

Wireless Handheld Meters for Increased Safety and Productivity in Installation and Maintenance



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INTRODUCTION

The world economy has generally improved since 2009. However, most companies are constantly under pressure to lower operation costs and usually, this means employees have to do more for less.

This is especially so for installation and maintenance (I&M) workers in industrial plants and commercial facilities. The I&M engineers and technicians are required to improve their skill sets and to source for tools that can improve productivity and efficiency, including handheld digital multimeters (DMM) and clamp meters, two of the most used measurement tools for installation and maintenance.

Modern and versatile handheld meters equipped with wireless connectivity capability can greatly save time and resources while improving safety, especially in the challenging and hazardous industrial and commercial environment.

PROPRIETARY WIRELESS CONNECTIVITY FOR HANDHELD METERS

Wireless engineering with the help of mobile phones in the 1990s, which evolved to 3G in 2000s, redefined portability in communication.

The world is now moving towards 4G (LTE) with higher connection speed but wireless connectivity in handheld meters was available only several years back.

In its simplest form, a wireless handheld meter is merely one with a detectable wireless display. When the display is detached, no measurement readings can be seen.

Another concept is a built-in proprietary wireless protocol to enable communication within the same series of single-function or limited-function meters or to a computer via a proprietary PC adapter. Wireless connection to off-the-shelf smart devices like Android (smartphone or tablet) or iOS (iPhone or iPad) is not always possible as most smart devices use open wireless connections like Bluetooth®, WiFi or GSM.

OPEN WIRELESS REMOTE CONNECTIVITY FOR HANDHELD METERS

The smartphone is one of the greatest technological innovations in the history of electronic engineering. It has changed the way we work, learn and play. To enable wireless connectivity for handheld meters, technologies like *Bluetooth* or WiFi (which are commonly built into any modern computing or smart devices) can be added as built-in or plug-in device. Considering factors such as ease of use and setup, power consumption and commonality, Bluetooth is a natural choice.

The other question is: "What is a better choice - a built-in or plug-in device?" Built-in is simpler but it limits the range of handheld meters to only those with built-in Bluetooth technology. On the other hand, a plug-in provides greater flexibility and leveragability.

One solution is the Agilent Wireless Remote Connectivity (WRC, Figure 1), which offers plug-in Bluetooth (U1177A IR-Bluetooth adapter) wireless connectivity for all the 15 models of U1200 series handheld meters (multimeters and clamp meters) with different performances and prices.



Figure 1: Agilent Wireless Remote Connectivity (WRC) Solution, which enables plug in Bluetooth wireless to Android smart devices and PC through the U1177A IR-Bluetooth Adapter with broad range of compatible U1200 series handheld meters.

Table 1: Comparison between proprietary and open wireless connectivity on handheld meters

Wireless Protocol	Proprietary	Open
Example	Company specific	<i>Bluetooth</i>
Connect to PC	Through proprietary adapter	<i>Bluetooth</i>
Connect to Smart devices	Usually not possible	<i>Bluetooth</i> and mobile apps
Cost	Typically higher initially and needs re-investment	Typically lower than proprietary due to leveragability
Choice of handheld meters at different functions, ranges, accuracy	Limited to certain model or series of handheld meters	With plug-in open wireless concept, more choices of handheld meters available.

FEATURE

IMPROVING SAFETY IN A HAZARDOUS ENVIRONMENT

When working in a hazardous environment, safety should always be the priority. Other than applying correct safety practices, tools (e.g. handheld meters must be within the right safety category, CAT IV 600V/CAT III 1000V as defined in IEC 61010 and certified by accredited labs like CSA or uL) also play a big role.

Measuring on live machinery or electrical system in industrial settings is both challenging and hazardous, but unavoidable. Often, maintenance engineers or technicians need to understand the loading conditions of the industrial system and this can only be done when the system is in operation. This is where wireless capability will be an added safety measure that allows engineers or technicians to view measurements at a safe distance.

When probing crowded electrical or industrial circuits, where connectors or test points are close to each other, audible output of meter's readings will help bring safety to the next level (Figure 2). Engineers or technicians can now concentrate on probing without having to look out for short circuits.



Figure 2: Android smartphone provides audible reading on multimeter's measurement for greater safety

DO MORE WITH LESS IN ELECTRICAL SYSTEM MAINTENANCE

In industrial and commercial settings, the measurement point is often a distance away from the control or switching point. To observe changes at a particular point affected by switch or control system, a technician would need to walk back and forth unless there are two persons doing the job. With wireless connectivity on handheld meters, only one technician is required to set up the measurement and observe the reading at control or switching point. Productivity is increased as there is no need to walk back and forth.

Certain wireless solutions (e.g. Agilent Wireless Remote Connectivity) allow wireless connection of up to 3 handheld meters (Figure 3). This means one technician in the control room can now observe 3 different measurements simultaneously. Again, productivity is increased without the need for added manpower.

INCREASING PRODUCTIVITY IN INDUSTRIAL TROUBLESHOOTING



Figure 3: Wirelessly monitor 3 handheld meters' measurements using free Agilent Mobile Meter apps

Troubleshooting an intermittent or drift related problem can be very challenging and time consuming. On top of having the experience and skill, one may need a professional handheld meter with data logging capability to capture events when a problem occurs so that appropriate action can be taken. Typically, an engineer would save data in the handheld meter's internal memory and then transfer the data to a computer for further analysis. Data can be transferred through USB connectivity.

The Bluetooth wireless connectivity implemented on the Agilent WRC solution has opened up a new level of portability on data logging application for handheld meters. At any one time, engineers can now log multiple measurements wirelessly and directly onto smart devices (e.g. smartphone or tablet). With intuitive touch screen controls on smart devices, analysis can be done on-site in real-time.

Smart devices are highly connected devices equipped with phone and network connectivity. With mobile apps (such as Agilent Mobile Logger, Figure 4), an engineer can configure to receive email or SMS alerts when anomalies are observed. These make multitasking possible as an engineer can attend to other problems until the anomalies do happen.



Figure 4: Data Logging using free Agilent Mobile Logger apps on Android tablet that is wirelessly connected to Agilent U1177A IR-Bluetooth adapter plugged into Agilent U1273A Industrial OLED digital multimeter

EVOLVEMENT OF PORTABLE MEASUREMENT SYSTEM

Preventive and predictive maintenance (PM) strategies are increasingly being adopted in industrial I&M to prevent unplanned breakdowns which can be costly. Engineers and technicians perform periodic measurements on electrical and industrial control systems to gauge the condition of a system. Technicians will need to manually record the measurements, date, time, location, machine identity and other related information for PM. This can be tedious.

With smart devices, it is now possible for an innovative engineer to automate or semi-automate some of the tasks by developing mobile apps and this can be done in-house or externally. The apps can directly acquire readings from handheld meter and tag the reading to the machine ID (usually available on the machine) by scanning the barcode (there are many barcode scanning mobile apps available). The information can then be synchronised with corporate database on real-time basis to effectively create a portable measurement system that is able to significantly increase productivity and reduce human errors.

CONCLUSION

With Bluetooth connectivity on handheld meters, increased adoption of smart devices and its highly connected eco-system into workplaces, I&M engineers and technicians can now work smart and be more efficient. ■