Power Quality Analyser

# ANALYST 3QC

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


## Measuring system

**ANALYST 3QC** 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.
An instant view of voltage and current waveforms is provided through an oscilloscope mode capable of displaying current and voltage waveforms for all 3 phases simultaneously.
The online harmonicsmeasurement mode quickly shows the state of voltage and current harmonics and THD.
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 3QC** 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 3QC** is an ideal troubleshooting tool to identify and quantify power quality problems that effect the performance and efficiency of electrical plant and equipment.
**ANALYST 3QC** has been designed for the rapid location 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.

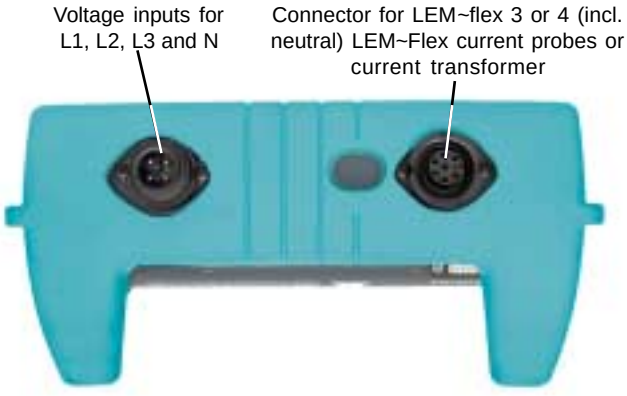
## Operation

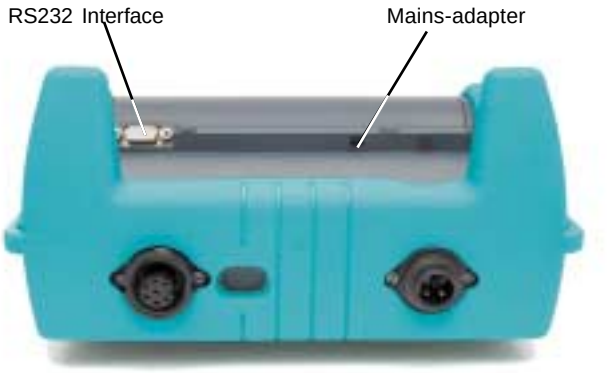
**ANALYST 3QC** was designed with easy operation in mind. The desired measuring function is directly selected using a central dial. **ANALYST 3QC** will immediately deliver the relevant measuring results.


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

A high-resolution colour display enables the representation of graphs.

## Connectors




## Technical Data

**Display:**

| | |
|---|---|
| Display | 1/4 VGA display, Colour transmissive LCD 320 x 240 pixels with backlight. |

**Ambient Conditions:**

| | | |
|---|---|---|
| Working temp. range | -10° C...+50° C | (+14° F...+122° F ) |
| Operating temp. range | 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 > 8 hours > 12 hours with backlight at level 2 |
| 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


- 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 (sinewave); 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 are not accounted for here.

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 | | |
| $U_m \geq 3\ \% U_N$<br>$U_m < 3\ \% U_N$<br>$I_m \geq 10\ \% I_N$<br>$I_m < 10\ \% I_N$ | 5 % $U_m$<br>0,15 % $U_N$<br>5 % $I_m$<br>0.5 % $I_N$ | | |
| THDU | for THD <3 %:<br>for THD ≥3 %: | < 0.15 %<br>< 5 % | at $U_N$<br>at $U_N$ |
| THDI | for THD <10 %:<br>for THD ≥10 %: | < 0.5 %<br>< 5 % | at $I_N$<br>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 |
|---|---|---|
| ± (0.7 % of m.v. + 15 dig) | 1 kW | ± (1.5 % of m.v. + 20 dig) |

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

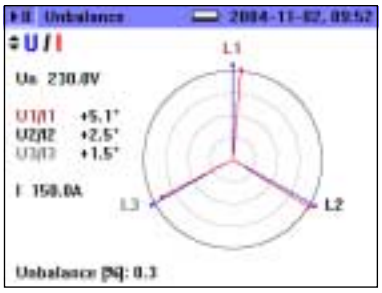
| Intrinsic error | Resolution | Operating error |
|---|---|---|
| ± (0.7 % of m.v. + 15 dig) | 1W…10W | ± (1.5 % of m.v. + 20 dig) |

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

**PF Power Factor**

| Range | Resolution | Accuracy |
|---|---|---|
| 0.000 to 1.000 | 0.001 | ±1% of full scale |

## Unbalance



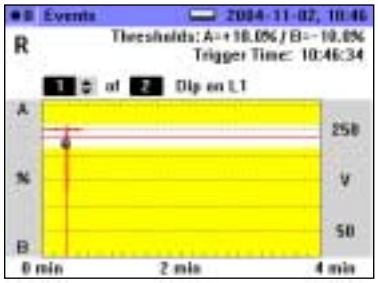

- Representation of 3-phase network as vector diagram
- Representation through voltage and current vector diagrams
- Numeric display of r.m.s. values and phase angles and unbalance.

Simultaneous display of current and voltage vectors in colour with phase angle information for phase to phase voltage, phase to phase current and phase voltage and current.

**Phase angles:**

| Intrinsic error | Resolution | Operating error |
|---|---|---|
| ± (0.5 % of m.v. + 5 dig) | 0.1 ° | ± (1 % of m.v. + 10 dig) |

## Events

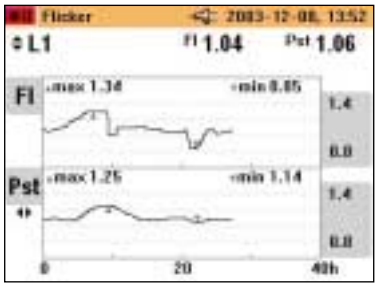



- Detection of voltage dips, voltage swells and voltage interruptions
- Automatic triggering and recording based on half-cycle r.m.s. values

**Half-cycle r.m.s. values:**

| Intrinsic error | Resolution | Operating error |
|---|---|---|
| ± (1 % of m.v. + 10 dig) | 0.1 V | ± (2 % of m.v. + 10 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 |
|---|---|---|
| ± (3 % of m.v. +10 dig) | 0.01 | ± (5 % of m.v. + 10 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-Screenshotsoption.

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

## Accessories

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

## 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 3QC | 15/150/3000 A with 7-pole plug | SX8315A |
| LEM~flex 4-phase for ANALYST 3QC | 15/150/3000 A with 7-pole plug | SX8415A |
| Replacement accumulator pack | NiMH - 2700mAh / 7.2 V | EP0610A |
| Carrying case | Transportation and protective carrying case | EP0611A |

## Service

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

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