

Ziegler

Redefine Innovative Metering

Technical Datasheet

ZDM 2x60 Series

DIGITAL MULTIMETER

ZDM 2x60 Series

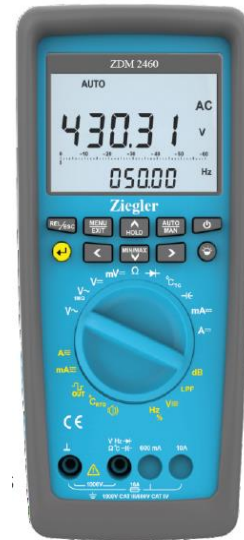
DIGITAL MULTIMETER

ZDM 2160 | ZDM 2260 | ZDM 2360 | ZDM 2460

The ZDM 2X60 series multimeter are high end multimeters that offers safety, high resolution, large range count, reliability, ruggedness, a complete tool for test automation and is equipped with many different measuring functions along-with options of plug and play USB for connection with PC or Bluetooth communication for PC & mobile with android/iOS App.

Product Features

- Available with 5 digits, 60,000 counts with high crest factors
- Basic Accuracy of 0.05%
- Data Logging upto 32000 readings with Real time stamp
- 100kHz bandwidth for voltage measurement in ZDM 2460
- 1kHz Low pass filter mode for VFD Applications
- Square wave output with selectable duty cycle & frequency
- Selectable clamp ratio for current measurement upto 6000A
- Temperature measurement with J, K, Pt100 & Pt1000 sensors
- Fully programmable GO-NO-GO
- Optional Plug and play USB connectivity with PC
- Optional Bluetooth Connectivity with Mobile & PC
- Android/iOS Multimeter App to display & store data in Mobile phones
- Optional External Power adapter for uninterrupted measurements
- Conductance measurement
- Self-battery voltage measurement
- 1M Ω low input impedance mode for elimination of ghost voltages



Fact Sheet

Display

LCD display field 67 mm X 54 mm with digital display, analog scale and with display of measurement unit, and Various special functions

Digital

Display	7 segment characters
Character height	Main Display Character: 12.88mm Sub Display Character : 7.37mm
Resolution	60,000 counts
Over range display	“OL” is displayed.
Polarity display	“-” sign is displayed if plus pole is connected to “L”
Measuring rate	10 measurement / sec with the Min-Max function except for the capacitance, frequency and duty cycle measuring Function
Refresh Rate	4 times/sec
Number of Digits	5

Analog

Indication	LCD scale with bar graph or pointer, depending on the selected parameter setting
Scaling	2 bar/pointer corresponds to 2500 counts at the digital display
Polarity Display	With automatic switching
Over range indication	By triangle “▶”
Sampling rate	10 measurements / sec and display refresh

Applicable Standards

EMC	IEC 61326-1:2012, Table A.1
Immunity	IEC 61000-4-2: 8 KV atmosphere discharge, 4 KV contact discharge IEC 61000-4-3 : 3 V/m
Safety	IEC 61010-1-2010
Pollution Degree	2
IP for water & dust	IEC 60529 : IP 50 for instrument and IP 20 fo sockets
Installation category:	CATIII 1000 V / CATIV 600 V (for 2460, 2360, 2160), CATI 1000 V / CATII 600 V (for 2260)
High Voltage Test	7.4 kV (IEC 61010-1-2010) (for 2460, 2360, 2160), 3.5 kV (IEC 61010-1-2010) (for 2260)

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Model wise functional Overview

Functions/Features	2160	2260	2360	2460
Voltage VDC (Ri>9MΩ)	•	•	•	•
Voltage VAC TRMS (Ri>9MΩ)	•	•	•	•
Voltage LoZ VAC TRMS (Ri=1MΩ)		•	•	•
Voltage VAC TRMS (Ri>9MΩ) LPF 1kHz		•	•	•
Voltage LoZ VAC TRMS (Ri=1MΩ) LPF 1kHz		•	•	•
Voltage VACDC (Ri>9MΩ)	•	•	•	•
High impedance, high bandwidth mV measurement	600mV	60mV/ 600mV	60mV/ 600mV	60mV/ 600mV
Bandwidth VAC & mV ACDC	10kHz	10kHz	10kHz	100 kHz
Frequency Measurement			•	•
Duty cycle %				
Voltage level measurement dB, dBu, dBm		•	•	•
Resistance	•	•	•	•
Conductance measurement	•	•	•	•
Continuity test (I const = 1 mA)	•	•	•	•
Diode measurement (I const = 1 mA)	•	•	•	•
Temperature measurement (TYP J,TYP K)		•	•	•
Temperature measurement (PT100,PT1000)	•		•	•
Capacitance measurement			•	•
Current ADC				
Current AAC+DC TRMS	600mA	6 A/16 A (20 A)	600 μA/6 mA 60 mA/600 mA	600 μA/ 6 mA 60 mA/600 mA
Current AAC TRMS			6 A/10 A (16 A)	6 A/10 A (16 A)
Bandwidth @ AAC+DC or AAC 10 kHz	•	•	•	•
Measurement with Clamp Sensor	•	•	•	•
Data Logging / Viewing Function			•	•
Protective rubber holster	•	•	•	•
Fuse 16A / 1000V	1.6A		•	•
0-20m A / 4-20mA percentage scale			•	•
Square wave Out			•	•
Self-battery voltage measurement	•	•	•	•
MIN/MAX/AVG and Auto Hold functions	•	•	•	•
Dangerous contact voltage indication	•	•	•	•
REL/Zero function	•	•	•	•
USB IR-interface	Optional			
Bluetooth Interface				
External power supply adapter				
Measuring Category	CATIII 1000V / CATIV 600V	CATI 1000 V / CATII 600 V	CATIII 1000 V / CATIV 600 V	CATIII 1000 V / CATIV 600 V

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Model wise functional Overview Voltage

Measurement Function	Measuring Range	Resolution	Input Impedance	Intrinsic Uncertainty under Reference Condition ±(...% of the rdg.+...Digits)			Overload Capacity ²⁾	
				DC ⁷⁾	AC ^{1) 3)}	ACDC ^{1) 3)}	Value	Time
V	6V	100µV	>9MΩ	0.05 + 5	0.5 + 9	1 + 30	1000 V DC/ AC RMS Sine	Continuous
	60V	1m V		0.05 + 5				
	600V	10m V		0.05 + 9				
	1000V	100m V		0.09 + 10				
mV	60m V	1µV	>10MΩ	0.09 + 15	-	1 + 30		Max 10 s
	600m V	10µV		0.09 + 15				
Influence Quantity	Range of Influence		Range	Accuracy				
Frequency ⁶⁾⁹⁾	>15 Hz 45 Hz		60 mV ^{~5)} , 600 mV ~	3+30				
	>65 Hz 100kHz							
	>15 Hz 45 Hz		6V, 60V, 600V ~	2+9	3+9			
	> 65Hz... 1kHz			1+9	3+9			
	>1kHz.....20kHz			3+9	4+9 ¹⁰⁾			
	>20kHz.....100kHz ⁸⁾			3.5+30				
	>15 Hz 45 Hz		1000V ~	2+9	3+9			
	> 65Hz... 1kHz			2+9	3+9			
>1kHz.....10kHz		3+30						

1) Specified Accuracy is valid as of 3% of the measuring range. With Short- circuited test probes: residual value of 1 to 30 d at zero point due to the TRMS converter.

2) At 0°C to 40°C (Accuracy Range)

3) In VAC measurement, Frequency will be shown above 10% of the present range, except for 1000V & 60m V range i.e. 25% & 50% respectively.

4) Frequency Influence upto 10kHz.

5) Frequency response up to 50 kHz

6) Frequency response is valid from 10% to 100% of range

7) With Zero Balancing

8) Frequency response up to 100 kHz, for greater than 50 kHz plus 2.5%

9) Overload capacity of the voltage measurement input: power Limiting: Frequency x Voltage Max : 6x10⁶ V x Hz for V>100V

10) Frequency response greater than 2 kHz plus 2.5%

Frequency/Duty Cycle

Measurement Function	Measuring Range	Frequency	Intrinsic Uncertainty	Overload Capacity ¹⁾	
				Value	Time
Hz ⁵⁾	600Hz, 6kHz, 60kHz, 600kHz, 1MHz	fmin ²⁾ : 6Hz	0.05 +5	1000 V DC/ AC RMS Sine	Max 10 s
Hz(V) ³⁾	10Hz.....100kHz		0.1 +5 ⁴⁾		
Duty Cycle(%)	2.0...98%	15Hz.... 1kHz	0.1 R + 5 d		
	5.0...98% 10kHz	0.2 R per kHz + 5d		
	10...90% 50kHz	0.5 R per kHz + 5d		

1) At 0°C to 40°C (Accuracy Range)

2) Lowest measurable frequency for square measuring signals symmetrical to the zero point (±5V)

3) Overload capacity of the voltage measurement input:
Power limiting: Frequency x voltage max : 6x10⁶V x Hz for U > 100V.

4) Input sensitivity, sinusoidal signal , 10% to 100% of the measuring range

5) At input ±5Vrms ,Square wave, Bipolar inputs.

R= Range d= digit

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Current

Measurement Function	Measuring Range	Resolution	Voltage Drop Approx.	Intrinsic Uncertainty under Reference Condition ±(...% of the rdg.+...Digits)			Overload Capacity ²⁾	
				DC ⁴⁾	AC ¹⁾	ACDC ¹⁾	Value	Time
mA	600 µA	10 nA	60 mV	0.5 + 15	1 + 10	1.5 + 10	0.7A	Continuous
	6 mA	100 nA	60 mV	0.5 + 5	1 + 10	1.5 + 10		
	60 mA	1 µA	60 mV	0.1 + 5	1 + 10	1.5 + 10		
	600 mA	10 µA	60 mV	0.2 + 5	1 + 10	1.5 + 10		
A	6 A	100 µA	60 mV	0.9 + 10	1 + 10	1.5 + 10	10 A: = 5 min ³⁾	
	10 A	1 mA	300 mV	0.9 + 10	1 + 10	1.5 + 10		

Influence Quantity	Range of Influence	Range	Accuracy	
			ZDM 2460	Others
Frequency ⁵⁾	>15 Hz45 Hz	600µA.....	3+10	
	>65Hz 10 kHz	10A		

1) Specified Accuracy is valid as of 3% of the measuring range. With Short- circuited test probes: residual value of 1 to 30 d at zero point due to the TRMS converter.

2) At 0°C to 40°C (Accuracy Range)

3) Off time 30 min and TA = 40°C

4) With Zero Balancing

5) Frequency response is valid from 10% to 100% of range

Resistance, Diode, Continuity

Measurement Function	Measuring Range ⁴⁾	Resolution	Open Ckt. Voltage	Meas. curr. @ range limit	Intrinsic Uncertainty	Overload Capacity	
						Value	Time
Ω ¹⁾	600Ω	10mΩ	<1.4V	Approx. 300 µA	0.1 + 10	1000 V DC/ AC RMS Sine	Max 10 s
	6kΩ	100mΩ		Approx. 250 µA	0.1 + 10		
	60kΩ	1Ω		Approx. 100 µA	0.1 + 10		
	600kΩ	10Ω		Approx. 12 µA	0.5 + 10		
	6MΩ	100Ω		Approx. 1.2 µA	1 + 10		
	60MΩ	10kΩ		Approx. 125 nA	5 + 10		
Continuity	600Ω	-	Appx. 8V	Approx. 1 mA	3 + 5		
Diode ¹⁾	6.0V ³⁾	-	Appx. 8V	Approx. 1 mA	0.5 + 5		

1) Measurement of Resistance, Diode will be more accurate after removal from device under test

2) At 0°C to 40°C (Accuracy Range)

3) Displays up to max 6.0 V, "OL" in excess of 6.0V.

4) With Zero Balancing

Capacitance

Measurement Function	Measuring Range	Resolution	V _o MAX	Intrinsic Uncertainty	Overload Capacity ²⁾	
					Value	Time
F ³⁾⁴⁾	10 n F	10 p F	0.7 V	1 + 10 ²⁾	1000 V D C / A C R M S S i n e	Ma x 1 0 s
	100 n F	100 p F		1 + 6 ²⁾		
	1 µ F	1 n F		1 + 6 ²⁾		
	10 µ F	10 n F		1 + 6 ²⁾		
	100 µ F	100 n F		5 + 6 ²⁾		
	1000 µ F	1 µ F		5 + 6 ²⁾		

1) At 0 °C to 4 0 °C (Accuracy Range)

2) Applies to measurements at film capacitors and battery operated.

3) Measurement of capacitance will be more accurate after removal from device under test

4) With Zero Balancing

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Temperature

Measurement Function	Measuring Range		Intrinsic Uncertainty	Over load Capacity ¹⁾	
				Value	Time
Temperature °C/°F	Pt 10 0	-200 °C ..+ 850 °C	0.3 + 15 ²⁾	100 0 V D C/ A C R M S S i n e	Ma x 10 s
	Pt 100 0	-150 °C ..+ 850 °C	0.3 + 15 ²⁾		
	TC K	-200 °C ..+137 2 °C	1 % + 20 ²⁾		
	TC J	-210 °C ..+120 0 °C	1 % + 20 ²⁾		

1) At 0 °C to 4 0 °C (Accuracy Range)
2) Plus Sensor Deviation

Square Wave Output

Output	Range	Accuracy
Frequency	30Hz - 10kHz	0.1% x output frequency + 2 counts of DMM display
Duty Cycle	10% - 100% ^[2]	0.2% of Full scale ^[1]
Amplitude	Fixed -3.15 to 3.15V	±0.4V

1) For signal greater than 1kHz, add 0.2% per kHz to the accuracy
2) In Multiple of 10

Influence Error

Influence Quantity	Range of Influence	Measured Quantity / Measuring Range ¹⁾	Variation ± (...% of rdg. + ...digits)/10k
Temperature	-10 °C to 21 °C & +25 °C to 50 °C	VDC	0.2 + 20
		V~, VACDC	0.4 + 10
		600Ω to 600 k Ω	0.5 + 10
		> 600 k Ω	1 + 10
		mA/ ADC	0.6 + 10
		mA/ AAC, ACDC	0.8 + 10
		10nF...10μF	1 + 5
		100μF...1000μF	1.5+10
		Hz, %	0.2 + 10
		°C/°Fpt100/pt1000	0.5 + 10
		°C/°F thermocouple K/J	0.2 + 10
Relative humidity	75% 3 Days Meter off	V, A, Hz, %, Diode, F, Ω	1 × intrinsic error
Battery voltage	1.8 to 3.6V	V, A, Hz, %, Diode, F, Ω	1 × intrinsic error

1) With Zero Balancing

Reference Conditions for Accuracy

Reference Temperature	23°C ± 1K
Relative Humidity	45%...55% RH
Waveform of measured quantity	Sinusoidal
Input frequency	45...65 Hz
Battery Voltage	3 V ± 0.1 V


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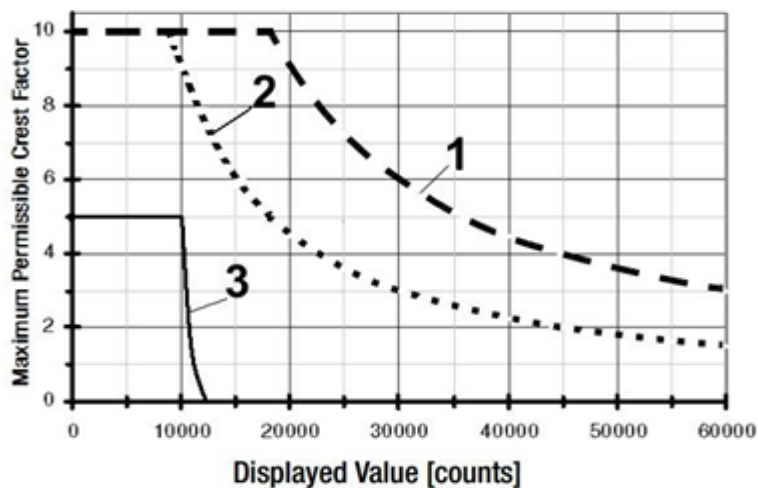
Influence Quantity

Influence Quantity	Range of Influence	Measuring Ranges	Attenuation
Common Mode interference voltage	Noise quantity max. 1000 V dc	V dc	> 120 dB
	Noise quantity max. 1000 V ~ 50-60 HZ sinusoidal	6.0 V~, 60 V~	>80 dB
		600 V~	> 70 dB
		1000 V~	> 60 dB
Normal Mode interference ratio	Noise quantity V ~ Value of the measuring range at a time Max. 1000V~, 50Hz, 60Hz Sinusoidal	V dc	> 50dB
	Noise quantity max. 1000 V dc	V~	>110dB

Battery

Battery Voltage	2 X 1.5 V Cells (LR6 Battery)
Battery type	Alkaline manganese cells.
Battery Life	For Model w/o Bluetooth: Appx. 100 Hrs. (Backlight off) For Bluetooth Model: Appx. 100 Hrs. (Backlight off / Bluetooth off) Appx. 48 Hrs. (Backlight off)
Battery test	Automatic display of  symbol when battery voltage drops below approx. 2.4V

Crest Factor



Additional error caused by signal's crest factor:

$1 < CF < 3$: 1% R+ 30D

$3 < CF < 10$: 3% R

Curve 1: Range from 0.06V to 60V, 0.6mA to 60mA, 6A

Curve 2: Range 600V 600mA

Curve 3: Range 1000V 10A

*Note: With Unknown Waveform (CF > 2), measurement should be made with manual range selection. R = Reading
D = Digit*

Mechanical Design

Housing	PC ABS
Dimension	200 x 91 x 54 mm
Weight	Approx. 0.5 kg with batteries

Internal Clock

Time Format	dd. MM. yy hh.mm.ss
Resolution	1 s
Accuracy	±1min. per month
Temperature Influence	50 ppm/K

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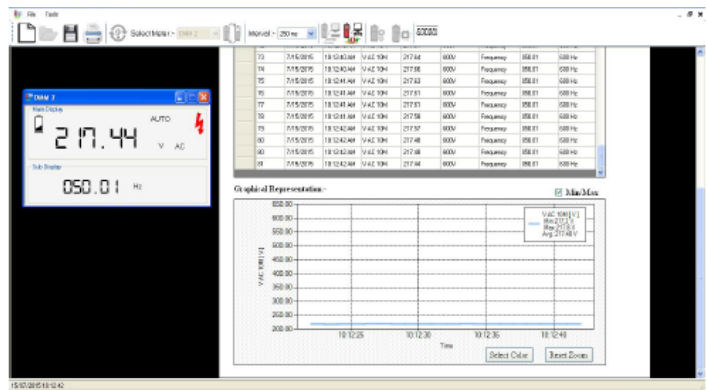
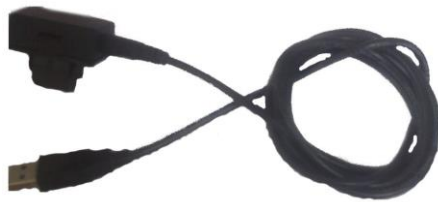
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Fuse

Fuse	FF (UR) 16 A/ 1000 V AC/DC; 10 mm x 38 mm (ZDM 2360 & ZDM 2460)
	FF (UR) 1.6 A/ 1000 V AC/DC ; 6.3 mm x 32 mm (ZDM 2160)
Switching Capacity	30 kA at 1000 V AC/DC (ZDM 2360 & ZDM 2460)
	10 kA at 1000 V AC/DC (ZDM 2160)

Accessories for Operation at a PC

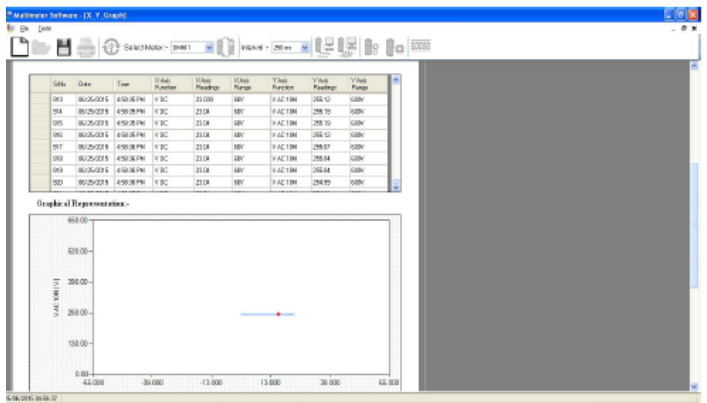
Interface Adapter for USB Communication



Communication: Bi-directional

- Baud Rate: 9600
- Data Bit: 8
- Stop Bit: 1
- Flow Control: None

A CD ROM is included which contains current drivers for Windows operating systems, Installation Guide, Ziegler Data-logger User Manual and Ziegler Data-logger Setup File.



Bluetooth Communication Details (for Bluetooth Model)

- Class 2 Bluetooth which is integrated in the instrument achieves transmission ranges of up to 10m
- Recommended Screen Size: 4.7" to 7" with resolution 1280 x 720p & above
- Android Version: 4.0 & above
- Meter Setup Parameter can be configured through application
- Measured Parameter can be logged in Excel format on mobile's default memory
- Function, Range and Relative key's operation is possible through application
- Graphical Analysis of measured parameter is possible
- Offline Data of meter can be retrieved on mobile through application
- Virtual Display of meter can be observed on mobile application

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Model Name	Scope of Supply
ZDM 2160	1. Digital Meter
ZDM 2260	2. Cable Set
ZDM 2360	3. Protective Case
ZDM 2240	4. Battery
	5. Operating Manual
	6. Test Certificate
OPTIONS & OPTIONAL ACCESSORIES	
	1. External Power Supply Adapter
	2. USB Interface Adapter + Software CD
	3. Bluetooth Interface + Software CD

Ziegler

Redefine Innovative Metering

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