

**FLUKE**®

# Fluke Digital Multimeters

Solutions for every need



# How to choose the best DMM for your job

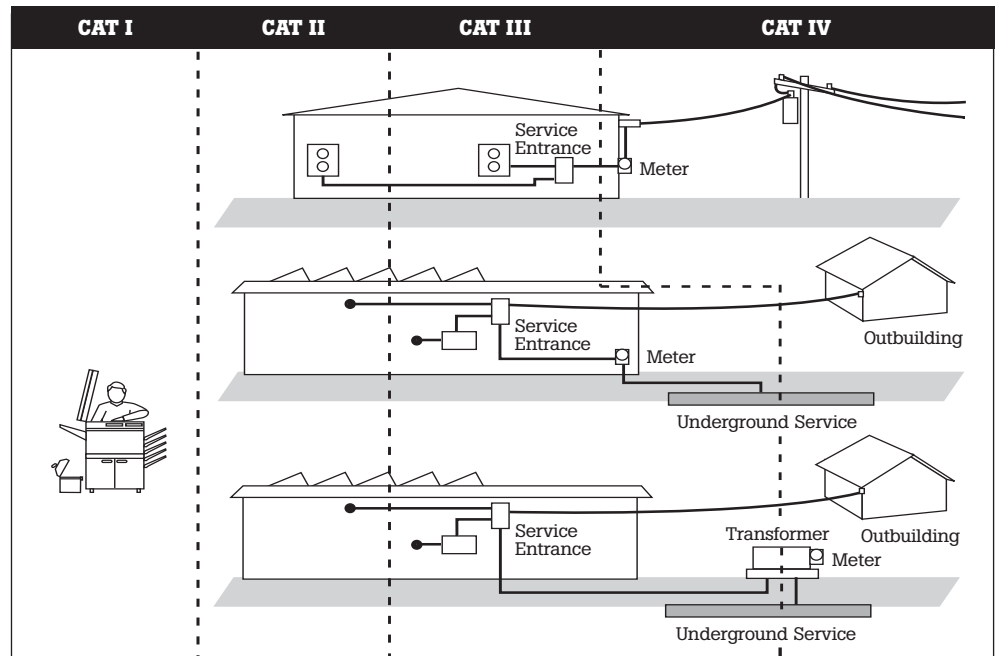
Choosing the right digital multi-meter (DMM) requires thinking about what you'll be using it for. Evaluate your basic measurement needs and job requirements and then take a look at special features/functions built into many multimeters. Think about whether you need to do basic measurements, or if you need the more advanced troubleshooting options offered by special features.

## Factors to consider:

- Your work environment (voltage level, types of equipment, types of measurements, applications)
- Specialty features/functions (capacitance, frequency, temperature, non-contact voltage, low impedance mode, min-max record, data logging, trending)
- Resolution and accuracy (6,000, 20,000, or 50,000 count resolution)








## Safety







The increased occurrence and levels of transient overvoltages in today's power systems have given rise to more stringent safety standards for electrical measurement equipment. Transients that ride on top of power sources (mains, feeder or branch circuits) can trigger a sequence of events that may lead to serious injury. Test equipment must be designed to protect people working in this high-voltage, high-current environment.



Measurement category	In brief	Examples
<b>CAT I</b>	Electronic	<ul style="list-style-type: none"> <li>• Protected electronic equipment</li> <li>• Equipment connected to (source) circuits in which measures are taken to limit transient overvoltages to an appropriately low level</li> <li>• Any high-voltage, low-energy source derived from a high-winding resistance transformer, such as the high-voltage section of a copier</li> </ul>
<b>CAT II</b>	Appliances, PCs, and TVs	<ul style="list-style-type: none"> <li>• Appliance, portable tools, and other household and similar loads</li> <li>• Outlet and long branch circuits</li> <li>• Outlets at more than 10 meters (30 feet) from CAT III source</li> <li>• Outlets at more that 20 meters (60 feet) from CAT IV source</li> </ul>
<b>CAT III</b>	MC panels, etc.	<ul style="list-style-type: none"> <li>• Equipment in fixed installations, such as switchgear and polyphase motors</li> <li>• Bus and feeder in industrial plants</li> <li>• Feeders and short branch circuits, distribution panel devices</li> <li>• Lighting systems in larger buildings</li> <li>• Heavy appliance outlets with short connections to service entrance</li> </ul>
<b>CAT IV</b>	Three-phase at utility connection, any outdoor conductors	<ul style="list-style-type: none"> <li>• Refers to the "origin of installation," i.e., where low-voltage connection is made to utility power</li> <li>• Electricity meters, primary overcurrent protection equipment</li> <li>• Outside and service entrance, service drop from pole to building, run between meter and panel</li> <li>• Overhead line to detached building, underground line to well pump</li> </ul>

# Digital Multimeter selection chart

	Best for	Applications	Recommended DMM
Advanced meters	Advanced industrial troubleshooting, including datalogging and graphing intermittent problems	<b>Logging:</b> For unattended monitoring of signals over time, to detect intermittent problems.	289 
		<b>Graphing:</b> View logged values graphically in the field right on the meter, without a PC.	
		<b>Working on VSD's:</b> Take accurate voltage, current and frequency measurements on the output side of the drive at either the drive itself or the motor terminals.	
Advanced meters	Advanced electronic applications, including datalogging and graphing intermittent problems	<b>Logging:</b> For unattended monitoring of signals over time, characterize device performance.	287 
		<b>Graphing:</b> View logged values graphically in the field right on the meter, without a PC.	
		<b>Monitoring two parameters at the same time:</b> Dual display allows for monitoring of two selectable parameters.	
Advanced meters	Industrial troubleshooting	<b>Working on VSD's:</b> Take accurate voltage, current and frequency measurements on the output side of the drive at either the drive itself or at the motor terminals.	87V 
		<b>Industrial troubleshooting:</b> All of the resolution and accuracy you need to solve more problems on motor drives, in-plant automation, power distribution, and electromechanical equipment.	
		<b>Checking power quality:</b> Capture glitches and spikes as short as 250 µs. Identify irregular signals.	
Specialty meters	Industrial troubleshooting in explosive environments	<b>Safety and compliance:</b> Unlike most other ATEX-certified tools, can be used both inside and outside the hazardous zone (ATEX Zones 1 & 2) without compromising performance or compliance.	87V Ex 
		<b>Industrial troubleshooting:</b> All the functionality necessary for most industrial troubleshooting jobs.	
	Automotive troubleshooting	<b>Troubleshoot variety of problems on conventional and hybrid vehicles:</b> Millisecond pulse width measurements for fuel injectors, RPM readings for both DIS and conventional ignitions with optional inductive pickup.	88V 
		<b>Automotive testing:</b> alternator diodes, duty cycle, solenoids, breaker points, wiring, switches, and more.	
Harsh environments requiring dustproof and waterproof test equipment	<b>Industrial troubleshooting in indoor and outdoor harsh environments:</b> Dustproof, waterproof, shockproof multimeter designed to withstand the toughest environments.	28 II/ 27 II 	
	<b>Working on VSD's:</b> Take accurate voltage, current and frequency measurements on the output side of the drive at either the drive itself or at the motor terminals. (28 II only)		
Applications where display positioning is problematic	<b>Remote monitoring:</b> View meter display up to 30 feet away from the measurement point. Observe meter real-time readings remotely.	233 	
	<b>Inconvenient measurements:</b> Remote magnetic display solves three handed problem.		
	<b>Electrical Maintenance:</b> All the features and functions of a conventional multimeter.		

	Best for	Applications	Recommended DMM
General purpose meters	Every day use requiring true-rms, accurate, rugged meter	<b>Industrial troubleshooting:</b> Applications requiring exceptional ease-of-use, ruggedness and reliability.	<b>179</b> 
		<b>Electrical maintenance and troubleshooting:</b> Variety of commercial electrical troubleshooting, installation and maintenance.	
General purpose meters	Every day use requiring average responding, accurate, rugged meter	<b>Industrial troubleshooting:</b> Applications requiring exceptional ease-of-use, ruggedness and reliability.	<b>77 IV</b> 
		<b>Electrical maintenance and troubleshooting:</b> Variety of commercial electrical troubleshooting, installation and maintenance.	
Compact meters	Wide variety of electrical work	<b>Electrical maintenance troubleshooting:</b> When you need to eliminate false or "ghost" voltages or perform continuity, connection or basic wiring checks.	<b>117</b> 
		<b>Non-contact voltage detection:</b> Integrated non-contact voltage detection simplifies many tasks.	
	HVAC troubleshooting	<b>Residential HVAC maintenance:</b> Lower voltage HVAC residential maintenance, installation and troubleshooting.	<b>116</b> 
		<b>Temperature and microamp measurements:</b> Troubleshooting problems with HVAC equipment and flame sensors.	
	Electronic and field service applications	<b>Electronic troubleshooting:</b> Troubleshoot a wide variety of measurement parameters, including frequency and capacitance.	<b>115</b> 
Utility applications involving basic electrical tests	<b>Revenue meter tests:</b> Involving meter sets and reconnects, capacitor checks, detection of absence or presence of voltage, and for continuity, connections or basic wiring checks.	<b>113</b> 	
	<b>Simultaneous voltage and continuity checks:</b> Vcheck LoZ low impedance function allows users to check voltage and continuity simultaneously.		

# Meters designed for the way you work.

Models	Advanced meters			Specialty meters			
	289	287	87 V	87V EX	88V	28 II	27
<b>Basic features</b>							
Counts	50000	50000	20000	20000	20000	20000	60000
True-rms readings	ac+dc	ac+dc	ac	ac	ac	ac	
Basic dc accuracy	0.025 %	0.025 %	0.05 %	0.05 %	0.1 %	0.05 %	0.1 %
Wide bandwidth	100 kHz	100 kHz	20 kHz	20 kHz	5 kHz	20 kHz	30 kHz
Auto/manual ranging	•/•	•/•	•/•	•/•	•/•	•/•	•/•
Digits	4½	4½	4½	4½	4½	4½	3½
ATEX II 2G Eex ia IICT4 safety rating Zone 1 and Zone 2				•			
<b>Measurements</b>							
Voltage ac/dc	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V
Current ac/dc	10 A	10 A	10 A	10 A	10 A	10 A	10 A
Resistance	500 MΩ	500 MΩ	50 MΩ	50 MΩ	50 MΩ	50 MΩ	50 MΩ
Frequency	1 MHz	1 MHz	200 kHz	200 kHz	200 kHz	200 kHz	200 kHz
Capacitance	50,000 μF	50,000 μF	10,000 μF	10,000 μF	10,000 μF	10,000 μF	10,000 μF
Temperature	(+) 1350 °C	(+) 1350 °C	(+) 1090 °C	(+) 1090 °C	(+) 1090 °C	(+) 1090 °C	(+) 1090 °C
dB	60 dB	60 dB					
Conductance	50 nS	50 nS	60 nS	60 nS	60 nS	60 nS	60 nS
Duty cycle/pulse width	•/•	•/•	•/-	•/-	•/-	•/-	•/-
Continuity/diode test	•	•	•	•	•	•	•
Motor Drive (ASD) measurements	•		•	•		•	
RPM					•		
VoltAlert™, non-contact voltage detection							
VCHEK™							
LoZ: low input impedance	•						
Lo Ohms	•						
Microamps	•	•	•	•	•	•	•
<b>Display</b>							
Removable wireless remote display							
Dot matrix display	•	•					
Dual display	•	•					
Analog bargraph	•	•	•	•	•	•	•
Backlight	Two level	Two level	Two level	Two level	Two level	Two level	Two level
Graphical trend display	•	•					
<b>Diagnostics and data</b>							
Min Max recording/with time stamp	•/•	•/•	•/-	•/-	•/-	•/-	•/•
Fast Min Max	250 μs	250 μs	250 μs	250 μs	250 μs	250 μs	250 μs
Display Hold/Auto (Touch) Hold	•/•	•/•	•/•	•/•	•/•	•/•	•/•
Relative reference	•	•	•	•	•	•	•
Stand alone logging	•	•					
Trend Capture	•	•					
Readings memories	10,000	10,000					
USB interface	•	•					
<b>Other features</b>							
Automatic selection, ac/dc volts							
Real time clock	•	•					
Overmolded case, integrated holster	•	•					
Removable holster			•	•	•	•	•
Closed case calibration	•	•	•	•	•	•	•
Separate battery/fuse access	•/•	•/•	•/-	•/-	•/-	•/-	•/•
Completely sealed/watertight						•	•
Automatic power off	•	•	•	•	•	•	•
Low battery indication	•	•	•	•	•	•	•
Operating temperature range	-20 °C ,+55 °C	-20 °C ,+55 °C	-20 °C ,+55 °C	-20 °C ,+55 °C	-20 °C ,+55 °C	-40 °C ,+55 °C	-40 °C ,+55 °C
<b>Warranty and electrical safety</b>							
Warranty (years)	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime
Input alert	•	•	•	•	•	•	•
Dangerous voltage indication	•	•	•	•	•	•	•
IP Rating	IP 42	IP 42	IP 30	IP 44	IP 30	IP 67	IP 67
EN61010-1 CAT III	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V
EN61010-1 CAT IV	600 V	600 V	600 V	600 V	600 V	600 V	600 V

		General purpose meters		Compact meters				
II	233	179	77 IV	117	116	115	114	113
Count	20000	6000	6000	6000	6000	6000	6000	6000
Accuracy	ac	ac		ac	ac	ac	ac	ac
Resolution	0.25 %	0.09 %	0.3 %	0.5 %	0.5 %	0.5 %	0.5 %	0.5 %
Frequency								
Relative Error	•/•	•/•	•/•	•/•	•/•	•/•	•/•	•/•
Resolution	3½	3½	3½	3½	3½	3½	3½	3½
Max Voltage	1000 V	1000 V	1000 V	600 V	600 V	600 V	600 V	600 V
Max Current	10 A	10 A	10 A	10 A	600 µA	10 A		
Max Resistance	40 MΩ	50 MΩ	50 MΩ	40 MΩ	40 MΩ	40 MΩ	40 MΩ	60 kΩ
Max Frequency	50 kHz	100 kHz	100 kHz	50 kHz	50 kHz	50 kHz		
Max Capacitance	10,000 µF	10,000 µF	10,000 µF	10,000 µF	10,000 µF	10,000 µF		10,000 µF
Temperature	(+) 400 °C	(+) 400 °C			(+) 400 °C			
Resolution								
Accuracy								
Relative Error	•	•	•	•	•	•	•	•
Resolution				•				•
Accuracy				•	•		•	•
Relative Error					•			•
Resolution	•							
Accuracy		•	•	•	•	•	•	•
Relative Error	•	•	•	•	•	•	•	•
Resolution								
Accuracy	•/-	•/-	•/-	•/-	•/-	•/-	•/-	•/-
Relative Error	•/•	•/•	•/•	•/-	•/-	•/-	•/-	•/-
Resolution								
Accuracy				•	•	•	•	•
Relative Error	•	•	•	•	•	•	•	•
Resolution	•	•	•	•	•	•	•	•
Accuracy	•/-	•/-	•/-	•	•	•	•	•
Relative Error	•	•	•	•	•	•	•	•
Resolution	•	•	•	•	•	•	•	•
Temperature	+55 °C	-10 °C, +50 °C	-10 °C, +50 °C	-10 °C, +50 °C	-10 °C, +50 °C	-10 °C, +50 °C	-10 °C, +50 °C	-10 °C, +50 °C
Warranty	Three	Lifetime	Lifetime	Three	Three	Three	Three	Three
Resolution	•	•	•	•	•	•	•	•
IP Rating				IP 42	IP 42	IP 42	IP 42	IP 42
Max Voltage	1000 V	1000 V	1000 V	600 V	600 V	600 V	600 V	600 V
Max Current	600 V	600 V	600 V					300 V