FH-145 S2
FHR-145
Pan and Tilt Head
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For your personal safety, read these instructions. Do not operate the product, if you do not understand how to use it safely. Save these instructions for future reference.

Follow all warnings and instructions marked on the product and in this manual. Safety warnings are included in this manual. These safety instructions must be followed to avoid possible personal injury and damage to the product.

WARNING! Do not install this product onto a bracket, support or other equipment that is not designed to support the weight of the product and its payload. All supports must comply with local government regulations.

WARNING! The fitting of non-approved parts and accessories, or the carrying out of non-approved alterations or servicing can be dangerous and could affect the safety of the product. It may also invalidate the terms and conditions of the product warranty.

WARNING! Risk of personal injury. All personnel must be fully trained and adhere to correct manual handling techniques. It is the responsibility of the individual and the local organisation to enforce safe working practices at all times.

WARNING! Risk of personal injury or injury to others. All personnel must be fully trained and adhere to local health and safety laws and guidelines. It is the responsibility of the local organisation to enforce safe working practices at all times.

CAUTION! FHR-145 only – This product is designed for robotic use only and is operated remotely. Do not attempt to operate this product manually.

Electrical Connections

WARNING! This product must be connected to a power supply of the same voltage (V) and current (A) as indicated on the product and described in the Technical Specifications section of this manual. To reduce the risk of electric shock, do not remove the covers. No userservicable parts inside. Refer all servicing to qualified service personnel.

WARNING! When wiring directly to a studio power supply, the product must be connected to a switched 3A fused outlet.

Basic Electrical Insulation (Class 1 equipment)

WARNING! This product is Class 1 equipment. For safe operation this equipment must be connected to a power supply that has a protective earth connection (US: ground).

Ventilation and Overheating

CAUTION! Slots and openings are intended for ventilation purposes to ensure reliable operation of the product and protect it from overheating. Do not block or cover any slots and openings.

Cleaning and Maintenance

CAUTION! Do not use solvent or oil-based cleaners, abrasives or wire brushes to remove accumulations of dirt as these damage the protective surfaces. To clean mechanical surfaces, use only detergent-based cleaners.

CAUTION! Do not use oil or grease on any exposed part of the product. This is unnecessary and traps dirt which acts as an abrasive.
Safety and Warnings

**Warning Signs**
Warning signs should be displayed prominently in the workplace alerting personnel that robotic equipment is in use and may move suddenly and without warning.

If personnel are working on robotic or associated equipment, ensure a warning sign is placed at the controller (control panel) to alert operators that work is being carried out.

**Safety Notes for Operators**
Operators must familiarise themselves with the working footprint of the robotic head, including all associated equipment (lens, zoom and focus controls, viewfinder, prompter, etc.) to prevent inadvertent collisions or injury to personnel.

If personnel are too close to a head or pedestal that is about to move, the operator should prevent the motion from starting or stop the motion if it has started.

We strongly recommend that the operator verifies visually that the active area is clear of hazards and personnel, both before and during remote operation.

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**Intended Use**
This product is designed for use within television studios to support and balance a camera together with ancillary equipment weighing up to 65 kg (145 lb). Camera operators can remotely control the head pan and tilt axes, and the lens zoom and focus using Vinten control systems.

**Safe Working Environment**
In normal operation, remote-controlled equipment can move suddenly and without warning. Since audible warnings are not suitable for use within the studio environment, it is recommended that only trained personnel be allowed to work in the active areas, where remote-controlled heads and pedestals are located.

Personnel must be made aware of the potential hazards of working in a robotic environment. To avoid personal injury, personnel should always exercise caution when working in the vicinity of robotic equipment. The forces are sufficient to cause personal injury or injury to others, and therefore caution is essential.

**Safe Operating Zone**
The safe operating zone for personnel is a minimum of 1 m (3 ft) outside of the footprint of the pan and tilt head.

In most installations, the teleprompter (if installed) is mounted onto the head and protrudes the furthest beyond the base of the head. The footprint must take into account the overhang of the teleprompter or other payload equipment as the head moves about the pan axis.

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**WARNING!** The tilt lock MUST be engaged whenever the head is lifted or transported and before installing or adjusting the camera or payload.

**CAUTION!** Risk of damage to equipment. Do not lift or carry the head by the back cover.
Components and Connections

Front View

1. Camera cradle backplate
2. Mounting plate
3. Pan drag dial
4. AUTO/MANUAL pan control switch (FH-145 S2 only)
5. Power ON/OFF button
6. AUTO/MANUAL tilt control switch (FH-145 S2 only)
7. Tilt lock button
8. Tilt drag dial
9. Genlock/Data indicator lights
10. BNC connector (for VR functionality)

Rear View

11. Serial connectors (Lens, GP I/O)
12. Power IN
13. Power OUT (not in use)
14. Ethernet port
15. Fuse compartment
16. Base with Quickfix groove, Mitchell key mount
17. Cable management bracket attachment points
18. Rod openings (for pan bar assembly)
19. Tilt lock release button
Box Contents

1. Camera cradle (comprising backplate and mounting plate)
2. Centre screws, x3
3. Cable management bracket, large
4. FH-145 S2 / FHR-145 pan and tilt head
5. Power cable, 3 m
6. Ethernet cable, Cat5e FTP, 3 m
7. Pan bar assembly (FH-145 S2 only) (comprising rosette bar and two 400 mm rods)
8. Pan bars, telescopic, black, x2 (FH-145 S2 only)

NI: Not illustrated

- Cable ties, black, x5
- M4 countersunk screws (cable bracket), x3
- 3/8” BSW x 3/4” cap head screws (camera screws), x2
- 3/8” head fixing bolts, x4
- Vinten spanner (for head bolts)
- Installation Guide

NI = Not illustrated

Tools required

- 5 mm Allen key
- 5/16” Allen key
- 5/64” Allen key
- Flat-blade screwdriver
# Installation

## Mounting Supports and Adaptors

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>MOUNTING SUPPORT OR ADAPTOR</th>
<th>PART NO.</th>
<th>MOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vinten HD Quickfix® Adaptor</td>
<td>3490-3</td>
<td>Vinten HD tripods</td>
</tr>
<tr>
<td>2</td>
<td>Mitchell Centre Screw (spider adaptor with Mitchell key)</td>
<td>3724-3</td>
<td>Vinten HD tripods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sachtler OB2000</td>
</tr>
</tbody>
</table>

The FH-145 S2 / FHR-145 is supplied with a large cable management bracket. The bracket can be affixed on the left- or right-hand side and to the front or back of the attachment point. Depending on the camera and head setup, a second large cable management bracket (see below) can also be fitted.

Camera and head connecting cables should be dressed and secured to the bracket(s) to provide strain relief for the connectors.

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![Diagram of Mounting Supports and Adaptors](image-url)
Mounting the Pan Bar Assembly (FH-145 S2)

For manual operation, mount the pan bar assembly to the camera cradle. Offset pan bars increase the range of movement and improve maneuverability of large and unwieldy payloads. The pan bar assembly can be mounted on the left- or right-hand side of the camera cradle.

1. Fit the pan bar assembly to the cradle. Insert rods into openings ensuring they cross at least two mounting points.

2. Tighten the screws underneath the openings to secure the assembly.

3. Attach the pan bars to the rosette mountings.

HD Tripod Mounting Options

The FH-145 S2 / FHR-145 pan and tilt head can be mounted onto the following heavy-duty (HD) tripods:

- Vinten HDT-1 single-stage tripod
- Vinten HDT-2 two-stage tripod
- Sachtler OB2000 aluminium tripod

**WARNING!** Engage the tilt lock before lifting or working on the head.

**CAUTION!** Do not attempt to manually switch the pan or tilt control switch to AUTO. Robotic mode must be initiated from the control panel.

Mount the head to the HD tripod using either a Mitchell Centre Screw (spider adaptor) and key or a Vinten Quickfix® adaptor.
Installation

Mitchell Centre Screw (3724-3)
Using a 5/64" Allen key, attach the Mitchell key to the head base with two 6-32 UNC screws, then use a 5/16" Allen key to attach the centre screw or spider adaptor with four 3/8" screws. The head can now be mounted directly on the tripod.

The Mitchell key fits into the cutout in the top of the tripod bowl, preventing the head from twisting.

Quickfix Adaptor (V4096-1013)
The base of the FH-145 S2 / FHR-145 features a groove that can be used to mount the head using a Quickfix adaptor. Use the adaptor to mount the head directly onto the tripod.
Locking/Unlocking the Camera Cradle

**WARNING!** The tilt lock MUST be engaged before installing or adjusting the camera or payload.

The tilt lock mechanism secures the camera cradle in the horizontal position, to provide a stable platform when making adjustments or when lifting the head. The tilt lock is located at the back of the head, on the left-hand side.

**Note:** The tilt lock can only be operated when the camera cradle is in the horizontal position.

Adjusting the Camera Cradle

The FH-145 S2 / FHR-145 is delivered with the camera cradle attached. Note that the cradle is set to the highest setting during transport.

The maximum payload is 65 kg (145 lb).

The camera cradle consists of two parts: a backplate and a mounting plate. The backplate is height adjustable and the two-way height-adjustable mounting plate features rod openings for the pan bar assembly for manual operation of the FH-145 S2 (see page 7 for details).

Refer to page 10 for instructions on how to adjust the cradle.

**WARNING!** Always support the backplate and/or mounting plate when adjusting them.

**WARNING! Heavy** – Depending on the weight of the camera and payload combination, adjustments to the cradle must be carried out by 2 or 3 persons.
1. Adjusting the backplate
   (A) Stepped adjustment – Using a 5 mm Allen key, remove the three centre screws and pull the camera cradle off the tilt mounting.

2. Adjusting the mounting plate
   (B) Stepped adjustment – Adjust the mounting plate by removing the two side screws and washers and moving the plate to the required attachment point on the side of the backplate. Reattach using the screws and washers.

   Note: Loosen the jacking screw before adjusting the height of the mounting plate (see page 11).

   (C) Slide adjustment – Loosen the two mounting plate side screws enough to adjust the plate by sliding it up or down. Ensure the side screws are securely tightened before mounting the payload.
**Adjusting the Horizon Level**

Using a 5 mm Allen key, tighten the jacking screw underneath the mounting plate to adjust the horizon level of the payload. Loosen the jacking screw before adjusting the height of the mounting plate.

**Mounting the Camera**

1. Apply the tilt lock. Using a 5 mm Allen key, remove the three centre screws securing the camera cradle and set the camera cradle to its lowest position.

2. Secure the cradle in position. Adjust the jacking screw as required to level the horizon.

3. Carefully position the camera onto the cradle. Align the mounting holes in the bottom of the camera with one of the slots on the cradle. Fit the camera screws and tighten to secure the camera in position.
**Installation**

**Balancing the Head**

The FH-145 S2 / FHR-145 is designed to allow the camera and payload to swing about its own Centre of Gravity (C of G), as opposed to balancing with the use of springs or cams. The camera and payload are mounted onto the camera cradle so the resulting C of G aligns with the tilt-axis pivot point, providing true balance. When the head is correctly balanced, the robotic drives will need a minimum amount of effort to move the head. A correctly balanced head and payload can be set to any tilt position and the head will maintain that position ‘hands off’.

**Setting the Fore/Aft Balance**

Ensure that the head and camera cradle are level before balancing. The camera and payload should be fitted on the cradle, so that the load is balanced. This can be achieved by moving the camera forwards (Fore) or backwards (Aft) on the cradle.

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**CAUTION!** Risk of damage to equipment. Be prepared to prevent the camera and cradle from falling away suddenly.

1. Engage the tilt lock. Loosen the bolts securing the camera to the cradle just enough to be able to slide the camera and payload backwards and forwards.

2. Hold and steady the camera cradle, then disengage the tilt lock. Carefully release the camera cradle and observe how it moves and where it stops.
If the camera cradle tilts backwards (points upward), then the camera must be moved towards the front of the head (fore).

3. Reposition the camera as required on the camera cradle and secure in position. The horizontal balance is correct when the camera cradle comes to rest in a horizontal position.

4. Tighten the bolts securing the camera to the cradle and recheck the horizontal balance. Readjust if necessary.

Adjusting the Centre of Gravity (C of G)

CAUTION! Risk of damage to equipment. Be prepared to prevent the camera and camera cradle from falling away suddenly.

1. Tilt the camera approx. 30° upward and release it. If the camera stays in the same position when released, the payload is correctly balanced with the C of G on the tilt axis.

If the camera continues to move upwards after releasing the camera cradle, the payload is mounted too high—lower the camera cradle.
Installation

If the camera moves back towards the horizontal position when released, the payload is mounted too low—raise the camera cradle.

2. Tilt the camera cradle through positive and negative angles of travel, checking that the head remains at the angle of tilt it is set to, unsupported.
   If the camera cradle angle falls or rises, repeat the alignment procedure until balance is achieved.

3. After adjusting the C of G height, it may be necessary to check that the fore and aft balance remains satisfactory. Readjust the position of the camera horizontally on the camera cradle as required.

4. After balancing, exercise the head through both axes to confirm that it operates smoothly.

Electrical Connections

CAUTION! Connect the head to the power source using the attached power cable only. Ethernet cables must be rated at Cat5e with screened RJ45 connectors.

1. Connect the lens interface cable to the 26-pin, male Lens interface connector on the FH-145 S2 / FHR-145.

2. Connect the power cable and the Ethernet cable.

Note: Connectors not currently in use are greyed out.
Cable Management

To ensure a safe and tidy installation, all cables connected to the head should be dressed and secured using the cable management bracket(s) supplied. Cables can also be secured to the tripod leg using the cable ties provided.

**CAUTION!** Leave sufficient slack in the cables between the fixed mounting and the head for free and full range of movement.

**CAUTION!** Cables must be secured to the cable management bracket when the head is mounted to a tripod.

Powering Up

**WARNING!** Ensure that all personnel are clear from the robotic equipment before powering up.

**CAUTION!** Disengage the tilt lock before powering up.

Before powering up the head, ensure that all external cable connections have been secured. To power up, press the power button located on the side of the head. The head will not move when powered up, but zoom and focus servos on the camera will take up their default positions on analogue lenses.

The LEDs located at the rear of the head indicate that data communications (green LED) and a genlock signal (amber LED) is present. If the LEDs do not illuminate on power up, refer to the Troubleshooting section of this manual (see page 17).

**Note: FH-145 S2 only** – The head can be switched to MANUAL mode using the control switches on the side of the head; this disengages the robotic drives and engages the drag modules. Drag settings engage with an audible ‘click’. If the dial is between settings, drag is ‘disengaged’ and not fully effective.

Configuring the Head

The head can now be configured for the studio environment using the ICE Tool (Intelligent Control Engineering) software.

For details refer to the ICE Tool Configuration Guide (publication no. V4096-4985) which is available on the USB memory stick supplied (see page 5).
Manual Mode (FH-145 S2 only)

Switching to Manual

The head can be operated in manual mode by a camera operator using the pan bars and adjustable drag modules to control pan and tilt movement.

The head can be switched to manual mode using the AUTO/MANUAL control switches on the side of the head. This disengages the robotic drives and engages the drag modules.

Operating the Drags

Both the pan and tilt axes on the FH-145 S2 head are fitted with drag modules to ensure smooth movement of the camera. The drag modules are fitted with 4 position dials to adjust the drag setting, positions Off, 1, 2 and 3.

Drag settings engage with an audible ‘click’. If the dial is between settings, drag is ‘disengaged’ and not fully effective.
Regular Checks

Routine Use

During use, check the following regularly:

• Once a month check the balance of the camera and payload and adjust if necessary.
• Check the integrity of bolts and fixings securing the head to the support.
• Check the bolts and fixings securing the payload.

No further routine maintenance is required.

Cleaning

WARNING! Risk of electric shock. Disconnect and isolate the product from the power supply before cleaning.

We encourage regular cleaning of the product. During normal use the only cleaning required should be a regular wipe over with a lint-free dry cloth. External electrical connection ports should only be cleaned with a vacuum cleaner.

Cover the head when not in use. Dirt accumulated during storage or periods of non-use may be removed with a vacuum cleaner.

Changing the Fuse

WARNING! Risk of electric shock. Disconnect the power cable. Fuses must only be changed by a trained and competent person.

CAUTION! The replacement fuse must be the correct rating: Type T3.15A, 250V AC.

1. Switch OFF and disconnect the power.

   Note: It is not necessary to remove the payload or cabling.

2. Using a flat-blade screwdriver or coin, remove the fuse holder.

3. Replace the fuse, then reinstall the fuse holder.
## Troubleshooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Check</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supplied, but the camera cradle is not moving.</td>
<td>Check that the tilt lock is disengaged.</td>
<td>See <a href="#">Locking/Unlocking the Camera Cradle</a> on page 9.</td>
</tr>
<tr>
<td>Head not operating.</td>
<td>Check that the power switch is ON.</td>
<td>See <a href="#">Powering Up</a> on page 15.</td>
</tr>
<tr>
<td></td>
<td>Ensure that the power and Ethernet cables are connected and secure.</td>
<td>See <a href="#">Electrical Connections</a> on page 14.</td>
</tr>
<tr>
<td></td>
<td>Check mains power supply to head.</td>
<td>Check that power is being supplied from the pedestal, height drive or studio supply.</td>
</tr>
<tr>
<td></td>
<td>Check the head fuse and replace as necessary.</td>
<td>See <a href="#">Changing the Fuse</a> on page 16.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the fuse continually blows, contact your nearest Service Centre.</td>
</tr>
<tr>
<td>Camera and payload moving too far on the pan and/or tilt axis.</td>
<td>Check the settings of the soft limits.</td>
<td>Refer to the <a href="#">ICE Tool Configuration Guide</a> (publication no. V4096-4985) for details.</td>
</tr>
<tr>
<td>Intermittent or no communications,</td>
<td>Check Ethernet cable.</td>
<td>If possible, try using another Ethernet cable, as this one may be damaged.</td>
</tr>
<tr>
<td></td>
<td>Check the Ethernet cable is CAT5E FTP.</td>
<td>Refer to the <a href="#">ICE Tool Configuration Guide</a> (publication no. V4096-4985) for details on configuring Ethernet.</td>
</tr>
</tbody>
</table>
Technical Specifications

Physical data
Weight (incl. cradle)
  FH-145 S2 ........................................ 28.4 kg (62.5 lb)
  FHR-145 ........................................ 24.25 kg (53.5 lb)
  Cradle .......................................... 3.4 kg (7.5 lb)
Height ........................................... 490 mm (19.3 in.)
Length .......................................... 436 mm (17.2 in.)
Width ............................................ 235 mm (9.3 in.)
Maximum payload .......................... 65 kg (145 lb)
Rated load inertia ......................... 7.5 kg m² (178 lb ft²)

Operating data
Temperature range ...................... +5°C to +50°C (+41°F to +122°F)
Motor noise ................................ minimal
Tilt range ..................................... ±50°
Pan range ...................................... 720°
Angular velocity (max) ................. 60°/s
Angular acceleration (typical) ......... 60°/s²
Angular acceleration (peak) .......... 120°/s²
Accuracy ....................................... 60 arcseconds

FH-145 S2
  Robotic/manual operation .............. full

FHR-145
  Robotic operation ....................... full
  Manual operation ......................... none

Electrical data
Power consumption ........................ 175W
Power input ............................... Autoranging 100–240V AC, 50/60 Hz

Parts List

Mounting supports and adaptors
  Vinten HD Quickfix® adaptor ............ 3490-3
  Mitchell Centre Screw ..................... 3724-3
  Sachtler OB2000 HD tripod ............... 6481
  Vinten HDT-1 single-stage tripod ........ 3901-3
  Vinten HDT-2 two-stage tripod .......... 3902-3

User-replaceable parts
  Fuse (rating: T3.15A, 250V AC) .......... C301-092
  Power connector (Neutrik NAC3FX) ...... C003-439
  Power cable (2 m/6.6 ft, with IEC plug) . V4101-5008
  Vinten spanner ................................ J551-001
General Purpose Connector

The 26-pin, female GP I/O connector (see page 14) can be configured and enabled in ICE Tool. It can be used to connect a Camera Control Unit (CCU) or for powering auxiliary devices. The pinouts for the connector are given in the table below.

**CAUTION!** Total power drawn from the 12V pins of this connector must NOT exceed 30W.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not connected</td>
<td>14</td>
<td>Not connected</td>
</tr>
<tr>
<td>2</td>
<td>Aux GND</td>
<td>15</td>
<td>CCU TXD422</td>
</tr>
<tr>
<td>3</td>
<td>Aux +12V</td>
<td>16</td>
<td>CCU TXD232</td>
</tr>
<tr>
<td>4</td>
<td>Aux +12V</td>
<td>17</td>
<td>Not connected</td>
</tr>
<tr>
<td>5</td>
<td>Not connected</td>
<td>18</td>
<td>GP I/O 1</td>
</tr>
<tr>
<td>6</td>
<td>CCU RXD422</td>
<td>19</td>
<td>GND</td>
</tr>
<tr>
<td>7</td>
<td>CCU RXD232</td>
<td>20</td>
<td>Aux GND</td>
</tr>
<tr>
<td>8</td>
<td>GP I/O 3</td>
<td>21</td>
<td>Aux +12V</td>
</tr>
<tr>
<td>9</td>
<td>GP I/O 0</td>
<td>22</td>
<td>Not connected</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>23</td>
<td>CCU TXD422</td>
</tr>
<tr>
<td>11</td>
<td>Aux GND</td>
<td>24</td>
<td>CCU RXD422</td>
</tr>
<tr>
<td>12</td>
<td>Aux GND</td>
<td>25</td>
<td>Not connected</td>
</tr>
<tr>
<td>13</td>
<td>Aux +12V</td>
<td>26</td>
<td>GP I/O 2</td>
</tr>
</tbody>
</table>

Compliance

**Declaration of Conformity**

Vitec Videocom Limited declares that this product has been manufactured in accordance with BS EN ISO 9001:2008 and is in compliance with the essential requirements and other relevant provisions of the Machinery Directive 2006/42/EC.

A copy of the Declaration of Conformity is available upon request.


This symbol marked on the product or its packing indicates that this product must not be disposed of with general household waste. In some countries or European Community regions, separate collection systems have been set up to handle the recycling of electrical and electronic waste products.

By ensuring this product is disposed of correctly you will help prevent potentially negative consequences for the environment and human health. The recycling of materials helps conserve natural resources.

**In countries outside the EU:**

Dispose of this product at a collection point for the recycling of electrical and electronic equipment according to your local government regulations.

Visit our website for information on how to safely dispose of this product and its packaging.
FCC Notice
This product complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for assistance.

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

FCC Declaration of Conformity
This product complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This product may not cause harmful interference.
(2) This product must accept any interference received, including interference that may cause undesired operations.

Pollution Degree 2
This equipment is designed for operation in Pollution Degree 2 environments.