RobotEye NAKED REN25

User Manual

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Revision Table

Date	Notes
12/07/2011	Initial Release
29/04/2014	Updates and corrections to general information

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1 Introduction

IMPORTANT
READ CAREFULLY BEFORE USE
KEEP FOR FUTURE REFERENCE

The REN25 User Manual is provided as a guide to the connection, configuration and safe use of the Ocular Robotics NAKED REN25 System. For development of custom software applications for use with the REN25 system see the RobotEye Network Interface Manual, RobotEye API Reference Manual, or contact Ocular Robotics.

Chapter 2 Basics, describes the initial setup and basic use of the REN25 including information on cleaning, maintenance and safety. Chapters 3 General Description presents a system description in terms of the system's Mechanical and Electrical properties and its communication and power interfaces.

CAUTION - USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN SIGNIFICANT RISK OF INJURY. IT WILL ALSO VOID YOUR WARRANTY

2 Basics

⚠ **IMPORTANT** – Before connecting the power to this system or attempting to operate it in any way, read and follow all instructions regarding safe operation of this system contained in section 2.5.

2.1 System Components

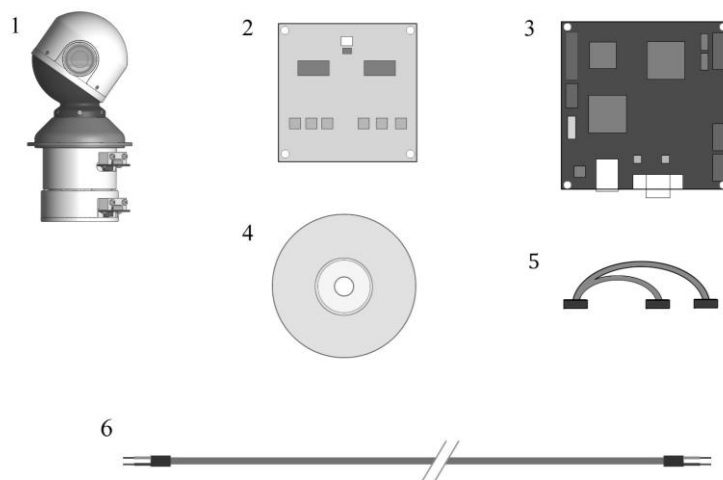### 2.1.1 NAKED REN25 Unit

Figure 2.1 – NAKED REN25 Unit Packing List

The Ocular Robotics RobotEye NAKED REN25 unit is supplied standard with the following components, each of which can be seen in Figure 2.1:

1. The RobotEye NAKED REN25 unit.

2. Motor Power Amplifier Board.

3. 2-Axis Motion Controller Board.

4. Installation & documentation disk.

5. Cable Harness.

6. REN25 Power Cable

2.2 What You Need

In order to operate the NAKED REN25 system, you will need:

1. Power supply – A 24 volt DC 10 Amp power supply with a continuous current capacity of 10 Amps.

2. Ethernet cable – A standard Ethernet cable (Cat5e or Cat6) is needed for control and communication with the REN25 system.

3. A computer with a Windows or Linux operating system with one free 100 Megabit Ethernet port.

2.3 Handling and Transportation

Avoid handling the RobotEye using the scanning head. This may result in mechanical damage and misalignment of the sensor.

When transporting, make sure the RobotEye head will not be subject to large external loads and stresses.
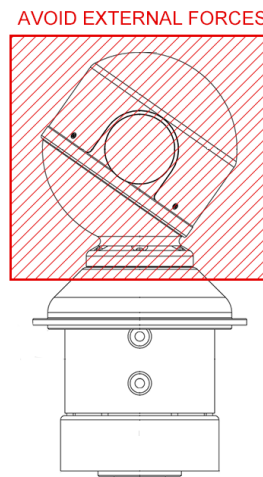
Figure 2.2 – REV25 Handling Zones

2.4 Initial Setup

> ⊘ **NOTE** – The robot eye head must be handled with extra care during transport and installation. External loads exerted on the head may result in damage.

2.4.1 NAKED REN25 Unit

Follow the steps below to set the REN25 unit up for use on a computer with a Windows or Linux operating system. The library version number and system IP address shipped with your system should be noted on the supplied *Certificate*.

Figure 2.3 Wiring and connections for the REN25 Unit

1. Connect Cable Harness (16 pin to 10/6 pin cable) between controller and amplifier board.

2. Connect unit Encoder Sensor cable (14 pin connector) to black 2 Axis Motion Controller board.

> **NOTE** – Make sure the orientation of the connectors is correct. Incorrect orientations may result in damage to the system.

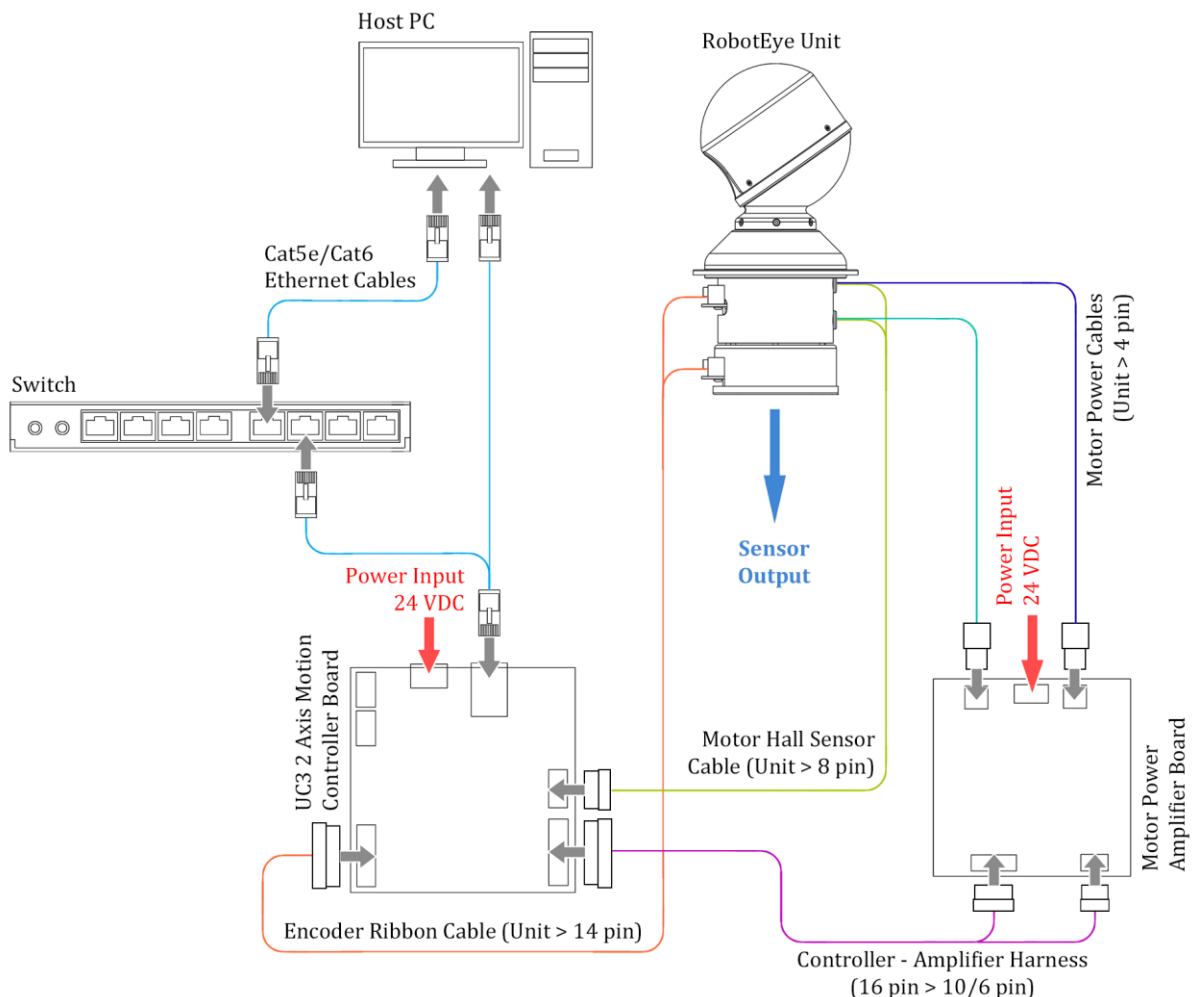3. Connect motor Hall Sensor cable (8 pin connector) from the unit to the black 2 Axis Motion Controller board.

4. Connect motor power cables (4 pin white connectors) to the Motor Power Amplifier board. Match the colour coding of the connectors to ensure correct operation, incorrect connection of the motor power cables will result in uncontrolled motion of the system on power up.

5. Connect both the 2 Axis Motion Controller board and Motor Power Amplifier board to a 24 VDC power supply. Information on the polarity of the power connectors are detailed in Section 3.3.

> **WARNING** - Make sure the power supply is not powered before connecting the cables.

6. Connect one end of the Ethernet cable to the network port on the PC or switch. Connect the other end to the Ethernet port on the 2 Axis Motion Controller board.

7. Attach preferred sensor to the bottom of the RobotEye unit, see Figure 3.2 for mounting site and hole placement.

2.5 Safety

The RobotEye NAKED REN25 System is a high speed device. All instructions regarding safe operation of this system should be strictly followed.

Protection Class 3. The device operates with a separated extra low voltage (SELV) of 24 Volts DC.

The device may only be operated as intended and in faultless condition. Safety and warning signs must not be removed.

The NAKED REN25 System by itself is in accordance with Ingress Protection 0 (IP00). The device is **NOT** protected against dust and jet water.

All instructions regarding safe operation of this system should be strictly followed.

- The user is responsible for the safe operation and maintenance of this system at all times.

- Installers of the sensor are responsible for ensuring their safe use in accordance with all applicable regulations in the state, country or territory of use.

- The device's rotating head is not designed to accommodate for any alterations or additions. High speed projectiles may result.

- The device must be securely mounted during operation to prevent unstable motions or vibrations.

- Ensure that the Robot Eye head will not contact anything while operating in its full range of movement.

- **Do not try to hold or touch the Robot Eye head while operating.**

- **Do not attempt to disassemble the sensor.** Improper disassembly will destroy the optical alignment of the sensor and necessitate factory repairs. Tampering with any enclosure will void warranty coverage.

- The manufacturer will not accept liability for any resulting damages caused by the non-observance of this manual or any unauthorised modification to the system.

2.6 Operation

Special precautions for when operating the device.

- The REN25 is NOT intended for use by children or inexperienced personnel.

- **DO NOT** attempt to touch or impede the Robot Eye head during operation.

- Avoid strands of fabric or long exposed hair from being in the vicinity of the Robot Eye head during operation. Significant injury and/or mechanical damage may result.

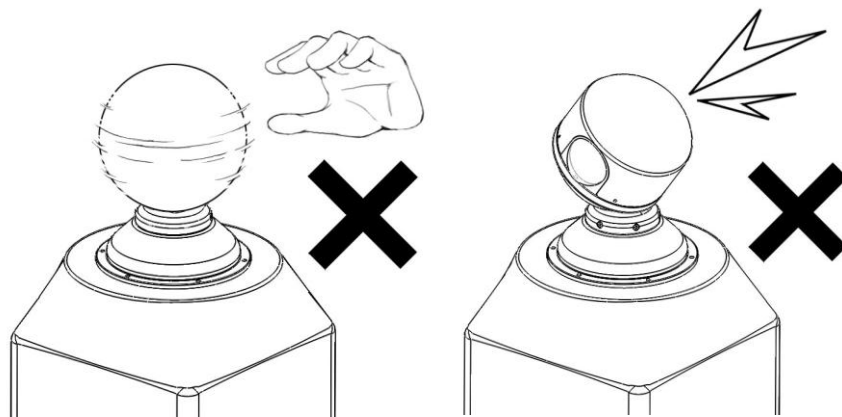- The device must be protected from shock and impact.

Figure 2.4 Do not touch RE Head while in operation. Avoid impacts.

General considerations for when operating the device.

- The REN25 should not be put into operation when the aperture is fogged or dirty. The aperture should not be touched with bare hands. Refer to **Section 2.7** for cleaning the device.

- The device must be protected against overheating. Persistent overheating of the device will lead to reduced lifetime of the camera.

- Additional protection is recommended when operating the device under extreme or adverse environmental conditions. Rapid changes in temperature may lead to humidity entering the device.

2.7 Cleaning and Maintenance

⚡ **CAUTION** – Power must be disconnected from the REN25 system before any cleaning or maintenance is carried out.

User performable cleaning and maintenance of the RobotEye NAKED REN25 System is limited to cleaning of the exterior housing and the aperture window. For ANY other maintenance or repair the unit should be returned to the factory. Unauthorised opening of the system enclosure will void warranty. Use the following guidelines for cleaning of the system enclosure and aperture window.

- It is **VERY** important not to abrade or scratch the system window (if present) during cleaning or at any other time as it has the potential to significantly degrade system performance.

- Use a soft non-abrasive cloth to clean the window, make sure there are no foreign abrasive particles on the window before performing cleaning, as this may damage the window.

- **DO NOT** use solvents. If a cloth alone is not sufficient, water or Isopropyl Alcohol may be used.

- The rest of the NAKED REN25 system housing can be cleaned with a soft damp cloth.

2.7.1 Replacement Parts

Replacement parts can be ordered directly through Ocular Robotics.

1) *RobotEye REN25 Head*

2) *RobotEye 2 Axis Motion Controller Board.*

3) *RobotEye Motor Power Amplifier Board.*

4) *Cable Harness.*

3 General Description

The RobotEye NAKED REN25 System is a two-axis high performance optical pointing system with unprecedented motion bandwidth. The REN25 System is ideally suited for use on ground vehicles, surface craft, aircraft and static installations.

The REN25's embedded RobotEye technology allows applications such as inertial stabilisation, object tracking, telepresence/teleoperation, environment mapping, rapid disparate point data acquisition and persistent surveillance to be easily achieved.

3.1 Electrical

The NAKED REN25 System requires a 24 Volt DC power supply that has a continuous current capacity of 10 amps. The output voltage of the 24 VDC power supply used with the REN25 System should not vary by more than ±15% from the nominal 24V under any circumstances otherwise damage to the REN25 System may result.

3.2 Optical

The NAKED REN25 System can be fitted with a variety of user specified optical components to maximise throughput.

3.3 Power

Power is supplied to the REN25 Unit via TE Connectivity Universal MATE-N-LOK connectors as shown in Figure 3.1. Both the 2 Axis Motion Controller board and Power Amplifier board need to be directly powered by the 24 VDC supply.
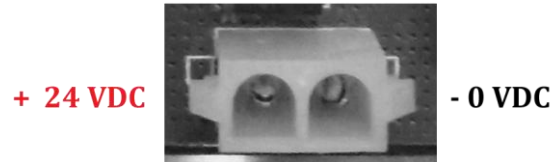

Figure 3.1 – Power connector on the controller and amplifier boards

3.4 Mechanical

The NAKED REN25 System has no environmental protection rating by itself however as the REN25 Head has a rating of IP65, it can adopt up to and including this rating when housed in an appropriate enclosure. The REN25 can operate in ambient temperatures of up to 70°C (The maximum operating temperature of installed cameras may however be lower than this) making it suitable for use in a wide range of industrial environments.

The bounding dimensions and positions of mounting holes for the REN25 Unit is shown in Figure 3.2.

[5.04in]
128.1mm

[3.25in]
82.6mm

[3.39in]
∅86mm

[2.70in]
68.5mm

NOTE: SENSOR MUST CLEAR
SHAFT PROTRUSION

[1.54in]
∅39mm

[0.18in]
4.6mm

[2.91in]
∅74mm

FLANGE HOLES
5 x ∅ M3 ⊤ 16[0.63]
ON ∅ 64 P.C.D.

MOUNTING HOLES
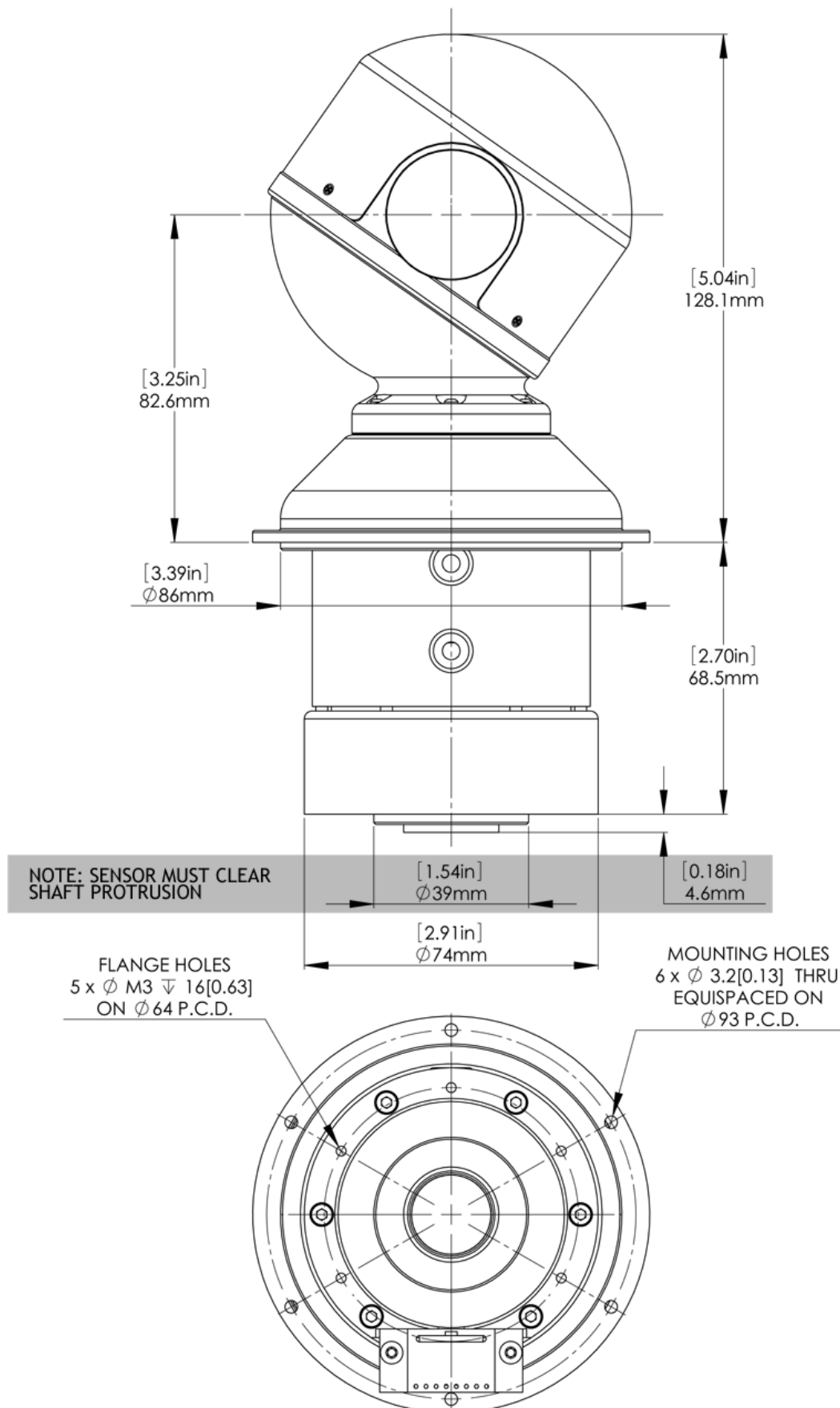6 x ∅ 3.2[0.13] THRU
EQUISPACED ON
∅ 93 P.C.D.

Figure 3.2 - REN25 Mechanical Dimensions

3.5 Ethernet

3.5.1 REN25 Controller Board

The NAKED REN25 Unit interfaces with a computer via a standard Ethernet cable. The REN25 Control supports a 100 Megabit connection.

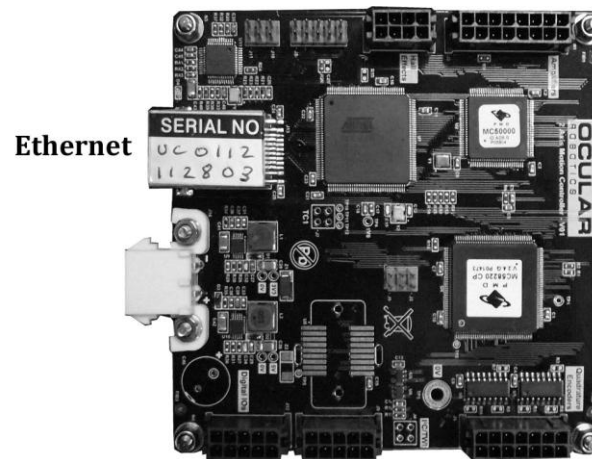The Ethernet connection is located on the black 2 Axis Motor Controller Board.

Figure 3.3 – RJ45 Ethernet Connection located under the Serial No. label.

3.5.2 Network Topology

It is recommended that the system be used on a private network to avoid large amounts of (unwanted) data potentially being sent to all computers on the network (see Figure 3.4). Multiple NAKED REN25 Units can be connected on a single network. However this should be done using a switch to avoid data collisions on the network (see Figure 3.5).

The REN25 is configured to allow any number of clients to receive data when in broadcast mode. The REN25 will only accept commands from the Primary Client however. This is to ensure that multiple clients cannot simultaneously send conflicting commands to the sensor. The Primary Client is determined by the REN25 in a very simple manner, it is the client that first sends data to the REN25 after it is powered up. For a more detailed explanation of the network behaviour of the REN25 System see the REN25 UDP Communications Specification available for download from the Ocular Robotics website.

In most situations use of a Cat5e Ethernet cable will be sufficient for operation of the NAKED REN25 Unit, however it is recommended that a Cat6 cable be used over long distances to avoid packet loss due to the large volume of data.

The REN25 System enclosure has an IP68/69K rated (when used with the mating cable plug) RJ45 connectors for use when environmental conditions require the use of extra protection. The mating cable plug is a Souriau UTS6JC18RJN and can be purchased as an Ethernet cable assembly from Ocular Robotics or through various suppliers of electronic connectors.
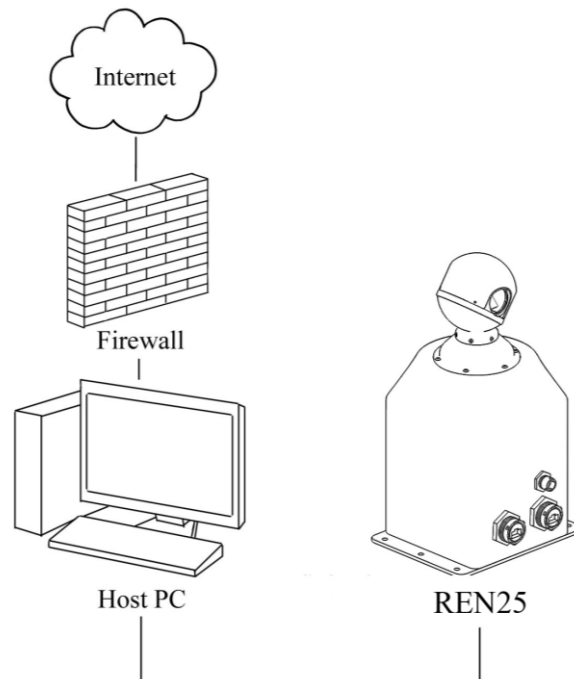

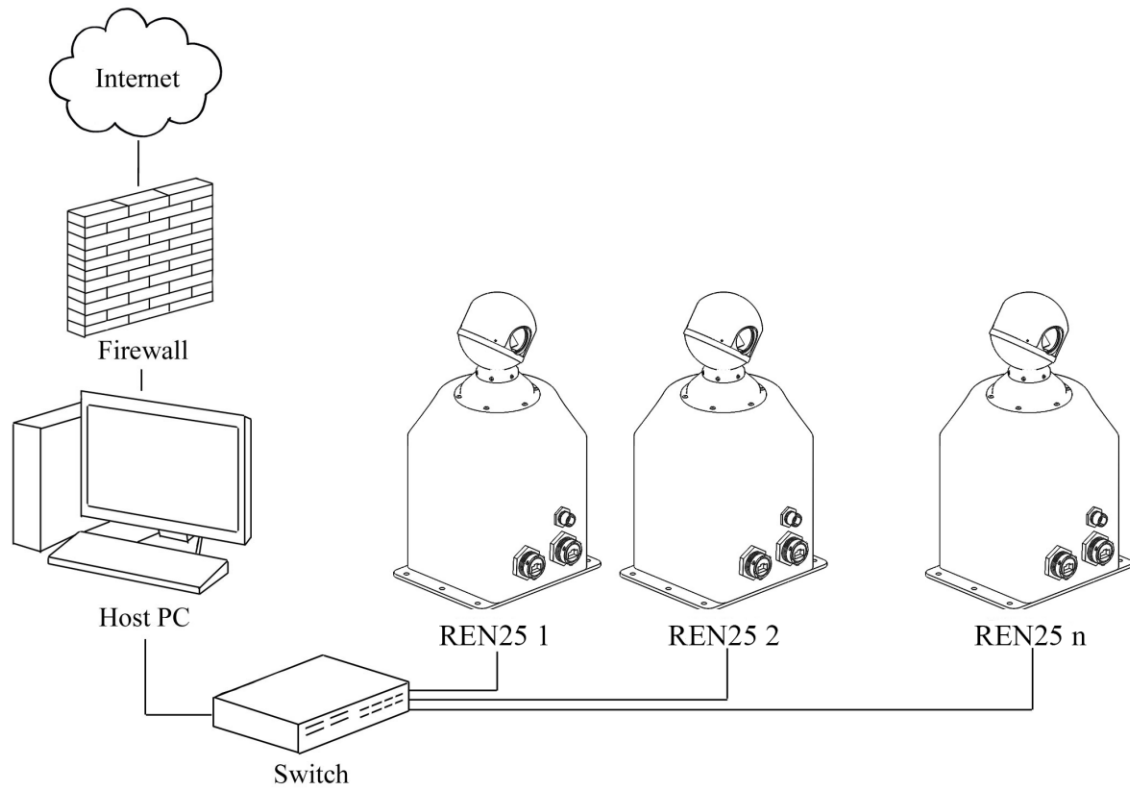**Figure 3.4 – Network Schematic for Single Host PC to Single REN25**

Figure 3.5 – Network Schematic for Single Host PC to Multiple REN25s

4 Specifications

Mechanical	
Maximum Aperture Rate	10,000°/s
Maximum Aperture Acceleration	100,000°/s^2
Azimuth Axis Resolution	0.010°
Elevation Axis Resolution	0.010°
Azimuth Range	360° Continuous
Elevation Range	70° (±35°)
Accuracy	0.05°
Weight	1.6 kg

Electrical	
Communication (minimum 100 Megabit)	Ethernet
Supply Voltage	24 VDC
Power Consumption — Typical (average)	<1.5 A
— Maximum (peak)	10.0 A

Optical	
Clear Aperture	22mm
Mirror Options	Yes
Customizable Optical Path Elements	Yes

Software	
RobotEye Class Library Support	Windows/Linux
Network Interface Protocol	

Environmental	
Operating Temperature Range	-20°C - +70°C
IP Class Rating*	Up to IP65

*IP Rating valid only when supplied in an enclosure, system window is factory fitted and both supplied power & optionally supplied weatherproof Ethernet cable connectors are fitted.