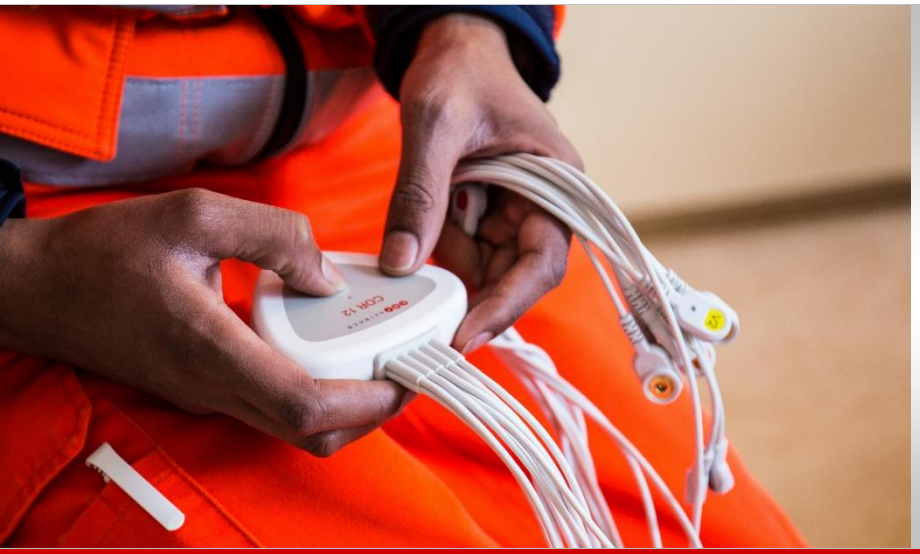
cor science
cardiovascular innovations



MEDICAL INNOVATIONS
CUSTOMIZED TO YOUR NEEDS!

Company Presentation

Our mission

Corscience is the **established development service provider** of international medical technology companies. We are leaders in our areas of expertise of **electrostimulation** and **monitoring, ventilation** and **gas analytics** as well as **mobile health**.

We offer unique **complete solutions** from **development** to **approval** and **production** to **life cycle management**.

As a **German engineering** company with **highly competent staff** we stand for **quality** and **reliability**. We are **curious, open-minded** and proud of our **achievements: *We work with our hearts and minds!***

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Key Figures

- **Foundation**
  - 2001 by Prof. Dr. Armin Bolz and Weinmann Geräte für Medizin GmbH & Co. KG
- **Locations**
  - Erlangen, Henstedt-Ulzburg
- **Number of employees**
  - > 80 (about 75% engineers)
- **Company strategy**
  - Development and production of innovative medical products as OEM full range service provider (B2B)
  - Focus: electro stimulation, gas analysis, mobile health, vital parameters, monitoring, ventilation
- **Certificates**
  - DIN EN ISO 13485
  - MDD Annex II
  - FDA registration (no. 9048414)

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Shareholder

- WEINMANN Emergency Medical Technology GmbH + Co. KG

  - Founded 1874
  - Headquarter in Hamburg, Germany.
  - 220 Employees, revenue € 47 million
  - (> 56% export; 100 countries)
  - Excellent Bisnode rating

- Prof. Dr. Armin Bolz

  - Founder of Corscience
  - Researcher in the Professors group at the Pattern Recognition Lab of the Friedrich-Alexander University Erlangen-Nuremberg

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Company locations

Henstedt-Ulzburg

Erlangen

Erlangen: Headquarter

Headquarter in Erlangen

Managing directors:

Dr. Claudius Moor, Philipp Schroeder

Employees 80

Our offerings

Comprehensive engineering services and approval

Module and licensing solutions

Manufacturing and logistics

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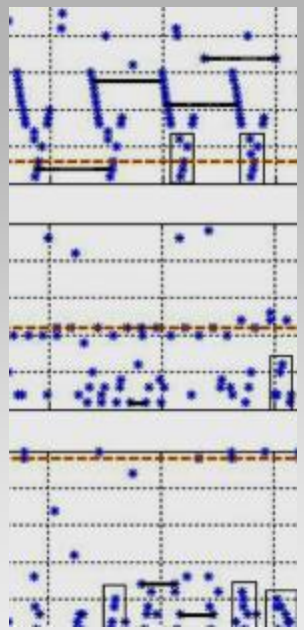
Our Customers

- **National and international medium-size companies and big corporations**

Services: Overview



Research	Development	Approval	Production	Logistics	Series production
Funded projects	Algorithmics	Consulting	Assembly	Consignment	Technical support
Cooperations	Firmware	Communication	Tests	Shipment	Safety check
Universities	Software	Investigation	Final testing	Storage	Product maintenance
	Hardware	Documentation	Supply chain management		
	Mechanics				

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Development: Process

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Development: Medical Expertise

- **Electrical Stimulation**
  - e.g. defibrillation, AED, PAD, pacing, muscular stimulation, intracardiac stimulation
- **Vital parameter, Sensors and Monitoring**
  - e.g. multiparametersystems, GUI, SpO_2, ECG, EEG, NiBP, CO_2
- **Mobile Health**
  - e.g.. Event-Recorder, EKG w/ UMTS, Webserver, Multiparameter monitors, Integration of interfaces like Bluetooth, Zigbee, Wifi, ANT+, GPRS, UMTS, Ethernet
- **Gas analysis**
  - e.g. capnography, multigas analysis, anesthesia
- **Ventilation**
  - e.g. emergency, transport-, home- and critical care ventilation

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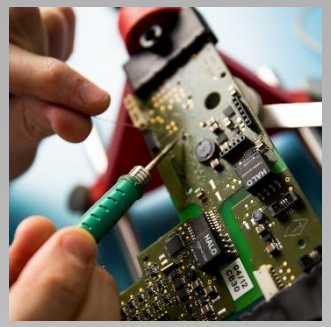
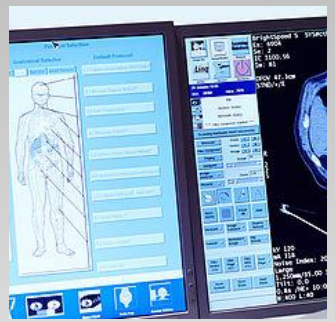
Development: Engineering services

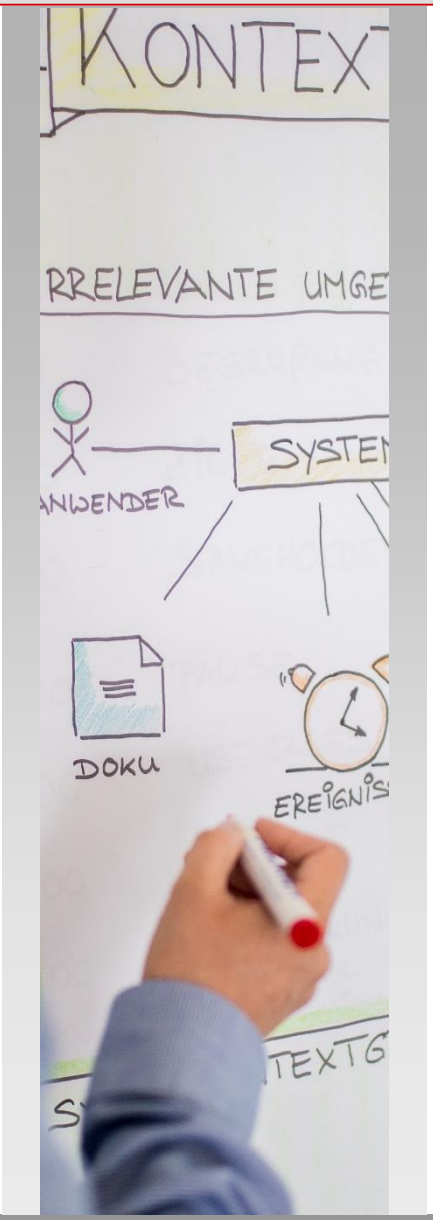
- **Hardware**
  - e.g. digital & analog, HF, SPICE, layout
- **Software**
  - e.g. GUI, FPGA, µC, embedded Linux, RTOS, Windows, APP, bio signal analysis, MATLAB/ Simulink
- **Mechanic**
  - e.g. construction, injection molding, mechatronic, FEM-calculation, installation tools, prototyping
- **System development**
  - e.g. combination of hardware, software, mechanics up to systems for security-critical applications





Development: Project Management

- **Detailed project planning**
  - Project structure plan incl. milestones and gates
  - Project plan
- **Cost planning**
  - DB calculation
  - Early calculation of manufacturing costs
  - Permanent monitoring
- **Requirements management**
  - Enterprise Architect
- **Communication**
  - Core team meetings every week
  - Regular interdisciplinary meetings
  - Project steering committee meetings every 4 weeks



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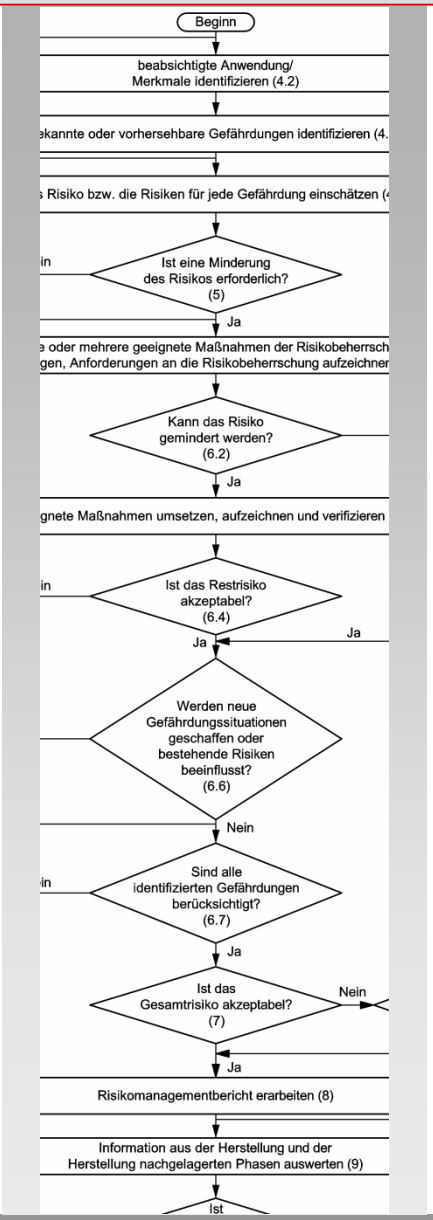
Development: Risk Management

- **Product risks**
  - Risk analysis already during planning phase
  - Risk management process: DIN EN ISO 14971
  - Risk classification hardware and software modules
  - FMEAs

- **Project risks**
  - First analysis already during the planning phase
  - Worst case/best case study ➔ plan B?
  - Critical path analysis
  - Continuous assessment regarding time/costs
  - Introduction/agreement on risk reduction measures



Development: Test Process

- **Documentation**
  - Test plan
  - Test specification
  - Test report
  - Traceability matrix
- **Execution of tests**
  - Black-box, white-box and unit tests
  - System tests
  - User tests
- **Automated test environment with Build-Server**
  - Automated unit tests
  - Nightly builds
  - Static code analysis
  - Code beautifying

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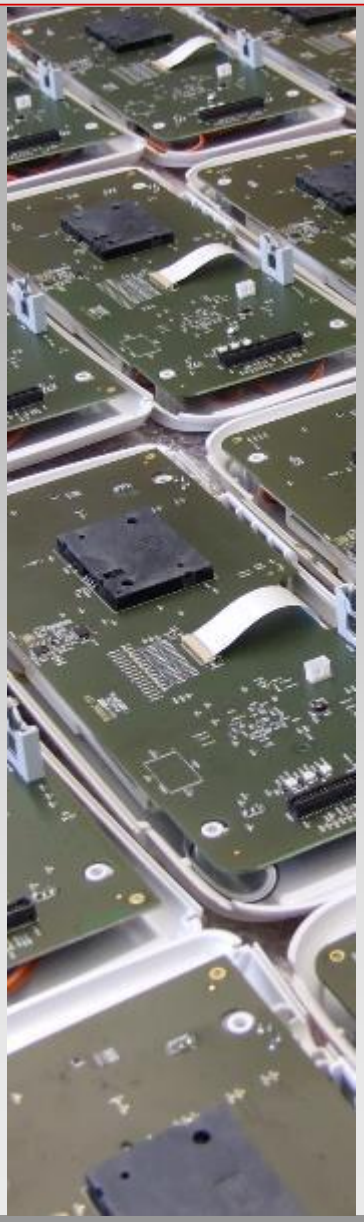
Approval

- **Approval of customer products**
- **Approval-specific consultation (CE, FDA)**
- **Standard and patent research**
- **Support for**
  - Risk management (DIN EN ISO 14971)
  - SW development process (DIN EN ISO 62304)
  - Usability (DIN EN ISO 62366)
- **Drawing up of accompanying documents and approval applications**
- **Communication with testing laboratories and notified bodies**

Manufacturing

- **NPI, pilot run and series production**
  - Close interlock between development and production (DfX)
  - Prototyping
  - Transfer to pilot run
- **Material management**
  - Worldwide purchase of electronic parts
- **PCB assembly**
  - „Preferred partnership program“, e.g. with Siemens
- **Supply chain management**
- **Module assembly inhouse**
  - Small and medium batch sizes
- **Final inspection and testing**
  - Boundary scan, in-circuit-tests, flying probe (with partners)
  - Product-specific electrical function tests



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Logistics and Warehousing

- **Warehousing and disposition**
  - Consignment warehouse
  - Just-in-time delivery (also by „Kanban“)
- **Consignment sales**
  - Customer-specific packaging and consignment
- **Worldwide shipping**
  - Handling of export and customs formalities
  - Shipping to the end customer (if required)
- **After-sales service**
  - Maintenance, spare part procurement, repairs, refurbishment, complaint management

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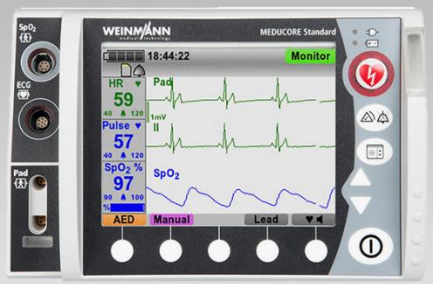
Services: Electrostimulation



Defibrillator/ Monitor

complete development

client: Weinmann (DE)

AED/PAD

complete development, production & series management

client: Cardia International (DK)

Therapy device for cardiac insuffenciency

complete development, production

client: Cardiola (CH)

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Services: Vitalparameters & Monitors

HZV-Trend Monitor

GUI development

client: Pulsion (DE)

Suntech BP Monitor

blood pressure monitor
complete development

client: Suntech (USA)

Vyntus ECG

Bluetooth PC ECG
complete development

client: Carefusion (DE)

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Services: Mechatronic & Data transmission

Gesture Controlled Lighting Concept for Surgical Operations

lighting concept for the operating room

Operations-microscope

foot control panel w/ Bluetooth wireless transmission

HDTV Camera System

Integration of HDTV coding/ decoding and WiFi-transmission

client: Berchtold Medizintechnik (DE)

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Services: Approval

EEG Amplifier

development
FDA approval

client: Bee Medic (DE)

Device for harm reduction after heart attack

integration of NIBP2010
(approval support)

client: CellAegis (CA)

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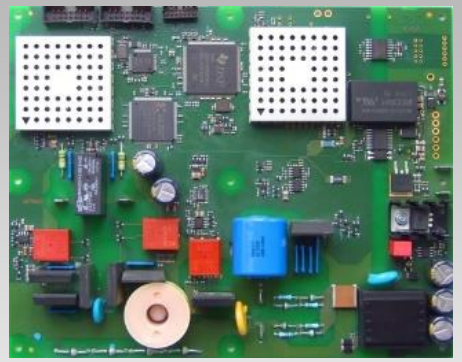
Products & Licenses: Electrostimulation



BDM65/ 75

Defibrillator board

AED/PAD

OEM- AED

client: Cardia Intl. (DK) *client: BPL (IN)*

Profi-Defi

BDM integrated

client: Skanray (IN)

client: BPL (IN) *client: Emtel (PL)*

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Products & Licenses: Pulse oximetry

ChipOx

pulse oximetry
OEM-board

Sensors

accessories for
ChipOx

Pulse oximetry

ChipOx
integrated

clients e.g.:
Envitec (DE), BluePoint Medical (DE),
Weinmann (DE), Fukuda Denshi (JP)

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Products & Licenses: ECG- Devices

BT-12

Bluetooth PC ECG
(predecessor of COR12)

COR12

Bluetooth PC ECG

PC- ECG clients

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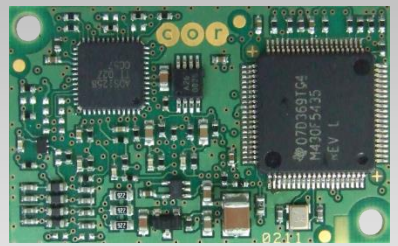
Products & Licenses: ECG- Boards



EMB1/3

1/3/6 channel
ECG board

EMI12

12 channel ECG/
SpO_2
combi board

Ultrasound-system

EMI12
integrated

client: Ultrasonix (CA)

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Products & Licenses: Gas analysis

CAP201	Mobile ventilator	MRT Monitor
capnography board	CAP201 integrated	CAP201 integrated (in FDA approval)
	Kunde: Weinmann (DE)	*client: in USA*

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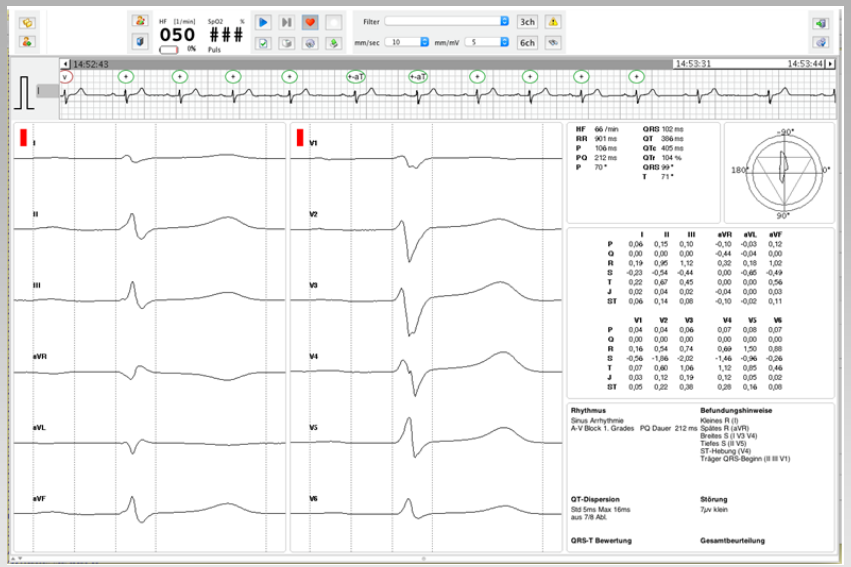
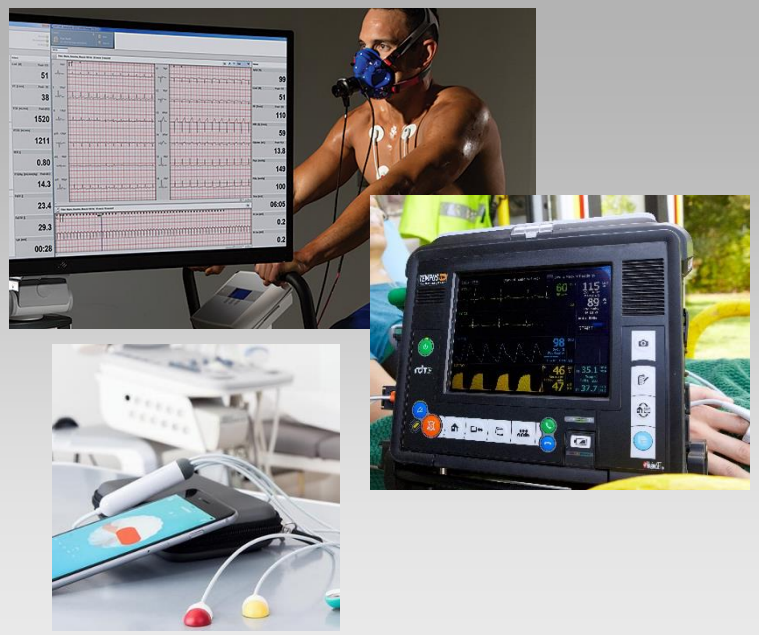
Products & Licenses: HES®





HES- Algorithm

HES® Clients

library for
ECG- analysis

All brand names and trademarks are property of their respective holders

HES Hannover ECG System

- **Diagnostic ECG Program**
  - Portable Library is written in C
  - Standardised or customized licensing model
- **Supported Operating Systems**
  - MS Windows, OS X and different Linux distributions
  - Embedded Systems
- **Software Modules**
  - Resting ECG
  - Exercise ECG
  - Real-Time Monitoring
  - VF/VT analysis for AEDs
- **Supported Standards**
  - IEC / EN 60601-2-47
  - IEC / EN 60601-2-25
  - IEC / EN 60601-2-4

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Licensing: Models

Module	License-Codes	HW-License (µC)
ChipOx (CS10100)	✓	
EMB1 ECG (CS10489-01)	✓	
EMB3 ECG (CS10489-03)	✓	
BDM65 (CS10344)		✓
CAP201 (CS10477)	✓	
HES Module	✓	

- **Licenses for algorithms and partial components**
- **Easy integration of OEM modules**
- **Suitable for large quantities**
  - Licensing during manufacturing with SW license codes
  - Systems with modern dongle solutions

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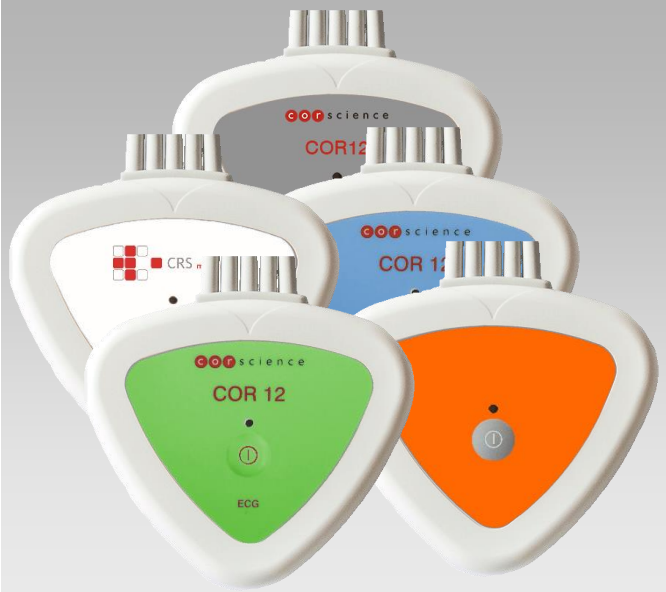
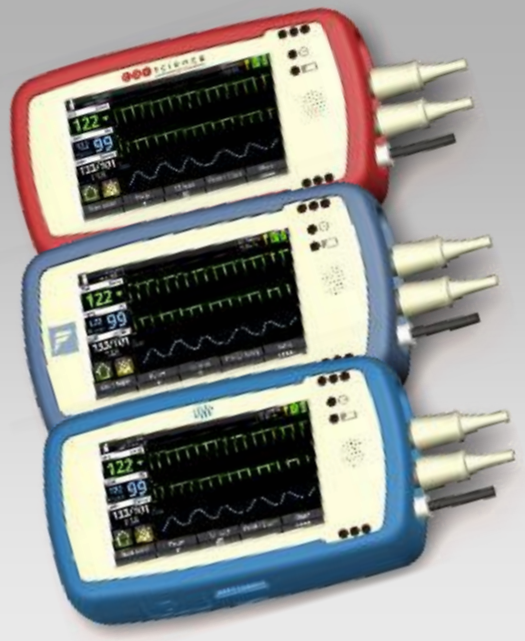
Products & Licenses: White- Label





COR12

White Label Product customization (frontfoil/ packaging)

Cardio-Monitor

White Label Product customization (housing/colors/printing)

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Contact

Corscience GmbH & Co. KG
Hartmannstraße 65
91052 Erlangen

Phone: +49 9131-977986-0
Fax: +49 9131-977986-449
Email: info@corscience.de
Homepage: www.corscience.com

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