

# High Precision Power Analyzer NORMA 5000

- Compact System 1- 6 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 5000** 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 5000** 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.

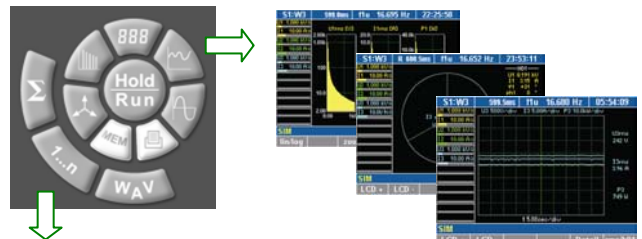
All voltage and current channels are separated by a completely new technology of barriers for high channel isolation and common mode rejection. That makes the analyser **NORMA 5000** also suitable for difficult applications.



Norma 5000 has a complete implementation of the "High Bandwidth Architecture" HBA® of LEM

## Operation

The Power Analyzer **NORMA 5000** 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:

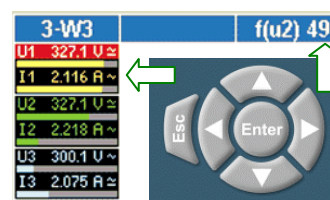


phase changing

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 5000** is extremely compact and equipped with a solid metal case.

Weight: approx. 7 kg

Dimension: W = 447 mm (19") 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.

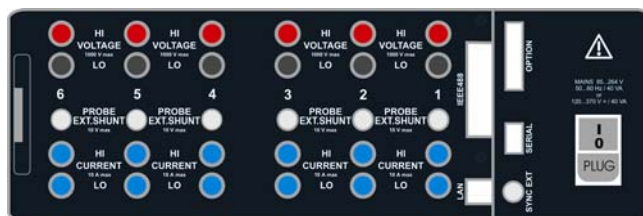
Net connection: 85 ... 264 V AC, 50 ... 60 Hz, DC 100 ... 260 V, ca. 40VA European plug with switch.

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 a 6-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]

$\lambda$ ,  $\cos\varphi$  phase angular

$\int$  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:  $\pm 0.01$  % 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 50 V.

The output signal is a pulsed 5 Volts 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

### El. Safety:

EN 61010-1 / 2nd Edition 1000 V CAT II (600 V 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<sub>eff</sub>, 2 kV<sub>peak</sub>

for current inputs Measurement range 10 A<sub>eff</sub>, 20 A<sub>peak</sub>

### 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 six 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.

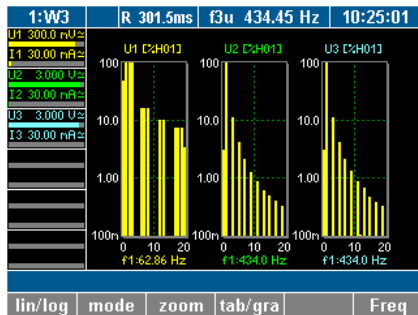
The exploration takes place synchronously to the sample rate of the NORMA 5000 or NORMA 4000. This makes in both cases an exploration of 34.13kHz.

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

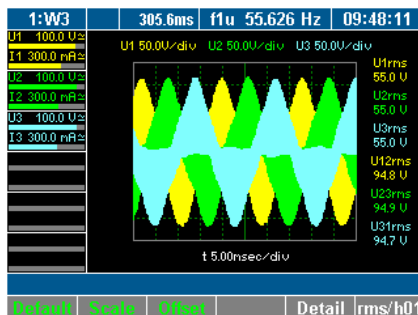


Calculation of harmonics with graphical representation. Up to 3 bar graphs are displayed at the same time.

Measured values: U, I, P per phase

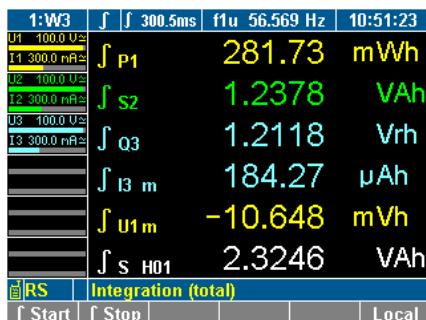
Order: 1. to 40. harmonics, max. half sample frequency

### DSO Digital Oscilloscope



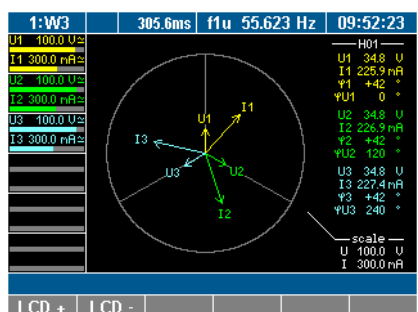
Simultaneous display of up to 3 measured values on sample level. Quick view of curve form and distortion.

### Integration function (Energy)



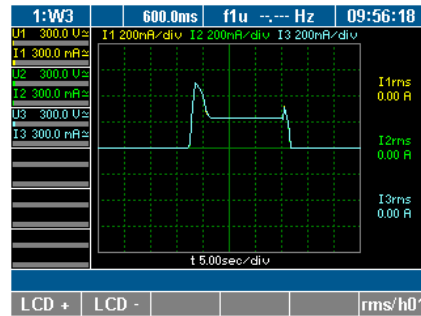
Simultaneous display of up to 6 configurable numeric values. Start/Stop conditions and positive negative direction available.

### 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

<b>NORMA 5000</b> BU 56	Basic Unit 19" with power supply, color display 5.7", RS232 Interface for Firmware upload, space for 6 Power-Phases and Options	EA 1560 Z
<b>Power phase</b> 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
<b>Power phase</b> 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
<b>Power phase</b> 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
<b>Power phase</b> PP 51	Power Phase with 3 MHz bandwidth, 1 MHz sample rate; ranges 0.3 – 1000V und 0.03 – 10 A, basic accuracy 0.05 % + 0.05 %	EA 1510 Z
<b>Power phase PP</b> 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
<b>Power phase</b> PP 54	Power Phase with 3 MHz bandwidth, 1/3 MHz sample rate; ranges 0.3 – 1000V 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

### Accessories

MC1	Measuring cable set for one Power Phase. Cable length 1.5 m	EA 1030 Z
Planar Shunt 32	32 A 10 mOhm 0-1MHz	EA 1032 Z
Shunt 300	300 A 0.2 mOhm 0-1MHz	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 0.5 mOhm 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...50MHz 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 – 100kHz	EA 1046 Z
LT 3	power supply for max 3 IT transducers	EA 1047 Z
RR 3030	Lemflex 30/300/3000A with BNC plug, 10 Hz-50kHz	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 an 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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