

# cforce plus Lens Motor

USER MANUAL

1st August 2016



## Imprint

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## Scope

This User Manual applies to the following product:

K2.0008819      cforce plus Lens Motor with Software Update  
Packet V1.1.1

## Revision history

Version	ID	Order #	Release	Date
01	10001488	K5.0008999	F06024	1.6.2016
02	10001488	K5.0008999	W01137	1.8.2016

## Disclaimer

Before using the products described in this manual, be sure to read and understand all the respective instructions.

The ARRI cforce plus Lens Motor is only available to commercial customers. By utilization, the customer agrees that the cforce plus Lens Motor or other components of the system are deployed for commercial use only. Otherwise the customer must contact ARRI before utilization.

While ARRI endeavors to enhance the quality, reliability and safety of their products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize the risk of damage to property or injury (including death) to persons arising from defects in the products, customers must incorporate sufficient safety measures in their work with the system and heed the stated canonic use.

ARRI or its subsidiaries do not assume any responsibility for losses incurred due to improper handling or configuration of the cforce plus Lens Motor or other system components.

ARRI assumes no responsibility for any errors that may appear in this document. The information is subject to change without notice.

For product specification changes after this manual was published, refer to the latest published ARRI data sheets or release notes, etc., for the most up-to-date specifications. Not all products and/or types are available in every country. Please check with an ARRI sales representative for availability and additional information.

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In the event that one or all of the foregoing clauses are not allowed by applicable law, the fullest extent permissible clauses by applicable law are validated.

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# 1 For your safety

Before use, please ensure that all users read, understand, and follow the instructions comprehensively in this document.

## Risk levels and alert symbols

Safety warnings, safety alert symbols, and signal words in these instructions indicate different risk levels:

### **DANGER!**

*DANGER* indicates an imminent hazardous situation, which, if not avoided, **will result in** death or serious injury.

### **WARNING!**

*WARNING* indicates a potentially hazardous situation, which, if not avoided, **may result in** death or serious injury.

### **CAUTION!**

*CAUTION* indicates a potentially hazardous situation, which, if not avoided, **may result in** minor or moderate injury.

### **NOTICE**

*NOTICE* explains practices not related to physical injury. No safety alert symbol appears with this signal word.

**Note:** Provides additional information to clarify or simplify a procedure.

## Vital precautions

### DANGER!

#### **Risk of electric shock and fire!**

Short-circuits may entail lethal damage!

Before use, read and follow all valid instructions.

Use solely and exclusively as described in the instructions.

Never open. Never insert objects.

For operation, always use a power source as indicated in the instructions.

Always unplug the cable by gripping the plug, not the cable.

Never try to repair. All repair work should be done by a qualified ARRI Service Center.

Never remove or deactivate any safety equipment (incl. warning stickers or paint marked screws).

Always protect from moisture, cold, heat, dirt, vibration, shock, or aggressive substances.

### DANGER!

#### **Risk of fire!**

Short-circuits and back currents to power supplies/batteries may entail lethal damage!

Always use original ARRI/cmotion LBUS cables to external power sources (D-Tap, XLR)! ARRI/cmotion LBUS cables to external power sources provide a protection circuit to prevent back currents to power supplies/batteries.

## 2 Audience and intended use

### ***NOTICE***

The product is solely and exclusively available for commercial customers and shall be used by skilled personnel only. Every user should be trained according to ARRI guidelines. Use the product only for the purpose described in this document. Always follow the valid instructions and system requirements for all equipment involved.

The cforce plus Lens Motor is solely and exclusively for use on professional camera setups.

### 3 Scope of delivery and warranty

#### **NOTICE**

Product and packaging contain recyclable materials. Always store, ship, and dispose of according to local regulations. ARRI is not liable for consequences from inadequate storage, shipment or disposal.

#### **Delivery**

On delivery, please check that the package and content are intact. Never accept a damaged or incomplete delivery. A complete delivery includes:

- cforce plus motor unit
- cforce plus clamp console 19/15mm
- cforce plus gear assembly 60 teeth m0.8
- User manual
- Original packaging

#### **Warranty**

For scope of warranty, please ask your local ARRI Service Partner. ARRI is not liable for consequences from inadequate shipment, improper use, or third-party products.

## 4 Introduction



ARRI and cmotion have partnered up to develop the new intelligent cforce plus motor. The fast and versatile lens motor moves all common cine style lenses with remarkable speed and torque.

Equipped with twin LBUS connectors and using daisy chain technology, up to three cforce plus or mini motors can be linked up in a row.

The cforce plus connects directly to the new ALEXA Mini camera, providing a integrated, versatile solution, e.g. if larger studio zooms are being used. It also connects to ARRI's AMC-1 motor controller and the Universal Motor Controller UMC-4 for camera-independent setups.

The cforce plus is fully compatible with all cmotion LBUS compatible devices such as the compact LCS and the cvolution system, the pan-bar zoom, the knob solo and ENG adapters.

### **NOTICE**

To tap the full potential of the device, have all connected units updated to the latest available firmware.

## Main features

- Fast, strong and versatile lens motor
- Daisy-chainable via LBUS
- Directly compatible with ARRI's ALEXA Mini camera, AMC-1 and UMC-4 motor controllers, cmotion's compact LCS, evolution, pan bar zoom, knob solo and broadcast solutions

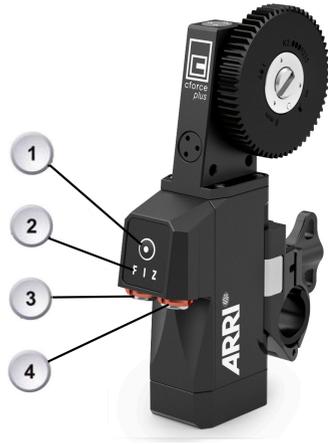
### 4.1 LBUS

LBUS is a bus standard designed to allow multiple lens motors and control devices to communicate with each other.

Up to three cforce-type motors can be chain-linked in a row. Each cforce motor has two identical, bi-directional LBUS interfaces providing power and control signals to the motor.

## 5 Motor layout

- 1 Setup button
- 2 Focus, Iris, Zoom indicator
- 3 LBUS connector 1
- 4 LBUS connector 2



### 5.1 Setup button

#### Motor assignment

Use the SETUP button to assign the cforce plus motor to the focus, iris or zoom control of the respective control device. Make sure that the assignment matches the lens axis the motor is attached to.

Press the SETUP button momentarily to indicate the current motor assignment. The F (Focus), I (Iris) or Z (Zoom) indicator underneath the SETUP button will light up for three seconds.

Press the SETUP button momentarily again to change the current motor assignment. Toggle through until you reach the desired setting.

#### Motor calibration

Press the SETUP button for three seconds to start the automatic calibration of the respective motor.

Press the SETUP button momentarily during calibration to interrupt the calibration process.

## 5.2 Status LED

The status LED of the SETUP button indicates the current motor status.

<b>LED</b>	<b>Status</b>
Solid green	Motor is ready and calibrated, no warnings
Green/red flashing	Motor is calibrated, but no motor master available (idle)
Yellow flashing	Motor is currently calibrating
Green/yellow flashing	Motor needs to be calibrated (calibration request)
Solid yellow	Motor is in calibration timeout state
Solid red	Motor power supply is below 10V
Red flashing	No LBUS data is available
Green flashing	Motor is in passive mode

## 6 Motor preparation

### Mounting to 19 mm rods

1. Open the clamp console by turning the thumbscrew counterclockwise.
2. Remove the 19/15mm clamp insert.
3. Attach the clamp console on the rod, with the motor gear engaged to the lens barrel.
4. Close the clamp console by turning the thumbscrew clockwise.

### Mounting to 15 mm rods

1. Open the clamp console by turning the thumbscrew counterclockwise.
2. Attach the 19/15mm clamp insert (K2.0006175) on the 15 mm rod.
3. Attach the clamp console around the clamp insert on the rod, with the motor gear at the respective lens barrel.
4. Close the clamp console by turning the thumbscrew clockwise.

Note: For high torque applications use clm-4 clamp insert (K2.0002080, not included)

### Mounting to Panavision rods

1. Open the clamp console by turning the thumbscrew counterclockwise.
2. Remove the 19/15mm clamp insert.
3. Attach the CLM-4 Clamp Insert 5/8" (K2.72115.0, not included) to the 5/8" rod.
4. Attach the clamp console around the clamp insert on the rod, with the motor gear at the respective lens barrel.
5. Close the clamp console by turning the thumbscrew clockwise.

## Setting up motor

1. Connect the motor to its control device.
2. Use the SETUP button to assign the cforce motor to the focus, iris or zoom control of the control device. Make sure that the assignment matches the lens scale the motor is attached to.
3. Set the motor side/direction on the control device.
4. Set the motor torque on the control device.
5. Press the SETUP button for three seconds to start the automatic calibration of the respective motor. Alternatively, activate the calibration process through the control device.

### **⚠ CAUTION!**

**Risk of injury!** Do not touch motor gear while motor is powered up!

### **NOTICE**

To prevent the motor from falling down when detaching the motor from the lens, hold the motor unit with one hand while opening the clamp console.

## 7 Compatibility

The cforce plus Lens Motor is directly compatible with the following ARRI products:

- ALEXA Mini camera (with Titanium PL LDS mount with LBUS connector; from SUP 4.1)
- Active Motor Controller AMC-1 (from SUP 1.44)
- Universal Motor Controller UMC-4 (from UMC-4 SUP 1.42)
- Wireless Compact Unit WCU-4 in hard-wired mode (from WCU-4 SUP 2.2.26) in combination with a motor controller or an ALEXA mini

The cforce plus Lens Motor is directly compatible with the following cmotion products:

- evolution camin 3M
- broadcast camin
- compact camin
- pan bar zoom
- knob solo
- ENG adapter
- cworld

### 7.1 Sample configurations

cforce plus Lens Motors can be used in different applications, within ARRI or cmotion systems. The following configurations are samples, making no claim to be exhaustive.



## NOTICE

- If UMC-4 is used for controlling motors, an additional power cable is required (See "LBUS cables", page 21).
- For hard-wired motor control with WCU-4, use an additional motor controller connected in the LBUS chain.

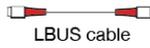
emotion evolution camin 3M



emotion broadcast camin



emotion compact LCS camin



LBUS cable



LBUS cable

LBUS cable

cmotion pan-bar zoom



cmotion compact LCS hand unit



cmotion ENG-adapter



cmotion knob solo



LBUS cable for hardwired operation



LBUS cable

LBUS cable

CBUS to LBUS cable for hardwired operation



LBUS power cable to external power source



## 8 Software update

The cforce plus Lens Motor can be updated from external devices through its LBUS interface.

The following devices provide update functionalities for cforce plus Lens Motor:

- ARRI Wireless Compact Unit WCU-4
- ARRI Active Motor Controller AMC-1
- ARRI Universal Motor Controller UMC-4
- cmotion compact hand unit
- cmotion cworld

Please refer to the respective user manuals for further information.

### **WARNING!**

Do not switch off power and do not remove the SD/Micro SD card during the update as this may damage the cforce plus Lens Motor!

## 9 Appendix

### 9.1 Part numbers

#### cforce plus Basic Set

K0.0010103 cforce plus (Basic Set)

The cforce plus Basic Set includes:

K2.0008819 cforce plus motor unit

K2.0008678 cforce plus clamp console 19/15mm

K2.0006175 cforce mini clamp insert 19/15mm (included in K2.0008678)

K2.0009335 cforce plus gear assembly 60 teeth m0.8

#### **NOTICE**

The cforce plus Basic Set does not include an LBUS cable. LBUS cables are available in various lengths and need to be ordered separately.

#### LBUS cables

K2.0006749 Cable LBUS 0.2m/8" LCB-3

K2.0006750 Cable LBUS 0.3m/1ft LCB-4

K2.0006751 Cable LBUS 0.5m/1.5ft LCB-A

K2.0006752 Cable LBUS 0.8m/2.5ft LCB-1

K2.0006753 Cable LBUS 1.5m/5ft LCB-5

K2.0006754 Cable LBUS 3m/10ft LCB-1-01

K2.0006755 Cable LBUS 6m/20ft LCB-2

K2.0006756 Cable LBUS 15m/49ft LCB-1-15

K2.0007318	Cable LBUS to LCS 0,8m/2.5ft
K2.0006757	Cable LBUS to D-Tap 1.2m/4ft LPS-7-01
K2.0006758	Cable LBUS to D-Tap 0.8m/2.5ft LPS-7
K2.0006759	Cable LBUS to RS 0.8m/2.5ft LPS-1
K2.0006760	Cable LBUS to XLR-4 0.8m/2.5ft LPS-6

### **⚠ DANGER!**

#### **Risk of fire!**

Short-circuits and back currents to power supplies/batteries may entail lethal damage!

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#### **Gears for cforce plus Lens Motor**

K2.0009335	cforce plus gear assembly with module 0.8, 60 teeth
K2.0010365	cforce plus gear assembly with module 0.8, 60 teeth, 25 mm extra-wide
K2.72111.0	gear assembly with module 0.6, 70 teeth
K2.0002044	gear assembly with 48 pitch, 75 teeth
K2.72110.0	gear assembly with module 0.5, 80 teeth
K2.72109.0	gear assembly with module 0.4, 100 teeth
K2.0000244	gear flange
K2.72127.0	knurled head captive screw
K2.72116.0	gear set module 0.8, 0.6, 0.5, 0.4 Note: You need a Torx key #6 to swap gear flange between gears

**Clamping consoles for cforce plus Lens Motor**

K2.72101.0 standard clamp console  
19/15mm



K2.65140.0 standard clamp console for  
CLM-3



K2.65141.0 clamp console-2 for CLM-3



K2.0008678 CLM-plus clamp console



K2.72115.0 insert 19mm to 5/8" for CLM-4



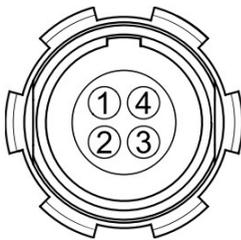
K2.0002080 insert 19 to 15mm for CLM-4

## 9.2 Specifications

Temperature range:	-20 to +50° C (-4 to +122° F)
Torque:	0,7 Nm const., 1 Nm max. peak at motor axis
Speed:	210 teeth per second with gear 60t (3.5 R/s)
Supply voltage:	12 - 34 V
Power consumption:	max. 32 W peak

## 9.3 Pinouts

### LBUS connector

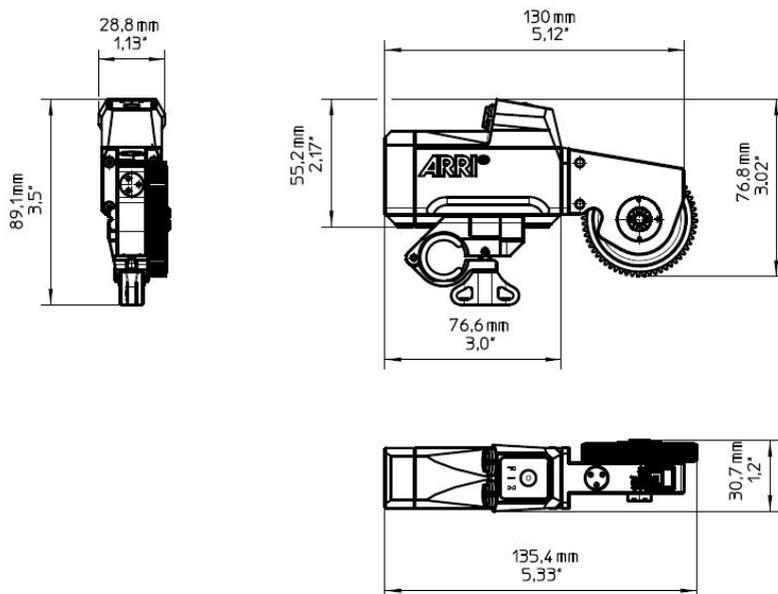


1	GND	Ground
2	CAN-L	CAN bus
3	V-BAT	Battery supply in-/output
4	CAN-H	CAN bus

## 9.4 Dimensions and weight

### Dimensions

The following dimensions are for the cforce plus (Basic Set) including the CLM-plus clamp console 19/15mm and cforce plus gear assembly m 0.8, 60teeth



### Weight

Weight of cforce plus (Basic Set): 325g/11,5oz

## 9.5 Service contacts

### **Munich, Germany**

Arnold & Richter Cine Technik  
+49 89 3809 2121  
service@arri.de  
Business hours:  
Mo. - Fr. 9:00 - 17:00 (CET)

### **London, Great Britain**

ARRI CT Limited  
+44 1895 457 051  
service@arri-ct.com  
Business hours:  
Mo. - Thu. 9:00 - 17:30  
Fr. 9:00 - 17:00 (GMT)

### **Burbank, USA**

ARRI Inc. West Coast  
+1 877 565 2774  
service@arri.com  
Business hours:  
Mo. - Fr. 8:15 - 17:00 (PST)

### **Mississauga, Canada**

ARRI Canada Limited  
+1 416 255 3335  
service@arri.com  
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Mo. - Fr. 8:30 - 17:00 (EDT)

### **Beijing, China**

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service@arrichina.com  
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Mo. - Fr. 9:00 - 18:00 (CST)

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### **Sydney, Australia**

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service@arri.com.au  
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Mo. - Fr. 8:00 - 18:00 (AEST)

## 9.6 International declarations

### EC Declaration of Conformity

The product cforce plus Lens Motor conforms with the specifications of the following European directives:

- Directive 2014/30/EU of the European Parliament and the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility
- Directive 2011/65/EU of the European Parliament and the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The compliance with the requirements of the European Directives was proved by the application of the following harmonized standards:

- EN 55103-1:2009; EN 55103-2:2009; EN 50581:2012

### FCC Class A Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### Industry Canada Compliance Statement

Complies with the Canadian ICES-003 Class A specifications. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada. This device complies with RSS 210 of Industry Canada. Cet appareil est conforme à CNR-210 d'

Industrie Canada. This Class A device meets all the requirements of the Canadian interference-causing equipment regulations. Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.