

Fault Codes & Communication Diagnosis

YES Electric • Arc Workforce Academy HVAC Apprenticeship

Draft 1 (October 2026). This lesson is under review. Videos are made by other companies, not YES Electric; follow this lesson and your journeyman where they differ. Boxes marked "Shop photo coming" will get real photos from our shop in a later version.

Unit 9 • Ductless Mini-Splits • Job Function 18 • Appendix A Competency 49 (completes) — "Commission, test, and troubleshoot mini-split systems using manufacturer diagnostic procedures and error codes" **Class time:** ~5 hrs (1.5 video/discussion + 3.5 bench)

1. What you'll be able to do

By the end of this lesson you will be able to:

- Retrieve a fault code from a mini-split by whichever method that brand uses — digital display, blink-code pattern, wired controller, or app — and correctly look up what it actually means.
- Apply the golden rule of inverter diagnostics: **a fault code points you at a neighborhood, not a house** — verify with a measurement before replacing anything.
- Diagnose a communication fault by isolating indoor board, outdoor board, and the interconnect wire itself, using the DC signal check from Lesson 9.4.
- Recognize the "installed fine, never worked right" pattern as a terminal-order mistake before you chase it as a component failure.
- Read and interpret several real Samsung E-code and generic blink-code examples as worked cases, and know where to find the equivalent reference for any other brand.

2. Tools & materials

- Digital multimeter with DC voltage function
- The shop unit(s) — ideally more than one brand, since fault-code systems are NOT universal
- Manufacturer service manuals / quick-reference fault code cards for each brand represented in the shop
- The Lesson 9.4 mock install, wired and ready for a deliberate-fault diagnosis drill
- A "fault code flashcard" set (built from the videos in §3 and manufacturer documentation) for the code look-up drill

3. Watch first

Order	Video	Channel	Length	Why
1	Ductless Mini-Split Troubleshooting: Common Issues & Solutions	HVAC School	21:07	The general diagnostic framework this lesson is built on
2	Ductless and VRF Diagnosis w/ John Chavez EP2	HVAC School	56:33	Deep-dive field diagnosis session — watch after the shorter videos below
3	Samsung HVAC Error Code E101 Communication Error Code	Taddy Digest	4:21	Worked example: a communication-specific fault code
4	E123 Error Code on Samsung Mini Split - How to Fix	Taddy Digest	9:14	Worked example: a sensor/component-specific fault code
5	TOP 5 CAUSES of Mini Split Heat Pump FAILURE!	AC Service Tech	8:43	The failure-pattern list — what's actually behind most fault codes in the field
Reference	How to replace mini split sensors with generic sensors?	Taddy Digest	10:17	What's on the other side of a sensor-fault code once you've confirmed it

4. The idea

The workflow, in order — and why the order matters

Every diagnostic lesson so far in this program (Units 6–8) taught you to work from the sequence of operation and verify with measurement. Mini-split diagnosis adds one step at the FRONT:

1. Pull the fault code first. 2. Look up what it means. 3. Verify the named subsystem with a measurement. 4. THEN decide what to replace.

The code is a massive head start — it tells you where the board itself suspects the problem is. But **a fault code names a neighborhood, not a house**. "Communication error" doesn't tell you if it's the outdoor board, the indoor board, or the wire between them. "EEV/sensor error" doesn't tell you if the sensor itself failed or if a connector came loose. Skipping straight to a parts swap based on the code alone is the same "parts changer" mistake Unit 7's die-point diagnosis lesson warned against — just with a fancier-looking code number attached.

Fault codes are NOT universal — every brand is its own language

This is the single biggest trap for a tech who's only ever worked one brand:

Brand pattern	How codes are shown	Example
Samsung	Digital "E-codes" on indoor display, wired controller, or SNET Pro service tool	E101 (communication), E123 (drain-related), E320 (OLP sensor), E337 (EVA OUT sensor), E470 (EEPROM programming)
Mitsubishi	Digital P/E/U-prefix codes on wired controller or blink patterns on some models	Varies by model generation — always check the specific unit's service manual
Entry-level / value brands (MrCool, Gree-based OEM units, etc.)	Often blink-code patterns on the indoor unit's LED, counted in groups	Varies by manufacturer — the install/service manual is the only reliable source
Daikin, Fujitsu	Digital codes, brand-specific numbering	Varies — same rule applies

The number "E101" or a specific blink pattern means something different on every brand. Never apply one brand's code meaning to another brand's unit from memory — that's a fast way to replace the wrong part with total confidence. Keep (or build) a per-brand quick-reference for every brand your shop services, and always confirm against the current service manual since manufacturers do revise code meanings across model generations.

Communication fault diagnosis — the mini-split-specific skill

"Communication error" or "no communication" codes are common enough on this equipment class to deserve their own procedure, building directly on what you wired and verified in Lesson 9.4:

1. **Meter the DC signal at the OUTDOOR unit's terminals first.** A healthy, fluctuating (or manufacturer-expected steady) DC voltage means the outdoor board itself is alive and attempting to communicate.
2. **Meter the same signal at the INDOOR unit's terminals.** If it's healthy at the outdoor end but absent or flat at the indoor end, the problem is in the wire or the indoor board — not the outdoor unit.
3. **Isolate the wire itself** if both ends test inconclusively — continuity checks on a de-energized run, visual inspection for damage (rodent chew, a staple through the cable, a connection that backed out of a wire nut).
4. **Check terminal order before you condemn a board.** If this is a NEW install or one that "has never worked right" since day one, go back to Lesson 9.4's rule before you spend a dollar on parts: **is the conductor landed in the same order at both ends?** A miswired terminal order can produce symptoms that look exactly like a dead board.

COMMUNICATION FAULT ISOLATION

METER DC SIGNAL AT OUTDOOR TERMINALS

Healthy fluctuating voltage = outdoor board is alive



METER DC SIGNAL AT INDOOR TERMINALS

Healthy here too = problem is elsewhere. Flat or absent here but healthy outdoor = problem is the WIRE or the INDOOR BOARD



ISOLATE THE WIRE ITSELF

Continuity check de-energized, visual inspection for damage, verify terminal order matches Lesson 9.4 at both ends

Recall Lesson 9.4: **never megger a communication line with either board still connected** — disconnect both ends from that conductor first if an insulation-resistance test is genuinely needed.

The "never worked right" pattern

A unit that ran fine for months and THEN threw a fault is a different diagnostic problem than a unit that never worked correctly since the day it was installed. **If a customer says "it's never been right since it went in,"** move terminal-order verification and flare-leak inspection (Lesson 9.3) to the TOP of your list, ahead of exotic board-level diagnosis — installation mistakes are a far more common cause of "never right" than a defective new board.

Worked example: reading a real Samsung fault code correctly

Take **E337 (EVA OUT sensor open/shorted)** as a worked case of the four-step workflow:

1. **Pull the code:** E337 displays on the indoor unit or service tool.
2. **Look it up:** per Samsung's documentation, this indicates the evaporator-out thermistor circuit is reading open or shorted — a sensor/wiring fault, not automatically "replace the sensor."
3. **Verify with measurement:** check the thermistor's resistance against its temperature/resistance chart (this is Lesson 9.8 territory — thermistor testing gets full treatment there). If resistance is wildly out of range or infinite/zero at a known temperature, the sensor itself has failed. If resistance reads correctly but the fault persists, suspect the wiring/connector between the sensor and the board instead.
4. **Then decide:** replace the sensor only if step 3 actually confirmed it — not because the code name contains the word "sensor."

5. Bench procedure

1. **Fault code flashcard drill.** Working through a mixed deck of real fault codes across at least two brands represented in the shop, students look up each code's actual meaning using the correct manufacturer reference (not memory, not guessing from a similar-sounding code on a different brand).
2. **Communication fault isolation drill.** On the Lesson 9.4 mock install (power OFF), instructor introduces ONE hidden fault: either a disconnected/miswired comm terminal, a cut conductor, or nothing at all (a trap — the unit is actually fine, testing whether students verify before condemning). Students power up, observe the resulting behavior/code, and run the outdoor-then-indoor-then-wire isolation procedure to correctly identify (or rule out) the fault.
3. **"Never worked right" scenario.** Instructor poses a customer complaint on a freshly "installed" mock unit with a fault code present. Students must check terminal order and flare integrity BEFORE proposing any board-level diagnosis, per the pattern discussed in §4.
4. **Cross-brand comparison.** Given the SAME symptom description (e.g., "no communication between indoor and outdoor") on two different brands' documentation, students identify the code each brand would show and confirm the codes are NOT numerically related despite describing a similar underlying problem.

Checkout (graded, pass/redo): Student correctly diagnoses the hidden-fault mock install using the four-step workflow (pull code → look up → verify → decide), correctly identifies whether it's an install/wiring mistake or a real component failure, and does NOT propose a part replacement without a verifying measurement. This completes Competency 49 alongside Lesson 9.6.

6. Field gotchas

- **Applying one brand's code meaning to another brand's unit from memory** is a fast way to confidently replace the wrong part — always confirm against the specific unit's current documentation.
- **Replacing a part because the code name mentions it, without verifying**, is the parts-changer mistake wearing a fault-code costume. Verify first, every time.
- **Power-cycling the unit immediately after a fault "to see if it clears" without recording the code first** throws away the diagnostic breadcrumb you were just handed — write it down before you reset anything.
- **A "never worked right" complaint is a strong signal to check installation basics FIRST** — terminal order, flare integrity — before assuming a defective new board.
- **Manufacturers revise fault code meanings across model generations** — a code table from an older service manual may not match a current model even within the same brand family. Confirm the model-specific reference.
- **Meggering a live comm line destroys the board** — this bears repeating from Lesson 9.4 because it's exactly the kind of shortcut a tech reaches for mid-diagnosis under time pressure.

7. Competency link

- **Competency 49 (completes here)** — "commission, test, and troubleshoot mini-split systems using manufacturer diagnostic procedures and error codes"; Lesson 9.6 opened it with commissioning, this lesson completes it with fault-code and communication diagnosis.
- Directly extends Lesson 9.4's communication wiring content and Lesson 9.3's flare-integrity discipline into diagnostic practice.
- Sets up Lesson 9.8 — several fault codes (sensor, EEV, fan motor) point directly at the components that lesson teaches you to test in depth.

8. Check yourself

1. State the four-step diagnostic workflow for a mini-split fault code, in order.
2. Why is it dangerous to apply one brand's fault code meaning to a different brand's unit?
3. Describe the outdoor-then-indoor-then-wire procedure for isolating a communication fault.
4. A customer says "it's never worked right since it was installed." What should you check before you consider board-level diagnosis?
5. Why is it a mistake to power-cycle a faulted unit before recording the fault code?
6. In the E337 worked example, what does "verify with measurement" actually mean before deciding to replace the sensor?
7. Why can't you always trust a code table from an older service manual for a current model?
8. What is the ONE thing you must do before performing an insulation-resistance (megger) test on a suspect comm line?
9. A unit throws a communication fault code but the outdoor terminals show healthy fluctuating DC voltage. Where does your suspicion move next, and why?
10. Why does this lesson call a fault code "a neighborhood, not a house"? Give your own example of a code that could have more than one root cause.

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