cforce mini RF
Software Update Package 1.2

USER MANUAL

14th April 2021
Imprint

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Original version.

This product was manufactured by ARRI Cine + Video Geräte Ges.m.b.H for Arnold & Richter Cine Technik GmbH & Co. Betriebs KG.

For further assistance

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Scope

This USER MANUAL applies to the following product:
K2.0016802 cforce mini RF with Software Update Package 1.2
## Document revision history

<table>
<thead>
<tr>
<th>Version</th>
<th>ID</th>
<th>Order #</th>
<th>Release</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>1.0</td>
<td>10002881</td>
<td>K5.0016851</td>
<td>F06617</td>
<td>03.05.2018</td>
</tr>
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<td>K5.0016851</td>
<td>W01412</td>
<td>25.09.2018</td>
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<td>W01453</td>
<td>14.12.2018</td>
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<td>10002881</td>
<td>K5.0016851</td>
<td>W01463</td>
<td>14.04.2021</td>
</tr>
</tbody>
</table>
Disclaimer

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

The ARRI Software Update Package 1.2 cforce mini RF is/are only available to commercial customers. By utilization, the customer agrees that the cforce mini RF 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 mini RF or other system components.

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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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or economic loss of any kind or for any claim by a third party, downtime, good-will, damage to or replacement of equipment or property, any cost or recovery of any material or goods associated with the assembly or use of our products, or any other damages or injury of the persons and so on or under any other legal theory.

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 comprehensively read, understand, and follow the instructions 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 paintmarked 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

ADVICE

The product is solely and exclusively available for commercial costumers 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 mini RF is solely and exclusively for use on professional camera setups.
3 Scope of delivery and warranty

**ADVICE**

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 mini RF Motor Unit with antenna
- cforce mini Clamp Console 2 19/15mm
- cforce mini gear 0.8/40t
- 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.
ARRI and cmotion have partnered up to develop the new intelligent cforce mini RF motor.

The ARRI cforce mini RF is an intelligent lens motor with integrated white-coded ARRI radio module, eliminating the need for an additional receiver unit mounted on the camera.

The cforce mini RF can pair with up to three hand units for split focus, iris and zoom operation and provides full lens data when used with the WCU-4 hand unit.

The simple user interface includes two soft buttons and a display for setting the motor axis, triggering motor calibration and selecting one of the 14 radio channels.

Using the LBUS interface, the system can be expanded with up to two additional cforce motors while the new CAM connector provides a versatile interface for power supply and run/stop control for cameras including ARRI, Red, Sony, Canon and Blackmagic.
Main features

- Integrated white radio module
- Supports lens data with WCU-4 hand unit
- Daisy-chainable via LBUS
- Small and lightweight (~186g/6.56oz incl. gear and antenna)
- Compatible with all hand units containing ARRI's white-coded radio module

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 Antenna
2 Gear
3 Display
4 Upper soft button
5 Lower soft button
6 CAM connector
7 LBUS connector

5.1 Control panel

The cforce mini RF features a user interface to configure the system. The display shows menu and status information.
**Soft buttons**

Two soft buttons are located below the display. They change their behavior depending on the screen content.

**Menu navigation**

Use the soft buttons to enter the setup menus as follows:

<table>
<thead>
<tr>
<th>Menu</th>
<th>Buttons</th>
<th>Press button…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor axis (FIZ)</td>
<td>Upper</td>
<td>short</td>
</tr>
<tr>
<td>Motor calibration</td>
<td>Upper</td>
<td>long (3 sec)</td>
</tr>
<tr>
<td>Flip screen</td>
<td>Upper</td>
<td>short (in menu “System info”)</td>
</tr>
<tr>
<td>Region settings</td>
<td>Lower</td>
<td>6 sec</td>
</tr>
<tr>
<td>RF channel</td>
<td>Lower</td>
<td>short</td>
</tr>
<tr>
<td>System info</td>
<td>Lower</td>
<td>long (3 sec)</td>
</tr>
</tbody>
</table>

*Note: Main screen turns off after 3 seconds.*

**5.2 Setup**

**Motor assignment**

Push the upper button short to assign motor to focus, iris or zoom control. Make sure that the assignment matches the lens axis the motor is attached to.

**Motor calibration**

Hold the upper button for three seconds to start the automatic calibration of the motor.

Press the upper button momentarily to interrupt the calibration process.
System info

Hold the lower button for three seconds to view the system info. The System info shows the current firmware version.

Region settings

RF offers radio settings for different areas (with white-radio module EMIP400). Make sure that you select the proper area you are operating the device in. All available region settings comply with Part 15 of the FCC rules.

Push the lower button for 6 seconds to enter the region settings menu. Push momentarily to toggle through the regions. Select World your specific region is not listed.

ADVICE

If the master device (camera) is also equipped with a radio module which is able to set regions, turn off the radio module from the cforce mini RF motor.
The **RF** menu lets you switch the radio on and off and select the radio channel.

Press the lower button momentarily to enter the *Radio* menu.

Toggle through the channels until you reach the desired Radio channel. The channel will be automatically set after three seconds.
### Master vs Client Mode

There always has to be one "master" who handles the wired communication. In combination with e.g. ARRI Alexa Mini/Mini LF, UMC-4 and AMC-1 please set radio to “CLIENT”. The motor behaves like a common cforce motor without a radio module. For all other setups please set radio to “OFF”.

<table>
<thead>
<tr>
<th>RF (Radio)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Radio=OFF / Motor controller = ON</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
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<tr>
<td>5</td>
<td></td>
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<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
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<td>8</td>
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<td>9</td>
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<tr>
<td>10</td>
<td></td>
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<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Client</td>
<td>Radio = OFF / Motor Controller = OFF</td>
</tr>
</tbody>
</table>
5.3 Status LEDs

The status LED of the upper button indicates the current motor status:

<table>
<thead>
<tr>
<th>LED (Upper button)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid green</td>
<td>Motor is ready and calibrated, no warnings</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Motor is in passive mode</td>
</tr>
<tr>
<td>Green/red flashing</td>
<td>No motor master available (idle)</td>
</tr>
<tr>
<td>Yellow flashing</td>
<td>Motor is currently calibrating</td>
</tr>
<tr>
<td>Green/yellow flashing</td>
<td>Motor needs to be calibrated (calibration request)</td>
</tr>
<tr>
<td>Solid yellow</td>
<td>Motor is in calibration timeout state</td>
</tr>
<tr>
<td>Solid red</td>
<td>Motor power supply is below 10V</td>
</tr>
</tbody>
</table>

The status LED of the lower button indicates the current radio status:

<table>
<thead>
<tr>
<th>LED (Lower button)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid green</td>
<td>Radio ready, client logged on</td>
</tr>
<tr>
<td>Yellow/red flashing</td>
<td>Selected channel used by another master device</td>
</tr>
<tr>
<td>Solid red</td>
<td>Motor initializing / hardware fault</td>
</tr>
<tr>
<td>Red flashing</td>
<td>Update</td>
</tr>
</tbody>
</table>
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 (K2.0038503).
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 (K2.0038503) 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 cforce mini clamp insert 5/8" (K2.0038504, 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. Press the lower button for six seconds to select the region you are in. Repeat this step each time you change a region.

2. Use the upper 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 axis the motor is attached to.

3. Press the lower button short to select the radio channel.

4. Press the upper button for three seconds to start the automatic calibration of the respective motor. Alternatively, activate the calibration process through the control device.

**Connecting to hand unit**

1. Set the hand unit to the same radio channel as the cforce mini RF (refer to user manual of the hand unit).

2. Set the motor side, torque and direction (refer to user manual of the hand unit).

You are now ready to shoot.
**CAUTION**

Risk of injury! Do not touch motor gear while motor is powered up!
This device is not intended for use by children. Keep body parts out of the motion path.

Disconnect the plug if the device is not used for a longer period of time.
IEC 60417-6056 (2011-05) for other moving parts

**ADVICE**

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 mini RF is directly compatible with the following ARRI products:

- cforce mini lens motor
- cforce plus lens motor
- UDM-1 (Ultrasonic Distance Measure) via LCUBE CUB-1
- Master Grips
- Operator Control Unit OCU-1
- Wireless Compact Unit WCU-4
- Single Axis Unit SXU-1

For compatibility with cmotion products please contact cmotion directly.

7.1 Sample configurations

cforce mini RF lens motors can be used in different applications, within ARRI systems. The following configurations are samples, making no claim to be exhaustive:

- cforce mini RF with WCU-4 and up to two additional cforce motors
- cforce mini RF with WCU-4 and up to two additional cforce motors and OCU-1 (Note: cforce mini RF supports OCU-1 override function with SUP 2.0)
- cforce mini RF with SXU-1
- cforce mini RF with WCU-4 and up to two additional cforce motors and LCUBE CUB-1 for UDM-1
- cforce mini RF with SXU-1 and LCUBE CUB-1 for UDM-1
- cforce mini RF with WCU-4 and up to two additional cforce motors and cmotion cfinder III
- cforce mini RF with SXU-1 and cmotion cfinder III
- cforce mini RF with WCU-4 and up to two additional cforce motors and Master Grips
- cforce mini RF with WCU-4 and up to two additional cforce motors and Master Grips (Note: cforce mini RF supports Master Grips override function with SUP 2.0)
When using the cforce mini RF with ALEXA Mini, switch the motor to client mode in its Radio menu.
8 Software update

The cforce mini RF motor can be updated from external devices through its LBUS interface.

To keep your cforce mini RF up-to-date, you may need to update its firmware. Please check ARRI’s website for the latest firmware packages.

The following devices provide update functionalities for cforce mini RF:

- Wireless Compact Unit WCU-4
- ALEXA Mini
- ALEXA Mini LF

Please refer to the respective user manuals for further information.

⚠️ WARNING

Do not switch off power during the update as this may damage the cforce mini RF!
9 Power disconnection

⚠️ CAUTION

To disconnect the device safely from the power source, pull the plugs. Mount and operate the device in an orientation that guarantees easy accessible plugs.
10 Appendix

10.1 Antenna connector

The radio connection is established via the antenna mounted to the antenna connector. The radio module inside could be damaged by electrostatic discharge via the open connector. We recommend using the originally supplied antenna only.

10.2 Specifications

**Electrical data**

- **Temperature range:** -20° to +50°C (-4° to +122°F)
- **Torque:** 0.25 Nm (0.3 Nm peak)
- **Speed:** 240 teeth/s (6 R/s) (all with gear m0.8, 40t)
- **Supply voltage:** 12V - 34V
- **Power consumption:** max. 2 - 6A
Radio system

The cforce mini RF motor contains a radio unit that enables wireless lens control with a white coded radio module. A white ring at the base of the antenna mount identifies it. It offers 14 channels to choose from:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.410 GHz</td>
</tr>
<tr>
<td>1</td>
<td>2.415 GHz</td>
</tr>
<tr>
<td>2</td>
<td>2.430 GHz</td>
</tr>
<tr>
<td>3</td>
<td>2.435 GHz</td>
</tr>
<tr>
<td>4</td>
<td>2.450 GHz</td>
</tr>
<tr>
<td>5</td>
<td>2.455 GHz</td>
</tr>
<tr>
<td>6</td>
<td>2.470 GHz</td>
</tr>
<tr>
<td>7</td>
<td>2.475 GHz</td>
</tr>
<tr>
<td>8</td>
<td>2.420 GHz</td>
</tr>
<tr>
<td>9</td>
<td>2.425 GHz</td>
</tr>
<tr>
<td>10</td>
<td>2.440 GHz</td>
</tr>
<tr>
<td>11</td>
<td>2.445 GHz</td>
</tr>
<tr>
<td>12</td>
<td>2.460 GHz</td>
</tr>
<tr>
<td>13</td>
<td>2.465 GHz</td>
</tr>
</tbody>
</table>

White radio and legacy yellow radio cannot be mixed in the same radio network of camera and hand units. It is possible to use both systems in parallel within different radio networks.
<table>
<thead>
<tr>
<th>ADVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARRIs white radio and cmotions red radio are not compatible.</td>
</tr>
</tbody>
</table>
10.3 Dimensions and weight

Dimensions

Weight

Weight of cforce mini RF: 153g/5.4oz

(including cforce mini RF motor unit, cforce mini gear m0.8, 40t and cforce mini clamp console 19/15mm)
10.4 Pinouts

The cforce mini RF motor contains one LBUS connector (Lemo 4 pin) and one CAM connector (Lemo 7 pin).

**LBUS connector**

1. GND
2. CAN-L
3. V-BAT
4. CAN-H

**CAM connector**

1. CAM lf1 (CAN RS232 RX)
2. CAM lf2 (CAN1-L)
3. GND
4. +V-Bat
5. CAM lf3 (CAN RS232 TX)
6. CAM lf4 (CAN1-H)
7. Cable ID
10.5 Part numbers

cforce mini RF Basic Set 2

KK.0040345  cforce mini RF Basic Set 2

The cforce mini RF Basic Set 2 includes:

K2.0016802  cforce mini RF motor unit
            (including K2.0002007 Outdoor Antenna (straight))

K2.0036610  cforce mini Clamp Console 2 19/15mm
            (including K2.0038503 cforce mini Clamp Insert 2 15mm)

K2.0003753  cforce mini gear m0.8, 40t
ADVICE

The cforce mini RF Basic Set does not include any LBUS or CAM cables. LBUS cables are available in various lengths and need to be ordered separately.

Gears for cforce mini and cforce mini RF

- **K2.0006363**  
cforce mini gear m0.6, 56t  
(Fujinon ENG focus/ zoom)

- **K2.0006365**  
cforce mini gear m0.5, 64t  
(Canon ENG focus/ zoom)

- **K2.0006367**  
cforce mini gear m0.4/64p, 80t  
(Pan. iris, Fujinon ENG iris, Canon ENG iris)

- **K2.0006370**  
cforce mini gear 48p, 60t  
(Panavision zoom)
Part numbers of compatible antennas

Radiall/Larsen  K2.0002007  Dipole / Reverse SMA
Wanshih        50.0013627  Dipole / Reverse SMA
Proant         K2.0001996  Dipole / Reverse SMA
Nearson        O5.20112.0  Dipole / Reverse SMA
Cables and Accessories

The following accessories are compatible with the cforce mini RF:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K2.0015754</td>
<td>Cable CAM (7p) - RS</td>
</tr>
<tr>
<td>K2.0015755</td>
<td>Cable CAM (7p) - EXT (16p)</td>
</tr>
<tr>
<td>K2.0015756</td>
<td>Cable CAM (7p) - EXT (6p)</td>
</tr>
<tr>
<td>K2.0015757</td>
<td>Cable CAM (7p) - LANC/D-Tap</td>
</tr>
<tr>
<td>K2.0015758</td>
<td>Cable CAM (7p) - RED CTRL/D-Tap</td>
</tr>
<tr>
<td>K2.0015759</td>
<td>Cable CAM (7p) - ENG (12p)</td>
</tr>
<tr>
<td>K2.0015760</td>
<td>Cable CAM (7p) - LBUS</td>
</tr>
<tr>
<td>K2.0018814</td>
<td>Cable CAM (7p) - Sony F5/55 CTRL/D-Tap</td>
</tr>
<tr>
<td>K2.0018813</td>
<td>Cable CAM (7p) - D-Tap</td>
</tr>
<tr>
<td>K2.0001996</td>
<td>Swivel antenna for SMC-1 and EMC-1 Motor Controlers</td>
</tr>
<tr>
<td>K2.0007318</td>
<td>Cable LCS (5p) - LBUS</td>
</tr>
</tbody>
</table>
### 10.6 Service contacts

**Munich, Germany**  
Arnold & Richter Cine Technik  
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service@arri.de  
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service@arri.com  
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Mo. - Fr. 8:15 - 17:00 (PST)

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ARRI Inc. East Coast  
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Mo. - Fr. 9:00 - 18:00 (CST)

**Sydney, Australia**  
ARRI Australia Pty Ltd  
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Business hours:  
Mo. - Fr. 8:00 - 18:00 (AEST)
10.7 International declarations

EU-Declaration of Conformity

The designated product conforms with the specifications of the following European directives:


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

- EN 301 489-1 V2.1.1; EN 301 489-17 V3.1.1
- EN 300 328 V2.1.1
- EN 50581:2012

To evaluate the respective information we used:
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.

Japan MIC Statement

Complies with Ministry of Internal Affairs and Communications notification Article 88, Annex 43.

Radio Module

The cforce mini RF motor contains the following radio module:

FCC ID: Y7N-EMIP400
IC ID: 9482A-EMIP400
CMIT ID: 2017DJ7863C(M)
Appendix

MIC ID: 020-180030
NCC: CCAH18LP0660T0
KC: R-CRM-ARg-EMIP400
EMIP400s: ETA:1385/2018/ERLO

10.7.1 Certifications

ARNOLD & RICHTER CINE TECHNIK GMBH & CO.
BETRIEBS KG, TUERKENSTRASSE 89
D-80799 MUENCHEN

Manufacturer: ARRI Cine & Video Geräte Ges.m.b.H
POTTENDORFERSTRASSE 23-25 3/1/1
A-1120 WIEN

Country of Origin: Austria

Made in Austria