

# Digital Encoder Head DEH-2

OPERATING MANUAL

2023-09-07 (V1.0, English)



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Before using the products, be sure to read and understand all respective instructions. The products are available for commercial customers only.

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

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## For Further Assistance

Arnold & Richter Cine Technik GmbH & Co. Betriebs KG  
Herbert-Beyer-Strasse 10  
D-80807 Munich  
Germany

E-mail: [service@arri.com](mailto:service@arri.com)  
[www.arri.com/en/technical-service](http://www.arri.com/en/technical-service)

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# 1 About this document

## Audience

This operating manual is aimed at everyone involved in using the system and provides directions on how to operate it safely and as intended. To ensure safe and correct use, all users must read the operating manual before using the system for the first time.

This operating manual is an essential part of this product and must be easily accessible and in close proximity to the equipment so that users can use it as a reference anytime.

The separate user manuals for the Master Grips, OCU-1 and DEP-1 contains more detailed information about the features and functionalities of the device.

Please visit the website [www.arri.com](http://www.arri.com) to download the additional user manuals and much more information.

Keep the operating manual, the user manuals and all other operating and assembly instructions belonging to the system in a safe place for future reference and possible subsequent owners.

## How To Use This Manual

All directions are given from a camera operator's point of view.

For example, camera-right side refers to the right side of the camera when standing behind the camera and operating it in a normal fashion.

## Additional Information

For useful information in addition to this operating manual please have a look at the [ARRI Learn & Help](#) section on the ARRI website.

## Strengthen Your Knowledge and Get Trained

The ARRI Academy courses provide unrivalled insights into the full possibilities of working with ARRI camera systems, lenses, lights and accessories.

Our Advanced Service Training courses are designed to transfer detailed knowledge about how to service and repair all types of ARRI products and give you permanent access to detailed Service instructions, special tools and spare-parts. To learn more, please visit [ARRI Academy](#) or contact [academy@arri.de](mailto:academy@arri.de).

For further details, refer to the ARRI website at <http://www.arri.com/en/deh2>



For Tech Tips, refer to the ARRI website at <https://youtube.com/user/arrichannel>



## Document Revision History

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<b>Version</b>	<b>Release</b>	<b>Date</b>	<b>Description</b>
1.0		2023-04-11	Initial Release
1.01	K11330	2023-09-07	Certification updated

## 2 About the Product

### 2.1 Introduction

#### What is the DEH-2?

In Broadcast and Studio configuration the new fluid head with digital encoders DEH-2 covers the needs of sophisticated video shooters.

The DEH-2 can hold camera systems from 3 kg (7 lbs) to 30 kg (66 lbs) and up to 40 kg (88 lbs.), if their center of gravity is not higher than 100 mm.

An exceptional new fluid module in both pan and tilt ensures smooth movements, with perfect starts and stops. The drag system allows a wide variety from almost freewheeling in fast action movements to maximum resistance for perfect long focal shoots.

Counterbalance performs perfect balance at any angle from 0 to +/- 90 degrees. All operating knobs and levers are conveniently located and easy to reach with a special care for ergonomics.

The fluid head comes equipped with a telescopic pan bar, illuminated spirit level and digital readouts for drag control and counterbalance settings.

With the classic Mitchell base the DEH-2 interfaces with all flat base Mitchell tripods and platforms. Optional 150mm bowl base can be easily applied.

#### What does the DEH-2 do?

The resolution of the digital encoded fluid head DEH-2 for VR and AR applications is 4.2 Million counts / revolution for both pan and tilt. Both encoders are absolute encoders.

#### How does the DEH-2 work?

All ARRI encoded fluid heads are designed to be used with an ARRI system. The daisy-chain LBUS system makes integration very easy.

### 2.2 Intended use

#### ATTENTION

This product is an accessory for a camera stabilizer system. It is a repositionable support for camera systems and a high resolution encoder for professional VR and AR production environments.

Only use the product as described in the operating manual and user manual. Any other use is considered improper and can result in property damage. ARRI assumes no liability for damages or changes that are caused by improper use.

The entire product may not be changed or converted.

## 2.3 Technical Data



Weight	10,5 kg	23 lb
Minimum Payload Capacity	3 Kg	7 lbs
Maximum Payload Capacity	30 Kg	66 lbs
Bowl Diameter	Flat Base	Mitchell Mount
Fluid Drag	Continuous	
Counterbalance	Continuous	
Pan Range	360°	
Tilt Range	+/- 90°	
Encoder resolution	22 bit	4.194.304 Counts / Revolution
Output code	LBUS	BiSS-C
Drives	Clock and Data	RS422 levels
Clock Frequency	100 kHz ... 10 MHz	
Timeout Sens	12 µs	
Timeout Reg	51 µs	
Driver output current:	max 60 mA	
Short circuit output current:	+/- 250 mA	
3dB limiting frequency	500 kHz	
Absolute accuracy	+/- 35"	
Repeatability	+/- 10"	



## 2.4 Environmental Conditions

Temperature range	-15° C to +45° C / 5° F to +113° F
Storage temperature	-15° C to +85° C / 5° F to +185° F
Humidity	95% relative humidity max, non condensing

## 2.5 Certifications and Safety Standards

### Approval Information

The DEH-2 is approved for use in countries where the CE or FCC declaration is accepted. That contains the European Union, Canada, and the USA. Additionally, the DEH-2 can be used in many other countries, including UK, China (incl. HK), Australia, New Zealand, UAE, Singapore, Japan, India, Egypt, South Africa, Mexico, Serbia, Thailand, Israel, Philippines, Lebanon, Bangladesh and Indonesia. Additional countries might follow in the near future.

The import and use in other countries may be subject to legal, official or regulatory requirements and regulations. It is the importer's or the user's responsibility, prior to importation or use, to inform themselves of the applicable legal, regulatory and administrative requirements and regulations and to ensure compliance with these requirements and regulations. This includes the applying for and obtaining of all necessary approvals or registrations.

As far as reasonable and legally possible, ARRI will support requests in relation to such applications by providing technical documents or declarations. As an importer or user, you confirm that you are familiar and comply with the legal, regulatory, and administrative requirements and regulations that apply in the countries to which you ship or use the products. You further confirm that you will arrange for any necessary registrations, enrollments, or authorizations that are required in such countries.

You release ARRI from all obligations resulting from any legislative, regulatory, or administrative requirements regarding import or use of the products, except in countries where ARRI has obtained a registration or certification. You agree to indemnify, defend, and hold ARRI harmless from any and all claims, damages, losses, liabilities, costs, and expenses (including reasonable fees of attorneys and other professionals) that may arise out of a demand on ARRI in connection with your obligations mentioned above.

### EU Declaration of Conformity



Brand Name:	ARRI
Product	Accessory for Camera Stabilizer Systems
Description:	<b>DEH-2</b>

The designated products conform to the specifications of the following European directives:

- Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- Directive 2011/65/EU of the European Parliament and the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment and the Commission Delegated Directive (EU) 2015/863 of March 31, 2015.

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

- EN 55032:2015 + AC:2016 + A1:2020 + A11:2020
- EN 55035:2017 + A11:2020
- EN IEC 61000-3-2:2014
- EN IEC 61000-3-3:2013
- EN IEC 63000:2018

The manufacturer bears sole responsibility for issuing this declaration of conformity.

### UK Declaration of Conformity



Brand Name: ARRI  
Product: Accessories for Stabilizer Systems  
Description: **DEH-2**

The designated products conform to the specifications of the following United Kingdom regulations:

- The Electromagnetic Compatibility Regulations 2016
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The compliance with the requirements of the United Kingdom regulations was proved by the application of the following standards:

- EN 55032:2015 + A11:2020
- EN 55035:2017 + A11:2020
- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN IEC 63000:2018

The manufacturer bears sole responsibility for issuing this declaration of conformity.

### FCC Compliance Statement

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

Changes or modifications to the product not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### Industry Canada Compliance Statement

Complies with CAN ICES-003(A) / NMB-003(A).

### South Korea



DEH-2

Registration No. R-R-ARg-DEH-2

### 3 Safety Instructions

#### 3.1 Safety Conventions and Product Labels

##### Structure of Safety and Warning Messages

These instructions use safety instructions, warning symbols and signal words to draw your attention to different levels of risk:

**⚠ WARNING**

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

- ▶ Always follow the recommended measures to avoid this hazardous situation.

**⚠ CAUTION**

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

- ▶ Always follow the recommended measures to avoid this hazardous situation.

**ADVICE**

**ADVICE** signifies a potentially hazardous situation which can result in damage to property.

- ▶ Always follow the recommended measures to avoid this hazardous situation.

**ATTENTION**

Not relevant to safety, **ATTENTION** provides additional information to clarify or simplify a procedure.

##### Warning Symbols and Product Labels



General warning sign



Warning of electrical voltage



Warning of hot surfaces



Warning of hand injuries



Warning of the risk of crushing



Warning of obstacles on the ground




Please read all instructions carefully before using the product for the first time.



Direct Current symbol found on electronics requiring or producing DC power


### 3.2 General Safety Instructions

**⚠ WARNING**

 **Risk of injury and damage to property**  
 Risk of injury and damage to property caused by an unexperienced or untrained operator.


- ▶ The DEH-2 in combination with the SRH-3, SRH-360 stabilized remote heads and related products must only be installed and operated by experienced and trained personnel.
- ▶ This product is not designed for inexperienced personnel and must not be used without proper training.
- ▶ Read and understand the operating manual before use.

**⚠ WARNING**

 **Crushing during assembly and disassembly of the system**  
 Risk of injury through crushing.


- ▶ Installation and operation must only be carried out by trained personnel who are familiar with the system.
- ▶ Use appropriate tools when mounting and dismounting the system components.
- ▶ Risk of crushing fingers and hands when connecting and disconnecting the system components and cables.
- ▶ Use only accessories approved by ARRI. The use of accessories not approved by ARRI is at your own risk. Please observe all relevant safety guidelines.

**⚠ WARNING**

 **Risk of fire**  
 Risk of short-circuits and back currents to power supplies / batteries.

- ▶ Do not connect any external battery or power supply via the LBUS cable to the DEH-2, the Master Grips, the OCU-1 or any other LBUS Controller.
- ▶ Do not insert any objects into the product!

**⚠ WARNING**

 **Falling System Parts**  
 If the system is inadequately built up or assembled, it can fall down and cause serious injuries and damage to the system or property.

- ▶ Installation and operation must only be carried out by trained personnel who are familiar with the system. Observe accident prevention regulations.
- ▶ Do not place the system on an unstable trolley or hand truck, stand, tripod, bracket, table or any other unstable support device.
- ▶ Secure the system components and accessories against falling and tipping over.
- ▶ Hold the camera system when opening the slide lock so that it can not fall. Make sure the camera plate is securely mounted on the top of the DEH-2 and cannot slip off.
- ▶ Observe the general and local safety regulations.

**⚠ WARNING**



**Positioning the System on an Inclined or Unsafe Plane**

Risk of injury caused by the system tipping over.

- ▶ Observe the accident prevention regulations.
- ▶ Put the system on level and stable ground.
- ▶ Do not place the system on an unstable trolley or hand truck, stand, tripod, bracket, table or any other unstable support device.
- ▶ Always place the system on dedicated support devices.
- ▶ Use only accessories approved by ARRI. The use of accessories not approved by ARRI is at your own risk. Please observe all relevant safety guidelines.

**⚠ WARNING**



**Overloading the System by Persons or Objects**

Risk of injury caused by the system tipping over.

- ▶ Do not lean on the system.
- ▶ Do not place any unauthorized objects on the system.
- ▶ Do not hang any unauthorized objects on the system.
- ▶ Use only accessories approved by ARRI. The use of accessories not approved by ARRI is at your own risk. Please observe all relevant safety guidelines.

**⚠ CAUTION**



**Using the Product in a Humid Environment and with Condensation**

When moving the system from a cool to a warm location or when the system is used in a damp environment, condensation may form on the system components and on internal or external electrical connections. Operating the system while condensation is present bears risk of electric shock and/or fire caused by a short circuit.

- ▶ Never operate the system when condensation occurs.
- ▶ After moving the system from a cool to a warm environment, wait for some time for the system to warm up.
- ▶ To reduce the risk of condensation, find a warmer storage location.

**⚠ CAUTION**



**Connected Cable on the Floor**

Risk of injury caused by tripping, falling or slipping over connected cables.

- ▶ Always properly secure cables connected to the system.
- ▶ Install cables in a way that they cannot be tripped over.
- ▶ If necessary, use a cable duct or secure the cables with adhesive tape.
- ▶ Disconnect the cables from the product before moving.

**⚠ CAUTION****Risk of Damage from Battery Acid**

Risk of damage to the system.

- ▶ Remove the battery for the illuminated display and bubble level during long term storage.
- ▶ Replace an empty battery immediately to avoid damage from battery acid.

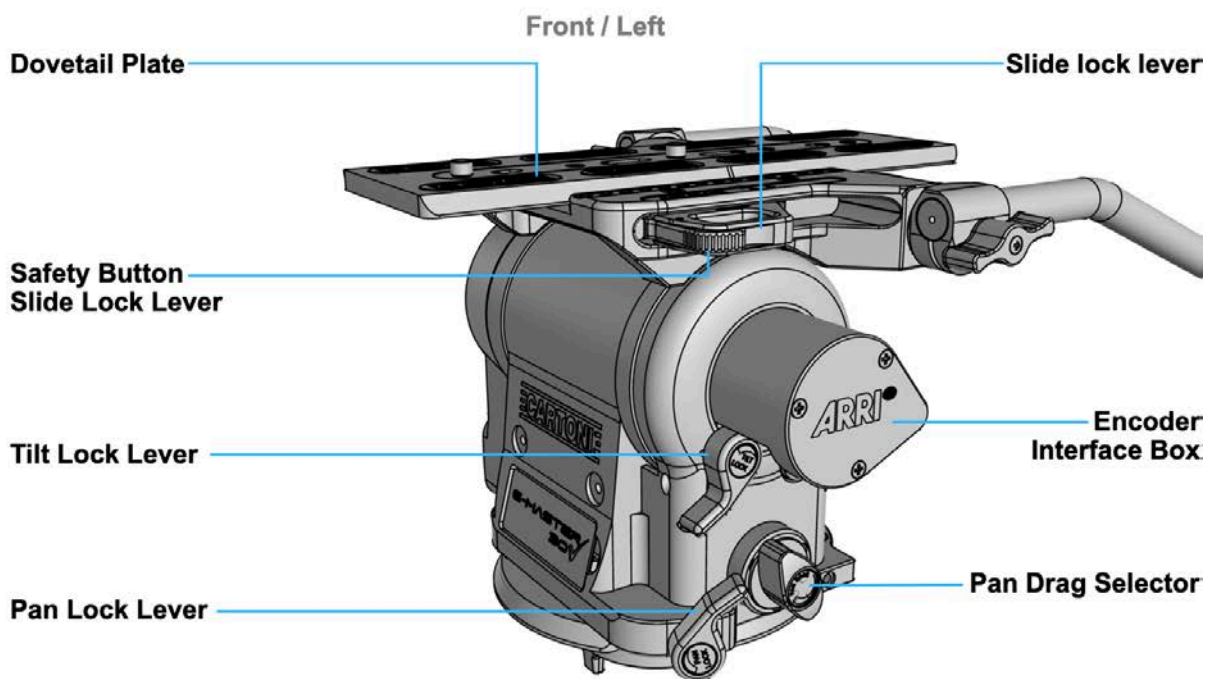
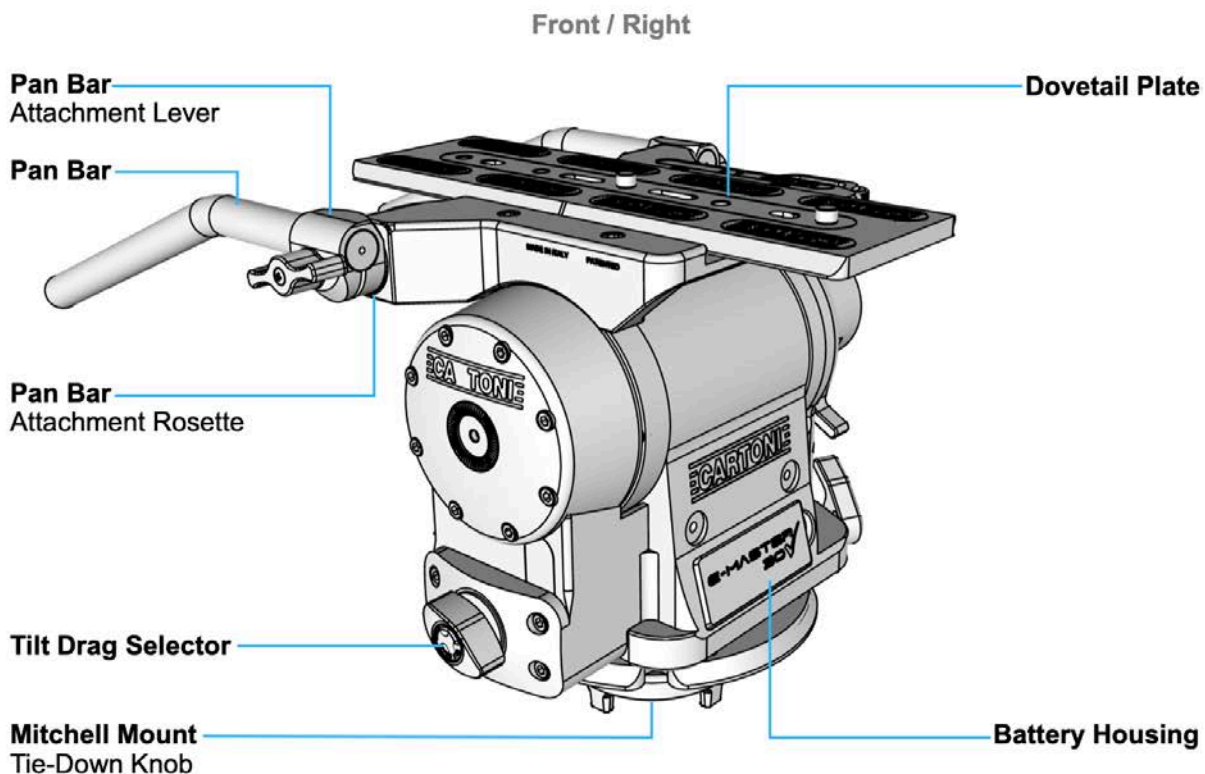
**ADVICE****Part Loosening Caused by External Vibration**

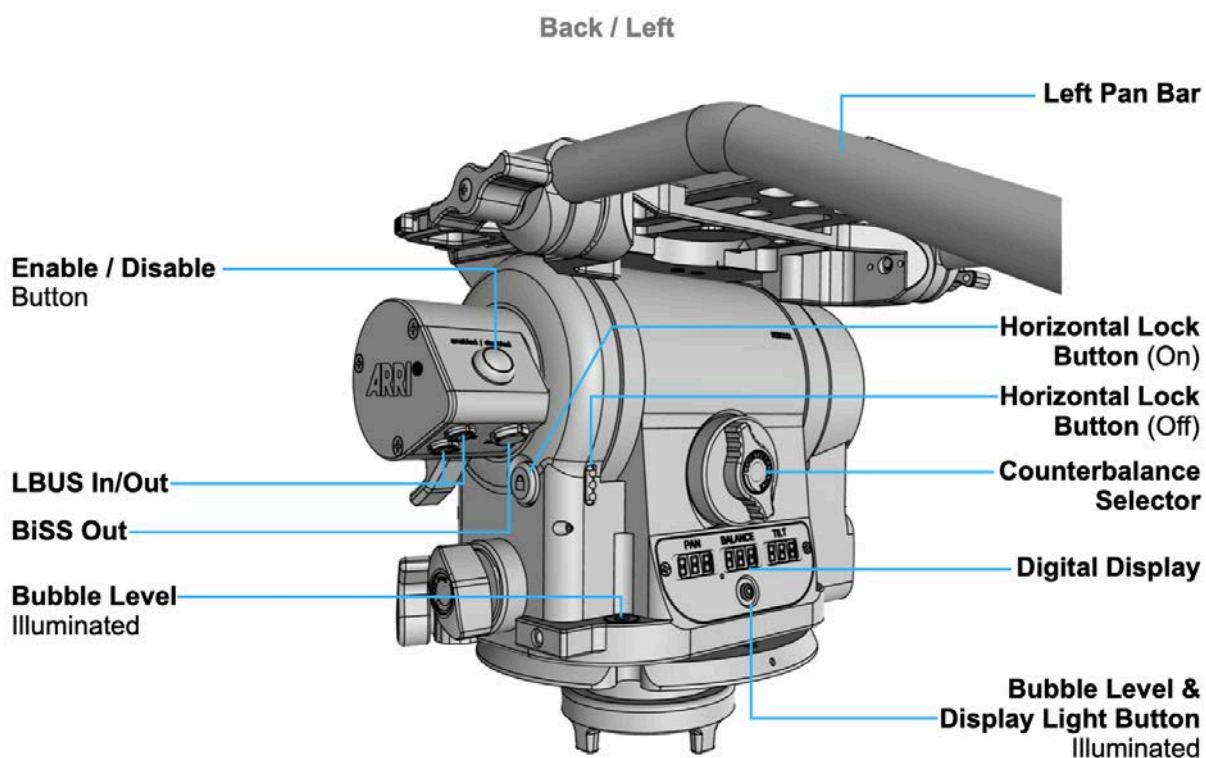
Risk of damage to the system.

- ▶ Do not use and store in places where the system will be subject to vibration.

# 4 Installation and Operation

## 4.1 DEH-2 Overview







## 4.2 DEH-2 Installation

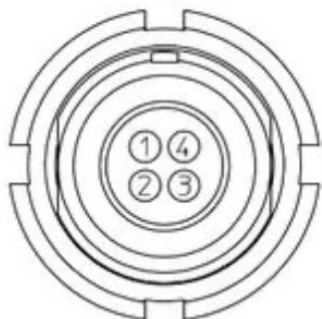
### ADVICE

- Read and understand this operating manual, before you use the DEH-2 encoder / fluid head.
- Check the stability of the tripod, before you install the DEH-2 encoder / fluid head on the tripod.

- ▶ Open the tripod to the desired height and lock all safety knobs.
- ▶ Place the DEH-2 encoder / fluid head on the tripod base and rotate until it matches the steel notch. Tighten the head firmly by screwing in the knob underneath the flat base. Check the illuminated bubble level and modify the legs angle if needed. In case of low visibility, press button for illuminated bubble level and to activate the digital displays. Lights will turn off automatically after approximately 30 seconds.
- ▶ Push the horizontal lock button in to lock the horizontal position. Turn the pan lock lever clockwise to lock the pan movement. Turn the tilt drag selector and counterbalance selector to position "0".
- ▶ To release the camera plate push the red safety button and open the slide lock lever completely till to position 2. Remove the camera plate.
- ▶ Attach the camera plate under the camera assembly and firmly secure it with both screws. Try to place the camera plate centered under the camera system. Keep the position of the center of gravity (CG) in mind.
- ▶ Place the camera on the top of the DEH-2 encoder / fluid head, leaning it sideways against the left side of the head (slide lock side). Push the assembly into horizontal position until you feel the click of the slide lock lever, which will be in position 1 (at this point the camera plate is clamped but still moving fore-and-aft).
- ▶ Hold the pan bar firmly. Push the horizontal lock button out to disengage the horizontal lock. Find the correct center of gravity (CG) sliding the camera assembly fore-and-aft. Lock the slide lock lever in position "0".
- ▶ Set the counterbalance system by turning the counterbalance selector to the appropriate tension. The camera has to stay still at any tilt angle. If needed, fine tune the balance by adjusting the sliding plate.
- ▶ Push button to activate illuminated digital displays. Turn the pan lock lever counter-clockwise to unlock the pan movement. Turn the pan drag selector and tilt drag selector to set the desired fluid drag intensity on both pan and tilt.

## 4.3 Pin Out

### LBUS



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

### BiSS



- 1 +12/24 V<sub>IN</sub>
- 2 GND
- 3 PAN-DATA
- 4 PAN-DATA-N
- 5 PAN-CLK
- 6 PAN-CLK-IN
- 7 TILT-DATA
- 8 TILT-DATA-IN
- 9 TILT-CLK
- 10 TILT-CLK-N

- 
- The BiSS module inside the DEH-2 must be supplied with 12/24 V DC via the BiSS socket (pin 1). Otherwise it will not work.
  - Please note that only one of the two interfaces (LBUS or BiSS) is active at the same time. You cannot use both interfaces simultaneously.
-

## 4.4 LBUS Setup

ADVICE
<ul style="list-style-type: none"><li>• Read and understand this operating manual, before you use the DEH-2 encoder / fluid head.</li><li>• Read and understand the user manuals of the components used with the DEH-2 (e.g. LBUS controllers like Master Grip Wheel / Rocker, OCU-1, DEP-1) before installation and operation.</li></ul>

### LBUS

The entire digital communication of the DEH-2 is based on the LBUS.

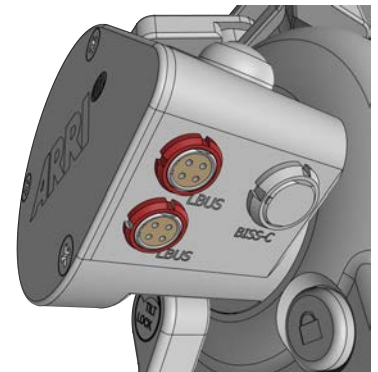
LBUS is an ARRI/cmotion bus standard designed to allow multiple lens motors and control devices to communicate with each other.

The DEH-2 is equipped with two bi-directional LBUS interfaces providing power and control signals and daisy chain technology.

This allows the use of current LBUS controllers such as the Master Grip Wheel / Rocker, OCU-1 and DEP-1.

Future LBUS controllers should become usable through according future SUPs.

⚠ WARNING
<p><b>⚠ Risk of fire!</b> Risk of short-circuits and back currents to power supplies / batteries.</p> <ul style="list-style-type: none"><li>▶ Risk of short-circuits and back currents to power supplies / batteries.</li><li>▶ <b>Do not insert objects!</b></li></ul>



### Master Grip Wheel / Rocker / OCU-1

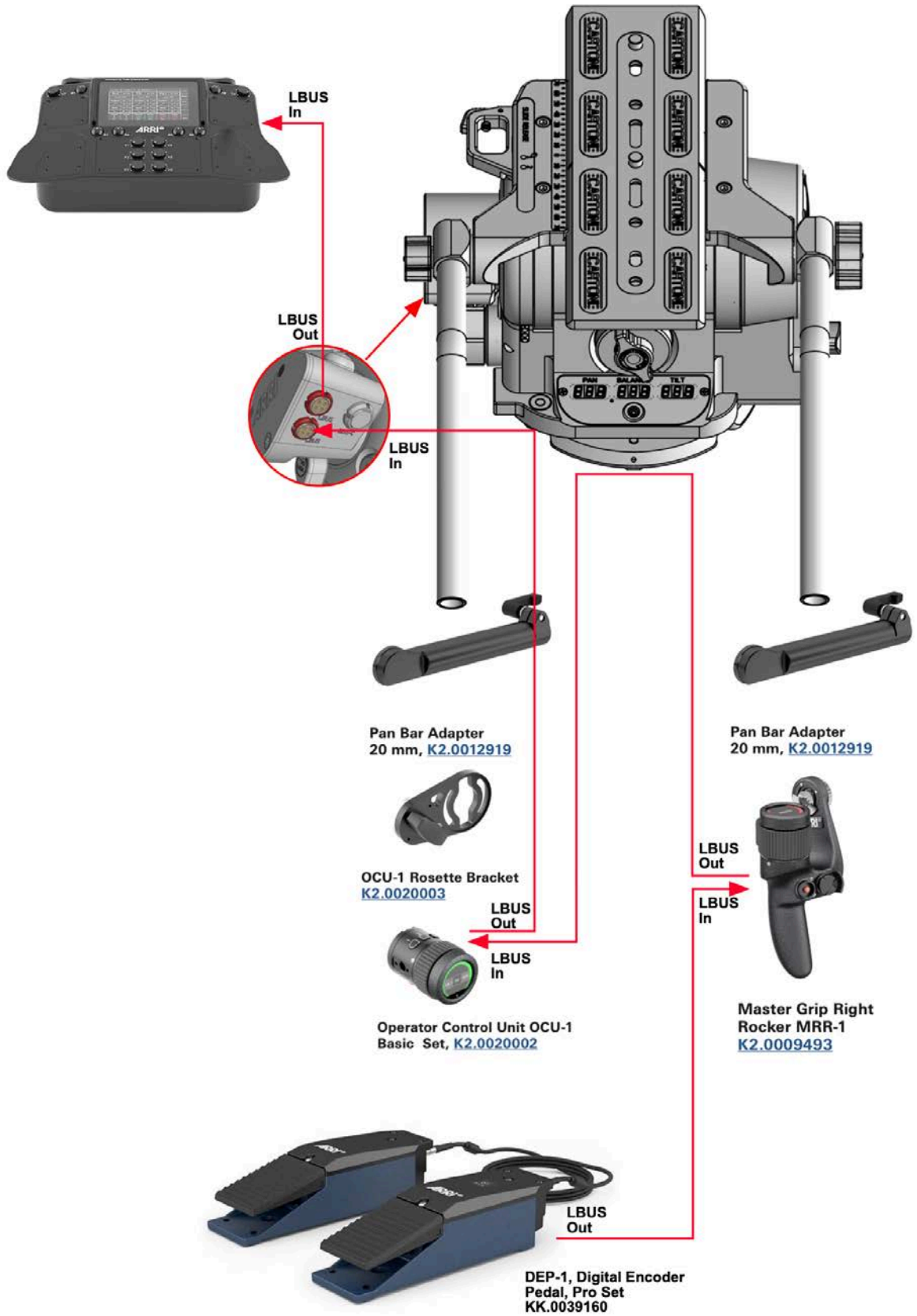
When the Master Grip Wheel / Rocker is connected to the remote control via the DEH-2, the Master Grip Wheel / Rocker switch to the so-called remote mode. The display shows **Remote**.

#### NOTE

If **Remote** is not shown in the display, the software on the Master Grip Wheel / Rocker / OCU-1 is out of date and needs to be updated.




### Possible LBUS Controller Setup



# 5 Cleaning and Repair

## Cleaning Instructions

ADVICE	
	<b>Improper Cleaning Procedure</b> Risk of damage of surfaces.
	<ul style="list-style-type: none"><li>▶ Only use the cleaning agents specified in this chapter.</li><li>▶ Do not use any strong or aggressive cleaning detergents like Methanol, Acetone, Benzine or acids. These chemicals may dissolve the paint on the accessories and damage highly polished surfaces.</li><li>▶ Do not moisten connectors when cleaning.</li><li>▶ Compressed air must not be used on the electronic accessories.</li></ul>


## Cleaning Information

Before cleaning, remove the accessories from the system and disconnect all cables.

Clean the accessories with a soft, lint free cleaning cloth and some water or glass cleaner.

Only when really necessary, e.g. to remove residues of camera tape, isopropyl alcohol should be used.

## Repair

⚠ WARNING	
	<b>Repairs carried out by Untrained Personnel</b> Risk of injury and damage.
	<ul style="list-style-type: none"><li>▶ Do not try to repair the device yourself. Repairs may only be carried out by authorized ARRI service partners.</li></ul>

For repairs and maintenance work on the system, please contact the [ARRI Service](#).

## 5.1 To Change the Battery

### ADVICE


The DEH-2 is equipped with a battery to supply the illuminated display and bubble level.  
Never use a rechargeable battery. Only use a 6LR61 type 9V battery in the DEH-2.  
Disconnect and remove the battery during long term storage.

#### To change the battery


1. Open the battery housing.
2. Take the battery out of the battery housing.
3. Carefully remove the battery connector. Do not damage the connector.
4. Connect the battery connector to a new 6LR61 9V battery. Pay attention to the correct polarity.
5. Slide the battery back into the battery housing and close the housing.

## 6 Transportation, Storage and Disposal

### Transportation and Storage

ADVICE	
	<b>Improper Packing and Transportation</b> Risk of damage to the accessories.
	<ul style="list-style-type: none"><li>▶ Unplug all cables during transport.</li><li>▶ Only transport and storage the accessories in suitable cases.</li><li>▶ Follow the specified environmental conditions. Do not store the accessories in places where they may be subject to temperature extremes, direct sunlight, high humidity, severe vibration or strong magnetic fields.</li></ul>

If you have any questions regarding the transport or storage of ARRI products, please contact the [ARRI Service](#).

ATTENTION	
	The product can be returned to the manufacturer Arnold & Richter Cine Technik GmbH & Co. Betriebs KG.
	This product falls within the scope of Directive 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of June 4, 2012 on waste electrical and electronic equipment (WEEE II). Accordingly, this product must not be disposed of with household waste. There are the respective country specific disposal rules that must be observed.

# 7 Specification of the BiSS Protocol

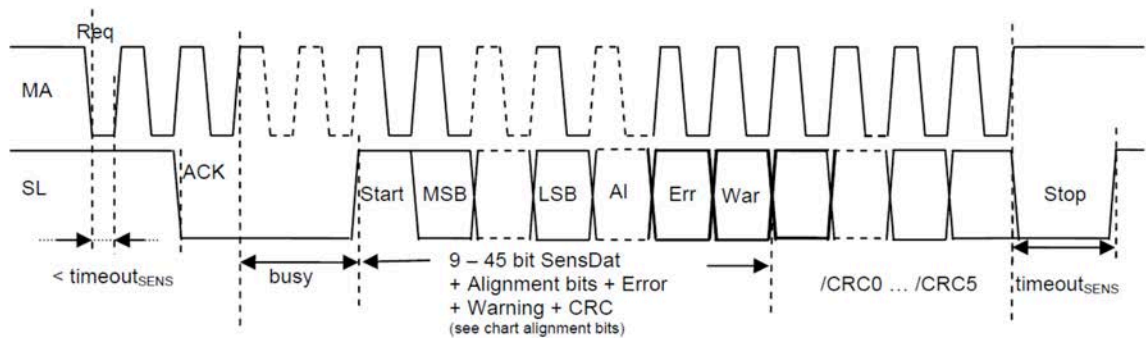
## Bidirectional Serial Sensor Interface (BiSS)

The Serial BiSS communication differentiates between the fast transmission of sensor data and the slower transmission of register data. The transmission of sensor data is unidirectional; here, encoder can only output data, whereas the bidirectional transmission of register data can include read and write access.

The BiSS sensor interface can be operated in an SSI compatible mode, in which only a lower transmission speed is possible and encoder may not demand processing time for procedures such as interpolation, for example.

### Transmitting sensor data (BiSS-Mode)

Transmission is initiated by a falling edge on the master line (MA). The master then again ramps the master line up to high within a stipulated period (<timeouts<sub>SENS</sub>) and continues the clock pulse. encoder acknowledges the request for sensor data on the second rising MA edge with a low signal at SLO (see description of the BiSS protocol). The next rising edge gives the validity of the position data and is interpreted as a start bit by the master. Depending on the configuration the length of encoder's position data varies between 9 and 45 bits, plus an error bit and a warning bit. With a maximum length of 47 bits this data is protected by a 6-bit cyclic redundancy check value or CRC (polynomial 0x43 = "1000011b") which directly follows the data. MCD: Multicycle data is not supported!



### Transmission of sensor data in BiSS mode.

The Warning – Bit (War) is coupled to the internal temperature sensor of the OptoAsic. It is high, when the following temperature limits are exceeded or under - run:

Operating temperature	Internal Warning thresholds
- 15° ... +120°C	-20° .. +125°C

The Error – Bit (Err) is coupled to the LED – current. It is high, when an factory defined threshold is exceeded. An excess LED current can indicate Pollution; Condensation, Over temperature or Ageing of the LED.



**Chart: Alignment Bits**

MT	ST	Alignment Bits
0	9	0
12	10	0
16	11	0
20	12	0
24	13	0
	14	0
	15	2
	16	1
	17	0
	18	6
	19	5
	20	4
	21	3
	22	2
	23	1
	24	0

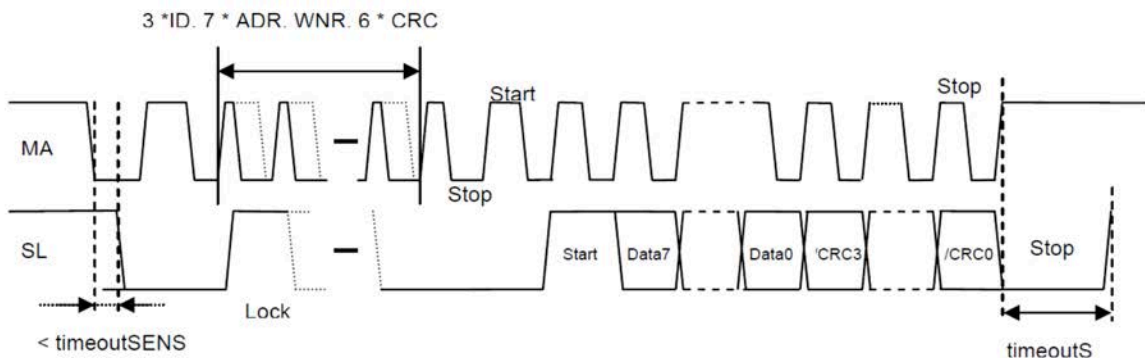
Values in columns: "Length of Data bits"

**Register – mode ( BiSS – Interface)**

The register communication is initiated by a low signal following the first falling edge from the master on the clock line. The master keeps the clock line on low until the encoder reacts with a falling edge on the data line and thus signaled the changeover to register mode. After this has happened the master transmits the addressing data coded as a PWM signal (pulse width modulated clock signal). The individual sensors (slaves) are addressed by slave IDs which are generated automatically according to the order of the slaves in the sequential circuit. encoder uses two slave IDs (e.g. ID "000" and "001") so that it can extend the available addressing range from 7 to 8 bits.

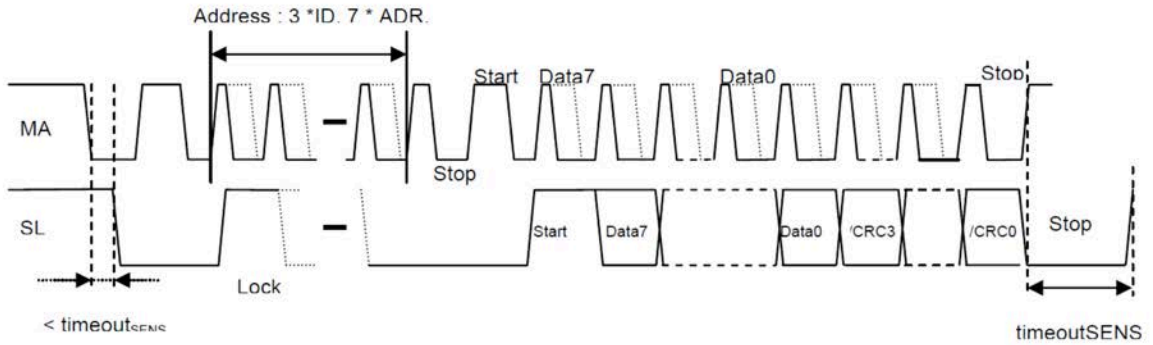
**Register mode: Read**

Once encoder has signaled the changeover to register mode the master transmits the start bit, the 3-bit slave ID and the 7-bit register address for the addressing sequence, followed by the WNR bit ("0") and the 6-bit CRC. Each bit is coded by the duty cycle (PWM), including the start bit. The generator polynomial for the 4-bit CRC is  $0x13 = "10011"$  (see the definitions in the description of the BiSS protocol). The encoder does not require any processing time to read the internal registers and answers immediately with the data of the addressed registers. When reading the external EEPROM registers the output is delayed until the data from the EEPROM has been made available. All 8-bit read data can also be checked for transmission errors by the 4-bit CRC  $0x13$ .

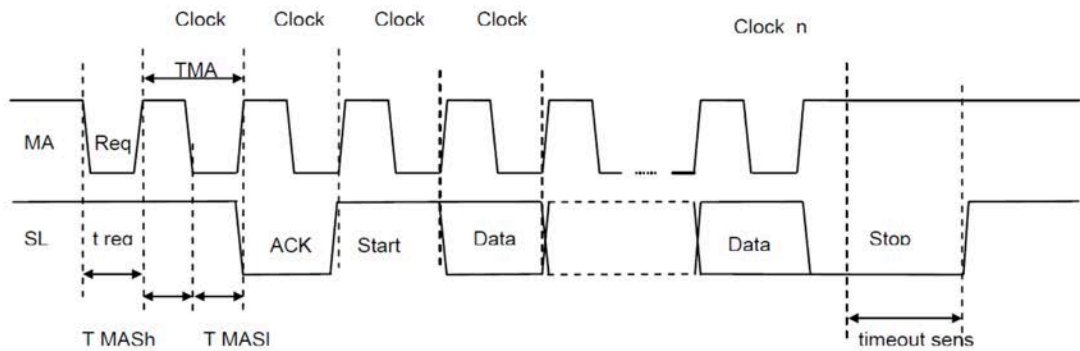


**Register mode: Write**

When data is being written to a register, after the encoder has confirmed the mode changeover the same addressing sequence as for read access is used (with the WNR bit at “1”). Following the second start bit the master transmits the data to be written which encoder returns for verification, bit by bit one clock pulse later. As in the above, a 4-bit CRC have to follow the 8-bit write data which is returned by encoder in the same manner, however not in PWM format. A transfer to the EEPROM registers is processed in the background and can be validated by a read access once transmission is over.

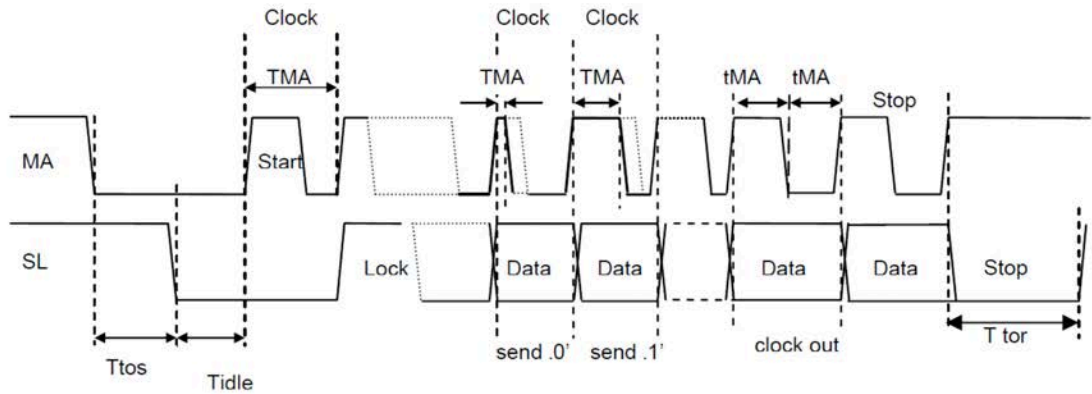


**Timing BiSS Sensor Mode**



BiSS Sensor Mode						
Symbol	Parameter	Conditions	min	typ	max.	Unit
timeout sens (Ttos) <sup>2</sup>			9,9	12,4	14,9	µs
TMAS	Permissible Clock Period		100 ns		2* Ttos	
tMASH	Clock Signal Hi Level Duration		50		Ttos	ns
tMASI	Clock Signal Lo Level Duration		50		Ttos	ns
Treq	Data Request Lo Level Duration	only with SAR converter	50		Ttos	ns

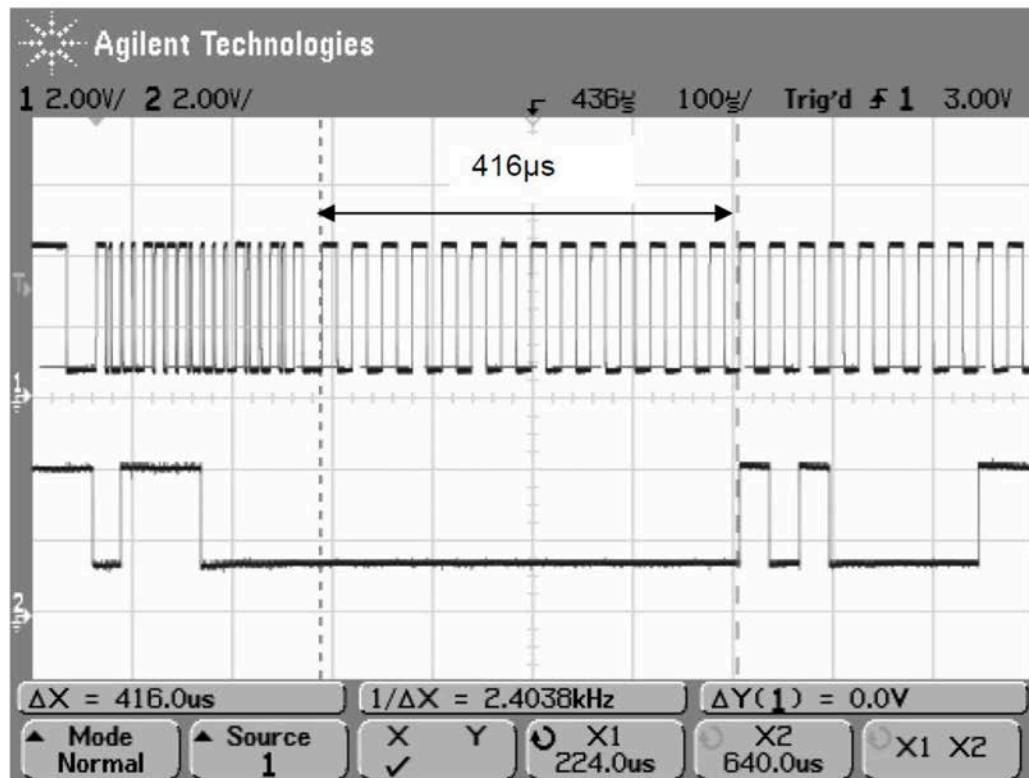
### Timing BiSS Register Mode



BiSS Register Mode					
Symbol	Parameter	Conditions	Min	Max.	Unit
TMAR	Permissible Clock Period	CFGTOR = 2Eh	4	52	µs
Tidle	Permissible Clock Halt (idle)		0	Indefinite	
tMARh	Clock Signal Hi Level Duration	read out of register data	50 %		% TMAR
tMARI	Clock Signal Lo Level Duration			Ttor	ns
tMA0h	.Logic 0" Hi Level Duration		10	30	% TMAR
tMA1h	.Logic 1" Hi Level Duration		70	90	% TMAR

Example for read register 78h

Keep clock active until start bit is sent by encoder. Approx. time ~ 416 µs.



See Figure: The clock should be applied until encoder sends ACK ( $\sim 416 \mu s$ ). This time is needed because the ASIC has to read the EEPROM internally before sending the data. There are different times for different registers because registers are mapped either directly in the ASIC or externally to an EEPROM value (takes more time).

## 8 ARRI Service Contacts

Please see the current list of service partners at [Service contacts](#)



**Arnold & Richter Cine Technik GmbH & Co. Betriebs KG**  
Herbert-Bayer-Str. 10  
80807 Munich  
Germany  
+49 89 3809 2121  
Business hours:  
Mo. - Fr. 09:00 am - 05:00 pm (CET)  
service@arri.de

**ARRI Inc. / West Coast**  
3700 Vanowen Street  
CA 91505 Burbank  
USA  
+1 818 841 7070  
Business hours:  
Mo. - Fr. 09:00 am - 05:00 pm (PT)  
service@arri.com

**ARRI Canada Limited**  
1200 Aerowood Drive, Unit 29  
ON L4W 2S7 Mississauga  
Canada  
+1 416 255 3335  
Business hours:  
Mo. - Fr. 08:30 am - 05:00 pm (EDT)  
service@arri.com

**ARRI Asia Pte. Ltd.**  
164 Kallang Way, #03-01  
349248 Singapore  
Singapore  
+65 6230 9488  
Business hours:  
Mo. - Fr. 9:00 am - 06:00 pm (CST)  
service@arri.asia

**ARRI CT Limited / London**  
2 Highbridge, Oxford Road  
UB8 1LX Uxbridge  
United Kingdom  
+44 1895 457 000  
Business hours:  
Mo. - Thu. 09:00 - 17:30  
Fr. 09:00 am - 05:00 pm (GMT)  
service@arri-ct.com

**ARRI Inc. / East Coast**  
617 Route 303  
NY 10913 Blauvelt  
USA  
+1 845 353 1400  
Business hours:  
Mo. - Fr. 08:00 am - 05:30 pm (EST)  
service@arri.com

**ARRI Australia Pty Ltd**  
Suite 2, 12B Julius Ave  
NSW 2113 North Ryde  
Australia  
+61 2 9855 4305  
Business hours:  
Mo. - Fr. 08:00 am - 05:00 pm (AEST)  
service@arri.com.au

**ARRI China (Beijing) Co. Ltd.**  
Chaowai SOHO Tower C, 6/F, 0628/0656  
Chaowai Dajie Yi 6  
Beijing  
China  
+86 10 5900 9680  
Business hours:  
Mo. - Fr. 09:00 am - 06:00 pm (CST)  
service@arri.cn

**ARRI Hong Kong Limited**

41/F One Kowloon, 1 Wang  
Yuen Street Kowloon Bay  
Hong Kong  
China  
+852 2537 4266  
Business hours:  
Mo. - Fr. 09:00 am - 06:00 pm (CST)  
service@arri.asia

**ARRI Japan Kabushiki Kaisha**

Service  
Haneda Innovation City Zone K210, 1-1-4  
Hanedakuko, Ota-Ku  
144-0011 Tokyo  
Japan  
+81 3 6635 3750  
Business hours:  
Mo. - Fr. 10:00 am - 06:00 pm (JST)  
info@arri.jp

**CINEOM Broadcast DMCC.**

Unit No. 2109, Jumeirah Bay Tower X2 Cluster X  
Jumeirah Lakes Towers  
P.O Box 414659  
Dubai, UAE  
+971 (0) 45570477  
Business hours:  
Sa. - Th. 10:00 am- 06:00 pm  
arriservice.me@cineom.com

**LINKA İthalat İhracat ve Dış Tic.**

Distributor  
Halide Edip Adivar Mah. Darülaceze Cad.  
No:3 Akın Plaza Kat:5 95-96  
34381 Şişli, İstanbul  
Turkey  
+90 2123584520  
Business hours:  
Mo. - Fr. 09:00 am - 06:00 pm (EET)  
service@linkgroup.com.tr

**ARRI Korea Limited**

Kolon Digital Tower 1(#1505-06), 25  
Seongsuil-ro 4 gil, Seongdong-gu  
04781 Seoul  
Korea  
+82 (0)70 4419 6401  
Business hours:  
Mo. - Fr. 9:00 am - 06:00 pm (KST)  
service@arri.kr

**ARRI Brasil Ltda**

Avenida Ibirapuera 2907 – Cj. 421, Indianópolis  
04029-200 São Paulo  
Brazil  
+55 1150419450  
Business hours:  
Mo. - Fr. 09:00 am - 05:30 pm (BRT)  
arribrasil@arri.com

**CINEOM Broadcast India Pvt. Ltd.**

C-4, Goldline Business Centre  
Link Rd. Malad West  
400 064 Mumbai  
India  
+91 (0)22 42 10 9000  
Business hours:  
Mo. - Sat. 10:00 am - 06:00 pm (IST)  
arrisupportindia@cineom.com