TRUE RMS CURRENT AND VOLTMETER FOR AC & DC

DM3430

- ACCURATE TRUE RMS READING
- GALVANIC ISOLATION TO 3.5 KV
- IP65 FRONT PANEL
- PLUG & PLAY “POD” OUTPUT OPTIONS
- RS485 SERIAL MODBUS
- UL APPROVED

INTRODUCTION

The DM3430 is a true RMS current and voltage panel meter suitable for measuring AC or DC signals. It has a four digit high intensity LED display that can be set to show a fixed number of decimal places with 'auto-rounding' to always show the maximum resolution.

It is highly accurate and designed to measure AC or DC voltages up to 550 Volts or currents up to 6 Amps. Readings can be displayed as current or voltage or, alternatively, the reading can be easily scaled from the front panel to take into account a multiplier from a transformed input or to display directly in engineering values. The 3.5KV isolation gives added protection when the instrument is used to measure high voltages. This is particularly important when measuring current, in that the instrument can be mounted anywhere in the measuring circuit and remains unaffected by any standing voltage.

The DM3430 has a number of special software features including Peak and Valley memory (Storing Maximum and Minimum readings) and an Alarm Inhibit that disables the alarm function for a programmable period after start up. It is available with a choice of power supplies, S1 for (90 to 253) VAC, and S2 for (20 to 35) VDC.

Output functions including Relay, (4 to 20) mA re -transmission or Modbus RS485 serial communications. Options are all available and easily installed without dismantling the case thanks to the unique 'plug and play' option pod design.

All programming is done via a simple to use menu accessible from the instrument front panel or via the RS485 Modbus RTU serial communications option.

BENEFITS OF TRUE RMS MEASUREMENT

The DM3430 uses true Root Mean Square measurement. This RMS value is related to the 'heating effect' of a waveform i.e. the amount of heat that a signal would generate in a resistor (1 VAC RMS would generate the same amount of heat as 1 VDC). This is quite different to the average or mean value of an AC signal, which is sometimes measured and then scaled as an RMS value. This can be acceptable if the waveform is a pure undistorted sine wave. Unfortunately this rarely occurs in practice and waveforms can vary considerably and therefore very significant errors of up to 30 % for different waveform types can result as shown in the table overleaf.

TRUE RMS EXAMPLE

The waveform shown is typical of that encountered in mains voltage measurement with a fundamental plus 30 % of 3rd harmonic. The DM3430 will accurately measure this waveform but a scaled average meter could be up to 12 % in error

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Waveform Type	Crest Factor (V Peak/ V RMS)	True RMS	Mean Value Calibrated to read RMS	% Error in Mean Circuit*
Pure Sine Wave	1.41	0.707	0.707	0 %
Symmetrical Square Wave	1	1	1.11	+11 %
Pure Triangle Wave	1.73	0.577	0.555	-3.8 %
SCR Waveforms 50% Duty Cycle 25% Duty Cycle	 2 4.7	 0.495 0.212	 0.354 0.15	 -28 % -30 %

*NOTE: Error = $\frac{((\text{Mean Value} - \text{True RMS Value})}{(\text{True RMS Value})}$ X 100 %

THE IMPORTANCE OF ISOLATION

The input is galvanically isolated to 3.5 KV from the rest of the electronics circuitry. What this means in practice is that any standing voltages can be ignored and currents or voltage differentials can be measured with high levels of common mode potentials. The Common Mode Rejection Ratio is a measure of the amount of error introduced when common mode voltages exist. The DM3430 has an exceptional rejection ratio of 102dB which means that even high levels of standing voltage have little or no effect on the overall measurement accuracy.

SPECIFICATIONS @ 20 °C

OUTPUT OPTIONS

INPUTS	AC*1	DC	
Ranges*2			
Voltage	550 ±	550	V
	60	± 60	V
Current	6	± 6	A
Accuracy	0.1 %r dg ± 0.1 FSD	0.1 %	FSD
Stability*4	0.02	0.02	%/°C

INPUT IMPEDANCE

550 V Range	10	10	M Ω
60 V Range	1	1	M Ω
6 A Range	0.02	0.02	Ω
Frequency Range	0 to 20	N/A	KHz

FREQUENCY EFFECT

20 Hz to 1 KHz	Negligible	N/A	%/KHz
1K Hz to 20 KHz	0.04	N/A	%/KHz

GENERAL

Breakdown Isolation*5	3.5	3.5	KV
Display (With Auto-rounding)*6	0 to 9999	-999 to 9999 Counts	

RESOLUTION*7

A/D	0.002	0.002	% FSD
Display	0.017	+0.017	% FSD
		-0.17	% FSD
Reading Rate	3 3		Hz
CMRR*8	102	102	DB

POWER SUPPLY

Switch Mode	S1	90 to 252	(90 to 252) VAC
	S2	20 to 35	(20 to 35) VDC

ENVIRONMENTAL

Sealing	Panel IP65
Ambient Operating Range	(-30 to 60) °C
Ambient Storage Temperature	(-50 to 85) °C
Ambient Humidity Range	(10 to 90) % RH non-condensing

APPROVALS

EMC

Emissions	BS EN50081-1
Susceptibility	BS EN50082-2

ELECTRICAL SAFETY BS EN61010-1
UL Approved

*NOTES:

1. Based on (50 to 60) Hz AC signal.
2. All ranges have a 10 % over-range capability.
3. Crest factor is the ratio between the Peak voltage and the RMS voltage and can have an effect on accuracy as shown in the following table:

Crest Factor	Degradation of Accuracy %
1	0
2	0.5 %
5	2.5 %

4. Over ambient Range (0 to 60) °C.
5. 3 way isolation between Input, PSU and any outputs: IEC pollution class 2.
6. The A/D resolution frequently exceeds the display resolution. Auto-rounding makes maximum use of the 4 digit display by reducing the displayed resolution if the measured parameter exceeds the available digits thus providing a level of performance in excess of the four digit capability. i.e. if the reading is showing 999.9 and the input increases by 0.1 the new reading will show 1000.
7. Perceived resolution increases with the level of filtering.
8. Common mode Rejection Ratio.

PLUG AND PLAY OPTION PODS

Simple plug in pre-calibrated units, no dismantling or re-calibration

POD-3000/02 DUAL RELAY ALARM

Two independent mains rated relay outputs (common connection).

Contacts	2 changeover relays common wiper	
Ratings	AC	DC
Maximum Load	5 A @ 250 V	5 A @ 30 V
Maximum Power	1250 VA	150 W
Maximum Switching	253 V	125 V
Electrical Life	10*5 operations at rated load	
Mechanical Life	50 million operations	
Termination	Screw terminals	

POD-3000/03 ISOLATED RE-TRANSMISSION

Ranges	(0 to 10) mA (Active or Passive)	
	(0 to 20) mA (Active or Passive)	
	(4 to 20) mA (Active or Passive)	
Minimum Current Output	0 mA	
Maximum Current Output	23 mA	
Accuracy	0.07 % F.S.	
Max. Output Load Active	1 KΩ	
Passive	[(Vsupply-2)/20] KΩ	
Max. External Supply Voltage	30 V (Passive mode)	
Voltage effect	0.2 µA/V	
Ripple current	< 3 µA	
Breakdown Isolation	500 VAC	
Stability	1 µA/°C	
Termination	Screw terminals	

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COMMUNICATIONS

POD-3000/05 RS 485 MODBUS COMMS.
PC communication for configuration and monitoring.

Physical Layer		4 wire or 2 wire half duplex RS485
Baud Rate software selectable		19 200 or 9 600
Protocol		Modbus RTU format
Breakdown Isolation		500 VAC
Maximum Fan out		32 units
Termination	Standard	5 way tension clamp connector
	Optional	screw terminals
	Optional	ribbon cable - RC

SOFTWARE FEATURES

INPUT MENU

Type	550 V, 60 V, 6 A
Display resolution	0, 1, 2 and 3 dps. (with Auto rounding)
Scale	Scale factor (Default 1)
ACDC	AC or DC Input
Filter	*Off, 2 s, 10 s, Adaptive*

OUTPUT MENU (RELAY IF FITTED)
The following parameters may be set for each individual relay.

Alarm type	Off, High, Low, Test
Set point	Set point in engineering units
Hysterisis	*Alarm hysterisis in engineering units*
Alarm delay	*Off, 2 s, 5 s, 10 s, 20 s, 60 s, 120 s, 240 s*
Latch	*Off, On (latch reset from front panel)*
Invert operation	*Off, On*
Type	550 V, 60 V, 6 A
Display resolution	0, 1, 2 and 3 dps. (with Auto rounding)
Scale	Scale factor (Default 1)
ACDC	AC or DC Input
Filter	*Off, 2 s, 10 s, Adaptive*

OUTPUT MENU (RELAY IF FITTED)
The following parameters may be set for each individual relay.

Alarm type	Off, High, Low, Test
Set point	Set point in engineering units
Hysterisis	*Alarm Hysterisis in engineering units*
Alarm delay	*Off, 2 s, 5 s, 10 s, 20 s, 60 s, 120 s, 240 s*
Latch	*Off, On (latch reset from front panel)*
Invert operation	*Off, On*

OUTPUT MENU (ANALOGUE RE-TRANSMISSION IF FITTED)

Span	*(4 to 20) mA, (0 to 20) mA, (0 to 100 ,mA (Set output range to (4 to 20) mA, (0 to 20) mA or (0 to 10) mA)*
Rt Lo	*User Defined (Set low end of scale)*
Rt Hi	*User Defined (Set high end of scale)*

OUTPUT MENU (MODBUS COMMS IF FITTED)

Device No	1 to 99
Baud Rate	19.2 Kb/1.2 Kb
Connections	2wire/4wire

SYSTEM MENU

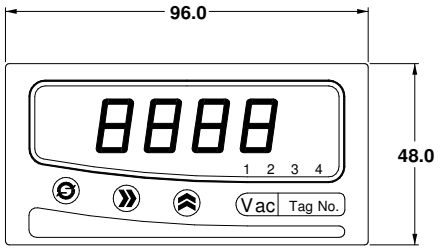
List	Short menu, Full menu
Clear enable	*Off, On*
Set point enable	*Off, On*
Alarm inhibit	*Off, 2 s, 5 s, 10 s, 20 s, 60 s, 120 s, 240 s*
Passcode	*4 digit passcode. (0000=Passcode disabled)*
Offset	*User calibration offset in engineering units.*

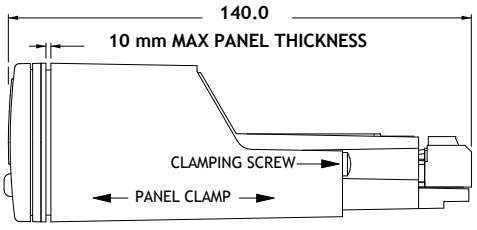
Items *in italics* are only available in the 'full menu' option has been selected

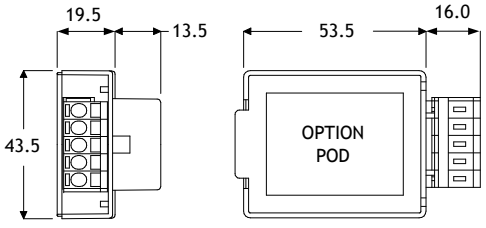
MECHANICAL DETAILS

Material	ABS/PC
Flammability	IEC707 FV0 UL 94VO
Weight	230 gms
Panel cut out	(92 x 45) mm

MAIN UNIT (All dimensions in mm)







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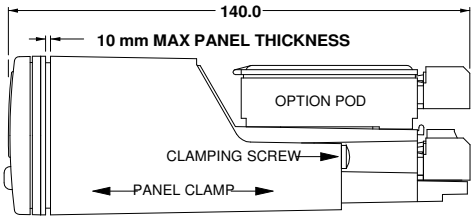

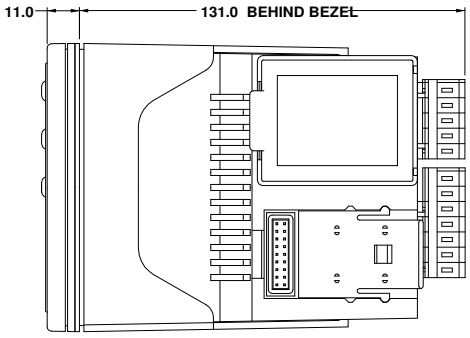

ASSOCIATED PRODUCTS:

Status Instruments design and manufacture a wide range of associated instrumentation products. Please visit us at www.status.co.uk for further details

ORDER CODE

SERIES DM340	/	

Power Supply (90 to 253) VAC (50 to 60) Hz	**S1***
Power Supply (20 to 35) VDC	**S2**

*NOTE: Supplied as standard unless otherwise specified.

OPTIONS

POD-3000/02	Dual Relay Output (2 per unit max)
POD-3000/03	Isolated (4 to 20) mA re-transmission (1 per unit max)
POD-3000/05	Isolated Modbus RS485 (1 per unit max)
POD-3000/05-RC	Ribbon Cable Option
ACC001	Pack of 10, 5 way optional screw terminals.

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