# User Manual and Technical Documentation

CT220 Configuration		
Basic settings I Basic settings II Resting I Basic scheme C Scheme 1 C Scheme 3 © Scheme 2 C Scheme 4	ECG   Layout   Signal window   Averaged beal ◀ ▶ Show protocol after finishing a test ▼ Rest protocol	V Dk
Signal layout C Limb leads Chest leads V2, V4, V6 I2 Leads C 2 x 6 Leads C user defined	Tall timepiece	
COM port (ECG-Module): COM 1	Use System-Settings	About

# Seca CT 220 / CT 220BT Configuration Version 1.9 July 2010

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#### 1.1 Basic Settings I / II tabs

Under "Basic scheme" you can set the appearance of the ECG recording program at start-up. "Scheme 1" shows the trend data in the right part of the screen. If you select "Scheme 2", the whole screen is available to display the on-line data. Schemes 3 and 4 correspond to displays 1 and 2. In addition, the average of the 12 ECG derivations is shown.

In the "Signal layout" area, you can establish which ECG derivations are shown in the on-line data window during the examination. If you choose the "user defined" option, the signals shown are those selected in the "User defined" subtab of the "Layout" tab.

In the "Show protocol after finishing a test" area, you can select for which type of examination the report should be shown.

CT220 Configuration		
Basic settings I Basic settings II Resting Basic scheme C Scheme 1 C Scheme 3 © Scheme 2 C Scheme 4	ECG   Layout   Signal window   Averaged beal ◀ ▶ Show protocol after finishing a test I Rest protocol	✓ Ok Papely X Cancel
Signal layout C Limb leads C Chest leads V2, V4, V6 12 Leads C 2 x 6 Leads User defined	Tall timepiece	
COM port (ECG-Module): COM 1 🗨	┌── Use System-Settings	About

CT 220 Configuration

The Device Manager enlists the ECG amplifier as serial device with the reserved port number.



Via the "COM port (ECG module)" list box, choose the port that your ECG module is connected to.



The ECG amplifier (Type B) with the USB port automatically informs the device manager that it is a serial device. Please make sure that the COM1 to COM99 ports are given.

If you check "Title bar", "Menu bar" and "Status bar", these will appear in the ECG recording program in the upper edge of the screen.

Via the "basic measurement" check box you can decide whether the ECG measurement is displayed in the assessment program and in the printed reports or not.

If "Patient management at program start" or "Show patient manager after test" is checked, the "Patient management" dialogue box is displayed automatically at the start of program / end of examination.

CT220 Configuration		
Basic settings   Basic settings    Resting	ECG   Layout   Signal window   Averaged beal 💶 🕨	
<ul> <li>✓ Title bar</li> <li>✓ Menu</li> <li>✓ Status bar</li> <li>✓ basic measurement</li> <li>✓ Patientmanagment at programstart</li> <li>Show patient manager after test</li> <li>acoustic alerts</li> <li>Signal width in printout 30</li> <li>File: C:\Program Files\seca\CT220\alarm</li> <li>Signal quality</li> <li>Monitor signal quality</li> <li>Sensibility: 120</li> <li>(between 10 = very sensitive and 200 = insensitive)</li> </ul>	<ul> <li>Show measurement cursors</li> <li>Tune at startup</li> <li>Test assistant</li> <li>Show print select dialog</li> <li>Use standard printer</li> <li>Print comments</li> <li>Large buttons</li> </ul>	Ok     Apply     Cancel

#### 1.2 Resting ECG tab

If you wish to record the resting blood pressure values under certain conditions, use the "Options NIBP in Rest ECG".

The "Automatic measurement: without edit dialog" and "Automatic measurement: additional dialog at test's end" options can only be used if an automatic blood pressure device is connected to your PC.

If the "Additional comment before saving rest ECG" box is checked, an input field will be displayed after a resting ECG examination. Here, you can enter additional comments to appear in the printed report.

CT220 Configuration	×
Basic settings I   Basic settings II   Resting ECG   Layout   Signal window   Averaged beal ◀ ▶	🖌 Ok
<ul> <li>man. Measurement: RR-Measure button with dialog</li> <li>man. Measurement: autom. dialog at test's end</li> </ul>	Cancel
automatic Measurement: without edit dialog     automatic Measurement: additional dialog at test's end	
<ul> <li>Findings at average signal report</li> <li>Additional comment before saving rest ECG</li> <li>Query before saving rest ECG</li> </ul>	
Finding informations: Medication / clinical state	
only by reanalyse         C detailed	About

#### 1.3 Layout tab

In the upper part of the tab, you can determine whether the layout of the screen is to be automatically adapted to the selected examination. You can also specify the Cabrera sequence for the limbs.

In the lower part of the "Layout" tab, you can select additional tabs for Resting examinations, and which display and signal layout you would like.

In the "User defined" tab, you can select the ECG derivations to be displayed if you set the channel selection to "user defined". This list is shown as standard if you select "user defined" in the "Signal layout" area "Basic settings" tab.



asic settings I Basic settin	igs II Resting ECG	Layout	Signal window	Averaged beal 4	1
🔽 Layout dependent fro	m test type	ne 🗍	ange limb leads ir	n Cabrera cycle	✓ Ok
					Apply 🗠
est layout User defined					X Cancel
est layout Oser denned				[	
		I			
Π.		□ V2			
		<b>□</b> V3			
∏ aVR		<b>□</b> ∨4			
∏ aVL		IT ∨5			
☐ aVF		I ⊂ 76			About

#### 1.4 Signal Window tab

In this tab, you can set the colours for the signal window of the ECG recording or assessment program.

Click the appropriate button (e.g. Background colour). A colour palette is opened so that you can choose the colour you want (e.g. for the screen background).

In the "Width" field, you can enter the line thickness for the ECG signal display on the screen (on-line data). The value "0" means that the signal will be displayed with hairline thickness.

CT220 Configuration			
Basic settings I Basic settings II Resting ECC	i   Layout Signal windov	Averaged beal 🔸 🕨	
			Ok
Background color			Apply 🔤
Grid color			🗶 Cancel
Signal color Width:			
Textfield color			
Text color			
			About
			About

#### 1.5 Averaged complexes tab

In this tab, you can set which averaged complexes are to be used.

Click the appropriate button (e.g. Background colour). A colour palette is opened so that you can choose the colour you want (e.g. for the screen background).

In the "Width" field, you can enter the line thickness for the ECG signal display on the screen (on-line data). The value "0" means that the signal will be displayed with hairline thickness.

Under "Number of raw data leads", you can choose whether the report print-out for the raw data should display 1 or 3 derivations in the lower part of the report.

CT220 Configuration	
Basic settings II   Resting ECG   Layout   Signal window Averaged beats   Lead names   • •	
	Ok
Background color	Apply
Grid color	🗶 Cancel
Signal color Width: 0	
Reference signal color	
Textfield color	
Textcolor	
Number of raw data leads	
C 1 Lead	
③ 3 Leads	
	About

#### 1.6 Signal identifier tab

In the "Lead names" tab, you can determine which derivation identifiers are shown in the report or on the screen in the ECG channels. If you select "Predefined names", the channel identifier is adjusted for the electrode application.

Edit the derivation identifier in the right part of the tab so that you can save these identifiers using the "apply user defined values" button and if necessary re-select "Self-defined" in the "Pre-defined identifiers" list box.

lead names I: I II: II III III aVR: aVR aVL: aVL aVF: aVF	sting ECG   Layout   S V1:  V1 V2:  V2 V3:  V3 V4:  V4 V5:  V5 V6:  V6	ignal window Averaged beats predefined names Standard 12-Channel	Lead names 🚺 🕨	Cancel
				About

#### 1.7 Measurement tab

In the "Measurement" tab, you can determine whether the vector loop should be displayed with 5, 10 or 20 mm/mV. If the "Gain from averaged beat" option is checked, the value to be shown will be taken from the averaged complex that can be changed directly in the program. If the "Gain from averaged beat" option is not activated, the vector loop with the input value will be taken from the configuration program.

CT220 Configuration	×
Signal window Averaged beats Lead names Measurement Filter settings Rest proto. ▲ ▶ Vector loop ✓ Gain from averaged beat 20 mm/mV ▼	Cancel
Sokolow Indices       I       S       I       R       I       V1       V2       II       R       V2         R       I       V5       V6       I       V5       V6         Threshold:       3.5       1.05       1.05	About

#### 1.8 Filter settings tab

If you want to use the standard 35 Hz muscle filter or the 50 Hz mains filter, you can check the desired filter in the "Filter Settings" tab.

If drift correction is activated, you can determine in the "Parameters" field whether a high or low filter level is to be applied to the signal.

If you check the "use filter for aver" box in the lower part of the screen, the filtered average values will be displayed.

Make sure that signal filters eliminate interference and change the desired signal.

You should therefore try to eliminate external interferences in every case.

CT220 Configuration				
Signal window Averaged beat Remark: Signal filter w Thereforeuse signal fil Tips: see manual	ill modify the l	ECG-signal!	Rest proto <u></u> ◀ ▶	Cancel
<ul> <li>Muscle filter</li> <li>50Hz filter</li> <li>baseline correction</li> <li>use filter for aver</li> </ul>	Parameters weak strong			About

#### 1.9 Resting report tab

Via the "Raw signal", "Averaged beats" and "Measurement data" check boxes, you can state whether these elements should appear in the printout or not.

CT220 Configuration	X
Averaged beats   Lead names   Measurement   Filter settings   Rest protocol   Default par.	
	Ok
🦵 Raw signal	📴 Apply
Averaged beats	🗶 Cancel
Measurement data	
🔽 Summary	
Print only 5s in case of 50 mm/s	
	About
	6

#### 1.10 Default presentation parameters tab

In this tab, select the presentation parameters (feed rate, amplification, channel selection) for printing and displaying the signals (on-line data, raw data, rhythm data, averaged complexes).

Make sure that your printer works with a resolution of 300 dpi if you want to work with the "millimetre raster". A higher resolution would result in the raster being unclear on the print-out.

If your printer only works with higher resolutions, activate the grid instead of the raster.

Under "Averaged beats", decide on the selection that should be displayed for the other three trend channels in the report.

You can also choose the colour of the grid shown on the screen and the print out separately.

CT220 Configuration			
Lead names Measurement Filter settin Online-Data Speed 25 mm/s	gs Rest protocol Default parameter Raw signals Speed: 25 mm/s		
Gain: 5 mm/mV Lead: 12 Leads	Gain: 5 mm/mV Lead: 2 x 6-Channels	Apply	
Rhythm ECG     Speed:   5 mm/s     Gain:   3 mm/mV	Averaged beats Speed: 25 mm/s Gain: 5 mm/mV		
Lead 1:         V2         ▼           Lead 2:         V4         ▼           Grid	Speed:         25 mm/s           Gain:         5 mm/mV           Lead 1:         II		
<ul> <li>✓ Grid</li> <li>✓ Grid in printout</li> <li>✓ 1 mm</li> </ul>	Lead 2: V4 • Lead 3: V5 •		
C 5 mm About Color of the grid for printing Coarse grid Fine grid			

# User Manual and Technical Documentation



# Seca CT 220 / CT 220BT Script Version 1.9 July 2010

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### **Declaration of Conformity**

Electrocardiograph:

#### CT 220 / CT 220BT

We, the undersigned, hereby declare that the medical device (classe IIa) specified above conforms with the Essential Requirements listed in Annex I, of

EC Directive 93/42/EEC

The Quality management system of Dr. Gerhard Schmidt GmbH is supported by

DEKRA Certification GmbH, D - 70565 Stuttgart

Certifikate of approval No .:

DIN EN 13485:2007:	50626-10-01
Annex II of the Directive 93/42/EEC Medical Devices:	50626-16-02

Valid date 07 / 2005



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Neunkirchen, 02.07.2010

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Heinz Schmidt Quality Assurance Manager

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#### 1.1 Rules for working with the CT 220 System



The following rules should be heeded by the operators when using the CT 220 system:

- The user instructions must always be available near the device.
- The PC program should always be correctly closed down when possible, because the program saves program settings to the hard drive during the close-down that may be lost if the system is quit incorrectly. Leaving the program incorrectly may lead to conflicts in the database.
- Carry out a backup of the patient database regularly (for a standard installation, the database is in the following directory C:\Program Files\seca\CT220\db)

### **1.2 Responsibility of the operator**



As operator of this medical device, you are responsible for:

- Ensuring that the product is used correctly and properly by authorized specialized personnel
- The technical instruction of the operating personnel on the system and ensuring that they are familiar with the user instructions
- Ensuring that the safety instructions are adhered to and that precautions are taken to ensure safe working conditions and protection against accidents

The CT 220 systems must be operated in accordance with the following EU guidelines and regulations:

- VDE 107 (Electrical installations in hospitals and doctors surgeries)
- EN 60601-1 (Safety of medical electrical devices)
- EN 60601-1-1 (Safety requirements for medical electrical systems)
- Accident prevention regulations
- Medical device operator regulations (MPBetreibV).

For users outside of the Federal Republic of Germany, the regulations on accident prevention for that country apply as well as national requirements that go beyond European provisions.



When cleaning the ECG Module the following rules should be heeded:

- Rub the ECG Module with a damp cloth only. No water must be allowed to enter the device.
- A small amount of soapsuds are suitable for cleaning the device.
- Do not use any caustic household cleaning products or disinfectants as they may attack the surface of the casing and may damage it.

In addition, you should heed indications in the user instructions on the various electrodes:

- Adhesive single-use electrodes should be disposed of immediately after use to avoid them being re-used unintentionally.
- Re-usable electrodes should be cleaned immediately after use in accordance with the user instructions.

### 1.4 Requirements of the user



The user of the ECG system must:

- Be authorised to operate the system,
- Have a full understanding of the processes,
- Know and apply the valid safety provisions for operating the system,
- Be informed of additional valid regulations (e.g. safety equipment),
- Be aware of possible dangers that might ensure from operating such devices.

#### 1.5 Maintenance



Before using the device, a visual check must be carried out on the device, the connections and the ECG cables for mechanical damage.

If you notice any damage that might affect patient safety, you must not use the device again until it has been repaired.

The system must in addition be regularly maintained.

The device must be sent to the manufacturer for repairs.

### 1.6 Disposal of old devices



The synthetic parts are to be disposed of in accordance with the requirements of the Recycling Law.

The parts contained in it must be passed on to authorized collection and processing facilities.

### 2.1 Basic information



### **2.1 Basic Information**

Follow the safety instructions to protect patients, users and third parties and to avoid the device being used incorrectly.

All users of this device as well as people dealing with assembly, maintenance and repair of the device must have read and understood the instructions for use before starting to operate it.

### 2.2 Earthing



#### **2.2 Earthing**

#### Earthing the patient

Ensure that the patient is correctly earthed during the examinations.

#### Earthing the electrodes

The electrodes, in particular neutral electrodes, should not be earthed.

### 2.3 Defibrillation

#### **2.3 Defibrillation**



/!

#### 2.3.1 Pictogram

The ECG CT 220 is a type CF defibrillation-proof ECG.

#### 2.3.2 Precautionary measures when using the defibrillator

The PC ECG Module CT 220 Script has defibrillator protection. This means that the ECG module is not disturbed during defibrillation of the patient.

If the patient is being defibrillated, the following must be heeded:

The defibrillator electrodes must be kept apart from the ECG electrodes and metallic parts that come into contact with the patient. Devices without defibrillator protection are to be removed from the patient before defibrillation.

<u>Warning:</u> The patient must not be touched during defibrillation. It is imperative to heed the user instructions.

Defibrillation protection is only guaranteed when used with the cable provided!

### 2.4 Patient environment



The PC is not to be used within the patient environment, even if it complies with the relevant safety provisions for medical devices. It must in all cases comply at the very least with the **Requirements of the EN 60950** standard (Safety of IT equipment).

The patient environment is established as follows:

Area in which the patient is situated,

- Up to 2.5 m above the ground
- Up to 1.5 m horizontal distance from the patient.

### 3.1 Hardware connection

#### 3. 1. Hardware connection

The CT 220 Script ECG amplifier comes in two versions.

Type A has a serial port (RS232) to connect it to the PC and Type B has a USB port.

The RS232 ECG Module can be connected to the serial port of the PC with a cable (RJ45 – 15-way sub-D).

Only use the special cables supplied to connect to the PC!

The following steps are necessary to connect the ECG amplifier (type A) to the PC:

- Connect the RJ-45 plug of the supplied PC connection cable to the ECG module.
- Connect the 9 pole sub-D connector of the PC connection cable to the RS232 port.
- Connect the PS2 plug / PS2 socket of the PC connection cable to the PS2 connector of the keyboard/ PC



#### 3.1 Hardware connection

- Connect the patient cable or electrode system to the ECG module (15 pole sub-D plug).

The ECG amplifier (type B) is connected to the PC using the USB cable. Please use the supplied USB cable only.

A USB driver is to be installed for communication using the USB port as part of the software installation.



The device must only be connected using the designated ports to avoid damage being caused.

#### 3.2 Software installation

Connecting via Bluetooth (type C)

The Bluetooth version of the ECG device has to be connected to the PC using the supplied USB-Bluetooth-adaptor.

The following steps are necessary to connect the ECG amplifier (type C) to the PC:

- Connect the USB-Bluetooth-Adaptor to the USB port of the PC.
- Switch on the amplifier (use rechargeable batteries of type AA only to avoid damage).
- Install the required device driver (Windows XP, service pack 2 or Windows Vista is recommended, see chap. 3.3.2).
- Connect the patient cable or electrode system to the ECG module (15 pole sub-D plug).



#### 3.2 Software installation

#### 3. 2. Software installation

In order to install the CT 220 Script software, the Installation CD must be inserted. The CD will start up the installation automatically. If it does not start up automatically, start the installation using Start Execute – d:\setup.exe



In order complete the installation, the software must be configured using the configuration program before being used.

If you want to keep the standard configuration, start the up configuration program and confirm by clicking "OK" without making any changes.<sup>1)</sup>

<sup>1)</sup> The configuration program must be called up on all work stations before running the software and confirmed by clicking "OK".



81.7 MB

0.6 MB

27.0 MB

6.4 MB

11.8 MB

Cancel

	1 <sup>27</sup> Setup - seca CT220	
seca	Select CardioBase Location Where should the CardioBase database be installed?	seca
MB MB MB MB MB MB MB	Setup will install CardioBase into the following folder. CardioBase folder CardioBase-RAW folder (Holter) C:\CardioBase\RAW seca CT220 1.09.007.test2	Browse Browse

< <u>B</u>ack

Next >

Select the components you want to install; clear the components you do not want to

🚰 Setup - seca CT220

Select Components

Program files

Database files

V Database tools

CT220-Script USB drivers

Firebird database system

Which components should be installed?

install. Click Next when you are ready to continue.

Current selection requires at least 144.7 MB of disk space.

### 3.2 Software installation

If the CT 220 Script software has been successfully installed, an item is added to the Start menu that can be used to start up the program.

🔂 Setup - seca CT220	🚰 Setup - seca CT220	
Select Start Menu Folder Where should Setup place the program's shortcuts?	3 Select Additional Tasks Which additional tasks should be performed?	seca
Setup will create the program's shortcuts in the following Start Menu folder. To continue, click Next. If you would like to select a different folder, click Browse. seca CT220 Browse	Select the additional tasks you would like Setup to perform while installin then click Next. Create desktop icons: CT220-Script (ECG record) CT220-View (ECG display)	ig seca CT220,
Don't create a Start Menu folder seca CT220 1.09.007.test2     Cancel	seca CT220 1.09,007.test2	Cancel
🗗 Setup - seca CT220	Setup - seca CT220	
Installing       Please wait while Setup installs seca CT220 on your computer.         Extracting files       C:\Program Files\seca\CT220\ulister.exe	Completing the seca CT2 Setup has finished installing seca CT220 on The application may be launched by selectin icons. Click Finish to exit Setup.	your computer.
Cancel	Enish	

### 3.3 Driver Installation

#### 3.3 Driver installation

#### 3.3.1 Installation of the ECG device driver (USB)

After connecting the amplifier to the PC the "Found New Hardware" wizard appears. Select "Install the software automatically (Recommended)". The device driver will be installed automatically. Click finish to close the wizard.

A second device driver has to be installed in the same manner. Now the installation is successfully completed.



### 3.3 Driver Installation

**3.3.2 Installation of the ECG device driver** (Bluetooth)

#### 1<sup>st</sup> Step

Insert the Bluetooth dongle in the computer and switch on the ECG module

2<sup>nd</sup> Step Open the Bluetooth Device Manager

**3<sup>rd</sup> Step** Click the button "Add..."

#### 4<sup>th</sup> Step

Activate "My device is set up and ready to be found" The Bluetooth Device Manager ist searching for the ECG module.



	Devices	· · · · · · · · · · · · · · · · · · ·	
Devices (	Options COM Port	s Hardware	
Add	. <u>R</u> emove		Properties

luetooth Device Wiz	ard	$\mathbf{X}$	Ac	ld Bluetooth Device Wizard	×
®	Welcome to the Add Bluetooth Device Wizard			Select the Bluetooth device that you want to add.	
✻	Before proceeding, refer to the "Bluetooth" section of the device documentation. Then set up your device so that your computer can find it: - Turn it on - Make it discoverable (visible) - Give it a name (optional) - Press the button on the bottom of the device (keyboards and mice only)			<b>A</b>	
	Wy device is set up and ready to be found.				
	Add only Bluetooth <u>devices that you trust</u> .			If you don't see the device that you want to add, make sure that it is turned on. Follow the setup instructions that came with the device, and then click Search Again.	gain
	< Back Next > Cancel			< <u>₿</u> ack Next> C	ancel

Add B

### 3.3 Driver Installation

### 5<sup>th</sup> Step

Select the "BlueRS+I/G2 67:27" device and click on next.

#### 6<sup>th</sup> Step

Set an own passkey for the Bluetooth device.

Key: **9876** 

#### 7<sup>th</sup> Step

Looking for the "Outgoing COM port" This COM port must be configurate after the driver installation.

Add Bluetooth Device Wizard	Add Bluetooth Device Wizard
Select the Bluetooth device that you want to add.	Do you need a passkey to add your device?
BlueRIS+I/G2 67:27      New device      If you don't see the device that you want to add, make sure that it is     turned on. Follow the setup instructions that came with the device,     and then click Search Again.	To answer this question, refer to the "Bluetooth" section of the documentation that came with your device. If the documentation specifies a passkey, use that one.
Cancel	< <u>₿</u> ack <u>N</u> ext > Cancel
Add Bluetooth Device Wizard	Add Bluetooth Device Wizard
Windows is exchanging passkeys.	Completing the Add Bluetooth Device Wizard
<ul> <li>When instructed below, enter the passkey using your Bluetooth device.</li> <li>For more information about entering a passkey, see the documentation that came with your device.</li> <li>Connecting</li> <li>Please enter the passkey on your Bluetooth device now.</li> <li>Passkey: 9876</li> <li>Installing Bluetooth device</li> </ul>	The Bluetooth device was successfully connected to your computer. Your computer and the device can communicate whenever they are near each other. These are the CDM (serial) ports assigned to your device. Outgoing CDM port: CDM3 Incoming COM port: CDM4 Learn more about <u>Bluetooth COM ports</u> .
< <u>B</u> ack <u>N</u> ext> Cancel	< <u>B</u> ack <b>Finish</b> Cancel
### 3. Installation

## 3.3 Driver Installation

#### 8<sup>th</sup> Step

Open the Device Manager and click on the outgoing com port with the right mouse button. Open the Properties.

9<sup>th</sup> Step Set the "Bits per second" on 115200.

#### 10<sup>th</sup> Setp

At last open the CT 220 Configuration and set the "COM port (ECG-Module) to the new Bluetooth com port and activate the System Settings "Use System Settings" in the right.

B         Computer           B         Disk drives           B         Neyboards           B<         Neyboards	iver Details
	its per second: 115200   Data bits: 8  Parity: None  Stop bits: 1  Elow control: None  Advanced  Estore Defaul  OK Can



### 4.1 Standard derivations

#### 4.1 Standard derivations

#### Limb electrodes

The four limb electrodes are placed on the soft parts of the skin.

Position of the electrodes:

- R Right arm
- L Left arm
- N Right leg
- F Left leg

#### **Chest wall electrodes**

Position of the electrodes:

- V1 right parasternal 4th intercostal space
- V2 left parasternal 4th intercostal space
- V3 5th rib between V2 and V4
- V4 Left medioclavicular 5th intercostal space
- V5 Anterior, left, axillary line 5th intercostal space
- V6 Middle, left axillary 5 line intercostal space



## 4.2 Entering patient data

4.2.1 Creating a new patient record

**1. step:** Call up the Patient Management dialogue box. <sup>1)</sup>

2. step: Select the "New (F4)" button.



Name	First name	Date of birth	G	Last test	Int. ID	Ext ID	^	Sorting	
### EMERGENCY ###	### EMERGENCY ###	01.07.2010	U	01.07.2010 11:15:52	### EME	### EMERC		Name	-
)oe	John	01.01.1951	М	17.11.2002 10:18:49	007	007		First name	•
								Date of birth	•
								<no></no>	•
								🕞 Standard so	rting
								<u>S</u> earch for name:	
							>	Tise filter	
Modify (F3)         New (F4)         New (F5)									

 Depending on whether the program has been configured, the patient management window will start up directly when the program is started up, even before the actual work screen is displayed.

## 4.2 Entering patient data



# 4.3 Resting ECG

#### 4.3.1 Recording a resting ECG

#### 1<sup>st</sup> Step:

Select a patient whose details have already been entered in the database or enter the details of the new patient.



Pa	atient management							
ſ	Name	First name	Date of birth G	Last test	Int. ID	Ext ID	~	Sorting
	### EMERGENCY ###	### EMERGENCY ###	01.07.2010 U	01.07.2010 11:15:52	### EMEF	### EMERC		Name
	Doe	John	01.01.1951 M	17.11.2002 10:18:49	007	007		First name
								Date of birth
	< •						>	T Use filter
Modify (F3)         New (F4)         New (F4)								
	Select X Cancel X Assign Emergency ECG							

Patient management

## 4.3 Resting ECG

### 2<sup>nd</sup> Step:

Set the screen layout.

3<sup>rd</sup> Step

Apply the electrodes and check the signal quality in the "Tune" mode (function key "F9")



S: 25 mm/s ▼ 6: 10 mm/mV ▼

Scheme 2

▼ 12 Leads

-

#### 4<sup>th</sup> Step

Record the ECG by clicking the "Record" button (function key "F10").



## 4.4 Displaying current examination

If an examination is found, it will be shown with a "1" in column "B" in the Examination selection screen.

If the examination was considered to be pathological, a "1" is added to the "P" column.

With the "Edit" button, you can change the comments and the results.

Click the "Display" button to call up the examination and display it on the screen.



The processing of examinations is explained in detail in the second part of the "CT 220 View" user manual.

With the "Delete" button, you can delete an entire examination from the database after the safety confirmation.

Doe, John - Test sel	lection					×
Date	Type of test	F	P B		Sorting	
5/3/2001 6:15:13 Pt	Resting ECG	0	0 0		Date	-
7/15/2010 2:10:49 F	Resting ECG	0	0 0		Type of test	-
7/15/2010 2:11:35 F	Resting ECG	0	0 0		Found	-
					<no></no>	-
					cr Standard sorting	
					Comment	
				~		
			>			
📸 Edit	Delete		ß	-		
📃 Select					Close	

### 5.1 The main screen

#### 5.1 The Main Screen

The main screen for the CT 220 Script ECG consists of a title bar, menu bar, toolbar and on-line data window with properties bar, info window.

#### Title bar (optional)

The title bar includes the program name and the names of the current patients.

#### Menu bar (optional)

You can use menu entries to change the various program options.

#### **Toolbar window (optional)**

With the toolbar you can control the way the program runs.

#### **On-line data window**

In the on-line data window the signals of the ECG amplifier can be viewed. The view can be modified using the **properties bar**.



#### Info window

In the info window, the current data on the examination can be previewed.

In the upper part, the details relating to the patient such as current heart rate, and both blood pressure values (systole and diastole), are shown. CT 220 Script gives premature ventricular contraction information in "PVC per minute". Right at the top, the whole ECG period is shown.



#### 5.1 The main screen

### 5.1.1 The menu bar

#### 5.1.1 The Menu Bar

#### File menu

Using this menu item you can call up the patient management and then load an examination for selected patients.

#### Settings menu

Using the "Clinic address..." entry you can open a dialogue box for entering the address of your practice. This address appears in the final report.

If the "Systole beep" entry is activated and there is a recognized QRS complex, a tone will sound.

If you check the "Arrange in Cabrera format" option, the ECG channels will be arranged in the Cabrera format in the on-line data window and in the report.





#### 5.1.1 The menu bar

#### Layout menu

#### Layout - Display

The *Scheme* entry is for the configuration of the screen. If you choose *Scheme 1*, the trend data will be displayed in the right part of the screen. If you choose *Scheme 2*, the whole screen will be dedicated to the display of the on-line data. Scheme 3 and 4 correspond to the screens of displays 1 and 2. In addition, the average of the 12 ECG derivations is shown.

Layout	He	lp	
Scher	me	۲	Scheme 1
Leads	5	۲	• Scheme 2
			Scheme 3
			Scheme 4

### 5.1.2 The toolbar

#### Layout – Derivations:

Using this menu item, you can establish which ECG derivations will be shown in the on-line data window.

#### Layout – Toolbars:

This menu item establishes how the toolbar is configured, i.e. which buttons in the toolbar are visible or removed.

#### 5.1.2 The toolbar

The toolbar can be configured with the Toolbars item of the Layout menu. This is used to switch on or off the buttons individually for the patient management, ECG operation and display.

#### **Patient management:**

Using these buttons, or using the corresponding function keys, the dialogue fields for patient management ("F2") can be called up and existing examinations can be displayed ("F3"). You can show the current examination in the assessment program or print it out directly in the examination reports.





### 5.1.2 The toolbar

#### **ECG Operation:**

Using the "Tune" button you can switch to monitor mode. This will display the ECG of the patient on the screen, but it will not be saved. This mode can also be used to check the electrode system (if the electrodes are not firmly attached this can lead to noisy signals  $\rightarrow$  Appendix I). From the monitor mode an examination can be started directly. The "Start examination" button is not active (in grey), if no patient has been selected. If a patient is selected, the button is shown in green.

If you click the "RR" button, the blood pressure measurement is started. The blood pressure values are sent to the examination report.



### 5.1.2 The toolbar

#### **Basic display**

Using the drop-down list "Scheme", you can configure the screen.

If you select "Scheme 1", the trend data will appear on the right side of the screen. If you select "Scheme 2" the whole screen can be used to display the on-line data.

The Schemes 3 and 4 correspond to Schemes 1 and 2. In addition, the average of the 12 ECG derivations is shown.

Scheme 2	-
Scheme 1	
Scheme 2	
Scheme 3	
Scheme 4	

### 5.1.2 The toolbar

#### Derivations

With this drop-down list, you can select which ECG derivations are shown on-line on the screen.

You can choose to show limbs only, or only channels V2, V4, V6.

If you choose "12 Leeds", all 12 channels are shown on the screen under each other.

If you choose "2 x 6 Leeds", the on-line data window will be divided into two columns with, on the right side, the I, II, III, aVR, aVL, aVF derivations, and, on the left side, derivations V1-V6.

By selecting "freely defined", you can show the channels that you selected in the "CT 220 Script Configuration" program in the "Layout" tab.

2 x 6 Leads	-
Limb leads	
chest walls	
V2, V4, V6	
12 Leads	
2 x 6 Leads	
user defined	

#### 5.1.3 The on-line data window

#### 5.1.3 The on-line data window

The on-line data window is used to display the ECGraw data. The data can be shown with a recording speed of 5 mm/s, 10 mm/s, 25 mm/s or 50 mm/s. With the "Intensity" drop-down menu, you can set signal intensity values of 5 mm/mV, 10 mm/mV or 20 mm/mV.



### 5.1.4 The info bar

#### 5.1.4 The information bar

The heart rate is taken continually and shown in the information bar.

Underneath the heart rate, the blood pressure is shown if the automatic blood pressure setting has been selected or if the values are entered manually.



### 5.1.5 The trend data window

#### 5.1.5 The trend data window

The trend data window shows the average value complex calculated from the raw data.

The display can be changed using the corresponding properties bar.

The averaged complexes can be shown with the feed rate settings of 25 mm/s and 50 mm/s. Each feed rate setting can be combined with the resolutions of 5 mm/mV, 10 mm/mV and 20 mm/mV.

Using the "Derivation" drop-down list, the desired ECG derivation can be selected.

As a standard, the first averaged complex is shown in red as a reference complex upon starting the load.

If you click "Ctrl" + "F6" the current averaged complex is selected as the reference complex (can also be selected in the context menu).



# 5.1.6 Keyboard controls

5.1.6 Keyboard controls	Key	Function
The CT 220 Script PC ECG system can be controlled	"F1"	On-line help
extensively using your computer keyboard without using the mouse.	''F2''	Patient management
In the table opposite, the "control keys" and their function are shown.	"F3"	Examination selection (list of examinations carried out for the patient to date)
	''F5''	On-line print-out (during ergometry). Output of the last 10 s of the examination on the connected printer
	''F6''	Opens up an input window for lactate input (these values are shown optionally in the report)
	''F9''	TUNE; TUNE STOP
	''F10''	Record Start recording End of load phase End of examination
	"F11"	a) Resting mode: retrospective resting ECG. By pressing this key the last 10 seconds of the displayed ECG signals are recorded in the database as a resting ECG.

# 5.1.6 Keyboard controls

Key	Function
	b) Rhythm / ergometry mode: sets a manual event. These markers are shown in the rhythm report and comments can be added to them directly in the report view.
"SHIFT" + "F1" to "F5"	Switches between the ergometry programs 1 to 5
"Ctrl" + "F6"	Shows the current averaged complex as a reference complex in the average value window
" Ctrl " + "R"	Switches to the Resting ECG mode
" Ctrl " + "Y"	Switches to the Rhythm ECG mode
" Ctrl " + "E"	Calls up the dialogue box to define the ergometry programs
" Ctrl " + "P"	Starts the print-out on the printer
" Ctrl " + "Alt" + "S"	Switches the systole beep on/off
" Ctrl " + "N"	Starts the recording of an emergency ECG

### 5.2 Patient management

#### 5.2 Patient management

#### **5.2.1** Selecting a patient already in the system

#### 1. Step:

Call up Patient management. The program can be configured so that the patient management dialogue box appears automatically when the program is started up, even before the main screen is displayed ( $\rightarrow$  configuration program).

#### 2. Step:

Check the desired patient in the patient list and then click "Select" button. The selected patient is called up as the current patient and the name of the patient appears in the title bar of the program.





# 5.2 Patient management

5.2.2 Deleting a patient already in the system

**1. Step:** Call up Patient management.

#### 2. Step:

Check the patient to be deleted in the patient list and click the "Delete" button. After a safety confirmation, the patient and all examinations performed for that patient will be deleted from the database.

### 5.2 Patient management

#### **5.2.3** Entering a new patient in the system

1. Step:

Call up Patient management.

2. Step:

Click the "New (F4)" button.

#### 3. Step:

Enter the patient information in the patient input dialogue box.

The fields "Name", "First name", "Sex" and "Date of birth" must be filled in. The year for the date of birth should be entered with 4 figures.

The "Extended patient input dialogue box" button calls up a dialogue box where you can enter the insurance number, health insurance number, health insurance scheme, status, ethnic group, native tongue and notes field.

#### 4. Step:

Confirm the details by clicking OK. The new patient will be saved in the database.

new patient				
Internal ID		Lasttest		
External ID			_	
<u>N</u> ame				
First name				
Birthname				
Sex	-	<b>-</b>		
Date of birth				
Age	0			
Birthplace				
<u>S</u> treet			-	
<u>P</u> ostcode				
<u>C</u> ity				
Phone	ĺ			
<u>F</u> ax	1			
Cur. weight	0 kg	Cur. height	cm	
	<u> </u>	· .	8	
<u>I</u> DEp	0			
				Extended patient
Ward / room			<b>1</b>	ipnut dialogue box
<u>R</u> eferrer				ipnat araiogue box
🖍 Undo	✓ <u>0</u> K	X Cancel		

## **Technical data**

Hardware		
Model:	CT 220 BT	CT 220
Power supply:	3.6 V=	4.3 V=
Power input:	< 0.5 W	0.25 A
Sampling rate:	600 Hz per channel	600 Hz per channel
Resolution:	12 Bit, 4.88 µV	12 Bit, 4.88 µV
Transmission range:	0.05 Hz – 100 Hz	0.05 Hz – 100 Hz
Incoming impedance:	>20 MΩ	>20 MΩ
Common mode rejections:	>105 dB	>105 dB
Risk class:	II a	II a
Defibrillation protection	-I ♥ F	-l <b>♥</b> F
Туре:	CF	CF
Housing protection class:	II, IPX0	II, IPX0
Module size:	LxWxH: 162x85x31 mm <sup>3</sup>	LxWxH: 188x98x45 mm <sup>3</sup>
Weight:	300 g (without storage batteries)	350 g.
Data transfer:	Bluetooth	USB port

## **Technical data**

Software:		
	Feed rates:	5 mm/sec
		10 mm/sec
		25 mm/sec
		50 mm/sec
	12 derivations:	Wilson
		Goldberger
		Einthoven
	Sensitivity:	5 mm/mV
		10 mm/mV
		20 mm/mV
	Filter:	50 Hz
		35 Hz
		Antidrift
		30 Hz low-pass filter

## **Technical data**

Environmental conditions			
	<b>Operation:</b>		
		Temperature:	10°C to 40°C
		Humidity:	25% - 95% rel. humidity
		Air pressure:	70 – 106 kPa
	Storage:		
		Temperature:	-10°C - +50°C
		Humidity:	15% – 95% rel. humidity
		Air pressure:	70 – 106 kPa

Appendix	Contents/Accessories	
ccessories		
CT 220 Script PC ECG System:	Articles	Article number
<u> </u>	CT 220 Script ECG-module, USB, clamp-connection	100.110.120
	Connecting cable ECG $\rightarrow$ PC, USB, 3 meters	100.130.205
	Instruction manual	100.130.305
	Software CD CT 220 / CT 220BT	100.210.116
	ECG interpretation incl. measurement (Glasgow)	100.210.220
	Patient cable 10-wired, banana plug, clump-connection 2 meters	100.210.160
	CT 220BT PC-ECG module Bluetooth, screw- connection	100.210.330
	Bag and belt	100.130.402
	Quick-charger, 230 volt	100.130.409
	Adapter for quick-charger, 230 volt, EU $\rightarrow$ UK	100.130.411
	Accumulator 2700 mAh	100.130.407
	Bluetooth dongle	100.130.400
	Patient cable, 10-wired, banana plug, screw- connection, 0.6 meters	100.130.406

Annex	Symbols
	Safety instructions: Heed the user instructions

# Troubleshooting

**Malfunction**: 50 Hz AC interference.

**Cause**: disruption to the 230V current

#### Remedy:

- Earth the couch.
- Check the positions of the electrode connections.
- Use a 50 Hz filter.

Malfunction: irregular AC interference.

**Cause**: disruption through muscle potentials; movement artefacts.

#### Remedy:

- Patient must not be cold.
- Calm patient.
- Possibly use muscle filters (35 Hz).









# Troubleshooting

Error	Possible cause	Remedy
Signal faded	Electrodes not correctly positioned	Apply electrodes again
	No filter	Switch on filters
No signal	Defective patient cable	Request new patient cable
	ECG module (not) connected	<ul> <li>Check the data connection to the COM port</li> <li>Check the power supply</li> <li>Port labels on PC mixed up</li> </ul>
AutomaticbloodpressuremeasurementsdoesnotstartautomaticallyLoad not placed on the ergometer	Communication to the ergometer broken	<ul> <li>Is the connection cable (correctly) connected?</li> <li>Is the ergometer cable to the COM port connected?</li> <li>Is the ergometer switched on?</li> <li>Switch the ergometer off and then back on 10 seconds later</li> <li>Has the correct ergometer been switched on (configuration program)?</li> </ul>
Printer does not print	Printer is not switched on	-Switch on printer
	Printer is not on-line	– Put printer on-line
	No paper in the printer	– Fill up with paper
	Defective/ no connection cable	-Check cable or change it if necessary