YOKOGAWA ◆

Digital Multimeter Series

TY700 / TY500 / 732 / 731 Series

- ■ **TY700** Series of 4.5-digit Handheld Multimeters
- ■ **TY500** Series of 3.5-digit Handheld Multimeters
- ■ **732** Series of 3.5-digit Handheld Multimeters
- ■ **731O1** of 3.5-digit Pocket Digital Multimeter

73101

Pocket DMM
73101

TY720

TY530

73203

0.09% Accuracy RMS Measurement
TY530

Low-end Model
73203

0.020% Maximum Measurement Accuracy
TY720

Communication Package
92015

Yokogawa Meters & Instruments Corporation

Bulletin DMM-E
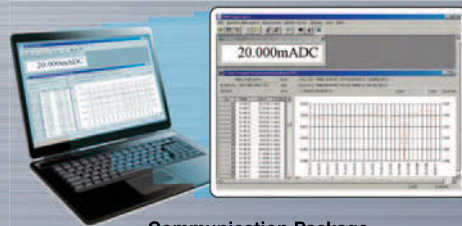
Integral Action Time

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: ±__% 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
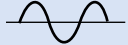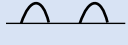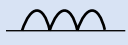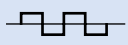
Item	Waveform	RMS	Mean value	Waveform factor	Crest factor
Sine wave		$\frac{1}{\sqrt{2}}=0.707$	$\frac{2}{\pi}=0.637$	$\frac{\pi}{2\sqrt{2}}=1.11$	$\sqrt{2}=1.414$
Half rectification wave		$\frac{1}{2}=0.5$	$\frac{1}{\pi}=0.318$	$\frac{\pi}{2}=1.571$	2
Full rectification wave		$\frac{1}{\sqrt{2}}=0.707$	$\frac{2}{\pi}=0.637$	$\frac{\pi}{2\sqrt{2}}=1.11$	$\sqrt{2}=1.414$
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

RMS value
$$E=\sqrt{\frac{1}{T}\int_0^T e^2(t)\, dt} \quad \text{(energy)}$$

Mean value
$$Emean=\frac{1}{T}\int_0^T |e(t)|dt \quad \text{(surface area)}$$

Calibration of RMS value by mean value rectification
$$E=\frac{1}{\sqrt{2}}\; Ep=0.7071\cdot Ep$$
$$Emean=\frac{2}{\pi}\; Ep=0.6366\cdot Ep$$
$$E=\frac{\pi}{2\sqrt{2}}\; Emean=1.11\cdot Emean$$

P-P value
$$Ep\text{-}p=2\sqrt{2}\; E=2.828\cdot E$$

Figure 2. RMS of Distorted Waves

Instantaneous value and spectrum
$$e(t)=a_0+a_1\cos wt+\cdots+a_n\cos nwt$$
$$+b_1\sin wt+\cdots+b_n\sin nwt$$

DC component — Fundamental wave component — Harmonic component

RMS of each spectrum
$$|En|=\frac{\sqrt{a_n{}^2+b_n{}^2}}{\sqrt{2}}$$

RMS value
$$E=\sqrt{E_0{}^2+|E_1|^2+|E_2|^2+\cdots+|E_n|^2}$$

Crest factor (CF)
$$CF=\frac{\text{Crest value}}{\text{RMS value}}$$
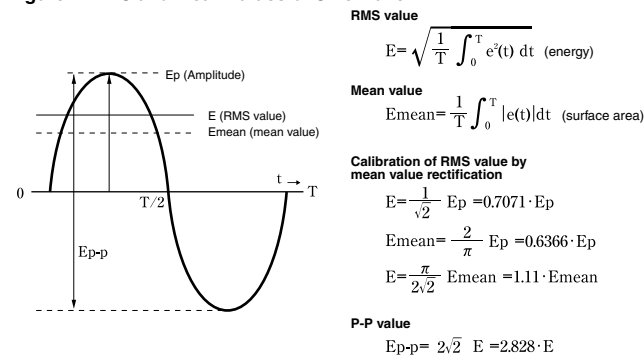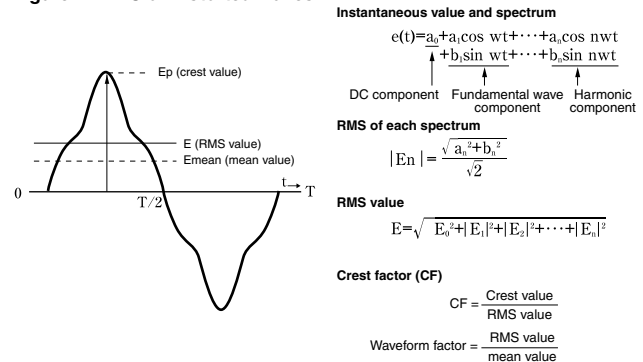$$\text{Waveform factor}=\frac{\text{RMS value}}{\text{mean value}}$$

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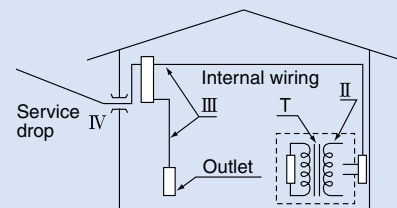
Measurement category	Description	Remarks
O (None, other)	Other circuits that are not directly connect to MEAINS.	
CAT.II	For measurement performed on circuits directly connected to the low-voltage installation.	Appliances, portable equipments, etc.
CAT.III	For measurement performed in the building installation.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

Model	Type	Max. Value	Dual	Bar Graph	Back-lit	AC RMS	Voltage	AC + DC	Current	AC + DC A	Resistance	Continuity Check	Diode Test	Frequency	Temperature	Capacitance	Filter	Communication	Data Memory	Max./Min. Value Memory	Relative Value Computation	Logarithm Computation	Data Hold	Auto Hold	Peak Hold	Overvoltage Input Warning	PC Connection	Auto Power Off	External View
				Display				Measurement Items													Additional Functions								
TY710	Handheld	50000	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●		●	●	●	●	
TY720			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
TY520		6000		●	●	●		●			●	●	●	●	●	●	●		●			●	●		●			●	
TY530				●	●	●		●			●	●	●	●	●	●	●	●	●			●	●		●	●		●	
73201		4300				●		●		●	●	●											●		◎			●	
73202						●		●		●	●	●			●								●		◎			●	
73203						●		●		●	●	●					●						●		◎			●	
73204						●		●		●	●	●											●		◎			●	
73101	Pocket-sized	4300				●				●	●	●											●					●	

◎ : Also functions as excessive current input warning.

TY500 Series

Safe design and supports various maintenance applications.

Model

TY530
TY520

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

3-year Warranty

c (UL) us
LISTED

CE

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.

Sub-display
Sensor output signal

Main display
Scaled value

Small motor

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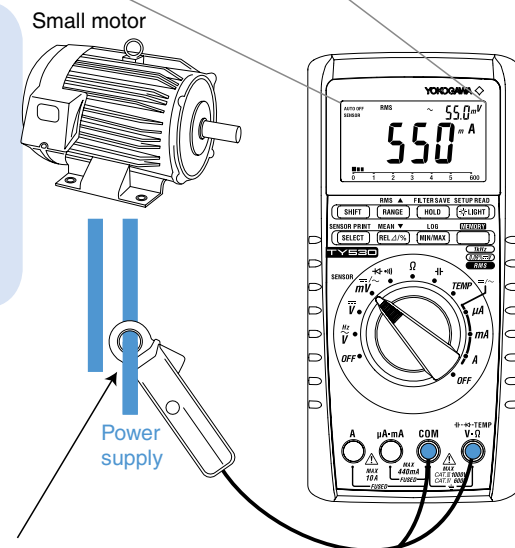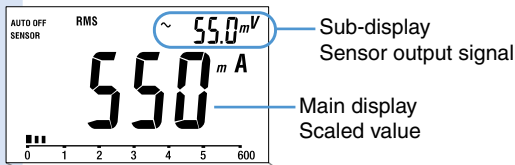
AC/DC clamp-on probe (Model 96095)
Reads maximum 60 A when used with the TY500 series.

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 insolated.

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

5

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 (1000μF), 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 CATⅣ, 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 (98015): 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		10MΩ	
6V	0.001V	0.09+2	11MΩ	1000V DC 1000V rms AC
60V	0.01V			
600V	0.1V		10MΩ	
1000V	1V	0.15+2		

NMRR: 60dB or greater for 50/60Hz ± 0.1%
CMRR: 120dB or greater for 50/60Hz (Rs = 1kΩ) 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 50/60Hz	Accuracy 40-500Hz	Accuracy 500Hz - 1kHz	Input Impedance	Maximum Input Voltage
600mV	0.1mV				10MΩ, <200pF	
6V	0.001V					
60V	0.01V	0.5+5	1+5	1.5+5	11MΩ, <50pF	1000V rms AC 1000V DC
600V	0.1V				10MΩ, <50pF	
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. CMRR: 60dB or greater for DC to 60Hz (Rs = 1kΩ). 4 counts or less is corrected to 0.

Resistance Measurement (Ω)

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

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

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

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

DC Current Measurement (⎓A)

Range	Resolution	Accuracy	Voltage Drop	Maximum Input Current
600μA	0.1μA		<0.12mV/μA	
6000μA	1μA	0.2+2		440mA fuse-protected
60mA	0.01mA		<3.3mV/mA	
600mA	0.1mA			
6A	0.001A	0.5+5	<0.1V/A	10A fuse-protected
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 50/60Hz	Accuracy 40Hz - 1kHz	Voltage Drop	Maximum Input Current
600μA	0.1μA			<0.12mV/μA	
6000μA	1μA				440mA fuse-protected
60mA	0.01mA	0.75+5	1.5+5	<3.3mV/mA	
600mA	0.1mA				
6A	0.001A			<0.1V/A	10A fuse-protected
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
600Ω	0.1Ω	Buzzer sounds at 50+30Ω or less	Approx. 1.2mA	<3.5V	1000V rms

Capacitance (⊣⊢)

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

*1: Accuracy after zero calibration for 10nF to 1μF 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*1, 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)
			50/60Hz / 40 Hz to 1 kHz
	AC 0.1 to 130 A	Output: 10 mV/A AC (AC 1 to 1300 mVrms)	1.2%+0.4 mV / 2.5%+0.4 mV
	DC 0 to ± 180 A	Output: DC10 mV/A (DC 0 to ± 1800 mV)	1.2% + 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)*2	
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

Example of document windows in DMM 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
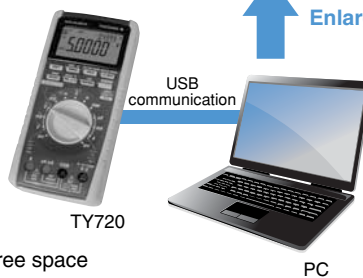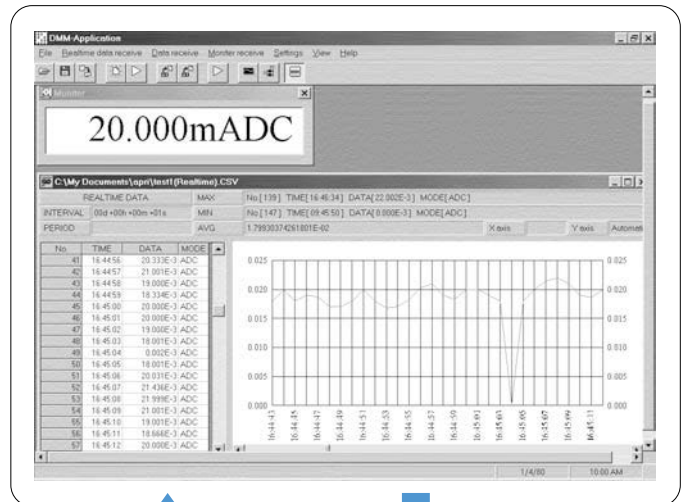Interface: USB 1.1
Supported models: TY710, TY720, TY530

■ **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
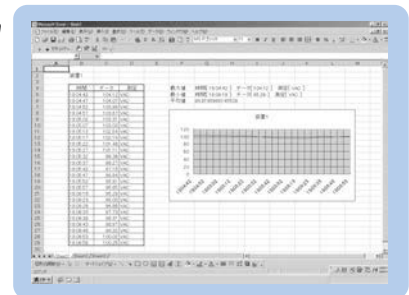   (communication adapter included): 1
                   User's manual
 * Windows and Excel is a registered trademark of Microsoft Corporation in the United States.

Enlarged view

USB communication

TY720

PC

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

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)	All models except 73101	
	RD031	L-plug, Red/black (1set)	732 series	
Test leads with Alligator Clip	99014	1000V CAT.III 600V CAT.IV Red/black (1set)	All models except 73101	
Alligator clips	B9646HF	Red/black(1set)	All models	98073 99014
Fuse	F02	15A/250V (3pcs/1set)	73201/73202/73203	
	F05	500mA/250V(3pcs/1set)		
	99015	440mA/1000V(1pc/1set)	TY700/TY500 series	
	99016	10A/1000V(1pc/1set)		
Rubber case	93007		732 series	
Carrying case	B9646GB	Hard 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	All models except 73101 (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		CE	CE	CE
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

Measurement probe
Load
DC power supply
AC power supply
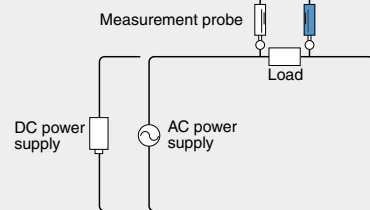
Current Measurement

The COM terminal, and A, μA 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

Measurement probe
Current
DC power supply
AC power supply
Load
The circuit needs to be open for connection.
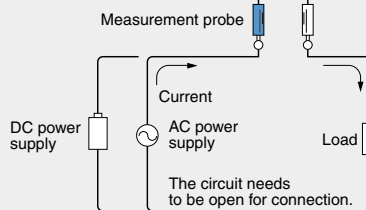
Diode Test

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

Measurement probe
A   K
Anode   Cathode
Current
DC power supply
(2) (1)