

PAS 280MP MK3

Operation Guide



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1 Introduction

1.1 Scope

This manual describes how to install and use the PAS 280MP MK3 as follows:

- Section 2 - PAS 280MP MK3 Overview
- Section 3 - Unboxing the PAS 280MP MK3
- Section 4 - Testing the PAS 280MP MK3 in the Office
- Section 5 - Installing the PAS 280MP MK3 in the Aircraft
- Section 6 - Recommended Flight Operation Procedure
- Section 7 - Post Flight Operations
- Section 8 - Shutting Down and Disassembling the PAS 280MP MK3
- Section 9 - Troubleshooting
- Appendix A - Technical Data
- Appendix B - Calculating Lever Arms
- Appendix C - Data Storage Management
- Appendix D - Connecting the PAS 280MP MK3 - Operator Monitor Cable to the Monitor
- Appendix E - Declarations of Conformity

1.2 Applicable Documents

Item	Manual
Applanix GNSS/IMU	GNSS Configuration Guide for PAS Systems
Phase One iX Process	iX Process Operation Guide
Phase One iX Flight Pro	iX Flight Pro Operation Guide
Somag DSM 400 Mount	SOMAG DSM 400 Manual
Somag GSM 4000 Mount	SOMAG GSM 4000 Manual
Trimble AV39 Antenna	Trimble AV39 Antenna Datasheet

2 PAS 280MP MK3 Overview

Note

- There are no user serviceable parts inside the PAS 280MP MK3 or iX Controller. All warranties are void if access panels are opened or cables not supplied by Phase One are connected, unless specifically instructed by Phase One personnel.
- Installation of the PAS 280MP MK3 in an aircraft must be performed by certified personnel while following the relevant Civil Aviation Authority regulations in the country of aircraft registration and operation. A Supplemental Type Certificate or Minor Change may be required.

The PAS 280MP MK3 is a large format, photogrammetric, large area coverage system, with a central projection resolution of 20,150 x 14,118 pixels using the latest BSI CMOS sensors.

The aerial system comprises the camera(s), iX Controller with an integrated Applanix GNSS, IMU and SOMAG mount.

2.1 Hardware

The following figure shows the main components of the PAS 280MP MK3 with the iX Controller.



The following PAS 280MP MK3 components are preassembled in and form part of the PAS 280MP MK3 frame:

- IMU
- iX Controller
- 1 RGB camera and 1 achromatic camera (optional)

2.1.1 iX Controller (MK6)

The iX Controller is the communication center and data storage for the PAS. Based on Microsoft Windows 10, it is responsible for controlling power and communication for all ancillary systems. The storage solution consists of 2 x 2 TB or 4 TB SSDs. For more information on storage, see Appendix C - Data Storage Management.

The iX Controller includes an integrated Applanix AP+ GNSS.



Note

The SFP+ ports are currently not supported in PAS 280MP MK3.

2.1.2 iXM-RS280F Camera Head and Lenses

The iXM-RS280F camera head uses two BSI CMOS sensors operated with two 90mm Rodenstock lenses. The iXM-RS280F camera produces a geometrically accurate 284 MP central projection image. The iXM-RS280F can capture up to 2 frames per second.



2.1.3 SOMAG DSM 400 Mount

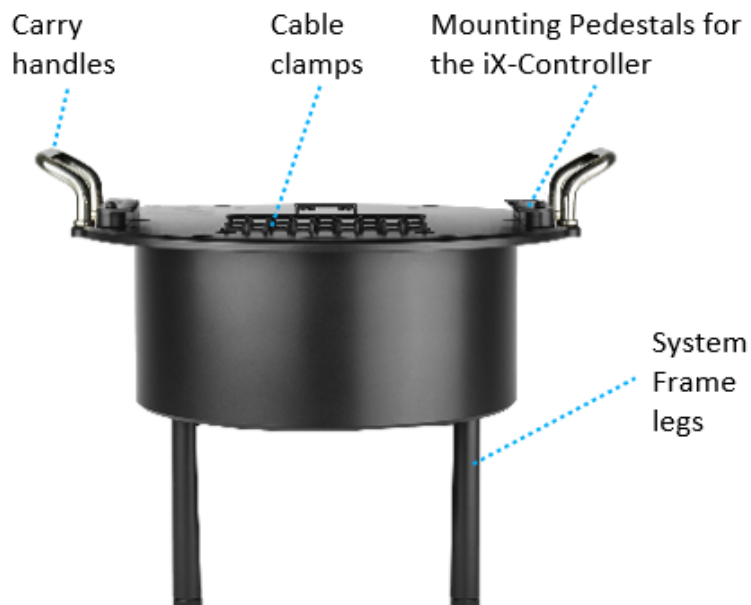
The SOMAG DSM 400 is a high-performance gyro-stabilized platform that compensates for roll, pitch and yaw movements in real-time. The dynamic reaction times and the compensation ability of this platform ensures your imagery remains fully vertical even in challenging conditions, while maintaining high levels of accuracy and efficiency.

SOMAG DSM 400 Mount is an electromechanical gimbal system.



2.1.4 Single-Band PAS 280MP MK3 Frame

The PAS 280MP MK3 frame enables mounting of the cameras and iX Controller. The PAS 280MP MK3 frame legs allow placing the PAS 280MP MK3 frame on a maintenance bench while maintaining sufficient clearance for the camera lenses.



2.1.5 Applanix GNSS/IMU

The Applanix GNSS/IMU contains a precision GNSS receiver and inertial sensor components, logging capability, and interfaces for mapping sensors and flight management systems.

Data such as geographic position (latitude, longitude and altitude), velocity, acceleration, angular rate, orientation (roll and pitch), ground track and performance metrics are available in real-time and through post-processing.

The Applanix GNSS/IMU is comprised of the Applanix AP+ card located in the iX Controller and one of the following IMU models:

- AP+ 180 with IMU-69
- AP+ 310 with IMU-82
- AP+ 510 with IMU-91
- AP+ 610 with IMU-57

Note

For detailed information on the differences between the above Applanix GNSS/IMUs, refer to www.applanix.com.

The Applanix GNSS is configured and managed via a browser-based application supported by the Applanix AP+ card. You can access the application through the shortcut on the iX Controller software taskbar.

2.1.6 Trimble AV39 Antenna

The Trimble AV39 antenna is a lightweight, TSO certified antenna that provides centimeter precision with superior phase center repeatability. The antenna is powered by the Applanix AP+ card in the iX Controller via a coaxial cable supplied with the antenna.



2.1.7 Monitor Kit

The monitor kit allows full control and flight feedback of the PAS 280MP MK3 and includes the following:

- pilot monitor
- operator monitor

2.1.7.1 Pilot Monitor

The 7" pilot monitor provides all flight information from iX Flight Pro, ensuring that the pilot has all required information to conduct a successful survey mission. The touch screen allows the pilot to perform several quick-access operations in iX Flight Pro (map display, zoom, line selection).

The pilot display is installed with the cables leading to the lower part of the monitor. The monitor orientation is then set in Microsoft Windows to flipped portrait.



2.1.7.2 Operator Monitor

The 15.6" operator monitor provides all required information from iX Flight Pro, ensuring the operator can control all aspects of the flight, including run selection, camera control, and data management using the touch screen.

The operator is installed with the cables leading to the lower part of the monitor. The monitor orientation is then set in Microsoft Windows to flipped landscape.



Note

You can install a 21" screen for the operator instead of the 15.6" screen. For details, contact Phase One.

2.2 Variants

The PAS 280MP MK3 can support different configurations as described below.

2.2.1.1 iXM-RS150F Achromatic Camera

In addition to the iXM-RS280F camera, you can also install the iXM-RS150F achromatic camera to provide NIR data in the spectral range of 720nm-1000nm.

Post processing this data in combination with the iXM-RS150F RGB data allows output imagery as IRG/RGBi CIR products or NDVI.

Note

For the iXM-RS150F Achromatic Camera, Phase One recommends using a lens with a 50 mm focal length to obtain the same footprint for both RGB and NIR.



2.2.1.2 SOMAG GSM 4000 Mount

You can install the PAS 280MP MK3 frame into a GSM 4000 mount (76013500) instead of the regular DSM 400 mount.

The SOMAG GSM 4000 Mount is a hydraulic gimbal system containing four cylinders and two servo pumps.

Note

- PAS 280MP MK3 can only operate with SOMAG GSM 4000 mounts with serial numbers 090236 and higher, or with earlier mounts that were refurbished by SOMAG to the dual communication port configuration.
- The SOMAG GSM 4000 mount requires installation of an adaptor plate. If you are providing the SOMAG GSM 4000, you also need to provide Vibration Damping Ring (111721-060-03/01).



2.3 Software

2.3.1 iX Flight Pro

iX Flight Pro uses iX Plan data to manage and guide the precise execution of aero-photography flight. Using the pilot and operator monitors, the pilot can easily maintain a precise trajectory by following altitude and localizer instructions, while the operator manages the flight, controls the order of passes, tags images and start/stops image collection. iX Flight Pro is pre-installed in the iX Controller.

For detailed information on using iX Flight Pro, see the iX Flight Pro Operation Guide provided with your PAS 280MP MK3.

Note

To process captured images, use iX Process available from Phase One.

2.3.2 Licensing

The iX Flight Pro software license is preinstalled in the iX Controller.

2.4 PAS 280MP MK3 Dataflow

The following table details the dataflow for the PAS 280MP MK3.

Dataflow for the PAS 280MP MK3

Cable	Signal/Data	From	To	Protocol	Description
Camera Trigger & MEP	Camera trigger	iX Controller	Camera	Analog I/O discrete	iX Flight Pro (in iX Controller) calculates when to capture an image (based on NMEA/GSOF data received from Applanix AP+) and issues a trigger.
	MEP (Mid Exposure Pulse)	Camera	iX Controller	Discrete	Camera sends an event input to the iX Controller when the image is captured.
	Event data	iX Controller	Camera	RS-232	Applanix AP+ (in iX Controller) sends event metadata to camera for image metadata.
Mount Control	Start/Stop pass	iX Controller	SOMAG DSM 400/ GSM 4000 mount	RS-232	<ul style="list-style-type: none"> iX Flight Pro (in iX Controller) sends angle data to SOMAG mount for stabilization. iX Flight Pro (in iX Controller) calculates Start of Line and before reached, sends "Stab" command to SOMAG mount. iX Flight Pro (in iX Controller) calculates End of Line and after reached, sends "Manual" command to SOMAG mount.
	GIM01	SOMAG DSM 400/ GSM 4000 mount	iX Controller	RS-232	SOMAG mount platform sends GIM01 message with platform angles to the Applanix AP+ (in iX Controller) for registration in TO4 files.
USB3 (for each camera)	Images	Camera	iX Controller	USB	Images taken by camera transferred to iX Controller SSD.

3 Unboxing the PAS 280MP MK3

Verify that all parts were supplied according to the specific packing list for your PAS 280MP MK3.

3.1 Product Identification

To enable support for your PAS 280MP MK3, you must identify and record the model and serial numbers for each of the following components:

- PAS 280MP MK3 - serial number is located on the iX Controller rear panel.
- Cameras - you can view camera serial numbers in iX Flight Pro. See the iX Flight Pro Operation Guide.
- Mount: model number and serial number are located on a label on the mount.
- IMU: model number and serial number is located on a label on the unit.

4 Testing the PAS 280MP MK3 in the Office

This section describes how to connect the PAS 280MP MK3 for testing in the office.

Phase One recommends testing the PAS 280MP MK3 in the office prior to transporting it and installing it in the aircraft. This allows for quick installation in the aircraft with little risk of missing cables or incorrect configuration.

Note

- Before placing the PAS 280MP MK3 on a work bench, make sure that the area is clear of debris to avoid damaging the lens. The PAS 280MP MK3 frame legs provide ample clearance between the lenses and the surface, but any objects underneath the PAS 280MP MK3, including loose cables, could impact the lenses.
- Make sure you place the PAS 280MP MK3 on a work bench capable of withstanding the PAS 280MP MK3 weight.
- The PAS 280MP MK3 does not have to be assembled in the mount for testing. You can place the PAS 280MP MK3 next to the mount.

The following tools are required to connect the PAS 280MP MK3 in the office:

- Allen key set
- Torx key set
- Standard tools

4.1 Connecting a PAS 280MP MK3 in the Office

Note

The 4-band frame with the camera and IMU does not have to be assembled in the mount for testing. You can place the 4-band frame next to the mount.

Note

- Do not excessively bend cables. Allow a bending radius of at least 40mm for all cables.
- Insert connectors into ports with care to prevent damage to pins. All LEMO connectors have a red dot to indicate correct alignment.



- Use cable ties to secure cables to the cable tie mounts on the iX Controller upper plate to ensure that the connectors are secured. Do not overtighten the cable ties.



- Make sure that the port connectors for both monitors are properly secured in their sockets.
- Use cable ties to secure the cables to the appropriate points on the monitors to ensure that the connectors are secured. Do not overtighten the cable ties.

Warning

Do not connect any components while the PAS 280MP MK3 is connected to a power source. Connecting monitor cables while the power cable is attached to the system will damage the iX Controller motherboard.

To connect the PAS 280MP MK3:

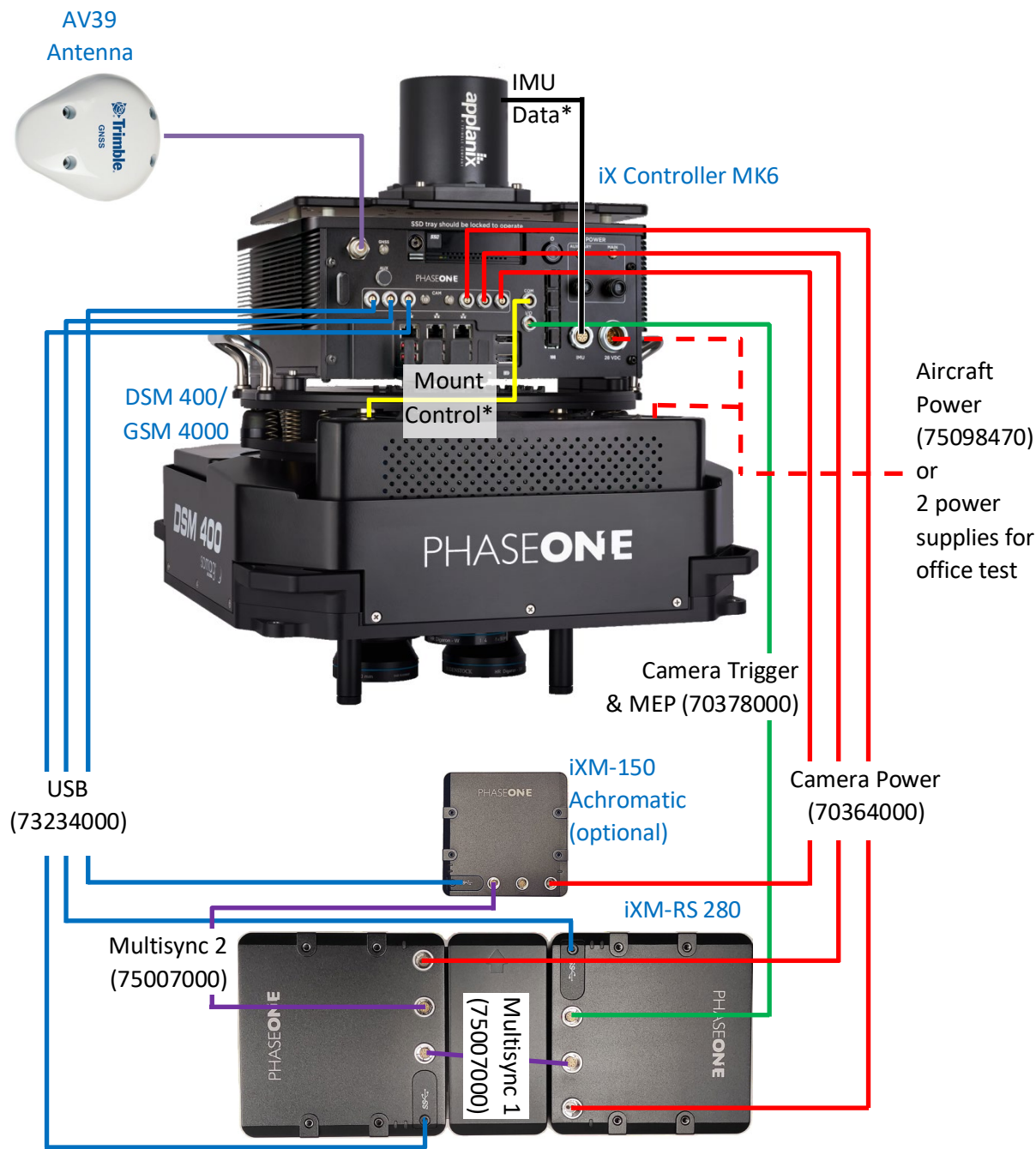
1. Connect all PAS 280MP MK3 components as described in the following table and the figures.

PAS 280MP MK3 Connection Details

Order	P/N	Description	Connects to
1	70364000	Power cable, iX Controller/Camera (one for each camera)	<p>Note</p> <p>This cable is pre-connected in the PAS 280MP MK3 frame.</p> <ol style="list-style-type: none"> 1. iX Controller, AUX2 ports 2. iXM-150, right-LEMO port
2	73234000	USB cable (one for each camera)	<p>Note</p> <p>This cable is pre-connected in the PAS 280MP MK3 frame.</p> <ol style="list-style-type: none"> 1. iX Controller, USB port 2. iXM-RS280F and optional iXM-150, USB port
3	70378000	Camera trigger & MEP	<p>Note</p> <p>This cable is pre-connected in the PAS 280MP MK3 frame.</p> <ol style="list-style-type: none"> 1. iX Controller, I/O port 2. iXM-RS280F, left LEMO port (on one of the cameras)
4	75007000	Multisync cable(s)	<p>Note</p> <p>This cable is pre-connected in the PAS 280MP MK3 frame.</p> <ol style="list-style-type: none"> 1. iXM-RS280F middle LEMO port (on the same camera to which the Camera Trigger & MEP cable is connected) 2. iXM-RS280F left LEMO port (on the other camera body) <ul style="list-style-type: none"> • If optional iXM-150 achromatic is also installed: <ol style="list-style-type: none"> a. iXM-RS280F middle LEMO port (not on the camera to which the Camera Trigger & MEP cable is connected) b. iXM-150 achromatic left LEMO port
5	73260000, 3 m 73285000, 0.5m 73293000, 1.6 m	Mount control	<ol style="list-style-type: none"> 1. iX Controller, COM port 2. DSM 400 Mount, INTERFACE port

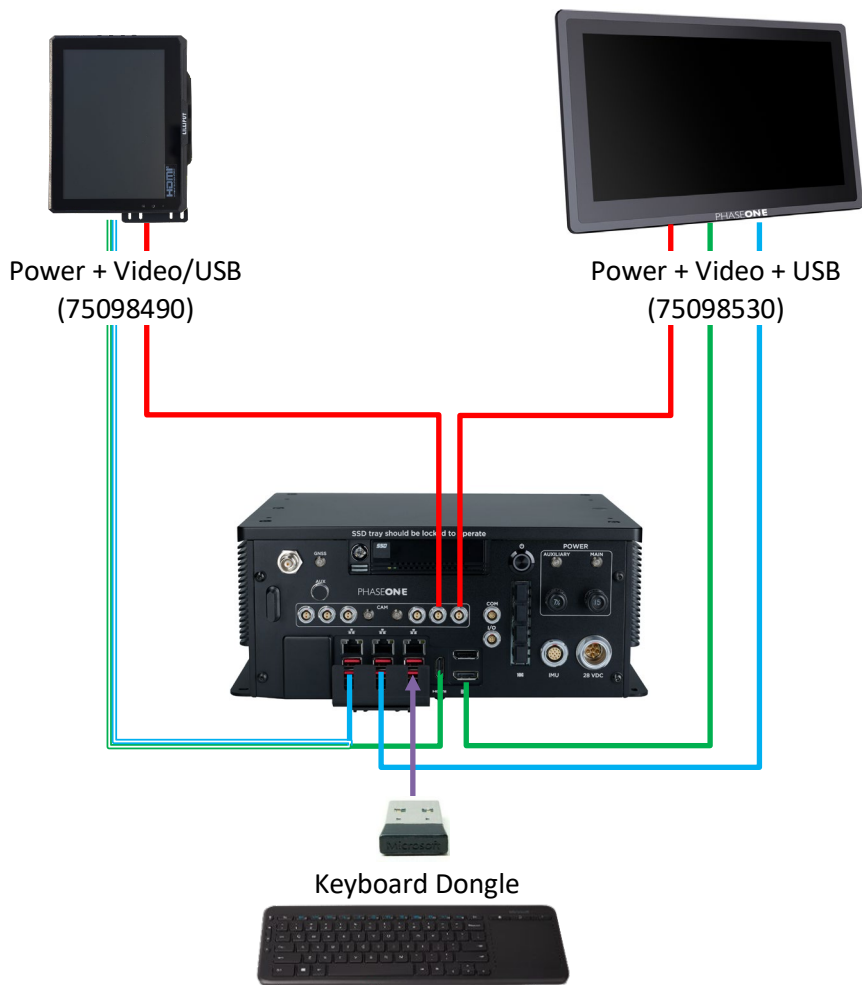
Order	P/N	Description	Connects to
6	73267000 for IMU69, 3 m 73273000 for IMU82/IMU91/IMU57, 0.5 m 73278000 for IMU82/IMU91/IMU57, 3 m 75098270 for IMU82/IMU91/IMU57, 0.81 m	IMU data	<ol style="list-style-type: none"> iX Controller, IMU port IMU
7	75098530	Power, Video, USB cable	<ol style="list-style-type: none"> Operator monitor (pre-connected to operator monitor). <div> <p>Note</p> <p>If the operator monitor cable is not connected to the operator monitor, see Appendix D - Connecting the PAS 280MP MK3 - Operator Monitor Cable to the Monitor.</p> </div> <ol style="list-style-type: none"> iX Controller AUX1 ports (power); DP (video); USB ports (USB)
8	75098490	Power, Video, USB cable	<ol style="list-style-type: none"> Pilot monitor (power, video - includes USB signal) iX Controller AUX1 ports (power); HDMI (video); USB ports (USB)
9	-	Keyboard dongle (supplied with keyboard)	<ul style="list-style-type: none"> iX Controller, USB port
10	-	Antenna cable (supplied with antenna)	<ul style="list-style-type: none"> iX Controller (rear panel) <div> <p>Note</p> <p>Place the antenna outside an open window in full view of the sky.</p> </div>

System and Power Connections



*See table: "PAS 280MP MK3 Connection Details"

Monitor and Keyboard Connections



Caution

Verify that no cables are entangled with other cables or equipment.

4.2 Powering the PAS 280MP MK3 and Mount in the Office

Note

For testing in the office, you will need two power supplies as follows:

- PAS 280MP MK3 power supply provided with the system for supplying power to the PAS 280MP MK3.
- Power supply suitable for supplying power to the mount (refer to your SOMAG Manual for details).

To connect the PAS 280MP MK3 power supply to the PAS 280MP MK3:

1. Connect the PAS 280MP MK3 power supply to a mains power outlet in the office.
2. Connect the PAS 280MP MK3 power supply cable LEMO connector to the PAS 280MP MK3 28 VDC port.

To connect the mount to a power supply:

1. Connect the PAS 280MP MK3 power supply to a mains power outlet in the office.
2. Connect the PAS 280MP MK3 power supply cable LEMO connector to the mount POWER SOCKET port.

To power up the PAS 280MP MK3:

1. On the iX Controller, push in the **MAIN** circuit breaker and confirm that the green LED turns on.
2. Wait 10 seconds.
3. On the iX Controller, push in the **AUXILIARY** circuit breaker and confirm that the green LED turns on.

Note

- The **MAIN** circuit breaker provides power to the iX Controller motherboard.
- The **AUXILIARY** circuit breaker provides power to the Applanix AP+ card and to the six AUX1 and AUX2 LEMO power ports for distributing power to system components. The **AUXILIARY** circuit breaker is dependent on the **MAIN** circuit breaker.

4. Set the mount POWER SWITCH to ON.

Once the iX Controller has booted, you will see the Windows 10 Desktop on both the operator and pilot monitors.

Note

The pilot monitor is an extended desktop as defined under **Multiple displays** in Windows Display Settings.

4.3 Configuring the PAS 280MP MK3

Note

All display settings (monitor orientation and touch) are relevant to the specific set of monitors attached to the system. These settings are Windows properties not controlled by Phase One software. If you replace monitors (even with monitors of the same type), you will need to reconfigure orientation. If the location of the USB connectors is changed, you may need to recalibrate the touch monitors.

4.3.1 Changing Monitor Orientation

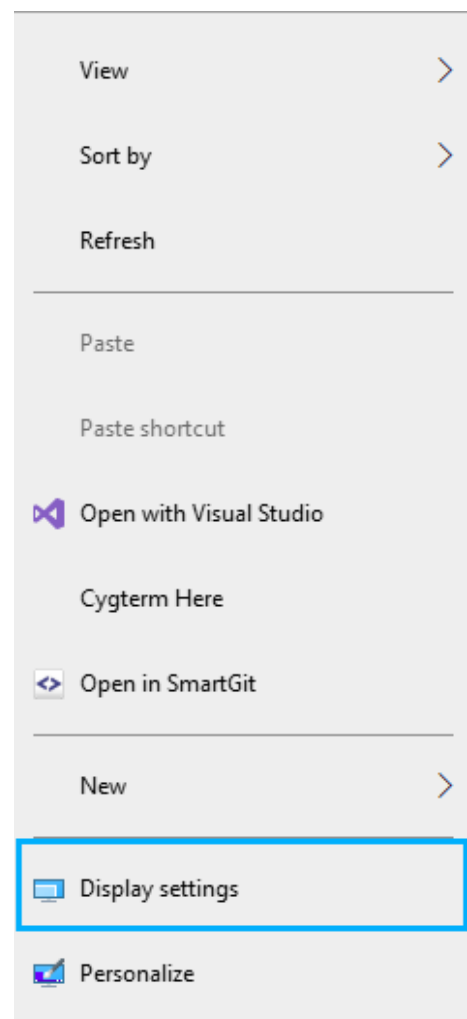
Both monitors are installed in the aircraft with their cables leading downward from the lower part of the monitor. This requires a change in display orientation.

In Windows Display Settings, the displays are identified as follows:

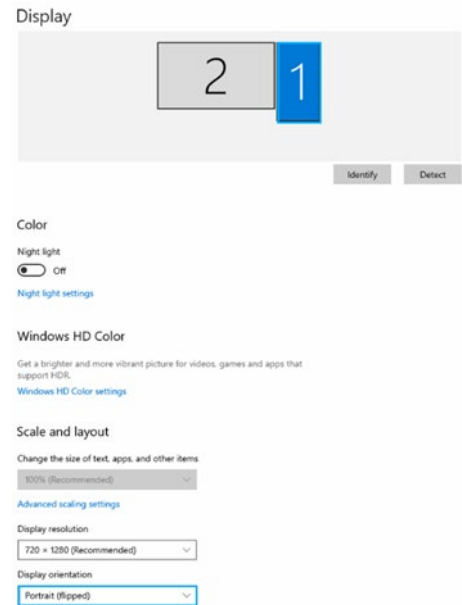
- 1 - pilot monitor connected to the iX Controller HDMI port.
- 2 - operator monitor connected to an iX Controller DP port.

To change the orientation of the monitors in Windows:

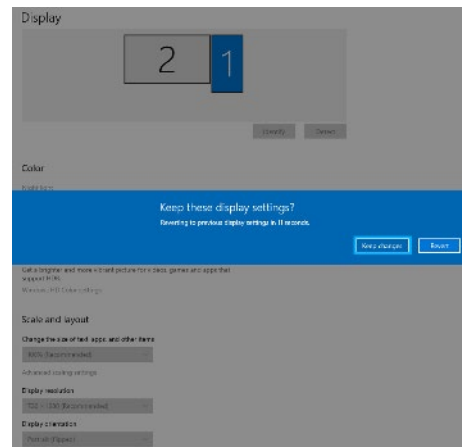
1. On the desktop, tap and hold for 1 second.
2. Tap **Display settings**.



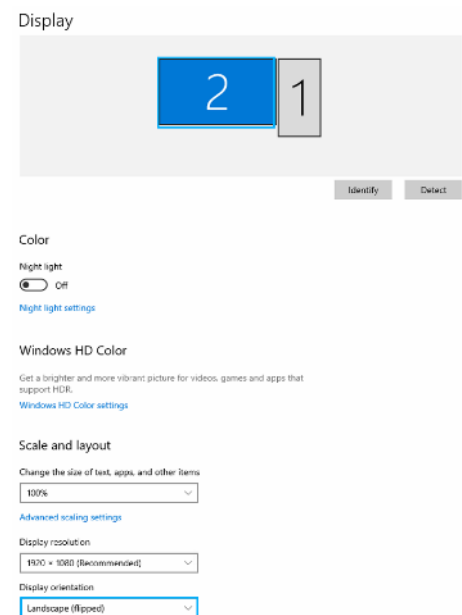
3. Tap display 1 (pilot monitor), then in **Display orientation**, select **Portrait (flipped)**.



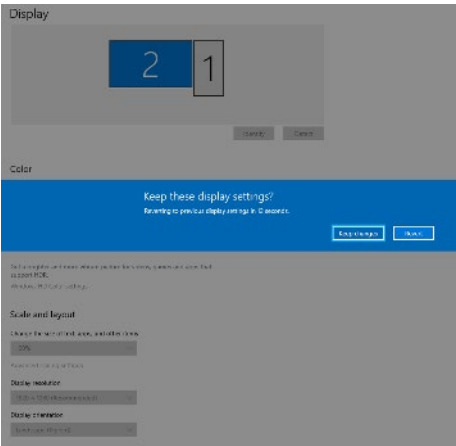
4. Tap **Keep changes**.



5. Tap display 2 (operator monitor), then in **Display orientation**, select **Landscape (flipped)**.



6. Tap **Keep changes**.

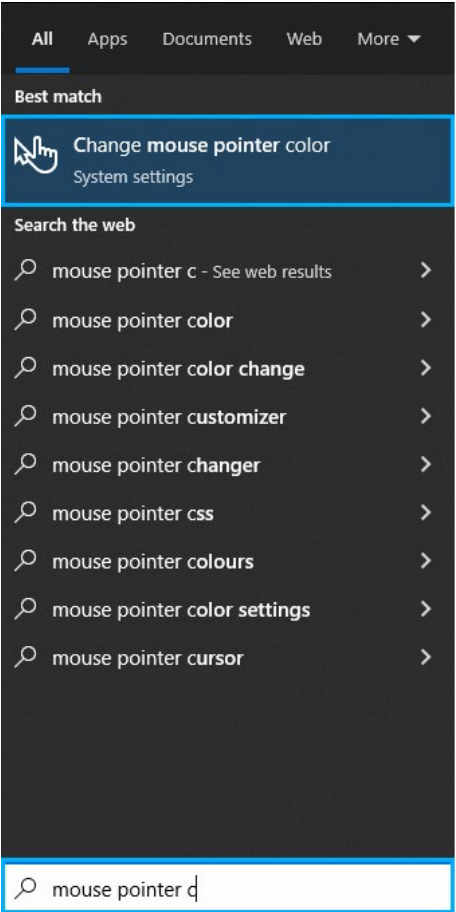


4.3.2 Changing the Mouse Pointer Color

Usually, the operator controls the mouse. In order for the operator to see the pointer on the pilot display, it needs to be enlarged.

To increase the mouse pointer visibility on the pilot monitor:

- 1. In the Windows search box, type **mouse pointer c** and tap **Change mouse pointer color**.

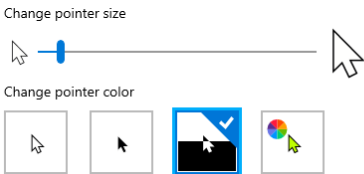


2. Tap the inverted pointer color.

Mouse pointer

Make mouse pointer and touch feedback easier to see.

Change pointer size and color



Change touch feedback

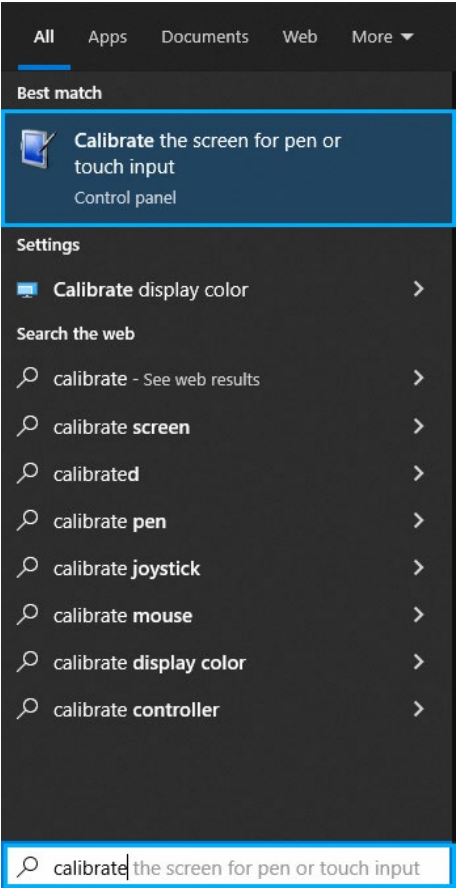
Show visual feedback around the touch points when I touch the screen

☒ On

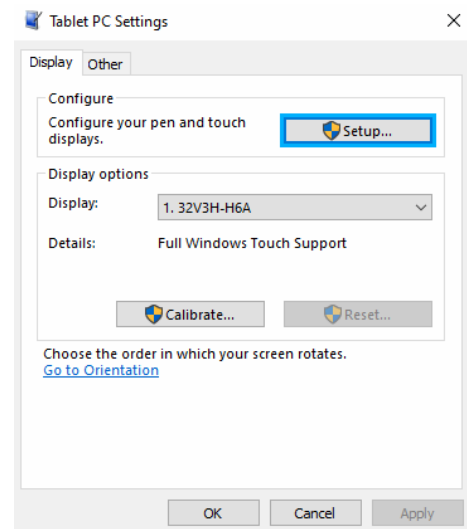
☐ Make visual feedback for touch points darker and larger

4.3.3 Configuring Touch Monitors

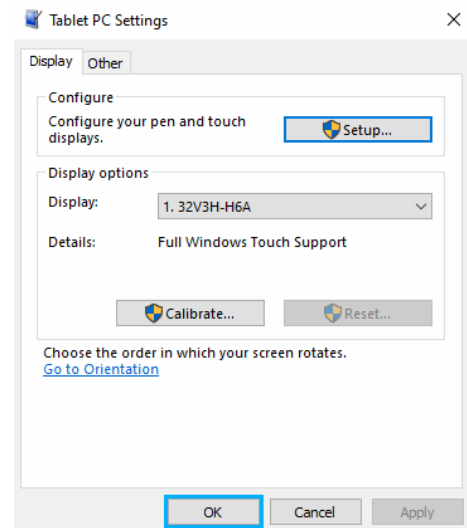
1. In the Windows search box, type **calibrate** and tap **Calibrate the screen for pen or touch input**.



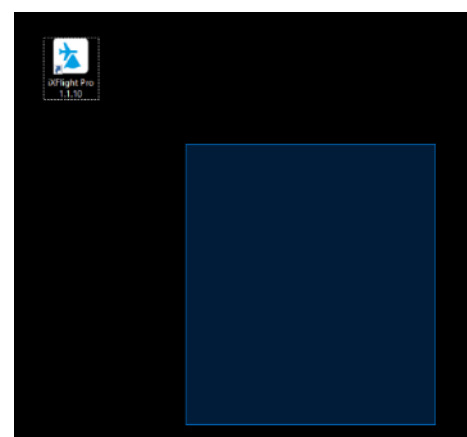
2. On the **Display** tab, tap **Setup**.



3. Follow the instructions that appear on the monitors.
4. Tap **OK**.



5. Test the configuration on each monitor by tapping and dragging. The blue frame created by your finger should appear only on the monitor you are touching.



4.3.4 Check Camera Firmware for Updates

The latest firmware and instructions on how to upgrade firmware is available at:
<https://www.phaseone.com/download-categories/ixm-firmware/>.

Warning

Update each camera individually.

4.3.5 Configuring GNSS/IMU Parameters

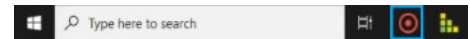
Configure GNSS/IMU Parameters as described in the GNSS Configuration Guide for PAS Systems.

4.3.6 Configuring Screen Recorder Pro

Note

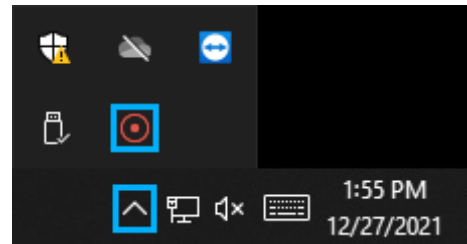
The procedure in this section is required only if screen recording is necessary.

1. On the taskbar, tap the Screen Recorder Pro icon.



Note

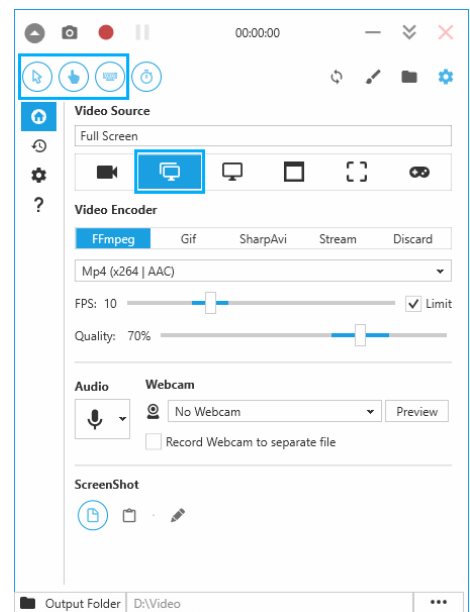
If Screen Recorder Pro is already running, tap its icon in the taskbar corner ((if it is not shown, first tap the overflow window arrow)).



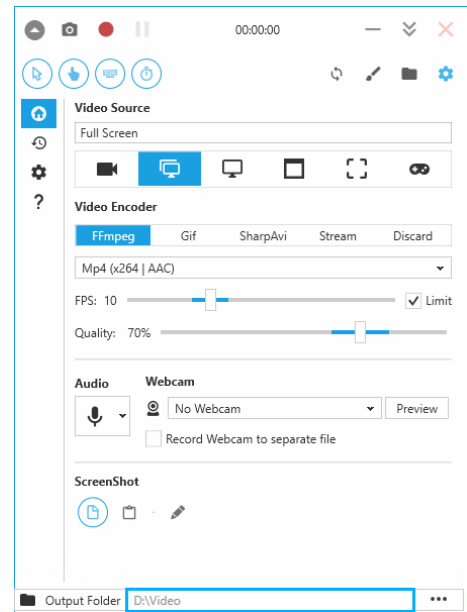
2. Verify that the following icons are active (each icon has a blue circle around it):

- Include Cursor
- Include Mouse Clicks
- Include Key Strokes

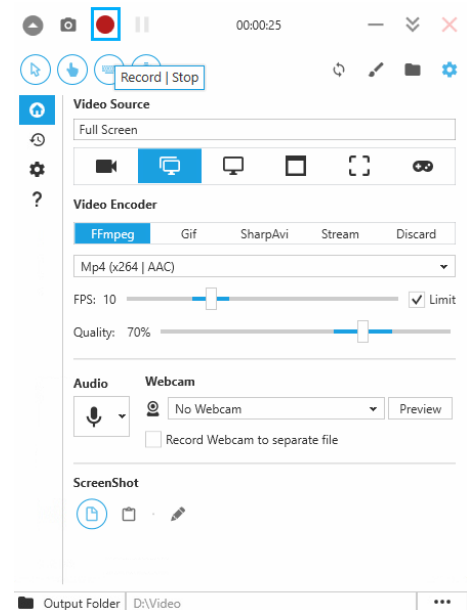
3. Under **Video Source**, verify that **Full Screen** is selected.



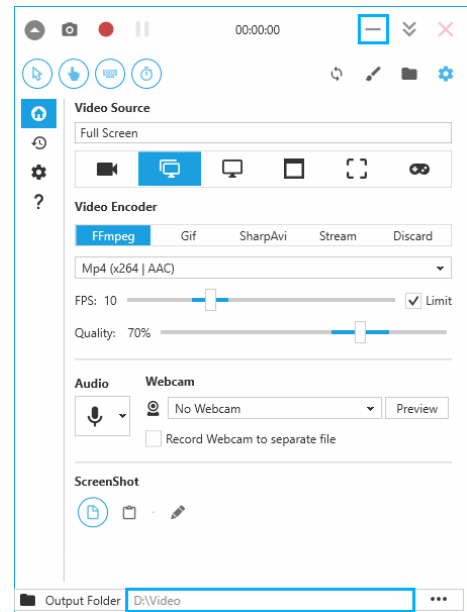
4. Verify that the **Output Folder** is set to the **D:\Videos** folder.
To change:
 - a. Tap **...**.
 - b. Navigate to **D:\Videos**.
 - c. Tap **Select Folder**.



5. Tap **Record | Stop**.



6. Tap minimize.



4.3.7 Configuring iX Flight Pro

1. In iX Flight Pro, configure **System Settings** and **Camera Settings** as described in the iX Flight Pro Operation Guide.

4.3.8 Checking the PAS 280MP MK3

1. In iX Flight Pro, perform a **Preflight Check** as described in the iX Flight Pro Operation Guide.

4.3.9 Configuring Lever Arms

4.3.9.1 Introduction

Photogrammetric solutions require accurate camera 6DOF data when the image is captured. Position 3D is measured by the GNSS at the antenna location. The 3 angular DOF are measured by the IMU at the IMU measurement center.

Transferring these position and angular measurements to the camera entrance pupil (nodal point) location requires accurate determination of the lever arms between the antenna and the camera entrance pupil and between the IMU measurement center and the Mount Rotation Center (MRC). This determination is performed by Applanix POSPac MMS® software.

The MRC is the origin of the reference coordinate system used by PosPac MMS.

In order to obtain the 6DOF data for each image, PosPac MMS needs the following lever arms:

- Lever arm from the MRC to the IMU measurement center.
- Lever arm from the MRC to the entrance pupil of each camera.
- Lever arm from the MRC to the antenna.

POSPac MMS performs the following calculations:

Calculation	Lever Arm Inputs	Other Inputs
North-East-Down (NED) coordinates for each image	<ul style="list-style-type: none"> Lever arm from the MRC to the antenna. Lever arm from the MRC to the entrance pupil of each camera. 	<ul style="list-style-type: none"> Mount angles at time of image capture. IMU angles at time of image capture.
Omega, phi, kappa angles	<ul style="list-style-type: none"> Lever arm from the MRC to the IMU measurement center. 	<ul style="list-style-type: none"> Mount angles at time of image capture. IMU angles at time of image capture. Camera boresight angles to the IMU.

4.3.9.2 Calculating and Entering Lever Arm Values

For an explanation on how to calculate the lever arms, see Appendix B - Calculating Lever Arms.

Note

You must enter the lever arm values in the Applanix GNSS browser UI as described in the GNSS Configuration Guide for PAS Systems.

4.4 Disconnecting the PAS 280MP MK3 in the Office

When you have completed testing the PAS 280MP MK3 in the office:

1. On the operator monitor, shut down Windows.
2. After the power LEDs have turned off, set the mount POWER SWITCH to OFF.
3. On the iX Controller, pull the MAIN circuit breaker out.
4. Power supplies – disconnect from the mains power outlet.
5. If using the GSM 4000 mount: open the main oil valve, wait until the mount returns to the lowest position then close the main oil valve.
6. Power cables - disconnect from the iX Controller and mount.
7. Mount control cable – disconnect from the iX Controller and mount.
8. Pilot and operator monitors - disconnect cables from the monitors and from iX Controller.
9. GPS antenna connection – disconnect.
10. If the single-band or 4-band frame is in the mount, remove it.

5 Installing the PAS 280MP MK3 in the Aircraft

This section describes how to install a typical PAS 280MP MK3 in an aircraft.

Note

- The following aircraft installation procedure assumes the system was previously assembled and tested in the office as described in Section 4 - Testing the PAS 280MP MK3 in the Office.
- There are no user serviceable parts inside the PAS 280MP MK3 or iX Controller. All warranties are void if access panels are opened or cables not supplied by Phase One are connected, unless specifically instructed by Phase One personnel.
- Installation of the PAS 280MP MK3 in an aircraft must be performed by certified personnel while following the relevant Civil Aviation Authority regulations in the country of aircraft registration and operation. A Supplemental Type Certificate or Minor Change may be required.

5.1 Required Tools

The following tools are required to install the PAS 280MP MK3 in the aircraft:

- Allen key set.
- Torx key set.
- Screwdriver, Hexagon 2 mm.
- Screwdriver, Hexagon 1.3 mm.
- Standard tools.
- Lens Cleaning Kit.
- Microfiber Cloth, Grey.

5.2 Installing the Trimble AV39 Antenna

Note

- For antenna installation instructions, refer to the Trimble AV39 Antenna Datasheet.
- Antenna installation and wire routing in the aircraft should be made by an approved aircraft maintenance facility.

1. Install the Trimble AV39 Antenna on the aircraft roof.
2. Lead the antenna cable to the antenna connector in the aircraft cabin.

5.3 Securing the Interface Plate to the Aircraft

Note

Phase One recommends assembling the entire system on an approved interface plate to properly secure the system to the aircraft and isolate the system from aircraft floor sheet metal vibrations.

5.4 Securing the Mount to the Interface Plate

Note

- For complete installation instructions and user care for the DSM 400 or GSM 4000, refer to the respective SOMAG manual.
- Make sure that the installation area is free from obstruction by objects.
- It is recommended that at least two people perform the installation procedures.
- Make sure you have allowed sufficient height clearance around the mount location, as described in the relevant SOMAG Manuals.

To secure the mount to the interface plate:

1. Place the mount on the interface plate and with the white arrow at the top of the mount pointing in the direction of the flight.

Note

You may install the SOMAG mount facing the rear of the aircraft, but it requires additional settings and licensing. For more information, contact Phase One Technical Support.

2. Secure the mount to the interface plate using 4 screws and torque as described in the respective SOMAG manual.

Note

Make sure that the camera(s) does not protrude more than 2 cm beyond the aircraft skin.

5.5 Installing the PAS 280MP MK3 on the Mount

Note

- Make sure that the installation area is free from obstruction by objects.
- The lenses protrude from the bottom of the PAS 280MP MK3. When placing the PAS 280MP MK3 on the ground/into the mount, take extra care that the lenses do not make contact with any objects. Where possible, the lens covers should remain attached to the cameras until it is necessary to remove them. This avoids any damage to the optics, or contamination from dust.
- Although the PAS 280MP MK3 frame is light enough for installation by a single person, always install with two people to enhance safety.
- Before installing the PAS 280MP MK3 into the mount, make sure that the vibration damping ring is clear of all cables before lowering the PAS 280MP MK3 onto the mount.

Note

If you are installing the PAS 280MP MK3 into a SOMAG GSM 4000 mount, you must install the adapter plate and secure it with 3 x M8-20 screws, as shown in the following figure:



To install the PAS 280MP MK3 on the mount:

1. Carefully lower the PAS 280MP MK3 into the center cavity while making sure that there is enough vertical space between the camera lenses and the aircraft optical glass hatch.

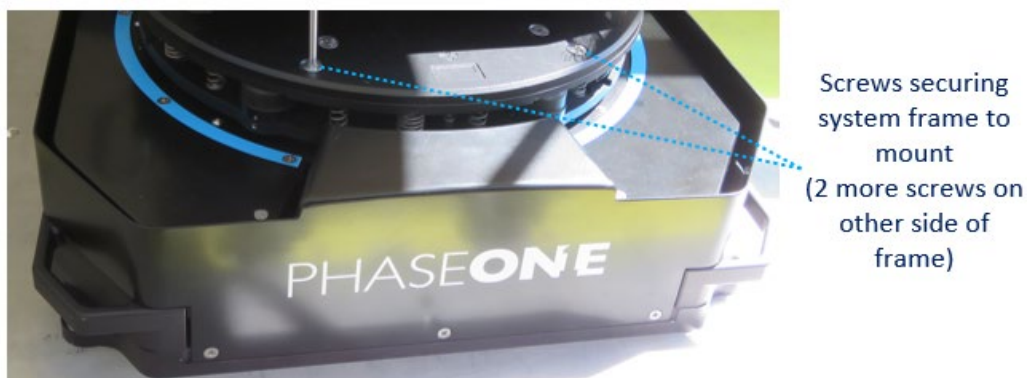
Warning

For open air camera hatches, make sure the pod does not protrude beyond the aircraft skin.

2. Align the holes in the PAS 280MP MK3 mount ring with the holes in the mount.

To secure the PAS 280MP MK3 to the mount:

1. Fasten the PAS 280MP MK3 frame to the mount using the four M6*16 screws provided.



2. Secure the screws using a maximum torque of 6 Nm.

5.6 Installing the Pilot Monitor

1. Mount the pilot monitor. A suggested method is using a proper mount with a suction cup.



5.7 Installing the Operator Monitor

1. The operator monitor is provided with a device for attaching the monitor to the head rest base. You can use this device or mount it with your own mounting device.



5.8 Connecting a PAS 280MP MK3 and Mount in the Aircraft

5.8.1 Connecting PAS 280MP MK3 Components

1. Verify that all components are connected as described in section 4.1 - Connecting a PAS 280MP MK3 in the Office.

5.8.2 Powering the PAS 280MP MK3 and Mount in the Aircraft

Warning

- The iX Controller has been tested and certified for connection to a 28 VDC power supply. Installation on aircraft with other power supplies is not recommended unless special measures are taken to provide the PAS 280MP MK3 with a 28 VDC supply.
- On the aircraft side, a 10 A circuit breaker must be installed on the 28 VDC power supply.
- It is highly recommended to connect the PAS Power cable to the aircraft power supply using a proper connector in accordance with aviation standards.

To connect the PAS 280MP MK3 power supply to the PAS 280MP MK3 and to the mount:

1. Connect the open end of the PAS Power cable to the aircraft power supply as follows:

Caution

Before connecting the power cable to the aircraft power supply, verify voltage polarity.

PAS Power Cable Polarity

Wire	Polarity
Red	+
Black	GND

2. Connect the PAS power cable iX Controller LEMO straight connector to the iX Controller 28 VDC port.
3. Connect the PAS power cable mount LEMO right-angle connector to the mount POWER SOCKET port.

Caution

Verify that no cables are entangled with other cables or equipment.

To power up the PAS 280MP MK3:

1. Once aircraft power is available, set the mount **POWER SWITCH** to **ON**.
2. On the iX Controller, push in the **MAIN** circuit breaker and confirm that the green LED turns on.
3. Wait 10 seconds.
4. On the iX Controller, push in the **AUXILIARY** circuit breaker and confirm that the green LED turns on.

6 Recommended Flight Operation Procedure

1. Follow the recommended flight operation procedure as described in the iX Flight Pro Operation Guide.

7 Post Flight Operations

1. Follow the recommended post flight operations as described in the iX Flight Pro Operation Guide.

8 Shutting Down and Disassembling the PAS 280MP MK3

8.1 Shutting Down the PAS 280MP MK3

Warning

To avoid any damage to the PAS 280MP MK3 when shutting it down, make sure you follow the following procedure.

1. On the operator monitor, shut down Windows.
2. After the power LEDs have turned off, set the mount POWER SWITCH to OFF.
3. On the iX Controller, pull the MAIN circuit breaker out.

8.2 Disassembling the PAS 280MP MK3

1. Power switch on aircraft switches panel - verify off.
2. If using the GSM 4000 mount: open the main oil valve, wait until the mount returns to the lowest position then close the main oil valve.
3. PAS Power cable - disconnect from aircraft power outlet, iX Controller and mount.
4. Mount control cable - disconnect from the iX Controller and mount.
5. Pilot and operator monitors - disconnect cables from monitors and from iX Controller.
6. Remove monitors from aircraft.
7. GPS antenna connection - disconnect from iX Controller.
8. Frame - remove screws securing frame to mount and remove frame from aircraft.
9. Mount - remove screws securing mount to interface plate and remove mount from aircraft.
10. Interface plate - remove screws securing interface plate to aircraft floor and remove interface plate from aircraft.
11. Perform any other changes required to return aircraft to regular approved configuration.

Note

For information on transferring SSDs from the iX Controller to the processing computer, see Appendix C - Data Storage Management.

9 Troubleshooting

9.1 General Faults

The following table details how to troubleshoot general PAS 280MP MK3 faults.

Fault	Probable Cause	Solutions
Camera not ready.	No space on SSD storage.	<ul style="list-style-type: none"> Change SSD storage. Change save location.
Image too dark or too bright.	Incorrect camera settings.	Change camera settings.
All images are black.	Lens cap is still on lens.	Remove lens cap.
iX Flight Pro pilot display “frozen” and GPS icon is red.	iX Flight Pro is not receiving GPS data.	<ul style="list-style-type: none"> In iX Flight Pro, check GPS status. <div> <p>Note</p> <p>You may need to reset the GPS or remove and reconnect the GPS antenna.</p> </div>
In iX Flight Pro > Preflight Check, the following error appears: Missing GPS in USB: MRXXXXXX - capture number XXXXXX?	<ol style="list-style-type: none"> GNSS antenna disconnected. GNSS configuration incorrect. Camera configuration incorrect. 	<ol style="list-style-type: none"> Connect antenna. Refer to GNSS Configuration Guide for PAS Systems for COM2 configuration. In iX Flight Pro > Settings > Camera Settings > Left Terminal, set: <ul style="list-style-type: none"> Terminal - GPS Baud Rate - 115200 GPS Receiver - Applanix GPS
In iX Flight Pro > Preflight Check, the following error appears: Missing Mount Data in T04	<ul style="list-style-type: none"> Configuration error iX Controller backplane hardware issue. 	<ol style="list-style-type: none"> Connect a USB cable between the mount and the iX Controller. Power up the PAS 280MP MK3 and the mount. Open the SOMAG mount management application and verify that it is connected to the mount (mount type and S/N is displayed). In the mount application, go to Setting 2 page and verify that the Aux Port is enabled and that AVX210 is selected. In the mount application, go to the home page, change to MAN, move angle sliders to 2 degrees in roll pitch and yaw. Make sure nothing is blocking the system and nobody is close to it and click Apply. The mount moves. Open the Applanix GNSS browser UI. Click I/O Configuration > Port Configuration and verify that for Serial/COM1 port, GIMBAL is set to GIM01. Click Receiver Status > INS Status and verify that the gimbal angles are the same as those displayed in the mount application. If the angles displayed are “0”, there is a hardware issue. Contact Phase One Technical Support.

9.2 iX Controller (MK6) Beep POST Codes

The following table lists the iX Controller (MK6) POST (Power On Self-Test) beep codes issued by the motherboard.

POST Beep Code	Description
1	Normal POST, PAS 280MP MK3 is OK.
3	Memory not installed
5	No console output devices found

Appendix A Technical Data

A.1 PAS 280MP MK3 Weight

A.1.1 Single-Band System

The weight of the single-band system components is listed in the following table:

Description	Weight
iXM-RS280 F camera (with dual 90mm lens)	4.7 kg/10.4 lb
Frame	5.4 kg/11.9 lb
iX Controller	6.3 kg / 13.9 lb
SOMAG DSM 400 Mount	14 kg / 30.9 lb
IMUs: <ul style="list-style-type: none">• IMU-69• IMU-82 with mounting base• IMU-91 with mounting base• IMU-57	<ul style="list-style-type: none">• 0.2 kg / 0.44 lb• 1.02 / 2.25 lb• 1.02 / 2.25 lb• 2.6 kg / 5.73 lb

A.1.2 Variants

The weight of the variants is listed in the following table:

Description	Weight
iXM-RS150F achromatic camera (excluding lens)	1 kg / 2.2 lb
SOMAG GSM 4000 Mount	29 kg / 63.9 lb

A.2 Power Input Specifications

A.2.1 Power Requirements

Parameter	Requirement
Voltage	24 - 32 VDC
Maximum current	10 A

A.2.2 Power Consumption

Power consumption for single and 4-band systems are listed in the following table:

Parameter	Single-Band System	4-Band System
Average power consumption	106 W	115 W
Peak power consumption	155 W	160 W

Appendix B Calculating Lever Arms

B.1 PAS 280MP MK3 installed in SOMAG DSM 400 Mount

B.1.1 IMU-91 or IMU-82

The following table detail the lever arm values for a PAS 280MP MK3 installed in SOMAG DSM 400 Mount with an IMU-91 or IMU-82.

Lever Arms Values for PAS 280MP MK3 with IMU-91/IMU-82 in SOMAG DSM 400 Mount

Lever Arm	X (meter)	Y (meters)	Z (meters)
MRC to IMU navigation center	0	0.0935	-0.2681
MRC to IMU hat mark	0	0.0935	-0.3254
MRC to iXM-RS280F image center	-0.0205	0	+0.131
MRC to iXM-RS150F Achromatic entrance pupil	+0.079	0	+0.09985
MRC to iXM-RS280F master (right camera)	-0.0205	+0.0505	+0.131
MRC to iXM-RS280F slave (left camera)	-0.0205	-0.0505	+0.131

B.1.2 IMU-57

The following table detail the lever arm values for a PAS 280MP MK3 installed in SOMAG DSM 400 Mount with an IMU-57.

Lever Arms Values for PAS 280MP MK3 with IMU-57 in SOMAG DSM 400 Mount

Lever Arm	X (meter)	Y (meters)	Z (meters)
MRC to IMU navigation center	-0.014	0.0835	-0. 2814
MRC to IMU hat mark	0	0.0935	-0.3444
MRC to iXM-RS280F image center	-0.0205	0	+0.131
MRC to iXM-RS150F Achromatic entrance pupil	+0.079	0	+0.09985
MRC to iXM-RS280F master (right camera)	-0.0205	+0.0505	+0.131
MRC to iXM-RS280F slave (left camera)	-0.0205	-0.0505	+0.131

B.2 PAS 280MP MK3 installed in SOMAG GSM 4000 Mount

B.2.1 IMU-91 or IMU-82

The following table detail the lever arm values for a PAS 280MP MK3 installed in SOMAG GSM 4000 Mount with an IMU-91 or IMU-82.

Lever Arms Values for PAS 280MP MK3 with IMU-91/IMU-82 in SOMAG GSM 4000 Mount

Lever Arm	X (meter)	Y (meters)	Z (meters)
MRC to IMU navigation center	0	0.0935	-0.2368
MRC to IMU hat mark	0	0.0935	-0.2941
MRC to iXM-RS280F image center	-0.0205	0	+0.16265
MRC to iXM-RS150F Achromatic entrance pupil	+0.079	0	+0.13115
MRC to iXM-RS280F master (right camera)	-0.0205	+0.0505	+0.16265
MRC to iXM-RS280F slave (left camera)	-0.0205	-0.0505	+0.16265

B.2.2 IMU-57

The following table detail the lever arm values for a PAS 280MP MK3 installed in SOMAG GSM 4000 Mount with an IMU-57.

Lever Arms Values for PAS 280MP MK3 with IMU-57 in SOMAG GSM 4000 Mount

Lever Arm	X (meter)	Y (meters)	Z (meters)
MRC to IMU navigation center	-0.014	0.0835	-0.2501
MRC to IMU hat mark	0	0.0935	-0.3131
MRC to iXM-RS280F image center	-0.0205	0	+0.16265
MRC to iXM-RS150F Achromatic entrance pupil	+0.079	0	+0.13115
MRC to iXM-RS280F master (right camera)	-0.0205	+0.0505	+0.16265
MRC to iXM-RS280F slave (left camera)	-0.0205	-0.0505	+0.16265

Appendix C Data Storage Management

C.1 Disk Management

The PAS 280MP MK3 storage consists of a built-in frame with a removable carrier containing two SSD drives. The drives store the images captured by cameras connected to the PAS 280MP MK3.

The carrier front panel contains the following LEDs:

LED	Color	State	Description
Drive power	Green	Solid	The drive is powered on.
Drive activity	Amber	Blinking	The drive is being accessed by the PAS 280MP MK3.

The drives are assigned the following drive letters:

- D - top drive
- E - bottom drive

Note

For information on transferring data from the SSDs to the processing computer, see the iX Process Operations Guide.

C.2 Locking the Carrier

Note

The carrier must be locked with the SSD carrier key for the PAS 280MP MK3 to recognize the drives.

To lock the carrier in the SSD drive bay frame:

Note

The SSD carrier key is stored on the left side of the PAS 280MP MK3 front panel.



1. Insert the SSD carrier key into the SSD carrier keylock and turn it 90° clockwise. The yellow and green SSD drive LEDs turn on momentarily and the green LED remains on.



An additional frame is provided with the PAS 280MP MK3. This frame should be installed in the computer used for post-flight processing. You can then transfer the carrier with its SSD drives between the PAS 280MP MK3 and the processing computer.

Note

Additional carriers (with or without SSD drives) with SATA or USB 3 based frames can be ordered through your Phase One sales representative.

C.3 Removing the SSD Drive Carrier

To remove the SSD drive carrier from the iX Controller:

1. On the operator monitor, shut down Windows.
2. On the iX Controller, pull the **MAIN** circuit breaker out.
3. Insert the SSD carrier key into the SSD carrier keylock and turn it 90° counterclockwise.
4. Push in the SSD carrier eject button once to release the button, and again to eject the carrier from the frame.
5. Gently remove the SSD carrier from the iX Controller.

C.4 Inserting the SSD Drive Carrier

To insert the SSD drive carrier into the iX Controller:

1. On the operator monitor, shut down Windows.
2. On the iX Controller, pull the **MAIN** circuit breaker out.
3. If the SSD carrier eject button is protruding, push it all the way in.
4. Gently insert the SSD carrier into the iX Controller.
5. Insert the SSD carrier key into the SSD carrier keylock and turn it 90° clockwise.
6. Power up the iX Controller by pushing in the **MAIN** circuit breaker.
7. Verify that the green SSD drive LED turns on.

C.5 Replacing SSD Drives

The iX Controller is factory provided with 2 x 2TB or 2 x 4TB SSD drives installed in a removable carrier.

You can replace the SSDs as required. To achieve optimal performance, both SSDs should have a high writing speed (>500 MB/S). Drive capacities can be different.

To replace the SSD drives:

1. On the operator monitor, shut down Windows.
2. On the iX Controller, pull the MAIN circuit breaker out.
3. Remove the carrier from the iX Controller (see Appendix C.3 - Removing the SSD Drive Carrier).
4. Remove both cover screws at the rear of the carrier.



5. Slide the carrier out from the carrier cover.



6. Remove all screws securing the SSD drives to the carrier.



7. Replace the SSD(s) in the carrier.
8. Secure the SSD(s) to the carrier.
9. Slide the cover back on to the carrier and secure it with the cover screws.
10. Insert the carrier into the iX Controller.

Appendix D Connecting the PAS 280MP MK3 – Operator Monitor Cable to the Monitor

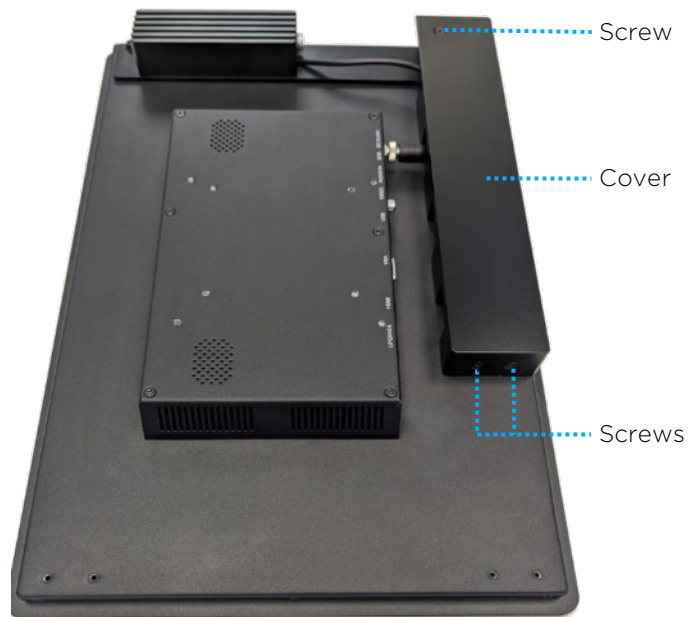
Note

If the operator monitor cable is not connected to the operator monitor, perform the procedure in this appendix.

The PAS 280MP MK3 – Operator Monitor Cable is connected to the operator monitor through the cable bracket on the rear of the monitor.

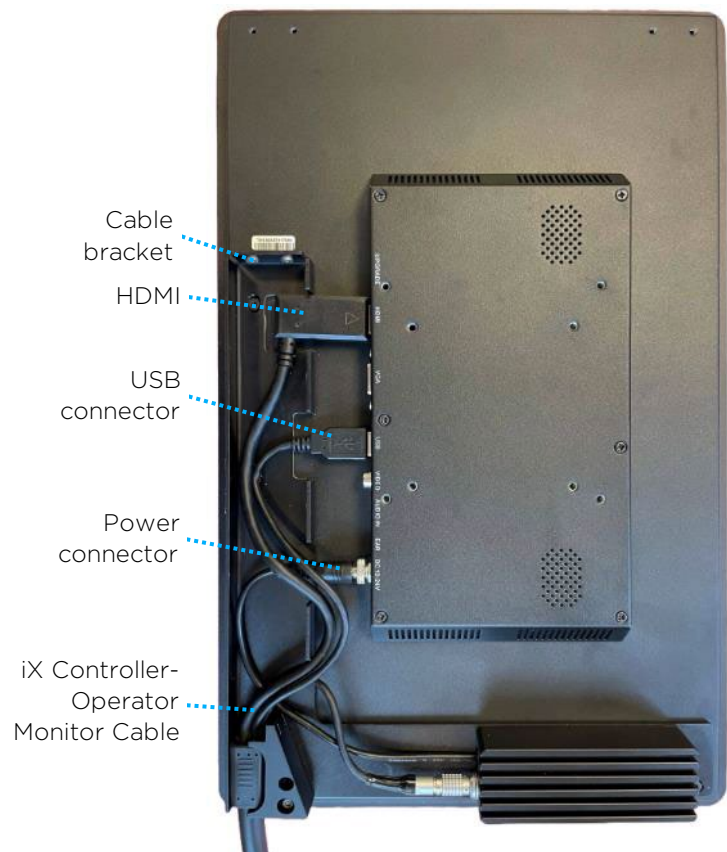
To connect the PAS 280MP MK3 – Operator Monitor Cable to the operator monitor:

1. Locate the cable bracket on the rear panel of the operator monitor.
2. Using a 2 mm Allen key, remove all three screws securing the cover to the cable bracket.
3. Remove the cover.

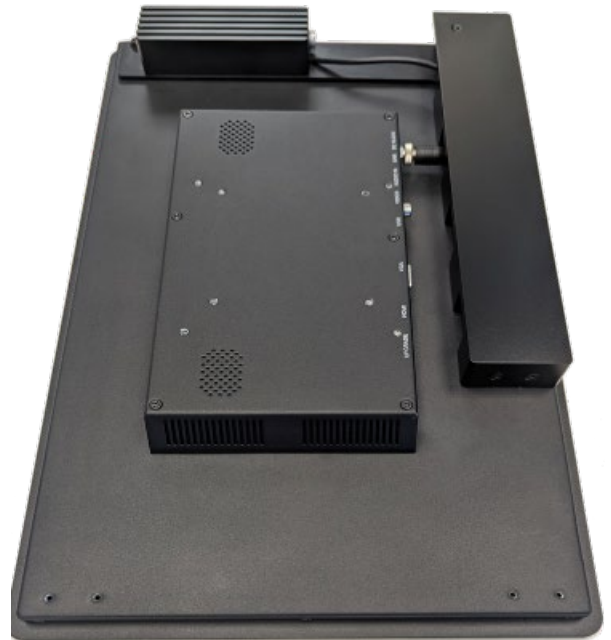


4. Insert the iX Controller - Operator Monitor cable into the cable bracket and connect the following connectors:

- HDMI
- USB
- Power



5. Place the cover on the housing.
6. Replace the three screws securing the cover to the cable bracket as follows:
- a. Place a drop of Loctite 222 on the screw thread and insert the screw in position.
 - b. Tighten the screw with a torque of 60 cNm.



Appendix E Declarations of Conformity

E.1 iX Controller MK 6



EU Declaration of Conformity

Phase One A/S issues this Declaration of Conformity under our sole responsibility, covering the following product(s):

Product: Phase One iX Controller
Manufacturer: Phase One A/S
Models: Phase One iX Controller mk 6
Phase One iX Controller mk 6 OEM

The product is in conformity with the following standards and/or other normative documents:

EMC: EN 61000-6-3:2020, EN 61000-6-1:2019
EN 55035:2017 + A1:2015, EN 55032:2015

FCC CFR 47 Part 15:2017 subpart B, class A
ANSI C63.4:2014
ICES-003:2020 issue 7
CISPR 32, AS/NZS CISPR 32:2012
VCCI Technical Requirements, V-3/2016.11

Environmental: RTCA/DO-160G Environmental Conditions and Test Procedures for Airborne Equipment

RoHS: Article 4 (1)

Technical Documentation relevant to the product is available from:

Phase One, Roskildevej 39, DK-2000 Frederiksberg, Denmark

Frederiksberg, Denmark, March 14, 2024

A handwritten signature in blue ink, appearing to read 'Morten Bruun-Larsen'.

Morten Bruun-Larsen
VP R&D and Quality

Phase One A/S ♦ Roskildevej 39, DK-2000 Frederiksberg, Denmark
Tel: (45) 36 46 0111 ♦ Website: geospatial.phaseone.com ♦ E-mail: geospatial@phaseone.com

E.2 iXM-RS280F Camera

PHASEONE

EU Declaration of Conformity

This declaration of conformity is issued under our sole responsibility and belongs to the following product(s):

Product: Phase One iXM-RS camera
Trade Name: Phase One A/S
Model: Phase One iXM-RS280F

The product is in conformity with the following standards and/or other normative documents:

EMC: EN 61000-6-3:2020 + EN 61000-6-1:2019,
EN 55035:2015 + A1:2020, EN 55032:2015/A11:2020

Other (voluntary specs):

EMC: FCC CFR 47 Part 15 Subpart B
ANSI C63.4:2014
Industry Canada ICES-003:06
VCCI Technical Requirements, V-3/2016

RoHS: Article 4(1)

DO160G RTCA/DO-160G: sections 4.5.1-4.5.4, 4.6.1 Cat. B4
Operating range: -10C to 40C
Ground survival: -55C to 85C,
5.3.1 Cat C,
6 Cat. B,
7.2.1, 7.3.1 Cat. B
8.5.2 – Fixed Wing Category S, Curve M
8.8.2 – Helicopter Category U

MTBF: 20,000 Hours

Technical Documentation relevant to the product described above is held by:
Phase One, Roskildevej 39, DK-2000 Frederiksberg, Denmark

Frederiksberg, Denmark, March 2022



Dedi Meler / Compliance Specialist

Phase One A/S ♦ Roskildevej 39, DK-2000 Frederiksberg, Denmark
Tel: (45) 36 46 0111 ♦ Website: industrial.phaseone.com ♦ E-mail: industrial@phaseone.com

E.3 iXM-RS150F Achromatic Camera



EU Declaration of Conformity

This declaration of conformity is issued under our sole responsibility and belongs to the following product(s):

Product: Phase One iXM-RS camera
Trade Name: Phase One A/S
Model: Phase One iXM-RS150F Achromatic

The product is in conformity with the following standards and/or other normative documents:

EMC: EN 61000-6-3:2007 + EN 61000-6-1:2007,
EN 55024:2010 + A1:2015, EN 55032:2012/AC:2013

Other (voluntary specs):
EMC: FCC CFR 47 Part 15 Subpart B
ANSI C63.4:2014
Industry Canada ICES-003:06
VCCI Technical Requirements, V-3/2016

RoHS: Article 4(1)

DO160G RTCA/DO-160G: sections 4.5.1-4.5.4
Operating range: -10C to 40C
Ground survival: -55C to 85C,
4.6.1 (B4)
5.3.1
6 (B)
7.2.1 (B),
8.2.1.1, 8.5.2 – Category S, Curve M

MTBF: 20,000 Hours

Technical Documentation relevant to the product described above is held by:
Phase One, Roskildevej 39, DK-2000 Frederiksberg, Denmark

Frederiksberg, Denmark, 7-2022

Dedi Meler / Compliance Specialist

Phase One A/S ♦ Roskildevej 39, DK-2000 Frederiksberg, Denmark
Tel: (45) 36 46 0111 ♦ Website: industrial.phaseone.com ♦ E-mail: industrial@phaseone.com