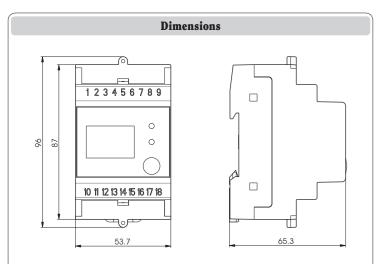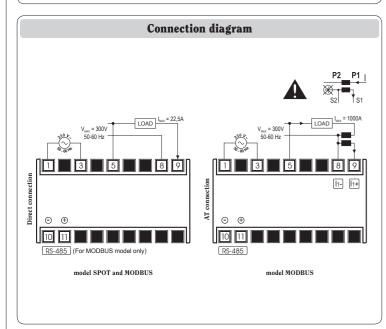V3IS00383-010

# Vemer

## Mod. ADR-D 230 D22 SPOT
## Mod. ADR-D 230 D22 MODBUS

CE

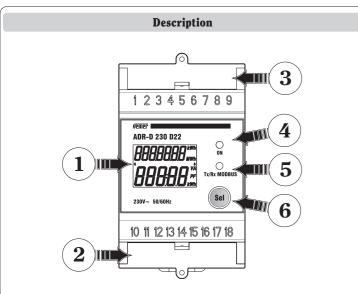**Vemer S.p.A.**
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## User Manual
### SINGLE-PHASE NETWORK ANALYSER
### Read all instructions carefully

■ A series of single-phase system analysers for TRMS (True Root Mean Squared) values:
- ADR-D 230 D22 SPOT for direct connection of current leads having $I_{MAX}$ = 22,5A
- ADR-D 230 D22 MODBUS with **serial output RS 485** for both direct connection of current leads having $I_{MAX}$ = 22,5A and current connection by way of external ATs type x/5A

### SAFETY INSTRUCTIONS

*To guarantee correct installation, observe the following instructions:*
1) *The instrument must be installed by a qualified person*
2) *The instrument must be installed in an electrical panel which, after installation, leaves terminals inaccessible*
3) *The building in which the instrument is installed must have an electrical system including a switch or a circuit breaker: this must be near the device and in a position that can be easily reached by operators.*
4) *A protection device against over-currents must be installed in the electrical system upstream of the instrument*
5) *Connect the instrument as shown in the diagrams of this manual*
6) *Before making contact with terminals, ensure that leads to be connected to the instrument are not live*
7) *Do not power or connect the instrument if any part of it is damaged*

*Note: The network analysers in the ADR-D 230 D22 series are aimed for use in places with overvoltage category III and pollution degree 2 to EN 61010-1.*

| Code | Model | Description |
|---|---|---|
| **VE008900** | ADR-D 230 D22 SPOT | Single-phase network analyser |
| **VE009700** | ADR-D 230 D22 MODBUS | Single-phase network analyser |

### TECHNICAL SPECIFICATIONS

- Power supply: 230V AC (-15%/+10%) 50/60Hz
- Input voltage: $V_{MAX}$ = 300V
- Input Current: $I_b$ = 5A; $I_{MAX}$ = 22,5A by direct connection
  $I_n$ = 5A; $I_{MAX}$ = 6A by external ATs type x/5A **(for MODBUS model only)**
- Maximum cross-section of current leads: 4 mm²
- Maximum consumption (device only): voltage circuit < 2,5 VA
  power circuit < 2,5 VA
  power supply < 4 VA
- Quantities measured: Voltage *(Page 1)*
  Current *(Page 2)*
  Active power *(Page 3)*
  Power factor *(Page 4)*
  Frequency *(Page 5)*
  Active power *(Pages 6-7-8)*
- Operating temperature: -10 ÷ +45 °C
- Relative humidity: 10% ÷ 90% non-condensing
- Storage temperature: -20 ÷ +60 °C
- Signalling leds: green = power on
  red = tx/rx activity on RS 485 line **(for MODBUS model only)**
- Serial output: RS 485 by modbus protocol RTU **(for MODBUS model only)**
- Display: LCD display 7 + 5 digit
- Enclosure: 3 DIN, RAL 7035 gray
- Protection rating: IP20/IP51 on the front

### ACCURACY

- Alternating voltage: Maximum reading: 105% $V_{MAX}$
  Minimum reading: 10V
  Resolution: 0,1V
  Accuracy: ± 0,5% full scale ± 1 digit (full scale: $V_{MAX}$)

- Alternating current (automatic scale change):
  Maximum reading: 105% $I_{MAX}$
  Minimum reading: 0,02A
  Resolution: 0,01A (range: 0 ÷ 100A) o 0,1A (range: 100 ÷ 1000A)
  Accuracy: ± 1% full scale ± 1 digit (full scale: 1A)
  Accuracy: ± 0,5% full scale ± 1 digit (full scale: 6A)
  Accuracy: ± 0,3% full scale ± 1 digit (full scale: 22,5A)

- Active power: Resolution: 0,01kW (range: 0 ÷ 100kW) o 0,1kW (range: 100 ÷ 1000kW)
  Accuracy: ± 1% full scale ± 1 digit (full scale: 100kW o 1000kW)

- Power factor: Resolution: 0,01
  Accuracy: ± 1% ± 1 digit

- Frequency: Resolution: 0,1Hz
  Accuracy: ± 0,1Hz (from 45Hz to 65Hz)

- Total active energy: Resolution: 1kWh
  Accuracy: class 1 to EN 62053-21

- Partial active power: Resolution: 0,01kWh (full scale: 999,99 kWh) or 0,1kWh (full scale: 9999,9 kWh)
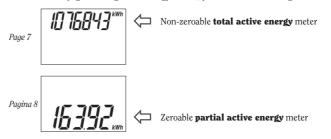  Accuracy: class 1 to EN 62053-21

### DEVICE DESCRIPTION

① Backlit LCD display to read the values measured
② Terminals 10-11 for serial output RS 485 **(for MODBUS model only)**
③ Terminals 1-3 for the connection of power supply, 5-8-9 for connection of voltage and current conductors
④ Green LED: ON when the instrument is powered
⑤ Red led **(for MODBUS model only)**: tx/rx activity on RS 485 line
⑥ Page scroll button, zeroing of partial meter, parameter set-up

### Dimensions



### Connection diagram



model SPOT and MODBUS          model MODBUS

### Description



## OPERATION

The values measured are read over 6 pages to be scrolled using the SEL button



Page 1 → Total active energy meter
→ **Alternating voltage** value

Page 2 → Total active energy meter
→ **Alternating current** value

Page 3 → Total active energy meter
→ **Active power** value

Page 4 → Total active energy meter
→ **Power factor** value and **phase shift** type
L = inductive phase shift - C = capacitive phase shift

Page 5 → **Frequency** value

Page 6 → **Total active energy** meter
→ **Partial active energy** meter

To access the 2 pages reading active energy counts, press the SEL button again.

Page 7 → Non-zeroable **total active energy** meter

Pagina 8 → Zeroable **partial active energy** meter

The partial meter is automatically zeroed when the scale range is overrun. To set the meter to zero manually, hold the "SEL" key down for more than 3 seconds
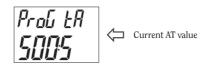To view the first page again, press the SEL key once more.

### BACKLIGHTING

The device's display backlights when the SEL key is pressed: it stays on for 30 seconds after the last key is pressed.
To change this setting, go to **page 1** and hold down the SEL key for at least 3 seconds



← Backlighting status (ON / OFF)

### SETUP OF EXTERNAL ATs (for MODBUS model only)

To view the AT setting, go to **page 2** and hold down the SEL key for at least 3 seconds.



← Current AT value

To change the AT setting, proceed as follows.
Hold the SEL key down while switching the device on: the display will read in a sequence the firmware version, the serial number and will flash the AT primary value. To select an AT different than the flashing value, press the SEL key repeatedly until the desired value appears.
The AT values available are as follows: 5/5A, 10/5A, 25/5A, 50/5A, 75/5A, 100/5A, 125/5A, 150/5A, 200/5A, 250/5A, 300/5A, 400/5A, 500/5A, 600/5A, 800/5A, 1000/5A.
To effect the change, select the AT value and then press the SEL key until the value stops flashing. The partial energy count will then be zeroed and the voltage page (page 1) will appear on the display.
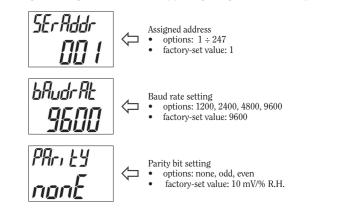
**Note: If direct connection of current leads is used ($I_{MAX}$ = 22,5A), select 5/5A (default value) in the AT setting.**

## SERIAL-COMMUNICATION CONFIGURATION (for MODBUS model only)

The following serial-communication parameters can be accessed: address number, baud rate and parity.
To read the current serial parameters, go to **page 3** and hold the SEL key pressed for at least 3 seconds, until the address page appears. To scroll the other pages push the SEL key: after viewing the last page the display resumes normal reading.
To set a parameter, go to the relevant page, hold the SEL key pressed until the value flashes, press it again to change it and then confirm by pressing it long, until the value stops flashing.



← Assigned address
• options: 1 ÷ 247
• factory-set value: 1

← Baud rate setting
• options: 1200, 2400, 4800, 9600
• factory-set value: 9600

← Parity bit setting
• options: none, odd, even
• factory-set value: 10 mV/% R.H.

### OPERATING MESSAGES

#### PHASE ERROR

On startup the device checks whether the current and voltage terminals are connected correctly.



← Error reading on start-up

In case of error the phase error page will be displayed for 3 minutes. The triangular LED on the left will flash.
To resume correct operation, turn it off, invert voltage or current connections, and turn on again.
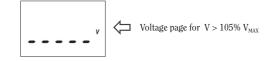


← Voltage value with Phase error LED

Error conditions occurring during normal operation are indicated by the flashing of the triangular LED on the left. Voltage, current and frequency values are nonetheless read correctly.

As for the remaining pages, energy counts will not increase, the power factor will be force-set to 1 and the active power value to 0.

#### OVERFLOW ERROR

When the voltage or current reading range is overrun, the relevant field will flash dots and the total energy count will be read.



← Voltage page for V > 105% $V_{MAX}$

Voltage or current overflow error is indicated on the other pages too. in this case the values measured will flash.

### SERIAL COMMUNICATION

The instrument **(MODBUS model only)** has an insulated serial output RS 485.
- The data communication system is based on MODBUS protocol (RTU coding system) and can be connected to a Master system (PC/PLC)...) on a multipoint line RS 485:
  - up to 31 ADRs (slaves) without signal amplifiers, from a maximum distance of 1000m
  - up to 247 ADRs (slaves) in groups of 30 separated by proper signal amplifiers
- Contact the technical assistance service dept. to request documents regarding MODBUS functions, use of registers and the ADR-view software.

### REFERENCE STANDARDS

Conformity to EU directives:
**73/23/EEC** amended by **93/68/EEC** (Low Voltage Electrical Equipment)
**89/336/EEC** amended by **92/31/EEC** and **93/68/EEC** (E.M.C.)
is declared with reference to the following harmonised standards:
EN 61010-1, EN 61000-6-2 and EN 61000-6-3
EN 62053-21 and EN 62052-11

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