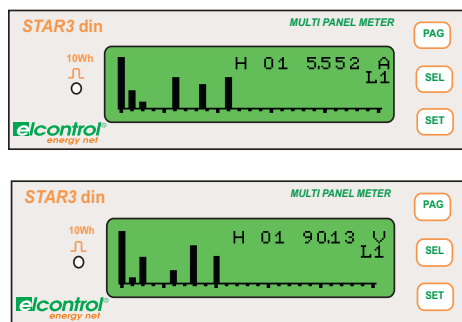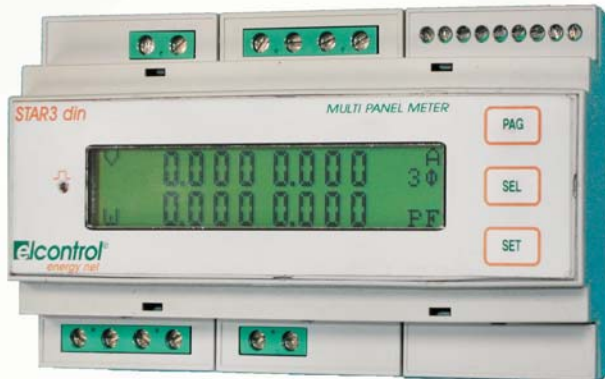# STAR3 DIN - Energy and Harmonics Analyser

Top-performance at affordable Cost

STAR3 din It is a perfect, professional and low cost solution for electrical panels, sub metering systems and OEM applications.

This high quality panel energy analyser provides brillant features at a price never reached before. The bright LCD display, the harmonic analysis, the wide set of measured parameters including the TDH (available in all the models), the multi-protocol capability of the RS485 port and the high accuracy class 0.5% allow to consider STAR3 din the new state of art of the of the panel analysers market.

The model including harmonic analysis allows a permanent based control of one of the most important aspects of power supply quality. Such important possibility, up to now, was reserved only to high-cost devices. STAR3 din breaks this price barrier bringing, for the first time, harmonic analysis into the panel analyser market.

Main Features

- Digital Energy and Harmonics Analyzer 9 DIN modules.
- True RMS measures.
- Display 65 measures (215 measures for model with harmonic analysis).
- Measures unbalanced three phase systems with or without neutral, bi-phase, single-phase.
- High accuracy : Voltage, Current and Power error <0.5%.
- High resolution graphic LCD display.
- Cogeneration Counters (Imported / Exported Energy).
- Total Harmonic Distortion (THD) factor per phase.
- Rs485 communication port included in all models.
- Multi-protocol instrument: Modbus BCD, IEEE and ASCII.
- Easy and extremely flexible SETUP 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 215 measures.
- Alarm / Pulse / Remote-controlled output.
- 3 years warranty period.

66 Measures

Further to all typical information provided by traditional analysers, Star3din monitors various additional parameters as:

The THD% (Total Harmonic Distortion) is a clear indication of an otherwise hidden problem: harmonic distortion. Current and voltage harmonics endanger the electrical installation (power transformer(s), neutral lines, circuit breakers and Power Factor Correction equipments) and such sensitive and expensive loads as for example IT loads.

The model including full Harmonic Analysis, allows a further, in-depth examination of the harmonic spectrum: voltage and current harmonics up to the 25th order are clearly displayed in numerical and bar-graph format, allowing a first-sight assessment of the causes of distortion.

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

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

Minimum and Maximum Voltage and Current readings per phase with bar graph indication allow immediate understanding of their variations.

Cogeneration Energy Counters enable energy measurement of both active and reactive energy on 4 quadrants, for installations with Cogeneration Plants.

DIN-RAIL POWER ANALYSERS

Available Models:

STAR3 din basic model
Measures all parameters listed in the below table. Includes an RS485 port with multiprotocol capability: Modbus RTU (BCD and 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 feature. Even if you are not immediately interested in setting up a network of instruments, this possibility will remain always available for future developments.

STAR3 din ALM 1:
 As the basic model + one relay output.
The output can be set for either alarm signalling or pulses generation or to be remotely controlled via the RS485 port. The "Alarm" function can be associated with several measures including V, A, W, THD. The relay is triggered by a maximum and a minimum threshold; histeresys and the delay time can be set. All the settings can be adjusted by means of the keyboard. If used in "Pulse" mode the relay generates pulses proportional to the associated measure.
Also in this case the behaviour is adjustable via the setup menu. In "remote control" the position of the relay is controlled by an external master device (PLC, PC, etc) via RS485. This is very convenient for load shedding applications.

Measures

PARAMETERS	TOT	L1	L2	L3	N
Phase-neutral Voltage [V]		•	•	•	
Phase-phase Voltage [V]		L1-L2	L2-L3	L3-L1	
Minimum Voltage [V]		•	•	•	
Maximum Voltage [V]		•	•	•	
Current [A]	•	•	•	•	•
Power Factor	•	•	•	•	
Frequency [Hz]		•			
Average Current [A]		•	•	•	
Maximum Demand Current [i]		•	•	•	
Minimun Current [I]		•	•	•	
Maximum Current [I]		•	•	•	
Active Power [kW]	•	•	•	•	
Reactive Power [kvar]	•	•	•	•	
Apparent Power [kVA]	•	•	•	•	
Average Active Power [kW]	•				
Average Reactive Power [kvar]	•				
Average Apparent Power [kVA]	•				
Maximum Demand Active Power [kW]	•				
Maximum Demand Reactive Power [kvar]	•				
Maximum Demand Apparent Power [kVA]	•				
Positive (Imported) Active Energy [kWh]	•				
Cog-negative (Expo) Active Energy [kWh]	•				
Positive Reactive Energy [kvarh]	•				
Cog-negative Reactive Energy [kvarh]	•				
Apparent Energy [Kvah]	•				
Current Thd%	•	•	•	•	•
Voltage Thd%	•	•	•	•	•

Standards and Regulations
STAR3 DIN conforms to Directive 73/23/CEE (LVD) and 2004/108/CE (EMC). It has been designed with reference to EN 61010-1, EN 61326 including append. A1/A2/A3, EN 61000-6-2, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-3-3/A1, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-5/A1, EN 61000-4-6, EN 61000-4-6/A1, EN 61000-4-8, EN 61000-4-8/A1, EN 61000-4-11, EN 61000-4-11/A1.

STAR3 din HARMO:
As Star3 din ALM 1 + three phase harmonics spectrum for voltage and current. In addition to the basic measures of the above table, this model displays complete information about the harmonic spectrum.
The instrument display also the harmonics using bar graph pages. For each harmonic order k the following values are available:

HARMONIC ORDER (k=1..25 @ 50Hz - k=1..20 @ 60Hz)	L1	L2	L3
HARMONIC VOLTAGE VK	•	•	•
HARMONIC CURRENT IK	•	•	•

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

General Technical Characteristics

Maximum size (mm): instrument: 158.5 X 73 X 90. (9 DIN module)
Power supply: from network 230 V ~ or 115 V ~ + 15% - 20% @ 35/400 Hz (consumption: 4VA)
Display: LCD display, dot-matrix
Voltmeter inputs: VL1, VL2, VL3, N up to 430 V ~ phase-neutral, 600 V ~phase-to-phase, 35 ÷ 400Hz.
Voltmeter input impedance: 2 M ohm
Voltage input overload: max 850 V phase-neutral
Current inputs: AL1, AL2, AL3; 5A. Consumption 1 VA. External CT(s) required.
Measurement range: 0 - 120% nominal current
Sensitivity: 20mA current ; 10V voltage
Current input overload: withstands 50A for 1sec.

Number of scales: 1 voltage scale, 2 current scales
Measurements: T.R.M.S. (true effective value) up to 25th harmonic = 1250 Hz with fundamental @50 Hz
Accuracy: error <0.5% for V, I and Power (EN 62053-21)
Suitable for connection to: Single-Phase, Three-Phase Star, Three-Phase Delta or Two-Phase systems
Weight of instrument: 0.6 Kg
Protection level: instrument IP20, front panel IP40
Ambient temperature range: -10°C ÷ + 50°C
Relative humidity range (R.H.): from 20% to 90%.
Condensation: condensation not allowed.
Relay output : 100VAC max, 120 mA AC max

Dimensions (mm)

MEASUREMENT CONNECTION CABLES max 4 mm^2

90   46 62

157.5   44 48 58

Rail DIN OMEGA da 35   9 Modules DIN (157.5 x 58 x 90) mm)