

protech

Wireless Datalogging Digital Multimeter

SPECIALIST



**LIFETIME
WARRANTY**

**4000
DISPLAY
COUNT**

**CAT IV
600V**

IP67

**TRUE
RMS**



Wireless Data Logging

Digital Multimeter User Manual

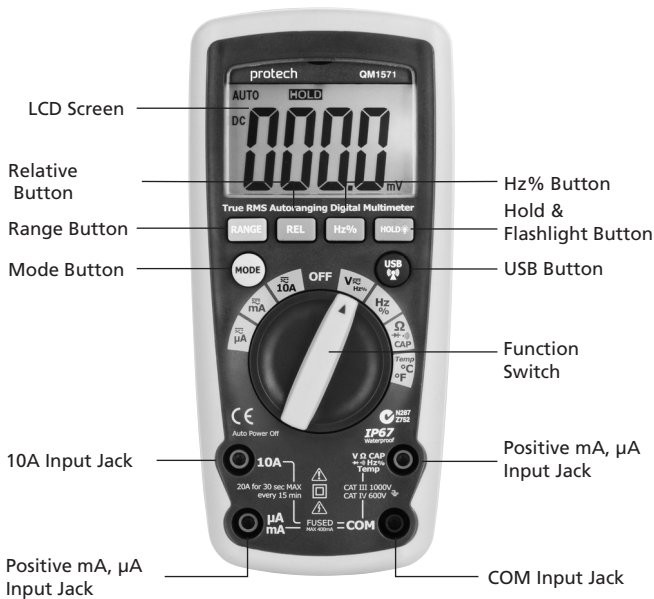
Thank you for purchasing this Wireless Data Logging Digital Multimeter. The wireless communication function of this multimeter allows you to transmit data wirelessly from the multimeter to your PC. This allows accurate recording at a much faster and detailed rate than manually writing down numbers. The true RMS function ensures accurate readings, regardless of load type or current wave shape. Packed with plenty of features, this multimeter will be your constant companion on-site, given its tough double moulded body and IP67 rating.

Please familiarise yourself with the functions of the multimeter before use. We recommend retaining this manual for ease of reference.

- Improper use of this meter can cause damage, shock, injury or death.
- Always remove the test leads before replacing the battery or fuses.
- Before using the meter, please inspect the condition of the test leads and the meter itself for any damage. If damage is present, please discontinue use.
- Do not measure voltage if the voltage on the terminals exceeds 1000V above earth ground.
- Use great care if voltages are greater than 30VAC RMS. Anything above this is considered a shock hazard.
- Always discharge capacitors and disconnect power before performing diode, resistance or continuity tests.
- Do not exceed the maximum limits of the input values shown in the specification tables on pages 12, 13, 14, 15 & 16 of this manual.
- Remove the batteries from the meter if it will be unused for an extended period of time.
- Always turn the function switch to the off position when not in use.

FUNCTIONS

Max. Display	4000 count
Basic Accuracy	0.5%
DC Voltage Range	400mV - 1000V
AC Voltage Range	4V - 1000V
DC Current Range	4mA -10A
AC Current Range	4mA - 10A
Resistance	400 Ω - 40M Ω
Capacitance (CAP)	4nF - 100 μ F
Frequency (Hz)	Up to 10MHz
Temperature	Yes
Data Hold	Yes
Relative Measurement	Yes
Diode Test	Yes
Duty Cycle	Yes
Audible Continuity	Yes
LCD Backlight	Yes
Wireless USB	Yes



The tilt stand & battery compartment are at the rear of the multimeter.

FUNCTIONS

Autoranging/ Manual	• The meter's default setting is autoranging. This automatically selects the best range for the selected test/measurement. • To set the meter to manual, press the "RANGE" button. The AUTO icon on the screen will turn off. • Press the "RANGE" button to move through the available ranges until you see the range you want. • To exit the manual mode and return to autoranging, press and hold the "RANGE" button for 2 seconds. • Manual ranging cannot be selected for capacitance and frequency measurements.
Mode	• The "MODE" button helps you to move through various operations with various icons displayed on screen. • It works in conjunction with the function switch to measure things like resistance, diode, continuity and capacitance. • It also allows you to select between AC or DC current measurements.
Function Switch	• Select a measurement range by turning the switch to the preferred option.
LCD Screen	• Readings and measurements taken by the multimeter will display in this area.
Hold & Backlight	• Press the "HOLD" button to lock readings as displayed on the screen. Press again to unlock. • Press the "HOLD" button longer to turn the backlight on. Press the button longer again to turn the backlight off.
Relative Button	• Press the "REL" button to store a reading for referencing at a later date. Then reference any new inputs against the stored measurement. • Press the "REL" button again to cancel the relative measurement function. • Not to be used for Hz/duty, diode and continuity measurements.

Hz% Button	• For use with frequency and duty cycle measurements. • Press the button to select either frequency or duty cycle.
USB Button	• To use the wireless communication, first install the software onto your computer. The software disc is located in the box of this multimeter. • To activate wireless mode, press the USB button on the multimeter. The RF icon should appear on the screen. • When communication between your computer and the multimeter is established, the LED indicator on the multimeter will flash. • The multimeter will transmit measurements to the computer every second, which will be plotted and inserted into a chart. • Press the USB button again to exit wireless transmit mode.
Input Jacks	• VΩCAP: Positive input terminal for voltage resistance, diode, temperature, frequency and capacitance. • COM: Negative input terminal for voltage, resistance, diode, temperature, frequency and capacitance. • μA mA: Input terminal for current under 400mA. • 10A: Input terminal for 10A current.
Auto Power Off	• The auto power off feature will turn the meter off after 30 minutes of inactivity.
Low Battery Indication	• The battery icon will appear on the screen when battery power is low and requires replacement.

SYMBOL	DESCRIPTION
	Continuity
	Diode Test
	Low Battery
F	Farads (Capacitance)
Ω	Ohms
Hz	Hertz (Frequency)
V	Volts
A, mA, μ A	Current Range
AC	Alternating Current / Voltage
AUTO	Autoranging
DC	Direct Current / Voltage
HOLD	Display Hold

AC/DC VOLTAGE MEASUREMENT

On some low AC and DC voltage ranges - when test leads are not connected to a device - the display on the screen may show a random, changing reading. This is normal and caused by high-input sensitivity of the multimeter. When connected to a circuit, the multimeter will display a stabilised, accurate measurement.

- 1) Set the function switch to the VAC or VDC position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive V Ω CAP jack.
- 4) Use the Mode button to select AC or DC voltage.
- 5) Connect the test leads in parallel to the circuit under test.
- 6) Read the voltage in the display.

DC CURRENT MEASUREMENT

Do not measure 20A currents for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or test leads.

- 1) Insert the black test lead banana plug into the negative COM jack.
- For current measurements up to 4000 μ A DC, set the function switch to the μ A position and insert the red test lead banana plug into the μ A jack.
- For current measurements up to 400mA DC, set the function switch to the mA position and insert the red test lead banana plug into the mA jack.
- For current measurements up to 10A DC, set the function switch to the 10A position and insert the red test lead banana plug into the 10A jack.
- 2) Press the MODE button to show "DC" on the screen.
- 3) Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 4) Touch the black test probe tip to the negative side of the circuit.
- 5) Touch the red test probe tip to the positive side of the circuit.
- 6) Apply power to the circuit.
- 7) Read the current displayed on the screen.

AC/DC VOLTAGE MEASUREMENT

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- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive V Ω CAP jack.
- 4) Use the Mode button to select AC or DC voltage.
- 5) Connect the test leads in parallel to the circuit under test.
- 6) Read the voltage in the display.

DC CURRENT MEASUREMENT

Do not measure 20A currents for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or test leads.

- 1) Insert the black test lead banana plug into the negative COM jack.
 - For current measurements up to 4000 μ A DC, set the function switch to the μ A position and insert the red test lead banana plug into the μ A jack.
 - For current measurements up to 400mA DC, set the function switch to the mA position and insert the red test lead banana plug into the mA jack.
 - For current measurements up to 10A DC, set the function switch to the 10A position and insert the red test lead banana plug into the 10A jack.
- 2) Press the MODE button to show "DC" on the screen.
- 3) Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 4) Touch the black test probe tip to the negative side of the circuit.
- 5) Touch the red test probe tip to the positive side of the circuit.
- 6) Apply power to the circuit.
- 7) Read the current displayed on the screen.

AC CURRENT MEASUREMENT

Do not measure 20A currents for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or test leads.

- 1) Insert the black test lead banana plug into the negative COM jack.
 - For current measurements up to 10A, set the function switch to the 10A position and insert the red test lead banana plug into the 10A jack.
 - For current measurements up to 400mA, set the function switch to the mA position and insert the red test lead banana plug into the mA jack.
 - For current measurements up to 4000 μ A, set the function switch to the μ A position and insert the red test lead banana plug into the μ A jack.
- 2) Press the MODE button to indicate "AC" on the screen.
- 3) Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 4) Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
- 5) Apply power to the circuit.
- 6) Read the current displayed on the screen.

RESISTANCE MEASUREMENT

To avoid electric shock, disconnect power to the test area and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

- 1) Set the function switch to the $\Omega \rightarrow \text{CAP}$ position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive Ω jack.
- 4) Press the MODE button until " Ω " displays on the screen.
- 5) Touch the test probe tips across the circuit or part being tested. It is best to disconnect one side of the part being tested so the rest of the circuit will not interfere with the resistance reading.
- 6) Read the resistance displayed on the screen.

CONTINUITY CHECK

To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

- 1) Set the function switch to the $\Omega \rightarrow \text{CAP}$ position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive $V\Omega\text{CAP}$ jack.
- 4) Press the MODE button until $\rightarrow$ displays on the screen.
- 5) Touch the test probe tips across the circuit or wire you want to check.
- 6) If the resistance is less than approximately 35Ω , the audible signal will sound.

DIODE TEST

The value that displays on screen during the diode check is the forward voltage.

- 1) Set the function switch to the $\Omega \rightarrow \text{CAP}$ position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive $V\Omega\text{CAP}$ jack.
- 4) Press the MODE button until display on the screen.
- 5) Touch the test probes to the diode or semiconductor being tested.
- 6) Reverse the probe polarity by switching probe position. Note this reading.
- 7) The diode or junction can be evaluated as follows:

- A) If one reading shows a value and the other reading shows OL, the diode is good.
- B) If both readings show OL, the device is open.
- C) If both readings are very small or zero, the device is shorted.

CAPACITANCE MEASUREMENTS

To avoid electric shock, disconnect power to the area being tested and discharge all capacitors before taking any capacitance measurements.

- 1) Set the function switch to the $\Omega \rightarrow \text{CAP}$ position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive $V\Omega\text{CAP}$ jack.
- 4) Press the MODE button until "nF" displays on the screen.
- 5) Touch the test leads to the capacitor being tested.
- 6) The test may take up to three minutes or more for large capacitors to charge. Wait until the readings settle before ending the test.
- 7) Read the capacitance value displayed on the screen.

TEMPERATURE MEASUREMENTS

The temperature probe is fitted with a type K mini connector. A mini connector to banana connector adaptor is supplied for connection to the input banana jacks.

- 1) Set the function switch to the temp position.
- 2) Insert the temperature probe into the input jacks, making sure to observe the correct polarity.
- 3) Press the MODE button to indicate "°F" or "°C".
- 4) Touch the temperature probe head to the part you wish to measure. Ensure the probe remains in contact with the part until the reading stabilises (about 30 seconds).
- 5) Read the temperature displayed on the screen.

FREQUENCY MEASUREMENT

- 1) Set the function switch to the HZ% position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the negative $V\Omega\text{CAP}$ jack.
- 4) Touch the test probes to the circuit being tested.
- 5) Read the frequency displayed on the screen.

MEASUREMENT SPECIFICATIONS

The following guide is based on an environmental temperature of 18-28°C and humidity <70%.

DC VOLTAGE

RANGE	RESOLUTION	ACCURACY
400mV	0.01mV	±(0.8% reading + 2 digits)
4V	0.1mV	
40V	10mV	
400V	100mV	
1000V	1V	±(1.0% reading + 2 digits)

Input impedance: 10MΩ; Max. input voltage: 1000V DC

AC VOLTAGE

RANGE	RESOLUTION	ACCURACY
400mV	0.1mV	±(1.0% reading + 3 digits)
4V	1mV	
40V	10mV	
400V	100mV	
1000V	1V	±(1.2% reading + 5 digits)

Input impedance: 10MΩ; Max. input voltage: 1000VAC RMS;
Frequency range: 50~400Hz; all AC voltage ranges are specified from 5% of range to 100% of range.

DC CURRENT

RANGE	RESOLUTION	ACCURACY
400 μ A	0.1 μ A	$\pm(1.2\%$ reading + 3 digits)
4000 μ A	1 μ A	
40mA	10 μ A	
400mA	100 μ A	
10A	10mA	$\pm(2.5\%$ reading + 3 digits)

Overload protection: fuse FF500mA/1000V and fuse F10A/1000V.

Maximum inputs: 400 μ A DC (μ A range), 400mA DC (mA range), 10A DC (10A range).

AC CURRENT

RANGE	RESOLUTION	ACCURACY
400 μ A	0.1 μ A	$\pm(1.5\%$ reading + 5 digits)
4000 μ A	0.001mA	
40mA	0.01mA	
400mA	0.1mA	
10A	10mA	$\pm(3.0\%$ reading + 5 digits)

Overload protection: fuse FF500mA/1000V fuse FF10A/500V.

Frequency range: 50~400Hz

RESISTANCE

RANGE	RESOLUTION	ACCURACY
400Ω	0.1Ω	±(0.8% reading + 5 digits)
4kΩ	1Ω	±(0.8% reading + 2 digits)
40kΩ	10Ω	
400kΩ	100Ω	
4MΩ	1kΩ	±(2.5% reading + 8 digits)
40MΩ	10kΩ	

Input protection: 1000VDC or 1000VAC RMS

CAPACITANCE

RANGE	RESOLUTION	ACCURACY
40nF	10pF	±(5.0% reading + 7 digits)
400nF	0.1nF	±(3.0% reading + 5 digits)
4μF	1nF	
40μF	10nF	
100μF	0.1μF	±(5.0% reading + 7 digits)

Overload protection: 1000VDC or 1000VAC RMS

DUTY CYCLE

RANGE	RESOLUTION	ACCURACY
0.1~99.9%	0.1%	±(1.2% reading + 2 digits)

Pulse width: >100us, <100ms; Frequency width: 5Hz-150kHz.

FREQUENCY

RANGE	RESOLUTION	ACCURACY
4Hz	0.001Hz	$\pm(1.0\% \text{ reading} + 3 \text{ digits})$
40Hz	0.01Hz	
400Hz	0.1Hz	
4kHz	1Hz	
40kHz	10Hz	
400kHz	100Hz	
5MHz	1kHz	$\pm(1.2\% \text{ reading} + 4 \text{ digits})$

Overload protection: 1000VDC or 1000VAC RMS.
Sensitivity >0.5V while $\leq 1\text{MHz}$, >3V while $> 1\text{MHz}$.

TEMPERATURE

RANGE	RESOLUTION	ACCURACY
-20°C to 760°C	1°C	$\pm(3\% \text{ reading} + 5 \text{ digits})$

Overload protection: 1000VDC or 1000VAC RMS.

DIODE & CONTINUITY

RANGE	FUNCTION
	Display approximate forward voltage of diode
	Built-in buzzer will sound if resistance is less than 30 Ω

DIODE TEST

TEST CURRENT	RESOLUTION	ACCURACY
1mA typical/open max 3V	1mV	$\pm(10\% \text{ reading} + 5 \text{ digits})$

Open circuit voltage max 3V; overload protection 1000VDC or 1000VAC RMS.

AUDIBLE CONTINUITY

THRESHOLD	TEST CURRENT
Less than 150 Ω	Maximum 1.5mA

MAINTENANCE

BATTERY INSTALLATION

To avoid the false readings, replace the battery as soon as the low battery power indicator appears.

- 1) Turn the power off and disconnect the test leads from the meter.
- 2) Open the rear battery cover with a screwdriver.
- 3) Remove the old battery and insert the new battery into the battery holder, observing the correct polarity.
- 4) Put the battery cover back in place, secure with the screws.

REPLACING FUSES

- 1) Turn power off and disconnect the test leads from the meter.
- 2) Remove the battery cover.
- 3) Gently remove the old fuse and install the new fuse into the holder.
- 4) Always use a fuse of the proper size and value (0.5A/1000V fast blow for the 400mA range, 10A/1000V fast blow for the 10A range).
- 5) Replace and secure the cover.

SPECIFICATIONS

Enclosure:	Double-molded
AC Response:	TRMS
Display:	4,000 count LCD display
Over Range Indication:	"OL" is displayed
Auto Power:	30 min (approx)
Polarity:	Automatic (no indication for positive); minus (-) sign for negative
Low Battery Indication:	 is displayed if battery voltage drops below operating voltage
Battery:	1 x 9V
Operating Temperature:	-10°C to 50°C
Storage Temperature:	-30°C to 60°C
Operating Humidity:	<70%
Storage Humidity:	<80%
Relative Humidity:	90% (0°C to 30°C); 75% (30°C to 40°C); 45% (40°C to 50°C)
Operating Altitude:	3000m maximum
Weight:	380g
Size:	182(L) x 82(W) x 55(H)mm

BOX CONTENTS

- 1 x Multimeter
- 1 x Test Leads
- 1 x Carry Case
- 1 x 9V Battery
- 1 x User Manual

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