

FREE EXECUTIVE & ENGINEER DIAGNOSTIC REFERENCE GUIDE · SAVES £450+ PER AVOIDED FALSE DISPATCH

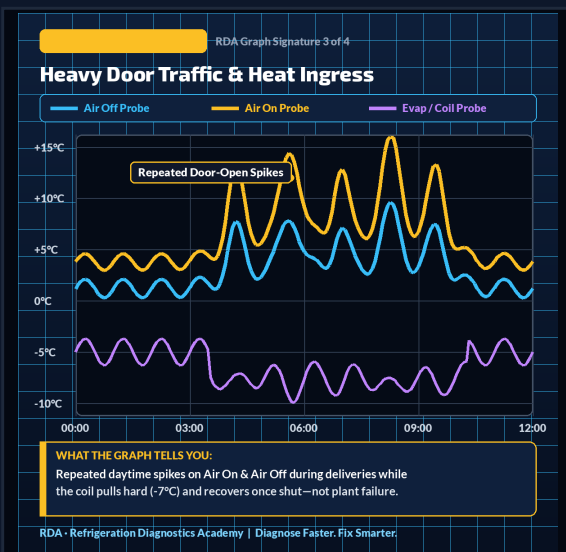
The 5 Supermarket Telemetry Graphs Every Engineer Misreads — And How to Spot a £450 False Call-Out in 60 Seconds

An alarm only tells you WHAT happened — the 24-hour multi-trace controller graph tells you WHY. Across UK supermarkets and FM estates, 22% to 30% of emergency refrigeration dispatches are triggered by misread defrost spikes, morning delivery door openings, or faulty thermistors. Use these 5 real RDM / Carel / Danfoss telemetry signatures to separate false alarms from genuine breakdowns in 60 seconds.

FAULT 1 · SENSOR ARTIFACT

Air-Off Probe Drop-Out vs Real Case Warm-Up

Embedded Reference Plate: assets/graph-3.png · Zero Thermal Inertia vs Genuine Heat Load Curve



■ Why Engineers Misread It:

A sudden vertical spike or drop on the Air-Off control trace triggers a High/Low Temp alarm and looks like an urgent case failure on a single spot reading.

■ The 60-Second Graph Clue:

Physical air and metal have thermal mass — a cabinet cannot plunge 20 K and bounce back to baseline in 60 seconds. Notice how Air-On and Evaporator Coil traces remain completely flat.

■ Correct Remote Action:

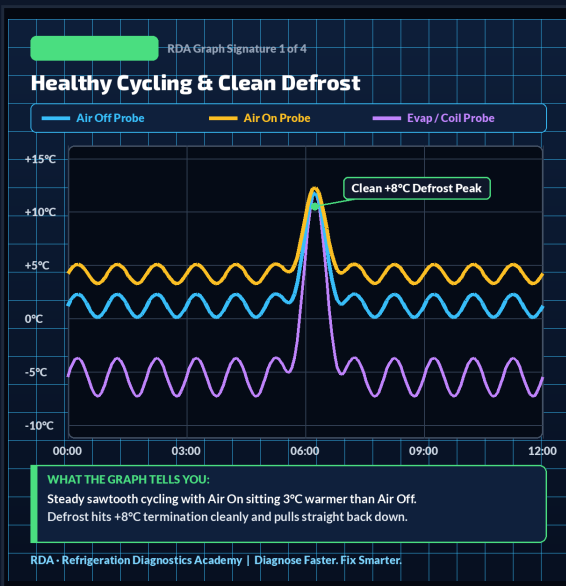
Flag as an electrical thermistor / loose probe termination artifact. Weight control temporarily to Air-On (if supported) and log a planned maintenance swap — DO NOT roll an emergency van.

60-SECOND TRIAGE RULE: Instant vertical needle spikes with undisturbed neighbouring traces = Electrical Probe Fault (Zero Thermal Inertia).

FAULT 2 · OPERATIONAL EVENT

Morning Delivery Door Usage vs Genuine Breakdown

Embedded Reference Plate: assets/graph-1.png (with graph-2.png correlation) · 30-Minute Sustained Rule



■ Why Engineers Misread It:

At 06:30 AM, a walk-in chiller or multideck logs a High Temp Alarm (+9°C to +11°C). An untrained helpdesk immediately dispatches a £450 emergency call-out.

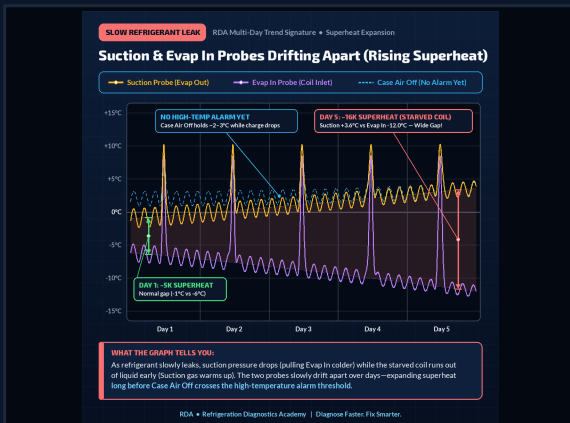
■ The 60-Second Graph Clue:

Warm store air hits the return grille first (Air-On jumps sharply), BUT the Evaporator Coil stays freezing cold (-5.5°C) and the EEV drives to 90%+ actively fighting the load.

■ The 30-Minute Rule:

Once restocking finishes, temperatures pull straight back to setpoint. Any excursion under 30 minutes outside defrost (or self-correcting with a cold coil) is operational door usage.

60-SECOND TRIAGE RULE: Air-On rises first + Evaporator stays cold (-5°C) + self-corrects after delivery window = Call Store Manager, Hold Van.

FAULT 3 · GAS STARVATION**Slow Refrigerant Leak & EEV Pinned at 100% Starvation**Embedded Reference Plate: [assets/graph-slow-leak.png](#) · Sawtooth Decay & Rising Superheat**Why Engineers Misread It:**

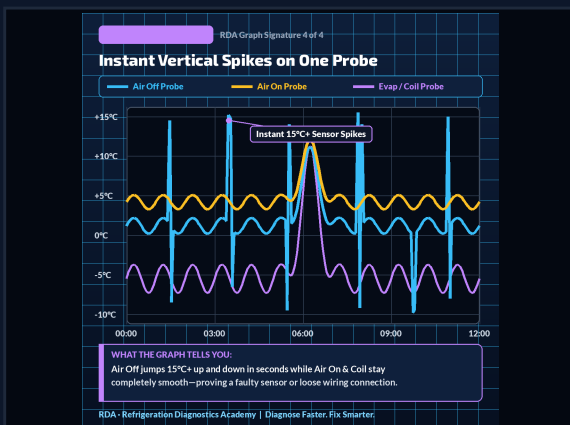
In the early stages of a leak, Air-Off only creeps up 2–3°C during peak afternoon trading, so bureaux dismiss it as 'warm store ambient' until £25,000 of stock is lost overnight.

The 60-Second Graph Clue:

Look at the EEV Opening % trace: it is pinned flat at 100% for hours while Evaporator Coil temperature drifts UPWARD toward Air-Off (high superheat, zero liquid boiling reserve).

Correct Remote Action:

Genuine refrigerant starvation (slow leak, flash gas in liquid line, or blocked strainer). Escalate immediately with instructions to leak-check and inspect liquid subcooling.

60-SECOND TRIAGE RULE: EEV pinned at 100% + Evaporator Coil warming up toward Air-Off = Starved Coil / Slow Refrigerant Leak.**FAULT 4 · AIRFLOW / ICE BLOCK****Iced Evaporator Coil & Failed Post-Defrost Recovery**Embedded Reference Plate: [assets/graph-4.png](#) · Diverging Coil vs Air-Off & Crushed Air ΔT **Why Engineers Misread It:**

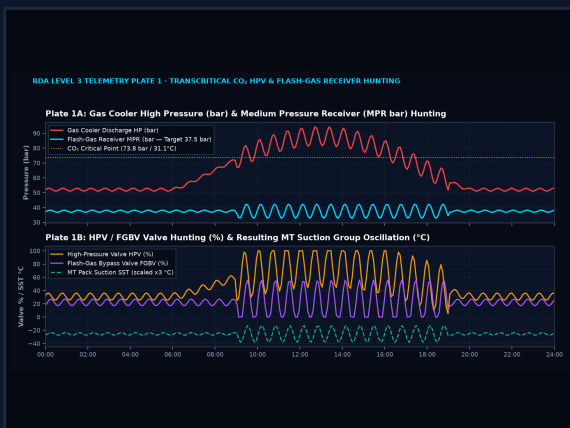
Field technicians see high case temperatures (+8°C) and assume the system is short of gas — adding refrigerant to a cabinet that actually has a solid block of ice!

The 60-Second Graph Clue:

Exact opposite of a leak: Evaporator Coil plunges freezing cold (-14°C to -16°C), EEV throttles down (20%), Air-Off climbs warm (+8°C), and Air-On/Air-Off ΔT crushes together.

Correct Remote Action:

Cold is trapped inside the coil by ice or failed evap fans. Desk engineers can force a manual de-ice cycle and extend defrost termination temp/duration remotely first!

60-SECOND TRIAGE RULE: Freezing cold Evaporator (-15°C) + Climbing warm Air-Off (+8°C) + Low EEV % = Iced Evaporator or Fan Failure.**FAULT 5 · LEVEL 3 CO2 PACK****Transcritical CO₂ (R744) HPV & Flash-Gas Bypass (FGBV) Hunting**Embedded Reference Plate: [assets/co2-graph-1-hpv-hunting.png](#) · Store-Wide Resonant Oscillation**Why Engineers Misread It:**

16 cabinets on MT Group 1 show rhythmic temperature and EEV hunting. Inexperienced teams book parts to replace individual cabinet EEVs across the store.

The 60-Second Graph Clue:

Check the common Pack Suction trace! HPV and Flash-Gas Bypass Valve (FGBV) are hunting 180° out of phase, dumping flash gas into MT suction and swinging header pressure +/-6 K.

Correct Remote Action:

Never touch individual case EEVs when Pack Suction is oscillating. Stabilise the CO₂ pack HPV/FGBV PID loop, receiver pressure deadband, and gas-cooler fan staging.

60-SECOND TRIAGE RULE: Rhythmic oscillation on common Pack Suction header = Pack-Level HPV / FGBV Instability (Not 16 faulty case valves).

QUICK-REFERENCE DECISION MATRIX · DESK ENGINEER & FIELD TECHNICIAN SOP

At-a-Glance Telemetry Fault Triage Matrix

Pin this sheet above your bureau workstation or keep it in your service van tablet. Always check Pack Suction and neighbouring cases on the same suction group before diagnosing an individual cabinet.

Fault Signature	Air-Off / Air-On	Evaporator Coil	EEV Opening %	Correct Action
1. Probe Glitch (graph-2 / 3)	Vertical needle spike	Flat / undisturbed	Normal (or brief jump)	Hold van · Plan probe swap
2. Door Usage (graph-1 / 2)	Air-On spikes first	Cold (-5°C to -8°C)	High (85%–100%)	Call store · 30-min rule
3. Slow Gas Leak (slow-leak)	Sawtooth upward drift	Warms toward Air-Off	Pinned at 100%	Dispatch for leak repair
4. Iced Evaporator (graph-4)	Air-Off climbs warm	Plunges cold (-15°C)	Throttles low (<28%)	Remote de-ice / Check fans
5. CO ₂ HPV/FGBV Hunting	All cases hunt in sync	Swings with Pack SST	Chases 15% <-> 98%	Tune CO ₂ pack HPV/FGBV

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