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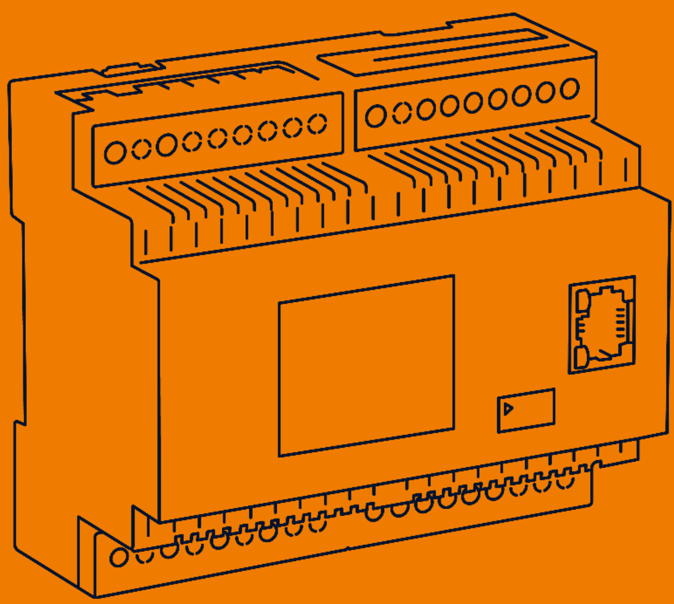

MIEZ Poweranalyser

ALLES MIT SPANNUNG

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Contents

1 General

The Poweranalyser 37020 was specially developed for monitoring the energy and power quality in modern power systems and intelligent power grids ("Smart Grid"). The unit is generally designed for installation on a DIN top-hat rail. The Poweranalyser 37020 features a great variety of communication options and is therefore suitable for a broad spectrum of automation tasks in modern buildings as well as for power generation and power transmission systems. The Poweranalyser 37020 is equipped with a small colour display embedded in the front panel for easy on-site readings. To protect the current settings (setup) and collected data, it can be locked by means of a user PIN. The device has standard RS-485 serial interfaces to communicate with remote control systems and uses Ethernet for communication with peripheral devices.
It is equipped with three voltage inputs and three current inputs.

1 Operation of the meter

1.1 Safety requirements for the use of the Poweranalyser 37020

! **When working with the unit, it is mandatory to take all required measures to protect against injury and electric shock to persons and property.**

- The device may only be operated by persons with the necessary expertise for this kind of work. This person must have detailed knowledge of the operation of the equipment listed in this description.
- When the unit is connected to components that are under dangerous voltage, it is essential to follow all necessary measures for the protection of the user and equipment against injury and damage caused by electric shocks.
- Persons carrying out installation or maintenance of the device must be equipped with and use personal protective clothing and tools.
- If the analyser is used in a manner not specified by the manufacturer, the protection provided by the analyser may be impaired.
- If the analyser or its accessories are damaged or do not work properly, do not use it and send it for repair.

1.2 Installing the device

There should be natural air circulation inside the distribution cabinet and in the area around the unit (especially under the unit). No other device with a heat source should be installed, otherwise the measured temperature values could be incorrect. The maximum possible conductor cross-section of the connecting cable is 2.5 mm².

The Poweranalyser 37020 is primarily intended for mounting on a DIN rail. The dimensions of the unit are shown in Fig. 2. For wall mounting, the hole positions for three screws are marked with dashed lines.

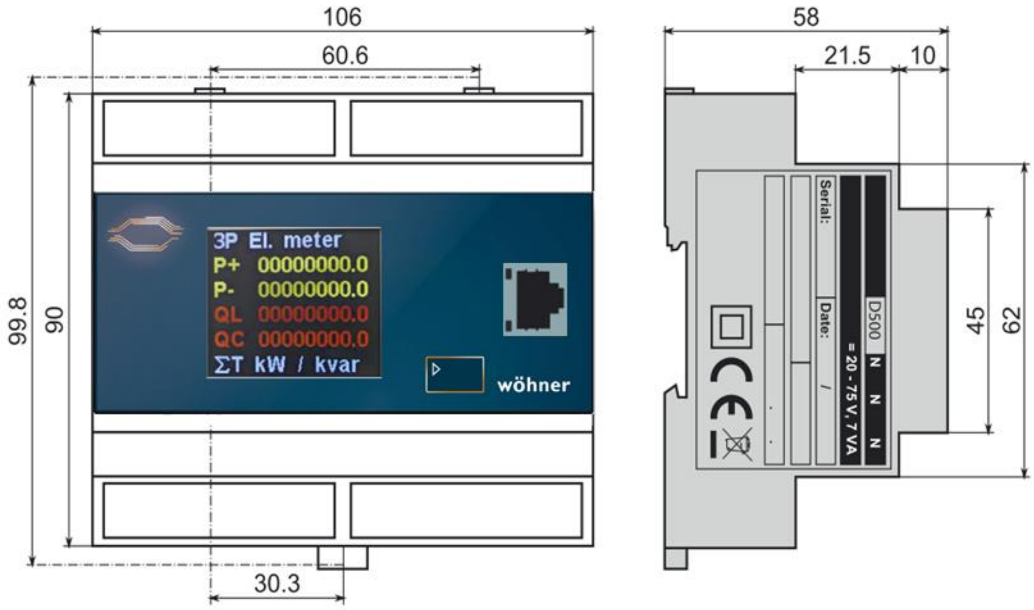


Figure 1: Dimensions of the Poweranalyser 37020

1.2.1 Supply voltage

The supply voltage (**20 – 75 VDC**, figure 2) is connected to the terminals X1 and X2 via an isolating element (fuse). This element must be close to the device and easily accessible to the user. Furthermore, it must be labeled as such. A fuse with a rated current of 1 A is suitable as an isolating element. Its functional and operating positions must be clearly marked (symbols 'O' and 'I' according to IEC EN 61010-1). The unit's internal power supply is galvanically isolated from the internal circuits.

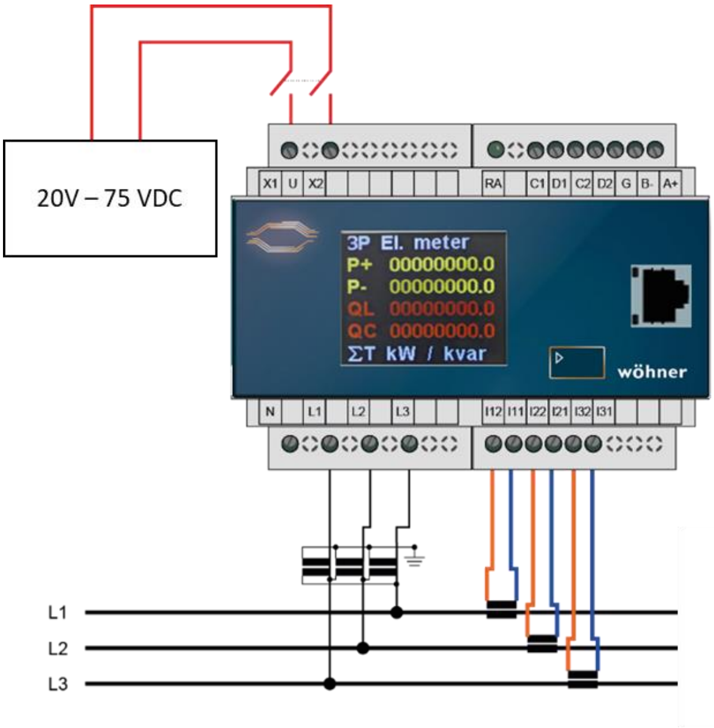


Figure 2: Typical Connection of Power analyzer 37020

1.2.2 Measuring voltage

The measured phase voltage is connected to the terminals L1, L2, L3 and L4. The neutral conductor is connected to terminal N. With a delta circuit and an Aron circuit, terminal N remains unused. Terminal 4 can optionally be used for voltage measurements: a mains voltage or a protective conductor against the connection N. The inputs for the measuring voltage are connected to the inner circuits via a large AC resistor. For the protection of the voltage lines, 1 A fuses are suitable. Measuring voltages can also be connected via measuring voltage transformers. The maximum conductor cross-section of the connection cable is 2.5 mm² for voltage connections.

1.2.3 Measuring current

The units are only designed for indirect current measurements via external current transformers. For correct current measurement, the current sensors must be correctly aligned and the polarity must be correct. Figure 2 shows such a connection of different current transformers in the low-voltage grid. It is strongly recommended to check the circuit and polarity of the currents for correctness (via the unit display or by means of the phasor diagram in the ServiceTool.DAQ). The current inputs are directly connected to the internal circuits.

The correct current transformers (secondary 5 A or 1 A) must be connected to I11, I12, I21, I22, I31, I32 with the appropriate pairs of terminals.

The maximum conductor cross-section of the connecting cable is 2.5 mm².

1.2.4 Peripherals for transmission

All of the following peripherals are galvanically isolated from the other parts of the unit and from each other:

1.2.4.1 Ethernet interface

The Ethernet interface with RJ-45 connector, labeled ETH, is located on the front of the unit. It allows easy communication with a PC via LAN connection and can be used as a replacement for the primary RS-485 interface.

1.2.4.2 RS-485

The RS-485 serial port is normally used to transmit instantaneous measurement values fetched from the unit's buffer; in addition, it can be used for setting up devices. For the serial RS-485 line, the connections A, B and GND are used. The end points of the transmission line must be terminated with a 120 Ω resistor.

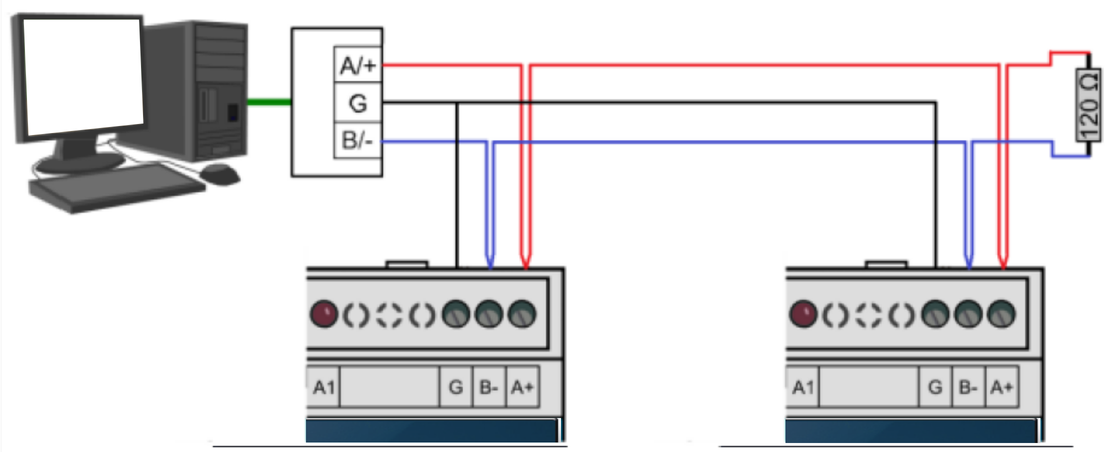
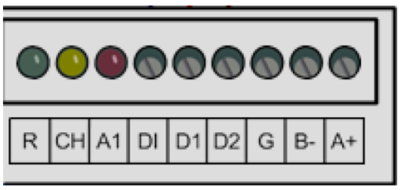


Figure 3: Typical wiring of the RS-485 transmission connections on the Poweranalyser 37020

1.2.5 Message indicator LEDs

Depending on the variant, the Poweranalyser 37020 has the following signalling LEDs:



R:	Ready	Flashes when the unit is ready for operation.
CH:	Charge	Lights up when the internal battery is being charged. Is off when the internal battery is fully charged. Flashes when the Poweranalyser is powered by the internal battery.
A1 / A2:	Alarm	Can be configured and used as desired in the I/O management.

1.3 Configuration of the device

Connect the unit to the PC and run the ServiceTool.DAQ application (***IP address in delivery state: 10.0.0.1***). Select the appropriate transmission setting and connect the unit.
In the following window, you can use the “Configuration" button to make all the necessary settings for measurement, communication, etc.

1.4 Downloading data to a PC

After you have configured the unit, you can close the setup. You will see the window again after you have connected to the Poweranalyser 37020. Press "Update all" here. This loads and displays the current status of each supported archive.
The section “Identify “shows the editable description and label under which the current recording is stored. In the "Destination" section, the current storage location can be selected, either for the SQL database or for a file. With the checkbox at "Archives for download" you determine which specific archive(s) you want to download. Next click on "Download all". The data can then be analysed in the ServiceTool.

1.5 Energy readings

The Poweranalyser 37020 has a three-phase four-quadrant energy meter with automatic measuring and tariff functions (for time-dependent electricity tariffs). The unit registers active and reactive energy separately (EP, EP+, EP-). For reactive energy, it measures the capacitive power EQC and the inductive power EQL for the four-quadrant meter or reactive EQC+, EQC- and EQL+, EQL- separately for the requested and delivered active current for the six-quadrant meter. Depending on the meter configuration, the measured values are transferred to the corresponding tariffs. Summaries are automatically created per phase. In star connections and single-phase measurements, the energy can also be registered separately for each phase.
The measurement data can be downloaded and analysed via ServiceTool. This step is also possible via a standard ModBus protocol or in any other system.

2 Technical specification

2.1 Basic parameters

Device voltage Auxiliary power supply	
Auxiliary voltage range	20 ÷ 75 VDC
Power supply	7 VA / 3.5 W
Overvoltage category	IV (300V)
Pollution level	2
Connection	Insulated, polarity-free

Other specifications	
Operating temperature	-20 to 60°C
Storage temperature	-40 to 80 °C
Rel. humidity	< 95 % - non-condensed environment
EMC interference immunity	EN 61010-1 ed.2:2011+A1 EN 61010-2-030:2011+O1+Z1
EMC interference emission	EN 61326-1 ed.2:2013+O1+O2+Z1 EN 61000-6-2 ed.4:2019 EN 61000-4-2 ed.2:2009 (8/6/4 kV) EN 61000-4-3 ed.4:2021 (10V/m) EN 61000-4-4 ed.3:2013 (4kV) EN 61000-4-5 ed.3:2015+A1 (4/2/1 kV) EN 61000-4-6 ed.4:2014 (10V) EN 61000-4-8 ed.2:2010 (100 A/m) EN IEC 61000-4-11 ed.3:2020 (0 % / 20 ms) EN IEC 61000-4-18 ed.2:2019 (2.5 kV)
Transmission ports	RS-485 (2400 ÷ 921600 Bd), Ethernet 100Base-T
Transmission protocols	KMB, Modbus RTU and TCP, web server, DHCP
Real-time clock: Accuracy	+/- 2 seconds per day
Emergency battery capacity	> 5 years (without supply voltage used)
Protection class front side	IP 40 (front, IP 20 (rear)
Dimensions (WxHxD)	106 x 90 x 58 mm
Weight	max. 0.25 kg

2.2 Measured variables

Accuracy classes* specified in IEC 61557-12	
Voltage:	Cl. 0.2
Current:	Cl. 0.5
Frequency:	Cl. 0.05
Active power:	Cl. 1
Reactive power:	Cl. 1
Apparent power:	Cl. 1
Harmonics:	Cl. 2
Power factor:	Cl. 0.5
cos phi:	Cl. 0.5
Active work:	Cl. 1
Reactive work:	Cl. 2
Apparent work:	Cl. 0.5

* Measurement uncertainties under certain ambient conditions are listed separately for the following measurands.

Frequency	
f_{NOM} – Rated frequency	50 / 60 Hz
Measuring range	40 ÷ 70 Hz
Accuracy	± 10 mHz

Voltage	
Versions Voltage input	Standard variant ("230V")
UNOM (UDIN)– Nennspannung	180 ÷ 250 VAC
Measuring range (phase to N)	4 ÷ 420 VAC
Measuring range (phase to phase)	7 ÷ 720 VAC
Internal inaccuracy (tA)= 23 ± 2 ºC)	+/- 0.05 % rdg ± +/- 0.02 % rng
Temperature drift	+/- 0.03 % rdg ± 0.01 % rng / 10 ºC
Measurement category	300V CAT III
Permanent overloading	1252 VAC (UL–N)
Overload peak, 1 second	2800 VAC (UL–N)
Load current, impedance)	< 0.05 VA (Ri = 3,78 MΩ)

Voltage unbalance	
Measuring range voltage asymmetry	0 ÷ 20 %
Measurement accuracy Voltage asymmetry	± 0.3% rdg or ± 0.3

THDU	
Measuring range	0 ÷ 20 %
Measurement accuracy	± 0.5

Harmonics (up to the 50th)	
Reference conditions	other harmonics up to 200 % of class 3 according to IEC 61000-2-4 Ed. 2
Measuring range	10 ÷ 100 % of class 3 according to IEC 61000-2-4 Ed. 2
Measurement accuracy	twice the quantities of class II according to IEC 61000-4-7 Ed. 2

Current	
Current input versions	„X/5A“
INOM (IB) - Rated (base) current	5 AAC
Measuring range	0.0125 ÷ 7.5 AAC
Internal inaccuracy (tA)= 23 ± 2 °C)	+/- 0,05 % vom rdg ± +/- 0,05 % vom rng
Temperature drift	+/- 0.03 % of rdg ± +/- 0.01 % of rng / 10 °C
Measurement category	600V CAT III
Permanent overload	10 AAC
Peak overload	90 AAC (1 second, maximum repetition rate > 5 minutes)
Burden power (impedance)	< 0.5 VA (Ri < 10 mΩ)

Current unbalance	
Measuring range	0 ÷ 100 %
Measurement accuracy	± 1 % rdg or ± 0.5

Harmonics & Interharmonics (up to the 50th)	
Reference conditions	other harmonics up to 1000 % of class 3 according to IEC 61000-2-4 Ed. 2
Measuring range	500 % von Klasse 3 gemäß IEC 61000–2-4 Ed.2
Measurement accuracy	Ih <= 10 % INOM: ± 1 % INOM Ih > 10 % INOM: ± 1 % rdg

THDI	
Measuring range	0 ÷ 200 %
Measurement inaccuracy	THDI <= 100 %: ± 0.6 % THDI > 100 %: ± 0,6 % rdg

Temperature (internal sensor, measured value influenced by power loss of the unit)	
Measuring range	-40 ÷ 80 °C
Measurement inaccuracy	± 2 ºC

Active / Reactive Power, Power Factor (PF), cos φ (PNOM = UNOM x INOM)	
Reference conditions "A ": **Ambient temperature (tA) U, I** **for active power, PF,** **cos φ for reactive power**	23 ± 2 ºC U = 80 ÷ 120 % UNOM, I = 1 ÷ 120 % INOM PF = 1.00 PF = 0.00
Active / reactive power accuracy	± 0.5 % rdg ± 0.005 % PNOM
Accuracy PF & cos φ	± 0.005
Reference conditions "B ": **Ambient temperature (tA) U, I** **for active power, PF,** **cos φ for reactive power**	23 ± 2 ºC U = 80 ÷ 120 % UNOM, I = 2 ÷ 120 % INOM PF >= 0.5 PF <= 0,87
Active / reactive power inaccuracy	± 1 % rdg ± 0.01 % PNOM
Uncertainty PF & cos φ	± 0.005
Temperature drift of the powers	+/- 0.05 % rdg ± +/- 0.02 % PNOM / 10 ºC

Energy	
Measuring range	4 "quadrants", active-reactive energy
Accuracy active energy	Class 1 according to EN 62053 - 21
Accuracy reactive energy	Class 2 according to EN 62053 - 23

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