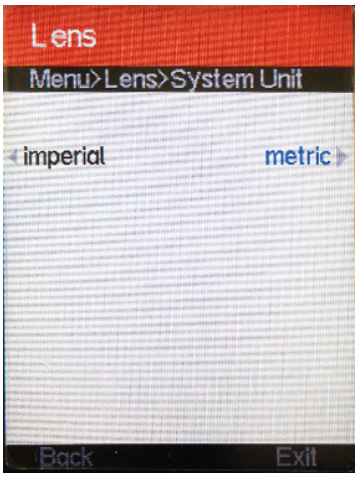
Note: A maximum of 14 lenses can be loaded in the system at one time.

Note: When a lens is loaded, loading another one will automatically unload the previous lens.

5.2.2. Unload Lens

To remove an active lens and return to the regular motor position display, press “Unload Lens”.

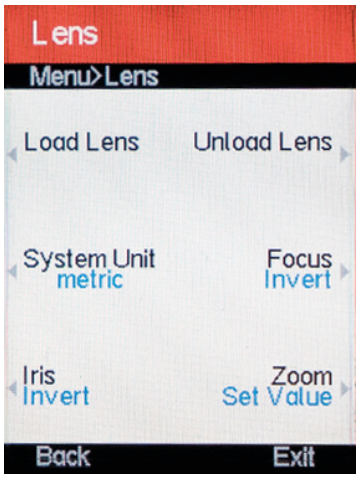
5.2.3. System Unit



The comapctLCS *hand unit* can display focal distance and DOF limits in either metric or imperial units. To change the displayed measurement unit, simply press the corresponding side button.

5.2.4. Focus/Iris/Zoom

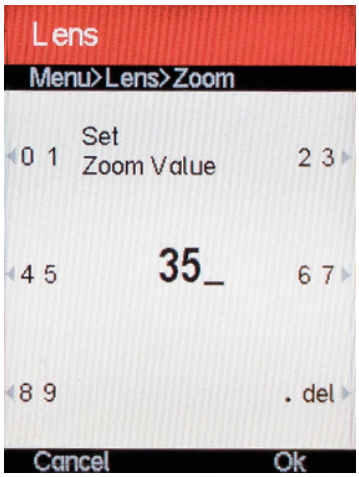
If the lens data on any axis is displayed travelling in the opposite direction to the travel of the lens scale, this can be inverted by pressing the corresponding 'Invert' button. If a complete lens file has been created but a motor is not present / available, the desired value can be input manually for the missing motor using the "Set Value" option. This will ensure the DOF can be calculated accordingly.



Note: When a prime lens is loaded, there will be no zoom scale options available.

5.2.5. Set Value

To set a value for Iris, Focus or Zoom proceed as follows:



- Press “Focus” “Iris” or “Zoom” button to select the required axis.

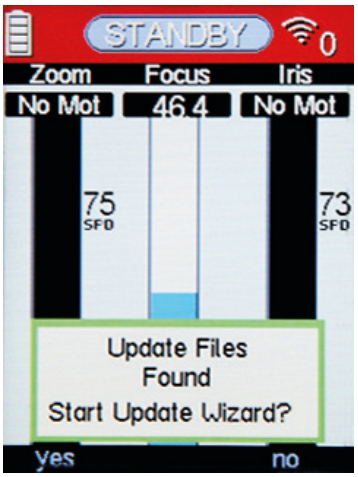
  Note: You cannot set a value to any scale where a motor is assigned and connected.

- Set the desired value using the numerical input screen. For more information refer section 4.4 on page 15.
- Save the value and exit the menu by pressing “OK”. Exit without saving by pressing “Cancel”.

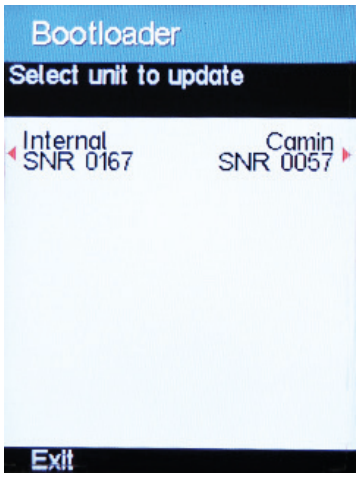
6. Updating Firmware

To update the firmware on any *compact* LCS components, please follow these instructions:

- Download and unzip the *compact* LCS firmware package from the software and support page on the cmotion website.
- Save this to an empty USB memory stick and insert into the USB port on the *hand unit*.
- Power up the *hand unit* by pressing the Menu button.
- The system will detect the update files. Press “yes” to start the update wizard.
- Select the unit to be updated by pressing the corresponding side button.

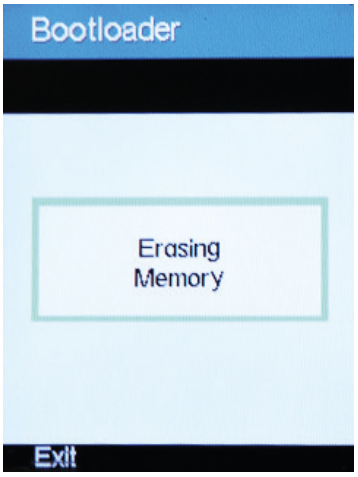


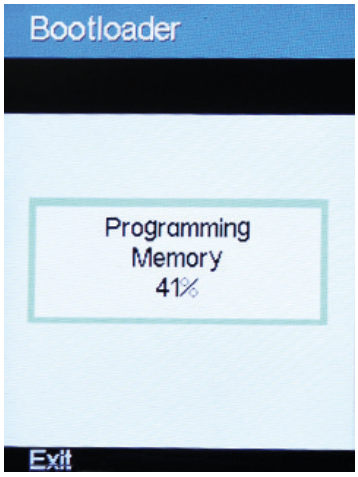
- Select the software version you want to install by pressing the corresponding side button..

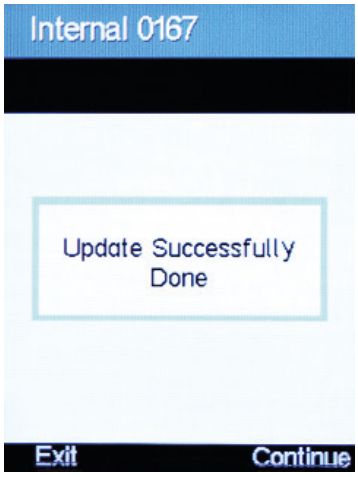


Note: Where applicable, update the Bootloader firmware before the main firmware file

- Wait for the system to perform the update. When complete, press “continue”. The system will restart and is ready for use with the new firmware.







Note: It is possible to update the firmware on all *compact*LCS components using the *compact hand unit*, any LCB cable and a single battery. To update *cforce*/*cforce mini* motors, please connect one motor at a time directly to the *hand unit*.