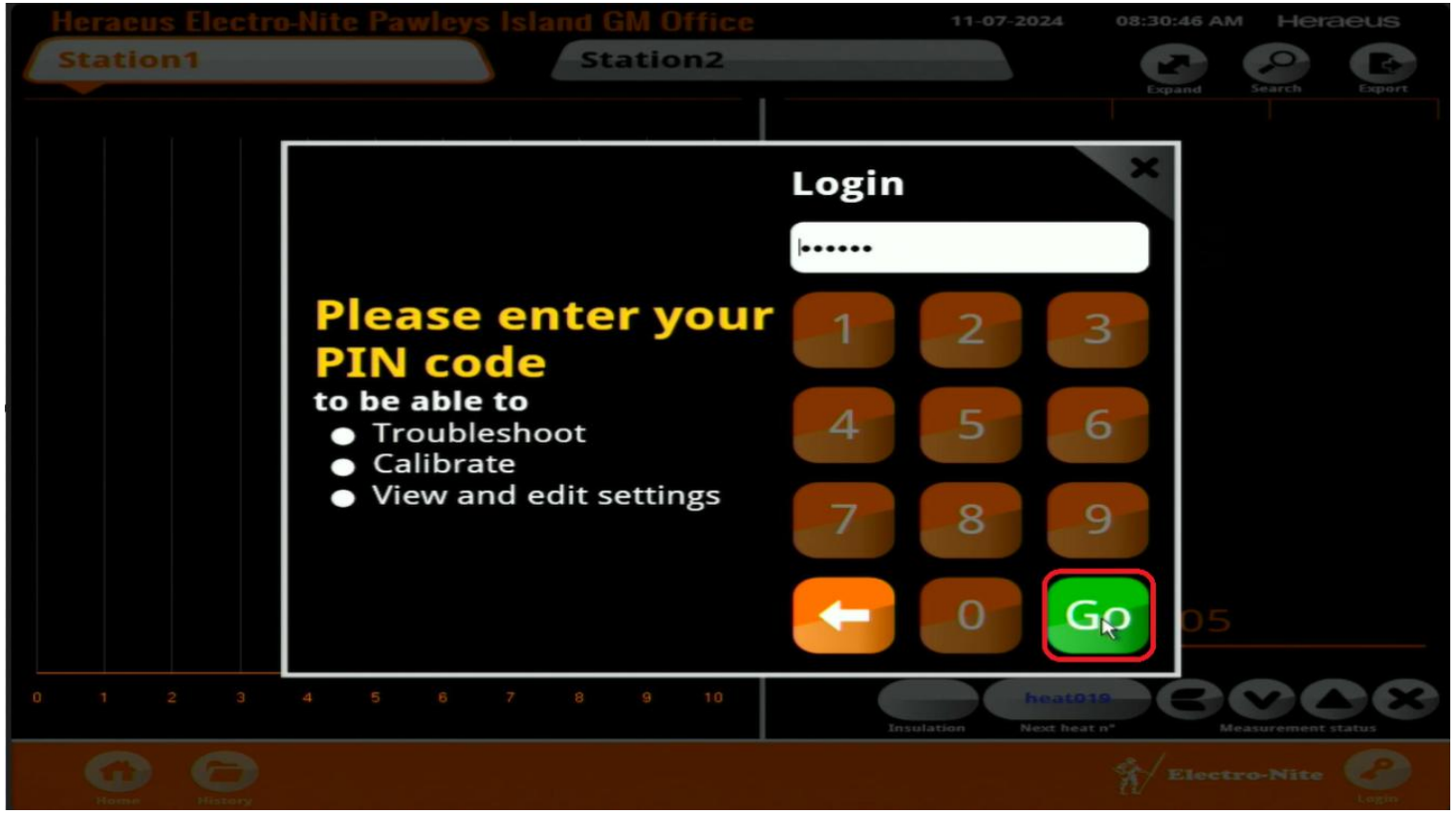
SensorLab Thermocouple (temperature-rise) Bath Level Detection

Description:

- **Thermocouple Bath Level Detection (SensorLab):** Step-by-step guide to configuring temperature-rise bath level parameters and verifying detection by monitoring the Bath Level status bit (status-bit only commissioning).

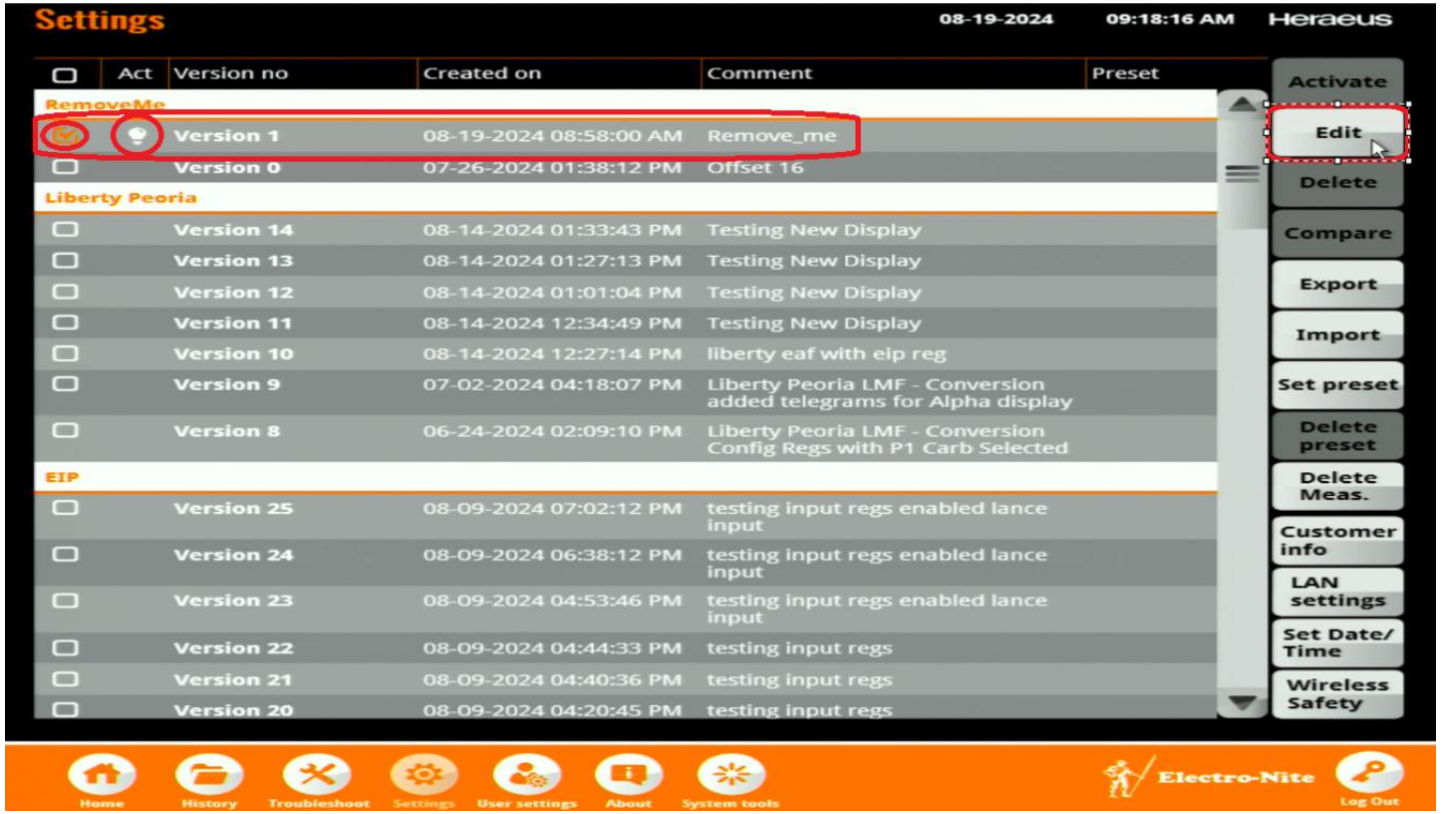
Log In

- Log in with “24816”.



Settings

- Click <Settings>
- The program with the light bulb is the active program
- Select the active program and click <Edit>



Settings Overview – Navigate to Oxygen Configuration

- In the “Applications” section:
- Choose the Station column(s) to have the Thermocouple Bath level feature enabled:
- Click the edit icon on the right side of the “Oxygen” item to navigate to the configuration screen for that station.

Enable Thermocouple Bath Level

- Check the “Enable bath level detection ” item in the “Application Parameters” section to activate it.
  - Do not check the “Enable bath level detection EMF ” option as this requires a license.
- Click <Done>.
- Repeat for any additional stations as required.

Navigate to Bath Level Options

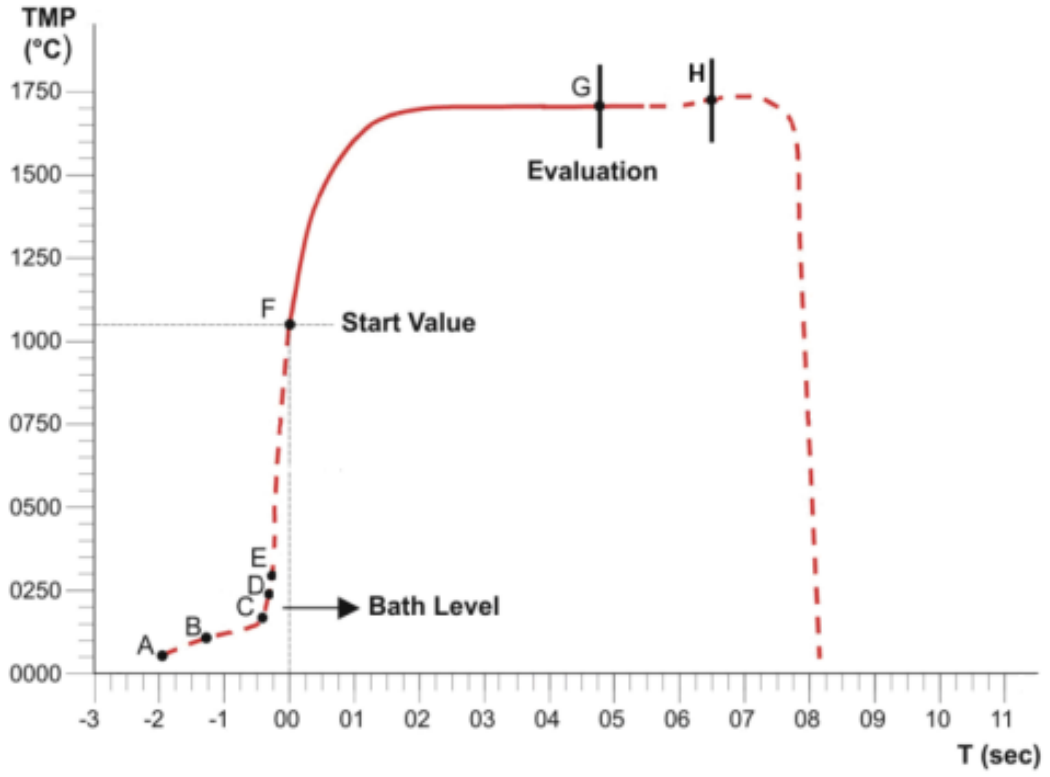
- Click the <Bath level options> button to navigate to “Bath Level Options” screen.

Bath Level Options

- See section 8.6.4.2. for more information about bath level detection.
- Purpose: Provide feedback when the probe reaches the melt surface to support level estimation and immersion/depth control.
- How it works: Detection is based on a rapid temperature increase as the probe approaches the melt (“fast temperature rise”).
- Fast temperature rise criteria: Detection occurs when either:
  - Temperature rise rate ≥ 1832 °F/s, or
  - Temperature increase ≥ 572 °F (above the start temperature)
- Adjust parameters for your process.
- Click <Done>.

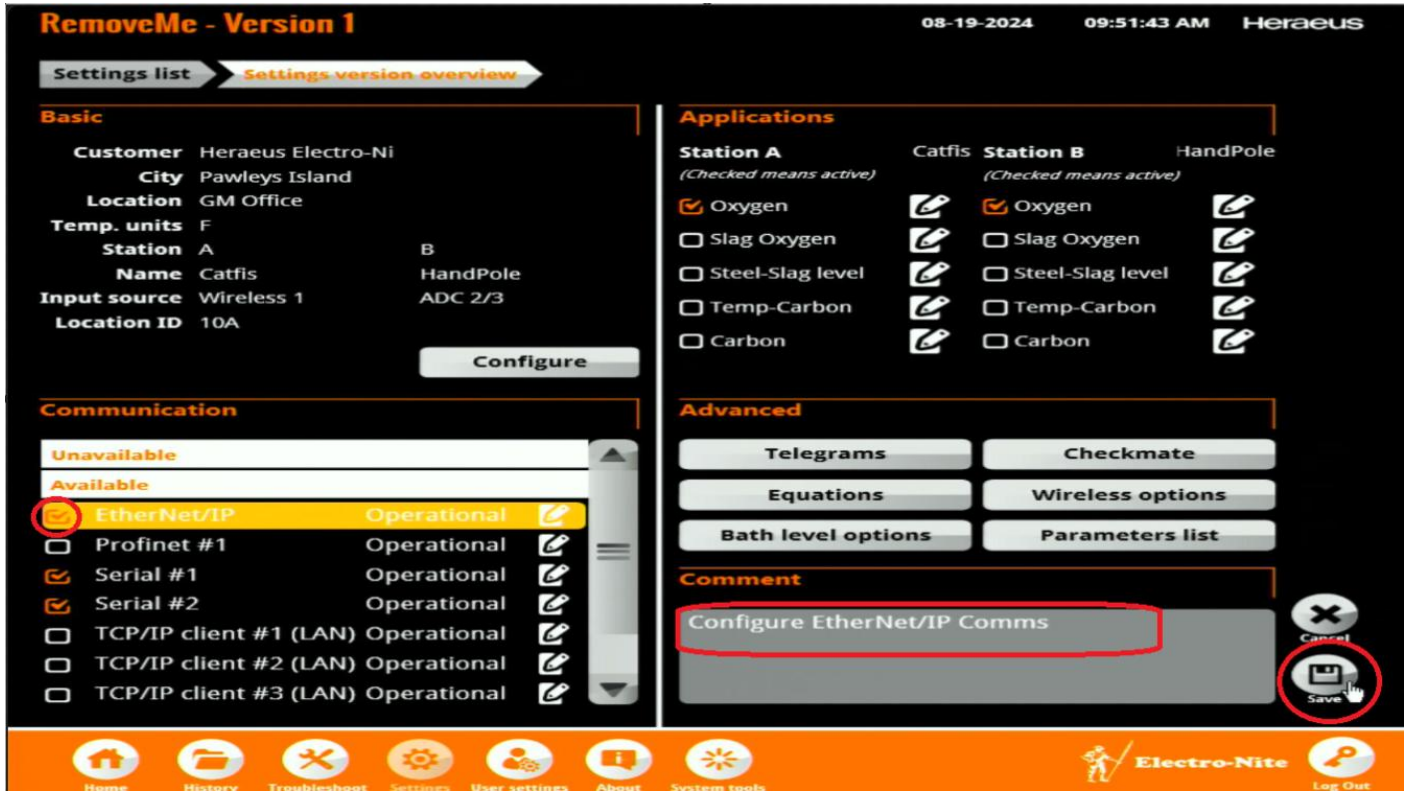
Bath Level Detection Curve Landmarks A-H (SensorLab manual section 8.6.4.2)

- **A** - The temperature of the probe increases when it approaches the bath surface
- **B** – Bath level detection is enabled **(Detection start temperature)**.
- **C** + **D** – The probe enters the bath (rapid temperature rise). **Bath level is detected here**.
  - C represents the slope of the temperature curve (Temperature rise detection threshold).
- **E** – Emergency stop position: the probe is stopped when this temperature (300°C) is reached if the previous attempt failed **(Detection temperature threshold).**
- **F** – The measurement curve is displayed on the screen.
- **G** – Temperature evaluation is complete. The instrument switches to END status (red light); the curve display stops and the probe rises.
- **H** – The probe leaves the bath (slight temperature rise while passing the slag layer). This is only visible for a fixed time measurement.



Save the changes

- Add comments to the “Comments” textbox to describe the changes made.
- Click <Save> to save the changes.

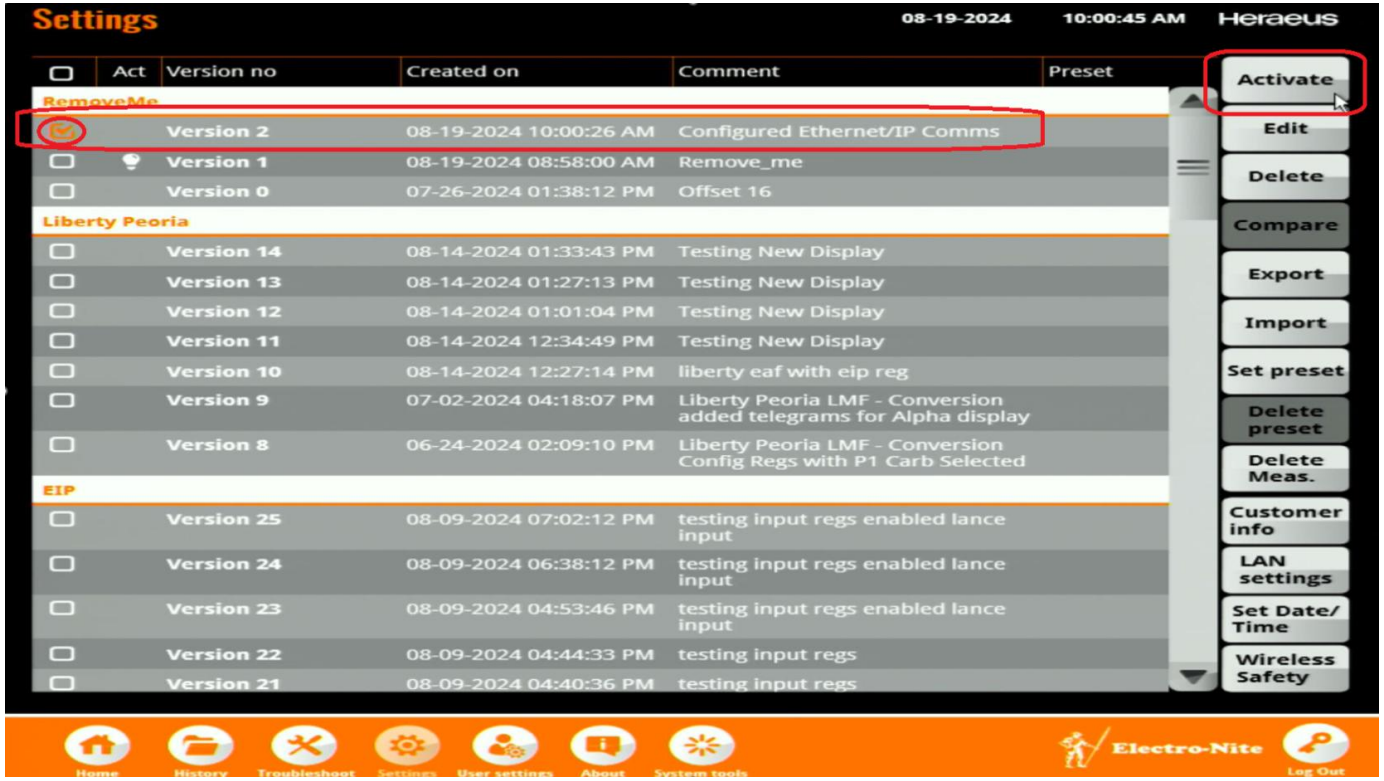


Save to Set

- Click <Save> to save the new program in the same set of programs as the program you started with.
- The original program will not be affected by this action.

Activating the New Program

- The program with the Bath Level configuration has been saved but not activated.
- The current activated program is still the original program with the light bulb indicator displayed beside it.
- To activate the new program, check the checkbox on the new program that was just created and click the <Activate> button.
- This will activate the new program.



Summary

- **Thermocouple Bath Level Detection is a temperature-rise algorithm.** Bath level is detected when the probe's temperature rises rapidly as it enters the melt.
- **Correct configuration is required before the status can be trusted.** In *Bath level options* → *Temperature*, set the **Detection start temperature** and the detection thresholds (slope / temperature) for your process.
- **Detection criteria:** In this example, "Fast temperature rise" is met when the **slope is 1832°F/s or more** *or* the **temperature threshold of 572°F** is exceeded; when enabled in the active settings set, **bath level is found** and shown.
- **Customer monitoring method:** Use **digital I/O** when available; otherwise, monitor the **Bath Level status bit**.
  - The bit goes active when bath level is detected and is reset after the measurement completes.
- **Operational intent:** Use the bath level detection feedback to support **melt-surface level estimation.**