

FLUKE®

FLUKE Plant News

Products and tips for industrial professionals

Volume 1, Number 1



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Details inside

PRODUCT FOCUS

200 MHz, Color ScopeMeter® Series ■ Fluke Digital Multimeters ■ Infrared Thermometers ■ Accessories and more...

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Fluke digital multimeters – Rugged. Reliable. Accurate.

Monitoring load current with a **DMM**

A digital multimeter (DMM) has become a necessity for electrical system measurements, and most electricians and electronic technicians would feel lost without one. The features available in today's meters make them versatile enough to find most problems in electrical and electronic circuits.

There are, however, some measurement tasks that make a technician think twice about his DMM.

Take for instance, load currents. Many DMMs are designed to safely measure current up to 2, 10 or 20 amps depending on the DMM. Yet load currents found in most industrial environments are much higher and backed by high energy. On the surface it's not an attractive match.

That's where a DMM accessory called a current clamp comes in handy. A current clamp, like the Fluke 80i-400, can be employed to overcome the DMM's limitations for measuring ac current. Like a power transformer, the current clamp uses windings around a laminated core to step-down the circuit current within the measurement range of the DMM. The step down ratio is commonly 1,000 to 1. So, measuring 100 amps in a load circuit through a current clamp will apply 100 mA to the DMM's current input. That's well within the DMM's capability and, conveniently, a direct reading from the DMM display. Just switch the DMM to mA ac mode and

think "amps" when reading the display.

The current clamp is designed to clamp around a single conductor and uses the fluctuating magnetic field around the conductor to induce a current. Because it uses transformer action, the current transformer is only usable on ac circuits.

However, there are other clamps, like the Fluke i410, designed to use the "Hall Effect" sensor which allows them to be used on both ac and dc circuits.

As long as the DMM is safety rated for the environment in which you will be making the measurement, say CAT III for electrical panels and switch gear, you can safely attach an appropriately rated current clamp to your DMM and make the measurement. Just remember that when you are using a DMM/current clamp combination you need to combine the measurement specifications of the current transformer and the DMM to get overall measurement accuracy.

Combining a DMM with a current clamp accessory enables accurate measurement and analysis of load currents.

Fluke has a wide range of current measurement accessories to fit just about any application. Current clamps with a maximum current rating ranging from 200 to 2,000 amps are available at



your nearest Fluke distributor. These same distributors stock a collection of Fluke DMMs with varying feature sets so you can purchase the exact features you need in your work. ■

**For the entire article,
visit our web site at
www.fluke.com/plant**

Fluke 189 Logging Multimeter

Smart meters for the most demanding users

The Fluke 180 Series DMMs deliver break-through features and functions with the accuracy to meet the demands of any application.

- 50,000-count resolution with instant readings for detailed analyses (0.001 mV, 0.01 mA, 0.01 Ω)
- Multiple reading display with bargraph and two-level backlight
- 0.025 % basic dc accuracy
- True-rms ac, ac and dc
- 100 kHz ac bandwidth for troubleshooting modern electronics
- Two separate internal memories. One for logging up to 995 readings automatically at user selectable intervals and one for 100 manually saved measurements.

CAT IV 600 V, CAT III 1000 V

Test drive this product before you buy at www.fluke.com/plant



Fluke 179 Digital Multimeter

Tough meters for industrial professionals

Designed tough to withstand the harshest work environments, and are accurate enough to rival most bench meters.

- 6000 count display provides better resolution
- 0.09 % basic dc accuracy zeros in on tight readings
- True-rms ac voltage and current measurement for accurate readings on all waveforms
- Frequency, capacitance and resistance
- Auto and manual hold
- Min/max/Average records irregular activity

CAT IV 600 V, CAT III 1000 V

Test drive this product before you buy at www.fluke.com/plant



Find more articles on the *Fluke Plant News* web site.

“So you need a DMM? Which one do you pick?” www.fluke.com/plant

“ABCs of DMM safety – Cat IV can really mess up your DMM. Worse yet, it can kill you.” www.fluke.com/plant

“Find hidden ac problems with true-rms” www.fluke.com/plant

Fluke 80 Series III Analog/Digital Multimeters

High-performance meters for demanding industrial and electronic applications

Fluke’s 80 Series III DMMs provide 11 functions for electronic and industrial applications including high-performance dc/ac voltage and current measurement, frequency, duty cycle, resistance, conductance, continuity, diode test and capacitance measurement.

- 4-1/2 digit mode, 20,000-count display (Fluke 87, 87/E only)
- 0.05 % basic dc accuracy
- True-rms measurements (Fluke 85, 87 and 87/E only)

CAT III 1000 V



Fluke 112 Digital Multimeter

Compact meters for installers and contractors

Compact digital multimeter with a wide range of functions for general purpose measurements

- 6000-count display provides improved resolution
- 0.7 % basic dc accuracy
- True-rms ac voltage and current measurement for accurate readings on all waveforms
- Frequency, capacitance and resistance capabilities
- Min/max/Average captures irregular activity
- Backlight illuminates the display in dark workspaces

CAT III 600 V

Test drive this product before you buy at www.fluke.com/plant



Save when you buy the Fluke 189 Multimeter + FlukeView® Forms documentation and analysis software together

We have bundled these two products together. So they can be ordered as a single bundle at a lower price than purchasing the items separately. Now you can get more out of your Fluke 189 Digital Multimeter.

Ask your distributor for details.



Fluke 179 Multimeter/ToolPak™ Combo Pak

Save when you buy the Fluke 179 Multimeter & ToolPak Magnetic Meter Hanging Kit together.

We have bundled these two products together. So they can be ordered as a single bundle at a lower price than purchasing the items separately. Now you can get more out of your Fluke 179 Digital Multimeter.

Ask your distributor for details.



Electrical tools for industrial electricians

Proper use of clamp meters in commercial settings

There's nothing so annoying as a breaker that keeps tripping, usually at the most inopportune times. More annoying yet is not being able to figure out why as the production line stands silent waiting for you to work your magic. The pressure's on!

Beyond the basic measurements, clamps were specifically designed for – circuit loading and balance of three-phase feeders – modern digital clamp meters have voltage and resistance measurement capability as well. That means it's possible to make most, if not all, of the common every-day measurements using a clamp meter. For optimum performance that clamp meter should be a true-rms model, like the Fluke 335, 336 or 337.

Clamp meters in commercial environments

Clamp meters are used at the panel board to measure circuit loading on feeders as well as on branch circuits. Measurements on the feeder should always be made at the load side of the breaker or fuse, if these are available (such as in an enclosed motor starter).

- Feeder cables should be checked for balance as well as loading: current on all three phases should be more or less the same, to minimize the return current on the neutral.

- The neutral should also be checked for overloading. With harmonic loads, it's possible for the neutral to be carrying more current than a feeder – even if the feeders are balanced.

- Each branch circuit should also be checked for possible overloading.

- Finally, the grounding circuit should be checked. Ideally there should be no current on the ground, although levels under 300 mA are ok.

(continued next page)

Fluke 33X and 32X Series Clamp Meters

Choose from 7 new clamp meters to get the right combination of features and functions that fit your job.

- Measures amps, volts, ohms and continuity
- Backlight available on most models
- New inrush current feature measures motor-starting current the way a circuit breaker or overload unit sees it (selected models)
- All models feature display hold button and auto shut-off
- 3-year warranty on 330 Series, 2-year warranty on 320 Series
- Includes: batteries, test leads, instruction card, safety sheet and carrying case

CAT III 600 V

Test drive this product before you buy at www.fluke.com/plant



T5-600 and T5-1000 Electrical Testers

- AC amps to 100.0 A
- Continuity/ohms to 1000 Ω
- 600 volts ac/dc (model T5-600)/1000 volts ac/dc (model T5-1000)
- OpenJaw™ technology for easy current measurements

T5-600: CAT III 600 V

T5-1000: CAT III 1000 V, CAT IV 600 V



Fluke VoltAlert™ Voltage Detectors

Pocket-sized, non-contact ac voltage detectors that glow red when near an outlet or conductor if voltage is present.

- Fluke 1AC for 90 V ac to 600 V ac
- Fluke 1LAC for 24 V ac to 90 V ac

CAT III 600 V



Fluke 1550 MegOhmMeter



- Digital MegOhmMeter that tests switchgear, motors, generators and cables up to 5000 V dc.
- Wide range of tests - simple spot checks to timed tests and break-down tests
- Measurement storage and included PC interface software make it ideal for preventative maintenance.

CAT III 600 V

Test drive this product before you buy at www.fluke.com/plant

Fluke 1520 MegOhmMeter



- Three output voltages for insulation resistance testing: 250 V, 500 V, 1000 V
- Insulation resistance testing up to 4000 MΩ
- AC/DC voltage measurement up to 600 V

CAT III 600 V

Test drive this product before you buy at www.fluke.com/plant

Find more articles on the *Fluke Plant News* web site.

“Clamp meters – they can do more than just measure circuit loads”

www.fluke.com/plant

“Receptacle measurements are simple – understanding what they mean is not”

www.fluke.com/plant

“Power quality at the service panel”

www.fluke.com/plant

Fluke 43B Power Quality Analyzer



Performs the measurements you need to maintain power systems, troubleshoot power problems and diagnose equipment failures.

- Display voltage and current waveforms
- Measure real power, apparent power and power factor
- Record sags and swells, capture transients and displays harmonics up to the 51st harmonic

CAT III 600 V, CSA, UL

Test drive this product before you buy at www.fluke.com/plant

(continued from previous page)

Testing for leakage currents

To check if there is leakage current on a branch circuit, put both the hot and neutral wires in the jaws of the clamp. Any current that is measured is leakage current, i.e., current returning on the ground circuit. The supply (black wire) and return (white wire) currents generate opposing magnetic fields. The currents should be equal (and opposite) and the opposing fields should cancel each other out. If they don't, that means that some current, called leakage current, is returning on another path. The only other available path is the ground.

If you do find ground current, you should check to see if any receptacles are mis-wired (visit the Fluke Digital Library at www.fluke.com/plant for information on receptacle diagnostics). It is also possible that individual loads have internal leakage currents.

Measuring individual loads

To measure individual loads, you can use a break-out cord at the receptacle. This is simply an extension-type cable where the outer insulation is stripped so that the black, white and green wires are exposed. It's a lot easier than taking the receptacle out to get at a wire. Plug the load into the cable and the cable into the outlet. To measure load current, clamp the black wire. Make the ground current check directly on the green cable or on the black and white wire together. ■

For the entire article, visit our web site at www.fluke.com/plant

VR101S Voltage Event Recorder System



- Records up to 4000 sags, swells transients, outages and frequency variations on line voltage at receptacles
- Includes a compact VR101 event recorder, an optical interface cable, and EventView™ software that turns your PC into a power quality reporting tool.

CAT III 300 V



Troubleshooting process loops

taking a precision resistor and placing it across the output leads of a loop calibrator creates a voltage across the resistor that is directly controlled by the source current from the calibrator. For example, placing a 250 Ω resistor across the source output jacks and driving it with a 4 to 20 mA current will produce 1 to 5 V across the resistor. Place this voltage on the input of a signal conditioner and you have created a test system to set linearity as well as the zero and span points of the conditioner. With a DMM or ProcessMeter™ like the Fluke 787, you can measure the output of the signal conditioner and ensure the proper levels are coming out of the conditioner with a corresponding input voltage.

ProcessMeter™

The Fluke 787 is a combination loop calibrator and professional true-rms DMM, all in one convenient package. Although not as accurate as other Fluke loop calibrators, the 787 works well as a current source in most troubleshooting situations. You can control devices on a current loop to see if they are functioning, and set them to various levels to aid in locating problems. The DMM measurement capabilities within the 787 make it a valuable tool in troubleshooting process loops. All the basic DMM measurement functions like volts ac and dc, current ac and dc, resistance, and frequency can be utilized at different stages of the troubleshooting process.

Another feature of the 787 that comes in handy is the min/max function, which can be used to determine the range of values a current loop experiences over a

period of time. If the current loop has a dropping resistor across which we can make a voltage measurement, place the 787 in volts dc and connect the leads across the dropping resistor. This will give you a voltage reading that will vary in proportion to loop current. If a dropping resistor is not available, you can open the current loop and use the process meter's current jacks to close the loop.

With the Fluke 787 in the proper function and connected to the circuit, press the min/max button to activate the mode. The Fluke 787 will look at each measurement and test whether it is higher than the highest reading it has measured so far, or lower than the lowest measurement. If it detects a new high or low, the meter will store that value. This process continues until the meter is shut off or another function selected. While in the min/max mode, selecting the min/max button will cycle the display through the high, low, and average readings stored in the process meter. ■

For the entire article, visit our web site at www.fluke.com/plant

Tracking down problems within a process loop can prove to be a challenge. However, armed with the right tools and an understanding of how to use them, you can identify and fix most problems found in process loops.

Loop calibrators

Loop calibrators, such as the Fluke 705, 707, and 715 have the ability to replace the power source in a current loop. With the calibrator in control of the current, you can accurately set the current between 4 and 20 mA, controlling the loop and the device connected to it. This makes it possible to test valve positioners, mechanical position indicators, and flow indicators. You can check a valve's closed and open positions by accurately setting the current in the loop through the calibrator for each of the positions, and then visually check the position of the valve at each setting.

For testing devices requiring a voltage input, like a signal conditioner, we can use the source mode of a calibrator in conjunction with a precision resistor to generate accurate voltages. Simply

Tools for process professionals

Fluke 787 ProcessMeter™



- Double your power - DMM and loop calibrator in one tool
- Precision 1000 V, CAT III rated digital multimeter with mA output
- Externally accessible battery for easy battery changes

1000 V CAT III

Fluke 724 Temperature Calibrator



- Source/measure TCs, RTDs, volts and ohms
- Measure mA while supplying loop power
- 25 % and 100 % stepping, auto-step and auto ramp

74X Series Documenting Process Calibrators



Work smarter. Work faster

Whether you are calibrating instruments, troubleshooting a problem, or running planned maintenance, the job gets done faster with Fluke Documenting Process Calibrators.

- Calibrate temperature, pressure, voltage, current, resistance, and frequency
- Measure and source with one compact, rugged, reliable tool
- Record and document as found/as left results and transfer results data to a PC (743, 744)
- Communicates with HART® instrumentation (744)



Fluke 707 Loop Calibrator



- Innovative output adjustment dial with .001 mA and 0.1 mA resolution
- Push button 25 % steps for fast, easy linearity checks
- 1-100 % "span check" for fast confirmation of zero and span

Test drive this product before you buy at www.fluke.com/plant

Fluke 725 Multifunction Process Calibrator



- Easy to read measure/source screen lets you view input and output simultaneously
- Source/simulate and measure, volts, mA, thermocouples, RTDs, frequency, ohms and pressure for instrument calibration and troubleshooting
- Measure pressure using any of 29 Fluke 700Pxx pressure modules

Find more articles on the *Fluke Plant News* web site.

"Understanding specifications for process calibrators"
www.fluke.com/plant

"Internationally renowned fieldbus training facility relies on ScopeMeter® to 'see' problems"
www.fluke.com/plant

Industrial thermometers

Find more articles on the *Fluke Plant News* web site.

“Drive, motor or load? Where do you start to identify a problem?”
www.fluke.com/plant

“Troubleshooting power harmonics”
www.fluke.com/plant

Fluke 65 Laser-sighted IR Thermometer

Best IR accuracy

- Quick non-contact temperature measurements from -40 to 500 °C (-40 to 932 °F)
- Resolution of 0.1° up to 200°, 1° over 200°
- Repeatability of $\pm 1^\circ$ or $\pm 1\%$, whichever is greater
- Backlight illuminates the display in the dark



Fluke 61 Laser-sighted IR Thermometer

Easy to use

- Quick non-contact temperature measurements from -18 to 275 °C (0 to 525 °F)
- 0.2 °C or 0.5 °F resolution
- Backlight illuminates the display in the dark



Fluke 50S and 50D Digital Thermometers

Industry standards

- Fluke 50S - a basic, single-input thermometers that accepts J or K-type thermocouples
- Fluke 50D - great for measuring input/output changes and differential trends and has all the features of the 50S plus dual channel with differential output (T1-T2), min/max recording to capture events
- Fluke 50D also has a scan function to continuously scan through measurement sequence (T1, T2, T2-T2)



Infrared technology makes safe measurements possible in a variety of dangerous or hard-to-reach situations

Infrared (IR) thermometers allow non-contact measurement of surface temperatures by analyzing the invisible, infrared spectrum emitted from an object. IR devices, like the Fluke 61 and 65, make it safe to take surface temperature measurements of items like rotating, hard-to-reach, electrically live, or dangerously hot targets. For preventative maintenance tasks, they cut measurement time to almost zero with the ability to take a surface temperature reading in less than one second.

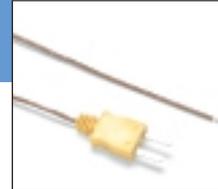
80T-150U Universal Probes

- Temperature probe for air, surface and non-corrosive environments
- Measurement range: -50 to 150 °C (-58 to 302 °F)
- Converts your DMM to a thermometer



80PK-1 Bead Probe

- Compatible with thermometers requiring K type thermocouples
- Measurement range: -40 to 260 °C (-40 to 500 °F)
- Works with 179 and 189 DMMs



Measure temperature with your DMM

80PK-7 Industrial Surface Probe

- K thermocouple with durable ribbon sensor for use in rugged environments
- Measurement range: -40 to 816 °C (-40 to 1500° F)
- Works with 179 and 189 DMMs



80T-IR

- Infrared non-contact temperature measurement
- 4:1 optical resolution
- Instantly measures from -18 to 260 °C (0 to 500 °F)



IR thermometers can be used to conduct thousands of different types of measurements, including:

- Electrical
- Preventive maintenance
- HVAC
- Steam
- Food processing
- Fast test of multiple targets

Proper use of IR technology

Although IR temperature measurement will never be quite as accurate as a calibrated contact temperature device, a typical reading will be within 2 °F of the absolute temperature when the instrument is properly applied. For scanning applications like those mentioned above that do not require precise measurement, this level of accuracy is more than adequate.

Putting IR technology to use is easy, but there are two critical parameters that must be understood to ensure proper and consistent temperature measurements with infrared type devices:

- Optical resolution
- Emissivity

Optical resolution

Optical resolution refers to the sample area the IR meter is measuring at a given distance. Optical resolution is also referred to as the “distance-to-spot-size ratio” or “field-of-view.”

Know your application! A device with a 4:1 optical resolution cannot effectively be used to measure the temperature of an object 15 feet away – even if the laser beam sight projects that far.

Try to determine how you are going to apply the IR thermometer before purchasing, and then buy a tool that provides the appropriate optical resolution for the application. Many erroneous readings are taken because the technician unknowingly samples a larger area than the object he is trying to measure.

Emissivity

Emissivity indicates the ability of an object to emit infrared energy. Emissivity is determined by the material from which the object is constructed and its surface finish. Values can range from less than 0.1 for a highly reflective body like polished metal to 1.0 for an ideal black body.

In simple terms, emissivity can be likened to the reflectivity – or shininess – of an object. Items such as soft-drawn copper are very smooth and shiny even under a microscope, while other objects such as lacquer paint appear quite porous under the microscope. The porous object will have a relatively high emissivity (typically 0.7 to 0.98), while new soft-drawn copper (shiny, not oxidized) will have a low emissivity (typically below 0.2). Shiny objects reflect IR energy from objects surrounding them, which dilutes the IR energy from the measured object. A

porous body tends to absorb surrounding IR energy, thus emitting its IR energy without dilution (like a black body).

Low-cost IR measurement instruments (under \$400) are typically fixed at 0.95 emissivity (the Fluke 61 and 65 are set to measure 0.95 emissivity). To get an effective absolute temperature reading, the surface being measured must have an emissivity close to 0.95. In other words, measuring a surface that is not highly reflective will provide an accurate reading. For shiny surfaces, use a coat of black paint, electrical tape, or magic marker to reduce reflection! If a 0.95 fixed emissivity IR instrument is used to measure an object that is not close to 0.95, the reading will be incorrect as follows:

- If the measured object is warmer than ambient temperature, the reading will be erroneously lower than the actual temperature
- If the measured object is colder than ambient temperature, then the reading will be erroneously higher than the actual temperature. ■

For the entire article, visit our web site at www.fluke.com/plant



Get more from your meter with Fluke accessories

T

he next time you get frustrated because you can't find the source of some stray transients that are playing havoc with your electrical system, think of the dairy cow in Minnesota that right this minute is snuggling up to a digital multimeter (DMM).

Is that a tingle she feels?

A lesson in data logging from down on the farm

Stray voltage, it turns out, can seriously stress dairy cows, inhibiting a herd's milk production. Dairy farmers for years have been on the hunt for places within barns that could produce unwanted stray voltage, from improperly grounded equipment to the metal stanchions at the cows' feeding stations. The results of the damage have been clear - injured or stressed cows at worst, reduced milk production at best - but most of the research so far has been academic, and a controlled research project in a university lab just doesn't adequately measure conditions on a real dairy farm.

That's why for the last year, Chuck and Wanda Untiedt of Lakefield, Minn., have been using Fluke digital multimeters and FlukeView™ Forms software at their Untiedt Udder Chaos Farm. They are finding out exactly what impact stray voltage is having on their herd of 350 dairy cows. FlukeView Forms allows users to take readings from Fluke meters and graphically view them on a Windows PC. While the measurements themselves yield valuable information, it is the ability to chart and analyze the results of multiple data logging sessions that is turning the farm's electrical system from a minefield of stray voltage into a safer environment for humans and animals.

The software works with a range of Fluke meters and thermometers, including the powerful 187 and 189 DMM models. Recently released FlukeView Forms V.2 displays data taken over time from up to eight meters on a single form, allowing troubleshooters to easily compare

comprehensive data that then can be printed for further analysis.

The capability to view and analyze data logged over time is particularly valuable for commercial and electrical contractors, plant maintenance engineers, electronic and R&D engineers who need to document measurements over a period of time. FlukeView Forms makes it possible to log data as events, which then are easily uploaded to a PC - either from a meter's memory or real time from the meter itself - and automatically displayed in graphs and tables.

That ability to incorporate information from multiple meters allows easy graphical comparison on the same form of data taken at different times, particularly important when performing extended tests from various locations. Time stamps record elapsed times of logged readings. And because users set the parameters of significant and insignificant readings recorded during any logging session, data is more valuable without the "noise" of irrelevant fluctuations.

FlukeView Forms can be set to automatically upload data from memory, or can log data from a meter in real time while it is connected to a PC. Graphs and tables automatically adjust to correctly display the type of readings required. The software includes many pre-defined forms from which to choose and also allows users to build customized forms using the FlukeView Forms Designer tool, which is included.

FlukeView Forms V.2 supports Windows 95, 98, NT 4.0, 2000, ME and XP. It requires only a Pentium-

TL21A Test Lead Extension Kit

- 1.5 meter silicone insulated test leads with shrouded, male connectors on both ends
- Separate female couplers convert the test leads into lead extensions

CAT III 1000 V, CAT IV 600 V
DUAL RATED



TL20 Industrial Test Lead Set

- Includes leads, probes and alligator clips

CAT III 1000 V, CAT IV 600 V
DUAL RATED



TL23F and TL2R Electrical Test Lead Set

- One pair each of TL24 test leads, AC20 alligator clips and TP1 test probes (TL23F) or TP4 test probes (TL23R)

CAT III 1000 V, CAT IV 600 V
DUAL RATED



AC20 Heavy Duty Alligator Clips

- Plunger style, safety grip operation
- Insulated jaws open to 20 mm

CAT III 1000 V, CAT IV 600 V
DUAL RATED



AC87 Heavy Duty Bus Bar Clips

- Plunger style, safety grip operation with insulated right angle jaws
- Adjustable jaws open to grip flat bus bars or round conductors

CAT III, 600 V, 5 A



class microprocessor, 32 MB RAM and 70 MB hard disk space (100 MB to install). Software, documentation and sample forms are available in English, French, German, Spanish, Italian, Japanese and Simplified Chinese. ■

For the entire article, visit our web site at www.fluke.com/plant

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“Understanding harmonics and motor problems can improve system reliability”
www.fluke.com/plant

“World’s telecommunications network relies on razor-accurate test tools”
www.fluke.com/plant

“Pulse width triggering with the ScopeMeter 190C”
www.fluke.com/plant

i1000s AC Current Clamp

- Round jaw opens to accommodate up to 1-1000 MCM conductor
- 1000 A range with BNC termination and 1 mV, 10 mV and 100 mV outputs



H5 Electrical Tester Holster

- Rugged fabric holster includes flap for lead storage and built-in belt loop
- Holds T3 or T5 electrical testers



i200/i200s AC Current Clamp

- Small size is ideal for tight spaces
- 0-200A range
- i200 has mA output
- i200s has mV output



C43 Nylon Meter Case

- Zippered carrying case with inner front pocket, removable handle/shoulder strap



i410 AC/DC Current Clamp

- Jaw opening for up to 1-750 MCM or 2-500 MCM conductors



C125 Nylon Meter Case

- Large carrying case with detachable external pouch
- Padded to protect your ScopeMeter or DMM



80i-400 Current Clamp

- Jaw opening for up to 1-750 MCM or 2 500 MCM conductors
- 400 A range with shrouded banana plugs and mA output



C510 Leather Meter Case

- Large belt loop and top flap to secure meter
- Designed for most Fluke DMMs, thermometers and process meters



H3 Clamp Meter Holster

- Rugged fabric holster includes flap for lead storage and built-in belt loop
- For Fluke 330 Series Clamp Meters



C550 Tool Bag

- Rugged fabric case with metal frame and heavy duty hardware
- Several inside and outside pockets and zippered main compartment



Harley® contest winner!

Palmer Thornton, of Sawdy Electric in Palmetto, Florida is the winner of the Fluke's "Take a Test Drive Sweepstakes." Palmer has been an electrician since 1981. Sawdy Electric is a two person firm specializing in residential and light commercial electrical work. Palmer entered the sweepstakes at Rexel Consolidated in Bradenton, Florida. His Rexel salesperson was John Fox.



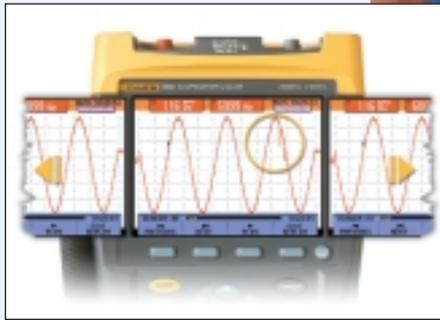
FLUKE®

See more, fix more with ScopeMeter® test tools

ScopeMeter® 199C See more, fix more – with color!

THE NEW SCOPEMETER 190C SERIES with large, high-resolution, color screen and new Digital Persistence mode gives you an even better view of complex waveforms in the most demanding troubleshooting applications in the field.

- Up to 200 MHz bandwidth
- Up to 2.5 GS/s real-time sampling rate
- Connect-and-View™ triggering for an instant stable waveform
- Automatic capture and replay of last 100 screens
- Isolated Inputs (1,000 V CAT II/ 600 V CAT III)
- 4-hour battery operation



ScopeMeter 123

- Dual input 20 MHz digital oscilloscope
- Two 5,000 count true-rms digital multimeters
- Dual input TrendPlot™ recorder
- Connect-and-View trigger simplicity for hands-off operation



Test drive this product before you buy at www.fluke.com/plant

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ENTER TO WIN
a Casio handheld
2.5" color television



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