

## Instrument Design Adds to Technician Safety

### **DMMs designed for the field help protect technicians**

By: Jack Sine

*When HVAC technicians speak of on-the-job safety they are seldom thinking about the instruments they use in the course of a work day. About the only safety related question involving instruments is: do they have the UL or CE mark on them? These days, most instruments have one or both marks. But that's not the end of it.*

*According to Adolfo Wurts, instruments present many more safety questions than most people would think. Wurts is the Senior Research Specialist at Fieldpiece Instruments, a company who manufactures measurement instruments designed specifically for HVAC/R technicians. He is also a certified HVAC technician, so he has a deep understanding of the technician's job and what it takes to perform it effectively.*



*“Since we opened our doors in 1990 we have interviewed a great many technicians to find out what they need to do their jobs,” he said. “The problem is that most instrument types were originally designed for laboratory use. As such, they can present some serious difficulties for the field tech. Those difficulties usually have little to do with tests required to get the UL and CE marks. Instruments built for the lab are often not effectively optimized for use in the field. For example, consider the third hand problem. To use most digital meters, the field guy uses two hands for the test leads and he needs a third hand to hold the meter.*

*He often doesn't have a nice flat spot to put it down. And even if he did, there's a big chance he'd knock it over or pull it onto the floor with the test leads."*

*Asked what the alternative is, Wurts explains that it's simple.*

*"Put a magnet on the back of the instrument. The HVAC/R tech is surrounded by metal surfaces. With the magnet, he can place it easily at eye level near his work and not have to worry about knocking it over."*

*But how does an instrument designed for a field technician offer greater safety than one designed for lab use? Wurts chose one of his company's own instruments and contrasted it with the typical DMM.*

*"Our HS30 series of stick-style DMMs is one hundred per cent the result of input from HVAC field techs," he said, "and was designed for the specific problems they meet on the job.*

*"Field service guys work around a wide variety of voltages and they like to know when there are potentially dangerous voltages their work area. Our meter includes a high voltage indicator that activates both the meter's LED and beeper when a probe makes contact with a voltage over 30V. The laboratory guys hate this feature in our meters because they know what they are working with and the noise it is distracting. They typically leave an instrument connected for a long time. But field techs, who typically make momentary contact, love it.*

*"Another safety feature is our NCV (non contact voltage) button. Our meter will tell a tech from a distance if a wire has voltage on it or not. All you have to do is bring the meter near the wire and press the NCV button. If the wire is hot, it the meter will beep and an LED blinksemit a sound. The higher the voltage, the further away the meter activates.*

*"If there are several wiresconductors in a confined area so that non contact would not be viable, the tech can perform one-lead testing. He puts one probe tip from a lead into the stick meter, presses the NCV button, and then with only one hand touches a test point on the wire. The beeper and the LED will tell the technician if the wire is hot, even if it is surrounded by other wires."*

*The three-handed technician seemed an intriguing idea, but how does the need for three hands translate into a safety problem?*

*"The three-handed problem is my term for the fix a field tech gets into when he has to hold two leads and can find no convenient place to put the meter. That's why the magnet exists. He can place it right at eye level while handling the leads. And that makes for better safety, especially when he is measuring 480V."*

*"It's like having a tester and a meter in the same instrument," said Tony Gonzalez, owner of Tony's Air Conditioning in Stanton, California. "I started using Fieldpiece instruments seven years ago because they do so many things, and that makes my job easier and safer. Now with my HS 33 model I don't have to carry a separate tester and I always know what*

*kind of voltages I'm working with. And including magnets on the back of them really simplifies every measurement I make. I get into a lot of tight spots and I used to hate dragging my DMM around by the leads. Now I just stick it where I want it and take my readings."*

*"But that's not the only hands problem with most multimeters," said Wurts. "Too many times a tech has to do a variety of tasks while taking measurements – turn power off and on, run equipment, and so on. Every time he has to put test leads on the test points and hold them there while looking at the DMM. We solved the problem by including two alligator clips with each meter. The technician can put the alligator clips on the leads and clip the leads to ground and to a test point, hang the meter by its magnetic strip, and go about his other tasks. Now he can make his adjustments and just look at the meter."*

*"The alligator clips have another important safety use. HVAC technicians are taught in school to perform one hand testing with the other hand in the pocket. The reason? Should there be any accidental electrical contact by the hand doing the measuring, the electricity could pass directly through the heart on its route to the other hand and ground. With one hand in the pocket the path of the electricity will not run through the heart across the chest on its way to the other hand. It's a good safety measurement, but with lab-designed meters it's often not possible. It couldn't be done without alligator clips and the leads made to use them."*

*"With the alligator clips, one handed testing is easy," said Wurts. "The tech attaches one alligator clip to the black COM lead and connects to ground. He then removes the red probe from the probe handle and inserts it into the HS30 series VOLTS jack on the top of the stick meter. Now he can hold the meter in one hand, put the other hand in his pocket, and touch the test points with the red lead from the top of the meter. If he wants to do two-handed testing, he uses the black probe tip instead of the alligator clip. Any way you look at it, it's still better than three handed testing."*

*Ken Maki, owner of KLM Construction in Vacaville, California particularly likes the alligator clips. "I spent fifteen years as an HVAC technician before I started my remodeling business and that's where I was introduced to Fieldpiece. I still do a lot of HVAC work in my business and I also repair appliances. With all of the tight spots I work in, the clips that came with my HS33 meter make me feel a whole lot more comfortable no matter what I'm working with. I always know that I'm properly grounded."*

*Fieldpiece also incorporates several other design elements in its HS30 series that are specifically designed for field use.*

*One of the most common failure points on a meter is where the test lead enters the meter body. Because of the frequent bending, the wire weakens at this point and a hot test lead can break open right next to the technician's hand – a serious safety risk.*

*“We took strain relief on the test leads very seriously,” said Wurts, “and have developed a patent-pending design. It gives a gentle bend to the wire as it comes out of the meter, even if a technician tugs on it sideways or pushes against the back of the probe with his hands. Our warranty repair manager cannot remember the last time he saw a broken test lead.”*

*Cramped quarters also create problems for field technicians that lab techs don’t experience. In an awkward or dark spot, the technician runs into another kind of three-handed problem – he can’t operate the leads and see the readout on his meter at the same time. Wurts and his engineers solved this problem by including a MIN/MAX/HOLD feature on their HS30 series. By pressing the MIN/MAX button before testing, the technician can concentrate his entire focus on the test leads. The meter will record the maximum voltage for later viewing or, by pressing the hold button, it will freeze the LED display.*

*“Voltage isn’t the only measurement that creates problems for the field technician,” said Wurts. “Clamp meters also have problems measuring current in hard-to-reach places. We got around that by including a current clamp on the end of three feet of wire with our HS30 series meters. The tech uses the magnet to hang the meter nearby, connects the current clamp to the appropriate wire, and reads the current. He can even use the MIN/MAX feature to measure inrush current. But the important point is that the technician can avoid putting himself in an awkward, potentially dangerous, position.”*

*Although Fieldpiece does offer autoranging on the HS30 series, Wurts says manual ranging can be safer.*

*“Technicians can develop bad habits using autorangers,” said Wurts, “especially where there are high voltages involved. Autorangers promote the hook-up-and-look approach which makes it easy to connect to the test points without thinking. That can be a big problem if you casually connect to 480V. With the manual ranger you have to set the range before connecting. This forces the technician to consider the magnitude of the voltage. He will probably act differently if he thinks the voltage might be 480V than if he thinks it might be 24V.”*

*Fieldpiece includes several other seemingly minor features that contribute to safety and longer instrument life.*

*“A great many of these came about as suggestions from the field technicians themselves,” said Wurts. “Our leads are insulated with silicon. Vinyl coated leads crack in cold weather and silicon stays flexible. It’s another concern they don’t have in a lab and a safety issue for the tech. And we feature a no-tangle test lead storage. The leads wrap neatly right around the meter where they won’t snag other tools in your kit and are less likely to get damaged. We also designed our HS30 series in an hourglass shape so it fits easily in the hand and we applied non slip rubber so it is less likely to get dropped.”*

*Since safety concerns every field service technician, it makes sense to use equipment specifically designed for the field*