

RobotEye RELW60

High Speed Long Wave Infra-Red Thermal Imaging System User Manual

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Revision Table

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Table of Contents

Revision Tableii
Table of Contentsiii
1 Introduction
2 Basics
2.1 System Components
2.2 What You Need
2.3 Handling and Transportation
2.4 Initial Setup
2.4.1 RELW60 THERMAL System
2.5 Safety
2.6 Operation
2.7 Cleaning and Maintenance7
2.7.1 Replacement Parts
3 General Description
3.1 Electrical
3.2 Power
3.3 Mechanical10
3.4 Ethernet
3.5 Optical14
4 Specifications



1 Introduction



IMPORTANT READ CAREFULLY BEFORE USE KEEP FOR FUTURE REFERENCE

The RELW60 User Manual is provided as a guide to the connection, configuration and safe use of the Ocular Robotics RELW60 High Speed Long Wave Infra-Red Thermal Imaging System. For development of custom software applications for use with the RELW60 system see the RELW60 EyeLib Application Programming Interface (API) Reference Manual. For further information, contact Ocular Robotics.

Chapter 2 Basics, describes the initial setup and basic use of the RELW60 including information on cleaning, maintenance and safety. Chapter 3 General Description presents a system description in terms of the system's Mechanical and Electrical properties and its communication and power interfaces.





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



Figure 2-1 - RELW60 Packing List

The RobotEye RELW60 High Speed Long Wave Infra-Red Thermal Imaging System is supplied standard with the following components, each of which can be seen in Figure 2-1:

- 1. The RobotEye RELW60 THERMAL System
- 2. Composite Cable Connector
- 3. Installation & Documentation USB



2.2 What You Need

In order to operate the RELW60 Optical Pointing System, you will need:

- 1. Power supply A 24 volt DC power supply. A 10 Amp continuous current capacity with good surge capability is recommended.
- 2. A computer with a Windows or Linux operating system with an available Gigabit Ethernet port.
- 3. Power and Ethernet cable Terminated to supplied Composite Connector; see Section 2.4

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 – RELW60 Handling Zones



2.4 Initial Setup



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NOTE – The robot eye head must be handled with care during transport and installation. Large external loads exerted on the head may result in damage.

2.4.1 RELW60 THERMAL System

Follow the steps below to set the RELW60 unit up for use with 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 RELW60 Unit

- 1. The RELW60 mating connector is supplied with the system. Follow the manufacturer's instructions included with the composite connector in order to terminate the RELW60 end of the cable correctly. The remaining un-terminated end of the cable should be appropriately terminated to chosen power and network connectors. See Table 1 located in Section 3.2 for a diagram.
- 2. Connect the previously terminated end of cable to the corresponding plug on the RELW60 unit; fully engage the mating lock. Ensure the correct orientation, if forced in the incorrect orientation, damage to the system is likely to result.





2.5 Safety

The RobotEye RELW60 Optical Pointing System is 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 RELW60 THERMAL System in accordance with Ingress Protection 65 (IP65). The device is protected against dust and water jets.

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.
- The RELW60 is NOT intended for use by inexperienced personnel.
- 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.
- 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.
- The manufacturer will not accept liability for any resulting damages caused by the non-observance of this manual or any unauthorized modification to the system.



2.6 Operation

Special precautions for when operating the device.

- **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 RELW60's RobotEye head must be protected from direct impact.



Figure 2-4 – Do not touch RE Head while in operation. Avoid impacts.

General considerations for when operating the device.

• The aperture should not be touched with bare hands. Refer to **Section 2.7** for cleaning the device.



IEC 61000 EMC Warning - This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.



2.7 Cleaning and Maintenance

4

CAUTION – Power must be disconnected from the RELW60 system before any cleaning or maintenance is carried out.

User performable cleaning and maintenance of the RobotEye RELW60 THERMAL 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. Opening of the system enclosure will void warranty. Use the following guidelines for cleaning of the system enclosure and aperture window.

- The RELW60 window has a DLC coating for protection from abrasion, however care should still be taken when cleaning to prevent damage and impaired operation.
- Use a soft non-abrasive cloth or tissue 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 diluted Isopropyl Alcohol may be used.
- The rest of the RELW60 unit housing can be cleaned with a soft damp cloth.

2.7.1 Replacement Parts

Replacement parts can be ordered directly through Ocular Robotics.



7

3 General Description

The RobotEye RELW60 THERMAL System is a High Speed Long Wave Infra-Red Thermal Imaging System with unprecedented motion bandwidth. The RELW60 System is suited for use on ground vehicles, surface craft, aircraft and static installations.

The RELW60's embedded RobotEye technology allows applications such as high performance and multiple object tracking, extreme performance stabilization, advanced security and surveillance behaviors, nausea free telepresence/teleoperation and high resolution mapping/panorama capture.

3.1 Electrical

The RELW60 System requires a 24 Volt DC power supply. A continuous current capacity of 10 Amps with a good surge capacity is recommended.

The output voltage of the 24 VDC power supply used with the RELW60 System should not vary by more than ±15% from the nominal 24V under any circumstances otherwise damage to the RELW60 System may result.

3.2 Power

When terminating the power cable, it is essential that all four pins are used. 14 gauge wire is recommended as a minimum. Refer to the power input pin-out provided in Table 1 below.



Table 1 - RELW60 Connector Pin Diagram



During connection of the power supply cable to the corresponding plug on the RELW60, ensure the correct orientation by aligning the polarization keys on the panel connector and the plug. If forced in the incorrect orientation, damage to the system is likely to result.

A 5x20 mm 20A rated slow blow fuse is housed in the fuseholder to prevent potential damage to internal electrical components from power surges. Ensure replacement fuses meet these specifications.



Figure 3-1 – Fuseholder on the RELW60 Enclosure



3.3 Mechanical

The bounding dimensions and positions of mounting holes for the RELW60 are shown in Figure 3-2 and Figure 3-3.



Figure 3-2 RELW60 Mechanical Dimensions





Figure 3-3 RELW60 Mechanical Dimensions



3.4 Ethernet

The RELW60 System interfaces with a computer using a Gigabit Ethernet connection.

In most situations use of a Cat5e Ethernet cable will be sufficient for operation of the RELW60 system; however it is recommended that a Cat6 cable be used over long distances to avoid packet loss.



NOTE – The RELW60 requires two IP addresses, however the communication between the two is handled via internal switching.



Figure 3-4 - Network Schematic for Single Host PC to Single RELW60





Figure 3-5 – Network Schematic for Single Host PC to Multiple RELW60s



3.5 Optical

The RobotEye RELW60 is available with a range of FLIR TAU2 thermal camera core and lens combinations. Information about each of the available combinations is shown in Table 2 below.

Camera Focal Length	TAU 640 640 x 512 Pixel Pitch: 17μm	TAU 336 336 x 256 Pixel Pitch: 17μm	TAU 324 324 x 256 Pixel Pitch: 25µm
13mm	820 pixels NoD: 10mm FOV: 30° x 30° (H × V)	422 pixels Aperture Image: 97% diagonal Usable pixels: 85,689 (99%) MOD: 10mm FOV: 25* x 19* (H x V)	Aperture Image: 70% diagonal Usable pixels: 62,624 (76%) MOD: 10mm FOV: 30* x 26* (H x V)
19mm	820 pixels NOD: 55mm FOV: 27* x 26* (H x V)	422 pixels 422 pixels Aperture Image: 118% diagonal Usable pixels: 86,016 (100%) MOD: 55mm FOV: 17* x 13* (H x V)	Aperture Image: 85% diagonal Usable pixels: 78,547 (95%) MOD: 55mm FOV: 24* x 18* (H x V)
25mm	820 pixels Aperture Image: 71% diagonal Usable pixels: 253,089 (77%) MOD: 200mm FOV: 22.7* x 20* (H x V)	422 pixels Aperture Image: 127% diagonal Usable pixels: 86,016 (100%) MOD: 200mm FOV: 13* x 10* (H x V)	Aperture Image: 92% diagonal Usable pixels: 81,776 (99%) MOD: 200mm FOV: 18* x 14* (H x V)
35mm	820 pixels NoD: 500mm FOV: 18* x14* (H x V)	Aperture Image: 138% diagonal Usable pixels: 86,016 (100%) MOD: 500mm FOV: 9.3* x 7.1* (H x V)	Aperture Image: 99% diagonal Usable pixels: 82,944 (100%) MOD: 500mm FOV: 13* x 10* (H x V)
60mm	820 pixels Aperture Image: 73% diagonal Usable pixels: 263,281 (80%) MOD: 2200mm FOV: 9.7* x 8.3* (H x V) FOV: 9.7* x 8.3* (H x V)	422 pixels Aperture Image: 127% diagonal Usable pixels: 86,016 (100%) MOD: 2200mm FOV: 5.5* x 4.2* (H x V)	Aperture Image: 91% diagonal Usable pixels: 81,438 (98%) MOD: 2200mm FOV: 7.6* x 5.7* (H x V)
Frame Rates	deo - TAU 336, TAU 324 - 30/60Hz(NTSC), 25/50H: TAU 640 – 30/60Hz(NTSC), 25Hz(PAL)	z(PAL) Slow Video – 7.5Hz(NTSC), 8.3Hz (PAL)	mmunication Protocols GigE C-Link Analog/USB

Table 2 – Approximate Fields of Views for FLIR TAU2 Core



4 Specifications

Mechanical				
Maximum Aperture Slew Rate	5,400°/s*			
Maximum Aperture Acceleration	60,000°/s ²			
Azimuth Axis Resolution	0.0025°			
Elevation Axis Resolution	0.0025°			
Accuracy	≤0.01°			
Azimuth Range	360° Continuous			
Elevation Range	70° (±35°)			
Weight	7.8 kg			

Electrical		
Communication		GigE/C- Link/Analog+USB
Supply Voltage		24 VDC
Power Consumption	— Typical (average)	< 75 W
	— Maximum (transient**)	600 W

Electrical	
RobotEye Thermal C++ Development Library	Windows/Linux

Electrical		
Operating Temperature Range	-20°C - +70°C	
IP Class Rating	IP65	
Note: IP Rating valid only when the Hybrid Plug is fitted		
* At the maximum acceleration rate of 60,000°/s ² more than a full rotation is required to reach 5,400°/s aperture		
slew rate		
**High current transients typically less than 2ms		

