

STAR 3

The latest instrument available from Elcontrol Energy Net.

This high quality 96*96 panel energy analyser provides brilliant features at a price never reached before.

The new bright red LCD display, the harmonic analysis, the wide set of measured parameters including the THD available in all the models, the multi-protocol capability of the RS485 port and the high accuracy **class 0.5%**, the 3 years-warranty period, allow to consider the **STAR 3** the new state of art of the panel analysers market.

It is a perfect, professional and low cost solution for the electrical panels, sub-metering systems, OEM applications, supervisory systems, Building and Factory automation systems.

The high flexibility of the instrument makes it adaptable to totally different applications. The model with harmonics allows a permanent based control of one of the most important aspect of the power supply quality. Such important possibility, up to now, was reserved only to high-cost device.

The **STAR 3** breaks this price barrier bringing, for the first time, the harmonic analysis into the market of the panel analysers.



MAIN FEATURES

- Digital Energy and Harmonics Analyzer 96*96.
- True RMS measures.
- Displays 52 measures and 352 measures for model with harmonics.
- Unbalanced three phase systems delta or star, bi-phase, single phase.
- High accuracy: Voltage, Current and Power error <0.5%.
- Bright back-lighted red numbers on dark background LCD display.

It is visible in any lighting conditions also from long distance

- Cogeneration Counters.
- Total harmonic distortion factor per phase.
- Alarm, pulses and analogue outputs.
- RS485 communication port included in all models.
- Multi-protocol instrument.
- Easy and extremely flexible Set up menu including CT and VT ratios selection.
- Password protection for setup and resets.
- Model with three phase Harmonic Analysis up to the 25th order and 352 measures.
- 3 years warranty period.

52 MEASURES

The **STAR3** displays 52 main measures.

The model with harmonics shows the harmonics spectrum, adding others 300 parameters

	3ph TOT	L1	L2	L3	Neutral
Voltage	•	V _{L1-L2}	V _{L2-L3}	V _{L3-L1}	
Phase-phase voltage		V _{L1-N}	V _{L2-N}	V _{L3-N}	
Current	•	•	•	•	•
Power factor	•	•	•	•	
Frequency		•			
Current Avg		•	•	•	
Current maximum demand		•	•	•	
KW	•	•	•	•	
KVAr	•	•	•	•	
KVA	•	•	•	•	
kW Avg	•				
KVAr Avg	•				
kVA Avg	•				
kW maximum demand	•				
kVA maximum demand	•				
kWh imported +	•				
kWh exported -	•				
kVArh leading +	•				
kVArh lagging -	•				
THD Current	•	•	•	•	
THD Voltage	•	•	•	•	

In addition to the commonly known measures, the **STAR 3** introduces several advanced measures whose are normally available only in high-cost instruments.

The **THD** provides a clear indication of an hidden problem: the harmonics.

You can save money not replacing switch breakers.

The **Neutral current** informs about the condition of the neutral cable, often overcharged as a consequence of unbalanced loads and harmonics.

The neutral current is an RMS value obtained with an intelligent method which ensure an accuracy higher than the one obtainable with a direct measures through a 4th CT.

The **maximum demand of current** tells you clearly if the components of the electrical network, cables, breakers, contactors, bus bars etc., are overcharged.

The model with **harmonics spectrum** shows comprehensive details to identify clearly the harmonics running in the system.

STAR3

High accuracy panel
energy analysers

HIGH ACCURACY

Voltage and current : error lower than **0.5%** for Power Voltage and Current. The accuracy remain the same with fundamental different than 50 or 60 Hz and power factor low. These conditions drive the majority of the instrumentations out of accuracy
Calibration certificate delivered with each instrument.

MODELS

STAR3 Basic model

It shows all the measures listed in the above table. Includes an **RS485** output with multi-protocol capability: Modbus RTU, Modbus IEEE and Modbus ASCII . The importance of the communication and the lower cost of the components allow today the inclusion of the RS485 port as a default features. Even if you are not interested in making a network of instruments, this possibility will remains always available for future developments.

STAR3 ALM:

as the basic model+ two relay outputs. The outputs can be set be for either alarms signalling or pulses or remote relay control .

The function "alarm" can be associated with several measures including V,A,W,THD and harmonics. Each relay has a maximum and a minimum threshold, the histeresys and the delay time. All the settings can be adjusted.

If used in "pulse" mode the relays generate pulses proportional to the associated measures. Also in this case the behaviour is adjustable with the setup menu.

In "remote control" the position of the relay is decided by an external master device (PLC, PC, etc) through the RS485 line . This is very convenient for load shedding application.

STAR3 4-20mA:

as the basic model + two analogue outputs 4-20 mA or 0-20 mA.

STAR3 HARMO:

as Star3 ALM+ three phase harmonics spectrum for voltage and current.

In addition to the basic measures of the above table, the harmonics model displays complete information about the spectrum.

For each harmonic order k the following values are available:

Harmonic order k	L ₁	L ₂	L ₃
Vrms _k	•	•	•
Irms _k	•	•	•

The accuracy of the harmonic measures is totally independent from the frequency of the fundamental.

The instrument measures harmonics up to the frequency 1250Hz which is the 25th in case of fundamental at 50Hz. In case of higher frequency value of the fundamental, the numbers of available orders decreases automatically.

OUTPUTS

1) **RS485**: serial communication output included in all models. It is now a standard feature

The STAR3 has an unique feature:

allows the selection of three protocols:

Modbus BCD (RTU)

Modbus IEEE

Modbus ASCII (only Vip Energy frame for compatibility with existing softwares)

The full control of the instrument is available only with the BCD and the IEEE format.

The ASCII format is limited to the same data frame of the VIP ENERGY; this allow the connection with all the existing softwares VIPLOAD, VIPVIEW, VIPVISION and the memory module VIPMEM

2) **ALM**: two digital outputs for alarms, pulses and remote control . the alarms setup includes the association of the measures, thresholds, hysteresys % and delay time.

The pulses setup includes association of the measures, number of pulses per unit , pulse width 100 msec or 20 msec

3) **4-20mA**: two analogue outputs programmable in two different ranges: 4-20 or 0-20 mA.

The setup includes the association of the measures and the full scale value.

STANDARDS and REGULATIONS CE

The STAR3 conforms to directive IEC 1010-1 430 V for Cat. III and protection level 2 according to IEC 664-664 A. regarding the safety of the operators

It conforms to EN55011; EN61000-3-2; EN61000-3-3; EN61000-4-2; EN61000-4-3; EN61000-4-4 extension 4kV; EN61000-4-5; EN61000-4-6; EN61000-4-8; EN61000-4-11 (EMC)

3-YEARS-WARRANTY

The high quality of all our new products makes possible to provide a warranty period of 3 YEARS .

This remain valid also for the STAR3.

THECNICAL CHARATERISTICS

Maximum dimensions (mm):

instrument: 96 X 96 X 115.4. Cut-out template: 91 X 91

Power supply:

from network 230 V or 115 V +15%-20% @ 35÷400 Hz (4 VA).

Display: reverse red LCD with LED backlight

Voltmeter inputs:

VL1, VL2, VL3, N up to 430 V phase-neutral,

750 V phase-to-phase, 35÷400 Hz

Voltmeter input impedance: 2 Mohm

Voltage input overload: max 850 V phase-neutral

Current inputs: AL1, AL2, AL3, COM., consumption 1 VA. Three or two 5A external curr.transf. required

Measuring range: 0-120% In

Sensitivity: current 20 mA ; voltage 10 mV

Overcurrent: withstand 50 amps for 1 min.

Number of scales: 1 voltage scale, 2 current scales

Measurements: True R.M.S. up to25th harmonic = 1250Hz with fundamental @50 Hz

Sampling frequency: 2.5 kHz.

Accuracy: <0.5% for Voltage and current and Power

Connection: Single phase or three phase star, three phase delta, or diphas systems

Weight: 0.6 Kg

Protection level: instrument IP20, front panel IP40

Temperature range: -10°C ÷ + 50°C

Relative humidity range: (R.H.): from 20% to 90%.

Condensation: non condensing.

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