



An Extended Guide · No. 1593

# Running Watts vs. Starting Watts, Explained

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The two numbers behind  
every sizing decision

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**! Read this first — size for safety, not just comfort**

Getting the size right is not only about comfort — it is about safety, too. An undersized unit gets overloaded and pushed harder than it should be: it runs hot, it strains, and a motor that can't get the surge it needs can hum, overheat, and be damaged. So take the size seriously and always leave yourself a margin — a little extra room — rather than sizing right to the edge. And one safety rule never changes: any fuel-burning generator gives off carbon monoxide, an invisible, deadly gas, so it runs **OUTDOORS ONLY**, well away from the house (the safety agencies say at least 20 feet), never in a garage or on a porch even with the door open. A battery or power station makes no exhaust and is safe to use indoors. This guide is all about the two watt numbers behind that safety picture — get them straight and the rest of sizing falls into place.

## Two numbers, one big misunderstanding

Almost every sizing mix-up I get called about comes down to one thing: there are two watt numbers, not one, and they do very different jobs. Once you can tell them apart, backup power stops feeling like a guessing game.

I'm Bill. When folks tell me a generator 'should have been plenty' but the fridge still wouldn't start, this is nearly always why. They sized to the steady number and forgot the brief jolt a motor needs to get going. It's an easy trap, and this guide is here to keep you out of it.

We'll take it slow. First the steady number, then the surprising one, then how they fit together into a number you can shop with. No math degree, no jargon left unexplained, and nothing on these pages that you have to memorize.

**★ You don't have to sort this out alone**

If you'd rather just talk it through, jot down what you want to keep running and call or text me at (330) 200-8042. I'll help you tell the two numbers apart for your own appliances — free, with nothing to sell you.

## The whole idea, on one page

If you remember only this page, you already understand the thing that trips most people up.

- ❑ Running watts (sometimes called 'rated' watts) is the steady power a thing needs once it's already going.
- ❑ Starting watts (or 'surge' watts) is the brief, much bigger jolt a motor needs for a second or two to get spinning.
- ❑ Only motors surge — fridges, pumps, blowers, air conditioners. Lights and heaters don't.
- ❑ Size for your steady running total PLUS the single biggest surge — not every surge added together.
- ❑ The real numbers live on each appliance's nameplate. Read them; don't guess.
- ❑ Then add a comfortable margin so nothing runs right at the edge.

### ✓ The one-sentence version

A generator or battery has to be big enough for everything running steadily at once, and strong enough for the biggest single motor to jump to life on top of that.

## Running watts — the steady number

This is the easier of the two to picture: the power a unit has to supply hour after hour to keep things going.

A lamp, a phone charger, a coffee maker, a television, the internet box — once they're on, they each draw a fairly steady amount and keep drawing about that same amount the whole time. Add those steady draws together and you have the backbone of your total.

A motor-driven thing like a fridge or a furnace blower has a running number too — the steady draw once its motor is already spinning. That part is well behaved. It's the moment the motor first kicks on that catches people off guard, and that's the next page.

### ✓ Running watts is the honest number to compare

When you look at a generator or power station, the running (or 'rated') watts is the figure to trust for steady work. A bigger number printed in bold on the box is very often the brief peak, not what the machine delivers all day. More on that trap in a moment.

## Starting watts — the jolt that surprises everyone

Here's the idea that catches nearly everyone the first time: for a second or two, a motor can ask for several times what it needs once it's up and running.

Think about why. A motor at rest has to overcome real resistance to begin turning — the compressor inside a fridge, the fan in a furnace blower, the impeller in a pump. Getting it moving takes a much bigger shove than keeping it moving. That brief shove is the starting watts, or surge.

It lasts only a moment, then the motor settles down to its ordinary running watts. But your generator or battery has to be able to deliver that jolt the instant the motor calls for it — or the motor simply won't start.

### **! Miss the surge and you'll know it**

Ask a motor for a jolt your unit can't deliver and the signs are unmistakable: the engine bogs down, the lights dim, and the motor hums, struggles, or refuses to start. That's not stubbornness — it's a message that the surge number came up short.

## A picture of the surge

You don't need numbers to feel how this works. You already know it from everyday life.

Think of pushing a car that's out of gas. Getting it rolling from a dead stop takes everything you've got; once it's moving, a light steady push keeps it going. A motor is the same. The heavy first shove is the surge; the easy steady push is the running watts.

The surge is brief — a second or two — which is exactly why it fools people. It doesn't show up on a bill or a stopwatch. But your backup unit has to have that shove in reserve for the split second the motor needs it, even though the need passes almost instantly.

### ✓ Brief doesn't mean unimportant

The whole surge lasts less time than it takes to read this sentence. That's why folks forget it — and why a unit sized only to the steady number leaves the fridge sitting there humming.

# Which loads surge, and which don't

Sort your list into these two buckets and sizing gets far less mysterious.

| Type of load            | Surges?                                             | Examples                                                                            |
|-------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------|
| Motor-driven            | Yes — often several times its running watts         | Fridge, freezer, well pump, sump pump, furnace blower, air conditioner, power tools |
| Resistive or electronic | No real surge — draws about the same the whole time | Lights, space heaters, toasters, kettles, chargers, most TVs and routers            |

The simple test: if it has a motor or a compressor that has to get moving, assume it surges. If it just makes heat or light, it doesn't.

✓ **When in doubt, assume it surges**

If you're not sure whether something has a motor tucked inside, the safe assumption is yes. Treating a steady load as if it might surge costs you nothing; missing a real surge is what causes trouble.

## Reading the two numbers on a unit's box

Generators, inverters, and power stations all advertise both numbers — but the big one on the front isn't always the useful one.

Look for the **running** or **rated** watts — that's what the unit can supply steadily, and it's the figure to compare from one unit to the next. The **starting**, **surge**, **peak**, or **maximum** watts is the brief burst it can deliver for a moment to help a motor start.

Both matter, but for different reasons: the running number has to cover everything on at once, and the surge number has to cover your biggest single motor jumping to life on top of that. If a box shows only one giant number, treat it with a little suspicion — it's usually the peak, not the steady rating.

### **! The big bold number is often the peak**

Marketing loves the largest figure. If a unit brags one number in huge type, look for the smaller 'rated' or 'running' figure nearby — that's the honest one for steady work.

## Reading the two numbers on your own appliance

Your appliances carry their real numbers on a little label called the nameplate. That's where guessing ends.

Look on the back, the bottom, or inside the door for watts. If watts aren't listed, look for volts and amps and multiply them together — that gives you the running watts. That's the only bit of arithmetic this idea asks of you.

A motor's nameplate sometimes lists a second, larger figure — you may see 'LRA' (locked-rotor amps) or a starting figure. That's your clue to the surge, which can run several times higher than the running number for that first second or two. Our guide on reading a nameplate walks through exactly where to look and what each marking means.

### ★ Photograph every label

Before you shop, walk around with your phone and snap the nameplate on the fridge, the furnace blower, the sump pump, and anything else you'd want running. Text them to me at (330) 200-8042 and I'll help you read the two numbers off each one — free.

## Why you add only the single biggest surge

This is the part that keeps your number from spiraling as your list grows — and it's genuinely good news.

You do not add up every motor's surge. You add your steady running total, then the surge of just the one biggest motor on top. Why? Because motors essentially never start at the very same instant. You flip things on one at a time, and each motor cycles on when it happens to need to, not in lockstep with the others.

So your unit only has to clear everything running steadily plus whichever single motor's jolt is largest. Add another small motor to the list and your surge requirement usually doesn't budge, because that new motor's jolt isn't the biggest one.

### ✓ The exception worth knowing

If two big motors really might kick on together — say a well pump and a furnace blower during a cold snap — some folks add both surges for extra peace of mind. It's rarely necessary, but it never hurts to be generous.

## What a too-small surge looks and sounds like

Even with careful planning, real life sometimes asks more of a unit than expected. Here's how to recognize a surge coming up short.

- ❑ Lights dim or flicker the moment a motor tries to start.
- ❑ A motor hums or growls, struggles, and won't quite catch.
- ❑ A generator's engine bogs down or sounds strained.
- ❑ A breaker on the unit trips, or a power station flashes an overload warning and shuts off the outlet.

### **! Stop and lighten the load — don't keep forcing it**

If you see these signs, turn something else off first, then try the motor again with more surge headroom free. Forcing a stubborn start over and over can overheat and damage both the motor and the unit trying to start it. If it keeps happening, the surge number was simply too small — call me at (330) 200-8042 for a second look.

## Two kinds of homes, two sets of needs

The two-number idea plays out very differently depending on where you live — and, above all, on whether a well pump is on your list.

### If you live in town or the suburbs

In town or a tighter suburban lot, the biggest surge on your list is usually the fridge or a window air conditioner. City water keeps flowing no matter what the power does, so there's no pump jolt to plan around, and your surprise surge stays fairly modest.

- Your steady running total is usually light — fridge, lights, electronics, maybe a furnace blower.
- The single biggest surge is often the fridge or an AC compressor, not an alarming figure.
- Read each motor's nameplate anyway; the fridge's surge is easy to overlook.
- Our guide on choosing a portable generator helps match this to the right size class.

### If you are out in the country on a well

Out on a well, the two-number idea has one loud headline: the well pump. A 240-volt submersible pump is a serious motor with a serious surge, and it usually has to be on the list — no power means no water at all, for drinking, cooking, flushing, or the animals.

- The pump's starting surge is very likely the single biggest number on your whole list — size the surge around it.
- A 240-volt pump can't run off a plain cord; it needs a transfer switch or interlock and a unit with a 240-volt outlet.
- Undersize its surge and the pump just hums and heats — hard on the motor. Give it generous headroom.
- Get the pump's real figures from its nameplate or your well company's horsepower — never a guess.

#### ★ The well pump is where the two numbers matter most

Well-pump surge is the easiest thing to underestimate and the costliest to get wrong. Tell me your pump's nameplate or horsepower and your other loads, and I'll help you land on a surge number you can trust. Call (330) 200-8042. Our guide on sizing for a well pump goes deeper.

## The usual surge culprits

A handful of motors show up on nearly every list. Knowing them in advance means fewer surprises when you read the nameplates.

- **Refrigerators and freezers:** a compressor that cycles on and off all day, asking for a brief jolt each time.
- **Well and sump pumps:** often the single largest surge in a rural home, especially a 240-volt well pump.
- **Furnace and boiler blowers:** the fan motor that pushes warm air through the house — near the top of the list in an Ohio winter.
- **Window and central air conditioners:** a compressor much like the fridge's, only larger.
- **Power tools and shop gear:** anything with a motor, from a table saw to an air compressor.

### ✓ Heat and light almost never surge

A lamp, a space heater, a toaster, a charger — if it just makes heat or light with no motor, add its running watts and move on. The surge conversation is really a conversation about motors.

## Taming a surge so a smaller unit can do the job

If a motor's jolt is the one number pushing you toward a bigger, heavier, thirstier unit, there are honest ways to shrink that jolt.

A **soft starter** is a small device a licensed pro installs on a motor — most often a central-air compressor, sometimes a well pump — that eases it up to speed instead of slamming it on. That makes its starting surge much smaller, so a more modest unit can start it. It doesn't change the running watts, just tames the jolt.

Cycling helps too: if you don't start two big motors at the same moment, your unit only faces one surge at a time. And clean inverter power tends to start motors more gracefully than rough power does. Our guide on managing loads during a run covers the taking-turns approach in detail.

### ✓ A soft starter is a real option, not a gimmick

For a home where the air conditioner or well pump is the single stubborn surge, a soft starter can be the difference between a unit that fits your garage and budget and one that doesn't. Ask a licensed electrician whether yours is a candidate.

## Batteries and power stations play by the same rule

The two-number idea isn't just a generator thing. A battery or power station has a steady number and a surge number as well.

A power station lists a **continuous** watt rating — what it can hand out steadily — and usually a brief **surge** or **peak** rating above it, for that motor-starting moment. It's the very same running-plus-biggest-surge thinking, just against the battery's two numbers instead of a generator's.

Batteries add one more number on top — watt-hours, which decide how long they last rather than how much they can push at once. That's a different idea, and our guide on watts versus watt-hours is devoted to it. For now, just know the surge rule follows you from generators to batteries unchanged.

### ✓ Same question, every kind of unit

Whether it burns fuel or holds a charge, ask the same two things: can it supply everything running steadily, and can it deliver the biggest single motor's jolt on top?

## Turning two numbers into your shopping number

Here's how the two numbers become the single figure you carry into the store or the conversation with me.

- ❑ Add the running watts of everything you'd run at once — your steady total.
- ❑ Find the single biggest surge among your motors.
- ❑ Add that one surge on top of the steady total.
- ❑ Add a comfortable margin so nothing sits right at the edge.
- ❑ Compare the result to a unit's starting/surge rating, not just its running rating.

That's the whole method in five steps. Our worksheet guide gives you a fill-in-the-blanks page to do it with your own nameplates, and our guide on margin and headroom explains just how much cushion is sensible.

### ★ Rather do the adding together?

Send me your list and your nameplate photos at (330) 200-8042 and we'll land on your number side by side. It's arithmetic, but it doesn't have to be arithmetic you do alone.

## Common mistakes with the two numbers

Nearly all sizing regret traces back to a handful of avoidable slip-ups. Now you'll spot them coming.

- **Sizing to the running number only** and forgetting the surge, then wondering why the fridge won't start.
- **Trusting the big bold number on the box**, which is usually the brief peak, not the steady rating.
- **Adding every motor's surge together** instead of just the single biggest, and overpaying for a giant unit.
- **Guessing instead of reading the nameplate**, on the hope that 'it's probably fine.'
- **Leaving no margin**, so the unit runs flat-out and stumbles the moment anything extra comes on.

### **! The costliest mistake is guessing low on the surge**

An undersized surge doesn't just disappoint — it strains the motor that won't start and the unit straining to start it. When your math sits near the line between two sizes, it's almost always worth stepping up.

## A quick self-check at your kitchen table

You can pressure-test your own understanding in about a minute with these questions.

- ☐ For each thing on my list, do I know whether it has a motor?
- ☐ Have I found the running watts for every item (from the nameplate, or volts times amps)?
- ☐ Do I know which single motor has the biggest surge?
- ☐ Have I added just that one surge, not all of them?
- ☐ Did I leave a comfortable margin on top?

✓ **If any answer is 'not sure', that's fine**

That's exactly what the nameplate guide and the worksheet guide are for — and it's exactly the kind of thing I'm happy to walk through with you at your pace.

## When the surge means it's time for an electrician

If a big motor's surge is on your list, the two-number question often comes bundled with a wiring question.

Hardwired 240-volt loads — a well pump, central air, a water heater — can't be plugged into a cord. They call for a transfer switch or interlock installed at your panel by a licensed electrician, and a unit with a 240-volt outlet and enough surge headroom to start them. Plan the hookup and the size together, not one after the other.

This guide stays in its lane — the two numbers. Our guides on transfer-switch circuit count and on sizing a standby generator pick up the wiring side, and I'm glad to coordinate the electrician for you.

### ★ I'll help line up the pro

Coordinating a trustworthy licensed electrician for panel work is part of what I do. Once you know your two numbers and your must-run list, call or text me at (330) 200-8042 and we'll plan the whole thing.

## Questions worth asking before you buy

Whether you're talking to a salesperson or to me, these get you to the truth about the two numbers.

### **Q: Is this number the running watts or the starting watts?**

Always ask which one a quoted figure is. You want the running (or 'rated') watts for steady work and a separate, larger starting or surge figure for motors.

### **Q: What's the biggest motor I'll ever ask this to start?**

That single motor's surge sets your surge requirement. For many rural homes it's the well pump; in town it's often the air conditioner or fridge.

### **Q: Will it start my motor, not just run it?**

Running a motor and starting one are different asks. Make sure the unit's surge rating clears your biggest motor's jolt, with room to spare.

### **Q: Could a soft starter let me use a smaller unit?**

Sometimes, yes — especially for central air or a well pump. A licensed electrician can tell you if your motor is a candidate.

#### **✓ There's no silly question**

If the two numbers still feel slippery, that's normal — call or text me at (330) 200-8042 and we'll sort them out together.

## Common Questions

The running-versus-starting questions I hear most, answered plainly.

**Q: Can I just add up every watt number on every box and be done?**

Not quite — boxes often print the brief peak in big letters. Use the running (or 'rated') watts for your steady total, and treat any one giant number with a little suspicion.

**Q: Do lights and electronics have a starting surge?**

No real one. Lights, chargers, and most electronics draw about the same the whole time. The surge conversation is about motors only.

**Q: How much bigger is a surge than the running watts?**

It varies by motor, so read the nameplate rather than trusting a rule of thumb — but for many motors the jolt is several times the running figure for a second or two, and a well pump's can be larger still.

**Q: What if I can't find the surge number anywhere?**

Check the manual or the maker's website with the model number, or have a licensed electrician measure the real draw. When in doubt, leave extra surge headroom.

**★ Still untangling the two numbers?**

Send me your list and your nameplate photos at (330) 200-8042 and we'll work through the running and starting watts together, at your pace.

## Bringing it all together

You now hold the one distinction that prevents most sizing mistakes: running watts keep things going, starting watts get motors going, and you size for both.

Add your steady running total, add the single biggest surge, add a margin, and check the result against a unit's surge rating as well as its running rating. That's the heart of load planning, no matter how big or small your home.

From here, our nameplate guide shows you exactly where to find your real numbers, the worksheet guide gives you a page to add them up, and the guides on each kind of unit — portable, inverter, standby, battery — help you match your number to the right machine.

### ★ Let's tell the two numbers apart together

If you'd rather talk it through than puzzle it out on paper, that's exactly what I'm here for. Call or text me at (330) 200-8042 with your list, and we'll make quick, calm sense of it — free, with nothing to sell you.

## You don't have to do this alone

You just have to remember that a friendly, patient person is one call away.

I hope this guide made the difference between running and starting watts feel a little less daunting and a lot more doable. Keep it in a drawer with your other home papers, come back to a page whenever you need it, and don't worry about memorizing anything.

When you'd rather have a hand, that's exactly what I do. I come to your home, work at your pace, and never make you feel rushed or silly for asking. A first visit is a flat \$99, and for the parts that don't need me on-site I can often help right on your screen for \$49. Every visit comes with a 30-day, come-back-free guarantee. I don't do the licensed electrical or gas work myself — for that I'll help you line up a trustworthy local pro.

### ★ Bill's Home Tech — real help, close to home

Call or text me at (330) 200-8042, or visit BillsHomeTech.com. Serving Atwater and all of Portage County. 30+ years of patient, plain-English tech help — and if you're ever not 100% happy with a visit, I'll make it right or refund it. That's a promise. — Bill

## Running Watts vs. Starting Watts

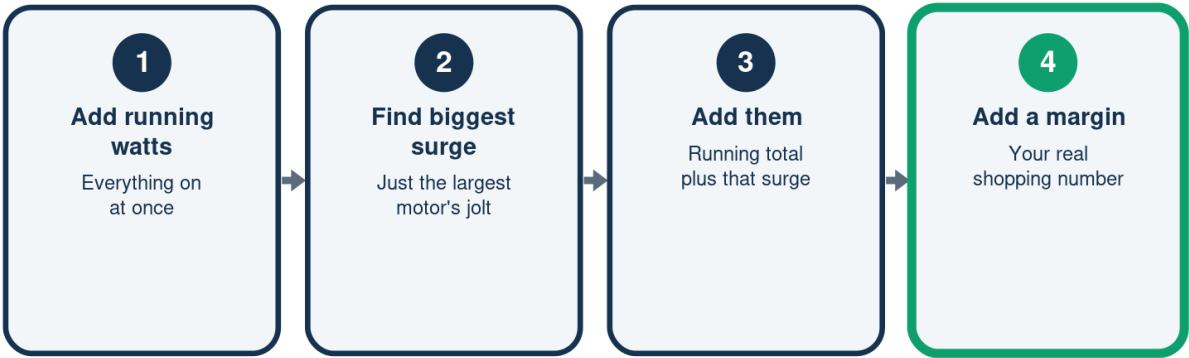
The one distinction that prevents most sizing mistakes

|                | What it is        | How to size          |
|----------------|-------------------|----------------------|
| Running watts  | Steady power draw | Add these all up     |
| Starting watts | Brief motor jolt  | Add just the biggest |
| Motor loads    | Fridge, pump, AC  | These are what surge |
| Heat and light | Lamps, heaters    | No surge to plan for |

Running total plus the single biggest surge, then a margin.

# Two Numbers to One Shopping Number

How the running and starting figures come together



Then compare it to a unit's surge rating, not just its running rating.

## Which Loads Surge?

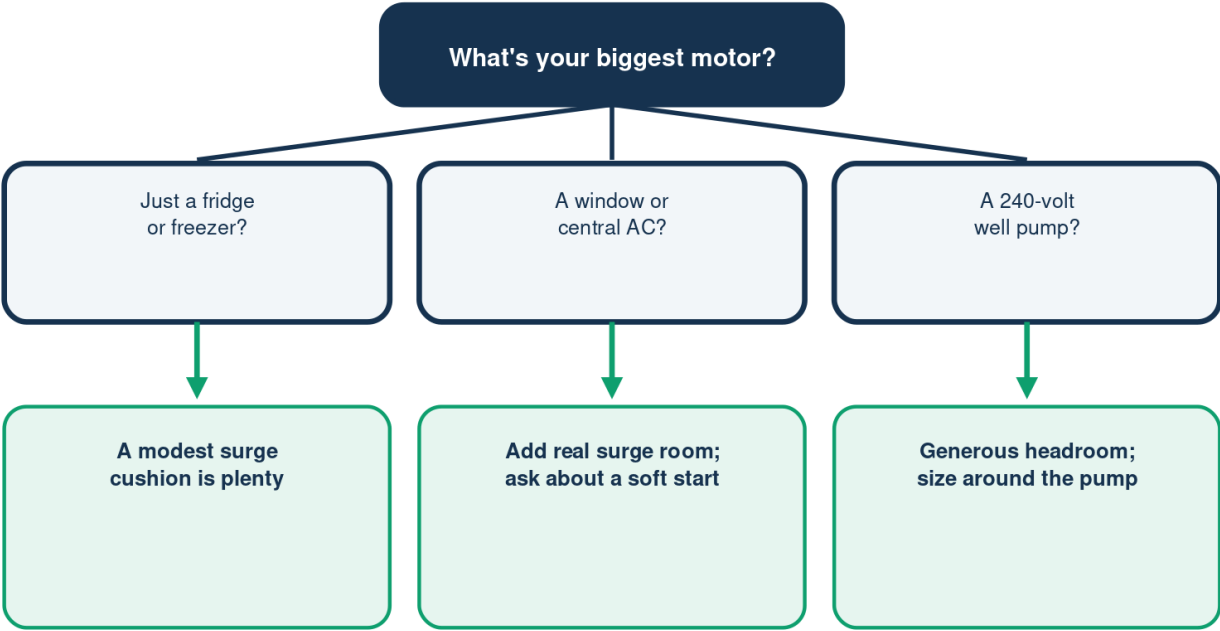
A quick reference for your must-run list

|                   | Surges?          | Watch for           |
|-------------------|------------------|---------------------|
| Fridge & freezer  | Yes              | Compressor kicks on |
| Well & sump pumps | Yes, often large | Biggest on the list |
| Furnace / AC fan  | Yes              | Fan motor starting  |
| Lights & heaters  | No               | Steady draw only    |

Has a motor? Assume it surges. Just heat or light? It doesn't.

# Is the Surge Going to Be a Problem?

Let your biggest motor point the way



Guessing low on the surge is the most common mistake -- when torn between two sizes, size up.

Illustration - a schematic, not to scale. Your setup may differ.



## Need a Real Person?

You do not have to remember all of it.  
You just have to remember you can call.  
Friendly, in-home tech help -- I come to you.

### BILL'S PROMISE

If you are not 100% happy with a visit, I will  
make it right -- or refund it. No awkwardness,  
no fine print. That is how I would want to be treated.

**(330) 200-8042 · BillsHomeTech.com**

Bill@BillsHomeTech.com · Mon–Sat 9:00 AM – 7:30 PM

— Bill

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### Prefer help without a visit?

Bill can screen-share and fix many things remotely — a flat \$49, free for Support Plan members.



## A Note From Bill

### A quick note from Bill.

I write these guides to make home tech a little less frustrating, and I do my best to keep every step accurate and up to date. Still, every home, device, and setup is a bit different, so I can't promise a guide will match yours exactly or fix your particular problem. These guides are for general information only — they're not professional, legal, or financial advice, and they don't replace your device's own manual or the manufacturer's instructions. Please go slow, use your own good judgment, and use everything here at your own risk. If a step involves electrical wiring, a gas appliance, a water heater, plumbing, or climbing a ladder — or if anything just doesn't feel safe — please stop and call a licensed professional (or give me a call at 330-200-8042). Bill's Home Tech and Bill Davis can't be responsible for any damage, data loss, or injury that comes from using these guides. Thanks for reading, and stay safe out there.

— *Bill*



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