



Lens Control System Instruction Manual

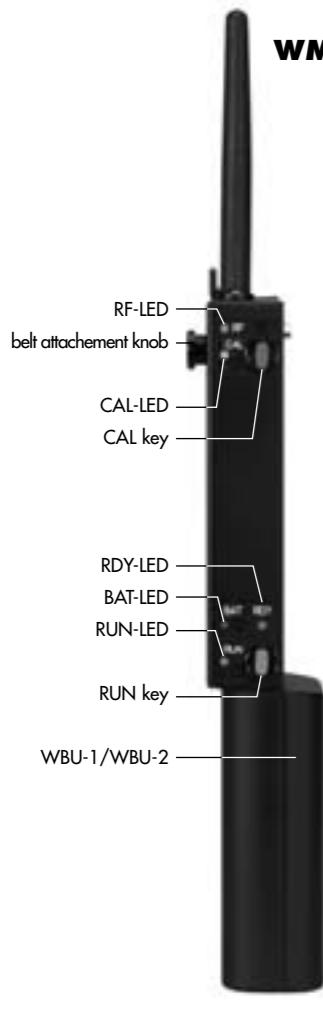
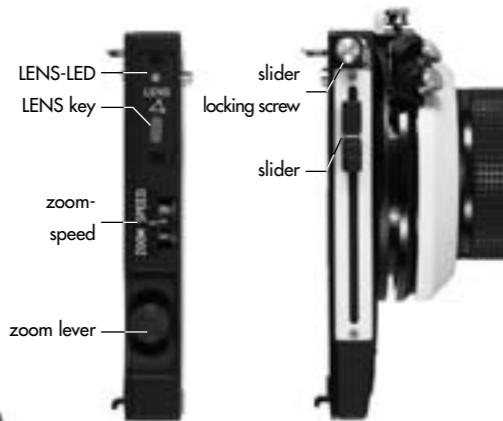
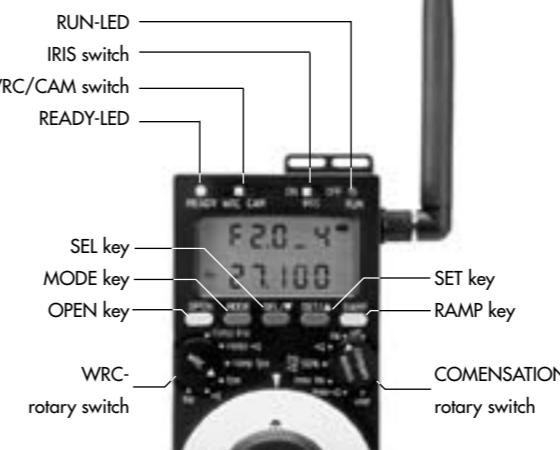
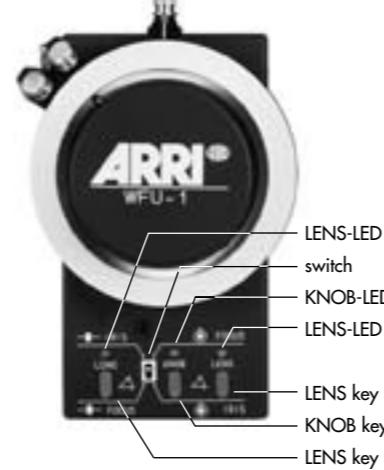
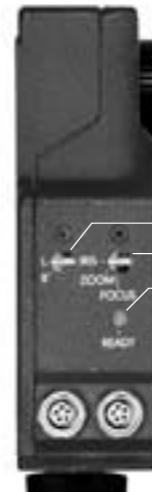
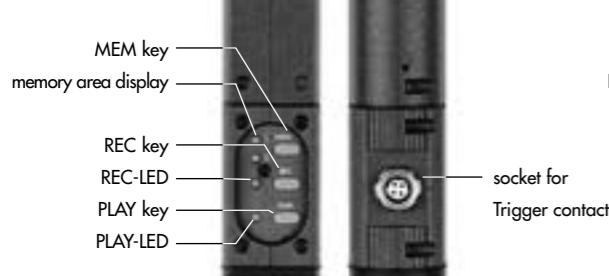
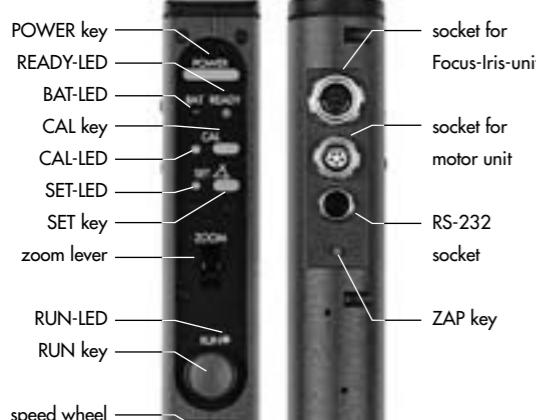
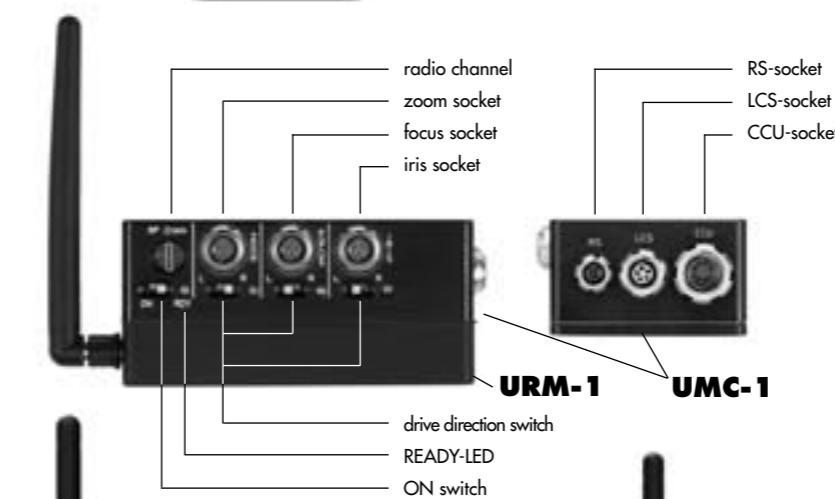
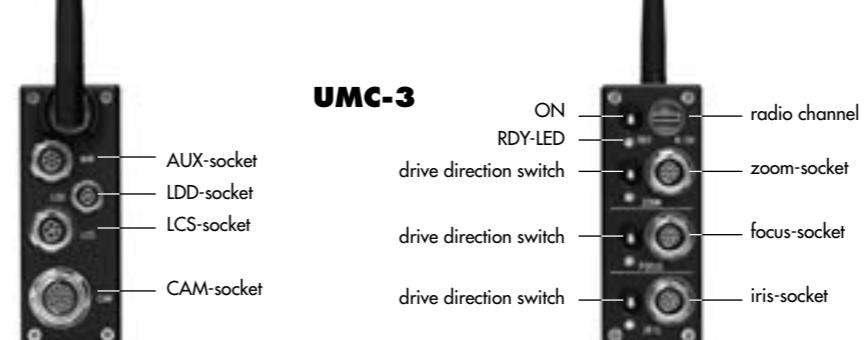
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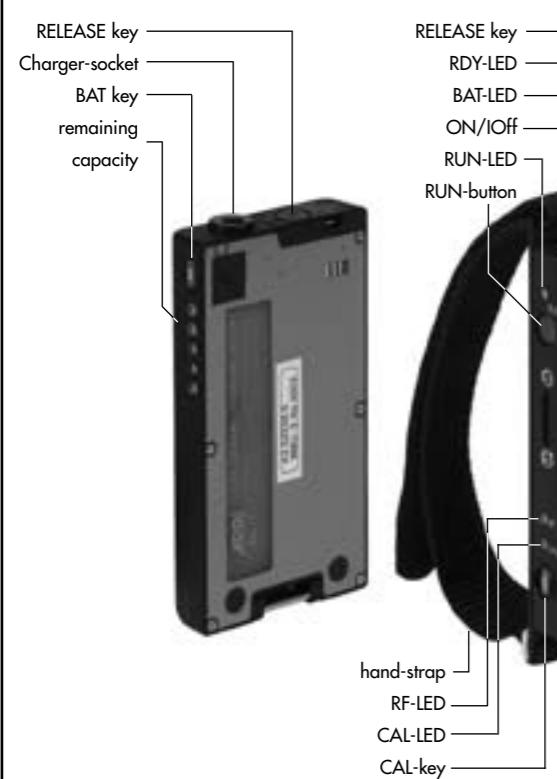
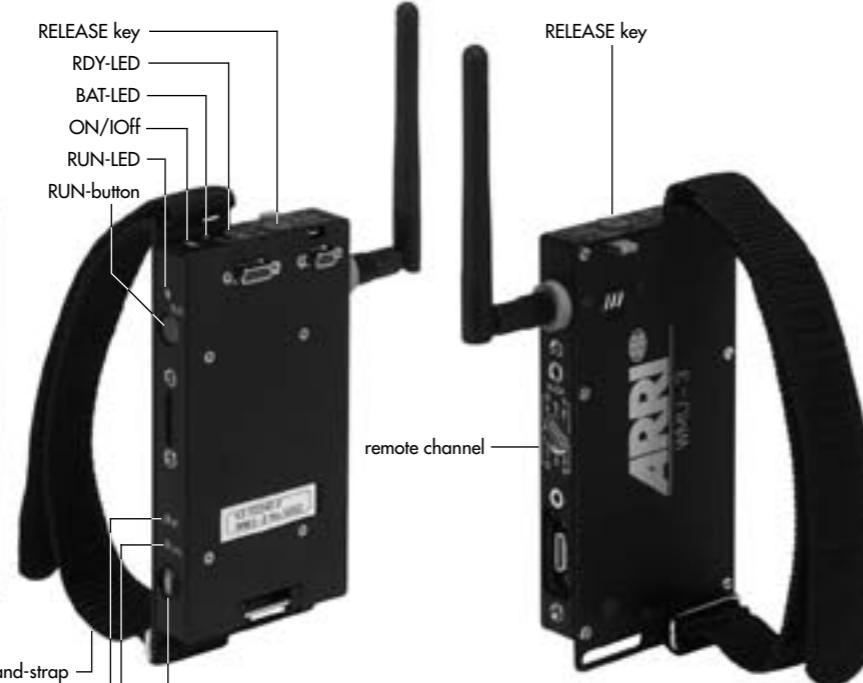
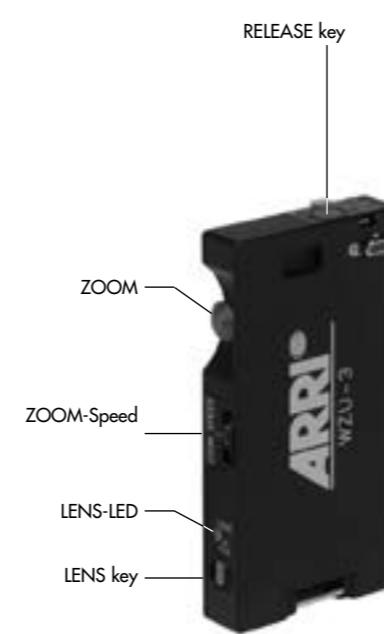
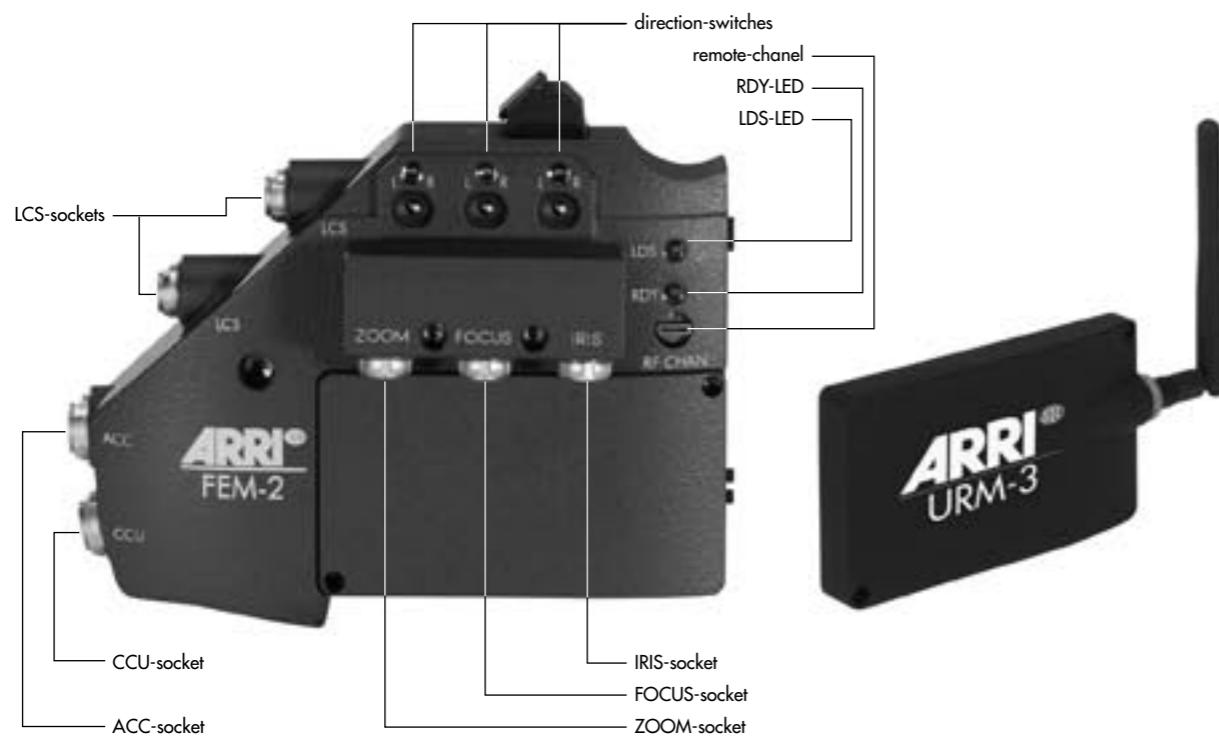
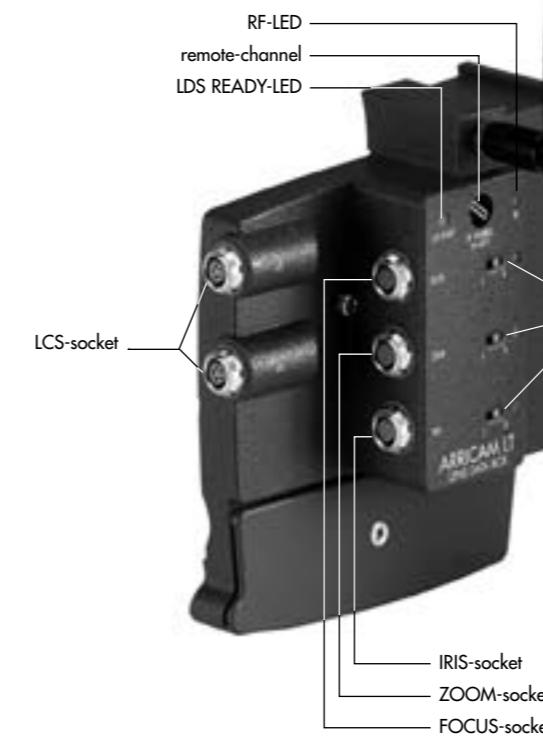
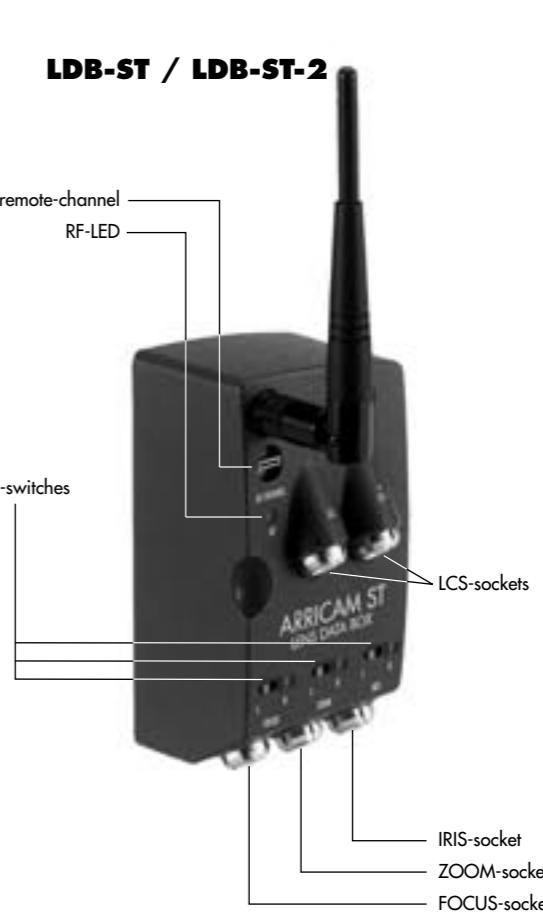
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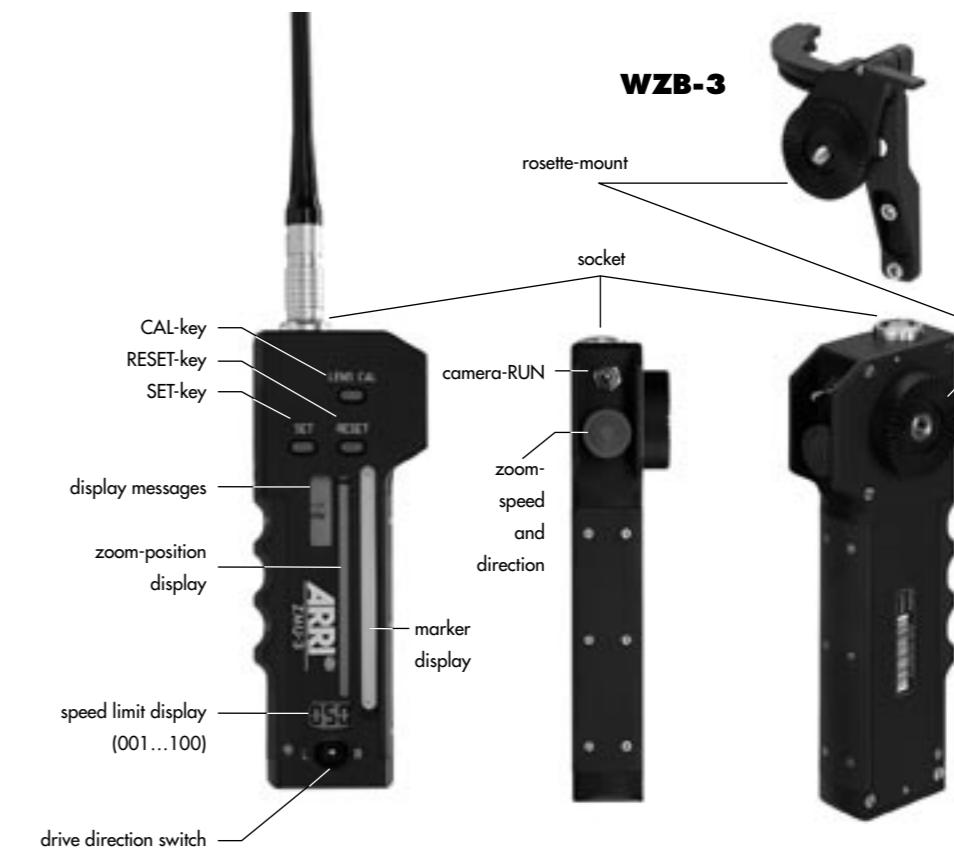
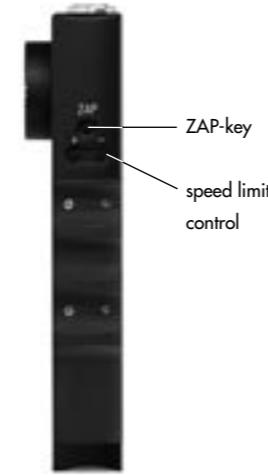
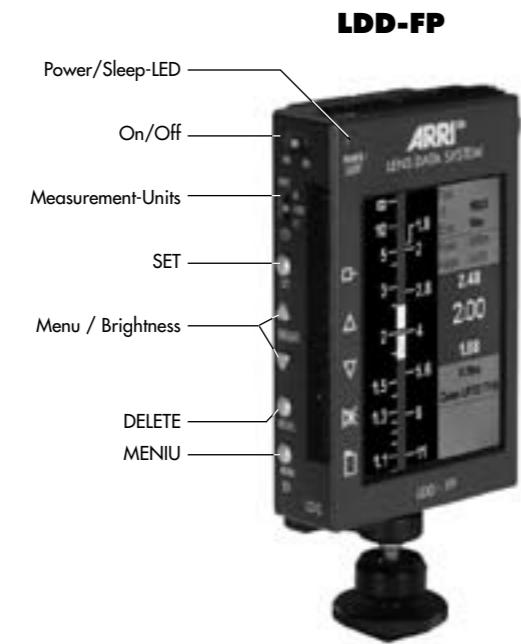
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WMU-1**WZU-1****WFU-1****CLM-1****CLM-2****FIU-1****UMC-1****ZMU-1**

WBU-3/-4**WMU-3****WMU-3****WZU-3****WFU-3****WEB-3****FEM-2****URM-3****LDB-LT / LDB-LT-2****LDB-ST / LDB-ST-2**



ZMU-3



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2. Safety Instructions and Legal Disclaimer

2.1. Safety Instructions



Please always follow these instructions to help ensure against injury to yourself and damage to the system or other objects.

This safety information is additional to the product-specific operating instructions in general and must be strictly observed for safety reasons. They are no substitute to settled down your own safety measures.

Warning signs



Possible risk of injury or damage to equipment.



This symbol indicates the risk of electric shock or fire danger that could result in injury or equipment damage.

General safety instructions



Read and understand all safety and operating instructions before you operate or install the system.



Retain all safety and operating instructions for future reference.



Heed all warnings on the system and in the safety and operating instructions before you operate or install the system. Follow all installation and operating instructions.



Do not use accessories or attachments not recommended by ARRI, as they may cause hazards and void the warranty.



Do not repair any part of the system. Repairs must only be carried out by authorized ARRI repair shops.



Do not remove any safety measure of the system.

Safety Instructions



Do not operate the system in high humidity areas or expose it to water or moisture.



Do not place the system on an unstable cart, stand, tripod, bracket, or table. The system may fall, causing serious personal injury and damage to the system or other objects.



Operate the system using only the type of power source indicated in the manual. Unplug the power cord by gripping the power plug, not the cord.



Never insert objects of any kind into the any part of the system through openings, as the objects may touch dangerous voltage points or short out parts. This could cause fire or electrical shock.



Unplug the system from the power outlet before opening any part of the system or before making any changes on the systems, especially the attaching or removing of cables.



Do not use solvents to clean.



Clean optical surfaces only with a lens brush or a clean lens cloth! In case of solid dirt moisten a lens cloth with pure alcohol.



Do not loosen any screws which are painted over!



Danger of injury: After switching the drive direction the focus and iris motors automatically move.



The antennas must always be kept screwed onto their bushing to protect the highly precise antenna-bushing (Reverse-SMA).



In order to ensure optimal radio connection the bushing must be free of dust and dirt at all times. If necessary remove the antenna and clean antenna and bushing using pressured air. Do not use any tools that can harm antenna or bushing.

Specific safety instructions



As the end-stops of the iris ring on the ARRIMACROS change when the lens is focussed, the ARRIMACROS may not be used with the LCS or the WRC-1 system.



Danger of injury with the rotating drive gears on the lens barrel, or when switching the operating direction on the UMC-1, LDB and FEM-2!

Any violation of this safety instructions or the non-observance of personal care could cause serious injuries (including death) and damages on the system or other objects.

Note: Notes are used to indicate further informations or informations from other instruction manuals.

☞ **photo** indicates objects which are shown in the illustration.

Product Identification

When ordering parts or accessories, or if any questions should arise, please advise your type of product and serial number.

2.2 Disclaimer

Before using the products described in this manual be sure to read and understand all respective instructions. The ARRI Wireless Lens Control System is only available for commercial customers. The customer grants by utilization, that the ARRI Wireless Lens Control System or other components of the system are only deployed for commercial use. Otherwise the customer has the obligation to contact ARRI preceding the 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 risks 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 have to heed the statuted canonic use.

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System Overview



3. Product Description

The ARRI Lens Control System – LCS – is an easy-to-use remote control system for camera lenses. A compact, modular system that can be expanded from simple zoom control to a complete remote-control system for zoom, focus and iris.

An important advantage of the system is the Lens Data Display to instantly show all respective data on a comfortable display – e. g. the respective depth of field. Non LDS-lenses can be equipped with the Lens Data Mount to integrate with the system.

The system can be operated via radio or remotely controlled via a cable. The system covers all control possibilities for standard lenses for ARRIFLEX and ARRICAM cameras and can also be used on cameras from other manufacturers.

The user can adapt the LCS with its varied functions to his own needs, for example adjustment range and speed as well as transmission ratio – at the touch of a button.

3.1 System Components

All operations of the lens control system can be performed with the flexible individual units. In general, all units are abbreviated using a code with three letters, a hyphen and a number (e.g. CLM-1). All cables are abbreviated using a code with two letters, a hyphen, a letter and a number (e.g. UC-C1).



Backwards compatibility to all existing wireless units is assured through careful design. For restrictions see the following compatibility list. A general exception to this rule is the radio modem of the "-1" generation: These radio modems are not compatible with the radio modems of the "-2" and "-3" series.

- Note: The radio modems of the "-1" series can be exchanged to the new standard modems at any ARRI Service Center.
- Note: To operate the new radio modem software version 1.08 or newer should be used with the WRC-1.

Old Radio Modem	Update	New Radio Modem	New Product
WMU-1 K2.52052.0		WMU-2 K2.52236.0	WMU-3 K2.52240.0
URM-1 K2.52048.0		URM-2 K2.52237.0	URM-3 K2.52262.0
ARRICAM Studio Lens Data Box K2.54014.0		ARRICAM Studio Lens Data Box-2 K2.54194.0	
ARRICAM Lite Lens Data Box K2.54025.0		ARRICAM Lite Lens Data Box-2 K2.54195.0	
compatible		compatible	

- Note: No update is necessary for the Universal Motor Controller (UMC-1), the Wireless Focus Unit 1 (WFU-1) and the Wireless Zoom Unit 1 (WZU-1) since they do not contain any radio modems.
- Note: Some functions of the UMC-1 are already incorporated in the FEM-2 or a Lens Data Box of an ARRICAM. Parallel operation of the UMC-1 with a respectively equipped ARRICAM or ARRIFLEX 435 Advanced is not recommended!

Compatibility

UMC-1 is not compatible with

FEM-2	K2.52226.0
UMC-3 (different radio modem)	K2.65000.0

UMC-3 is not compatible with

URM-1 (different radio modem)	K2.52048.0
WMU-1 (different radio modem)	K2.52052.0
LDB-ST (different radio modem)	K2.54014.0
LDB-LT (different radio modem).....	K2.54025.0

URM-1 is not compatible with

URM-2 (different radio modem)	K2.52237.0
URM-3 (different radio modem)	K2.52262.0
UMC-3 (different radio modem)	K2.65000.0
WMU-2 (different radio modem)	K2.52236.0
WMU-3 (different radio modem)	K2.52240.0
LDB-ST-2 (different radio modem)	K2.54194.0
LDB-LT-2 (different radio modem).....	K2.54195.0

URM-2 / URM-3 is not compatible with

URM-1 (different radio modem)	K2.52048.0
WMU-1 (different radio modem)	K2.52052.0
LDB-ST (different radio modem)	K2.54014.0
LDB-LT (different radio modem).....	K2.54025.0

FEM-2 is not compatible with

UMC-1	K2.52040.0
UC-C2 run cable	K2.52076.0
LC-S1 power supply module.....	K4.46859.0
LC-S2 power supply module.....	K2.47146.0
LC-S3 power supply module.....	K2.47147.0
LC-A1 battery adapter	K2.41385.0
LC-A2 battery adapter	K2.41386.0
LC-A3 cable.....	K2.44022.0
LC-C1 run cable	K2.41398.0
LC-C2 run cable	K2.41399.0
• Software version SW 2.73 or newer and firmware 2.65 or newer is required for the ARRIFLEX 435 Advanced to operate the FEM-2. For the WRC-1 V 1.08 or newer, and for the LDD version 2.59 or newer is required	
• The FEM-2 may not be attached to an ARRIFLEX 435 or 435 ES!	

LDB ST / LDB LT is not compatible with

WHA-1	K2.52070.0
FIU-1	K2.41383.0
URM-2 (different radio modem)	K2.52237.0
URM-3 (different radio modem)	K2.52262.0
WMU-2 (different radio modem)	K2.52236.0
WMU-3 (different radio modem)	K2.52240.0
LDB-ST-2 (different radio modem)	K2.54194.0
LDB-LT-2 (different radio modem).....	K2.54195.0

LDB-ST-2 / LDB LT-2 is not compatible with

WHA-1	K2.52070.0
FIU-1	K2.41383.0
URM-1 (different radio modem).....	K2.52048.0
WMU-1 (different radio modem).....	K2.52052.0
LDB-ST (different radio modem).....	K2.54014.0
LDB-LT (different radio modem).....	K2.54025.0

WMU-1 is not compatible with

URM-2 (different radio modem).....	K2.52237.0
URM-3 (different radio modem).....	K2.52262.0
WMU-2 (different radio modem).....	K2.52236.0
WMU-3 (different radio modem).....	K2.52240.0
LDB-ST-2 (different radio modem).....	K2.54194.0
LDB-LT-2 (different radio modem).....	K2.54195.0
LDL-FP	K2.54163.0

WMU-2 / WMU-3 is not compatible with

URM-1 (different radio modem).....	K2.52048.0
WMU-1 (different radio modem).....	K2.52052.0
LDB-ST (different radio modem).....	K2.54014.0
LDB-LT (different radio modem).....	K2.54025.0

- WMU-2 is not compatible with LDL-FP
- WMU-3: WRC-1 and LDL-FP can not be operated together on the same WMU-3

WFU-1 / WFU-3

- If two WFU units are used together on the WMU-3 + WEB-3 the units must be set to control each a different lens motor.

WZU-1 / WZU-3

- WZU-1 and WZU-3 can not be attached and operated between the WMU and the LDL-FP or the WRC-1.

WHA-1

LDL-FP can not be attached directly K2.54163.0

WHA-2 is not compatible with

UMC-1

LDL-FP can not be attached directly K2.54163.0

WHA-3

- For Focus-Tracking with the ARRICAM or ARRIFLEX 435 Advanced software version ≥ 0205 is necessary
- LDL-FP can not be attached directly K2.54163.0

WRC-1

- WRC-1 and LDL-FP can not be operated together on the same WMU-3
- WZU-1 and WZU-3 can not be attached and operated between the WMU and the LDL-FP or the WRC-1.
- Software version ≥ 1.08 is necessary for the WMU-2, WMU-3, URM-2, URM-3, LDB-ST-2, and LDB-LT-2

ZMU-3 is wirelessly not compatible with

WMU-1	K2.52052.0
WMU-2 (different radio modem)	K2.52236.0

FIU-1

- The FIU-1 can not be operated with an ARRICAM or an ARRIFLEX 435 Advanced

LDD-FP is not compatible with

Directly attached to the WHA-1	K2.52070.0
Directly attached to the WHA-2	K2.54079.0
Directly attached to the WHA-3	K2.52254.0
WMU-1	K2.52052.0
WMU-2	K2.52236.0
• LDDFP-CAC cable together with a cable drum	
• WRC-1 and LDD-FP can not be operated together on the same WMU-3	
• WZU-1 and WZU-3 may not be attached and operated between the WMU and the LDD-FP or the WRC-1.	

System Overview



CLM-1



CLM-2

CLM-1 Controlled Lens Motor

K2.41378.0

The main features of the motor units CLM-1  **photo** are their high torque; they are particularly suited to work with stiff lenses or in cold weather. The vertical mounting allows the motor unit to be attached even when the available space for the set-up is restricted. The motor units can be installed on and removed from the fully equipped camera. The matte box does not need to be removed.

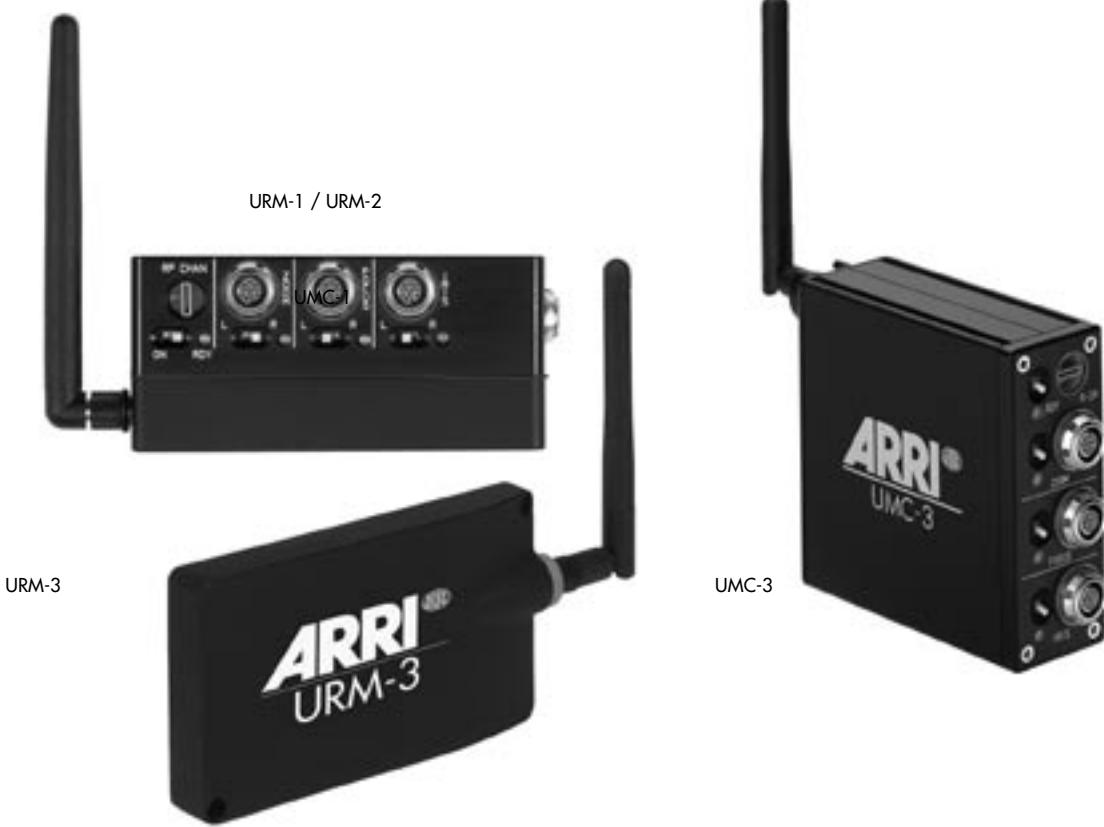
CLM-2 Controlled Lens Motor

K2.52036.0

The small, lightweight motor units CLM-2  **photo** are particularly suited to applications for which weight and size are decisive factors, for example Steadicam shots, when using 16mm or video cameras, or with sensitive lenses. As with the CLM-1 motor units the vertical mounting enables working in particularly tight conditions. The consoles to the motors enable very flexible mounting.

Note: CLM-2 motor units can be directly connected to the Lens Data Box of an ARRICAM, or to the FEM-2 on an ARRIFLEX 435 Xtreme/Advanced. For all other camera models a UMC motor controller is necessary.

System Overview



UMC-1 Universal Motor Controller

K2.52040.0

The universal motor controller UMC-1  is used to control the CLM-2 motors on the camera. Up to three CLM-2 motors (zoom, focus, iris) can be controlled. Mixed operation with CLM-1 and CLM-2 motors is also possible.



The functions of the UMC are already incorporated in the FEM-2 or a Lens Data Box of an ARRICAM. Parallel operation of the UMC with a respectively equipped ARRICAM or ARRIFLEX 435 Xtreme/Advanced is not recommended!

UMC-3 Universal Motor Controller

K2.65000.0

The universal motor controller UMC-3  is used to control the CLM-1/2 motors on the camera. Up to three CLM-1/2 motors (zoom, focus, iris) can be controlled. A serial interface and a LDD/LDD-FP interface is integrated in order to display digitally stored lens data.

URM-1 Universal Radio Module

K2.52048.0

The Universal Radio Module URM-1  is mounted to the UMC-1 and provides the radio connection to the WMU-1.



The radio modem of the URM-1 is not compatible with the radio modem of the WMU-2, WMU-3, URM-2 and URM-3.

Note:

The radio modems of the "-1" series can be exchanged to the new standard modems at any ARRI Service Center.

URM-2 Universal Radio Module

The Universal Radio Module URM-2  is already equipped with a new standard radio modem and offers the same fuctions as the URM-1. The URM-2 is mounted to the FEM-2 or the UMC-1 and provides the radio connection to the WMU-2 or WMU-3.

URM-3 Universal Radio Module

K2.52262.0

The Universal Radio Module URM-3  is mounted to the FEM-2 on an ARRIFLEX 435 Advanced or to the UMC-1 and provides the radio connection to the WMU-2 or WMU-3.



Due to the different radio modem the URM-3 is not compatible with URM-1 and WMU-1.

System Overview



FEM-2



LDB-LT



LDB-ST

FEM-2 Function Extension Module

K2.52226.0

The FEM-2 is necessary for the wireless control of the ARRIFLEX 435 Advanced. The FEM-2 can be operated with the URM-1, URM-2 or URM-3. It provides the LCS-bus interfaces for up to 3 CLM-1 motors or up to 3 CLM-2 motors and a Lens Data Display. For further informations on the FEM-2 and the operation with the ARRIFLEX 435 Advanced please see the respective instruction manual (Ident-Nr. K5.60901.0 German, K5.60902.0 English).



Software version SW 2.73 or newer and firmware 2.65 or newer is required for the ARRIFLEX 435 Advanced to operate the FEM-2. For the WRC-1 version 1.08 or newer, and for the LDD version 2.59 or newer is required The FEM-2 may not be attached to an ARRIFLEX 435 or 435 ES!



Note: With the WHA-1 (K2.52070.0) fast ramping speeds and 0.1 fps are not possible. Using the ICU-1 (K2.47028.0) might lead to exposure fluctuations (please refer to the nomogram in the ICU-1 instruction manual)

Note: For the FEM-2 and a ARRICAM Lens Data Box software 03f or newer is required!

ARRICAM Lens Data Box

LDB-ST K2.54014.0

LDB-ST-2 K2.54194.0

LDB-LT K2.54025.0

LDB-LT-2 K2.54195.0

The Lens Data Box is the central processing point for signals from the Lens Control and Lens Data System on the ARRICAM. It controls lens motors, supplies the Lens Data Display and IVS with information and manages the connection to the LCS hand units for focus, zoom, iris and to the WRC-1 for camera control, either hardwired through the WHA-2 or wireless through the radio module Up to 3 CLM-2 motors can be connected.



The WHA-1 can not be used with a Lens Data Box.

Note: The LDB-ST and LDB-LT are compatible with the WMU-1 and URM-1. The radio modems can be exchanged to the new standard at any ARRI Service Center.



The LDB-ST-2 and LDB-LT-2 are not compatible with the URM-1 and WMU-1 due to the different radio modem.

For the operation of the Lens Data Box on the ARRICAM please refer to the respective instruction manual.

System Overview



WAC-1

WMU-1 / WMU-2 Wireless Main Unit

WMU-1 K2.52052.0

WMU-2 K2.52236.0

The WMU-1  is the central main unit for radio remote control and provides the radio connection from the manual control units to the URM-1. With the WMU-1 or WMU-2 various manual control units (WZU-1, WZU-3, WFU-1, WFU-3) can be combined to remotely control the lens and camera. All new control units are compatible with the WMU-1 and WMU-2, however, the LDD-FP can not be attached. Three WMU can be operated simultaneously per radio channel.



Due to the different radio modem the WMU-1 is not compatible with the WMU-2, WMU-3, URM-2, URM-3, UMC-3, LDB-ST-2 and LDB-LT-2.

Note: The radio modem of the WMU-1 can be exchanged to the new standard radio modem at any ARRI Service Center. A WMU-1 with a new radio modem is then called a WMU-2, and is then compatible with the WMU-2, WMU-3, URM-2, URM-3, UMC-3, LDB-ST-2 and LDB-LT-2

WBU-1 Wireless Battery Unit

WBU-1 no longer available

WBU-2 K2.52088.0

The battery WBU-1 or WBU-2  is used to power the WMU-1 or WMU-2. Both batteries can not be used with the WMU-3.

WAC-1 Wireless Accumulator Charger

K2.52072.0

The battery charger WAC-1  is used to charge the WBU-1 or WBU-2 battery.



The WAC-1 can not be used to charge WBU-3 batteries.

WZU-1 Wireless Zoom Unit

K2.52054.0

The wireless zoom control unit WZU-1  can be attached to any WMU to enable wireless remote control of the focal length on a zoom lens.

WFU-1 Wireless Focus Unit

K2.52055.0

The wireless focus control unit WFU-1  can be attached to any WMU to enable radio remote control of the lens iris and focus.

System Overview



WBU-4

WBU-3

WMU-3

WZU-3

WFU-3

WAC-3

WMU-3 Wireless Main Unit

K2.52240.0

The WMU-3  is the new central main unit for the ARRI Wireless Lens Control System. It provides the radio connection from the manual control units to the camera radio receiver. Three WMU units can be operated simultaneously per radio channel.



Due to the different radio modem the WMU-3 is not compatible with the WMU-1 or URM-1.

WBU-3 Wireless Battery Unit

K2.52238.0

The battery WBU-3  is used to power the WMU-3. WBU-1 and WBU-2 batteries can not be used with the WMU-3.

WBU-4 Wireless Battery Unit

K2.65001.0

The battery WBU-4  is used to power the WMU-3 and provides twice of the capacity of the WBU-3. WBU-1 and WBU-2 batteries can not be used with the WMU-3.

WAC-3 Wireless Accumulator Charger

K2.52266.0

The battery charger WAC-3  is used to charge the WBU-3 and WBU-4 batteries.



The WAC-3 can not be used to charge WBU-1 or WBU-2 batteries.

WZU-3 Wireless Zoom Unit

K2.52267.0

The wireless zoom control unit WZU-3  can be attached to any WMU to enable wireless remote control of the focal length on a zoom lens. The WZU-3 is compatible with the WZU-1. Its operating elements are ergonomically optimized for the WMU-3.

WFU-3 Wireless Focus Unit

K2.52268.0

The wireless focus/iris control unit WFU-3  can be attached to any WMU to enable radio remote control of the lens iris and focus. The WFU-3 is optimized in design and offers the individual adjustment of the index marking.

System Overview



WBU-3 + WMU-3 + LDD-FP + WEB-3 +WFU-3

ZMU-3 + WZB-3+ WBU-4 + WMU-3 + LDD-FP + WEB-3 + WFU-3

WEB-3 Wireless Expansion Bracket

K2.52241.0

The Wireless Expansion Bracket WEB-3  [photo](#) is mounted on the side of the WMU-3 and allows the attachment of up to 3 ARRI control units on one WMU-3. The following combinations are possible:

- LDD-FP and WFU-1 or WFU-3
- LDD-FP and WZU-1 or WZU-3
- LDD-FP and WFU1 or WFU-2 and one WZU-1 or WZU-3
- LDD-FP and WFU-1 or WFU-2 and ZMU-3
- Two WFU-1 or WFU-3
- Two WFU-1 or WFU-3 and one WZU-1 or WZU-3
- Two WFU-1 or WFU-3 and ZMU-1
- WRC-1 and WFU-1 or WFU-3

- WRC-1 and WFU-1 or WFU-3 and one WZU-1 or WZU-3
- WRC-1 and WFU-1 or WFU-3 and ZMU-3

Note: The LDD-FP and the WRC-1 are using the same interface, therefore simultaneous operation of both units on one WMU-3 is not possible.

Note: In wireless mode the battery capacity depends strongly on the set illumination level of the display. For longer battery life reduce the display illumination to the necessary minimum.

WZB-3 Wireless Zoom Bracket

K2.65017.0

The Wireless Zoom Bracket WZB-3  [photo](#) is mounted on the left side of the WMU-3 and allows for the mechanical attachment of the ZMU-3.

Note: Parallel operation of the WZU-1/3 and the ZMU-3 is not possible.

System Overview



LDD-FP



LDD Classic

LDD Lens Data Display Classic

K2.54012.0

The LDD  photo displays lens ring position and camera status. The LDD graphically shows depth of field, and allows for the setting, display and storage of focus marks. It can be used on an ARRICAM or an ARRIFLEX 435 Xtreme/Advanced or remotely, for instance when the camera is on a crane.

The Lens Data Display Classic can be connected to the respective Lens Data Box or the FEM-2. Cables KC-60 (0.5m/1.5ft) or KC-79 (3m/9ft) can be used to connect the LDD on the Studio to the Studio Readout of the Studio camera, or to the Lite Mask Frameglow of the Lite camera. Alternatively, cables KC-67 (3m/9ft) or KC-68 (15m/45ft) connects the LDD Classic to the CAC connectors of Studio or Lite. For remote operation it can also be connected to the ARRICAM Remote Control Station (K2.54143.0) with cables KC-60 or KC-79.

LDD-FP

Lens Data Display for the Focus Puller

K2.54163.0

The LDD-FP  photo is a small and lightweight Lens Data Display showing important lens informations and camera status. It can be configured to show focus, zoom and iris scale and the camera status in any combination. The LDD-FP graphically shows depth of field, and allows for the setting, displaying and storage of focus marks. Because of its small size it can be mounted in many ways, allowing the assistant to see precise lens and camera information while keeping an eye on the action. Together with the WMU-3 the LDD-FP can also be used in a wireless configuration.

The LDD-FP can be connected to the ARRICAM as long as the respective Lens Data Box is present and to the ARRIFLEX 435 Xtreme/Advanced through the FEM-2. The cable LDDFP-RDO (0.6m/2ft) connects it to the Studio Readout or to the Lite Mask Frameglow. With cable LDDFP-CAC (1.5m/5ft) the LDD-FP can be connected to the CAC connectors of Studio or Lite. For remote operation it can be connected to the ARRICAM Remote Control Station (K2.54143.0) with cable LDDFP-RDO.



Do not use the LDDFP-CAC cable with the cable drum.

System Overview



WRC-1

WRC-1 Wireless Remote Control

K2.52087.0

The Wireless Remote Control WRC-1  is a handy remote control unit for use with all of the latest generation of ARRICAM and ARRIFLEX camera models: ARRICAM ST and LT, ARRIFLEX 16SR 3 / Advanced, 16SR 3 HS / Advanced, 535, 535B, 435, 435ES and 435 Xtreme/Advanced.

It enables the user to remotely control

- the camera speed,
- the shutter angle of the mirror shutter, and
- the aperture of the lens (iris),

providing a wide range of compensation options for constant exposure.

The range of functions offered by the WRC-1 is automatically adapted to the limits of the camera and the lens control motor to which it is connected. The large handwheel permits sensitive adjustment of operational values, and easy programming of end-stops for user-defined minimum and maximum values.

The illuminated LCD provides quick, precise and comprehensive information about all the settings, the status of the camera and the WRC-1, including all warnings.

The WRC-1 can be connected to all Wireless Main Units. Using the WHA-1, WHA-2 or WHA-3 it can be used in a hardwired configuration. In this case remote lens control functions are not available.



WRC-1 and LDD-FP can not be operated together on the same WMU-3



WZU-1 and WZU-3 can not be attached and operated between the WMU and the WRC-1.

Note:

Software version 1.08 or newer is necessary to operate with the WMU-2, WMU-3, URM-2, URM-3, UMC-3, LDB-ST-2 and LDB-LT-2.

For the operation of the WRC-1 please refer to the respective instruction manual (K2.43660.0 German or K2.43668.0 English).

System Overview



WEU-1 Wireless Extension Unit

K2.52056.0

The extension WEU-1  consists of three components which enable the WMU-1 to be worn on a belt so that only the manual control unit needs to be held:
the adapter WHA-1 (Wireless Handgrip Attachment),
, the cable WC-E1  and the WMA-1 (Wireless Main Attachment) .

WHA-2 Wired Handgrip Attachment

K2.54079.0

With this handgrip attachment  the hand units of the wireless Lens Control System (WFU-1, WFU-3 and/or WZU-1, WZU-3) or the Wireless Remote Control (WRC-1) can be operated hardwired. The WHA-2 works with the ARRIFEX 435 Xtreme/Advanced if a FEM-2 is present as well as with the ARRICAM Studio and ARRICAM Lite. It can be connected to the LCS socket of a Lens Data Box with cable LC-M1, LC-M2, LC-Z1 or LC-Z2. Alternatively it can be connected to the CAC connector of Studio or Lite using cable KC-70 (3m/9ft). For lens control on an ARRICAM, a Lens Data Box must be present.



*The LDD-FP can not be attached to the WHA-2.
The WHA-2 is not compatible with the UMC-1.*

WHA-3 Wired Handgrip Attachment

K2.52254.0

The WHA-3 , just like the WHA-2, allows all hand controllers except the LDD-FP to be connected with a cable to 435 Advanced with FEM-2 or to an ARRICAM Lens Data Box. In addition the WHA-3 has a button on the left side for focus tracking. Focus tracking based on measured distances is available when using an ARRICAM with the Lens Data Display for Focus Puller (LDD-FP) and a compatible distance measurement device.



The LDD-FP can not be attached to the WHA-3.

Studio LDB Adapter

K2.54144.0

The Studio LDB Adapter  allows the mounting of the Studio Lens Data Box 1m/3ft away from the camera body.

System Overview



ZMU-1
ZMU-2



ZMU-3



FIU-1



ICU-1

ZMU-1 / ZMU-2 Zoom Main Unit

ZMU-1 K4.47496.0

ZMU-2 K4.52419.0

The zoom unit ZMU → **photo** is the main control unit for all configurations remotely controlled via cable. It enables the focal length of zoom lenses to be adjusted by remote control.

ZMU-3 Zoom Main Unit

K2.65003.0

The zoom unit ZMU-3 → **photo** controls the focal length of zoom lenses on film- or video-cameras wirelessly or hard-wired. For wireless operation the ZMU-3 must be connected to the WMU-3. A CLM-2 motor can be directly operated with the ZMU-3 via the Y-cable KC-91S (K2.65008.0).

Note: When operating with video-lenses, the LC-display of the ZMU-3 shows the actual zoom speed instead of the lens position.

FIU-1 Focus Iris Unit

K2.41383.0

The focus iris unit FIU-1 → **photo** can be used for remote focus as well as remote iris control. It is user-friendly and can be operated on the same principles as the mechanical follow-focus system. To use an FIU-1, a ZMU is always necessary.

ICU-1 Iris Control Unit

K2.47028.0

The ICU-1 → **photo** provides constant exposure during speed-ramps. It constantly monitors the frame rate of the camera. During a frame rate change, the ICU-1 will calculate a new value for the iris to compensate for the exposure change, and instruct the lens motor to change the iris ring accordingly.



Best exposure is achieved with a WRC-1 on the ARRICAM or the FEM-2 on the ARRIFLEX 435 Xtreme/Advanced!

Power Supply

The LCS is operated with a separate 24V or 12V battery. The LCS can also be powered directly from the camera, provided the rated load of the camera socket is not exceeded.

Cables

A modular cable-connecting system allows easy connection from one unit to the other, as well as to the system operating control. The LCS recognises connected units and also detects defective cables.

System Overview



LDS-Ultra Primes



LDS-Mount



Ultra Prime LDS Lenses

Optically identical to their name sake non-LDS lenses, LDS lenses are equipped with encoders that can read lens ring positions, and with contacts on the lens mount to communicate lens status to the camera. A miniature chip inside the lens stores precise depth of field information and other lens information. LDS Ultra Primes also have new housings and larger index marks in a brighter color for better readability in low light.

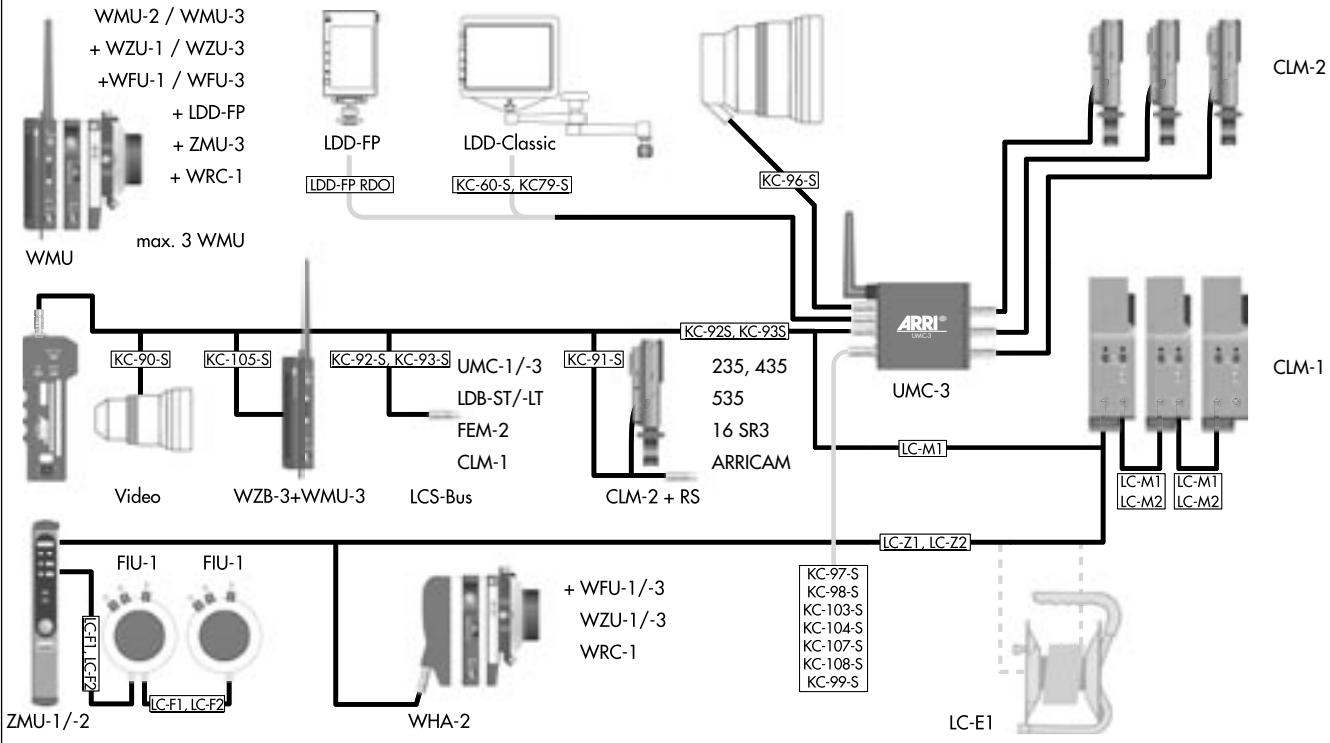
LDS lenses can be mounted on all PL mount cameras. On the ARRICAMs and the ARRIFLEX 435 Advanced, LDS lenses should be mounted in the 12:00 or 3:00 o'clock position.

Ultra Primes	Meter Scale	Feet Scale
LDS Ultra Prime T 2/12mm	K2.52198.0	K2.52199.0
LDS Ultra Prime T 1.9/14mm	K2.52111.0	K2.52123.0
LDS Ultra Prime T 1.9/16mm	K2.52112.0	K2.52124.0
LDS Ultra Prime T 1.9/20mm	K2.52113.0	K2.52125.0
LDS Ultra Prime T 1.9/24mm	K2.52114.0	K2.52126.0
LDS Ultra Prime T 1.9/28mm	K2.52115.0	K2.52127.0
LDS Ultra Prime T 1.9/32mm	K2.52116.0	K2.52128.0
LDS Ultra Prime T 1.9/40mm	K2.52117.0	K2.52129.0
LDS Ultra Prime T 1.9/50mm	K2.52118.0	K2.52130.0
LDS Ultra Prime T 1.9/65mm	K2.52200.0	K2.52201.0
LDS Ultra Prime T 1.9/85mm	K2.52119.0	K2.52131.0
LDS Ultra Prime T 1.9/100mm	K2.52120.0	K2.52132.0
LDS Ultra Prime T 1.9/135mm	K2.52121.0	K2.52133.0
LDS Ultra Prime T 1.9/180mm	K2.52202.0	K2.52203.0

LDS-Mount

A modified PL mount, the so called LDS Datamount, replaces the standard PL mount. The LDS Datamount contains LDS contacts and a miniature chip. Once the lens settings have been calibrated at the rental house, the lens can be used on a LDS camera as long as an ARRI lens motor (CLM-1 or CLM-2) is attached.

3.2 Diagram System Overview UMC-3



3.3 System Overview

The illustration on the left page provides an overview of the entire system with the various units, their relation to each other, and which cables are used to connect the units. For typical examples of use please see the following pages.

With the various manual control units, up to 3 lens motors can be controlled via cable or radio. The camera can be started or stopped with the units

- ZMU (Zoom Main Unit) (via cable)
- and WMU-1, WMU-2 or WMU-3 via radio.

3.3.1 Motor Units

The LCS enables a maximum of three lens motors to be controlled via the manual control units. The CLM-1 motors are particularly useful for stiff lenses, they can be operated with either a power cable LC-S1 (S2, S3, S4), the UMC-1, a LDB or a FEM-2. The CLM-2 motors are particularly useful for configurations in restricted spaces or if weight is critical. The CLM-2 motors can only be operated together with the UMC-1, the FEM-2 or a LDB.

3.3.2 Manual Control Units

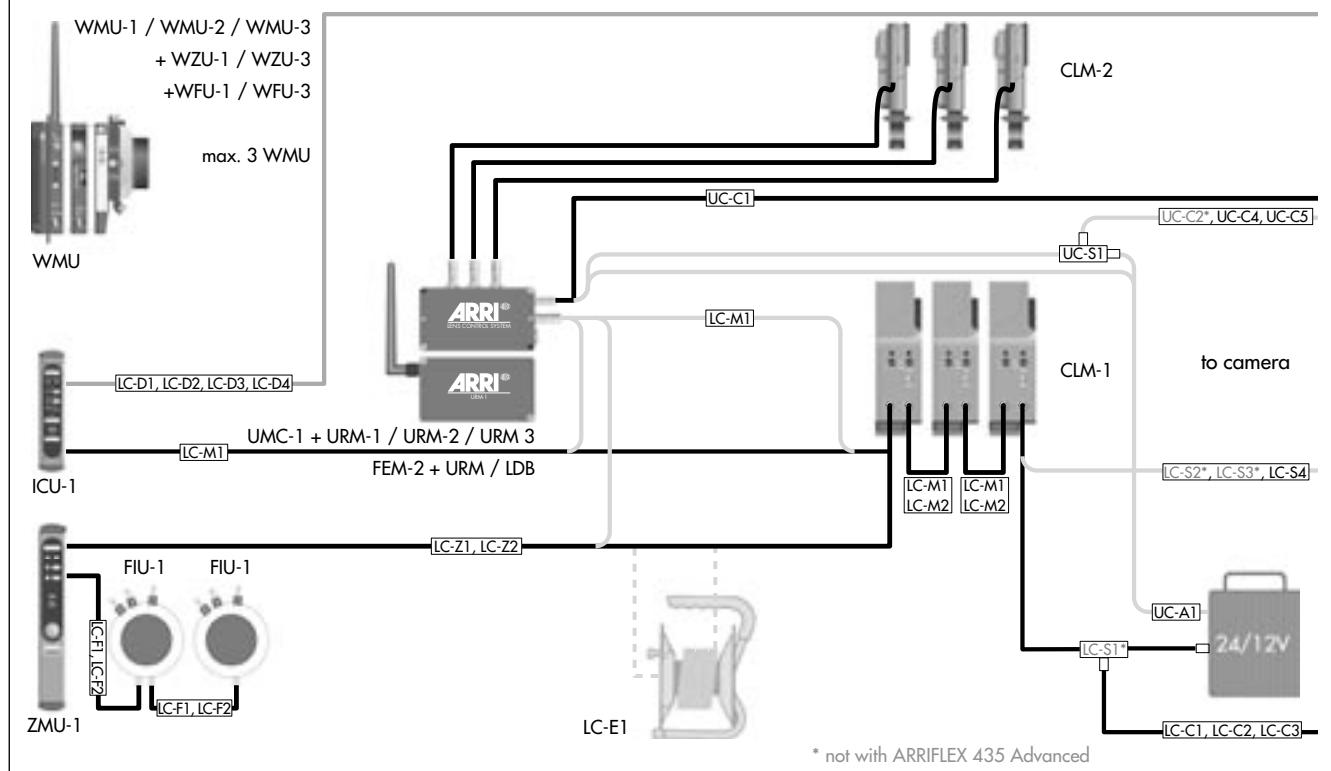
Remote Control via Cable

For remote control via cable a ZMU can be used. This is either connected to the UMC-1, a LDB, the FEM-2 or a CLM-1 motor. If iris and/or focus are to be controlled, up to two Focus Iris Units FIU-1 can be attached to the ZMU. With the ARRICAM the Remote Control Station, the Studio LDB Adapter and the WHA-2 or WHA-3 are available for cable remote control. With the ARRIFLEX 435 Advanced the WHA-2 or WHA-3 can also be used on the FEM-2.

Remote Control via Radio

To remotely control via radio at least one WMU is necessary. A maximum of three WMU can be operated simultaneously. For the lens motors a UMC-1 with an attached URM, or a LDB or a FEM-2 with URM is always necessary. On the WMU units can be attached to control the lens zoom ring (WZU-1 or WZU-3), and the focus ring and/or iris ring (WFU-1, WFU-3). All three lens rings can be remotely controlled with one or with several Wireless Main Units in radio network operation.

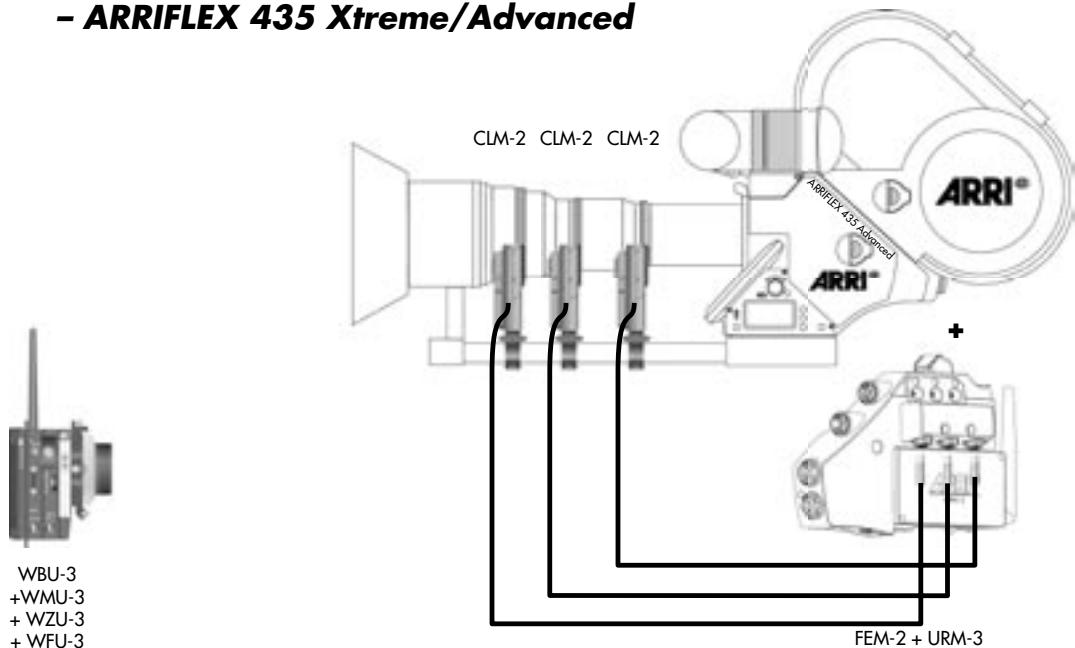
3.4 Diagram System Overview UMC-1



3.5 Typical Examples of Use

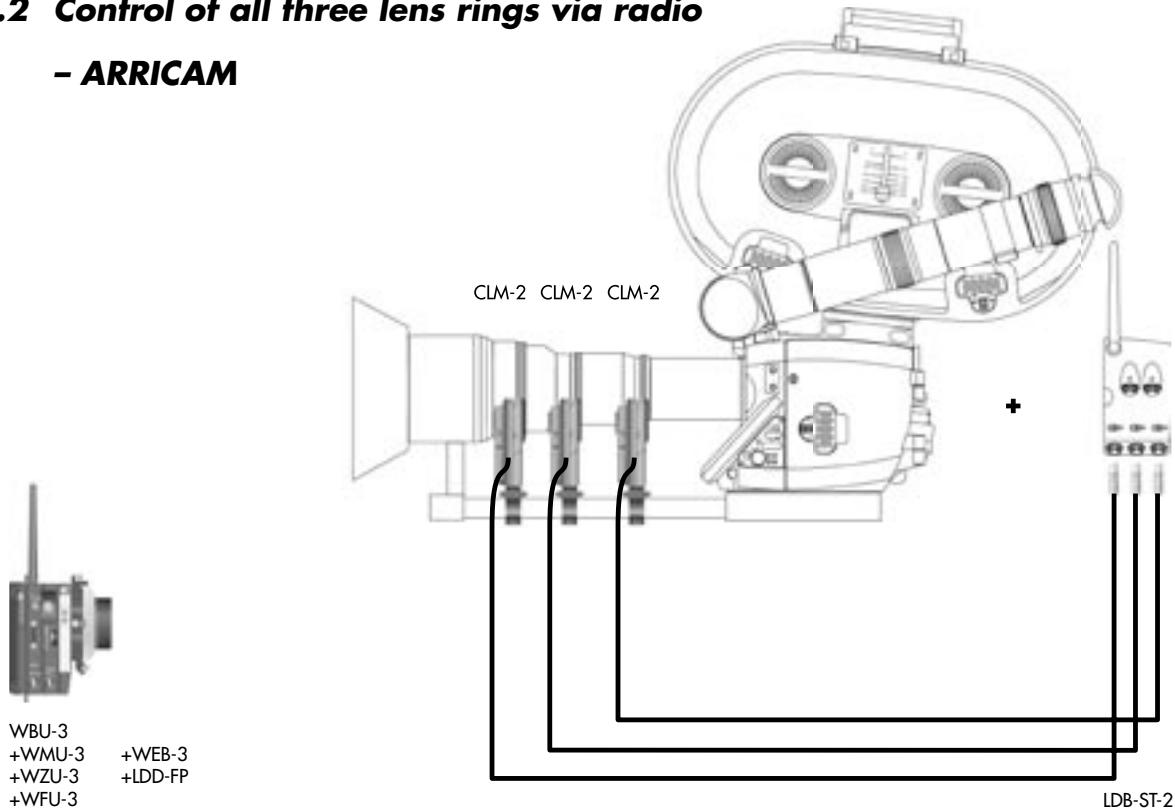
3.5.1 Control of all three lens rings via radio

- ARRIFLEX 435 Xtreme/Advanced

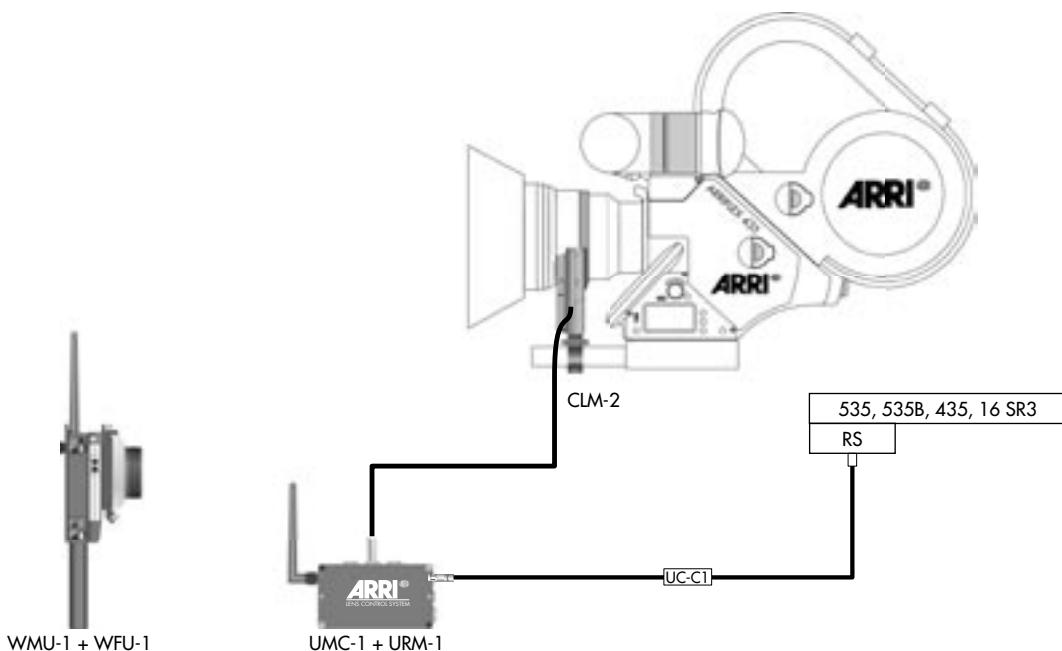


3.5.2 Control of all three lens rings via radio

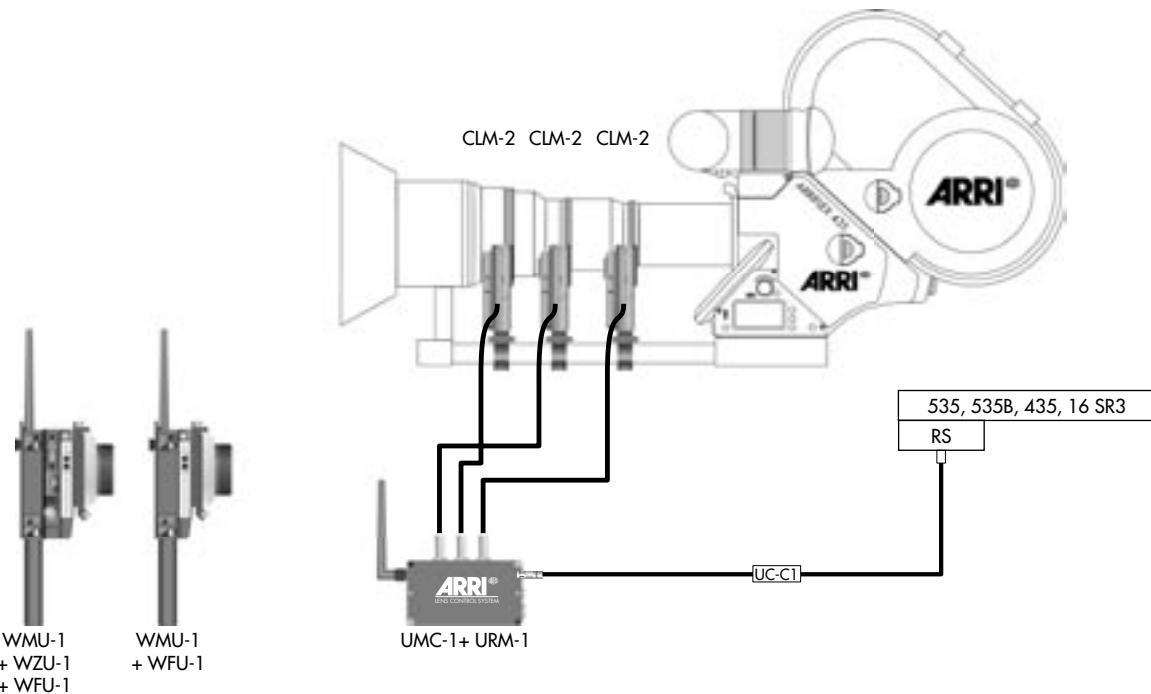
- ARRICAM



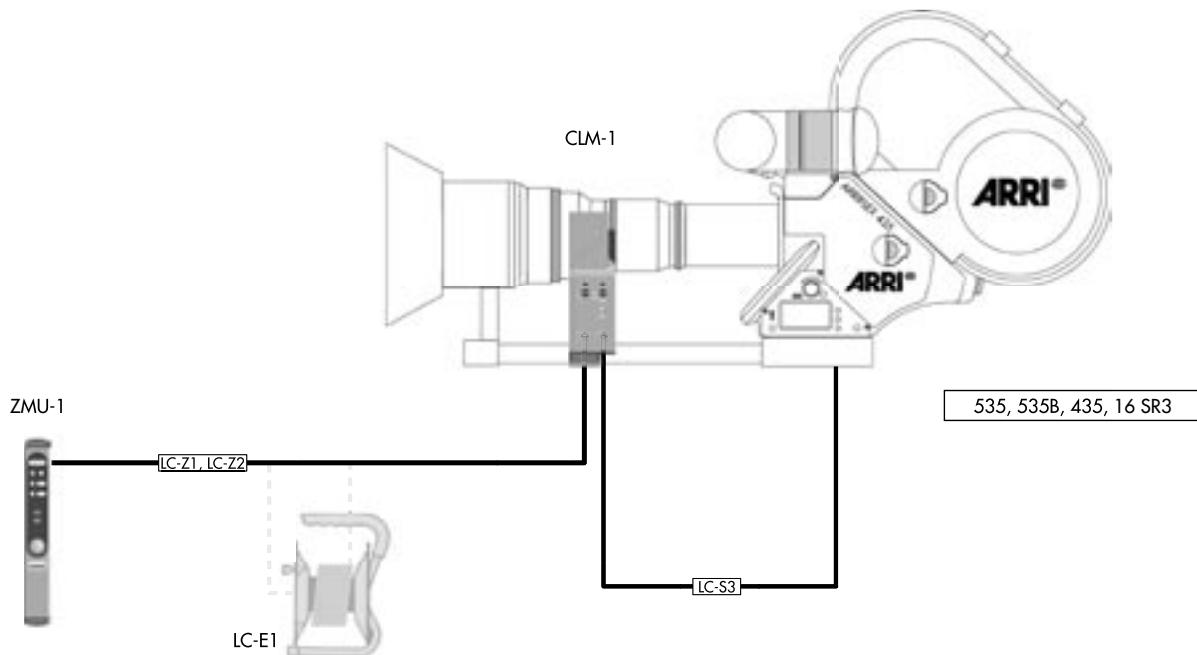
3.5.3 Radio remote control of focus



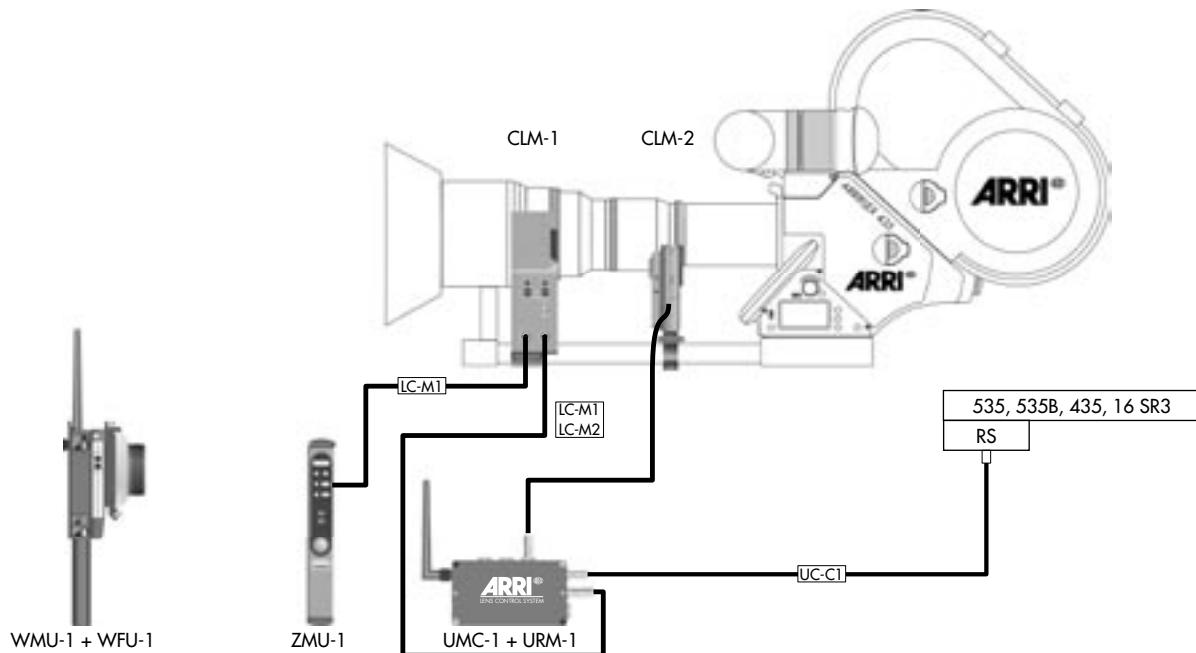
3.5.4 Control of all three lens rings via radio



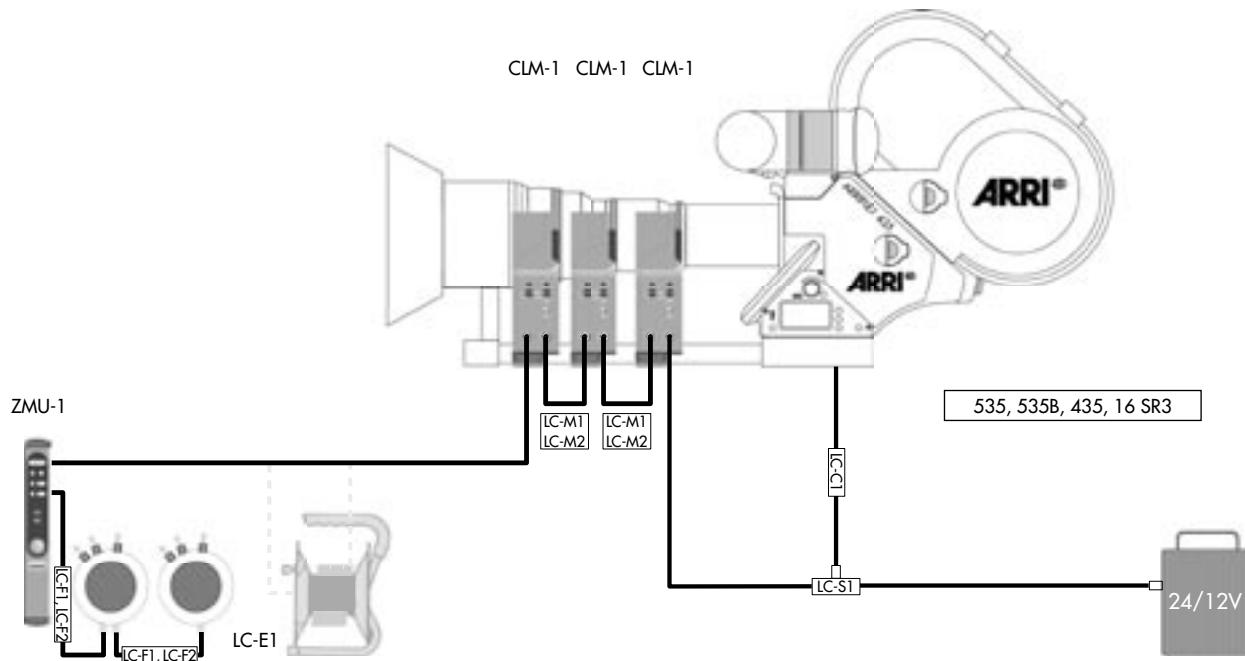
3.5.5 Control of the zoom ring via cable



3.5.6 Control of the zoom ring via cable and focus via radio



3.5.7 Control of all three lens rings via cable



System Overview

4. Setup

4.1 Installing and Connecting the Lens Motors



Before connecting or disconnecting electrical connections, switch off

- the camera
- the Zoom Main Unit ZMU,
- the Universal Motor Controller UMC
- and all Wireless Main Units WMU!



Use only 24V or 12V batteries!

Changing the setting is not necessary. The LCS automatically recognises the voltage.

At 12V there is however a lower maximum speed of the lens motors due to the lower torque.



As the end-stops of the iris ring on the ARRIMACROS change when the lens is focussed, the ARRIMACROS may not be used with the LCS or the WRC-1 system.

4.1.1 Selection of lens motors and their power supply

There are two different lens motors available:

The lens motors CLM-1 have a high torque and should be used with stiff lenses or in adverse weather conditions.

The lens motors CLM-2 are lighter and smaller. Where light weight and small size are important, they should be used.

For various lens rings, different motor types can also be used, for example a CLM-1 motor for the zoom ring and a CLM-2 motor for the iris ring.

After selecting the control motors, the power supply for them must be specified. The selection can be made according to the diagram on the [fold out page](#) in the back of this manual. In the squares is listed which units and cables are necessary for the desired application.

The cables listed in the diagram should be connected to the various units according to the following table:

To power from the battery					
Code	Description	Connection between	Length / m	Plug with no. pins	
UC-A1	Power cable UMC-1	Battery / UMC-1 or UC-S1	2	XLR 3*	Fischer 3
LC-S1	Power cable CLM-1 (NOT for 435 Advanced)	Battery / CLM-1	4.5	XLR 3*	Fischer 5
LC-A1	Battery cable (NOT for 435 Advanced)	Battery / Power cable	0.15	XLR 4*	XLR 3*
LC-A2	Battery cable (NOT for 435 Advanced)	Battery / Power cable	0.15	XLR 5*	XLR 3*
For remote RUN and to power from the camera					
Code	Description	Connection between	Length / m	Plug with no. pins	
UC-C1	Supply UMC-1 from 435, 535, 535B, 16SR3	Camera / UMC-1	1	Fischer 3	Fischer 3
LC-S2	Supply CLM-1 from 435, 35III, 35BL, 16SR2 (NOT for 435 Advanced)	Camera / CLM-1	0.8	Fischer 11	Fischer 5
LC-S3	Cable CLM-1 from 435+FEM, 535, 535B, 16SR3 (NOT for 435 Advanced)	Camera / CLM-1	0.8	Fischer 9	Fischer 5
KC-97-S	Supply UMC-3 from 235	Camera / UMC-3	0.4	Fischer 11	Fischer 16
KC-98-S	Supply UMC-3 from 235, 435, 535, 16SR3, ARRICAM	Camera / UMC-3 (24V)	0.5	Fischer 3	Fischer 16
KC-99-S	Supply UMC-3 from 435, 535, 16SR3	Camera / UMC-3 (24V)	1.0	Fi. 8 + 9	Fischer 16
KC-103-S	Supply UMC-3 from Moviecam	Camera / UMC-3 (24V)	0.5	Fischer 3	Fischer 16
KC-104-S	Supply UMC-3 from Aaton XTR16	Camera / UMC-3 (12V)	0.5	Lemo 6	Fischer 16
KC-108-S	Supply UMC-3 from 12V ARRIFLEX	Camera / UMC-3 (12V)	0.5	Fischer 11	Fischer 16
KC-91-S	Supply ZMU-3 from 235, 435, 535, 16SR3, ARRICAM	Camera / CLM-2 / ZMU-3	1.3	Fi. 3 + 12	Lemo 19

*) assignment of pin contacts see page 53

For remote RUN when using a UMC-1 as well as to power from the camera or a battery				
<i>Code</i>	<i>Description</i>	<i>Connection between</i>	<i>Length / m</i>	<i>Plug with no. pins</i>
UC-S1	UMC-1 Connection with UC-C2 C4, C5 cable to the camera and connection to the battery with UC-A1	RUN cable and battery / UMC-1	0.8	Fischer 7 and 3 Fischer 3
UC-C2	RUN cable with 435, 35III, 35BL, 16SRII (NOT for 435 Advanced)	Camera / UC-S1	1	Fischer 11 Fischer 7
UC-C4	RUN cable with 535, 535B, 435+FEM, 16SR3	Camera / UC-S1	1	Fischer 9 Fischer 7
UC-C5	RUN cable 535B, 435, 16SR3	Camera / UC-S1	1	Fischer 3 Fischer 7

For remote RUN when using an LC-S1				
<i>Code</i>	<i>Description</i>	<i>Connection between</i>	<i>Length / m</i>	<i>Plug with no. pins</i>
LC-C1	RUN cable with 435+FEM, 535, 535B, 16SR3 (NOT for 435 Advanced)	Camera / LC-S1	1	Fischer 9 Fischer 6
LC-C2	RUN cable with 435, 35III, 35BL, 16SR2 (NOT for 435 Advanced)	Camera / LC-S1	1	Fischer 11 Fischer 6 and XLR 3*

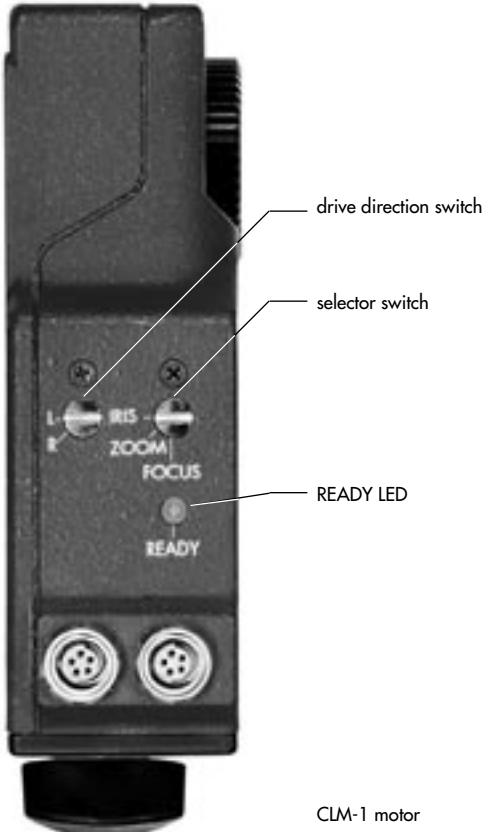
To cable the cable manual control units				
<i>Code</i>	<i>Description</i>	<i>Connection between</i>	<i>Length / m</i>	<i>Plug with no. pins</i>
LC-M1	Motor cable	CLM-1 / CLM-1	1	Fischer 5 Fischer 5
LC-M2	Motor cable	CLM-1 / CLM-1	0.2	Fischer 5 Fischer 5
LC-Z1	Zoom cable	ZMU-1 / CLM-1	3.5	Fischer 5 Fischer 5
LC-Z2	Zoom cable	ZMU-1 / CLM-1	7	Fischer 5 Fischer 5
LC-E1	Zoom cable extension	LC-Z1 or LC-Z2 / CLM-1	75	Fischer 5 Fischer 5
LC-F1	Focus cable	ZMU-1 or FIU-1 / FIU-1	2	Fischer 10 Fischer 10
LC-F2	Focus cable	ZMU-1 or FIU-1 / FIU-1	0.2	Fischer 10 Fischer 10
KC-92-S	Zoom cable	ZMU-3 / LCS bus	0.8	Lemo 19 Fischer 5
KC-93-S	Zoom cable	ZMU-3 / LCS bus	10	Lemo 19 Fischer 5
KC-105-S	connection for wireless operation ZMU-3	ZMU-3 / WMU-3	0.3	Lemo 19 MSubD 15

To cable the lenses with the digital interface				
<i>Code</i>	<i>Description</i>	<i>Connection between</i>	<i>Length / m</i>	<i>Plug with no. pins</i>
KC-96-S	Cooke S4i to UMC-3	S4i / UMC-3	0.7	Lemo 4 Fischer 16
To cable the lenses of video cameras				
<i>Code</i>	<i>Description</i>	<i>Connection between</i>	<i>Length / m</i>	<i>Plug with no. pins</i>
KC-107-S	Supply UMC-3 from Fujinon video lens	camera / UMC-3 (12V)	1.3	Hirose 12 Fi. 7 + 16
KC-90-S	Supply ZMU-3 from Fujinon video lens	camera / ZMU-3	1.0	Hirose 12 Lemo 19

*) Assignment of pin contacts

Type		pins	Assignment
XLR	3-pin	1	Ground
		2	+ 24V or + 12V DC
XLR	4-pin	1	Ground
		4	+ 24V or + 12V DC
XLR	5-pin	1	Ground
		3	+ 24V or + 12V DC

If the LCS is to be powered by a camera from another manufacturer, the relevant information should be obtained from that manufacturer.



4.1.2 Attaching and connecting the motors

Attaching the motor unit CLM-1

- Clamp the motor unit CLM-1 [photo](#) on the lens support rods. Make sure the motor unit's drive gear engages the lens' gear. Ensure as little play as possible!
- Lenses with laterally moving gears: with the motor unit engaged, turn the lens ring manually through its entire range to ensure perfect movement. Do not press the motor too hard in order to prevent tilting of the shift unit.
- Turn the selector switch [photo](#) on the motor unit to position corresponding to the lens ring
- Select the drive direction with the switch (L/R) [photo](#) on the motor unit CLM-1.

Note: The operating direction of the motor unit can be altered at any time (except during the calibration process).

- When using an LC-S1 cable, connect the first motor with the LC-S1 and additional CLM-1 motors to each other with LC-M1 or LC-M2 cables.



The LC-S1 cable can not be used with a FEM-2

- When using a UMC, a LDB or a FEM-2 connect the first motor with an LC-M1 or LC-M2 cable to the LCS-socket on the UMC. Connect the additional CLM-1 motors to each other with LC-M1 or LC-M2 cables.



The functions of the UMC-1 are already incorporated in the FEM-2 or a Lens Data Box of an ARRICAM. Parallel operation an UMC with a respectively equipped ARRICAM or ARRIFLEX 435 Xtreme/ Advanced is not recommended!



CLM-1 motor mounted at an ARRIFLEX 35 III



Mounting the CLM-2 with /without a console

Order number of the console: K2.52035.0

- Flip up the locking lever and screw back the ballcatch with a screwdriver until it disappears completely in the bracket.
- Push the tube flush into the console receptacle, taking care that the slit in the tube points towards the ballcatch.
- Screw the ballcatch out of the bracket until the tube can no longer be pushed out of the bracket.
- Turn the locking lever until a slight resistance can be felt, then press the lever downwards.
- Fasten the motor unit CLM-2 to the console tube.

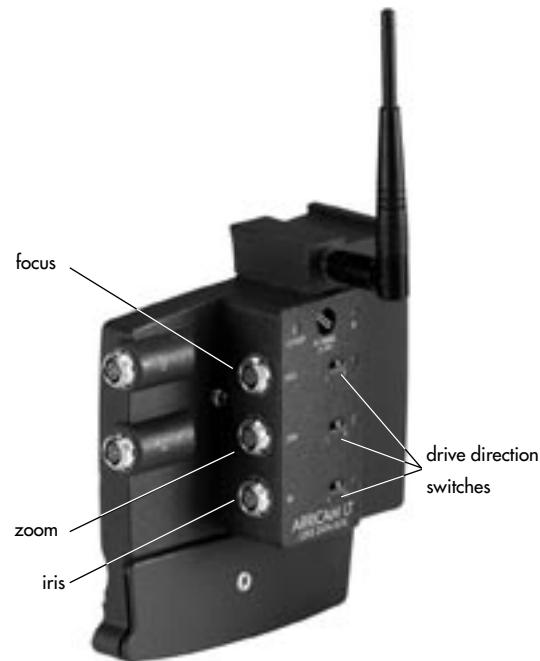


- Fasten the console to the support rods so that the motor unit's drive gear engages with the gear of the lens ring. Ensure as little play as possible!
- Lenses with laterally moving gears:
with the motor unit engaged, turn the lens ring manually through its entire range to ensure perfect movement. Do not press the motor too hard in order to prevent tilting of the shift unit.

The motor unit CLM-2 can also be mounted directly onto the support rods without the console.



Setup



Connecting the CLM-2 to the Lens Data Box on the ARRICAM

- Attach the plug of the motor unit CLM-2 to the respective socket  of the lens ring to control on the Lens Data Box.
- Select the drive direction with the switch (L/R)  on the Lens Data Box.

Note: The operational direction of the motor can be altered at any time (except during the calibration process).

Note: The LDB already contains the radio module – no extra module is needed for wireless remote control.

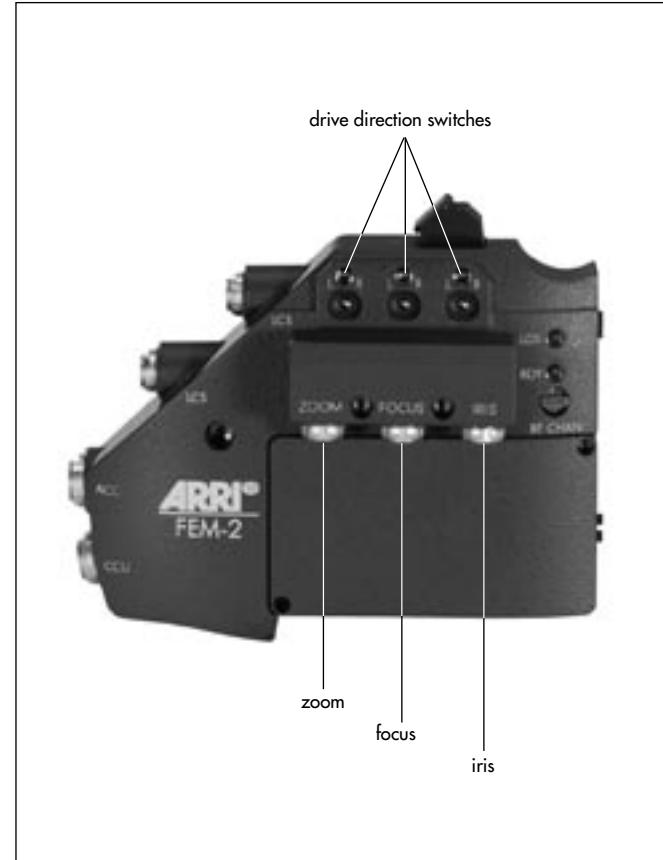
Connecting the CLM-2 to the FEM-2 on the ARRIFLEX 435 Xtreme/Advanced

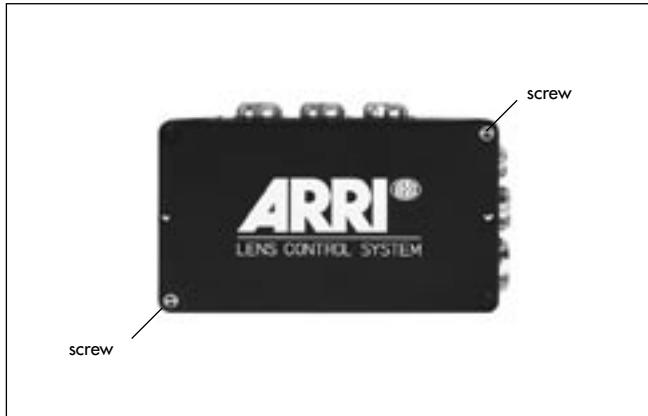
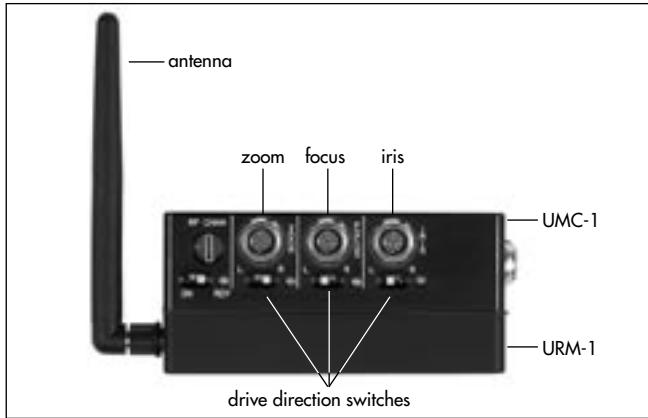
- Attach the plug of the motor unit CLM-2 to the respective socket  of the lens ring to control on the FEM-2.
- Select the drive direction with the switch (L/R)  on the FEM-2.

Note: The operational direction of the motor can be altered at any time (except during the calibration process).



Danger of injury: After switching the drive direction the focus and iris motors automatically move.





Connecting the CLM-2 to the UMC-1 Motor Controller

- Attach the plug of the motor unit CLM-2 to the socket [photo](#) of the universal motor controller UMC-1 which corresponds to the lens ring.
- Select the drive direction with the switch (L/R) [photo](#) on the universal motor controller UMC-1.

Note: The operational direction of the motor can be altered at any time (except during the calibration process).



Danger of injury: After switching the drive direction the focus and iris motors automatically move.

Attaching the URM (Universal Radio Module) to the UMC-1 (Universal Motor Controller)

For radio operation of the ARRIFLEX 535, 535B, 435, 435ES and the 16SR 3 series, as for models from other manufacturers the UMC-1 [photo](#) must be equipped with a URM [photo](#). According to the system in use URM-1, URM-2 or URM-3 modules can be attached. Compatible are:

- URM-1 with the WMU-1 (and LDB-ST and LDB-LT), or

- URM-2 / URM-3 with the WMU-2, WMU-3 (and LDB-ST-2, LDB-LT-2, UMC-3).

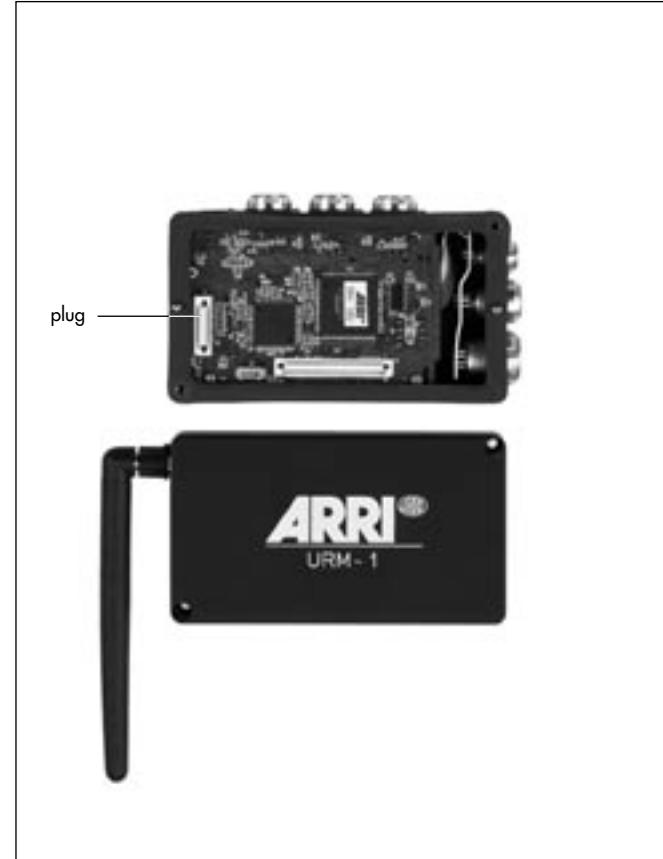
All radio modules are attached in same way:

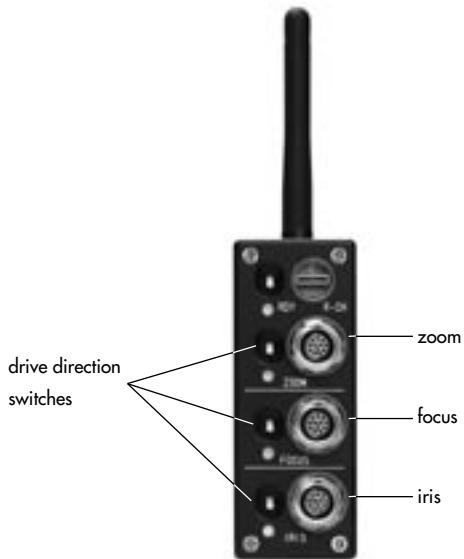
- Remove all cables from the UMC.
- Screw the antenna  onto the threaded bushing on the URM-1 / URM-2 / URM-3.
- Unscrew both screws  from the cover and remove the cover.
- Place the URM onto the UMC-1, align both plugs  with each other and do not tilt them while attaching.
- Screw the URM tight to the UMC-1 with the two screws.

Note: To operate an ARRICAM or an ARRIFLEX 435 Xtreme/Advanced with a FEM-2 a UMC-1 is not necessary.



The functions of the UMC-1 are already incorporated in the FEM-2 or a Lens Data Box of an ARRICAM. Parallel operation an UMC with a respectively equipped ARRICAM or ARRIFLEX 435 Xtreme/Advanced is not recommended!





Connecting the CLM-2 to the UMC-3 Motor Controller

- Attach the plug of the motor unit CLM-2 to the socket of the universal motor controller UMC-3 which corresponds to the lens ring.
- Select the drive direction with the switch (L/R) on the universal motor controller UMC-3.

Note: The operational direction of the motor can be altered at any time (except during the calibration process).



Danger of injury: After switching the drive direction the focus and iris motors automatically move.

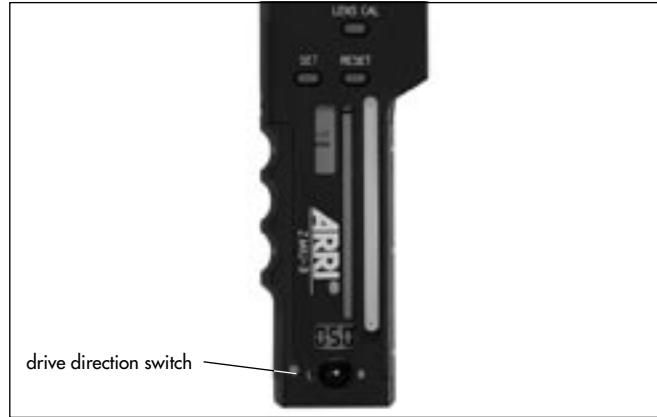
Connecting the CLM-2 to the ZMU-3 Zoom Main Unit

- Connect the CLM-2 with the Y-cable KC-91-S (K2.65008.0) to the ZMU-3 and the RS-socket.
- Select the drive direction with the switch (L/R)  on the ZMU-3.

Note: The operational direction of the motor can be altered at any time (except during the calibration process).



Danger of injury: After switching the drive direction the focus and iris motors automatically move.





Attaching the UMC/URM to the camera

- Attach the universal motor controller UMC  (for wireless remote control with attached URM) to the camera using the dovetail adapter with a 3/8" thread (Ident-No. K2.52080.0).

Attaching a URM to the FEM-2

For radio operation of the ARRIFLEX 435 Xtreme/Advanced the FEM-2  must be equipped with a URM .

According to the system in use URM-1, URM-2 or URM-3 modules can be attached. Compatible are:

- URM-1 with the WMU-1 (and LDB-ST and LDB-LT), or
- URM-2 / URM-3 with the WMU-2, WMU3 (and LDB-ST-2 LDB-LT-2, UMC-3).

All radio modules are attached in same way:

- Remove all cables from the FEM-2.
- Screw the antenna  onto the threaded bushing on the URM.
- Unscrew both screws  from the cover and remove the cover.
- Place the URM onto the FEM-2, align both plugs  with each other and do not tilt them while attaching.
- Screw the URM tight to the FEM-2 with the two screws.

For the attachment of the FEM-2 to the ARRIFLEX 435 Xtreme/Advanced and the operation please refer to the respective instruction manual (K5.60901.0 German and K5.60902.0 English).



Setup

4.2 Attaching and Connecting the Manual Control Units

After cabling up the motors and their power supplies, it is necessary to define which manual control units will be used to control the motors. The selection can be made using the diagram on the fold-out page in the back of this manual. In the squares is listed which units and cables are necessary for the desired application.

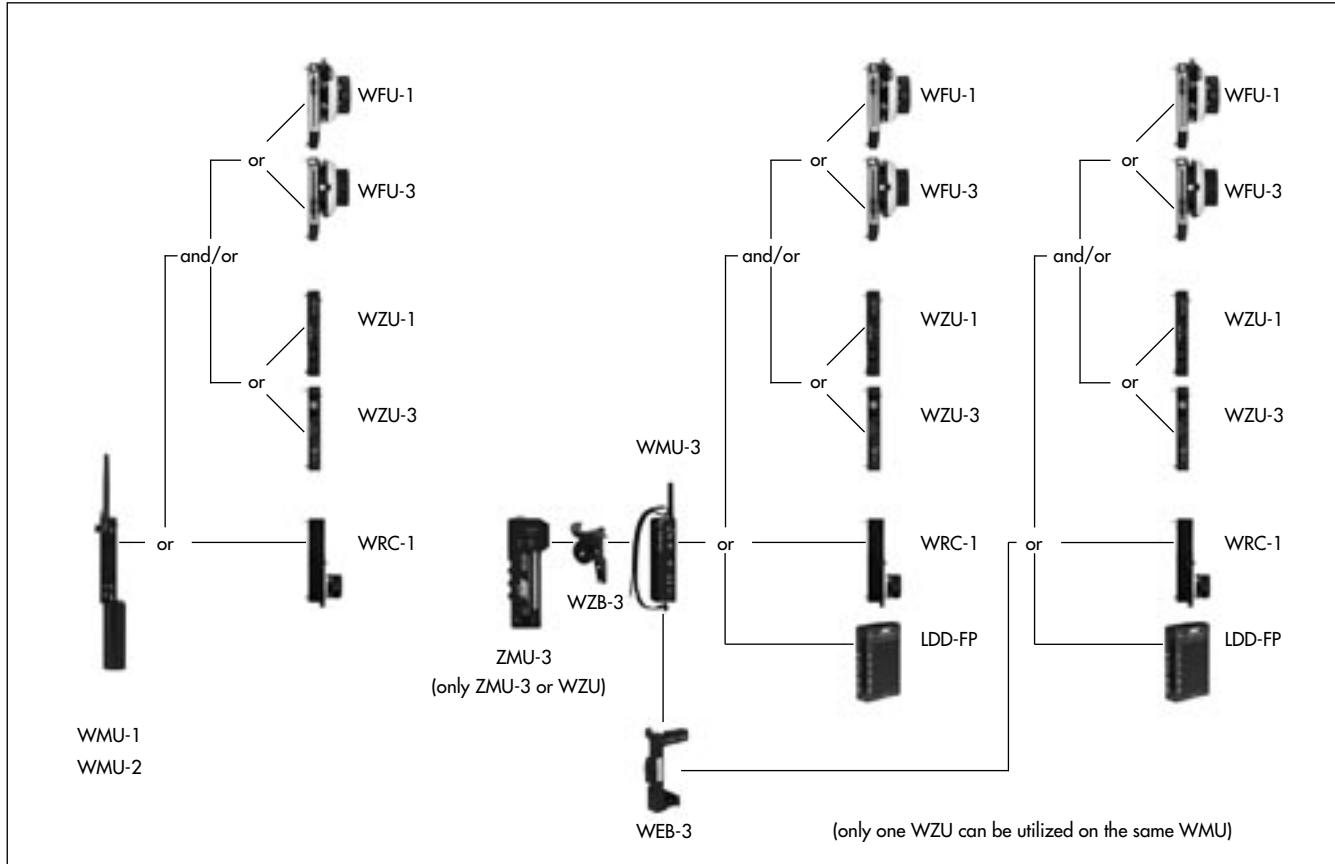
Connect the cables listed in the diagram with the different units according to the following table:

To cable the cable manual control units					
<i>Code</i>	<i>Description</i>	<i>Connection between</i>	<i>Length / m</i>	<i>Plug with no. pins</i>	
LC-Z1	Zoom cable	ZMU / CLM-1	3.5	Fischer 5	Fischer 5
LC-F1	Focus cable	ZMU or FIU-1 / FIU-1	2	Fischer 10	Fischer 10
LC-F2	Focus cable	ZMU or FIU-1 / FIU-1	0.2	Fischer 10	Fischer 10
WC-W1	WHA-1 with WRC-1	WHA-1 with WRC-1 / 16 SR3, 535, 435, 435ES, 435 Adv. with FEM-1	2	Fischer 8	Fischer 16
LC-M1	WHA-2/3 LCS Cable	WHA-2/3 / LDB, RCS, 435 Adv+FEM-2	1	Fischer 5	Fischer 5
LC-Z1	WHA-2/3 LCS Cable	WHA-2/3 / LDB, RCS, 435 Adv+FEM-2	3,5	Fischer 5	Fischer 5
KC 70	WHA-2/3 CAC Cable	ARRICAM ST/LT WHA-2/3	3	Fischer 16	Fischer 5

Note: The focus iris unit FIU-1 cannot be used together with a WFU-1 or WFU-3 in radio operation since these units cover the same functions.

Note: The zoom cable LC-Z1 can be extended by 75 m with the cable drum LC-E1.

Operation



5. Operation

5.1 Radio Remote Control

5.1.1 *Manual control units for radio remote control*

In general for remote control via radio always at least one WMU (Wireless Main Unit)  **photo** is necessary as a radio main unit. As a maximum, three WMU can be operated simultaneously per radio channel. The radio modems of the "-1" series are not compatible with the radio modems of the "-2" and "-3" series. Compatible are:

- URM-1 with the WMU-1 (and LDB-ST and LDB-LT), or
- URM-2 / URM-3 with the WMU-2, WMU3 (and LDB-ST-2 and LDB-LT-2).

Note: The radio modems of the "-1" series can be exchanged to the new standard radio modem at any ARRI Service Center.

For radio operation the camera must be equipped with

- a Lens Data Box (ARRICAM)
- a FEM-2 (ARRIFLEX 435 Advanced)
- or an UMC-1 (Universal Motor Controller)
with an URM (Universal Radio Module)
- or an UMC-3.

Through the flexible design of the system, optimal manual operations for radio remote control can be created as desired. It is possible to remotely control the various setting rings on a lens as desired with a single or up to three WMU radio remote controllers in radio network operation.

General features

Two units can be attached to the WMU-1 or WMU-2 to remotely control the lens:

- the WZU-1 / WZU-3 (Wireless Zoom Unit) to remotely control the zoom ring.
- the WFU-1 / WFU-3 (Wireless Focus Unit) to remotely control the focus and/or iris ring.

Both units can be attached together to the WMU-1 or WMU-2; the WZU is then attached first and then the WFU onto the WZU.

Alternatively a WRC-1 (Wireless Remote Control) can be attached to the WMU-1 or WMU-2 to remote control

- camera speed
- mirror shutter angle and
- iris of the lens.

The WEB-3 and the LDD-FP are not compatible with the WMU-1 or WMU-2.

Two units can be directly attached to the WMU-3 to remotely control the lens: remote control units:

- the WZU-1 / WZU-3 (Wireless Zoom Unit) to remotely control the zoom ring.
- the WFU-1 / WFU-3 (Wireless Focus Unit) to remotely control the focus and/or iris ring.

Both units can be attached together to the WMU-3; the WZU is then attached first and then the WFU onto the WZU.

Alternatively a WRC-1 (Wireless Remote Control) can be attached to the WMU-3 to remote control

- camera speed
 - mirror shutter angle and
 - iris of the lens
-
- or a LDD-FP to display wirelessly all important data from a connected LDS compatible camera.

Additionally the WMU-3 can be expanded with the Wireless Expansion Bracket WEB-3. Then up to three control units can be attached to one WMU-3.
The following combinations are possible:

- LDD-FP and WFU-1 or WFU-3
- LDD-FP and WZU-1 or WZU-3
- LDD-FP and WFU1 or WFU-2 and one WZU-1 or WZU-3
- Two WFU-1 or WFU-3
- Two WFU-1 or WFU-3 and one WZU-1 or WZU-3
- WRC-1 and WFU-1 or WFU-3
- WRC-1 and WFU-1 or WFU-3 and one WZU-1 or WZU-3

Note: The LDD-FP and the WRC-1 are using the same interface, therefore simultaneous operation of both units on one WMU is not possible.

5.1.2 Selecting the radio channel

The following units are equipped with a radio modem:

- WMU-1, WMU-2, WMU-3
- URM-1, URM-2, URM-3
- LDB-ST, LDB-ST-2, LDB-LT, LDB-LT-2
- UMC-3.

The radio modems of the "-1" series are not compatible with the radio modems of the "-2" and "-3" series.

Compatible are:

- URM-1 with the WMU-1 and LDB-ST and LDB-LT, or
- URM-2 / URM-3 with the WMU-2, WMU3 and LDB-ST-2 / LDB-LT-2, and UMC-3.

The two kinds of radio modems utilize a very different method of transmission. With the modems of the "-1" series a specific subband is selected with the remote channel switch. Whereas with the "-2" and "-3" series radio modems a specific scheme of constantly changing frequencies is selected, making the connection between the different radio units a lot more robust against interference. The even channels on the remote channel switch (numbers 2, 4...) utilize the upper half of the bandwidth (2444 - 2472 MHz) while the odd numbers use the lower frequencies (2406 - 2435 MHz).

To establish a connection between one or more Wireless Main Units (a maximum of three per radio channel is possible), the WMU must be set to the same radio channel as the receiving URM, UMC-3 or LDB.

If several lenses are to be remotely controlled independently of each other with radio modems of the "-1" series, each URM-1 or LDB-ST/LDB-LT used must be set to a different channel. The following radio channels can not be used simultaneously:

- radio channel 0 and 5
- radio channel 1 and 6
- radio channel 3 and 7.

It is not possible to control two URM, UMC-3 or LDB units with one Wireless Main Unit.

Note: In case two remote systems with the "-2" or "-3" series modems are on the same set, it is recommended to set one of the systems to an upper (even) channel and one system to a lower (odd) channel number.



Due to local telecommunications regulations, only certain channels are allowed in some countries.

Units with "-2" and "-3" type radio modems must be used in odd numbered channels in France. For units with "-1" type radio modems only the channels listed in the following table may be set in the respective countries!

In all countries not listed in this table, radio channels from 0-7 may be programmed if there are no local telecommunication restrictions for the 2.4 GHz ISM-band.

For units with type "-1" radio modems	
Switch setting	Countries
0	USA, Canada, Mexico, New Zealand, Europe except France and Spain
1	USA, Canada, Mexico, New Zealand, Europe except France and Spain
2	Europe except Spain
3	USA, Canada, Mexico, New Zealand, France
4	Japan
5	Australia
6	Australia
7	Spain
8,9	UMC-1, WMU-1/-2: do not use! (LDB, FEM-2, WMU-3: radio is switched off)

Note: Channels 8 and 9 must not be used with the UMC-1 or the WMU-1 or WMU-2 due to possible interferences with the channels 0 and 1.

selection of
radio channel
WMU-1
WMU-2



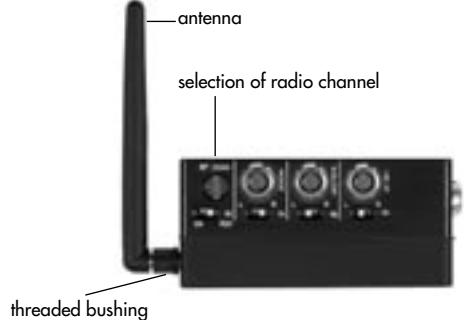
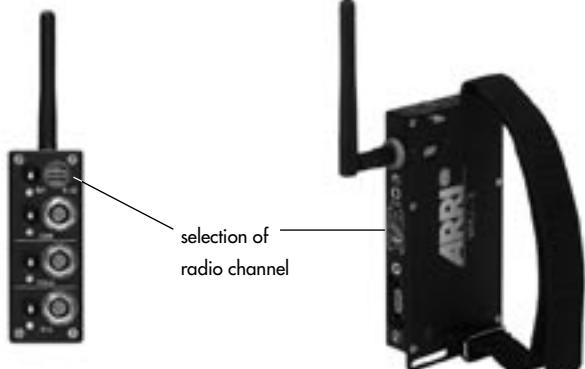
- Set the desired channel with the rotary selection knob on the WMU (Wireless Main Unit).
- Using the selection knob on the LDB (Lens Data Box), the FEM-2 or the UMC set the same channel as on the WMU.

Note: Alternatively both antennas (WMU and receiver) can be screwed off and connected with the cable WC-A3 (15m, other lengths on request) (K2.52263.0) mounted to the antenna sockets.

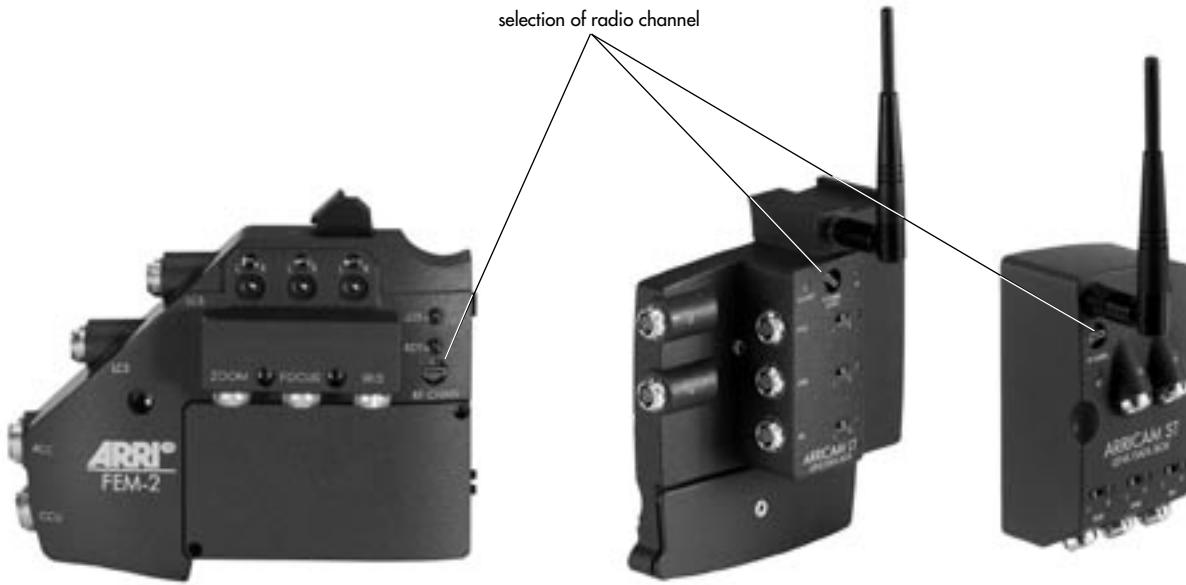
UMC-3

WMU-3

selection of
radio channel



Operation

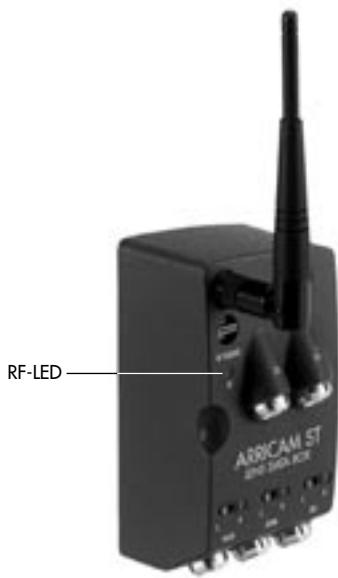


FEM-2

LDB-LT / LDB-LT-2

LDB-ST / LDB-ST-2

Operation



LDB-ST / LDB-ST-2



LDB-LT / LDB-LT-2

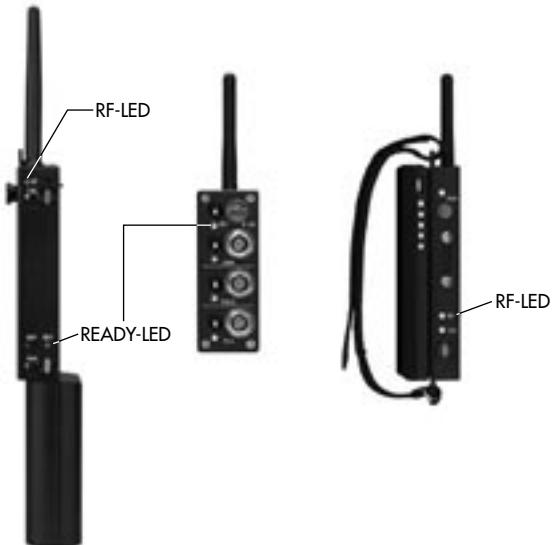
Quality of the radio connection

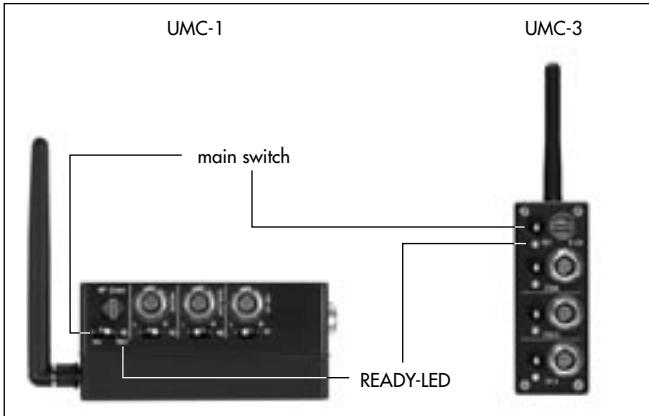
The LED RF  shows whether the quality of the radio transmission is sufficient. As long as the LED RF is green, the radio connection is perfect. If the LED is illuminated briefly red, this means that a data packet has been lost. The packet is cyclically transmitted and the lens adjustment is still correct.

If the LED lights up red several times briefly, or continuously, it must be assumed that lens adjustment is no longer being performed correctly. If the LED flashes red, the radio connection has been interrupted for longer than a second.

The radio connection is best when there is visual contact between the antennas of the LDB, UMC-3 or URM and the WMU is as small as possible. The maximum range inside depends on the particular building and is typically approx. 30m.

Outdoors the range is approx. 100m.





5.1.3 Operating the WMU-1, WMU-2, WMU-3 (Wireless Main Unit)

The following description applies for all Wireless Main Units – the differences in operation are specifically explained in the respective sections.

5.1.3.1 Switching on

- Before switching on, ensure that
 - the desired radio manual control units are attached and correctly configured,
 - the same radio channel is programmed on the WMU and the LDB, FEM-2, UMC-3 or URM,
 - the support rods are securely fastened to the camera
 - the motor units are securely fastened to the support rods
 - the motor drive gear engages the lens gear ring with as little play as possible.
- Switch the main switch on the universal motor controller UMC or the camera main switch on the ARRICAM or ARRIFLEX 435 Xtrem/Advanced to ON.

Note: The camera (ARRICAM with LDB or ARRIFLEX 435 Xtreme/Advanced with FEM-2) or the UMC must always be switched on prior to the WMU.

- Switch on the power supply with the ON key  on the WMU.

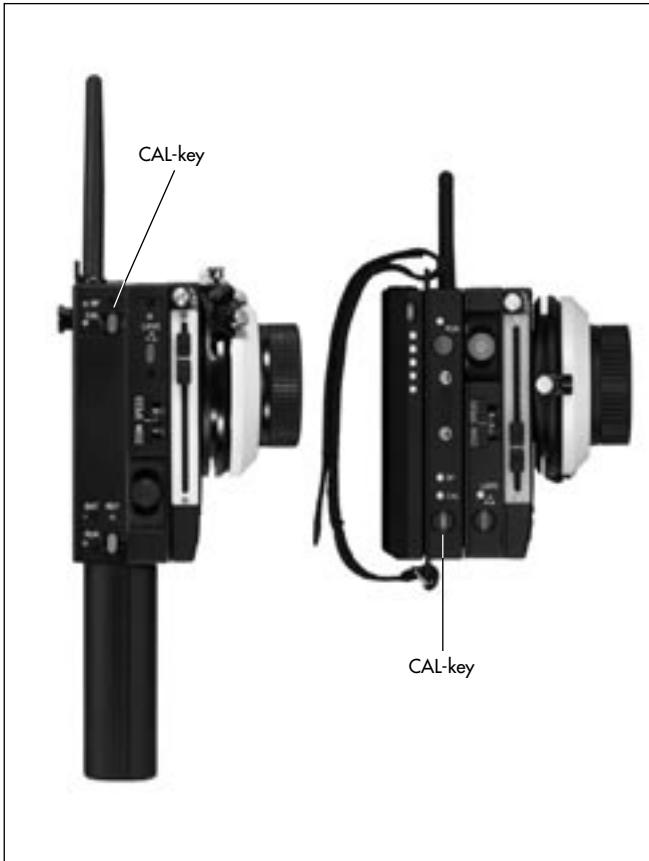
Note: If the ARRICAM with LDB, the ARRIFLEX 435 Xtreme/Advanced with FEM-2 or the UMC is switched off while radio contact exists, all connected WMUs will also be automatically switched off.

The READY LEDs on the WMU  and the motor unit CLM-1 or the universal motor controller UMC will briefly illuminate red. Then the Ready LED on the WMU-1 will show the status of the LCS:

green	LCS is ready for operation
red	operating error on one unit (e.g. incorrect key pressed, WMU switched on before UMC)
flashing red	the selector switch on the motor unit is incorrectly set or connected to the incorrect socket on the UMC

Note: The LEDs on the CLM-1 or UMC, LDB or FEM-2 flash green when the lens reaches the end of the set operating range.

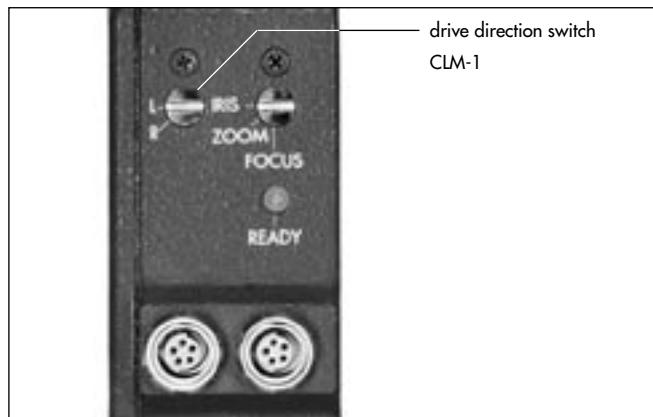




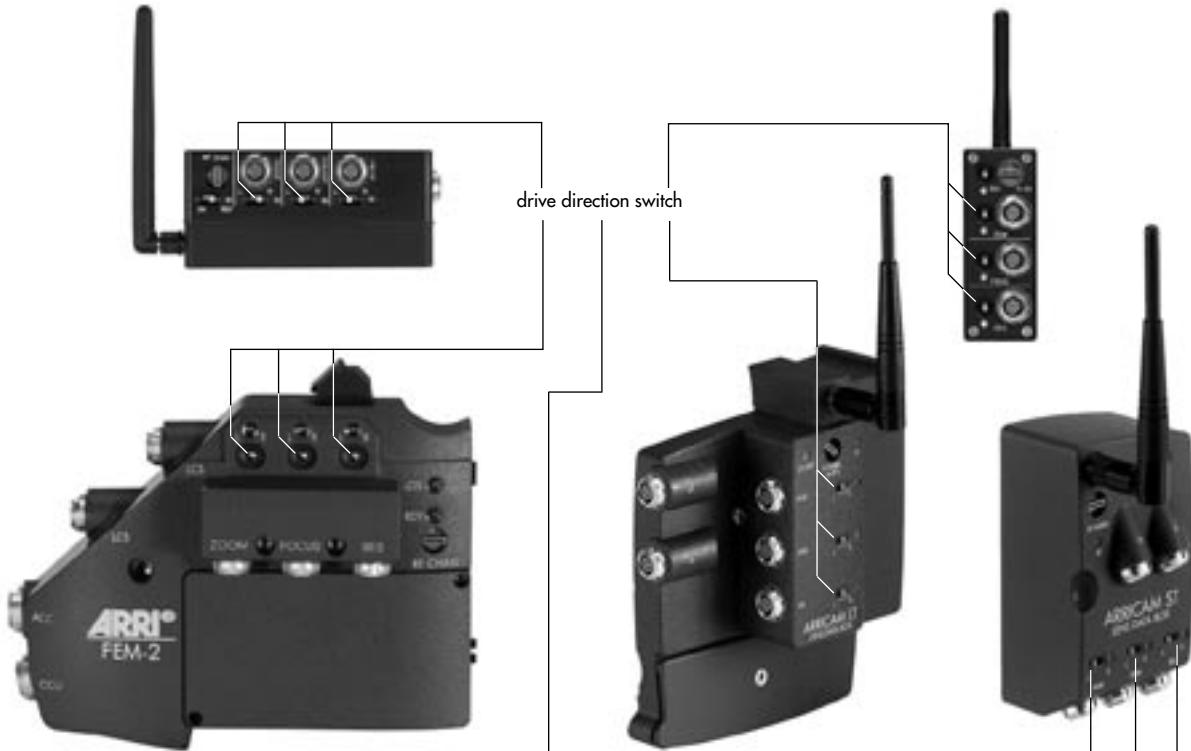
- Calibrate the motor end stops by pressing the CAL-key [photo](#) on the WMU. During calibration no WMU can be switched on.

Note: All WMUs or ZMUs must calibrate all lens rings assigned to the respective unit.

- Select the desired direction with the drive direction switch on the CLM-1 motor unit [photo](#) or on the respective switches close to the motor sockets on the LDB, FEM-2 or the UMC [photo](#).



Operation





5.1.3.2 Resuming operation after an extended break

If a lens ring was moved manually while the LCS was switched off, the stored values for the lens end stops will no longer be correct. So:

- switch on the LCS and recalibrate.

5.1.3.3 Battery Control (BAT)

When the battery control LED (BAT) on the WMU flashes, the battery must be replaced.



Do not begin any new scenes!

WBU-1 and WBU-2

The operating time of a battery is approx. 5 hours.

Meaning of the BAT LED signals on the WMU-1 and WMU-2:

illuminated red	WMU-1 / WMU-2 will work for approx. 15 min
flashing red	WMU-1 / WMU-2 will work for approx. 5 min
fast flashing red	WMU-1 / WMU-2 will switch off in approx. 5 s.

WBU-3

The operating time of a WBU-3 with a WMU-3 and a WFU-3 is approx. 12 hours.

- The capacity of the WBU-3 battery is displayed with 5 LEDs  [photo](#).
- By pressing the BAT-key  [photo](#) the LED display is activated about 4s. One LED stands for 1/5 of the loaded capacity.



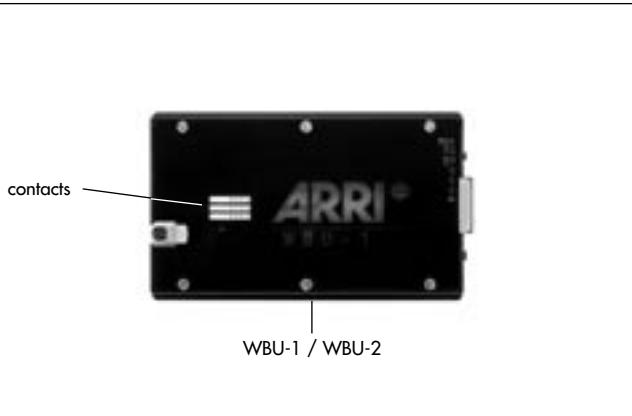
WBU-3 and WBU-4 batteries must only be discharged within a temperature range of -20°C to +60°C (-4°F to +140°F), and are charged within a temperature range between 0°C and + 50°C (32°F to 122°F).

WBU-4

The operating time of a WBU-4 with a WMU-3 and a WFU-3 is approx. 24 hours.

- The capacity of the WBU-4 battery is displayed with 5 LEDs  [photo](#).
- By pressing the BAT-key  [photo](#) the LED display is activated about 4s. One LED stands for 1/5 of the loaded capacity.





5.1.3.4 Replacing the battery WBU-1, WBU-2 WBU-3, WBU-4 (Wireless Battery Unit)



Never place the battery contacts on a conductive surface. Do not short-circuit the battery.



To protect the battery contacts on the WMU, a battery should always be attached to the WMU.



WBU-1 and WBU-2 batteries are only for use with the WMU-1 and WMU-2 and can not be used on the WMU-3.



WBU-3 and WBU-4 batteries are only for use with the WMU-3 and can not be used on a WMU-1 or WMU-2.

- Switch off the WMU by pressing the ON key.

WMU-1 and WMU-2

- Push away the locking lever from the battery and pull the battery backwards to remove it.
- Insert a fully charged battery with its wide black pin facing the surface and push into the holder until the battery clicks in audibly.

WMU-3

- Press the RELEASE button on the WMU-3 and pull the battery backwards to remove it.
- Hook up a fully charged battery to the black pin  on the WMU-3 and push into the holder until the battery clicks in audibly.



5.1.3.5 Charging the batteries WBU-1, WBU-2, WBU-3, WBU-4



Only charge batteries in dry rooms and within a temperature range between 0°C and +50°C (32°F to 122°F)!



WBU-1 and WBU-2 batteries must only be charged using the WAC-1 (Wireless Accumulator Charger)!



WBU-3/4 batteries must only be charged using the WAC-3 (Wireless Accumulator Charger)!



Only original ARRI WBU batteries may be charged. Do not charge any non-rechargeable batteries!



ARRI WBU batteries must not be thrown into normal household waste; they must be disposed off according to the regulations!



Do not disassemble ARRI WBU batteries, and do not throw them into an open fire!



Only operate the WAC-1 (Wireless Accumulator Charger) with its accompanying power supply, otherwise the battery may be severely damaged!



Do not short-circuit the contacts of the WAC-1 or the WAC-3!

Note:

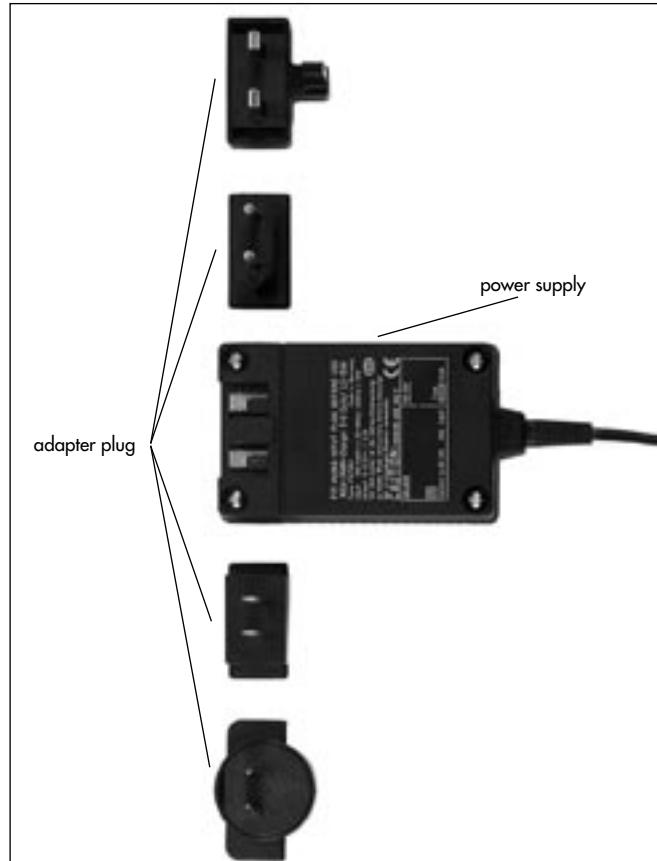
WBU-1 and WBU-2 batteries consist of 6 nickel metal hydride cells with a rated capacity of 2 Ah; the charge time is approx. 1.5 h.

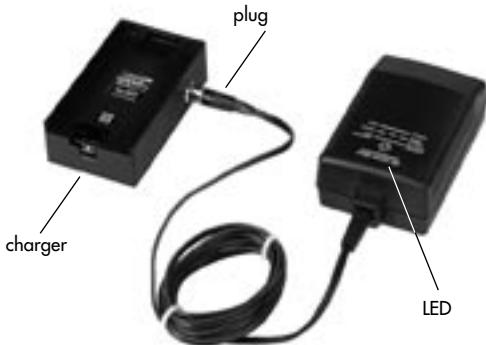
Note:

WBU-3/4 batteries consist of Lithium-Ion cells with a rated capacity of 2.3Ah respectively 4.6Ah. Charging time is approx. 5 hours for the WBU-3 batteries, and approx. 7 hours for the WBU-4 batteries.

WBU-1, WBU-2

- Push the adapter plug  suited to your country onto the power supply. Alignment to the voltage is automatic within the range of 100-240 V AC and a Frequency of 50-60Hz.



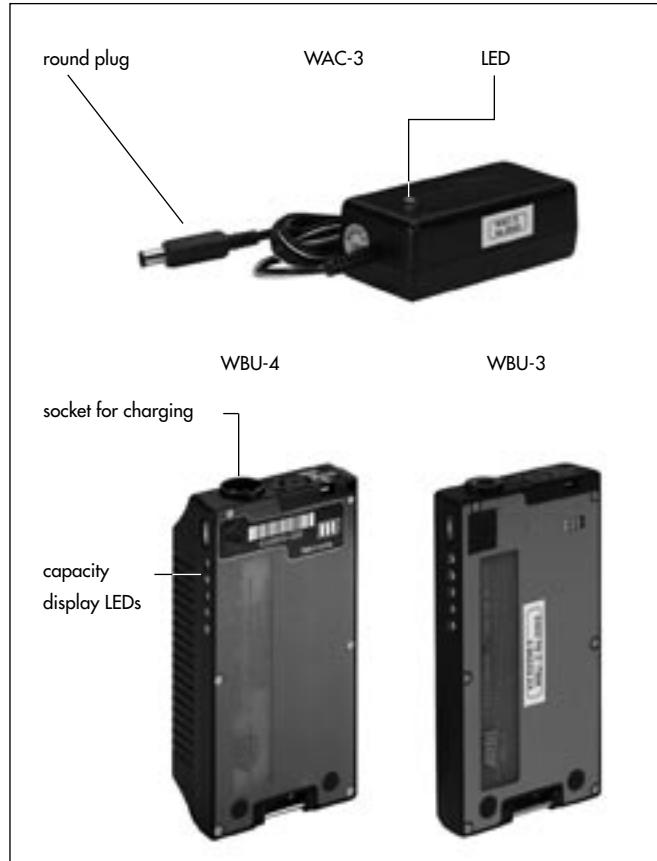


- Connect the round plug on the power supply to the WAC-1 (Wireless Accumulator Charger).
- Insert the WBU-1/WBU-2 to be charged with its wide black pin facing the surface and push into the holder until the battery clicks in audibly.
- Connect the power supply to the mains. The LED on the power supply is illuminated red.
- The WBU-1/WBU-2 is fully charged when the power supply LED flashes red.
- Push away the locking lever from the battery and pull the fully charged battery backwards to remove it.



WBU-3 WBU-4

- Connect the round plug  **photo** of the WAC-3 (Wireless Accumulator Charger) to the WBU-3/4. Alignment to the voltage is automatic within the range of 100-240V AC and a Frequency of 50-60Hz.
- To start charging connect the power supply to the mains. The LED on the WAC-3  **photo** is illuminated red, and the capacity display LEDs on the WBU-3/4 indicate the charged capacity with 1-5 LEDs.
- The WBU-3 is already fully charged when the power supply LED on the WAC-3 remains green. The capacity display on the WBU-3/4 shows 5 green LEDs.
- When the battery is fully charged, the red power supply LED on the WAC-3 turns to green. The capacity display on the WBU-3 shows 5 green LEDs, which can be illuminated up to 40s after charging is finished.
- After charging (WAC-3 shows a green LED) first disconnect the WAC-3 from the mains and then disconnect the WBU-3 or WBU-4 battery from the WAC-3.
- If charging is interrupted, the capacity display on the WBU-3/4 can be illuminated for up to 40 s after interrupting the charging.





5.1.3.6 Calibration

The end stops of the lens rings are defined and stored during the automatic calibration process in order to prevent driving the lens ring up against the lens' end stops. Previously set values are thereby erased.

Calibration must be carried out

- during initial set-up,
- after a lens change,
- after the lens control ring has been manually moved while the units were disconnected from the power, e.g. after an extended break
- after the motor drive gear has been removed from the lens control ring.

- To calibrate press the CAL key  on the WMU. While the LCS is calibrating, the CAL-LED on the WMU is illuminated yellow, the motor LEDs on the UMC-1 are flashing red/green. Only those axes are calibrated for which a manual control unit is available. During calibration no extra WMU can be switched on.



The CAL-LED flashes:

Lens end stops are not yet defined, or the lens has been moved while the LCS was switched off and then driven against the end stops. Recalibrate!

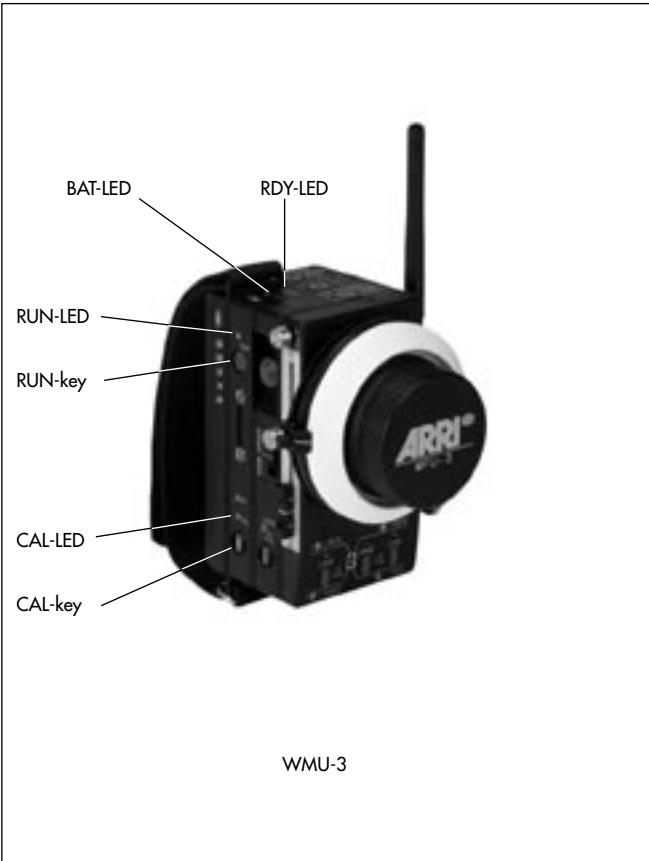
5.1.3.7 Camera RUN

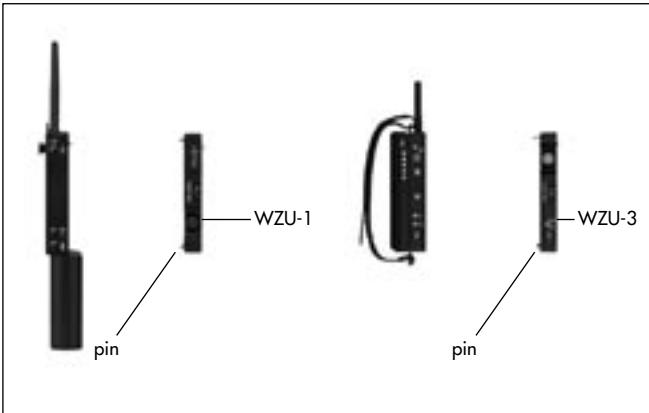
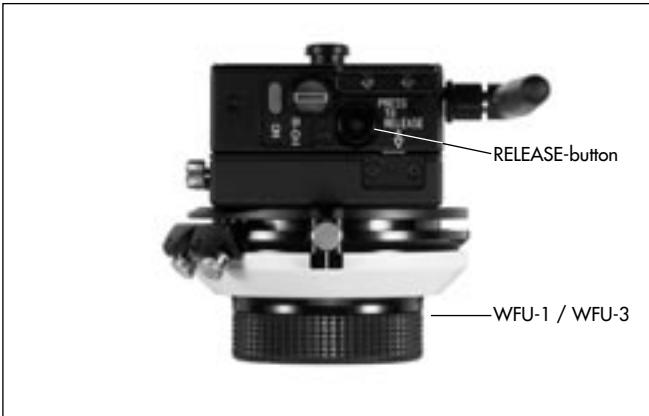
- To start or stop the camera:
Press the RUN key  photo.

The RUN-LED  photo is illuminated green while the film is running.

In REMOTE-RUN operation with the ARRIFLEX 35 BL, 35 III and 16 SR II the camera can only be stopped with the key with which it was started.

Note: While the camera is running, the UMC and the WMU cannot be switched off.





5.1.4 Operating the WZU-1 / WZU-3 (Wireless Zoom Unit)

5.1.4.1 Mounting the WZU on the WMU

WZU-1 and WZU-3 are fully compatible in their functions. While the WRC-1 is ergonomically optimal suited for the WMU-1 / WMU-2, the WZU-3 is optimised for the WMU-3. Both WZUs can be used with all WMUs.

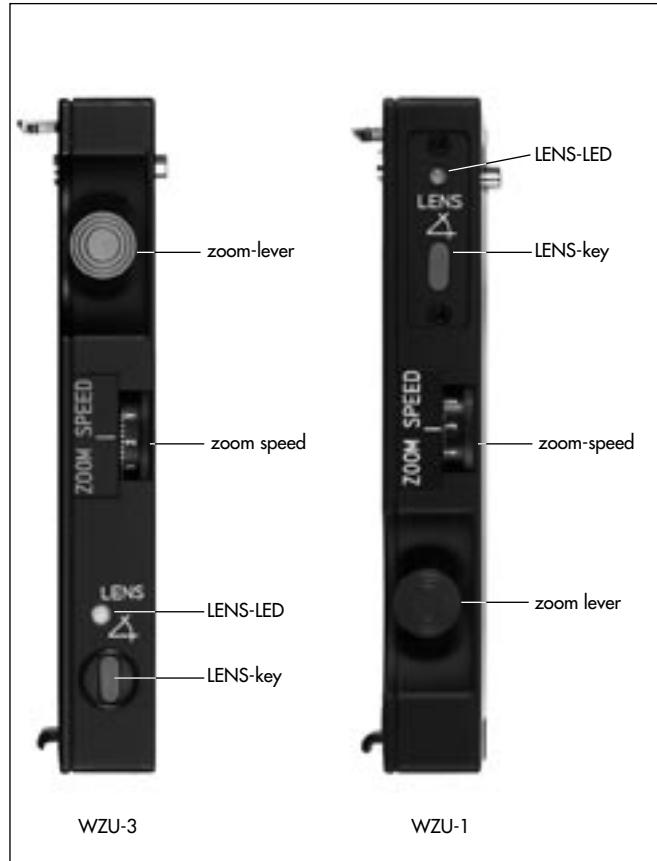
- Switch off the WMU with the ON key.
- To detach another unit if attached, press the RELEASE-button photo, swing away the other unit and pull up to remove it.
- Insert the WZU with its wide black pin photo facing into the free space on the WMU, then press the WZU onto the WMU until the module clicks in audibly.

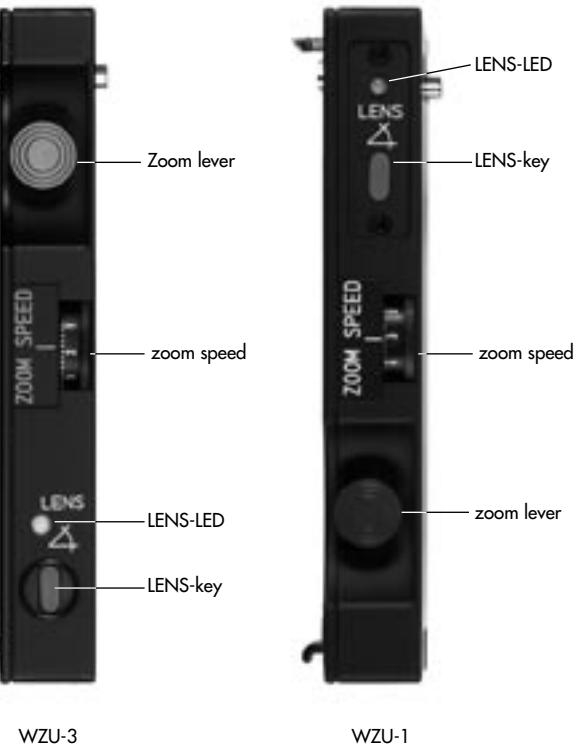
Note: Do not separate the manual control units from each other while switched on, as this could lead to functional errors, e. g. unintentional alteration of lens end stops.

5.1.4.2 Zooming

- Prior to operation, the end stops of the lens must be calibrated (see chapter 5.1.3.6 Calibration).
- Press the zoom lever  in the desired direction.

The focal length will be altered. The greater the force, the faster the zoom will react.





5.1.4.3 Defining the zoom range

For zooming a defined range can be selected and stored.

- Drive the zoom ring to one end of the selected range.
- Press the SET key \leftrightarrow photo, and hold down. The SET LED will flash.
- Drive the zoom ring to the other end of your selected range, and release the SET key. The SET LED will now be illuminated.

When redefining the zoom range, the range can only be smaller. If this is not desired, the zoom range must first be erased and then redefined.

5.1.4.4 Erasing the zoom range

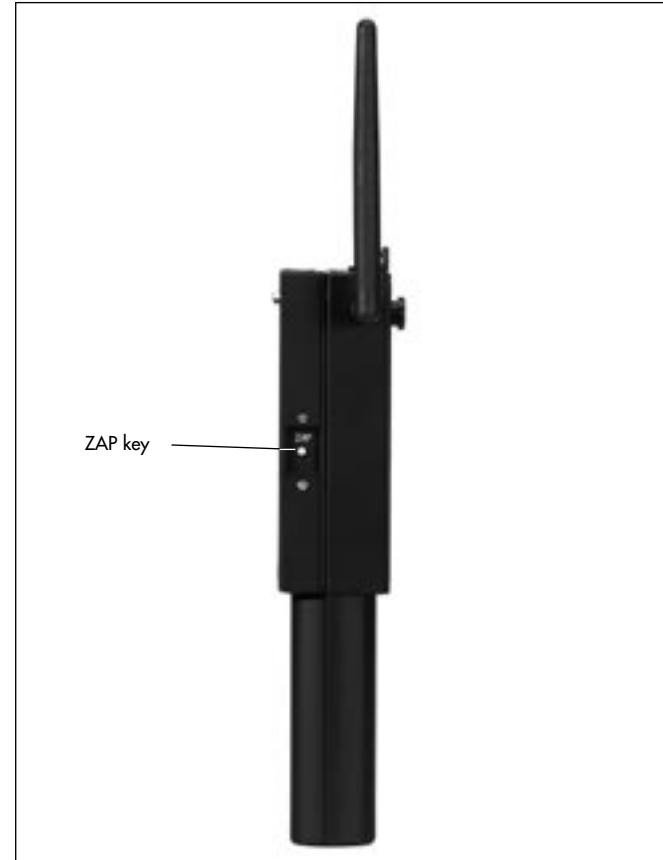
- Press the SET key \leftrightarrow photo and hold down briefly. The SET-LED \leftrightarrow photo switches off.

5.1.4.5 Setting zoom speed

The sensitivity of the zoom lever is pre-selected with the speed wheel  **photo**. At maximum zoom speed (10), a mains supply of 24V and full deflection of the zoom lever, a half turn (180°) takes 1 second. At the slowest speed (1) it takes about 2 minutes (for lenses with 130 mm diameter gear ring). Even slower speeds can be achieved with smaller deflections of the zoom lever.

5.1.4.6 ZAP-Function

- The ZAP key  **photo** switches to maximum zoom speed – independently of the speed wheel setting.





5.1.5 Operating the WFU-1 / WFU-3 (Wireless Focus Unit)

The WFU-3 is a redesign of the WFU-1 and offers additionally the free adjustment of the index marking within a range of 180°. WFU-1 and WFU-3 are fully compatible in their functions and can be attached to all WMUs.

With a WFU, the focus and iris rings can be controlled remotely. It is however also possible to control focus with one WFU and iris with a second WFU. In this case each WFU must be operated with its own WMU, or must be attached to a WMU-3 using the WEB-3 Expansion bracket.

The WFU has two main operating elements: a handwheel with stops and a slider . With the switch on the front side of the WFU it is possible to determine whether focus or iris is to be controlled with the handwheel. The slider then controls the remaining lens ring.

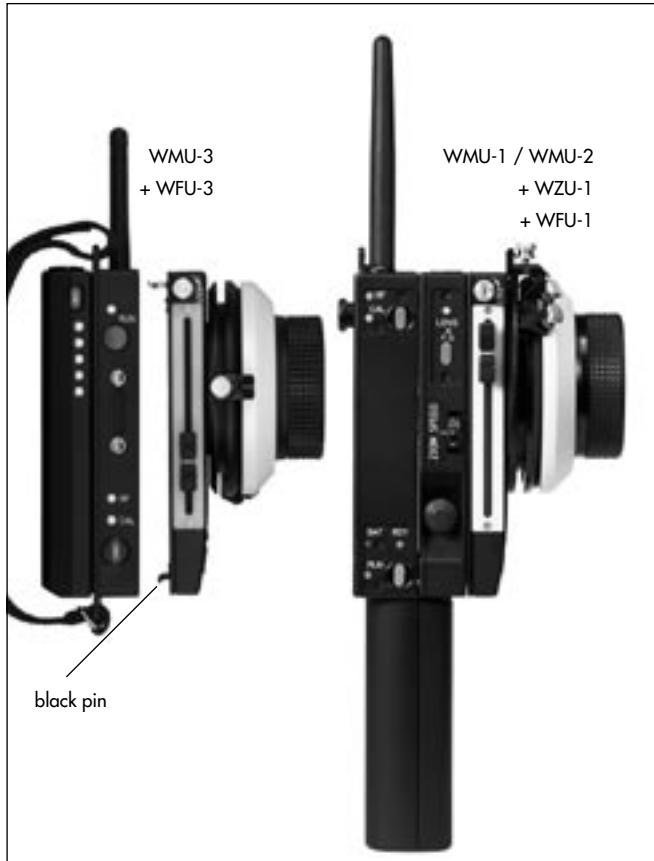
If two WFU units are used for focus and iris, for each WFU a separate WMU, or a WMU-3 with WEB-3 is necessary. Before switching on both WMUs, the WFU switches must be set to different positions. In this case only the two handwheels are used for control; the sliders are deactivated.

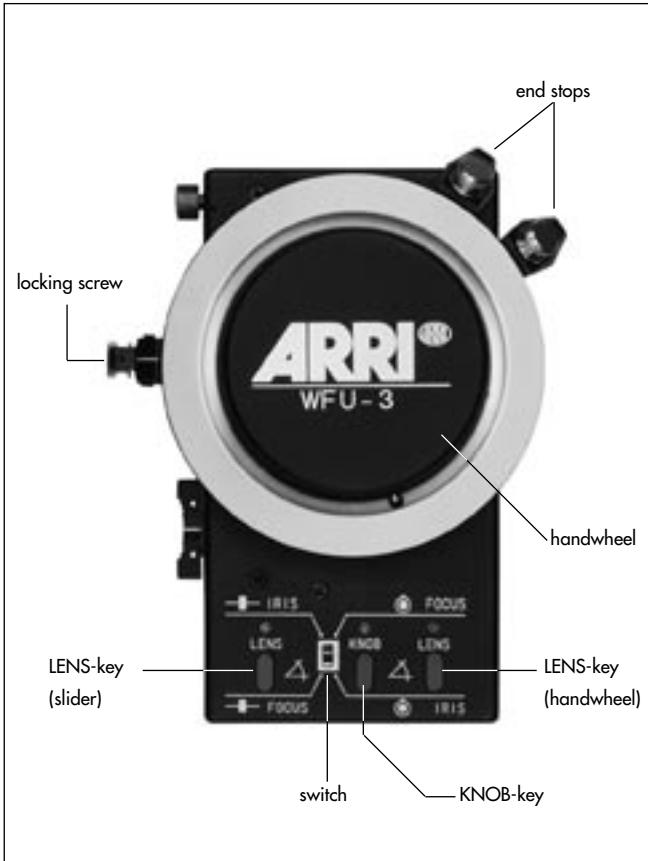
As operating the handwheel and the slider is independent from the particular lens ring (focus or iris), only operation of the handwheel and the slider is described in the following two chapters.

5.1.5.1 Attaching the WFU to the WMU

- Switch off the WMU with the ON key.
- Insert the WFU with its wide black pin facing it  **photo** into the free space on the WMU or on the WZU, then push the WFU onto the WMU or the WZU until the module clicks in audibly.

Note: Do not separate the manual control units from each other while switched on as this could lead to functional errors, e. g. unintentional alteration of lens end stops.





5.1.5.2 Determining whether the handwheel should control focus or iris

- Turn the switch [photo](#) in the middle of the operating field of the WFU to the desired position.
To operate focus with the handwheel, push the switch in the direction of the rotary knob.

5.1.5.3 Operating the handwheel on the WFU

- Prior to operation, the end stops of the used lens must be calibrated (see chapter 5.1.3.6 Calibration).

Focus or Iris Adjustment

- Adjust the handwheel [photo](#) of the WFU.

The lens ring follows the handwheel adjustment very precisely and smoothly.

When quickly turning the handwheel, focus and iris adjustment follows with the maximum speed of the lens control motors (at 12V the maximum adjustment speed is lower).

Fixing the Handwheel in Position

To prevent unintentional moving of the handwheel – only on the WFU-1 – it can be fixed in its position.

Note: On the WFU-3 the locking screw is used to lock the index mark in its position. The locking screw no longer locks up the entire handwheel.

- To fix in position, turn the locking screw on the WFU-1  clockwise.
- To loosen, turn the locking screw anti-clockwise.

Adjusting the Index Mark on the WFU-3

This function is only available with the WFU-3.

- To adjust the index mark on the WFU-3, unlock the locking screw  anti-clockwise. Now the index mark can be freely adjusted within a range of 180°. This way it can be oriented on the side of the WFU-3 to enable precise reading.
- Fix the index mark by turning the locking screw clockwise.

Defining the Adjustment Range of the Lens

For each ring on the lens controlled by the LCS, a setting range can be defined and stored. The smaller this range, the more precisely setting can be carried out.

With the corresponding control unit (handwheel or slider), set the range as follows:

- Drive to the beginning of the selected range by adjusting the handwheel.
- Press the LENS key and hold down
 - LENS-LED  flashes.
- Drive to the end of the selected range by adjusting the handwheel.
- Release the LENS key
 - LENS-LED illuminates.

Note: With the WMU-3 it is not necessary to hold down the LENS key while adjusting the other end of the range. The end of the range is stored by pressing the LENS-key a second time. To erase the programmed range on the WFU press the LENS-key another time.



The selected operating range must cover at least 2% of the entire lens range. Otherwise the setting will have no effect.

Erasing the Setting Range

- Press the LENS key  and hold down briefly
 - LENS-LED switches off.

Matching the Scale Range to the WFU

On the focus scale disk of the WFU a scale range can be selected by marking as desired. Previously marked focus disks can be used, e.g. from mechanical follow-focus devices.

For each WFU the scale range is aligned to the stored setting range of the lens ring as follows:

- With the mechanical end stops  of the handwheel, set the limits of the desired scale range and fix them.
- Turn the handwheel to the first end stop.
- Press the KNOB key  and hold down
 - KNOB-LED flashes.
- Turn the handwheel to the second end stop and release the KNOB key
 - KNOB LED illuminates.

Note:

With the WMU-3 it is not necessary to hold down the KNOB-key while moving to the other end-stop. The other end-stop can be programmed by pressing the KNOB-key a second time in the desired position. To erase the programmed range press the KNOB-key another time.



The set scale range must be at least 30° on the handwheel. Otherwise the setting will have no effect.

Erasing the Scale Range

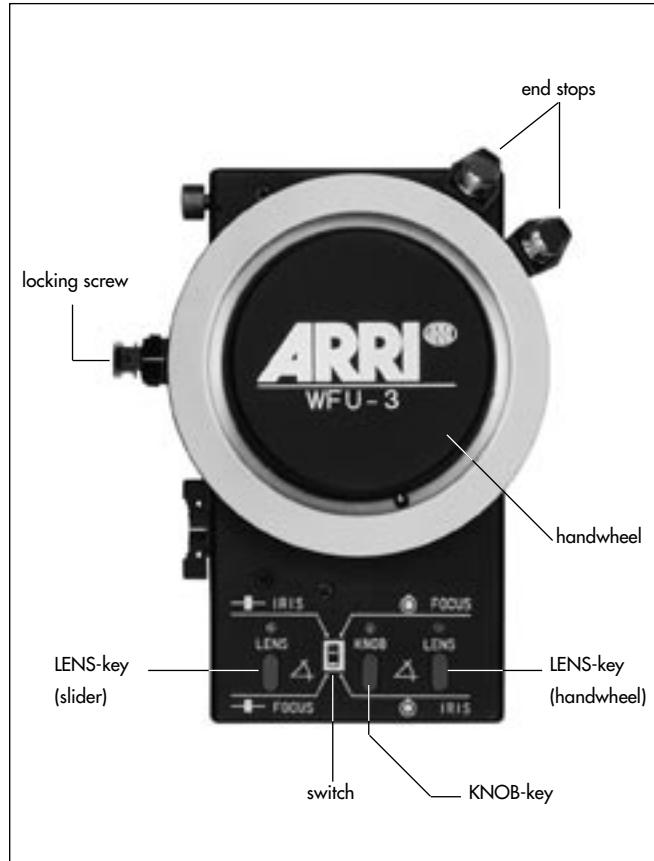
- Press the KNOB key and hold down briefly
 - KNOB-LED switches off.

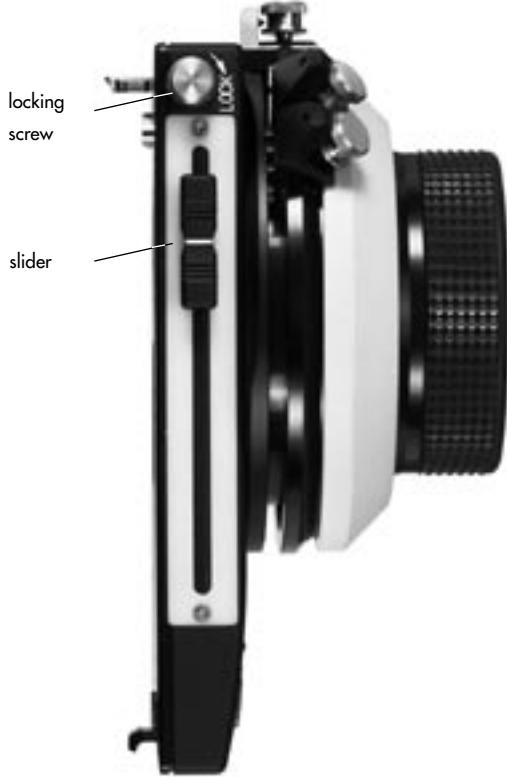
Using Scales from Mechanical Follow-Focus Devices

If a focus disk is firstly to be marked on a mechanical follow-focus device and then used on the WFU, it must be set up on the follow-focus device as follows:

- Turn the handwheel on the follow-focus device clockwise to the lens end stop.
- Move the index indicator of the follow-focus device to the disk-positioner pin.
- Fix the index indicator in this position.
- Mark the scale.

Scales marked in this way can be used for LCS focus-iris operation. Match the scale ranges as described above.





5.1.5.4 Operating the slider on the WFU

- Prior to operation, the end stops of the used lens must be calibrated (see chapter 5.1.3.6 Calibration).

Focus or Iris Setting

- Shift the slider of the WFU.

The lens ring follows the sliding switch adjustment very precisely and smoothly.

When moving the slider very quickly, focus and iris adjustment follow at maximum speed (at 12V the maximum speed is lower).

Fixing the Slider in Position

To prevent unintentional moving of the slider, it can be fixed in position.

- Turn the locking screw clockwise to fix in position.
- Turn the locking screw anti-clockwise to release.

Defining The Lens Setting Range

For each ring of the lens controlled by the LCS, a setting range can be defined and stored. The smaller the setting range, the more precisely setting can be carried out.

With the corresponding control unit (handwheel or slider) the range can be set as follows:

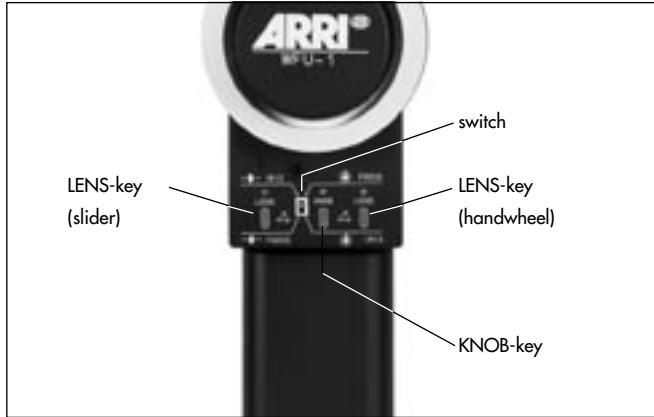
- Drive to the beginning of the selected range by adjusting the slider (handwheel).
- Press the LENS key and hold down
 - LENS-LED  photo flashes.
- Drive to the end of the selected range by adjusting the sliding switch.
- Release the LENS key
 - LENS-LED illuminates.



The selected operating range must cover at least 2% of the entire lens range. Otherwise the setting will have no effect.

Erasing the Setting Range

- Press the LENS key and hold down briefly
 - LENS-LED switches off.





5.1.6 WRC-1 (Wireless Remote Control)

The WRC-1 enables the user to remotely control

- the camera speed,
 - the shutter angle of the mirror shutter, and
 - the aperture of the lens (iris),
- providing a wide range of compensation options for constant exposure.



WRC-1 and LDD-FP can not be operated together on the same WMU-3



WZU-1 and WZU-3 can not be attached and operated between the WMU and the WRC-1.

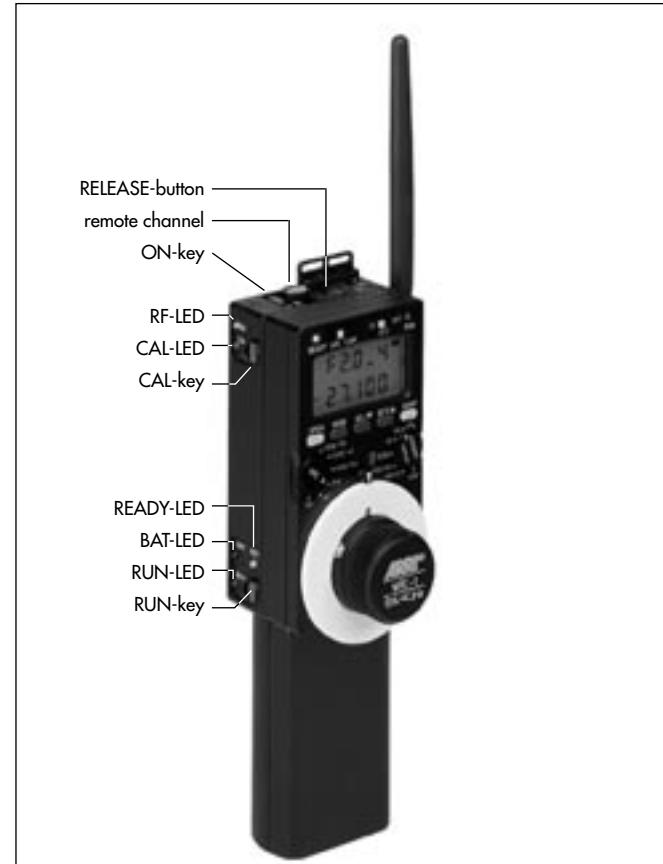
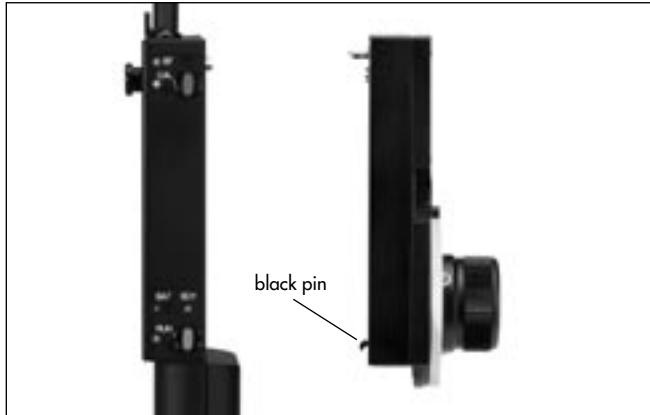
Note: Software version 1.08 or newer is necessary to operate with the WMU-2, WMU-3, URM-2, URM-3, LDB-ST-2 and LDB-LT-2.

The WRC-1 can be connected to all Wireless Main Units. Using the WHA-1 on the ARRIFLEX 435, or the WHA-2 or WHA-3 on the ARRICAM or ARRIFLEX 435 Advanced it can be used in a hardwired configuration.

- Switch off the WMU with the ON key.

- To detach another unit if attached, press the RELEASE-button  **photo**, swing away the other unit and pull up to remove it.
- Insert the WRC-1 with its wide black pin  **photo** facing into the free space on the WMU, then press the WRC-1 onto the WMU until the module clicks in audibly.

For the operation of the WRC-1 please refer to the respective instruction manual (K2.43660.0 German or K2.43668.0 English).



Operation



5.1.7 LDD-FP (Lens Data Display for the Focus Puller)



For wireless configurations the LDD-FP can only be used attached to a WMU-3. The LDD-FP is not compatible with the WMU-1 or WMU-2.



To operate the LDD-FP with an ARRICAM a Lens Data Box and LDS-compatible lenses are necessary.



To operate the LDD-FP with an ARRIFLEX 435 Advanced a FEM-2 and LDS-compatible lenses are necessary.



WZU-1 and WZU-3 must not be attached between the WMU-3 and the LDD-FP.

The LDD-FP is a small and lightweight Lens Data Display showing important lens informations and camera status. It can be configured to show focus, zoom and iris scale and the camera status in any combination. The LDD-FP graphically shows depth of field, and allows for the setting, displaying and storage of focus marks. Because of its small size it can be mounted in many ways, allowing the assistant to see precise lens and camera information while keeping an eye on the action.

- Switch off the WMU-3 with the ON key.
- To detach another unit if attached, press the RELEASE-button , swing away the other unit and pull up to remove it.
- Insert the LDD-FP with its wide black pin facing into the free space on the WMU, then press the LDD-FP onto the WMU-3 until the module clicks in audibly.

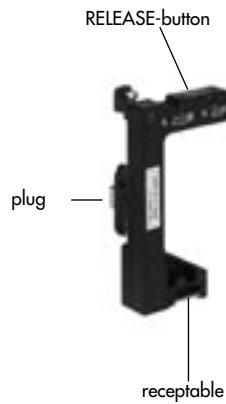
For the configuration and operation of the LDD-FP please see the instruction manual of the ARRICAM (K5.58508.0).

The cable LDDFP-RDO (0.6m/2ft) connects the LDD-FP to the Studio Readout or to the Lite Mask Frameglow. With cable LDDFP-CAC (1.5m/5ft) the LDD-FP can be connected to the CAC connectors of Studio or Lite. For remote operation it can be connected to the ARRICAM Remote Control Station (K2.54143.0) with cable LDDFP-RDO.



Do not use the LDDFP-CAC cable with the cable drum.

Operation



WEB-3



WBU-3 + WMU-3 + LDD-FP + WEB-3 + WFU-3



WBU-3 + WMU-3 + WRC-1 + WEB-3 + WFU-3

5.1.8 WEB-3 (Wireless Expansion Bracket)

The WEB-3 can only be attached to the WMU-3.

The Wireless Expansion Bracket WEB-3  is mounted on the side of the WMU-3 and allows the attachment of up to 3 ARRI control units on one WMU-3. The following combinations are possible:

- LDD-FP and WFU-1 or WFU-3
- LDD-FP and WZU-1 or WZU-3
- LDD-FP and WFU1 or WFU-2 and one WZU-1 or WZU-3
- LDD-FP and WFU-1 or WFU-3 and ZMU-3
- Two WFU-1 or WFU-3
- Two WFU-1 or WFU-3 and one WZU-1 or WZU-3
- Two WFU-1 or WFU-3 and ZMU-3
- WRC-1 and WFU-1 or WFU-3
- WRC-1 and WFU-1 or WFU-3 and ZMU-3
- WRC-1 and WFU-1 or WFU-3 and one WZU-1 or WZU-3

Note: The LDD-FP and the WRC-1 are using the same interface, therefore simultaneous operation of both units on one WMU-3 is not possible.

- Connect the WEB-3 with the plug  to the socket on the right side of the WMU-3. Do not use force.
- Fasten the WEB-3 using the two screws .
- Insert the desired module with its wide black pin  facing into the free space on the WEB-3, then press the module onto the WEB-3 until the module clicks in audibly.
- To detach another unit if attached, press the RELEASE-button .

Operation



WZB-3

ZMU-3 + WZB-3 + WMU-3 + WFU-3 + WEB-3

ZMU-3 + WZB-3 + WMU-3 + LDD-FP+ WEB-3 + WFU-3

5.1.9 WZB-3 (Wireless Zoom Bracket)

The WZB-3 can only be used on the WMU-3.

The expansion module WZB-3 is mounted on the WMU-3 and allows for the mechanical attachment of the ZMU-3. To connect the ZMU-3 electrically, the cable KC-105 (K2.65036.0) is needed.

- Mount the WZB-3 to the WMU-3 with the two allen screws  **photo**.
- Mount the ZMU-3 by using the knurled screw  **photo**.
- Plug in the cable KC-105 (K2.65036.0)  **photo** on the ZMU-3 and the WMU-3.



5.1.10 Operating several units



The radio modems of the "-1" series units are not compatible with the radio modems of the "-2" and "-3" units. Compatible are:

- URM-1 with the WMU-1 and LDB-ST / LDB-LT, or
- URM-2 / URM-3 with the WMU-2, WMU-3 UMC-3 and LDB-ST-2 / LDB-LT-2.

Only compatible units can be used to be operated together to control one lens with several units.

If a lens is to be remotely operated by several units (several WMUs), the following applies:

If two WFUs are active and if their selector switches are set to different positions, on both units only the rotary knob is active for the selected lens ring. Both sliders on the units are deactivated, and the sequence in which they are switched on has no effect.

As a maximum, three WMUs can be operated per remote channel.

5.1.11 Radio Unit accessories

In order to further reduce the weight to be held in the hand, it is possible to fasten the WMU-1 to your belt. An extension WEU-1 (Wireless Extension Unit) between the WMU and the manual control units WFU and WZU is available.

The extension WEU-1 [photo](#) (Ident-No. K2.52056.0) consists of:

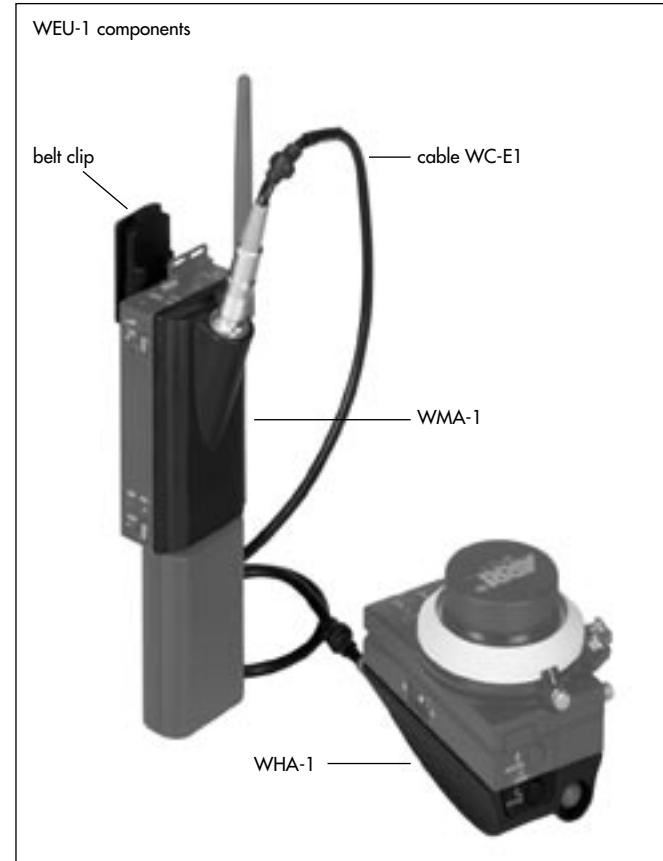
The attachment piece for the manual controls WHA-1 [photo](#) (Wireless Handgrip Attachment) (Ident-No. K2.52070.0).

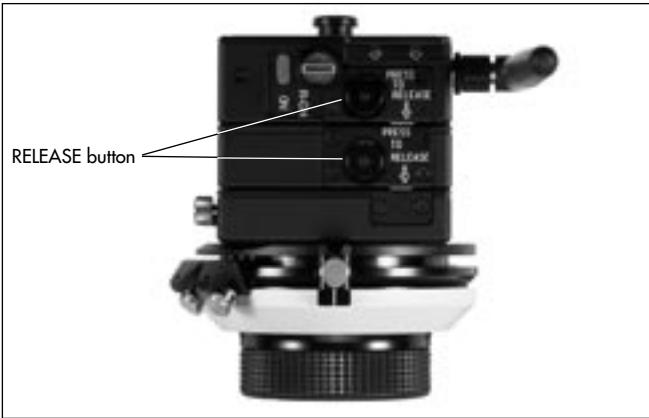
The attachment piece for the main unit WMA-1 [photo](#) (Wireless Main Attachment) (Ident-No. K2.52071.0).

The extension cable WC-E1 (1m) [photo](#) (Ident-No. K4.52336.0).

A longer cable WC-E2 (3m) is also available (Ident-No: K2.52084.0).

Note: An alternative configuration connects the WEU-1 to WZU which is attached to the WMU. The WHA-1 of the WEU-1 is then connected to a WFU enabling zoom and focus to be controlled separately by two persons.





The LDD-FP can not be used with the WHA-1, WHA-2 or WHA-3. The WHA-2 and the WHA-3 are not compatible with the UMC-1.

Attaching the Extension WEU-1

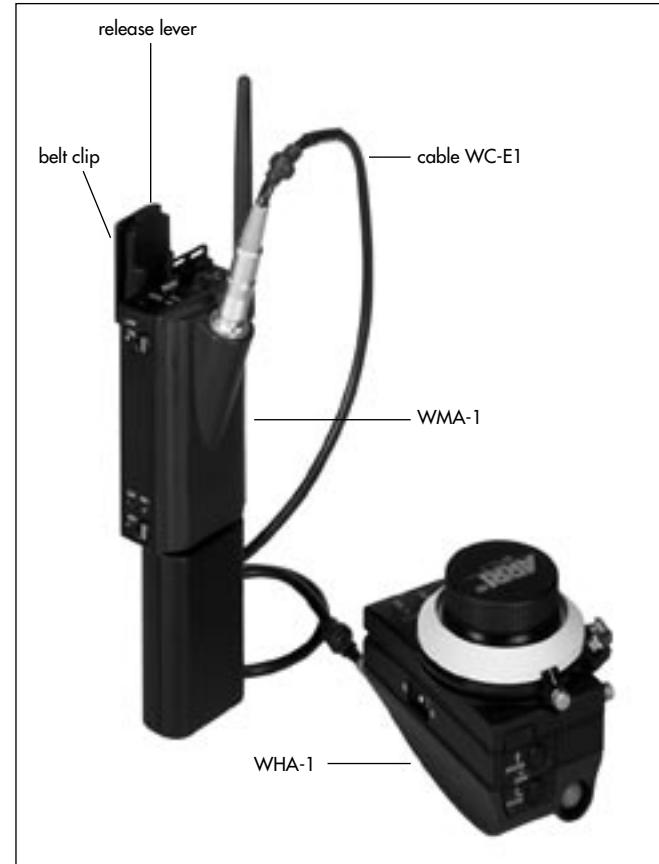
- Switch off the WMU with the ON key.
- To detach a WFU, press the RELEASE button , swing away the WFU and then pull upwards to remove it.
- Insert the WMA-1 (Wireless Main Attachment) with the wide black pin facing into the free space on the WMU or WZU, then press the WMA-1 onto the WMU or WZU until the module clicks in audibly.
- Insert the WZU or the WFU with its wide black pin facing into the free space of the Wireless Handgrip Attachment WHA, then press the WZU or WFU onto the WHA until the module clicks in audibly.
- Connect the two attachment pieces WHA and WMA-1 to each other with a cable WC-E1  or WC-E2.

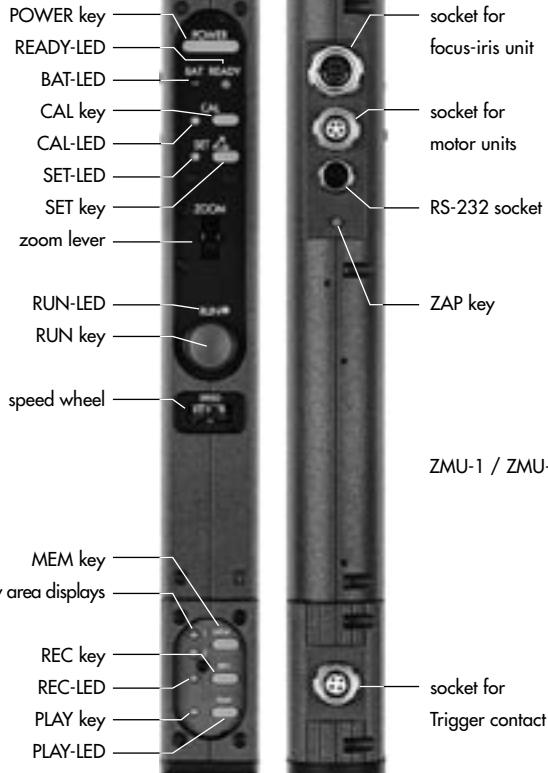
- Clip the belt clip  onto your trousers belt and clip the pin on the WMU into the belt clip.



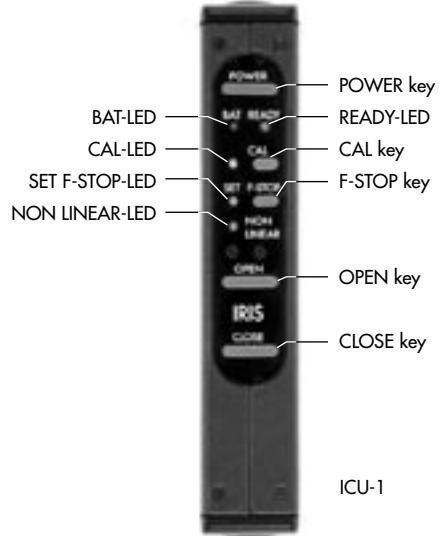
Check that the WMU is fastened securely to your belt!

- To release the WMU, press the release lever  on the belt clip and pull the WMU with its attachment pin out of the holder.

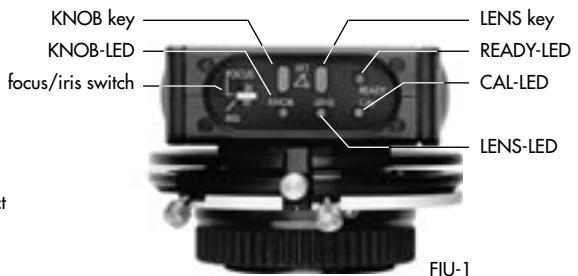




ZMU-1 / ZMU-2



ICU-1



FIU-1

5.2 Remote Control via Cable

5.2.1 Manual control units for remote control via cable

For remote control of the lens via cable either a ZMU-1, ZMU-2 or ZMU-3 (Zoom Main Unit) is necessary as a main unit, or a WHA-2 / WHA-3 with a FEM-2 on the ARRIFLEX 435 Xtreme/Advanced or a Lens Data Box on the ARRICAM can be used.

5.2.2 Operating the ZMU-1 / ZMU-2 (Zoom Main Unit)

5.2.2.1 Switching on



To use CLM-2 motors the ARRICAM must be equipped with a Lens Data Box, and the ARRIFLEX 435 Xtreme/Advanced must be equipped with a FEM-2



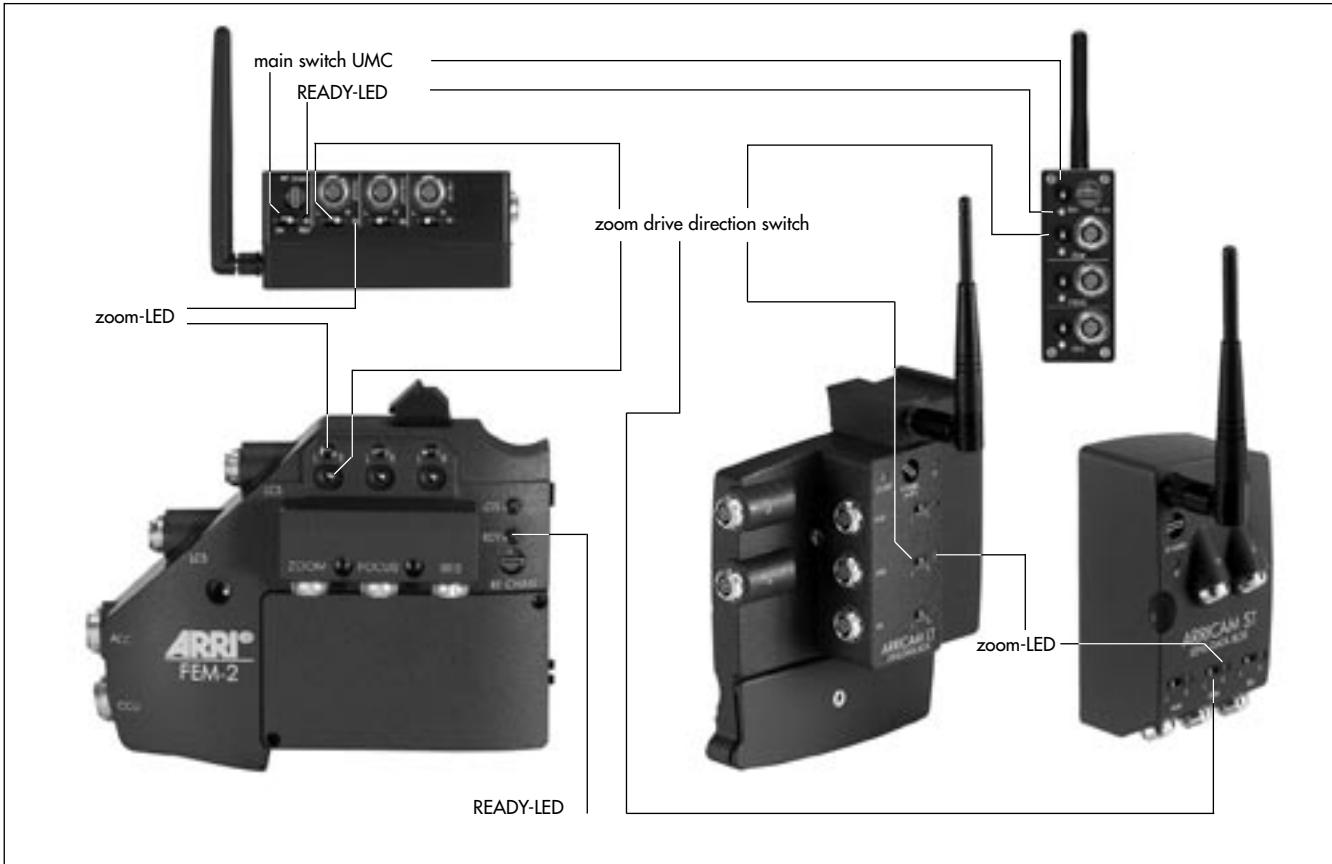
An ARRIFLEX 435 Xtreme/Advanced must not be connected with the following cables: LC-S1, LC-S2, LC-S3, LC-A1, LC-A2, LC-A3, LC-C1, LC-C2.

- Before switching on, ensure that
 - the support rods are securely fastened to the camera,
 - the motor unit is securely fastened to the support rods,
 - the motor drive gear engages the lens gear ring with as little play as possible.
- If a Universal Motor Controller UMC is to be used, switch its main switch to ON. If an ARRICAM or an ARRIFLEX 435 Xtreme/Advanced is used, switch on the camera.
- Switch on the power supply with the POWER key on the Zoom Main Unit ZMU.

Note: If the Universal Motor Controller UMC, an ARRICAM or an ARRIFLEX 435 Xtreme/Advanced is switched off and on again, the ZMU must also be reset by switching off and on.

Note: Wireless units can also be directly connected using the WC-A3 cable.

Operation



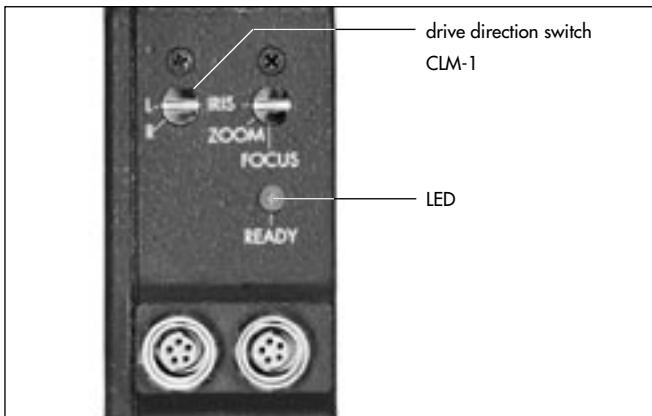
The READY-LEDs on the ZMU \Rightarrow photo and the motor unit CLM-1 or the UMC, ARRICAM or ARRIFLEX 435 Xtreme/Advanced briefly illuminate red, then the READY-LED on the ZMU displays the status of the LCS:

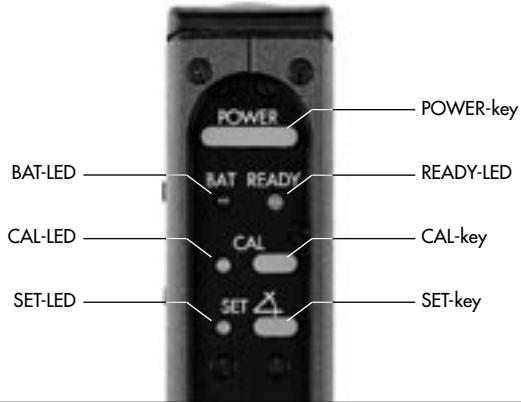
green	LCS is ready for operation
red	operating error on one unit (e.g. incorrect key pressed, ZMU switched on before UMC /ARRICAM / ARRIFLEX 435 Xtreme/Advanced) or power cable LC-S1 defective (see also chapter 7. Trouble-Shooting)
flashing red	selector switch on the motor unit is incorrectly set or connected to the incorrect socket of the UMC, FEM-2 or on the LDB of the ARRICAM motor unit is not connected cable defective (see also chapter 7. Trouble-Shooting)

Note: The LEDs on the CLM-1 \Rightarrow photo or the UMC, FEM-2 or the LDB \Rightarrow photo flash green if the lens is at the end of the set operating range.

- Then press the CAL key \Rightarrow photo on the ZMU to calibrate the motor end stops.

- Select the desired drive direction of the zoom adjustment with the drive direction switch on the CLM-1 motor \Rightarrow photo unit or on the zoom socket on the UMC, FEM-2 or the LDB \Rightarrow photo.





5.2.2.2 Resuming operation after a break with power down

If a lens ring was moved manually while the LCS was switched off, the stored values for the lens end stops will no longer be correct. So:

- Switch on the LCS and recalibrate.

5.2.2.3 Battery Control (BAT)

When the battery control LED (BAT) on the zoom unit flashes, replace the battery.



Do not start any new scenes!

- If the battery control LED flashes, replace the battery immediately (danger of completely discharging the battery).

The battery control reacts to the following voltage limits:

Battery	BAT-LED	Voltage
24V	illuminated	<20V
	flashing	<18V
12V	illuminated	<10V
	flashing	<9V

5.2.2.4 Calibration

The end stops of the lens rings are defined and stored during the automatic calibration process to prevent driving the lens ring up against the lens' end stops. Previously set values are thereby erased.

Calibration must be carried out

- during initial set-up
- after a lens change
- after the lens control ring has been manually moved while the units were disconnected from the power, e.g. after an extended break
- after the motor drive gear has been removed from the lens control ring.

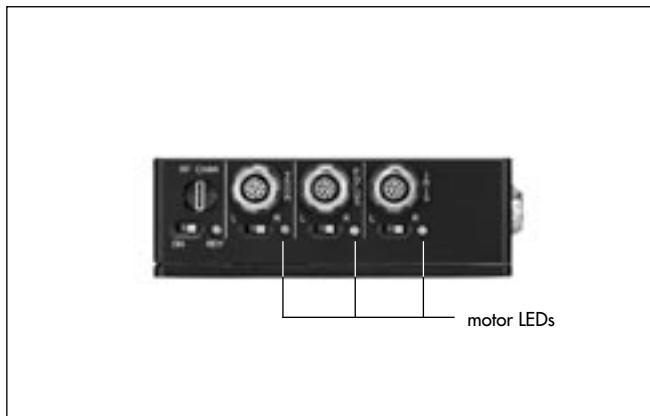
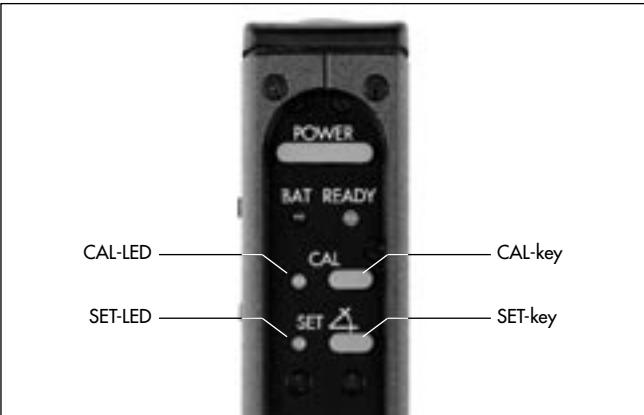
- To calibrate on the ZMU, press the CAL key .

While the LCS is calibrating, the CAL-LED  on the ZMU is illuminated yellow, the motor LEDs on the UMC, the FEM-2 or the LDB  flash red/green.



The CAL-LED flashes:

Lens end stops not yet defined, or the lens has been moved while the LCS was switched off and then driven against the end stops. Recalibrate!





5.2.2.5 Zooming

- Turn the zoom lever \diamond photo in the desired direction. The focal distance will be altered. The greater the deflection, the faster the zoom will react.

5.2.2.6 Defining the zoom range

For focal length adjustment, a defined range can be selected and stored.

- Drive the zoom control ring to the beginning of the selected range.
- Press the SET key \diamond photo, and hold down. The SET-LED \diamond photo will flash quickly.
- Drive the zoom control ring to the end of the selected range, and release the SET button. The SET-LED will now be illuminated.

When redefining the zoom range, the range can only be smaller. If this is not desired, the zoom range must first be erased and then redefined.

5.2.2.7 Erasing the zoom range

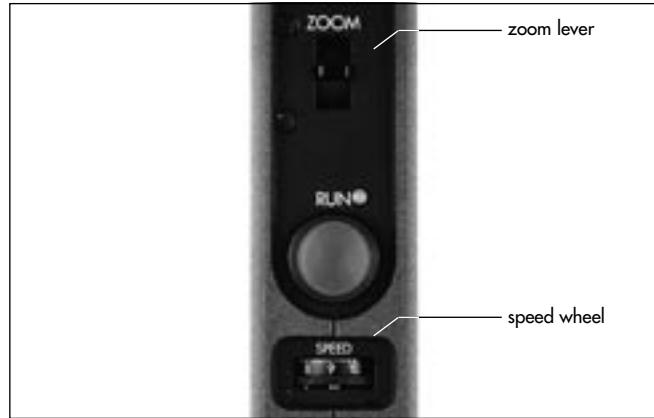
- Press the SET key \diamond photo and hold down briefly. The SET-LED \diamond photo switches off.

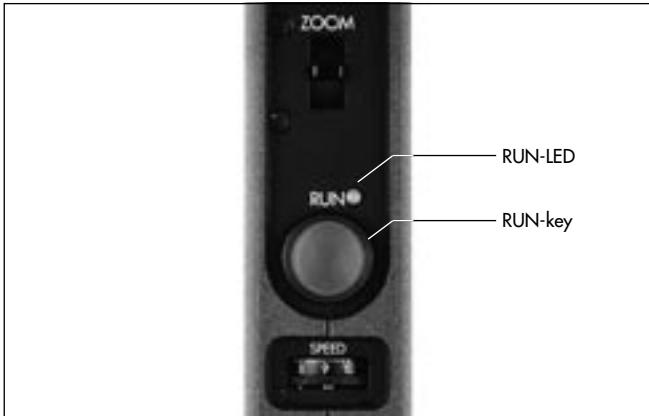
5.2.2.8 Setting zoom speed

The sensitivity of the zoom lever is pre-selected with the speed wheel  photo. At maximum zoom speed (10), a mains supply of 24V and full deflection of the zoom lever, a half turn (180°) takes 1 second. At the slowest speed (1) it takes about 2 minutes (for lenses with 130 mm diameter gear ring). Even slower speeds can be achieved with smaller deflections of the zoom lever.

5.2.2.9 ZAP-Function

The ZAP-key  photo switches to maximum zoom speed – independently of the speed wheel setting.





5.2.2.10 Camera RUN

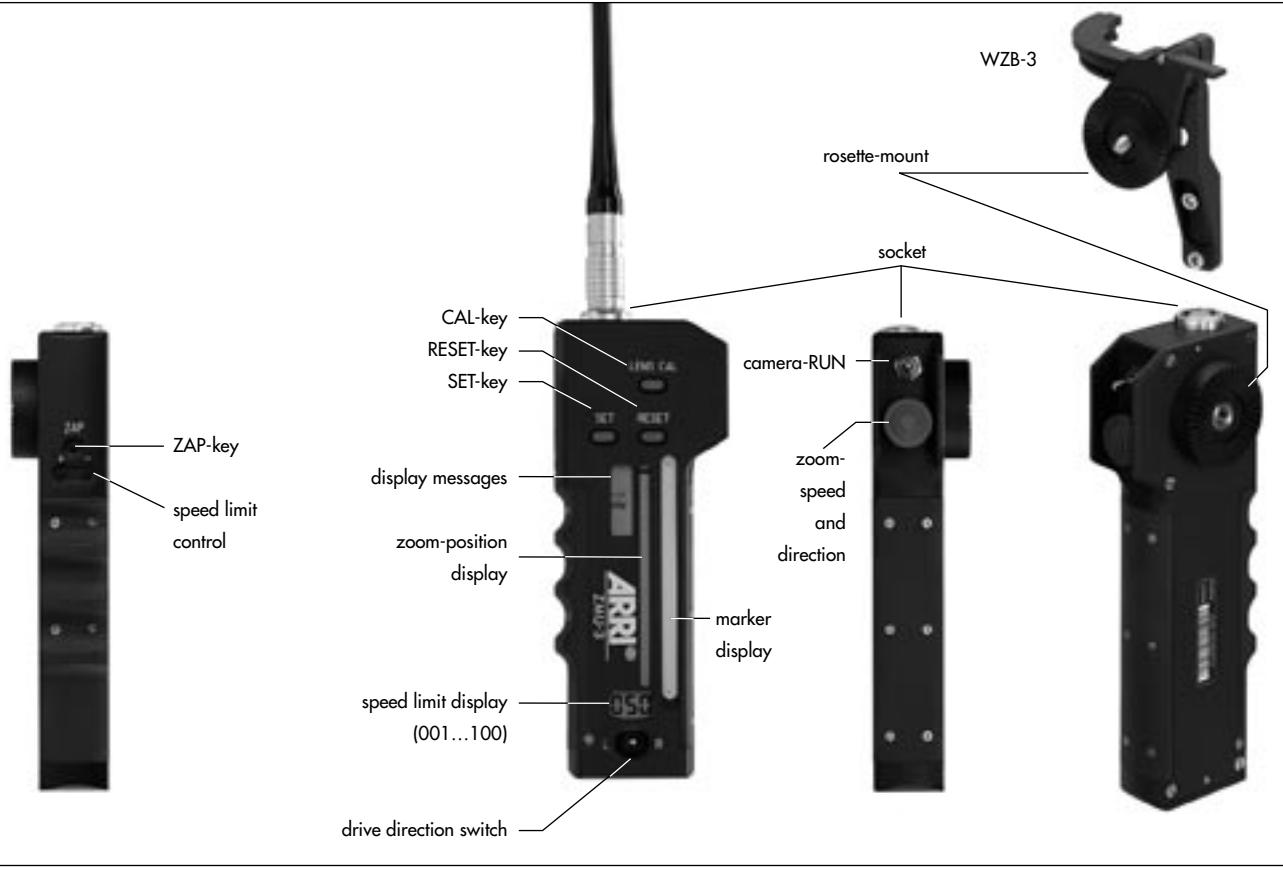
- To start or stop the camera:
Press the RUN key **photo**.

The RUN-LED **photo** is illuminated green while the film is running.

During REMOTE-RUN operation with the ARRIFLEX 35 BL, 35 III and 16 SR II, the camera can only be stopped with the key with which it was started.

Note: While the camera is running, the UMC and the ZMU-1 cannot be switched off.

Operation



5.2.3 Operating the ZMU-3 (Zoom Main Unit)

5.2.3.1 Switching on

Operating with a CLM-2 motor:

The ZMU-3 can be connected directly with the Y-cable KC-91S (K2.65008.0) to a CLM-2 Motor and the RS-socket. The power will be supplied through the RS-socket.

Operating on the LCS bus:

The ZMU-3 can be connected to the UMC, FEM-2 or the LDB-ST/LT with the cables KC92-S (K2.65009.0) or KC93-S (10m) (K2.65010.0).



*The ARRIFLEX 435 Advanced or the ARRIFLEX 435 Xtreme must not be connected with the following cables:
LC-S1, LC-S2, LC-A1, LC-A2, LC-A3, LC-C1, LC-C2.*

- Switch on the UMC if used. Switch on the ARRICAM or ARRIFLEX 435 Xtreme/Advanced if used.

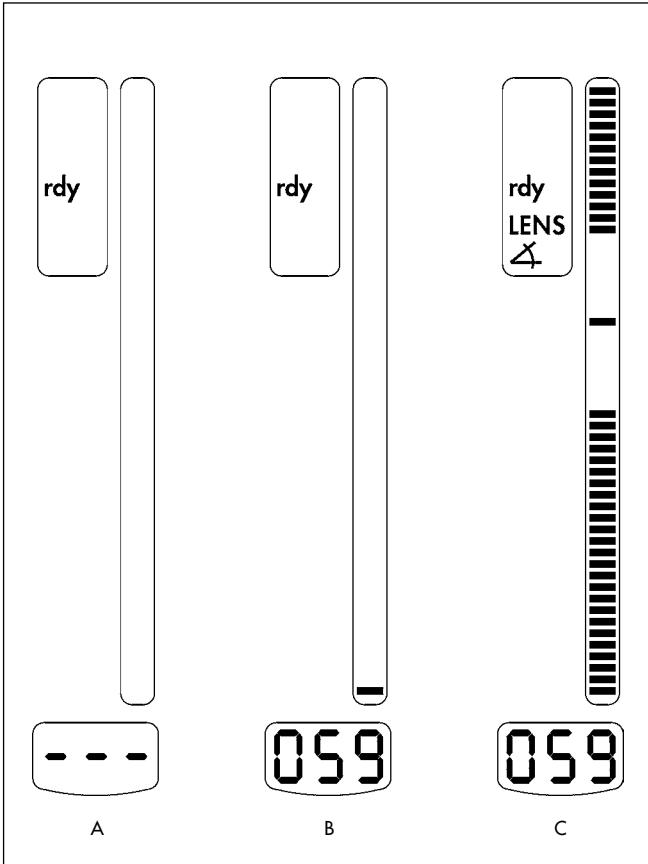
Operating wirelessly:

The ZMU-3 can be connected to the WMU-3 with the cable KC-105 (K2.65036.0) to allow for wireless operation.

Note: Software version 1.02 or above is necessary for wireless operation of the ZMU-3 with all display functions.

- The ZMU-3 can be mounted to the WMU-3 by using the Wireless Zoom Bracket WZB-3 [photo](#).





5.2.3.2 Switching on

- Before switching on, make sure that
 - the support rods are securely fastened to the camera
 - the motor units are securely fastened to the support rods
 - and the motor drive gear engages the lens gear ring with as little play as possible.

After connecting to the RS/LCS socket three lines briefly flash up in the speed display ([photo A](#)).

The zooming speed previously used is then shown on the display. The status display indicates ready with the rdy display ([photo B](#)).

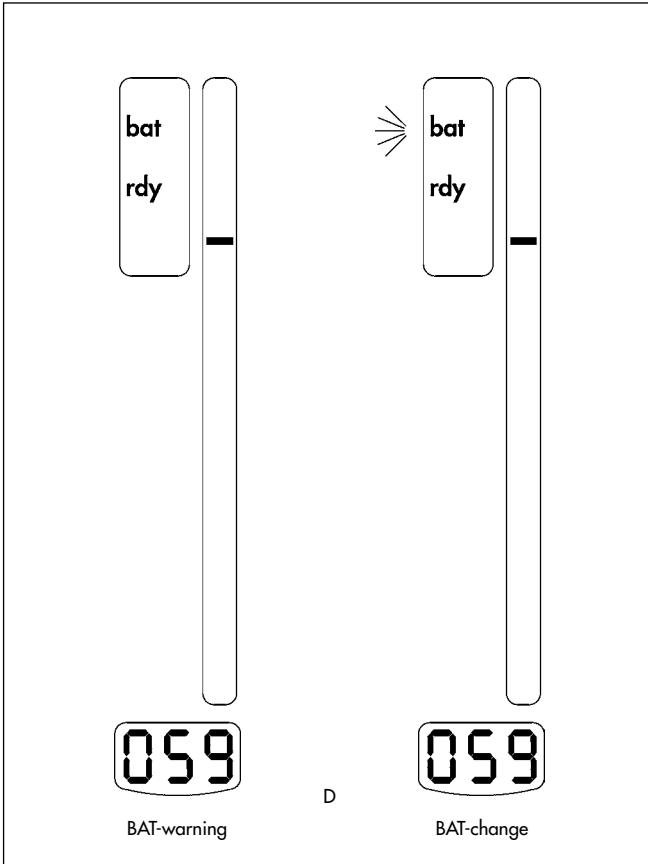
In case a zoom range was previously stored this is now shown on the marking display ([photo C](#)).

Note: In wireless operation the zoom range must be executed one time in order to show up on the display.

- The lens motors must be calibrated in case this have not been done before, or the lens settings have been changed while switched off. Press the CAL-key on the ZMU-3  to calibrate the end-stops.
- Select the desired drive direction with the drive direction switch on the ZMU-3 .

Note: If operated together with a FEM-2/UMC/LDB the drive direction can as well be selected on these units.





5.2.3.3 Battery control (BAT)

An illuminated or flashing BAT symbol on the status display of the ZMU-3 indicates that the battery must be exchanged or recharged (⇒ photo D).



Do not begin any new takes!

The BAT sign signals the following voltage levels:

Operating mode	BAT Symbol	Voltage
24V	illuminated	<21V
12V	illuminated	<10V
7.2V (wireless)	illuminated	<6.8V
	flashes	<6.3V

5.2.3.4 Calibration

The end stops of the zoom ring are defined and stored during the automated calibration process in order to prevent driving the lens ring up against the lens' end stops. Previously set values are thereby erased.

Calibration must be carried out

- during initial set-up,
 - after a lens change,
 - after the lens ring has been manually moved while the units were disconnected from the power, e.g. after an extended break
 - after the motor drive gear has been removed from the lens control ring.
- Press the CAL-key  **photo** on the ZMU-3 to start the calibration process.

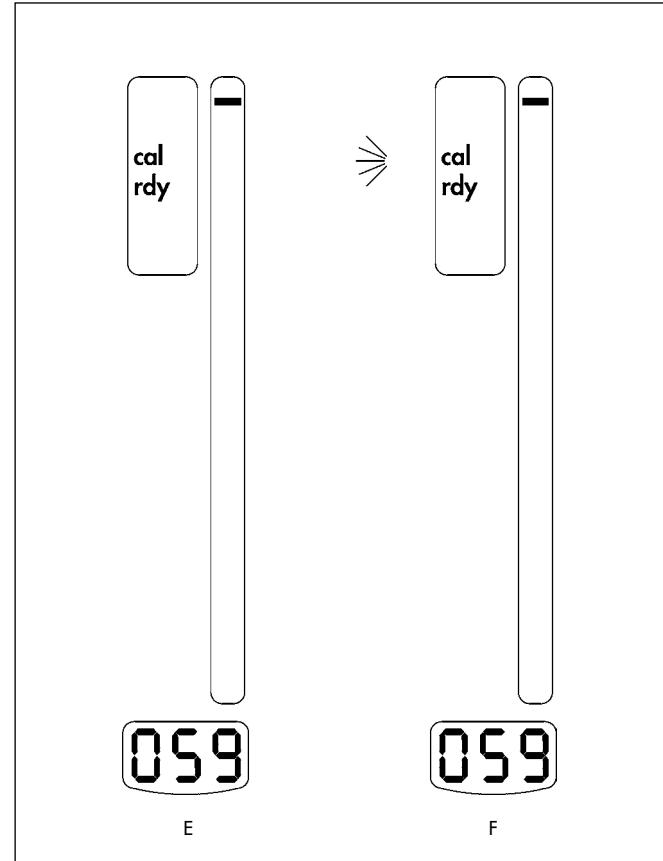
During calibration the CAL-symbol is illuminated on the display ( **photo E**).

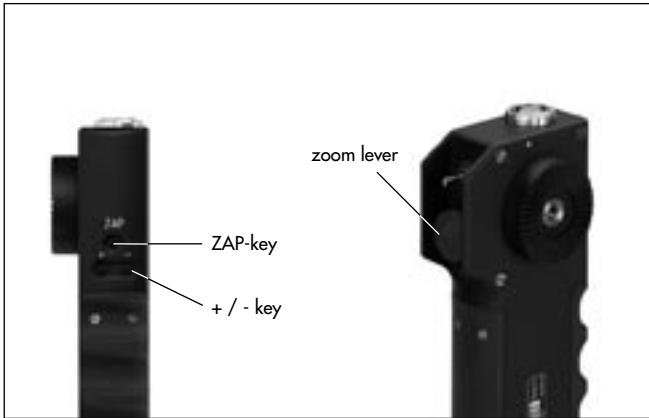


The CAL symbol flashes:

Lens end stops are not yet defined, or the lens has been moved while the LCS was switched off and then driven against the end-stops.

*Recalibrate! ( **photo F**)*



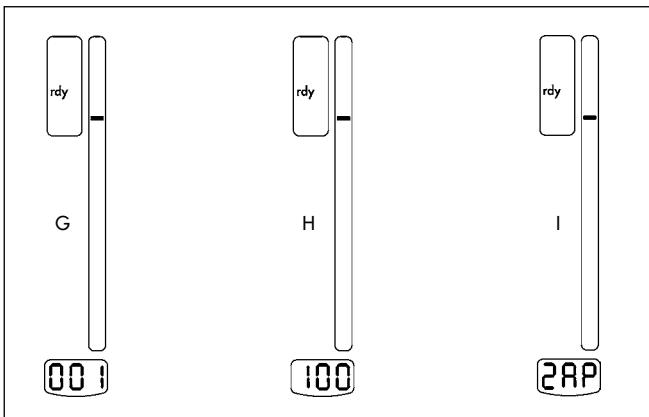


5.2.3.5 Zooming

- Press the zoom lever in the desired direction. The focal length will be altered. The greater the force, the faster the zoom will react.

5.2.3.6 Setting zoom speed

The sensitivity of the zoom lever (zoom speed) can be adjusted and is indicated on the speed display of the ZMU-3. The smaller the value the lower the maximum zoom speed will be.



- The + and - keys on the ZMU-3 are used to set the zoom speed. Pressing the +/- key briefly will change the speed setting in increments of 1, pressing the keys longer will alter the speed in increments of 10. The zooming speed can be set within a range between 1 and 100 (G, H).

5.2.3.7 ZAP-function

- The ZAP key switches to maximum zoom speed – independently of the speed setting. The display indicates ZAP.

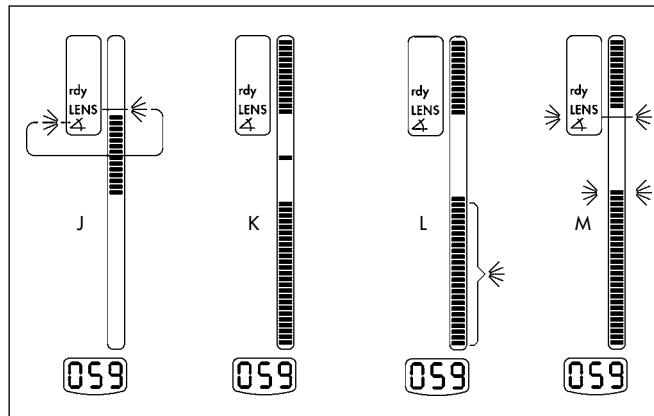
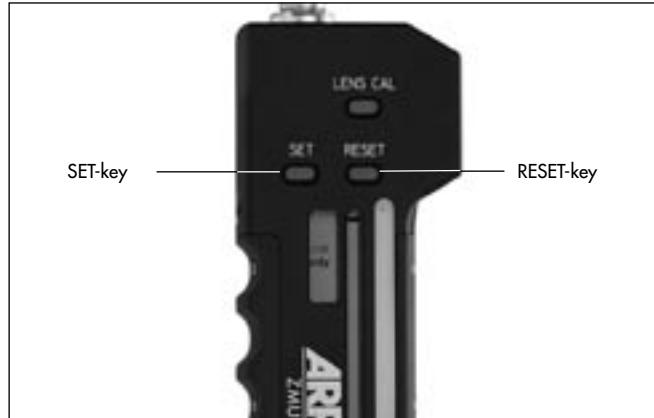
5.2.3.8 Defining the zoom range

For zooming a defined range can be selected and stored.

- Drive the zoom ring to one end of the selected range.
- Press the SET-key and hold down. LENS and ANGLE symbol are flashing (photo J).
- Drive the zoom ring to the other end of your selected range and release the SET-key. LENS and ANGLE symbol will now be illuminated. The zooming range is indicated on the marker display (photo K).
- If one end stop is reached (zooming lever not pressed) the complete bar of the marker display flashes towards the end of the reached range (photo L).
- If one of the defined end stops is reached while zooming (zooming lever is pressed), the LENS and ANGLE symbol and the position marker are flashing (photo M).

5.2.3.9 Erasing the zoom range

- Press the RESET-key and hold down briefly. The LENS and ANGLE symbol turns off.



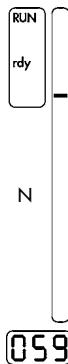


5.2.3.10 Camera RUN

- The camera can be started with the camera RUN switch. This switch has three positions:
 - middle OFF
 - intermediate switching ON
 - permanent switching ON

24V ARRI cameras are started with the intermediate switching on function. In camera RUN this is indicated on the status display of the ZMU-3

Note: The permanent switch on function is available with the socket of the ZMU-3.



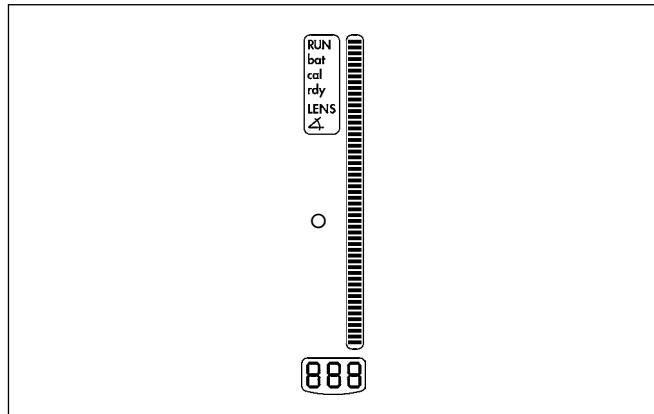
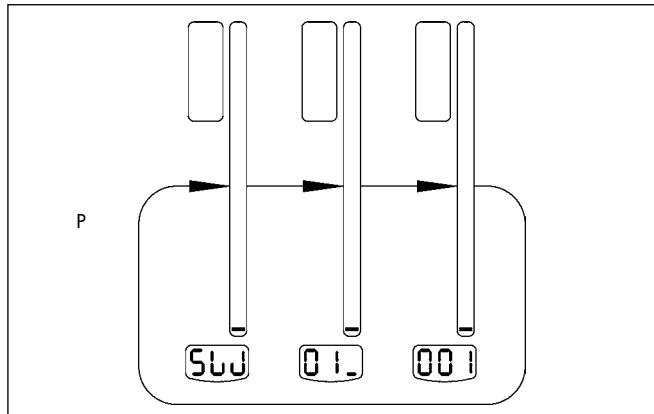
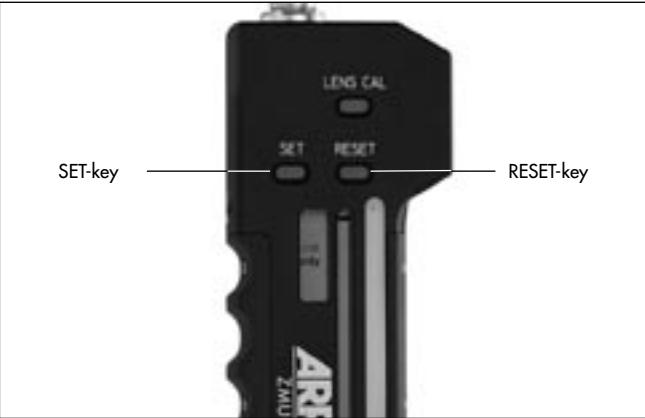
5.2.3.11 Video lenses

The ZMU-3 can be connected to video lenses with the cable KC-107 (K2.65041.0).

In this mode the marker display indicates the zooming speed starting from the middle position.

5.2.3.12 Reading out the software version

- Before connecting the unit with the cable press the SET and RESET key and hold down. All elements of the displays will be shown for testing purposes (☞ photo O).
- Press and hold down the RESET-key. The speed display will indicate the software version in three separate steps (☞ photo P).



Operation

5.2.4 Operating the FIU-1 (Focus Iris Unit)

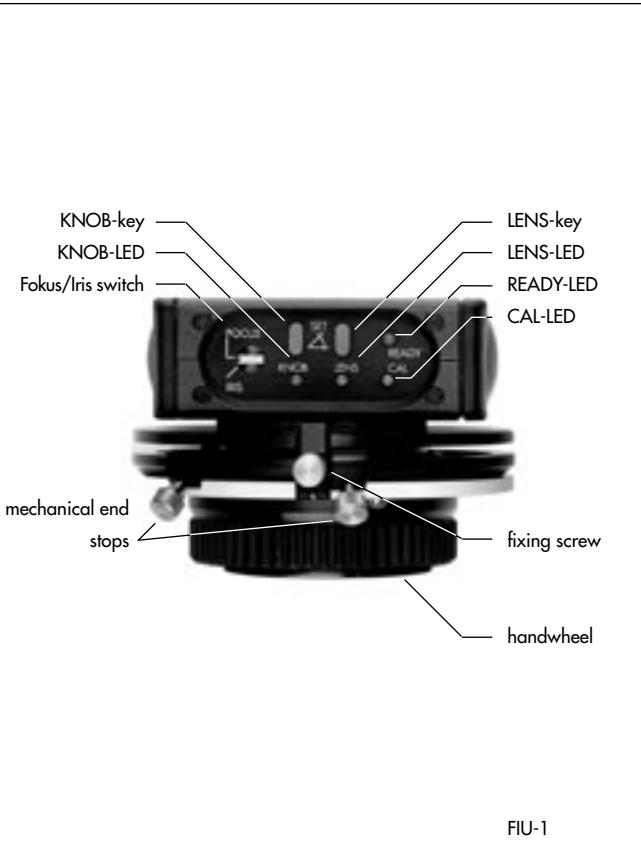
With an FIU-1  either a focus ring or an iris ring can be remotely controlled. For use of the FIU-1 a ZMU-1 or ZMU-2 is always necessary as a main unit. The first FIU-1 is connected to the ZMU with a cable LC-F1 or LC-F2. If a second FIU-1 is used, this can be connected to the first FIU-1 with a cable LC-F1 or LC-F2.

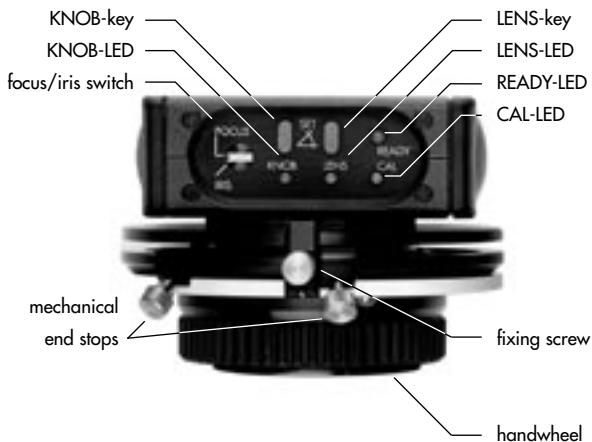
5.2.4.1 Defining the function of the FIU-1

Switch on the FIU-1 with the ZMU. Before switching on, it is necessary to determine whether the FIU-1 is to control a focus ring or an iris ring.

- Using a coin, turn the switch Focus/Iris  to the desired position.

Note: If only one FIU-1 is used, the function (focus/iris) can also be altered while switched on.





FIU-1

5.2.4.2 Focus or iris setting

- Turn the handwheel of the FIU-1.

The focus ring of the lens follows the handwheel adjustment very precisely and smoothly.

When quickly turning the handwheel, focus and iris adjustment follow the lens control motors at maximum speed (at 12V the maximum adjustment speed is lower).

5.2.4.3 Fixing the handwheel in position

To prevent unintentional moving of the handwheel, it can be fixed in its position.

- To fix in position, turn the locking screw clockwise.
- To loosen, turn the locking screw anti-clockwise.

5.2.4.4 Defining the setting range of the lens

For each setting ring on the lens controlled by the LCS, a setting range can be defined and stored. The smaller this range, the more precisely setting can be carried out.

The setting range is determined individually for each axis. On the Focus Iris Unit the LENS key  is used:

With the corresponding control unit, set the range as follows:

- Drive to the beginning of the selected range by adjusting the handwheel.
- Press the LENS key  and hold down
 - LENS-LED  flashes.
- Drive to the end of the selected range by adjusting the handwheel.
- Release the LENS key
 - LENS-LED illuminates.



The selected operating range must cover at least 2% of the entire lens range. Otherwise the setting will have no effect.

5.2.4.5 Erasing the setting range

- Press the LENS key  and hold down briefly
 - The LENS-LED  switches off.

5.2.4.6 Matching the scale range on the Focus Iris Unit

On the focus scale disk of the Focus Iris Unit a scale range can be selected with markings as desired. Already marked focus scale disks can be used, e.g. from mechanical follow-focus devices.

For each Focus Iris Unit the scale range is aligned to the stored setting range of the lens ring as follows:

- With the mechanical end stops  of the handwheel, set the limits of the desired scale range and fix them.
- Turn the handwheel to the first end stop.
- Press the KNOB key  and hold down
 - The KNOB-LED flashes.

- Turn the handwheel to the second end stop and release the KNOB key
 - The KNOB LED illuminates.



The set scale range must be at least 30° on the handwheel. Otherwise the setting will have no effect.

5.2.4.7 Erasing the scale range

- Press the KNOB key and hold down briefly
 - The KNOB-LED switches off.

5.2.4.8 Using scales from mechanical follow-focus devices

If a scale is firstly to be marked on a mechanical follow-focus device and then used on the Focus Iris Unit, it must be set up on the follow-focus device as follows:

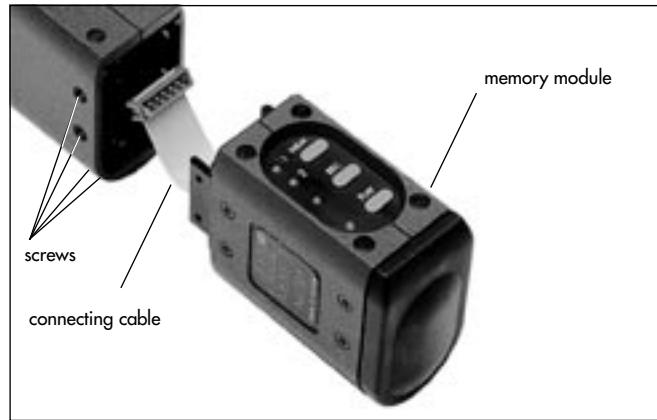
- Turn the hanwheel on the follow-focus device clockwise to the lens stop.
- Move the index indicator of the follow-focus device to the disk-positioner pin.
- Fix the index indicator in this position.
- Mark the scale.

Scales marked in this way can be used for LCS focus-iris operation. Match the scale ranges as described above.

5.2.5 Memory Module

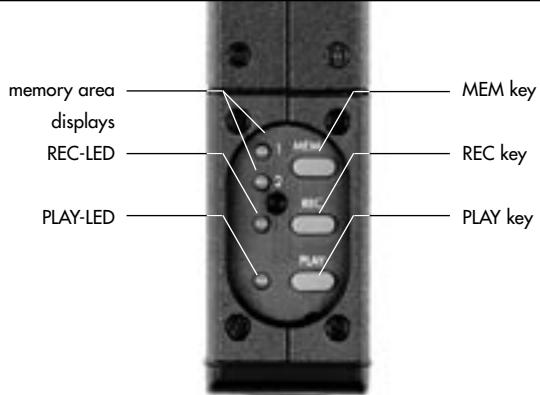
With the optional memory module functions of the zoom, iris or focus controls can be recorded and played back. Recording and playback can be started via an external trigger signal. The data is also stored even after switching the power supply off. As the memory module only functions together with the ZMU-1 and ZMU-2, the memory module functions are only available when using a cable.

Order Number: K2.41382.0



5.2.5.1 Installation

- Remove the screws that hold the cover on the bottom part of the zoom unit and remove the bottom cover.
- Plug the connecting cable into the zoom unit and the memory module  **photo**.
- Attach the memory module onto the zoom unit.
- Replace the cover on the memory module.
- Secure the unit with the appropriate screws.



5.2.5.2 Operating functions

The memory module's storage function has two memory banks. These can be used individually or simultaneously. According to the memory bank selection recording time is limited (see Technical Data).

Memory bank indicators 1 and 2 display how these memory banks can be used:

- | | |
|-------------------------|---|
| <input type="radio"/> 1 | both memory banks are locked |
| <input type="radio"/> 2 | no recording or playback possible |
|
 | |
| <input type="radio"/> 1 | memory bank 1 active |
| <input type="radio"/> 2 | recording and playback in memory bank 1 possible
data in memory bank 2 remain stored |
|
 | |
| <input type="radio"/> 1 | memory bank 2 active |
| <input type="radio"/> 2 | recording and playback in memory bank 2 possible
data in memory bank 1 remain stored |
|
 | |
| <input type="radio"/> 1 | memory bank 1 and 2 active |
| <input type="radio"/> 2 | recording and playback in memory bank 1
and bank 2
data in memory bank 1 and 2 will be erased |

After switching on, the memory banks are locked to prevent accidental erasure of stored data.

Selecting Memory Bank

- Press the MEM key  repeatedly until the desired memory bank is active.

Recording Operating Functions

- Select the desired memory bank.
- To initialize:
Depress the REC key – the REC-LED  will flash. The LCS is ready for recording. This status can be cancelled by pressing the MEM key. If no memory bank has been pre-selected, memory bank LEDs 1 and 2 will flash. Select memory bank!
- To start recording:
Press the REC key again. During recording, the REC-LED will illuminate.
- To stop recording:
Press the REC key again or wait until the entire sequence has been recorded.

Playback Operating Functions

- Select the desired memory bank.

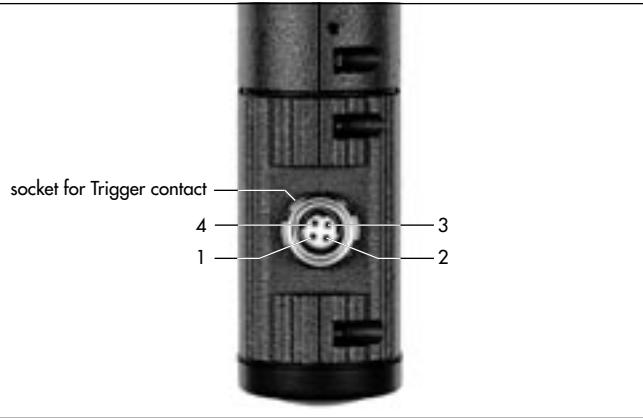
- To set the starting position:
press the PLAY key .

During the search for the start positions, the PLAY-LED  will flash quickly; once the positions have been reached, the LED will flash slowly.

The unit is ready for playback. This status can be cancelled by pressing the MEM key.

If there is no recorded data in the memory bank, both memory bank LEDs will flash, and the READY-LED on the zoom unit will be illuminated red. Select the correct memory bank!

- To start playback:
press the PLAY key again.
During playback the PLAY-LED will be illuminated.
- To stop playback:
press the PLAY key again or wait until the entire sequence has been played back.



5.2.6 Trigger Function

The trigger function allows precisely timed activation of recording or playback functions of selected ranges. Operations like focusing on a moving object can be more accurately reproduced when the adjustments of memory module are activated by the trigger functions via a remote activation signal.

5.2.6.1 Recording

- Select the desired memory bank.
- To initialize:
press the REC key **photo**
– the REC-LED will flash. The LCS is ready for recording.

This status can be cancelled by pressing the MEM key.

If no memory bank has been pre-selected, memory bank LEDs 1 and 2 will flash. Select memory bank!

- To start recording:
connect the trigger contacts.
During recording, the REC-LED will be illuminated.
- To stop recording:
press the REC key again or wait until the entire sequence has been recorded.

5.2.6.2 Playback

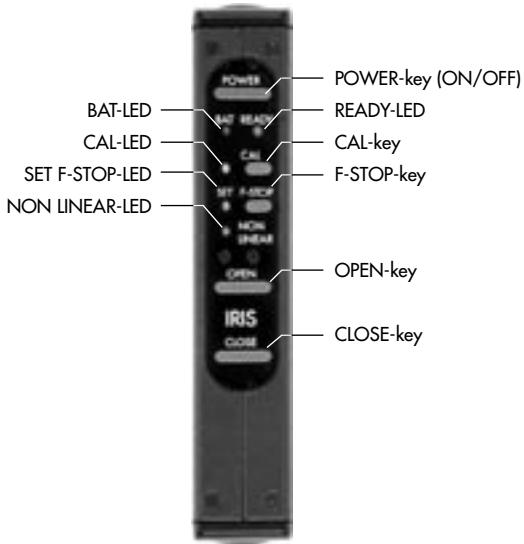
- Select the desired memory bank.
- To set the starting positions:
press the PLAY key. During the search for the start positions, the PLAY-LED will flash quickly; once the positions have been reached, the LED will flash slowly.

The LCS is ready for playback. This status can be cancelled by pressing the MEM key.

If there is no recorded data in the memory banks, both memory bank LEDs will flash, and the READY-LED on the zoom unit will be illuminated red. Select the correct memory bank!

- To start playback:
connect the trigger contacts. During playback the PLAY-LED will be illuminated.
- To stop playback:
press the PLAY key again or wait until the entire sequence has been played back.

1	TRIG +	Activate trigger mode by connecting both contacts
2	TRIG -	
3	-	not connected
4	-	not connected



5.2.7 ICU-1 (Iris Control Unit)

The ICU constantly monitors the frame rate of the camera. If a frame rate change occurs, the ICU will calculate a new value for the iris to compensate for the exposure change, and instruct the lens motor to change the iris ring accordingly.

Iris changes are calculated and set in such short time intervals that all changes are smooth – even if the camera's frame rate is changing very slowly.

Speed Ramp Overview

A speed ramp is a change of the camera's frame rate (fps), performed while the camera is running. Speed ramps can be used for a myriad of effects, from the dramatic speeding up or slowing down of the action to the subtle enhancing of a scene's timing. A speed ramp essentially allows the cameraman to compress or stretch time transparently and dynamically.

The frame rate of the new generation of ARRIFLEX cameras can be changed with the following accessories: RU-1 (Remote Unit), RCU-1 (Remote Control Unit) and CCU-1 (Camera Control Unit).

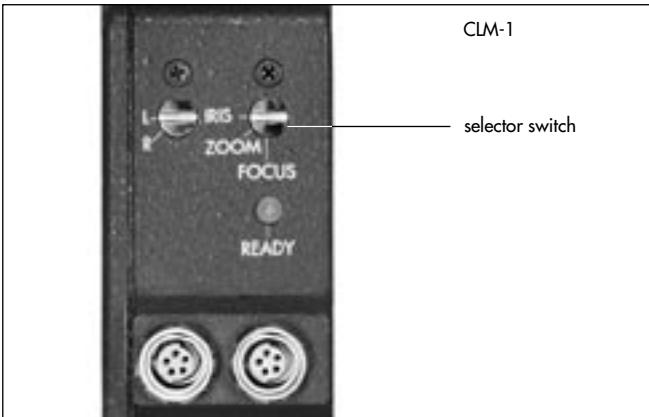
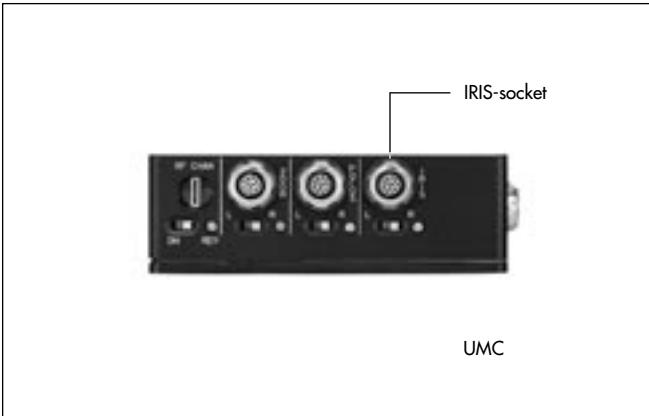
Since each frame's exposure time is dependent on the camera's frame rate, the mirror shutter setting and the aperture setting on the lens, a change in the camera's frame rate results in a change of the exposure.

ARRI currently provides two methods to compensate for this change in exposure:

- The ARRICAMs, ARRIFLEX 435 Xtreme/Advanced, 435 ES and 535 are equipped with an electronic shutter that can change its open shutter angle on the fly to compensate for the change in exposure during a speed ramp. The RCU-1 or the WRC-1 are needed to create such speed/shutter ramps. There is no visible change in the depth of field in the picture with this kind of exposure compensation.

- The ICU-1 (Iris Control Unit) can change the lens iris on the fly to compensate for the change in exposure during a speed ramp even on cameras that are not equipped with an electronically adjustable mirror shutter.

With the ICU, speed ramps can be performed on the following cameras: ARRICAM ST and LT, ARRIFLEX 435 Xtreme/Advanced, 435ES, 435, 535, 535B, 35 III, 16SR I, 16SR II, 16SR II HS, 16SR 3 / Advanced, 16SR 3 HS / Advanced, 765.



5.2.7.1 Setup

- Make sure that the lens motor is tightly attached to the support rods, and that the support rods are tightly locked into the sliding base plate.
- Switch the selector switch on CLM-1 lens motors to IRIS or connect CLM-2 motors to the IRIS socket of the UMC.

Note: The lens motors can be adapted to attach either to the ø 19 mm or to the ø 15 mm support rods. Make sure you have the correct attachment for the lens motor.

Note: Some older lenses do not have the proper gear ring on the iris ring. Make sure that all lenses to be used have the proper gear on the iris ring (see chapter 6.7 Iris Gear Rings).

ICU-1 Connecting Cables

The ICU-1 identifies different camera models through different cables.

The ICU-1 and the lens motor are generally powered from the camera, but can also be connected to a separate 12 or 24 Volt battery (with cable LC-S1). The ICU-1 will automatically detect if the incoming voltage is 12 or 24 Volts.

Note: If the camera runs on 12 V, it is recommended to use a separate 24 Volt battery for the ICU-1. The lens motor will be able to respond at a faster rate when connected to a 24V power source.

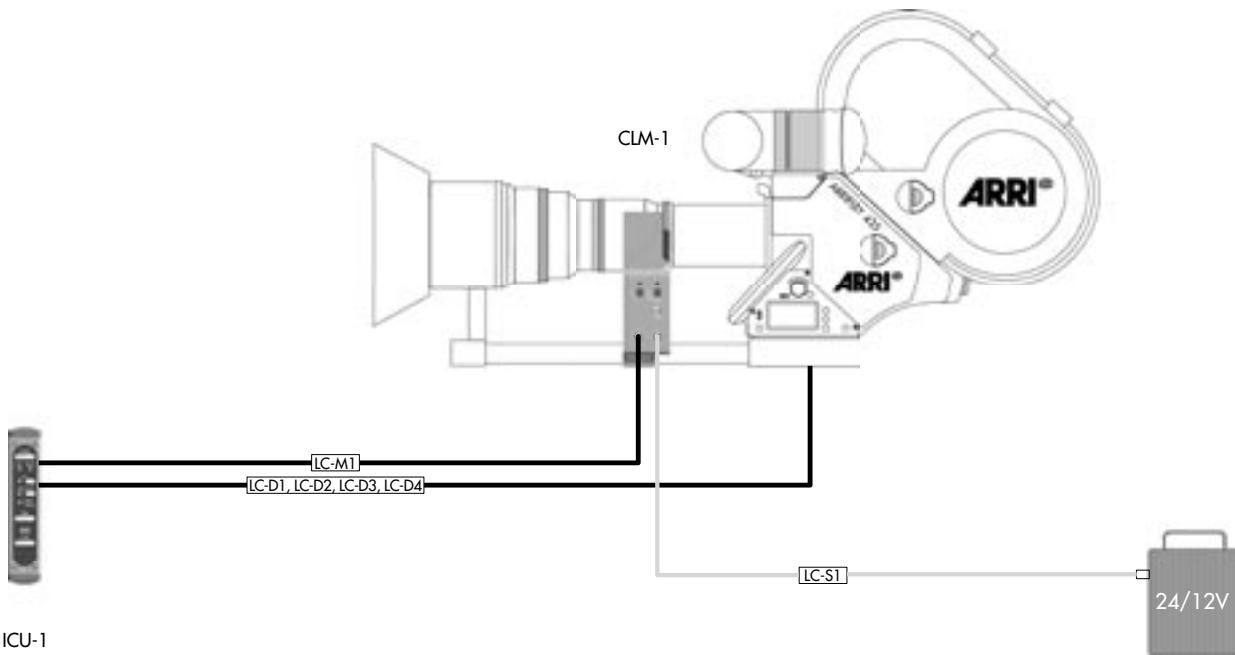
Note: When powering the ICU-1 and the Motors from the camera, make sure that the maximum load of the used connector on the camera is not exceeded

- Make cable connections according to the diagram. To power the ICU-1 from a separate battery, connect cable LC-S1 to the battery and to the unused connector on the lens motor.

Camera	Camera Cable
ARRICAM ST/LT	KC 72 cable to CAC receptacle Part number: K2.54137.0
ARRIFLEX 535 535B 16SR 3 16SR 3 HS 435ES 435 Adv.	Connect LC-D1 to RU receptacle Connect LC-D1 to ACC receptacle Connect LC-D1 to ACC receptacle Connect LC-D1 to ACC receptacle Connect LC-D1 to RU receptacle Part number: K2.47029.0
ARRIFLEX 35 III 435 435ES 435 Adv.	Connect LC-D2 to 11 pin accessory receptacle Part number: K2.47030.0
ARRIFLEX 16SR 16SR II 16SR II HS	Connect LC-D4 to 11 pin accessory receptacle Part number: K2.47048.0
ARRIFLEX 765	Connect LC-D3 to SCU receptacle Part number: K2.47031.0

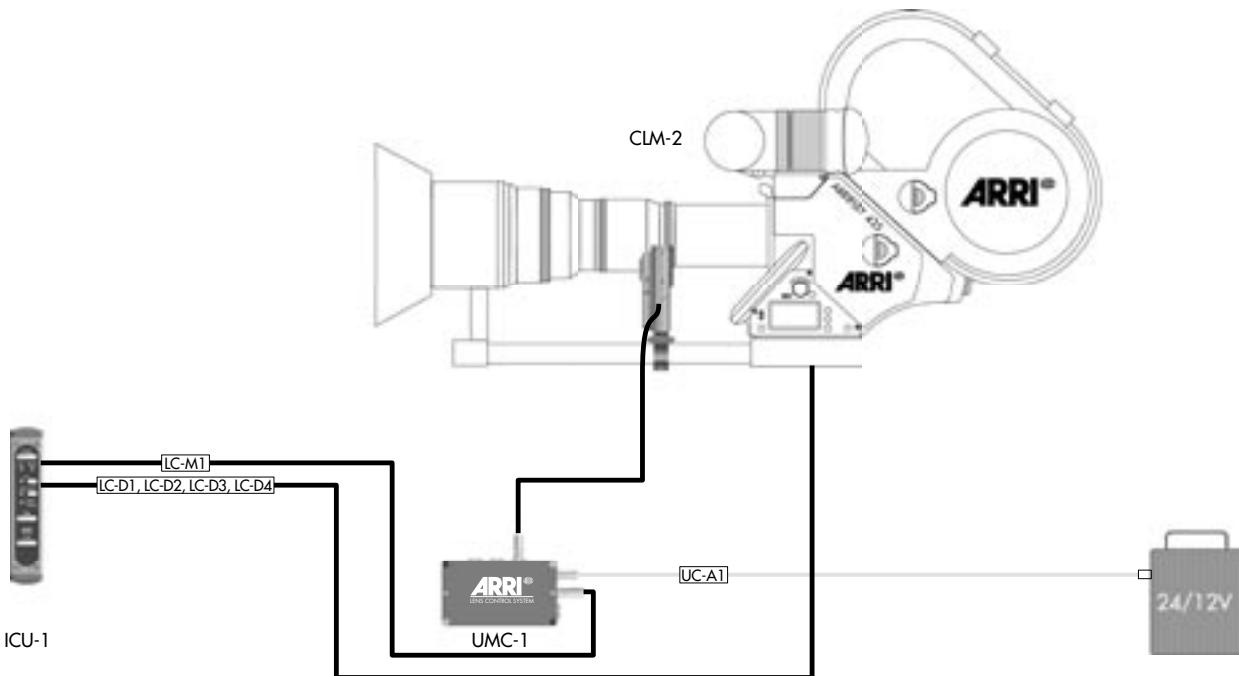
Operation

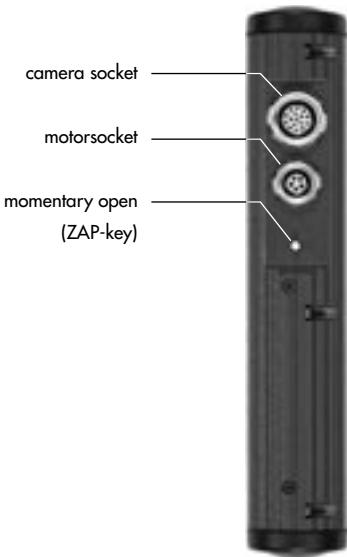
ICU-1 cable diagram with CLM-1



ICU-1

ICU-1 cable diagram with CLM-2





- Note: The ARRIFLEX 435ES can be used with cable LC-D1 (9 pin) or with cable LC-D2 (11 pin) since it has both a 9 pin and a 11 pin accessory connector.
- Note: Cables for camera models not listed here can be supplied on request.
- Note: When using a UMC-1 together with the URM-1 both other lens rings (zoom and focus) can be remotely controlled via the same UMC-1.
- Note: The connection of a CLM-1 as a motor for the iris ring on the ICU-1 via a UMC-1 is not possible (and of no use as the direct connection to the motor is also possible).

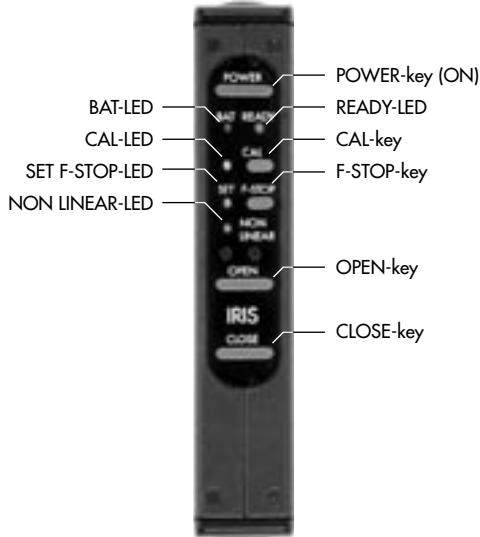
5.2.7.2 Turning ICU-1 Power On

- Push the POWER key  to switch on the ICU-1.
- The READY LEDs on the ICU-1 and on the lens motor will illuminate briefly and then indicate the system status. See table below.

Setting ICU-1 Reaction Speed

The ICU-1 can be set to a fast or slow reaction speed. This setting determines how fast the ICU-1 reacts to a change in the camera's frame rate.

For most cameras, the fast reaction speed should be used. If you detect a jittering in the lens motor while the camera is running at a constant speed, or a jerky motor movement



ICU READY LED	Camera	ICU	Lens motor
Slow green flashing	Standby	Ready	Ready
Fast green flashing	Ramping up to speed	Set to beginning F-Stop	Ready
Steady green light	Running at speed	Will follow any frame rate changes	Will follow any frame rate changes
Red	See "Trouble Shooting" chapter		
Red/green flashing	See "Trouble Shooting" chapter		

during a speed change, you can change the reaction speed to SLOW, which will reduce these effects.

Note: The minimum ramp duration time for the slow setting is twice as long as for the fast setting. If you need a short ramp duration, use to the fast setting.

To set the ICU-1 reaction speed:

- Turn the ICU-1 power off.
- Turn the ICU-1 power back on while holding down the – OPEN button to set the ICU-1 to the fast reaction speed, or the – CLOSE button to set the ICU-1 to the slow reaction speed.
- The green SET F-STOP and NON LINEAR LEDs will blink alternately for about 2 seconds in rapid succession if a fast reaction speed is set, and in slow succession if a slow reaction speed is set.

The last reaction speed set in the ICU-1 will remain in memory even if the ICU-1 is turned off.

Note: Lens motors with a serial number smaller than 1190 will always use the fast reaction speed, disregarding of the reaction speed setting on the ICU-1.

Note: Some older ICU-1 models do not have the capability to change the reaction speed. They will always use the fast reaction speed. The ICU-1 can change reaction speeds from software version V0210 on. Older units can be upgraded by your local ARRI service center.

Note: When using the SLOW setting, the minimum ramp times must be doubled – please see the following chapter on calculating the ramp time.

Calculating the Ramp Time



Do not change the camera frame rate abruptly!

The rate of the permissible camera fps change depends on the beginning frame rate and the acceleration characteristics of the lens motor. The minimum change time as described below should not be exceeded!

All values given here are for the fast reaction time setting. The minimum change time should be doubled if the reaction time is set to SLOW.

The minimum change time can be calculated using the following formula:

$$t = \frac{(V_2 - V_1)}{4 V_1}$$

t Minimum ramp time (in seconds)

V_1 Beginning frame rate for a positive ramp or ending frame rate for a negative ramp (in fps)

V_2 Ending frame rate for a positive ramp or beginning frame rate for a negative ramp (in fps)

Beginning Frame Rate [fps]	Time [Seconds]	Ending Frame Rate [fps]
3	16	150
4	12	128
5	8	112
6	6	96
7	4	80
8	3	64
10	2	56
12	1.50	48
14	1.00	40
16	0.75	32
20	0.50	28
24	0.25	24
28	0	20
32	0.25	16
40	0.50	14
48	0.75	12
56	1.00	10
64	1.50	8
80	2	7
96	3	6
112	4	5
128	6	4
150	8	3
	12	
	16	

Note: A "positive" ramp is a frame rate change to a higher fps value. Example: 10 to 50 fps.
A "negative" ramp is a change to a smaller fps value. Example: 50 to 10 fps.

The approximate minimum ramp time can also be derived from the nomogram. To calculate the minimum ramp time, connect the two camera frame rates with a straight line and read the time at the intersection of that line and the time scale.

For example, if ramping from 12 to 48 fps, the ramp should not be shorter than 0.75 seconds.

To shorten the ramp duration when a large fps range is covered, the ramp can be broken up into separate smaller ramps. These can be run consecutively.

For example, if ramping from 4 to 96 fps, 6 seconds would be the minimum time. But if ramping:

- from 4 to 16 fps, the minimum ramp time is 0.75 seconds, and if then ramping
- from 16 to 96 fps, the minimum ramp time is 1.25 seconds.

Combined, the new minimum time is only 2 seconds. Consecutive frame rate ramps can be created with an external camera controller like the LCC.

Changing camera frame rate manually with VSU:
Multiply derived minimum ramp time by 3 to be sure that possible uneven speed change of the ramp is not critical.

ICU-1 Calibrating

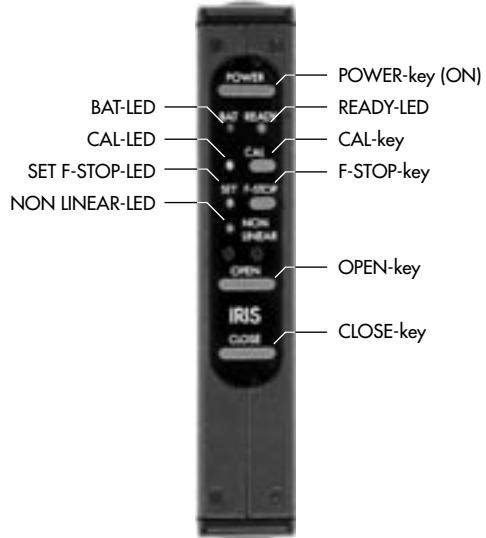
During calibration the ICU-1 learns and memorizes the end-stops of the iris ring to avoid the mechanical stress of driving the ring all the way to the end. Any previously stored end-stops will be erased during calibration.

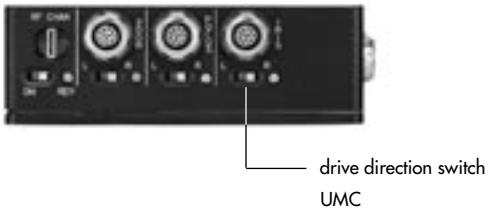
You should calibrate the ICU-1:

- when setting up
 - after a lens change
 - after having moved the iris ring while the ICU-1 was switched off
 - after the lens motor and the iris ring gear have been separated
 - if the CAL-LED flashes.
-
- Push the CAL key  on the ICU-1. While the ICU-1 is calibrating, the yellow CAL-LED will be illuminated.

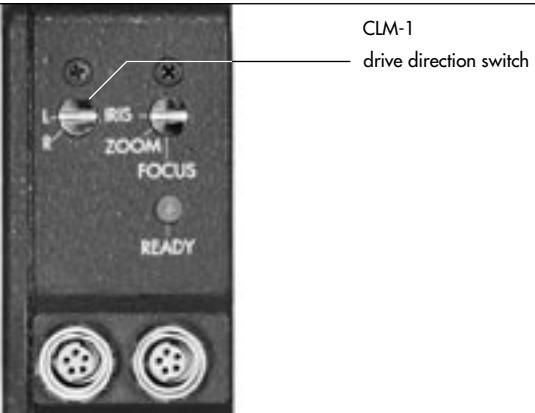


If the CAL LED flashes: End stops have not been defined yet or the lens ring has been turned while the ICU-1 was switched off and then been driven to an end-stop. Repeat calibration process!





Note: Pay specific attention to the gears when calibrating. Sometimes the gears can slip because they do not mesh closely enough, or the lens motor is not clamped down tight enough on the support rods, or the support rods are not clamped tightly enough on the bridge plate. If this happens, re-tighten everything. In extreme cases it helps to push the lens motor towards the lens while calibrating. This is only an issue during calibration, as the ICU-1 uses a lot of torque during calibration.



Setting the ICU-1 Lens Motor Drive Direction

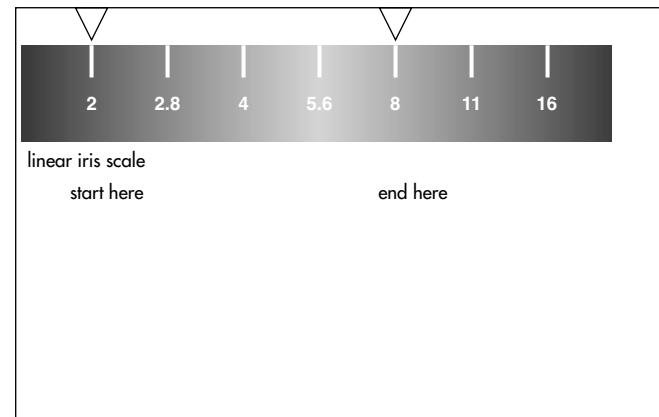
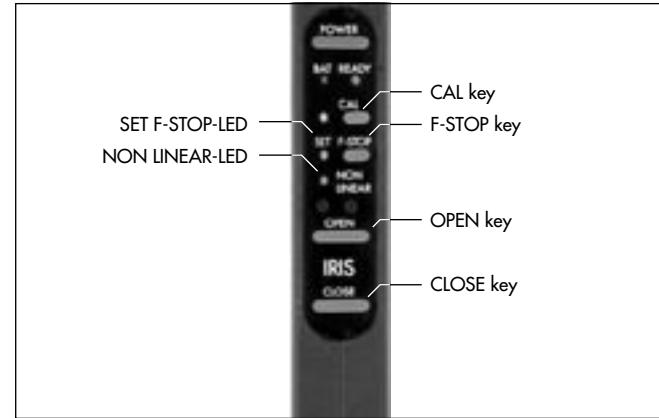
The ICU-1 can perform the proper iris correction only if the lens motor drive direction corresponds to the OPEN and CLOSE keys.

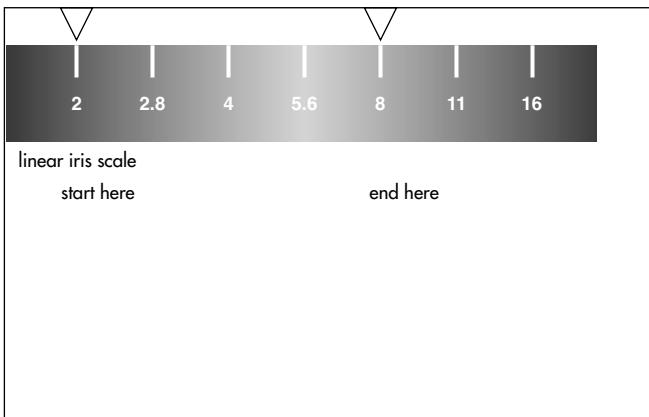
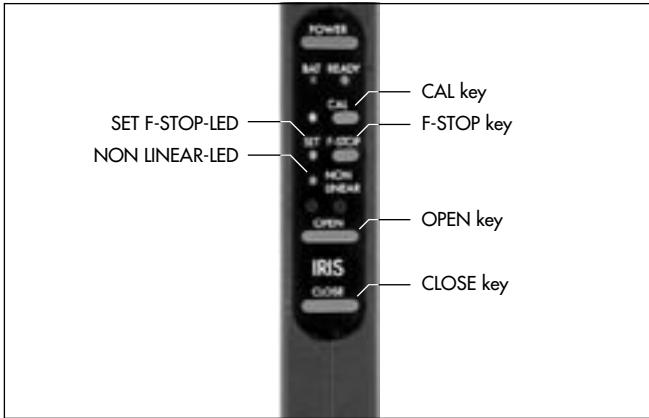
- Check the current lens motor drive direction by pushing the OPEN and CLOSE key on the ICU. The iris should open when the OPEN key is pushed, and close when the CLOSE key is pushed. If that is not the case, switch the drive direction switch (labelled L/R) on the CLM-1 lens motor [photo](#), or on the UMC [photo](#) for CLM-2 lens motors.

Assigning F-Stops with the ICU-1

The ICU-1 has to be taught where on the iris ring the F-Stops are. There are two different methods for two different types of iris scales:

- A **linear** iris scale is an iris scale where each F-Stop is exactly the same distance from the next one. Zeiss Standard Primes, Super Speed Primes and Variable Primes have a linear iris scale, for example. Assigning F-Stops for a linear iris scale is a one step procedure.
- A **non-linear** iris scale is an iris scale where the distances between the F-Stops differ. The Angenieux 25-250HR has a non-linear iris scale, for example. Each F-Stop will have to be assigned individually for a non-linear iris scale.





Assigning F-Stops

for a lens with *linear* iris ring markings:

- Use the OPEN and CLOSE keys to precisely position the iris ring either at the largest or at the smallest **full** F-Stop.
- Push the F-STOP key and keep it pushed down. Use the OPEN and CLOSE keys to move the iris ring four F-Stops further. If you are at a T 2.8, for instance, you should go to a T 11 (see graphic). The SET F-STOP LED will flash while you move the lens ring.
- Release the F-STOP key. The SET F-STOP LED will illuminate to indicate that a linear iris scale has been memorized.

Assigning F-Stops

for a lens with *non-linear* iris ring markings:

- Use the OPEN and CLOSE keys  to precisely position the iris ring either at the largest or at the smallest **full** F-Stop.
- Push the F-STOP key  and keep it pushed down.
- Use the OPEN and CLOSE keys to set the iris ring to each F-Stop. At each F-Stop push the CAL key  briefly.

Do not go to the end positions unless they represent a full F-Stop change from the last F-Stop marking. The NON LINEAR LED  flashes while you read the F-Stops. You can assign a minimum of two and a maximum of twelve F-Stops.

- Release the F-STOP key. The NON-LINEAR LED  illuminates and thus indicates that the settings are valid. If the NON-LINEAR LED stops blinking or does not illuminate, the settings have not been memorized properly. Then you must repeat the procedure.

Note: When assigning F-Stops on both linear and non linear scales, use only full F-Stops! The widest open F-Stop on many lenses, for example, is **not** a full F-Stop. The most common full F-Stops are: 1, 1.4, 2, 2.8, 4, 5.6, 8, 11, 16, 22, 32, 45.

Verify Operation

- Run the camera without a magazine attached.
- Use your speed controller to change the speed from 24 to 48 fps. Watch the lens iris ring: it should open up one stop.

Resetting after a Lens Change

- Swing the lens motor back onto the iris ring and tighten it. Make sure that the lens motor gear meshes with the iris ring gears without any play.
- Make sure that the lens motor is tightly attached to the support rods, and that the support rods are tightly locked into the sliding base plate.
- Switch the ICU-1 on.
- Calibrate the ICU-1.
- Assign F-Stops.

If the Iris Ring Moves While Power is Off

If the iris ring is moved while the ICU-1 is switched off, the end positions memorized in the ICU-1 and the actual end positions of the iris ring will no longer be the same!

- Switch the ICU-1 on and re-calibrate.
It is not necessary to assign new F-Stops.

5.2.7.3 Operating the ICU-1

Before starting the camera, the beginning frame rate and the corresponding F-Stop have to be set. Once the camera is running, the ICU-1 will remember the beginning frame rate and F-Stop. It will then correct the iris for any change in the camera's frame rate. Once the camera is stopped the ICU-1 will set the iris back to the beginning F-Stop.

The ICU-1 will interpolate all F-Stop values that fall in between two full F-Stops. For linear iris rings, the ICU-1 will use those interpolated values in the space between the last F-Stop and the end position of the iris ring. For non linear iris rings, the ICU-1 will extrapolate based on the values from the last full F-Stop and use the results in the space between the last F-Stop and the end position of the iris ring.

The ICU will remember its calibration and the assigned F-Stops even when it is switched off.

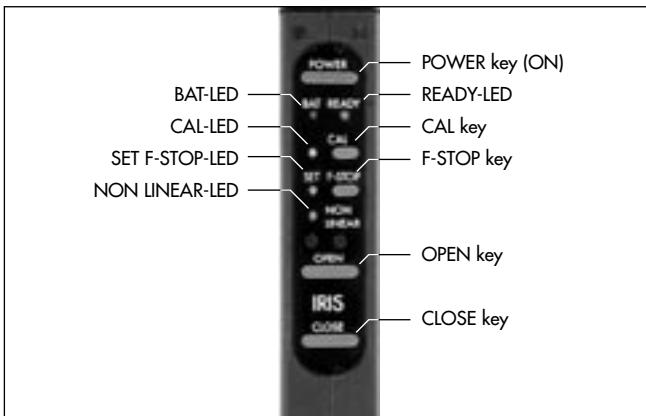
- Set the ICU-1 up as described in the previous chapter.
- Set the beginning frame rate on the camera.
- Set the beginning F-Stop with the ICU-1.
- Start the take.
The ICU-1 will be ready one second after the camera has reached speed. If the frame rate of the camera changes during the take, the ICU-1 will automatically compensate for the change in exposure by changing the iris accordingly.

Note: The ICU-1 will lock all operating buttons while the camera is running to prevent unintentional operation of those buttons.

Operating the ICU-1 with the ARRIFLEX 535 or 435

The ARRIFLEX 535 and 435 cameras can be programmed with the RCU-1, the LCC or the CCU to perform simultaneous frame rate and mirror shutter changes to compensate for differences in exposure during speed ramps.

To use the ICU-1 during a frame rate change on these cameras, the mirror shutter must be programmed to remain constant, i.e. kept at the same angle through the whole frame rate change!



Setting a F-Stop

To open or close the iris:

- Push the OPEN or CLOSE key [photo](#). The lens motor will move the iris ring as long as one of these buttons is pushed. If a button is pushed for a long duration, the lens motor will increase the rate of change. If the button is released, the speed of change will be set back to the slower value.

Momentary Opening of the Iris (ZAP)

- To open the iris temporarily, push the zap key [photo](#) located on the ICU-1 back side, underneath the connectors.

The iris will remain open as long as the zap button is pushed. When the zap button is released, the ICU-1 will return to exactly the same position it was in before the zap button was pushed.

Note: This feature is disabled while the camera is running!

ICU-1 and Variable Primes

When using the ICU with the Variable Primes, make sure that the iris ring does not move in the area between T-22 and CLOSE. An improper exposure would result.

ICU-1 Battery LED

- Replace the battery when the battery LED (labelled BAT) illuminates or flashes.



Do not start any new scenes!

- Immediately replace the battery when the battery LED flashes. Otherwise, you run the danger of deep discharging the battery.

The battery LED reacts to the following voltage limits:

Main Voltage	BAT Indicator	Actual Voltage
24V	illuminated	< 20 V
	flashing	< 18 V
12V	illuminated	< 10 V
	flashing	< 9 V

ICU-1 Main Fuse

The main fuse is a self resetting thermal fuse. If it blows due to an error, remove the cause of that error and let the fuse reset itself. Under normal conditions it will reset in five to ten seconds. High outside temperature or a severe error will prolong the resetting time.

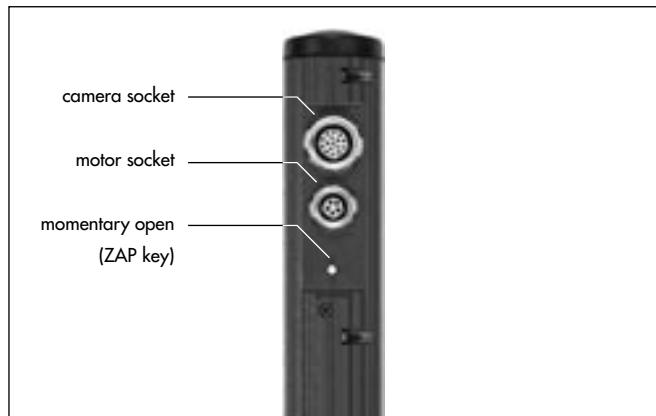
Note:

If you suspect a blown fuse while using the ICU-1 with the ARRIFLEX 535A, 535B, or early models of the 16SR 3, make sure to also check the camera's accessory fuse!

Later models of the 16SR 3 and the 435 are equipped with self resetting thermal fuses. The same method for resetting applies.

Button Lock During Run

The ICU-1 will lock all buttons while the camera is running. If a locked button is pushed, the ICU-1 will show a red LED as long as that button is pushed.





WHA-2

5.2.8 WHA-2 Wired Handgrip Attachment



To operate the WHA-2 with the ARRIFLEX 435 Xtreme/Advanced a FEM-2 must be attached to the camera.

With the WHA-2 photo the hand units of the wireless Lens Control System (WFU-1, WFU-3 and/or WZU-1, WZU-3) or the WRC-1 can be operated hardwired with the ARRICAM or an ARRIFEX 435 Xtreme/Advanced.

- Connected the WHA-2 to the LCS socket of a Lens Data Box with cable LC-M1, LC-M2, LC-Z1 or LC-Z2, or
- with the cable KC-70 (3m/9ft) to the CAC connector of ARRICAM ST or LT



For lens control on an ARRICAM, a Lens Data Box must be present.



The LDD-FP can not be attached to the WHA-2. The WHA-2 is not compatible with the UMC-1.

5.2.9 WHA-3 Wired Handgrip Attachment

The WHA-3  just like the WHA-2, allows all hand controllers except the LDD-FP to be connected with a cable to 435 Xtreme/Advanced with FEM-2 or to an ARRICAM Lens Data Box. In addition the WHA-3 has a button on the left side for focus tracking. Focus tracking based on measured distances is available when using an ARRICAM with the Lens Data Display for Focus Puller (LDD-FP) and a compatible distance measurement device.



The LDD-FP can not be attached to the WHA-3.

5.2.10 Studio LDB Adapter

The Studio LDB Adapter  allows the mounting of the Studio Lens Data Box 1m/3ft away from the camera body.





For setup and operation of the LDD Classic please refer to the ARRICAM instruction manual (K2.58508.0).

5.2.11 LDD Lens Data Display Classic

The LDD can be used on an ARRICAM or an ARRIFLEX 435 Xtreme/Advanced or remotely, for instance when the camera is on a crane.



To operate the LDD a Lens Data Box must be attached to an ARRICAM, or a FEM-2 to an ARRIFLEX 435 Xtreme/Advanced. LDS compatible lenses must be used.

The LDD shows lens ring position and camera status. The LDD graphically shows depth of field, and allows for the setting, display and storage of focus marks.

- Connect the LDD with the cable KC-60 (0.5m/1.5ft) or KC-79 (3m/9ft) to the Studio Readout of the ST or to the Lite Mask Frameglow of the LT.
- Alternatively cables KC-67 (3m/9ft) or KC-68 (15m/45ft) can be used to connect the LDD Classic to the CAC connectors of the ST or LT.
- For remote operation the LDD can also be connected to the ARRICAM Remote Control Station (K2.54143.0) with cables KC-60 or KC-79.

5.2.12 LDD-FP Lens Data Display for the Focus Puller

The LDD-FP  photo can be used in a wireless configuration with the WMU-3, as well as hardwired with an ARRICAM or the ARRIFLEX 435 Xtreme/Advanced, for instance when the camera is on a crane.



To operate the LDD-FP a Lens Data Box must be attached to an ARRICAM, or a FEM-2 to an ARRIFLEX 435 Xtreme/Advanced. LDS compatible lenses must be used.

The small and lightweight LDD-FP shows important lens informations and camera status. It can be configured to show focus, zoom and iris scale and the camera status in any combination. The LDD-FP graphically shows depth of field, and allows for the setting, displaying and storage of focus marks. Because of its small size it can be mounted in many ways, allowing the assistant to see precise lens and camera information while keeping an eye on the action.

- The cable LDDFP-RDO (0.6m/2ft) connects the LDD-FP to the Studio Readout or to the Lite Mask Frameglow.
- With cable LDDFP-CAC (1.5m/5ft) the LDD-FP is connected to the CAC socket of the ARRICAM ST or LT.



- Using the LDDFP-RDO cable it can be connected to the ARRICAM Remote Control Station (K2.54143.0).



Do not use the LDDFP-CAC cable with the cable drum.

- The LDD-FP can also be attached to the WMU-3, either directly or using the WEB-3 Expansion bracket for a wireless configuration.

For setup and operation of the LDD-FP please refer to the ARRICAM instruction manual (K2.58508.0).

Mechanical Accessories



Steadicam configuration

6. Mechanical Accessories

6.1 Mounting on Ø 15mm Support Rods

The motor units can also be mounted on Ø 15mm support rods.

Replace the offset clamp unit on the CLM-1

- Remove the two screws on the bottom of the motor unit and the screw on the side  **photo**.
- Replace clamp unit.
- Replace screws.

Order number for the clamp unit: K2.41379.0





Mounting diminishing brackets on the motor unit CLM-2

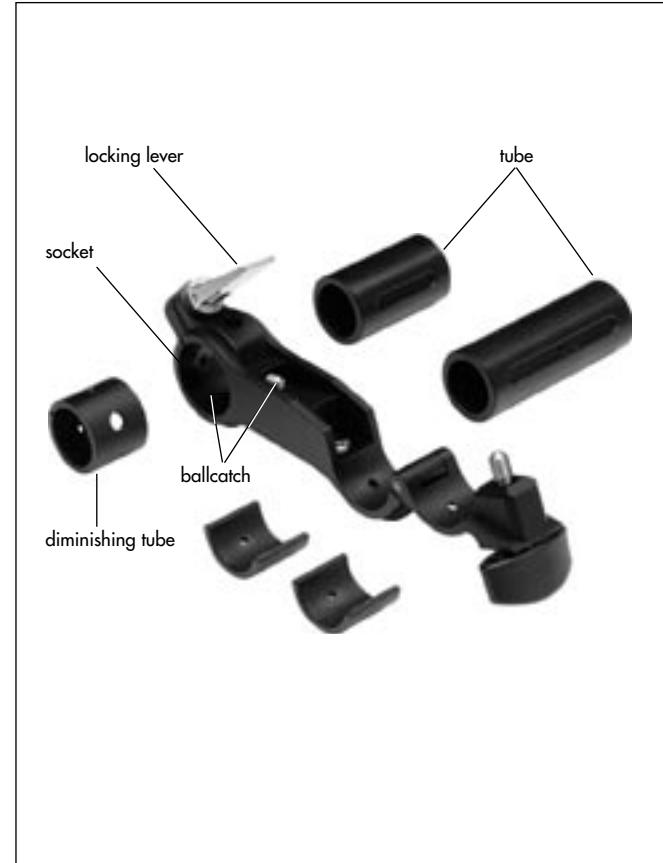
- Flip up the clamp brackets on the motor unit CLM-2.
- Place the diminishing brackets into the clamp bracket of the motor unit CLM-2.
- Fasten the diminishing brackets externally with two screws each.

Mounting the diminishing brackets on the console

- Flip up the locking lever and unscrew the ballcatch with a screwdriver until it completely disappears in the bracket.
- Push the tube with the slit flush into the console socket , ensuring that the slit in the tube corresponds with the clamp slit.
- Fix the diminishing tube with two screws from the outside.

- Push the tube ø 15mm flush into the diminishing tube on the console. Ensure that the slit  **photo** in the tube points in the direction of the ballcatch.
- Screw the ballcatch out of the bracket until the tube can no longer be pushed out of the bracket.
- Turn the locking lever until a slight resistance can be felt, then press the lever downwards.
- Flip up the clamp brackets.
- Place the diminishing brackets into the clamp brackets.
- Secure the diminishing brackets with two screws each on the exterior.

Order number for the console: K2.52035.0





6.2 Offset Mounting

If the motor unit CLM-1 is to be used on a short lens, a different offset clamp unit should be mounted to reach the iris control ring of the lens.

Order numbers:

K2.41381.0 for ø 19mm rods

K2.41380.0 for ø 15mm rods

To replace the offset clamp unit

- Remove the two screws on the bottom of the motor unit and the screws on the side → **photo**.
- Replace clamp unit.
- Replace screws.

6.3 Panhandle Holder

The zoom unit can be used with a panhandle holder on the following SACHTLER fluid heads:

- Video 17III_25II
- Horizon II
- Studio II
- Dutch Head
- Studio 80

The zoom unit can also be used with the panhandle holder on fluid heads of other manufacturers.

Order number: K2.44809.0

6.4 Motor Holder for ARRIFLEX 35 III

If the motor unit is to be used with the ARRIFLEX 35 III with a short lens, a special motor holder is necessary in order to reach the iris control ring.

Order number: K2.41390.0

Mounting the Motor Holder

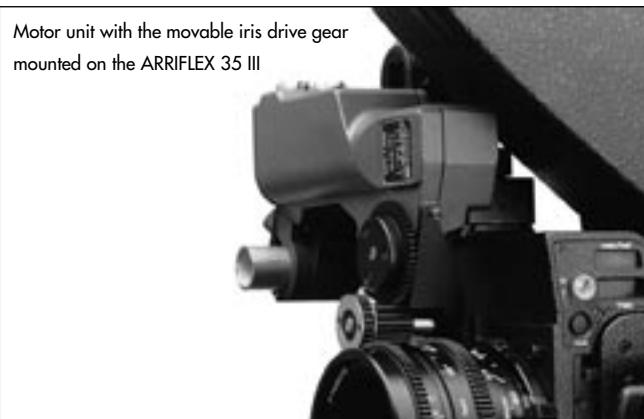
- Mount the motor holder instead of the standard carrying handle.
- Mount the motor unit onto the motor holder.



6.5 Movable Iris Drive Gear

On lenses where the iris control ring moves laterally when the lens is being focused, the iris drive gear must move with it. To enable this, the motor unit CLM-1 or CLM-2 is equipped with a movable iris drive gear which allows the iris ring to move 15 mm.

Order number: K2.41388.0



Mounting the Movable Iris Drive Gear

- Replace the original standard motor unit drive gear with the narrow gear (included in the conversion kit).
- Mount the movable iris drive gear with two screws onto the standard motor unit **photo**.



Before calibration of the LCS unit, ensure that the lens ring is engaged properly in the movable iris drive gear. Otherwise damage to the lens or the LCS can occur.

6.6 Iris Drive Gear

To enable greater adjustment speeds, gears with a larger diameter are available. Gears for use on video camera lenses are also available.

Order numbers:

- | | |
|------------|---|
| K5.52457.0 | Gear for motion picture camera lenses
with large diameter (65 teeth) |
| K5.52049.0 | Gear for video camera lenses (module 0.5 104 teeth) |
| K5.52051.0 | Gear for video camera lenses (module 0.5 80 teeth) |

6.7 Iris Gear Rings

Retrofit iris gears are available for the following older lenses that were not available with integrated iris gear rings.

Order numbers:

- | | |
|------------|--|
| K2.43351.0 | for Zeiss Vario-Sonnar T2.0, 10-100mm
and for Zeiss Vario-Sonnar T2.2, 11-110mm |
| K2.44925.0 | for Zeiss standard lenses |
| K2.44811.0 | for 35mm High Speed Zeiss T1.3 |
| K2.44833.0 | for 16mm High Speed Zeiss T1.3
and for standard Zeiss 180mm |
| K2.44835.0 | for Cooke Cine Varotal T4.0, 25-250 |
| K2.44863.0 | for Cooke T1.6, 10-30
and for Cooke T3.1, 20-60 |
| K2.44925.0 | for Angenieux T2.9, 20-120 |
| K2.44928.0 | for Angenieux T3.9, 25-250 |

7. Trouble-Shooting

7.1 Power Supply

Problem	Cause	Remedy
No Reaction when switched on	Battery empty	Check battery level
	camera switched off	When power is supplied through camera, switch it on
	Main fuse defective	Replace fuse in the LC-S1, S2, S3, S4. The UMC and the UC-S1-S are equipped with self-resetting fuses Switch off, wait several seconds, switch on
	More than one CLM-1 motor supplied through camera	Only one CLM-1 motor unit can be supplied through the camera (danger of overload)
	Power cable LC-S1, S2, S3, S4 defective	Connect power cable LC-S1, S2, S3, S4 directly to the zoom unit and press POWER key. If no reaction, replace power cable
	Power cable UC-A1 or UC-S1 defective	Replace power cable
	Zoom cable LC-Z1 or LC-Z2 defective Motor cable LC-M1 or LC-M2 defective	When using several motor units, connect zoom cable directly to the motor unit to which the power cable LC-S1 is also connected. If no reaction, replace zoom cable. Otherwise replace motor cable.

7.2 UMC, LDB, FEM-2 Motor Controller LEDs

Problem	Cause	Remedy
READY LED illuminated red	Operating error on the UMC/LDB/FEM-2 (radio channel was altered while switched on, an attempt was made to switch off the UMC/LDB/FEM-2 while the camera was running)	go back to prior status
READY LED flashes red	URM with same radio channel active	select another radio channel
Motor LED illuminated red	ZMU or WMU is switched off	switch on ZMU or WMU
	UMC/LDB/FEM-2 was switched on after ZMU or WMU	switch ZMU or WMU off and on again
	CLM-2 motor unit was connected after switching on ZMU and/or WMU	switch off ZMU or WMU and UMC/LDB/FEM-2, switch on again and recalibrate the system
Motor LED flashes red	Several motor units are set to the same operational function or plugged into the UMC/LDB/FEM-2. The READY LEDs on the manual control units also flash red	switch off, set selector switch on each motor unit CLM-1 to the corresponding function, or plug CLM-2 motor units into the corresponding position. Switch on.
	CLM-2 motor unit defective	replace CLM-2 motor unit

7.3 CLM-1 Motor Unit LEDs

Problem	Cause	Remedy
READY LED flashes red	Several motor units are set to the same operational function or plugged into the UMC. The READY LEDs on the manual control units also flash red	switch off ZMU, WMU and UMC. set selector switch on the motor units to the corresponding function, switch on.
	Motor cable LC-M1 or LC-M2 defective	check all motor cables and replace if necessary
READY-LED illuminated red	Operational error, e.g. selector switch on motor unit was operated while the unit was switched on	reset to original setting switch off ZMU, WMU and UMC, check settings on control units and motor units, switch on
	Power cable LC-S1 defective	Replace power cable

7.4 WMU Wireless Main Unit LEDs

Problem	Cause	Remedy
WMU cannot be switched on	During calibration no extra WMU can be swiched on	wait until calibration is finished
READY-LED flashes red	Incorrect cable configuration	switch off, set selector switch on motor units CLM-1 to correct position, or attach motor unit CLM-2 to the correct socket on the UMC/LDB/FEM-2, or turn selector switch on the WFU to the corresponding function, switch on
READY-LED illuminated red	Operating error on a control unit (e.g.selector for radio channel was changed)	reset to original setting, switch off, check settings on control unit, switch on
	Use of a locked control element, e.g. SET key while camera is running	perform all functions in proper sequence
	UMC/LDB/FEM-2 is switched off	switch on UMC/LDB/FEM-2, switch WMU off and on
	UMC/LDB/FEM-2 was switched on after WMU	switch WMU off and on
	operational unit was removed while the system was on	switch WMU off and on
READY-LED flashes red/green	WMU-3/WBU-3/-4 communication lost	exchange WMU-3/WBU-3/-4. Work can also be continued.

Trouble-Shooting

Problem	Cause	Remedy
RF-LED briefly illuminates red	Short disturbance (loss of a data packet)	with no effect on lens positioning; to prevent further disturbances, reduce distance between WMU and URM. Switch off possible sources for disturbances, e. g. Bluetooth, WLAN or other devices using the 2.4 GHz radio band.
RF-LED flashes red	No radio contact for over a second (danger of incorrectly set lens)	reduce distance between WMU and URM
CAL-LED flashes	Motor units were replaced or moved. After switching on again, the end stops are incorrect	recalibrate
	Stops not yet defined or the lens ring has been moved with the LCS switched off and was then driven against the lens' end stop.	recalibrate
	Lens ring does not move freely	Manually check for damage of lens ring

Problem	Cause	Remedy
Battery Control (BAT)	illuminated - Battery nearly empty	WMU will work for approx. 15 min
	Flashing	WMU will work for approx. 5 min Battery empty, replace battery Do not start any new scenes!
	Flashing quickly	WMU will switch off in approx. 5 s Battery empty, replace battery immediately Do not start any new scenes!

7.5 WZU Wireless Zoom Unit LEDs

Problem	Cause	Remedy
LENS-LED illuminated red	The WZU is not active (has no control over a motor)	a different unit (ZMU or WFU) already has control over the lens zoom ring.
	No zoom motor available	attach zoom motor

7.6 WFU Wireless Focus Unit LEDs

Problem	Cause	Remedy
LENS-LED (slider) illuminated red	no motor unit installed for slider	install motor for slider
	The slider on the WFU is not active (has no control over a motor)	a different WFU has the control over the lens ring operated by the slider. If a different WFU is switched on, and its handwheel is aligned to the same ring as the slider, this WFU has control.
LENS-LED (handwheel) illuminated red	no motor unit installed for handwheel	install motor for handwheel
	The handwheel on the WFU is not active (has no control over a motor)	A different WFU already has control of the aligned lens ring. The first unit switched on always has control. Exception: the FIU-1 units always lose control when a WFU is switched on.
LENS LED and READY-LED flashing red	the handwheel of the WFU on the WMU that was switched on last is assigned to the same function as the WFU/WMU already in operation	avoid assigning the same control function twice set the WFUs to different control functions and switch the WMU off and on again

7.7 ZMU-1, ZMU-2, ZMU-3 Zoom Main Unit LEDs

Problem	Cause	Remedy
READY-LED flashes red (ZMU-3 flashes)	Incorrect configuration	switch off, set selector switch on motor units CLM-1 to the correct position, or connect motor unit CLM-2 to the correct socket on the UMC-1, switch on
	UMC/LDB/FEM-2 is switched off (READY-LEDs on FIU-units flash red)	switch on UMC, switch zoom unit off and on
	UMC/LDB/FEM-2 was switched on after the zoom unit	switch zoom unit off and on
	No motor unit connected	connect motor unit
	Motor cable LC-M1 or LC-M2 or focus cable LC-F1 or LC-F2 defective LC-Z1 or LC-Z2 defective	check all motor cables and focus cables and replace if necessary
READY-LED illuminated red	Use of a locked control element, e.g. SET key, while calibrating	perform all functions in proper sequence
	Operating error on a control unit	Switch off, check settings on control units, switch on

Trouble-Shooting

Problem	Cause	Remedy
CAL-LED flashes	Motor units were replaced or moved. After switching on again, the end stops are incorrect	recalibrate
	Stops not yet defined or lens was moved while LCS was switched off and then driven against the stop	recalibrate
	Lens ring does not move freely	Check for damage of lens ring and movability
Battery Control (BAT) illuminated	Battery nearly empty	Replace battery Do not start any new scenes!
Battery Control (BAT) flashes	Battery empty	Replace battery immediately; danger of deeply discharging
ZMU-3 display flashes alternatively with Joy / speed value	Joystick is not in middle position when switching on	do not operate the joystick while switching on; joystick defective

7.8 FIU-1 Focus/Iris Unit LEDs

Problem	Cause	Remedy
READY-LED flashes red	Incorrect configuration	switch off, set selector switch on the motor units or on the FIU-1 to the correct function, switch on
	Motor unit not connected	Connect motor unit
	Motor cable LC-M1 or LC-M2 or focus cable LC-F1 or LC-F2 defective	Check all motor cables and focus cables and replace if necessary
READY-LED flashes red / green	another WFU took over control	check configuration
READY-LED illuminated red	Use of a locked control element, e.g. SET key while calibrating	perform all functions in proper sequence
	Operating error on one control unit e. g. focus or iris handwheel was moved during calibration	wait for calibration to end
CAL-LED flashes	Motor units were replaced or moved. After switching on again, the end stops are incorrect	recalibrate

Problem	Cause	Remedy
CAL-LED flashes	Stops not yet defined or lens was moved while LCS was switched off and then driven against the stop	recalibrate
	Lens ring does not move freely	check for damage of lens ring and movability

7.9 ICU-1 Iris Control Unit LEDs

Problem	Cause	Remedy
READY LED flashes red	Camera cable shows invalid camera ID	use correct cable
	No lens motor or more than one have been set to IRIS	only one motor unit must be set to IRIS
READY LED illuminated red	A locked button has been pressed	all buttons are locked while camera is running
READY LED flashes green/red	The Lens motor has reached a lens end-stop while the camera was running. (even if the CLM is positioned no longer at the end stop)	the LED will flash until any button is pressed to reset it.

Trouble-Shooting

Problem	Cause	Remedy
READY LED flashes green/red	The OPEN or CLOSE button has been pressed while the motor was at an end position	avoid operational errors
	Calculated F-Stop is outside of the range of the iris ring	iris compensation not possible
CAL LED flashes	End stops are invalid	calibrate
	Iris ring has been turned while the ICU was switched off and then been driven to an end-stop.	recalibrate
	Iris ring moves with difficulty or is stuck/gears may mesh too tightly	Clean or readjust
BAT illuminated red	Battery voltage low	change battery, do not start a new take
BAT red flashing	Battery voltage very low	change battery immediately danger of deeply discharging the batty do not start a new take

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9. Technical Data

Description of System Components

Controlled Lens Motor.....	CLM-1	Lens Data Box LT-2	LDB-LT-2
Controlled Lens Motor (small)	CLM-2	Lens Data Display Classic.....	LDL
Universal Motor Controller for CLM-2 and radio control	UMC-1 UMC-3	Lens Data Display for Focus Puller	LDL-FP
Universal Radio Module.....	URM-1 URM-2 URM-3	Wireless Remote Control.....	WRC-1
Wireless Main Unit.....	WMU-1 WMU-2 WMU-3	Wireless Zoom Unit.....	WZU-1 WZU-2
Wireless Expansion Bracket	WEB-3	Wireless Focus Unit	WFU-1 WFU-3
Wireless Battery Unit.....	WBU-1 WEB-2 WEB-3	Wireless Extension Unit.....	WEU-1
Wireless Battery Charger.....	WAC-1 WAC-3	Wireless Zoom Bracket	WZB-3
Functional Expansion Module.....	FEM-2	Zoom Main Unit.....	ZMU-1 ZMU-2 ZMU-3
Lens Data Box ST.....	LDB-ST	Focus Iris Unit	FIU-1
Lens Data Box ST-2.....	LDB-ST-2	Power Cable for CLM-1	LC-S1
Lens Data Box LT	LDB-LT	Iris Control Unit.....	ICU-1

Power Supply

Voltage:..... 24V DC or 12V DC (reduced speed)
 Power consumption
 without motor running: 24V/12V
 Motor Unit CLM-1: 0.09/0.15 A
 Motor Unit CLM-2: 0.01/0.01 A
 UMC-1:..... 0.06/0.08 A
 UMC-3:..... 0.14/0.28 A (wireless ON)
 0.12/0.24 A (wireless OFF)
 Power consumption WMU-1: 0.35 A
 Power consumption WMU-3 0.13 A
 Battery WBU-1 for WMU-1: 6 nickel metal hydride cells 7.2V 2 Ah
 WAC-1 100-240 V, 50-60Hz AC
 Battery WBU-3 for WMU-3 2 Lithium-Ion cells, 7.2V 2.3 Ah
 Battery WBU-4 for WMU-4 4 Lithium-Ion cells, 7.2V 4.6 Ah
 WAC-3 100-240V, 50-60Hz AC
 ZMU-1/-2: 0.08/0.13 A
 ZMU-3: 0.05/0.07 A
 Focus-Iris Unit: 0.10/0.10 A
 Power Cable LC-S1: 0.04/0.04 A
 LCS with 1 Motor Unit CLM-1
 operating at full torque: 1.60/1.90A
 LCS with 1 UMC-1 and 1 CLM-2
 operating at full torque: 0.90/0.90 A

Torque of Motor Unit

Maximum torque on CLM-1 drive gear: 1 Nm
 on CLM-2 drive gear: 0.65 Nm
 Maximum speed of the CLM-1
 drive gear at 24V DC: 2 U/s at 0.25 Nm
 Maximum speed of the CLM-2
 drive gear at 24V DC: 1 U/s at 0.25 Nm
 2 U/s at 0.15 Nm
 Adjustment range on drive gear: 8 revolutions
 Accuracy of adjustments: max. 1/2 thickness of lens barrel witness marks

Weight

Motor Unit CLM-1 0.63 kg / 1.38 lb
 Motor Unit CLM-2 0.28 kg / 0.61 lb
 Console for CLM-2 0.07 kg / 0.15 lb
 Universal Motor Controller UMC-1 0.28 kg / 0.61 lb
 Universal Motor Controller UMC-3 0.33 kg / 0.65 lb
 Universal Radio Module URM-1 0.2 kg / 0.44 lb
 Wireless Main Unit WMU-1 0.4 kg / 0.88 lb
 Battery WBU-1 for WMU-1 0.25 kg / 0.55lb
 Wireless Zoom Unit WZU-1 0.17 kg / 0.37 lb
 Wireless Focus Iris Unit WFU-1 0.3 kg / 0.64 lb
 Zoom Main Unit ZMU-1 0.42 kg / 0.92 lb
 Zoom Main Unit ZMU-3 0.39 kg / 0.87 lb
 Focus Iris Unit FIU-1 0.49 kg / 1.08 lb

Power Cable LC-S1	0.09 kg / 0.19 lb
Iris Control Unit ICU-1	0.4 kg / 0.88 lb
WMU-3.....	0.2 kg / 0.44 lb
WEB-3	0.1 kg / 0.22 lb
WBU-3.....	0.24 kg / 0.53 lb
WBU-4.....	0.41 kg / 0.89 lb
WZU-3.....	0.16 kg / 0.35 lb
WFU-3.....	0.34 kg / 0.75 lb
WAC-3	0.12 kg / 0.26 lb
URM-3	0.14 kg / 0.31 lb

Operating Noise Level

Noise level according to DIN 45635/51 for drive gear of motor unit CLM-1	
n < 0.5 U/s	< 20 dBA
n < 1 U/s	< 25 dBA
Motor unit CLM-2	
n < 0.5 U/s	< 22.5 dBA

Temperature Range

Operating and storage temperature:.... - 20...50°C (-5° to 122° Fahrenheit)

Memory Module

Recording time in seconds for:

Number of units	1	2	3
Range 1, 2 separate.....	242	162	81
Range 1+2 together	485	242	162

Trigger voltage required

between TRIG+ and TRIG-

when open: +4.5 V DC

Allowable voltage range

between TRIG+ and TRIG-: -5 ... +30V DC

Minimal pulse duration for trigger: 0.2 s

Iris Control Unit ICU-1

Valid iris range: Will not exceed mechanical end stops of lens
after calibration

Resolution (smallest change): 0.25° (of a typical prime lens iris ring)

Deviation from set iris value: - during constant speed: 1%

- during ramp up/down: 6%

Precision of iris setting: Equals precision of the LCS lens motor

Camera frame rate: 3 to 200 fps (depending on camera model)

Maximum fps change rate: See chapter 5.4 "fps change rate"

WMU-3, UMC-3 Declaration of Conformity

The radio modem conforms to RL 1999/5/EG

ERC/REC 70-03 / FCC Rule Parts 15C

Antenna:

Connection: Reverse SMA; Gain 2,0 dBi;

Frequency Range: 2,4 - 2,5 GHz, Impedance 50 Ohm

The unit is labelled with the CE sign

see the declaration in the Appendix

10. ARRI Service

Germany Arnold & Richter Cine Technik
Türkenstraße 89
D-80799 München
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fax: +49 (089) 3809-1244
fax service: +49 (089) 3809-1793
e-mail service: webmaster@arri.de

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fax: (914) 425 12 50
e-mail: arriflex@arri.com

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fax: (818) 848 40 28
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fax: (0) 1895 457 001
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fax: (06) 79 89 02 39

Canada ARRI Canada Ltd.
415 Horner Avenue, Unit 11
Etobicoke, Ontario
Canada M8W 4W3
phone: (416) 255 33 35
fax: (416) 255 33 99
e-mail: service@arrican.com

Declaration of Conformity

We, Manufacturer
ARRI CINE + VIDEO GERÄTE GmbH
Mariahilfer Strasse 136
A-1150 Wien
declare that the product
Wireless Lens Control System
WMU-3

is in conformity with

EN61000-6-3: 2001-12
EN61000-6-1: 2001-12
EN61000-4-2: 2001-12
EN61000-4-3: 2001-12

EN61000-3-2: 2001-12
EN61000-3-3: 2002-05

EN 60065: 2003-01

additional Certification of built in RF-modem AC4424I-100

EN 300 328-1 V1.3.1: 2001-12
EN 300 328-2 V1.2.1: 2001-12

EN 301 489-1 V1.3.1: 2001-09
EN 301 489-17 V1.1.1: 2000-09

FCC Rule Parts 15 C

Date:
2004-04-02

Signature

Ing. Walter Trauninger

Date:
2005-02-08

Declaration of Conformity

We, Manufacturer
ARRI CINE + VIDEO GERÄTE GmbH
Mariahilfer Strasse 136
A-1150 Wien
declare that the product
Universal Motor Controller
UMC-3

is in conformity with

EN 55103-1: 1997-06
EN 55103-2: 1997-06
EN61000-4-2: 2001-12
EN61000-4-3: 2001-12

EN61000-3-2: 2001-12
EN61000-3-3: 2002-05

EN 60065: 2003-01

additional Certification of built in RF-modem AC4424I-100

EN 300 328-1 V1.3.1: 2001-12
EN 300 328-2 V1.2.1: 2001-12

EN 301 489-1 V1.3.1: 2001-09
EN 301 489-17 V1.1.1: 2000-09

FCC Rule Parts 15 C

Signature

Ing. Walter Trauninger

Declaration of Conformity

We, Manufacturer
ARRI CINE + VIDEO GERÄTE GmbH
Mariahilfer Strasse 136
A-1150 Wien
declare that the product
Zoom Main Unit
ZMU-3

is in conformity with

EN 55103-1: 1997-06

EN 55103-2: 1997-06

EN61000-4-2: 2001-12

EN61000-4-3: 2001-12

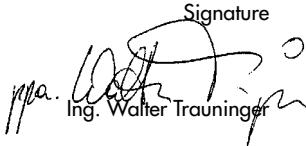
EN61000-3-2: 2001-12

EN61000-3-3: 2002-05

EN 60065: 2003-01

Date:
2005-02-08

Signature



ma. *[Signature]* Ing. Walter Trauninger

Technical data are subject to change without notice.

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JThieser@arri.de

Ident. No. K5.52423.0

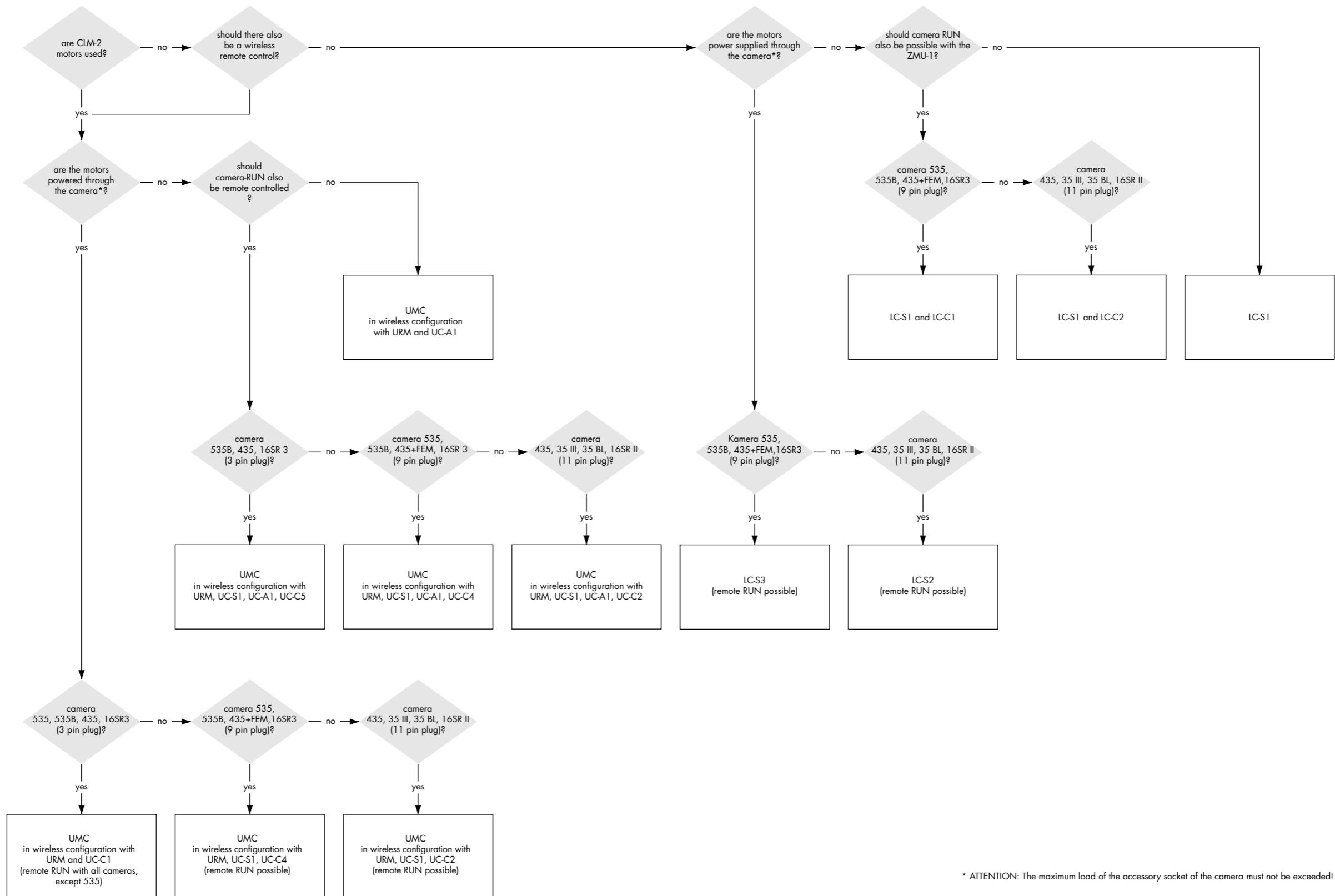
available languages
Deutsch
English

ARRI 
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FAX (089) 3809 - 1244 • <http://www.arri.de>

selection of the motor units and power supply

Note: LDB and FEM-2 are directly supplied through the camera



* ATTENTION: The maximum load of the accessory socket of the camera must not be exceeded!

Selection of the handcontrol units

