



METRA BLANSKO

VALUE IS INSIDE

Metra 6016

TRMS Digital multimeter





Main features

- Data logger & View function (up to 32000 readings)
- Plug and Play USB connectivity with PC
- 100kHz bandwidth for voltage measurement
- 1kHz Low Pass Filter mode
- NO-GO function
- VAC with 1M impedance
- 4-20mA/0-20mA scale type measurement
- Single fuse for mA & A
- Adjustable square wave output
- Temperature measurement with J, K, Pt100 & Pt1000 sensors
- External power adapter for long hours of measurements
- Selectable clamp ratio for current measurement
- Conductance Measurement
- Frequency / Time Period Measurement

The 6012-6016 series of new multimeters is made for professional use that offers safety, high resolution, large range count, reliability, ruggedness, a complete tool for test automation and is equipped with more than 30 different measuring functions.

Application

Low input impedance ($R_i = 1M$)

Trouble shooting a branch circuit with dead or disconnected circuit is made easy with VACIM. Low impedance VACIM measurement helps eliminating error readings resulting from ghost voltages caused by long wires that share a common conduit.

Single fuse(16A)

Instrument contains a single fuse of 16A common for all the ranges of current from 600A to 10A AC/DC as compared to the two fuses in traditional DMMs. This eliminates the accidental blowing of 1.6A fuse due to operator's error when higher current is applied in lower ranges.

Tool for automation, Bluetooth Interface

With ready to use communication protocol, one can easily automate his test system. The extensive data capturing and analysis is possible with 601X Android Application. Instead of cable, the higher communication distance can be achieved (10m). The Graphical and Tabular analysis is possible over android app.t

Square Wave Output

A square wave output can be generated from the DMM with the user selectable frequency and adjustable duty cycle. This can be used as baud rate generator, to check flow meters, to test frequency counters, accelerometer and frequency transmitter. It can also be used as audio signal in audio signal testing.

Current measurement with clamp sensor

Measurement with various clamp sensors is possible, which helps in accurate measurement of current from 60mA to 6000A without interrupting the circuit. The measured current is automatically calculated from the selected clamp ratio.

Low pass filter (LPF) in VAC& VAC

A selectable 1kHz low pass filter offers advanced variable frequency drive filtering to help you accurately analyze non-traditional sine waves and noisy signals. In LPF mode DMM rejects all high frequency noise making it suitable for making measurements on inverters and high frequency drives.

True RMS measurement with high crest factors

Accurate true RMS measurement of distorted waveform with crest factor CF between 1 to 10.

Data Logging

DMM 6015/6016 offers continuous data logging of up to 32000 readings with real time stamping. Log rate is adjustable from as low as 0.1 sec to as high as 1hr.

Adjustable Beep Level

With Beep level setting, the limit for continuity can be adjusted from 10 Ω to 90 Ω depending upon application.



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Separate fuse compartment

Easier access to fuse when replacing the blown fuse.

Auto Power OFF with adjustable timing

Flexibility to adjust "Auto off" period from 5 minutes to 60 minutes.

60mv & 600mV DC & ACDC

This helps in accurate measurement of low output voltages <600mV from sensors & transmitters. High frequency low voltage signal from RF transmitters can also be measured. Signal as low as 0.001mV can be measured accurately.

Min / Max / Avg measurement

Min/Max/Avg function records the minimum, maximum and average of all the readings applied since its activation. With dual display it makes it even flexible for the user to keep the trace of the applied readings while viewing Min/Max/Avg readings. The average reading is useful for smoothing out unstable inputs & verifying circuit performance.

Dedicated keys for easy navigation

Dedicated navigation keys make scrolling through menu and setting of parameters easy & comfortable.

External Power Adapter (DC Jack)

The external power supply adapter helps in conserving battery while performing long hours of measurements. When DC jack is connected batteries inside DMM are electronically disconnected, and reconnected in absence of mains, hence there is no need of removing the battery when using the power adapter.

100kHz Bandwidth

Alternating voltages with frequencies up to 100kHz can be measured accurately. This is useful while analysing high frequency analog signals.

Self-battery voltage measurement

Capable of measuring self-battery voltage.

Room temperature measurement

Room temperature can be sensed and measured without any external sensor. The same is used as internal reference temperature in thermocouple-based temperature measurements.

Fully programmable GO NO-GO

The Go - NoGo function gives an indication through a buzzer for the applied input lying inside or outside the set band. The values for low limit, high limit and buzzer condition can be easily set through NoGo function in menu settings. Once the NoGo function is set, user can get busy doing other activities in the vicinity of the meter, whenever the condition is met

it will be indicated by a buzzer. It eliminates the need of operator to continuously monitor the display.

View Function

Data logged on meter can be viewed directly on the meter itself, hence the data analysis is also possible without a PC based software. However, for graphical and large data analysis PC based software can be used.

Dangerous Contact Voltage Indication

Presence of hazardous voltage (>35Vrms 50/60Hz and 50Vdc) at the contact terminal are indicated on display. This is very useful while performing measurements in the circuit which takes longer time to discharge its capacitors, or where unexpected danger voltage are present.



Specifications

Functions/Features	6012	6013	6015	6016
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	10 kHz	10 kHz	10 kHz	10 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, K)		•	•	•
Temperature measurement (PT100, PT1000)			•	•
Capacitance measurement			•	•
Current ADC	600mA	6A/16A (20A)	600uA/6mA	600uA/6mA
Current AAC+DC TRMS			60mA/600mA	60mA/600mA
Current AAC TRMS			6A/10A (20A)	6A/10A (20A)
Bandwidth @AAC+DC or AAC 10 kHz	•	•	•	•
Measurement with clamp sensor	•	•	•	•
Data logging/viewing function			•	•
Protective rubber holster	•	•	•	•
Fuse 16A/100V	1,6A		•	•
0-20mA/4-20mA percentage scale			•	•
Square wave out			•	•
Self-battery voltage measurement	•	•	•	•
MIN/MAX/AVG/ and auto Hold function	•	•	•	•
Dangerous contact voltage indication	•	•	•	•
REL/Zero function	•	•	•	•
USB IR-interface	Optional			
External power supply adapter				
Measuring category	1000 V CAT III 600 V CAT IV	1000 V CAT I 600 V CAT II	1000 V CAT III 600 V CAT IV	1000 V CAT III 600 V CAT IV

Environmental conditions

Operating temperature	-10 to +50°C
Storage temperature	-25 to +70°C
Relative humidity	<75% non condensing
Terminal protection	IP 50 for instrument and IP 20 for terminals
Altitude	Up to 2000 m



Technical specification

Voltage

Measurement function	Measuring range	Resolution	Input Impedance	Intrinsic uncertainty under reference condition $\pm(\dots \% \text{ of the rdg.} + \dots \text{ digits})$			Overload capacity ²	
				DC ⁷	AC ^{1,3}	ACDC ^{1,3}	Value	Time
V	6 V	100 μ V	>9M Ω	0,05 + 5	0,5 + 9	1 + 30	1000 V DC/AC RMS Sine	Continuous
	60 V	1 mV		0,05 + 5				
	600 V	10 mV		0,05 + 9				
	1000 V	100 mV		0,09 + 10				
mV	60 mV	1 μ V	>10M Ω	0,09 + 15	-	1 + 30		Max 10 s
	600 mV	10 μ V		0,09 + 15				

Influence quantity	Range of influence	Range	Accuracy	
			DMM 6016	Oth-ers ⁴
Frequency ^{6,9}	>15 Hz ... 45 Hz	60 mV ^{~5}	3 + 30	
	>65 Hz ... 100 Hz	600 mV [~]		
	>15 Hz ... 45 Hz	6 V, 60 V, 600 V [~]	2 + 9	3 + 9
	>65 Hz ... 1 kHz		1 + 9	3 + 9
	>1 kHz ... 20 kHz		3 + 9	4 + 9 ¹⁰
	>20 kHz ... 100 kHz ⁸		3,5 + 30	
	>15 Hz ... 45 Hz	1000 V [~]	2 + 9	3 + 9
	>65 Hz ... 1 kHz		2 + 9	3 + 9
>1 kHz ... 10 kHz	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 & 60mV range i.e. 25% & 50% respectively.

3 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 : 6x10 V xHz 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	600 Hz, 6 kHz, 60 kHz, 600 kHz, 1 MHz	Fmin ² :6Hz	0,05 + 5	1000 V DC/AC RMS Sine	Max 10 s
Hz(V) ³	10 Hz ... 100 kHz		0,1 + 5 ⁴		
Duty cycle (%)	2 ... 98 %	15 Hz ... 1 kHz	0,1 R + 5		
	5 ... 98 %	... 10 kHz	0,2 R per kHz + 5		
	10 ... 90 %	50 kHz	0,5 R per kHz + 5		

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: 6x10 Vx 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



Current

Measurement function	Measuring range	Resolution	Voltage drop approx.	Intrinsic uncertainty under reference condition $\pm(\dots\%$ of the rdg. + ... digits)			Overload capacity ²	
				DC ⁴	AC ¹	ACDC ¹	Value	Time
mA	600 μ A	10 nA	60 mV	0.5 + 15	1 + 10	1,5 + 10	0,7 A	Continuous
	6 mA	100 nA	60 mV	0.5 + 5	1 + 10	1,5 + 10		
	60 mA	1 μ A	60 mV	0.1 + 5	1 + 10	1,5 + 10		
	600 mA	10 μ A	60 mV	0.2 + 5	1 + 10	1,5 + 10		
A	6 A	100 μ A	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	
			DMM 6016	Others
Frequency	>15 Hz ... 45 Hz	600 μ A ... 10 A	3 + 10	
	>65 Hz ... 10 kHz			
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. ² range limit	Intrinsic Uncertainty	Overload capacity	
						Value	Time
Ω^1	600 Ω	10 m Ω	<1,4 V	Approx. 300 μ A	0,1 + 10	1000 V DC/AC RMS Sine	Max 10 s
	6 k Ω	100 m Ω		Approx. 250 μ A	0,1 + 10		
	60 k Ω	1 Ω		Approx. 100 μ A	0,1 + 10		
	600 k Ω	10 Ω		Approx. 12 μ A	0,5 + 10		
	6 M Ω	100 Ω		Approx. 1,2 μ A	1 + 10		
	60 M Ω	10 k Ω		Approx. 125 nA	5 + 10		
Continuity	600 Ω	-	Appx. 8 V	Approx. 1 mA	3 + 5		
Diode ¹	6 V ³	-	Appx. 8 V	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 max6.0 V, "OL" in excess of 6.0V.							
4 With Zero Balancing							

Temperature

Measurement function	Measuring range		Intrinsic Uncertainty	Overload Capacity	
				Value	Time
Temperature °C/°F	Pt 100	-200 °C... + 850 °C	0,3 + 15 ²	1000 V DC/AC RMS Sine	Max 10 s
	Pt 1000	-150 °C... + 850 °C	0,3 + 15 ²		
	TC K	-200 °C... + 1372 °C	1 % + 20 ²		
	TC J	-210 °C... + 1200 °C	1 % + 20 ²		
1 At 0°C to 40°C (Accuracy Range)					
2) Plus Sensor Deviation					



Capacitance

Measurement function	Measuring range	Resolution	V ₀ Max	Intrinsic uncertainty	Overload capacity ²	
					Value	Time
F ^{3,4}	10 nF	10 pF	0,7 V	1 + 10 ²	1000 V DC/AC RMS Sine	Max 10 s
	100 nF	100 pF		1 + 6 ²		
	1 uF	1 nF		1 + 6 ²		
	10 uF	10 nF		1 + 6 ²		
	100 uF	100 nF		5 + 6 ²		
	1000 uF	1 uF		5 + 6 ²		
1 At 0 °C to 40 °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.						

Square wave out

Output	Range	Accuracy
Frequency	30 Hz – 10 kHz	0,1 % output frequency + 2 counts of DMM display
Duty cycle	10 % – 100 % ²	0,2 % of full scale ¹
Amplitude	Fixed -3,15 to 3,15 V	±0,4 V
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 20 °C & +25 °C to 50°C	VDC	0,2 + 20
		V~, VACDC	0,4 + 10
		600 Ω – 600 kΩ	0,5 + 10
		>600 kΩ	1 + 10
		mA/ADC	0,6 + 10
		mA/AAC, ACDC	0,8 + 10
		10nF ... 10 uF	1 + 5
		100 uF ... 1000 uF	1,5 + 10
		Hz, %	0,2 + 10
		°C/°F pt100/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 x intrinsic error
Battery voltage	1,8 to 3,6 V	V, A, Hz, %, Diode, F, Ω	1 x intrinsic error
1 With Zero Balancing			

Reference conditions for Accuracy

Reference Temperature	23°C ± 2K
Relative Humidity	45%...55% RH
Waveform of measured quantity	Sinusoidal
Input frequency	50 or 60 Hz ±2%
Battery Voltage	3 V ± 0.1 V


Influence quantities

Influence quantity	Range of influence	Measured quantity/ measuring range	Attenuation
Common mode interference voltage	Noise quantity max. 1000 V dc	VDC	> 120 dB
	Noise quantity max. 1000 V ~ 50 Hz, 60 Hz sinusoidal	6 V~, 60 V~	> 80 dB
		600 V~	> 70 dB
		1000 V~	> 60 dB
Normal mode interference voltage	Noise quantity V ~ Value of the measuring range at a time Max. 1000V~, 50Hz, 60Hz Sinusoidal	V dc	> 50 dB
	Noise quantity max. 1000 V dc	V~	> 110 dB

Applicable regulations and standards

EMC Immunity	ČSN EN 61326-1 ed.2
Immunity	ČSN EN 61010-1 ed.2
Safety	ČSN EN 61010-1 ed.2
IP for water & dust	ČSN EN 60529 – IP 50
Pollution degree	2
Installation category	CAT IV

Battery

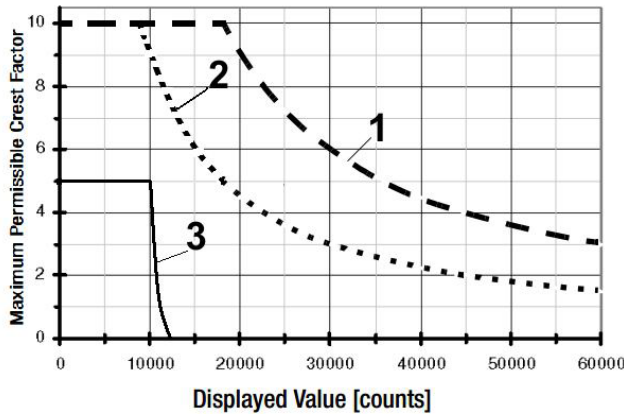
Battery voltage	2 x 1,5 V Cells
Battery type	Alkaline manganese cells
Battery life	Appx. 100 Hrs. (Backlight off)
Battery test	Automatic display of  symbol when battery voltage drops below approx. 2,4V

Mechanical design

Housing	PC ABS
Dimension	200 x 91 x 54 mm
Weight	Approx. 0,5 kg with batteries



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

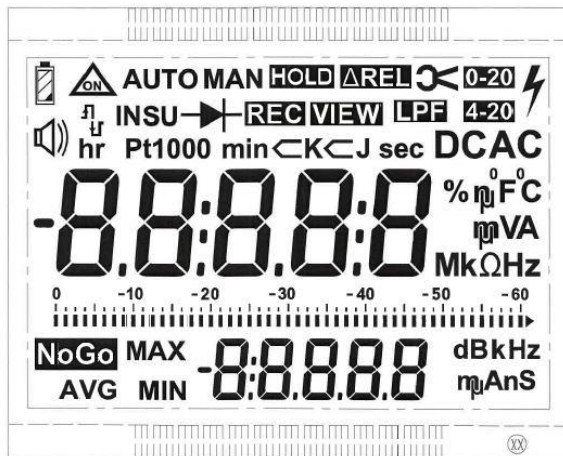
Note: With Unknown Waveform ($CF > 2$), measurement should be made with manual range selection.

Internal clock

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

Display

LCD display field 67 mm x 54 mm with digital display, analog scale and with display of measurement unit, and various special functions.



Analog

Display: LCD scale with bar graph or pointer
Scaling: 2 bar/pointer corresponds to 2500 counts at the digital display

Over range display (digital): by triangle
Polarity display: with automatic switching
Sampling rate (digital): 10 measurements/sec and display refresh

Digital

Display	7 segment
Character height	Main Display – 12,88 mm Sub Display – 7,37mm
Resolution	60 000 counts
Overrange display	"OL" is displayed.
Polarity display	"-" sign is displayed when positive pole at "1"
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



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Fuse

Fuse	FF (UR) 16 A / 1000 V AC/DC; 10 mm x 38 mm
Switching capacity	30 kA at 1000 V AC/DC

Accessories for operation at a PC



Interface adapter for USB communication

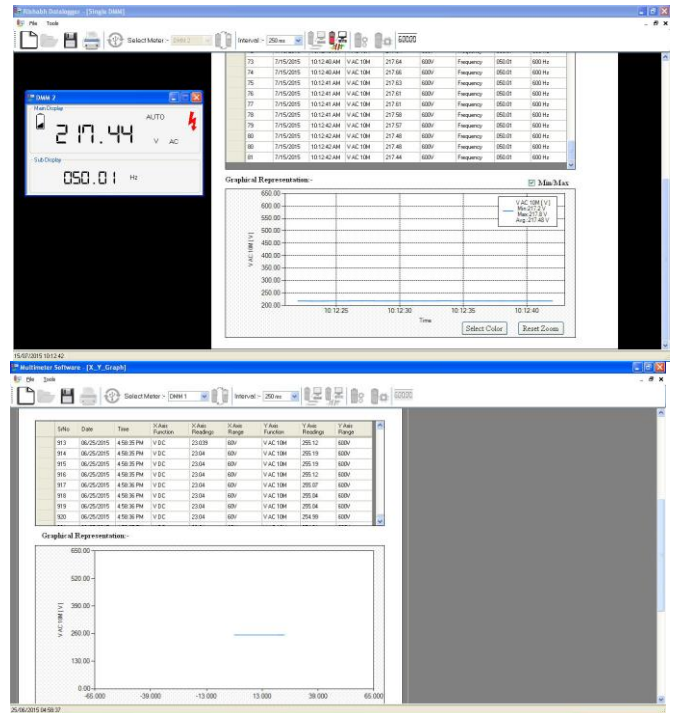
Communication: Bi-Directional

Baud Rate: 9600

Data Bit: 8

Stop Bit: 1

Flow Control: None



Sales & service:

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