265

Digital Clamp-on Meter Instruction Manual

TABLE OF CONTENTS

A. INTRODUCTION

1. Congratulations!!

Thank you for purchasing TPI products. The 265 is easy to use and is built to last. It is backed by a 3 year limited warranty. Please remember to complete and return your product warranty registration card.

2. Product Description

The 265 is a hand-held, autoranging clamp-on DMM. Extra large numerals, capacitance, frequency and data hold are just a few of the features of the 265. An affordable choice, the 265 offers measurements in all basic electrical functions.

The 265 comes complete with the following accessories:

Carrying Pouch
Test Lead Set
Instruction Manual
Battery

3. EC Declaration of Conformity

This is to certify that TPI Model 265 conforms to the protection requirements of the council directive 89/336/EEC, in the approximation of laws of the member states relating to Electromagnetic compatibility and 73/23/EEC. The Low Voltage Directive by application of the following standards:

EN 50081-1	**1992 Emissions Standard**
EN 50082-1	**1992 Immunity Standard**
EN 61010-1	**1993 Safety Standard**
EN 61010-2-031	**1995 Safety Standard**
EN 61010-2-032	**1995 Safety Standard**

To ensure conformity with these standard, this instrument must be operated in accordance with the instructions and specifications given in this manual.

CAUTION: Even though this instrument complies with the immunity standards, it's accuracy can be affected by strong radio emissions not covered in the above standards. Sources such as hand-held radio transceivers, radio and TV transmitters, vehicle radios and cellular phones generate electromagnetic radiation that could be induced into the test leads of this instrument. Care should be taken to avoid such situations or alternatively, check to make sure that the instrument is not being influence by these emissions.

CAUTION: Please follow manufacturers test procedures whenever possible. Do not attempt to measure unknown voltages or components until a complete understanding of the circuit is obtained.

B. SAFETY CONSIDERATIONS

⚠ ***WARNING: Please follow manufacturers test procedures whenever possible. Do not attempt to measure unknown voltages or components until a complete understanding of the circuit is obtained.***

GENERAL GUIDELINES

ALWAYS

- Test the 265 before using it to make sure it is operating properly.
- Inspect the test leads before using to make sure there are no breaks or shorts.
- Double check all connections before testing.
- Have someone check on you periodically if working alone.
- Have a complete understanding of the circuit being measured.
- Disconnect power to circuit, then connect test leads to the 265, then to circuit being measured.

NEVER

- Attempt to measure unknown high voltages.
- Attempt to measure DC microamps with the meter in parallel to the circuit.
- Connect the test leads to a live circuit before setting up the instrument.
- Touch any exposed metal part of the test lead assembly.

INTERNATIONAL SYMBOLS


CAUTION: RISK OF ELECTRIC SHOCK

AC (Alternation Current)

DC (Direct Current)


REFER TO INSTRUCTION MANUAL


GROUND


DOUBLE INSUMLATION


EITHER DC OR AC

C. TECHNICAL DATA

1. Features and Benefits

Agency Meets CE and IEC 1010.

Auto Off Automatically powers off after 10 minutes of inactivity. When active, APO is displayed on the LCD.

NOTE: To disable Auto Off, hold down the RANGE button while turning on the 265.

2. Product Applications

Perform the following tests and/or measurements with the 265 and the appropriate function:

HVAC/R

DCmV	• Thermocouples in furnaces.
ACA	• Heat anticipator current in thermostats.
ACV	• Line voltage.
ACV or DCV	• Control circuit voltage.
OHMS	• Compressor winding resistance.
OHMS	• Continuity of wiring.
CAP	• Motor start and run capacitors.
ACA	• Motor and compressor start up current.
Hz	• Frequency on controls and line voltage.

ELECTRICAL

ACV	• Measure line voltage.
ACA	• Measure line current.
OHMS	• Continuity of circuit breakers.
DCV	• Voltage of direct drive DC motors.
ACA	• Start up current of motors, relays, contactors and transformers.

ELECTRONIC

ACV	• Measure power supply voltage.
ACA	• Measure power supply current.
OHMS	• Continuity of circuit breakers and fuses.

3. Specifications

IEC 1010 Over Voltage:
CAT II - 1000V
CAT III - 600V
Pollution Degree 2

UL 3111 Pending

Temperature for gauranteed accuracy: 23ºC ±5ºC

DC VOLTS

Range	Res.	Accuracy	
400mV	0.1mV	+/-(0.3% of reading + 5 digits)	Impedance:
4V	0.001V		10MΩ
40V	0.01V	+/-(0.5% of reading + 4 digits)	Overload Protection:
400V	0.1V		600VDC or AC RMS
600V	1V	+/-(1.0% of reading + 4 digits)	

AC VOLTS

(40Hz to 60Hz Frequency Response 400mV Range)
(40Hz to 400Hz Frequency Response All Other Ranges)

Range	Res.	Accuracy	
400mV	0.1mV	+/-(1.5% of reading + 5 digits)	Impedance:
4V	0.001V		10MΩ
40V	0.01V	+/-(1.5% of reading + 5 digits)	Overload Protection:
400V	0.1V		600VDC or AC RMS
600V	1V		

AC AMPS

(45Hz to 100Hz Frequency Response 200A to 400A)
(45Hz to 450Hz Frequency Response Below 200A)

Range	Res.	Accuracy
40A	0.01A	+/-(3.0% of reading + 5 digits)
400A	0.1A	

OHM (Resistance, Ω)

Range	Res.	Accuracy	
400Ω	0.1Ω	±(0.8% of reading +5 digits)	Overload Protection: 250VDC or AC RMS
4kΩ	0.001kΩ		
40kΩ	0.01kΩ		
400kΩ	0.1kΩ		
4MΩ	0.001MΩ	±(2% of reading +10 digits)	
40MΩ	0.01MΩ		

Frequency (Hz)

Range	Res.	Accuracy	
4000Hz	1Hz	±(0.5% of reading +2 digits)	Overload Protection: 250VDC or AC RMS
40.00kHz	0.01kHz		
400.0kHz	0.1kHz		
4.000MHz	0.001MHz		
40.00MHz	0.01MHz		

Diode Test

Test Current	Over Load Protection
1.5mA MAX	250 V DC or AC RMS

Continuity Buzzer

Test Voltage	Threshold	Over Load Protection
3V	<35Ω	250 V DC or AC RMS

Capacitance

Range	Res.	Accuracy	
4nF	0.001nF	±(3% of reading +10 digits)	Overload Protection: 500VDC or AC RMS
40nF	0.01nF		
400nF	0.1nF		
4µF	0.001µF		
40µF	0.01µF		
400µF	0.1uF		
4mF	0.001mF	±(7% of reading +10 digits)	

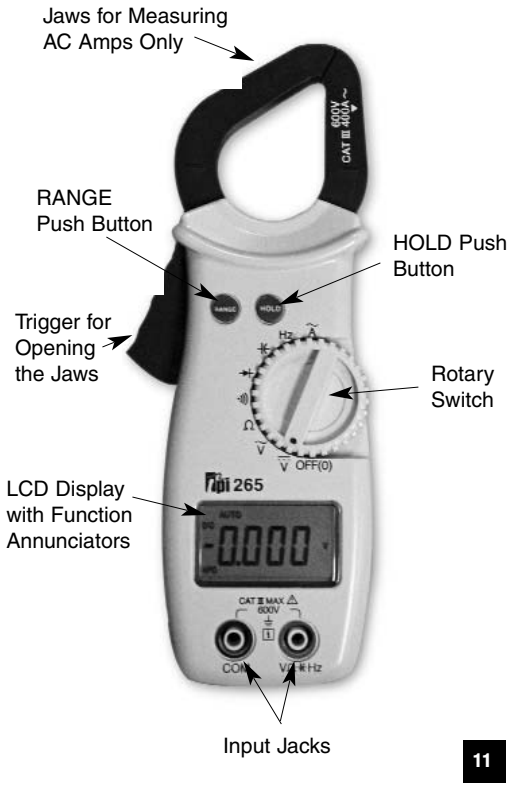
nF= nanofarad, µF= microfarad, mF= millifarad

General

Max Voltage between any input and ground	600V
Fuse Protection (µA range)	0.5A/600V
Display Type	4000 Count 41 seg. bargraph
Operating Temperature	32ºF to 113ºF (0ºC to 40ºC)
Storage Temperature	-4ºF to 140ºF (-20ºC to 60ºC)
Relative Humidity	80% non-condensing
Power Supply	9V (MN1604)
Battery Life	80 hrs. typical
Size (H x L x W)	32.5mm x 255mm x 65mm (1.3in x 10in x 2.5in)
Weight	363g (0.8lbs)

D. MEASUREMENT TECHNIQUES

1. Controls and Functions:



Controls and Functions: (cont.)

Push Buttons

HOLD Holds the reading on the display until the button is pushed a second time.

RANGE Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

Rotary Switch

OFF Turns the 265 completely off.

⎓ **V** Used to measure DC volts.

Ṽ Used to measure AC volts.

Ω Used to measure resistance.

Used to measure continuity.

Selects diode test function.

Selects capacitance test function.

Hz Selects frequency test function.

Ã Used to measure AC amperage.

Controls and Functions: (cont.)

Input Jacks

COM Black test lead connection for all measurements except AC Amps.

V/Ω/ ⏚/Hz Red test lead connection for all measurements except AC Amps.

2. Step by Step Procedures:

Measuring DC Voltage

⚠ ***WARNING!***
Do not attempt to make a voltage measurement of more than 600V or of a voltage level that is unknown. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD	MIN READING	MAXI READING
$\overline{\tilde{V}}$	COM	V/Ω	0.1mV	600V

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3 Plug red test lead into the **V/Ω** input jack.
4. Set rotary switch to the $\overline{\tilde{V}}$ range.
5. Connect test leads to circuit to be measured.
6. Reconnect power to circuit to be measured.
7. Read the voltage on the 265.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.
- **RANGE:** Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

Measuring AC Voltage

⚠ ***WARNING!***
Do not attempt to make a voltage measurement of more than 600V or of a voltage level that is unknown. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD	MIN READING	MAX READING
$\tilde{V}$	COM	V/Ω	0.1mV	600V

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3 Plug red test lead into the **V/Ω** input jack.
4. Set rotary switch to the $\tilde{V}$ range.
5. Connect test leads to circuit to be measured.
6. Reconnect power to circuit to be measured.
7. Read the voltage on the 265.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.
- **RANGE:** Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

Measuring Resistance

⚠ ***WARNING!***

Do not attempt to make resistance measurements with circuit energized. For best results, remove the resistor completely from circuit before attempting to measure it. Make sure the temperature probe is NOT plugged in during this test.

NOTE:

To make accurate low ohm measurements, short the ends of the test leads together and press the REL button to store the reading. This will deduct the stored value from subsequent measurements eliminating the test lead resistance from the reading.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD	MIN READING	MAX READING
Ω	COM	V/Ω	0.1Ω	40.00MΩ

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3. Plug red test lead into **V/Ω** input jack.
4. Set the rotary switch to the Ω function.
5. Connect test leads to circuit to be measured.
6. Read the resistance value on the 265.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.
- **RANGE:** Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

Measuring AC Amperage

⚠ ***CAUTION!***

Do not attempt to make a current measurement with the test leads. The 265 measures the current by clamping the jaw around one conductor (wire). Clamping around more than one wire will result in erroneous readings. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD	MIN READING	MAX READING
Ã	NOT USED	NOT USED	0.01A	400A

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Set rotary switch to Ã function.
3. Clamp the jaws around one conductor of the circuit to be measured. For best results, center the wire in the jaw.
4. Reconnect power to circuit to be measured.
5. Read the current on the 265.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.
- **RANGE:** Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

Measuring Continuity

⚠ ***WARNING!***

Do not attempt to make continuity measurements with circuit energized. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD
	COM	V/Ω

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3. Plug red test lead into **V/Ω** input jack.
4. Set the rotary switch to the position.
5. Connect test leads to circuit to be measured.
6. The 265 will beep and the LED will illuminate at resistances of 35Ω or lower.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.

Measuring Diodes

⚠ ***WARNING!***

Do not attempt to make diode measurements with the circuit energized. For accurate tests, remove the diode completely from the circuit prior to measuring it. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD
	COM	V/Ω/μA

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3. Plug red test lead into **V/Ω** input jack. position.
4. Set the rotary switch to the
5. Connect the black test lead to the banded end of the diode (cathode) and the red test lead to the non-banded end of the diode (anode).
6. For a good diode, the reading on the display should be between 0.5V and 0.8V. The reading will be lower for a germanium diode.
7. Reverse the leads on the diode.
8. For a good diode, the reading on the display should be OL (overload).

Optional Modes

- **HOLD:** Freezes the reading on the LCD.

Measuring Capacitance

⚠ ***WARNING!***

All capacitance measurements are to be made on de-energized circuits with all capacitors discharged only. Failure to de-energize and discharge capacitors prior to measuring them could result in instrument damage and/or personal injury. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD
⊣⊢	COM	V/Ω/μA

Measurement Procedure:

1. Disconnect power to circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3. Plug red test lead into **V/Ω** input jack. ⊣⊢ position.
4. Set the rotary switch to the
5. Remove the capacitor from the circuit and discharge it.
6. Connect test leads to the capacitor to be measured. Observe polarity on polarity sensitive capacitors.
7. Read the capacitor value on the LCD.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.
- **RANGE:** Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

Measuring Frequency

⚠ ***WARNING!***

Never attempt a frequency measurement with a voltage source greater than 500V. Determine the voltage of any unknown frequency source before connecting the instrument in frequency mode. Make sure the temperature probe is NOT plugged in during this test.

Instrument set-up:

FUNC.	BLACK TEST LEAD	RED TEST LEAD
Hz	COM	V/Ω/μA

Measurement Procedure:

1. Disconnect power to the circuit to be measured.
2. Plug black test lead into the **COM** input jack.
3. Plug red test lead into **V/Ω** input jack.
4. Set the rotary switch to the **Hz** position.
5. Reconnect power to the circuit to be measured.
6. Read the frequency on the LCD.

Optional Modes

- **HOLD:** Freezes the reading on the LCD.
- **RANGE:** Activates manual ranging. Press and hold for 2 seconds to return to auto ranging.

E. Other Features

Manual Ranging (RANGE)

The range hold button (RANGE) activates manual ranging. Press the RANGE button to cycle through available ranges. Pressing and holding the RANGE button for approximately two seconds returns the meter to autorange mode and “auto” will be displayed in the upper left corner of the display.

Data Hold (HOLD)

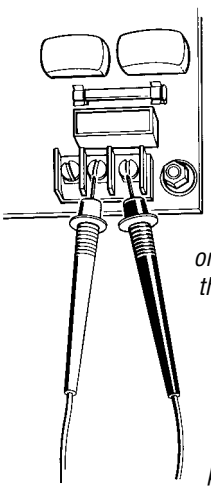
Press the HOLD button at any time to freeze the reading on the LCD display. This function is useful when measuring in locations where the display is difficult to read.

Auto Power Off (APO)

Automatically powers off after 10 minutes of inactivity. When active, APO is displayed on the LCD.

NOTE: To disable Auto Off, hold down the RANGE button while turning on the 265.

F. Application Notes (AC Volts)



Disconnect power from the terminal block, find the fuse or circuit breaker that controls the block and turn it off.

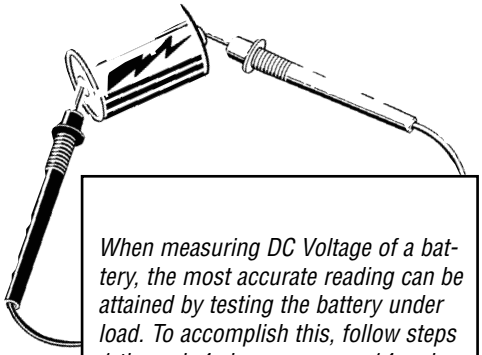
Set up the meter following the steps under “Measurement Procedure” on page 15. Then proceed with the following:

•Connect the red test lead to the hot side of the block and the black lead to the neutral side of the block. Reconnect power to the block and read the voltage on the meter. The reading should be approximately 110V to 130V.

- *Disconnect power from the block and move the red wire to ground. Reconnect power to the block and read the voltage on the meter. Typically less than 20V should exist from neutral to ground. If 110V or above exists, the block may be wired incorrectly.*

Application Notes (DC Volts)

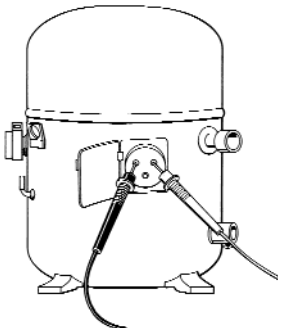
The 265 will accurately measure rectified DC Voltages like those encountered in furnaces and other appliances even though many of these devices do not have output filtering or other signal conditioning.



When measuring DC Voltage of a battery, the most accurate reading can be attained by testing the battery under load. To accomplish this, follow steps 1 through 4 shown on page 14 and the following (with the battery in holder and device turned on):

- *Connect the red test lead from the meter to the positive (+) terminal of the battery.*
- *Connect the black test lead to the negative (-) terminal of the battery.*

Application Notes (Resistance)



When measuring resistance of a motor, make sure the power is disconnected prior to testing.

Set up meter following steps under "Measurement Procedure" on page 16, and proceed with the following:

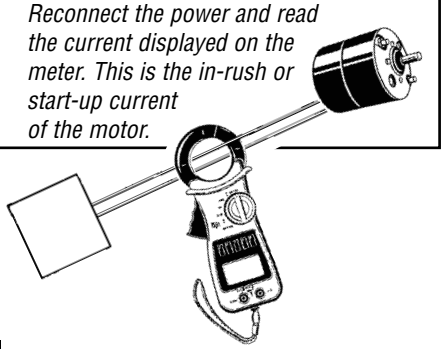
- *Connect the red test lead to one power input line of the motor and the black test lead to the other power input line of the motor. In most applications if the reading is OFL, the motor winding is open.*
- *Connect the red test lead to the frame of the motor and the black test lead to the winding. In most applications if a reading of 0 Ohms is displayed, the winding is shorted to the motor frame (ground).*

Application Notes (AC Amps)

When measuring AC Amps of a motor there are two types of measurements that can be made, running current and in-rush or start-up current. Start-up current will usually be much higher than running current.

Set up the meter following the steps under "Measurement Procedure" on page 17, and then proceed with the following:

- *Clamp the meter around a single wire and reconnect power to the device. Read the current displayed on the meter. This is the running current of the motor.*
- *Disconnect power to the motor and put the meter in PEAK HOLD mode. Reconnect the power and read the current displayed on the meter. This is the in-rush or start-up current of the motor.*



G. Trouble Shooting

Problem	Probable Causes
Does not power up	• Dead or defective battery • Broken wire from battery snap to PCB
All functions except ohms read high	• Very weak battery that will not turn on the low battery indicator on the LCD
AC Volts do not read	• Very weak battery that will not turn on the low battery indicator on the LCD
AC Amps does not read	• Make sure the jaw is clamped around a single wire and the device connected to the wire is turned on.

H. Maintenance

1. **Battery Replacement:** The 265 will display a battery symbol when the internal 9 Volt battery needs replacement. The battery is replaced as follows:

   a. Disconnect and remove all test leads from live circuits and from the 265.
   b. Loosen the screw from the back of the 265 battery cover.
   c. Remove the battery compartment cover.
   d. Remove old battery and replace with new battery. Observe the correct polarity on the battery.
   e. Reassemble the instrument in reverse order from above.

2. **Cleaning your 265:**
   Use a mild detergent and slightly damp cloth to clean the surfaces of the 265.

Accessories

Standard Accessories	**Part Number**
9 Volt Alkaline Battery	A009A
Test Lead Set	A040
Soft Carrying Pouch	A255

Optional Accessories	**Part Number**
Fused Test Lead Kit	FTLK3
Deluxe Test Lead Set	TLS2000RB
Carbon Monoxide Adapter	A771
Pressure Adapter	A620
Temperature Adapter	A301
Differential Temperature Adapter	A312

Notes:

Notes:

265 SPECIFICATIONS (PARTIAL LIST)

±0.5% Basic DCV Accuracy

Func.	Range	Res.
DCV	400mV	0.1mV
	4V	0.001V
	40V	0.01V
	400V	0.1V
	600V	1V
ACV	400mV	0.1mV
	4V	0.001V
	40V	0.01V
	400V	0.1V
	750V	1V
ACA	40A	0.1A
	400A	1A
OHM	400Ω	0.1Ω
	4kΩ	0.001kΩ
	40kΩ	0.01kΩ
	400kΩ	0.1kΩ
	4MΩ	0.001MΩ
	40MΩ	0.01MΩ
Capacitance	4nF	0.001nF
	40nF	0.01nF
	400nF	0.1nF
	4uF	0.001uF
	40uF	0.01uF
	400uF	0.1uF
	4mF	0.001mF
Frequency	4000Hz	1Hz
	40.00kHz	0.01kHz
	400.0kHz	0.1kHz
	4.000MHz	0.001MHz
	40.00MHz	0.01MHz

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