



cardiofax V

Providing more information and high versatility

The Cardiofax V electrocardiograph was designed to deliver the best possible diagnostics in the field of resting as well as stress test ECG. Cardiofax V supports caregivers in their daily routines by supporting efficient workflows and providing comprehensive clinical information to ensure reliable diagnosis for today's diverse patient population.

With its large 12-inch color touch display, data can be viewed easily. The display allows for ECG preview before recording. Other efficiency tools like customizable smart keys or a help function for ECG electrodes placement improve and simplify the caregiver's workflow. Nihon Kohden's breakthrough technology supports clinicians in testing more patients by providing enhanced information:

The synECi18 technology makes 18-lead ECG information available from a 12-lead ECG, thus optimizing patient safety and functioning as a great triage tool without additional workload on the caregiver. Our high quality waveform analysis technology meets the IEC60601-2-25:2011 international standard for electrocardiographs' accuracy and safety, and supports noise elimination with no waveform distortion for a reliable diagnosis.



cardiofax **V**

High versatility and efficient workflow

- **High visibility:** The large 12-inch color touch display shows ECG waveforms and analysis results clearly.
- **Easy operation:** The touch panel display shows all the keys right on the display for intuitive operation. Configurable smart keys on the main unit help to simplify the operation.
- **Efficient workflow:** A start/ stop key on the patient input box improves caregiver's workflow. An alarm indicates if electrodes are detached supported by an illustration on the screen. The patient ID check functionality indicates if the patient information is not entered or if the patient had 2 limb leads detach for 5 seconds or more and the patient information has not been changed.
- **Reliable diagnosis:** Cardiofax V features a digital input box with noise resistance. It digitalizes the ECG signals, reducing AC noise in the waveform.
- **Electronic recording:** The preview function allows for checking of waveforms and analysis results before recording. In paperless mode, waveform and analysis results can be transferred to a PC for review using USB, SD card, LAN, or WiFi. PDF and DICOM are supported as output modes.
- **Easy data transfer:** Up to 18,000 ECG files can be stored in the internal memory. Approximately 48,000 ECG files can be stored in an SD memory card.
- **Optional stress testing functionality:** Cardiofax V can be connected to a treadmill or ergometer (*) to generate a 12-lead ECG while exercising.

More information and reliable diagnosis

High level 12-lead ECG analysis – Cardiofax V includes Nihon Kohden's latest interpretation program, **ECAPS 12C analysis program**. It provides simultaneous 12-lead ECG acquisition for up to 24 seconds and analysis with approximately 200 findings and 5 judgment categories. ECAPS 12C can also find typical waveforms of Brugada-type electrocardiograms.

Nihon Kohden developed synECi18 as a breakthrough technology to provide 18-lead ECG information from a standard 12-lead ECG by synthesis of the additional leads V3R to V5R and V7 to V9 to **help identify invisible ischemia**.

Especially when presentation is not typical or initial 12-lead ECG is negative, diagnostic inaccuracy may cause harmful delays. Timely ischemia detection may prevent myocardial damage or may shorten the time to PCI (percutaneous coronary intervention) indication.

With the same workload and cost as for the standard ECG procedure, patient safety is optimized and time to reperfusion may be reduced. Especially in emergencies, synECi18 is regarded as a useful triage tool to enhance outcomes through early recognition and stratification.

High performance IEC60601-2-25:2011– Cardiofax V complies with IEC standard IEC60601-2-25:2011 which approves high accuracy of signal processing (AC filtering), ECG measurement, and ECG analysis. It helps you with accurate ECG diagnosis.

(*) Treadmill: Valiant (Lode BV); TMX428 (Full Vision.Inc); STEX-8100T (TAEHA Mechatronics.,LTD)
Ergometer: Corival (Lode BV); ergoselect 50/100/200 (ergoline GmbH)

Specifications

ECG-2450

Display

Display size	12.1"
Display type	TFT LCD
Resolution	1024 × 768
Touch panel	Available
Displayed data	Waveform, patient information, message, status, input box key, result key, current date and time, battery status, QRS sync mark, heart rate, test setting, test name, individual test and mode keys, test setting key, comment on patient or comment at request, network icon, operation guide icon, media icon, technician, function key

Recorder

Recording method	Thermal head
Meandering	0.5 mm or less
Printing density	200dpi
Number of channels	3, 3+Rhythm, 6, 6+Rhythm, 12, 15
Recording data	Program type, version, data and time, paper speed, sensitivity, lead name, filter, hospital name, patient information, electrode detachment, noise
Recording paper	<i>For use inside the instrument:</i> Width: 210 or 216 mm Z-fold or roll type: 30 m <i>For cart:</i> Width: 210 or 216 mm Z-fold or roll type: 100 or 300 m Recording speed: 5, 10, 12.5, 25, 50 mm/s

Power status indication and battery

Indicate status on LED lamp	Power lamp, AC power lamp, battery charge lamp and battery power lamp
Indicate status on LCD	Remaining battery power
Battery operation time	More than 30 minutes battery charging
Battery charging time	Less than 6 hours

Dimensions and weight

Main unit dimensions	340 W × 153 H × 455 D mm (excluding protrusions, when the display is closed) 340 W × 380 H × 502 D mm (excluding protrusions, when the display is opened)
Weight	Approx. 8.6 kg (including battery, excluding other options)
Input box dimensions	105 W × 30 H × 123 D mm (excluding protrusions)
Weight	Approx. 220 g

ECG measurement and recording

Filter	<i>Hum filter:</i> 50 or 60 Hz <i>Drift filter:</i> Strong, weak or OFF <i>EMG filter:</i> 25 or 35 Hz (-3 dB) <i>High-cut filter:</i> 75, 100 or 150 Hz (-3 dB) <i>Low frequency characteristic:</i> Time constant 3.2 s or more
Sampling frequency and bit precision	<i>Input:</i> 16,000 samples <i>Waveform data processor:</i> 500 samples <i>Resolution:</i> 1.25 μV/LSB
Heart rate count measurement	<i>Measurement and display range:</i> 30 to 299 bpm <i>Accuracy:</i> ±10% (30 to 240 bpm)
RR interval measurement	Available
Arrhythmia analysis	Available
Extended recording for auto arrhythmia detection	Available
Measurement mode	Standard 12-lead, 15-lead, Cabrera leads or Nehb leads, RR interval test, exercise test (option), signal average ECG test (option)
Input impedance	20 MΩ or more
Electrode offset tolerance	±550 mV
Common mode rejection ratio (discrimination ratio):	110 dB or more
Sine wave characteristics (frequency response)	0.05 to 150 Hz (-3 dB)
Sensitivity precision	10 mm/mV ±5%
Channel interference	-40 dB or less
Pacemaker detection	Available
Start/stop key and lamp	Available
Electrode failure indication LED	Available
External input	2 channel, 10mm/0.5 V
Signal output	1 channel, 0.5V/1 mV
Sensitivity selection	2.5, 5, 10, 20 mm/mV

ECG analysis

Program name	ECAPS 12C
Analysis patient age	3 years to adult
Finding items	approx. 200
Judging items	5
Program name	ECAPS 18
Finding items	Right ventricular or posterior findings

Input/ output connectors and destination device

Input box connector	2 (for JD-211D/DA , JD-212D, JD-213D/DA input box)
LAN connector	1 (for 10baseT, 100baseTX or 1000baseT)
RS-232C ports ^{*1}	2
USB 2.0 ports	4 (for keyboard, numeric keypad, magnetic card reader, or barcode scanner, wireless Ethernet converter)
Concentration connector ^{*1}	1 (for 2ch external analog input or 1ch external analog output ^{*2})
3.5ø mini jack ^{*1}	1 (for 1ch external analog output ^{*2})
SD card slot	1 (for QM-001D/QM-002D SD memory card or equivalent)
Sub monitor connector ^{*3}	1 (for sub monitor)
Sound output	1 speaker

^{*1} IEC-60601-1 applies to the RS-232C connectors, concentration connector, and 3.5ø mini jack

^{*2} The same signals are output; ^{*3} IEC and ISO applies the sub monitor connector.

Storage environment

Main unit	<i>Surrounding temperature:</i> -20 to +65°C <i>Relative humidity:</i> 10 to 95% <i>Atmospheric pressure:</i> 700 to 1060 hPa
Battery	<i>Storage temperature range:</i> 30 days or less: -20 to +50°C One year or less: -20 to +30°C <i>Storage humidity range:</i> 60 days or less: 10 to 95% One year or less: 45 to 85%
Recording paper	<i>Storage temperature range:</i> -20 to +50°C <i>Storage humidity range:</i> 10 to 95%

Operating environment

Main unit	<i>Surrounding temperature:</i> 5 to 40°C <i>Relative humidity:</i> 25 to 95%, non-condensing (except for recording paper) <i>Atmospheric pressure:</i> 700 to 1060 hPa
Battery	<i>Operating humidity range:</i> 60 days or less: 10 to 95% One year or less: 45 to 85%
Recording paper	<i>Operating humidity range:</i> 25 to 80%

Performance standard

IEC60601-1:2005+Amendment 1:2012, IEC60601-2-25:2011, ISO14971:2007, ISO10993-1:2009, IEC60601-1-6:2010+Amendment 1:2013, IEC60601-1-9:2007+Amendment 1:2013, IEC60601-1-2:2007, IEC62304:2006, IEC62366:2007+Amendment 1:2014

Electromagnetic Compatibility

IEC 60601-1-2: 2007, IEC 60601-2-25:2011

Power

AC power	<i>Line voltage:</i> 100 to 240 V <i>Line frequency:</i> 50 or 60 Hz ±5% <i>Power input:</i> 220 VA
Built-in battery	<i>Rated voltage:</i> 14.4 V <i>Battery operation:</i> more than 30 minutes under the conditions of operating temperature 25°C, new, fully charged, recording speed 25 mm/s, continuous recording

Exercise test software, QP-246E (option)

Clip type 12-lead set (BR-203D or BR-203DA) and connection cable (5 or 10 m) are required when using the QP-246E exercise test software in ECG-2450 electrocardiograph

12-lead waveform display	12-lead ECG waveform displays on stress test enable the doctor to detect and diagnose the abnormal multifaceted perspective.
Average complex and ST measurement	The average of resting ECG is displayed at the left side of each lead. The average complex display is updated every 5 sec.
ST-HR loop	After exercising, ST-HR loop is printed so you can see the ST change.
Irregular R-R auto detection	When irregular R-R is detected during or after exercising, the number of irregular R-R can be recorded as a report.
Report and data storage	The trend graph, average complex, measurement value can be output as a report. Report data can be stored in internal memory or memory card and reviewed on ECG Viewer Lite, QP-170D.
Protocol	BRUCE, m-BRUCe, and SHEFFIELD protocol are registered in default setting for treadmill.
Software specifications	
ECG waveform on screen	6 channels x 2 sequence (12-lead) or 6 channels x 1 sequence
Patient information	ID number, sex, age, name
Ergometer	Elapsed time, stress load, RPM, stage number
Treadmill	Elapsed time, speed, elevation, stage number
Data	Heart rate, target heart rate, blood pressure, ST level, DB



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