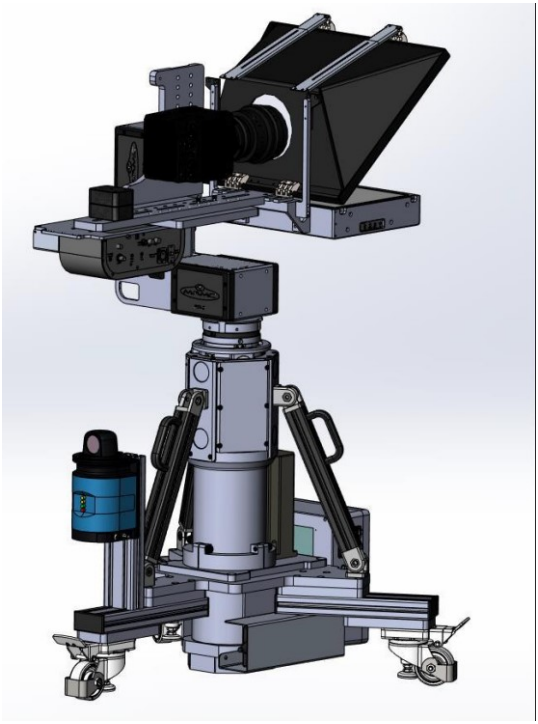
MARK ROBERTS MOTION CONTROL

XY LOCATION SYSTEM



QUICK START GUIDE

QSG Product code: MRMC-2221-00
Product Covered: MRMC-2211-00

XY Location System Quick Start Guide

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Chapter 1 **Quick Start**

Important safety instructions

To ensure the best from the product, please read this manual carefully. Keep it in a safe place for future reference.

To reduce the risk of electric shock, do not remove the cover from the unit. No user serviceable parts inside. Refer servicing to qualified personnel.

Power and connections

- This unit must be connected to a mains socket outlet with a protective earth connection.
- This unit is not disconnected from the AC power source as long as it is connected to the wall outlet.
- When not using the unit for a long period of time, ensure that the AC power cord is disconnected from the wall outlet.
- The AC wall outlet should be installed near to the unit and be easily accessible.
- Do not plug in or attempt to operate an obviously damaged unit.

General care

- Do not force switches or external connections.
- When moving the unit, disconnect the mains cable and then disconnect the long umbilical cable.
- Do not attempt to clean the unit with chemical solvents or aerosol cleaners, as this may damage the unit. Use a clean dry cloth.
- Do not use around flammable gas. All electrical equipment can generate sparks that can ignite flammable gas.
- Keep away from pets and children. The head has powerful motors that can pinch, so take care not to get your hands trapped in the head or cabling.

- Keep cables tidy. Use cable ties to keep them out of harm's way. If you have a head with slip rings then make use of them; avoid running any cables between the base and the rotating head or camera.

Location

Installation of this unit should be away from sources of excessive heat, vibration, and dust.

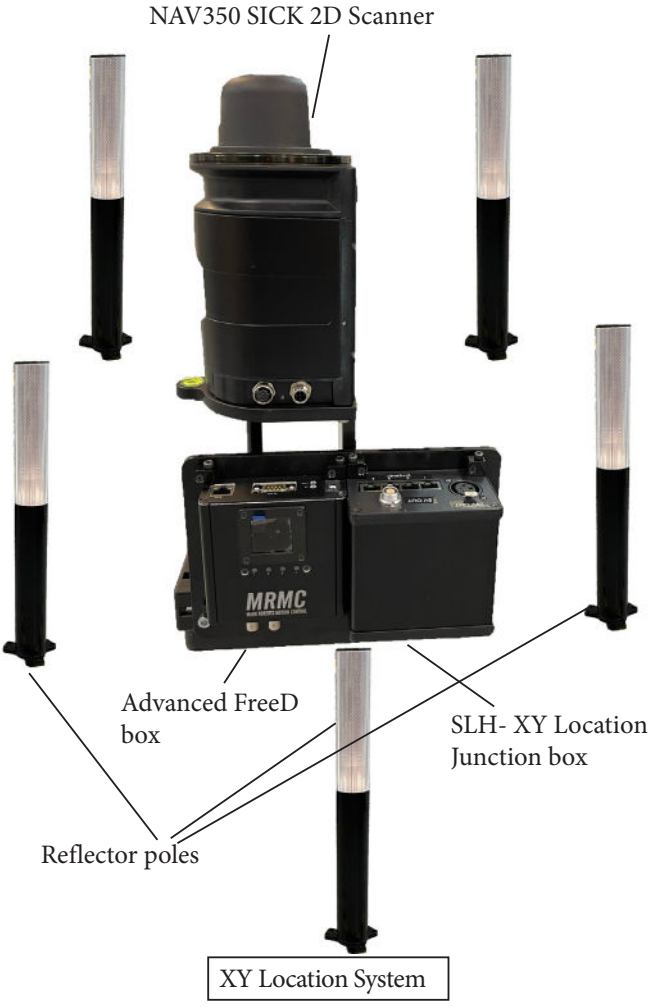
Keep the brakes on caster wheels on when using the SLH lift column.

Intellectual property

This product includes confidential and/or trade secret property. Therefore, you may not copy, modify, adapt, translate, distribute, reverse engineer, or decompile contents thereof.

Overview

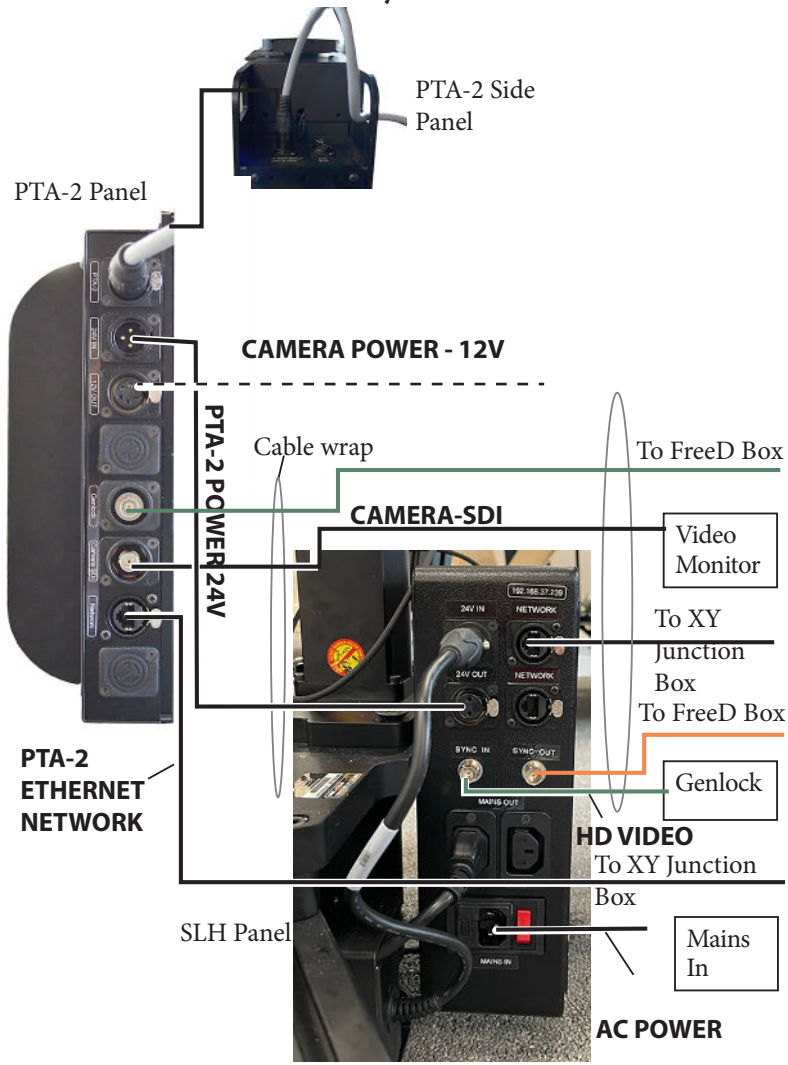
Thank you for using the XY Location System column from Mark Roberts Motion Control (MRMC). This is an optical locating device which can be used to determine X and Y coordinate locations of items such as Lift Columns, robots and potentially other equipment making it invaluable in indoor studios using Virtual Reality environments. You can use the Ethernet connection on the SLH to connect directly to a PC running the Multi-Head Controller (MHC) or RTL software.

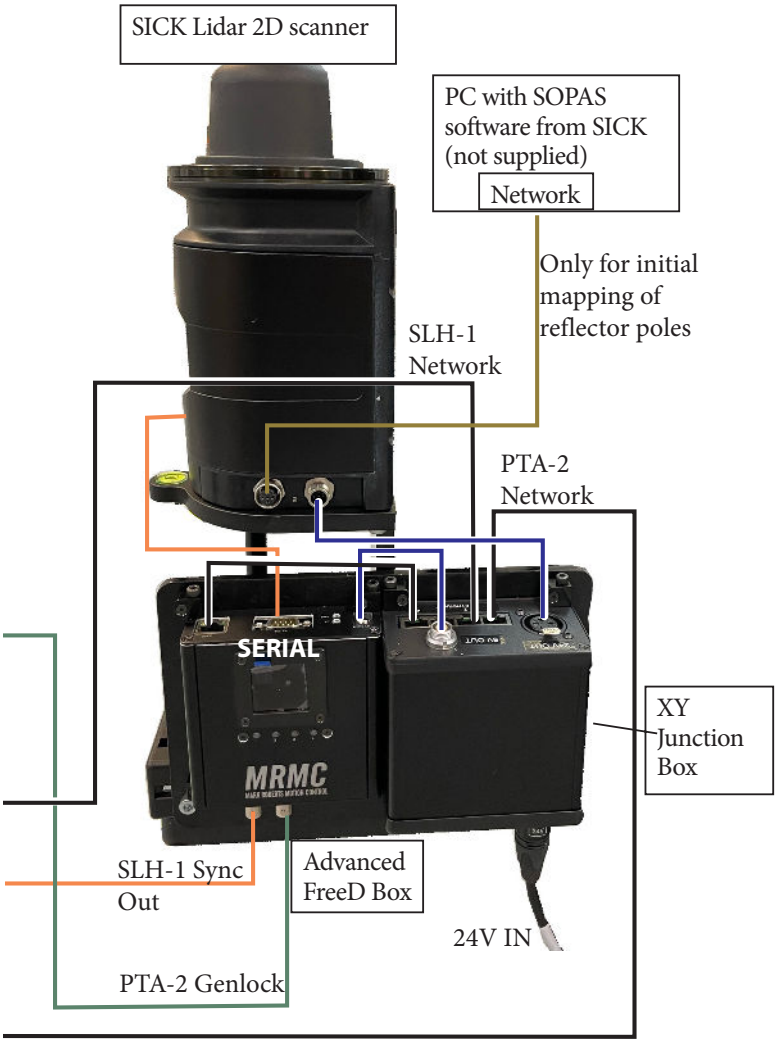


Connecting the cables

For further instructions on how to mount the camera and teleprompter on PTA-2, see *PTA-2 Quick Start Guide*.

PTA-2 - SLH - XY Location System Connections




SICK Lidar 2D scanner
PC with SOPAS software from SICK (not supplied)
Network
Only for initial mapping of reflector poles
SLH-1 Network
PTA-2 Network
SERIAL
MRMC
XY Junction Box
SLH-1 Sync Out
Advanced FreeD Box
24V IN
PTA-2 Genlock

Setting up the Reflector Poles

- The reflector poles should be placed so they are always clearly visible to the laser.
- Every reflector pole visible to the laser must be mapped by the scanner
- To set up the reflector poles around the scanner, spread them but do not arrange them symmetrically.
- Drill holes to secure the reflector poles to the ground only after you are satisfied with the positions.
- Minimise the chance of occlusion to favour accuracy.

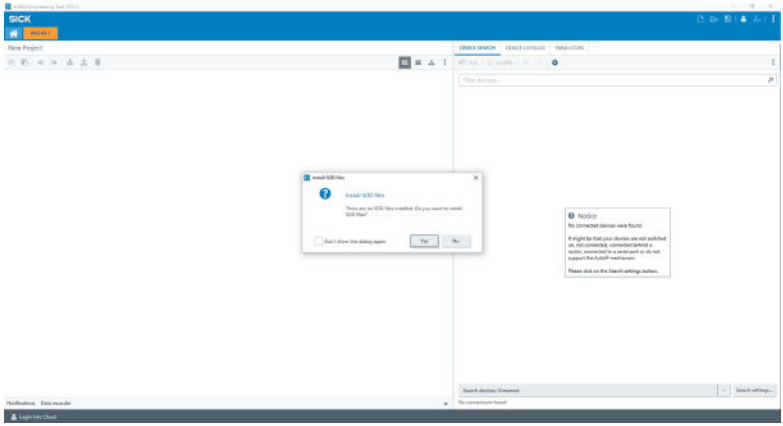
Note

- Reflector poles, or targets, to be well secured before mapping.
- 3 or more must be in the field of view when Scanner is operating
- If a target is moved or damaged, remove or cover completely until it can be re-mapped.

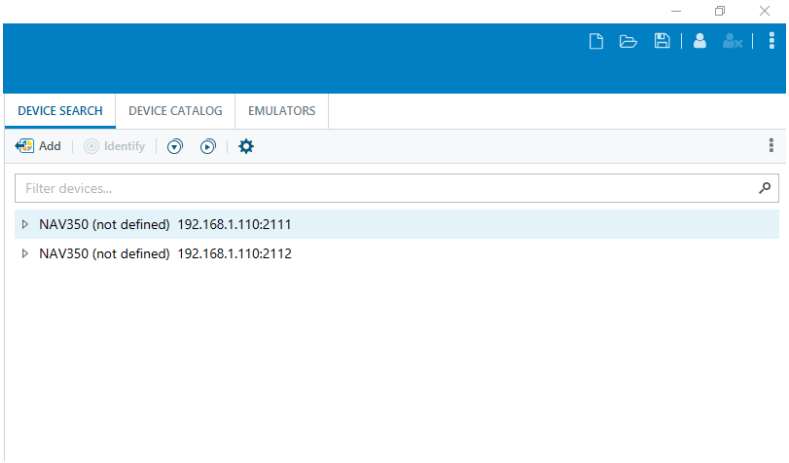
Setting up the 2D scanner

1. Download and install the scanner configuration app. At the moment of that manual writing SOPAS Engineering Tool resides here: https://www.sick.com/be/en/sopas-engineering-tool/p/p367244
2. Before running the installed app make sure you plugged the green 4W M12 SICK network cable between 2D scanner and PC or laptop. Ensure that the Advanced FreeD box power supply jack is unplugged. 2D Scanner should be powered on and reflectors poles should be placed in position.
3. Setting up the 2D scanner in the app:

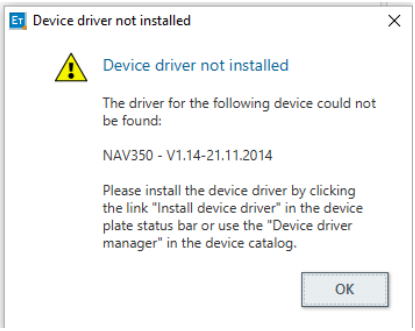
3.1 After application launch the following window appears. Here, click No.



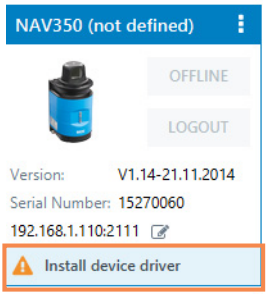
3.2 In the following window, double-click on the top position in the list of available scanners on the right hand side of the screen.



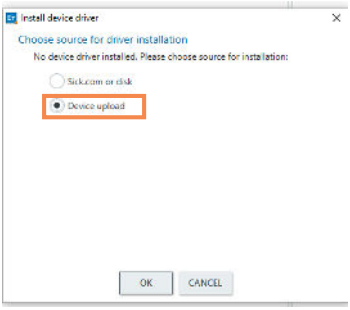
3.3 In the following window, click OK.



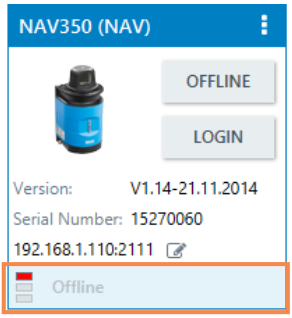
3.4 Select **Install Device Driver**.



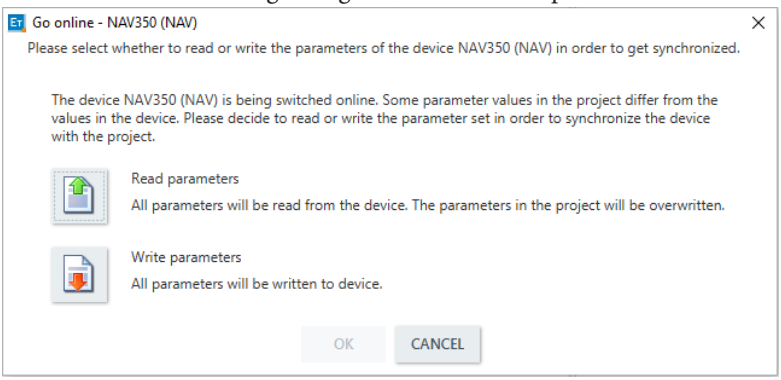
3.5 In the following window, select Device upload and click OK to upload device driver from the device itself.



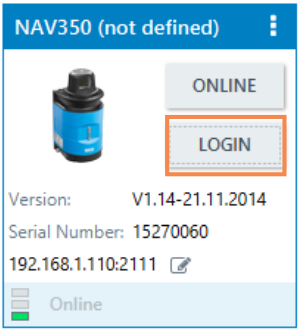
3.6 In the following screen, click on OFFLINE button (which makes the scanner to go online).



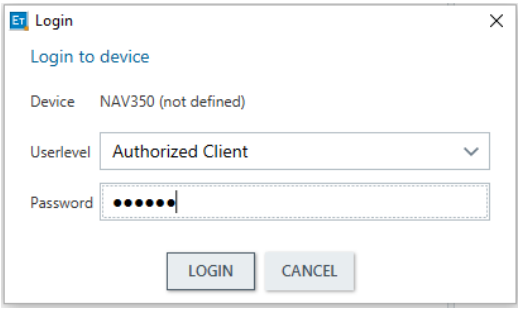
3.7 In the following dialog box, click on read parameters.



3.8 In the following screen, click on the LOGIN button (on the left hand side of the screen).

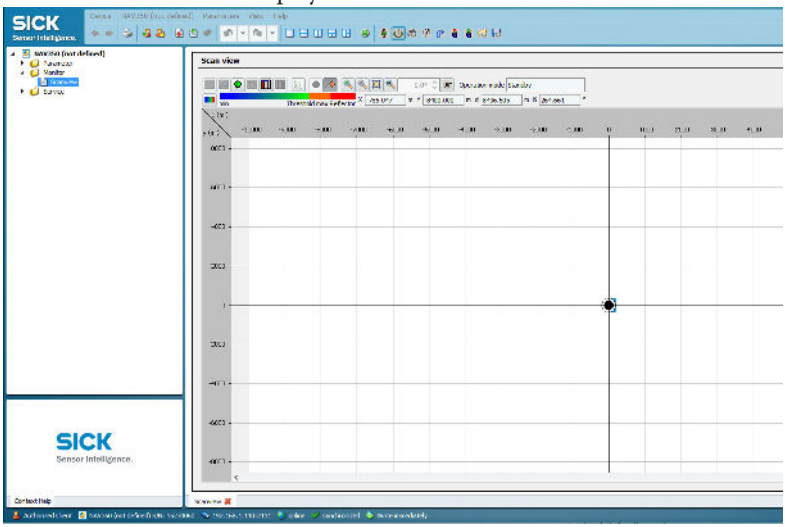


3.9 Select Userlevel which should be Authorized Client. Enter password **client** and click the LOGIN button.



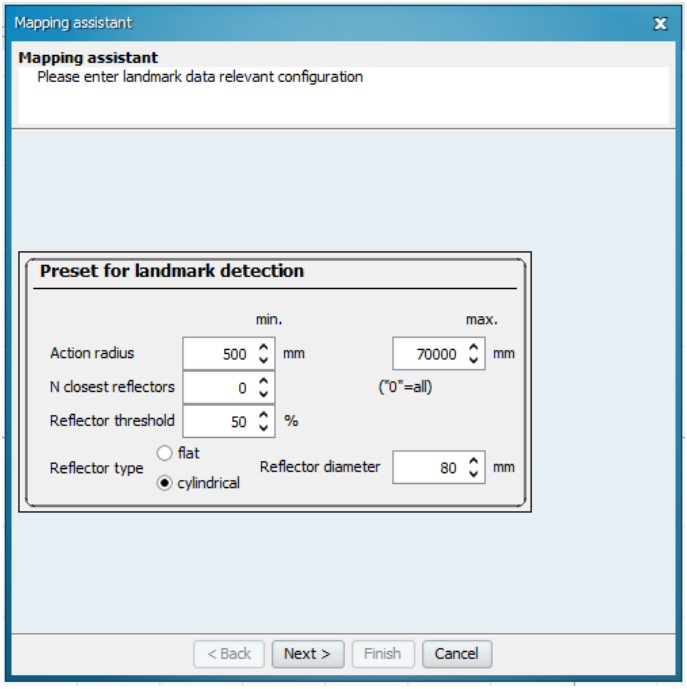
3.10 Double-click on scanner image on the left hand side of the screen.

3.11 Here we double-click on Monitor and then double-click on Scanview to display the view of the scan from the scanner.



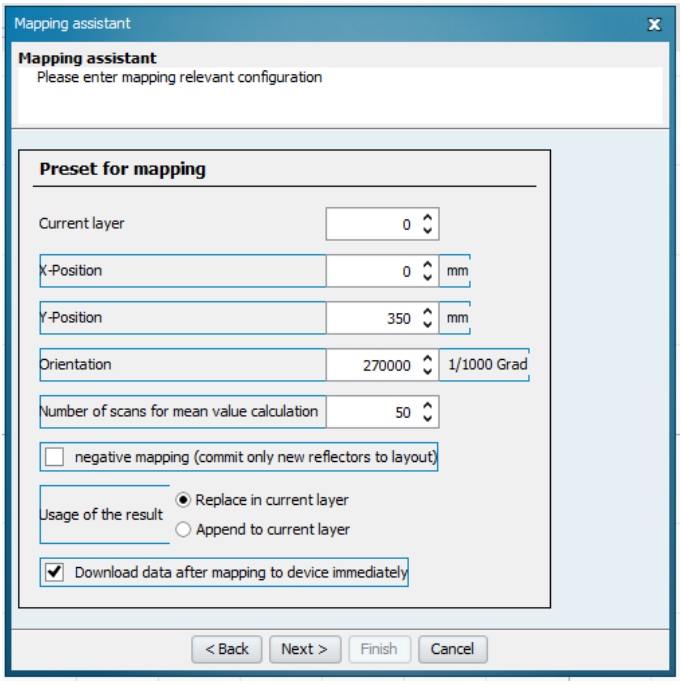
3.12 Click Switch to mapping mode button on the toolbar on top of the screen. During mapping mode make sure that SLH column is located in its zero X,Y, Angle position.

3.13 Check the following settings make sure they are the same and click on Next button.



3.14 In that window we check the following settings make sure they are the same. DOUBLE-CHECK those numbers and check boxes to ensure accurate functioning of the system. Click the

Next button. The distance between the scanner and SLH column is 350mm.



If scanner is installed on the front leg then do the settings as per above graphic.

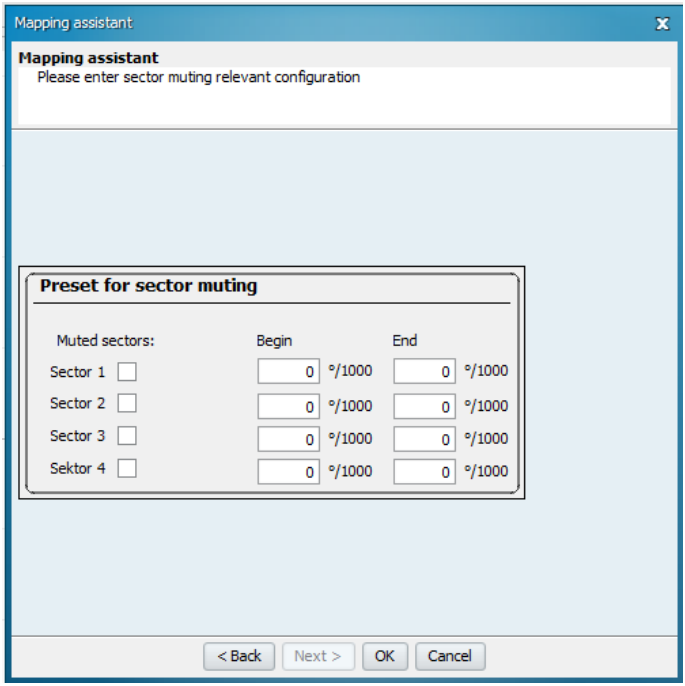
If scanner is installed on the rear right leg, then use the following settings:

- X = 303mm
- Y = -174mm
- Angle = 150000

If scanner is installed on the rear left leg, then use the following settings:

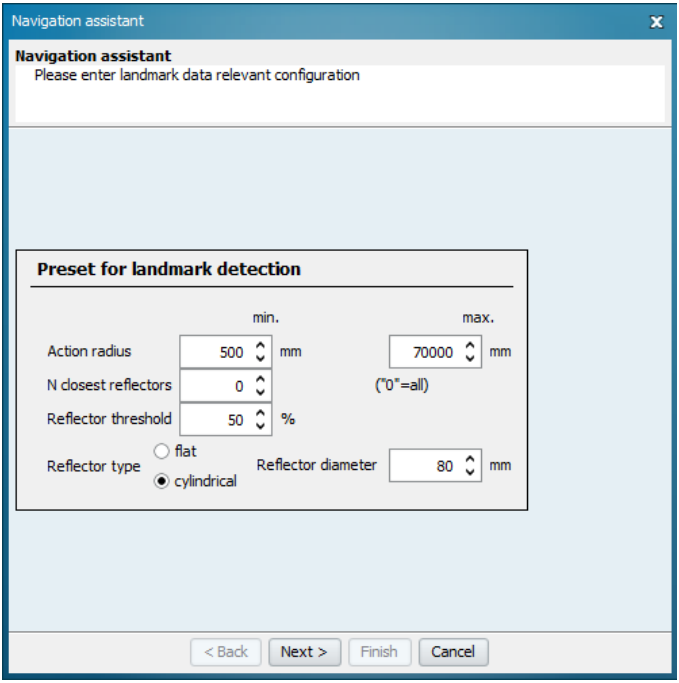
- X = -303mm
- Y = -174mm
- Angle = 30000

3.15 Click OK in the following window.

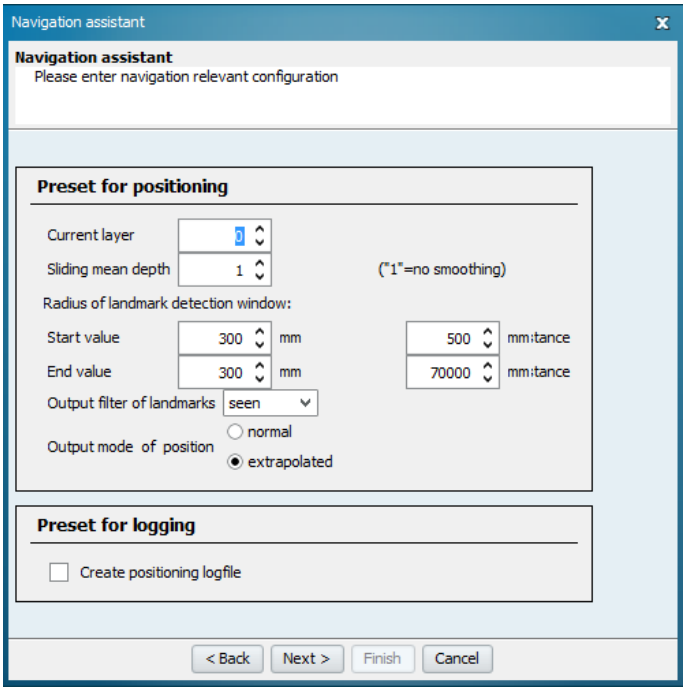


3.16 After waiting a bit until mapping is completed click on Switch to Navigation Mode ( ) button

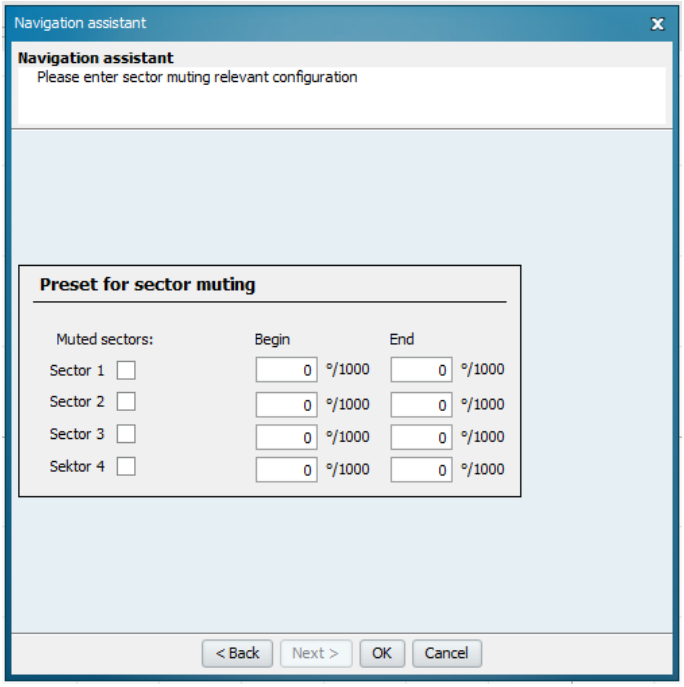
3.17 Click Next in the following window.



3.18 Click Next in the following window.



3.19 Click OK in the following window.

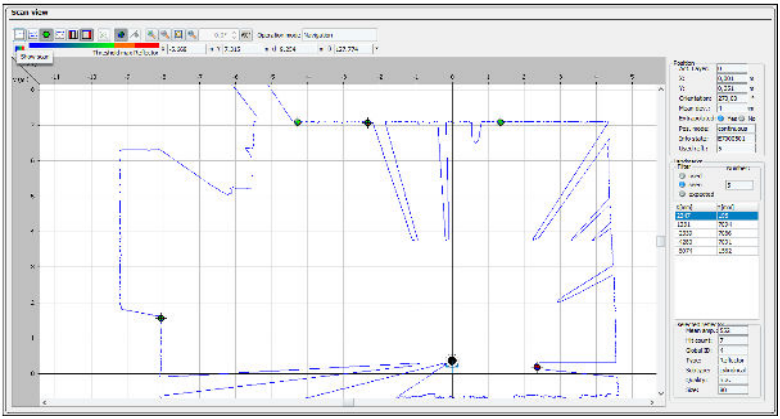


3.20 Click on Show Right Panel button ( ).

3.21 Click on Show Landmarks button ( ).

3.22 On the right to panel we can see if mapping has been done correctly. We can see current 2D scanner position which is X=0m, Y=0.35m, Orientation 270.00 deg. If numbers differ significantly mapping can be done again from step 3.13 making sure that device is in standby mode (switch by button

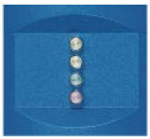
in toolbar). It also shows the landmarks (reflector poles) that can be seen at the moment by the scanner.



There are a two useful buttons: Show Scan ( ) and Zoom auto ( ). Those allow to see what 2D scanner is "seeing" at the moment.

3.23 To complete mapping procedure click on Switch to Standby Mode button ( ). After this network cable can be unpluged from 2D scanner and merge box (advanced sync box) power jack can be plugged back.

LEDs indications



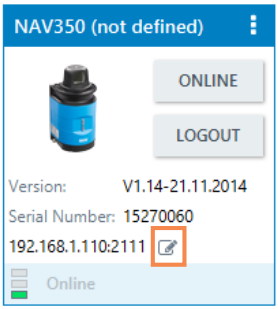
Yellow (1)
Yellow (2)
Green
Red

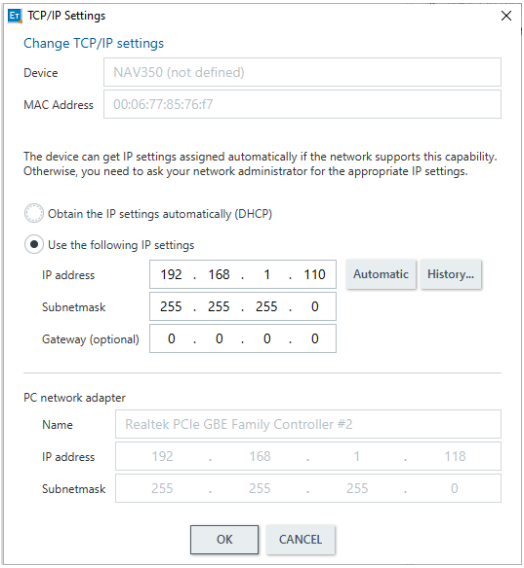
Yellow LED (1)	Yellow LED (2)	Green LED	Red LED	Meaning
Off	Off	Off	Off	Device switched off. No supply voltage.
On	On	On	On	LED test for 5 s after switching on. The output signal switching device is active.
Off	On	Any	Any	A command is being processed
Off	Any	Flashing 1 Hz	Any	Stand by
Off	Any	Flashing 4 Hz	Any	Measurement mode
Flash-ing 4 Hz	Off	Flashing 1 Hz	Off	Firmware Update
Any	Any	Any	On	System error in the device For information on troubleshooting see *section 8.3 "Troubleshooting and rectification" on page 61*

Setting up 2D Scanner's IP address

In order to connect properly, the host PC and the Device must be in the same IP range.

IP address of the scanner can be adjusted at any point by clicking on pen sign on the right from current scanners's IP address.

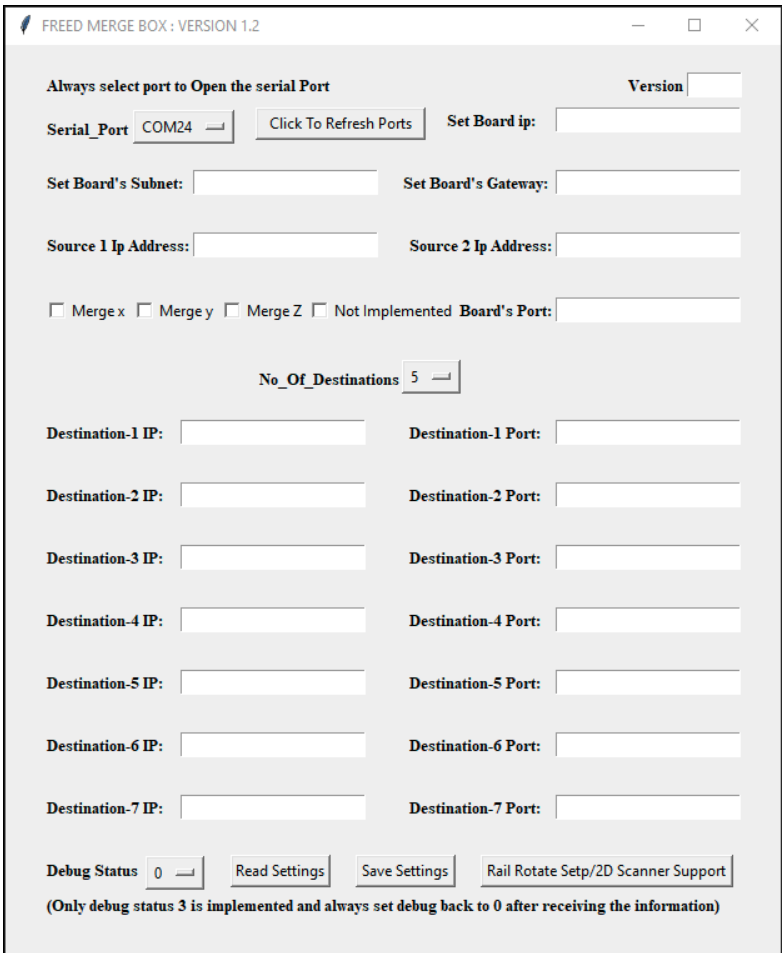




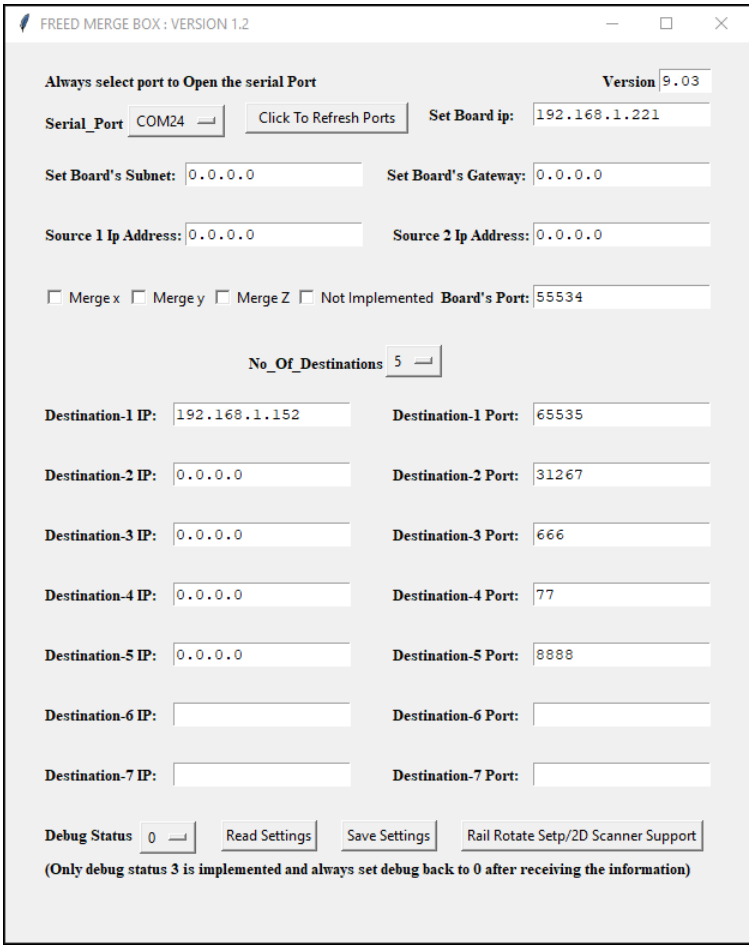
SLH and PTA2 FreeD setup

Ensure that your system consisting of SICK 2D scanner, advanced FreeD box, SLH and PTA-2 is connected. Make sure that SLH and PTA-2 is supplied with a sync signal source. Make sure the system is powered on before FreeD configuration process. Use the USB cable to connect PC or laptop to the FreeD Box. To simplify the FreeD box configuration, a configuration app can be used with it.

1. Run Freed_Merge_Box.exe file and the following window should appear.



2. Click on Serial Port button to select serial port of the FreeD box. After that you should see current settings of the FreeD box.

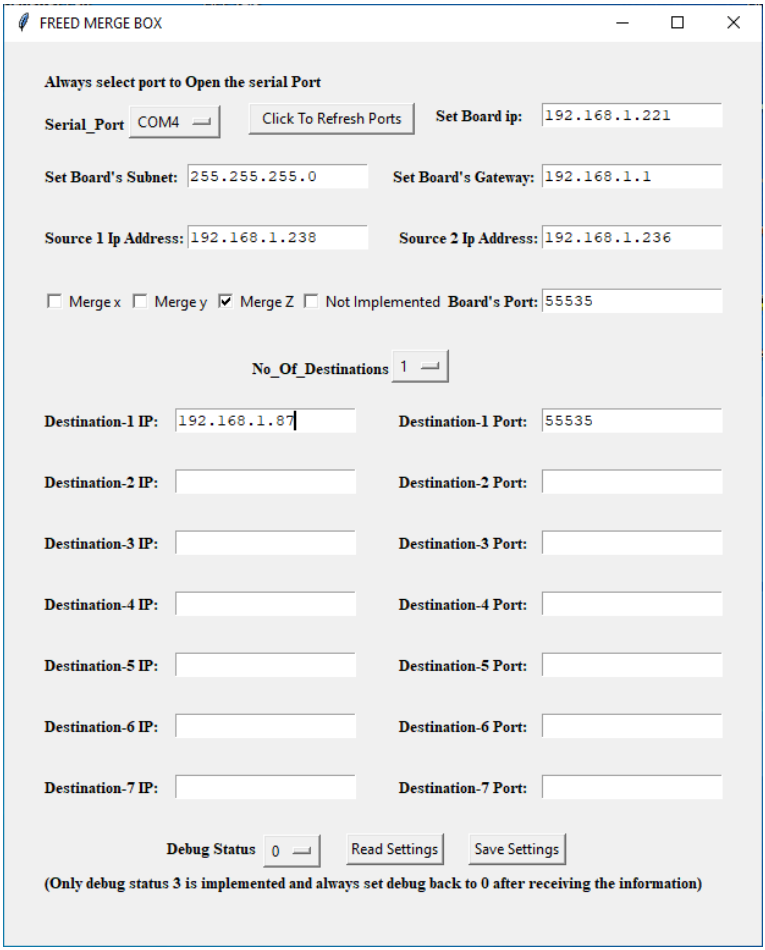


3. Check current settings and make required changes. For example if FreeD box should have IP address 192.168.1.221 and listening port 55535 then type in 192.168.1.221 to the Set Board IP field and 55535 to the Board's Port field

   For example if PTA-2 head's IP address is 192.168.1.238, so this IP should be input to the **Source 1 Ip Address** field. If SLH's IP address is 192.168.1.236. Then this IP should be input to the **Source 2 Ip Address** field.

4. In PTA-2 + SLH system we merge Z position then Merge Z checkbox should be checked.

For example PC's (for FreeD packets reception) IP Address is 192.168.1.87 and Port is 55535. In that case we populate **Destination-1 IP**: field and **Destination-1 Port**: field accordingly.

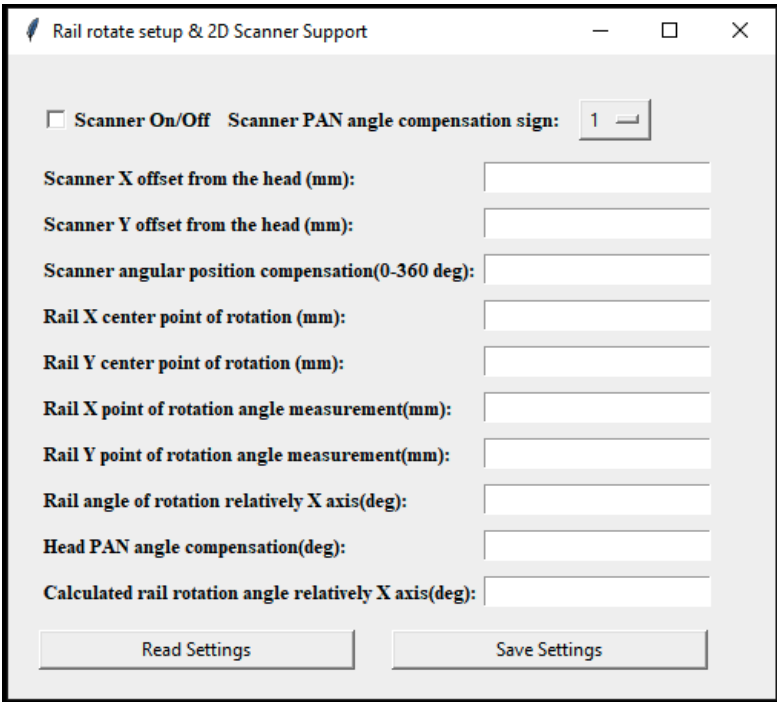


5. After checking of the current settings click **Save Settings** button to complete FreeD box IP setup.

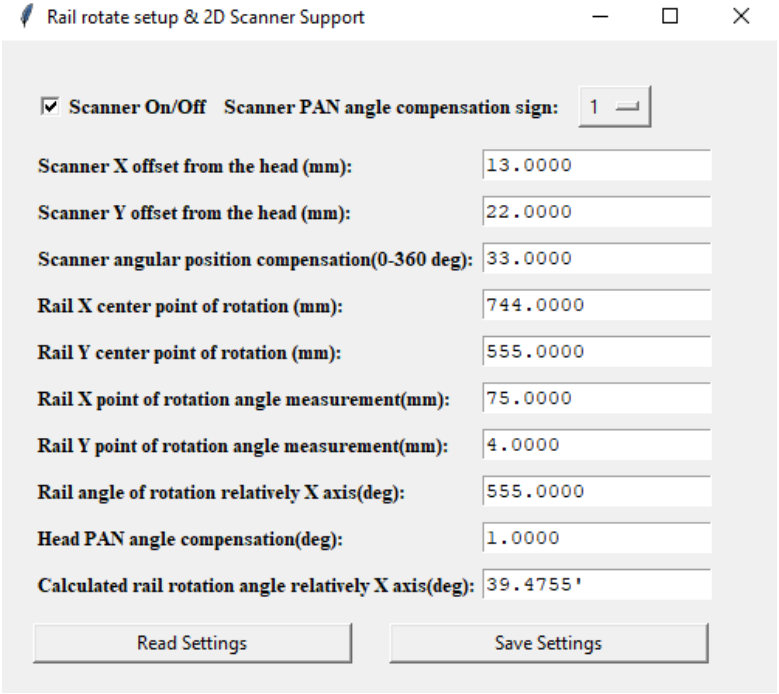
6. After that close (exit) the app.

Setting up FreeD box offsets and enabling the 2D scanner support

1. Click the **Rail Rotate Setup/2D Scanner Support** button. The following screen should appear.



2. Press the **Read Settings** button and the following screen appears.



3. Check the Scanner On/Off option.

4. Set **Scanner PAN angle compensation sign** to **1**.

At the factory, the scanner is installed on the Front Leg of the SLH. So, the scanner installation configuration is:

- Front Leg

  In this case, assign these values to the following parameters:

  Scanner X offset from the head (mm) to 0.0

  Scanner Y offset from the head (mm) to -350.0

  Scanner angular position compensation (0-360 deg) to 90.0

- If scanner is installed on the rear right leg then use the following settings:

  Scanner X offset from the head (mm) to -302.0

Scanner Y offset from the head (mm) to 174.0

Scanner angular position compensation (0-360 deg) to 210.0

- If scanner is installed on the rear left leg then use the following settings:

  Scanner X offset from the head (mm) to 302.0

  Scanner Y offset from the head (mm) to 174.0

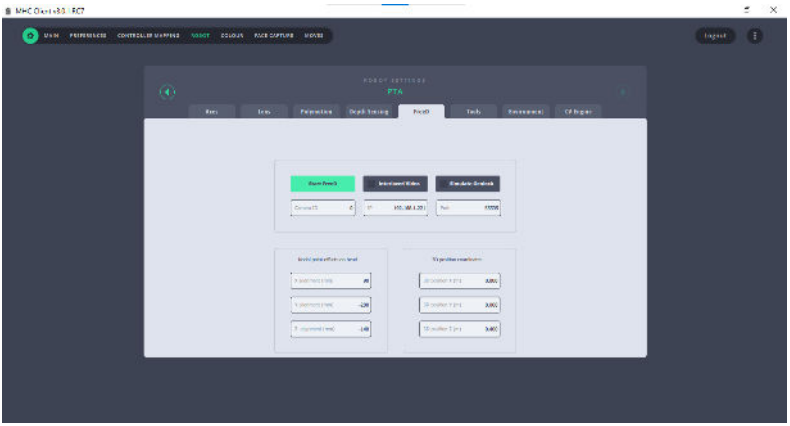
  Scanner angular position compensation (0-360 deg) to 330.0

All the remaining fields except the last one (which is read only) should be set to 0.0

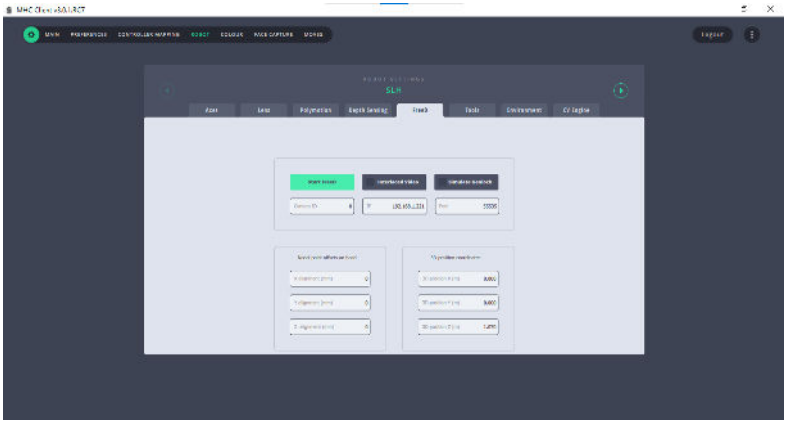
Note that positive PAN angles direction should be CLOCKWISE.

Configuring FreeD Box's IP in MHC for PTA-2 and SLH-1

1. Launch MHC. Log in as Admin. In Network Setup, add the PTA-2 head and add SLH-1 as the 'child' of PTA-2.
2. Log in as 'Engineer' and navigate to **Settings → Robot →FreeD** for PTA-2 head. Enter FreeD Box IP and its Port to the corresponding fields in MHC for the PTA-2 head. For example,



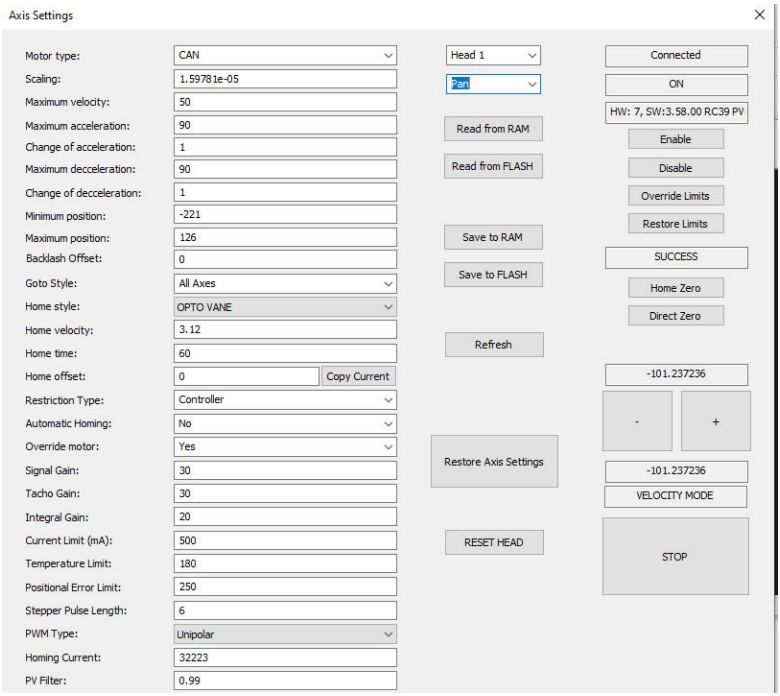
3. Enter FreeD Box IP and its Port to the corresponding fields in MHC for SLH. For example,



Setting up FreeD offsets in MHC

Setting up Z room offset on SLH.

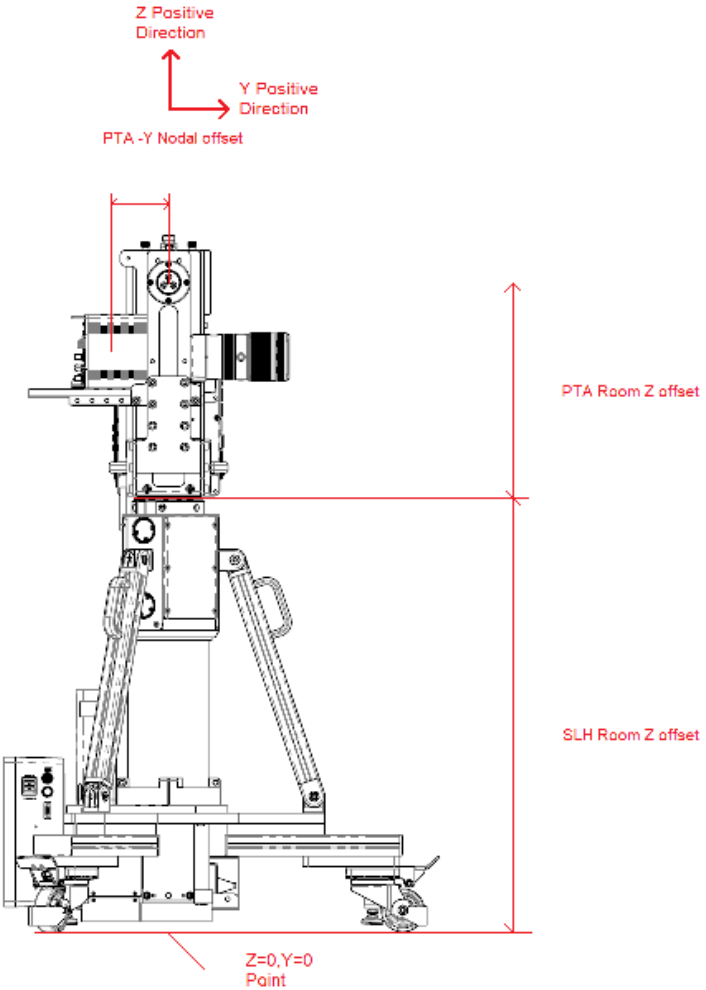
1. Ensure you got correct scaling factor on the lift column. It might be found in **MHC Server → Axis Settings**.



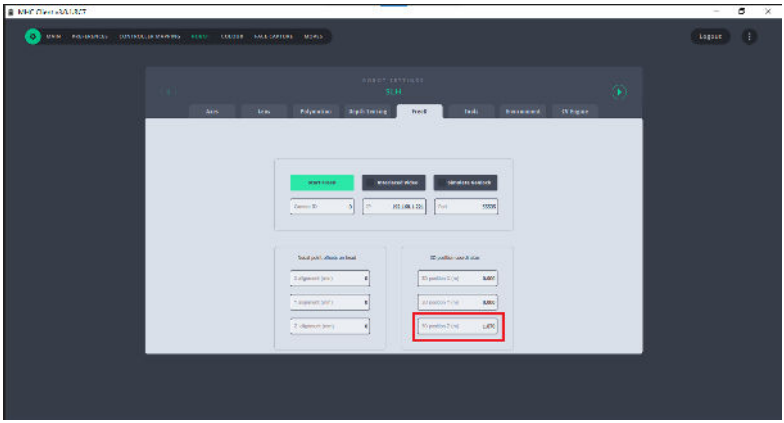
To test scaling factor correctness move the column to 100mm. The current position should be changed to 100 units.

2. Run SLH to it Zero position (using MHC). Use the following diagram to measure SLH Z Room offset in metres using a tape

measure and add it in the **3D Position Z (m)** box for SLH's FreeD tab.



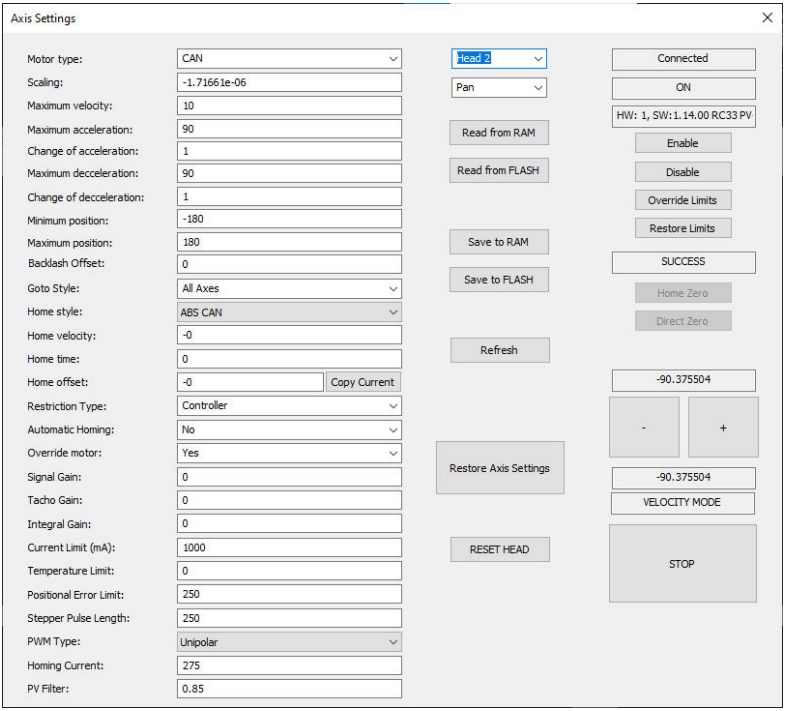
Z Room Offsets



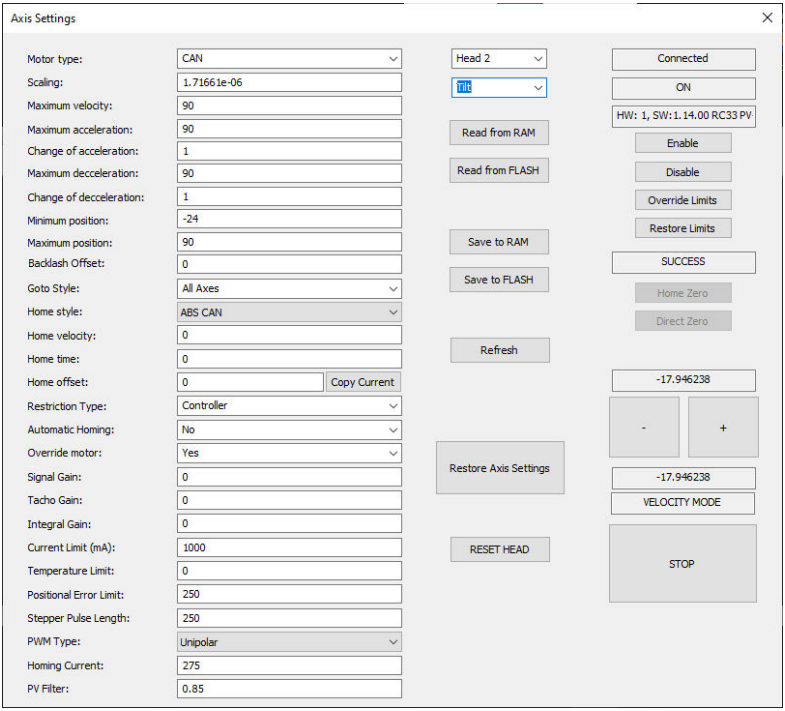
Setting up offsets on PTA-2

1. Ensure you got correct scaling factors on the PAN and TILT Axis. Use the following MHC Server Axis Settings screens for reference:

PAN

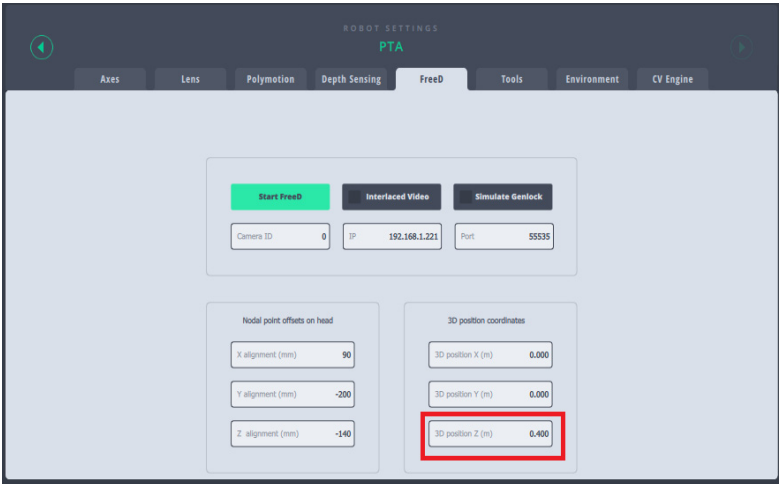

Axis Settings
Motor type:
CAN
Scaling:
-1.71661e-06
Maximum velocity:
10
Maximum acceleration:
90
Change of acceleration:
1
Maximum decceleration:
90
Change of decceleration:
1
Minimum position:
-180
Maximum position:
180
Backlash Offset:
0
Goto Style:
All Axes
Home style:
ABS CAN
Home velocity:
-0
Home time:
0
Home offset:
-0
Copy Current
Restriction Type:
Controller
Automatic Homing:
No
Override motor:
Yes
Signal Gain:
0
Tacho Gain:
0
Integral Gain:
0
Current Limit (mA):
1000
Temperature Limit:
0
Positional Error Limit:
250
Stepper Pulse Length:
250
PWM Type:
Unipolar
Homing Current:
275
PV Filter:
0.85
Head 2
Pan
Read from RAM
Read from FLASH
Save to RAM
Save to FLASH
Refresh
Restore Axis Settings
RESET HEAD
Connected
ON
HW: 1, SW:1.14.00 RC33 PV
Enable
Disable
Override Limits
Restore Limits
SUCCESS
Home Zero
Direct Zero
-90.375504
-
+
-90.375504
VELOCITY MODE
STOP

TILT


Axis Settings
Motor type:
CAN
Scaling:
1.71661e-06
Maximum velocity:
90
Maximum acceleration:
90
Change of acceleration:
1
Maximum decceleration:
90
Change of decceleration:
1
Minimum position:
-24
Maximum position:
90
Backlash Offset:
0
Goto Style:
All Axes
Home style:
ABS CAN
Home velocity:
0
Home time:
0
Home offset:
0
Copy Current
Restriction Type:
Controller
Automatic Homing:
No
Override motor:
Yes
Signal Gain:
0
Tacho Gain:
0
Integral Gain:
0
Current Limit (mA):
1000
Temperature Limit:
0
Positional Error Limit:
250
Stepper Pulse Length:
250
PWM Type:
Unipolar
Homing Current:
275
PV Filter:
0.85
Head 2
Tilt
Read from RAM
Read from FLASH
Save to RAM
Save to FLASH
Refresh
Restore Axis Settings
RESET HEAD
Connected
ON
HW: 1, SW:1.14.00 RC33 PV
Enable
Disable
Override Limits
Restore Limits
SUCCESS
Home Zero
Direct Zero
-17.946238
-
+
-17.946238
VELOCITY MODE
STOP

Setting up Z Room Offset on PTA-2

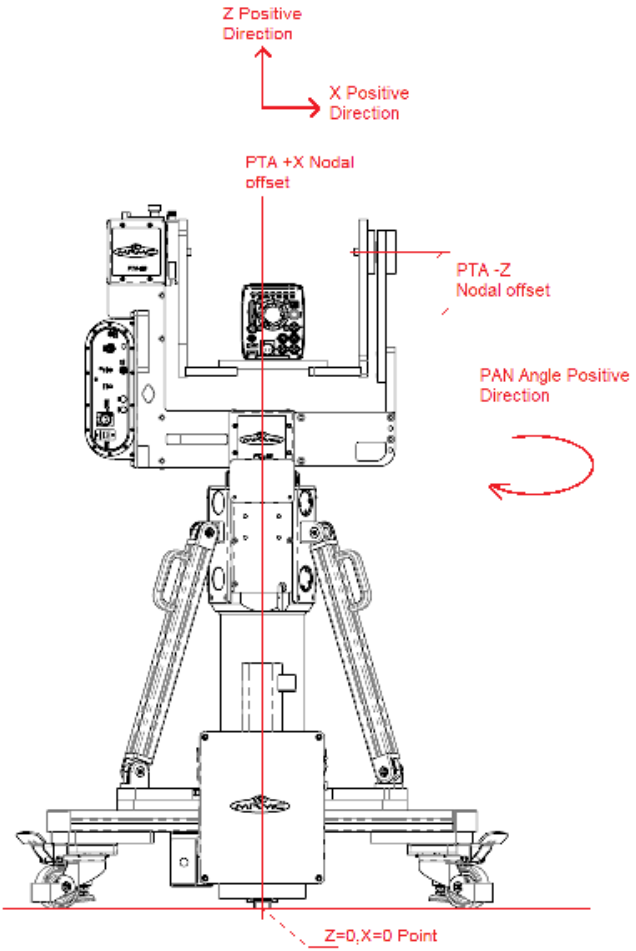
Switch to the PTA head FreeD settings in MHC. Use the above 'Z Room Offsets' diagram to measure the PTA Z Room Offset and enter the value (in metres) in the **3D Position Z (m)** box for the PTA.



Setting up X, Y and Z nodal offset on PTA-2

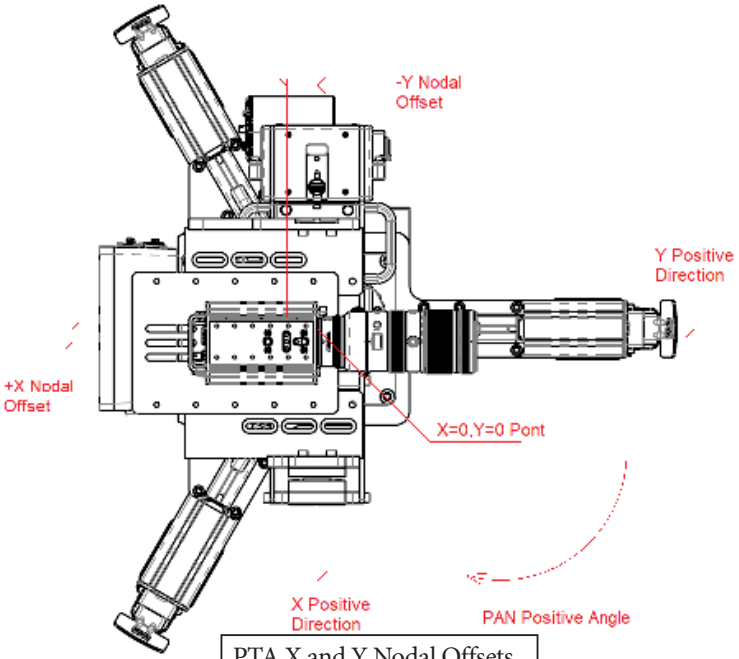
> Note
>
> The X, Y and Z Nodal offsets are to be measured with respect to the camera sensor.

Use the following drawing to measure the X and Z Nodal offsets on the PTA-2 head. Note that the positive Z direction is upwards and positive X is on the right.



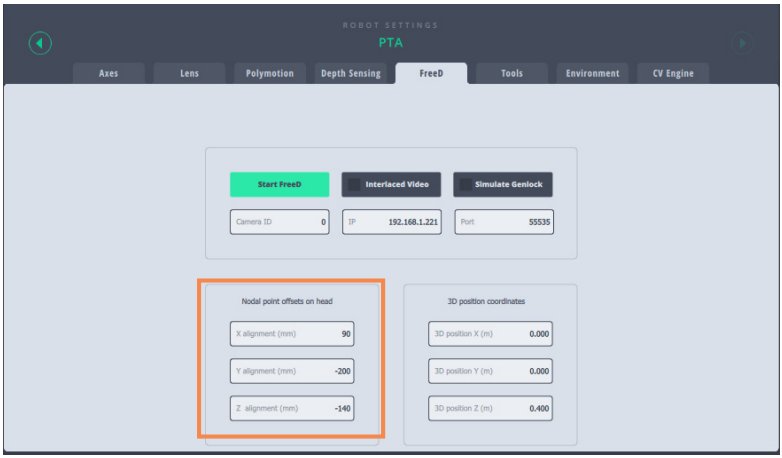
PTA X and Z Nodal Offsets

Use the following drawing to measure the Y Nodal offsets on the PTA-2 head. Note the positivity of Y direction.



PTA X and Y Nodal Offsets

Following is an example of the PTA Nodal offsets in MHC.



PTA Nodal Offsets in MHC

Advanced FreeD Box's screen overview

Button	Function
1	Toggle between the screens on the FreeD box display
2	Save settings
3	Start/stop the FreeD box
4	Not used

FreeD box Screen 1

FreeD box Screen 2

FreeD box Screen 3

Screen showing below can be useful to doublecheck that system is setup properly and running.

SRC1 Freq. indicates that FreeD Source 1 (which is the head) is transmitting FreeD packets with a indicated frequency. It also means that the head is receiving sync signal on its genlock input. (Assuming sync simulation is turned off).

SRC2 Freq. indicates that FreeD Source 2 (which is the SLH column) is transmitting FreeD packets with a indicated frequency. It also means that SLH is receiving sync signal on its genlock input. (Assuming sync simulation is turned off).

Sync Freq. is a test feature that can be used to check if sync signal is present in the coax sync cable plugged into advanced sync box. Note that Advanced sync box does not requre sync signal supplied to it.

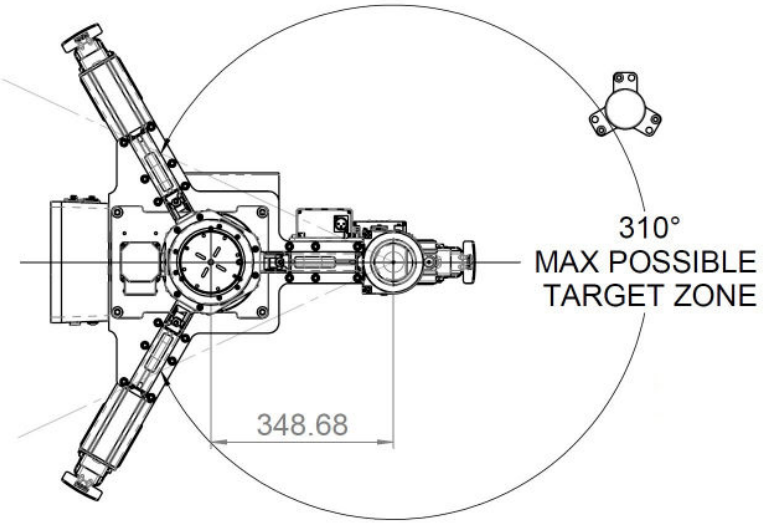
FreeD box Screen 4

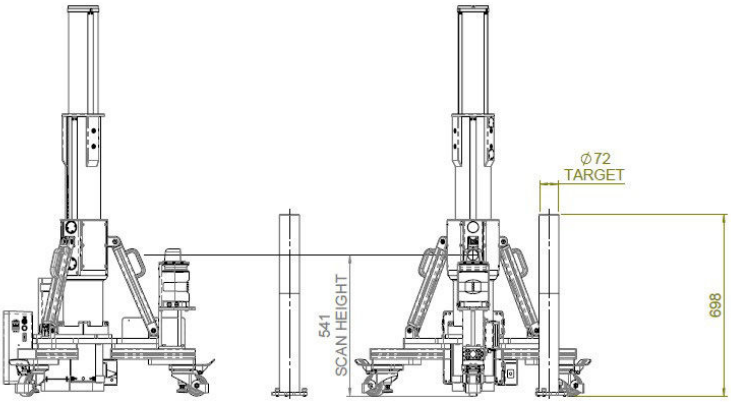
FreeD box Screen 5

After the entire system is setup properly in that user interface is used to run or stop 2D scanner in order to get positional data for the SLH+PTA-2 system. After positional data have been acquired (may take 10s to settle) button SAVE can be used to save current position. That position will be saved and system position will be known even after power off/on cycle. If SLH was moved while 2D scanner was off it will be required to run scanner again to update (and SAVE) new current position.

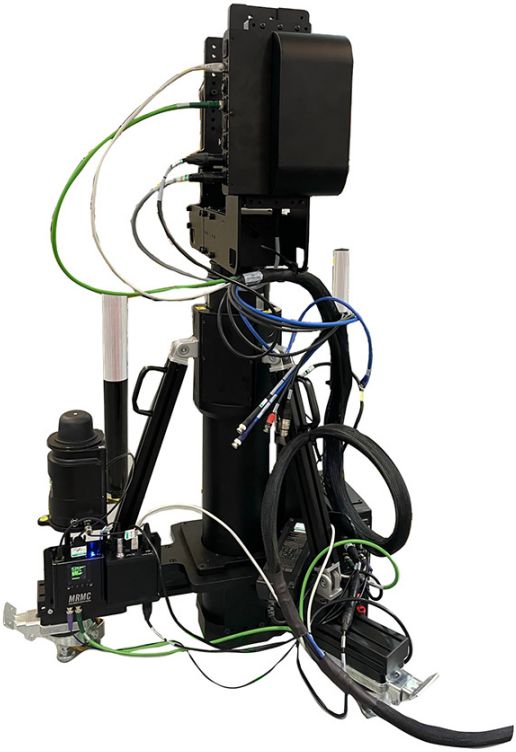
Appendix 1 **Specifications**

Electrical connection	24V, Ethernet, provided by the SLH control box
Host control	Embedded device, for example a modified FreeD box. Only for offline mapping and target management: A Windows PC/Laptop with SICK software.
Command interface	SICK Protocol to scanner itself, other commands internal to MRMC. Offline Mapping and target management using SICK "SOPAS" engineering tool – this tool is not required in normal operation.
Scanner Position accuracy:	+/-10mm
Scanner angular accuracy	+/- 0.1 degree
Maximum weight	Mounts on SLH (adds about 10kg)
Temperature range	Studio use
IP Rating	Indoor use


310°
MAX POSSIBLE
TARGET ZONE
348.68


Ø72
TARGET
541
SCAN HEIGHT
698

Notes



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