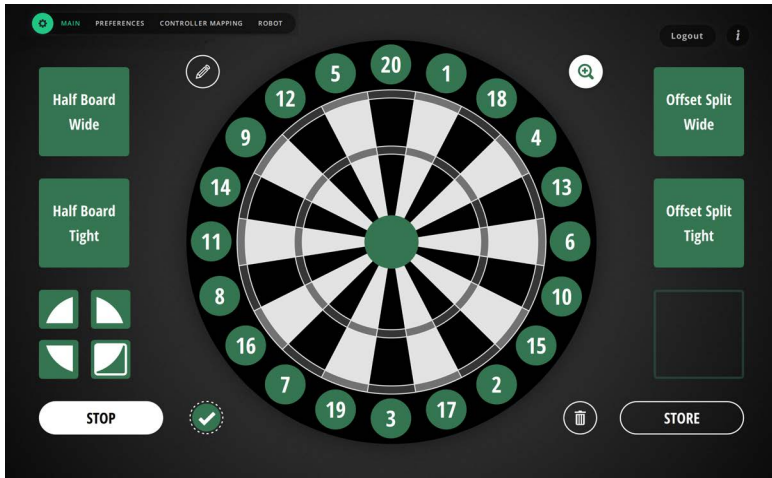




MARK ROBERTS MOTION CONTROL

MHC (DARTS) V3.8



QUICK START GUIDE

Product code: MRMC-1544-38

MHC (Darts) v3.8 Quick Start Guide

Product code: MRMC-1544-38

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Contents

Chapter 1	Getting Started with MHC	1
	MHC Overview	1
	MHC Installation	1
	MHC Licensing Information	2
	Powering up a head and the PC	3
	Changing system configuration and network settings.....	4
	Network setup	6
	Adding heads.....	6
	Adding the Type of head.....	7
	Changing a head's name	10
	Assigning heads to user(s).....	10
	Assigning a Parent Head.....	11
	Rail or Lift Setup.....	11
	Removing a head	11
	Editing network settings on the head	12
	Adding Camera Video Feed	13
	Setting up video feed from the camera.....	13
	Adding users	14
	Logging in as a User	15
	Testing head connectivity	15
Chapter 2	Main Page.....	17
	Settings menu	18
	Presets.....	18
	Storing a position as a preset.....	19
	Activating a preset	21
	Adding a custom name to a preset button.....	22
	Deleting a preset	22
	Stop button	23
	Help button	23
	Status button	24
	Zoom button.....	24

Chapter 3 Preferences Page 25

 Preferences Page.....25

 Master Manual Speed.....25

 Goto Speed26

 Individual axis speed control26

 Max. Limit and Min. Limit.....26

 Invert26

 Homing26

 ARC-360 and ARC-UHD Preferences Page.....27

Chapter 4	Robot Settings Page (Engineer, Supervisor Users only)	29
	Selecting different robots	29
	Axes tab	30
	Motor settings	30
	Motion settings	31
	Speed limits	31
	Soft limits (Min-Max Positions).....	31
	Change of Acceleration.....	32
	Scaling and direction	32
	Backlash offset	32
	Override and restore limits	32
	Change of Deceleration	33
	Home Zeroing.....	33
	Homing settings.....	33
	Types of Homing.....	34
	Homing Style	35
	Homing Velocity.....	35
	Homing Time.....	35
	Homing Offset	35
	Homing when changing lenses	36
	Enabling and disabling the axis	36
	Stopping the head.....	36
	Test the axis with manual control	36
	Save and apply settings to the head	37
	Lens tab	37
	Importing Lens Settings (Selecting a Lens).....	38
	Focus Calibration.....	38
	Zoom Calibration	41
	Iris Calibration	44
	Infinity offset.....	45
	Lens Focal Length	45
	Sensor Width and Height	45
	Use Pan to Calibrate FOV	45
	Linearise Zoom.....	45
	ZOOM SCALING	46
	Exporting lens settings (Saving a lens with a new name)	47
	Lens tab	48
	Linearise Zoom button	49
	Infinity offset.....	49

	Lens Focal Length	49
	Sensor Width and Height	49
	Use Pan to Calibrate FOV	49
	Focus calibration	50
	Zoom linearisation	51
	The last entry must correspond to the upper travel limit of the Zoom axis.	52
	Exporting lens settings	52
	Importing lens settings	52
Tools tab		53
	RESET CAMERA (Nikon camera only)	53
	RESET 10-PIN (Nikon camera only).....	54
	POWER DOWN (Nikon camera only)	54
	POWER UP (Nikon camera only)	54
	DISABLE/ENABLE TENPINSRF (Nikon camera only).....	54
	EXPORT ROBOT SETTINGS (MRMC heads and some other third party heads).....	54
	IMPORT ROBOT SETTINGS (MRMC heads and some other third party heads).....	55
	CHANGE NETWORK QUALITY (Pod and MRMC VISCA heads only)	56
	TEST NETWORK QUALITY (Pod and MRMC VISCA heads only)	57
	FreeD	57
Chapter 5	Nikon Remote (Nikon Z6 and D5 Only).....	61
Chapter 6	Camera Settings Page	63
	Install MHC Classic v3.8.x.....	63
	Enable Nikon JPEG Live View streaming in MHC	63
	Camera Settings for SRF-enabled Z9	64
	Adding a Nikon Z9 without robotics to MHC	64
	Connecting to an SRF-enabled Z9	64
	Controller Mapping.....	65
	Formatting Memory Cards.....	66
	FTP Status and Profiles	68
	Syncing the data time of cameras	69
	Editing IPTC	69
	Camera Settings Page for ARC-UHD	71
	Camera Settings Page for ARC-360.....	72
	Camera Settings for Non-MRMC Heads	74

Appendix 1 Troubleshooting 75

 Typical symptoms, causes, and actions 75

 Backup and Restore All User Settings 76

 Backup 76

 Restore 80

Chapter 1 **Getting Started with MHC**

MHC Overview

Multi-Head Controller, or MHC, is software by Mark Roberts Motion Control used to control the MRMC camera heads via Ethernet. It gives you a smooth, precise and real-time control over a multitude of MRMC robotic heads at the touch of a button from a single workstation. You can also connect additional controls via USB, such as a Joystick Controller, to the PC running MHC.

You launch the MHC Server first and the MHC Client, which can run on the same or different PCs.

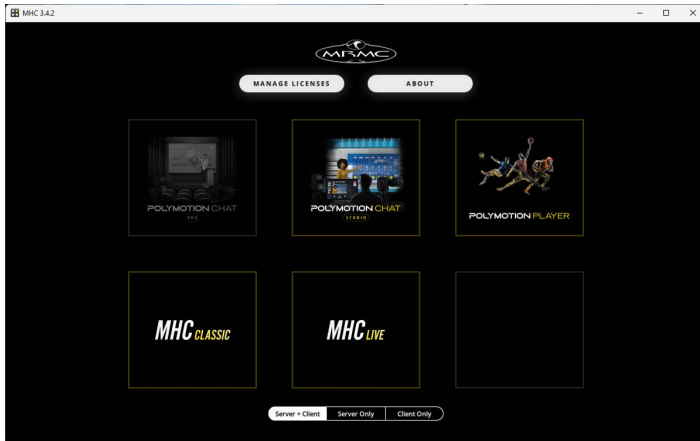
MHC Installation

You can download and install MHC v3.8 from www.mrmoco.com. Once you have downloaded the installer, follow the on-screen instructions to install MHC. The minimum system requirements for installing MHC v3.8 are:

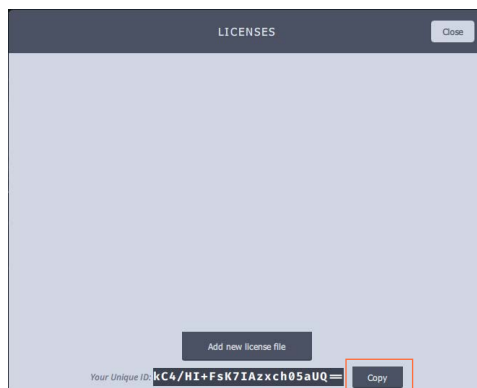
- Windows 10
- Intel i3 CPU
- 4 GB RAM
- Ethernet adapter
- A graphic card with support for Open GL v4.3 or greater

MHC Licensing Information

If you have recently installed MHC, when you launch MHC Polymotion Launcher, click **Manage Licenses**.



On the Licenses window, click the Copy button the bottom of your MHC screen to copy the UID and paste it your license request including any other products such as Polymotion Chat or Polymotion Player to support@mrsmoco.com.



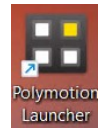
On the receipt of your license file, save it on to the disk, launch Polymotion Launcher. Click the **Add new licence file** button and select the new license file. Once the license is added, you will be ready to use the product.



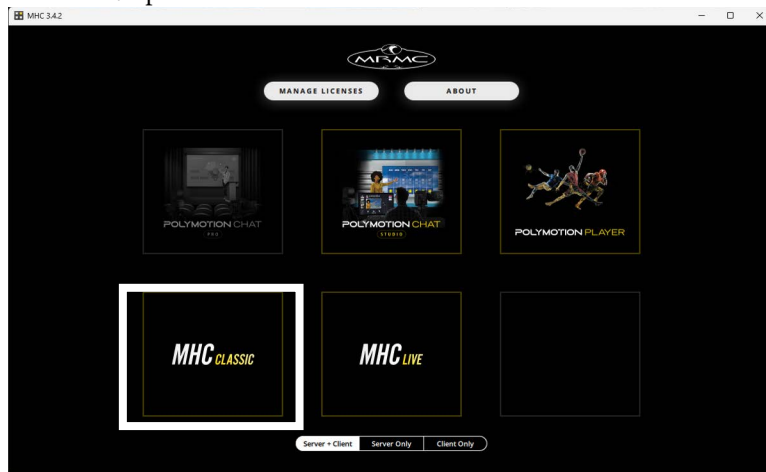
At any point, to access Help files for MHC and Polymotion Products including all MRMC broadcast hardware products, use the **MHC Help** desktop icon.

Powering up a head and the PC

1. Cable together and power up all heads including camera and lens motors.
2. Use the icon on desktop to launch MHC Launcher.



3. Click/tap **MHC**.



4. If you are launching this for the first time, you will be required to add a new license file or a license code. Contact MRMC Support for a new license. Refer to *MHC Licensing Information* on page 2.
5. You can select 'Server Only' or 'Client Only' depending on if you have a remote server or client. The default option of 'Server+Client' is selected.
6. Once you have supplied a license code, MHC Server and Client are launched, login to MHC Client as Admin:

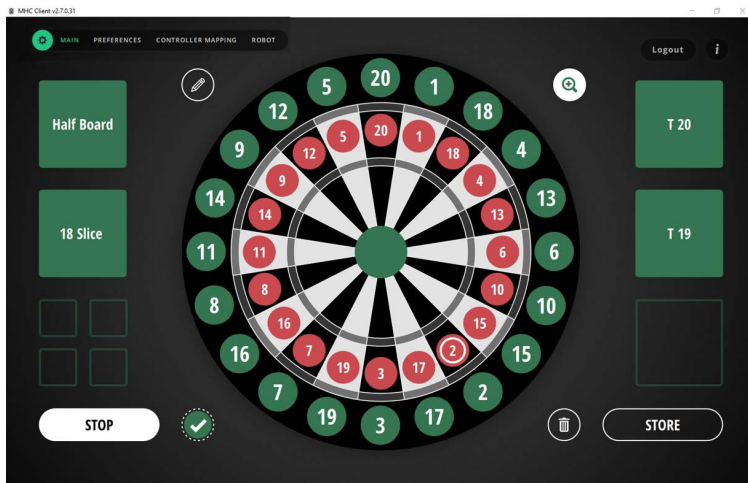
Username: Admin
Password: Admin1234

Note

At any time, if you need to restart MHC, perform the following steps:

1. Close the MHC Client and the MHC Server windows.
2. Double-click or tap the MHC Server desktop icon to launch it.
3. Double-click or tap the MHC Client icon to launch it. The MHC Client can be launched on the same or a different computer present on the same network.

Changing system configuration and network settings



You can click the **Settings** (⚙️) button to display the Settings menu. The tabs in the menu are:

- **NETWORK** – Adding/deleting heads and changing head network settings
- **PREFERENCES** – Preferences page can be accessed via Admin login allowing the administrator to set head-specific axis

speeds, limits and homing. For more details on these settings, refer to Chapter 3 *Preferences Page*.

- **CONTROLLER MAPPING** – View and modify functions assigned to USB joystick controller buttons. Refer to *MHC User Manual* for further details.
- **USER** – Add/change user accounts.

Important

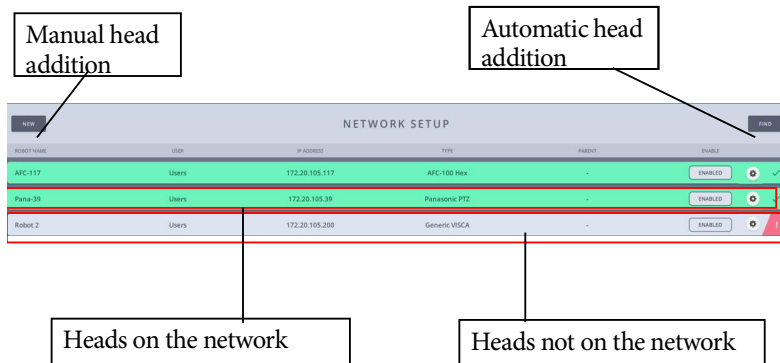
All robot movement must be **completely stopped** before making any changes to configuration or network settings.

- Ensure the robot is in a powered-on but idle state.
- Verify that no presets are active.
- Only proceed with configuration adjustments once the system is confirmed to be stationary.

Failure to follow this procedure may result in equipment damage or personal injury.

The **Settings** menu is different for Administrator and User login. For more information on Settings menu for the User login, refer to *Settings menu* on page 18.

Network setup



When you log in as the Administrator, the NETWORK SETUP page launches and provides a general overview of all the heads linked to the system's network. If you are loading MHC for the first time you probably have 4 robots already set up with addresses from 192.168.1.236 to 192.138.1.239. You can delete these if you want a clean slate to start from.

The two row colours represent the status of the heads:

- **Green:** The head is successfully connected and ready to operate.
- **Grey:** The head with the IP address is not connected with the system's network or is not powered up.

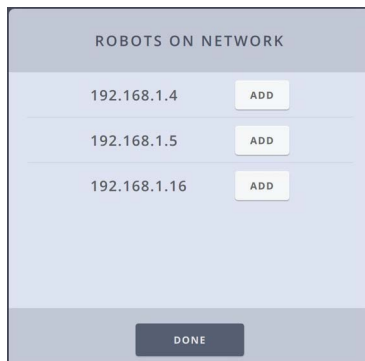
A connected head can also be 'disabled', which means that it will not be available to any user.

Adding heads

1. Click the **FIND** button to automatically find the connected MRMC head(s). This will show you all the heads that are connected.



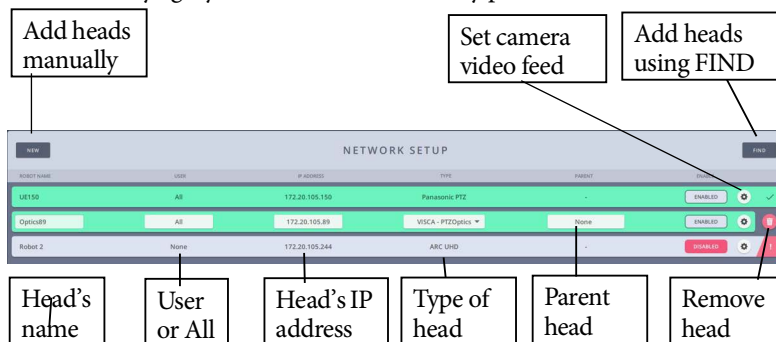
2. Select the head's row that you want to connect to and click the **ADD** button. This will connect the head to the system, and move it to the group of connected heads (the green section).



If a selected robot does not go green, then check it is on the same IP address range as the server PC. The Find button does a network wide broadcast, therefore it finds heads even on different subnets.

Some heads such as Panasonic PTZ even if present on the network are not auto-detected using the FIND button. These can be added manually by entering their IP address after clicking the **NEW** button.

3. Then, enter the **TYPE** of head and a **NAME** for it. The row for the head stays grey until the head is actually present on the network.



Adding the Type of head

The first thing you should do is check what type of head you have and what type of lens you are using. If you are using a serial lens then you

would choose one with **Serial** in the name. If you are using external Servo motors then you would choose one **without Serial**. For example, if you are using a Hex head with Servo motors, choose **AFC-100 HEX** from the **Type** dropdown. Certain head types are auto-detected by MHC but other non-MRMC heads will need to be selected. For example for BirdDog head, specify the head type as **VISCA - Birddog**. For an unknown head type, you can add **Generic VISCA** or **Generic NDI** depending on the connection protocol followed between the head and the server. It is important to choose the **Type** of head in MHC before entering the robot IP address because once it is connected MHC will try to change it to whatever it currently set to. Ensure that you choose the correct head because if you chose the wrong one, the head either won't work as expected or won't work at all. For more detail on the rig types that can be added, refer to *MHC v3.8 User Manual*.

Note

When adding Sony FR7 PTZ head, ensure that the **SETUP** switch **3** in the FR7 panel is in the off position.

For Sony AM7, ensure that the **SETUP** switch **4** of the unit to the ON position to enable VISCA over IP communication (not SETUP switch 3 like the FR7).



When adding a Sony FR7 and Sony AM7 camera on the Network Settings page, MHC allows for authentication to access the camera controls, for example to switch auto-focus on and off and to use Iris. When you change the Type to Visca-FR7 or Visca-AM7, you will be prompted to provide username and password for the camera.

The image shows a dialog box titled 'AUTHENTICATE SONY FR7 CAMERA'. It contains two input fields: 'Username' and 'Password'. Below the input fields are two buttons: 'CANCEL' and 'SAVE'.

You can also choose to authenticate at a later point, using the **Authenticate** button in the IP address box.

Note

If an NDI protocol robot, such as that with a rig type of NDI_PTZ, is not being detected in Network setup page (turning green), then it is recommended that you download and install NDI Studio Monitor tool from NDI website. If the NDI Studio Monitor cannot detect the NDI protocol robot, then the Chat system will not detect it (as the Chat system uses the same source library as the NDI Studio Monitor for source detection).

NDI® is a registered trademark of NewTek, Inc. Refer to <http://ndi.tv/> for more information.

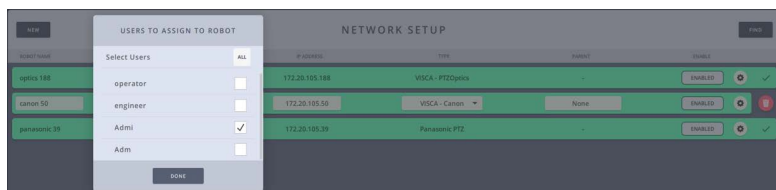
Changing a head's name

You can change the name of a connected or disconnected head. The name appears in the **ROBOT NAME** column. To change the head's name:

1. Select the row for the head.
2. Click or tap in the box representing the name of the head.
3. Enter the name for the head.

Assigning heads to user(s)

A head can be assigned to a specific user or **All** users. Assign a head to the user by selecting the user from the list. If you select **All** from the User drop-down, then all users who are logged in to the MHC Server can use the head. Selecting **NONE** will mean none of the users can use the head.



Note

It is recommended that multiple users do not connect to the same PTZ head as this can result in undesired head movements.

Assigning a Parent Head

Sometimes, two different robotic heads are required to operate using the controls in one of the two heads, for example if an AFC is mounted on a rail, the rail controls are added to AFC. In this case, AFC is added first in the Network Setup and when the rail is added, AFC can be selected as the **parent** to the rail.

Rail or Lift Setup

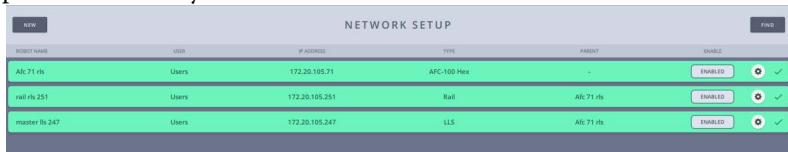
If you have a rail in a system, they are configured in the network setup as the ‘child’ of the ‘parent’ head that moves along the rail.



ROBOT NAME	USER	IP ADDRESS	TYPE	PARENT	ENABLED	
afc 112	Users	172.20.105.112	AFC-100 Hex	-	ENABLED	✓
rail	Users	172.20.105.196	Rail	afc 112	ENABLED	✓
Mimic 1	Users	172.20.105.237	Pan-Bar (camera)	-	ENABLED	✓

Rail set up as ‘child’ of ‘parent’ AFC head

For the RLS (Rail Lift System), the network settings page allows adding an LLS to the parent that already has rail as a child and adding a rail to a parent that already has LLS as a child.



ROBOT NAME	USER	IP ADDRESS	TYPE	PARENT	ENABLED	
Afc 71 rls	Users	172.20.105.71	AFC-100 Hex	-	ENABLED	✓
rail rls 251	Users	172.20.105.251	Rail	Afc 71 rls	ENABLED	✓
master lls 247	Users	172.20.105.247	LLS	Afc 71 rls	ENABLED	✓

Removing a head

To remove a head, click the appearing **remove** (🗑️) button on the head’s row.

Editing network settings on the head

On the NETWORK SETUP page, only the disconnected (grey) head's IP address is editable. Only when the head is connected, can the network settings be changed on it.

Select a robot that is connected (green) and click in the **IP ADDRESS** box.

NETWORK SETUP						
ROBOT NAME	USER	IP ADDRESS	TYPE	HEADSET	STATUS	
UR150	AB	172.20.105.150	Panasonic PTZ	-	ENABLED	✓
Optical8	AB	172.20.105.89	VISCA - PTZOptics	None	ENABLED	ⓘ
Robot 2	None	172.20.105.144	ABC UNID	-	DISABLED	!

Edit IP address

Use the appearing dialog box to change the IP settings of the robot. Your system will also automatically update its local reference address, so you won't lose the connection to the edited robot.

Enter the **IP Address**, **Subnet Mask**, and **Default Gateway** if your network IT Manager deems it necessary. Clicking **SAVE TO ROBOT** will change the IP address on the head and also tell MHC where to find the head at the new address. If you are changing across to a different subnet, the head will appear disconnected until you change your computer network IP address to the new subnet range.

EDIT ON ROBOT

IP Address

172.20.105.236

Subnet Mask

255.255.0.0

Default Gateway

192.168.68.113

Cancel

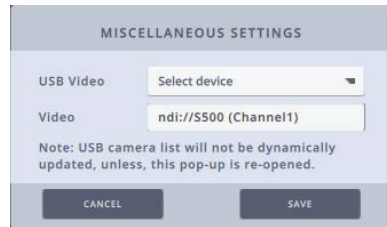
SAVE TO ROBOT

Note

You must be logged in as Administrator to change network settings on the head.

Adding Camera Video Feed

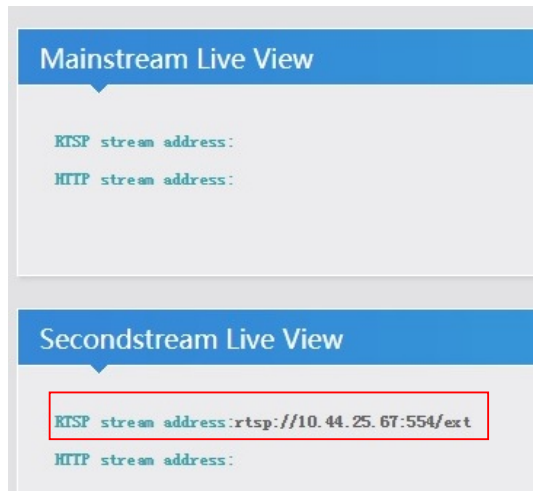
To view the video stream from the robotic camera in the MHC Liveview window, click  for the camera and specify the URL of the IP stream from the camera in the **Video** box in the Miscellaneous Settings pop up. This will depend on whether your robotic head IP stream is that of NDI, RTSP or Decklink. If the camera is USB then select it in the **USB Viodeo** list.



Setting up video feed from the camera

Live SDI video stream from the camera can be sent to MHC via a video encoder which converts SDI input into an IP stream that is web managed and can be viewed over LAN or public Internet. To set up live feed on MHC via SDI out:

1. Connect the HD video encoder to the network. Ensure that your PC on which you want to view that video feed from the head is on the same LAN as the head and the encoder.
2. Open the encoder's web interface in the Web browser and note the RTSP address of the video stream.
3. Copy and paste this RTSP stream address in the **Video** box in the network settings.



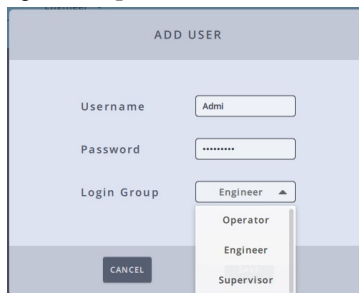
Note

MHC does not support authentication of RTSP Streams.

Adding users

On the User page, two types of users can be added: Engineer and Operator. **Operator** type users have the controls to operate the heads whereas **Engineer** type users have additional controls to edit robot and lens settings and also some tools to troubleshoot if an issue occurs. A **Supervisor** type user has access to basic functionality and configuration, in addition to having all robots automatically assigned to them. By default, there is three User accounts added to the system: Operator, Engineer and Supervisor. You can have up to 15 user accounts including the default ones. However, if you require you can add more Users. To do this:

1. Click/tap Settings (🔧) > **USER**.
2. Click/tap **ADD USER**.
3. Enter the username and password that you want to assign to the user. Select a Login Group.



4. Click/tap **SAVE**.



Once user(s) are added, the heads can be assigned to them.

Logging in as a User

Once robots are added, accounts are created and robots are assigned to users, log out of the Administrator login and log in as a User.

Default Username	Default Password
operator	password
engineer	password
supervisor	password

Note

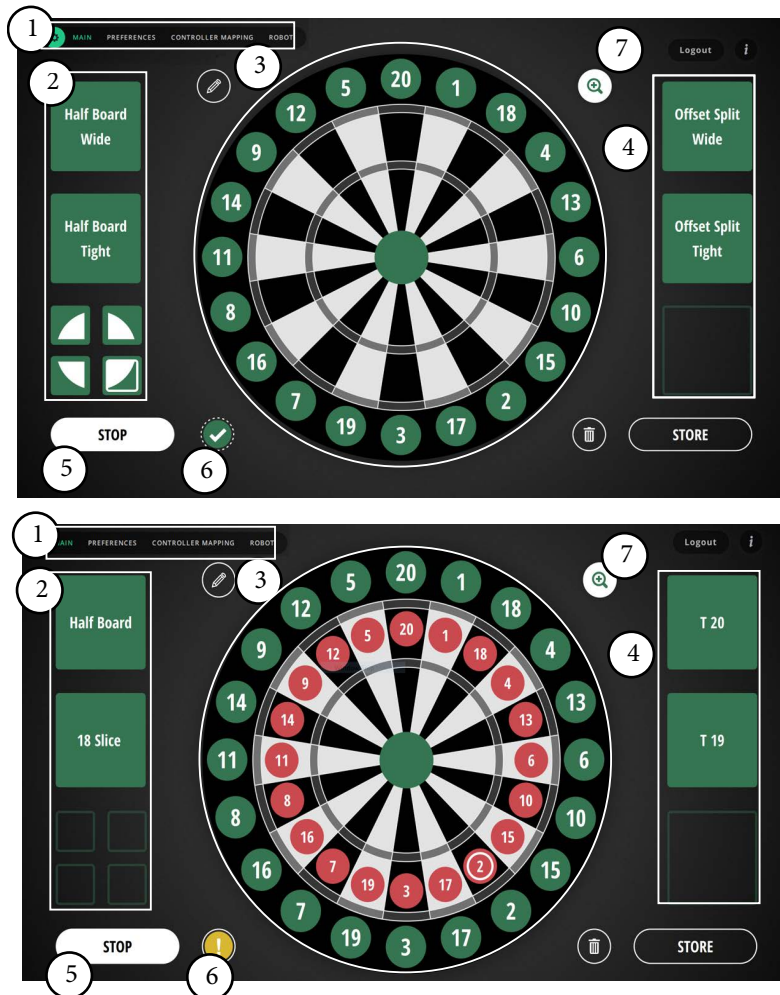
In order to modify setting and record presets, you need to log in as Engineer type user. Use Settings  > **User** page to check whether one is already set up or create a new one.

Testing head connectivity

Logging on as a user will take you to the MHC Main Page. You should be able to move the robot now with either the on-screen controls or the joystick if you have one connected. Check the pan and tilt are working now, just to check if the head is connected properly. For detailed explanation of the controls, see Chapter 2 *Main Page*.

Chapter 2 Main Page

The following figure shows the controls available on two types of darts skins.



Both these interfaces, or skins, are technically similar, except the second skin provides more preset options for trebles.

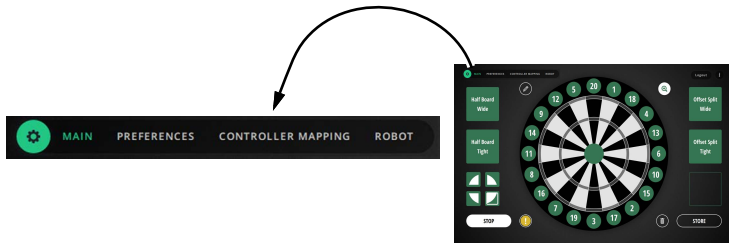
1. Settings menu

2, 3 & 4. Presets

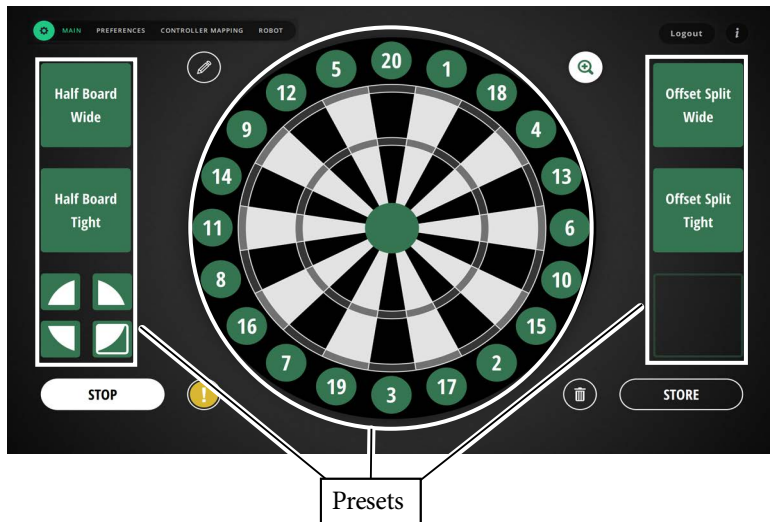
5. **Stop button**
6. **Status button**
7. **Zoom button**

Settings menu

You can navigate the different sections or pages of MHC using the **Settings** menu. To display the Settings menu, click the **Settings** (⚙️) button.



Presets

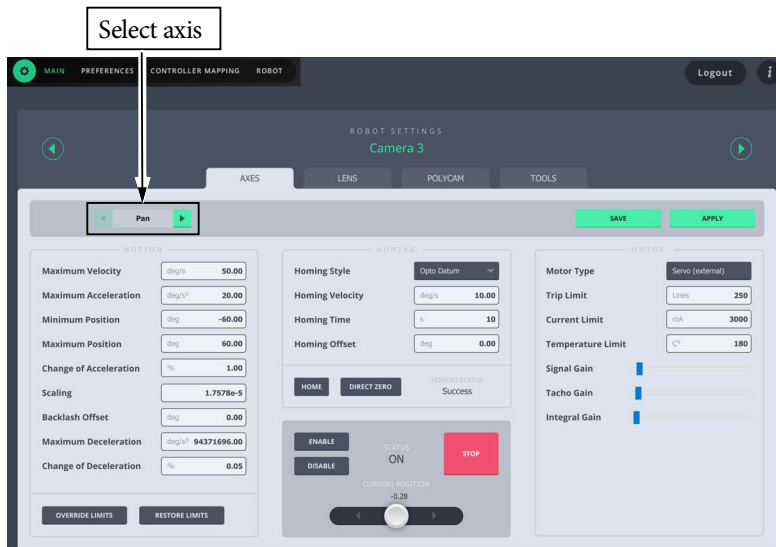


You can store the position of the head as a preset and later make it to go to a recorded position (this motion is called Goto). When storing a position, all the axes will be stored including the speed settings for each axis. A preset button is faded when no position is stored in them.

Storing a position as a preset

Use the following steps to store a **new** position or **change** an existing position in a preset button:

1. Use the controls on the joystick to go to a head position of your choice. Ensure that all axes are in the intended positions. You can control the master speed of the axes on the Preferences tab. For more info, refer to *Goto Speed* on page 26.
2. Select **Settings** (⚙️) > **Robot** and select the axis for which you want change the speed settings.

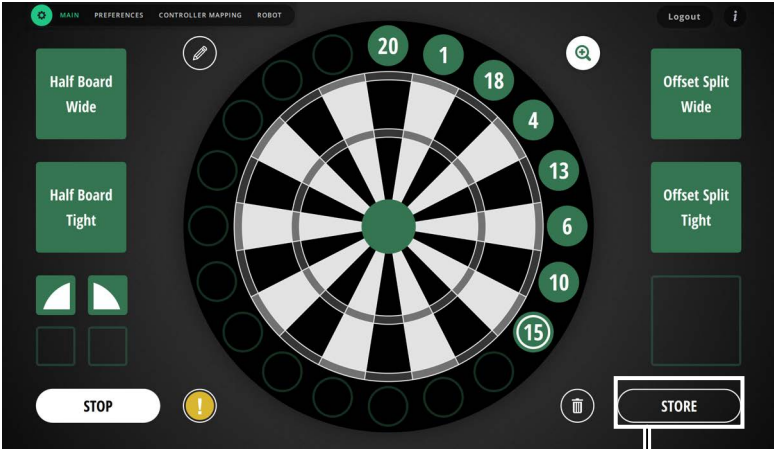


3. Change the speed settings in **Settings** (⚙️) > **Preferences**. The Goto speed of the robot moving into preset positions can be adjusted in

the **Preferences** tab. For more information, refer to Chapter 3 *Goto Speed* on page 26.

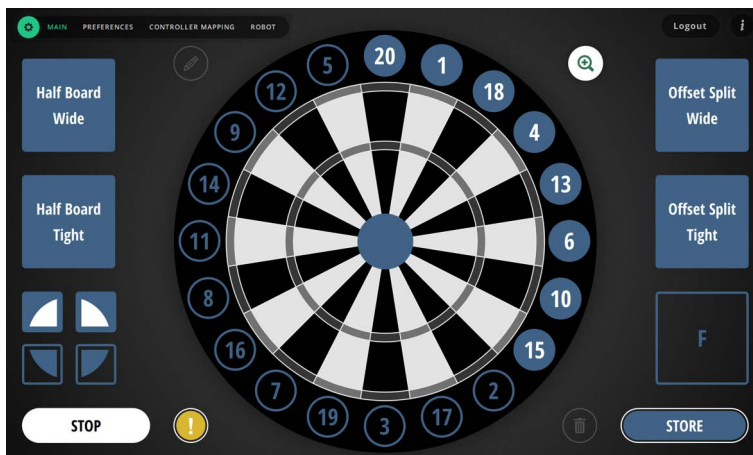


4. Select **Settings** (⚙️) > **Main** to go back to the main page.

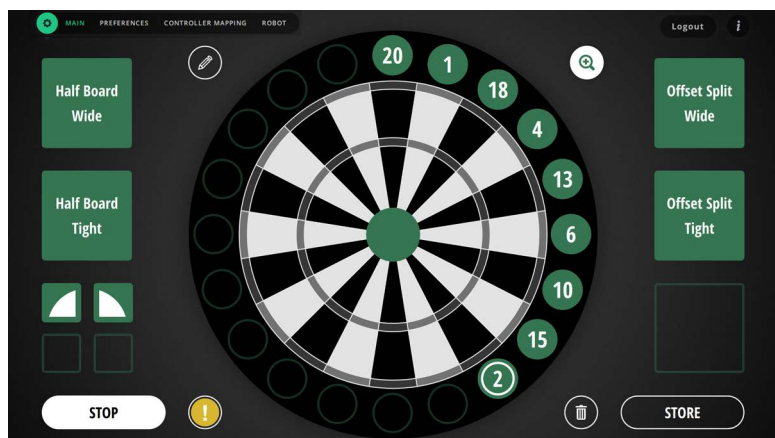


5. Get into store mode by clicking/tapping on the **STORE** button.

The screen will change to a blue theme, indicating that the preset buttons can be selected to store your current head position.



- Click/tap on the intended preset button and then tap on the STORE button to store the current head position. The screen will return to the green theme.



Activating a preset

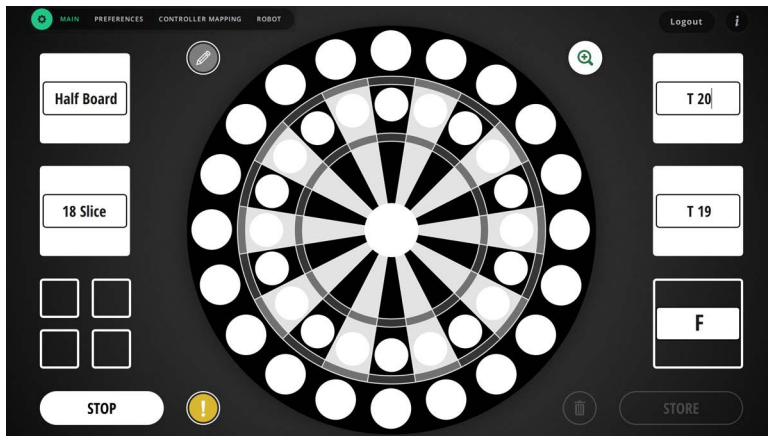
To activate a preset you simply click/tap on the preset button. A white border will appear around the preset and the head will move to the preset position.

If a Goto is in progress, you can immediately stop the movement by clicking/tapping the **STOP** button.

Adding a custom name to a preset button

You can assign a name to the preset button. To do so:

1. Click/tap the **edit** () button.
2. Click/tap the preset button that you want to change and enter the new name. Note that the buttons on the sides of the Darts skin are



editable.

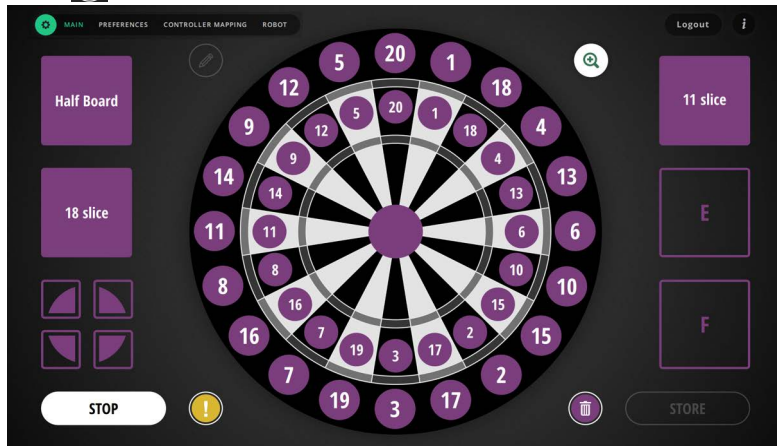
3. Click/tap the **edit** () button again to finish editing.

Deleting a preset

To delete a preset:

1. Click/tap the **delete** () button.

2. Click/tap the preset you want to delete and click/tap the **delete** (🗑️) button.



Note

Pressing the **delete** (🗑️) button will delete the goto move stored in the preset button but not its name whereas deleting/editing the name of a preset will alter its name only but not the goto move itself.

Stop button

Use this button to stop a preset or a move.

Help button

 allows you to access MHC Quick Start Guide intended to get you started on MHC and a more detailed MHC User Guide as well other related MRMC manuals.

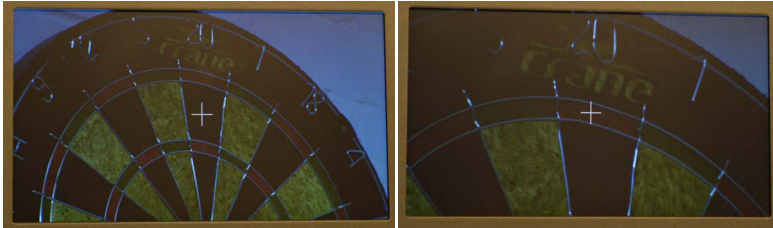
Status button

The Status button has the following tree states:

	The head is connected, but has errors, for example an axis is not connected.
	The head is connected and all axes ready to use.
	The head is not connected.

Zoom button

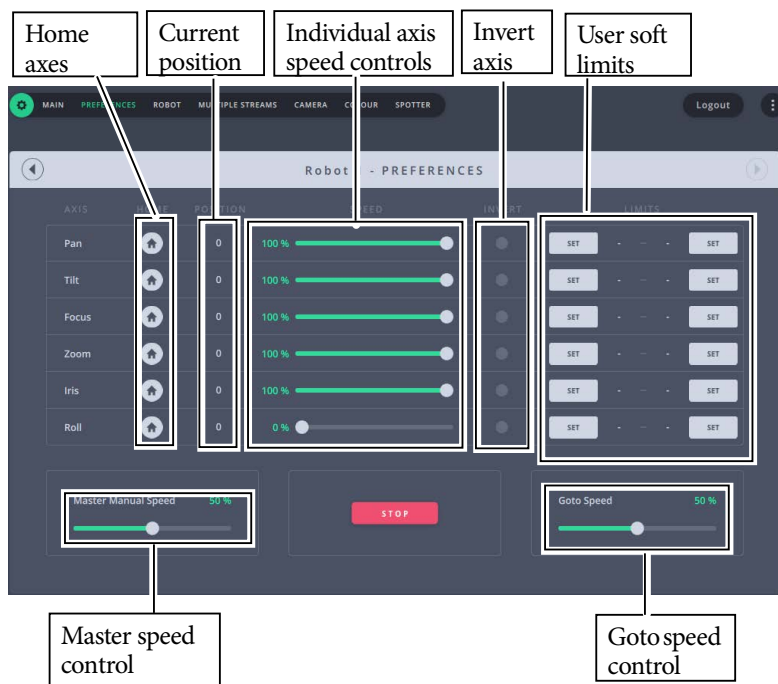
The zoom () button is used to tight zoom on the current head position. To zoom in slightly, click/tap the button once. To zoom in all the way, press and hold the zoom button.



Chapter 3 Preferences Page

Preferences Page

This screen provides a general overview of the speed and soft limits set for all available axes for a head. The limits set in the Preferences page are saved in the local disk and not stored on the head (unlike those in the Robot Settings page), thus providing a faster way of setting limits.



Master Manual Speed

The **Master Manual Speed** control specifies how fast you want all axes to move. Note that this is user dependent that is in case the robot is assigned to more than one user then each user can set this value individually.

Goto Speed

The value in this field will be used for the head movement during presets. Like Master Manual Speed, Goto speed is also user dependent and can be set individually by each user for a given robot.

Individual axis speed control

Individual axis speed controls to specify how fast you want the axis to move. These speeds are set on the robot and if the robot is controlled by many users, it will be set by the user who last controls the axis.

Max. Limit and Min. Limit

The current positions can be stored as minimum and maximum limits for each axis using the **SET** button. These are user limits and not stored on the head. These limits are checked at run time to see that the move does not exceed the allowed limits of travel.

Note

Ensure that you don't set minimum limit same as the maximum limit set on the Robot Settings page or vice versa. This will result in the axis not moving at all.

Also, if the limits on this page are outside the range of limits set on the Robot Settings page, then smallest range of travel will be applied.

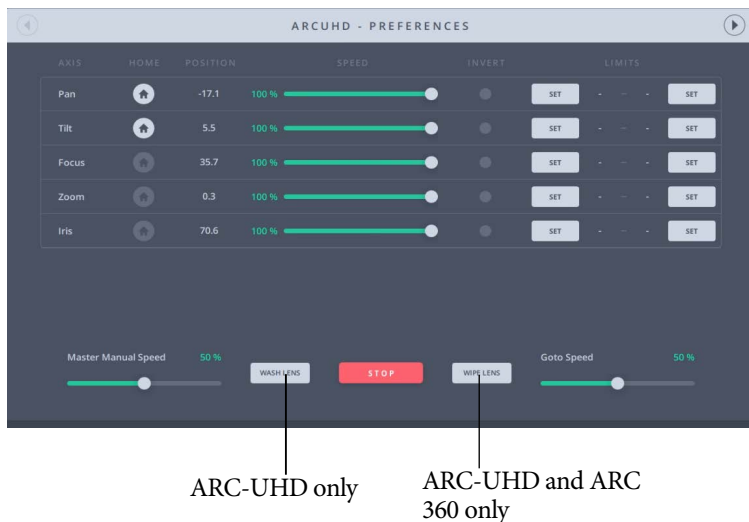
Invert

Use this button to invert the direction of the input control for the axis.

Homing

You can use the axis Home () button to home each axis individually. This button is not available for pan and tilt axes for Pods.

ARC-360 and ARC-UHD Preferences Page



Wipe Lens function is available to activate the wiper of ARC-360 and Wash Lens and Wipe Lens are available for ARC-UHD.

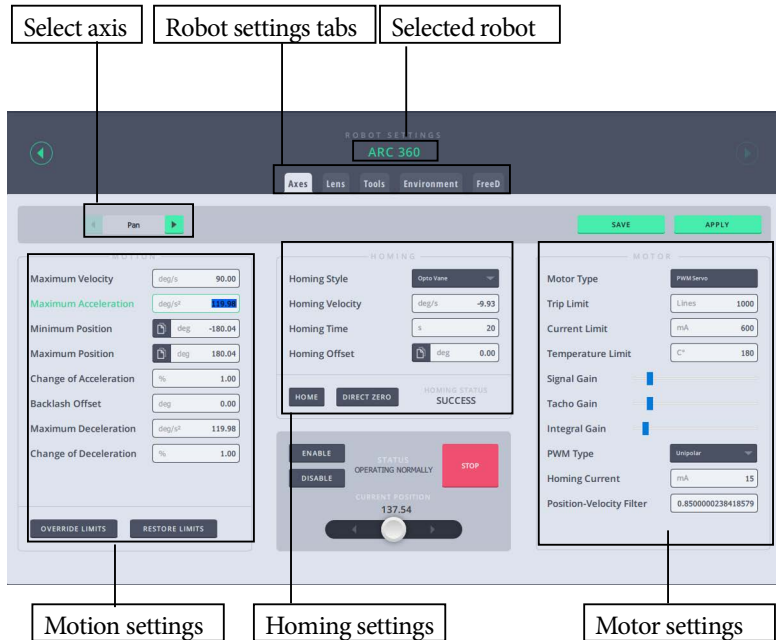
Note

If active, robot tracking deactivates when the wiper function is activated. You can turn tracking on again once the wiping is complete.

Notes

Chapter 4 Robot Settings Page (Engineer, Supervisor Users only)

The Robot Settings page is a collection of engineering type displays related to the head. They are separated into pages for each head assigned to the user and indicated with selectable tabs near the top.



Selecting different robots

You'll find the name and number of the currently selected robot in the header of the page in green. With the green arrow buttons on the side of the header, you can browse through all of your robots, while staying at the same robot settings sub-section. (For example, you want to change the same parameter on all of your connected robots.)



Important

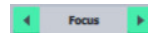
All robot movement must be **completely stopped** before making any changes to configuration or network settings.

- Ensure the robot is in a powered-on but idle state.
- Verify that no presets are active.
- Only proceed with configuration adjustments once the system is confirmed to be stationary.

Failure to follow this procedure may result in equipment damage or personal injury.

Axes tab

Use the Axes tab to store the settings for all the axes of the head. You can browse the axis you want to set up at the top of the page by using the arrows. Any axis that are added for the head, such as Rail, will also appear here.



After setting the options, when you click **Apply** the settings are saved in the RAM of the head and are volatile. However, when you click



Save after applying the settings, they are saved in the flash memory of the head and are permanent until you modify and save them again. Note that while the head tries to store the modified settings, it disconnects for a few seconds and does not accept any command.

Motor settings

Motor type depends on the type of motor that the head uses for that axis. The motor type must be set to the type of motor on that axis. You will need to refer to the product specification for the exact motor type. For Lens axes you want to check that if you are using a serial lens these say "Focus serial" or "Zoom serial". If you are using external servo motors then this should say "Servo (PWM)" (or whatever type of motor you have plugged in). You cannot actually change this setting from here but you can see what it has been set to. If it is not correct then you will need to go back to the Admin page to change the Type of head. Note that this value

is fixed based on the type of head you are using and was selected in the Network Settings page in the Administrator login.

Motion settings

MOTION	
Maximum Velocity	deg/s 90.00
Maximum Acceleration	deg/s² 90.00
Minimum Position	deg -144.00
Maximum Position	deg 144.00
Change of Acceleration	% 0.50
Scaling	1.7578e-5
Backlash Offset	deg 0.00
Maximum Deceleration	deg/s² 90.00
Change of Deceleration	% 0.50

OVERRIDE LIMITS RESTORE LIMITS

Speed limits

Set the **Maximum Velocity** to limit the head's maximum speed to a safer setting. Be sure not to exceed the product specification otherwise unexpected movement will occur. **Maximum Acceleration** sets how quickly (or slowly) the head attains a speed.

Soft limits (Min-Max Positions)

You might need to restrict the range of movement of the robot in some cases. Minimum and Maximum position is the range that the axis is allowed to move.

If there is limited space for the robot, you must avoid collisions to the surrounding objects. You can keep the view in a certain field for easier operation.

Minimum and **Maximum Positions** can be set, the unit is degrees. The recommended way to set these values, is to slowly approach the desired limit while carefully watching the robot. Once satisfied with the position, read the value over the joystick control and use that number as the soft

limit for one end of the desired track. If min and max are both 0 or set the wrong way round then the robot will not move.

Important

One thing is different with a Serial lens axis (i.e. focus, zoom or iris), specifically when using a serial lens. It's important to have the minimum position set to 0. For the maximum position, move the lens axis to the farthest marker and use this position as max. If the range is outside these values, you can have a situation where MHC thinks the lens is moving and you will see the axis position change however the lens itself is rejecting the input from MHC and just not moving. Only when the axis position falls within the acceptable range will the lens move – it can be different depending on the lens.

Change of Acceleration

Use this setting to smoothen the head movements and make them less jerky. You can set it to a value between 0.1 and 1.0. 1 being no smoothing and 0.1 being the most.

Scaling and direction

Scaling is the ratio between 1 degree on the software and how much the motor needs to be moved. Usually it is best to leave at the factory default setting. If this is set incorrectly the head will either move very slow or very fast, so it needs to be just right which is what the default is.

You can reverse the direction for the selected axis by inverting the value in the text field. To do that add or remove the minus sign (-) in the beginning of the number to invert the control of the axis.

Backlash offset

This setting compensates for backlash in the motor during Goto moves and manual control. Backlash is when you have a bit of “wobble room” usually between where gears are meshing the axis can be moved a little without the motor actually moving. Normally 0 is the best setting unless you have problems with backlash.

Override and restore limits

OVERRIDE LIMITS will temporarily disable these settings if you want to ensure the robot is not stopped because of a limit problem. Doing this

will display a red border around the limits that will be overridden. Use this option to perform certain checks on the settings or whilst troubleshooting axes movements. After you have finished, ensure that you click **RESTORE LIMITS** to restore the limits for safer head movement.

Maximum Deceleration

This would set how quickly (or slowly) the head would slow down.

Change of Deceleration

Use this setting to smoothen the head movements when slowing down and make them less jerky. You can set it to a value between 0 and 1.

Home Zeroing

The process of Homing or Zeroing, both meaning the same, is used to let the computer know exactly where each axis is. The zero points themselves are not stored in the head or lens when the power is off, so you need to define them at the start of each session, by Home Zeroing the axes. The MHC software physically moves the axes to the home positions that are built into the hardware and then assigns these positions as the zero points for the axes. Once zeroed, an axis can be controlled to not hit its limits of travel, and can be programmed to move to preset positions and provide accurate Target Tracking information.

The method of Home Zeroing depends on the hardware setup and is pre-configured by MRMC.

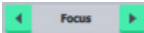
Homing settings

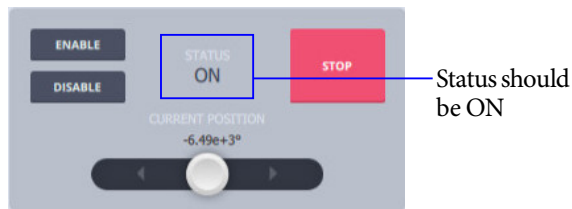
When an axis is zeroed by the computer, it is moved in a certain direction set by the **Homing Velocity** value until it reaches a sensor, once the sensor is detected, the axis slows down and stops. If the sensor is not detected within a certain time (**Homing Time**), then the zeroing will stop and an error will be reported. Once the computer has stopped on a sensor, it moves the motor slowly away until the sensor can no longer be detected and this point is used as a reference point to zero the axis. The axis is then moved further away from the sensor by an amount set in the **Homing Offset** value to its standard Zero point and then the axis position is set to 0.0.

Types of Homing

Controllers usually offer two different ways to Home the axes: an automatic method and a manual method.

In the **automatic** method, MHC moves the axes to the home positions that are built into the hardware and then assigns these positions as the zero points for the axes. This is for Pan, Tilt, and Roll axes on the head. The Focus and Zoom axes having end-stops are Homed differently by MHC but are done automatically. To home an axis from Robot Settings page:

1. Use  > **Robot** > **Axes** tab to Home each axis. 
 Select the axis you want to Home at the top of the page.
 - Ensure that the values in the **Minimum** and **Maximum Position**, and **Homing Type** are correct for the lens on the head for the axes you are homing. This is done automatically for Zoom with end stops (Homing type: **Lens**). The Focus is normally Homing type: **Slip**.
 - Check that the Status of the axis is **ON** in the grey box. If it is not, click the **ENABLE** button to turn it on.



2. Click/tap the **HOME** button to home the selected axis.

Alternatively, you can use the Preferences page, to home an axis. Refer to Chapter 3 *Preferences Page*.

In the **manual** method, while observing the position of the axis, use the controls to take the axes to an end point and then click/tap **DIRECT ZERO**. Conventionally **Focus** is zeroed at **infinity** and **Zoom** is zeroed at **wide angle**.

Homing Style

HOMING

Homing Style	Opto Datum
Homing Velocity	deg/s 3.99178
Homing Time	s 100
Homing Offset	deg 0

HOME DIRECT ZERO HOMING STATUS SUCCESS

This setting depends on the type of the motor of the head. The default setting of this field is set for your head so you don't need to alter Homing Style. However, if you need to set it again, contact MRMC to know the Homing Style.

Homing Velocity

The speed at which the axis will seek its reference point (The direction is set by the sign). This should be set low at first. It is in display scaled units just like the maximum velocity.

Homing Time

This setting determines the time allowed to look for the home position before timing out.

Homing Offset

Once a reference point has been properly located, the axis will move a given distance from this point back to its normal zero position, this is known as the **Homing Offset**. This is useful for making small adjustments to an existing zero.

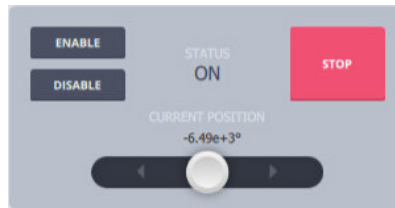
Homing when changing lenses

The values for the **Minimum** and **Maximum Position** must be entered for the lens fitted to the head. It is a good idea to label each lens with the Minimum and Maximum Position for Focus axis.

Important

During homing of the Focus axis, the lens ring is driven to each end of the travel. Ensure that the lens motors are sufficiently tight on their matte bars and remain in mesh with the lens gear.

Enabling and disabling the axis



Enable the axis is needed if an axis trips. You will get a message here in the STATUS area. For example, if the current limit is exceeded then the axis will “trip” as a warning that something is wrong. Either the motor is overloaded or there is something wrong in the axis settings. Once you have fixed the problem or to re-test you click the ENABLE button to allow the axis to move.

You can also disable the axis if you don’t want it to move even when the user move the controller. The status will display as “USER” when it is disabled by the user.

Stopping the head

Use the **STOP** button to stop the head movement.

Test the axis with manual control

You can test your axis settings with the joystick control at the bottom. The **Current Position** of the axis is shown above the joystick control.



Note

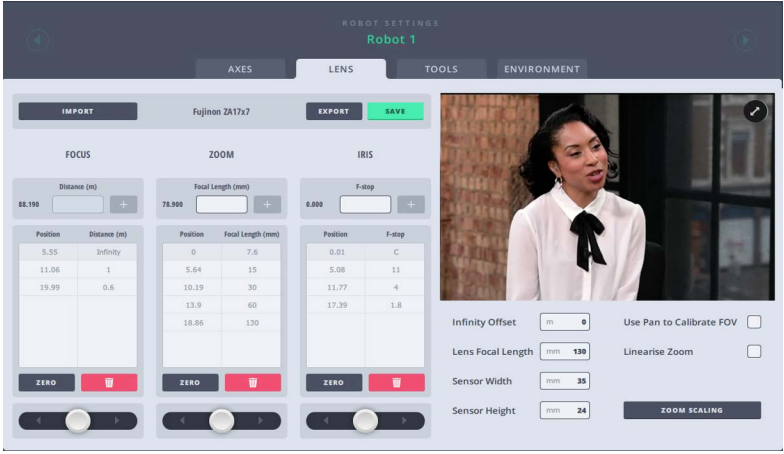
There other settings here known as **Motor Tuning** settings, which are advanced settings and should be fine left as the default settings.

Save and apply settings to the head

To save and apply the settings to the robot, use the two buttons in the top right corner.



Lens tab



Settings in the **Lens tab** store information relating to the individual lens characteristics, such as its focal length so that the system knows which lens is attached. These settings are used when you are using an external tracking system or when you need to control the camera lens in the robot in a more advanced way. A tracking system requires Focus and Zoom axes to keep the moving target in focus and in frame without apparent change in target size. However, the relationship between Focus motor position and target distance, and Zoom motor position and focal length is not linear. Therefore, the Zoom and Focus axes need to be calibrated

allowing the head to control the Focus axis in terms of target distance and the Zoom axis in terms of focal length.

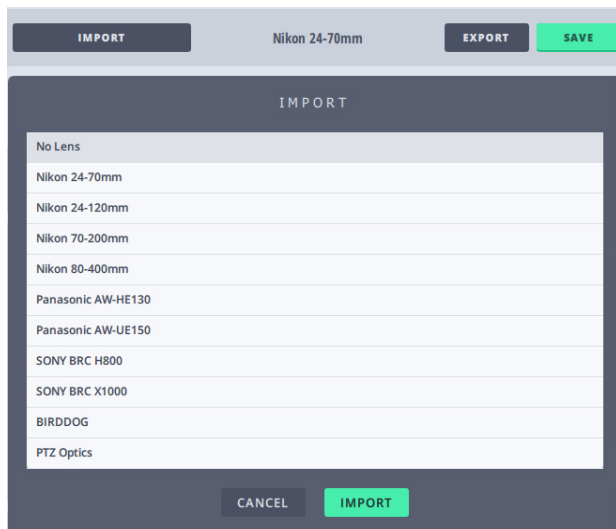
Note

For the Lens calibration settings to work, you should have already set the soft limits in the Axes tab.

Importing Lens Settings (Selecting a Lens)

Use the **IMPORT** button to select a lens profile to be used with this robot or select the 'New Lens' profile from the list in order to create a new lens profile. To import a lens settings:

1. In the Lens tab, click the **IMPORT** button.
2. Select a lens profile. To start creating a new one, select **New Lens**.
3. Click **IMPORT**.



Focus Calibration

To calibrate the Focus axis, you need to specify a calibration table in which each line contains a **Target Distance** and a matching **Focus**

Position. The Target Distance is measured in metres, and the Focus Position is specified by using the Focus slider. To create the focus table:

1. Ensure that the soft limits are set correctly on the AXES tab.
2. Ensure that the Focus ring on the camera is at the minimum position.
3. If you haven't already, import a lens profile as explained in *Importing Lens Settings (Selecting a Lens)* on page 38.
4. Click/tap **ZERO** to direct zero focus axis at infinity.
5. Click **+** button to add the first line as the Target **Distance** of Infinity and Focus motor **Position** of 0.0.

The screenshot shows a mobile application interface titled "FOCUS". At the top, there is a "Distance (m)" input field with the value "0.000" and a "+" button. Below this is a table with two columns: "Position" and "Distance (m)". The table has one row with the values "0" and "Infinity". At the bottom of the interface, there are two buttons: "ZERO" and a red button with a trash icon.

Position	Distance (m)
0	Infinity

6. The next value must be in increasing Focus position and decreasing target distance:
 - 6.1 Use the **Focus** slider to drive the Focus ring to mid **Position** and measure the Target **Distance** using a tape measure and type it in the box.
 - 6.2 Click **+** to add the second line in the Focus table.

FOCUS

Distance (m)

2.240

2

+

Position	Distance (m)
0	Infinity

ZERO

✖

7. The third or final position must be the **maximum motor position for Focus axis** that you set as the soft limit in the Axis tab and the corresponding reading from the camera Focus ring. You must add at least three entries for Focus calibration.

FOCUS

Distance (m)

78.410

+

Position	Distance (m)
0	Infinity
2.24	2
78.41	0.2

ZERO

✖

8. To delete any line, simply select it and click/tap  .
9. Click/tap **SAVE** to save the focus table. Clicking the Save button will save the Lens settings to the currently selected lens profile. To use these newly saved settings with currently selected robot, click the Import button and select the lens profile.

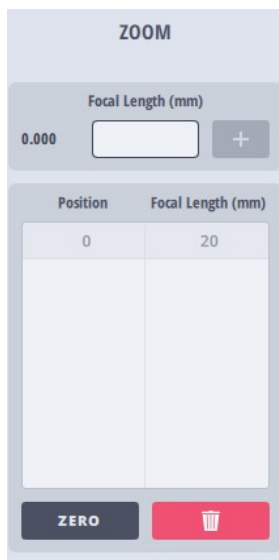
Zoom Calibration

By entering in the MHC a few Zoom motor positions and the their respective focal lengths, the software can work out for any desired focal length what the Zoom motor position should be. This means that you can plot a move on the Zoom axis in terms of focal length, and the zoom will be driven to change the focal length in a smooth manner.

To calibrate the Zoom axis, you need to specify a calibration table in which each line contains a **Focal Length** and a matching **Zoom Position**. The Focal Length is measured in millimetres, and the Zoom motor position is specified by using the Zoom slider. To create the zoom calibration table:

1. Ensure that the soft limits are set correctly for the Zoom axis on the AXES tab.
2. Ensure that the zoom ring on the camera is at the minimum position (at widest zoom).
3. Click/tap  to direct zero the zoom axis.
4. Specify the Focal length for the widest zoom (reading from the camera zoom ring)

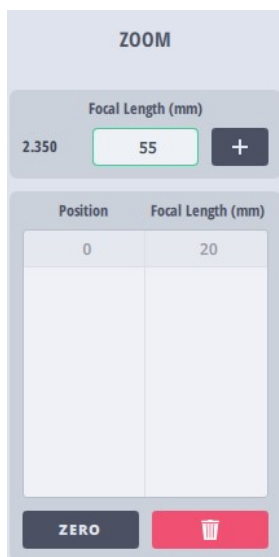
5. Click  to add the first line in the Zoom table..



The screenshot shows a mobile application interface titled "ZOOM". It features a section for "Focal Length (mm)" with a text input field containing "0.000" and a "+" button. Below this is a table with two columns: "Position" and "Focal Length (mm)". The table has one row with the values "0" and "20". At the bottom of the interface are two buttons: a dark blue "ZERO" button and a red button with a trash icon.

6. The next value must be in increasing zoom motor position and respective focal length:
- 6.1 Use the **Zoom** slider to change the Zoom motor **Position** so that the reading on the lens zoom ring is about half the travel. Specify the reading from the lens zoom ring in the **Focal Length (mm)** box.

6.2 Click  .

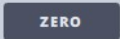


ZOOM

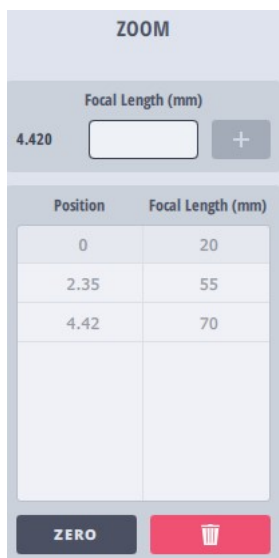
Focal Length (mm)

2.350 

Position	Focal Length (mm)
0	20

- The last entry must correspond to the upper travel limit of the Zoom axis or tightest zoom. You must add minimum 3 and maximum 12 entries for Zoom calibration.



ZOOM

Focal Length (mm)

4.420 

Position	Focal Length (mm)
0	20
2.35	55
4.42	70

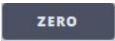
 

8. To delete any line, simply select it and click/tap .
9. Click/tap **SAVE** to save the zoom table. Clicking the Save button will save the Lens settings to the currently selected lens profile. To use these newly saved settings with currently selected robot, click the Import button and select the lens profile.

Iris Calibration

If your head and camera have iris, its calibration is done by entering up to 10 F stops and motor positions. The computer will then fit a curve to the entered points and use this curve to convert motor positions to stops and vice versa. The points are entered as normal, simply decide where the iris is to zero, and zero it; then move the iris by hand through each of its marked stops, entering the stop on the right and using the mouse store button to read the iris axis position into the column on the left. The positions must not reverse direction nor can the stops, but otherwise they can be increasing or decreasing. You must enter at least 3 lines in the iris table; 2 for the end of travel and 1 for the middle.

To calibrate the Iris axis, you need to specify a calibration table in which each line contains a **F Stop** and a matching Iris motor **Position**. The F Stop is measured in millimetres, and the Iris motor position is specified by using the Iris slider. To create the iris calibration table:

1. Ensure that the soft limits are set correctly for the Iris axis on the AXES tab.
2. Ensure that the zoom ring on the camera is at the minimum F stop.
3. Click/tap  to direct zero zoom axis.
4. Specify the Focal length for the first F stop.
5. Click  to add the first line in the Iris table.
6. The next value must be in increasing iris motor position and respective F stop:
7. Use the **Iris** slider to change the Iris **Position** so that the reading on the lens Iris ring is about half the travel. Specify the reading from the lens iris ring in the **F stop** box.
8. Click .

9. The last entry must correspond to the upper travel limit of the Iris axis. You must add minimum 3 and maximum 12 entries for Iris calibration.
10. To delete any line, simply select it and click/tap  .
11. Click/tap **SAVE** to save the iris table. Clicking the Save button will save the Lens settings to the currently selected lens profile. To use these newly saved settings with currently selected robot, click the Import button and select the lens profile.

Infinity offset

Before calibrating the Focus axis, it is important that the axis is correctly zeroed. Sometimes, the Focus axis might not zero at infinity. In this case, set up the zeroing to where you want it to go and zero the lens, then move it to Infinity, and use the reading over the Focus axis control on the Main page to store this distance as the Infinity Offset.

Lens Focal Length

Specify the focal length of the lens. If the focal length of the lens is not fixed, then use a number in the middle of the focal length range of the camera.

Sensor Width and Height

Specify the Sensor Width and Sensor Height for the sensor of the camera.

Use Pan to Calibrate FOV

When using pan and tilt along with Zoom, a small movement in the pan axis on narrow zoom can result in greater shift in FOV than the same movement in pan axis on wide zoom. Therefore, the Zoom axis might need to be scaled to avoid such shifts. Specify whether you want to use Pan to calibrate FOV. When this option is selected, the zoom table will have pan positions instead of focal length in order to linearise the movement of pan with zoom during presets.

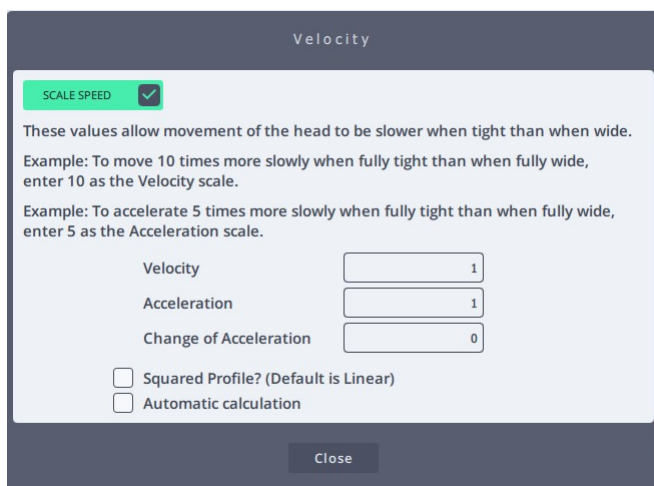
Linearise Zoom

Normally the field size change does not move steadily with a constant movement on the zoom lens. Zoom linearisation allows for smoothing the head movement with changing zoom position using the Zoom table. The feature makes it easier to do contra zooms (zoom in and track back to change perspective without apparent change in object size) and also

makes it easier to match the end of one zoom to the beginning of another. When this option is selected, the MRMC head will use the zoom table of pan positions to focal length in order to linearise the movement during presets.

ZOOM SCALING

Clicking this button opens the Velocity dialog box. The fields in this dialog box allow pan movement of the head to be slower when on zoom tight than when wide.

A screenshot of the 'Velocity' dialog box. At the top, the title 'Velocity' is centered. Below it, a green button labeled 'SCALE SPEED' with a checkmark icon is on the left. To its right, text explains that these values allow movement to be slower when tight than wide, with two examples: one for Velocity scale (10) and one for Acceleration scale (5). Below the text are three input fields: 'Velocity' with value '1', 'Acceleration' with value '1', and 'Change of Acceleration' with value '0'. At the bottom left are two checkboxes: 'Squared Profile? (Default is Linear)' and 'Automatic calculation', both currently unchecked. A 'Close' button is at the bottom right.

Velocity

SCALE SPEED ☒

These values allow movement of the head to be slower when tight than when wide.

Example: To move 10 times more slowly when fully tight than when fully wide, enter 10 as the Velocity scale.

Example: To accelerate 5 times more slowly when fully tight than when fully wide, enter 5 as the Acceleration scale.

Velocity

Acceleration

Change of Acceleration

☐ Squared Profile? (Default is Linear)

☐ Automatic calculation

Close

SCALE SPEED: Check this toggle button if you want to enable zoom relating scaling. Once enabled, the values in this dialog box will be used instead of those on Axes tab.

Velocity: Specify a number for the Velocity factor here. At the tightest zoom position, the velocity generated from the joystick or other input device is divided by the Velocity factor. At the widest zoom position, the velocity generated from the joystick or other input device remains unchanged. For example, to move 10 times more slowly when fully tight than when fully wide, enter 10 as the Velocity scale.

Acceleration: Specify a number for the Acceleration factor here. For example, to accelerate 5 times more slowly when fully tight than when fully wide, enter 5 as the Acceleration scale.

Change of Acceleration: This functions the same way as the setting on the Axes tab. Use this setting to smoothen the head movements and make them less jerky. You can set it to a value between 0.1 and 1.0, where 1.0 means no smoothing and 0.1 being the most.

Squared Profile?: Values between the tightest and widest zoom position are divided by an intermediate value which can be either on a linear scale or a squared scale. The squared profile changes more steeply at the tight end and less steeply at the wide end.

Automatic calculation: If checked, the calculation will take the velocity percentage and make the maximum acceleration percentage and the maximum change of acceleration percentage the same value.

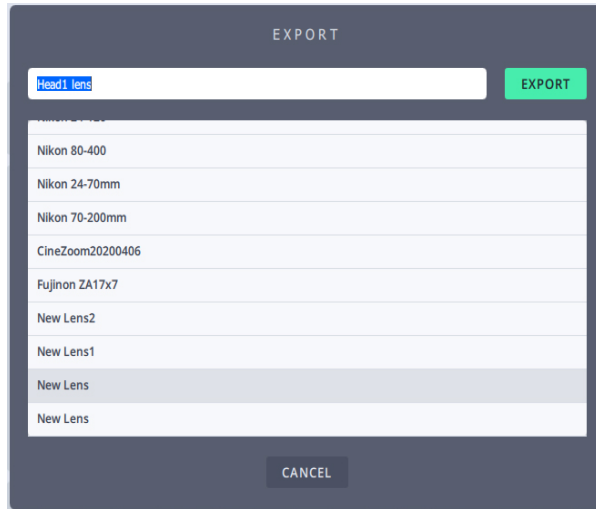
Exporting lens settings (Saving a lens with a new name)

Use the **EXPORT** button to save the current lens configuration settings to a specific slot in the lens profiles list and give it a new name. To use these newly saved settings with currently selected robot, click the **Import** button and select the lens profile.

To export a lens configuration file:

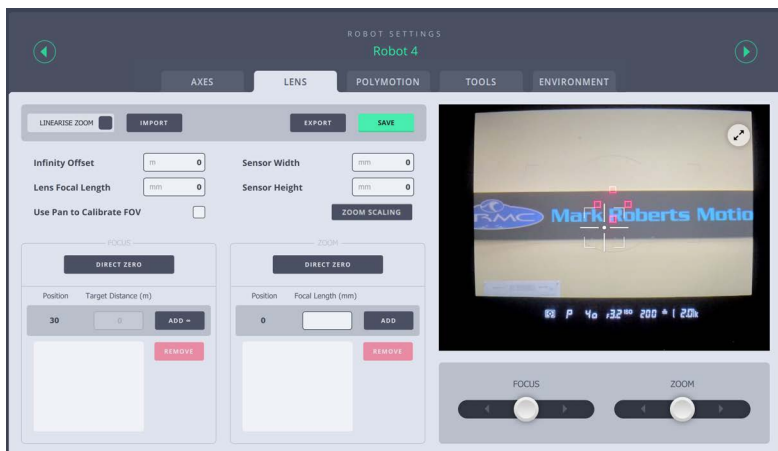
1. Change the required settings on the Lens tab.
2. Click **EXPORT**.
3. Select one of the existing lens profiles to replace or select the **New Lens** profile to create a new lens.

4. Enter a name for the profile.



5. Click **EXPORT**.

Lens tab



Settings in the **Lens** tab stores information relating to the individual lenses characteristics, such as its focal length and throw of the manual

Focus ring so that the system knows which lens is attached. These settings are used when you are using an external tracking system or when you need to control the camera lens in the robot in a more advanced way. A tracking system requires Focus and Zoom axes to keep the moving target in focus and in frame without apparent change in target size. However, the relationship between Focus motor position and target distance, and Zoom motor position and focal length is not linear. Therefore, the Zoom and Focus axes need to be linearised or calibrated allowing the head to control the Focus axis in terms of target distance and the Zoom axis in terms of focal length.

Linearise Zoom button

Linearise Zoom is a toggle button that allows you to enable Zoom linearisation during Goto moves, using the parameters shown in the table.

Note

For the Lens calibration settings to work, you should have already set the soft limits in the AXES tab.

Infinity offset

Before calibrating the Focus axis, it is important that the axis is correctly zeroed. Sometimes, the Focus axis might not zero at infinity. In this case, set up the zeroing to where you want it to go and zero the lens, then move it to Infinity, and use the reading over the Focus axis control on the Main page to store this distance as the Infinity Offset.

Lens Focal Length

Specify the focal length of the lens. If the focal length of the lens is not fixed, then use a number in the middle of the focal length range of the camera.

Sensor Width and Height

Specify the Sensor Width and Sensor Height for the sensor of the lens.

Use Pan to Calibrate FOV

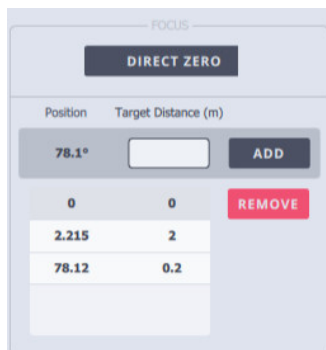
When using pan and tilt along with Zoom, a small movement in the pan axis on narrow zoom can result in greater shift in FOV than the same

movement in pan axis on wide zoom. Therefore, the Zoom axis might need to be scaled to avoid such shifts. Specify whether you want to use Pan to calibrate FOV.

Focus calibration

To calibrate the Focus axis, you need to specify a linearisation table in which each line contains a **Target Distance** and a matching **Focus Position**. The Target Distance is measured in metres, and the Focus Position is specified by using the Focus control. To create the linearisation table:

1. Ensure that the soft limits are set correctly on the AXES tab.
2. Ensure that the Focus ring on the camera is at the minimum position.
3. Click the **ADD** ∞ button to add the first line as the **Target Distance** of infinity and Focus **Position** of 0.0.
4. The next value must be in increasing Focus position and decreasing target distance:
 - 4.1 Use the **Focus** control to drive the Focus **Position** and type the **Target Distance** in the box.
 - 4.2 Click the **ADD** button.
5. The third or final position must be the maximum position that you set as the soft limit in the Axis tab. Use the marking of the lens to decide how many entries you add in the translation table. Normally, you would add about three entries for Focus linearisation.



Position	Target Distance (m)
78.1°	
0	0
2.215	2
78.12	0.2

Zoom linearisation

By entering in the MHC a few Zoom motor positions and the their respective focal lengths, the software can work out for any desired focal length what the Zoom motor position should be. This means that you can plot a move on the Zoom axis in terms of focal length, and the zoom will be driven to change the focal length in a smooth manner. Normally the focal length (or field of view) change does not move steadily with a constant movement on the Zoom lens.

The screenshot shows a software window titled "MHC". At the top is a button labeled "DIRECT ZERO". Below it are two columns: "Position" and "Focal Length (mm)". Under "Position", there is a text input field containing "0°" and an "ADD" button. Below this is a table with two columns: "Position" and "Focal Length (mm)". The table contains the following data:

Position	Focal Length (mm)
0	20
2.325	40
2.516	50
2.803	70

To the right of the table is a red "REMOVE" button.

To linearise the Zoom axis, you need to specify a linearisation table in which each line contains a **Focal Length** and a matching **Zoom Position**. The Focal Length is measured in millimetres, and the Zoom Position is specified by using the Focus control. To create the linearisation table:

1. Ensure that the soft limits are set correctly for the Zoom axis on the AXES tab.
2. Ensure that the Zoom ring on the camera is at the minimum position (at widest zoom).
3. Specify the focal length for the widest zoom.
4. The next value must be in increasing Zoom position and respective focal length:
 - 4.1 Use the **Zoom** control to specify the Zoom **Position** and type the **Focal Length** in the box.
 - 4.2 Click the **ADD** button.
5. Use the marking of the lens to decide how many entries you add in the linearisation table. Normally, you would add about 3 to 7 entries for Zoom linearisation.

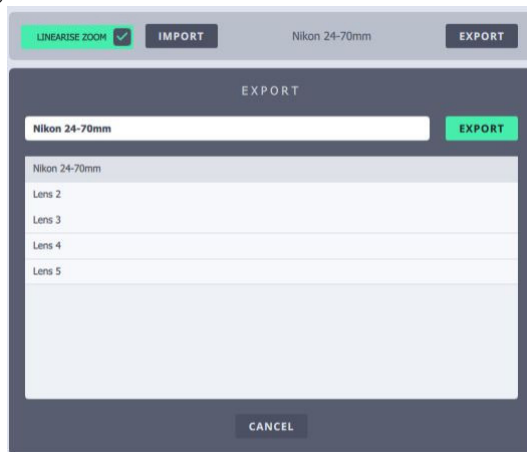
The last entry must correspond to the upper travel limit of the Zoom axis.

Exporting lens settings

You can save the current populated field characteristics in a lens configuration file on the local disk. In other words, clicking the **EXPORT** button will save the current values to the local disk.

To export a lens configuration file:

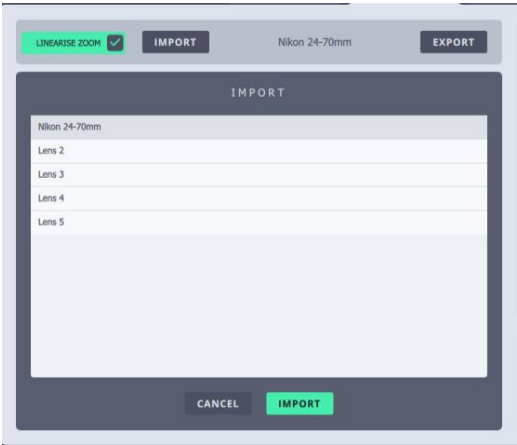
1. Change the required settings on the Lens tab.
2. Click **EXPORT**.
3. Select one of the existing lens configurations. Rename the configuration.



4. Click **EXPORT**.

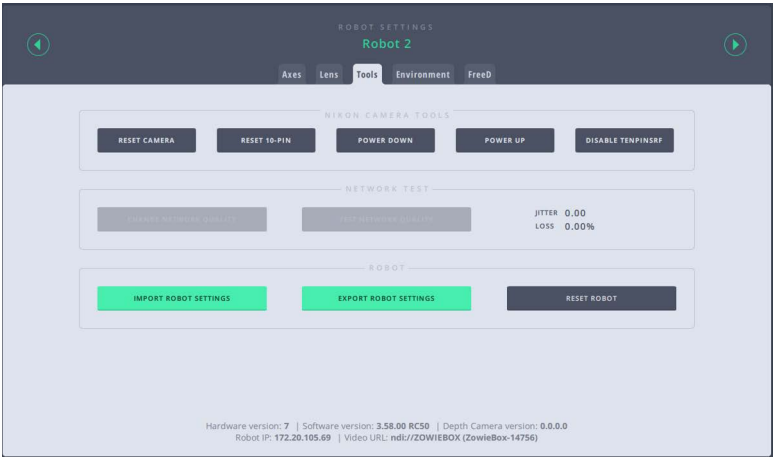
Importing lens settings

Use the **IMPORT** button to populate a previously saved lens profile on the Lens tab. Note that any value changed will be stored on the head immediately. Normally, as long as you are using the same lens on the head, you will not need to change this.



Tools tab

The TOOLS tab allows resetting of the head and exporting and importing MHC settings.



The following buttons can be used when a Nikon camera is connected, either via the MRMC robotic head or as a stand-alone:

RESET CAMERA (Nikon camera only)

Clicking **Reset Camera** resets the Nikon camera as-though you power-cycled it.

RESET 10-PIN (Nikon camera only)

10-pin board is a special board that MHC uses to access special functions in the D5 camera. Clicking **Reset 10-Pin** reinitialises the 10-Pin board, or resets all the camera functions that are accessible via 10-pin protocol, such as ISO, aperture, focus, white balance, image quality etc.

POWER DOWN (Nikon camera only)

Removes power from the Nikon camera.

POWER UP (Nikon camera only)

Powers up the Nikon camera.

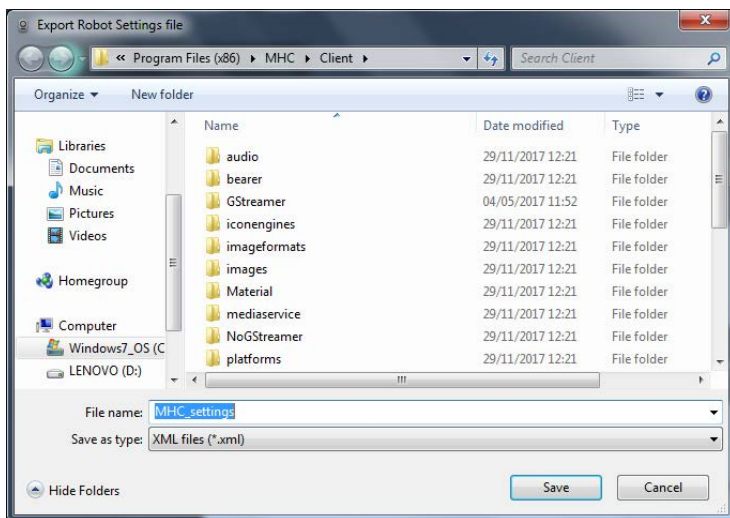
DISABLE/ENABLE TENPINSRF (Nikon camera only)

Disable/enable TenpinSRF.

EXPORT ROBOT SETTINGS (MRMC heads and some other third party heads)

Use this button to store all the robot settings in MHC to an XML file which you can import later. This can be used to copy settings to another robot or save the factory settings to be restored later. When exporting settings all child robot axes settings are also saved.

1. Clicking the button will open a dialog box, enter the name of the XML file.



2. Click **Save**.

Note

Robot settings can only be imported or exported when the MHC Server application is running on the same computer as MHC Client.

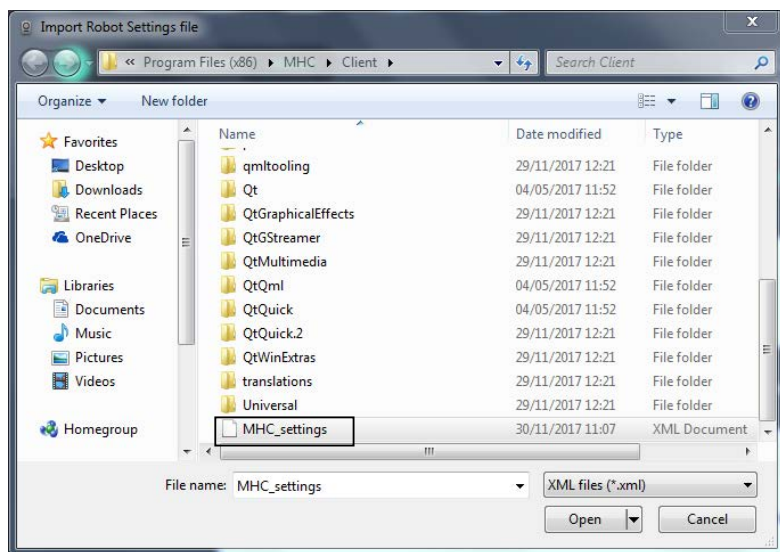
Note

Import/Export is not supported for remote clients. You will need to perform the operation of the MHC Server computer.

IMPORT ROBOT SETTINGS (MRMC heads and some other third party heads)

Use this button to import MHC settings from an XML file. If you disconnect the child robot, such as rail or LLS, a warning dialog is

displayed indicating that there is a mismatch and inquiring whether to accept loading of the file



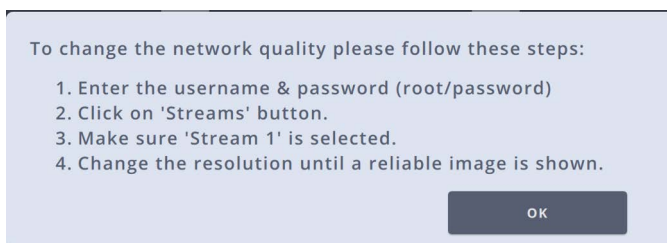
Note

Import/Export is not supported for remote clients. You will need to perform the operation of the MHC Server computer.

CHANGE NETWORK QUALITY (Pod and MRMC VISCA heads only)

Clicking/tapping this option gives you a message with instructions on how to change the resolution of the imagery from the REP camera. You

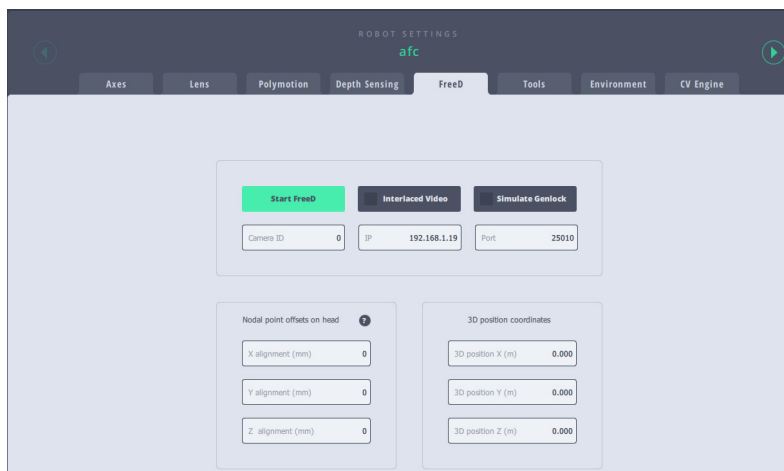
might need to do this if your bandwidth is limited and you want to reduce the traffic on the network.



TEST NETWORK QUALITY (Pod and MRMC VISCA heads only)

This button displays the percentage values of Jitter and Loss in the network.

FreeD



MRMC heads are now capable of sending free-D data to a designated host to create a virtual studio system. Using the free-D virtual studio system allows for motion tracking up to eight axes of motion (x, y, z, pan, tilt, roll, zoom, focus). All whilst accurately measuring the position and orientation of each camera, to ensure the precise matching of the real and virtual worlds. The following fields on the Tools tab allow you to send free-D data to a host:

- **Camera ID:** Add the Camera ID for the robotic head. This helps to identify the camera head for a multi-head system. Defaults to 0 and can be left as when you are using a single head.
- **IP:** IP address of the host PC. This should be a static IP.
- **Port:** Port number to receive the free-D packet.
- **USE FREED:** Check this box to start transferring the data to the host PC using the options specified. The values cannot be changed once this is enabled.

Note

For Canon PTZ, the proprietary web interface needs to be used to switch on and off broadcasting FreeD data from this head.

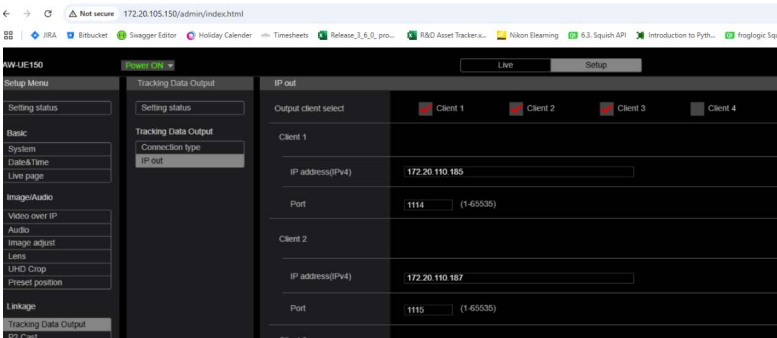
Note

Offsets and 3D positions in FreeD tab for child robots (rail and lift) should always be set to 0.

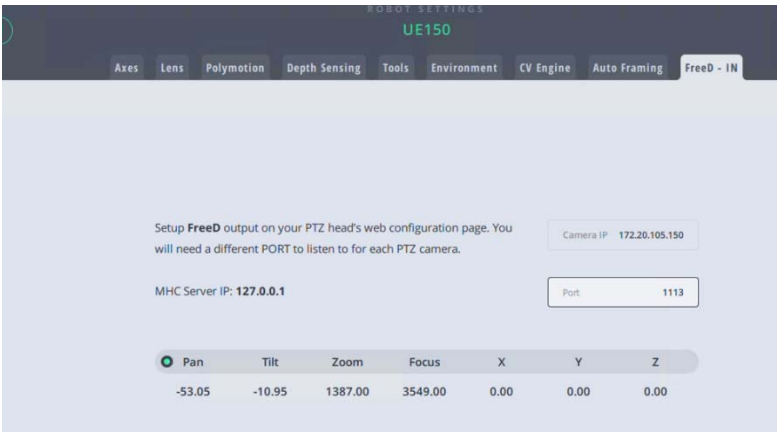
The screenshot displays the 'ROBOT SETTINGS' window for an 'ARC 360' robot. The 'FreeD' tab is selected, showing configuration options for the robot's position and orientation. The 'Rail' sub-tab is active, with 'Lift' and 'Head' also available. A note states: 'Setup FreeD to send real time position and orientation data'. The interface includes a 'Start FreeD' button, checkboxes for 'Interlaced Video' and 'Simulate Genlock', and input fields for 'Camera ID' (2), 'IP' (172.20.105.100), and 'Port' (25011). There are also buttons for 'Underslung', 'Invert Pan', and 'Invert Tilt'. At the bottom, two sections are visible: 'Nodal point offsets on head' with input fields for X, Y, and Z alignment (all set to 0), and '3D position coordinates' with input fields for 3D position X, Y, and Z (all set to 0.000).

ROBOT SETTINGS					
ARC 360					
Axes	Lens	Tools	Environment	FreeD	
Rail Lift Head					
Setup FreeD to send real time position and orientation data					
Start FreeD ☒ Interlaced Video ☒ Simulate Genlock					
Camera ID	2	IP	172.20.105.100	Port	25011
Underslung		Invert Pan		Invert Tilt	
Nodal point offsets on head			3D position coordinates		
X alignment (mm)			3D position X (m)		
0			0.000		
Y alignment (mm)			3D position Y (m)		
0			0.000		
Z alignment (mm)			3D position Z (m)		
0			0.000		

For third party heads, set up FreeD on the robot's own webpage:

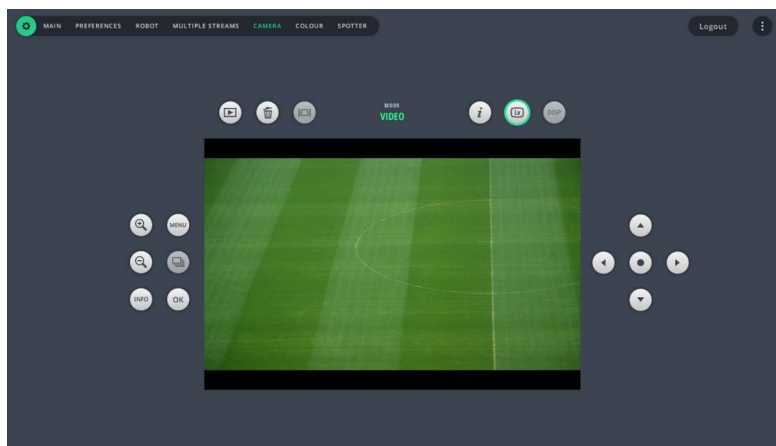


Add the port to the MHC FreeD page (it is no longer automatically assigned).



Chapter 5 Nikon Remote (Nikon Z6 and D5 Only)

Camera page can be accessed by clicking/tapping **Settings** (🔌) > **Nikon Remote**. This page allows the user to use many camera controls on the camera body via the MHC screen.



This page mimics some of the controls on the rear of the Nikon camera.

The Lv button (🔌) is disabled for Z6 camera and should be always left turned on for D5 camera. The RTSP video stream from the D5 needs to be configured for this page to display the video stream. To learn more about how to set up RTSP stream from the camera, refer to *Setting up video feed from the camera* on page 13.

Use the **DISP** button in the Z6 camera to view or hide indicators in the video stream.

Notes

Chapter 6 Camera Settings Page

The Camera Settings page allows you to change a wide range of remote functions and adjustments including colour, white balance and other image setting parameters on the Nikon DSLR camera attached to the head or otherwise. A different Camera Settings page appears for MRMC Visca heads such as ARC 360 and ARC UHD.

The Camera Settings page has combinations of functions that can be accessed via SRF or USB. The default Nikon camera connection for Nikon D5 or Z9 is USB which allows you to modify certain colour controls.

Install MHC Classic v3.8.x

Run the provided installer (MHCSetup_x64-3.8.x onwards) to install MHC.

When prompted, allow MHC Server.exe and MHC Client.exe access through the firewall.

Enable Nikon JPEG Live View streaming in MHC

To enable JPEG Live view streaming:

1. Close MHC Server and MHC Client if running.
2. Edit the MHC\server\MHCSystemSettings.xml and set the NikonJpegEnabled setting to 1:

```
<NikonJpegEnabled>1</NikonJpegEnabled>
```

Note

The live view video will only display while connected to an SRF enabled Nikon Z9 camera.

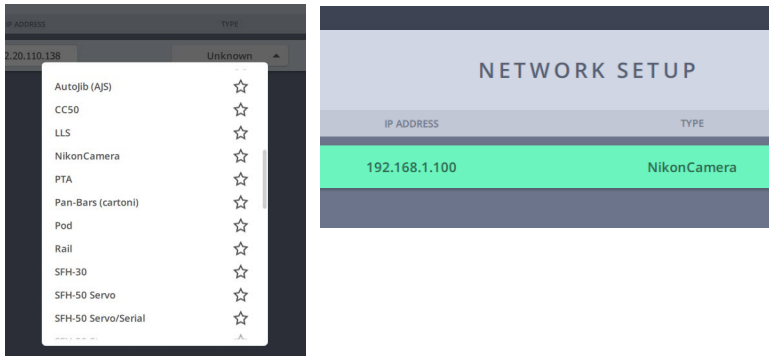
To add robotic heads such as SR-1 or AFC with attached Nikon Z9, refer to *Adding heads* on page 6. You will need to log in as 'Admin' with password 'Admin1234' to enter the Admin screen.

Then select users for the robot – see section *Assigning heads to user(s)* on page 10. To add new users, see *Adding users* on page 14.

Camera Settings for SRF-enabled Z9

Adding a Nikon Z9 without robotics to MHC

1. Login as 'Admin' with password 'Admin1234' to enter the Admin screen.
2. Click the 'NEW' button and enter IP address of the Z9 camera.
3. Select the 'Type' to be 'NikonCamera' as shown in images below.

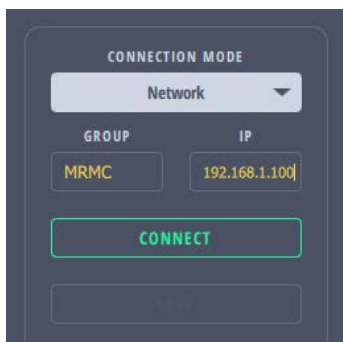


4. Then select users for the robot – see section *Assigning heads to user(s)* on page 10. Add more users if needed in the 'User' screen, as in section *Adding users* on page 14.

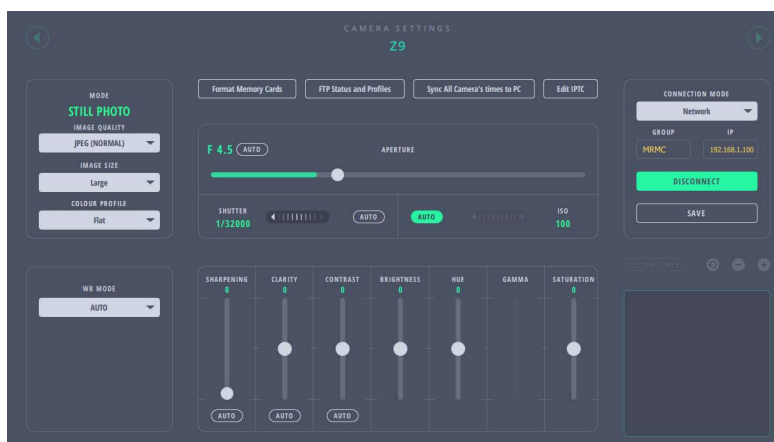
Connecting to an SRF-enabled Z9

1. Log in as a user and click **Settings** (⚙️) > **Camera Settings** in the top menu to open the colour control screen.

2. Set the connection mode to be 'Network', set the Group and IP address to match the configuration in the Nikon camera.



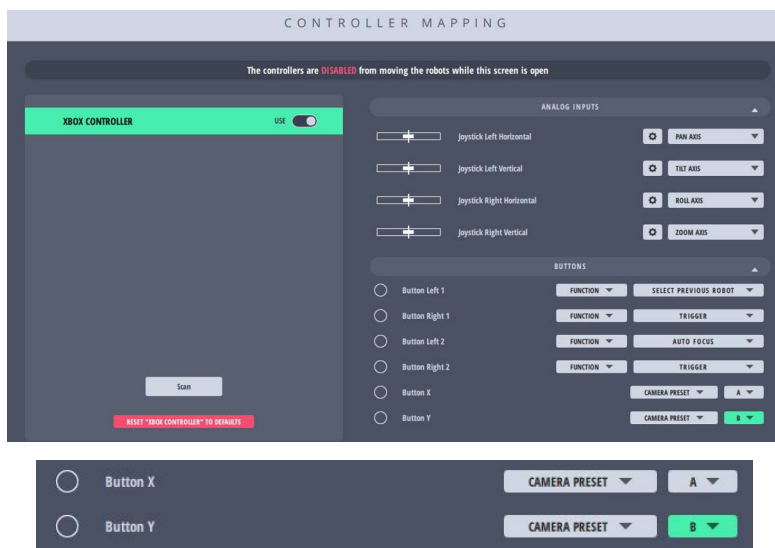
3. Click 'Connect'. When the connection is successful, the controls will enable as shown in image below:



Controller Mapping

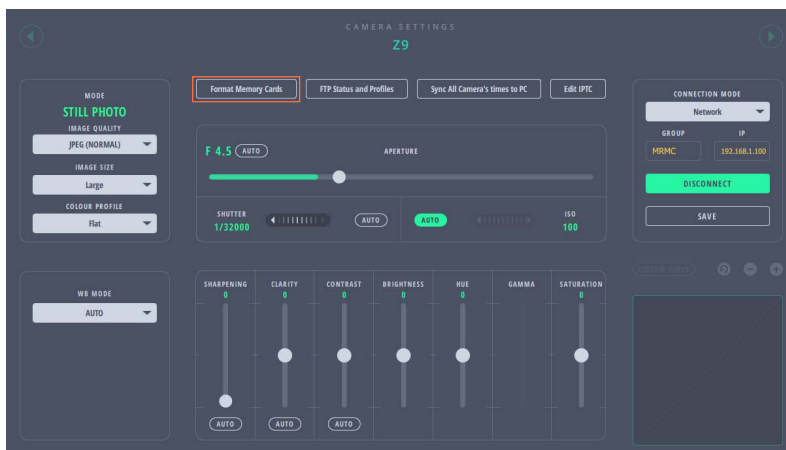
MHC supports USB gamepads and controllers including Xbox, Playstation and generic gamepads/joysticks. Refer to Chapter 4 *Controller Mapping Page* in *MHC v3.8 User Manual* to learn how to use the Controller Mapping options. New 'Camera Preset' option is now available

for buttons to allow the user to switch between the camera banks A, B, C and D, as shown:

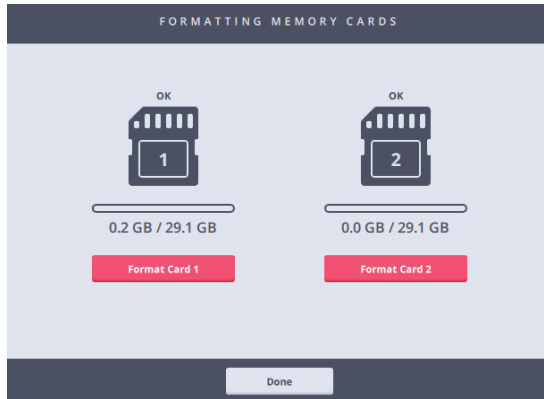


Formatting Memory Cards

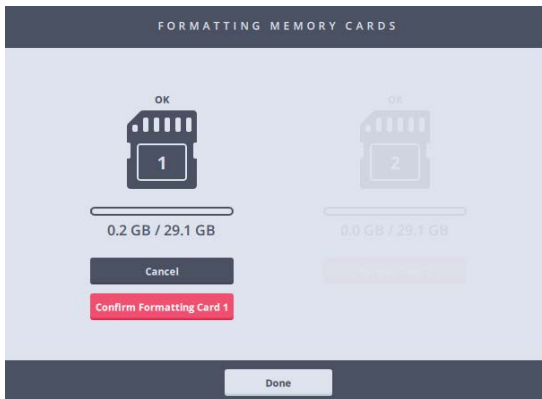
To format a Nikon Camera memory card, navigate to the 'Camera Settings' page and click the 'Format Memory Cards' button.



Click on the red 'Format Card' button.



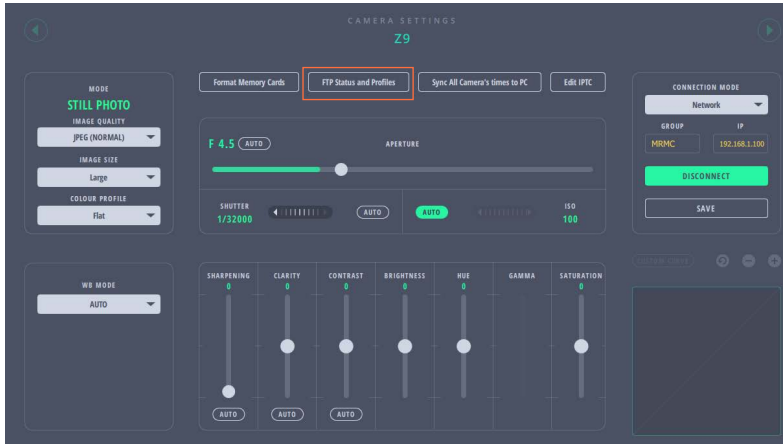
A cancel and a confirmation button is then displayed. To continue with formatting the memory card click on the red confirmation button. Press the cancel button to stop the formatting the card.



The formatting should only take a few seconds, then click done when finished to close the dialog.

FTP Status and Profiles

To manage FTP profiles navigate to the 'Camera Settings' screen and click the 'FTP Status and Profiles' button.



The current FTP connection status is displayed at the top of the dialog.

The 'Reboot' button will reboot the camera connection.

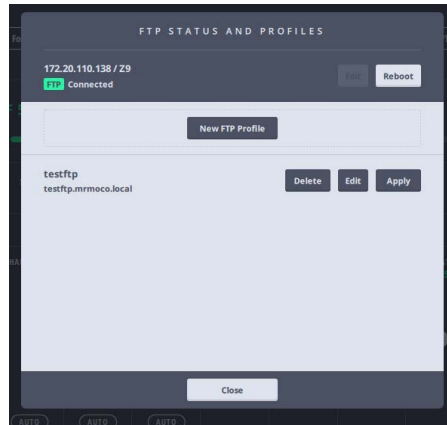
To create a new FTP profile, click on the 'New FTP Profile' button.

The 'Delete' button will delete the profile.

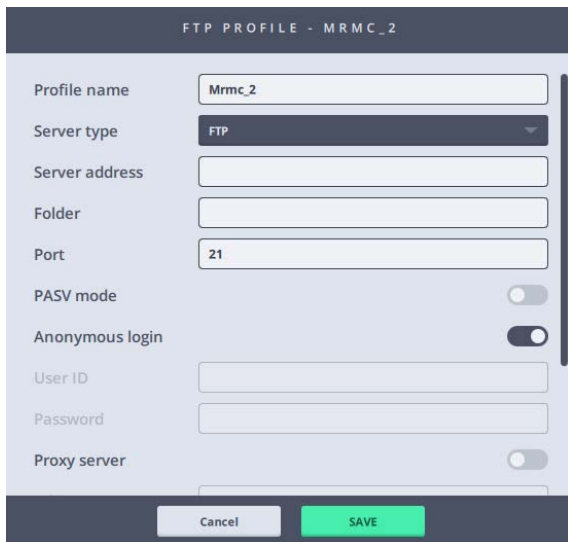
The 'Edit' button will open a form to edit an existing profile.

The 'Apply' button will set the profile to be the current profile on the camera.

When creating a new profile or editing an existing profile, a dialog will be displayed with all the settings.



When finished click 'Save' to store the settings locally or 'Cancel'.



The screenshot shows a settings form titled "FTP PROFILE - MPMC_2". The form contains the following fields and controls:

- Profile name: Text input field containing "Mpmc_2".
- Server type: Dropdown menu set to "FTP".
- Server address: Text input field.
- Folder: Text input field.
- Port: Text input field containing "21".
- PASV mode: Toggle switch, currently off.
- Anonymous login: Toggle switch, currently on.
- User ID: Text input field.
- Password: Text input field.
- Proxy server: Toggle switch, currently off.

At the bottom of the form are two buttons: "Cancel" and "SAVE".

Syncing the data time of cameras

To sync the date and time of all connected cameras to the PCs time, on the 'Camera Settings' page and click **Sync All Camera's times to PC**.

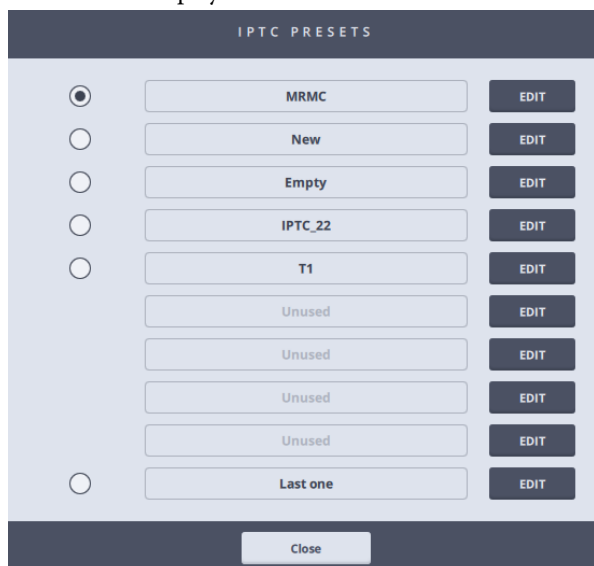
Editing IPTC

To edit IPTC settings in the camera, on the 'Camera Settings' page, click



A list of IPTC presets from the camera will be displayed. The radio buttons on the left allow the user to select the IPTC preset to use in the camera.

The EDIT button will display a form to edit the IPTC data for that preset.

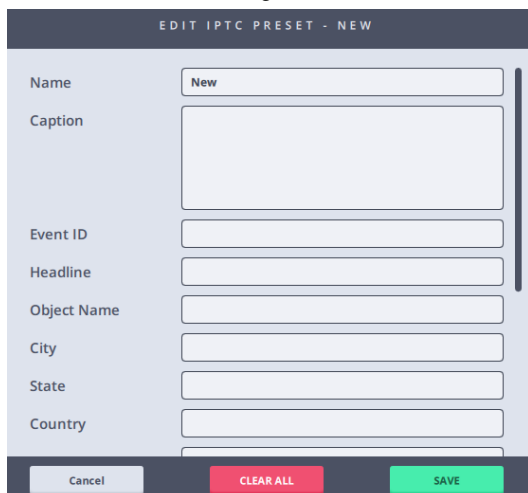


The screenshot shows a window titled "IPTC PRESETS". On the left, there is a vertical column of radio buttons. The first radio button is selected. To the right of the radio buttons is a list of preset names in light blue boxes: "MRMC", "New", "Empty", "IPTC_22", "T1", "Unused", "Unused", "Unused", "Unused", and "Last one". To the right of each preset name is a dark blue button labeled "EDIT". At the bottom of the window is a dark blue bar with a light blue button labeled "Close".

The red 'CLEAR ALL' button will clear all the data from all the fields in the form.

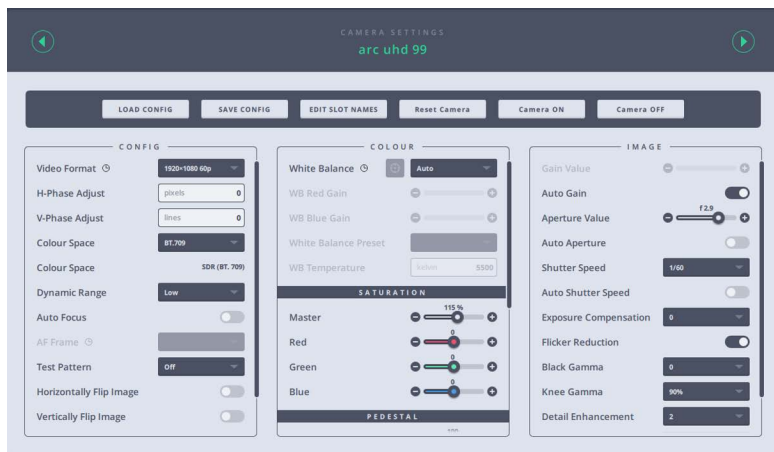
The 'SAVE' button will save the changes made to the IPTC preset in the camera.

Click 'Cancel' to exit without saving.



The screenshot shows a form titled "EDIT IPTC PRESET - NEW". The form has a light blue background. On the left, there are labels for the fields: "Name", "Caption", "Event ID", "Headline", "Object Name", "City", "State", and "Country". On the right, there are corresponding input fields. The "Name" field contains the text "New". The "Caption" field is a large text area. The other fields are empty. At the bottom of the form is a dark blue bar with three buttons: "Cancel" (light blue), "CLEAR ALL" (red), and "SAVE" (green).

Camera Settings Page for ARC-UHD



The options on this page allow you to specify config, colour, saturation, pedestal and image settings. Some of these settings include:

Video Format: Select from the list of Video Formats available.

Auto Focus: Auto focus can be set to Manual or Auto.

Horizontally Flip Image and **Vertically Flip Image:** Allow you to flip the camera image vertically and horizontally based on the mounting position of the camera.

White Balance: Allows you to adjust the white balance. Default setting is 'Auto'.

Noise Reduction Amount: Default is 3.

Colour Bars: Default is off but can be set to CrossLine and 7 Bar 100%.

Shutter speed: Allows you to select a shutter speed based on the available light and video frame rate. Only available when the shutter speed mode is not set to 'Auto'.

Auto shutter speed: The shutter speed is determined automatically by the system.

Flicker Reduction: You have facility to enable/disable the camera's flicker reduction function during a live event. Default setting is off.

In addition to these the buttons on the top of the page are:

SAVE CONFIG: Allows you to save the current camera settings for subsequent recall. You can save different configurations, say for indoor and outdoor settings.

LOAD CONFIG: You can load any pre-saved camera settings as the current ARC-UHD configuration. Any loaded configuration is applied to the head immediately.

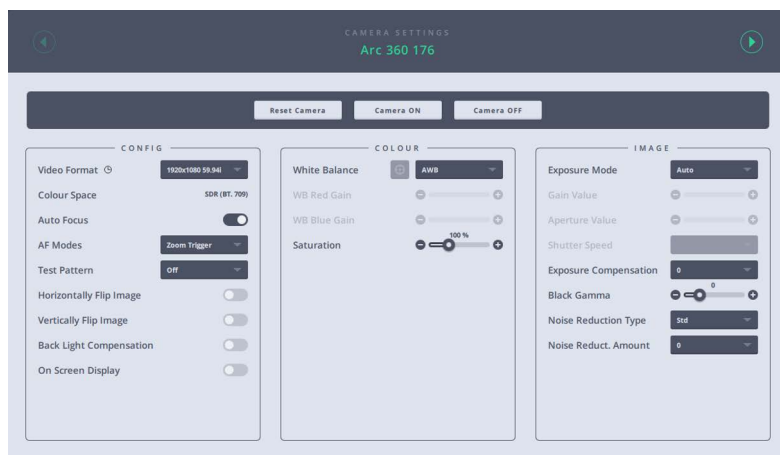
EDIT SLOT NAMES: The config on the page can be saved to slots and the slot names can be changed for easy recognition.

RESET CAMERA: Use to power cycle the camera and load the default camera settings.

CAMERA OFF: Power down the camera in isolation from the head, for example in situations when the camera is not going to be used for long periods.

CAMERA ON: Use to power up the camera.

Camera Settings Page for ARC-360



The options on this page allow you to specify config, colour, saturation, pedestal and image settings. Some of these settings include:

Video Format: Select from the list of Video Formats available.

Note

When the Video Format is changed for ARC-360, the camera is turned off and on to save the setting and all other settings are reset to camera defaults.

Auto Focus: Auto focus can be set to Manual or Auto.

Horizontally Flip Image and **Vertically Flip Image:** Allow you to flip the camera image vertically and horizontally based on the mounting position of the camera.

White Balance: Allows you to adjust the white balance. Default setting is 'Auto'.

Exposure Mode: Auto or Manual; Manual allows you to set the **Gain Value** and **Aperture Value**.

Shutter speed: Allows you to select a shutter speed based on the available light and video frame rate. Only available when the shutter speed mode is not set to 'Auto'.

Noise Reduction Amount: Default is 3.

Note

IR Cut Filter option is now removed from the Camera Settings page for ARC-360.

In addition to these the buttons on the top of the page are:

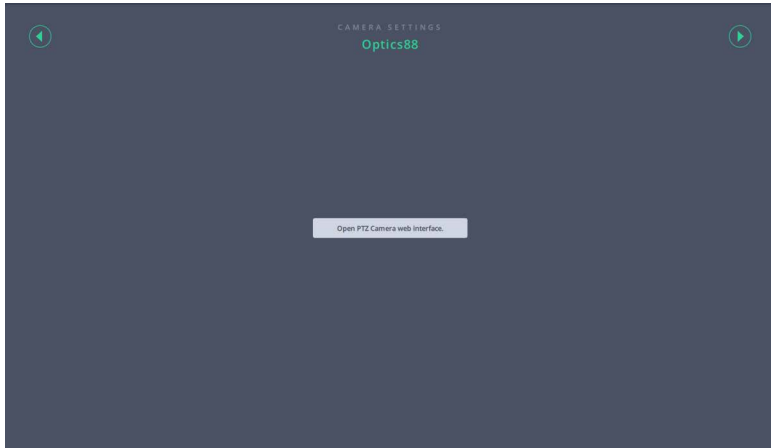
RESET CAMERA: Use to power cycle the camera and load the default camera settings.

CAMERA OFF: Power down the camera in isolation from the head, for example in situations when the camera is not going to be used for long periods.

CAMERA ON: Use to power up the camera.

Camera Settings for Non-MRMC Heads

For non-MRMC heads, the Camera Settings page provides all MHC user group types with access to camera/PTZ web UI built in to MHC. If the head is connected, pressing the button spawns the system's default web browser and displays the robot login page for username and password validation and access to the camera settings.



Appendix 1 Troubleshooting

Typical symptoms, causes, and actions

Symptoms	Cause and/or action
The head did not appear connected in MHC In the Network settings, the row for the head is not green.	Check that all cables are connected, and all units have power. In the Network Settings page: • Check you have added the correct IP address of the head in MHC. • Ensure that the Type of robot is correct. • Check that the IP addresses of the head and MHC PC are in the same network range. • Ensure that two devices on the same network do not have the same IP address. If you have connected more than one heads, connected the MRMC system to another local network, or moved the head between networks, check that correct addresses have been entered in MHC.
A '!' appears with the head icon in the MHC Main screen.	 Click/tap the spanner() icon appearing below the head icon to allow MHC to correct the error.
While tracking, the camera is pointing in the wrong direction.	The Pan axis must move to the left when position is moved positively. If it is incorrect, then scaling for the axis will need its sign changing. The Tilt axis must move up when position is moved positively. If this is incorrect, then scaling for the axis will need its sign changing.

Symptoms	Cause and/or action
The controls are not moving the head or the head doesn't appear to be communicating.	• Check that the soft limits are correct; the min and max limits are not set the wrong way around. These limits should be checked both on Axes tab and the Preferences page. • Click the Reset Robot button in the Tools tab. The head will take a few seconds to reconnect after doing this.
The axis settings do not appear to be correct	If the axis settings seem to be out of order or you just want to get back to the original settings, then you can reset the settings to "factory default". This can be done from Server --> Axis.
Camera controls are not responding.	• Click the Reset Robot button in the Tools tab.

Backup and Restore All User Settings

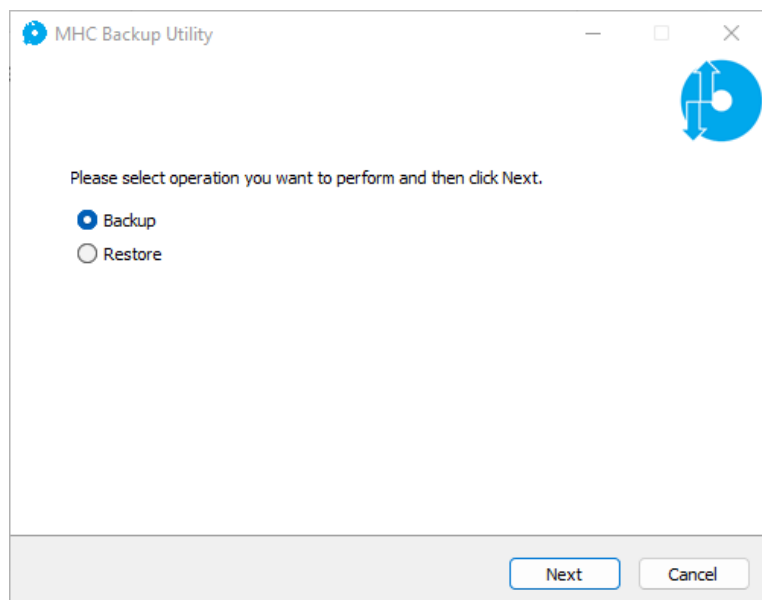
MHC Backup Utility allows you to backup and restore all user settings for client and server including the CV-Engine settings held by the server, saved presets settings, robot parameters, screen grabs for preset buttons and so on. MHC v3.8 onwards, the desktop MHC Backup utility backs up Program Data configuration files so that the restore option can restore the lens calibration profiles too. Using the following procedure you can backup and restore the entire Polymotion/MHC configuration.

Backup

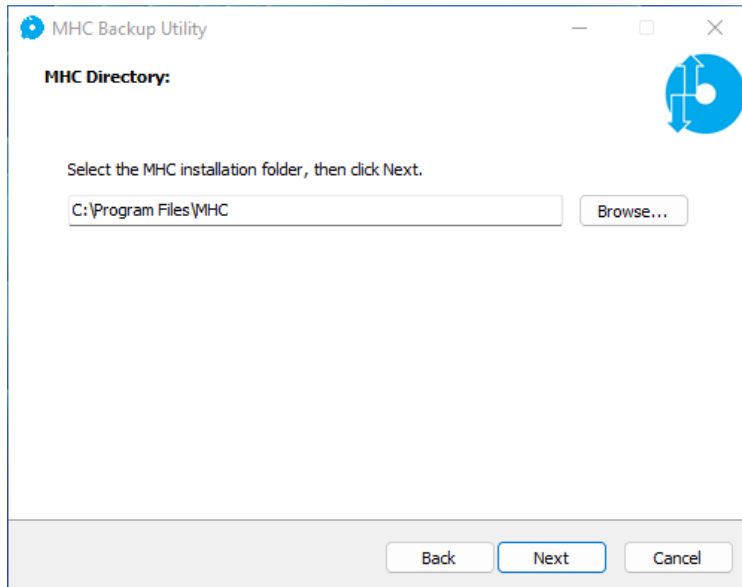
1. Launch the MHC Backup Utility using the Desktop icon.



2. At the first screen of the Backup utility, select **Backup** and click Next.

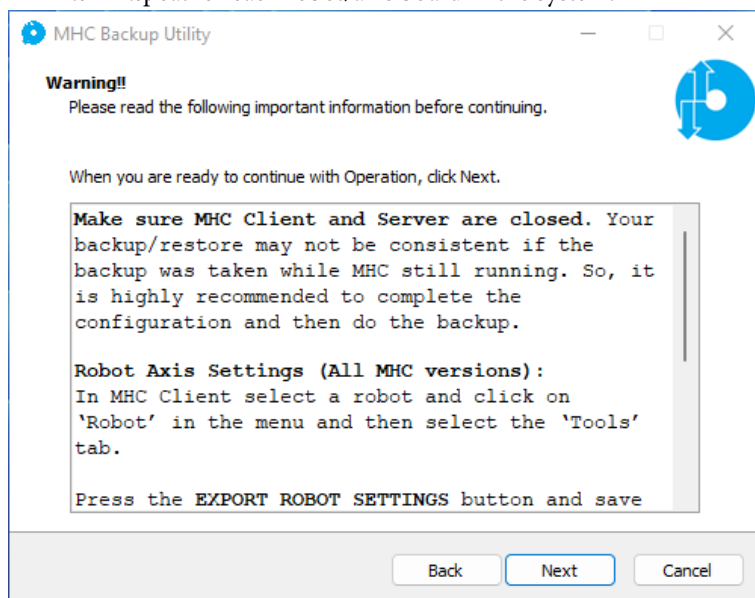


3. In the next screen, select the MHC installation folder that you want to back up.



4. Close both MHC Server and Client. Your backup/restore may not be consistent if the backup was taken while MHC still running. So, it is highly recommended to complete the configuration and then do the backup. Also ensure that you backup separately all robot axis settings as follows:
 - 4.1 In MHC Client select a robot and click on 'Robot' in the menu and then select the 'Tools' tab.
 - 4.2 Press the EXPORT ROBOT SETTINGS button and save the .xml file with a unique name that identifies the robot/axis board that the settings are from.

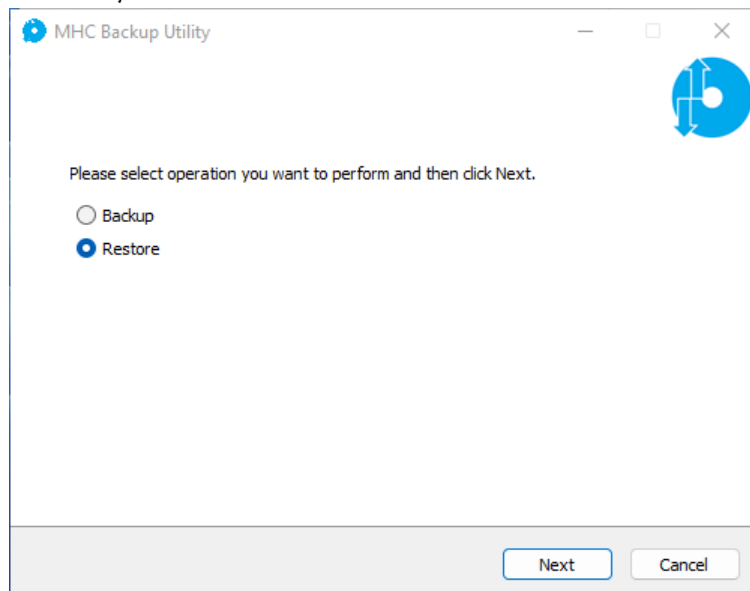
4.3 Repeat for each robot/axis board in the system.



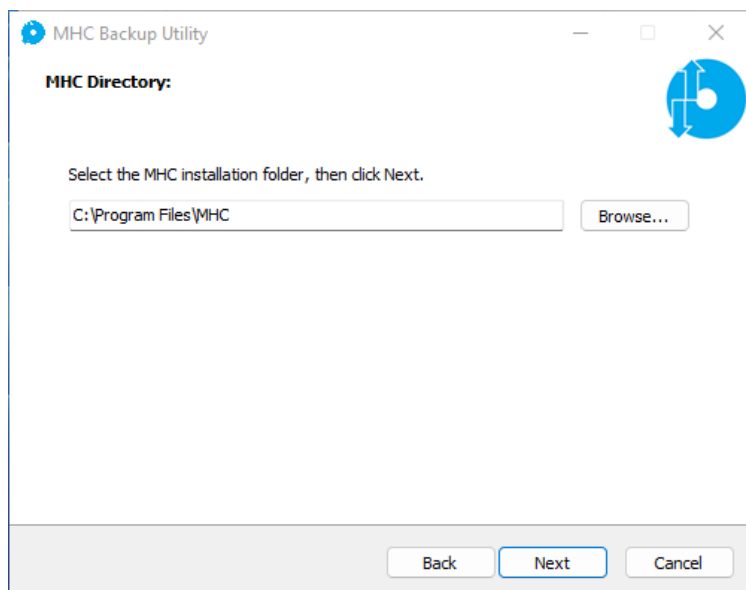
5. Select the Open the backup folder option to see the contents of the folder and click Finish.

Restore

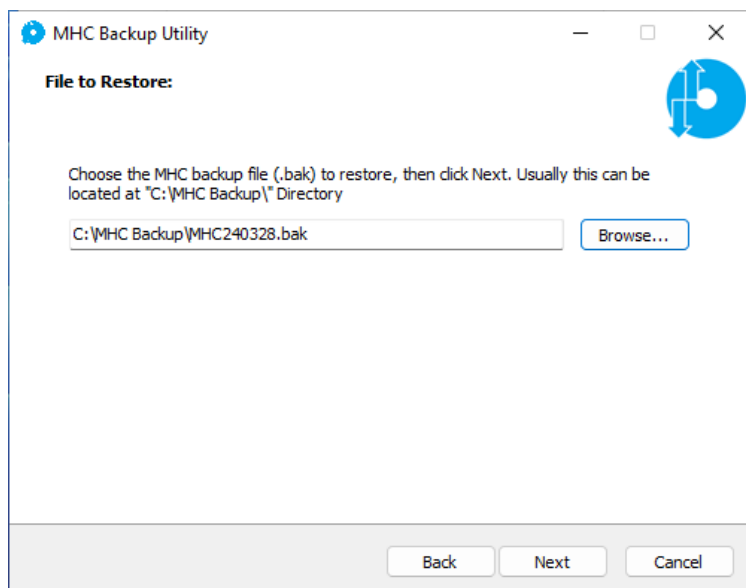
1. Ensure that Polymotion/MHC is installed on the PC where you want to restore the previously stored backup. Start the MHC Backup Utility and select Restore and click **Next**.



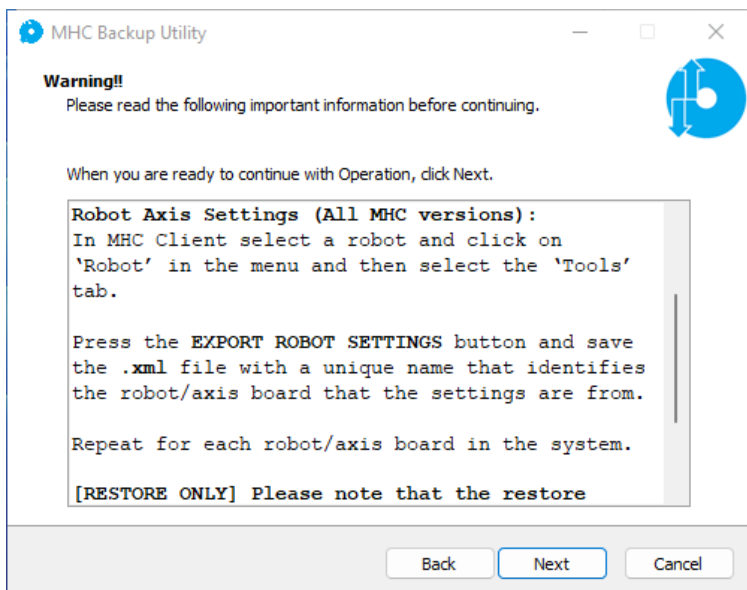
2. Select the MHC installation folder where the configuration needs to be restored and click Next.



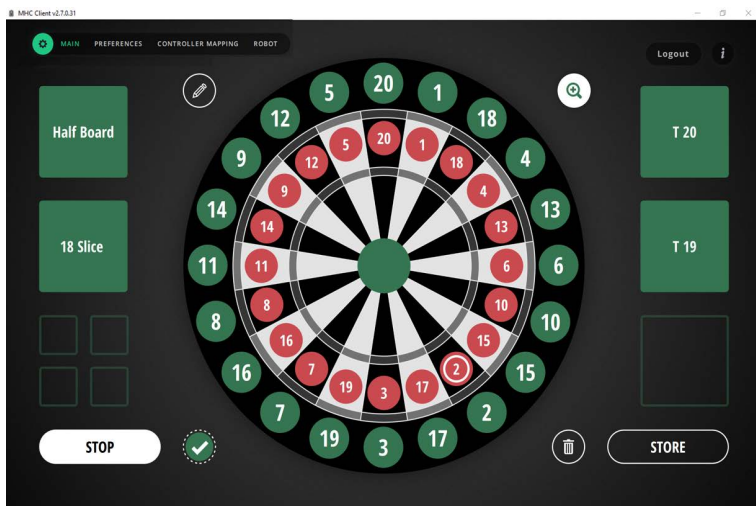
3. Navigate to the backup file and click Next.



- Note that the restore operation cannot be reversed. If you are unsure make a backup of current configuration using this tool before attempting to restore.



Notes



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