FluidInspectIR®_Ultra

Installation & Operation Manual

Multi-Sensor Oil Condition Monitoring System with Particle Counter

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MAN_FI_ULTRA_01	**Revision 1 | March 2026**

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Please read these operating instructions completely and carefully before commissioning the FluidInspectIR®_ULTRA. These instructions form part of the product and contain important information on commissioning, operation, and safe handling. Always observe all safety instructions.

Before commissioning, verify that the correct supply voltage is present and that all parts are correctly fitted. If you have any questions regarding the use of this equipment, contact Spectrolytic or your authorised dealer.

Keep these instructions in a safe place accessible to all personnel. Pass them on to third parties if necessary.

Document Revision History

Revision	Description	Date	Author
1	First Version	15/03/2026	G. Hantos

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1. Notes and Explanations

The following symbols and signal words are used throughout this manual:

Symbol	Signal Word	Meaning
ϟ	DANGER — ELECTRICAL HAZARD	Hazards due to dangerous electrical voltages. Failure to comply may result in serious injury or death. Access only permitted for qualified electricians or EUP.
✋	WARNING — CRUSH HAZARD	Risk of crushing hands. Failure to comply may result in minor injuries. Applicable during installation and assembly.
🌡	WARNING — HOT SURFACE	Warning of hot surface (> 40°C). Failure to comply may result in serious injury. Applicable in case of direct contact with the heating cable.
⚠	WARNING	Warns of dangerous situations. Avoid these situations. Failure to comply may result in serious injury or death.
✓	INSTRUCTION	How to act correctly. Follow recommended actions to avoid property damage and problems.
🕮	READ INSTRUCTIONS	Follow the recommended actions to avoid property damage and problems.
♻	ENVIRONMENTAL	Eco-label: identifies environmental protection measures. Failure to comply will result in environmental damage.

2. Safety Instructions

2.1 Scope of Application

This documentation applies to all persons carrying out work on the FluidInspectIR®_ULTRA. Before carrying out any work on this equipment, this documentation must be read in full and followed exactly. It must be kept in the vicinity of the equipment and be accessible to all personnel at all times.

2.2 Applicable Regulations

The FluidInspectIR®_ULTRA was developed, designed, and manufactured in accordance with German and European technical regulations and may only be operated in compliance with applicable technical rules and safety regulations, including:

- Applicable health, labour, and fire protection regulations
- National laws, regulations, and safety rules

2.3 Staff Deployment and Responsibilities

The following personnel categories are defined throughout this manual:

2.3.1 Expert

- Qualified for managerial tasks; interdisciplinary supervision of all activities
- Authorised by the operator; understands all functional sequences and environmental interaction

2.3.2 Operating Personnel

- Qualified for normal operation; authorised by the operator
- Understands functional sequences and environmental interaction

2.3.3 Maintenance Personnel

- Qualified for maintenance activities; authorised by the operator
- Understands functional sequences and environmental interaction

2.3.4 Qualified Electricians

- Authorised by the operator; demonstrably qualified to work on electrical systems through recognised training
- Understand the technology and functional sequences of the equipment

2.3.5 Operator

- Any natural or legal person who uses the equipment or makes it available to third parties, and is responsible for the safety of users, personnel, or third parties during use

2.3.6 External Persons

- All persons not belonging to the above-mentioned groups
- Unauthorised persons are forbidden from remaining in the working area of this equipment

2.4 Obligations of the Operator

The FluidInspectIR®_ULTRA is used in the commercial sector. The operator is subject to legal obligations regarding occupational safety and must:

- Inform themselves about applicable health and safety regulations
- Identify additional hazards through risk assessment and minimise them with appropriate measures
- Implement required behavioural requirements in operating instructions
- Regularly check and update operating instructions to reflect current regulations
- Clearly regulate responsibilities for installation, operation, maintenance, and cleaning
- Ensure all employees are familiar with protective measures for safe operation and have read these instructions

The operator must train personnel at regular intervals and is responsible for ensuring the equipment is always in perfect technical condition.

2.5 General Safety Instructions

Always carry out all activities responsibly and safely. Faults that impair safe operation must be rectified immediately and the equipment taken out of operation until resolved. All markings and labels must remain legible. The housing may only be opened by authorised Spectrolytic personnel.

⚠ Hazards in Normal Operation

Only operate on a level surface whose dimensions are ≥ the base area of the equipment.
Before switching on, ensure the equipment cannot fall from the work surface.

⚠ Dangers Due to Electrical Energy

The FluidInspectIR®_ULTRA must be connected to a protective earth (PE) at all times during operation. Earth continuity must be verified before energising the system. Never operate the unit with the PE bonding conductor disconnected or removed.
Work on electrically operated assemblies may only be carried out by qualified electricians.
Regularly inspect all cables and connections. Loose connections and damaged cables must be repaired or replaced immediately.
Do not open the housing.
Always de-energise equipment before working on live assemblies.

⚠ Dangers During Maintenance and Assembly

Switch off and disconnect from mains before carrying out any work.
If the housing is opened, observe all hazard warnings inside the equipment.

2.6 Damage

Damage caused by non-compliance with these operating instructions will invalidate the warranty. No liability is accepted for consequential damage, property damage, or personal injury caused by improper handling or non-compliance with the safety instructions. This equipment is intended for industrial and commercial use only; operation and maintenance must only be carried out by trained personnel.

Avoid danger to life due to electric shock. Have electrical installation carried out by a qualified electrician. Ensure no cables are damaged. Verify mains voltage matches operating voltage. Avoid cleaning with water or liquids. Perform electrical safety inspections (DGUV V3) before initial commissioning and at regular intervals. Despite the IP67 rating, where possible protect the equipment from moisture, dirt, and excessive heat.

3. Intended Use

3.1 Intended Use Criteria

- The FluidInspectIR®_ULTRA monitors the status parameters of liquids, including real-time fluid condition monitoring using IR spectroscopy, viscosity measurement, and optical particle counting / wear debris analysis.
- It may only be installed by qualified personnel with the necessary qualifications for electronic measuring devices.
- The lid may only be removed by qualified personnel after consultation with Spectrolytic.
- If the lid has been removed, the valve may be hot and could cause burns.

3.2 Reasonably Foreseeable Misuse

The FluidInspectIR®_ULTRA is intended for industrial and trade use only, in dry and heated indoor areas. The following uses are expressly prohibited:

- Operation outside the IP67 enclosure rating
- Operation in EX zones or areas with fire hazards
- Operation underground
- Operation outside industrial environments (EMC Directive, interference emission)
- Measurement or monitoring of highly flammable liquids (e.g. petrol, paraffin)
- Operation under water

Any use or modification beyond the stated intended purpose is not permitted without written agreement with Spectrolytic.

4. Product Overview and Operation

4.1 System Overview

Figure 1 — FluidInspectIR®_ULTRA Main Unit

The FluidInspectIR®_ULTRA is a highly developed multi-sensor system for monitoring oil condition. Unlike the PLUS model, the ULTRA integrates three measurement technologies: an IR fluid condition sensor, a viscosity sensor, and an optical particle counter / wear debris sensor, all fully contained within an IP67 housing.

4.2 Interfaces and Display

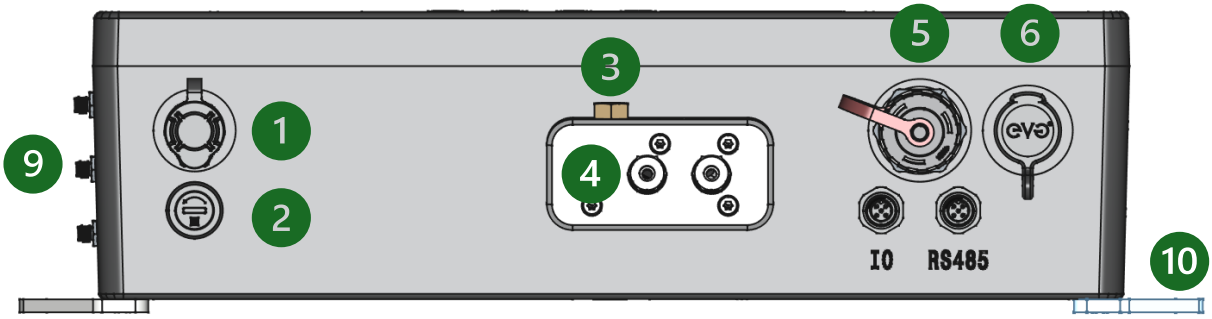


Figure 2 — Overview of Electrical Equipment FluidInspectIR®_ULTRA – Interfaces and connections

Figure 3 Overview of Electrical Equipment FluidInspectIR®_ULTRA – Front Panel

The following interfaces and controls are available on the FluidInspectIR®_ULTRA:

Ref.	Interface / Component	Description
1	Power Connection	LP-16 3-pin (AC) or 2-pin (DC) connector
2	Fuse	5A 250V 5×20mm fast-blow fuse for overcurrent protection
3	Filter	60µ stainless steel inline filter
4	Manifold Connection Block	Inlet port (left) and outlet port (right) for hydraulic sample connections
5	RJ45 (Ethernet)	Standard RJ45 for wired network connectivity
6	USB-A	USB port
7	Digital I/O (M12 5-pin)	Digital input/output connector
8	RS485 (M12 5-pin)	Modbus RTU communication connector
9	Mobile / WiFi Antenna	External antenna port — optional, version-dependent
10	Mounting Brackets	Pre-fitted brackets for M8 anti-vibration mount attachment
11	Control Buttons	Navigation buttons: Up, Down, Enter, Back
12	Display Panel	LCD display panel showing system status and menu

4.3 Overview of Safety Devices

- Power input overvoltage protection
- eFuse with overload and short-circuit protection plus 5A 250V fast-blow glass fuse
- Optical leakage detection with photo sensor
- Stepper motor driver with over-current protection (OCP) and over-temperature shutdown (OTSD)
- Every FET (heater, valve, etc.) has over-current and over-temperature protection
- Digital inputs and outputs have ESD and over-voltage protection

- Digital outputs have current limiting (1A), thermal shutdown and overcurrent protection
- Maximum current output to temperature sensors is limited
- RS485 pins have ESD protection
- 5V voltage output on RS485 and flow sensor has a current limiter (~650–1050 mA)
- USB socket has ESD and overcurrent protection
- RJ45 jack has ESD protection

4.4 Overview of Warnings

Warning	Condition	Action Required
Electrical Hazard	Dangerous electrical voltage detected	Immediately de-energise. Contact qualified electrician.
Crush Hazard	Moving parts active during assembly	Keep hands clear during installation/assembly.
Hot Surface	Surface temperature > 40°C	Do not touch heating cable or internal components.
Leakage Detected	Photo sensor triggered	Power down, inspect hydraulic connections.
Overcurrent / Fuse Blown	Fuse blown	Replace fuse (Section 13.3). Contact Spectrolytic if issue persists.

4.5 Functional Description

The FluidInspectIR®_ULTRA measures fluid condition, viscosity, and particle count/wear parameters continuously in-line. The particle counter provides ISO 4406 cleanliness codes and wear debris classification. Data is captured at a configurable interval (default: 60 minutes) and transmitted to the Spectrolytic DataInspectIR cloud platform via Ethernet, LTE modem, or WiFi (version-dependent). Direct SCADA or PLC integration is available via Modbus RTU/TCP.

5. Technical Data

5.1 System Specifications

Parameter	Value / Specification
Width	46 cm
Depth	36 cm
Height	11.7 cm
Weight (main unit)	12 kg
Rated Voltage / Frequency	100–240V AC, 50–60 Hz / 24V DC (depending on variant)
Rated Power	120 W
Network Connection — Wired	1× RJ45 Ethernet
Network Connection — Wireless (optional)	LTE, WiFi (version-dependent)
Power Connection	LP-16 3-pin (AC) / 2-pin (DC), unterminated (pigtails)
Earthing	Protective Earth (PE) required – see Section 8.3 for connection details
Overcurrent / Short-circuit Protection	Fuse — 5A 5×20mm fast-blow
Maximum Hydraulic Pressure (Bypass — valve version)	7 Bar absolute
Recommended Flow Rate	50–150 ml/min (target 100 ml/min)
Inline Filter	60µ stainless steel (manifold-mounted)
IP Protection Class	IP67

5.2 Environmental and Emissions

Parameter	Value	Remarks
Operating Temperature	0°C to +55°C / –10°C to +75°C	Valve / Pump variant
Storage Temperature	–10°C to +65°C / –10°C to +85°C	Valve / Pump variant
Operating Humidity	Max. 50% at 40°C or 90% at 20°C	Non-condensing
Altitude	Up to 2,000 m above sea level	—
EMC Directive	DIN EN 61326-1	Interference emission and influence
Lightning Protection	Yes	Protective Earth
Emissions	Yes	EMC compliant
RoHS (Solder)	Yes	Compliant
Maximum Heating	≤ 80°C	—

6. Declaration of Conformity

Spectrolytic Ltd. hereby declares that the FluidInspectIR®_ULTRA complies with the requirements of the following applicable European and national directives:

- Low Voltage Directive 2014/35/EU (& DIN EN 61010-1)
- Electromagnetic Compatibility Directive 2014/30/EU (& DIN EN 61000-6-2, -4)
- RoHS Directive 2011/65/EU

Conformity has been verified. Corresponding declarations and documents are held on file by the manufacturer. Note: Per DIN EN 61000-6-4, this equipment must not be operated in residential, commercial, or small-business areas.

Directive / Standard	Title
2014/35/EU	Low Voltage Directive for Electrical Equipment
2014/30/EU	Harmonisation of Laws Relating to Electromagnetic Compatibility
2011/65/EU	Restriction of Hazardous Substances in Electrical and Electronic Equipment
DIN EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use — Part 1: General Requirements
DIN EN 61010-2-201	Safety Requirements — Part 2-201: Particular Requirements for Control Equipment

Authorised person for compiling the technical documentation:

Name: Mr Carsten Giebeler

Address: Spectrolytic Ltd., 1–6 Techcube, Summerhall Place, Newington, Edinburgh, EH9 1PL, United Kingdom

Signature of authorised representative (Mr Carsten Giebeler): _____

7. Scope of Delivery

Immediately after unpacking, check that the scope of delivery is complete and that the equipment is in perfect condition. If any items are missing or damaged, contact Spectrolytic immediately before proceeding with installation.

Figure 4 — Packing List Contents

Item No.	Description	Qty
1	FluidInspectIR®_ULTRA Main Unit	1
2	G1/8 6mm OD pipe connectors	2
3	Sealing washers	2
4	Anti-vibration mounts (M8)	4
5	Power cable (pigtail endings)	1
6	Ethernet cable (optional — confirm with order)	1
7	LTE modem — external (optional — confirm with order)	1

8. Installation

⚠ Electrical Safety

When connecting to the mains supply, observe the connected loads and technical specifications. Lay the connecting cable so that nobody can trip over it. Nothing should be placed on or across the cable.
Do not open the device. In the event of faults, contact Spectrolytic or call specialist personnel.

8.1 Network Connectivity

The FluidInspectIR®_ULTRA supports three connectivity options:

8.1.1 Customer Network (Ethernet)

- Default configuration: DHCP client. A valid DHCP server must be present.
- Required open ports: 8883 and 9993 (TCP and UDP) to allow data upload to the Spectrolytic cloud.
- For detailed IT requirements refer to the Requirements for FluidInspectIR Systems Using Customer IT document (FLUIDIR_IT).

8.1.2 External LTE Modem (Optional)

- Connect the FluidInspectIR®_ULTRA to the LAN port of the modem only.
- Do not connect any external device to the modem WAN port unless specifically instructed by Spectrolytic.
- Do not connect non-Spectrolytic systems (e.g. laptops) to the modem — doing so could lead to excessive data charges.
- Standard RJ45 Ethernet cable required. IP67 Ethernet cover provided.

8.1.3 Built-in LTE / WiFi Modem (Version-Dependent)

- Some variants include a factory-fitted internal modem. Ensure the antenna is securely attached before deployment.
- Ensure the modem is activated on an appropriate data plan before use.

8.2 Pre-Installation Checks

1. Visually inspect the system for any transit damage before mounting.
2. Confirm the supply voltage available matches the system variant (AC or DC).
3. Verify the hydraulic bypass pressure does not exceed 7 Bar absolute (valve versions).
4. Ensure the installation location is clean, dry, and free from excessive vibration.
5. Confirm network connectivity requirements with your IT team (ports 8883, 9993 open).
6. Confirm intended orientation with Spectrolytic if in doubt.
7. Confirm that a suitable PE bonding conductor and M8 ring crimp terminal are available for connection at the bottom-right mounting hole prior to installation.

8.3 Main System Installation

1. Secure the anti-vibration mounts (M8) to the device frame. At the bottom-right mounting hole, also attach a protective earth (PE) bonding conductor using an M8 ring crimp terminal. Connect the other end to the installation's protective earth terminal. Ensure the conductor is sized appropriately for the installation and that the connection is clean, tight, and free from corrosion.
2. Mount the system in the desired location. Orientation must be either: (A) vertical with oil inlet and outlet facing downwards (default), or (B) horizontal with top side facing up and oil inlet/outlet facing forward. Do not place on its side or in any rotated position that shifts the top away from up or forward.
3. Mount maximum 1 m above or below the oil inlet connection (sampling point). Preferred: in-line with sampling point to eliminate head pressure effects.
4. For detailed mounting instructions refer to Section 10 — Mounting.

Figure 5 — FluidInspectIR®_ULTRA with Inlet / Outlet Lines Highlighted

5. Install the provided hydraulic fittings, ensuring sealing washers are included on each fitting.
6. Attach hydraulic supply lines: sample supply to the LEFT INLET port, sample return to the RIGHT OUTLET port.
7. Connect the power supply wiring to the supplied pigtail wire endings or to the appropriate terminals of the site's industrial electrical installation, in accordance with local wiring regulations. For the **100–230V AC variant**, ensure Live (L), Neutral (N), and Earth (PE) are connected correctly per the pin assignment in Appendix 18.1.1. For the **24V DC variant**, ensure positive (24V) and negative (GND) are connected correctly per Appendix 18.1.2.
8. Provide power to the system.
9. The display will activate with a welcome message. The system boots into safe mode by default.

8.4 System User Notification

The FluidInspectIR®_ULTRA notifies the user of its current status via the display panel and can transmit status messages and error codes via:

- Cloud connections (Spectrolytic DataInspectIR platform or customer cloud)
- Modbus RTU/TCP
- Digital I/O
- Alternative digital communication protocols (available on request)

8.5 Accessing Measurement Data

8.5.1 Cloud — DataInspectIR Dashboard

When connected to the internet, data is automatically uploaded to the Spectrolytic cloud and accessible through the DataInspectIR web dashboard. Refer to the DataInspectIR User Manual for full instructions.

8.5.2 Cloud — Customer Cloud Integration

Data uploaded to the Spectrolytic cloud can be automatically forwarded to a configured customer cloud endpoint. Contact Spectrolytic to configure this integration.

8.5.3 Local System Integration — Modbus

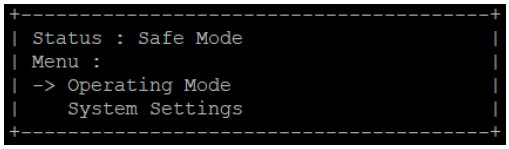
The system integrates directly into customer infrastructure via the Modbus RTU/TCP interface. Refer to the FluidInspectIR Inline Modbus Protocol Description document for register maps and function codes.

9. Commissioning and Operation

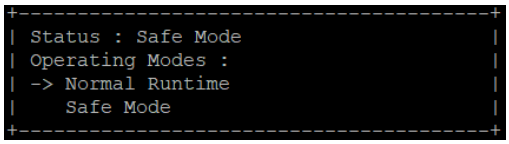
9.1 System Initialisation

By default, the system starts in safe mode: no measurements are taken and the valve is closed or pump is off. The user must manually advance to either Circulation Mode (for priming) or Runtime Mode using the display and navigation buttons.

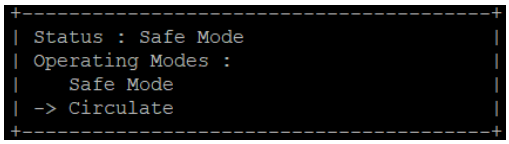
9.2 Circulation Mode (Priming)



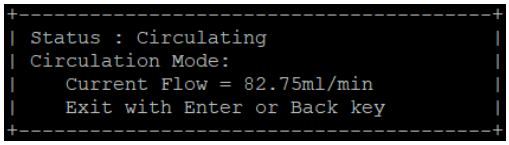
1. From the home screen, press the Enter button to access the menu.



2. Use the Up/Down buttons to navigate to "Operating Modes" and press Enter.



3. Select "Circulation Mode" and press Enter.
4. The system opens the valve or starts the pump and holds this state until mode is exited.
5. Current sample flow is shown on the display. A reading of 0 indicates no sample has reached the system yet.

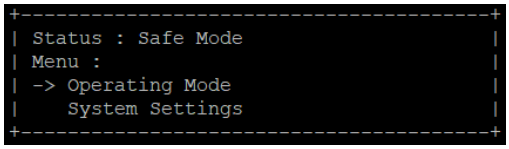


6. Exit circulation mode by pressing the Back or Enter button. The system returns to safe mode.

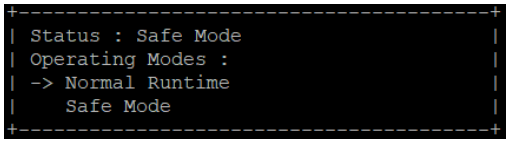
⚠ Circulation Mode Time Limit

Do not keep the device in Circulation Mode for more than 10 minutes.
Extended operation in this mode may cause system overheating or pump damage.

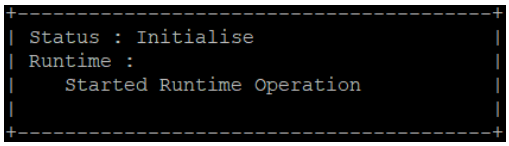
9.3 Runtime Mode (Normal Operation)



7. From the home screen, press the Enter button to access the menu.



8. Use the Up/Down buttons to navigate to "Operating Modes" and press Enter.



9. Select "Normal Runtime" and press Enter.
10. The system begins normal runtime operation. The home screen will display current system information and measurements.

9.4 Flow Rate and Sample Line Requirements

Maintaining an appropriate flow rate is essential for accurate and consistent measurements. The ULTRA has specific flow requirements due to the integrated particle counter:

Parameter	Value / Guideline
Recommended Flow Rate	50–150 ml/min (target: 100 ml/min)
Maximum Hose Length	3 m from sampling point to unit (1 m or less preferred) 1 m for pump systems with high viscosity oils
Maximum Inlet Pressure (Valve versions)	7 Bar absolute
Recommended Pressure Differential (Valve versions)	2–5 Bar between inlet and outlet lines
Flow tuning (Valve versions)	Recommended: Install needle valve on inlet line; adjust during Circulation Mode – monitor flow rate displayed on screen
Air Entrainment	Install Tee connector per Spectrolytic recommendations to eliminate air

9.5 Power Off Procedure

⚠ Before Powering Down

Always place the device in safe mode before disconnecting power.
Ensure the hydraulic valve is closed before disconnecting sample lines.

1. Using the navigation buttons, put the device into Safe Mode from the Operating Modes menu.
2. Turn off the main power supply to de-energise the system completely.
3. Locate the LP-16 power connector on the system.
4. Press and hold the push button on the connector to release the locking mechanism.
5. While holding the push button, carefully unplug the connector from the system.
6. Avoid pulling or yanking the connector without pressing the push button, as this may damage the power cable.
7. For built-in modem variants: disconnect wireless antennas before moving the unit.

10. Mounting

10.1 Mounting Options

The FluidInspectIR®_ULTRA is affixed to a mounting plane using the provided M8 anti-vibration mounts. Anti-vibration mount orientation is flexible and should be adjusted to best suit the installation context.

Orientation	Description	Notes
Vertical (default)	Oil inlet and outlet facing downwards	Preferred for most installations
Horizontal	Top side facing up, oil inlet/outlet facing forward	Confirm with Spectrolytic for your application

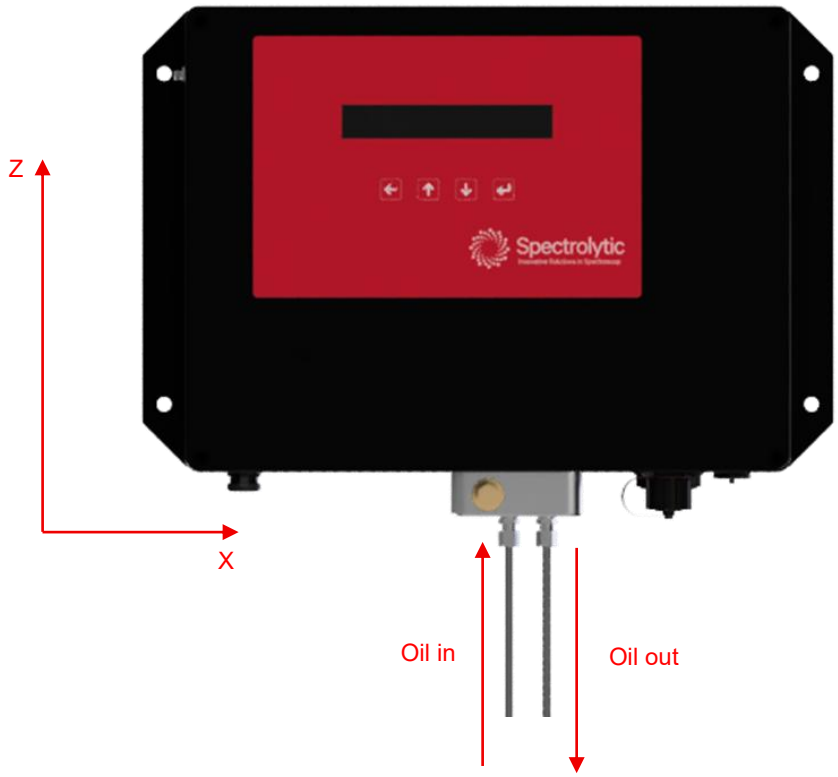


Figure 6 — ULTRA Mounting Orientation Reference

- Mount the anti-vibration mounts to the device frame and secure to the mounting plane.
- Do not place the unit on its side or in any rotated position that shifts the top away from the up or forward direction.
- Mount maximum 1 m above or below the oil inlet connection (sampling point). In-line mounting is preferred.
- Ensure the mounting surface is rated for the weight of the unit (12 kg minimum).
- Maintain minimum 100 mm clearance on all sides for ventilation and cable management.

11. Fault Diagnosis

Disconnect the unit from the power supply immediately in the following situations:

- The mains cable or plug is damaged
- Smoke development is noticeable
- Liquid has penetrated the unit
- The unit is exposed to humidity beyond the IP67 rating
- The unit is not working properly according to these operating instructions
- The unit has fallen, is damaged, or shows clear signs of a defect

An expert must determine the cause and define further measures. Work on the electrical equipment may only be carried out by authorised Spectrolytic personnel.

For systematic troubleshooting of installation issues (no flow, inconsistent data, connectivity problems), refer to the FluidInspectIR Installation Troubleshooting Guide (MAN_FI_ITG).

Symptom	Possible Cause	Recommended Action
No display on power-up	No power supply / blown fuse	Check power connection; inspect and replace fuse (Section 13.3)
Display shows error code	System fault detected	Note the error code; refer to Spectrolytic support or DataInspectIR cloud alerts
Flow reading shows 0	No sample reaching system	Check hydraulic connections; run Circulation Mode to prime (Section 9.2)
Flow outside 50–150 ml/min	Needle valve adjustment needed	Adjust needle valve during Circulation Mode to reach target 100 ml/min
Particle count readings erratic	Air entrainment in sample line	Install/check Tee connector; ensure no air in inlet line
System does not enter Runtime Mode	Initialisation not complete	Ensure Circulation Mode completed; check for leakage alerts
No data in cloud dashboard	Network connectivity issue	Verify Ethernet/modem connection; check ports 8883 and 9993 are open
Fuse blown repeatedly	Electrical fault present	Do not continue operation; contact Spectrolytic Service immediately
Leakage warning displayed	Hydraulic fitting leak	Power down; inspect and re-seal fittings; replace sealing washers

12. Transport

When moving the device, take these operating instructions with you and keep them accessible. Follow these steps to safely transport the equipment:

1. Switch off all electrical equipment following the Power Off Procedure (Section 9.5).
2. Disconnect the power supply cable.
3. Disconnect the network cable.
4. Disconnect all fluid hoses.
5. For built-in modem variants: disconnect and stow all wireless antennas.
6. Use the original packaging materials where possible to protect the unit during transit.
7. Protect the unit from moisture, impact, and extreme temperatures.
8. Transport in the correct orientation wherever possible (see Section 10.1).

13. Maintenance

13.1 General Maintenance

The FluidInspectIR®_ULTRA is designed to be largely maintenance-free. Any maintenance can typically be carried out as part of normal engine servicing. Key rules:

- Always disconnect from the power supply before cleaning.
- Do not use any liquid or aerosol cleaners — use only a dry, lint-free cloth.
- Housing may only be opened by a qualified electrician or EUP. The ULTRA has integrated tamper protection — any unauthorised opening automatically voids the warranty.
- Remote servicing by qualified Spectrolytic personnel is available — contact Spectrolytic to arrange.
- Any attempt by unauthorised personnel to service or repair the analyser will automatically invalidate the warranty.

No.	Maintenance Activity	Frequency	Remarks
1	Inspect mains cable and connection cables for damage and tight fit	Daily	Remove damaged cables from service immediately
2	Clean the outside of the unit	Weekly	Remove dust from housing using dry cloth only
3	Inspect hydraulic fittings and seals	Monthly	Check for leaks; replace sealing washers if required
4	Filter inspection	Monthly or as required	Replace when blocked or flow is reduced (see Section 13.2)
5	Electrical safety inspection (DGUV V3)	Annually	Qualified electrician only
6	Full calibration and remote maintenance	Annually	Spectrolytic Service only

13.2 Filter Maintenance

The FluidInspectIR®_ULTRA includes a 60µ stainless steel filter element located in the manifold above the oil inlet connection. Filter may require replacement when flow readings are continuously lower than expected under normal asset operating conditions. For filter element replacement instructions, refer to the FluidInspectIR Filter Replacement Guide (MAN_SER_Filter).

13.3 Fuse Replacement

⚠ Electrical Safety

Only replace the fuse when the system is fully de-energised.
Use only the specified fuse type: 5A 250V 5×20mm fast-blow.
If the fuse blows again after replacement, do not continue operation — contact Spectrolytic Service.

1. Power down the system completely and disconnect all power cables.
2. Verify that no external power source is connected.
3. Locate the fuse holder on the front panel.
4. Using a flat-head screwdriver, carefully unscrew the fuse holder cap.
5. Remove the old fuse and visually inspect it to confirm failure.
6. Insert a new fuse of the same type and rating: 5A 250V 5×20mm fast-blow.

7. Reinstall the fuse holder cap and tighten securely.
8. Reconnect the power supply and verify normal system startup.

13.4 General Operational Considerations

13.4.1 Data Capture Frequency

The default data capture rate is 60 minutes. This can be adjusted within reason though optimal settings may vary by application — contact Spectrolytic for guidance on your specific deployment.

13.4.2 Maintenance on Monitored Asset

In the event of maintenance on any connected asset (engine, lubrication loop, etc.), the FluidInspectIR®_ULTRA must be switched off before work begins. Refer to the Power Off Procedure (Section 9.5). After maintenance is complete, power the system back on using the Main System Installation procedure (Section 8.3).

13.4.3 Power Cut Recovery

In the event of a power cut or power loss, check that the fuse has not blown. Ensure the system is powered back on. The system will reboot in safe mode and must be manually placed into Runtime Mode.

14. Spare Parts

> ⚠ **Important**
> Only use spare parts of the same type and specification.
> Spectrolytic accepts no liability for damage caused by the use of non-original parts or accessories.

All spare and wear parts can be purchased from Spectrolytic. Spectrolytic Ltd. and its suppliers guarantee spare parts availability for all electrical equipment and components for 10 years from the delivery date, in accordance with DIN EN 82079-1.

Part	Description	Part Number
Fuse	5A 250V 5×20mm fast-blow glass fuse	Contact Spectrolytic
Sealing Washer	G1/8 sealing washer for hydraulic fittings	Contact Spectrolytic
60µ Filter Element	Stainless steel replacement filter element for manifold inlet	Contact Spectrolytic
G1/8 6mm OD Pipe Connector	6mm OD double ferrule compression fitting pipe connector	Contact Spectrolytic
Anti-Vibration Mount	M8 anti-vibration mount	Contact Spectrolytic

15. Service and Support

For servicing, spare parts, technical support, and warranty enquiries, contact Spectrolytic using the details below:

Contact Detail	Information
Company	Spectrolytic Ltd.
Address	1.6 Techcube, Summerhall Pl, Edinburgh, EH9 1PL, United Kingdom
Registered Address	12 Orchard Court, Longniddry, EH32 0PE, Scotland, United Kingdom
Company Number	SC674482
Email	info@spectrolytic.com
Website	spectrolytic.com

When contacting Spectrolytic Service, please have the following information ready:

- Product serial number and year of manufacture
- Description of the fault or query
- Any error codes displayed on the system
- Whether the issue affects connectivity, measurement, or hardware

16. Warranty Provisions

The manufacturer's statutory warranty period is 12 months from the date of delivery or handover on site after commissioning.

The FluidInspectIR®_ULTRA has been carefully produced and subjected to a thorough quality inspection. All material or manufacturer defects will be rectified free of charge within the warranty period.

The warranty does not cover damage caused by:

- Improper handling or non-compliance with these operating instructions
- Tampering by unauthorised persons or any unauthorised opening of the housing (tamper protection active)
- Normal wear of wearing parts
- Use of non-original spare parts or accessories

The warranty service neither extends nor renews the warranty period.

17. Disposal

The FluidInspectIR®_ULTRA is made of metal and plastic and must be disposed of in accordance with applicable local environmental regulations. Depending on the nature of the component, dispose as follows:

- Electronic waste — deliver to an authorised WEEE collection point
- Plastics / Rubber — dispose via appropriate recycling streams
- Batteries — deliver to authorised battery collection points
- Fluorescent / energy-saving lamps — deliver to appropriate collection points

The product must not be disposed of with normal household waste. It must be handed in at a collection point for recycling of electrical and electronic equipment. It is recommended that disposal be carried out by Spectrolytic.

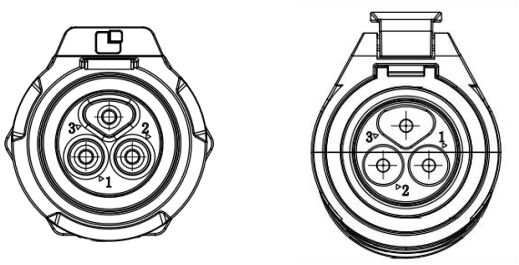
18. Appendix

18.1 Cable Connector Pin Assignment

18.1.1 100–230VAC Version

3-pin LP-16 02 Series female connector. Cable provided with open-ended pigtail wire endings.

Pin	Function
1	Live (L)
2	Neutral (N)
3	Earth (PE)



Pin assignment of the Sensor connector

Pin assignment of the Cable connector

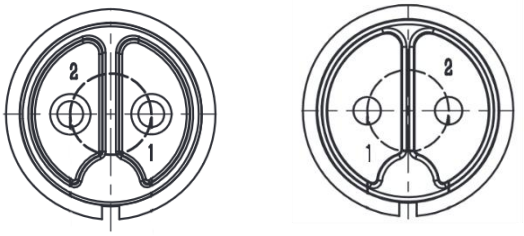
Figure 7 — 100–230VAC Connector (LP-16 3-pin)

Note: Pin 3 (Earth PE) provides the protective earth connection through the power connector. In addition, a chassis bonding conductor must be connected to the bottom-right mounting hole using an M8 ring crimp terminal as described in Section 8.3 Step 1. Both earth connections are required for safe and compliant operation.

18.1.2 24VDC Version

2-pin LP-16 02 Series female connector. Cable provided with open-ended pigtail wire endings.

Pin	Function
1	24V DC (+)
2	GND (–)



Pin assignment of the Sensor connector

Pin assignment of the Cable connector

Figure 8 — 24VDC Connector (LP-16 2-pin)

Note: For the 24V DC variant, the 2-pin connector does not include a PE pin. The chassis bonding conductor connected to the bottom-right mounting hole using an M8 ring crimp terminal therefore provides the protective earth connection for this variant. This connection is required for safe and compliant operation.

18.1.3 RS485 Modbus (M12 5-pin)

M12 female connector for RS485 Modbus communication (unterminated). For full Modbus protocol details refer to the FluidInspectIR Inline Modbus Protocol Description document.

Pin	Function
1	+5V DC
2	A (Data +)
3	GND
4	B (Data –)
5	Shield

Pin assignment of the Sensor connector

Pin assignment of the Cable connector

Figure 9 — RS485 Modbus M12 5-pin Connector

18.1.4 Digital I/O (M12 5-pin)

M12 female connector configured for digital input/output signals.

Pin	Function
1	GND
2	IN1 (Digital Input 1)
3	IN2 (Digital Input 2)
4	OUT (24V Digital Output)
5	Not connected

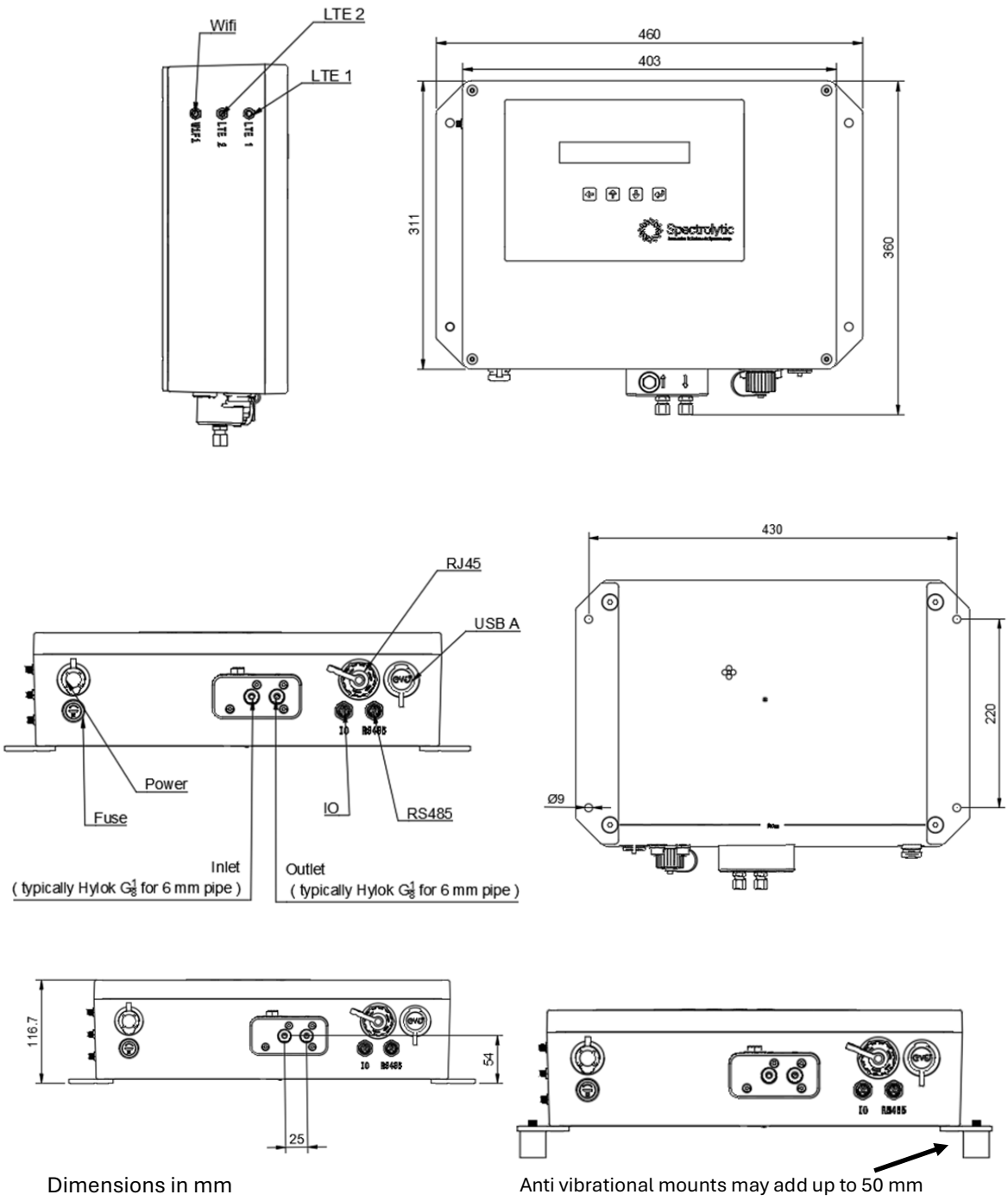
Pin assignment of the Sensor connector

Pin assignment of the Cable connector

Figure 10 — Digital I/O M12 5-pin Connector

18.2 Technical Drawings

The following technical drawings provide dimensional and connection reference for the FluidInspectIR®_ULTRA.



Dimensions in mm

Anti vibrational mounts may add up to 50 mm

18.3 Related Documents

The following documents supplement this manual and should be referenced for specific activities:

Document	Reference	Description
DataInspectIR User Manual	—	Instructions for using the DataInspectIR cloud dashboard
FluidInspectIR Inline Modbus Protocol Description	—	Modbus register maps, function codes, and RTU/TCP integration details
Requirements for FluidInspectIR Systems Using Customer IT	FLUIDIR_IT	Network and IT requirements for customer infrastructure integration

Document	Reference	Description
FluidInspectIR Filter Replacement Guide	MAN_SER_Filter	Step-by-step instructions for replacing the 60µ inline filter element
FluidInspectIR Installation Troubleshooting Guide	MAN_FI_ITG	Systematic troubleshooting for flow, measurement, and connectivity issues

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