

## MODEL 6630

## Key Features:

- IEC555-2, IEC1000-3-2, EN60555-2, EN61000-3-2 준거한 Voltage 및 Current Harmonics 시험 가능
- IEC555-3, IEC1000-3-3, EN60555-3, EN61000-3-3 준거한 Flicker(Voltage fluctuations) 시험 가능
- 진보된 DFT 와 DSP 기술 채택
- Multi-Processor System 방식
- 세가지 측정모듈을 갖춘 모듈 측정 방식
- 다양한 시험 요구를 충족시켜주는 57가지의 시험기능 모듈(Harmonics, Flicker, Multimeter, Recording, Waveform)
- Harmonic 분석과 Bar-Graph/Table을 40개 Harmonic까지 표현가능
- 각 측정 모듈에 2채널 18비트 A/D 컨버터 내장형
- Voltage와 Current curves의 동시표현(1~16 주기)
- 규격시험용 프로그램기능 내장형
- 충분한 입력 전압(6V~2,000Vpk) 및 전류(0.1A~300Apk)
- 측정값을 저장하고, Software를 Up-Grade 할 수 있는 3 1/2" Floppy driver 채택
- RS-232C, IEEE-488 Interface 기능
- 1 Parallel & 2 Serial Communication Ports

## Power Measurement System POWER ANALYZER MODEL:6630

Chroma의 전원측정시스템은 국제규격에 따라, 빠르고 정밀한 전원 관련 측정을 위하여 철저히 새로운 개념으로 만들어 졌다.

진보된 6630 Power Analyzer와 6530 Series 또는 기타 Chroma AC Power Source를 함께 사용시 IEC 555-2, EN60555-2, EN61000-3-2, IEC 1000-3-2 규격에서 요구하는 Voltage, Current Harmonics 시험이 가능하고, IEC 555-3, EN60555-3, EN61000-3-3, IEC 1000-3-3 규격에서 요구하는 Flicker 시험이 가능하다. 이러한 시험은 프로그램 되어 있기 때문에 곧바로 실행이 가능하고, 사용자가 임의로 바꿀수도 있다.

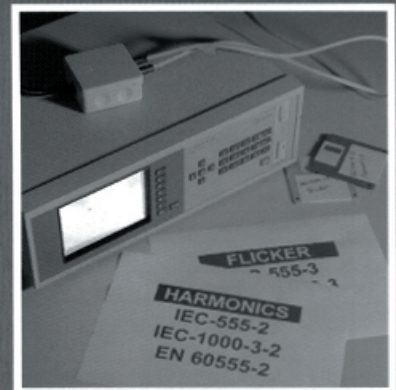
6630 Power Analyzer는 두가지 측정모듈타입, 규격과 DSP를 갖춘 모듈의 측정기이다. 각 측정모듈은 Processor, 메모리(ROM, RAM, Flash ROM), 2 채널 18-bits A/D 컨버터를 포함하며, 32-bits floating point mathematical algorithms과 함께 software에서 충족시킬수 있는 Discrete Fourier Transform (DFT)를 사용한다. 그러므로 고속 상태의 Power관련 측정기를 평가할 수 있고, 정확히 측정 변수를 분석할 수 있다.

측정기는 정상적인 전원 측정을 위한 모든 규격측정을 할 수 있으며, Voltage(U),

Current(I), Active Power(P), Reactive Power(Q), Apparent Power(S), Active Energy(W), Reactive Energy(Wr), Apparent Energy(Wa), Frequency(f), Crest Factor(CF), Power Factor(PF), Phase Angle( $\phi$ )등을 나타낸다.

6630 Power Analyzer는 독립적으로 사용하거나, 통합하여 사용할 수 있도록 설계되어 있어, 여러 가지 다용도 목적으로 사용 할 수 있다. Harmonics, Flicker, Multimeter, Recording, Waveform은 5가지 독립적인 기능모듈이고, 시스템모듈은 통합하여 사용하는 ATE 시험이나, 상황분석을 용이하게 해 준다. 향후 규격이 개정되어도 Software를 Upgrade하여 이용 할 수 있고, 디스크 드라이브가 내장되어 있어 Test Report 작성시 편리하게 이용할 수 있다.

6630 Power Analyzer는 전면에 있는 Keypad를 이용하여 쉽게 작동 시킬수 있고, IEEE-488 또는 RS-232C를 이용하여 작동시킬수 있다. 또한 Printer Interface는 Harmonic bar-charts, 결과치, 파형 또는 측정기상태와 측정값을 프린트하여 줄 수 있다.



# Chroma



EN60555-2

IEC-555-2

EN60555-2

EN61000-3-3

IEC-555-3

IEC-1000-3-3

EN60555-3

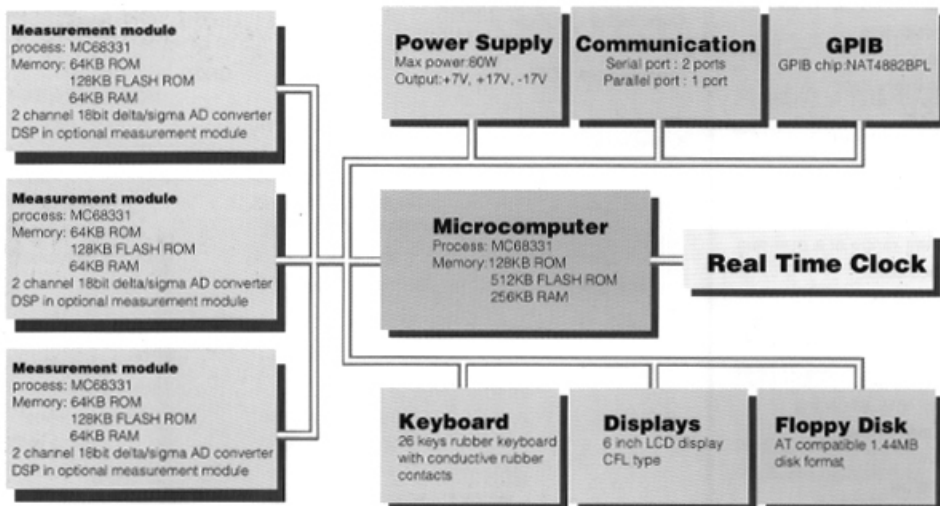
IEC-1000-3-2

EN61000-3-2

IEC-1000-3-2



## The State of Art System Architecture offers Comprehensive Testing Capabilities.



### Multimeter

The Multimeter mode offers up to six - simultaneous and user selectable measurement possibilities. In this mode the analyzer fits a wide range of test requirements by replacing multiple power instruments.

### Harmonics

The Harmonics mode measures voltage and current harmonics in compliance with IEC555-2, EN60555-2, EN61000-3-2 and IEC 1000-3-2. Results are available in graphical and numerical form for convenient presentation and storage.

### Flicker

The Flicker mode measures voltage fluctuations according to the international standards IEC555-3, EN60555-3, EN61000-3-3 and IEC1000-3-3.

### Waveform

The Waveform mode is a power frequency digital oscilloscope tool to analyze 1 to 16 periods of the voltage and current inputs.

### Recording

The Recording mode presents time diagrams of up to three simultaneous user defined variables for medium and long term variation studies. In this mode the 6630 Power Analyzer becomes a multichannel power data recorder.

### MULTIMETER:

- User selectable mean value measurement.
- Standard deviation measurement.
- Fast-follow function apply best transient response under mean-value measurement.
- Large measurement range.
- User selectable set up for 6 simultaneous readouts.

### MULTIMETER:

#### MEASUREMENT SETUP AND PRESENTATION

Display:	The display is divided into six user defined rows and three or five columns. For each row, a suitable parameter and measurement mode may be selected	
Parameters:	Voltage(U) Current(I) Frequency(f)	Power factor(PF) Phase angle( $\phi$ ) Active energy(W)

Measurement mode:  
Presented value  
Phases/channels

Frequency source:  
Measurement window:  
Window type:

Measurement average:

Fast follow:

Active power(P)    Reactive energy(Wr)  
Reactive power(Q)    Apparent energy(Wa)  
Apparent power(S)    Crest factor(CF)  
AC, DC or(AC+DC)  
rms, peak+/- and peak to peak(for U and I only)  
One or three phase mode. At three phase measurements the display may be setup to present either mean and sum values for all phases or values split into phases  
Voltage or current channel  
0.8-5 s  
Fixed or adapted to full periods of source frequency fundamental  
Moving of 1-100 measurements. Stand. dev. is displayed when averaging 2 or more measurements  
Yes or no. If yes is selected, averaging will restart when the fast follow threshold is exceeded



Fast follow threshold: 0.1-10% of reading+10% of lowest range  
 Result storage: Hardcopy

### COMMON TO ALL MULTIMETER PARAMETERS

Frequency range: DC and 40-70Hz fundamental  
 Filter: LP 2kHz  
 Crest factor: < 5  
 Power factor: -1 to +1  
 A/D conversion: Simultaneous sampling of U and I channels  
 Phase error between U and I inputs: Less than 0.05° at 70Hz

### VOLTAGE U

Ranges(AC peak and DC): 2000V / 600V / 200V / 60V / 20V / 6V  
 Automatic or manual range selection  
 Maximum input voltage: U+to U- or U+/U- to I+/I-  
 600Vrms(AC+DC) or 2000Vpeak  
 U+/U- to case 400Vrms(AC+DC)  
 Uncertainty at 23 ± 5 °C:  
 AC rms: ±(0.2% of rdg+0.05% fo range)  
 DC and(AC+DC) rms: ±(AC spec.+15mV)  
 Peak: ±(AC spec. +0.1% of rdg)  
 Tem. coeff. (0-18 and 28-40) °C: ±0.01%/°C rdg AC and ±2mV/°C DC  
 Common mode voltage influence: Less than 0.02% of any voltage range at a common mode voltage level of 400Vrms 50Hz  
 Display resolution: Better than 0.01% of range of 1mV  
 Input impedance: 2 × 1M/470pF

### CURRENT I

Ranges(AC peak and DC): 300A / 100A / 30A / 10A / 3A / 1A / 0.3A / 0.1A  
 Automatic or manual range selection  
 Maximum input current: 20Arms(AC+DC) continuous  
 300Apeak or 200Arms 20ms every 2sec  
 Maximum common mode voltage: I+/I- to case 400Vrms(AC+DC)  
 Uncertainty at 23 ± 5 °C:  
 AC rms: ±(0.3% of rdg+0.05% of range)  
 DC and(AC+DC) rms: ±(AC spec. + 0.5mA)  
 Peak: ±(AC spec + 0.1% of rdg)  
 Temp. coeff.(0-18 and 28-40) °C: ±0.01%/°C of rdg AC and ±0.05mA/°C DC  
 Common mode voltage influence: Less than 0.02% of any current range at a common mode voltage level of 400Vrms 50Hz  
 Display resolution: Better than 0.02% of range or 10µA  
 Input resistance: ~18mΩ  
 Protection: Fuse F25A on rear panel

1. Ucm is applied between U+/U- and case. I+ or I- is connected to U+ or U-. If I+ or I- is connected to case, the influence is less than 0.02% of common mode voltage.
2. Ucm is applied between I+/I- and case
3. Conditions: 30 min warm up time. Sine wave. Within 12 month after cal.  
 I+ connected to source, measurement time 2s adapted.

### POWER S, P, Q

Ranges: 48 ranges from 0.6VA to 12kVA. Automatic or manual selection of voltage and current range  
 Power range: Voltage range × Current range  
 Maximum input: 600Vrms and 20Arms  
 Uncertainty at 23 ± 5 °C:  
 Apparent AC and active AC: ±(0.4% of rdg + 0.1% of range)  
 Reactive: ±(0.4+D)% of rdg S + 0.1% of range  
 D=0.01 × (U<sub>THD</sub>%) × (I<sub>THD</sub>%)  
 Temp. coeff. and common mode  
 Voltage influence: Refer to voltage and current spec.  
 Display resolution: Better than 0.02% of range or 0.1mVA  
 Calculation methods:  
 (apparent) S=U · I VA  
 (active)  $P = \frac{1}{N} \sum_{i=1}^N (U_n \cdot I_n) W$   
 (reactive)  $Q = \frac{1}{N} \sum_{i=1}^N (U_n \cdot I(n+X)) var$   
 N=number of samples in acquisition time  
 X=number of samples corresponding to 90° at the fundamental frequency

4. At DC or(AC+DC) power, add(0.015 × Irdg+0.0005 × Urdg)

### FREQUENCY f

Measurement range: 40-70Hz  
 Source: Voltage or current input  
 Principle: Auto correlation  
 Uncertainty: ±0.01% of rdg  
 Resolution: 0.001Hz

### ENERGY W,Wr,Wa

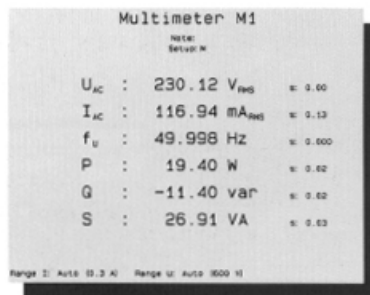
Measurement range: 0-999 999 kWh  
 Ranges and uncertainty: refer to power spec.  
 Timer uncertainty: ±0.01%(fixed measurement window)  
 Timer value: Elapsed time from start is displayed  
 Display resolution: Better than 0.05% of rdg or 0.02% of (power range × 1h)

Calculation methods: <sup>5</sup>  
 (apparent)  $W_a = \sum_{i=1}^M S_m \cdot t_a$  VAh  
 (active)  $W = \sum_{i=1}^M P_m \cdot t_a$  Wh  
 (reactive)  $W_r = \sum_{i=1}^M Q_m \cdot t_a$  varh

### COMPUTED PARAMETERS

Name:	Calculation method:	Range:	Resolution:	Unit:
Power factor	$PF = \frac{P}{S}$	-1 to +1	0.0001	none
Phase angle	$\varphi = \arctan \frac{Q}{P}$	-180 to +180	0.01	deg
Crest factor U	$CF_U = \frac{U_{peak}}{U}$	1 to 5	0.001	none
Crest factor I	$CF_I = \frac{I_{peak}}{I}$	1 to 5	0.001	none

5. ta=acquisition time M=number of acquisitions



### HARMONICS:

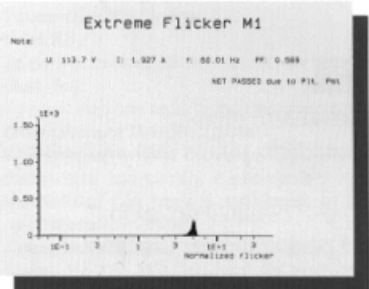
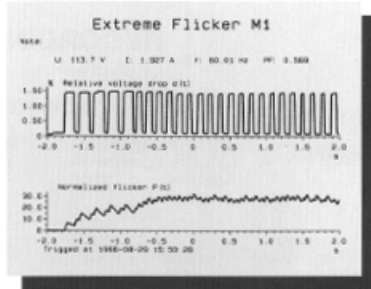
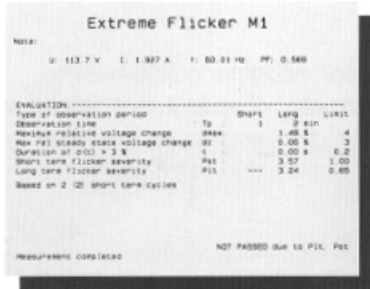
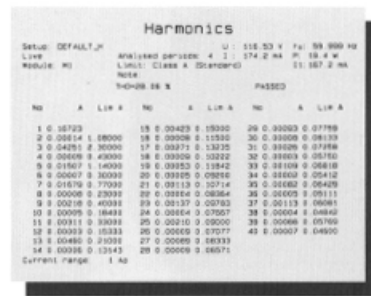
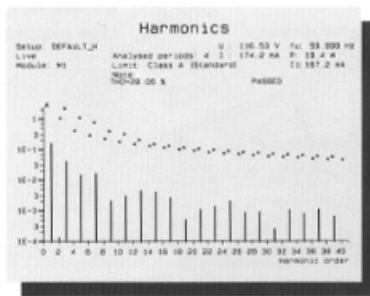
- DFT and DSP technology for steady state and fluctuating harmonics measurement.
- Graph-Table measurement result presentation.
- User defined display scale(Linear/Log & Absolute/Relative).
- Sliding windows for fluctuating harmonics recording.
- Test against IEC standard and user defined limits.

### HARMONICS ANALYSIS

#### GENERAL

Compliance measurements acc. to: IEC555-2, EN60555-2, EN61000-3-2 and IEC1000-3-2

Testing: Preprogrammed limits according to standards for pass/fail testing. User specified limits may be added  
 Result storage: Automatic or manual on hardcopy of floppy disk  
 External power source: Remote control via GPIB. Selection of voltage and frequency from 6630 Power Analyzer



## PRESENTATION

Display:	Selectable between table and graphical presentation of harmonic rms values
Limits:	On or off, both in graph and table
Graph scale:	Relative or absolute
Graph resolution:	Linear or logarithmic
Displayed parameters:	Total rms value of U and I, source frequency, active power, rms value of fundamental and THD

## MEASUREMENT

Harmonic order:	1-40
Frequency of fundamental:	40-70Hz
Frequency source:	Voltage or current
Data source:	Voltage or current
Voltage and current ranges:	Refer to voltage and current spec.
Phases/channels:	One or three
Calculation method:	FFT with 32 bit floating point math
AD-conversion:	18 bit resolution
Measurement window:	Rectangular
Analyzed periods(window with):	1-47
Synchronization uncertainty:	±0.01%
Antialiasing filter attenuation:	80dB
Measurement time:	3.5 s when standard module analyzing 6 periods
Uncertainty at 23 ±5 °C, rms: *	±(0.5% or rdg+0.03% of range)

6. Conditions: 30 min warm up time. Within 12 month after cal. 6 periods/measurement

## FLICKERS:

- Full compliance with IEC-868/IEC-1000-4-15 flicker meter specifications.
- User defined reference impedance.
- 1024 classify scales for flicker level.
- 4800 samples/second for 50/60Hz fundamental.
- Test against IEC standard and user defined limits.

## FLUCTUATIONS AND FLICKER ANALYSIS

### GENERAL

Compliance measurements acc. to:	IEC555-3, EN60555-3, EN61000-3-3 and IEC1000-3-3
Method of analysis:	Implementation of IEC868/EN60868, flickermeter spec.
Testing:	Preprogrammed limits according to standard for pass/fail testing. User specified limits may be added.
Result saving:	Hardcopy
External power source:	Remote control via GPIB. Selection of voltage and frequency from 6630 Power Analyzer.

### PRESENTATION

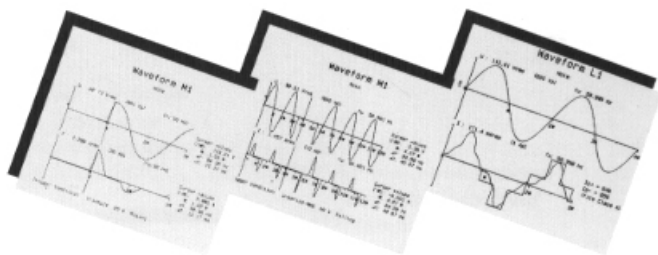
Displayed parameters:	Pst Short-term flicker Plt Long-term flicker dc Relative steady state voltage change dmax Max relative voltage change d(t) Relative voltage change Test voltage and frequency.
Limits:	On or off for pass/fail decision.

### MEASUREMENT

Voltage and current ranges:	Refer to voltage and current spec.
Range Pst:	0.1 to 20
Plt:	0.1 to 20
d:	0 to 25%
Frequency range:	40-70Hz
Phases/channels:	1-3. One phase at a time
Reference impedance:	R+jX simulated in calculation
Impedance range(R and X):	0.01-70 Ω
Reference lamp:	230V. 60W
Measurement time:	1-15min
Number of measurements:	1-1100
Uncertainty Pst:	±4% of rdg for 0.5 < Pst < 20
at 23 ±5 °C Plt:	±4% of rdg for 0.5 < Plt < 20
d:	±2% of rdg for amax > 0.1%



Remote control language: IEEE488. 2-87 and SCPI-1994.0 (Standard Commands for Programmable Instruments)  
 GPIB address: User selectable to 0-30



## WAVEFORM:

- V and I waveform monitor.
- Moving cursor to check the instantaneous values of V/I,  $\phi$ ,  $\Delta T$  &  $\Delta f$
- ICE-1000-3-2 class D envelop.
- Level and period trigger function.

## WAVEFORM GENERAL

Display: Simultaneous presentation of waveforms.  
 At single phase: voltage and current  
 At three phase; voltage or current for all phases  
 Mask for pass/fail testing acc. to IEC1000-3-2 class D

Testing: A vertical cursor is available for setting wave measurements.

Wave measurements: One or three

Phases/channels: Hardcopy or floppy disk

Result storage:

## PRESENTATION

Displayed input parameters: Rms values of voltage and current. Frequency of frequency source

Displayed cursor parameters: Horizontal position( $\phi$ ), vertical position(u), relative time( $\Delta t$ ) and relative frequency( $\Delta f$ )

No. of waveforms: 2 at single phase and 3 at three phase

Magnification: Any wave may be selected to use full screen

## MEASUREMENT

Frequency range: 40-70Hz fundamental

Frequency source(upper trace): Voltage or current

Measurement mode: AC+DC

Filter: LP 6kHz

horizontal axis length: 1, 2, 4, 8 or 16 periods

Vertical axis: Normalized to peak values

## APPLICATIONS AND DATA STORAGE

Applications: Up to 5 individual instrument setups may be stored as applications in an internal non volatile memory. More applications may be stored and read from disk

Data: Collected data from recording, waveform or harmonics measurements may be stored and read from disk

Data format: DBF

## REMOTE CONTROL

Interface: GPIB(IEEE488. 1-87)  
 RS232

Connectors: GPIB:according to IEEE488. 1-87  
 RS232: 25 pin D-sub

GPIB interface capabilities: Talker, Listener and Controller.  
 SH1, T6, AH1, L4, SR1, RL1, PP0,  
 DC1, DT1, (C0), E2

## RECORDING:

- Full range of observation period(8min-24hr).
- Simultaneous recording of up to 3 user defined parameters.
- Mean or Min-Max display diagram can be selected.
- Full range scale or interval scale display mode.

## RECORDING GENERAL

Display: Simultaneous recording of up to three user defined parameters

Magnification: Any trace may be selected to use full screen

Memory: Freeze of recording. may be sued any time without losing an information

Phases/channels: one or three

Number of traces: 1-3

Result storage: Hardcopy or floppy disk

## SELECTIONS FOR EACH TRACE

Channel: L1, L2 or L3

Parameter: Voltage(U) Frequency(f)  
 Current(I) Crest factor(CF)  
 Active power(P) Power factor(PF)  
 Reactive power(Q) Phase angle( $\phi$ )  
 Apparent power(S)  
 AC, CD or (AC+DC)

Measurement mode: Max and min or mean of collected measurements per increment

Incremental value: Full range or interval

Vertical axis scaling: Full range or interval

## MEASUREMENT

Frequency range: DC and 40-70Hz fundamental

Frequency source: Voltage or current channel

Filter: LP 2 kHz

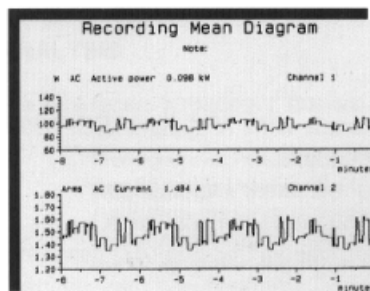
Horizontal axis length(time window): 8, 15 or 30 min, 1, 2, 4, 8 or 24 hours

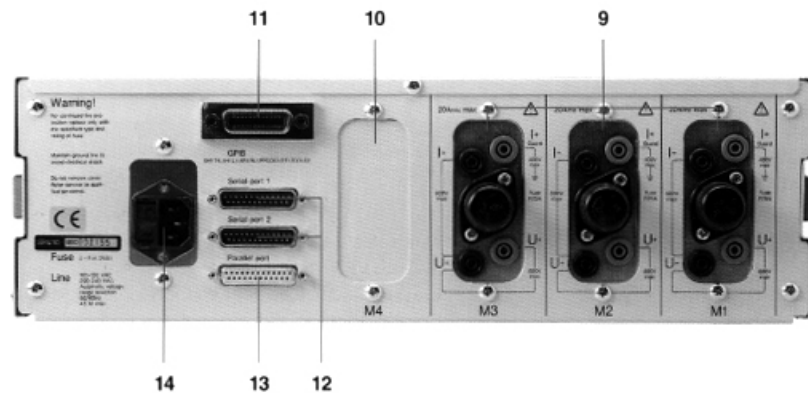
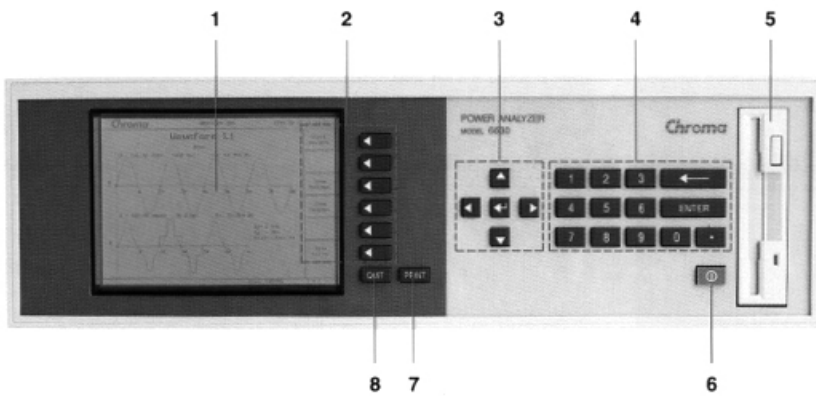
Measurements per increment: 1, 2, 4, 8, 15, 30, 60, 180

Measurement windows: 1 s

Window type: Fixed or adapted to full periods of source frequency fundamental

7. Due to horizontal axis length. One at 8min. increasing to 180 at 24 hours





## PANEL:

### 1. Graphic LCD Display

Graphic LCD shows test setup, operating status, readings and waveforms.

### 2. Softkey Group

The 6 softkeys each have a text area on the display that defines its function. the softkey functions change with the current menu level.

### 3. Arrow Keygroup

For stepping through the input fields on a display page, and used for stepping through predefined choices on input fields.

### 4. Numeric Key

For entering numeric data.

### 5. Floppy Disk Unit

3.5" disk drive that reads, writes and formats standard PC-AT compatible 1.44MB disks.

### 6. Power ON/OFF Switch

### 7. Print Key

To print or to save on disk the current display contents.

### 8. Quit Key

To back step one level in the instruments menu level tree.

### 9. Measurement Module Inputs

The measurement modules Current/Voltage input connectors and current measurement input fuses. The instrument can have a maximum of three installed measurement modules.

### 10. Spare Module Slot

Spare module slot reserved for instrument options or future expansion of the instrument.

### 11. GPIB Interface

### 12. Serial Ports

### 13. Parallel Port

Centronic compatible parallel port for connecting a hard copy device such as a printer or plotter to the instrument.

### 14. Power Input Connector and Fuseholder

## POWER ANALYZER MODEL: 6630

### GENERAL SPECIFICATIONS

<b>Display:</b>	LCD 640 × 480 pixels with backlight
<b>Printer output for hardcopy:</b>	Parallel(Centronics compatible) or serial(RS232)
<b>Floppy drive:</b>	1.44MB 3" PC-format. For software updates and result storage
<b>Rack mounting:</b>	With optional rack mount kit. Size 19" 3HE
<b>Dimensions:</b>	(H × W × L) 132 × 425 × 340mm(5.2 × 16.7 × 13.4inches)
<b>Weight:</b>	Single phase 9kg(20lbs), three phase 11.4kg(25lbs)
<b>Operating environment:</b>	0 to +40 °C <80%R.H. non condensing
<b>Storage environment:</b>	-30 to +60 °C non condensing
<b>Power supply:</b>	100-130V or 220-240V, automatic range selection
<b>Power line frequency:</b>	50/60Hz
<b>Power consumption:</b>	45 W max
<b>Protection:</b>	Fuse 2 × F1A on rear panel
<b>Safety:</b>	Designed to comply with the Low Voltage Directive 73/23/EEC plus parts of 93/68/EEC. Applied standard, EN61010-1:1993, Installation category II.
<b>EMC:</b>	Designed to comply with the EMC Directive 89/336/EEC and 92/31/EEC Applied standards, EN50081-1:92 and EN50082-1:92
<b>Warranty:</b>	One year from date of delivery for manufacturing and material failures

### Ordering Information

6630:Power Analyzer 6630 with Measurement Module x 1(1 ☉)

6631:Power Analyzer 6630 with Measurement Module x 3(3 ☉)

6630DSP:Power Analyzer 6630 with DSP Measurement Module x 1(1 ☉)

6631DSP:Power Analyzer 6630 with DSP Measurement Module x 3(3 ☉)

### Options

A663001:Measurement Module

A663002:DSP Measurement Upgrade Kit

A663003:Measurement Input Cables

A663004:Rack mounting Kit for Model 6630 Series

A663009:Measurement Fixture 1