

Power Quality Analyser ANALYST 3Q

- **3 Phase power quality analyser and disturbance recorder**
- **Unique power quality overview mode**
- **Portable, robust and easy to use**
- **Ideal for troubleshooting, load profiling and supply monitoring**
- **All key parameters for 3 phase systems including neutral currents**
- **Power and Energy measurement**
- **Measurement in accordance with EN50160 power quality standard**



Measuring system

ANALYST 3Q measures all essential power quality parameters in 50 and 60 Hz systems: r.m.s. values of voltage and current, events, harmonics, flicker, voltage, unbalance for current and voltage and line frequency.

The instrument features a unique 3 phase power quality overview mode, displaying all key parameters on one screen for fast and easy diagnosis of power quality problems. Additionally, the most important power parameters are measured including active power, apparent power, reactive power, power factor, phase angle and active and reactive energy.

The analysis of the voltage quality is provided through an oscilloscope mode capable of displaying current and voltage waveforms for all 3 phases simultaneously.

The measured parameters are sampled at 10.24kHz, can be recorded over time and displayed on screen in chart mode and downloaded to a PC for further analysis and report generation. The chart mode facility is ideal for identifying intermittent problems, trends with time and peak demand figures. The firmware of **ANALYST 3Q** can be updated via a standard RS232 interface.

Applications

Due to the liberalisation of the energy market and the increasing use of modern electronic equipment that can pollute the supply, "Power Quality" is becoming increasingly important for energy providers and final customers alike. The consequences of poor power quality include malfunction and reduced lifetime of electronic equipment, inefficient use of energy and potential safety hazards due to overheating.

ANALYST 3Q is an ideal troubleshooting tool to identify and quantify power quality problems that effect the performance and efficiency of electrical plant and equipment.

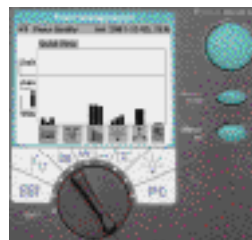
ANALYST 3Q has been designed for the fast localisation of disturbances within electrical distribution networks. It provides the perfect solution for electricians, service personnel and plant managers, who are frequently confronted with disturbance problems.

Operation

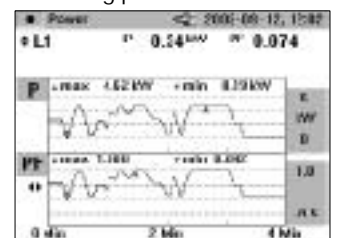
ANALYST 3Q was designed with easy operation in mind. The desired measuring function is directly selected using a central dial. **ANALYST 3Q** will immediately deliver the corresponding measuring results.



Additional functions can be accessed via user-friendly buttons. It is also possible to change the measuring parameters.

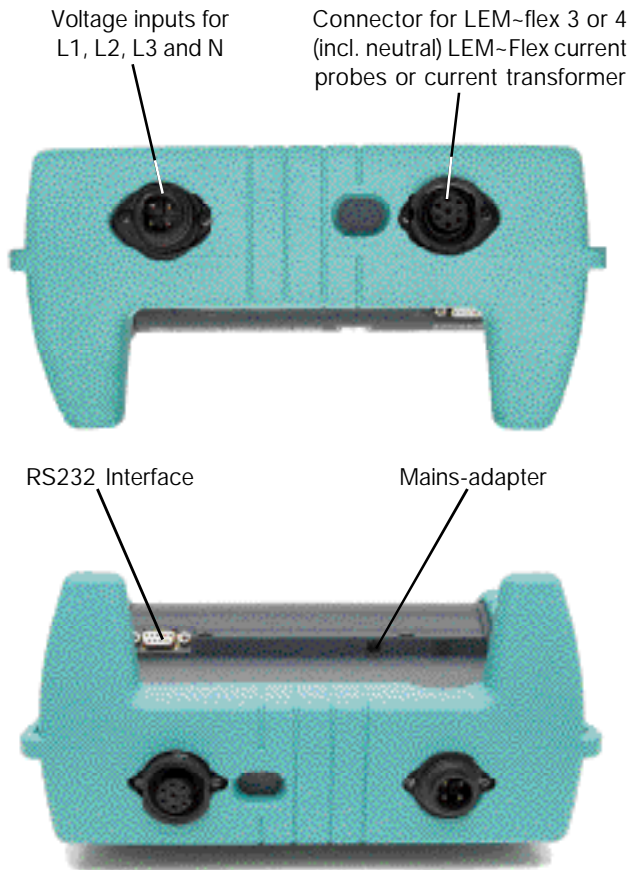


A high-resolution display enables the representation of graphs.



LEM

Connectors



Technical Data

Display:

Display 1/4 VGA display (320x240 pixel), representation of texts and graphics in shades of grey. Variable display contrast. Bright EL backlight.

Ambient Conditions:

Working temp. range -10° C...+50° C (+14° F...+122° F)
 Operating temp. ran. 0° C...+40° C (+32° F...+104° F)
 Storage temp. range -20° C...+60° C (-4° F...+140° F)
 Reference temp. +23° C ± 2K (+73° F ± 4° F)
 Climate class C1 (IEC654-1),
 -5° C...+45° C, 5 %...95 % RH, no dew

Error indication:

Intrinsic error Refers to the reference temperature range and is guaranteed for 2 years
 Operating error Refers to the operating temperature range and is guaranteed for 2 years
 Temperature coefficient ±0.1% of the measuring value per K

Safety class and Safety features:

Protective holster Robust rubber holster protects against mechanical damage
 Safety class IP65 as per EN60529
 Safety IEC 61010-1, 600V CAT III, double or enforced insulation, pollution degree 2

EMC:

Emission IEC/EN61326-1:1997 Class A
 Immunity IEC/EN61326-1:1997,
 IEC/EN61326-1, amendment 1:1998

Power supply and mechanical properties:

NiMH battery package Typical battery operation > 24 hours (> 12 hours with backlight)
 Power adapter 15V / 0.8 A DC mains adapter (operation & charging of battery)
 Dimensions 240 x 180 x 110 mm
 Weight 1.7 kg (including batteries)

Quality assurance system:

ISO 9001 Developed, designed and fabricated as per DIN ISO 9001

Measurement Functions

Volt, Ampere, Hertz

	V rms	A rms
L1	231.3	19.5
L2	231.2	20.2
L3	231.4	20.1

- Measuring r.m.s. values of voltage and current
- Display as digital measurement values (multimeter function) and as time curve (recorder function).

Voltage inputs:

U_N ranges Y: 57 to 480 V AC
 U_N ranges D: 100 to 830 V AC

Intrinsic error	Resolution	Operating error
± (0.2 % of m.v. + 5 dig)	0.1 V	± (0.5 % of m.v. + 10 dig)

Current inputs:

LEM-flex and current clamps with voltage output are supported. All current sensors must meet 600V / CATIII.

LEM-flex I_N ranges: 15 / 150 / 3000 Amp AC (at sine); Current probe ranges: 50 / 500 mV AC; CF (typical): 2.83

Intrinsic error	Resolution	Operating error
± (0.5 % of m.v. + 10 dig)	1 A	± (1 % of m.v. + 10 dig)
± (0.5 % of m.v. + 10 dig)	0.1 A	± (1 % of m.v. + 10 dig)
± (0.5 % of m.v. + 20 dig)	0.01 A	± (1 % of m.v. + 20 dig)

The errors of the current sensors themselves have not been considered.

By using LEM-flex:

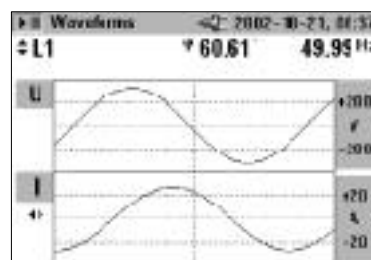
LEM-flex measuring error: ±(2% of m. v. + 10 digit)
 Position influence: ±(3% of m. v. + 10 digit)

Frequency measurement:

Measuring range: 46 - 54 Hz and 56 - 64 Hz

Intrinsic error	Resolution	Operating error
± (0.2 % of m.v. + 5 dig)	0.01 Hz	± (0.5 % of m.v. + 10 dig)

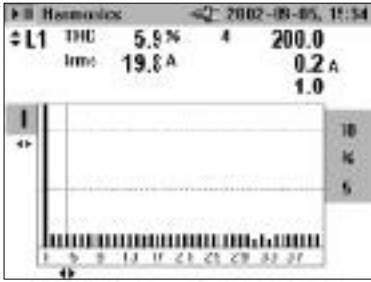
Waveform



- Graphic representation of waveforms for voltage and current as well as a numerical representation of the ϕ angle.
- Quality assessment of the line voltage and the load currents

Errors see Volt, Ampere, Hertz.

Harmonics



- Calculation of harmonics with graphic representation
- Scalable bar chart with detailed information on every harmonic
- Recording of harmonics

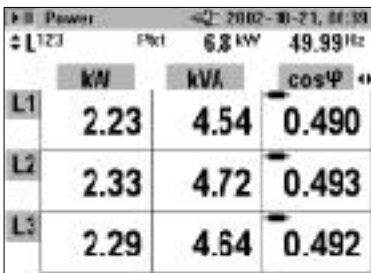
Measurement range: 1st...40th harmonic
(for harmonic values < 50 % of U_m)

Accuracy	
U_m, I_m THDU, THDI	As per IEC 1000-4-7, class B
$U_m \geq 3\% U_N$	5% U_m
$U_m < 3\% U_N$	0,15% U_N
$I_m \geq 10\% I_N$	5% I_m
$I_m < 10\% I_N$	0,5% I_N
THDU	for THD <3%: < 0.15% at U_N for THD \geq 3%: < 5% at U_N
THDI	for THD <10%: < 0.5 % at I_N for THD \geq 10%: < 5% at I_N

m for Measured value

N for Nominal ranges of the measurement instrument

Power



- Calculations of active power, apparent power, reactive power, distortion power and power factor cosine ϕ , active and reactive energy,
- Display of power flow direction
- Indication whether capacitive / inductive

Measuring range: see measurements of U and I; Power deviations are derived by adding the deviations of current and voltage; Additional error through PF: Specified deviations x (1-IPFI)

Maximum Range with Voltage range 830V delta-connection and 3000A current range is 2.490MW

Intrinsic error	Resolution	Operating error
$\pm (0.7 \% \text{ of m.v.} + 15 \text{ dig})$	1 kW	$\pm (1.5 \% \text{ of m.v.} + 20 \text{ dig})$

Typical Range with Voltage range 230V star-connection and 150 A current range is 34.50 kW

Intrinsic error	Resolution	Operating error
$\pm (0.7 \% \text{ of m.v.} + 15 \text{ dig})$	1W...10W	$\pm (1.5 \% \text{ of m.v.} + 20 \text{ dig})$

The errors of the current sensors themselves have not been considered.

PF Power Factor

Range	Resolution	Accuracy
0.000 to 1.000	0.001	$\pm 1\%$ of full scale

Unbalance

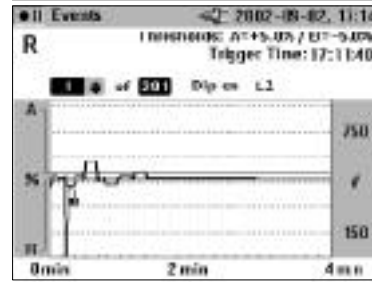


- Representation of 3-phase network as vector diagram
- Representation through voltage and current vector diagrams
- Numeric display of r.m.s. values and phase angles and unbalance.

Phase angles:

Intrinsic error	Resolution	Operating error
$\pm (0.5 \% \text{ of m.v.} + 5 \text{ dig})$	0.1 °	$\pm (1 \% \text{ of m.v.} + 10 \text{ dig})$

Events

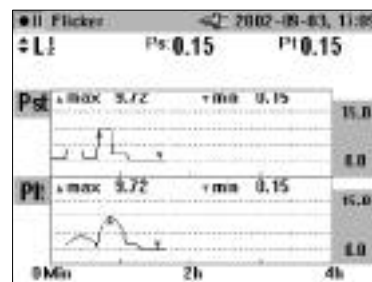


- Detection of voltage dips, voltage swells and voltage interruptions
- Automatic triggering and recording based on half-cycle r.m.s. values

Half-cycle r.m.s. values:

Intrinsic error	Resolution	Operating error
$\pm (1 \% \text{ of m.v.} + 10 \text{ dig})$	0.1 V	$\pm (2 \% \text{ of m.v.} + 10 \text{ dig})$

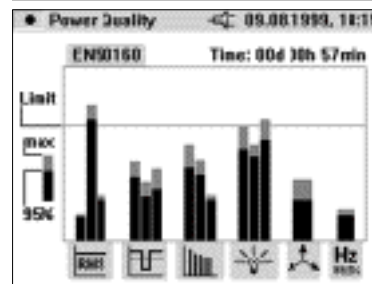
Flicker



- Display of flicker level as a digital value or chart
- Flicker level P_{st} as per IEC1000-4-15
- Display of momentary flicker level for fast diagnosis.

Intrinsic error	Resolution	Operating error
$\pm (3 \% \text{ of m.v.} + 10 \text{ dig})$	0.01	$\pm (5 \% \text{ of m.v.} + 10 \text{ dig})$

Voltage quality



- Graphic display of all relevant power quality parameters
- "Quick View" display for fast analysis
- Representation as per EN50160.

Other

Screenshots



- Saving of all measurement results
- On-site management and viewing of data
- Sorting of measurement results according to date and time.

Data storage

- Stores up to 50 screenshots, event data and course-of-time data in the flash memory
- Total of approx. 1.5 MB storage space for measurement data
- Storage duration 1440: average intervals in the functions of performance, harmonic component, Hz, volt, amps and flicker and for network quality 9600 average intervals, which for instance correspond to 10 days or 66 days (in PQ mode) with 10 minute average times.
- Auto-Screenshot saves up to 6 screenshots during one recording session, which can be viewed with the View Auto-Screenshots option.

Interface

- RS232 interface for data transfer and firmware upgrades
- Standard RS232 SUB-D connector (9-pole / female)
- RS232 configuration:
up to 115.2 kBaud, 8 data bits, no parity, 1 stop-bit.

Updates

- Firmware updates by user via RS232 interface and Flash Update software
- Due to flash technology, the device does not need to be opened

Scope of Delivery, Accessories, Service

Analyser

ANALYST 3Q Basic unit	Basic unit 3-phase, voltage test leads, NiMH-battery package, mains adapter, protective holster, carrying belt, RS232 interface	SH0601G
ANALYST 3Q Set	ANALYST 3Q basic unit + LEM-flex set for 3 currents and carrying case	SH0600G
ANALYST 3Q Set	ANALYST 3Q basic unit + LEM-flex set for 4 currents and carrying case	SH0602G

Accessories

Voltage measuring cable	Measuring cable 3-phase, 2 m long, 4 insulated alligator clips dolphin grips	E438080005
Voltage measuring cable for the UK	Measuring cable 3-phase, see above, UK colours	E438080011
Voltage measuring cable for the USA	Measuring cable 3-phase, see above, USA colours	E438080018
LEM-flex 3-phase for ANALYST 3Q	15/150/3000A with 7-pole plug	SX8315A
LEM-flex 4-phase for ANALYST 3Q	15/150/3000A with 7-pole plug	SX8415A
Replacement accumulator pack	NiMH - 2700mAh / 7.2V	EP0610A
Carrying case	Transportation and protective carrying case	EP0611A

Accessories

Current transformer	Clip-on current transformer 3-phase 1 / 10 A 5 / 50 A 20 / 200 A	SX8305A SX8350A SX8320A
Current transformer	Clip-on current transformer 4-phase 1 / 10 A 5 / 50 A 20 / 200 A	SX8405A SX8450A SX8420A

Service

Certificate A3Q	ASC 02 (LEM-certificate with list of calibration points) for ANALYST 3Q	EP0620A
Certificate A3Q	ASC 05 (ÖKD-certificate) for ANALYST 3Q	EP0621A
Certificate A3Q+Flex3	ASC-02 for ANALYST 3Q incl. 3-phase LEM-flex set	EP0622A
Certificate Flex3	ASC-02 (LEM-certificate with list of calibration points) for 3-phase LEM-flex set (without ANALYST 3Q)	EP0624A
Certificate Flex4	ASC-02 (LEM-certificate with list of calibration points) for 4-phase LEM-flex set (without ANALYST 3Q)	EP0625A
Certificate A3Q+Flex4	ASC-02 for ANALYST 3Q incl. 4-phase LEM-flex set	EP0626A
Certificate A3Q+Flex4	ASC-05 for ANALYST 3Q incl. 4-phase LEM-flex set	On request
Certificate A3Q+Flex3	ASC-02 for ANALYST 3Q incl. 3-phase LEM-flex set	On request

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