

iSeries Safety Guide

Important Regulatory and Safety Notices to User and Service Personnel

Before using this product and any associated equipment, refer to the "**Important Safety Instructions**" listed in this document to avoid personnel injury and to prevent product damage. Product may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings



Protective Earth:

This symbol identifies a Protective Earth (PE) terminal, which is provided for connection of the supply system's protective earth (green or green/yellow) conductor.



Warning Hazardous Moving Parts:

This symbol is intended to alert the user to the presence of hazardous mechanical moving parts that can cut and crush. User shall not remove cover and shall keep hands/objects clear at all times during operation to avoid serious injuries.



Important:

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.



Warning Hazardous Belt Drive:

This symbol is intended to alert the user to the presence of hazardous Belt Drive motion that can nip, snag, crush. User shall not remove cover and shall keep hands/objects clear at all times during operation to avoid serious injuries.

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**Warning:**

The symbol with the word "Warning" within the equipment manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**Warning Arc Flash**

Hazard: This symbol is intended to alert the user that the equipment may produce a dangerous arc flash, releasing extreme heat, intense light, and pressure. Arc flash can cause severe burns, eye injury, hearing damage, or fatal shock if approached or serviced without proper PPE/safety measures.

**CAUTION:**

The symbol with the word "Caution" within the equipment manual indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**Warning Laser Hazard:**

This symbol is intended to alert the user to the presence of a hazardous laser beam that can cause skin and vision damage. User shall not remove Laser cover and shall not look directly at the laser component during operation to avoid serious injuries.

**Warning Hazardous Voltages:**

This symbol is intended to alert the user to the presence of uninsulated "Dangerous voltage" within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.

**Warning Burn Hazard:**

This symbol is intended to alert the user to the presence of a risk of skin or tissue burns caused by hot surfaces, heated components, or high-temperature equipment. Contact with the surface can cause thermal injury, even without visible flame.









**ESD Susceptibility:**

This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.












Important Safety Instructions


A.Robotics Safety Measures

Impact/Collision Risk management & reduction

-  **Warning:** This equipment must be operated or maintained by trained personnel only. This equipment must be operated in a controlled and restricted-access environment only. This system must only be used by operators with extensive prior knowledge of remote-controlled systems, they must have undergone special training approved by Ross Video Ltd.
-  **Warning:** Failure to control the area around the system during operation can result in serious injury or equipment damage. The operator must keep all personnel, objects, and structures clear of the system's operating area.
-  **Warning:** The operator must have carried out an appropriate risk assessment before using the system and be satisfied that all operations can be carried out safely. Refer and complete the pre-flight checklist before every system operation.
-  **Caution:** It is recommended to get the final installation inspected by a structural engineer to make sure the building can support the system weight.
-  **Caution:** Loose payloads may slip, causing equipment damage and injury. Periodically check all bolts that fasten the payload, to ensure that they are tightened to specified torque. If the payload is loose or slips, ensure that it is properly balanced and fastened before operating the system.
-  **Caution:** Risk of impact due to freewheeling Gimbal. Keep a safe distance and control of the Gimbal during payload setup.
-  **Warning:** Failure to lock the winch transport case wheels can allow unintended movement, which may lead to serious injury or fatal crushing. Always engage all wheel brakes to prevent any shifting or rolling of the winch.
-  **Warning:** Always ensure the winch is fully stabilized and secured with the specified counterweights before energizing, operating, or performing any service work. Never stand in the potential movement path of an unsecured winch. A sudden shift of the equipment can cause serious injury.
 - Verify counterweights are installed and locked in the correct position.
 - Confirm the winch base is stable, level, and unable to move under load.

Additional Robot Safety Notices

1.  **Caution:** Serious injuries can result from people tripping over equipment, such as cables. Methods of reducing such risks include, but are not limited to, the following:
 - › Inspect and remove restraints on cables regularly so they do not present a tripping hazard.
 - › Erecting signs at studio entrances to remind people about tripping hazards and other studio hazards.
 - › Training personnel in safety procedures and proper cable management techniques.
 - › Showing personnel and guests the locations of cables equipment and explaining that robotic cameras and cables attached to them may move at any time.
 - › Escorting guests at all times while in the studio.
 - › Ensuring adequate lighting when working in the studio.
 - › Marking safe paths and/or restricted areas, to keep people away from moving robots and potential tripping hazards.
2.  **Important:** Ensure that proper cable management techniques are always used:
 - › Bundle and wrap cables neatly and provide adequate strain relief and slack where necessary.
 - › Test your cable installation by slowly moving the robotic units through their entire range of motion and observing the cables, to ensure that they do not become taut, or snag on anything.
 - › Avoid running cables along floors in places where they may present a tripping hazard.
 - › Clearly mark areas where cables may present a tripping hazard and keep personnel away from such areas.
 - › Inspect cables periodically for damage, and to ensure that proper cable management is maintained.
3.   **Important:** Safety Shoes must be worn while working on or near the system (Installation, Setup, Troubleshooting, Servicing, Operation)
4.  **Important:** Only qualified and trained servicing personnel are allowed to remove covers and access internal system areas.
5.  **Warning:** The E Stop button must be engaged whenever the system is powered ON and any setup, troubleshooting, servicing, or other tasks are being performed within the specified safety distance.
6.  **Warning:** System must be powered OFF and disconnected from the main power source when servicing motors, belts, high voltage circuits and installing or adjusting the payload.
7.   **Warning:** Keep all personnel away from the system when operational.
8.  **Important:** When servicing or moving equipment, always observe safe handling practices. Get help to move heavy items. Use safe lifting techniques. Follow all safety rules of your workplace.
9.  **Important:** Loose or overtightened bolts may cause equipment damage. When servicing, tighten bolts to specified torque.

10.  **Warning:** DO NOT perform maintenance or adjustments without proper precautions, training and without following proper procedures. winches store potential energy. Uncontrolled release can cause serious injury or damage.

B. Cable Camera Systems Electrical Safety Measures


1.  **DANGER: Electric shock and arc flash Hazard**
Disregarding the following instructions will result in death, physical injury or considerable damage to property!

Never open the winch Electrical Cabinet Door while the main power cord is still connected. Flip the Emergency Switch/Main Power Switch to "OFF" position, then unplug the main power cord to fully de-energize the equipment (WARNING: Hazardous voltages are present inside the cabinet when the Emergency Switch/Main Power Switch is on "OFF" position, and the cord remains connected to the main power).

- › Wait at least 10 MINUTES after de-energizing the equipment before opening door to avoid electrical shock from capacitive circuits.
- › Always inspect that internal wiring is properly connected after relocation and installation of this equipment.
- › Only qualified and trained personnel from Spidercam is authorized to perform installation and maintenance on this equipment.

To prevent unauthorized access to energized electrical components, reduce the risk of electric shock, arc flash, or accidental operation, and ensure system integrity:

- › Only authorized and trained personnel may unlock or access the winch electrical cabinet.
 - › The winch electrical cabinet key shall be stored in a controlled location accessible only to authorized personnel.
 - › Before performing any maintenance, troubleshooting, or inspection inside the cabinet, the system must be **disconnected from the main supply** and verified de-energized following the established Lockout/Tagout (LOTO) procedure.
 - › After completing work, the cabinet must be **closed and locked** prior to reconnecting power.
2. The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground.
3. Certain parts of this equipment still present a safety hazard with the power switch in the "OFF" position. To avoid electrical shock, disconnect all A/C power cords from the main supply source before servicing.
4. This product contains safety critical parts, which, if incorrectly replaced, may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area are not intended to be customer-serviced and should be returned to the factory for repair.

5.  **DANGER: HIGH LEAKAGE CURRENT**
This equipment contains electrical components that may generate high leakage current during operation. All winches must be connected to a power source protected by a **Ground Fault Circuit Interrupter (GFCI)** or **Residual Current Device (RCD)**.
- › The RCD must be Type B.
 - › **The maximum permitted residual operating current is 30 mA.**

- › Operating the equipment without the appropriate protective device may result in severe electric shock, serious injury, or death.
Before use, verify that all grounding conductors are properly connected and that leakage current protection devices are tested and functioning according to applicable electrical safety standards.

6.  CAUTION: Electrical Cabinet Inspection Required


Before operating or servicing this system, inspect all winch electrical cabinets to ensure it is free of hazards. Failure to do so may result in equipment damage, electrical faults, or personal injury.

- › Verify that all wiring connections are secure and free of looseness. Loose connections can cause overheating, arcing, or system malfunction.
- › Check for the presence of debris, dust, moisture, or foreign objects that could obstruct ventilation or create electrical hazards.
- › Inspect for insects or small animals that may have entered the cabinet, as they can cause short circuits or damage to components.
- › If any issues are identified, correct the condition before resuming operation.

C. Cable Camera Systems Emergency Stop Safety Measures

1. All E-Stop functionalities, components and safety functions must be tested before operating the system:

- Joystick E-Stop Button operation
- E-Stop Buttons operation on all winches
- Limit Switches operation on all winches
- Mechanical Overload Protection: functionality test by overloading each winch
- Communication loss protection: functionality test by disconnecting communications paths between the base station and winches.
- Brakes operation: functionality test by comparing the brake status on the user interface against its intended position (Closed and Open)
- Structural Pulley collision avoidance: functionality test by driving the dolly within 2m of a pulley
- Belt/Motor/Encoder failure detection: functionality test by disconnecting the belt.

2.  **Important:** Immediate E Stop Activation Is Required Under Any of the Following Conditions:

- › **Unexpected Dolly Height Changes**
 - Sudden or uncontrolled dolly height drop
 - Any downward movement not commanded by the operator
 - Dolly position instability or oscillation suggesting loss of control or winch malfunction
- › **Rope Slack or Cable Irregularities**
 - Visible slack on any rope
 - Rope suddenly losing tension or not responding to load changes
 - Asymmetrical tension developing between corners
 - Rope behavior indicating potential mechanical failure (fraying, abnormal sounds, vibration)
- › **Winch or System Malfunctions**



- a. Irregular or delayed winch response to commands
- b. Unexpected acceleration or deceleration
- c. Brake malfunction or uncommanded brake release
- d. Erratic sensor readings for height, tension, or position
- e. Loss of communication between winch controllers and flight control system

› **Power or Electrical Hazards**

- a. Electrical cabinet faults, smoke, sparks, or abnormal odor
- b. Power fluctuation causing intermittent system behavior
- c. Control hardware freezing, rebooting, or showing critical errors

› **Environmental or External Interference**

- a. Sudden wind gusts or weather conditions affecting system stability
- b. Foreign object intrusion (e.g., drones, equipment, cranes, stage elements) into the flight path
- c. Unexpected personnel entering restricted operational zones

› **Flight Operator Incapacity**


- a. The flight operator becomes incapacitated (medical event, fainting, loss of consciousness, seizure, etc.)
- b. The flight operator becomes unresponsive to callouts or fails to acknowledge critical communication
- c. The operator drops controls or demonstrates impaired control input behavior
- d. Any situation arises in which the operator cannot safely continue system operation

› **Loss of Situational Awareness or Safety Control**

- a. Operator confusion, incorrect or contradictory control inputs
- b. Miscommunication between flight operator, technician, or safety personnel
- c. Ambiguous or lost visual contact with the dolly
- d. Any team member calling for "STOP", "HOLD", "E STOP", or another predetermined emergency phrase

› **Potential Collision or Impact Risk**

- a. Dolly approaching an obstacle, or structure unintentionally
- b. Movement toward people, equipment, lighting fixtures, or overhead elements
- c. Rope or dolly trajectory not matching commanded or expected behavior

3.  **Warning:** Once a manual or automatic E-Stop was activated, the following requirements must be followed:

- › All motion must remain halted until the area is confirmed safe.
- › Crew must be notified immediately.
- › System reset is prohibited until a qualified technician inspects:
 - a. Rope integrity:
 - Slack on the cables must be tensioned
 - Cable overlap in the winch drum to be fixed
 - Visual inspection for any cable damage
 - b. Winch mechanics and braking
 - c. Dolly hardware



- d. Control system and communication links
- › E Stop may only be reset following formal inspection and authorization procedures.

D. Cable Camera Systems Emergency Stop Safety Measures


1.  **DANGER: Hot Surface and Burn Hazard**

Disregarding the following instructions will result in physical injury!

The external and internal surface temperature of this equipment can reach $\geq 50^{\circ}\text{C}$ during operation and more than 120°C on the braking resistor.

There is an acute risk of sustaining burns to parts of the body and limbs. Take the following measures for safety:

- Wait 15 MINUTES after de-energizing the equipment before touching external and/or internal surfaces.
- Check the surface temperature with a laser/IR thermometer to make sure it reached a safe level below 50°C .

2.  **Warning:** Do not operate the system in Automatic or Preset mode, if any winch is experiencing a recurring temporary overload condition **lasting less than 10 seconds**. This could cause the braking resistor to overheat and damage the system.

E. Laser Safety Measures

Optical Fibers safety

1. Before using this product and any associated equipment, refer to the sections below so as to avoid personnel injury and to prevent product damage. For further safety information when using fiber products, consult the following publications:
 - › IEC 60825-1:2014, Safety of Laser Products - Part 2: Safety of Optical Fiber Communication Systems (OFCS) (for use outside of the U.S.A.)
 - › ANSI Z136.2, Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources (for use in the U.S.A.)

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements.

 **Notice:** CLASS 1 LASER PRODUCT IEC 60825-1:2014

 **Caution:** INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.

2. During normal operation of this product, observe the following safety measures:
 - › Do not stare at, or into, broken, or damaged fibers.
 - › Do not stare at, or into, optical connectors.
 - › Only properly trained and authorized personnel shall be permitted to perform laser/fiber optic operations.
 - › Ensure that appropriate labels are displayed in plain view and in close proximity to the optical port on the protective housing/access panel of the terminal equipment.



Notice: Before operating or servicing this product, all personnel should be familiar with laser safety and fiber handling practices.

3. During maintenance and servicing of this product, only properly trained and authorized personnel shall be allowed to use optical test or diagnostic equipment.



Warning: Do not use optical equipment, such as a microscope or an eye loupe, to stare at the energized fiber end. Doing so may damage your eyes.

Laser product safety (LIDAR)

4. Before using this product and any associated equipment, refer to the sections below so as to avoid personnel injury and to prevent product damage. For further safety information when using laser products, consult the following publications:
 - › IEC 60825-1:2014, Safety of Laser Products - Part 1: Equipment classification and requirements (for use outside of the U.S.A.)
 - › ANSI Z136.1, Safe Use of Lasers (for use in the U.S.A.)


Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements.



Notice: CLASS 1 LASER PRODUCT IEC 60825-1:2014



Caution: INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.

5.  **Warning:** Do not open or disassemble the housing/cover of the LIDAR sensor. Opening the housing will not switch off the laser can lead to dangerous exposure to radiation.
6. During normal operation of this product, read the following safety measures:
 - › Do not stare at, or into, broken, or damaged Lidar sensor cover.
 - › Do not remove the Lidar sensor cover.
 - › Only properly trained and authorized personnel shall be permitted to operate laser products.
 - › Ensure that appropriate labels are displayed in plain view and in close proximity to the optical port on the protective housing/access panel of the terminal equipment.



Notice: Before operating or servicing this product, all personnel should be familiar with laser safety.

7. Lidar sensor is not intended to be customer-serviced and should be returned to the factory for replacement.



Warning: Do not use optical equipment, such as a microscope or an eye loupe, to stare at the energized fiber end. Doing so may damage your eyes.

F. Battery Pack Safety Measures

Carefully read the following safety instructions and warnings before using, charging or disposing of the battery packs.

Warning: Do not use optical equipment, such as a microscope or an eye loupe, to stare at the energized fiber end. Doing so may damage your eyes.

Batteries Handling and Storage


1. Risk of explosion if battery is replaced with a battery of an incorrect type. Refer to the product Technical Manual for more details on the required battery type.
2. Do not short-circuit, disassemble, deform or heat batteries.
3. Never attempt to charge any battery that is frozen, leaking, deformed, or visibly damaged in any way as it can lead to fire, explosion or serious injury.
4. Do not solder directly onto batteries.
5. Do not leave the battery in the charger once it is fully charged.
6. Store in a cool location. Keep batteries away from direct sunlight, high temperature, and high humidity.
7. Immediately discontinue use of the battery if, while using, charging, or storing the battery, the battery emits an unusual smell, feels hot, changes color, changes shape, or appears abnormal in any other way.
8. Keep batteries out of reach of small children. Should a child swallow a battery, consult a physician immediately.







Batteries Handling and Storage

When discarding batteries, insulate the + and - terminals of batteries with insulating/ masking tape.

1. Do not place multiple batteries in the same plastic bag.
2. Do not incinerate or dispose of batteries in fire.
3. Do not place used batteries in the household waste. Dispose of used batteries in accordance with the applicable regulations and legal requirements.
4. Batteries that have been disposed of incorrectly may short circuit, causing them to become hot, burst or ignite.

G. General Safety instructions

1.  **Warning:** Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings.
Install in accordance with manufacturer's instructions.
8. Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.

13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. Do not expose this apparatus to dripping or splashing, and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
 **Warning:** Indoor Use: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
15. To completely disconnect the base station from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
16. The mains plug of the power supply cord shall remain readily operable.
17.  **Warning:** This equipment is not suitable for use in locations where children are likely to be present.
18.  **Warning:** This apparatus, when equipped with multiple power supplies, can generate high leakage currents. To reduce the risk of electric shock, ensure that each individual supply cord is connected to its own separate branch circuit with an earth connection.
19.  **Warning:** These service instructions are for use by qualified service personnel only. To reduce the risk of injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.
20. Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages and moving parts. For continued safety, replace all barriers after servicing.
21. To reduce the risk of fire, replacement fuses must be the same type and rating.
22. Use only power cords specified/rated for this product and certified for the country of use.
23. The safe operation of this equipment requires that the user heed and adhere to all installation and servicing instructions contained within the equipment's Setup Manuals.
24.  **Warning:** This product includes "Ethernet Ports" which allow this product to be connected to local area networks (LAN). Only connect to networks that remain inside the building. Do not connect to networks that go outside the building.
25. For use at an altitude of 2000m or lower.
26. For use in non-tropical locations.
27.  **Caution:** Do not make mechanical or electrical modifications to the equipment or add metallic items, such as metallic foil labels, to the printed circuit boards. Modifications can impair regulatory compliance, or performance and may void your warranty.

H.EMC Notices

Europe


This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

General Handling Guidelines

- Careful handling, using proper ESD precautions, must be observed.

A Word About Static Discharge

Throughout the many procedures in this manual, please observe all static discharge precautions.

 **Caution:** void handling circuit boards in high static environments such as carpeted areas, and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame, and exercise proper grounding precautions when working on circuit boards.

Exercise proper grounding precautions when working on circuit boards.

I.Environmental Information

Waste Electrical and Electronic Equipment Directive (WEEE Directive)

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health-conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

For more information about sustainability at Ross Video, visit our website at:

<https://www.rossvideo.com/company/sustainability/>

Use of Hazardous Substances in Electrical and Electronic Products (China RoHS)

Ross Video Limited has reviewed all components and processes for compliance to:

- "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products" also known as China RoHS.
- The "Environmentally Friendly Use Period" (EFUP) and Hazardous Substance Tables have been established for all products. We are currently updating all of our Product Manuals.
- The Hazardous substances tables are available on our website at:
<http://www.rossvideo.com/about-ross/company-profile/green-practices/china-rohs.html>

电器电子产品中有害物质的使用

Ross Video Limited 按照以下的标准对所有组件 和流程进行了审查：

" 电器电子产品有害物质限制使用管理办法 " 也 被称为中国 RoHS 。

所有产品都具有 " 环保使用期限 " (EFUP) 和有害物质表。目前，我们正在更新我们所有的产品手册有害物质表在我们的网站：

<http://www.rossvideo.com/about-ross/company-profile/green-practices/china-rohs.html>