

Digital Multimeter Series

TY700/TY500 Series

- **TY700** Series of 4.5-digit Handheld Multimeters
- **TY500** Series of 3.5-digit Handheld Multimeters



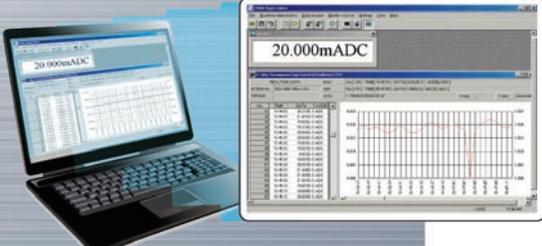
TY720

0.020% Maximum Measurement Accuracy
TY720



TY530

0.09% Accuracy RMS Measurement
TY530



Communication Package
92015

Integral Action Time

Digital multimeters (DMMs) employ an A/D converter with a dual-integration system, which determines the measurement value by converting the input voltage into time using an integration AD converter. The interval to perform an integral action periodically is referred to as the integralaction time.

Measurement Accuracy

With DMMs, the measurement accuracy is generally expressed as: \pm ___ % of reading + ___ digits. ("Reading" refers to the reading value, and is abbreviated as "rdg"; "digits" refers to the number displayed in the smallest decimal place, and is abbreviated as "dgt.") This expresses the range of values that a DMM may measure or represent for a given actual value.

Root Mean Square Value

The value most directly related to the energy of a given waveform. Refers to the square root of a value found by averaging the squares of instantaneous values of a waveform over a single cycle. (See Table 1, Figures 1 and 2.)

Mean Value

Refers to the average of the sum of instantaneous values, determined for a current half-wave. It is equivalent to calculating the surface area of a waveform.

Form Factor

Ratio of RMS value with respect to average value.
Form factor = RMS value/mean value (See Figures 1 and 2.)

Crest Factor

Ratio of maximum value to RMS value.
Crest factor = maximum value/RMS value(See Figures 1 and 2.)

Peak-to-Peak (P-P) value

Refers to the distance between the smallest and largest amplitudes in a waveform (see Figure 1).

Frequency Characteristic

Refers to a characteristic that shows variations in input, measurement, or response with frequency. When measuring alternating current signals, a measured signal does not have a simple frequency, but often includes various frequencies ranging from lower frequencies to higher harmonics. To measure such signals more accurately, it is preferable to use a measurement device that has a broader frequency characteristic range.

Input Impedance

To prevent the measured object from being influenced during voltage measurement, you should use a measurement device with an extremely high input impedance.

Decibel

A unit used for describing the change in electrical signal amplitude or noise level, or transmission systems in wired devices, etc. This parameter is also used to represent the level differences in voltage, current or related values, but is generally restricted to cases characterized by the relationship: $(I_1/I_2)^2 = (V_1/V_2)^2 = P_1/P_2$. In the abbreviation "dB," "d" (deci) denotes 1/10, and "B" (Bell) denotes logarithm.

Table 1. RMS Value, Average Value, Waveform Factor and Crest Factor for a Typical Periodic Waveform

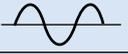
Item	Waveform	RMS	Mean value	Waveform factor	Crest factor
Sine wave		$\frac{1}{\sqrt{2}} = 0.707$	$\frac{2}{\pi} = 0.637$	$\frac{\pi}{2\sqrt{2}} = 1.11$	$\sqrt{2} = 1.414$
Half rectification wave		$\frac{1}{2} = 0.5$	$\frac{1}{\pi} = 0.318$	$\frac{\pi}{2} = 1.571$	2
Full rectification wave		$\frac{1}{\sqrt{2}} = 0.707$	$\frac{2}{\pi} = 0.637$	$\frac{\pi}{2\sqrt{2}} = 1.11$	$\sqrt{2} = 1.414$
Triangular wave		$\frac{1}{\sqrt{3}} = 0.577$	$\frac{1}{2} = 0.5$	$\frac{2}{\sqrt{3}} = 1.155$	$\sqrt{3} = 1.732$
Square wave		1	1	1	1

Figure 1. RMS and Mean Values of Sine Wave

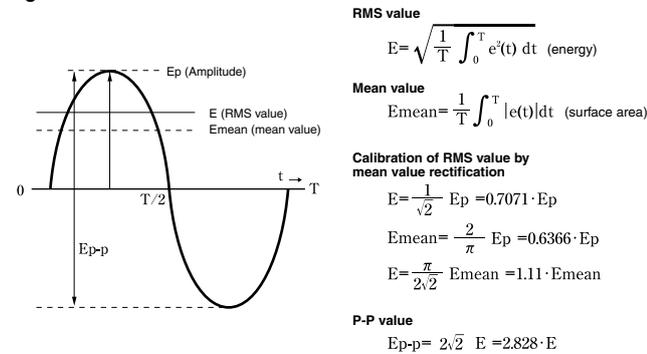
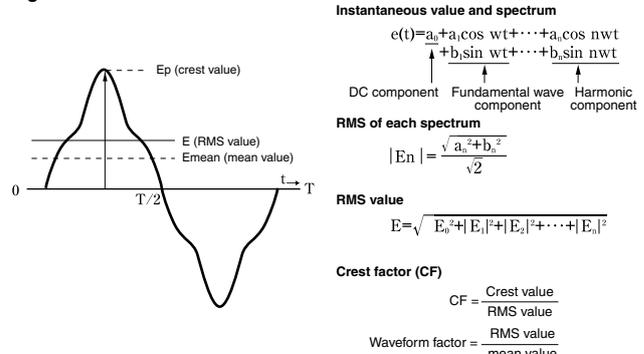


Figure 2. RMS of Distorted Waves



CE Mark

The products of Yokogawa Meters & Instruments Corporation are subjected to design and evaluation testing to ensure compliance with the safety and EMC standards in accordance with the directives issued by the EC.

Electromagnetic Compatibility (EMC)

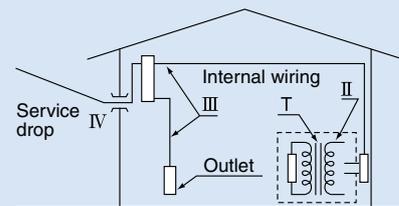
The parameters EMI and EMS are referred to as electromagnetic compatibility as they relate to compatibility within an electromagnetic environment.

Safety Standards

These standards lay out safety requirements that are to be met by a product with the objective of the preservation of human life and property. The applicable international standard is IEC 61010, and while a product must conform to this standard, there are also domestic standards laid out by individual countries. With these safety regulations, the range of use of a measurement device is specified by categorization in measurement categories I through IV to ensure the safety of the user. The designations "CAT II, 1000 V" or "CAT III, 600 V" at the input terminals of a measurement device, for example, indicates the applicable category and the maximum voltage for the device in terms of safety.

Measurement categories (CAT)

In order to ensure the safety of the user, IEC 60664 defines the ranges of use of measuring instruments by classifying power levels into measurement categories II through IV and O (None, other). This is because the excessive impulse or surge levels induced in a power line vary depending on the location of measurement (category). Categories with higher numerals designate locations that include larger surge voltages. Instruments that are designed for category III can thus withstand higher surge voltages than instruments designed for category II.



Measurement category	Description	Remarks
O (None, other)	Other circuits that are not directly connect to MEANS.	
CAT.II	For measurement performed on circuits directly connected to the low-voltage installation.	Appliances, portable equipments, etc.
CAT.III	For measurement performed in the building installation.	Switchboard, circuit breaker, etc.
CAT.IV	For measurement performed at the source of the low-voltage installation.	Overhead wire, cable systems, etc.



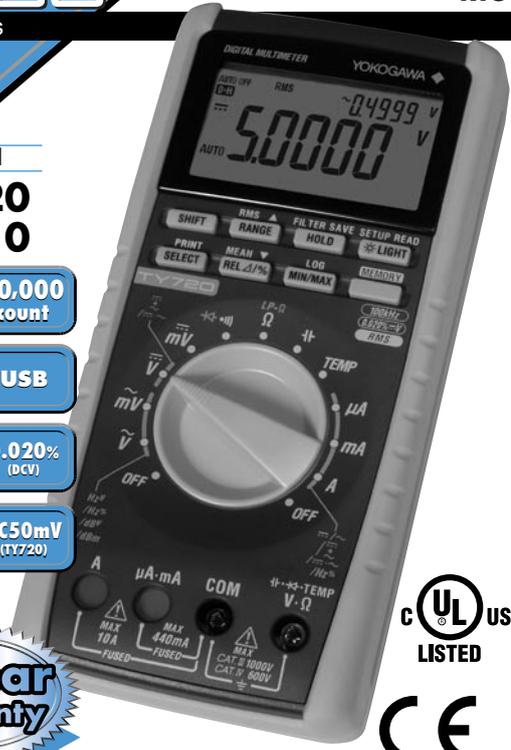
Most Reliable Handheld Digital Multimeters

Series

Model

TY720
TY710

- 4.5 digits**
- 50,000 count**
- RMS**
- USB**
- Terminal shutters**
- 0.020% (DCV)**
- LPF (TY720)**
- AC50mV (TY720)**



Maximum Measurement Accuracy

0.020% rdg + 2 dgt (DC voltage)
True RMS measurement

Safe Design

Conforms to EN61010-1 safety standard
Conforms to measurement category 1000 V AC/DC, CAT III and 600 V AC/DC, CAT IV

Shutters prevent erroneous insertion of test leads into current measurement terminals (terminal shutters)

The current terminals have terminal shutters that prevent erroneous setting of the measurement function and leadwire connections resulting from operational errors. The terminal shutters open and close according to the function switch position.

Closed Case Calibration

User calibration function

The TY series, simply performing special operations via front panel allows for quick and reliable adjustment. In addition, the series allows for one-touch adjustment of AC voltage- and AC current-to-frequency characteristics. The user calibration function leads to improved operation efficiency and cost reduction.

- External standard instrument required for calibration.

Full Support for Data Management

Two memory modes

- SAVE-mode memory
A mode for manually saving any data
- Logging-mode memory
A mode for automatically saving data at a specified interval
Logging interval: 1 second to 30 minutes

Model	Memory capacity	
	SAVE-mode memory*	Logging-mode memory*
TY710	100	1000
TY720		10000

* Saved data can be checked on the display.

Real-time measurement

The optional communication package*1 sold separately (Model 92015) allows you to connect to a PC for transmitting large amounts of data that cannot be saved in the DMM internal memory. You can transmit the saved data from the internal memory to a PC and process it using application software or spreadsheet software (Excel*2) for data management.

*1 Communication cable and application software are included.
*2 Excel is a registered trademark of Microsoft Corporation in the United States.
*3 The communication cable employs an infrared system, so the device is electrically insulated.

For details of the application software, refer to page 7.

Loaded with Measurement Functions

Peak hold function (TY720, for DC V/A measurement)

Supports waveforms of 1 ms or greater. You can capture instantaneous crest values not possible with ordinary maximum measurement functions.

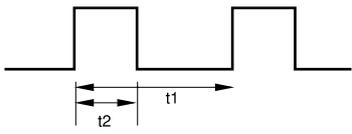
Relative and percentage value computation

Can display the measured values as the values relative to a reference value (defined by the REL key; even after data hold) or as the percentages of the reference value.

Percentage calculation: (Measured value – reference value) / (reference value), expressed as percentage.

Duty ratio (%) measurement

Displays the duty ratio of a pulse waveform:
(High level period/1 cycle of waveform) x 100 = (t2/t1) x 100 [%]



AC+DC measurement

Measures RMS of a waveform in which ripple waveforms are superimposed on a direct current.

Auto hold

Automatically hold the data measured when the test leads are disconnected from the measured object, thus freeing both hands for performing reliable measurement.

Minimum/maximum/average display

Allows recording of minimum, maximum and average values along with their respective times (time passed since the start of measurement)

Decibel calculation

Computes the logarithm of an alternating current, and uses it together with the relative value computation to display the relative value. You can select the standard resistance according to the application, such as audio or communication circuit signal measurement.

* Selectable standard resistance values:
4/8/16/32/50/75/93/110/125/135/150/200/250/300/500/600/800/900/1000/1200Ω

Full Display Functions

50,000-count, 51-segment bar graph display

Backlight provided as standard for when working in dark places.

Simultaneous display of frequency and voltage, frequency and duty ratio or decibels and voltage on the dual display.

Display: V AC and V DC measurements



Sub-display

In addition to the above, the sub-display can display the reference value for differential calculation, memory storage numbers for measured data, minimum/maximum/average value recording times, and standard resistance during decibel calculation.

TY700 General Specifications

Measurement Functions :DC voltage, AC voltage, DCV+ACV, DC current, AC current, DCA+ACA, resistance, frequency, temperature, capacitance, duty cycle, decibel calculation, continuity check, diode test, low-power resistance (TY720 only)
For AC voltage/current, RMS/MEAN detection can be switched (TY720 only).
For AC voltage/current, the low-pass filter can be turned on/off (TY720 only).

Additional Functions :Data hold/auto hold/peak hold (TY720 only), range hold, maximum/minimum/average values resistance, capacitance zero, relative and percentage value calculation, manual-mode memory, logging-mode memory, auto power off, backlight (white LED)

Display :5-digit LCD :.....7-segment
Digital display :.....Main display; [50,000] counts
Sub-display ; [50,000] counts
Bar graph display :.....51-segment
Polarity indicator :.....“-” appears automatically when the polarity is negative
Overrange indicator :.....“OL”
Low-battery indicator :.....“” appears at or below the minimum operating voltage.

Measuring Rate :6 times/sec (Frequency: 1 time/sec, Capacitance: max. 0.03 times/sec (50mF), Resistance: 4 times/sec)
Bar graph display: 15 times/sec

Operating Temp. and Humidity :-20 to 55°C; 80% RH or less (no condensation) 40 to 55°C: 70% RH or less
Storage Temp. and Humidity :-40 to 70°C; 70% RH or less (no condensation)

Temperature Coefficient :Add the accuracy 0.05°C to the basic accuracy at a temperature within -20 to 18°C and 28 to 55°C. For continuous measurements, add 1 digit°C for DC voltage (DCV) and DC current (DCA). (Add 3 digits°C for 50mV, 5A, and 10A ranges)

Power Supply :Four AA (R6) dry cells
Battery Life :Approx. 120 hours (for continuous DC voltage measurement with alkaline cells)
Withstanding Voltage :6.88kV for 5 seconds (between input terminals and casing)
Dimensions :Approx. 90(W) x 192(H) x 49(D) mm
Weight :Approx. 560g (including batteries)

Compliance with Standards :Safety EN61010-1, EN61010-2-030, EN61010-031, 1000V CAT III, 600V CAT IV, pollution level 2, indoor, 2000m max. above sea level
UL 61010-1, CAN/CSA-C22.2 No. 61010-1,
UL 61010-031, CAN/CSA-C22.2 No. 61010-031
EMC: EN61326-1 Class B, EN55011 Class B Group 1, EN61326-2-2

Standard Accessories :AA (R6) dry cells: 4, Test lead set (98015): 1, Fuse (installed) 440mA/1000V and 10A/1000V, Instruction manual: 1

Model and Specification Code

Name	Model
Digital Multimeter	TY710
	TY720

Optional Accessories

Name	Model	Specification
DMM communication package	92015	USB communication adapter + USB communication cable + Application software
Test leads	98073	1000V CAT III, 600V CAT IV Red/black (1 set)
Test leads with Alligator Clip	99014	1000V CAT III, 600V CAT IV Red/black (1 set)
Fuse	99015	440 mA/1000V (1 piece/1 unit)
	99016	10 A/1000V (1 piece/1 unit)
TC-K temperature probe	90050B	-50 to 600°C (For liquids)
	90051B	-50 to 600°C (For liquids)
	90055B	-20 to 250°C (For surfaces)
	90056B	-20 to 500°C (For surfaces)
Current clamp probe	96001	For 400A, AC Output: 10mV/A, AC
Carrying case	93029	Hard type (Houses the DMM, the test leads and communication cable)

Performance

Test conditions: Temperature and humidity = 23 ± 5°C, 80% RH or less; Accuracy = ± (% rdg + dgt).
Note: A response time is the time required for achieving the accuracy specified for the corresponding range.

DC Voltage Measurement (≡V)

Range	Resolution	Accuracy TY710, TY720	Input Resistance	Maximum Input Voltage
50mV	0.001mV	0.05+10	Approx. 100MΩ	1000V DC
500mV	0.01mV	0.02+2		
2400mV	0.1mV	0.025+5		
5V	0.0001V	0.03+2	10MΩ	1000V rms AC
50V	0.001V			
500V	0.01V			
1000V	0.1V			

NMR: 80dB or greater for 50/60Hz ± 0.1% At 50mV of range, 70dB or greater for 50/60Hz ± 0.1%
CMRR: 100dB or greater for 50/60Hz(Rs=1kΩ) Response time: 0.3 seconds or less

AC Voltage Measurement [RMS] (-V) AC coupling, RMS detection, crest factor for 1000V of range: 1.5; crest factor for ranges other than 1000V: 3

Range	Resolution	Accuracy (Upper: TY710; Lower: TY720; the display of “—” is not specified)						Input Impedance	Maximum Input Voltage
		10 - 20Hz	20Hz - 1kHz	1k - 10kHz	10k - 20kHz	20k - 50kHz	50k - 100kHz		
50mV	0.001mV	2+80 ^{*2}	0.4+40 ^{*2}	5+40 ^{*2}	5.5+40 ^{*2}	15+40 ^{*2}	11MΩ<50pF	1000V rms AC 1000V DC	
500mV	0.01mV	1.5+30 ^{*1}	0.7+30 ^{*1}	2+50 ^{*2}	1+40 ^{*1}	—			
5V	0.0001V	1+30 ^{*1}	0.4+30 ^{*1}	2+70 ^{*2}	5+200 ^{*2}	—			
50V	0.001V	—	—	—	—	—			
500V	0.01V	—	—	—	—	—	10MΩ<50pF	10A	
1000V	0.1V	—	—	—	—	—			

*1: At 5 to 100% of range *2: At 10 to 100% of range CMRR: 80dB or greater for DC to 60Hz(Rs=1kΩ) Response time: 1 second or less

AC Voltage Measurement [MEAN] (-V) AC coupling, Mean-value detection and RMS-value calibration (sinusoidal wave)

Range	Resolution	Accuracy TY720			Input Impedance	Maximum Input Voltage
		10 - 20Hz	20 - 500Hz	500 - 1kHz		
50mV	0.001mV	4+80 ^{*2}	1.5+30 ^{*2}	5+30 ^{*2}	11MΩ<50pF	1000V rms AC 1000V DC
500mV	0.01mV	—	—	—		
5V	0.0001V	2+30 ^{*1}	1+30 ^{*1}	3+30 ^{*1}		
50V	0.001V	—	—	—		
500V	0.01V	—	—	—	10MΩ<50pF	10A
1000V	0.1V	—	—	—		

*1: At 5 to 100% of range *2: At 10 to 100% of range CMRR: 80dB or greater for DC to 60Hz (Rs = 1kΩ) Response time: 1 second or less

DCV + ACV (≡+/-) AC coupling, RMS detection, crest factor for 1000V of range: 1.5; crest factor for ranges other than 1000V: 3

Range	Resolution	Accuracy (Upper: TY710; Lower: TY720; the display of “—” is not specified)						Input Impedance	Maximum Input Voltage
		DC, 10 - 20Hz	DC, 20Hz - 1kHz	DC, 1k - 10kHz	DC, 10k - 20kHz	DC, 20k - 50kHz	DC, 50k - 100kHz		
5V	0.0001V	1.5+10 ^{*1}	1+10 ^{*1}	2+10 ^{*2}	—	—	11MΩ<50pF	1000V rms AC 1000V DC	
50V	0.001V	1.5+10 ^{*1}	0.5+10 ^{*1}	1+10 ^{*1}	2+10 ^{*2}	5+200 ^{*2}			
500V	0.01V	—	—	—	—	—			
1000V	0.1V	—	—	—	—	—			

*1: At 5 to 100% of range *2: At 10 to 100% of range CMRR: 80dB or greater for DC to 60Hz (Rs = 1kΩ) Response time: Approx. 2 seconds

Resistance Measurement (Ω)

Range	Resolution	Accuracy		Maximum Testing Current	Open-circuit Voltage	Input Protection Voltage
		TY710	TY720			
500Ω	0.01Ω	0.1+2 ^{*1}	0.05+2 ^{*1}	<1mA	<2.5V	1000V rms
5kΩ	0.001kΩ			<0.25mA		
50kΩ	0.01kΩ			<2.5μA		
500kΩ	0.01kΩ			<2.5μA		
5MΩ	0.001MΩ			<1.5μA		
50MΩ	0.001MΩ			<0.15μA		

*1: Accuracy after zero calibration Response time: 1 second or less for 500Ω to 500kΩ, 5 seconds or less for 5MΩ to 50MΩ

Low-power Resistance Measurement (LP-Ω) Maximum effective display: 5000

Range	Resolution	Accuracy TY720	Maximum Testing Current	Open-circuit Voltage	Input Protection Voltage
5kΩ	0.001kΩ	0.2+3	<10μA	<0.7V	1000V rms
50kΩ	0.01kΩ		<1.0μA		
500kΩ	0.1kΩ		<0.6μA		
5MΩ	0.001MΩ		<0.05μA		

Continuity Check (🔊) Maximum effective display: 5000

Range	Resolution	Continuity Beeper TY710, TY720	Testing Current	Open-circuit Voltage	Input Protection Voltage
500Ω	0.1Ω	Buzzer sounds at 100 ± 50Ω or less.	Approx. 0.5mA	<5V	1000V rms

DC Current Measurement (≡A)

Range	Resolution	Accuracy TY710, TY720	Voltage Drop	Maximum Input Current
500μA	0.01μA	0.2+5	<0.11mV/μA	440mA fuse-protected
5000μA	0.1μA		<4mV/mA	
50mA	0.001mA		0.6+10	<0.1V/A
500mA ^{*3}	0.01mA		0.6+5	

Response time: 0.3 seconds or less *3: Maximum testing current at 500mA of range is 440mA

AC Current Measurement [RMS] (-A) RMS detection crest factor: 3

Range	Resolution	Accuracy (Upper: TY710; Lower: TY720; the display of “—” is not specified)			Voltage Drop	Maximum Input Current	
		10 - 20Hz	20Hz - 1kHz	1k - 5kHz			
500μA	0.01μA	1.5+20	1+20	—	<0.11mV/μA	440mA fuse-protected	
5000μA	0.1μA						
50mA	0.001mA				0.75+20	1+30	<4mV/mA
500mA ^{*3}	0.01mA				—		
5A	0.0001A	1.5+20	1+20	—	<0.1V/A	10A fuse-protected	
10A	0.001A	1.5+20	1+20	2+30			

Shown above is the accuracy at 5 to 100% of range (10 to 100% for 10A range). Response time: 1 second or less

*3: Maximum testing current at 500mA of range is 440mA.

AC Voltage Measurement [MEAN] (-A) Mean-value detection and RMS-value calibration (sinusoidal wave)

Range	Resolution	Accuracy TY720			Voltage Drop	Maximum Input Current	
		10 - 20Hz	20 - 500Hz	500Hz - 1kHz			
500μA	0.01μA	2+20	1.5+20	2+30	<0.11mV/μA	440mA fuse-protected	
5000μA	0.1μA						
50mA	0.001mA				—	1+10	<4mV/mA
500mA ^{*3}	0.01mA				—		
5A	0.0001A	3+20	2+20	4+30	<0.1V/A	10A fuse-protected	
10A	0.001A	—	—	—			

Shown above is the accuracy at 5 to 100% of range (10 to 100% for 10A range). Response time: Approx. second or less

*3: Maximum testing current at 500mA of range is 440mA.

DCA + ACA (≡+/-) Maximum effective display: 50,000, crest factor: 3

Range	Resolution	Accuracy (Upper: TY710; Lower: TY720; the display of “—” is not specified)			Voltage Drop	Maximum Input Current		
		DC, 10 - 20Hz	DC, 20Hz - 1kHz	DC, 1k - 5kHz				
500μA	0.01μA	2+10	1.5+10	—	<0.11mV/μA	440mA fuse-protected		
5000μA	0.1μA							
50mA	0.001mA				1.5+10	1+10	1.5+10	<4mV/mA
500mA ^{*3}	0.01mA				—	—	—	
5A	0.0001A	2+10	1.5+10	—	<0.1V/A	10A fuse-protected		
10A	0.001A	2+10	1.5+10	3+10				

Shown above is the accuracy at 5 to 100% of range (10 to 100% for 10A range). Response time: Approx. 2 seconds *3: Maximum testing current for 500mA of range is 440mA.

Diode Test (⚡)

Range	Resolution	Accuracy TY710, TY720	Testing Current (Vf = 0.6 V)	Open-circuit Voltage	Input Protection Voltage
2.4V	0.0001V	1 + 2	Approx. 0.5mA	<5V	1000V rms

Temperature Measurement (TEMP)

Range	Resolution	Accuracy TY710, TY720	Input Protection Voltage
-200 - 1372°C	0.1°C	1+1.5°C	1000V rms

Temperature probe: Type K thermocouple sensor (optional)

Capacitance (-) Maximum effective display: 5000

Range	Resolution	Accuracy TY710, TY720	Input Protection Voltage
5nF	0.001nF	1+5 ^{*1}	1000V rms
50nF	0.01nF		
500nF	0.1nF		
5μF	0.001μF		
50μF	0.01μF		
500μF	0.1μF		
5mF	0.001mF		
50mF	0.01mF		

*1: Accuracy after zero calibration

Frequency Measurement (Hz) AC coupling, Maximum effective display: 9999

Range (auto-ranging)	Resolution	Accuracy TY710, TY720
2,000 - 9,999Hz	0.001Hz	0.02+1 ^{*1}
9.00 - 99.99Hz	0.01Hz	
90.0 - 999.9Hz	0.1Hz	
0.900 - 9.999kHz	0.001kHz	
9.00 - 99.99kHz	0.01kHz	

*1: At 10 to 100% of input voltage or current range

*2: At 40 to 100% of input voltage or current range

Duty Cycle (%)

Range	Resolution	Accuracy TY710, TY720
10 - 90%	1%	± 1% ^{*1}

*1: For input of a square wave with a frequency within 10.00 to 500.00Hz. At 40 to 100% of input voltage or current range.

Peak Hold Function (PH) TY720 only Maximum effective display: 5000

Range	Accuracy TY720	Response Time
DCV, DCA	± 100 digit	>250μs

Model
TY530
TY520

- 3.5 digits
- 6000 count
- RMS
- USB (TY530)
- Terminal shutters
- 0.09% (DCV)
- Sensor
- LPF



Maximum Reliability and Safety

Reliability High accuracy and safety

Accuracy: 0.09% rdg + 2 dgt (DC voltage)
True RMS measurement
Only TY530 can switch RMS and mean detection.

Safe Design

Conforms to EN61010-1 safety standard.

Conforms to overvoltage category 1000 V AC/DC, CAT III and 600 V AC/DC, CAT IV.

Shutters prevent erroneous insertion of test leads into current measurement terminals (terminal shutters).

If the function is switched to other than current measurement while a test lead remains inserted in a current measurement terminal, the fuse built into the DMM can not protect the circuits. The terminal shutters prevent such accidental errors.

Closed Case Calibration

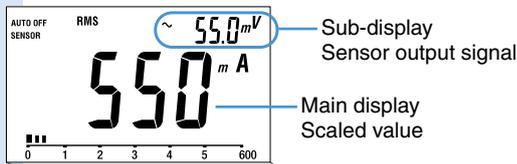
User calibration function

The TY series, simply performing special operations via front panel allows for quick and reliable adjustment. In addition, the series allows for one-touch adjustment of AC voltage- and AC current-to-frequency characteristics. The user calibration function leads to improved operation efficiency and cost reduction.

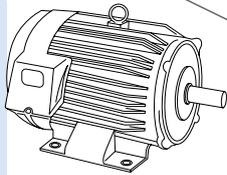
- External standard instrument required for calibration.

Direct reading of various sensor output signals

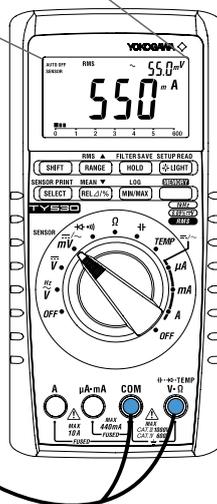
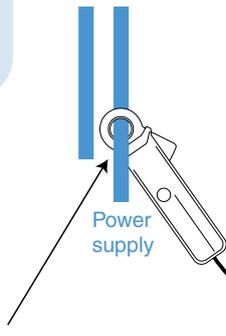
The DMM can directly read the various sensor output signals (mV DC/AC) at any scaling. The units can be changed (16 units are available). Output signal and scaled value are simultaneously displayed.



Small motor



Power supply



AC/DC clamp-on probe (Model 96095)
Reads maximum 60 A when used with the TY500 series.

Data Storage Method

Two memory modes (TY530 only)

Selectable from 2 types of memory mode to suit field needs.

- SAVE-mode memory
A mode for manually saving any data
- Logging-mode memory
A mode for automatically saving data at a specified interval

Model	Memory capacity	
	SAVE-mode memory	Logging-mode memory
TY530	100	1600

Real-time measurement

The optional communication package*1 sold separately (Model 92015) allows you to connect to a PC for transmitting large amounts of data that cannot be saved in the DMM internal memory. You can transmit the saved data from the internal memory to a PC and process it using application software or spreadsheet software (Excel*2) for data management.

*1 Communication cable and application software are included.
*2 Excel is a registered trademark of Microsoft Corporation in the United States.
*3 The communication cable employs an infrared system, so the device is electrically insulated.

For details of the application software, refer to page 7.

TY500 General Specifications

Measurement Functions :DC Voltage, AC voltage, DC current, AC current, resistance, frequency, temperature, capacitance, continuity check, diode test For AC voltage/current, RMS/MEAN detection can be switched (TY530 only).
Low-pass filter can be switched on/off

Additional Functions :Data hold/auto hold/range hold, maximum/minimum/average values (TY530 only), resistance, relative and percentage value calculation, memory function (TY530 only), communication function (TY530 only), logging-mode memory (TY530 only), auto power off, backlight

Display :3.5-digit LCD: 7-segment
Digital display: [6000] counts
Bar graph display: 31-segment
Polarity indicator: "-" appears when the polarity is negative
Overrange indicator: "OL"
Low-battery indicator: "+" appears at or below the minimum operating voltage.

Measuring Rate :5 times/sec (Frequency: 1 time/sec, Capacitance: max. 0.14 times/sec (1000 μ F), Resistance: 2.5 times/sec, Temperature: 0.7 times/sec), Bar graph display: 25 times/sec (DC voltage, diode test: 5 times/sec)

Operating Temp. and Humidity :-10 to 55°C; 80% RH or less (no condensation) 40 to 55°C; 70% RH or less

Storage Temp. and Humidity :-30 to 70°C; 70% RH or less (no condensation)

Temperature Coefficient :Add the accuracy 0.1°C to the basic accuracy at a temperature within -10 to 18°C and 28 to 55°C.

Power Supply :Four AA (R6) dry cells

Battery Life :Approx. 300 hours (for continuous DC voltage measurement with alkaline cells)

Withstanding Voltage :6.88kV for 5 seconds (between input terminals and casing)

Dimensions :Approx. 90(W) x 192(H) x 49(D) mm

Weight :Approx. 570g (including batteries)

Compliance with Standards :Safety EN61010-1, EN61010-2-030, EN61010-031, 1000V CAT III, 600V CAT IV, pollution level 2, 2000m max. above sea level
UL 61010-1, CAN/CSA-C22.2 No. 61010-1,
UL 61010-031, CAN/CSA-C22.2 No. 61010-031
EMC: EN61326-1 Class B, EN55011 Class B Group 1, EN61326-2-1

Standard Accessories :AA (R6) dry cells: 4, Test lead set (99015): 1, Fuse (installed) 440mA/1000V and 10A/1000V, Instruction manual: 1

Model and Specification Code

Name	Model
Digital Multimeter	TY520
	TY530

Optional Accessories

Name	Model	Specification
DMM communication package	92015	USB communication adapter + USB communication cable + Application software
Communication package for printer	97016	Printer adapter + Printer cable
Test leads	98073	1000V CAT III, 600V CAT IV Red/black (1 set)
Test leads with Alligator Clip	99014	1000V CAT III, 600V CAT IV Red/black (1 set)
Fuse	99015	440mA/1000V (1 piece/1 unit)
	99016	10A/1000V (1 piece/1 unit)
TC-K temperature probe	90050B	-50 to 600°C (For liquids)
	90051B	-50 to 600°C (For liquids)
	90055B	-20 to 250°C (For surfaces)
	90056B	-20 to 500°C (For surfaces)
Current clamp probe	96001	For 400A AC Output: 10mV/A, AC
	96030	200A AC
	96031	500A AC
	96033	50A AC
	96036	2A AC
Carrying case	93029	Hard type (Houses the DMM, the test leads and communication cable)

Performance

Test conditions: Temperature and humidity = 23 ± 5°C, 80% RH or less; Accuracy = ± (% rdg + dgt).
Note: A response time is the time required for achieving the accuracy specified for the corresponding range.

DC Voltage Measurement (≡V)

Range	Resolution	Accuracy TY520, TY530	Input Resistance	Maximum Input Voltage
600mV	0.1mV	0.09+2	10M Ω	1000V DC 1000V rms AC
6V	0.001V		11M Ω	
60V	0.01V		10M Ω	
600V	0.1V			
1000V	1V	0.15+2		

NMR: 60dB or greater for 50/60Hz ± 0.1%

CMR: 120dB or greater for 50/60Hz (Rs = 1k Ω) Response time: 1 second or less

AC Voltage Measurement (~V)

AC coupling, RMS detection (TY530, TY520) crest factor: 3/mean-value detection (TY530 only) sinusoidal wave

Range	Resolution	Accuracy			Input Impedance	Maximum Input Voltage
		50/60Hz	40-500Hz	500Hz - 1kHz		
600mV	0.1mV	0.5+5	1+5	1.5+5	10M Ω , <200pF	1000V rms AC 1000V DC
6V	0.001V				11M Ω , <50pF	
60V	0.01V				10M Ω , <50pF	
600V	0.1V					
1000V	1V					

Shown above is the accuracy at 5 to 100% of range (200 to 1000V for 1000V range, peak 1500V or less). Response time: 2 seconds or less
Add accuracy = ±(2% of reading + 2% of F.S.), except for sinusoidal wave. CMR: 60dB or greater for DC to 60Hz (Rs = 1k Ω), 4 counts or less is corrected to 0.

Resistance Measurement (Ω)

Range	Resolution	Accuracy	Maximum Testing Current	Open-circuit Voltage	Input Protection Voltage
600 Ω	0.1 Ω	0.4+1*	<1.2mA	<3.5V	1000V rms
6k Ω	0.001k Ω		<110 μ A		
60k Ω	0.01k Ω		<13 μ A		
600k Ω	0.1k Ω		<1.3 μ A		
6M Ω	0.001M Ω	0.5+1	<130nA	<1.3V	1000V rms
60M Ω	0.01M Ω	1+2(0-40M Ω) 2+2(40-60M Ω)			

*1: Accuracy after zero calibration for 600 Ω to 6k Ω range. Response time: 2 seconds or less for 600 Ω to 600k Ω , 10 seconds or less for 6M Ω to 60M Ω .

Frequency Measurement (Hz)

AC coupling, Maximum effective display: 9999

Range (auto-ranging)	Resolution	Accuracy	Input Voltage Range
10.00 - 99.99Hz	0.01Hz	0.02+1	0.2 - 600V rms
90.0 - 999.9Hz	0.1Hz		0.4 - 600V rms
0.900 - 9.999Hz	0.001kHz		0.8 - 100V rms
9.00 - 99.99kHz	0.01kHz		

DC Current Measurement (≡A)

Range	Resolution	Accuracy	Voltage Drop	Maximum Input Current	
600 μ A	0.1 μ A	0.2+2	<0.12mV/ μ A	440mA fuse-protected	
6000 μ A	1 μ A		<3.3mV/mA		
60mA	0.01mA		0.5+5	<0.1V/A	10A fuse-protected
600mA	0.1mA				
6A	0.001A				
10A	0.01A				

Maximum testing current at 600mA of range is 440mA. Response time: 1 second or less.

AC Current Measurement (~A)

RMS detection crest factor: 3

Range	Resolution	Accuracy		Voltage Drop	Maximum Input Current
		50/60Hz	40Hz - 1kHz		
600 μ A	0.1 μ A	0.75+5	1.5+5	<0.12mV/ μ A	440mA fuse-protected
6000 μ A	1 μ A			<3.3mV/mA	
60mA	0.01mA			<0.1V/A	10A fuse-protected
600mA	0.1mA				
6A	0.001A				
10A	0.01A				

Shown above is the accuracy at 5 to 100% of range (2 to 10A for 10A range). Response time: 3 seconds or less

Add accuracy = ±(2% of reading + 2% of F.S.), except for sinusoidal wave. 4 counts or less is corrected to 0.

Diode Test (⚡)

Range	Resolution	Accuracy	Testing Current (Vf=0.6V)	Open-circuit Voltage	Input Protection Voltage
2V	0.001V	1+2	Approx. 0.5mA	<3.5V	1000V rms

Continuity Check (🔊)

Range	Resolution	Accuracy	Testing Current (Vf=0.6V)	Open-circuit Voltage	Input Protection Voltage
600 Ω	0.1 Ω	Buzzer sounds at 50+30 Ω or less	Approx. 1.2mA	<3.5V	1000V rms

Capacitance (fF)

Range	Resolution	Accuracy	Input Protection Voltage
10nF	0.01nF	2+10*	1000V rms
100nF	0.1nF	2+5	
1 μ F	0.001 μ F		
10 μ F	0.01 μ F	3+5	
100 μ F	0.1 μ F		
1000 μ F	1 μ F		

*1: Accuracy after zero calibration for 10nF to 1 μ F range.

Temperature Measurement (TEMP)

Range	Resolution	Accuracy	Input Protection Voltage
-50 - 600°C	0.1°C	2+2°C	1000V rms

Temperature probe: Type K thermocouple sensor (optional)

NEW Accessory AC/DC clamp-on probe (Model 96095)



Features

A compact, light, and portable device with 12-mm caliber useful for tangled wiring. When used with this probe*, the DMM can measure and display current (which it otherwise cannot do by itself). The TY500 series can directly read up to 60 A when used with the probe (in sensor mode).

Specifications

Model	96095			
Diameter of measurable conductor	12 mm max.			
Basic performance	Current to measure	Output voltage	Accuracy (at 23°C ± 5°C)	
	AC 0.1 to 130 A	Output: 10 mV/A AC (AC 1 to 1300 mVrms)	50/60 Hz	40 Hz to 1 kHz
	DC 0 to ± 180 A	Output: DC 10 mV/A (DC 0 to ± 1800 mV)	1.2%+0.4 mV	2.5%+0.4 mV
General specifications				
Operating temperature and humidity	-10 to 55°C, 80%RH or less (no condensation)			
Storage temperature and humidity	-30 to 70°C, 85%RH or less (no condensation)			
Power supply	AAA alkaline cell × 2 Power alert: LED light on at 2.2 V ± 0.2 V Auto power off at 1.9 V ± 0.2 V			
Battery life	Approx. 35 hours (continuous) (until LED light on)**			
Dimensions and weight	127(L) × 42(W) × 22(D) mm Cable length: 1200 mm Weight: Approx. 140 g (including cells)			
Safety standard	EN61010-1: CAT III 300V, pollution degree 2, operation at maximum altitude of 2,000 m, EN61010-2-032 EN61326-1: Class B, EN61326-2-2, EN55011 Class B Group 1			
Accessories	Soft carrying case (93040), Battery, User's manual			

*1 Readings must be converted when used with the DMM.

**2 After the battery alert, approx. 5 hours remain to automatic power-off.

Communication Functions and Application Software Allow Analyses and Management of Measurement Data

Data management by dedicated application software

Data saved in the DMM can be managed by the dedicated application software (Model 92015).

- Saved data can be transmitted from the internal memory to a PC. Data collected in SAVE-memory mode or logging-memory mode
 - Measurements by the DMM can be monitored on a PC in real time.
 - Large amounts of data that cannot be saved in the DMM internal memory can be transmitted to a PC in real time. Data can be written to an Excel* spreadsheet. Maximum number of real-time data transmission: 32767
 - Measurement data can be laid out in an Excel spreadsheet. Graphs can be automatically created on a spreadsheet.
- * Excel is a registered trademark of Microsoft Corporation in the United States.

92015 Communications Package Specifications

Specifications

Communication cable

Communication cable: IR communication adapter, USB communication cable: 1
 Cable length: 2 m
 Interface: USB 1.1
 Supported models: TY710, TY720, TY530

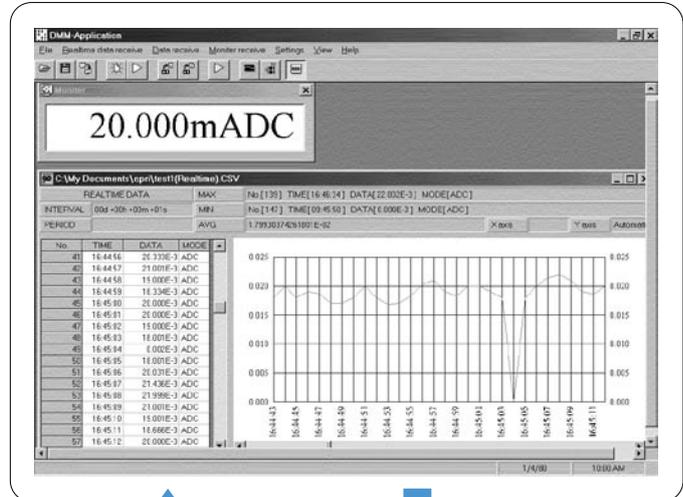
Application software

System requirements of PC

Operating system: WindowsXP/Vista(*)/7
 CPU: Pentium 133 MHz or higher
 Memory: 64 MB or larger
 Storage device: Hard disk with 10 MB or more free space
 CD-ROM drive: 1
 Excel: Excel2003 or later(*)
 Contents: CD-ROM software: 1
 Communication cable (communication adapter included): 1
 User's manual

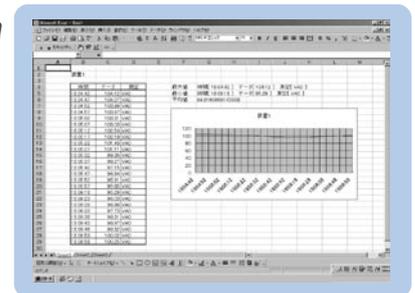
* Windows and Excel is a registered trademark of Microsoft Corporation in the United States.

Example of document windows in DMM application software



↑ Enlarged view

↓ Data layout on Excel spreadsheet



Data layout example on Excel spreadsheet

Optional Accessories*

* For TY710, TY720, and TY530 only

Item	Model	Specification
DMM communication package	92015	USB communication cable (adaptor included), application software

Optional Accessories and Spare Parts

Name	Model	Specification	Applicable DMM Models	Appearance
DMM communication package	92015	USB communication adapter + USB communication cable + Application software	TY700 series TY530	
Test leads	98073	1000V CAT.III 600V CAT.IV Red/black (1set)	TY700/TY500series	
Test leads with Alligator Clip	99014	1000V CAT.III 600V CAT.IV Red/black (1set)		
Alligator clips	B9646HF	Red/black(1set)		
Fuse	99015	440mA/1000V(1pc/1set)	TY700/TY500 series	
	99016	10A/1000V(1pc/1set)		
Carrying case	93029	Hard case (Houses the DMM, the test leads and communication cable)	TY700/TY500 series	
Temperature (thermocouple type K) probe	90050B	-50°C to 600°C(for liquid)	TY700/TY500 series	
	90051B	-50°C to 600°C(for liquid)		
	90055B	-20°C to 250°C(for surface)		
	90056B	-20°C to 500°C(for surface)		
Current clamp probe	96001	For 400A AC; 10mV/A AC output	TY700/TY500series (with TY500 series upto 60A can be read directly)	
	96095	For 130A AC/180A DC; 10mV/A AC/DC output		

Current Clamp Probe:TY700/TY500 series (Direct reading is possible for TY500 series)

Name	96036	96033	96030	96031
Current Clamp Probe				
Measurable Conductor Diameter	dia. 40mm	dia. 18mm	dia. 30mm	dia. 30mm
Measurement Range	2A, AC	50A, AC	200A, AC	500A, AC
Output Voltage	50mV, AC	500mV, AC	500mV, AC	500mV, AC
Accuracy *varies according to input/Amplitude	±0.5% of rdg	±0.5% of rdg	±0.5% of rdg	±0.5% of rdg
Frequency Range	20Hz - 5kHz	20Hz - 20kHz	20Hz - 20kHz	20Hz - 5kHz
Maximum Circuit Voltage	50V, AC	300V, AC	600V, AC	600V, AC

Note:Use AC voltage range of the DMM.

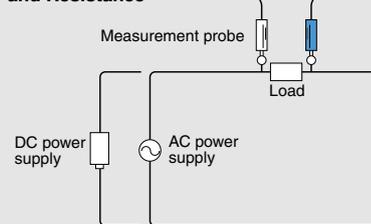
Note:Need to covert the meter reading except TY500series.

Basic Usage Digital Multimeters

Voltage/Resistance Measurement

The COM terminal and V/ Ω terminal are used. To measure a voltage, set the dial to voltage measurement. To measure a resistance, set the dial to resistance measurement. Some DMM models can also display the frequency and calculated decibel value at the same time when measuring an AC voltage. During resistance measurement, it is possible to switch the function to checking of the continuity of the measured circuit.

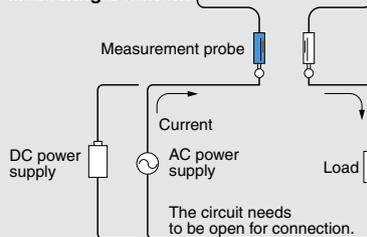
Measuring a Voltage and Resistance



Current Measurement

The COM terminal, and A, μ A or mA terminal are used. Some models have shutters for preventing erroneous insertion into the current terminals and allow a contact of a lead to a current terminal only when the dial is set to current measurement. For these models, you cannot set the dial to voltage measurement while a lead is left inserted into a current terminal. This feature provides greater safety.

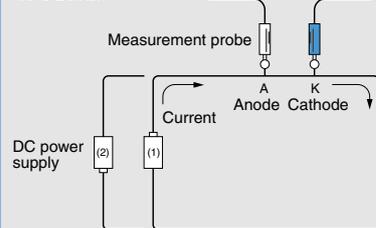
Measuring a Current



Diode Test

A current flows through a diode when the power supply is connected as (1) below, while, almost no current flows when the power supply is connected as (2). The diode test function applies an adequate forward voltage across a diode to make a constant current flow and measures the voltage drop in the forward direction to determine the forward and reverse directions of the diode.

Checking the Polarity of a Diode





NOTICE

- Before using the product, read the instruction manual carefully to ensure proper and safe operation

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