

cubestress

The CARDIOLINE **cubestress** wireless stress testing system combines the high performance of the software **cubestress** and of the acquisition unit **clickecgbt**.

cubestress is the complete solution to manage ECG Stress tests.

cubestress combines all the typical procedures for the stress test in a single application: from patient preparation management to the real time display of the 12 leads on the screen, from printing out the trace, also available in real time, to automatic ergometer management, and from automatic archiving to printing out the final document and exporting it in electronic format.

Equipped with a highly configurable user interface and numerous operating options, **cubestress** is a tool dedicated to cardiologists and sports medicine professionals.

The system includes a trolley that can accommodate all the accessories of the system and that can be provided with medical isolation transformer.

Detailed description of performances and features for both versions are described below in the dedicated product descriptions.

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Description

cubestress can operate as a single workstation, or the database can be shared with other networked **cube** workstations.

The main characteristics of **cube**stress are:

User Interface

cubestress makes the most of the graphic potential of Windows, guiding even inexperienced users through the correct execution of all phases of the ECG stress test. Using menus, dedicated keys and guided procedures, working with **cube**stress is extremely practical and fast.

cubestress consists of several windows which can be used to monitor all program features at the same time: from simply displaying the trace in real time in various formats to managing printouts and monitoring peripheral devices such as ergometers and pressure gauges.

cubestress manages both the execution of the stress test in real time and the post-analysis phase, organising the screen with windows designed to focus the operator's attention on characteristic aspects of the test:

- the **realtime ECG window** displays the ECG signal and its complex means in real time: the amplitude values of the *J+80msec* point or the *J+60msec* point, and the *gradient* of the ST segment are calculated for each complex mean and displayed on the screen. The **twelve leads can be displayed**, changing the amplitude and speed, or the operator can choose to display certain leads only, from a minimum of one to a maximum of twelve;
- **The realtime AVG window** offers both a view of all twelve leads together, by displaying the twelve AVG values, with indications of the amplitude and gradient of the ST segment, and a privileged view of any single lead selected, displaying the *magnified complex mean* and a real time rhythm;
- In the exercise and recovery phases, the enlarged complex mean is automatically superimposed on the corresponding complex mean acquired during the pre-exercise phase, for more effective assessment of the **variations in the ST segment**;
- the **realtime trend window** presents various diagrams showing the trend in certain relevant parameters, such as heart rate, blood pressure, load applied to the ergometer, and double product, during the test. the ST analysis trends are displayed for the twelve leads using an innovative display that is characteristic of **cube**stress. These displays combine the amplitude and gradient of each lead,. Using a special colour coding to give an overall view of the channel by channel trend in the ST segment that is immediate and efficacious. the real time ECG trace is always present to guarantee safe monitoring of the patient;
- the **realtime ST-QT window** focuses the attention of the operator on analysis of the **ST and QT segment**, and allows measurements to be made directly on the single magnified complex displayed on the screen. . The ST-QT window is ideal for entering the conclusions of the test while the final recovery phase is still underway, using the system editor, since it allows the operator to constantly monitor the conditions of the patient using the real time ECG, while reviewing preceding phases of the test;

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- the **realtime ECG review window** organises the display of the *real time ECG trace for the twelve leads*, the *trace of the whole test in full-disclosure format* and a *strip of twelve channels previously acquired* to be displayed in three sub-windows for any selected instant of the test. The ECG-review window is ideal for entering the conclusions of the test while the final recovery phase is still underway, using the system editor, since it allows the operator to constantly monitor the conditions of the patient using the real time ECG, while reviewing preceding phases of the test.

All the windows give direct access to the print functions in automatic format (pages from 10 seconds) and in continuous format, using a laser printer and/or **CARDIOLINE®** thermal printer, according to how the product has been configured.

The heart rate, percentage of maximum theoretical heart rate, blood pressure values, double product, METs, and step and phase times, as well as the active protocol data, are always displayed in the foreground to inform the operator.

Use profile

The operator can choose to use all the displays available in **cubestress** or can select ,to use only those that best meet his or her requirements and approach.

Beat-beat analysis

The efficiency and performance of the analysis algorithms, together with the calculation power of the latest generation of PCs, guarantee the accuracy of the analysis and allow the program to perform real time beat-beat analysis.

cubestress automatically performs and updates the following calculations and analyses in real time:

- Heart rate;
- Percentage maximum theoretical heart rate;
- METs;
- Double product;
- J, J+60 and J+80 amplitudes for the twelve leads;
- R peak and S peak amplitudes for the twelve leads;
- Durations of QT, QTc, QTa, and QT2a for the twelve leads;
- Arrhythmia analysis.

All the analysis, printout and display parameters can be customised and saved as system configurations.

Additional software modules for analysis of *RR variability in the frequency domain*, and *Late Potentials* analysis are available as advanced options.

Filtering the ECG signal

The **CARDIOLINE®** filtering algorithms are the fruit of over twenty years' experience in processing the ECG signal applied to the stress Test. The stability of the baseline and the efficiency of the anti-muscle tremor filters permit high quality display and printout of the ECG trace, retaining its diagnostic character.

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Managing ergometers

cubestress automatically manages a vast number of cycloergometers and treadmills, monitoring their load values according to the effort protocol set, and also allows manual changes to be made during the test.

Managing effort protocols

cubestress includes a dedicated application to build customised effort protocols. The operator can use guided procedures to create protocols for cycloergometers, treadmills or generic devices, and then make them automatically available in **cubestress**.

The most common effort protocols for cycloergometers and treadmills are already available at installation.

Managing start test procedures

cubestress offers innovative management of the procedures at the start of the test. The operator can use guided procedures to successfully and efficiently prepare the patient, manage his or her *personal identification data*, enter the *indications and treatment*, and select the *ergometer and type of protocol* to be used.

Managing tests

cubestress offers a system of predefined views of the database, accessed by dedicated icons on the toolbar: so the operator can quickly access the list of tests to report on, and read and sign each test. The program also includes a *long term archiving* function for the database, which allows tests that have already been analysed to be transferred to an external support (CD, DVD, etc.), maintaining the patient data and overall data on the archived test available online in the database.

cubestress also allows advanced searches to be made using the patient data, test or acquisition device as search parameters.

Saving tests

cubestress saves the whole test in *full-disclosure* format, complete with the signals for the twelve leads, the parameters calculated, alarms and operator notes and comments, in the built-in database.

cubestress places the patient at the centre of the system, creating a virtual clinical record in which all the tests performed by **cube** workstations are automatically saved.

Sharing the database with other cube stations

cubestress was designed with the capacity to share its database with other **cube** workstations. This feature can be used to optimise work in a clinic or ward according to the specific clinical requirements of the department. For example, workstations can be dedicated to the execution of stress tests, and others to their analysis, or to the execution of different diagnostic techniques such as Holter tests and rest ECGs.

Compatible acquisition devices

cubestress can be used with **CARDIOLINE® clickecgbt** acquisition device, using *bluetooth* technology for *wireless* connection between the patient and the workstation, and the **CARDIOLINE® clickecg** acquisition device which uses a USB connection to offer ease of use and totally independent operation.

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Intended use

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cubestress is designed to monitor, store and analyse ECG signals during the execution of cardiovascular stress tests.

cubestress, used with **clickecg** and **clickecgbt**, acquisition units, is designed to monitor cardiac functions and/or diagnose the state of health of the patient, including the circumstances in which a change in cardiac function could create an imminent danger for the patient concerned.

The results of the analyses performed by the software must always be validated by qualified medical personnel, as should the use of the **cubestress** itself, designed for use in a medical environment by suitably trained and qualified personnel, and in compliance with the instructions contained in the User Manual.

All warnings concerning Residual Risks are indicated and highlighted in the **cubestress** User Manual in the "Warnings" Chapter, and in the User Manuals of the single acquisition units.

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Configurations available

cubestress is available either as a **system** configuration, complete with analysis station and trolley, or as a **software package**.

The **cube**stress *wireless system* - ref. 81019536 (MIT)/81019537 (MPL) - includes:

- **cube**stress software
- USB protection key
- USB extension cable (1,8 m)
- **cube**stress software configuration in the workstation
- **cube**stress trolley; dedicated trolley with insulating transformer (MIT only), drawer and TFT LCD screen
- **click**ecg acquisition unit complete with accessories
- analysis station:
 - o Multi-Core processor
 - o 2GB RAM, 250 GB HD, Graphical adapter 256 MB
 - o Windows 7 pro, SP1 licence
 - o LCD monitor
 - o DVD, CD reader/rewriter
 - o Built in network card
 - o Multimedia system (built in speakers)
 - o Mouse and keyboard
 - o 2 serial ports
 - o 1 parallel port
 - o 8 USB ports
 - o USB Bluetooth receiver for PC

The **cube**stress *system* - ref. 81019538 (MIT)/81019539 (MPL) - includes:

- **cube**stress software
- USB protection key
- USB protected connecting cable (4,5 m)
- **cube**stress software configuration in the workstation
- **cube**stress trolley; dedicated trolley with insulating transformer (MIT only), drawer and TFT LCD screen
- **click**ecg acquisition unit complete with accessories
- analysis station:
 - o Multi-Core processor
 - o 2GB RAM, 250 GB HD, Graphical adapter 256 MB
 - o Windows 7 pro, SP1 licence
 - o LCD monitor
 - o DVD, CD reader/rewriter
 - o Built in network card
 - o Multimedia system (built in speakers)
 - o Mouse and keyboard
 - o 2 serial ports
 - o 1 parallel port
 - o 8 USB ports

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The **cubestress** *wireless software package* - ref. 81019540 - includes:

- **cubestress** software
- USB protection key
- **clickecgbt** acquisition unit
- USB Bluetooth receiver for PC
- USB extension cable (1,8 m)

The **cubestress** *software package* - ref. 81019541 - includes:

- **cubestress** software
- USB protection key
- **clickecg** acquisition unit

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Technical Specifications

Display modes	Multiple, as selected by the user
Test saving.....	full-disclosure
Colour coding	Normal, ventricular, supraventricular anticipated, paused, noisy beats
List of mains arrhythmias	VEB, SVEB, CPT, VT, SVT, SVS, BRA,DEL, AFIB, detected ESC; IVR, AIVR, PAU, DEL
Morphological classifications	Normal beats, ventricular beats
Advanced RR analysis.....	RR tachogram
Analysis of ST and QT segment	Simultaneous and independent analysis of the ST and QT segment on 12 leads, maximum ST depression, maximum ST elevation, trend ST and QT on all 12 leads.
Alarms	Arrhythmias, electrode detached, acquisition device message, ergometer message
Print management.....	Real time printout on Windows laser printer or CARDIOLINE® thermal printer Options for programmed printout every minute or every step
Print format	12 channels+AVG, 6+6+AVG, 12 channels, 6+6
Ergometer management	Fully automatic Extensive list of compatible treadmills and cycloergometers
Effort protocol management	Extensive list of effort protocols already preloaded in the program. Possibility of defining and saving customised protocols for cycloergometers, treadmills or generic devices.
Optional advanced analyses.....	RR variability in time and frequency domain Ventricular and supraventricular late potentials analysis, vectorcardiogram
Print document.....	fully customisable
Trace archiving	Automatic archiving in the database; optional DVD backup in the SW package.
Export of final document	Export and transmission by e-mail of final document in PDF or text format
Network connection	Can be networked and database can be shared with other cube workstations.

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Compatible Acquisition Devices

Ref.	Description
81010021	clickecg – ECG acquisition device with USB connection to PC
81010024	clickecgbt – ECG acquisition device with bluetooth technology wireless connection to PC

Options

Ref.	Description
9ABCUBEX	cube abpm Option
9AMCUBEX	Long Term Storing Manager Option - cube
9CHCUBEX	Automatic Import Option
9ECCUBEX	cube ecg Option
9HOCUBEX	cube holter Option
9HRCUBEX	Heart Rate Variability TD / FD Option
9INCUBEE	cube ecg ECG interpretation Option
9LPCUBEX	Late Potential Option

Accessories

Ref.	Description
62000031	Laser Printer B/W
62000039	MP200 Thermal Printer, High Res. A4
63090642	Parallel/USB adapter for PC
63090295	BT USB dongle for PC cl.I + extens.cable
63090650	Insulated medical transformer (MIT only)
65000233	Velvet supp. arm for cubestress trolley
66010049C	Z-fold x MP200, 210x280mm, 200sh.5p.
81019529	cube Suite demo Software
63090331	cube stress trolley MIT
63090332	cube stress trolley MPL

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