Understanding Fuel Monitoring

Tank monitoring systems use IoT devices to track fuel levels in real time. This guide explains how to link monitors to equipment, view monitor data in the app (Systems carousel), and use monitor data for delivery scheduling.

What is tank monitoring?

Tank monitoring devices:

- **Measure** fuel level in the tank (percentage, gallons, or both)
- **Transmit** data wirelessly to the cloud (cellular, WiFi, or LoRa)
- **Alert** when levels drop below thresholds or when the device goes offline
- **Integrate** with delivery scheduling to trigger automatic refills

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Where to see monitor info in the app

You can quickly see monitor information from the customer dashboard:

Systems carousel

- Go to the Customer Dashboard for a location
- In the Systems section, use the horizontal carousel to browse systems
- Select a system to view its details at-a-glance

When a system is linked to a tank monitor, the selector shows:

- **Tank Level (%)**: Current level from the monitor (visual gauge/knob)
- **Estimated Gallons Remaining**: Calculated from the current level and recommended capacity
- **Target/Window Dates**: Projected delivery window or target date
  - For a monitored system, dates are still shown; the level drives urgency
  - For non-monitored systems, dates are converted from degree days

Tip: You can toggle the date/time display per system to reveal window start/end and target dates.

How the selector computes gallons remaining

The system selector calculates gallons remaining using the best available data:

1. **If a monitor reading is available**
   - Uses the monitor's current level (e.g., 0.42 for 42%)
   - Multiplies by the system's recommended delivery capacity
   - Formula: `gallons = monitorLevel * recommendedCapacity`
2. **If no monitor reading is available (fallback)**
   - Estimates consumption using degree days since the last full delivery
   - Applies seasonal usage rates (winter/summer) across the heating year
   - Subtracts estimated consumption from recommended capacity to estimate remaining gallons

This mirrors the in-app logic: monitor values take precedence; otherwise, the degree-day model provides a reasonable estimate.

Linking a monitor to a tank

1. Navigate to **Systems** from the Customer Dashboard.
2. Select the system and find the tank equipment.
3. Click **Edit** on the tank.
4. In the **Monitoring** section:
   - **Monitor Link**: Select or add the monitor
   - **Monitor ID / Serial**: Device serial number or identifier (required for monitored strategy)
   - **Monitor Type**: Float gauge, ultrasonic, pressure sensor, etc.
   - **Vendor**: Tank monitor vendor/brand
5. Save the equipment.

The monitor is now linked and data will flow into the system and the Systems carousel.

Using monitor data for scheduling

To have the system automatically trigger deliveries based on monitor readings:

1. Edit the system (Add/Edit System dialog)
2. Set **Window Strategy** to **Monitored**

3. Enter the **Monitor Serial Number** (required)
4. Enable the **Auto Delivery** toggle

- Deliveries are triggered when the level drops below configured thresholds (per your operations policy)
- If the monitor goes offline, the system can fall back to degree day estimates (see Window Strategies)

See: Window Strategies

Combining monitors with other strategies

Monitoring works best alongside other estimation methods:

Monitored (primary) + Degree Day (fallback)

- **Primary**: Tank monitor provides ground-truth level
- **Fallback**: If monitor goes offline/stale, switch to degree day estimates
- **Benefit**: Reliable automation with a safe backup

Calendar + Monitor (validation)

- **Primary**: Recurring calendar schedule
- **Validation**: Skip a scheduled delivery if the monitor shows the tank is still sufficiently full
- **Benefit**: Avoids unnecessary trips and overfilling

For configuring priorities, see: Window Strategies

Monitor data fields

Real-time readings

- **Current Level (%)**: Percentage of tank capacity (drives the gauge and gallon estimates)
- **Current Level (gallons)**: Calculated gallons based on capacity
- **Last Reading Timestamp**: When the last data transmission occurred

- **Signal Strength**: Cellular or WiFi signal quality
- **Battery Level**: Monitor battery status (for battery-powered units)

Historical data

- **Reading History**: Chart or log of level over time
- **Consumption Trend**: Rate of fuel usage derived from readings
- **Anomalies**: Sudden drops (delivery) or unusual patterns (leaks, sensor issues)

Offline behavior and stale readings

Monitors can go offline due to signal loss, power failure, or damage. Configure fallback behavior:

Stale reading grace period

- **Grace period**: Allow readings to be X hours old before marking as stale (e.g., 48 hours)
- **Alert**: Notify dispatch or service tech if the monitor hasn't reported within the grace period
- **Fallback strategy**:
  - Switch to degree day projections (if configured)
  - Switch to manual calendar scheduling
  - Flag customer for manual review

Status indicators (implementation-dependent)

- **Red/Offline**: No reading in grace period; investigate
- **Yellow/Stale**: Reading is aging; monitor closely
- **Green/Active**: Recent reading within normal bounds

Calibration and accuracy

Initial calibration

When installing a monitor:

1. Fill the tank to a known level (e.g., 100% after delivery)
2. Calibrate the monitor to read that level accurately

3. Verify readings against gauge or stick measurements for a few weeks

Ongoing calibration

- Every so often after a delivery, compare:
  - Gallons delivered (from ticket)
  - Pre-delivery monitor reading
  - Post-delivery monitor reading

This can be done with the rate checking feature on the fuel deliveries page Fuel Deliveries

- If discrepancies > 5%, recalibrate or investigate:
  - Tank shape irregularities
  - Sensor placement
  - Fuel expansion/contraction with temperature

Common accuracy issues

- **Fuel temperature**: Cold fuel contracts, warm fuel expands; some monitors compensate, others don't
- **Tank tilt**: Uneven ground can skew float gauge readings
- **Sediment buildup**: Bottom of tank may have sludge reducing effective capacity
- **Sensor drift**: Over time, sensors may need recalibration

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Troubleshooting from the Systems carousel

- **No percent shown**: Ensure the system is set to the Monitored strategy and a serial number is saved
- **Gallons remaining seems off**: Verify the tank's recommended capacity on the equipment record
- **Dates look odd**: If not monitored, dates are computed from degree days; check winter/summer usage rates
- **Cannot see schedules**: Calendar schedules are managed in the system dialog; save the system first

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Related guides

- Adding Equipment — Set up tank equipment to link monitors
- Degree Day System — Used as fallback and for estimation without monitors
- Window Strategies — Configure Monitored primary and fallbacks
- Calendar Scheduling — Use with monitor validation to skip unnecessary deliveries
- Add Services — Apply strategies via system configuration

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