Power meter for low-voltage networks

Current measuring instruments for power distribution systems

Product datasheet

- **General description**

The power meter combines the Volt1000x voltage measuring unit with the RoCo and Cube current measuring devices, enabling precise power calculation in low-voltage networks.
The Volt1000N/S/Q controls up to 20 serially connected three- or four-phase current measuring devices, which can be flexibly combined with each other.
Integration into higher-level systems is provided via a Modbus RTU slave interface.

Figure 1, Power meter

- **Measurements**
    - Current measurement per phase: L1, L2, L3, optional N
    - Voltage measurements
        - Phase-to-neutral voltages (L-N)
        - Line-to-line voltages (L-L)
    - Network frequency
    - Harmonics

- **Calculation & Analyses**
    - Comprehensive power calculations: active, reactive, apparent power, etc..
    - Power quality calculations: power factor cos(φ), distortions, etc..
    - Total Harmonic Distortion (THD) per phase
    - Limit monitoring for voltage and current
    - Phase error detection
        - Only when Cube and Volt1000x are combined
    - Evaluation of 4 I/Os with alarm generation (Volt1000S(Q) only)
    - Power Quality according to EN50160 (Volt1000Q only)
        - Frequency deviations
        - Voltage deviations (flicker, asymmetry, transients, vectors, …)
        - Supraharmonic disturbances (2–150 kHz)

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- **Interfaces Volt1000N, RoCo and Cube**
    - 2 × RJ45 connectors
        - RS485 Modbus RTU Slave: connection to Volt1000, router, or remote control technology
- Bus chaining: with up to 20 Anerma current measuring devices (Cube525Ax, RoCo2110Ax, **Interfaces Volt1000S(Q)**
        - RoCo1065Ax) via patch cable
    - RJ45 connector for bus chaining of up to 20 Anerma current measuring devices
    - RS485 Modbus RTU Slave for connection to router or remote control technology
    - USB interface for configuration and access to measurement values
    - Supports the MODBUS RTU protocol
    - With the Acal Modbus Reader software, data registers and system status can be read out conveniently. This makes the measuring system fully transparent within the ONS for maintenance and installation
    - 4 configurable input/output (I/O) channels, flexibly usable for control or monitoring functions
        - Alarm output
        - Temperature sensor
        - Digital I/O
        - Voltage input
        - Current input
        - Modbus-controlled output
- **Status indicators via LED**
    - LEDs to indicate operating status and communication status
- **Easy installation**
    - Quick installation on a TS35 DIN rail
    - Easy installation with cable ties on the outgoing cables
    - Serial connection to the next devices using standard patch cables

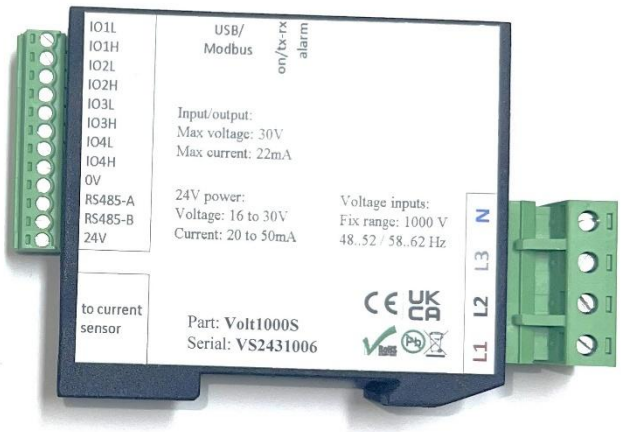

Figure 2, Volt1000S(Q)

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- **Cascading of Volt1000 with RoCo and Cube**

RJ45 patch cables are used to connect the RoCo and Cube power meters to the Volt1000.
Standard Ethernet patch cables can be used as long as they have all four pairs of wires (8 wires). Cables with only two pairs of wires are unsuitable. Please note: Crossover cables must not be used. All pins (1–8) on cable end 1 must be connected to the same pins on cable end 2.

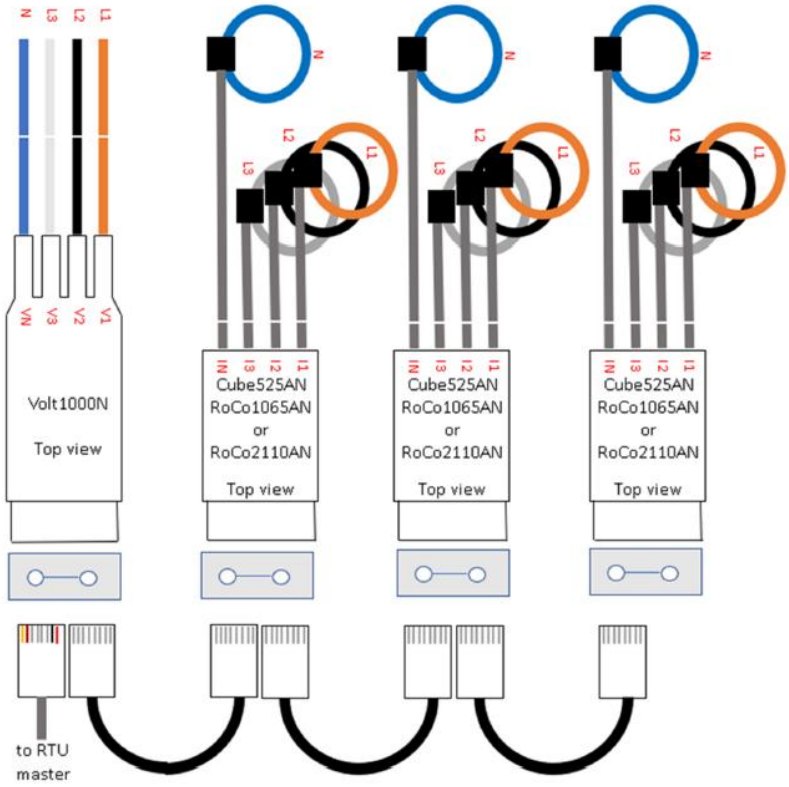

Figure 3, Cascading of Volt, RoCo & Cube

Technical Data

Parameter	Value	Remarks
Supply voltage	15 ... 32 VDC	Standard: 24VDC
Current consumption	20 – 50 mA + n*12 mA per device	@24V
Relative humidity	0 … 90 %	Non-condensing
Overvoltage category	CAT IV 600V	
Primary sampling frequency	81,920 kHz	
Secondary sampling frequency	5,120 kHz	After digital filtering/subsampling
Total harmonic distortion	Up to the 50th harmonic	
Maximum power (at phase voltage = 230V)	1400kVA 700kVA 400kVA	RoCo2110 RoCo1065 Cube525
Phase angle measurement error φ	< 1°	
Power measurement error	+/- 1%	
Interrupting current	0,4 A	lower currents are set to zero

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CE Conformity

Guideline	Norm	Reference
LVD 2014/35/EU	EN 61010-1:2010 / A1: 2019 IEC 61010-1:2010 / A1:2016 (Edition 3.0)	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
	IEC 61010-2-030:2017 (Edition 2.0)	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-030: Particular requirements for equipment having testing or measuring circuits
EMV 2014/30/EU	IEC 61000-6-5: 2015	Electromagnetic Compatibility (EMC) – Part 6-5: Generic Standards – Immunity for Equipment Operating in Power Plant and Substation Environments
	IEC 61000-6-2: 2016	Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity Standard for Industrial Environments
RoHS 2011/65/EU	EN 50581: 2012	Technical Documentation for the Assessment of Electrical and Electronic equipment with regard to the restriction of Hazardous Substances

Order Codes Power meter

Device	Description
Volt1000N	Voltage meter for L1, L2, L3 and N with Display
Volt1000S	Voltage meter for L1, L2, L3 and N with USB and 4 I/Os
Volt1000Q	Voltage meter for L1, L2, L3 and N with USB and 4 I/Os and Power-Quality-Measuring according to EN 50160, upon request
RoCo1065AN	4- Current Measuring Device for L1, L2, L3 and N with 65 mm coils
RoCo1065A	3-phase Current Measuring Device for L1, L2, L3 with 65 mm coils
RoCo2110AN	4-Phase Current Measuring Device for L1, L2, L3, and N with 110 mm coils
RoCo2110A	3-Phase Current Measuring Device for L1, L2, and L3 with 110 mm coils
Cube525AN	4-Phase Current Measuring Device for L1, L2, L3, and N with 25 mm Cube
Cube525A	3-Phase Current Measuring Device for L1, L2, and L3 with 25 mm Cube
Accessories	Power supply, voltage taps, mounting accessories, temperature sensors

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Contact Information

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Product Documentation

Please refer to the latest user manual, *"ModularPowerMeter_UM.x.x.pdf"*, for detailed information, as well as the datasheets for Volt1000x, RoCo, and Cube.
These documents are available through your Acal BFi sales contact.

Revision history

Revision	Date	Author	Changes / Description
1.0	25.08.2025	A. Schöneberg	Initial creation of the document

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