Scope

This document describes the components, the setup and programming of the DRW-1 Digital Remote Wheels.

Disclaimer

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

Otherwise the customer must contact ARRI before using the product.

While ARRI endeavors to enhance the quality, reliability and safety of their products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely.

To minimize the risk of damage to property or injury (including death) to persons arising from defects in the products, customers must incorporate sufficient safety measures in their work with the system and heed the stated conditions of use.

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

ARRI assumes no responsibility for any errors that may appear in this document.

The information is subject to change without NOTICE.

For product specification changes after this manual was published, refer to the latest published ARRI data sheets or release notes, etc., for the most up-to-date specifications.

Not all products and/or types are available in every country. Please check with an ARRI sales representative for availability and additional information.

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For your safety

**Warning**

The DRW-1 in combination with the SRH-3 stabilized remote head and related products should only be used by experienced and trained operators. This product is not designed for inexperienced users and should not and must not be used without proper training. ARRI recommends that all users of the DRW-1 and the stabilized remote head read the manual in its entirety prior to use.

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.

**NOTICE**

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

Strengthen Your Knowledge and Get Trained
The ARRI Academy courses provide unrivaled insights into the full possibilities of working with ARRI camera systems, camera stabilizer systems, lenses, lights and accessories. To learn more, please visit [http://arri.com/academy](http://arri.com/academy).

1.1 Risk Levels and Alert Symbols
Safety warnings, safety alert symbols, and signal words in these instructions indicate different risk levels:

**DANGER**

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

**Warning**

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

**CAUTION**

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

**NOTICE**

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

**NOTE**

Provides additional information to clarify or simplify a procedure.
2 Functions

2.1 Functions top view

Clamp Lever
Wheel Carrier
P T R Selector
Fluid Drag Ring
(Friction)
Crank
Hand Wheel
(150mm diameter)
Wheel Carrier
Brake
(for the selected axis)
Cover mounting bay
for the additional 3. axis

RMB-3 mounting threads
Clamp Lever
Mounting Bracket
SRH Remote
Mounting Bracket
Clamp Lever
Swivelling Rods
Clamp Lever
Wheel Carrier
PTR Selector
Brake
(for the selected axis)
Hand Wheel
(150mm diameter)
Locking Screw
Hand Wheel

2.2 Functions bottom view

Wheel Carrier
3/8" Thread
DRW-1 Mounting Base
Cover Screws
Wheel Carrier

Circular arranged threads
for Mitchell and Euro mounts
Clamp Lever
Mounting Bracket
3/8" Thread
SRH Remote
Mounting Bracket
Swivelling Rods
Clamp Lever
Swivelling Rods
Circular arranged threads
for Mitchell and Euro mounts
3 DRW-1 Setup

3.1 Mounting the DRW-1 base

The bottom of the DRW-1 mounting base offers multiple mounting options:

3/8” threads for long camera dovetail plates, like the O’Connor plate (08283),
Euro style quick release plate (2575-120),
Sachtler sideload plate M (1164),
Cartoni Camera plate Focus12-18-22 (AH859)
Cartoni Camera plate - Cine style slide (AH833)

Below are three circular threaded sets for Mitchell and Euro mounts.
The following brackets can be used:
Mitchell Mount K2.0010427
Euro Mount K2.0010426
and the O’Connor Mitchell Base 08281.

NOTE
To ensure a tight fit, use a minimum of two 3/8” screws when a dovetail plate is used and four screws for the Euro Mount and the Mitchell Mount.

3.2 Mounting the DRW-1 modules

There are three M3 threads positioned at the left, at the bottom, and the right side of the DRW-1 module.

Place the DRW-1 module carefully into the DRW-1 carrier and tighten all three screws using a 3mm hex key.

NOTE
Ensure that all three screws are tightened evenly, otherwise the DRW-1 module will have a loose fit, which may affect the application.

3.3 Mounting the hand wheel

Turn the location pin of the drive shaft to a 12:00 o’clock position.
Turn the blue fluid drag ring (friction) to the right to reach full friction.
Locate the groove inside the mounting hole of the hand wheel and bring it into the 12:00 o’clock position too.
Now place the wheel onto the conic drive shaft.
When the hand wheel has reached its final position, tighten the blue locking screw.

NOTE
Turn the fluid drag ring (friction) fully back to the left to reach the lowest possible friction level.
3.4 Mounting the Remote Control

The bottom of the remote control offers four M6 threads. Open the clamp lever of the remote mounting bracket, remove the bracket from the rods of the DRW-1 mounting base. Place the DRW-1 SRH remote mounting bracket to the bottom of the remote control. Tighten the four included M6 screws.

<table>
<thead>
<tr>
<th>Danger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not use any screws longer than M6x12. Longer screws may cause damage.</td>
</tr>
</tbody>
</table>

3.5 Adding the optional third hand wheel

The ARRI engraved cover can be removed after the two screws at the bottom holding the cover have been unscrewed.

Now the third wheel carrier can be mounted to the bay.

Redo step 3.2.

NOTE
Ensure that all three screws are tightened evenly, otherwise the DRW-1 module will have a loose fit, which may affect the application.
Connecting the LBUS cables

4.1 Introduction

Each DRW-1 module is equipped with two LBUS connectors and daisy-chain technology. Up to three DRW-1 modules can be connected in series.

Each DRW-1 module has two identical bidirectional LBUS interfaces that provide the DRW-1 module with power and control signals.

4.2 Connecting the DRW-1 modules

The DRW-1 Set comes with the following LBUS cables:

1 x Cable LBUS 0.3m/1ft  K2.0006750
1 x Cable LBUS 0.5m/1.5ft K2.0006751

The illustration shows how one wheel is linked to the other and then with the remote.

The LBUS jacks are located on the sides of the remote control.
5 Selecting the axes

Each DRW-1 module has a selection button for Pan, Tilt and Roll, at the top.

Initially Roll of P T R will be selected and visible, after the SRH remote panel had been connected to the LBUS.

By pressing the button Pan, Tilt and Roll, the desired axis for each wheel can be selected.

**NOTE**
Ensure that each wheel is assigned to only one individual axis. Avoid assigning two wheels to the same axis.

**NOTE**
A blue blinking LED indicates a problem in the LBUS daisy chain.

6 The brake

The DRW-1 wheels are equipped with a brake lever, which goes back to the ARRI Gear Head.

The brake lever allows the operator to engage or disengage the wheel from the selected motor axis.

**NOTE**
An unlocked wheel will be indicated by a green LED. A locked wheel will be indicated by a red LED.

**NOTE**
Disengaging the wheels can also support operation.

When you need to reproduce a movement and you want the position of the crank to be at a certain angle, for example at the end of the movement, than first move the head to the desired end position, disengage the wheel and bring the crank to the required angle. Now engage the wheel again and move the head backwards to the starting point. Start the movement from the beginning.

7 Fluid Drag Ring (friction)

The DRW-1 wheels are equipped with a fluid drag ring, which allows friction to be adjusted.

This unique feature allows the operator to control the accuracy of the head through a mechanical friction adjustment instead of a software value such as ramp.

Due to the mechanical friction, the ramp values in the remote control can be set to 0 or close to 0. The mechanical friction ensures that the DRW-1 wheels and remote head respond quickly and accurately.
8 Remote Control Setup

8.1 Auto Assignment DRW-1

SUP2.2 introducing the so-called Auto Assignment.

For a fast and easy setup, this menu will show up, as soon the DRW-1 is connected to the remote control.

The Auto Assignment will set:

- DRW-1 Tilt, Pan and Roll axes
- SENSITIVITY to 0
- DEADBAND to 0
- RAMP to 0
- MODE Angle

8.2 Quick Setup

1. Daisy chain the single modules with each other
2. Connect the LBUS cable to the remote control
3. Select Pan, Tilt, Roll for each DRW-1 module
4. Press OK at the touchscreen

Selecting OK automatically sets all required values.

NOTE
Press Cancel if the DRW-1 has already been assigned and personal values have already been set.

Press OK to overwrite your previous settings.

The Auto Assignment function can be deactivated in the settings for the remote control.

8.3 Selecting the Mode

There are two ways to use the DRW-1: Angle Mode (preset) and Speed Mode.

Angle Mode the right choice when extremely precise movements are needed.

Every movement of the DRW-1 is transferred to the remote head with the exact degree of precision.

Speed Mode is the right mode when high dynamic action needs to be covered.

Touch Menu at the lower right corner of the home screen to reach the Main Menu.

In the Main Menu select Head to reach the head menu.

Touch Mode to toggle between Angle and Speed.

Press Save after the Mode is selected.
8.4 Speed setup in Angle Mode

**NOTE**
In order to operate the DRW-1 correctly in *Angle Mode*, the following settings shall be made:

- **Speed** 100
- **SENSITIVITY** set to 0
- **DEADBAND** set to 0
- **RAMP** set to 0
- **Ratio** set to 0

In the factory preset setup, the **Speed** is assigned to the knobs K1, K2 and K3.

**NOTE**
In order to achieve a faster movement in *Angle Mode*, the **Ratio** values must be adjusted. See page 12.

8.5 Speed setup in Speed Mode

**NOTE**
In order to operate the DRW-1 correctly in *Speed Mode*, the following settings shall be made:

**Speed** 01 - 100
- **SENSITIVITY** set to 0
- **DEADBAND** set to 0
- **RAMP** set to 0
- **Ratio** set to 0

A lower **Speed** value will **under crank** the movement of the remote head.

A higher **Speed** value will **over crank** the movement of the remote head.

8.6 Ramp (K4, K5, K6)

In the factory preset setup, ramp is assigned to the knobs K4, K5 and K6.

Initially, ramp should be set to 0.

**NOTE**
A high positive ramp value will delay the response of the remote head.

The DEH-1 will start and stop progressively softer as the value increases.

**NOTE**
By unassigning K4, K5, K6 you can set individual ramp values for start and stop for each axis. The setting is then made via the touchscreen, by Selecting **Menu**, **Controls**, **Position**, **Ramp Start** and **Ramp Stop**.
8.6 **Ratio (Angle Mode)**

Because the ARRI DRW-1 wheels are the digital version of the ARRI Geared Head 2, the DRW-1 wheels also offer the classic 3-speed drive with the original gear ratio.

**NOTE**

Once the DRW-1 wheels are connected to the remote control, the *Ratio* value is set to the classic *Medium Speed* of the ARRI Geared Head 2.

<table>
<thead>
<tr>
<th>Tilt Speeds:</th>
<th>Turns</th>
<th>Movement</th>
<th>Ratio value</th>
<th>Angle per one Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow</td>
<td>17.5</td>
<td>for 60° Tilt</td>
<td>-21</td>
<td>5.51°</td>
</tr>
<tr>
<td>Medium (preset)</td>
<td>9.25</td>
<td>for 60° Tilt</td>
<td>0</td>
<td>10.14°</td>
</tr>
<tr>
<td>Fast</td>
<td>4.75</td>
<td>for 60° Tilt</td>
<td>22</td>
<td>19.06°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pan Speeds:</th>
<th>Turns</th>
<th>Movement</th>
<th>Ratio value</th>
<th>Angle per one Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow</td>
<td>65</td>
<td>for full 360° Pan</td>
<td>-22</td>
<td>3.45°</td>
</tr>
<tr>
<td>Medium (preset)</td>
<td>35.5</td>
<td>for full 360° Pan</td>
<td>0</td>
<td>6.49°</td>
</tr>
<tr>
<td>Fast</td>
<td>19</td>
<td>for full 360° Pan</td>
<td>23</td>
<td>12.45°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roll Speeds:</th>
<th>Turns</th>
<th>Movement</th>
<th>Ratio value</th>
<th>Angle per one Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow</td>
<td>17.5</td>
<td>for 60° Tilt</td>
<td>-22</td>
<td>3.45°</td>
</tr>
<tr>
<td>Medium (preset)</td>
<td>9.25</td>
<td>for 60° Tilt</td>
<td>0</td>
<td>6.49°</td>
</tr>
<tr>
<td>Fast</td>
<td>4.75</td>
<td>for 60° Tilt</td>
<td>22</td>
<td>12.45°</td>
</tr>
</tbody>
</table>

**NOTE**

To adapt the DRW-1 to the other classic gear ratios of the ARRI Geared Head 2, the gear ratios listed above must be programmed for each axle.

Selecting **Menu**, will open the **Main Menu**.

Selecting **Controls**, will open the **Controls Menu**

Selecting **Ratio** opens a new submenu in which the required speed ratio of the Pan, Tilt and Roll axes can be adjusted.

**NOTE**

In **Angle Mode** changing the ratio value will move the remote head to a new position.

Therefore use the + and - keys to change the ratio value **carefully**.

Press **OK**
8.7 Changing Direction

For a fast adjustment, the home screen of the remote control offers a short cut.

This field indicates the selected direction of the assigned controller.

Selecting Dir will open the Direction submenu.

Selecting the field in the middle toggles between Standard and Reverse.

Press OK

9 Additional Setups

9.1 Assigning the DRW-1

NOTE
The DRW-1 shall be assigned to the corresponding axes of the remote head.

For a fast selection, the home screen of the remote control offers a short cut.

Selecting the indicated area below the single axis will open the assignment submenu.

Select DRWP in the submenu to assign the Pan axis of the DHE-1 to the Pan axis of the remote head.

Press Assign.

Select DRWT in the submenu to assign the Tilt axis of the DHE-1 to the Tilt axis of the remote head.

Press Assign.

Unassigning Controllers

To unassign a selected controller, touch Unassign.

NOTE
After the controller has been unassigned, the function is only available via the touchscreen.
9.2 Selecting **Position** will open up a submenu for: **Deadband, Sensitivity, Filter, Ramp and Ramp Mode**.

9.3 **Deadband**

Selecting **Deadband** opens a new touchscreen slider that allows to change the **Deadband** values on the selected axis.

**Deadband** sets the starting point of the control. This value defines when the setpoint will react after the control was changed.

**NOTE**

If the DRW-1 wheels is used as a controller, **Deadband** shall be set to 0!

Otherwise there would be a **delay** in response!

9.4 **Sensitivity**

Selecting **Sensitivity** will open a new touchscreen slider that allows you to change the sensitivity of the control device for the selected axis.

**NOTE**

Redo the procedure for the other axes and press **OK**.

9.5 **Filter**

Additional low pass filter function for encoder based controllers, like the DRW-1.

When the DRW-1 is used in a car or a train, vibrations of the vehicle may be transmitted to the DRW-1’s encoders.

This can lead to irritations in the pan and tilt axis. In case of such irritations, the operator can use the **Filter** function to set a low-pass filter value, which allows to eliminate these disturbing vibrations.

**NOTE**

A **too high Filter value** may cause a **delay** in response.
10 **Power Disconnection**

---

**CAUTION**

To disconnect the device safely from the power source, remove both cables from the remote head and remote control. Mount and operate the device in an orientation to ensure easy access to the connectors.

11 **Sets**

11.1 **DRW-1, Two Wheels Set**

<table>
<thead>
<tr>
<th>Contains</th>
<th>K2.0019319</th>
<th>K2.0019325</th>
<th>K2.0006750</th>
<th>K2.0006751</th>
<th>90.0020791</th>
<th>O5.15436.0</th>
<th>K4.0021085</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x DRW-1 Module</td>
<td>0.7kg/1.5lb</td>
<td>1.5kg/3.3lb</td>
<td>0.8kg/1.7lb</td>
<td>518 mm x 392 mm x 229 mm</td>
<td>20.39 x 15.43 x 9.01&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x Hand Wheel complete</td>
<td>50 N2.25004.A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x DRW-1 Mounting Base</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x Cable LBUS 0.3m/1ft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x Cable LBUS 0.5m/1.5ft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x DRW-1 Foam Set</td>
<td>90.0020791</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x M6x12 stainless hex screws</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x DRW-1 User Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
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</table>

11.2 **Optional Third Wheel Set**

<table>
<thead>
<tr>
<th>Contains</th>
<th>K2.0019319</th>
<th>K2.0006751</th>
<th>90.0021210</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x DRW-1 Module</td>
<td>0.7kg/1.5lb</td>
<td>1.5kg/3.3lb</td>
<td></td>
</tr>
<tr>
<td>1 x Hand Wheel complete 150mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x Cable LBUS – LBUS (0.5m/1ft)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 x DRW-1 THIRD-WHEEL-SET-PACKING-SET</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12 **Technical Data**

12.1 **Weight / Dimensions**

<table>
<thead>
<tr>
<th>Weight</th>
<th>DRW-1 Modul</th>
<th>0.7kg / 1.5lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRW-1 Mounting Base</td>
<td>1.5kg / 3.3lb</td>
<td></td>
</tr>
<tr>
<td>Hand Wheel</td>
<td>0.8kg / 1.7lb</td>
<td></td>
</tr>
<tr>
<td>Outer dimensions foam</td>
<td>518 x 392 x 229 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.39 x 15.43 x 9.01&quot;</td>
<td></td>
</tr>
</tbody>
</table>

12.2 **Environment**

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>-20°C - 50°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-04°F - 122°F</td>
</tr>
</tbody>
</table>

13 **Pinout**

![LBUS Connector Diagram]

- 1 GND: Ground
- 2 CAN-L: CAN bus
- 3 V-BAT: Power supply in-output
- 4 CAN-H: CAN bus
EU–Declaration of Conformity

Brand Name: ARRI
Product Description: Camera Stabilizer System:

- ARRI Stabilized Remote Head SRH-3 Pro Set including ARRI Stabilized Remote Head – SRH-3 and ARRI Remote Remote control – Remote control-1

+ Europe Setting for Software 01.14.00 or later and Antenna Proant 333 Ex-It 2400 Foldable, Accessories regarding Apendix I

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


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

Essential Requirements regarding No 1

- Art. 3.1 a following 2014/35/EU

- Art. 3.1 b following 2014/30/EU

- Art. 3.2
  o EN 300 328 V2.1.1;
  Essential Requirements regarding No 2
  • EN 50581: 2012;

To evaluate the respective information, we used:

Year of affixed CE-marking: 2018

Munich 13.12.2018

Sign        Sign
Walter Trauninger       Dr. Sebastian Lange
Managing Director       Head of Quality Management

APENDIX-I

List of additional accessories:

<table>
<thead>
<tr>
<th>Item</th>
<th>Model name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ARRI Digital Remote Wheels - DRW-1</td>
</tr>
</tbody>
</table>
### 14 International Declarations

**Prüfbericht / Test Report**

<table>
<thead>
<tr>
<th><strong>Auftraggeber</strong></th>
<th>FoMa Systems GmbH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geräteart</strong></td>
<td>Digital Remote Wheel</td>
</tr>
<tr>
<td><strong>Typenbezeichnung</strong></td>
<td>DRW-1</td>
</tr>
<tr>
<td><strong>Seriennummer / Serial number</strong></td>
<td>Prototype</td>
</tr>
<tr>
<td><strong>Auftragsnummer / Order No.</strong></td>
<td>---</td>
</tr>
<tr>
<td><strong>Prüfgrundlage / Test standards</strong></td>
<td>EN 55032:2012 (KN32)</td>
</tr>
<tr>
<td></td>
<td>EN 55035:2017 (KN35)</td>
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<tr>
<td></td>
<td>CISPR 32:2015</td>
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</table>

**Nr. / No. TR-25880-43304-01 (Edition 01)**

2018-11-27
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Summary

<table>
<thead>
<tr>
<th>Prüfergebnisse / Test Results</th>
<th>Auftragsnummer / Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Die Prüfungen wurden nach folgenden Vorschriften durchgeführt:</td>
<td>---</td>
</tr>
<tr>
<td>Tests were performed according to:</td>
<td></td>
</tr>
<tr>
<td>EN 55032:2012 (KN32); EN 55035:2017 (KN35); CISPR 32:2015</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Durchgeführte Prüfung</th>
<th>Prüfergebnis Test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiated Emissions (Class A limits)</td>
<td>Pass</td>
</tr>
<tr>
<td>Conducted Emissions at Mains Power Ports</td>
<td>N/A</td>
</tr>
<tr>
<td>Conducted Emissions at Communication Ports</td>
<td>N/A</td>
</tr>
<tr>
<td>Enclosure Port - Radio-frequency electromagnetic field Amplitude modulated</td>
<td>Pass</td>
</tr>
<tr>
<td>Enclosure Port - Power-frequency magnetic field</td>
<td>Pass</td>
</tr>
<tr>
<td>Enclosure Port - Electrostatic discharge</td>
<td>Pass</td>
</tr>
<tr>
<td>Signal Port - Radio-frequency continuous conducted</td>
<td>Pass</td>
</tr>
<tr>
<td>Signal Port - Electrical fast transient</td>
<td>Pass</td>
</tr>
<tr>
<td>DC Power Port - Radio-frequency continuous conducted</td>
<td>Pass</td>
</tr>
<tr>
<td>DC Power Port - Electrical fast transient</td>
<td>Pass</td>
</tr>
</tbody>
</table>

**Bemerkungen / Remarks:**
The EuT is Battery powered. Therefore a test of the DC line is not necessary according the used standard.

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.

<table>
<thead>
<tr>
<th>Datum / Date</th>
<th>Geprüft von / Tested by</th>
<th>Freigabe durch / Checked by</th>
<th>Prüfergebnis / Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-11-27</td>
<td>Thomas Winterberger</td>
<td>Hannes Adelsberger</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Responsible for testing</td>
<td>Reviewer</td>
<td></td>
</tr>
</tbody>
</table>
In accordance with FCC 47 CFR Part 15B and ICES-003

Prepared for: FoMa Systems GmbH
Oskar-Sembach-Ring 11
91207 Lauf - Germany

FCC ID: ---
ICES: ---

COMMERCIALLY-IN-CONFIDENCE

Date: 2018-11-28
Document Number: TR-25880-43304-02 | Issue: 01

<table>
<thead>
<tr>
<th>RESPONSIBLE FOR</th>
<th>NAME</th>
<th>DATE</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management</td>
<td>Thomas Winterberger</td>
<td>2018-11-28</td>
<td></td>
</tr>
<tr>
<td>Authorised Signatory</td>
<td>Hannes Adelsberger</td>
<td>2018-11-28</td>
<td></td>
</tr>
</tbody>
</table>

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15B and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

<table>
<thead>
<tr>
<th>RESPONSIBLE FOR</th>
<th>NAME</th>
<th>DATE</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing</td>
<td>Thomas Winterberger</td>
<td>2018-11-28</td>
<td></td>
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</tbody>
</table>

Laboratory Accreditation
Dakks Reg. No. D-PL-11321-11-02
Laboratory recognition Registration No. SNetzA-CAB-16/21-15 Industry Canada test site registration 3050A-2

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B and ICES-003:2017 and 2016.
Prüfbericht / Test Report

Nr. / No. TR-80986-44626-01 (Edition 1)

Auftraggeber / Applicant: Arnold & Richter Cine Technik GmbH & Co Betriebs KG

Geräteart / Type of equipment: Digital Encoder Head

Typenbezeichnung / Type designation: DEH-1, K2.0022594

Auftragsnummer / Order No.: ---

### Test Report

**IEC 60950-1: 2005 (2nd Edition) and/or EN 60950-1:2006**

**Information technology equipment – Safety –**

**Part 1: General requirements**

<table>
<thead>
<tr>
<th>Report Reference No.</th>
<th>TR-80986-44626-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of issue</td>
<td>December 12, 2018</td>
</tr>
<tr>
<td>Total number of pages</td>
<td>34</td>
</tr>
<tr>
<td>Testing Laboratory</td>
<td>TÜV SÜD Product Service GmbH</td>
</tr>
<tr>
<td>Address</td>
<td>Äußere Frühlingstr. 45, D-94315 Straubing, Germany</td>
</tr>
<tr>
<td>Applicant’s name</td>
<td>Arnold &amp; Richter Cine Technik GmbH &amp; Co Betriebs KG</td>
</tr>
<tr>
<td>Address</td>
<td>Türkenstr. 89, D-80799 München Germany</td>
</tr>
</tbody>
</table>

**Test specification:**

- IEC 60950-1:2005 (2nd Edition) and/or

**Test procedure**

- Standard

**Non-standard test method**

- N/A

**Test Report Form No.**

- IECEN60950_1C

**Test Report Form(s) Originator**

- SGS Fimko Ltd

**Master TRF**

- Dated 2007-06

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**Test item description:**

- Digital Encoder Head

**Manufacturer**

- ARRI Cine + Video Geräte GmbH
  - Pottendorferstraße 23-25 3/1/1, A-1120 Wien

**Model/Type reference**

- DEH-1, K2.0022594

**Ratings**

- External power supply 12 V DC
- max. operating temperature of EUT: -20 °C to +50°C
**Testing procedure and testing location:**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Testing Laboratory: TÜV SÜD Product Service GmbH</td>
</tr>
<tr>
<td></td>
<td>Testing location/ address: Äußere Frühlingstr. 45, D-94315 Straubing, Germany</td>
</tr>
<tr>
<td></td>
<td>Tested by (name+ signature): Stefan Weiherer</td>
</tr>
<tr>
<td></td>
<td>Approved by (name + signature): Stefan Moser</td>
</tr>
</tbody>
</table>

**Summary of testing:**

The equipment under test in accordance with the conditions of acceptability complies with the requirements.

**Conditions of Acceptability:**

- In order to verify, if a component is already tested according to the applicable standard (IEC) following information-sources are accepted, in agreement with the customer: Copies of the type approval test certificate, markings on a component, brochures and prospectus from the manufacturer of the component, declarations of conformity from the manufacturer of the component, and information from the customer; all information the test-laboratory receives will not be verified.

- All safety instructions and equipment marking has to be in the language which is acceptable in the country in which the equipment is to be installed. Documentation, intended for service persons only, is permitted to be in English language only, except Germany where also this information has to be in the German language, too. The safety instructions are not evaluated in this report.

- The evaluation of the EUT is based on the fact, that the EUT is used inside a building / house, only.

- This safety test was performed without radiation test (clause 4.3.13). Please refer to separate test report for EN 62479.

- This safety test was performed without evaluation of mechanical parts of the system.

- All marking shall meet the requirements of durability according to clause 1.7.11.

- The power supply, shall meet the requirements according to clause 2.5 (LPS).
To evaluate the respective Grundlegende Anforderungen zu The compliance with the requirements of the European Directives was proved by the application of the following standards: Die Übereinstimmung der entsprechenden Normen haben wir die folgende Quelle verwendet:


Die bezeichneten Produkte stimmen mit den Vorschriften folgender Europäischer Richtlinien überein:

Die Übereinstimmung mit den Richtlinien erfolgte unter Anwendung nachfolgend genannter Normen:

Grundlegende Anforderungen zu Nr. 1. - Essential Requirements regarding No 1

- Art. 3.1 a nach 2014/35/EU - following 2014/35/EU

- Art. 3.1 b nach 2014/30/EU - following 2014/30/EU
  - No EN 301 489-3 V3.1.1; EN 301 489-17 V3.1.1; EN 61000-4-2:2009; EN 61000-4-3:2006

- Art. 3.2
  - No EN 300 328 V2.1.1;

Grundlegende Anforderungen zu Nr. 2. - Essential Requirements regarding No 2

- No EN 50681: 2012

Für die Ermittlung der entsprechenden Normen haben wir die folgende Quelle verwendet:

to evaluate the respective information, we used:


Jahr der Anbringung des CE-Zeichens / Year of affixed CE-marking: 2018

München, den 15.07.2019

gezählt

Dr. Michael Neuhäuser
Geschäftsführer / Managing Director

Dr. Sebastian Lange
Leiter Qualitätmanagement / Head of Quality Management