VEGA76 - VEGA78
POWER QUALITY ANALYZERS FOR SINGLE- AND THREE-PHASE PLANTS

Thanks to an innovative development, the instruments **VEGA76** and **VEGA78** allow carrying out analysis and tests on single-phase and three-phase electric systems with and without neutral. VEGA76 and VEGA78 display 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. VEGA76 and VEGA78 are 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 instruments are 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 VEGA76 and 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 *(only VEGA78)*
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:	Dot matrix with backlight, 128x128pxl (VEGA76) TFT, 65536 colors, 320x240pxl with high contrast, touch screen *(VEGA78)*
Power supply:	6 batteries 1.5V type LR6-AA-AM3-MN 1500 *(VEGA76)* 1x3.7V Li-ION rechargeable battery with external adapter, duration 6h, auto power off after 5 min of idleness *(VEGA78)*
Internal memory:	2Mbyes (approx. 40 days @ IP=15min and 63 parameters selected) *(VEGA76)* 15Mbyes (approx. 3 months @ IP=15min and 251 parameters selected) *(VEGA78)*
Memory extension:	external Compact Flash memory *(VEGA78)*
PC interface	RS232 *(VEGA76)* USB 2.0 *(VEGA78)*
Safety:	IEC/EN61010-1
Insulation :	double insulation
Measurement category:	CAT III 300V, CAT III 350V (Phase-Ground); CAT III 600V (Phase-Phase) *(VEGA76)* CAT IV 1000V (between inputs); CAT IV 1000V (between inputs) *(VEGA78)*
Electric power quality:	EN61000-4-30, class B *(VEGA78)*
Voltage unbalance:	EN61000-4-30, class B *(VEGA78)*
Size (LxWxH):	225x165x105 *(VEGA76)* 235x165x75mm *(VEGA78)*
Weight (with battery):	Approx 0.7kg *(VEGA76)* Approx 1kg *(VEGA78)*

ACCESSORIES

ACCESSORIES	Code
Standard *(VEGA76)*	
- Flexible clamp 0÷1000A, 0÷3000A, diameter 174mm, 3 pcs	HTFLEX33
- Set of 4 cables + alligator clips	KITENERGY2
- AC/DC 230V 50/60Hz rechargeable adapter	A0050
- Windows software + USB cable	TOPVIEW
- Carrying bag	BORSA2051
- ISO9000 calibration certificate	
- User manual	
Standard *(VEGA78)*	
- Flexible clamp 0÷300A, 0÷3000A, diameter 174mm, 4 pcs	HTFLEX33D
- Set of 5 cables + alligator clips	KIT800
- AC/DC 230V 50/60Hz rechargeable adapter	A0055
- Li-ION 3.7V rechargeable battery	
- Pointer for "touch screen"	PT400
- Windows software + USB cable	TOPVIEW2007
- Carrying bag	BORSA2051N
- ISO9000 calibration certificate	
- User manual on CD-ROM	
- Quick reference guide	
Optional	
- Standard clamp 0÷1A, 0÷100A, 0÷100A/1V, AC diameter 54mm	HT96U
- Standard clamp 0÷10A, 0÷100A, 0÷1000A/1V, AC diameter 54mm	HT97U
- Standard clamp 0÷1000A/1V, AC diameter 54mm	HT98
- Standard clamp 0÷200, 0÷2000A/1V AC, diameter 70mm	HP30C2
- Standard clamp 0÷3000A/1V AC, diameter 70mm	HP30C3
- Standard clamp 0÷1000A/1V AC/DC, diameter 50mm (only VEGA78)	HT98U
- Flexible clamp 0÷300A, 0÷3000A, diameter 274mm (only VEGA78)	HTFLEX35
- Case 3x1-5A/1V for connection to CTs	HT903
- AC/DC 110V 50/60Hz mains adapter (only VEGA76)	A0053
- AC/DC 110V 50/60Hz mains adapter (only VEGA78)	A0056
- Compact flash card, 1GB (only VEGA78)	CF800
- USB compact flash reader (only VEGA78)	MCR800
- Set of straps for carrying belt (only VEGA76)	CN0050
- Set of straps for carrying belt (only VEGA78)	SP-0400

FUNCTIONS

- TRMS P-N, P-P, P-PE voltage measures (5 inputs)
- TRMS current on phases and neutral (4inputs)
- Active, reactive and apparent powers measures
- Active, reactive and apparent energies measures
- Power factors measure
- Frequency measure
- Max 251 selected parameters at the same time
- Integrated period selectable from 1s to 60min
- Harmonic analysis of voltage and current up to 49th component
- Voltage anomalies (sags, swells) with 10ms resolution
- Numerical and graphical (waveforms) visualization
- Histogram visualization of harmonic analysis
- Vectorial diagram of voltages and currents
- Voltage unbalance
- Predefined recordings of parameters
- TFT colour display with "touch screen"
- 15Mbytes internal memory for recordings saving
- Using of external compact flash and USB pen drives
- USB interface for PC connection
- Windows software for recordings analysis
- Rechargeable Li-Ion battery and external AC/D adapter
- Contextual help selectable on each screen
- Virtual keyboard at display

ACCESSORIES

Included accessories:

- KIT800: set of 5 cables with alligator clip
- HTFLEX33D: flexible clamp 3000A AC, 174mm, 4 pcs
- A0055: 100/240V 50Hz /5VDC external adapter
- TOPVIEW2007: PC Windows software + USB cable C2007
- BORSA2051N: carrying bag
- PT400: Pen for touch screen display
- Rechargeable battery Li-ION
- Calibration certificate ISO9000
- User manual on CD-ROM
- Quick reference guide

Optional accessories:

- HT96U: transducer standard clamp 1-100-1000A/1V AC, 54mm diameter
- HT97U: transducer standard clamp 10-100-1000A/1V AC, 54mm diameter
- HP30C2: transducer standard clamp 200-2000A/1V AC, 70mm diameter
- HP30C3: transducer standard clamp 3000A/1V AC, 70mm diameter
- HTFLEX35: flexible clamp 3000A AC, 274mm diameter
- HT903: Box 3 x 1-5A / 1V for connection of CT's
- A0056: AC/DC external adapter 110V/60Hz
- CF800: compact flash card, 1GB
- MCR800: USB compact flash reader
- SP-0400: set of straps for carrying belt

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

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:	> 3 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
IP degree:	IP50

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