VEGA78
POWER QUALITY ANALYZER FOR SINGLE- AND THREE-PHASE PLANTS

Thanks to an innovative development, the instrument VEGA78 allows carrying out analysis and tests on single-phase and three-phase electric systems with and without neutral. VEGA78 displays in real time the values of all fundamental electric quantities which characterize the electric system being tested (voltage, current, active power, reactive power, apparent power, power factor, etc.), showing the waveforms of voltages and currents. VEGA78 is used for testing and analysing the quality of the electric service provided by the electric power supplier, for analysing single-phase and three-phase electric users such as offices and industries, when diagnosing voltage anomalies by taking advantage of the possibility of recording electric quantities. The instrument also allows evaluating the harmonic content introduced by non-linear loads such as computers, TV sets, controlled electric motors, etc. which can cause the RCD's tripping or a neutral overheating. The instrument is supplied with the PC management software, which further expands the analysis possibilities of the data acquired by the instrument.

FUNCTIONS

Recording
Each integration period (selectable) the instrument saves the maximum, minimum and average values of the parameters to be recorded (voltage, current, active power, reactive power, apparent power, power factor, etc.)

Voltage anomalies
To analyze voltage anomalies, the instrument tests the input voltages against two threshold values (which can be set against the nominal value of the voltage). If the read voltage is higher than the upper limit or lower than the lower limit, the instrument saves:
- Time (with second hundredths) and date when the phenomenon started.
- The duration of the phenomenon.
- The maximum (or minimum) value of voltage during the phenomenon

Harmonic analysis
With the increasing use of complex electronic machines, the analysis of an electric mains cannot leave out an accurate check of harmonics. With VEGA78, it is possible to analyze on the screen and to record the harmonic trend, against the fundamental, both for voltage and for current, as well as to measure the value of the total harmonic distortion (THD). The results of the analyses are shown on the display as curves, bargraphs, frequency percentage and numerical values

Voltage unbalance
Voltage unbalance degrades the performance and shortens the life of a three-phase motor. Voltage unbalance at the motor stator terminals causes phase current unbalance far out of proportion to the voltage unbalance. Unbalanced currents lead to torque pulsations, increased vibrations and mechanical stresses, increased losses, and motor overheating, which results in a shorter winding insulation life. It is recommended to regularly monitor voltages at the motor terminals to verify that voltage unbalance is maintained below 1%

GENERAL SPECIFICATIONS

Display:	TFT, 65536 colors, 320x240pxl with high contrast, touch screen
Power supply:	1x3.7V Li-ION rechargeable battery with external adapter, duration 6h, auto power off after 5 min of idleness
Internal memory:	15Mbyes (approx. 3 months @ IP=15min and 251 parameters selected)
Memory extension:	external Compact Flash memory
PC interface	USB 2.0
Safety:	IEC/EN61010-1
Insulation :	double insulation
Measurement category:	CAT IV 600V (to ground) CAT IV 1000V (between inputs)
Dimensions (LxWxH):	235x165x75mm
Weight (batteries included):	Approx 1kg

ACCESSORIES	Code
Standard	
Flexible transducer for 0÷300A, 0÷3000A AC currents Ø 174mm, 4 pcs	HTFLEX33D
Set of 5 cables + alligator clips	KIT800
AC/DC 230V 50/60Hz mains adapter	A0055
Li-Ion 3.7V rechargeable battery	YABAT0003HT0
Pointer for "touch screen"	PT400
Windows software + USB cable	TOPVIEW2007
Rigid transport suitcase	VA500
ISO9000 calibration certificate	
User manual on CD-ROM	
Quick reference guide	
Optional	
Transducer for 0÷5A, 0÷100A AC currents Ø 20mm	HT4005N
Transducer for 0÷200A AC currents Ø 40mm	HT4005K
Transducer for 0÷1A, 0÷100A, 0÷1000A AC currents Ø 54mm	HT96U
Transducer for 0÷10A, 0÷100A, 0÷1000A AC currents Ø 54mm	HT97U
Transducer for 0÷200A, 0÷2000A AC currents Ø 70mm	HP30C2
Transducer for 0÷3000A AC currents Ø 70mm	HP30C3
Transducer for 0÷1000A DC currents Ø 50mm	HT98U
Transducer for 0÷1000A DC currents Ø 83mm	HP30D1
Flexible transducer for 0÷300A 0÷3000A AC currents Ø 274mm	HTFLEX35
Transducer 3x1-5A/1V for connection to CTs with accessories	HT903
Magnetic adapter for connection to screw heads	606-IECN
AC/DC 115V/50-60Hz mains adapter - US plug	A0056
Hard carrying case	VA400
Free hands kit	SP-0400
Compact flash memory card	CF800
USB compact flash card reader	MCR800

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1. ELECTRICAL SPECIFICATIONS

Accuracy is calculated as ± [% readings + (no. of digits * resolution)] at 23°C ± 5°C, relative humidity <60%HR

TRMS AC/DC phase - neutral / phase - ground voltage, single / three phase systems

Range (V)	Crest factor	Resolution (V)	Accuracy	Input impedance
2.0 ÷ 600.0	≤ 2	0.1	± (0.5%rdg + 2dgt)	10MΩ

The meter can be connected to external VTs with selectable ratio from 1 to 3000

TRMS AC/DC phase - phase voltage, three phase systems

Range (V)	Crest factor	Resolution (V)	Accuracy	Input impedance
2.0 ÷ 1000.0	≤ 2	0.1	± (0.5%rdg + 2dgt)	10MΩ

The meter can be connected to external VTs with selectable ratio from 1 to 3000

Phase - neutral voltage anomalies, single / three phase systems

Range (V)	Voltage resolution (V)	Voltage accuracy	Time resolution (50/60Hz)	Time accuracy (50/60Hz)
2.0 ÷ 600.0	0.2	± (1.0%rdg + 2dgt)	10ms	± 10ms

Maximum crest factor: 2; the meter can be connected to external VTs with selectable ratio from 1 to 3000
The voltage threshold can be set from ±1 to ±30%

Phase - phase voltage anomalies, three phase systems

Range (V)	Voltage resolution (V)	Voltage accuracy	Time resolution (50/60Hz)	Time accuracy (50/60Hz)
2.0 ÷ 1000.0	0.2	± (1.0%rdg + 2dgt)	10ms	± 10ms

Maximum crest factor: 2; the meter can be connected to external VTs with selectable ratio from 1 to 3000
The voltage threshold can be set from ±1 to ±30%

AC TRMS current with standard STD transducer clamp

Range (mV)	Crest factor	Resolution (mV)	Accuracy (*)	Input impedance	Overload protection
0.0 ÷ 1000.0	≤ 3	0.1	± (0.5%rdg + 0.06%FS)	510kΩ	5V

(*) Accuracy of the transducer excluded ; FS = Full Scale clamp ; current values <0.1%FC are zeroed

TRMS AC current with flex FlexINT transducer – 300A full scale (**)

Range (A)	Crest factor	Resolution (A)	Accuracy (*)	Input impedance	Overload protection
0.0 ÷ 49.9	≤ 3	0.1	± (0.5%rdg+ 0.24%FS)	510kΩ	5V
50.0 ÷ 300.0			± (0.5%rdg + 0.06%FS)		

(*) Accuracy of the transducer excluded ; FS = Full Scale clamp ; current values <1A are zeroed
(**) The 300A range is selectable inside of the instrument

TRMS AC current with flex FlexINT transducer – 3000A full scale

Range (A)	Crest factor	Resolution (A)	Accuracy (*)	Input impedance	Overload protection
0.0 ÷ 3000.0	≤ 3	0.1	± (0.5% rdg + 0.06%FS)	510kΩ	5V

(*) Accuracy of the transducer excluded ; FS = Full Scale clamp ; current values <5A are zeroed

Frequency (voltmetric and amperometric inputs)

Range (Hz)	Resolution (Hz)	Accuracy
42.5 ÷ 69.0	0.1	± (0.2%rdg + 1dgt)

Voltage and current harmonics

Range (Hz)	Resolution (*)	Accuracy
DC ÷ 25th	0.1V / 0.1A	± (5%rdg + 5dgt)
26th ÷ 33rd		
34th ÷ 49th		

(*) Add to the error of correspondent TRMS parameters

Power – Single phase and three phase systems (@cosφ>0.5, Vmis>60V, STD clamp)

Parameter [W, VAR, VA]	FS clamp	Range [W, VAR, VA]	Accuracy	Resolution [W, VAR, VA]
Active Power Reactive Power Apparent Power	FS ≤ 1A	0.0 – 999.9	± (1.0%rdg + 6dgt)	0.1
		1.000 – 9.999k		0.001k
	1A< FS ≤ 10A	0.000 – 9.999k		0.001k
		10.00 – 99.99k		0.01k
	10A< FS ≤ 100A	0.00 – 99.99k		0.01k
		100.0 – 999.9k		0.1k
	100A< FS ≤ 3000A	0.0 – 999.9k		0.1k
		1.000 – 9.999M		0.001M

FS = full scale clamp ; Vmis = voltage reference for power measurement

Energy – Single phase and three phase systems (@ cosφ>0.5, Vmis>60V, STD clamp)

Parameter [Wh, VARh, VAh]	FS clamp	Range [Wh, VARh, VAh]	Accuracy	Resolution [Wh, VARh, VAh]
Active Energy Reactive Energy Apparent Energy	FS ≤ 1A	0.0 – 999.9	± (1.0%rgd + 6dgt)	0.1
		1.000 – 9.999k		0.001k
	1A< FS ≤ 10A	0.000 – 9.999k		0.001k
		10.00 – 99.99k		0.01k
	10A< FS ≤ 100A	0.00 – 99.99k		0.01k
		100.0 – 999.9k		0.1k
	100A< FS ≤ 3000A	0.0 – 999.9k		0.1k
		1.000 – 9.999M		0.001M

FS = full scale clamp ; Vmis = voltage reference for power measurement

Power factor (cosφ)

Range	Resolution	Accuracy
0.20 ÷ 0.50	0.01	1.0
0.50 ÷ 0.80		0.7
0.80 ÷ 1.00		0.6

2. GENERAL SPECIFICATIONS

DISPLAY:

Features:	graphic TFT with backlight, ¼ VGA (320 x 240)
Touch screen:	present
Colours:	64K
Contrast:	adjustable

POWER SUPPLY:

Internal power supply:	Li-ION, 3.7V rechargeable battery
Battery life:	> 6 hours
External power supplier:	AC/DC adapter 100-240V 50/60Hz / 5VDC
Auto Power Off:	after 5 minutes of idleness (no external power)

MEMORY AND PC INTERFACE

Every parameter can be stored into the memory. The instrument saves the MIN, AVG and MAX values of the parameters each integration period which can be: 1, 2, 5, 10, 30 seconds, 1, 2, 5, 10, 15, 30, 60 minutes

Maximum parameters to be stored:	251
Memory:	> 3 months @ 251 parameters and integration period = 15 min
Internal memory:	15 Mbyte
External memory:	USB pen drive
External memory:	compact flash card
Operative system:	Windows CE
PC communication port:	USB

The instrument can store **SIMULTANEOUSLY** all the parameters like:

- voltages, currents, power factors, powers, energies, etc.
- ingoing and outgoing power
- voltage anomalies
- voltage and current harmonics
- voltage unbalance

MECHANICAL FEATURES

Dimensions:	235 (W) x 165 (L) x 75 (D) mm
Weight (batteries included):	1.0 kg

ENVIRONMENTAL CONDITIONS:

Reference temperature:	23°C ± 5°C
Working temperature:	0° ÷ 40°C
Working humidity:	< 80% UR
Storage temperature (batt. not included):	-10 ÷ 60°C
Storage humidity:	< 80% UR

GENERAL REFERENCE STANDARDS:

Safety:	IEC/EN61010-1, IEC/EN61010-031, IEC/EN61010-2-032
Insulation:	double insulation
Pollution degree:	2
Overvoltage category:	CAT IV 600V to ground, max 1000V between inputs
Max height of use:	2000m
Harmonics:	IEC/EN61000-4-30 Class B, IEC/EN50160
Unbalance:	IEC/EN61000-4-30 Class B, IEC/EN50160

This instrument complies with the requirements of the European Low Voltage Directives 2006/95/EEC (LVD) and EMC 2004/108/EEC