

High Precision Power Analyzer NORMA 4000

- Compact System 1- 3 Phases
- Sampling rate 1 MHz / 341 kHz
- 5.7" Graphic Display colour
- Non gapping Average Values
- 4 MB Memory (expandable)
- Calibration interval 2 Years



General

Measuring System

The Power Analyzer **NORMA 4000** measures exactly current and voltage and calculates active, reactive and apparent power and other derived values.

The accuracy of this instrument does not depend on the wave form, frequency and phase shift in a wide range.

Harmonics are calculated up to half the sampling rate.

The DSO – function visualises the values in wave form.

Voltage and current can be measured directly due to integrated voltage dividers and shunts. It is also possible to connect external voltage dividers as well as shunts or probes.

Options like additional interfaces, analogue inputs and outputs are available.

The firmware of the analyser can be updated via the standard interface RS232.

High Precision

The Power Analyser **NORMA 4000** is designed to measure signals in a wide frequency range from DC to a few MHz. The input stages are DC coupled, suited with high quality pulse amplifier.

A zero- and offset calibration against a stable voltage reference runs automatically in short time periods to stabilize the accuracy.

All voltage and current channels are separated by a completely new technology of barriers for high channel isolation and common mode rejection. That makes the analyser **NORMA 4000** also suitable for difficult applications.



Operation

The Power Analyzer **NORMA 4000** is easy to use. Due to a generous number of keys and a large display it is possible to switch directly to the desired screen:

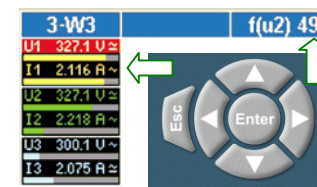


phase changing

6 function keys (soft keys):



Cursor block to access parameters:



With arrow keys a cursor can be moved to several fields. The settings behind these fields are accessible by pressing Enter. Several configurations can be saved. Factory configurations are also available.



General technical data

Ambient conditions:

Working temp. range: +5 ... 35 °C
Storage temp. range: - 20 ... + 50 °C

Housing: The Power Analyzer **NORMA 4000** is extremely compact and equipped with a solid metal case.

Weight: approx. 5 kg

Dimension: W = 237 mm H = 150 mm (3U)
D = 315 mm

Display: 5.7" 320 x 240 pixel
Background lighting and contrast decidable.

Climatic class: KYG DIN 40040, max. 85 % rel. humidity, non condensing.

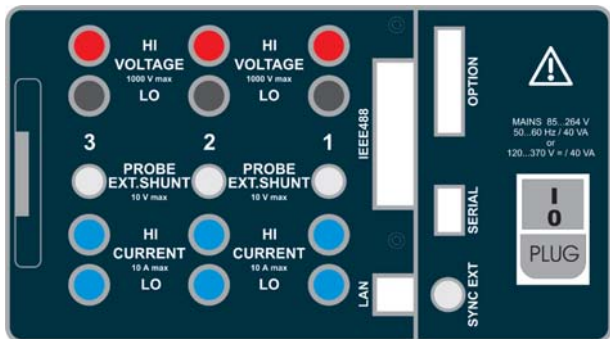
Net connection: 85 ... 264 V AC, 50 ... 60 Hz, DC 100 ... 260 V, ca. 40VA European plug with switch.

Measuring inputs: Safety sockets 4 mm, 2 for each input. Ext. Shunt connection over BNC socket

Operation: film keyboard with cursor, function keys and direct functions

Connections

Rear panel of the 3-phase Analyzer



Specifications

Measured Values

Non gapping calculation of averaged values for each phase. In three phase system additionally calculation of total power and averaging of V and I of the three phases. The fundamental H01 will be calculated in synchronous mode also for these values.

U_{RMS} effective value, U_m rectified mean, U_m mean value

U_{p-} , U_{p+} , U_{pp} peak values

U_{cf} crest factor U_{cf} , U_{ff} form factor

U_{fc} fundamental content

U_{thd} distortion factor DIN, IEC

I_{RMS} effective value, I_m rectified mean, I_m mean value

I_{p-} , I_{p+} , I_{pp} peak values

I_{cf} crest factor I_{cf} , I_{ff} form factor

I_{fc} fundamental content

I_{thd} distortion factor DIN, IEC

P active power [W]

Q reactive power [Var]

S apparent power [VA]

λ , $\cos\phi$ phase angular

∫ Integral function for active power P, reactive power Q, apparent power S, voltage (U_m) and current (I_m),

Number of digits 4 or 5 dependent on measured value.

Frequency and Synchronisation

Range: 0.2 Hz ... sample rate

Accuracy: ± 0.01 % of measured value (reading)

Channels which can be selected: all U/I or external input

One of three low pass filter with different frequencies can be switched into the signal.

The frequency is always visible on the top of the screen.

The BNC synchronization socket on backside of the instrument can be used either as input or output.

The input signals could be measured up to the sample rate of the power phase. The maximum level must not be higher than 50V.

The output signal is a pulsed 5Volts TTL signal (frequency depends on the measured synch frequency).

Configuration Memory

Up to 15 user configurations can be saved into a permanent memory and reloaded later on. Changes that were not saved are lost after switching off the instrument.

Interface

RS232 Interface for upload of firmware and data exchange with the PC. A printer can be connected over an external converter.

Options: IEEE 488.2 / 1 MBit/s

Ethernet / 10 MBit/s or 100 Mbit/s

Standards and Safety

Electrical safety:

EN 61010-1 / 2nd Edition 1000 V CAT II (600V CAT III)

Degree of pollution 2, safety class I.

EN 61558 for transformer

EN 61010-2-031/032 for accessories

Max. inputs:

for voltage inputs Measurement range 1000 V_{eff}, 2 kV_{peak}
for current inputs Measurement range 10 A_{eff}, 20 A_{peak}

Test voltages:

Net input - case (protective conductor): 1.5 kV a.c.

Net connection – Measurement input: 5.4 kV a.c.

Measurement inputs – case: 3.3 kV a.c.

Measurement input – Measurement input: 5.4 kV

Electromagnetic susceptibility:

Emission: IEC 61326-1, EN 50081-1, EN 55011 Class B

Immunity: IEC 61326-1 / Annex A (industrial sector), EN 50082-1

Power Phases

The unit can be equipped with one to three power phases. One power phase consist of voltage and current measurement channel. The different specifications depend on the model of the power phase.

For details look at the Power Phase Specifications

Option Process Interface

The Process interface PI1 is an option for the Power Analyser NORMA 4000 and NORMA 5000.

The main quality of PI1 is the simultaneous recording of **torque (M)**, **speed (N)** and **mechanical power (Pm)** till 4 motors..

Each of the 8 inputs is switch-able between analogue (voltage) or digital (frequency) input.

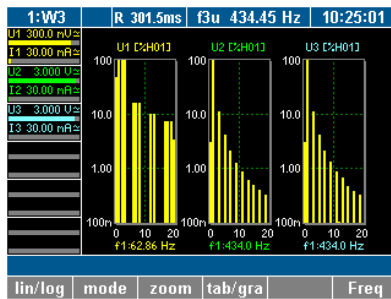
The exploration takes place synchronously to the sample rate of the NORMA 5000 or NORMA 4000. This makes in both cases an exploration of 34.13 kHz.

The PI1 interface also possesses 4 analogue outputs, which are updated after every average interval.

For further information please take a look in the PI1 data sheet.

Basic functions

FFT Fast Fourier Transformation

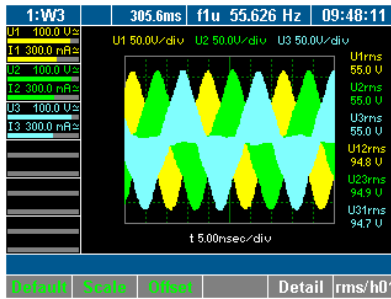


Calculation of harmonics with graphical representation. Up to 3 bar graphs are displayed at the same time.

Measured values: U, I, P per phase

Order: 1. to 40. harmonics, max. half sample frequency

DSO Digital Oscilloscope



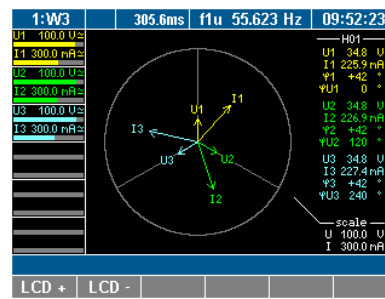
Simultaneous display of up to 3 measured values on sample level. Quick view of curve form and distortion.

Integration function (Energy)

1:W3	f	f	300.5ms	f1u	56.569 Hz	10:51:23
U1 1000.0 V	∫ P1	281.73	mWh			
I1 300.0 mA	∫ S2	1.2378	VAh			
U2 100.0 V	∫ Q3	1.2118	Vrh			
I2 300.0 mA	∫ I3 m	184.27	μAh			
U3 100.0 V	∫ U1 m	-10.648	mVh			
I3 300.0 mA	∫ S H01	2.3246	VAh			
RS Integration (total)						
Start	Stop		Local			

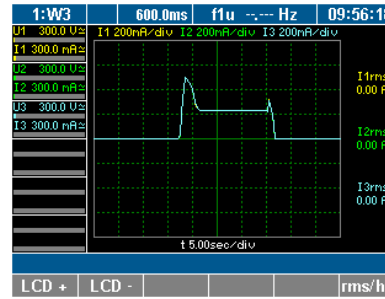
Simultaneous display of up to 6 configure able numeric values. Start/Stop conditions and positive negative direction available.

Vector



Vector display of HO1 up to 6 signals. For easy testing of the right connection of the instrument and quick overview of the phase angle of each signal.

Recorder



Display of average values over time for trend determination.

RAM Data Memory

Storing of sample and average values, setting of start and stop conditions.

From the RAM approximately 4 MB are available for the storage of measured values. The memory can be expanded up to 128 MB.

Configuration



Scope of Delivery, Accessories, Service

Analyzer

NORMA 4000 BU 43	Basic Unit 2/3 19" with power supply, colour display 5.7", RS232 Interface for Firmware upload, space for 3 Power-Phases and Options	EA 1560 Z
Power phase PP 40	Power Phase with 3 MHz bandwidth, 1/3 MHz sample rate; ranges 0.3 – 1000 V und 0.03 – 10 A, basic accuracy 0.1 % + 0.1 %	EA 1400 Z
Power phase PP 42	Power Phase with 3 MHz bandwidth, 1/3 MHz sample rate; ranges 0.3 – 1000 V und 0.06 – 20 A, basic accuracy 0.1 % + 0.1 %	EA 1420 Z
Power phase PP 50	Power Phase with 10 MHz bandwidth, 1 MHz sample rate; ranges 0.3 – 1000 V und 0.03 – 10 A, basic accuracy 0.05 % + 0.05 %	EA 1500 Z
Power phase PP 51	Power Phase with 3 MHz bandwidth, 1 MHz sample rate; ranges 0.3 – 1000 V und 0.03 – 10 A, basic accuracy 0.05 % + 0.05 %	EA 1510 Z
Power phase PP 52	Power Phase with 3 MHz bandwidth, 1/3 MHz sample rate; ranges 0.3 – 1000 V und 0.06 – 20 A, basic accuracy 0.05 % + 0.05 %	EA 1520 Z
Power phase PP 54	Power Phase with 3 MHz bandwidth, 1/3 MHz sample rate; ranges 0.3 – 1000 V und 0.03 – 10 A, basic accuracy 0.05 % + 0.05 %	EA 1540 Z

Options

Interface IF2	IEEE 488/GPIB and Ethernet	EA 1002 Z
Process Interface PI1	8 Analog/Impulse Inputs 4 Analog Output	EA 1003 Z
External printer cable	RS232-Centronics	EA 1007 Z

Accessories

MC1	Measuring cable set for one Power Phase. Cable lengths 1.5 m	EA 1030 Z
Planar Shunt 32	32 A 10 mOhm 0-1 MHz	EA 1032 Z
Shunt 300	300 A 0.2 mOhm 0-1 MHz	EA 1033 Z
Shunt 1000	1000 A 0.1 mOhm 0- 0.5 MHz	EA 1034 Z
Shunt 1500	1500 A 0.1 mOhm 0-0.2 MHz	EA 1035 Z
Shunt 450	450 A enhanced voltage drop 0.5mOhm 0-0.5 MHz	EA 1036 Z
MCP	measuring cable for Planarshunt	EA 1038 Z
MCS	measuring cable for shunt 1.5 m	EA 1039 Z

PR 50	High frequency current probe DC...50 MHz cable with BNC adapter	EA 1041 Z
LS 50	power supply to PR50	EA 1042 Z
IT 150-S	Transducer 150 A / 0.2 A DC – 100kHz	EA 1045 Z
IT 600-S	Transducer 600 A / 0.4 A DC – 100 kHz	EA 1046 Z
LT 3	power supply for max 3 IT transducers	EA 1047 Z
RR 3030	Lemflex 30 / 300 / 3000 A with BNC plug, 10 Hz – 50 kHz	EA 1051 Z
Probe PR1200	passive AC probe 1000 / 1 A 30 Hz – 10 kHz	EA 1052 Z
Probe PR 201 ACI	passive AC probe 200/ 0.2 A 40 Hz – 10 kHz	EA 1053 Z
SP	Star point adapter 3 phases	EA 1059 Z

Software

PowerVIEW Basic	PC software basic package for numerical visualisation	EA 1090 Z
PowerVIEW Motor	Plug-In Motor supports PI Process Interface	EA 1091 Z
PowerVIEW Storage	Plug-In Storage Storage functions, DSO	EA 1092 Z
PowerVIEW Harmonic	Plug-In Harmonic FFT and Harmonic order	EA 1093 Z
PowerVIEW Developer	Plug-In for own developments please ask for additional training + support	EA 1094 Z

Service

1 year support	- Handling Guidance - Setting Proposals - Software and Firmware Updates	EA 1070 Z
Cal BU	Recalibration for the first Power Phase of a analyzer including LNO test report	EA 1071 Z
Cal PP	Recalibration for each other Power Phases of this analyzer including LNO test report	EA 1072 Z
Cal 500	Recalibration of a shunt up to 500 A with OKD test report	EA 1075 Z
Cal 1500	Recalibration of a shunt up to 1500 A with OKD test report	EA 1076 Z

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