

IEC 60601-1 Defibrillation-Proof and Energy Reduction Tester

Model KP3301

For defibrillation-related protection, energy-reduction and residual-voltage evaluation of ECG and patient-monitoring equipment.



Applicable Standard Family: IEC 60601-1, relevant IEC 60601 particular standards, and applicable IEC 80601 particular standards for compatible patient-connected medical equipment.

0 to ± 5.5 kV

Charging voltage

32 μ F / 8 kV

Main capacitor

500 μ H / 25 mH

Selectable inductance

1 J

Energy resolution

Automatic

Y1-Y2 calculation

7-inch LCD

Touchscreen control

Product Overview

The KP3301 integrates the high-voltage source, selectable resistance and inductance networks, polarity control, energy calculation, Y1-Y2 voltage calculation and physiological signal simulation in one platform. Manual and automatic ECG lead-switching accessories can be selected according to the DUT and test workflow.

Key Information

Product model: KP3301

Test arrangements: Common mode and differential mode

Energy measurement: Automatic calculation with 1 J resolution

Lead switching: Manual adapter or optional automatic converter box

Typical DUT: ECG and patient-monitoring equipment

PRODUCT FUNCTION

How the KP3301 Supports Defibrillation-Related Testing

The instrument combines the electrical test source, selectable test network and supported measurement functions in one coordinated platform.

Protection Against the Effects of Defibrillation

Applies controlled positive or negative high-voltage conditions to compatible patient-connected inputs through the selected resistance and inductance network.

Energy Reduction Measurement

Uses the 25 mH configuration and displays the calculated result with 1 J resolution. The no-load theoretical references are approximately 364 J at 10 Ω and 360 J at 11 Ω .

Y1-Y2 Residual or Hazardous Voltage

Automatically calculates the supported Y1-Y2 result, reducing manual processing of disturbed oscilloscope data during the high-voltage event.

ECG and Respiration Signal Simulation

Provides a 10 Hz sine-wave ECG signal adjustable from 0.5 mV to 10 mV and a respiration-rate setting from 5 to 60 rpm for compatible functional observation.



Product Distinction

The KP3301 is not a clinical defibrillator analyzer. A defibrillator analyzer measures the energy and waveform delivered by a clinical defibrillator. The KP3301 instead generates controlled electrical conditions for evaluating the protection and energy-reduction performance of patient-connected medical equipment.

TEST WORKFLOW

Typical Test Sequence

01	Confirm DUT and clause	Identify the equipment type, applied part, standard edition and applicable test clause.
02	Select the test network	Set the resistance, inductance, charging voltage and polarity required by the test method.
03	Connect the DUT	Use the manual adapter or optional automatic lead converter box according to the lead configuration.
04	Apply the test sequence	Perform the required common-mode or differential-mode test sequence.
05	Evaluate the result	Review energy, Y1-Y2 voltage and post-exposure DUT performance against the applicable criteria.

INSTRUMENT DATA

KP3301 Technical Specifications

Published values below are derived from the current KingPo product material. Unconfirmed parameters are intentionally omitted.

High-Voltage Source and Test Network

Charging voltage	0 to ± 5.5 kV
Charging-voltage accuracy	$\pm 1\%$
Voltage setting resolution	1 V
Output polarity	Positive and negative, digitally selectable
Main capacitor	32 μF $\pm 5\%$
Capacitor voltage rating	8 kV
Selectable inductance	500 μH and 25 mH
Inductance tolerance	$\pm 5\%$
Internal resistance	10 Ω and 11 Ω
Non-inductive resistors	50 Ω , 100 Ω and 400 Ω
Resistor tolerance	$\pm 1\%$
Display and operation	7-inch LCD touchscreen

Measurement, Signal and Operation

Test operation	Automatic and manual modes
Test arrangements	Common mode and differential mode
Energy-test inductance	25 mH
Energy display resolution	1 J
No-load reference at 10 Ω	Approx. 364 J, theoretical value
No-load reference at 11 Ω	Approx. 360 J, theoretical value
Y1-Y2 calculation	Automatic residual or hazardous voltage calculation
ECG signal type	10 Hz sine wave
ECG signal range	0.5 mV to 10 mV
Default ECG signal	5 mV
Respiration signal range	5 to 60 rpm
Default respiration rate	27 rpm

Technical Notes

Energy references: The approximately 364 J and 360 J values describe the documented no-load circuit conditions and are not universal DUT pass/fail limits.

External verification: An oscilloscope, high-voltage probe or other instrument may still be required where the standard, laboratory procedure or quality system calls for independent waveform or voltage verification.

Parameters not confirmed in the source: Instrument dimensions, net weight, AC input power, charging time and charging-cycle interval.

TEST ARRANGEMENTS

Common-Mode and Differential-Mode Testing

Common-Mode Test

The applicable patient connections are grouped and exposed to the test condition relative to another reference point in the circuit. This evaluates the response of the patient-connected input system to a common electrical stress.

Differential-Mode Test

The test voltage is applied between selected patient connections or lead groups. This evaluates the protection between individual patient-input circuits and the behavior of the associated input electronics.

APPLICATION SCOPE

Applications, Standards and Ordering Information

Typical Equipment Under Test

- Diagnostic electrocardiographs
- ECG monitoring equipment
- Multifunction patient monitors
- ECG patient cables and lead systems
- Respiration-monitoring input circuits
- Compatible patient-connected physiological monitoring modules

Typical Users

- Medical device manufacturers
- Third-party testing laboratories
- Certification and inspection organizations
- Product development laboratories
- Medical electrical safety laboratories
- Quality-assurance and type-testing departments

STANDARDS REVIEW

Applicable Standard Family

The final circuit and applicability must be confirmed against the DUT, standard edition and specific clause.

Standard / Edition	Typical Equipment Scope
IEC 60601-1 Ed. 3.2	General requirements for basic safety and essential performance; used with the applicable particular standard.
IEC 60601-2-25:2011	Diagnostic electrocardiographs.
IEC 60601-2-27:2011	Electrocardiographic monitoring equipment.
IEC 60601-2-34:2024	Invasive blood pressure monitoring equipment, subject to project-specific circuit review.
IEC 80601-2-49:2018+A1:2024	Multifunction patient monitors.
Other relevant standards	Applicable IEC 60601 or IEC 80601 particular standards where the specified KP3301 circuit is suitable.



Main instrument	KP3301 Defibrillation-Proof and Energy Reduction Tester
Lead-switching accessories	Manual defibrillation adapter or optional automatic defibrillation lead converter box
Automatic converter communication	DB9 serial communication cable
Connection accessories	Output signal lead, adapter cables, Y1-Y2 test lead, grounding wire, connection posts and aluminum plate
Documentation	Electronic user manual, calibration certificate, certificate of conformity and warranty documentation

Compliance statement: The KP3301 supports selected test arrangements but does not independently certify the DUT or guarantee conformity. Final results depend on the applicable edition, clause, test network, DUT classification, lead arrangement, verification instruments, test sequence and post-test acceptance criteria.

Information Required Before Ordering

- DUT manufacturer and model
- Equipment type and applied-part classification
- Standard, edition and test clause
- Number and type of patient leads
- Common-mode / differential-mode requirement
- Energy-reduction and Y1-Y2 requirements
- Manual or automatic lead-switching preference
- Calibration and traceability requirements

Technical Inquiry and Configuration Support



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