



Think your readings are ACCURATE?

IT MIGHT BE
TIME TO THINK
AGAIN.

According to the U.S. Energy and Information Administration, the commercial and residential sectors account for the majority of energy consumption in the nation. Commercial buildings account for the highest usage, making HVACR system efficiency a top priority not only to reduce cost of ownership and meet the environmental challenges we face today but also to ensure HVACR pros keep the contracts they work so hard to earn—and retain long-term clients that are pleased with their efficient and well-maintained systems.

It's important to measure an accurate

A how-to for measuring pipe temperatures with the highest accuracy guaranteed, and an exploration of why refrigeration charge, superheat and subcooling are too critical to be taken lightly.

superheat and subcooling to help determine an optimal refrigerant charge, because even small inaccuracies can result in: increased cost of ownership over time; lost commercial contracts due to repeated call-backs or subpar efficiency; full system failures due to increased wear and tear and/or spoilage loss due to underperforming refrigeration systems; compliance fines from improper temperature maintenance, and penalties and shut-downs in commercial refrigeration settings.

The stakes are high. *So, how can you be certain your readings are accurate?*

“BEER CAN COLD” JUST DOESN’T CUT IT ON MODERN SYSTEMS.



Forty-plus years ago when homes were just starting to get A/C window units, it was common to gauge system refrigeration charge by simply grabbing the suction line near the condenser with a bare hand to determine whether it was as cold as a frosty cold beer should be, hence the term “beer can cold.” If it wasn’t, we added refrigerant. If it was, we considered the job done.

It was highly subjective and massively imprecise, but it passed as a rule of thumb for these older systems that were built for hardiness vs. efficiency. Their compressors were oversized, their coils had extra room around them, and their fan motors had high

horsepower—leaving a good amount of flexibility in the amount of refrigerant used.

Today’s critically charged systems, however, are built tightly and precisely, and made for efficiency. This means refrigerant charge has to be within ounces of the correct amount...or else. Instead of guessing with our hands for an arbitrary measurement, accuracy is necessary, especially with today’s precision-engineered systems. Taking accurate measurements of both the superheat on the suction line and subcooling on the liquid line are critical to ensure system efficiency is the industry gold standard.

Why Superheat & Subcooling Matter.

Most techs always check out a system’s refrigerant charge, but superheat and subcooling readings are often something we learn about in school and then don’t think much about in daily life. That said, these readings can be a critical tool in an HVACR pro’s troubleshooting arsenal and can make more difference than many techs realize.

Using superheat and subcooling is the best way to know if a system is overcharged, under charged (most likely), or in proper working order. Superheat is typically used for fixed restrictor system. To get actual superheat, measure the suction line pressure and suction line temperature. To get target superheat, measure the return wet bulb and outdoor dry bulb. Target superheat can also be found on the equipment nameplate. The actual superheat should be within $\pm 5^{\circ}\text{F}$ of the target superheat to ensure optimum performance.

Subcooling is the best way to obtain proper refrigerant charge for a TXV/EXV system since the TXV/EXV holds the superheat constant. Subcooling involves two measurements as well: one for pressure and one for temperature, but this one is taken from the liquid

line. Target subcooling can be found on the system nameplate. The actual subcooling should be within $\pm 3^{\circ}\text{F}$ of the target subcooling for correct refrigerant charge.

An improper superheat value can indicate a range of issues such as a clogged filter drier, a refrigerant undercharge or overcharge or improper airflow. A bad subcooling value can indicate an overcharge or undercharge, liquid-line restriction or insufficient condenser airflow. Miscalculated readings can cause a technician to overcharge the system and compromise the compressor.

Just as we know that, with refrigerant, too much or too little are common issues—with too little often indicating a system leak. Most of us are also well-aware that when refrigerant gets to the metering device it needs to be in liquid form, and when it gets to the compressor, it needs to be gas, otherwise a whole host of problems can ensue. *Why then, don’t we take these measurements on every system, every time?*

Probably because in the past it has been a big pain in the rear—that’s why!



Tapes, Straps and Zip-Ties, Oh My!

Even getting one reading in the tight spaces and odd corners of many commercial and even refrigeration spaces requires some doing. Trying to get multiple readings for superior calculations and advanced troubleshooting has seemed less like a necessity and more like a nice-to-have that's not quite worth the hassle.

Why? Because most pipe temperature measurement instruments have been designed with tapes that fall off the moment there's any condensation or straps that require two hands to apply (which often just isn't possible in small, tight and awkward spaces) as well as zip ties (that may or may not allow for consistent pressure) and let ambient air get in the way of a precise reading.

Techs shouldn't feel like some sort of a MacGyver, jerry-rigging their tools to get a measurement. We should be able to trust our readings, but unfortunately, with most tools – we just can't. Even for those pros that feel confident that their technique is flawless, many are blissfully unaware of the common culprits coming between them, their tools and precision work.

PSA: Don't Believe Every Reading You Take. Most Measurements are Actually Wrong.

It's estimated that as many as 90% of common pipe temperature readings are wrong. *Worried you may be among those putting their trust in a tool that you shouldn't to get a reading you can't rely on?*

It's important to know that most tools will easily give you an inaccurate reading due to outside interference—and when it does, you likely won't even know it. With no systems to alert you that the reading is off, your measurement could be impacted by paint, dirt, ambient air, improper sensor calibration, condensation or

insulation that's gotten caked onto the pipe itself—all factors that can throw a reading off by as much as 3 to 4 degrees, with you none the wiser.

If the readings are off, not only is your client's system at risk, but so is your professional reputation.

The Rapid Rail™ Sensor Technology Difference.

For the types of readings we're talking about, a clamp design tool is a superior innovation in and of itself to both take a reading with one hand and ensure consistent pressure. You may also have heard about Fieldpiece's patented Rapid Rail sensor technology. This matters because, with two sensors, one either side of a pipe clamp tool, the electrically conductive pipe itself completes the circuit on both sides to provide a stabilized reading in seconds (versus minutes required for other tools) on a clean pipe. If the pipe clamp detects intrusive elements that can affect readings, such as paint, dirt, dust, grime or the myriad of other factors, it simply will not provide a reading at all, unlike other tools that would provide a false, inaccurate reading.

With Rapid Rail on the wireless JL3LC, hear a single beep? You know it's working. See a flashing yellow light and hear double beeps? This indicates you do not have a solid connection. You need to use an emery cloth to



clean off the pipe to ensure a proper connection. Do this, and your good, clean contact on a pipe will ensure the accuracy of your temperature readings. Knowledge is power, right? *What more could you want?*

Size. That's what.

Current products are underwhelming in their range, with the second largest competitor pipe clamp on the market measuring only 3 1/2". That's why Fieldpiece has innovated yet again to deliver the:

- Large Pipe Clamp Type K Thermocouple TC48
- Job Link® System Premium Large Pipe Clamp Probe JL3LC

Meet the Largest, Most Precise Pipe Clamps in the Industry.

Equipping HVACR pros with the most advanced tools on the market is the Fieldpiece thing to do. Realizing inaccurate readings on large pipes were the status quo but refusing to settle for it, Fieldpiece solved the issues of inconsistency, inaccuracy, improvisation, inconvenience and size through two pipe clamps that can do it all, and do it right the first time – no zip-ties, no waiting, no second-guessing.

With the ability to measure up to 4 1/8" or to scale down for pipes as small as 3/4", these high-tech clamps are the largest available on the market.

They are rugged, versatile, water resistant and always spot on, providing highly accurate readings every time. And, with consistent clamping force and our patented Rapid Rail Sensor Technology, they are unaffected by ambient air, dust, paint, corrosion or moisture on the pipe surface.

Plus, with a wired version that offers an extra-long six-foot tangle-free cord eliminating the need to crouch and squat while waiting for a reading, and a wireless version that can take a reading through even the thickest commercial freezer walls, these clamps let you do it all, even with one hand tied behind your back. (Not that you need to be doing tricks, but a one-handed operation does come in pretty darn handy in some of those harder to reach areas.)

With the TC48 and JL3LC, you *only* get accurate readings. Other tools will deliver readings no matter what, even when they are wrong – leaving techs with little more than a hope and a prayer that they've got it right. With Fieldpiece technology, you are guaranteed accuracy, and if there is interference, the TC48 and JL3LC will not generate a reading at all*—eliminating false readings and ensuring only precise results.

* indications of bad readings (bad connection) are "OL", "OPEN", values fluttering, -3000 (measurequick).



SAY HELLO TO FIELDPIECE'S JL3LC JOB LINK® SYSTEM PREMIUM LARGE PIPE CLAMP AND TC48 LARGE PIPE CLAMP TYPE K THERMOCOUPLE—AND WELCOME UNMATCHED SIZE, PRECISION AND SPEED TO YOUR TOOL BAG.

- Widest industry pipe clamp range on the market, suitable for pipes 3/4" to 4 1/8" diameter.
- Rapid Rail™ Sensor Technology delivers extremely accurate readings without interference.
- Made for single-hand operation with comfortable, ergonomic grip, which means no more struggling with straps, zip ties and tapes.
- Guarantees a fast set-up and instant reaction time, stabilizing in seconds unlike the competitors which can take several minutes.
- Waterproof, rugged, compact for easy storage and built durable to withstand the rigors of field use.

Choose from two options:

- **TC48 Large Pipe Clamp Type K Thermocouple (Wired)** For techs that prefer a longer tangle-free cord – 6' to be exact – for less crouching and more range can choose model **TC48**, which includes a Type K male mini plug for a universal fit.
- **JL3LC Job Link® System Premium Large Pipe Clamp (Wireless)** For those who enjoy more freedom, the Fieldpiece Job Link® System mobile app-enabled **JL3LC** is the right pick to communicate full system details with building managers, document system performance for future reference and more. Learn more about JobLink at <https://www.fieldpiecejoblink.com/>.

The Gold Standard for HVACR Requires Constant Innovation.



In the last 40 years, Fieldpiece has led the charge in providing HVACR professionals more than just the basic tools needed for the job. Fieldpiece is always looking for the next innovation; offering new solutions often before techs realize there's an area for improvement. We've worked hard to cultivate a reputation as an "all or nothing" company that believes in accuracy and precision above all else, and we believe that techs should settle for nothing less than the best.

Even way back when "beer can cold" was the go-to approach, Fieldpiece was the first to innovate a tool to calculate superheat/subcooling (it's ASX14, SSX34), and it wasn't long before nearly everyone in the field began to realize the importance of these readings. Now, with the addition of the Large Pipe Clamp Type K Thermocouple TC48 and the Job Link System Wireless Large Pipe Clamp JL3LC to its full suite of products, Fieldpiece has innovated yet again.

Whats Next?



Check out our JL3LC Job Link® System Premium Large Pipe Clamp and TC48 Large Pipe Clamp Type K Thermocouple product pages at www.fieldpiece.com for even more details about the features and benefits of these hot new products. Ready to buy? Visit your local distributor to get one on your truck today!

And, trust us that the forward progress won't stop here. Stay tuned for the next big innovation in HVACR technology by signing up for our newsletter, following us on social media and checking back at www.fieldpiece.com regularly!

"The TC48 and the JL3LC are industry game changers! For the past 15 to 20 years, it has been the norm to use wire thermometers that entail taping or using velcro, methods that are time-consuming, a pain to set up, and can still give techs fake readings in many cases. With the large pipe clamps, I can single-handedly connect and stabilize for accurate readings; where before, I would have to take my type k thermocouple, wrap it 3 to 4 times around the pipe, and still worry that the tape would lose its hold. These new tools make a world of difference for me. I can't wait to test them out coming into boiler season. I'm looking forward to working through these hot pipes faster...and avoiding burns from reaching in too much."

~ Roger Thompson, commercial technician



Tools HVACR Pros Trust

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