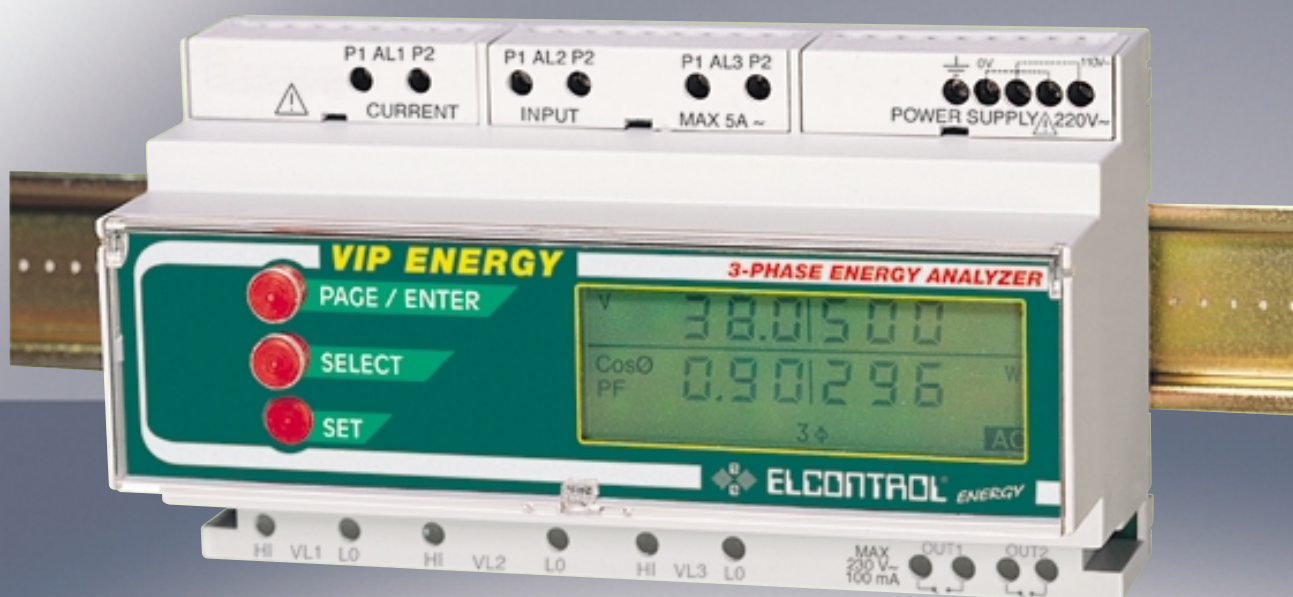


## 43 Instruments in 1

Versions with outputs for kWh, kvarh and kVAh energy measurement, data transmission, alarms, DIN rail mounting, demand control (load shedding)

Volt	kW	Hz	kWh	Average KVA	Date
Amp	kVA	Peak kVA	kvarh	Average kvar	Time
P.F., cosØ	kvar	Peak kW	THDF	Average KW	



**VIP ENERGY**

**D I G I T A L P O W E R A N A L Y Z E R S**

For monitoring single-phase and three-phase LV, MV, HV electric systems

43 instruments in 1

Volt  
Amp.

True  
RMS

P.F.,cosØ

kW

kVA

kvar

Hz

Peak kVA

Peak kW

kWh Single-phase and  
Three-phase

kvarh Energy Meters

kVAh (Selectable in  
VIP ENERGY ALM)

±kWh Import/export  
COG4 option

±kvarh

Average kW

Average kVA

Average kvar

C.F. (1/THDF)

Date

Time

## VIP ENERGY

For UNBALANCED THREE-PHASE systems



Measurements on STAR (4 wires) or DELTA (3 wires) systems with internal CT, PT up to 5A, 550V max. or with external CT, PT up to 999999 A, 999999 V max.

Measures and displays Volts, Amps, W, P.F.cosØ, VAR, VA, Hz, kWh, kvarh, VA Peak, W Peak, Average kW, Average kVA, Average kvar, Crest Factor (1/THDF), Date, Time, replacing 43 instruments and using the space and connections of just one. LV, MV, HV measurements. Star and Delta connections. 4-quadrant energy counters kWh, kvarh Import/Export. User programmable CT, PT ratios.



## VIP ENERGY-485

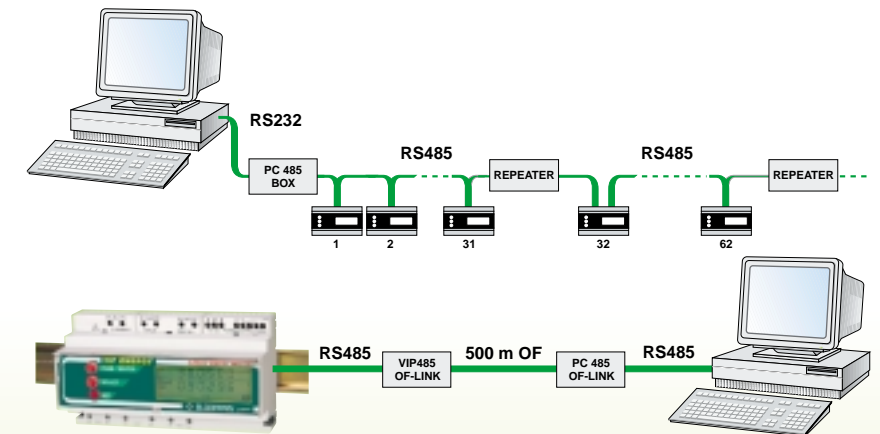
For energy monitoring networks



### RS485 SERIAL OUTPUT

For energy monitoring networks up to 247 analyzers.

A Personal Computer which contains either VIPVIEW or VIPLINK software can easily control all the measurement data from a distance.



Two way optic fibre RS485 output can be carried out by means of the external converters "PC485 OF-LINK" and "VIP485 OF-LINK".

## VIP ENERGY RPQS, RPQS-485

PULSED OUTPUTS for industrial monitoring



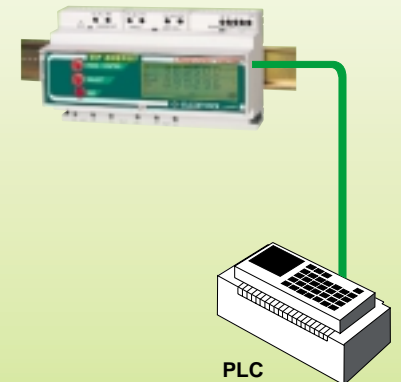
2 SOLID STATE RELAY OUTPUTS with pulse frequency proportional to 2 out of the P (P+ or P- with COG4 option), Q (Q+ inductive or Q- capacitive), S (active, reactive, apparent) powers selection by keyboard.

In addition to the measuring function it is equipped with 2 solid state relay outputs, volt-free contacts (280 VAC rms max. 100 mA max.). They supply pulses with frequency proportional to the power measured. A simple display menu and SELECT, SET push-buttons allow selecting 2 out of powers: active (P, P+ or P- with COG4 option selected), reactive (positive Q+ inductive, negative Q- capacitive), apparent (S) and different output frequencies according to requirements:

Min. 1 pulse = 1 MWh (Mvarh) (MVAh)  
Max. 999 pulses = 1 Wh (varh) (VAh)

- RPQ (P+ or P- with COG4 option, Q+ or Q-) selection: supplies pulses proportional to the active energy (P=W) and reactive (Q=var) for measurements of active energy (kWh) and reactive (kvarh).
- RPS (P+ or P-) selection: supplies pulses proportional to the active energy (P=W) and apparent (S=VA) for measurements of active energy (kWh) and apparent (kVAh).
- RSQ (Q+ or Q-) selection: supplies pulses proportional to the apparent energy (S=VA) and reactive (Q=var) for measurements of apparent energy (kVAh) and reactive (kvarh).

In the VIP ENERGY RPQS-485 version it is possible a remote control (by PC) of 2 loads.



## VIP ENERGY ALM, ALM-485

RELAY OUTPUT for alarm and load control

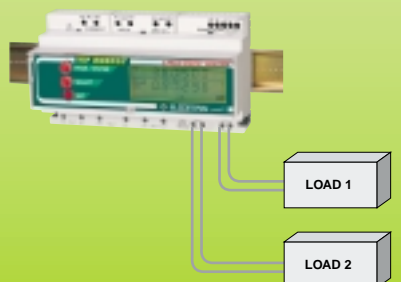


### 2 RELAY OUTPUTS

MINIMUM and MAXIMUM alarms on any 2 measurements chosen by the user from 27 of those displayed, with selection of the ON and OFF delay time (from 0 to 999 seconds) and of the MINIMUM and MAXIMUM threshold hysteresis (from 0 to 17.5% in steps of 2.5%) for each of the two relays which can be connected to the alarms.

The VIP ENERGY ALM-485 also has all the functions of the VIP ENERGY RPQS-485.

Possibility of automatic ONE WAY (RS422) transmission of the measurements every second.  
Possibility of displaying single-phase measurements only.





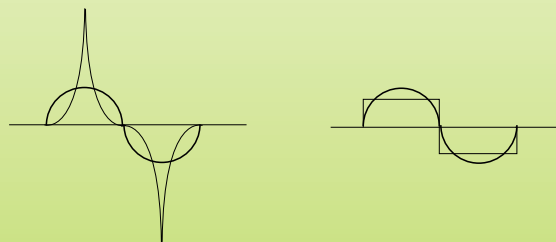
## TOP PERFORMANCE IN A SMALL PLACE

### • 43 Measuring functions in 157.5 mm of DIN rail (9 DIN modules):

- **Volts** single-phase and three-phase (rms), **Amp** single phase and three-phase (rms), **P.F. cosØ** single-phase and three-phase, **W** single-phase and three-phase, **var** single-phase and three-phase, **VA** single-phase and three-phase, **Hz**.
- **kWh**, **kvarh**, energy meters.
- import/export **kWh**, **kvarh** (kWh, kVAh selecting STD2 in VIP ENERGY ALM).
- Storage of average, apparent and active **power peaks** average active, apparent, reactive powers (Maximum demand).
- True Rms measurements from 200 mW (7.5V 23mA) up to 999 GW (999999 V, 999999 A).
- Unbalanced and distorted three-phase system measurements.
- Backlit display.
- Simple and easy to install and use.
- **Fully programmable in the field by means of the keyboard.**
- Signal outputs: available in a number of versions and with various configurations for expansion of VIP ENERGY functions up to industrial control level.

## POWER MEASUREMENTS WHEN AND HOW YOU WANT THEM

- WHERE: Installation in any panel.
- HOW: The measurements give a full view of electrical consumption including storage of power peaks and consumption (Maximum demand of Active Power).
- High accuracy (class 1 IEC1036).
- Voltage input: Max. direct 550V or from 2 or 3 voltage transformers: primary value programmable from 1V to 999999V; secondary value selection from 57.7, 63.5, 100, 115, 120, 173, 190, 200, 220 Volt configuration.
- Current input: Direct 5A or through secondary of CT/5 or CT/2.5, CT/2, CT/1. Primary value of CT selectable from 1 to 999999 A). Accepts alternatively either 2 or 3 CTs.
- All models are available also with 30A input current.
- Automatic scale change.
- Average kVA: integration times of 1', 2', 5', 10', 15', 20', 30', 60'.
- Average kW: integration times of 1', 2', 5', 10', 15', 20', 30', 60'.
- Ampere Crest Factor (1/THDF = Transformer Harmonic Derating Factor):  
>1 or <1 for DISTORTED signals  
=1 for SINUSOIDAL wave forms



## OPTIONS FOR COGENERATION PLANTS

- **COG4**: shows positive/negative power flow. Records both imported (+ve) and exported (-ve) energy (kWh, kvarh) simultaneously on separate displays.



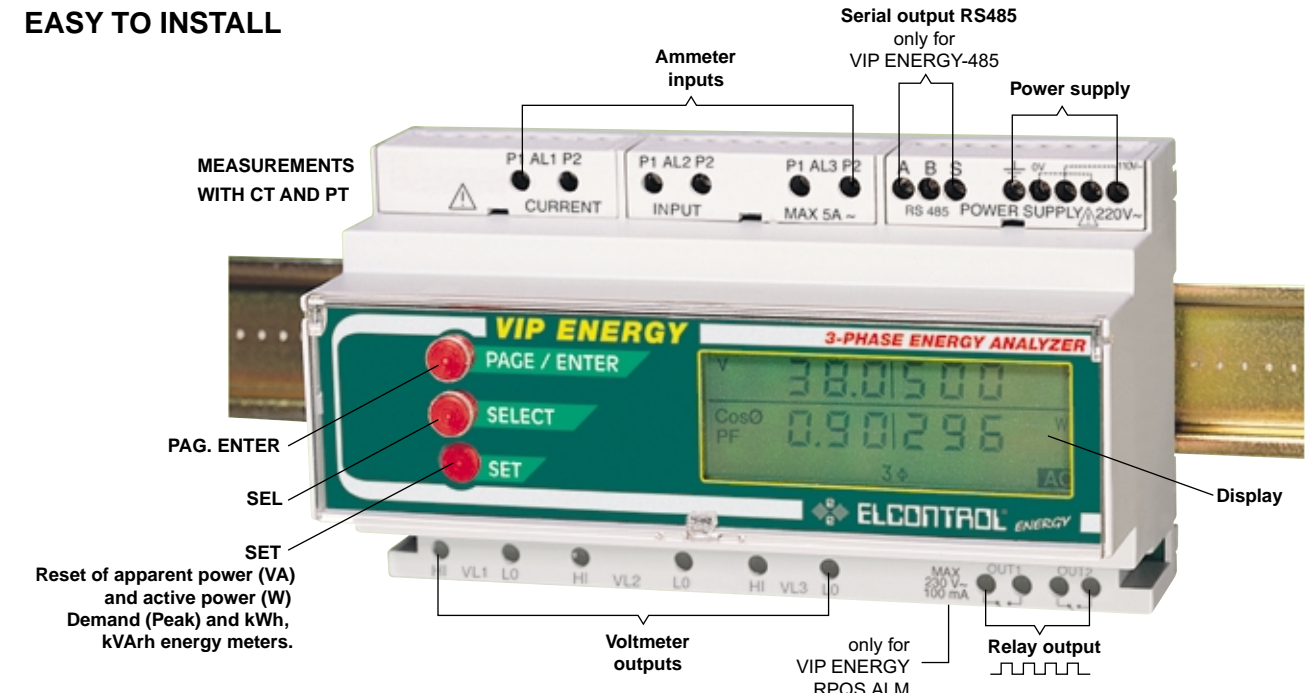
**C.VIPENERGY**

FRAME FOR  
PANEL MOUNT  
OF VIP ENERGY

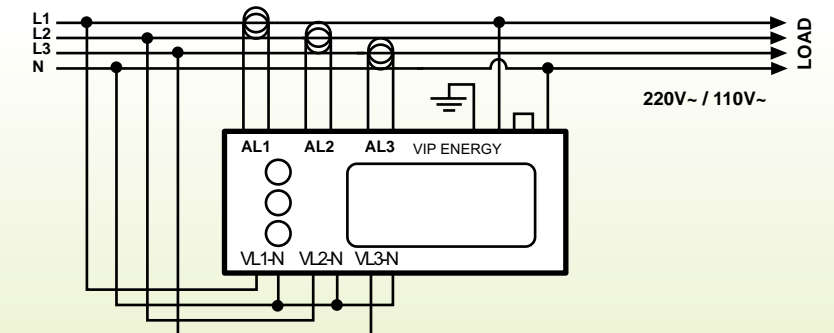
## MEASUREMENTS ON DISPLAY PAGES

<b>Volt</b>	Phase-to-phase rms voltage (ave. of the 3 phases)	V	380500	A
<b>Amp</b>	Equivalent current rms of the three-phase system	CosØ P.F.	0.90296	kW
<b>P.F. cosØ</b>	Power factor of the three-phase system	3Ø		AC
<b>kWatt</b>	Active power of the three-phase system	kVar	88.9329	kVA
<b>kvar</b>	Instantaneous reactive power of the three-phase system	kVA	1500	Hz
<b>kVA</b>	Instantaneous apparent power of the three-phase system	3Ø		AC
<b>Hz</b>	Phase L1 voltage frequency			
<b>kVar</b>	10 Average three-phase reactive power	kVar	380500	kVA
<b>kVA</b>	15 Average three-phase apparent power	kW	151330	AC
<b>kW</b>	20 Average three-phase active power	MEM		3Ø
<b>Volt L1</b>	Rms voltage between phase L1 and neutral (STAR) or L1-L3 (DELTA)	V L1	220221	L2
<b>Volt L2</b>	Rms voltage between phase L2 and neutral (STAR) or L2-L3 (DELTA)	L3	220	AC
<b>Volt L3</b>	Rms voltage between phase L3 and neutral (STAR) or L1-L2 (DELTA)			
<b>Amp L1</b>	Phase L1 rms current	L1	490499	L2
<b>Amp L2</b>	Phase L2 rms current	L3	480	AC
<b>Amp L3</b>	Phase L3 rms current			
<b>P.F. cosØ L1</b>	Phase L1 Power Factor	L1	0.90092	L2
<b>P.F. cosØ L2</b>	Phase L2 Power Factor	CosØ P.F.	1.00	AC
<b>P.F. cosØ L3</b>	Phase L3 Power Factor			
<b>kW L1</b>	Phase L1 active power	L1	97.0993	L2
<b>kW L2</b>	Phase L2 active power	L3	95.0	kW
<b>kW L3</b>	Phase L3 active power			AC
<b>kVar L1</b>	Phase L1 instantaneous reactive power	kVar	38038.1	L2
<b>kVar L2</b>	Phase L2 instantaneous reactive power	L3	37.9	AC
<b>kVar L3</b>	Phase L3 instantaneous reactive power			
<b>kVA L1</b>	Phase L1 instantaneous apparent power	L1	490499	L2
<b>kVA L2</b>	Phase L2 instantaneous apparent power	L3	480	AC
<b>kVA L3</b>	Phase L3 instantaneous apparent power			
<b>C.F. L1</b>	L1 Current Crest Factor (1/Transformer Harmonic Derating Factor)	L1	1.08	L2
<b>C.F. L2</b>	L2 Current Crest Factor (1/Transformer Harmonic Derating Factor)	L3	1.00	C.F.
<b>C.F. L3</b>	L3 Current Crest Factor (1/Transformer Harmonic Derating Factor)			AC
<b>DATE</b>	DD MM YY		01 10 196	
<b>TIME</b>	HH MM		h. 08.30	AC
<b>kvarh</b>	Consumption in kVarh of the three-phase system (or kVAh in VIP ENERGY ALM)	kVarh	8888.88	kWh
<b>kVAh</b>	Consumption in kVAh of the three-phase system (and of L1, L2, L3 phases)	3Ø	9999.99	AC
<b>kWh</b>	Consumption in kWh of the three-phase system (and of L1, L2, L3 phases)			
<b>kVA</b>	Average apparent power peak of the three-phase system		1500	kVA
<b>kW</b>	Average active power peak of the three-phase system		1500	kW
<b>PEAK MEM</b>		3Ø		AC
<b>-kVarh</b>	Reactive energy export (COG4 option)	kVarh	-999999	kWh
<b>-kWh</b>	Active energy export (COG4 option)	3Ø	-999999	AC
<b>kA</b>	The VIP ENERGY has a page for selecting the CT.		999999	A
		3Ø	5	AC
<b>kV</b>	The VIP ENERGY has a page for selecting the VT.	V	999999	
		P.E.	110	AC
<b>STAR</b>	4 wires L1, L2, L3, N (star)		delta	
<b>DELTA</b>	3 wires L1, L2, L3, (delta)		1n5Er6	AC
<b>RELAY STATUS</b>	Only RPQS, ALM		1.0PEn	
			2.CLOSE	

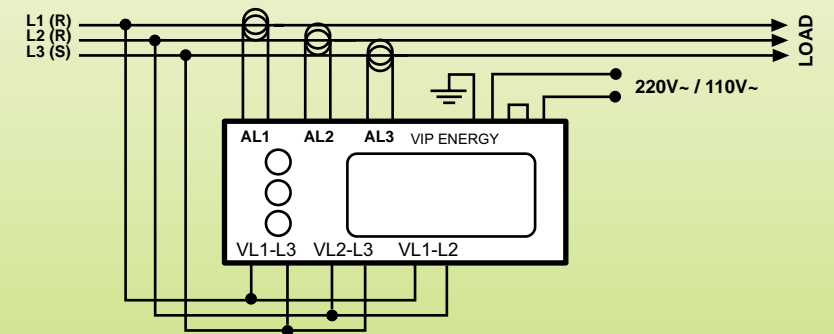
## EASY TO INSTALL



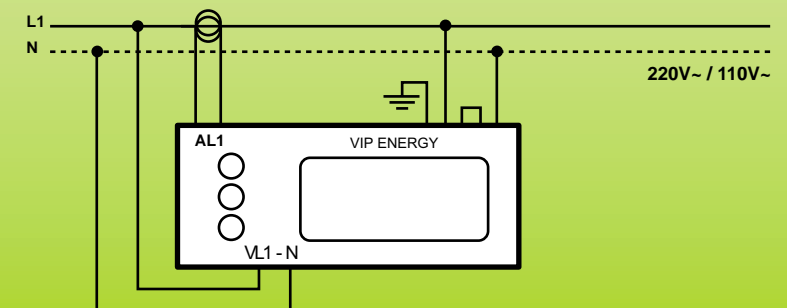
## STAR CONNECTION 3 phases - 4 wires



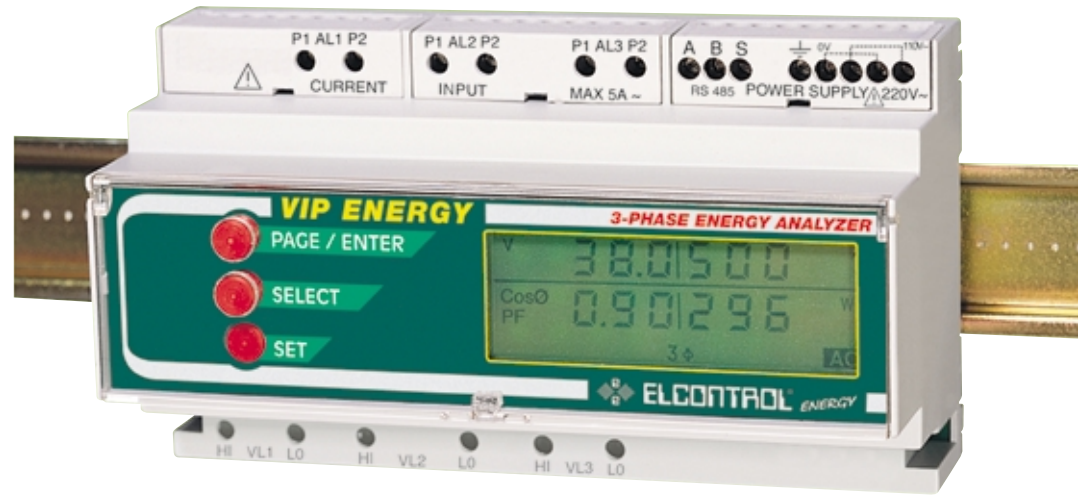
## DELTA CONNECTION 3 phases - 3 wires



## SINGLE-PHASE CONNECTION 1 phase - 2 wires



# RS485 options: VIP ENERGY-485, VIP ENERGY RPQS-485, VIP ENERGY ALM-485



The VIP ENERGY-485 enlarges an already wide range of portable and panel mounting instruments. The VIP ENERGY-485 is supported by Elcontrol Energy's VIPLINK and VIPVIEW software and RS485 network system.

The "windows" based PC software combines sophisticated features and a high quality graphic user interface with simple operation.

The JBUS/MODBUS communication protocol via the RS485 standard can accommodate up to 247 meters on a single network via signal repeaters.

Reliable and safe operation is assured by the use of opto-isolated communication ports and galvanically isolated voltage and current inputs exceeding the requirements of all relevant European Standards. This allows the VIP ENERGY-485 networks to operate in highly aggressive environments where electrical noise and overvoltage conditions arise.

## EXTERNAL CONNECTIONS AND SET-UP OF THE RS485 OPTION

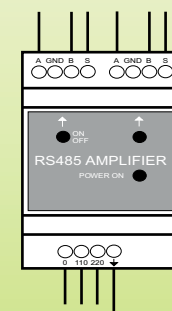
The VIP ENERGY-485 can be connected to a PC via a single pair shielded cable with maximum length of 1200 mt. Other instruments or devices can be connected to the same line (VIP ENERGY-485 or REPEATER-485 signal repeaters) for up to 31 units. Additional groups of 32 units can be added by means of the REPEATER-485 signal repeaters for a maximum of up to 247 VIP ENERGY-485s.

Every VIP ENERGY-485 is individualised by its own address which can be configured in the field by means of the keyboard.

The VIP ENERGY-485 connection to the network is via a shielded single pair cable connected to the terminals located in the options area of the instrument.

## "REPEATER-485" - SIGNAL REPEATER

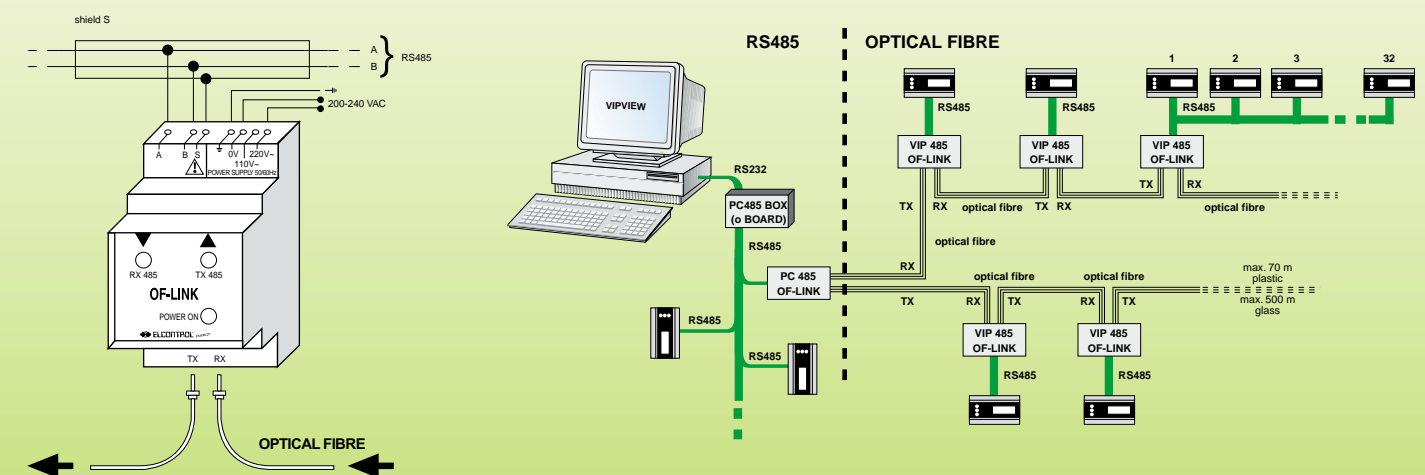
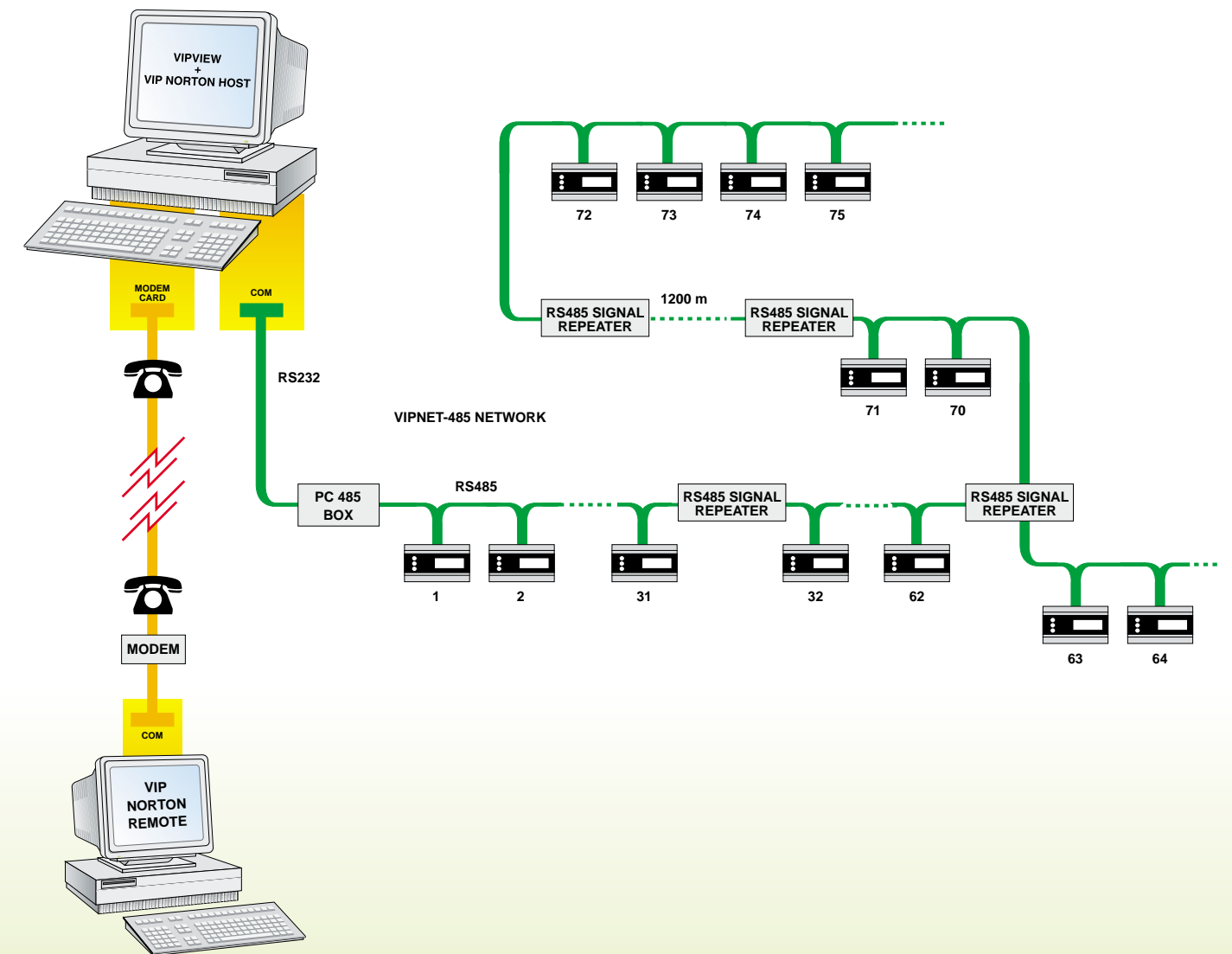
Power supplied at 220VAC  $\pm 10\%$  or at 110VAC  $\pm 10\%$ , the REPEATER-485, signal repeater, is a bi-directional amplifier connected to the VIPNET-485 network according to the following diagram:



Depending on the type of system, the REPEATER-485s can be utilised in various network configurations, both the "linear" type (Linear Bus Tipology) or the "tree" type (Tree Tipology).

## SPECIFICATIONS OF THE VIP ENERGY-485 SOFTWARE PROTOCOL

The software communication protocol is compatible with the JBUS/MODBUS standard with data rate of 9600 and 1200 baud (7 data bit, 1 or 2 stop bit, parity bit NONE, ODD, EVEN programmable by means of the keyboard) with a master represented by the PC-485-BOARD (Personal Computer board) or by the PC-485-BOX (external converter) and a maximum of 247 slave VIP ENERGY-485s.



## "PC 485 OF-LINK" and "VIP 485 OF-LINK" CONVERTERS

Power supplied at 220VAC  $\pm 10\%$  or at 110VAC  $\pm 10\%$ , VIP 485 OF-LINK and PC 485 OF-LINK interfaces RS 485 twisted pair cable and 2 (TX and RX) optic fibres in EMI high polluted environment. Up to 70 mt. (plastic fibre) or 500 mt. (glass fibre).

The VIP 485 OF-LINK is designed for connection to the RS 485 leading out of a VIP ONE 485 or from a VIP ENERGY 485. The PC 485 OF-LINK is intended for connection to the RS 485 - PC side. Up to 32 VIP ONE 485 or VIP ENERGY 485 instruments can be connected to the RS 485 side of a single VIP 485 OF-LINK converter (see diagram). Any number of VIP 485 OF-LINK can be connected to the OF side: the only constraint is that of 247 instruments max with RS 485 (see diagram).



## GENERAL SPECIFICATIONS

## Inputs

Voltmeter: L1-N, L2-N, L3-N max 550 Vrms (STAR)  
L1-L3, L2-L3, L1-L2 max 550 Vrms (DELTA)  
from 20 to 600 Hz.

Ammeter: 5A or 30A from 20 to 600 Hz.

- Voltmeter input overload: peak voltage 2000 Vrms (60 sec.).
- Ammeter input overload: 20 times Full Scale value / 1 sec. (with overload cut-out tripped at limit values).
- Number of scales: 2 voltage scales; 3 current scales.
- Automatic scale change: response time at scale change: 1.2 sec; passage to scale above occurs at 105% of scale activated; passage to scale below occurs at 20% of scale activated.
- Dimensions: length= 157.5 mm (9 DIN modules); height= 90 mm; Depth= 73 mm
- Lithium battery: 3 V; 200 mAh
- Weight: 1 kg.
- Degree of protection: instrument IP20; front panel IP40.
- Data back-up (Max demand, energy meters, set-up, clock) is guaranteed by means of the internal EEPROM (1.000.000 write cycles min.) 40 years.

## SERVICE AND TESTING CONDITIONS

- Ambient service conditions:  
ambient temperature range: from -10°C to +60°C.  
relative humidity (R.H.) range: from 20% to 80%.
- Storage temperature: from -20°C to +70°C.
- Condensation: not permitted.
- Insulation to VDE 0110 group C for operating voltage - 500 VAC rms.
- Insulation resistance  $\geq 500 \text{ M}\Omega$  between input terminals and outer casing.
- Insulation voltage between input connectors: testing at 2000 Vrms at 50 Hz for 60 sec.  
Between each connector and the container: testing at 3000 Vrms for 60 sec.
- Safety reference standards: IEC 348, VDE 411, class 1 for operating voltage - 650 VAC rms; IEC 1010 600 V.
- EMC reference standards: EN 50082-1, EN 50082-2, EN 55011, EN 55022.

## POWER SUPPLY

- Mains: 110/220 V  $\sim \pm 10\%$ , 50/60 Hz. Available also at 24 VDC under request.
- Instrument consumption: 8 VA
- Immunity to voltage microints: 0.1 sec.

## MEASUREMENT OF PRIMARY PARAMETERS

- Measuring method: fixed sampling and analog/digital conversion
- Sampling frequency: 1.25 KHz.
- Number of samples per phase: 125 (100 msec.).
- Measuring interval: 1.2 sec.
- Zero self-correction: every 1.2 sec.

## MEASUREMENT ACCURACY FOR PRIMARY PARAMETERS

- Measuring error in ambient from 18°C to 25°C (after 30' warm-up) - see the tables
- Measuring error outside this temperature range:  $\pm 0.02\%$  F.S. for each °C out of range.
- Sensitivity and accuracy in voltage measurements:  
direct input with max. voltage = 550 Vrms at Full Scale;  
Input voltage crest factor  $\geq 1.6$ ;  
0.03 VA for each phase.

## DISPLAYED VALUES

	Volt	Ampère	Watt	VA	Var	cos $\phi$ , PF	Crest Factor (A)	Max demand (peak) KW	Max demand (peak) KVA	Average KW	Average KVA	Average KVar	Hz	KWh	KVAh	KVarh	KWh Import/Export	KVarh Import/Export	Date	Time
L1	•	•	•	•	•	•	•						•	•						
L2	•	•	•	•	•	•	•							•						
L3	•	•	•	•	•	•	•							•					•	•
3Ø	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•		

## Alternating voltage sensitivity, Full scale and accuracy

Nominal Range	Sensitivity	Full Scales	$\varepsilon$ from 20% F.S. to 100%F.S.
			VIP ENERGY
140 Vrms	111 mV	140 V	0.3%F.S. + 0.3% Rdg.
550 Vrms	480 mV	550 V	0.3%F.S. + 0.3% Rdg.

- Sensitivity and accuracy in current measurements.  
Direct input with max. 5A at Full Scale. 0.07 $\Omega$  Burden for each current transformer.  
Input current crest factor  $\geq 1.6$ .

## Alternating current sensitivity, Full scale and accuracy

Nominal Range	Sensitivity	Full Scales	$\varepsilon$ from 20% F.S. to 100%F.S.
			VIP ENERGY
0.30 A	0.2 mA	0.30 A	0.5%F.S. + 0.5% Rdg.
1.50 A	1 mA	1.50 A	0.3%F.S. + 0.3% Rdg.
5.00 A	3.2 mA	5.00 A	0.3%F.S. + 0.3% Rdg.

- Accuracy in voltage and current measurements in relation to frequency: for signal frequencies in the range 20-90 Hz no error in addition to those indicated in the tables above.
- Precision in measurement of secondary parameters: measurements (single-phase or three-phase) of power, Cos $\phi$ , active energy: Class 1 IEC 1036.
- Frequency measurement accuracy: 20  $\div$  99 Hz  $\pm$  0.1 Hz - 100  $\div$  600 Hz  $\pm$  1 Hz + 0.5% Rdg.
- Measurements of other secondary parameters: the error is expressed by the formula which defines the parameter, in relation to V, I, W.

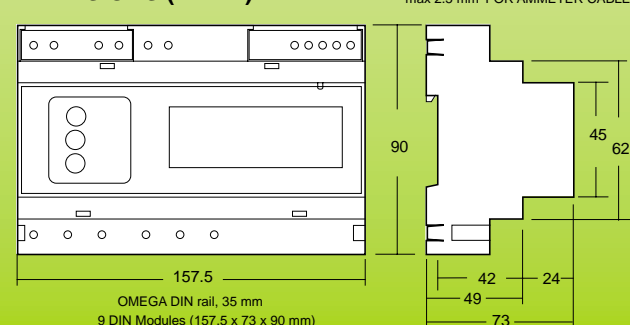
## Formulae used for single-phase and three-phase measurements

Instantan. rms voltage	$V_{IN} = \sqrt{\frac{1}{n} \sum_{i=1}^n (V_{IN})^2}$	Equiv. three-phase voltage	$V_Y = \frac{V_{12} + V_{23} + V_{31}}{3}$
Instantan. active power	$W_i = \frac{1}{n} \sum_{i=1}^n (V_{IN}) \cdot (A_i)$	Three-phase reactive power	$VAR_Y = VAR_1 + VAR_2 + VAR_3$
Instantan. power factor	$\cos\phi_i = \frac{W_i}{VA_i}$	Equiv. three-phase current	$A_Y = \frac{VA_Y}{\sqrt{3} \cdot V_Y}$
Instantan. rms current	$A_i = \sqrt{\frac{1}{n} \sum_{i=1}^n (A_i)^2}$	Three-phase active power	$W_Y = W_1 + W_2 + W_3$
Instantan. apparent power	$VA_i = V_{IN} \cdot A_i$	Three-phase apparent power	$VA_Y = \sqrt{W_Y^2 + VAR_Y^2}$
Instantan. reactive power	$VAR_i = \sqrt{(VA_i)^2 - (W_i)^2}$	Equiv. three-phase power factor	$\cos\phi_Y = \frac{W_Y}{VA_Y}$
Crest Factor (1/Transformer Harmonic Derating Factor) $C.F.1 = \frac{I_{peak}}{\sqrt{2} \cdot I_{RMS}} = 1/THDF1$			

## SIGNAL OUTPUT

- RS-485** - Isolated serial output for shielded twisted pair cable up to 1.2 Km, 9600/1200 baud, 7 data, 1 or 2 stop bit, parity, NO/E/O parity bit, JBUS/MODBUS ASCII protocol, up to 247 slave instrument.
- Pulses** - 2 terminal outputs 280 VAC Rms 100 mA insulated (insulation 1500 Vrms), selectable frequency from 1 imp./1KWh to 999 imp./Wh. Min. pulse length 200 msec. long pulse / 17 msec. short pulse
- Optic fibre** - By means of external converter PC 485 OF-LINK, VIP485 OF-LINK and 2 optic fibres (HFBR or VERSATILE LINK HP type connector) plastic fibre up to 70 m (plastic fibre), glass fibre up to 500 m.

## DIMENSIONS (in mm)



**WARNING** - ELCONTROL ENERGY declines all liability for any damage to people or property caused by unsuitable or incorrect use of its products. (Subject to change without prior notice).

**ELCONTROL ENERGY** S.p.A.

advanced technology for electrical installations

Via Vizzano 44 - 40044 Pontecchio Marconi (Bologna) Italy  
Tel. +39 051 6782006 - Fax +39 051 845544  
<http://www.elcontrol-energy.it> - E-Mail: [sales@elcontrol-energy.it](mailto:sales@elcontrol-energy.it)