Operators Manual

TYPHOON

AUTOMATIC ENDOSCOPE REPROCESSOR

stevi.

Operators Manual

Automatic Endoscope Reprocessor

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Regulatory Information

This medical device complies with applicable international standards and regulatory requirements, including but not limited to:
ISO 13485 – Medical Devices: QMS
IEC 60601 – Medical Electrical Equipment
FDA 21 CFR Part 820 – Quality System Regulation
EU MDR (Regulation (EU) 2017/745), where applicable

Refer to regional labeling for specific approvals and certifications.

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FOR VETERINARY USE ONLY

Technical Support

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Designed, manufactured, and supported by clinicians and engineers who understand that reliability is not optional—and neither is trust.

Every system we build reflects decades of experience in veterinary medicine, a commitment to continuous improvement, and a belief that great technology should work as hard as the professionals who rely on it.

Symbols and Conventions

Symbol	Description
	Caution
	Caution Electric Shock
CE	The CE Mark On This Video Processor Indicates It Has Been Tested To And Conforms With The Provisions Noted Within The 93/42/EEC MDD.
	Caution For Use Of Corrosive Chemicals
	Consult Owners Manual For Instructions on Use
	Date of Manufacture
	Manufacturer
	Fabrication Origin Country
EC REP	European Representative
SN	Serial Number
	Wear Hand and Clothing PPE
	Wear Eye Protection PPE
	Keep Out Of Direct Sunlight

WARNING!

This device must only be operated by trained and qualified veterinary personnel. Improper operation by untrained personnel may result in incomplete disinfection, exposure to hazardous chemicals, transmission of infectious disease between patients, personal injury, or equipment damage.

Qualified operators include licensed veterinarians, credentialed veterinary technicians, veterinary assistants who have received formal training in endoscope reprocessing, and authorized biomedical service personnel.

Operators must demonstrate knowledge and competency in veterinary infection control practices, proper handling and preparation of flexible endoscopes, safe handling of high-level disinfectants and cleaning chemicals, and the basic operation of medical equipment prior to using this device.

Training must be completed and documented in accordance with the veterinary facility's infection control and equipment training protocols before independent operation of the system is permitted.

This device must not be operated by untrained personnel.

Failure to comply with these requirements may compromise patient safety, operator safety, and the effectiveness of the disinfection process.

WARNING!

Flexible endoscopes used in veterinary medicine are reusable semi-critical medical devices that come into direct contact with mucous membranes, bodily fluids, and biological material during examination and treatment of canine, feline, and equine patients. These materials may include saliva, respiratory secretions, gastric contents, intestinal contents, blood, urine, and other organic debris capable of harboring infectious microorganisms.

Flexible veterinary endoscopes contain narrow internal channels (lumens), including biopsy channels, air/water channels, suction channels, and auxiliary lumens. These internal pathways are particularly susceptible to retention of organic material, especially following procedures involving the gastrointestinal tract, respiratory tract, or upper airway. Residual organic material within these lumens may support survival and proliferation of microorganisms.

If not properly cleaned and disinfected, microorganisms may remain within the internal lumens and form biofilm on internal surfaces. Biofilm is a structured microbial layer that adheres to channel walls and protects microorganisms from exposure to disinfectants. Once established, biofilm may significantly reduce the effectiveness of disinfection and may result in persistent contamination of the endoscope.

WARNING!

Veterinary patients undergoing endoscopy may carry infectious pathogens including, but not limited to, organisms associated with respiratory infection, gastrointestinal disease, urinary tract infection, opportunistic bacterial infection, and hospital-associated infection. These pathogens may survive within inadequately cleaned endoscope lumens and may be transmitted to subsequent patients if proper reprocessing procedures are not followed.

The Automatic Endoscope Reprocessor is designed to deliver controlled flushing, cleaning, and high-level disinfection of both external surfaces and internal lumens of compatible flexible endoscopes. However, the effectiveness of the automated reprocessing cycle depends on proper manual pre-cleaning, correct connection of all endoscope channels, appropriate selection and handling of disinfectants, and completion of the full automated cycle without interruption.

Failure to properly clean and disinfect endoscope lumens and external surfaces in accordance with this manual may result in retained biological contamination, biofilm formation, transmission of infectious disease between patients, exposure of veterinary personnel to infectious material, equipment damage, and failure to meet veterinary infection control standards.

WARNING!

Do not use any endoscope on a patient unless the complete reprocessing cycle has been successfully completed and verified. Any endoscope that has not completed a full and uninterrupted cleaning and disinfection cycle must be considered contaminated and must be reprocessed prior to use.

WARNING!

For Veterinary Use Only – Not FDA Approved

System Is Not Intended For Use On Human Instruments.

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Disclaimer

The information contained in this manual is provided for instructional and reference purposes only. It does not replace professional medical training, clinical judgment, or institutional protocols.

STEVi, it's parent and it's distributors assume no responsibility for improper use of this equipment or failure to follow the instructions and safety guidance contained in this manual.

Product specifications, designs, and features are subject to change without notice as part of ongoing product improvement.

Documentation of addendums or additions to this manual will be made available by your local representative.

This manual covers components and features for these Typhoon products:

TYPHOON UNO

TYPHOON DUO

Unless otherwise listed in a factory or distributor provided addendum, the information contained within only applies to the models shown. Use of this manual for any other device may result in damage to the machine or instrument.

Chapter 1 — Introduction

1.1 Purpose of This Manual

The Typhoon AER is an automated endoscope reprocessor designed to provide safe, efficient, and reliable cleaning and high-level disinfection of flexible veterinary endoscopes. This system is engineered specifically for use in veterinary hospitals and specialty clinics where flexible endoscopes are routinely used in canine, feline, equine, and other animal patients. The Typhoon AER automates the critical steps required to properly reprocess endoscopes, helping to reduce the risk of cross-contamination, protect patient safety, and improve clinical workflow efficiency.

Flexible endoscopes are precision medical instruments that come into direct contact with mucous membranes, bodily fluids, and microorganisms during diagnostic and therapeutic procedures. Proper reprocessing is required after each use to remove organic material and eliminate infectious organisms. The Typhoon AER performs this function using a controlled, automated cycle that ensures consistent exposure to cleaning agents, disinfectants, and filtered rinse water. This process helps achieve reliable high-level disinfection of both external surfaces and internal endoscope channels.

The Typhoon AER is designed in accordance with internationally recognized standards for automated endoscope reprocessing, including ISO 15883-4 requirements for washer-disinfectors. The system incorporates microprocessor-controlled automation that regulates fluid delivery, disinfectant exposure time, leak detection, rinsing, and drying. This automated process reduces operator variability and ensures repeatable performance when used according to this manual.

The reprocessing cycle consists of a programmed sequence that includes leak detection, pre-washing, enzymatic cleaning, high-level disinfection, rinsing with filtered water, alcohol flushing, and forced air drying. Each step is designed to remove biological debris, eliminate microorganisms, and prepare the endoscope for safe reuse or storage. The automated circulation of cleaning and disinfecting solutions ensures that internal channels, which cannot be effectively disinfected manually, receive proper chemical exposure.

The system is compatible with commonly used veterinary high-level disinfectants, including glutaraldehyde, ortho-phthalaldehyde (OPA), and peracetic acid. These disinfectants are widely recognized for their effectiveness against bacteria, viruses, fungi, and other microorganisms commonly encountered in veterinary medicine. The Typhoon AER automatically delivers and circulates these disinfectants under controlled conditions, helping ensure proper disinfection while minimizing operator exposure to chemicals.

The Typhoon AER is capable of reprocessing flexible endoscopes used in gastrointestinal, respiratory, and urinary procedures. This includes gastroscopes, bronchoscopes, and other flexible endoscopes that contact mucous membranes during veterinary examinations and treatments. The system is designed to support the infection control and biosecurity requirements of modern veterinary practice.

The system incorporates multiple protective and monitoring features designed to ensure safe and effective operation. An integrated leak detection system verifies the integrity of the endoscope before and during reprocessing, helping prevent damage caused by fluid intrusion. The system continuously monitors disinfectant levels, water supply, and system performance, and alerts the operator if corrective action is required. Automated chemical dosing ensures accurate delivery of disinfectants and reduces manual handling of hazardous chemicals.

Internal fluid circulation pumps ensure thorough flushing of endoscope channels, helping remove debris and reduce the risk of microbial contamination and biofilm formation. The system also incorporates water filtration to ensure that rinse water does not introduce contaminants. A final drying phase uses alcohol flushing and filtered air to remove residual moisture, which helps prevent microbial survival and prepares the endoscope for storage or immediate reuse.

The Typhoon AER also includes an automated self-disinfection function that disinfects internal system components, including internal piping and fluid pathways. This feature helps ensure that the reprocessor itself does not become a source of contamination and maintains a high level of infection control within the clinical environment.

The automated reprocessing cycle typically requires approximately 15 to 20 minutes, depending on the selected disinfectant and cycle parameters. This rapid cycle time improves workflow efficiency and increases endoscope availability, allowing veterinary staff to safely and efficiently reprocess equipment between patients.

The system is equipped with an integrated operator interface that allows users to initiate cycles, monitor system status, and review reprocessing data. Process records may be printed or stored to provide documentation of disinfection cycles, supporting veterinary infection control protocols and regulatory compliance.

Proper operation, maintenance, and adherence to the procedures described in this manual are essential to ensure effective disinfection, operator safety, and long-term equipment reliability. pliance with infection control and workplace safety standards.

All operators must read and understand this manual before using the equipment.

1.2 Scope and Contents of This Manual

This manual contains detailed instructions and technical information covering all aspects of AER operation, including:

- System overview and device description
- Identification and function of major system components
- Proper preparation of endoscopes prior to reprocessing
- Step-by-step operating instructions
- Cleaning and disinfection cycle descriptions
- Routine maintenance procedures
- Consumable replacement instructions
- Installation requirements
- Safety precautions and hazard warnings
- Troubleshooting and corrective actions
- Regulatory and compliance information

The instructions provided in this manual are intended to ensure consistent, effective reprocessing of veterinary endoscopes and reduce the risk of cross-contamination.

1.2 Operator Responsibility

The Typhoon AER must be operated only by trained veterinary personnel who have read and understood this manual. Proper pre-cleaning of endoscopes, correct system operation, and routine maintenance are essential to ensure effective disinfection and safe operation.

Failure to follow the procedures described in this manual may result in ineffective disinfection, equipment damage, or increased risk of infection transmission.

When operated correctly, the Typhoon AER provides a reliable, efficient, and consistent method for reprocessing veterinary flexible endoscopes and supports the infection control standards required in modern veterinary practice.

Specification	Description
Device Name	Typhoon AER Veterinary Automatic Endoscope Reprocessor
Intended Use	Automated cleaning and high-level disinfection of flexible veterinary endoscopes
Water Supply Requirements	Purified water, pressure 0.2–0.5 MPa, minimum flow rate 20 L/min
Electrical Requirements	AC 220V ±10%, 50 Hz, 10 A, grounded connection required
External Dimensions (Standard Unit)	790 × 670 × 910 mm (L × W × H)
Weight (Standard Unit)	65 kg
Washing Chamber Dimensions	540 × 400 × 142 mm
Disinfectant Reservoir Capacity	6–12 liters
Enzyme Reservoir Capacity	1.5 liters
Alcohol Reservoir Capacity	1.5 liters
Leak Detection Method	Continuous digital leak detection with automatic alarm
Water Filtration	Integrated ultrafiltration system
Disinfection Time Range	Adjustable from 1 to 99 minutes
Typical Disinfection Time	5 minutes (OPA), 20 minutes (glutaraldehyde), depending on disinfectant manufacturer recommendations
Drying Method	Automated alcohol flush followed by forced air drying
Chemical Delivery	Automated dosing and discharge
Process Monitoring	Automated cycle tracking and operator alerts
Self-Disinfection	Automated internal system disinfection cycle
Expected Service Life	8 years (with proper maintenance)

Chapter 2 — Infection Control Principles in Veterinary Endoscopy

2.1 Purpose

Flexible endoscopes are reusable medical devices that are routinely exposed to biological material, including blood, mucus, gastrointestinal contents, respiratory secretions, and microorganisms, during veterinary diagnostic and therapeutic procedures. Because these devices are used on multiple patients, they present a recognized risk of transmitting infectious organisms if they are not properly cleaned and disinfected between uses. Effective endoscope reprocessing is essential to protect animal patients, veterinary personnel, and the clinical environment from preventable disease transmission.

The Typhoon AER is designed to provide automated cleaning and high-level disinfection of veterinary flexible endoscopes in a controlled and repeatable manner. When used according to the procedures described in this manual, the system supports veterinary hospital infection control protocols and reduces the risk of cross-contamination. Proper reprocessing is a required component of modern veterinary practice and is considered a standard of care for any facility performing endoscopic procedures.

2.2 Infection Risk Associated with Veterinary Endoscopy

Veterinary endoscopes routinely contact mucous membranes and internal body systems that naturally contain microorganisms. These include the gastrointestinal tract, respiratory tract, urinary tract, and upper airway passages. During endoscopic procedures, biological material can adhere to both the external surface and internal channels of the endoscope. These materials may contain infectious bacteria, viruses, fungi, and other pathogens capable of causing disease in other animal patients or, in some cases, veterinary personnel.

The internal structure of flexible endoscopes includes narrow lumens, valves, and internal channels that can retain organic debris and microorganisms. Without proper cleaning and disinfection, these internal surfaces may remain contaminated even when the exterior appears clean. If a contaminated endoscope is reused, infectious organisms may be transferred directly into another patient's body, increasing the risk of infection.

Improperly cleaned or disinfected endoscopes have been associated with transmission of infectious disease in both human and veterinary medical settings. For this reason, strict adherence to proper reprocessing procedures is required after every use.

2.3 Common Veterinary Pathogens of Concern

Endoscopes used in veterinary medicine may be exposed to a wide range of infectious organisms. Many of these pathogens are capable of surviving on contaminated surfaces for extended periods of time if not properly disinfected. These organisms may cause gastrointestinal, respiratory, urinary, or systemic infections depending on the patient and procedure.

Examples of common veterinary pathogens that may be transmitted through contaminated endoscopes include:

1. ***Salmonella spp.,*** commonly associated with gastrointestinal infection in canine and equine patients
2. ***Escherichia coli,*** which may cause gastrointestinal or urinary infections
3. ***Clostridium difficile,*** a cause of severe gastrointestinal disease
4. ***Pseudomonas aeruginosa,*** associated with respiratory and opportunistic infections
5. ***Streptococcus equi,*** the causative organism of strangles in horses
6. ***Equine herpesvirus***, a highly contagious respiratory pathogen
7. ***Feline herpesvirus and feline calicivirus,*** common respiratory pathogens in cats

These organisms may be present even when infection is not clinically obvious. As a result, all endoscopes must be treated as potentially contaminated after each use and reprocessed accordingly.

2.4 Mechanisms of Cross-Contamination

Cross-contamination occurs when infectious organisms are transferred from one patient, instrument, or surface to another. In veterinary endoscopy, this most commonly occurs when biological material remains inside or on the endoscope following use. Microorganisms can survive within retained debris, particularly inside internal channels where they may be protected from incomplete cleaning or disinfection.

Cross-contamination may result from several factors, including delayed pre-cleaning, inadequate removal of organic material, insufficient disinfectant exposure, improper chemical concentration, or incomplete drying of internal channels. Improper handling of the endoscope after disinfection may also result in recontamination.
Because flexible endoscopes are complex instruments with multiple internal pathways, effective reprocessing requires both manual pre-cleaning and automated disinfection to ensure all surfaces are properly treated.

2.5 Biofilm Formation and Endoscope Risk

Microorganisms that remain inside an endoscope may attach to internal surfaces and form biofilm. Biofilm is a protective structure that allows microorganisms to adhere firmly to surfaces and resist removal by disinfectants. Once biofilm develops, it can protect microorganisms from chemical exposure and increase the risk of persistent contamination.

Biofilm formation is more likely when endoscopes are not promptly cleaned after use or when disinfection procedures are incomplete. Preventing biofilm formation requires thorough removal of organic material and proper exposure to approved disinfectants.

The Typhoon AER reduces this risk by delivering disinfectant through all internal channels and performing controlled cleaning, rinsing, and drying cycles. These automated processes help ensure consistent and effective disinfection when the system is used according to the procedures described in this manual.

2.6 Role of Automated Reprocessing in Infection Prevention

Automated endoscope reprocessing improves infection control by providing a consistent and repeatable disinfection process. Manual cleaning alone cannot reliably ensure that disinfectant reaches all internal surfaces of the endoscope. Automated systems such as the Typhoon AER are designed to circulate cleaning solutions and disinfectants through internal channels under controlled conditions, ensuring proper contact time and coverage.

Automated reprocessing also reduces variability between operators and minimizes direct handling of contaminated instruments and chemicals. This helps protect veterinary staff from exposure to infectious materials and chemical disinfectants.

Automated disinfection is effective only when combined with proper pre-cleaning and correct operating procedures. Failure to perform proper pre-cleaning may reduce the effectiveness of the disinfection process.

2.7 Veterinary Hospital Biosecurity Responsibilities

Veterinary hospitals and clinical personnel are responsible for maintaining proper infection control practices to protect patients, staff, and the clinical environment. Proper endoscope reprocessing is an essential part of these responsibilities.
All endoscopes must be pre-cleaned immediately after use and reprocessed according to the procedures described in this manual. Approved disinfectants must be used at the correct concentration and exposure time. Operators must wear appropriate personal protective equipment when handling contaminated endoscopes and disinfectants.

Routine maintenance and proper operation of the Typhoon AER are necessary to ensure reliable performance. Any alarms, malfunctions, or abnormal conditions must be addressed promptly to maintain proper infection control.

Failure to follow proper procedures may result in patient infection, staff exposure to biological hazards, or equipment damage.

2.8 Summary

Flexible endoscopes are critical diagnostic tools in veterinary medicine but present a potential infection risk if not properly reprocessed. Microorganisms may survive inside endoscope channels and be transmitted between patients if proper cleaning and disinfection procedures are not followed.

The Typhoon AER provides an automated method for cleaning and high-level disinfection of veterinary endoscopes. When used according to this manual, the system helps reduce infection risk and supports veterinary hospital biosecurity.
Proper pre-cleaning, correct operation of the reprocessor, and adherence to infection control procedures are essential to ensure patient safety and effective infection prevention.

Chapter 3 — System Overview and Components

3.1 System Overview

The Typhoon AER is an automated endoscope reprocessor designed for the cleaning and high-level disinfection of flexible veterinary endoscopes. The system provides a controlled and repeatable process that reduces operator variability and supports veterinary infection control protocols. By automating the cleaning, disinfecting, rinsing, and drying phases of endoscope reprocessing, the Typhoon AER helps ensure consistent and effective removal of biological contaminants and microorganisms from both the external surfaces and internal channels of flexible endoscopes.

Flexible endoscopes used in veterinary medicine contain complex internal pathways that cannot be reliably disinfected using surface cleaning alone. The Typhoon AER addresses this risk by circulating cleaning agents, disinfectants, and filtered rinse water through all accessible endoscope channels. This ensures proper chemical contact with internal surfaces, which is essential for effective high-level disinfection.

The Typhoon AER is intended for use in veterinary hospitals, specialty clinics, and diagnostic facilities that perform endoscopic procedures on canine, feline, equine, and other veterinary patients. The system must be operated by trained veterinary personnel who are familiar with endoscope handling, infection control procedures, and the operating instructions provided in this manual.

fig. 1 Typhoon Uno v1, 2023

fig. 2 Typhoon Duo v1, 2023

fig. 3 Typhoon Uno v2, 2026

fig. 4 Typhoon Duo v2, 2026

3.2 Principle of Operation

The Typhoon AER performs automated reprocessing using a programmed sequence of cleaning, disinfecting, rinsing, and drying steps. These steps are designed to remove organic material, eliminate microorganisms, and prepare the endoscope for safe reuse.

The reprocessing cycle includes several controlled phases. First, the system verifies proper connection and performs leak detection to ensure the integrity of the endoscope. The system then circulates cleaning solutions and disinfectants through the endoscope channels and over external surfaces. Following disinfection, the system performs one or more rinse cycles using filtered water to remove residual disinfectant. Finally, the system introduces air and alcohol flushing to promote drying of internal channels and external surfaces.

Each phase of the cycle is automatically controlled by the system software to ensure proper timing, chemical delivery, and fluid circulation. This automated process helps ensure consistent and repeatable disinfection performance when used according to this manual.

3.3 Major System Components

The Typhoon AER consists of several integrated components that work together to perform automated endoscope reprocessing. These components include:

- Reprocessing chamber *(a)*
- Fluid circulation and chemical delivery system
- Leak detection system
- Filtration system *(b)*
- Air drying system
- Operator control interface *(c)*
- External housing and structural frame *(d)*
- Hands-free Lid Open Footpedal *(e)*

Each component performs a specific function that contributes to the overall effectiveness and safety of the reprocessing process.

3.4 Reprocessing Chamber

The reprocessing chamber is the enclosed compartment where the endoscope is placed during the automated reprocessing cycle. This chamber is designed to contain cleaning fluids, disinfectants, and rinse water while preventing external contamination and minimizing operator exposure to chemicals.

The chamber supports the endoscope during processing and allows fluids to circulate around external surfaces and through internal channels. The enclosed design helps maintain controlled conditions during disinfection and prevents the release of disinfectant vapors into the surrounding environment when properly operated.

The chamber is constructed of materials compatible with veterinary disinfectants and designed for repeated exposure to cleaning agents and disinfectants.

3.5 Fluid Circulation and Chemical Delivery System

The Typhoon AER contains an integrated fluid circulation system that delivers cleaning solutions, disinfectants, and rinse water throughout the reprocessing cycle. This system includes pumps, internal tubing, valves, and chemical reservoirs that control the movement and delivery of fluids.

The circulation system ensures that disinfectant solutions are delivered to all connected endoscope channels and external surfaces. Proper circulation is essential to ensure that disinfectants reach areas where microorganisms may be present. The system is designed to deliver fluids at controlled flow rates and exposure times to ensure effective disinfection.

Automated delivery of chemicals reduces the need for manual handling and helps ensure consistent chemical exposure during each cycle.

3.6 Leak Detection System

The Typhoon AER includes an integrated leak detection system that helps protect the endoscope from damage and ensures safe operation. This system verifies the integrity of the endoscope before and during the reprocessing cycle.

If a leak is detected, the system alerts the operator and may stop the cycle to prevent fluid from entering sensitive internal components of the endoscope. Leak detection is important because fluid intrusion into damaged endoscopes may cause permanent equipment damage and increase the risk of contamination.

Proper use of the leak detection system helps protect both the endoscope and the reprocessing system.

3.7 Filtration System

The filtration system helps ensure that water used during the reprocessing cycle meets appropriate cleanliness standards. Filters remove particulate matter and microorganisms from incoming water before it is used for rinsing.

Filtered rinse water helps prevent recontamination of the endoscope after disinfection. The filtration system is an important component of infection control because contaminated rinse water may introduce microorganisms onto disinfected surfaces. The Typhoon AER utilizes a 3-filter system that includes UV sterilization. Ensuring water is sterile with the power of the sun.

Routine maintenance and replacement of filters are required to ensure proper system performance. Filter replacement schedule is every 6-months from the date of implementation.

0.1µ, 0.02µ, 0.02µ, UV Filters

3.8 Air Drying System

The Typhoon AER includes an integrated air drying system that promotes removal of moisture from both external surfaces and internal endoscope channels. Drying is an important step in endoscope reprocessing because residual moisture may support microbial growth if the endoscope is stored before complete drying.

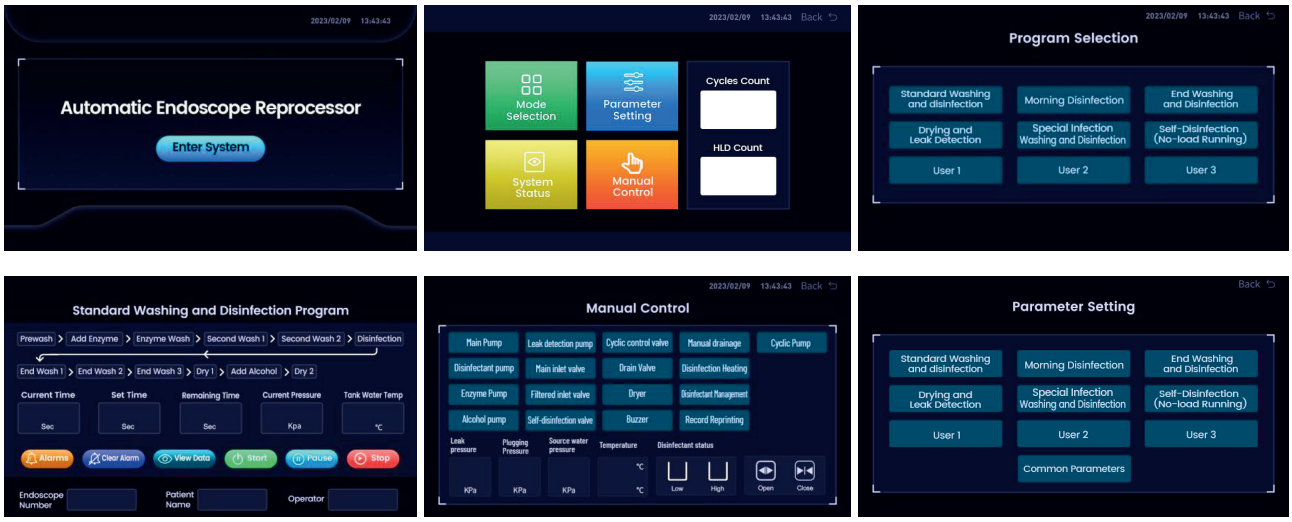
The system uses filtered air and alcohol flushing to assist in drying internal channels. This helps reduce the risk of microbial survival and prepares the endoscope for safe storage or immediate reuse. Proper drying is essential for maintaining endoscope hygiene and preventing contamination.

3.9 Operator Control Interface

The Typhoon AER is operated using an integrated touchscreen control interface. This interface allows the operator to select reprocessing cycles, monitor system status, and receive alerts or notifications.

The control interface provides visual feedback throughout the reprocessing cycle, allowing the operator to confirm proper system operation. System alerts notify the operator of conditions such as low disinfectant levels, connection issues, or system errors.

The control interface is designed to be intuitive and accessible for trained veterinary personnel.



3.10 External Housing and Structural Design

The external housing of the Typhoon AER provides structural support and protects internal components from damage. The housing is designed for use in veterinary clinical environments and is constructed of durable materials compatible with routine cleaning and disinfection.

The system is designed to operate safely in veterinary hospital environments when installed and used according to the requirements described in this manual. The enclosed design helps protect operators from chemical exposure and supports safe and reliable operation.

3.11 Summary

The Typhoon AER is an automated system designed to provide reliable cleaning and high-level disinfection of flexible veterinary endoscopes. The system integrates multiple components, including fluid circulation, leak detection, filtration, and drying systems, to ensure effective and repeatable reprocessing.

When properly operated and maintained, the Typhoon AER supports veterinary infection control protocols and helps reduce the risk of cross-contamination between patients. Proper use of the system in accordance with this manual is essential to ensure effective performance and patient safety.

Chapter 4 — Installation and Facility Requirements

4.1 General Installation Requirements

The Typhoon AER must be installed in a veterinary clinical environment that provides stable electrical power, adequate ventilation, appropriate water supply, and proper drainage. Correct installation is essential to ensure reliable operation, effective disinfection, and safe handling of disinfectants and biological contaminants. Installation should be performed by qualified personnel familiar with medical device installation requirements and veterinary facility infrastructure.

The system must be placed on a stable, level surface capable of supporting the full operating weight of the unit, including internal fluid loads. The installation area should allow sufficient space for safe operation, maintenance access, and unobstructed opening of the reprocessing chamber door. The system should be located within the designated endoscope reprocessing or treatment area in accordance with the facility's infection control workflow.

The Typhoon AER must not be installed in environments exposed to excessive moisture, extreme temperatures, direct sunlight, or corrosive chemical vapors. Proper environmental conditions help ensure safe operation and long-term reliability.

4.2 Electrical Requirements

The Typhoon AER must be connected to a properly installed electrical supply that meets all applicable local, state, and national electrical codes governing healthcare and veterinary medical facilities. Electrical installation must be performed by qualified personnel and must comply with recognized standards, including applicable provisions of the National Electrical Code (NEC), OSHA workplace safety requirements, and any additional municipal or facility-specific regulations governing medical equipment installation.

The unit requires a dedicated, grounded electrical circuit of the voltage and frequency specified in Chapter 1. The use of shared circuits, extension cords, or temporary wiring is strictly prohibited, as these may result in unstable system operation, increased electrical hazard risk, or equipment damage. A dedicated branch circuit helps ensure consistent system performance and protects against overload conditions caused by other electrical equipment.

The Typhoon AER must be connected to a Ground Fault Circuit Interrupter (GFCI)-protected receptacle. GFCI protection is required to reduce the risk of electrical shock in environments where water and conductive fluids are present. The GFCI device must be installed in accordance with applicable electrical codes and must be fully functional prior to system operation.

The wall outlet supplying the Typhoon AER must be installed at a height above the water supply and fluid connection points located on the rear of the unit. This placement helps prevent water intrusion into the electrical connection and reduces the risk of electrical hazards associated with fluid leaks or accidental disconnection. The outlet height must not exceed the overall height of the Typhoon AER to ensure that the power cord can be connected without strain and can be safely disconnected when necessary.

The outlet must be located within visible and accessible reach of the operator and must not be obstructed by walls, cabinetry, or equipment. This accessibility ensures that power can be quickly disconnected in the event of an emergency, equipment malfunction, or service requirement.

Proper grounding is required for safe operation. The grounding conductor must be connected to an approved facility grounding system in accordance with applicable electrical codes. Under no circumstances may the grounding conductor be disconnected, bypassed, or attached to plumbing fixtures, gas lines, or other unapproved grounding points.

Before operating the Typhoon AER, the electrical supply must be verified to ensure proper voltage, grounding integrity, and GFCI functionality. Operation of the unit without proper grounding or GFCI protection may result in electrical shock, equipment damage, or system malfunction.

Failure to comply with these electrical installation requirements may result in unsafe operating conditions, equipment failure, or violation of applicable electrical safety regulations.

4.3 Water Supply Requirements

The Typhoon AER requires a continuous supply of purified or appropriately filtered water at a controlled temperature and flow rate to ensure effective cleaning, rinsing, and disinfection performance. Proper water delivery is essential to ensure removal of biological debris, effective circulation of disinfectants, and reliable system operation.

The water supply must provide a minimum continuous flow rate of 5.3 gallons per minute (GPM) at the connection point to the Typhoon AER. This flow rate must be maintained under dynamic operating conditions, not solely static pressure conditions. Insufficient flow may result in incomplete chamber filling, inadequate rinsing, extended cycle times, or system alarms.

Static supply pressure must remain within the operating range of 29 to 73 psi (0.2–0.5 MPa). Static pressure requirements remain constant regardless of installation height. However, in multi-story veterinary facilities, vertical elevation and piping distance from the main supply may reduce available dynamic flow rate due to elevation head and friction losses. This reduction becomes more significant on floors above the second level.

Facilities installing the Typhoon AER on upper floors must verify that the required minimum flow rate of 5.3 GPM is available at the point of installation. Static pressure measurements alone are not sufficient to verify proper performance. If required flow rate cannot be maintained, installation of a properly sized booster pump or pressure regulation system is required.

To ensure effective enzymatic cleaning and removal of organic material, the Typhoon AER requires a hot water supply capable of delivering water within the temperature range of 95°F to 113°F (35°C to 45°C). Water temperature within this range supports optimal enzymatic activity and improves cleaning performance while protecting sensitive endoscope materials.

An inline tankless hot water heater is required at the installation location if the facility's central hot water system cannot reliably maintain both the required temperature and flow rate. The tankless heater must be capable of delivering a continuous flow rate of not less than 6 to 7 gallons per minute (GPM) at the specified operating temperature. This capacity ensures that adequate heated water is available during peak demand phases of the reprocessing cycle.

The tankless water heater must be installed in accordance with applicable municipal plumbing and electrical codes. The heater must be sized appropriately for the incoming water temperature and electrical capacity available at the facility. Undersized heaters may result in reduced flow rate or insufficient temperature during operation.

The water connection must include an accessible shutoff valve located within 6 feet (1.8 meters) of the unit. Plumbing connections must comply with applicable local plumbing codes and healthcare facility infrastructure requirements.

Failure to provide adequate water temperature, flow rate, or supply stability may result in ineffective cleaning, incomplete disinfection cycles, or system malfunction. Verification of proper water supply performance is the responsibility of the installing facility.

4.4 Drainage Requirements

The Typhoon AER must be connected to a dedicated drainage system capable of safely and continuously removing wastewater generated during each reprocessing cycle. Wastewater produced during operation may contain disinfectants, enzymatic cleaners, alcohol residue, and biological contaminants. Proper drainage is essential to ensure complete cycle performance and to prevent fluid accumulation within the system.

The drainage connection must be made to a gravity-fed sanitary drain with a minimum internal diameter of 2 inches (50 mm). This diameter is consistent with common municipal plumbing code requirements for medical and laboratory equipment drainage and ensures adequate flow capacity. The drainage connection point must be located at or below the level of the unit's drain outlet to allow unrestricted gravity flow. Elevating the drain above the unit outlet may result in incomplete drainage, system alarms, or fluid retention.

The total drainage discharge volume per reprocessing cycle may exceed 20 gallons, depending on cycle configuration and rinse parameters. The drainage system must be capable of accepting this volume without backflow or restriction.

The drain line must include an approved trap in accordance with local plumbing codes to prevent sewer gas from entering the clinical environment. In addition, an air gap or approved backflow prevention device should be installed where required by municipal plumbing regulations to prevent contamination of the potable water system.

Drainage tubing must be installed with a continuous downward slope of at least ¼ inch per foot (2%), which is consistent with standard plumbing design requirements. This ensures proper drainage and prevents fluid stagnation or backflow.

The drain connection must remain accessible for inspection and maintenance and must not be permanently sealed or obstructed.

4.5 Ventilation Requirements

The Typhoon AER must be installed in a clinical environment with adequate room ventilation to prevent the accumulation of disinfectant vapors and to maintain a safe working environment. Although the system is designed with a sealed chamber to minimize vapor release, trace amounts of disinfectant vapor may be released during operation, loading, and unloading.

The installation room must meet general ventilation standards for healthcare and veterinary clinical environments. A minimum ventilation rate of 6 to 12 air changes per hour (ACH) is recommended, consistent with common healthcare facility ventilation standards such as those outlined in ASHRAE and healthcare environmental guidelines.

If glutaraldehyde disinfectants are used, ventilation must be sufficient to maintain airborne chemical concentrations below applicable occupational exposure limits established by OSHA or other relevant regulatory authorities.

The Typhoon AER must not be installed in enclosed cabinets, closets, or confined spaces without mechanical ventilation. Installation in confined spaces may result in accumulation of chemical vapors and increase operator exposure risk. If local exhaust ventilation is used, airflow should be directed away from the operator's breathing zone. Ventilation systems must comply with applicable local building and mechanical codes.

4.6 Physical Placement and Clearance

The Typhoon AER must be installed on a flat, stable, and level surface capable of supporting a minimum load of 200 pounds (91 kg) to accommodate the unit weight and fluid loads. The floor surface must be rigid and free from vibration, which may interfere with system operation and fluid sensing.

The maximum allowable floor slope is 2 degrees (approximately ½ inch per foot). Excessive slope may interfere with proper drainage, leak detection accuracy, and internal fluid circulation.

Minimum clearance distances must be maintained to allow safe operation, maintenance, and service access:

- Minimum rear clearance: 6 inches (150 mm)
- Minimum side clearance: 4 inches (100 mm) on each side
- Minimum overhead clearance: 12 inches (300 mm) above the unit
- Minimum front clearance: 24 inches (600 mm) to allow safe loading and unloading

These clearance distances are consistent with common healthcare equipment installation practices and allow adequate airflow, service access, and operator movement.

The unit must not be installed on carpeting, soft flooring, or unstable surfaces. Installation on hard, sealed flooring such as tile, sealed concrete, or medical-grade vinyl flooring is recommended.

The installation location must allow unobstructed access to electrical power, water supply, and drainage connections.

4.7 Environmental Conditions

The Typhoon AER must be operated in an indoor clinical environment maintained within normal veterinary facility environmental conditions. The recommended operating temperature range is 50°F to 95°F (10°C to 35°C). Operation outside this range may affect system performance, fluid viscosity, and sensor accuracy.

Relative humidity in the installation area must remain between 30% and 75% non-condensing. Excessive humidity or condensation may increase the risk of electrical hazards and internal corrosion.

The system must not be exposed to freezing temperatures, as freezing may damage internal plumbing components, pumps, and valves.

The installation area must be free from excessive dust, airborne contaminants, and corrosive chemical vapors. Exposure to corrosive environments may damage system components and reduce equipment lifespan.

The unit must not be installed in areas subject to flooding, washdown spray, or direct water exposure.

4.8 Installation Verification and Commissioning

After installation is complete, the Typhoon AER must undergo installation verification to confirm proper electrical, plumbing, and operational performance. Installation verification must be performed by qualified distributor or installer personnel and must include confirmation of electrical grounding, GFCI functionality, water supply flow rate, and proper drainage function.

Water supply flow rate must be verified to confirm that the system receives at least 5.3 gallons per minute (GPM) at the connection point under operating conditions.

The system must be powered on and inspected for proper startup, control interface function, and absence of leaks. Chemical reservoirs must be filled with approved disinfectants and cleaning agents in accordance with manufacturer instructions.

A complete test cycle must be performed without an endoscope present to confirm proper fluid circulation, drainage, and cycle completion.

Any installation deficiencies must be corrected before the system is placed into clinical use.

4.9 Summary

Proper installation of the Typhoon AER is essential to ensure safe operation, effective disinfection, and long-term reliability. Electrical, water supply, drainage, ventilation, and environmental conditions must meet the requirements specified in this chapter.

Special consideration must be given to drainage capacity, ventilation performance, and water supply delivery, particularly in multi-story veterinary facilities where vertical elevation may affect flow rate.

Installation must comply with applicable municipal electrical and plumbing codes, OSHA workplace safety requirements, and facility engineering standards.

Proper installation verification ensures that the system operates safely and performs as intended.

WARNING!

Do not bend, kink, or twist the water supply or drainage hoses beyond their natural curvature. Sharp bends or hose deformation may restrict water flow, prevent proper drainage, and result in incomplete reprocessing cycles, fluid leakage, or system malfunction.

Ensure that the drainage outlet remains unobstructed at all times. Blocked or restricted drainage may cause wastewater backup, fluid leakage, incomplete cycle completion, and potential equipment failure. Regularly inspect all hose connections and drainage pathways to verify unrestricted flow and proper system operation.

Utility Category	Specification	Requirement	Notes
Electrical Supply	Voltage	AC 220–240V, 50/60 Hz, single phase	Must match device rating label
Circuit Type	Dedicated branch circuit	No shared circuits or extension cords	
Circuit Protection	GFCI-protected outlet required	Per NEC and healthcare facility codes	
Grounding	Equipment grounding conductor required	Must comply with municipal electrical code	
Outlet Placement	Above rear water connection and below top height of unit	Must be within 6 ft (1.8 m) and accessible	
Circuit Breaker Rating	10 A minimum (or per unit nameplate)	Verify at installation	
Water Supply	Minimum Flow Rate	≥ 5.3 gallons per minute (GPM)	Must be verified under dynamic flow
Static Pressure Range	29–73 psi (0.2–0.5 MPa)	Static pressure requirement does not change with elevation	
Water Temperature	95°F–113°F (35°C–45°C)	Required for proper enzymatic cleaning	
Hot Water Source	Inline tankless heater rated ≥ 6–7 GPM	Required if facility hot water supply is insufficient	
Shutoff Valve	Required within 6 ft (1.8 m) of unit	Must be accessible	
Water Quality	Purified or potable water, free of visible sediment	Filtration recommended	
Drainage System	Minimum Drain Diameter	≥ 2 inches (50 mm) internal diameter	Per municipal plumbing
Drain Flow Type	Gravity drain required	Pump-assisted drains not recommended	
Drain Elevation	Must be at or below unit drain outlet	Prevents backflow	
Drain Line Slope	≥ ¼ inch per foot (2%) downward slope	Ensures proper drainage	
Drain Capacity	≥ 20 gallons per cycle discharge capacity	Must prevent backup or restriction	
Backflow Prevention	Air gap or approved backflow device required where applicable	Per local plumbing code	

Chapter 5 — Approved Chemicals and Consumables

5.1 General Requirements

The Typhoon AER is designed to operate with specific categories of enzymatic cleaners, high-level disinfectants, and drying agents that are compatible with flexible veterinary endoscopes and the internal components of the reprocessing system. The use of approved and properly specified chemicals is essential to ensure effective removal of biological contaminants, elimination of infectious microorganisms, and safe operation of the system.

Only chemicals that are intended for medical or veterinary endoscope reprocessing and approved by their manufacturer for use with flexible endoscopes may be used in the Typhoon AER. The use of unapproved chemicals may result in ineffective disinfection, equipment damage, operator exposure to hazardous substances, or voiding of the equipment warranty.

All chemicals must be used in accordance with the chemical manufacturer's instructions, including requirements for concentration, contact time, storage, and disposal.

5.2 Enzymatic Cleaning Agents

Enzymatic cleaning agents are used during the cleaning phase of the reprocessing cycle to break down and remove organic material, including blood, mucus, proteins, and tissue debris. Proper enzymatic cleaning is critical because disinfectants alone cannot reliably penetrate or neutralize microorganisms that are protected by organic material.

The Typhoon AER is designed for use with low-foaming, multi-enzyme cleaning solutions specifically formulated for flexible endoscope reprocessing. These enzymatic cleaners contain proteolytic, lipolytic, and amylolytic enzymes that assist in the removal of organic debris from both external surfaces and internal channels.

The enzymatic cleaner must meet the following requirements:

- Must be labeled for use with flexible medical or veterinary endoscopes
- Must be low-foaming and compatible with automated reprocessing systems
- Must be compatible with materials used in flexible endoscopes and Typhoon AER internal components
- Must be used within the manufacturer's recommended concentration range

The Typhoon AER automatically doses enzymatic cleaner during the cleaning cycle. The operator must ensure that the enzymatic cleaner reservoir is filled with an approved solution prior to system operation.

Failure to use an appropriate enzymatic cleaner may result in incomplete removal of organic material and reduced disinfection effectiveness.

WARNING!

Enzymatic Cleaning Is *NOT* a disinfection step. This alone is not reprocessing.

5.3 High-Level Disinfectants

The Typhoon AER is designed to use high-level disinfectants that are effective against bacteria, viruses, fungi, and other microorganisms commonly encountered in veterinary clinical environments. High-level disinfection is required for flexible endoscopes that contact mucous membranes.

The following disinfectant types are compatible with the Typhoon AER when used according to the disinfectant manufacturer's instructions:

- Ortho-phthalaldehyde (OPA), typically used at 0.55% concentration
- Glutaraldehyde, typically used at 2.0% concentration

These disinfectants provide broad antimicrobial activity and are commonly used in veterinary and human medical endoscope reprocessing.

Disinfectant contact time must be set according to the disinfectant manufacturer's instructions located on the bottle's label. Typical contact times include:

- OPA: approximately 12 minutes
- Glutaraldehyde: typically 20-28 minutes

The Typhoon AER allows programmable disinfection times to accommodate different disinfectant types.

The Typhoon AER automatically circulates disinfectant through internal channels and external surfaces to ensure proper exposure. High-level Disinfectants must be replaced every 28-30 days.

5.4 Alcohol for Drying

The Typhoon AER uses alcohol during the final phase of the reprocessing cycle to assist in drying internal endoscope channels. Alcohol promotes evaporation of residual water and reduces the potential for microbial survival within endoscope lumens.

Only medical-grade alcohol meeting the following specifications may be used:

- Isopropyl alcohol or ethanol
- Concentration between 70% and 95%
- Free from additives, fragrances, or contaminants

Alcohol is used only for drying purposes and must not be used as a primary disinfectant.

The alcohol reservoir must be filled with approved alcohol prior to operation of the system. The Typhoon AER automatically delivers alcohol during the drying phase.

5.6 Chemical Replacement and Monitoring

Disinfectants and cleaning agents must be replaced according to the chemical manufacturer's instructions and facility infection control protocols. Over time, disinfectants lose effectiveness due to dilution, contamination, and repeated use.

The Typhoon AER tracks disinfection cycles and may alert the operator when disinfectant replacement is required.

Failure to maintain proper disinfectant concentration may result in ineffective disinfection and increased infection risk.

5.7 Chemical Compatibility and Restrictions

Only approved chemicals meeting the requirements described in this chapter may be used with the Typhoon AER.

The following substances must not be used in the Typhoon AER:

- Bleach or chlorine-based disinfectants
- Hydrogen peroxide solutions
- Chlorahexadine or any other liquid chemical germacide
- Abrasive or corrosive cleaning agents
- Household or industrial cleaning chemicals

Use of unapproved chemicals may damage internal system components, reduce system performance, or create unsafe operating conditions. Unapproved chemical use will void the warranty.

Chapter 6 — Endoscope Pre-Cleaning Requirements

6.1 General Requirements

Pre-cleaning is a mandatory first step in the endoscope reprocessing workflow and must be performed immediately after each endoscopic procedure. Pre-cleaning removes organic material such as blood, mucus, gastric contents, and tissue debris that may harbor microorganisms and interfere with the effectiveness of automated disinfection. Failure to perform proper pre-cleaning may result in incomplete disinfection, increased infection risk, and potential equipment damage.

6.2 Immediate Post-Procedure Pre-Cleaning

Pre-cleaning must begin immediately following removal of the endoscope from the patient. Delayed cleaning allows biological material to dry and adhere to internal surfaces, which may reduce cleaning effectiveness and promote microbial survival.

The operator must wipe the external surface of the endoscope insertion tube using a clean, lint-free cloth or sponge moistened with approved enzymatic cleaning solution. This removes visible debris and prevents contamination from drying on the surface.

All accessible endoscope channels must be flushed with approved enzymatic cleaning solution according to the endoscope manufacturer's instructions. Flushing helps remove organic material from internal channels and prepares the endoscope for automated processing.

6.3 Leak Testing Prior to Reprocessing

The endoscope must be visually inspected for damage prior to placement in the Typhoon AER. If the endoscope manufacturer recommends manual leak testing prior to automated processing, leak testing must be performed according to the endoscope manufacturer's instructions.

Endoscopes that fail leak testing or show visible damage must not be processed in the Typhoon AER. Damaged endoscopes may allow fluid intrusion, resulting in equipment damage and ineffective reprocessing.

The Typhoon AER performs automated leak detection as part of the reprocessing cycle; however, this feature does not replace required pre-cleaning or visual inspection.

6.4 Handling and Transport to the Typhoon AER

After pre-cleaning, the endoscope must be transported carefully to the Typhoon AER to prevent recontamination or physical damage. The endoscope insertion tube must not be sharply bent, twisted, or allowed to contact contaminated surfaces.

The endoscope must be handled in a manner that protects both the equipment and clinical personnel. Operators must wear appropriate personal protective equipment when handling contaminated endoscopes.

Pre-cleaned endoscopes should be placed into the Typhoon AER as soon as possible following pre-cleaning.

Chapter 7 — Operating Instructions

7.1 General Operating Requirements

The Typhoon AER must be operated only by trained personnel who have read and understood this manual. Proper pre-cleaning, correct endoscope placement, and proper cycle selection are required to ensure effective cleaning and high-level disinfection.

Before operating the Typhoon AER, verify that the system is connected to electrical power, water supply, drainage, and that approved enzymatic cleaner, disinfectant, and alcohol reservoirs are adequately filled.

Do not operate the system if alarms, leaks, or system errors are present.

7.2 System Startup

1. Verify that electrical power is connected and the GFCI outlet is active.
2. Verify that the water supply valve is open.
3. Verify that disinfectant, enzymatic cleaner, and alcohol levels are sufficient.
4. Press the Power button to activate the system.
5. Allow the touchscreen interface to fully initialize.

Confirm that no system alarms are displayed prior to operation.

7.3 Endoscope Loading Procedure

1. Confirm that the endoscope has been properly pre-cleaned according to Chapter 6.
2. Open the Typhoon AER chamber door using the control interface or foot pedal.
3. Place the endoscope into the chamber, ensuring the insertion tube is not sharply bent or twisted.
4. Connect all required channel adapters and leak detection connections according to endoscope type.
5. Verify that the endoscope is properly positioned and fully supported within the chamber.
6. Close the chamber door securely.

Proper placement ensures effective fluid circulation and disinfection.

7.4 Cycle Selection and Start

1. From the touchscreen interface, select the appropriate reprocessing cycle.
2. Verify that the correct cycle parameters are displayed.
3. Press Start to initiate the automated reprocessing cycle.

The Typhoon AER will automatically perform the following sequence:

- Leak detection
- Pre-wash
- Enzymatic cleaning
- High-level disinfection
- Rinse cycles
- Alcohol flush
- Air drying

The system automatically controls fluid delivery, timing, and monitoring throughout the cycle.

7.5 Cycle Monitoring

During operation, the touchscreen will display system status and cycle progress.

Do not open the chamber door during an active cycle.

If an alarm or error occurs, follow the instructions displayed on the touchscreen and refer to Chapter 12 — Alarms and Corrective Actions.

7.6 Cycle Completion and Endoscope Removal

At the end of the cycle, the system will notify the operator that processing is complete.

1. Verify that the cycle completed successfully and no alarms are present.
2. Open the chamber door.
3. Carefully disconnect channel adapters.
4. Remove the endoscope without bending or twisting the insertion tube.
5. Transport the endoscope to the designated storage or use area.

The endoscope is now ready for clinical use or storage.

7.7 Shutdown Procedure

The Typhoon AER may remain powered on between cycles. At the end of every work day, however, the unit is required to shut down.

If shutdown is required:

1. Ensure no cycle is in progress.
2. Press the Power button to turn off the system.
3. Close water supply valve if required by facility protocol.

Do not disconnect electrical power while a cycle is in progress.

Chapter 8 — Reprocessing Cycle Description

8.1 General Description

The Typhoon AER performs automated cleaning and high-level disinfection of flexible endoscopes using a controlled, multi-phase cycle. Each phase of the cycle is designed to remove organic material, eliminate microorganisms, and prepare the endoscope for safe clinical use. The system automatically controls fluid delivery, exposure time, temperature, and drying to ensure consistent and repeatable results.

The complete cycle consists of leak detection, cleaning, disinfection, rinsing, alcohol flushing, and drying phases. These phases are performed in sequence without operator intervention once the cycle is initiated.

8.2 Leak Detection Phase

At the start of the cycle, the Typhoon AER performs automated leak detection to verify the structural integrity of the endoscope. The system pressurizes internal channels and monitors for pressure loss.

If a leak is detected, the system will generate an alarm and stop the cycle. Leak detection protects the endoscope from fluid intrusion, which may damage internal components and compromise disinfection effectiveness.

If no leak is detected, the system automatically proceeds to the cleaning phase.

8.3 Cleaning Phase

During the cleaning phase, the system circulates enzymatic cleaning solution through the internal channels and over the external surfaces of the endoscope. This process removes residual organic material, including blood, mucus, and biological debris.

Proper cleaning is essential because disinfectants cannot effectively penetrate organic material. Automated circulation ensures that cleaning solution reaches internal channels that cannot be manually accessed.

8.4 Disinfection Phase

During the disinfection phase, the Typhoon AER circulates high-level disinfectant through all endoscope channels and external surfaces. The disinfectant is delivered at controlled flow rates and maintained for the programmed contact time.

This phase eliminates bacteria, viruses, fungi, and other microorganisms that may be present on or within the endoscope. Disinfection time is programmable to match the requirements of the disinfectant manufacturer.

The system continuously monitors fluid delivery and cycle timing during this phase.

8.5 Rinse Phase

Following disinfection, the Typhoon AER performs one or more rinse cycles using filtered water. The rinse phase removes residual disinfectant from the endoscope to prevent chemical exposure to patients and to protect endoscope materials.

Filtered rinse water helps prevent recontamination of disinfected surfaces.

Proper rinsing is required to ensure patient safety and endoscope compatibility.

8.6 Alcohol Flush Phase

During the alcohol flush phase, medical-grade alcohol is circulated through the endoscope channels. Alcohol promotes evaporation of residual water and improves drying efficiency.

This phase reduces moisture within internal channels, which helps prevent microbial survival and supports proper storage conditions.

8.7 Drying Phase

The Typhoon AER performs forced air drying of the endoscope channels and external surfaces. Filtered air is circulated through the system to remove remaining moisture.

Proper drying is critical because moisture may support microbial growth if the endoscope is stored or reused before fully drying.

The drying phase prepares the endoscope for safe storage or immediate clinical use.

8.8 Cycle Completion

At the end of the cycle, the system verifies completion of all programmed phases. The touchscreen interface notifies the operator when the cycle is complete.

If no alarms or errors are present, the endoscope has undergone automated cleaning and high-level disinfection and may be safely removed.

The operator must verify successful cycle completion before removing the endoscope.

WARNING!

The Typhoon AER uses a fully automated, multi-phase process to clean, disinfect, rinse, and dry flexible veterinary endoscopes. Each phase is designed to ensure effective removal of contaminants and microorganisms.

Proper cycle completion ensures that the endoscope is ready for safe clinical use.

Failure to allow the full cycle to complete may result in incomplete disinfection.

Chapter 9 — Special Infection Control Considerations

9.1 General Infection Control Responsibilities

Flexible endoscopes used in veterinary medicine may be exposed to infectious microorganisms during diagnostic and therapeutic procedures. All endoscopes must be treated as contaminated following each use, regardless of the patient's known or suspected disease status. Proper pre-cleaning and automated reprocessing using the Typhoon AER are required after every procedure to reduce the risk of cross-contamination between patients and to protect veterinary personnel.

The Typhoon AER is designed to provide automated cleaning and high-level disinfection when used according to this manual. However, effective infection control depends on proper handling, pre-cleaning, and adherence to established reprocessing protocols.

9.2 Endoscopes Used on Patients with Known or Suspected Infectious Disease

Endoscopes used on patients with known or suspected infectious disease require strict adherence to standard reprocessing procedures. This includes procedures involving patients with gastrointestinal, respiratory, or systemic infections.

Examples of infectious diseases that may pose increased contamination risk include:

- **Salmonella infections in canine and equine patients**
- **Strangles (Streptococcus equi) in equine patients**
- **Equine herpesvirus (EHV-1, EHV-4) respiratory infections**
- **Feline herpesvirus and feline calicivirus respiratory infections**
- **Bacterial respiratory or gastrointestinal infections**

Following use on such patients, the endoscope must undergo immediate pre-cleaning and full automated reprocessing using the Typhoon AER. The full disinfection cycle must be completed without interruption.

9.3 Prevention of Cross-Contamination

Cross-contamination may occur if contaminated endoscopes are improperly handled, inadequately cleaned, or improperly stored. To prevent cross-contamination, endoscopes must be pre-cleaned immediately after use and reprocessed using the Typhoon AER before reuse.

Reprocessed endoscopes must be handled with clean gloves and stored in a clean, dry environment. Contact with contaminated surfaces or equipment after reprocessing may result in recontamination.

Endoscopes must never be reused without completing the full automated reprocessing cycle.

9.4 Operator Protection

Operators handling contaminated endoscopes or reprocessing chemicals must wear appropriate personal protective equipment, including gloves, eye protection, and protective clothing as required by facility safety protocols.

Proper use of the Typhoon AER reduces direct handling of contaminated equipment and disinfectants, helping protect operators from biological and chemical exposure.

Operators must avoid direct contact with disinfectants and contaminated fluids.

9.5 Management of Reprocessing Failures

If a reprocessing cycle is interrupted, incomplete, or terminated due to an alarm or system error, the endoscope must be considered contaminated. The full reprocessing cycle must be repeated after correcting the cause of the interruption.

Endoscopes must not be used clinically until a complete reprocessing cycle has been successfully completed.

If system malfunction is suspected, the Typhoon AER must not be used until the issue has been corrected.

9.6 Environmental Infection Control

The area surrounding the Typhoon AER must be maintained in a clean condition consistent with veterinary infection control standards. Surfaces that may come into contact with contaminated endoscopes should be cleaned and disinfected regularly.

The Typhoon AER includes an internal self-disinfection function that may be used after maintenance, extended periods of inactivity, or contamination events. This function helps ensure internal system cleanliness and prevents contamination of reprocessed endoscopes.

Chapter 10 — Operator Safety and OSHA Compliance

10.1 General Safety Requirements

The Typhoon AER is designed to reduce operator exposure to contaminated instruments and chemical disinfectants; however, proper safety precautions must be followed at all times. Flexible endoscopes and reprocessing chemicals may present biological, chemical, and physical hazards if improperly handled.

Operators must be trained in endoscope handling, chemical safety, and proper operation of the Typhoon AER prior to use. Failure to follow proper safety procedures may result in operator injury, chemical exposure, or infection risk.

10.2 Personal Protective Equipment (PPE)

Operators must wear appropriate personal protective equipment when handling contaminated endoscopes, disinfectants, or reprocessing components. At a minimum, the following PPE is required during endoscope handling and reprocessing:

- *Medical-grade gloves*
- *Eye protection or face shield*
- *Protective gown or lab coat*

Additional PPE may be required based on facility infection control policies or chemical manufacturer recommendations.

PPE must be removed and disposed of or cleaned according to facility safety protocols after handling contaminated equipment.

10.3 Chemical Safety

High-level disinfectants and cleaning agents used in the Typhoon AER may cause irritation or injury if they contact skin, eyes, or respiratory tissue. Operators must avoid direct contact with all reprocessing chemicals.

Chemicals must be handled only in well-ventilated areas and stored in properly labeled containers. Chemical Safety Data Sheets (SDS) must be accessible to all personnel in accordance with OSHA Hazard Communication requirements.

If chemical exposure occurs, follow the chemical manufacturer’s safety instructions and facility emergency procedures.

10.4 Electrical Safety

The Typhoon AER must be connected to a properly grounded, GFCI-protected electrical outlet. Do not operate the system if electrical cords, plugs, or connections are damaged.

Do not operate the system if water leakage or electrical malfunction is suspected. Disconnect power and notify qualified service personnel if unsafe conditions are observed.

Never attempt to open the system housing or access internal electrical components.

10.5 Biological Hazard Protection

All used endoscopes must be considered contaminated with potentially infectious material. Operators must handle endoscopes using appropriate PPE and follow proper pre-cleaning and reprocessing procedures.

Avoid direct contact with biological material and contaminated fluids. Wash hands thoroughly after handling contaminated equipment.

The Typhoon AER reduces exposure risk by automating the cleaning and disinfection process when used properly.

10.6 Safe Operating Practices

Do not open the chamber door during an active reprocessing cycle. Do not bypass safety features or operate the system with known malfunctions.

Only approved chemicals and accessories may be used with the Typhoon AER. Improper chemical use may create unsafe conditions.

Routine inspection of hoses, connections, and system components must be performed to ensure safe operation.

10.7 Emergency Procedures

In the event of chemical exposure, electrical malfunction, or fluid leakage, immediately stop system operation and disconnect electrical power if safe to do so.

Follow facility emergency procedures and notify qualified service personnel. Do not resume operation until the issue has been resolved.

WARNING!

The Typhoon AER is designed to support safe and effective endoscope reprocessing. Proper use of personal protective equipment, chemical safety practices, and safe operating procedures is essential to protect operators and maintain a safe clinical environment.

Failure to follow safety procedures may result in injury, chemical exposure, or infection risk.

Chapter 11 — Routine Cleaning and Maintenance

11.1 General Requirements

Routine cleaning and maintenance of the Typhoon AER are required to ensure proper operation, effective endoscope reprocessing, and long-term system reliability. Regular inspection and maintenance help prevent equipment malfunction, reduce contamination risk, and ensure compliance with veterinary infection control standards.

Maintenance must be performed only by trained personnel. Always disconnect electrical power before performing maintenance that involves internal components or fluid connections.

Do not operate the system if maintenance requirements are overdue or if system malfunction is suspected.

11.2 Daily Cleaning

The exterior surfaces of the Typhoon AER must be cleaned at the end of each clinical day or as needed if visibly contaminated. External surfaces may be wiped using a clean cloth and an approved medical surface disinfectant.

The chamber interior must be visually inspected daily for debris, residue, or foreign material. Remove any visible debris using a soft cloth and approved cleaning solution.

Do not use abrasive cleaners, brushes, or corrosive chemicals, as these may damage system components.

11.3 Chemical Level Inspection

Chemical reservoirs must be inspected daily to verify adequate levels of enzymatic cleaner, disinfectant, and alcohol.

Replace or refill chemicals as needed to ensure uninterrupted operation. Always use approved chemicals specified in Chapter 5.

Disinfectant concentration must be verified according to the disinfectant manufacturer’s instructions and facility protocol.

11.4 Filter and Hose Inspection

Water supply hoses, drainage hoses, and internal filters must be visually inspected on a regular basis for signs of damage, blockage, or leakage.

Verify that hoses are free from sharp bends, kinks, or obstructions. Damaged or restricted hoses may reduce system performance or cause leakage.

Filters must be replaced according to the service schedule or when contamination is observed.

11.5 Internal System Self-Disinfection

The Typhoon AER includes an automated self-disinfection function designed to disinfect internal fluid pathways and the chamber.

Self-disinfection should be performed:

- *After extended periods of non-use*
- *Following service or maintenance*
- *If contamination of the system is suspected*
- *According to facility infection control protocols*

This function helps maintain internal system hygiene and prevents system contamination.

11.6 Periodic Maintenance

Periodic inspection and maintenance by qualified service personnel are required to ensure continued safe and effective operation.

Periodic maintenance may include:

- *Inspection of pumps, valves, and internal tubing*
- *Verification of leak detection function*
- *Inspection of electrical components*
- *Replacement of internal filters*

Service intervals should follow manufacturer recommendations and facility maintenance schedules.

11.7 Maintenance Precautions

Always disconnect electrical power before performing maintenance. Do not attempt to repair internal components unless qualified and authorized to do so. Use only manufacturer-approved replacement parts. Improper maintenance may result in system malfunction or unsafe operating conditions.

WARNING!

Routine cleaning and maintenance are essential to ensure safe, reliable operation of the Typhoon AER. Regular inspection, proper chemical management, and periodic service help maintain system performance and infection control effectiveness.

Failure to perform proper maintenance may result in equipment malfunction or ineffective endoscope reprocessing.

Chapter 12 — Alarms and Corrective Actions

12.1 General Alarm Function

The Typhoon AER continuously monitors system performance during operation. If the system detects an abnormal condition that may affect safe operation or effective endoscope reprocessing, it will generate an alarm and display a message on the touchscreen interface.

When an alarm occurs, the reprocessing cycle may pause or stop automatically to prevent equipment damage, ineffective disinfection, or unsafe operating conditions.

Endoscopes processed during an interrupted or failed cycle must be considered contaminated and must be fully reprocessed after the condition is corrected.

Do not use an endoscope clinically until a complete, uninterrupted cycle has been successfully completed.

Alarm Condition	Possible Cause	Corrective Action
Leak Detection Alarm	Endoscope leak or improper connection	Remove endoscope and perform leak test according to endoscope manufacturer instructions. Do not reprocess damaged endoscopes.
Low Disinfectant Level	Disinfectant reservoir empty or below required level	Refill disinfectant reservoir with approved disinfectant. Restart cycle.
Low Enzymatic Cleaner Level	Enzymatic cleaner reservoir empty	Refill enzymatic cleaner reservoir. Restart cycle.
Low Alcohol Level	Alcohol reservoir empty	Refill alcohol reservoir. Restart cycle.
Water Supply Alarm	Insufficient water pressure or flow	Verify water supply valve is open and supply meets flow and pressure requirements.
Drainage Alarm	Blocked or restricted drain hose	Inspect drain hose for blockage, kinks, or improper installation.
Door Open Alarm	Chamber door not fully closed	Close and secure chamber door before restarting cycle.
System Error	Internal system malfunction	Restart system. If alarm persists, remove system from service and contact authorized service personnel.

12.2 Operator Response to Alarms

When an alarm occurs, the operator must immediately review the message displayed on the touchscreen and determine the cause of the condition.

The operator must:

- *Stop the current operation if not automatically stopped by the system.*
- *Identify the cause of the alarm.*
- *Correct the condition before restarting operation.*
- *Repeat the full reprocessing cycle once the issue has been resolved.*

Do not attempt to bypass or override system alarms.

If the cause cannot be identified or corrected, remove the system from service and contact qualified service personnel.

12.4 Interrupted Cycle Conditions

If a cycle is interrupted due to power loss, alarm condition, or operator intervention, the disinfection process must be considered incomplete.

The endoscope must be reprocessed using a full cycle before reuse.

Do not assume disinfection has occurred unless the cycle has completed successfully without alarms.

12.5 Removal from Service

The Typhoon AER must be removed from service if any of the following conditions occur:

- *Repeated unresolved alarm conditions*
- *Electrical malfunction*
- *Fluid leakage from internal components*
- *Failure to complete reprocessing cycles*
- *Visible system damage*

Contact qualified service personnel before returning the system to operation.

12.6 Alarm Verification and Documentation

Facilities may be required to document alarm conditions and corrective actions as part of infection control and equipment maintenance records.

Proper documentation helps ensure regulatory compliance and supports safe equipment operation.

Chapter 13 — Troubleshooting

13.1 General Troubleshooting Procedure

If the Typhoon AER does not operate as expected, perform the following checks in order:

1. *Review the touchscreen display for alarm messages or error notifications.*
2. *Verify that electrical power is available and properly connected.*
3. *Verify that water supply is connected, turned on, and meets flow requirements.*
4. *Verify that disinfectant, enzymatic cleaner, and alcohol reservoirs are adequately filled.*
5. *Verify that the chamber door is fully closed and secured.*
6. *Verify that hoses and drainage connections are properly installed and unobstructed.*

If the issue cannot be resolved using the procedures in this chapter, remove the system from service and contact qualified service personnel.

Do not attempt to repair internal components.

13.2 System Does Not Power On

Check the following:

- *Verify the system is connected to a powered electrical outlet*
- *Verify the outlet is a functioning GFCI outlet*
- *Reset the GFCI outlet if it has tripped*
- *Verify the circuit breaker has not tripped*
- *Inspect the power cord for damage or loose connections*
- *Verify facility electrical power is available*

If the system still does not power on:

- *Remove the system from service*
- *Contact qualified service personnel*

13.3 Cycle Will Not Start

Check the following:

- Verify the chamber door is fully closed and latched
- Verify sufficient disinfectant is present
- Verify sufficient enzymatic cleaner is present

- *Verify sufficient alcohol is present*
- *Verify water supply valve is open*
- *Verify no active alarms are displayed*
- *Verify endoscope is properly connected*

Correct any identified condition and restart the cycle.

13.4 Cycle Stops or Is Interrupted

If the cycle stops before completion:

- *Review touchscreen for alarm message*
- *Verify water supply flow rate is adequate (≥ 5.3 GPM)*
- *Verify chemical reservoirs are not empty*
- *Verify drainage hose is not kinked or blocked*
- *Verify endoscope is properly connected*
- *Verify electrical power is stable*

Correct the condition and repeat the full cycle.

Endoscopes from interrupted cycles must be considered contaminated and must be reprocessed.

13.5 Leak Detection Alarm

Check the following:

- *Verify endoscope is properly connected*
- *Inspect endoscope for visible damage*
- *Verify leak test connections are secure*

If leak alarm persists:

- *Remove endoscope from service*
- *Perform leak testing according to endoscope manufacturer instructions*
- *Do not reprocess damaged endoscopes*

Chapter 14 — Documentation and Recordkeeping

14.1 Purpose

Proper documentation of endoscope reprocessing is required to verify that each endoscope has been safely cleaned and disinfected before clinical use. Accurate records help ensure patient safety, support infection control protocols, and provide traceability in the event of equipment issues or infection concerns.

The Typhoon AER automatically tracks reprocessing cycles; however, the facility is responsible for maintaining complete and accurate records.

14.2 Required Reprocessing Records

A record must be maintained for each endoscope reprocessing cycle. At a minimum, documentation must include:

- Date and time of the cycle
- Operator name or identification
- Confirmation that the cycle completed successfully
- Any alarm conditions or cycle interruptions
- Corrective actions taken, if applicable

Endoscopes must not be returned to clinical use unless a complete and successful cycle has been documented.

14.3 Maintenance and Service Records

Routine maintenance and service activities must be documented to ensure proper system function. Records should include:

- Chemical replacement
- Filter replacement
- Routine cleaning and maintenance
- Service inspections or repairs
- Date and personnel performing the work

Maintenance records help verify proper system performance and support equipment reliability.

14.4 Alarm and Corrective Action Documentation

If an alarm or system error occurs, the following information should be recorded:

- Date and time of the alarm
- Description of the alarm
- Corrective action performed
- Operator identification

Endoscopes from interrupted or failed cycles must be reprocessed before clinical use.

14.5 Record Retention

All reprocessing and maintenance records must be retained according to facility policy. It is recommended that records be kept for a minimum of three (3) years.

Records may be stored electronically or in written form but must be accessible for review if needed.

Documentation confirms that endoscopes have been properly reprocessed and that the Typhoon AER is functioning correctly. Maintaining accurate records supports infection control, equipment maintenance, and safe clinical operation.

Failure to maintain proper documentation may result in unsafe equipment use or inability to verify proper disinfection.

OSHA Compliance Notice — Recordkeeping and Exposure Documentation

Proper documentation of endoscope reprocessing, alarm conditions, maintenance activities, and chemical handling is required to support compliance with Occupational Safety and Health Administration (OSHA) workplace safety regulations.

Failure to maintain accurate records may prevent identification of hazardous conditions, chemical exposure events, or infection control failures.

Facilities must ensure that the following OSHA-related documentation requirements are met:

- Maintain accessible Safety Data Sheets (SDS) for all enzymatic cleaners, disinfectants, and alcohol used with the Typhoon AER, in accordance with OSHA Hazard Communication Standard (29 CFR 1910.1200).
- Document and report any employee exposure incidents involving biological materials or hazardous chemicals according to facility exposure control plans.
- Maintain maintenance and service records to verify safe system operation and hazard prevention.
- Ensure personnel training records are maintained for all operators using the Typhoon AER.

Operators must immediately report any suspected chemical exposure, equipment malfunction, or unsafe condition to facility management.

Proper documentation supports workplace safety, protects personnel, and ensures compliance with OSHA safety requirements.

Chapter 15 — Storage, Transport, and Disposal

15.1 System Storage

If the Typhoon AER will not be used for an extended period, the system must be cleaned and prepared to prevent contamination or internal damage. All chemical reservoirs should be emptied if the system will be stored for prolonged periods, and the internal self-disinfection cycle should be performed prior to shutdown.

The system must be stored indoors in a clean, dry environment within the following conditions:

- Temperature range: 50°F to 95°F (10°C to 35°C)
- Relative humidity: 30% to 75%, non-condensing

The system must not be exposed to freezing temperatures, excessive heat, or moisture.

Electrical power and water supply must be disconnected during extended storage.

15.2 Endoscope Storage After Reprocessing

After successful reprocessing, endoscopes must be handled with clean gloves and stored in a clean, dry, designated storage area.

Endoscopes must be protected from contamination, physical damage, and moisture. Proper storage helps maintain disinfection effectiveness and protects endoscope integrity.

Endoscopes must not be stored in a contaminated or uncontrolled environment.

15.3 Transport of the Typhoon AER

If the Typhoon AER must be moved or transported, all chemical reservoirs must be emptied and all fluid connections disconnected.

The system must be transported in an upright position and handled carefully to prevent damage to internal components. Do not tilt, drop, or subject the system to excessive vibration.

Protect the system from moisture, freezing temperatures, and physical impact during transport.

15.4 Disposal

The Typhoon AER contains electrical and mechanical components that must be disposed of in accordance with applicable local, state, and federal regulations.

Do not dispose of the system as general waste.

Chemical residues must be handled and disposed of according to chemical manufacturer instructions and applicable environmental regulations.

Facilities should contact authorized service providers or waste management services for proper disposal.

Chapter 16 — Warranty and Service Information

16.1 Warranty Coverage

Rutledge Medical warrants that the Typhoon AER Veterinary Automatic Endoscope Reprocessor shall be free from defects in materials and workmanship under normal use and service for a period of one (1) year from the date of installation, or fifteen (15) months from the date of shipment, whichever occurs first.

During the warranty period, Rutledge Medical will, at its sole discretion, repair or replace any component determined to be defective due to manufacturing defects or material failure, provided the system has been installed, operated, and maintained in accordance with the instructions contained in this Operator Manual.

This warranty applies only to the original purchaser and is not transferable without written authorization from Rutledge Medical.

16.2 Parts Warranty

Rutledge Medical shall provide replacement parts for components determined to be defective due to manufacturing defects during the warranty period. Replacement parts may be new or refurbished components that meet manufacturer performance specifications.

Warranty coverage applies only to defects arising from normal and intended use of the Typhoon AER.

Consumable items and routine maintenance components are not covered under this warranty. These include, but are not limited to:

- Filters
- Chemical tubing subject to normal wear
- Seals and gaskets subject to routine replacement
- External hoses and user-replaceable consumables

Replacement of consumable components is the responsibility of the facility.

16.3 Labor Coverage and Service Limitations

Labor associated with warranty repair is subject to the terms of the service agreement provided by the authorized distributor or service provider. Labor coverage outside of an active service agreement may be limited or subject to additional charges.

Unless otherwise specified in a written service agreement, the customer is responsible for:

- Labor costs associated with installation, removal, or replacement of components
- Travel expenses associated with on-site service
- Shipping costs associated with return or replacement of equipment

Rutledge Medical reserves the right to provide warranty service through remote technical support, authorized distributors, or designated service providers.

16.4 Warranty Exclusions

This warranty does not cover damage or malfunction resulting from:

- *Improper installation or failure to meet facility installation requirements*
- *Improper operation or failure to follow instructions in this manual*
- *Use of unapproved chemicals, accessories, or consumables*
- *Failure to perform required maintenance*
- *Physical damage, misuse, abuse, or negligence*
- *Unauthorized modification, repair, or disassembly*
- *Electrical power surges, water supply contamination, or facility infrastructure issues*
- *Damage caused by external environmental conditions*

Any service performed by unauthorized personnel may void this warranty.

16.5 Limitation of Liability

Rutledge Medical shall not be liable for any indirect, incidental, special, or consequential damages arising from the use or inability to use the Typhoon AER, including but not limited to loss of business, loss of equipment use, or interruption of clinical operations.

Rutledge Medical's total liability under this warranty shall be limited solely to repair or replacement of defective components as described herein.

This warranty is provided in lieu of all other warranties, express or implied, including any implied warranties of merchantability or fitness for a particular purpose, to the extent permitted by applicable law.

16.6 Service and Technical Support

Service and technical support for the Typhoon AER must be performed by Rutledge Medical or authorized service providers. Facilities requiring service must contact their authorized distributor or Rutledge Medical technical support.

Do not attempt to service internal components unless authorized and qualified to do so.

When requesting service, provide the following information:

- Device model number
- Serial number
- Description of the issue
- Facility name and contact information

This information will assist in providing timely and accurate service.

16.7 Out-of-Warranty Service

After the warranty period has expired, repair and service may be provided on a billable basis. Replacement parts, labor, and travel expenses may be charged according to current service rates.

Facilities are encouraged to maintain an active service agreement to ensure continued system reliability and priority technical support.

EXCEPT AS EXPRESSLY SET FORTH HEREIN, STEVi, ITS PARENT OR DISTRIBUTOR MAKE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, ALL SUCH IMPLIED WARRANTIES ARE HEREBY DISCLAIMED.

IN NO EVENT SHALL RUTLEDGE MEDICAL BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL, OR EXEMPLARY DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE, LOSS OF REVENUE, LOSS OF BUSINESS OPPORTUNITY, OR INTERRUPTION OF CLINICAL OPERATIONS, ARISING OUT OF OR RELATED TO THE USE OR INABILITY TO USE THE PRODUCT, EVEN IF RUTLEDGE MEDICAL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

STEVi's total liability under this Limited Warranty shall not exceed the original purchase price of the Product.

This Limited Warranty shall be governed by and construed in accordance with the laws of the State of Oklahoma, United States, without regard to conflict of law principles.

No agent, distributor, or representative of Rutledge Medical is authorized to modify or extend this Limited Warranty without the express written authorization of STEVi.

Warranty service may be obtained by contacting STEVi Direct or an authorized distributor and providing the Product model number, serial number, installation date, and description of the issue.

Typhoon AER — Endoscope Compatibility Statement

General Compatibility

The Typhoon AER is designed for automated cleaning and high-level disinfection of fully immersible, reusable flexible endoscopes (fiberscopes or video endoscopes), provided the endoscope is intended by its manufacturer for immersion and high-level disinfection and the endoscope's channels can be connected using appropriate channel adapters.

Universal compatibility statement (for legal/manual use):
The Typhoon AER is compatible with all fully immersible flexible fiberscopes and video endoscopes from any manufacturer, when the endoscope is approved by its manufacturer for immersion and high-level disinfection and the endoscope's channels are connected using appropriate adapters consistent with the endoscope IFU.

Not compatible / limitations:
Non-immersible scopes, disposable single-use scopes, and scopes that require sterilization methods incompatible with HLD are not compatible. Endoscopes that fail leak testing or are visibly damaged must not be processed.

Compatibility Tables by Brand

1) Rutledge Medical — AURORA XP

Rutledge Medical AURORA XP flexible video endoscopes are designed for veterinary GI and airway procedures and are compatible with Typhoon AER reprocessing when fully immersible and connected using the appropriate channel adapters. Rutledge Medical lists current AURORA XP models including XP-VS3300 and equine gastroscope configurations such as 3.3 m / 3.5 m variants.

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
AURORA XP	XP Series flexible videoscopes (e.g., XP-VS3300)	Small animal GI, airway; multi-species	Connect biopsy/suction, air/water, and auxiliary channels per scope configuration
AURORA Xpress	1-1.5M Video Endoscopes	Equine Airway	Connect all lumens; ensure proper support to avoid sharp bends

2) AOHUA (including systems sold via MDS channels)

Aohua veterinary offerings include dedicated veterinary scope models (examples listed in veterinary distribution channels include VET-8015 and HD-VGS-6012)

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
OR-1200/OR-100	VET-8015 (video endoscope)	Small animal GI / general	Standard lumen connections; follow Aohua IFU for channel mapping
AVC-1	HD-VGS-6012 (video bronchoscope)	Samall animal/Equine	Confirm suction/biopsy lumen adapter size; avoid over-pressurization on small lumens
OR-160/OR-1800	VET-FHD15 (video endoscope)	Small animal gastroscope	Confirm suction/biopsy lumen adapter size; avoid over-pressurization on small lumens

Compatibility Tables by Brand

3) TKVetKit (SeeSheen / TK-VETKIT)

Current TK-VETKIT veterinary scope listings include model families such as VEC-15 (150 cm) and VEC-15L (300 cm). Some TK-VETKIT offerings also reference models such as EC/EU-250H.

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
TK-VETKIT	**VEC-15** (150 cm)	Small animal GI / general	Standard biopsy/suction lumen connections
TK-VETKIT	**VEC-15L** (300 cm)	Equine GI	Confirm full lumen flushing; ensure no kinking at long working length
TK-VETKIT	**EC/EU-250H** family	Small animal GI	Match adapter sizing to channel diameter per IFU

4) Olympus

The Typhoon AER is compatible with immersible Olympus flexible fiberscopes and video endoscopes when used in accordance with Olympus Instructions for Use and proper channel adapter connections.

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
Olympus — EVIS EXERA I & II	GIF-100, GIF-140, GIF-160, GIF-180 series gastroscopes; CF-140, CF-160, CF-180 series colonoscopes; BF-140, BF-160, BF-180 bronchoscopes; XP-140, XP-160, XP-180 small-diameter scopes	Small animal gastroscopy, bronchoscopy, cystoscopy, rhinoscopy; equine gastroscopy	Connect biopsy/suction, air/water, and auxiliary channels per Olympus IFU. These series represent the most commonly deployed Olympus flexible scopes in veterinary practice.
Olympus — EVIS EXERA III	GIF-H190, GIF-HQ190 gastroscopes; CF-HQ190 colonoscopes; BF-Q190 bronchoscopes; XP-190 small-diameter endoscopes	Small animal and specialty veterinary endoscopy; referral and specialty hospital use	Connect all fluid channels using appropriate adapters. Verify channel configuration, as some models include auxiliary or secondary channels requiring connection.

Compatibility Tables by Brand

5) Huger / VetOvation

Huger “69 series” is actively marketed for veterinary use through distributors, and VetOvation sells flexible endoscopy systems/bundles (including “Complete Endoscopy System”).

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
Huger/VetOvation	**69 Series** videoscopes (family)	Small & large animal endoscopy	Connect channels per model configuration

6) Pentax

The Typhoon AER is compatible with immersible Pentax flexible fiberscopes and video endoscopes when used in accordance with Pentax Medical Instructions for Use and proper channel adapter connections. The Pentax K-Series and 90i Series represent the most widely deployed Pentax platforms in veterinary clinical practice.

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
Pentax — Video Endoscope 70K Series	EG-2490K, EG-2790K gastroscopes; EC-3890K colonoscopes; EB-1970K bronchoscopes	Small animal GI, airway, and specialty endoscopy	Connect all lumens per Pentax IFU. Ensure auxiliary channels are connected where present.
Pentax — Video Endoscope 90i Series	EG-2990i, EG-3490i gastroscopes; EC-3890i colonoscopes; EB-1990i bronchoscopes	Referral and specialty veterinary endoscopy; advanced diagnostics	Connect biopsy/suction, air/water, and auxiliary channels. Verify channel configuration prior to cycle initiation.

7) Fujifilm/Fujinon

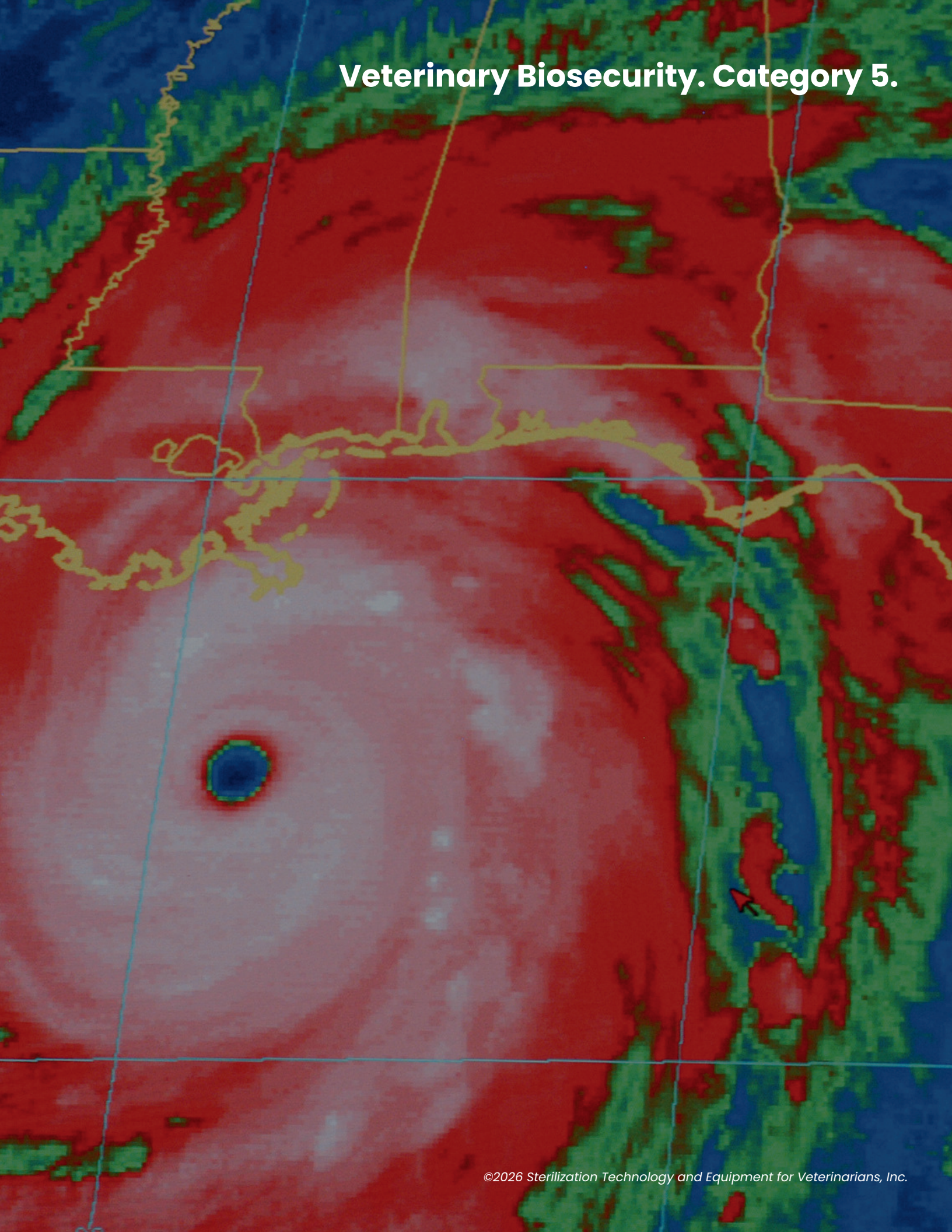
The Typhoon AER is compatible with immersible Fujifilm (Fujinon) flexible fiberscopes and video endoscopes when used in accordance with Fujifilm Instructions for Use and proper channel adapter connections. The 400, 530, and 580 Series represent the most commonly deployed Fujinon platforms in veterinary practice.

Brand / Platform	Current Models / Families (Examples)	Typical Use	Typhoon AER Connection Notes
Fujinon — 400 Series	EG-410 gastroscopes; EC-410 colonoscopes; EB-410 bronchoscopes	Small animal gastroscopy, bronchoscopy, cystoscopy	Connect biopsy/suction and air/water channels. Ensure full lumen irrigation during cycle.
Fujinon — 530 Series	EG-530 gastroscopes; EC-530 colonoscopes; EB-530 bronchoscopes	Small animal GI and airway procedures	Connect all lumens per Fujinon IFU. Verify auxiliary channels if present.
Fujinon — 580 Series	EG-580 gastroscopes; EC-580 colonoscopes; EB-580 bronchoscopes	Small animal and referral veterinary endoscopy	Connect biopsy/suction, air/water, and auxiliary channels. Ensure proper adapter sizing for lumen diameter.

To Order Parts, Connectors or other Consumables:

Contact your **TYPHOON** distributor or in the US call:
+1-888-363-6838
option 4

Online:
stevi.vet/parts



Veterinary Biosecurity. Category 5.

TYPHOON

AUTOMATIC ENDOSCOPE REPROCESSOR

stevi.

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