Controls / Functions / International Symbols

TPI offers a complete line of…

- CO, Combustibles & Combustion (CEA)
- Refrigerant Leak Detectors
- Digital Manometers
- Temperature Contact & IR Instruments
- IAQ: Air Flow / Humidity
- Handheld Oscilloscopes
- Digital Multimeters & Clamp-on Meters
- Accessories & Kits

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Controls and Functions

Push Buttons

	Activates back light for LCD (automatically turns off after approx. 70 sec.)
REC	Activates the Min/Max/Ave mode
COMP	Activates the Compare mode
REL%	Activates the REL% mode
Range	Activates manual ranging
EDIT	Activates the EDIT mode for Compare and Relative% functions
HOLD	Activates two-hold data-hold mode
⬭	Activates special dual functions on LCD. (Min/MAx time references)
ON/OFF	Turns DMM on and off
Data-H	Activates the data hold function

Rotary Switch

V⎓	Selects the DCV function. Select the best range for the voltage to be measured
V~	Selects the ACV function. Select the best range for the voltage to be measured
A⎓	Selects the DCA function. Select the best range for the current to be measured
A~	Selects the ACA function. Select the best range for current to be measured Selects resistance, diode, or continuity function
OFF	Turns the instrument off
mV⎓	Selects the DC mV function
V⎓	Selects the DCV function
V~Hz	Selects the ACV function (Push the yellow button to display frequency of measured voltage on lower display

Rotary Switch cont'd

⊣◀	Selects the diode test function
Ω •)))	Selects resistance function. (Push the yellow button to activate continuity buzzer)
mA⎓	Selects the DC mA function
A⎓	Selects the DCA function (10A max.)
A~	Selects the ACA function (10A max.)
mA~	Selects the AC mA function
⊣⊢	Selects the Capacitance function
Hz	Selects the Frequency function

Input Jacks

A	Red test lead connection for current measurements on the 2 and 10 ACA and DCA functions
mAµA	Red test lead connection for current measurement on the mA and A DCA and ACA functions
COM	Black test lead connection for all functions
V	Red test lead connection for all OHM, DCV, and ACV functions

International Symbols

- CAUTION: RISK OF ELECTRICAL SHOCK
- AC (ALTERNATION CURRENT)
- DC (DIRECT CURRENT)
- REFER TO INSTRUCTION MANUAL
- GROUND
- DOUBLE INSULATION
- EITHER DC OR AC
- FUSE

Distributed By:

To learn about the entire line of TPI products visit:

www.tpi-thevalueleader.com

DMM FAQ

1. Is there a way to measure higher current with a TPI DMM?

TPI DMMs (except the 120 and 126) have the capacity to read up to 10A AC/DC. Optional adapters are available for all models to increase the current range. Our shunt adapters are available to increase the range up to 1,000A AC/DC.

2. What other adapters are available for TPI DMMs?

Various adapters including carbon monoxide (A771), pressure (A620/630), and clamp-on low current (A254) are available. Contact TPI for additional information.

3. Which of the TPI DMMs will measure temperature?

All TPI DMMs can measure temperature by using the optional A301 K-Type thermocouple temperature adapter.

4. Which TPI DMMs can measure DC millivolts?

All TPI DMMs measure millivolts. Models are available with 1 or 0.1 millivolt resolution.

5. Which TPI DMMs can measure DC microamps?

The TPI 126, 133, 135, 153, 163, 183, 190, 194, 196, and 440 all have this capability.

6. Which TPI DMMs will measure capacitance?

The TPI 135, 183, 190, 192, 194, and 440 all have this capability.

7. What is continuity?

Continuity refers to a test performed on wires and circuits to see if a break(open) exhists. If the wire or circuit is continuous, the resistance reading will be at or near zero. The continuity range on a meter provides audible indication of a continuous circuit, allowing quicker tests without having to take your eyes off the circuit or wire under test.

DMM Selection Guide

Palm Size
100, 120, 122, 126

Full Size
133, 135, 153, 163, 183, 190, 192, 194, 196

True Rms
183, 190, 192, 194, 440

50,000 Count High Resolution
190, 192, 194, 196

Wave Form Display
440

Process Loop Calibration
196

True RMS Plus Waveform
440

The Value Leader™

See page 3 inside for ranges, specifications, and features.

100 120 122 126 133 135 153 163 183 190 ~ 196 440

1. Determine the maximum over voltage installation category (CAT I ~ CAT IV) the multimeter will be used in and narrow your choice to those meters meeting the requirement. The Category rating for each meter is listed on page 2 in the specifications table.
2. Narrow your choice by selecting meters with the features required for your intended applications. For example, if your applications require a CAT III meter with true RMS, frequency, and RS232 output capabilities, the TPI 183 or TPI190 would be good choices. See applications listed below.
3. Finally, select a meter with enough range, accuracy, and resolution for the tests you will perform. For example: the TPI 183 and the TPI 190 meet your application needs, but you require precision high-resolution measurements. Then the 50,000 count TPI 190 would be the better choice.

APPLICATIONS

Application	Market: HVACR	Electrical	Electronic	Industrial	Function	100	120	122	126	133	135	153	163	183	190	192	194	196	440
Thermocouples in furnaces and gas appliances	•				DCmV		◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Heat anticipator current in thermostats	•				ACA					◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Line voltages	•	•	•	•	ACV	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Control voltages	•	•	•	•	ACV/DCV	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Flame safety control current	•				DCuA				◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Heating element resistance	•				Ohms	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Compressor winding resistance	•				Ohms	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Contactor and relay coil resistance	•	•		•	Ohms	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Motor run and start capacitors	•	•			CAP					◉				◉	◉		◉		◉
Use bar graph to indicate rapid fluctuations	•	•	•	•	ALL								◉	◉	◉	◉	◉	◉	
Continuity of wiring	•	•	•	•	Ohms	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Measure frequency on control and line voltage	•	•	•	•	Hz									◉	◉	◉	◉		◉
Record minimum and maximum of measurements	•	•	•	•	REC				◉			◉		◉	◉	◉	◉	◉	◉
Measure temperature*	•	•	•	•	DCV		◉*	◉*	◉*	◉*	◉*	◉*	◉*	◉*	◉*	◉	◉	◉*	◉*
Measure True RMS of distorted or non-linear signals	•	•	•	•	ACV/ACA									◉	◉	◉	◉		◉
Measure line current up to 10 amps	•	•		•	ACA					◉	◉	◉	◉	◉	◉	◉	◉		◉
Test continuity of circuit breakers and fuses		•	•	•	Ohms	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Measure voltage of direct drive DC motors		•		•	DCV	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Measure power supply voltage			•		ACV/DCV	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Measure power supply current			•		ACA/DCA				◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
High resolution, high accuracy	•	•		•	ALL													◉	◉
High resolution, high accuracy			•		ALL											◉			
Category IV tests	•	•		•	ACV/DCV												◉		
Process loop calibration				•	mA Out													◉	
Power Quality		•	•	•	ACV/ACA														◉
Audio			•		ACV/ACA														◉
Video			•		ACV														◉
Logic Tests			•		LOGIC														◉
Waveform Display		•	•		•AC+DCV+A														◉

*Requires either the A301single input or A312 dual input temperature adapters

TPI DIGITAL MULTIMETER TERMINOLOGY

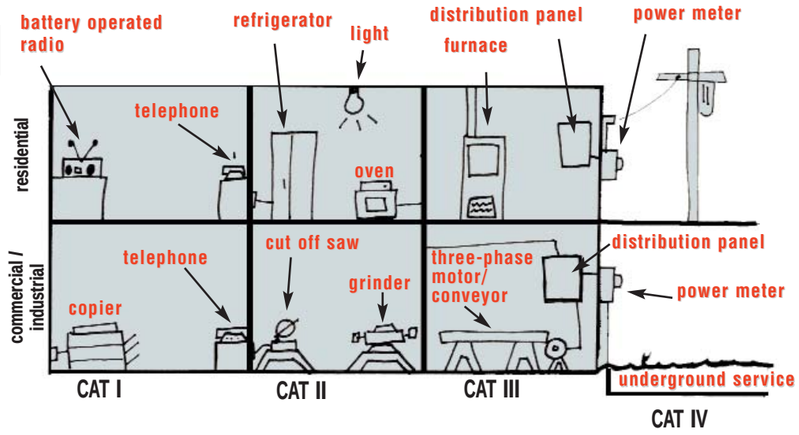
CATEGORY RATINGS

>> Category I: Usually electronic equipment or equipment where measures have been taken to limit transient over voltages.

>> Category II: Single phase loads like appliance personal computers, television sets, and other household loads. Outlets located more than 30 feet from a CAT III source or more than 60 feet from a CAT IV source.

>> Category III: Distribution level fixed installations like distribution panel devices, short branch and feeder circuits, three phase loads, and single phase commercial lighting.

>> Category IV: Equipment and lines located on the power line side of a service panel or where a low voltage connection is made to utility power



Terminology

>> Agency Approval: Test equipment with the CE or UL mark have passed through tests and are designed with operators safety in mind.

>> Record Mode: Record and display the minimum and maximum readings measured. This feature is useful when looking for trends over a long period of time.

>> Auto Range: Meter automatically selects the appropriate range after the function has been selected.

>> Backlight: Feature allowing the display to be illuminated for easier viewing in low light conditions.

>> Basic DC Accuracy: Important specification affecting the overall accuracy of all functions on a DMM.

>> Resolution: A measurement of how small of a signal a meter can display. This specification must be taken into account with accuracy to determine the overall capability of a DMM.

>> True RMS: Allows accurate measurement of non-sinusoidal AC voltage and current found in many control and switching power supply circuits.

>> Analog Bar Graph: Provides the ability to see rapidly changing signals too fast for the digital display to see.

>> Triple Display Simultaneosly display more than one reading at the same time. This feature is useful when measuring AC volts beacuse the frequency can be displayed at the same time without having to switch ranges

>> Sleep/Auto Off: Automatically powers instrument down after 30 minutes of inactivity to preserve battery life. Meters with sleep mode will still acquire data during this time

>> Data Hold: Freezes the reading on the display. This feature is useful when recording readings on paper or when in hard to see locations. Triple display meters can hold two readings on the display at the same time.

>> Input Impedance: Total resistance of the meter as measured at the input terminals. Meters with high impedance, 10MΩ or more, cause negligible loading of the circuit under test. This is important because circuit loading can adversely influence the displayed reading and can cause damage to the circuit under test.

>> Relative Mode: Displays measured value as a percentage of the stored value. This feature is useful for component checking.

>> Compare Mode: Compares measured value with stored value. This feature is useful when component matching.

>> Audible Continuity: Audible beep indicating a complete circuit connnection

>> RS-232 Output: Transfer data directly to a PC while performing tests

>> Process Output: Supply 0 ~ 24mADC for testing current loops and current loop devices

>> Waveform Display: The ability to see the actual waveform under test. This feature is useful for determining the quality of the input signal.

>> Duty Cycle: The total "on" time of the device under test. This feature is useful in preventing component overheating

>> Pulse Width: Measurement of the duration of a pulse. This feature is useful when testing pulse width modulation drive motors.

>> Logic Test: Measurement transitions of logic circuits. This feature is useful when testing CMOS and TTL logic circuits.

>> Two Hold System: Meters with this feature can hold two readings on the display at the same time

>> Digits: Total number of digits that can be displayed. For example, a 3½ digit meter can display a maximum of 1,999. A 3¾ digit meter can display a maximum of 3,999. This means the 3¾ digit meter has beter resolution capability.

>> Counts: Total number of display steps a meter has. This is determined by adding one to the maximum display value. For example, a 3½ digit meter can display a maximum of 1,999 and therefore has 2,000 count capability. Both digits and counts must be taken into account when determining resolution. In general, the more counts a meter has the higher the resolution will be.

TPI DIGITAL MULTIMETER SPECIFICATIONS

DMM Model Part Number

	100	120	122	126	133	135	153	163	183	190	192	194	196	440
Range Selection														
Manual		•			•	•								
Auto*/Manual	•		•	•			•	•	•	•	•	•	•	•
Display Specifications														
2,000 Count		•	•		•									
3,260 Count								•						
4,000 Count	•			•		•	•							
4,000 Count w/ Triple Display									•					
4,000 Count w/ Waveform Display														•
50,000 Count Triple display										•	•	•	•	
Analog Bar Graph								•	•	•	•	•	•	
Backlight									•	•	•	•	•	•
Basis Features														
AC Volts	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DC Volts	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AC Amps				•	•	•	•	•	•	•	•	•	•	•
DC Amps				•	•	•	•	•	•	•	•	•	•	•
Resistance	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Diode Test				•	•	•	•	•	•	•	•	•	•	•
Audible Continuity		•	•	•	•	•	•	•	•	•	•	•	•	•
Additional Features														
True RMS									•	•	•	•		•
Frequency									•	•	•	•		•
Capacitance						•			•	•	•	•		•
Inductance											•			
Data Hold		•	•	•	•	•	•	•	•	•	•	•	•	•
Two Hold System									•	•	•	•	•	
Min/Max Record				•			•		•	•	•	•	•	•
Relative Mode									•	•	•	•	•	•
Compare Mode									•	•	•	•	•	•
RS-232 Output									•	•	•	•	•	•
Oscilloscope Functions														•
Duty Cycle														•
Pulse Width														•
Logic Test														•
Process Output (0~24mA)													•	
Sleep Mode/Auto Off				•			•	•	•	•	•	•	•	•
Range & Resolution														
Basic DC Accuracy	0.5%	0.5%	0.5%	0.3%	0.5%	0.5%	0.3%	0.5%	0.3%	0.05%	0.05%	0.05%	0.05%	0.05%
DC Voltage (maximum)	600V	600V	600V	600V	1,000V	1,000V	1,000V	1,000V	1,000V	1,000V	1,000V	1,000V	1,000V	1,000V
Input Impedance	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ
Resolution (maximum)	1mV	1mV	1mV	0.1mV	0.1mV	0.1mV	0.1mV	0.1mV	0.1mV	0.001mV	0.001mV	0.001mV	0.001mV	0.1mV
AC Voltage (maximum)	600V	600V	600V	600V	750V	750V	750V	750V	750V	750V	750V	750V	750V	1,000V
Input Impedance	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	10MΩ	1.11MΩ
Resolution (maximum)	1mV	100mV	1mV	1mV	0.1mV	0.1mV	1mV	1mV	1mV	100µV	100µV	100µV	100µV	1mV
DC Amps (maximum)	-	-	-	400mA	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A
Resolution (maximum)	-	-	-	0.1mA	0.1µA	0.01µA	0.1µA	0.1µA	0.1µA	0.01µA	0.01µA	0.01µA	0.01µA	0.1µA
AC Amps (maximum)	-	-	-	400mA	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A
Resolution (maximum)	-	-	-	0.1mA	0.1µA	0.01µA	0.1µA	0.1µa	0.1µA	0.01µA	0.01µA	0.01µA	0.01µA	0.1µa
Resistance (maximum)	40MΩ	2KΩ	2KΩ	40MΩ	20MΩ	40MΩ	40MΩ	32.6MΩ	40MΩ	50MΩ	50MΩ	50MΩ	50MΩ	40MΩ
Resolution (maximum)	0.1Ω	1Ω	1Ω	0.1Ω	0.1Ω	0.1Ω	0.1Ω	0.1Ω	0.1Ω	0.01Ω	0.01Ω	0.01Ω	0.01Ω	0.1Ω
Frequency (maximum)	-	-	-	-	-	-	-	-	200KHz	500KHz	500KHz	500KHz	-	2MHz
Resolution (maximum)	-	-	-	-	-	-	-	-	0.01Hz	0.001Hz	0.001Hz	0.001Hz	-	0.01Hz
Capacitance (maximum)	-	-	-	-	-	20,000µF	-	-	10,000µF	20,000µF	100µF	20,000µF	-	400µF
Resolution (maximum)	-	-	-	-	-	0.1µF	-	-	0.01µF	0.001µF	0.1nF	0.001µF	-	100pF
Inductance (maximum)	-	-	-	-	-	-	-	-	-	-	500mH	-	-	-
Resolution (maximum)	-	-	-	-	-	-	-	-	-	-	0.01mH	-	-	-
Agency Approval														
CE IEC 1010	CAT III 600V	CAT III 600V	CAT III 600V	CAT III 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V	CAT III 1,000V / CAT IV 600V	CAT II 1,000V / CAT III 600V	CAT II 1,000V / CAT III 600V
CULus 3111		•	•	•	•		•	•	•		•	•	•	

*the range selection for the 100 DMM is auto only