QFLO UNIVERSAL TEMPERATURE CONTROLLER

USER MANUAL

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UNIVERSAL TEMPERATURE CONTROLLER (UTC)

USER GUIDE AND TECHNICAL SPECIFICATIONS

INTRODUCTION

Welcome to the QFlo Temperature Controller!

This manual provides the User Guide and Technical Specifications for the QFlo Universal Temperature Controller (UTC), a device designed for precise temperature control in residential, commercial, and industrial applications. It features robust performance, intelligent connectivity, and a user-friendly interface.

The QFlo UTC ensures accurate monitoring and management of temperature within specified limits, offering real-time feedback and alerts for any threshold breaches. Tools for trend tracking and process analysis are also included to enhance operational insights.

Developed in South Africa, this guide outlines the key features, set-up instructions, specifications, and operational details necessary for effective installation, use, and maintenance.

SAFETY INSTRUCTIONS

WARNINGS

Only use power adaptors within specification. See Specification.

PRECAUTIONS

- Keep away from heat sources.
- Ensure proper ventilation.

INSTALLATION

- **Tools Required**: Determined by the environment
- **Steps**:
    1. Unbox the unit and check all included accessories.
    2. Mount the device based on the bracket or surface type where it is to be installed.
    3. Connect the power adapter to a suitable power source.
    4. Power on the unit and follow on-screen instructions for setup.
    5. For complex installations use an accredited installer.

PRODUCT OVERVIEW

The QFlo Universal Temperature Controller (UTC) is a sophisticated device engineered for precise and efficient temperature management. It combines advanced features with a simple and intuitive design, ensuring reliable performance and ease of use across a broad range of applications.

Figure 1 illustrates the unit's front panel, detailing the status display and the arrangement of control and selection buttons. It also shows the two access ports and probe positioned at the bottom of the unit. The subsequent sections provide a comprehensive breakdown of each component, aiding in effective operation and understanding of the device.

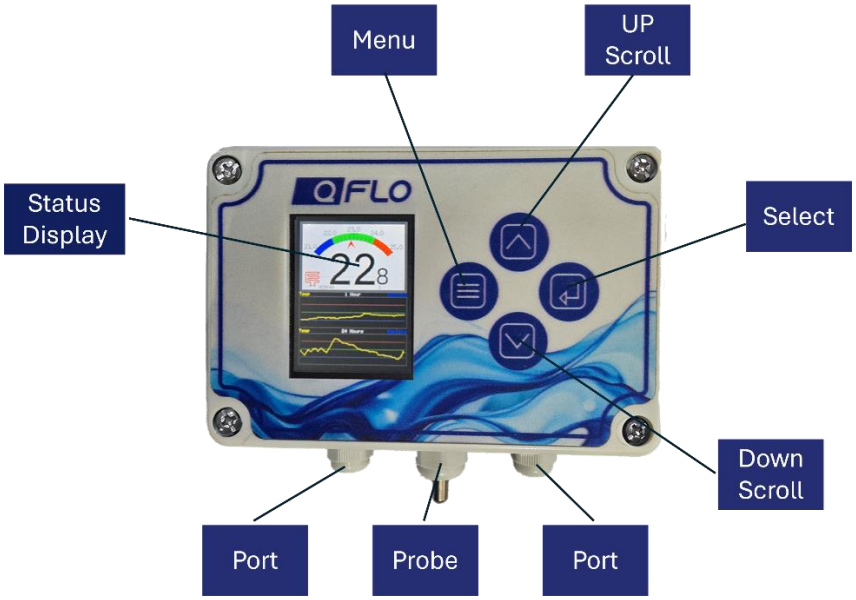

Figure 1: Figure 1: QFlow Universal Temperature Controller (UTC) Features

PRIMARY DISPLAY

The primary display, which activates as soon as the unit is powered on, provides a clear and comprehensive performance dashboard divided into two main sections.

The upper section features a temperature gauge displaying the upper and lower control limits alongside the current temperature. Directly below the gauge is a precise numerical temperature readout, accurate to one decimal place. To the left of this readout, icons indicate whether the heating or cooling system is active.

The lower section of the dashboard showcases two Statistical Process Control (SPC) charts. The top chart presents the temperature data from the past hour, while the lower chart shows the trend over the previous 24 hours. Both charts include upper, centre, and lower control levels for easy reference.

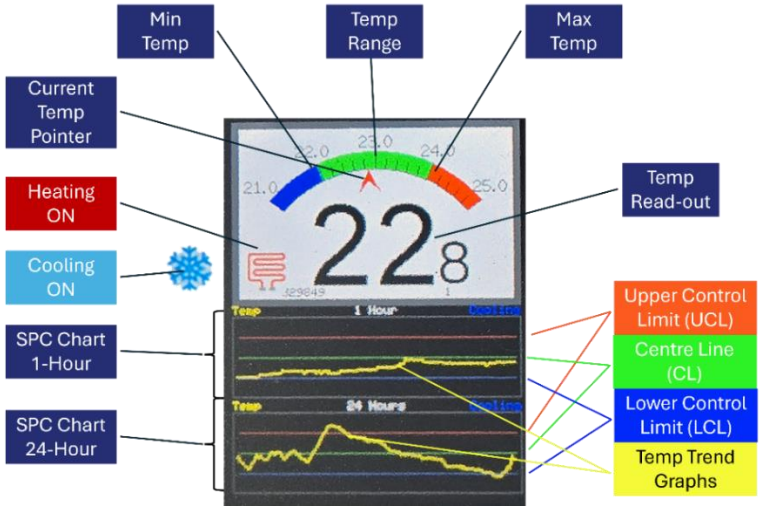

Figure 2: Primary Display Dashboard

MENUS AND SET-UP PROCEDURES

INTRODUCTION

The QFlo Universal Temperature Controller (UTC) offers three menu options, accessible by pressing the menu icon, as shown in Figure 1. By holding the button, the menus will scroll open, or they can be accessed directly through one, two, or three quick presses of the button.

The menus and their respective items are illustrated in Figure 3. They include:

1. Control Setting
2. Relay and Connectivity Settings
3. System Maintenance

Control Setting

Relay and Connectivity Settings

System Maintenance

Figure 3: QFlo Menus and Menu Items

Following is a description of each menu and its menu items and how the set-up of each of the items is done.

CONTROL SETTINGS

The Control Settings menu contains the following menu item:

1. **Temperature** - desired setpoint temperature.
2. **Differentials** - tolerance range for maintaining process stability and controlling temperature fluctuations.
3. **Power** – On/OFF selection of sensors and applications.
4. **Additional Functions** (Example Brix) – pre-defined functions based on intended application.

Figure 4: Control Settings Menu

The function and set-up process for each of these menu items will now be explained.

.

TEMPERATURE SET-UP

A key aspect of the QFlo Universal Temperature Controller (UTC) is the setup of the Centre Line (CL), which serves as the target or average value for the process being controlled. In the context of temperature control, the CL typically represents the desired setpoint temperature, acting as a reference point to monitor and maintain stability within acceptable limits.

Proper configuration of the CL is essential for achieving optimal performance, minimizing fluctuations, and ensuring consistent quality in operations. By integrating advanced Statistical Process Control (SPC) features, the QFlo UTC empowers users to streamline processes and enhance efficiency with ease.

When activating the Control Settings menu and selecting Temperature, the window will change to the set-up screen. Follow the set-up process as depicted in Figure 6.

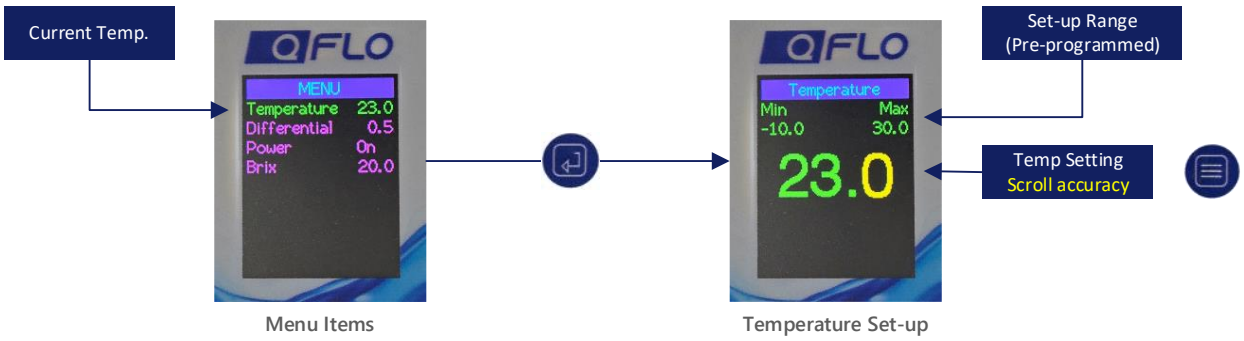

Figure 5: Temperature Displays

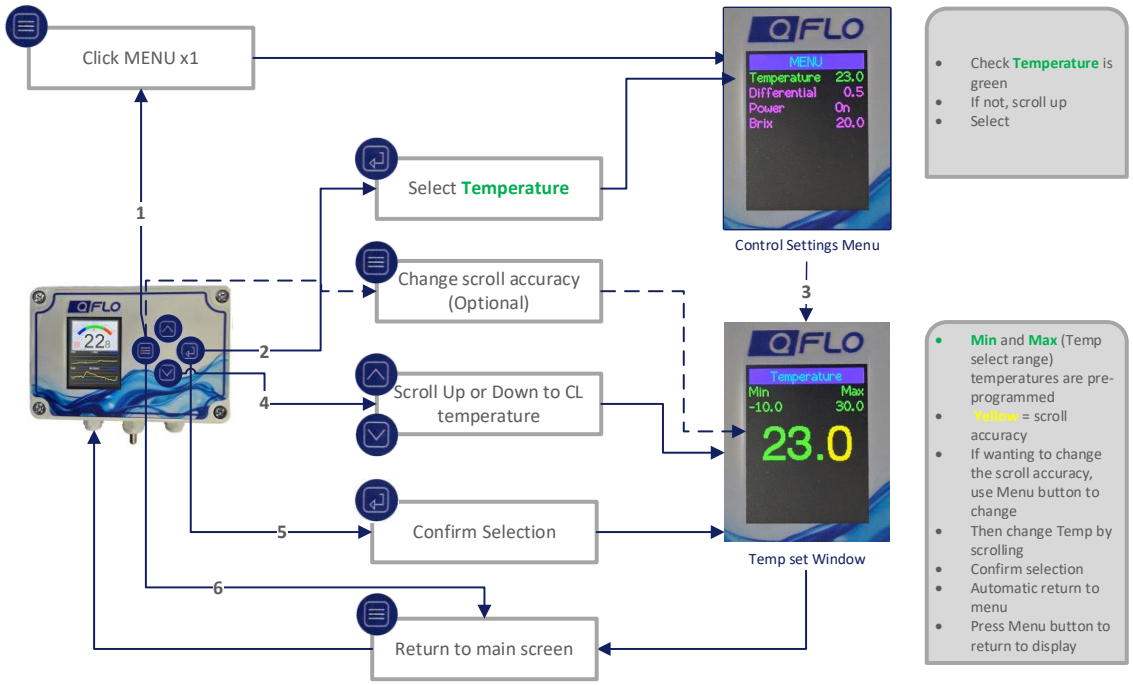

Figure 6: Temperature Set-up Process

DIFFERENTIAL SET-UP

The Differential setup in the QFlo Universal Temperature Controller (UTC) is a vital parameter that defines the tolerance range for maintaining process stability and controlling temperature fluctuations. Once the Centre Line (CL) temperature is configured, the differential establishes the Upper Control Limit (UCL) and Lower Control Limit (LCL), ensuring the system operates within the desired range. Additionally, the differential plays a key role in managing the automatic activation of heating and cooling systems, responding when the temperature deviates beyond these limits. Proper configuration of the differential enhances efficiency, reduces variability, and ensures consistent performance across all applications.

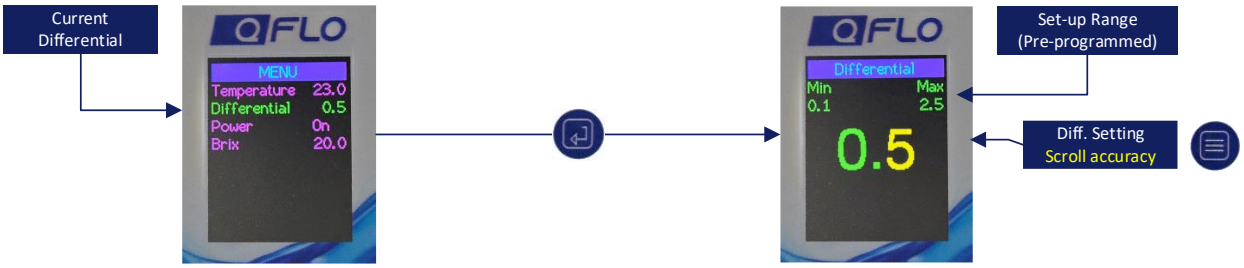

Figure 7: Differential Displays

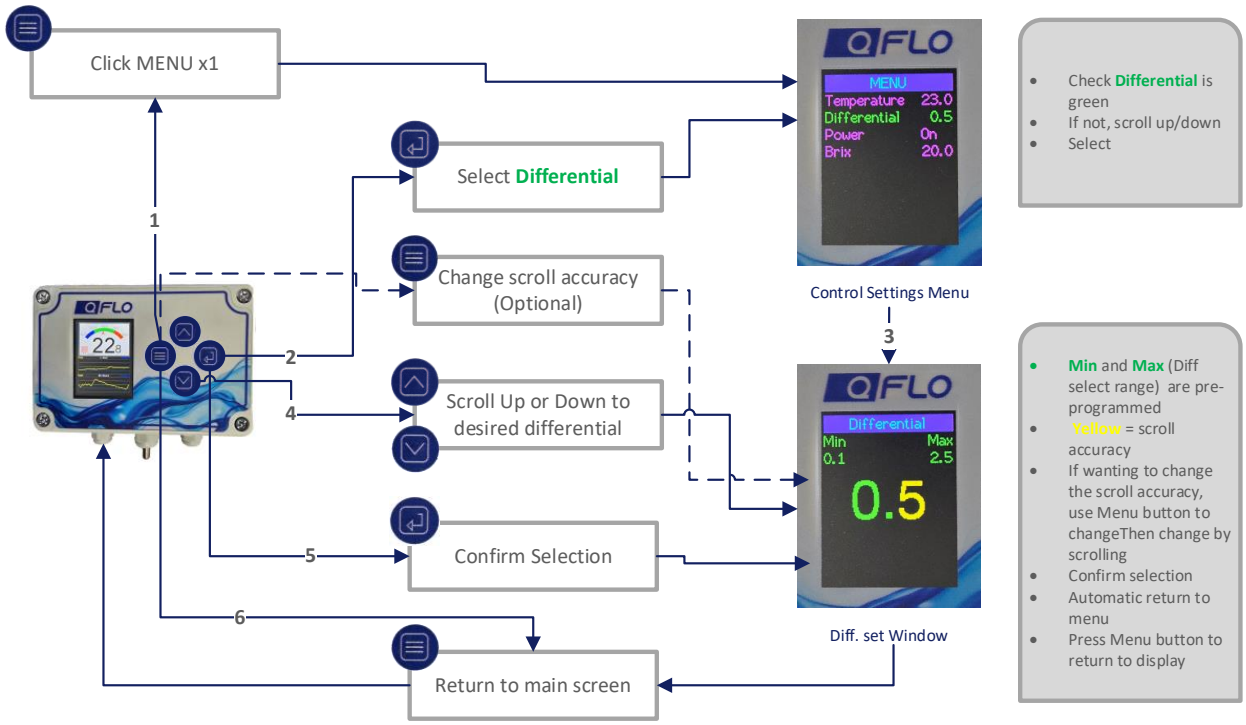

Figure 8: Differential Set-Up Process

POWER

The Power ON/OFF selection connects the controller with the heating and cooling systems, or any other systems/devices connected to it.

The process to access this selection is shown in Figure 10.

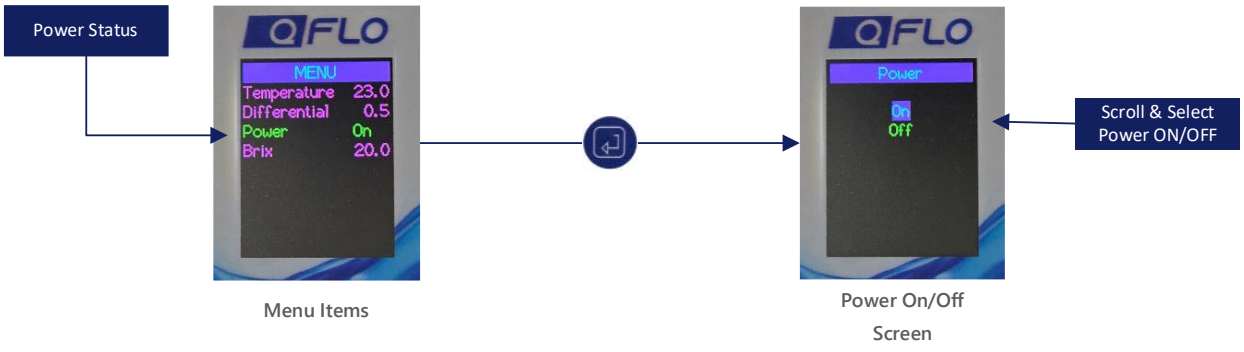

Figure 9: Power ON/OFF Displays

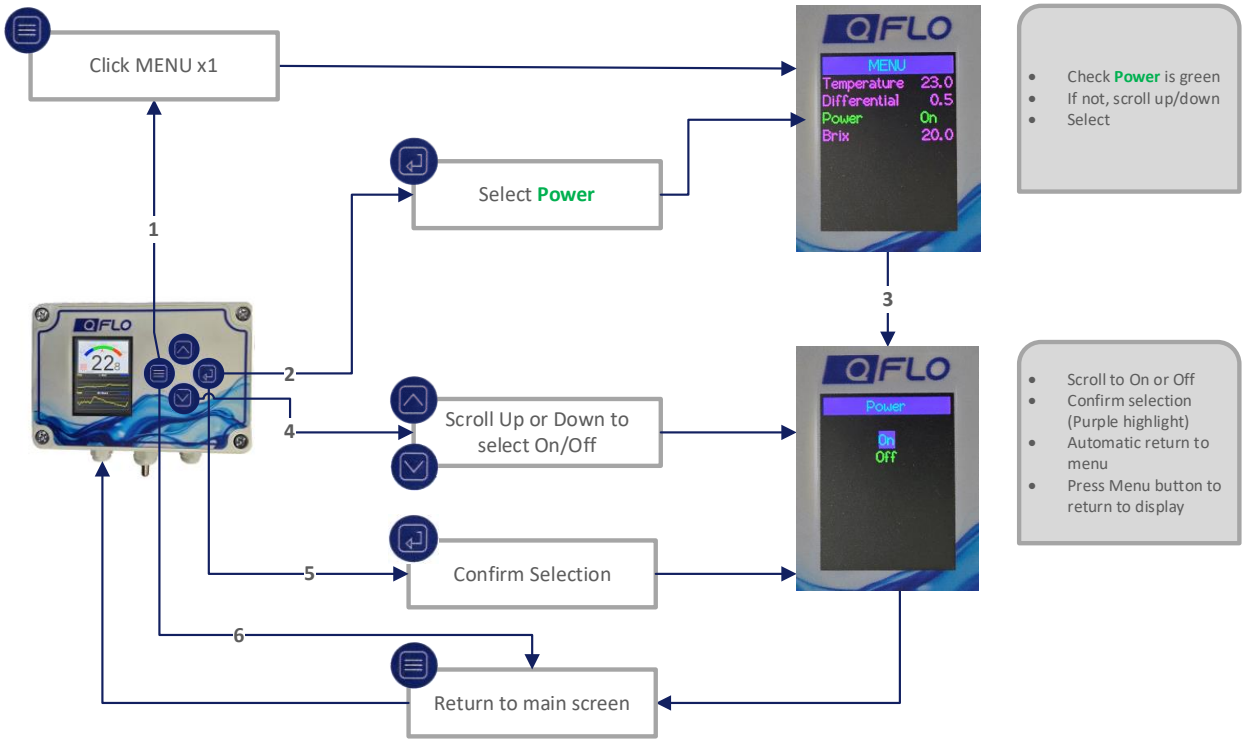

Figure 10: Power ON/OFF Process

ADDED FUNCTIONALITY SET-UP

The QFlo UTC offers the advantage of pre-configuration tailored to its intended application. Its flexibility and scalability are further highlighted by the ability to integrate additional functions. For example, the unit shown below has been pre-configured to display Brix levels during the wine fermentation process.

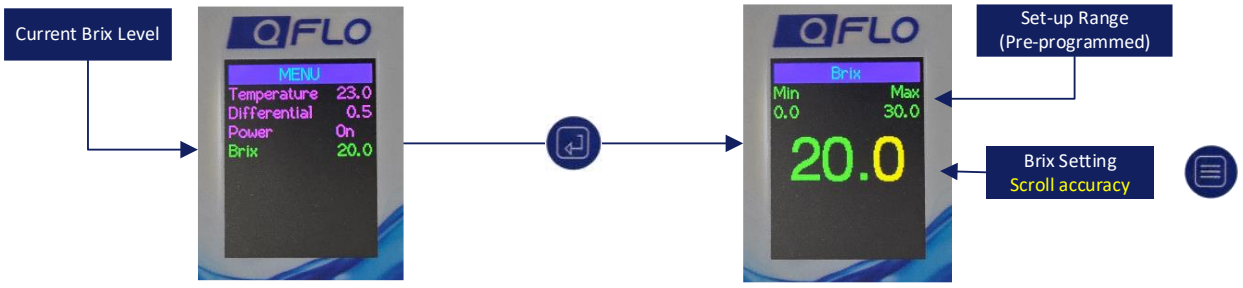

Figure 11: Added Functionality Displays (Brix Example)

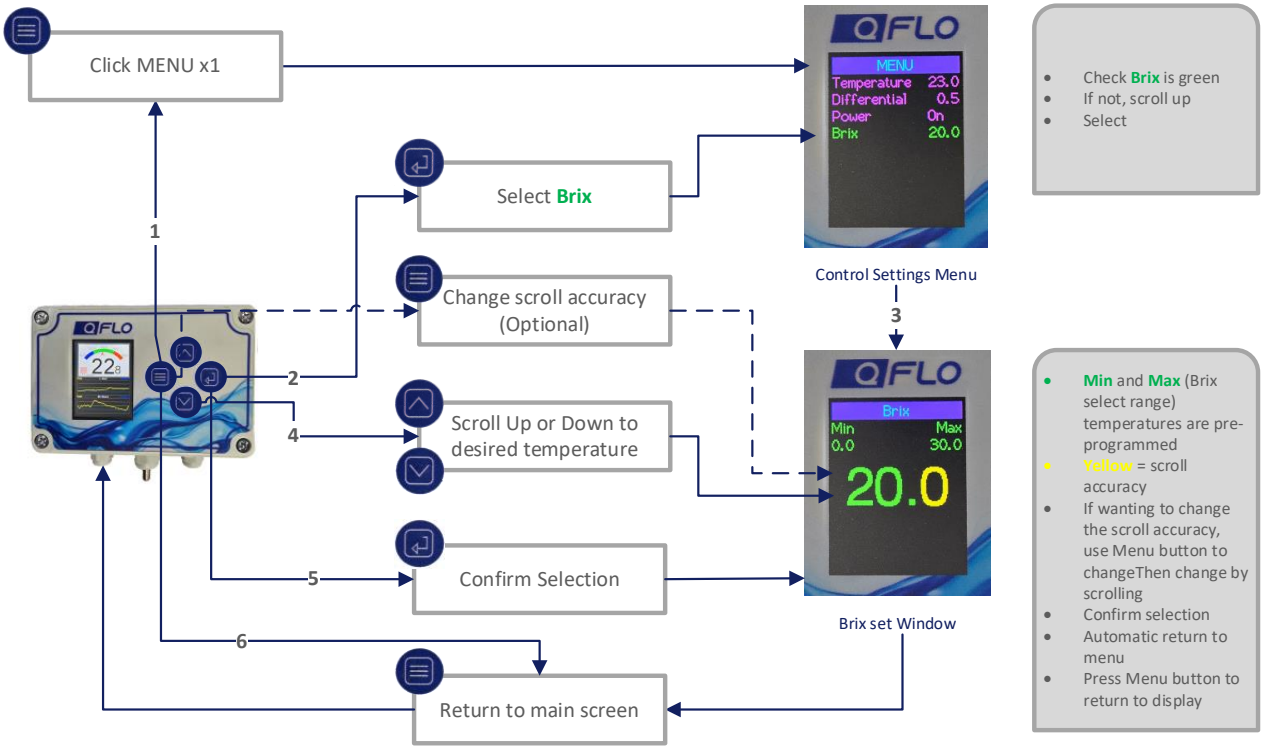

Figure 12: Added Functionality Set-up (Brix Example)

RELAY AND CONNECTIVITY SETTINGS MENU

The Relay and Connectivity Setting menu contains the following menu item:

1. **RelayHeat** – Internal relay to select heat/pump.
2. **RelayExt** – Link to an external relay with its specific functions.
3. **Mobile App** – Linking a device to a personal profile using a phone.
4. **LoRa SF** - LoRa Spreading Factor, a key parameter in LoRaWAN communication.
5. **LoRa Int** - Communication link.

Figure 13: Relay and Connectivity Settings Menu

The function and set-up process for each of these menu items will now be explained.

HEATING RELAY (RELAYHEAT) SELECTION

The QFlo UTC is equipped with two internal relays: one exclusively for cooling and the other for connecting to external systems, such as a heat source or a pump, as demonstrated in this example. Users can select from three additional modes: "Heat," "Pump," or "Off," where the "Off" mode applies specifically to the two external sources. This guide provides step-by-step instructions to help users configure these settings, ensuring reliable and efficient temperature control tailored to their specific needs.

- Pump – pressure pump is running.
- Heat – heating element is on.
- Off – both pump and heat are off.

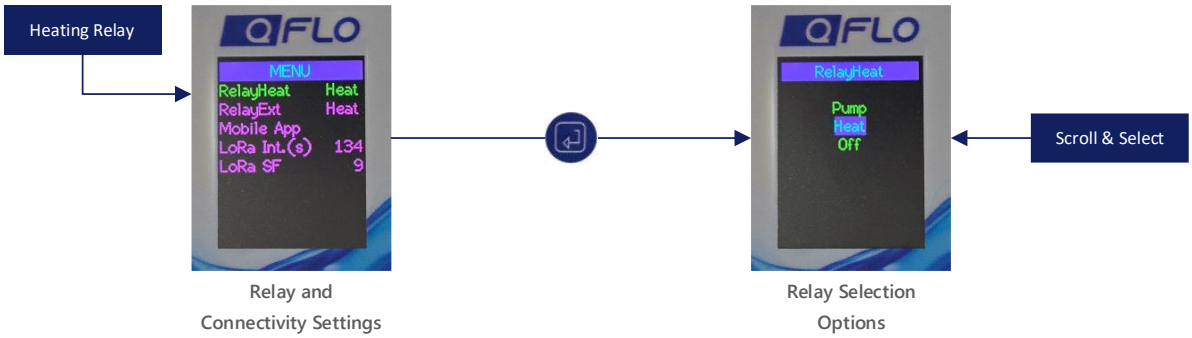

Figure 14: Heating Relay Displays

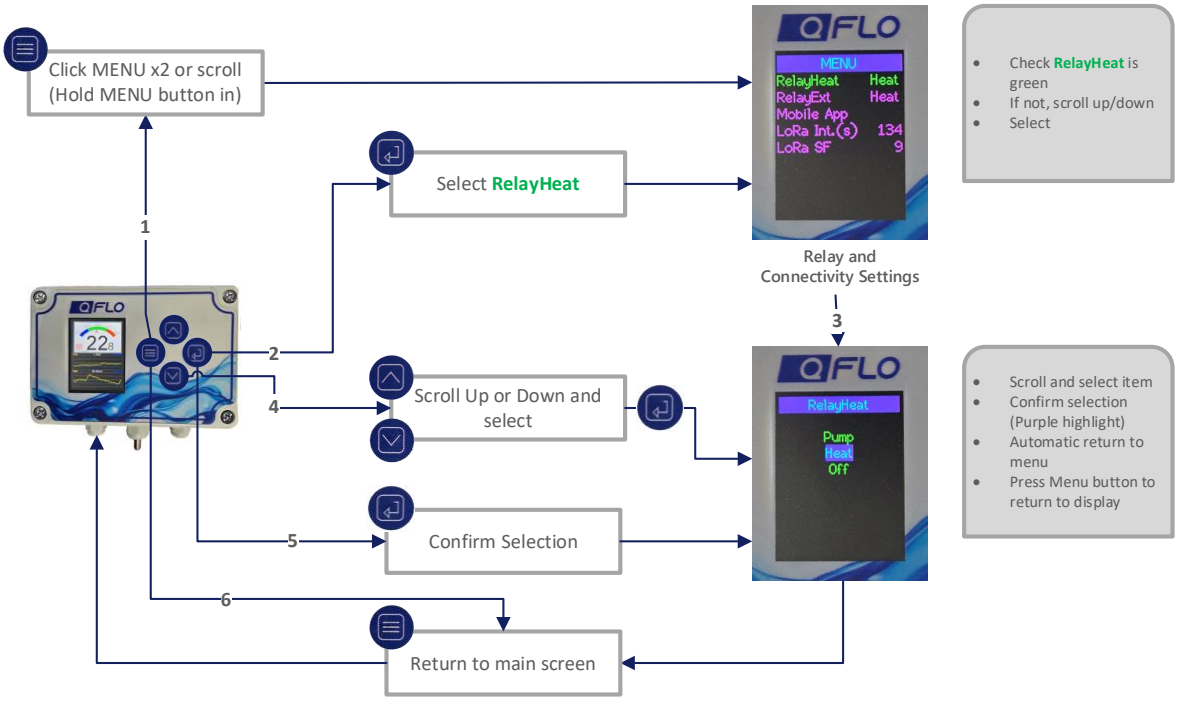

Figure 15: Heating Relay Selection Process

EXTERNAL RELAY (RELAYEXT) SELECTION

The QFlo UTC can connect to one or more external relays, which can then be managed directly from the QFlo UTC. While the standard unit supports a single external relay, additional relays can be connected depending on the specific application requirements.

This example shows the following selections:

- Pump – pressure pump is running.
- Heat – heating element is on.
- Off – both pump and heat are off.

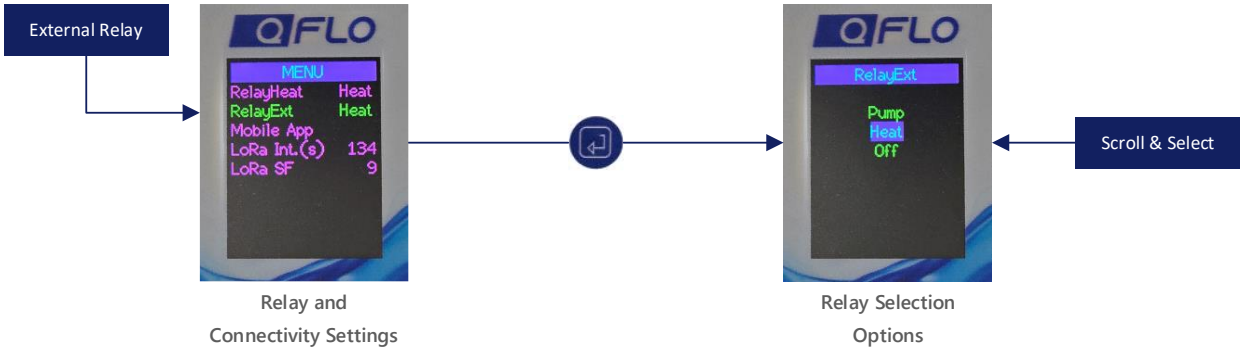

Figure 16: External Relay Displays

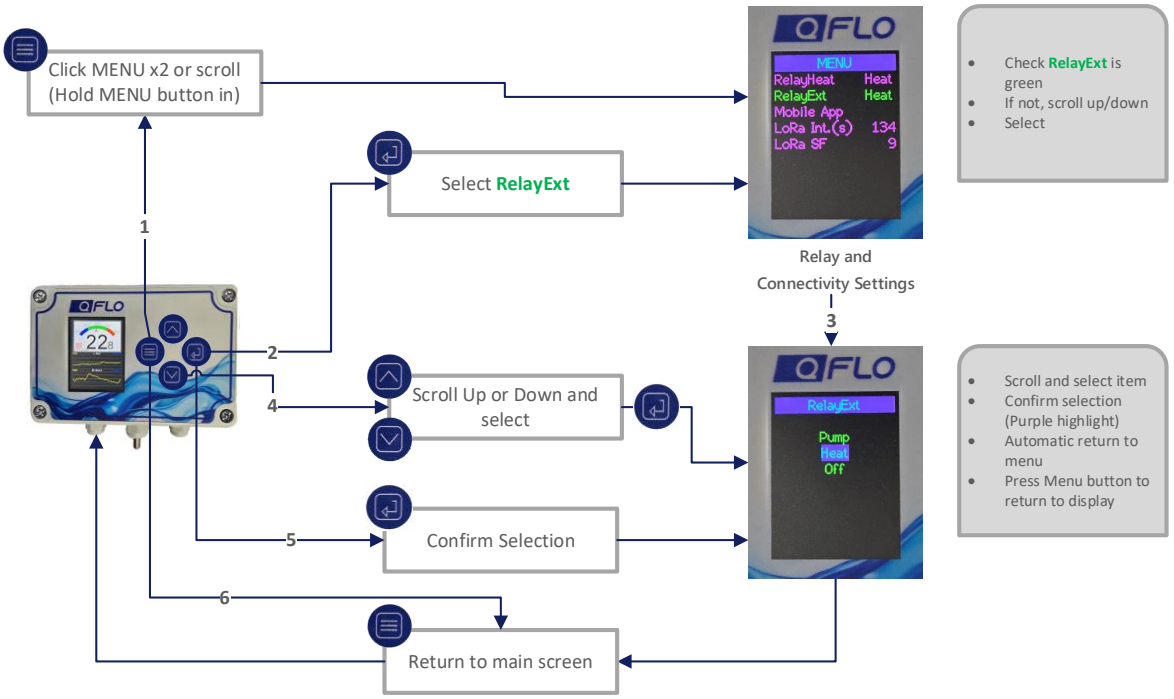

Figure 17: External Relay Selection Process

MOBILE APPLICATION SELECTION

The QFlo UTC user can access their profile and management portal via the Mobile App feature available in the Relay and Communication Settings menu. A QR Code option is provided, allowing users to seamlessly connect to their profile using a mobile device, such as a smartphone or tablet.

Figure 18: Mobile Application Displays

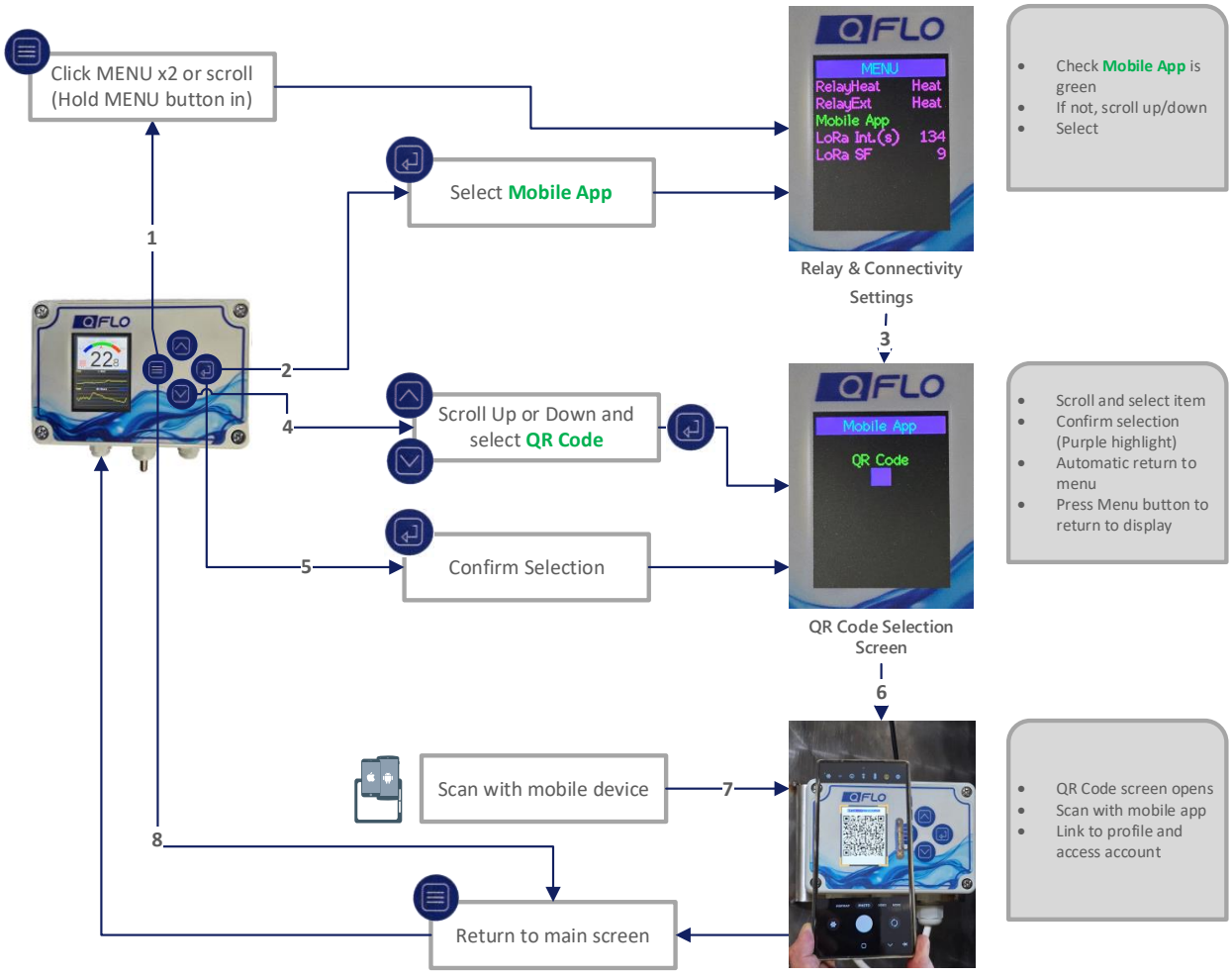

Figure 19: Mobile Application Selection Process

LoRa INTERVAL SELECTION

In the context of LoRa technology, "interval in seconds" (LoRa Int.(s) refers to the time duration between data transmissions by a LoRa device. A longer interval results in less frequent transmissions, which enhances energy efficiency—particularly for battery-powered devices. Conversely, shorter intervals allow for more frequent data transfers but can deplete battery life more quickly.

This parameter is crucial in optimizing device performance for specific applications, balancing data transfer frequency with energy consumption.

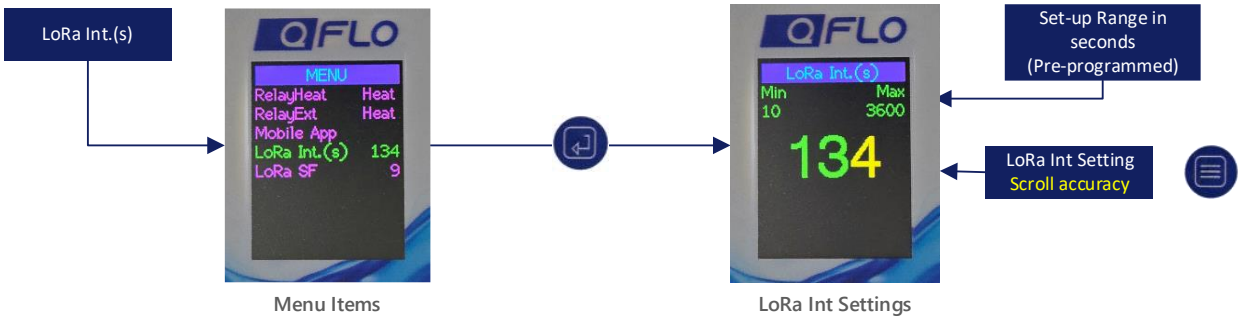

Figure 20: Mobile Application Displays

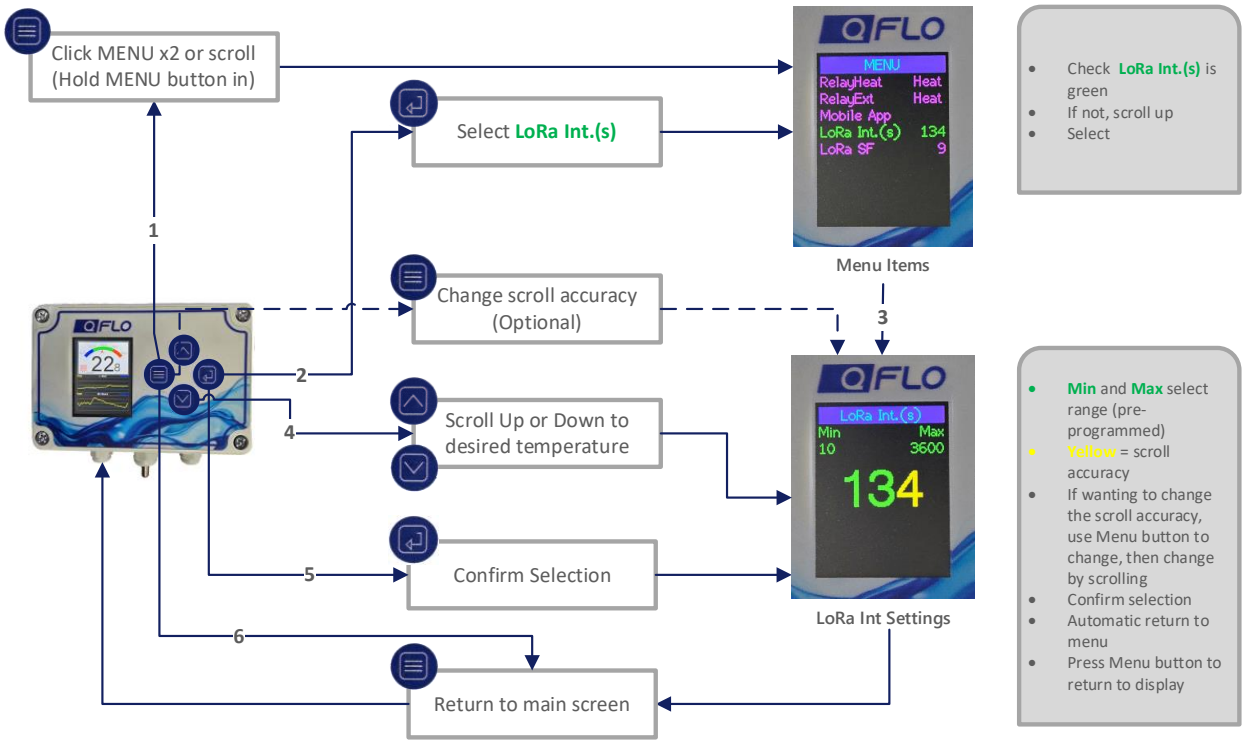

Figure 21: Mobile Application Selection Process

LoRa SF SELECTION

LoRa SF, or LoRa Spreading Factor, is a key parameter in LoRaWAN communication. It determines the duration of the chirp signal used for data transmission. A higher spreading factor increases the range and sensitivity of the signal but reduces the data rate, while a lower spreading factor does the opposite.

Figure 22: Mobile Application Displays

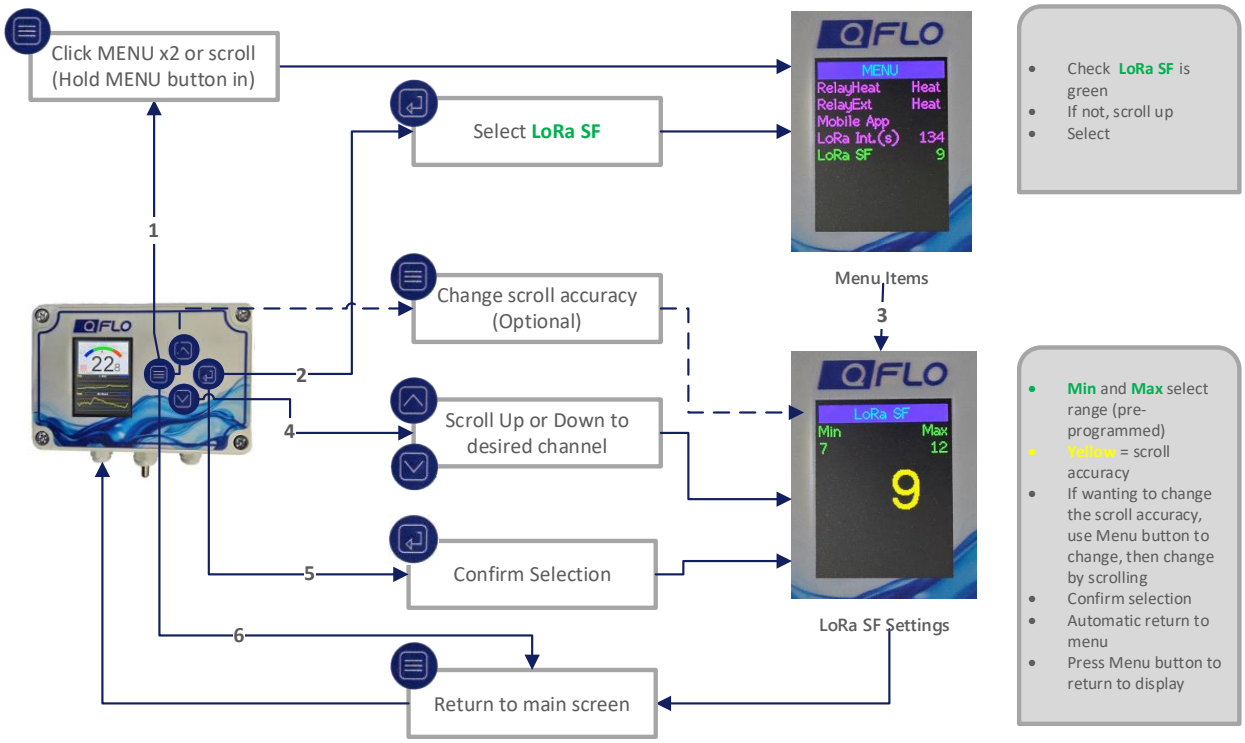

Figure 23: Mobile Application Selection Process

SYSTEM MAINTENANCE MENU

The System Maintenance menu contains the following menu item:

1. **Reboot** – reboot the QFlo UTC.
2. **Upgrade** – Upgrade to the latest software version.
3. **Factory Reset** – Resets the unit to the default factory settings.
4. **Sensor Debug** – Fault analysis of the sensor On/Off.

Figure 24: Systems Maintenance Menu

The function and set-up process for each of these menu items will now be explained.

REBOOT

When selecting the reboot option on the QFlo UTC, the system performs essential tasks to refresh its operation. This process includes clearing cache, resolving minor glitches, testing all input and outputs and restarting services to ensure optimal performance. Rebooting does not affect user settings, updates, or factory configurations unless specifically prompted through the respective options.

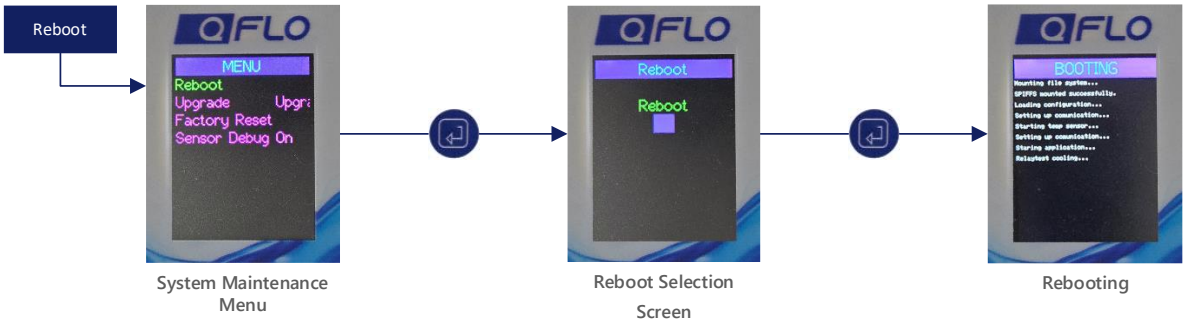

Figure 25: Reboot Displays

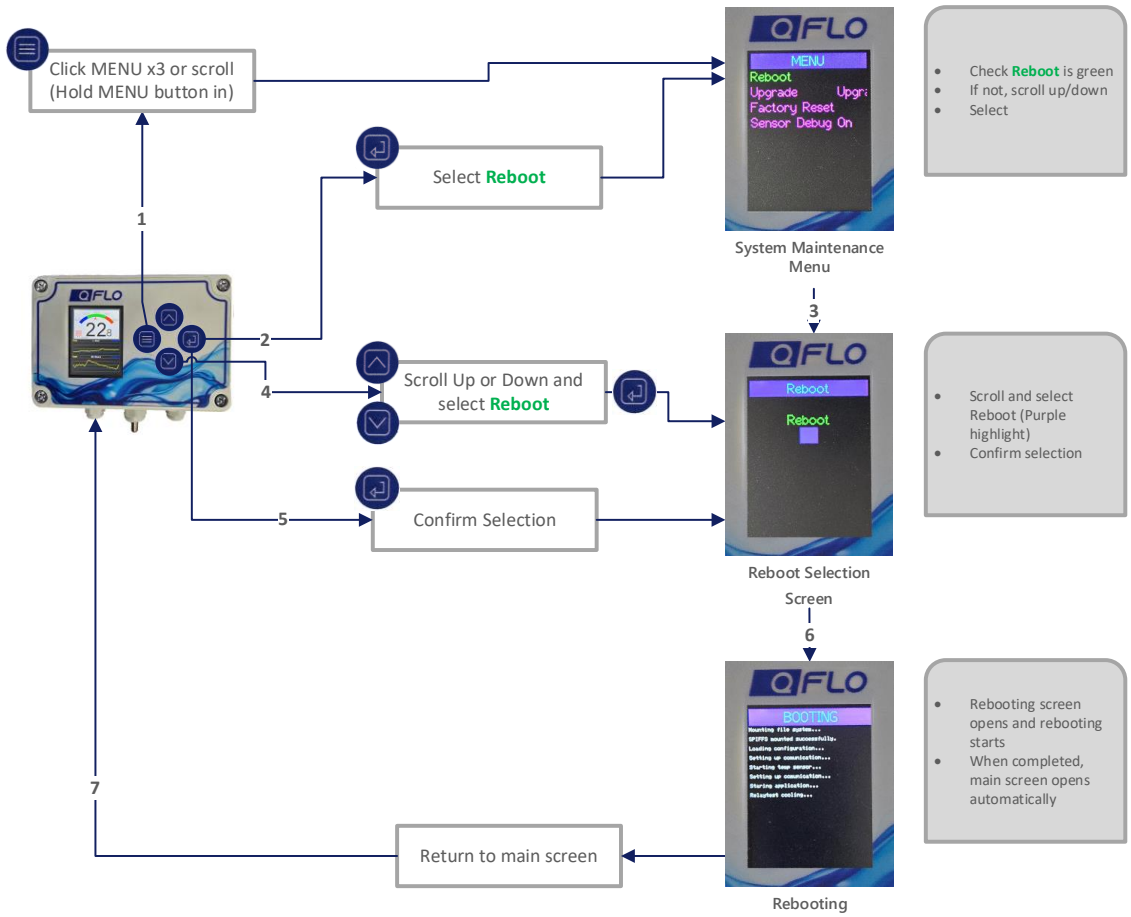

Figure 26: Reboot Selection Process

UPGRADE

When selecting the upgrade option on the QFlo UTC, the firmware is upgraded to the latest version. This can be done using the QFlo application or via the Web. Following is a description of how it is done through the Web.

Figure 27: Upgrade Displays

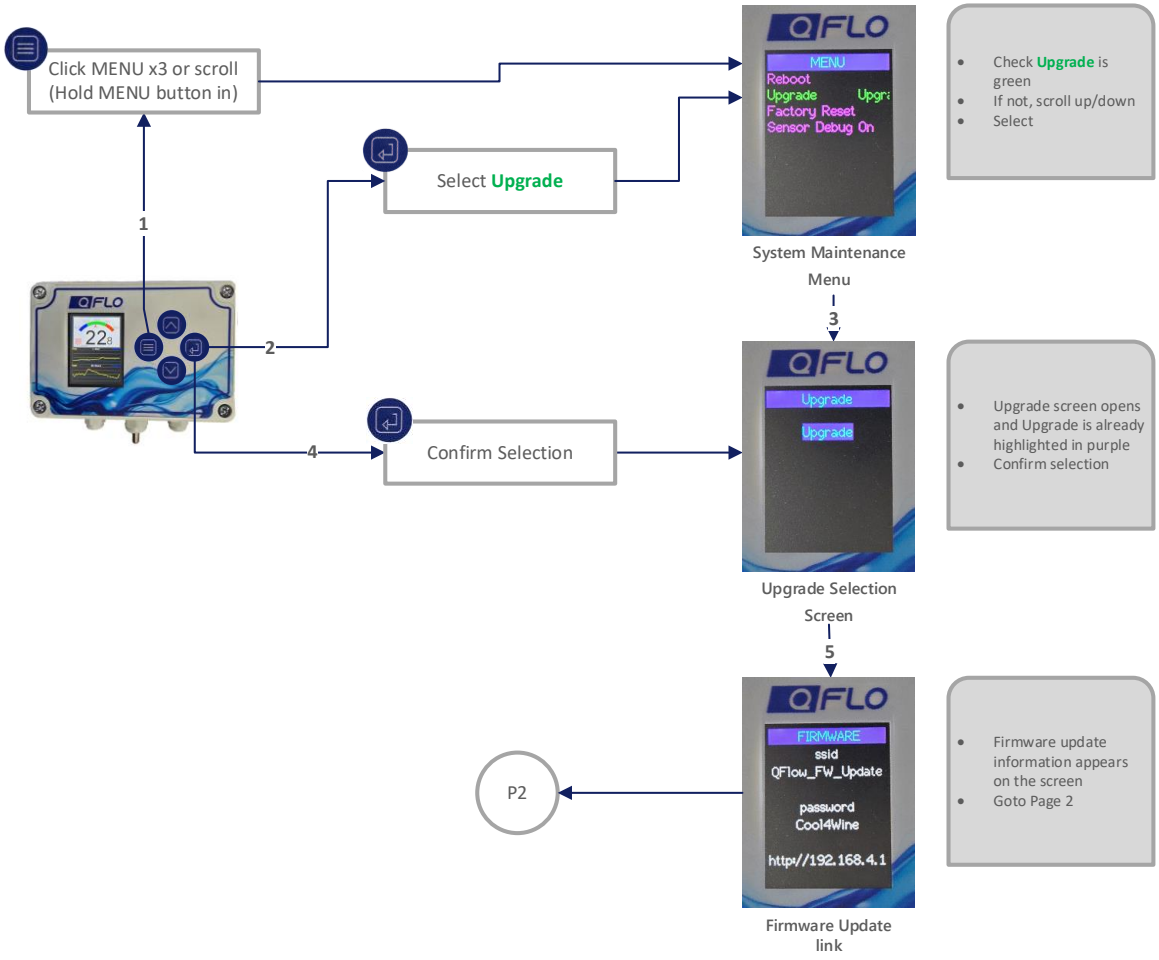

Figure 28: Upgrade Selection Process

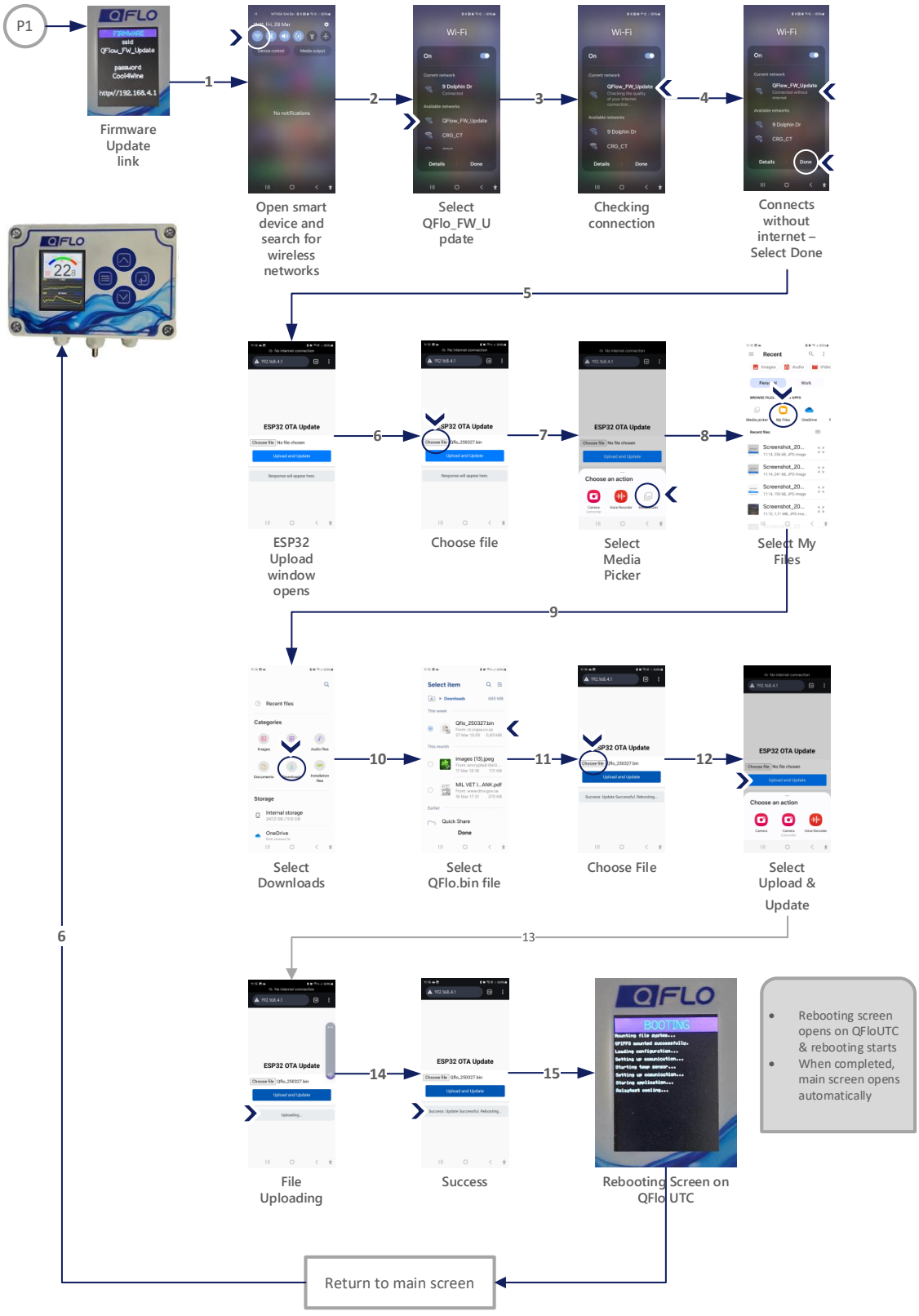

Figure 29: Online Upgrade Process using a Smart Device

FACTORY RESET

When selecting the Factory Reset option on the QFlo UTC, all functions are reset to the factory settings.

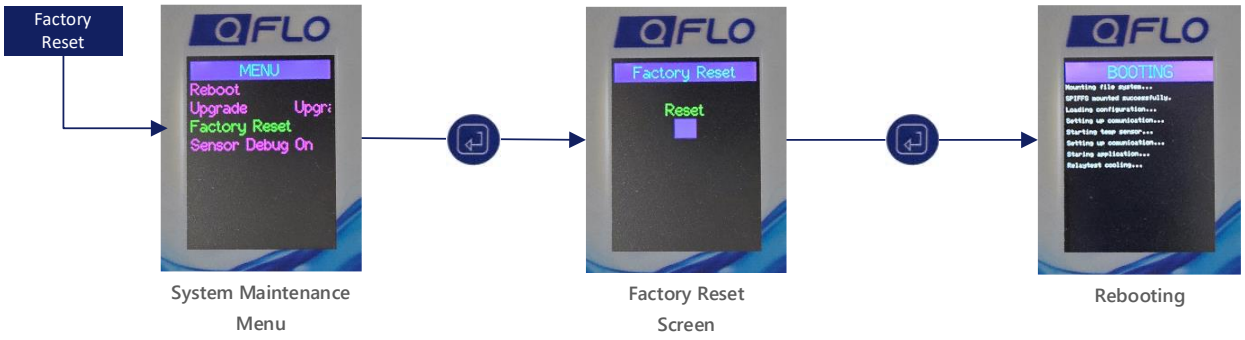

Figure 30: Factory Reset Displays

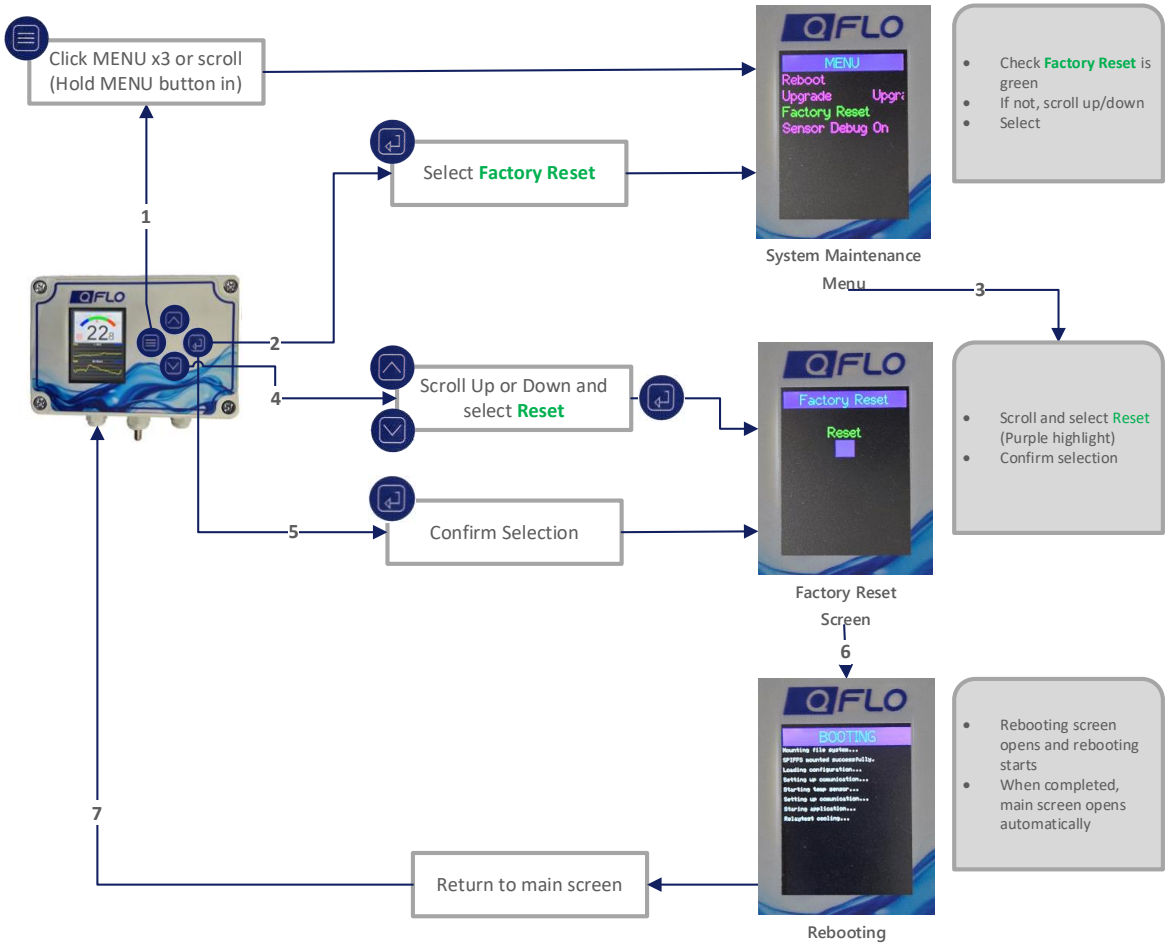

Figure 31: Factory Reset Process

SENSOR DEBUG

When the Sensor Debug selection is made, the controller and sensors are scanned to see if there are any errors. The count of the errors will be displayed along with the number of scans.

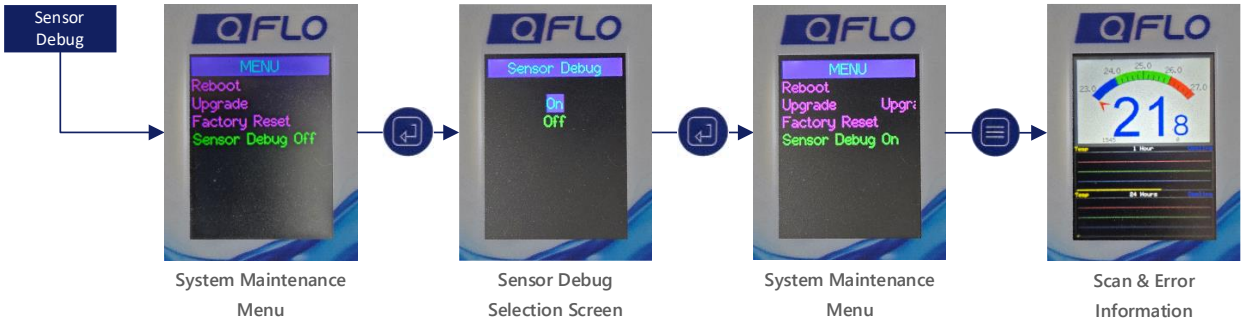

Figure 32: Sensor Debug Displays

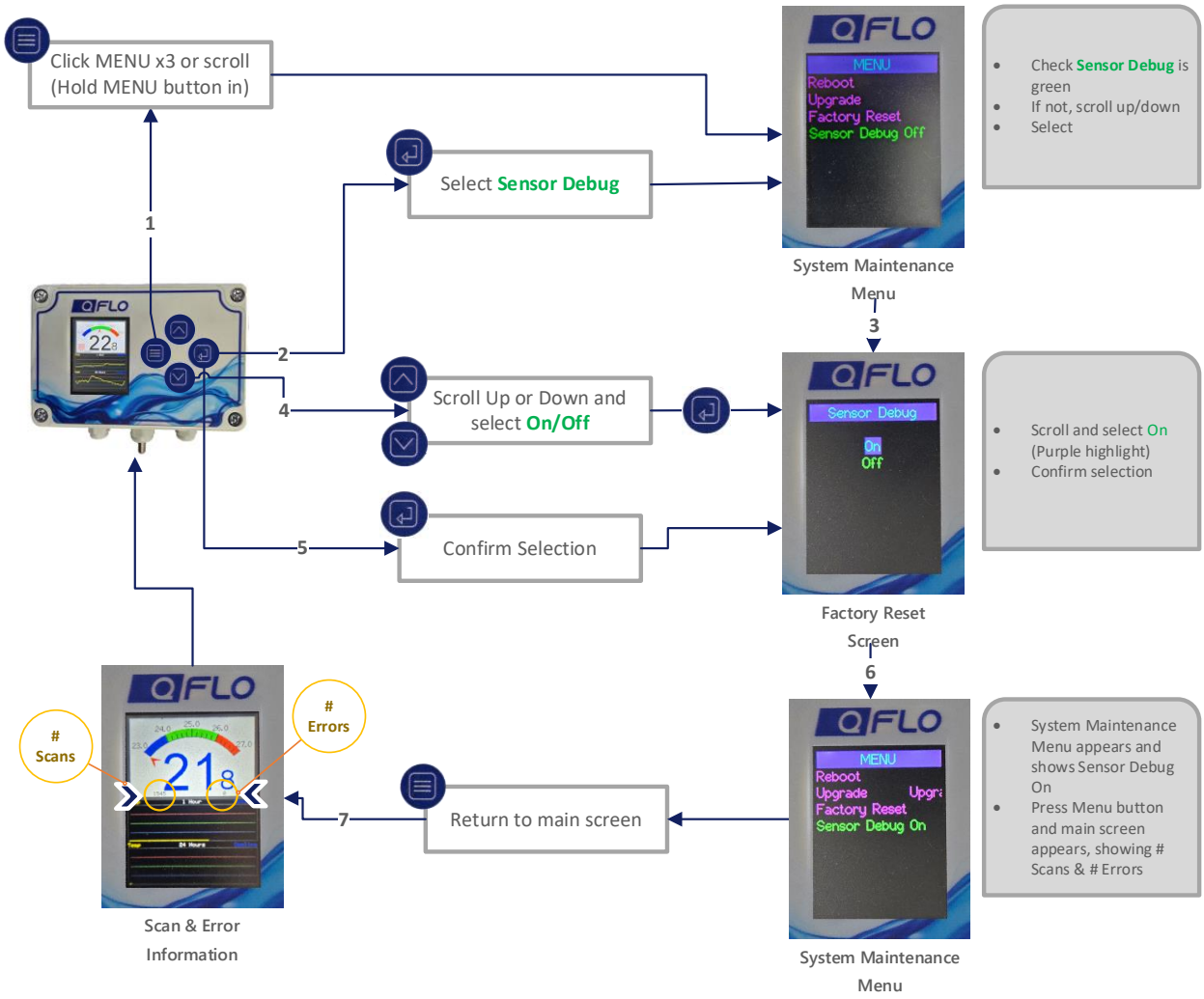

Figure 33: Sensor Debug Selection Process

MAINTENANCE

CLEANING:

- Wipe the surface with a soft, damp cloth.
- Do not use abrasive cleaners or immerse in water.

TROUBLESHOOTING:

- *Issue*: The display is not turning on.
  - *Solution*: Ensure the power source is connected and functional.
- *Issue*: Temperature readings seem inaccurate.
  - *Solution: Use manual meter to verify and then act accordingly.*
- Not controlling external outputs
  - *Check internal fuse.*
  - *Check control valve functionality.*
  - *Check wiring.*

TECHNICAL SUPPORT

- For assistance, contact our support team at:
  - Phone: +27 21 557 5847
  - Email: support@qflo.co.za
- Warranty claims can be processed via our website at www.qflo.co.za.

PRODUCT SPECIFICATION

1. PRODUCT OVERVIEW

- **Product Name**: QFlo Temperature Controller
- **Model Number**: QFlo-UTC-10-40-V1
- **Description**: The QFlo Temperature Controller is an advanced temperature controller designed for precision temperature management in residential, commercial, and industrial settings. It offers a user-friendly interface, smart connectivity, and robust performance.

2. TECHNICAL SPECIFICATIONS

- **Dimensions**: 80mm x 120mm x 60mm
- **Weight**: 310g
- **Material**: Flame-retardant polycarbonate with operating temperature range of - 20°C to + 110°C
- **Input voltage**: 12v -to 48v AC or DC
- **Outputs**:
  - **Cooling relay**: 10A 250V
  - **Heating relay**: 10A 250V
  - **Pump-over relay**: 10A 250V
- **Temp differential**: 0.1°C to 2.5°C
- **Temperature Range**: -10°C to 40°C
- **Accuracy**: ±0.5°C
- **Response Time**: <1 second
- **Connectivity**: Wi-Fi 2.4G, LoRa EU868, Bluetooth BLE
- **Resolution**: ±0.1°C
- **Stability**: ±0.1°C per year

3. FEATURES

- **Display**: 2" (5cm) Colour LED
- **Control Modes**: Automatic
- **Safety Features**: Overheat protection, customizable alarms, automatic shutdown
- **Energy Efficiency**: Low power device

4. ENVIRONMENTAL CONDITIONS

- **Ingress Protection**: IP66
- **Operating Temperature**: 5°C to 40°C
- **Storage Temperature**: 0°C to 60°C
- **Humidity**: 10% to 90%

5. PACKAGING AND ACCESSORIES

- Included Items:
  - Temperature controller unit
  - Quick-start guide
  - User manual

6. WARRANTY

- 1-year limited warranty

SUPPORT

- For assistance, contact our support team at:
  - Phone: +27 21 557 5847
  - Email: support@qflo.co.za
- Warranty claims can be processed via our website at www.qflo.co.za.