

InterSim III Interface / CCM version

Manual

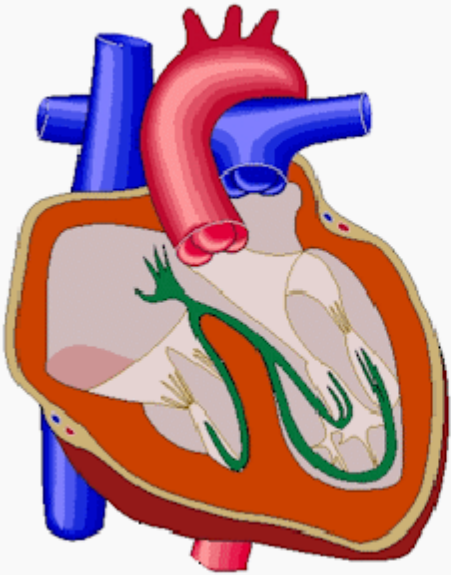
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About InterSim III Help



InterSim III
(c) 2023

Interactive Heart Simulator III

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This help is valid for application version 1.4.8266 and later. To get help on an InterSim III dialog, open the dialog and then press the F1 button of the keyboard. This works also for the home screen.

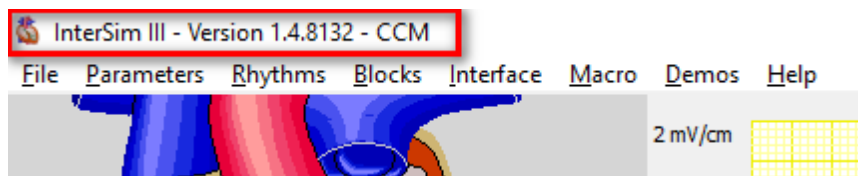
Home Screen

The most important controls and displays are grouped together on the home screen:

- See the wavefront propagation, pacing and sensing in the [heart window](#).
- Choose the appropriate device type in the [Device Type](#) group box.
- Select the most important parameters in the [Parameters](#) group box.
- Trigger premature contractions using the buttons in the [Premature Contractions](#) group box.
- See the most important parameters in the [Current State](#) group box at a glance.
- Get a better overview through the [ECG](#).

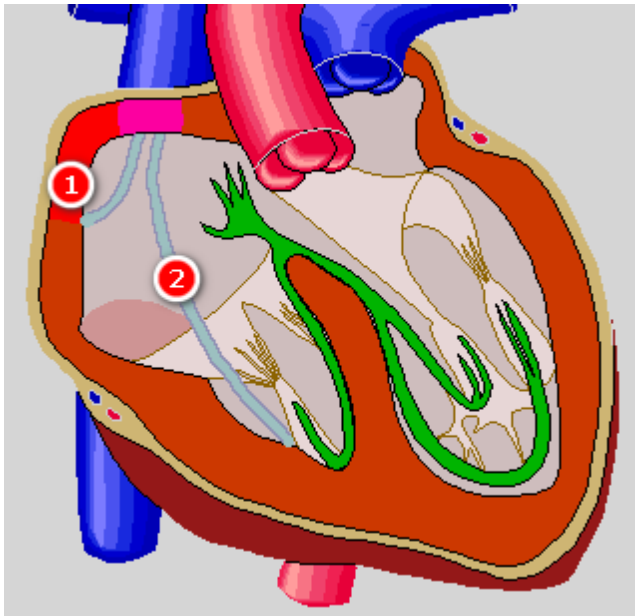
Title Bar

The title bar shows the name of the application and the current software version.

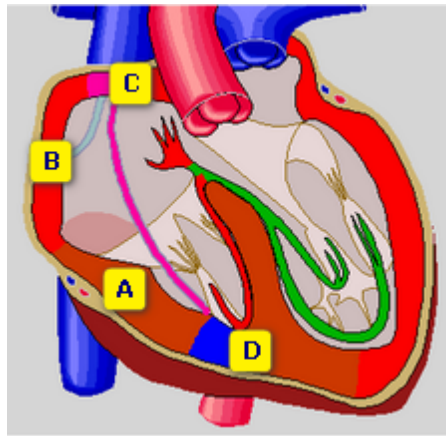


Animated Heart

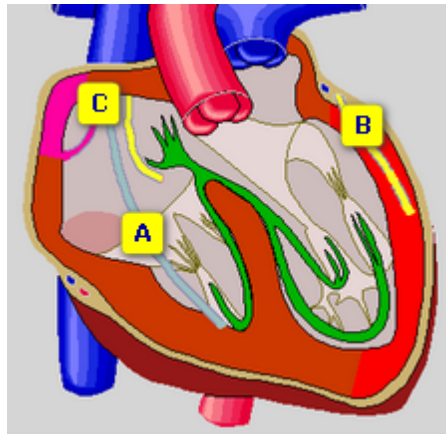
The heart window illustrates the wavefront propagation, pacing and sensing as shown in the figure below. **The Animated Heart is only visible if there is enough space on the screen.** The image changes with the selected [Device Type](#).



- 1 Myocardium**
- A**
Brown: repolarized
 - B**
Red: depolarized
 - C**
Magenta: automaticity or paced
 - D**
Blue: stimulus in vulnerable phase



- 2 Lead**
- A**
Gray: inactive
 - B**
Yellow: sensing
 - C**
Magenta: pacing



Device Type

Device type

- Dual Chamber
- Biventricular
- Quadripolar
- S1CD
- CCM

Choose the appropriate device type that matches your device. Some settings are shown or hidden depending on this type:

- display of [LV pace values](#)
- [LV ECG trace](#)
- [Left Ventricle Setup](#)
- [CCM Parameters](#)
- [S1CD Parameters](#)

If an adapter box is connected, additional restrictions may apply.

The S1CD device type is visible after a S1CD HV adapter has been connected for the first time

Parameters

Parameters

▼	▼	Atr.: 68 bpm	▲	1
▼	▼	Ven.: 28 bpm	▲	2
▼	▼	PR: 170 ms	▲	3
Temp AV Block				4
Temp Asystole				5

1 **Atrial Rate**

Use the buttons to manually control the intrinsic sinus node rate.

See also [Parameters/Rates](#)

2 **Ventricular Rate**

Use the buttons to manually control the intrinsic ventricular escape rate.

See also [Parameters/Rates](#)

3 **PR Interval**

Use the buttons to manually control the interval between the intra-atrial P wave and the intraventricular R wave in case of 1:1 conduction.

See also [Parameters/Intervals](#)

4 **Temp AV Block**

This button allows temporary application of 3rd degree AV block while pressed.

See also [Blocks](#)

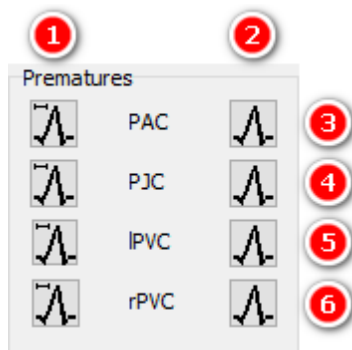
5 **Temp AV Block + Asystole**

This button allows temporary application of 3rd degree AV block and asystole while pressed.

See also [Blocks](#)

Premature Contractions

Use these buttons to create premature contractions.

**1** **Premature Contractions with Coupling Interval**

The buttons in the left column create premature contractions after an intrinsic action. The delay is set by the [Premature Coupling Interval](#).

Hold a button to create a series of premature contractions.

2 **Immediate Premature Contractions**

The buttons in the right column create premature contractions immediately. If the tissue is just refractory no premature contraction will be created.

Hold a button to create a series of premature contractions.

3 **PAC**

These two buttons create premature atrial contractions.

4 **PJC**

These two buttons create premature junctional contractions.

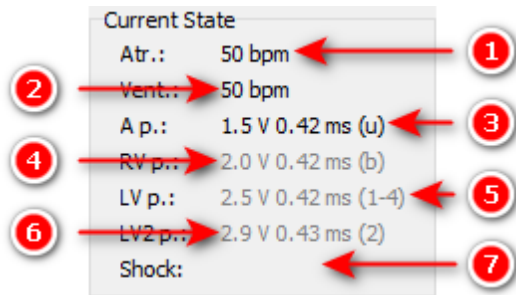
5 **lPVC**

These two buttons create premature left ventricular contractions. The left PVC amplitude of the surface ECGs and HV lead EGMs can be changed in the [PVC Amplitudes](#) dialog.

6 **rPVC**

These two buttons create premature right ventricular contractions. The right PVC amplitude of the surface ECGs and HV lead EGMs can be changed in the [PVC Amplitudes](#) dialog.

Current State

**1** **Current Atrial Rate**

This value shows the current intrinsic or paced atrial rate.

2 **Current Ventricular Rate**

This value shows the current intrinsic or paced ventricular rate.

The pace displays show the measured voltage and pulse width. The color of the display changes to black for about 0.5 s for a currently delivered pulse.

The active electrodes are placed in the parenthesis (1-4, R, Sh). For unipolar left ventricular pacing, only the cathode will be displayed.

- u: unipolar
- b: bipolar
- 1: LV Tip 1
- 2: LV Ring 2
- 3: LV Ring 3
- 4: LV Ring 4
- Sh: Shock Coil
- R: RV Ring
- rv p: Ventricle
- ls p: Local Sense

3 **Most Recent Atrial Pace Values**

This entry shows voltage and duration of the most recent atrial pace.

4 **Most Recent Right Ventricular Pace Values**

This entry shows voltage and duration of the most recent right ventricular pace.

5 **Most Recent Left Ventricular Pace Values**

This entry shows voltage and duration of the most recent left ventricular pace. It is only visible for biventricular, quadripolar, and CCM devices. For CCM devices, it shows voltage and duration of a local sense pace.

6 Most Recent Second Left Ventricular Pace Values (MPP)

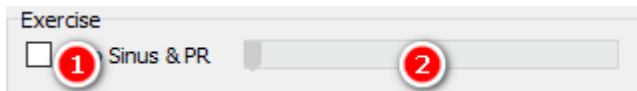
This entry shows voltage and duration of the second left ventricular pace for MPP devices. It is only visible for quadripolar devices and shows the second pace in case of multipoint pacing. The active electrodes are placed in the parenthesis (1-4, R, Sh). For unipolar pacing, only the cathode will be displayed.

7 Most Recent Shock Values

This entry shows energy and polarity at RV coil of the most recent shock event.

Exercise

Use checkbox and trackbar to manually control the simulated exercise of the virtual patient.



1 Auto Sinus & PR

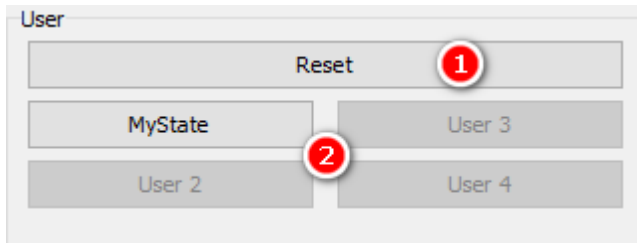
If the box is checked, the simulator controls sinus rate, PR interval, and QT time relative to the selected workload.

2 Workload

Use the trackbar to select the workload for the virtual patient.

See also [Status Bar](#), [Exercise](#) dialog, [Chronotropic Incompetence](#).

User



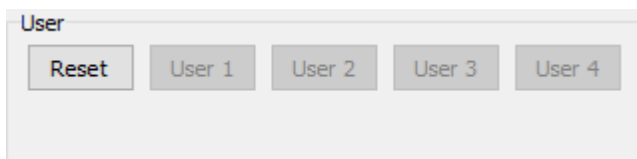
1 Reset

Resets all parameters to default values. See also the [Reset](#) menu item and the [Reset Values](#).

2 User Buttons

Use the User Buttons for quick access to frequently used States or Macros. Create these states via [Save Simulation State](#) or the Macros via [Save Macro](#). Apply the States or Macros via [Assign User Buttons](#).

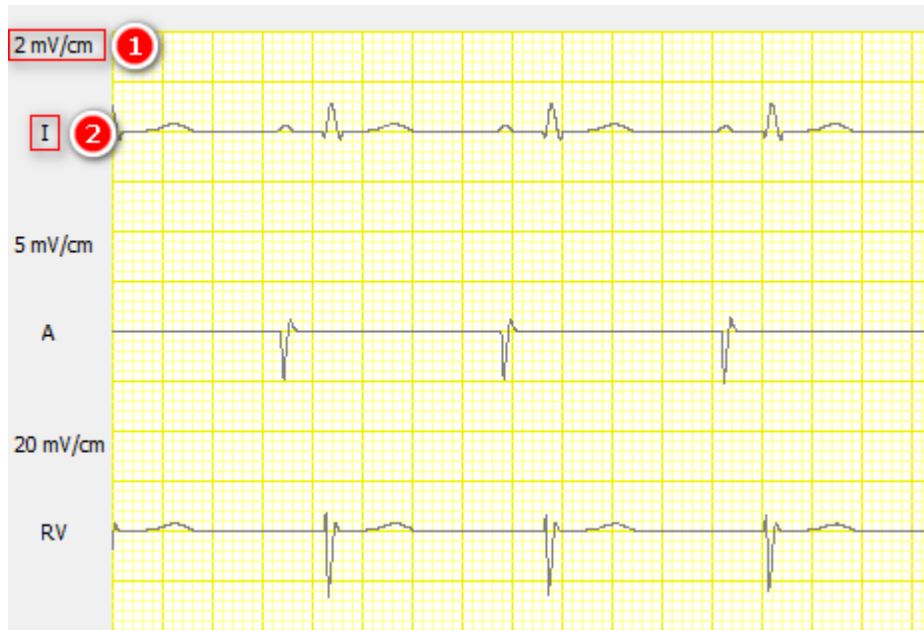
If the space on the screen is limited, the User group can also appear with buttons reduced in size.



ECG

Watch the simulated ECGs or EGMs in the ECG display.

ECG Display



1 Amplification

Shows the amplification of the assigned ECG trace. Adjust all amplifications with the button [Normalize](#).

2 Lead

Shows the lead of the assigned ECG trace. Select the visible traces by checking the [boxes](#) below the ECG.



Two squares are the equivalent to 1 cm.

Traces



1 List of available ECG Traces

Select the desired traces in the ECG area. At least one trace must be selected.

The available traces depend on the selected [Device Type](#).

- Dual Chamber

I II III A RV Shock

- Biventricular, Quadripolar

I II III A RV LV Shock

- SICD

I II III Pri Sec

- CCM

I II III A rv ls

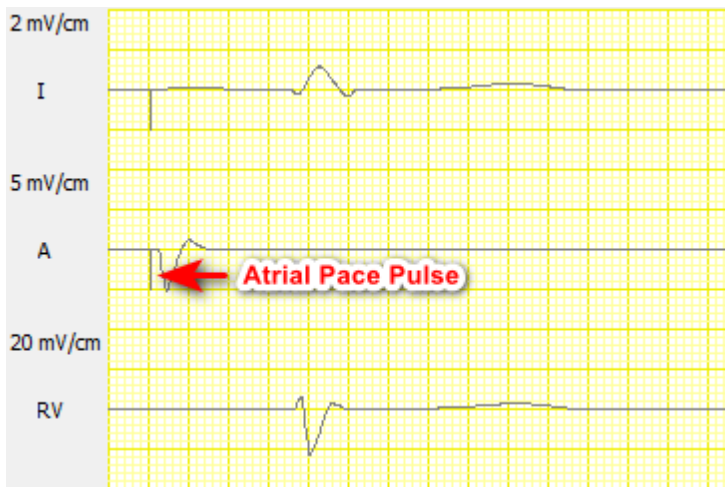
Pace Pulses

Draw Pulses Draw Cross Pulses

1 **2**

1 Draw Pulses

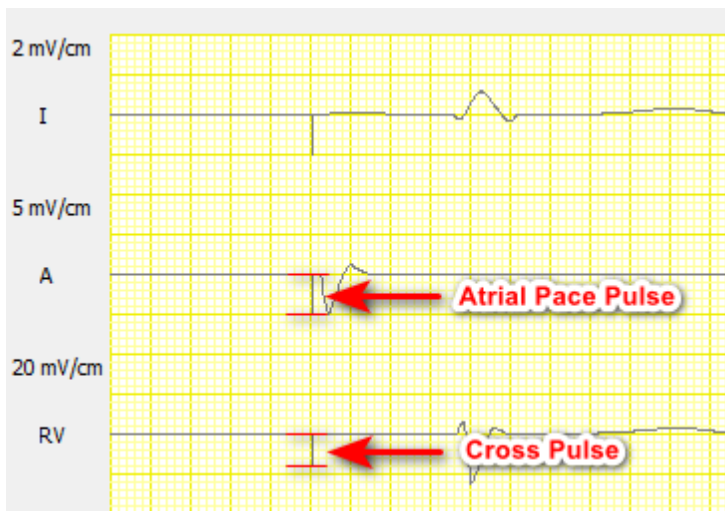
Check this box to see pace pulses in the ECG. Pace Pulses are visible in the limb lead ECGs and in the appropriate intracardiac traces.



The atrial pace pulse is seen in the atrial and in the limb lead traces.

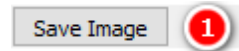
2 Draw Cross Pulses

Check this box to see all pace pulses in each intracardiac trace; an atrial pulse is also drawn in the ventricular traces and vice versa.



The atrial pace pulse is seen as smaller cross pulse in the ventricular trace.

Save Image

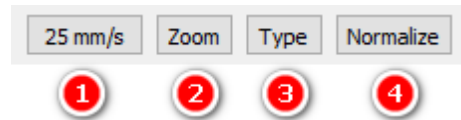


1 Save Image

Press this button to take a screenshot of the current ECG. After capturing the ECG, a Save ECG Dialog will appear.

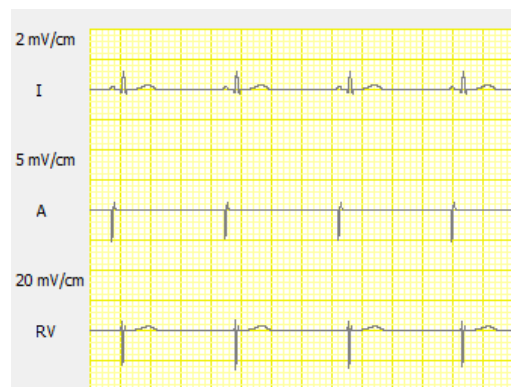
See also [Folders](#).

Settings



1 Sweep Speed

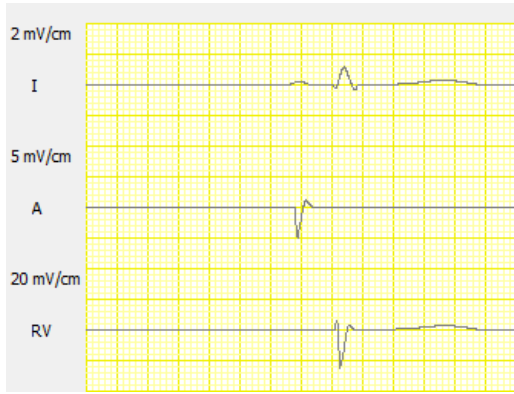
Select the sweep speed in the ECG.



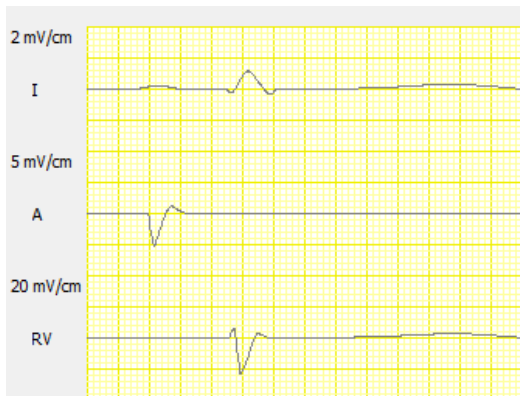
12.5 mm/s



25 mm/s



50 mm/s



100 mm/s

2

Zoom

Use this to select the zoom factor of the ECG. The number of visible ECG traces may be reduced with high zoom factors.

3

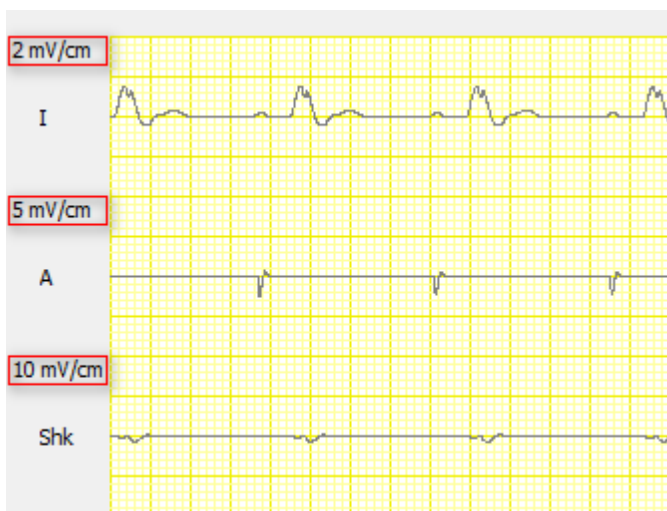
Type

Use this to toggle between two ECG views.

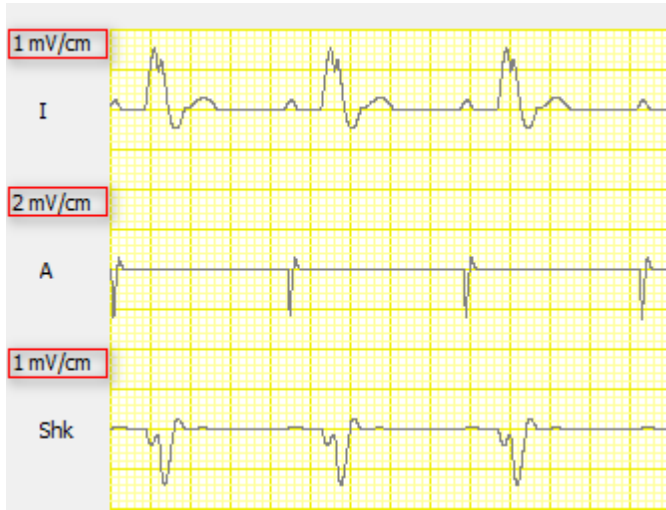
4

Normalize

Use this to adjust all trace amplifications.



ECG after setting of atrial and ICD amplitudes



The same ECG after normalizing



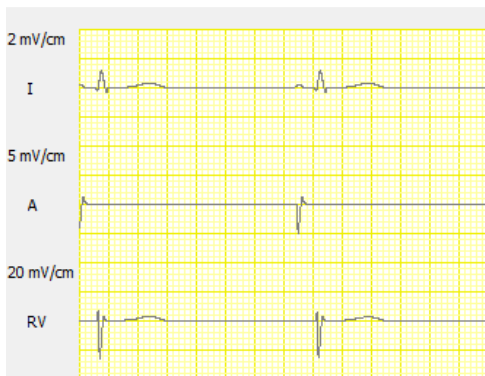
2 squares are the equivalent of 1 cm.

ECG Review

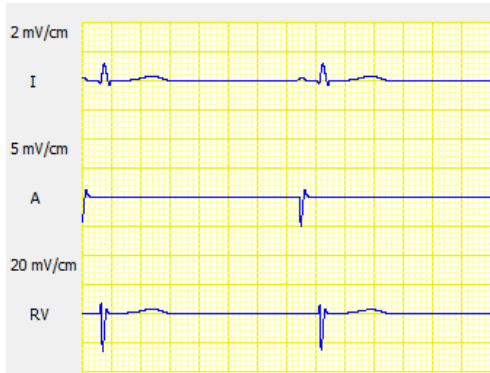


1 Freeze / Continue

Press the Freeze button to go up to 8 minutes back in the ECG. The caption of the button will become "Continue" and the buttons Backward, Refresh, and Forward will be enabled. Press the button Continue to see the real time ECG again. Upon continuation the ECG buffer will be cleared.



ECG is running,



ECG is frozen.

2 Backward

Press the Backward button to move the ECG half a page backward.

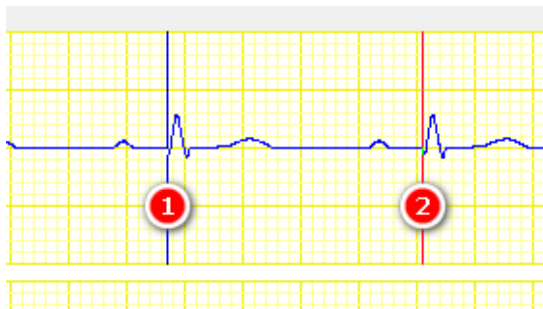
3 Refresh

Press the Refresh button if you have changed [visible_traces](#), [sweep speed](#), or [zoom factor](#).

4 Forward

Press the Forward button to move the ECG half a page forward.

Cursors



0,880 s 68 bpm 25 mm/s Zoom Type Normalize Continue ◀◀ ◀ ▶ ▶▶

7 **8** **3** **4** **5** **6**

1 Blue Cursor

The blue line represents cursor 1. Click left mouse button to show or move the cursor.

2 Red Cursor

The red line represents cursor 2. Click right mouse button to show or move the cursor.

3 Large Step Left

This moves the cursor a large step left.

4 Step Left

This moves the cursor a small step left.

5 Step Right

This moves the cursor a small step right.

6 Large Step Right

This moves the cursor a large step right.

Click on the step buttons with the left mouse button to move cursor 1 and with the right mouse button to move cursor 2. If you want to use the keyboard, navigate with the TAB key to the appropriate button and use the space bar to move cursor 1 and the "P" key to move cursor 2.

7 Interval between Cursors

If both cursors are visible the interval between them is shown here.

8 Corresponding Rate to Cursor Interval

If both cursors are visible the "rate" associated to this interval (7) is displayed.

Status Bar

Sinus Rhythm	AV II M II	Retro	Acc	LBBB	RBBB	Inter	Defi	W50/29	Macro			
1	2	3	4	5	6	7	8	9	10	11	12	13

1 Rhythm

The currently active rhythm.

If Dual Tachycardia is activated, abbreviations of both rhythms are displayed.

2 AV Block

The currently AV conduction status.

3 Retrograde Conduction

"Retro" if Retrograde Conduction is selected.

4 Accessory Pathway

"Acc" if Accessory Pathway is selected.

5 LBBB

"LBBB" if Left Bundle Branch Block is selected.

6 RBBB

"RBBB" if Right Bundle Branch Block is selected.

"LBBB" and "RBBB" cannot be selected at the same time.

7 Inter

Displays either "Inter" for Interface or the activated demo device.

8 Defi

Displays "Defi" when the demo ICD is charging.

9 Exercise

"W#/#" if Auto Sinus & PR is active.

The first number shows the current workload, the second number the exercise level of the patient as a percentage.

For Example: "W50/43" stands for a current workload of 50% and a current exercise level of 43%.



Macro active

The word "Macro" flashes if a macro is currently running.



Interface Status



No interface unit available or communication to the interface is compromised.



The upper half of the field should always be light green if an InterSim III Interface unit is connected. It shows the successfully established connection to the simulator electronics.



The lower half turns green in case an Adapter Box is connected and recognized. It remains red in case no Adapter Box is connected or the communication between interface and Adapter Box is compromised.



Delay Indicator



Normal operation, real time simulation available.



Borderline condition exists for a short period in time.



Real-time simulation not possible.



Classroom State



Classroom functionality enabled. InterSim III is used in classroom mode.



Connection to local or web classroom server established.



Classroom Session active.

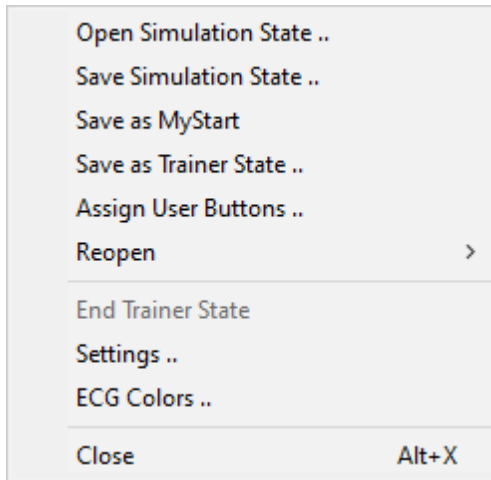


Error occurred.

Menus

File

The File menu contains all commands necessary for dealing with Simulation States and some additional system commands.



Open Simulation State

The menu item opens the Open Simulation State Dialog. Select the desired state and click OK. See also [Simulation States](#) and [Folders](#).

Save Simulation State

The menu item opens the Save Simulation State Dialog. Enter the filename and click OK to create a new Simulation State. See also [Simulation States](#) and [Folders](#).

Save as MyStart

This menu item creates the special [MyStart](#) State. If MyStart already exists, a confirmation dialog will appear. See also [Simulation States](#) and [Folders](#).

Assign User Buttons

Use User Buttons for quick access to commonly used [Simulation States](#) or [Macros](#). This dialog lets you assign appropriate States or Macros.

1 User Button 1-4

Select the [User Button](#) to which the State or Macro should be assigned.

2 Active

Select whether the User Button should be active or not.

3 Label

Enter the Label that should appear on the [User Button](#).

4 State/Macro

Choose State or Macro depending on what you want to assign.

5 Filename

This control shows the selected file.

6 Disc symbol

Press the disc symbol to select the file you want to assign to the [User Button](#).

See also [Simulation States](#), [Macros](#), and [Folders](#).

Save as Trainer State

A Simulation State can be saved as [Trainer State](#). See also [Simulation States](#) and [Folders](#).

Reopen

Click Reopen to open the list of recently saved or loaded state files. Click the filename of the state you want to load again.

End Trainer State

A [Trainer State](#) allows only access to a limited set of parameters. Use this menu item to return to normal operation. The menu item is disabled if no Trainer State is loaded.

Settings

1 Classroom

InterSim can work in a [classroom](#) configuration. Check this box to enable the classroom functionality. Choose the Local or Web Classroom based on your existing configuration.

2 Log Level

It is possible to have more comprehensive information in the journal file. At startup, a message window indicates a higher log level.

3 Sound

Check this box to play available heartbeat [sounds](#).

4 Expanded Voltage Range

Use this option to expand the voltage range for atrial and ventricular thresholds and amplitudes. This can be useful in conjunction with external pacemakers.

See [Atrial Parameters](#) and [Right Ventricular Parameters](#).

5 Adapter Box

Depending on the Adapter Box (Standard, Extended) and High Voltage Adapter (DF-1, DF-4) used, some functions may not be available. If you do not want this behavior, uncheck this box.

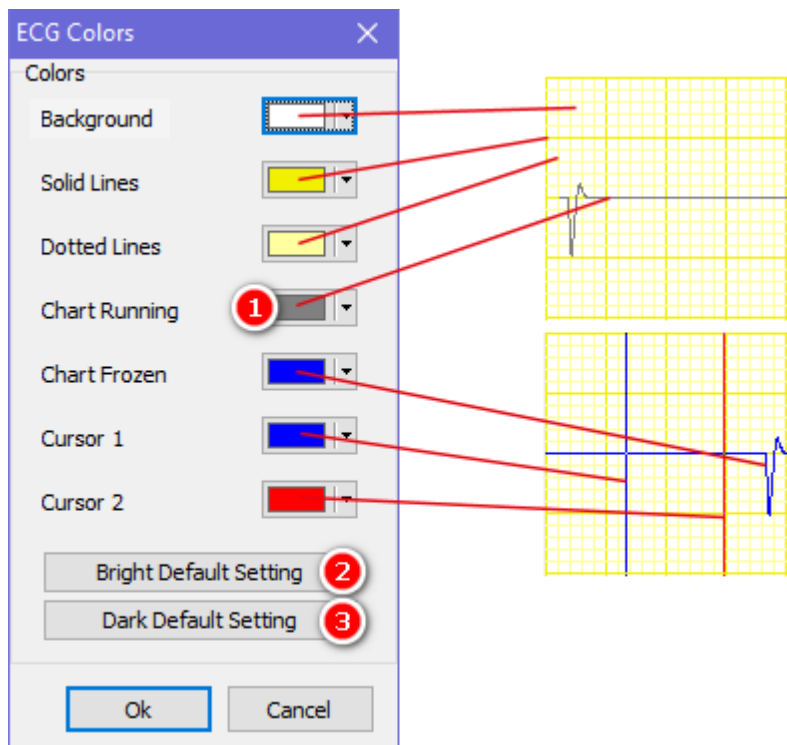
6 Firmware

The simulator stores up to two different firmware versions. By default the latest version is loaded at simulator start-up. In case of problems, the hotline may ask you to load the previous version.

7 Sleep Mode

When the PC is going to sleep, the application will stop. A connected ICD could misinterpret this as fibrillation. When this checkbox is checked, the application tries to prevent Windows from sleep.

ECG Colors



1 Color Buttons

Use these buttons to define the different colors of the [ECG](#). The image shows the assignment of the buttons to the different ECG parts.

2 Bright Default Settings

Press this button if you want to restore the default bright color assignment.

3 Dark Default Settings

Press this button if you want to restore the default dark color assignment.

Close

Use this menu item to close the application. If the macro window contains a changed and unsaved macro, a confirmation dialog appears before closing.

Parameters

The Parameters menu contains settings that primarily control rates and timing. The values selected in the dialogs will be applied by pressing the OK button. The selected values will be discarded by pressing the Cancel button.



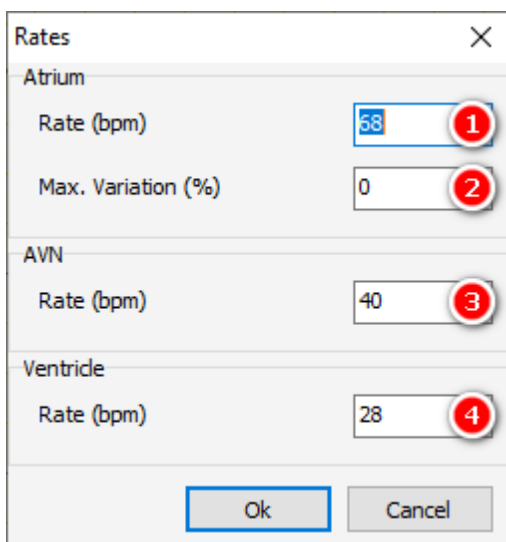
Reset

Resets all parameters to default values. See also the [Reset button](#) and the [Reset Values](#).

Reset to MyStart

The [MyStart State](#) is a special state that is automatically loaded at program startup. Use this menu entry to return to this state at any time. See also [Simulation States](#).

Rates



1

Atrial Rate

Use this to set the intrinsic sinus node rate. Note that this value will only take effect if the checkbox "Auto Sinus & Auto PR Interval" is not selected. Otherwise the simulator will control the atrial rate. The range is from 2 bpm to 245 bpm.

2 Max. Variation

Use this to define the maximum variation of the sinus node rate. The range is from 0% to 20%.

3 AVN Rate

Use this to set the intrinsic AV node escape rate. The range is from 2 bpm to 200 bpm.

4 Ventricular Rate

Use this to set the intrinsic ventricular escape rate. The range is from 2 bpm to 250 bpm.

Intervals

Parameter	Value	Annotation
PR Interval (ms)	170	1
RP Interval (ms)	280	2
Block Rate (bpm)	171	3
Premature Coupling Interval (ms)	250	4
Vulnerable Phase Interval (ms)	60	5
BBB QRS Width Interval (ms)	180	6
RV-LS Interval (ms)	10	7

1 PR Interval

Use this to set the interval between the intra-atrial P wave and the intraventricular R wave in case of 1:1 conduction. Note that this value will only take effect if the checkbox "Auto Sinus & Auto PR Interval" is not selected. Otherwise the simulator will control the PR Interval. The range is from 50 ms to 400 ms.

2 RP Interval

If the retrograde conduction is enabled, use this to set the RP interval. The range is from 130 ms to 600 ms.

3 AVN Block Rate

Use this to set the block rate of the atrioventricular conduction (Wenckebach point). The range is from 20 bpm to 250 bpm.

4 Premature Coupling Interval

Use this to set the coupling interval of premature contractions. This value will be effective on premature

contractions which are triggered by means of the left row of the premature buttons. The range is from 100 ms to 1000 ms.

5 Vulnerable Phase Interval

This parameter applies to the initiation and termination of tachyarrhythmias. It determines the width of the vulnerable phase at the end of the refractory period of the atria and the ventricles. The range is from 40 ms to 80 ms.

6 BBB QRS Width

If LBBB or RBBB is active, use this to set the QRS width. The range is from 80 ms to 220 ms.

7 RV-LS Interval

Use this to set the RV-LS interval. The range is from 0 to 150 ms.

Exercise

1 Current Workload in %

If the Auto Checkbox is checked, the patient's exercise level increases or decreases to meet the value of the workload. The exercise level in turn determines Sinus Rate and PR Interval. The range is from 0 to 100%.

2 Sinus Rest Rate

The Sinus Rest Rate is the rate at an exercise level of 0%. The range is from 0 to 245 bpm.

3 Max Sinus Rate

The Max Sinus Rest Rate is the rate at an exercise level of 100%. The range is from 0 to 245 bpm.

The Sinus Rest Rate cannot be set to a higher value than the Max Sinus Rate.

4 PR Rest Interval

The PR Rest Interval is the interval at an exercise level of 0%. The range is from 50 to 400 ms.

5 Min PR Interval

The Min PR Interval is the interval at an exercise level of 100%. The range is from 50 to 400 ms.

The PR Rest Interval cannot be set to a lower value than the Min PR Interval.

6 Auto Sinus & PR

If the Auto Checkbox is checked, Sinus Rate and PR Interval are set automatically by the simulator. If the box is unchecked, the values are determined by the appropriate controls.

Chances

Chances determine the result of an ATP or Induction.

Chances for ATP

Chances for ATP determine the result of an ATP while a sinus tachycardia < 180 bpm or a ventricular tachycardia < 182 bpm is active. The sum of the chances must be 100%. Follow a top-down direction while entering new values.

Category	Percentage (%)
Termination	100
Accel. 50 ms	0
Accel. 70 ms	0
Degeneration	0
No Response	0

1 Chances for ATP

Select this Tab to edit the Chances for ATP.

2 Termination

Sets the chance of termination of a tachycardia.

3 Acceleration 50 ms

Sets the chance of acceleration of a tachycardia by 50 ms.

4 Acceleration 70 ms

Sets the chance of acceleration of a tachycardia by 70 ms.

5 Degeneration

Sets the chance a tachycardia will degenerate to a fibrillation.

6 No Response

Sets the chance that the virtual patient does not response to an ATP.

Chances for Induction

Chances for Induction determine the result of an induction like T wave shock, QRS shock, or alternating current while a sinus rhythm is active. Note that the sum of the chances must be 100%. Follow a top-down direction while entering new values.

Chances / % (T Wave and QRS Shock, Alt. Current)	
Monomorphic Tachycardia 170 bpm	0
Polymorphic Tachycardia	0
Fibrillation	100
No Response	0

1 Chances for Induction

Select this Tab to edit the Chances for Induction.

2 Monomorphic Tachycardia 170 bpm

Sets the chance of induction of a Monomorphic Tachycardia.

3 Polymorphic Tachycardia

Sets the chance of induction of a Polymorphic Tachycardia.

4 Fibrillation

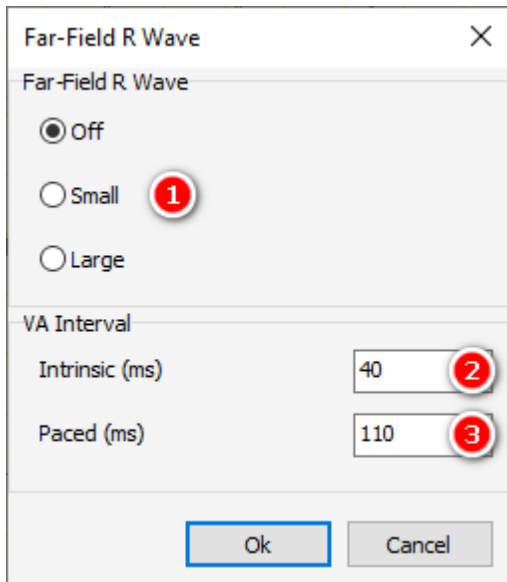
Sets the chance of induction of a Ventricular Fibrillation.

5 No Response

Sets the chance that the virtual patient does not response to an Induction.

Far-Field R Wave

The settings of the Far-Field R Wave dialog control the appearance and delay of R waves in the atrial channel.



1 Far-Field R Wave shape

Use this to set the shape of Far-Field R Waves.

- Off: no Far-Field R Wave in the atrial channel
- Small: a small Far-Field R wave appears in the atrial channel
- Large: a large Far-Field R wave appears in the atrial channel

2 Delay of intrinsic Far-Field R Waves

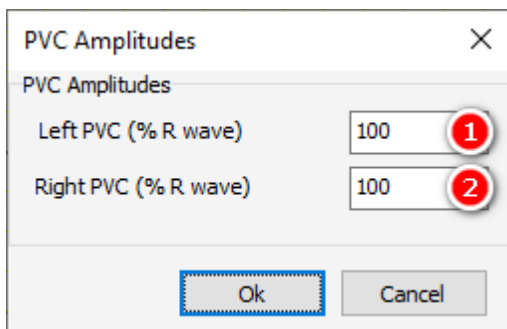
Determines the delay of a Far-Field R Wave to an intrinsic R wave. The range is from 0 to 100 ms.

3 Delay of paced Far-Field R Waves

Determines the delay of a Far-Field R Wave to a paced R wave. The range is from 50 to 200 ms.

PVC Amplitudes

The settings of the PVC Amplitudes dialog control the amplitudes of left and right ventricular premature contractions. This way, it is possible to show an undersensing of a R wave following a PVC.



1 Left PVC Amplitude

Use this to set the left PVC amplitude of the surface ECGs and HV lead EGMs as percentage of the R wave amplitude. The range is from 50% to 300%.

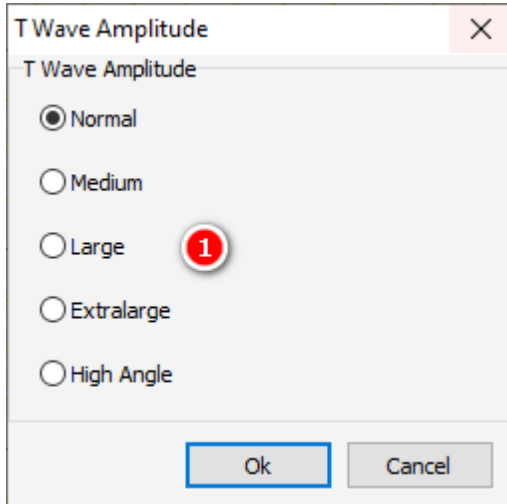
2 Right PVC Amplitude

Use this to set the right PVC amplitude of the surface ECGs and HV lead EGMs as percentage of the R wave amplitude. The range is from 50% to 300%.

See also how [premature contractions](#) are created.

T Wave Amplitude

The settings in the Amplitude T Wave dialog control the appearance of the T waves in the intraventricular and shock channels.

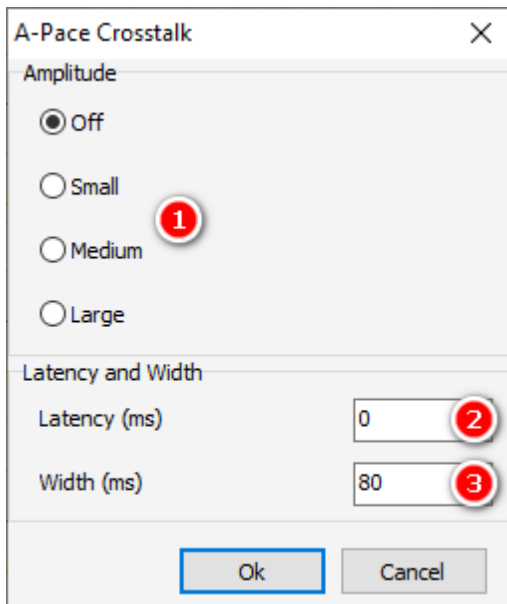


1 T Wave Amplitude

Use this to set the amplitude of the T wave. High Angle is especially intended to show T wave oversensing.

A-Pace Crosstalk

The parameters in this dialog are intended to demonstrate ventricular safety pacing that occurs if the pacemaker discovers any interference in the ventricular IEGM during the AV interval.



1 A-Pace Crosstalk Amplitude

Use this to set the amplitude of the A-Pace Crosstalk signal.

2 A-Pace Crosstalk Latency

Use this to set the latency of the A-Pace Crosstalk signal. The range is from 0 ms to 50 ms.

3 A-Pace Crosstalk Width

Use this to set the width of the A-Pace Crosstalk signal. The range is from 5 ms to 100 ms.

Miscellaneous

1 A-Pace-P Latency

Use this to set the latency between the delivery of the atrial stimulus and the resultant atrial excitation. The range is from 1 ms to 150 ms.

2 V-Pace-Q Latency

Use this to set the latency between the delivery of the ventricular stimulus and the resultant ventricular excitation. The range is from 1 ms to 150 ms.

3 Pace-LS Latency

Use this to set the latency between the delivery of the ventricular stimulus and the resultant local sense excitation. The range is from 30 ms to 100 ms.

4 ERAF

By means of this box the ERAF phenomenon (Early Recurrence of AF) can be shown.
Procedure:

- select ERAF
- choose atrial fibrillation
- terminate the atrial fibrillation, for example manually
- without pacing the atrial fibrillation will recur after a while
- with pacing (> 80 bpm) the atrial fibrillation will not recur

5 ERVT

By means of this menu item the ERVT phenomenon (Early Recurrence of VT) can be shown.
Procedure:

- select ERVT
- choose ventricular fibrillation

- terminate the ventricular fibrillation, for example manually
- without pacemaker interaction the ventricular fibrillation will recur after a while
- with pacemaker interaction (> 80 bpm) the ventricular fibrillation will not recur

Rhythms

The Rhythms Menu provides the different heart rhythms.

<input checked="" type="checkbox"/>	Sinus Rhythm	Shift+Ctrl+S
<input type="checkbox"/>	Sinus Brady	Shift+Ctrl+R
<input type="checkbox"/>	Sinus Arrest	
<input type="checkbox"/>	Idioventricular Rhythm	
<input type="checkbox"/>	Sinus tachy	Shift+Ctrl+N
<input type="checkbox"/>	Brady-Tachy Syndrome	
<input type="checkbox"/>	Paroxysmal Atrial Tachy	
<input type="checkbox"/>	Atrial Flutter	Shift+Ctrl+F
<input type="checkbox"/>	Atrial Fibrillation	Shift+Ctrl+G
<input type="checkbox"/>	Combined Atrial Flutter/Fibrillation	
<input type="checkbox"/>	AVNRT	Shift+Ctrl+A
<input type="checkbox"/>	LV Tachy	>
<input type="checkbox"/>	RV Tachy	>
<input type="checkbox"/>	Polymorphous VT	
<input type="checkbox"/>	Torsades de Pointes	>
<input type="checkbox"/>	Ventricular Flutter	Shift+Ctrl+U
<input type="checkbox"/>	Ventricular Fibrillation	>
<input type="checkbox"/>	Dual Tachycardia	

1 List of predefined rhythms

Select a rhythm from the list.

2 List of atrial tachycardias

The entries of this part of the list, except combined rhythms, can be used for dual tachycardias.

3 List of ventricular tachycardias

This list contains ventricular tachycardias.

4 Entry that opens a submenu

Entries that open a submenu are indicated by the little arrow on the right.

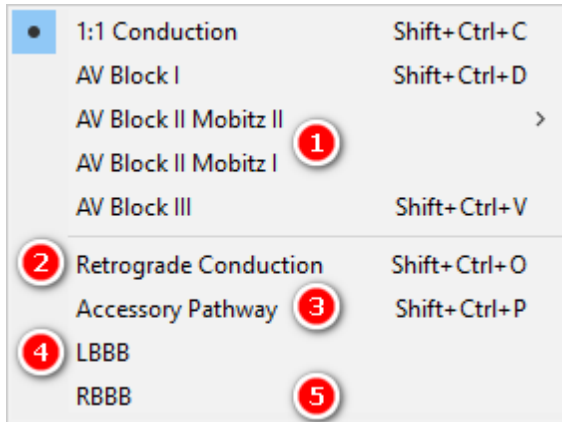
5 Dual Tachycardia

Some of the atrial and ventricular tachycardic rhythms can be used in a dual tachycardia. This checkbox enables this behavior.

See also [Rhythm Characteristics](#).

Blocks

The Blocks Menu provides different atrio-ventricular conduction options.



1 List of AV Blocks

Select an AV block from the list.

2 Retrograde Conduction

Use this checkbox to enable the retrograde conduction.

3 Accessory Pathway

Check this box to enable an accessory pathway between the atrium and the upper left ventricle. It is possible to demonstrate a reentry loop.

4 LBBB

Use this checkbox to establish a Left Bundle Branch Block.

5 RBBB

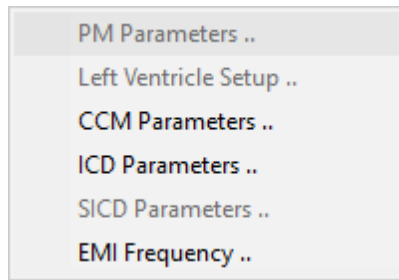
Use this checkbox to establish a Right Bundle Branch Block.

LBBB and RBBB cannot be checked at the same time. See also the [RV-LV-Interval](#) in the [Left Ventricle Setup Dialog](#). See [Block Characteristics](#).

Interface

The Interface menu contains settings that directly control the interaction with pacemakers or ICDs. Apply the settings of the Interface dialogs with the Apply button. Refresh the settings with the Refresh button. This is useful when settings have changed, for example by loading a state or running a macro. Close the window with the Close Button. You can leave the Interface dialogs open and open another dialog window.

The Left Ventricle Setup menu item is enabled when a bipolar or quadripolar device type is selected. The SICD Parameters menu item is enabled when a SICD device type is selected.

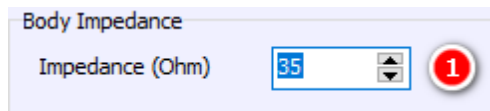


PM Parameters

Use this to set the parameters for a pacemaker. This menu item is disabled when a SICD device type is selected. See the [Left Ventricle Setup](#) to set impedances, thresholds, RV-LV intervals, amplitudes, and EMI of the left ventricle.

Body Impedance

The annotated picture is part of the [PM Parameters Dialog](#).



1 Body Impedance

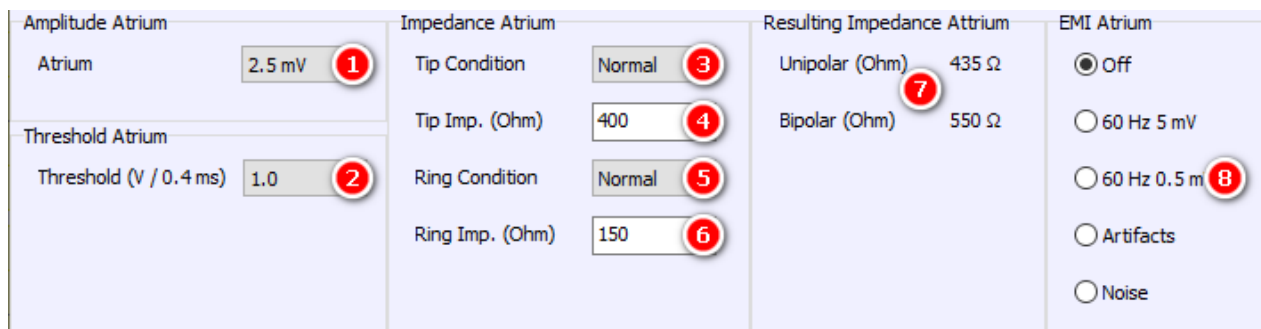
Use this to set the Body Impedance. The Body Impedance affects every unipolar pacemaker impedance. Possible values are 15 Ω to 45 Ω . See [Impedances](#).

Atrial Parameters

The annotated picture is part of the [PM Parameters Dialog](#).

The simulator uses strength-duration curves for threshold calculation. Every PM threshold parameter is valid for a duration of 0.4 ms.

Click link to learn more about how to calculate [impedances](#).



1 Atrial Amplitude

Use this to set the maximal intra-atrial amplitude during sinus rhythm. The range is from 0.15 mV to 6.0 mV. If the [Expanded Voltage Range checkbox](#) is selected, the range expands to 0.15 mV to 25.0 mV.

2 Atrial Threshold

Use this to set the threshold value of the atrial channel. The range is from 0.5 V to 3.75 V. Use n.c. if you do not want to have capture at all.

If the [Expanded Voltage Range checkbox](#) is selected, the range expands to 0.5 V to 8.0 V.

3 Atrial Tip Defect Condition

Use this to set an [electrode defect](#) of the atrial tip strand. Possible values are Normal, Fracture, Leakage, Scar.

4 Atrial Tip Strand Impedance

For a normal condition, use this to set the [impedance](#) of the atrial tip strand. The range is from 150 Ω to 500 Ω .

5 Atrial Ring Defect Condition

Use this to set an [electrode defect](#) of the atrial ring strand. Possible values are Normal, Fracture, Leakage.

6 Atrial Ring Strand Impedance

For a normal condition, use this to set the [impedance](#) of the atrial ring strand. The range is from 150 Ω to 500 Ω .

7 Atrial Resulting Impedance

This panel displays the resulting [impedances](#) of the atrial channel.

8 Atrial EMI

Use this to set the EMI of the atrial channel. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

Right Ventricular Parameters

The annotated picture is part of the [PM Parameters Dialog](#).

The simulator uses strength-duration curves for threshold calculation. Every PM threshold parameter is valid for a duration of 0.4 ms.

Click link to learn more about how to calculate [impedances](#).

Amplitude Right Ventricle	Impedance Right Ventricle	Resulting Imp. Right Ventricle	EMI Right Ventricle
Right Ventricle: 12.5 mV 1	Tip Condition: Normal 3	Unipolar (Ohm): 415 Ω	<input checked="" type="radio"/> Off
Threshold Right Ventricle	Tip Imp. (Ohm): 380 4	Bipolar (Ohm) 7 : 530 Ω	<input type="radio"/> 60 Hz 5 mV
Threshold (V / 0.4 ms): 1.0 2	Ring Condition: Normal 5		<input type="radio"/> 60 Hz 0.5 mV 8
	Ring Imp. (Ohm): 150 6		<input type="radio"/> Artifacts
			<input type="radio"/> Noise

1 Right Ventricular Amplitude

Use this to set the maximal right intraventricular amplitude during sinus rhythm. The range is from 1 mV to 15.0 mV.

If the [Expanded Voltage Range checkbox](#) is selected, the range expands to 1 mV to 25.0 mV.

2 Right Ventricular Threshold

Use this to set the threshold value of the right intraventricular channel. The range is from 0.5 V to 3.75 V. Use n.c. if you do not want to have capture at all.

If the [Expanded Voltage Range checkbox](#) is selected, the range expands to 0.5 V to 8.0 V.

3 Right Ventricular Tip Defect Condition

Use this to set an [electrode defect](#) of the right intraventricular tip strand. Possible values are Normal, Fracture, Leakage, Scar.

4 Tip Strand Impedance Right Ventricle

For a normal condition, use this to set the [impedance](#) of the right intraventricular tip strand. The range is from

150 Ω to 500 Ω .

5 Right Ventricular Ring Defect Condition

Use this to set an [electrode defect](#) of the right intraventricular ring strand. Possible values are Normal, Fracture, Leakage.

6 Right Ventricular Ring Strand Impedance

For a normal condition, use this to set the [impedance](#) of the right intraventricular ring strand. The range is from 150 Ω to 500 Ω .

7 Right Ventricular Resulting impedance

This panel displays the resulting [impedances](#) of the right intraventricular channel.

8 Right Ventricular EMI

Use this to set the EMI of the right intraventricular channel. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

Left Ventricle Setup

All settings for the left ventricle are accessible via the Left Ventricle Setup in the Interface Menu. This menu item is enabled when a biventricular or a quadripolar [device type](#) is selected.

Impedances (LV)

The annotated picture is part of the [Left Ventricle Setup Dialog](#). The cathodes LV ring3 and ring4 are disabled for [biventricular devices](#).

See [impedances](#) for instructions on calculating impedances. The [resulting impedances](#) are shown in the threshold matrix.

	Conditions	Strand impedances (Ω)
Cathode		
LV tip1	Normal 1	410 2
LV ring2	Normal 3	390 4
LV ring3	Normal 5	440 6
LV ring4	Normal 7	400 8

1 LV Tip1 Defect Condition

Use this to set an [electrode defect](#) of the left ventricular tip 1 strand. Possible values are Normal, Fracture, Leakage.

2 LV Tip1 Strand Impedance

For a normal condition, use this to set the [impedance](#) of the left ventricular tip 1 strand. The range is from 150 Ω to 500 Ω .

3 LV Ring2 Defect Condition

Use this to set an [electrode defect](#) of the left ventricular ring 2 strand. Possible values are Normal, Fracture, Leakage.

4 LV Ring2 Strand Impedance

For a normal condition, use this to set the [impedance](#) of the left ventricular ring 2 strand. The range is from 150 Ω to 500 Ω .

5 LV Ring3 Defect Condition

Use this to set an [electrode defect](#) of the left ventricular ring 3 strand. Possible values are Normal, Fracture, Leakage.

6 LV Ring3 Strand Impedance

For a normal condition, use this to set the [impedance](#) of the left ventricular ring 3 strand. The range is from 150 Ω to 500 Ω .

7 LV Ring4 Defect Condition

Use this to set an [electrode defect](#) of the left ventricular ring 4 strand. Possible values are Normal, Fracture, Leakage.

8 LV Ring4 Strand Impedance

For a normal condition, use this to set the [impedance](#) of the left ventricular ring 4 strand. The range is from 150 Ω to 500 Ω .

Pacing Thresholds (LV)

The annotated picture is part of the [Left Ventricle Setup Dialog](#). The cathodes and anodes LV ring3 and ring4 are disabled for [biventricular devices](#).

The simulator uses strength-duration curves for threshold calculation. Every PM threshold parameter is referred to a duration of 0.4 ms.

Cathode	Pacing thresholds (V / 0.4 ms)					
	Anode					
	CAN	LV tip1	LV ring2	LV ring3	LV ring4	RV
LV tip1	1.0 445 Ω		1.0 800 Ω	1.0 850 Ω	1.0 810 Ω	1.0 524 Ω
LV ring2	1.0 425 Ω	1.0 800 Ω		1.0 830 Ω	1.0 790 Ω	1.0 504 Ω
LV ring3	1.0 475 Ω	1.0 850 Ω	1.0 830 Ω		1.0 840 Ω	1.0 554 Ω
LV ring4	1.0 435 Ω	1.0 810 Ω	1.0 790 Ω	1.0 840 Ω		1.0 514 Ω
RV (anodal)	n.c.	n.c.	n.c.	n.c.	n.c.	

1 Cathodes for Threshold Matrix

Each threshold row corresponds to a cathode.

2 Anodes for Threshold Matrix

Each threshold column corresponds to an anode.

3 RV Anode

The RV column stands for two different anodes. For pacemakers and CRT-Ps, it refers to the anode RV ring. For CRT-D devices, it refers to the RV coil.

4 LVRing2-LVRing3 Threshold

This is an example how to read the matrix. This specific value is the threshold for the cathode LV ring2 and the anode LV ring3.

5 LVRing3-LVRing4 Resulting Impedance

The resulting impedances are also displayed in the matrix. The example shows the resulting impedance between LV ring3 and LV ring4.

6 Anode for Anodal Stimulation

RV is always the anode for Anodal Stimulation.

7 Cathodes for Anodal Stimulation

Each threshold column corresponds to a cathode for Anodal Stimulation.

PNS Thresholds (LV)

The annotated picture is part of the [Left Ventricle Setup Dialog](#). The cathodes and anodes LV ring3 and ring4 are disabled for [biventricular devices](#).

Phrenic nerve stimulation is effective if the voltage exceeds the selected value.

		PNS thresholds (V)					
		Anode					
Cathode		CAN	LV tip1	LV ring2	LV ring3	LV ring4	RV
LV tip1		n.c.		n.c.	n.c.	n.c.	n.c.
LV ring2		n.c.	n.c.		n.c.	n.c.	n.c.
LV ring3		n.c.	n.c.	n.c.		n.c.	n.c.
LV ring4		n.c.	n.c.	n.c.	n.c.		n.c.

1 Cathodes for PNS Threshold Matrix

Each threshold row corresponds to a cathode.

2 Anodes for PNS Threshold Matrix

Each threshold column corresponds to an anode.

3 Anode RV

The RV column stands for two different anodes. For pacemakers and CRT-Ps, it refers to the anode RV ring. For CRT-D devices, it refers to the RV coil.

4 LVRing2-LVRing3 PNS Threshold

This is an example how to read the matrix. This special value is the PNS threshold for the cathode LV ring2 and the anode LV ring3.

RV-LV Interval

The annotated picture is part of the [Left Ventricle Setup Dialog](#). The cathodes LV ring3 and ring4 are disabled for [biventricular devices](#).

Cathode	RV-LV Interval (ms)
LV tip1	100 1
LV ring2	105 2
LV ring3	110 3
LV ring4	115 4

1 RV-LV Interval of LV tip1

Use this to set the RV-LV Interval of the left ventricular tip 1 strand. The range is from 10 ms to 160 ms. The default is 100 ms for [LBBB](#) and [RBBB](#).

2 RV-LV Interval of LV ring2

Use this to set the RV-LV Interval of the left ventricular ring 2 strand. The range is from 10 ms to 160 ms. The default is 105 ms for [LBBB](#) and 95 ms for [RBBB](#).

3 RV-LV Interval of LV ring3

Use this to set the RV-LV Interval of the left ventricular ring 3 strand. The range is from 10 ms to 160 ms. The default is 110 ms for [LBBB](#) and 90 ms for [RBBB](#).

4 RV-LV Interval of LV ring4

Use this to set the RV-LV Interval of the left ventricular ring 4 strand. The range is from 10 ms to 160 ms. The default is 115 ms for [LBBB](#) and 85 ms for [RBBB](#).

The controls are only accessible if a [LBBB](#) or [RBBB](#) is selected. In case of a [RBBB](#), the controls determine the LV-RV intervals.

Amplitudes (LV)

The annotated picture is part of the [Left Ventricle Setup Dialog](#). The cathodes LV ring3 and ring4 are disabled for [biventricular devices](#).

	Amplitudes (mV)
Cathode	
LV tip1	12.5 mV 1
LV ring2	12.5 mV 2
LV ring3	12.5 mV 3
LV ring4	12.5 mV 4

1 LV tip1 Amplitude

Use this to set the amplitude of LV tip1. Possible values are in the range from 1 mV to 15 mV. The default value is 12.5 mV.

2 LV ring2 Amplitude

Use this to set the amplitude of LV ring2. Possible values are in the range from 1 mV to 15 mV. The default value is 12.5 mV.

3 LV ring3 Amplitude

Use this to set the amplitude of LV ring3. Possible values are in the range from 1 mV to 15 mV. The default value is 12.5 mV.

4 LV ring4 Amplitude

Use this to set the amplitude of LV ring4. Possible values are in the range from 1 mV to 15 mV. The default value is 12.5 mV.

EMI (LV)

The annotated picture is part of the [Left Ventricle Setup Dialog](#). The cathodes LV ring3 and ring4 are disabled for [biventricular devices](#).

	EMI
Cathode	
LV tip1	Off 1
LV ring2	Off 2
LV ring3	Off 3
LV ring4	Off 4

1 LV tip1 EMI settings

Use this to set EMI for LV tip1. Possible values are Off, 50 Hz 5 mV, 50 Hz 0.5 mV, Artifacts, and Noise.

2 LV ring2 EMI settings

Use this to set EMI for LV ring2. Possible values are Off, 50 Hz 5 mV, 50 Hz 0.5 mV, Artifacts, and Noise.

3 LV ring3 EMI settings

Use this to set EMI for LV ring3. Possible values are Off, 50 Hz 5 mV, 50 Hz 0.5 mV, Artifacts, and Noise.

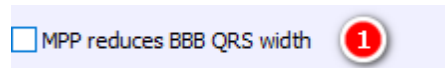
4 LV ring4 EMI settings

Use this to set EMI for LV ring4. Possible values are Off, 50 Hz 5 mV, 50 Hz 0.5 mV, Artifacts, and Noise.

Use the [EMI frequency dialog](#) to select 50 Hz or 60 Hz EMI frequency.

Multi Point Pacing

The annotated picture is part of the [Left Ventricle Setup Dialog](#).

**1 MPP reduces BBB QRS width**

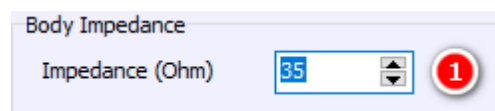
Select this checkbox to show the advantages of left ventricular multi point pacing.

CCM Parameters

Use this to set the parameters for a CCM device. This menu item is only enabled when a CCM device type is selected.

Body Impedance

The annotated picture is part of the [CCM Parameters Dialog](#).

**1 Body Impedance**

Use this to set the Body Impedance. The Body Impedance affects every unipolar pacemaker impedance. Possible Values are 15 Ω to 45 Ω . See [Impedances](#).

Atrial Parameters

The annotated picture is part of the [CCM Parameters Dialog](#).

Get some information how to calculate [impedances](#).

Amplitude Atrium	Impedance Atrium	Resulting Impedance Atrium	EMI Atrium
Atrium 2.5 mV 1	Tip Condition Normal 2	Unipolar (Ohm) 435 Ω 6	<input checked="" type="radio"/> Off
	Tip Imp. (Ohm) 400 3	Bipolar (Ohm) 550 Ω	<input type="radio"/> 60 Hz 5 mV
	Ring Condition Normal 4		<input type="radio"/> 60 Hz 0.5 mV 7
	Ring Imp. (Ohm) 150 5		<input type="radio"/> Artifacts
			<input type="radio"/> Noise

1 Atrial Amplitude

Use this to set the maximal intra-atrial amplitude during sinus rhythm. The range is from 0.15 mV to 6.0 mV.

2 Atrial Tip Defect Condition

Use this to set an [electrode defect](#) of the atrial tip strand. Possible values are Normal, Fracture, Leakage, Scar.

3 Atrial Tip Strand Impedance

For a normal condition, use this to set the [impedance](#) of the atrial tip strand. The range is from 150 Ω to 500 Ω.

4 Atrial Ring Defect Condition

Use this to set an [electrode defect](#) of the atrial ring strand. Possible values are Normal, Fracture, Leakage.

5 Atrial Ring Strand Impedance

For a normal condition, use this to set the [impedance](#) of the atrial ring strand. The range is from 150 Ω to 500 Ω.

6 Atrial Resulting Impedance

This panel displays the resulting [impedances](#) of the atrial channel.

7 Atrial EMI

Use this to set the EMI of the atrial channel. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

Right Ventricular Parameters

The annotated picture is part of the [CCM Parameters Dialog](#).

Get some information how to calculate [impedance](#).

Amplitude Right Ventricle	Impedance Right Ventricle	Resulting Imp. Right Ventricle	EMI Right Ventricle
Right Ventricle 12.5 mV 1	Tip Condition Normal 2	Unipolar (Ohm) 415 Ω 6	<input checked="" type="radio"/> Off
	Tip Imp. (Ohm) 380 3	Bipolar (Ohm) 530 Ω	<input type="radio"/> 60 Hz 5 mV
	Ring Condition Normal 4		<input type="radio"/> 60 Hz 0.5 mV 7
	Ring Imp. (Ohm) 150 5		<input type="radio"/> Artifacts
			<input type="radio"/> Noise

1 Right Ventricular Amplitude

Use this to set the maximal right intraventricular amplitude during sinus rhythm. The range is from 1 mV to 15.0 mV.

2**Right Ventricular Tip Defect Condition**

Use this to set an [electrode defect](#) of the right intraventricular tip strand. Possible values are Normal, Fracture, Leakage, Scar.

3**Tip Strand Impedance Right Ventricle**

For a normal condition, use this to set the [impedance](#) of the right intraventricular tip strand. The range is from 150 Ω to 500 Ω .

4**Right Ventricular Ring Defect Condition**

Use this to set an [electrode defect](#) of the right intraventricular ring strand. Possible values are Normal, Fracture, Leakage.

5**Right Ventricular Ring Strand Impedance**

For a normal condition, use this to set the [impedance](#) of the right intraventricular ring strand. The range is from 150 Ω to 500 Ω .

6**Right Ventricular Resulting [impedance](#)**

This panel displays the resulting impedances of the right intraventricular channel.

7**Right Ventricular EMI**

Use this to set the EMI of the right intraventricular channel. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

Local Sense Parameters

The annotated picture is part of the [CCM Parameters Dialog](#).

Get some information how to calculate [impedance](#).

Amplitude Local Sense	Impedance Local Sense	Resulting Imp. Local Sense	EMI Local Sense
Local Sense: 12.5 mV 1	Tip Condition: Normal 2	Unipolar (Ohm) 6 : 445 Ω	<input checked="" type="radio"/> Off
	Tip Imp. (Ohm): 410 3	Bipolar (Ohm): 800 Ω	<input type="radio"/> 60 Hz 5 mV
	Ring Condition: Normal 4		<input type="radio"/> 60 Hz 0.5 mV 7
	Ring Imp. (Ohm): 390 5		<input type="radio"/> Artifacts
			<input type="radio"/> Noise

1**Local Sense Amplitude**

Use this to set the maximal local sense amplitude during sinus rhythm. The range is from 1 mV to 15.0 mV.

2**Local Sense Tip Defect Condition**

Use this to set an electrode defect of the local sense tip strand. Possible values are Normal, Fracture, Leakage, Scar.

3**Local Sense Tip Strand Impedance**

For a normal condition, use this to set the impedance of the local sense tip strand. The range is from 150 Ω to 500 Ω .

4**Local Sense Ring Defect Condition**

Use this to set an electrode defect of the local sense ring strand. Possible values are Normal, Fracture, Leakage.

5 Local Sense Ring Strand Impedance

For a normal condition, use this to set the impedance of the local sense ring strand. The range is from 150 Ω to 500 Ω .

6 Local Sense Resulting Impedance

This panel displays the resulting impedances of the local sense channel.

7 Local Sense EMI

Use this to set the EMI of the local sense channel. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

ICD Parameters

Use this to set the parameters for an ICD. This menu item is disabled when a SICD device type is selected.

1 RV Coil Amplitude

Use this to set the maximal amplitude of the shock electrode during sinus rhythm. The range is from 0.2 mV to 4.0 mV.

2 RV Coil Defect Condition

Use this to set a fracture of the shock (RV coil) electrode. Possible values are Normal, Fracture.

3 Post Shock Asystole

Use this to set the duration in s of an asystole after a delivered shock. The range is from 0 s to 180 s.

The software provides the option to choose different ICD thresholds for atrium and ventricle. The reaction of the application on ICD shocks depends on the relation between shock energy and threshold. See [Antitachycardia pacing, Cardioversion, and Defibrillation](#).

4 Atrial ICD Threshold

An atrial tachycardia will be terminated by a shock if the delivered energy is greater than this threshold in J.

5 Atrial ICD Threshold Variation

This provides the option to randomly vary the Atrial ICD Threshold in a range from -25% to +25%.

6 Ventricular ICD Threshold

A ventricular tachycardia will be terminated by a shock if the delivered energy is greater than this threshold in J.

7 Ventricular ICD Threshold Variation

This provides the option to randomly vary the Ventricular ICD Threshold in a from -25% to +25%.

8 Threshold defined by Pulse Width

A biphasic shock is only effective if the two pulses have defined widths.

Shock impedance	Pulse 1	Pulse 2
40 Ω	4 ms	3 ms
50 Ω	4.5 ms	3 ms
79 Ω	5 ms	2.5 ms

9 RV Coil EMI

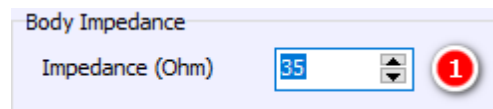
Use this to set the EMI settings of the shock pathway. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

SICD Parameters

All settings for the SICD are accessible via the SICD Parameters in the Interface Menu. This menu item is enabled if a [SICD device type](#) is selected.

Body Impedance

The annotated picture is part of the [SICD Parameters Dialog](#).



1 Body Impedance

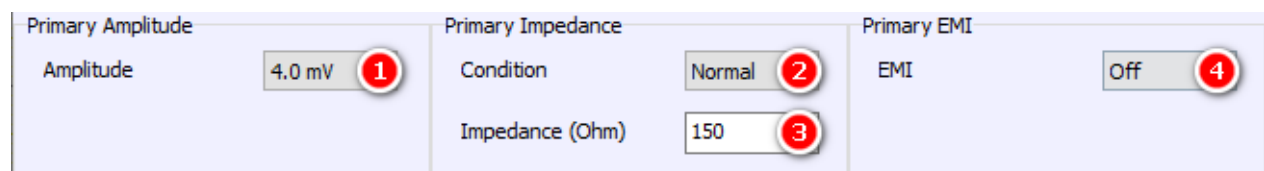
Use this to set the Body Impedance. The Body Impedance affects primary and secondary impedance. Possible values are 15 Ω to 45 Ω .

See [Impedances](#).

Primary Parameters

The annotated picture is part of the [SICD Parameters Dialog](#).

Use this to set the parameters of the Primary Strand.



1 Primary Amplitude

Use this to set the maximal amplitude of the primary vector during sinus rhythm.

2 Primary Defect Condition

Use this to set an [electrode defect](#) of the primary strand. Possible values are Normal, Fracture, Leakage.

3 Primary Strand Impedance

For a normal condition, use this to set the [impedance](#) of the primary strand.

4 Primary EMI Settings

Use this to set the EMI settings of the primary channel. Possible values are Off, 50 Hz 5 mV, 50 Hz 0.5 mV, Artifacts, Artifacts2, and Wire Noise. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

Secondary Parameters

The annotated picture is part of the [SICD Parameters Dialog](#).
Use this to set the parameters of the Secondary Strand.

Secondary Amplitude	Secondary Impedance	Secondary EMI
Amplitude <input type="text" value="2.5 mV"/> 1	Condition <input type="text" value="Normal"/> 2	EMI <input type="text" value="Off"/> 4
	Impedance (Ohm) <input type="text" value="380"/> 3	

1 Secondary Amplitude

Use this to set the maximal amplitude of the secondary vector during sinus rhythm.

2 Secondary Defect Condition

Use this to set an [electrode defect](#) of the secondary strand. Possible values are Normal, Fracture, Leakage.

3 Secondary Strand Impedance

For a normal condition, use this to set the [impedance](#) of the secondary strand.

4 Secondary EMI Settings

Use this to set the EMI settings of the secondary channel. Possible values are Off, 50 Hz 5 mV, 50 Hz 0.5 mV, Artifacts, Artifacts2, and Wire Noise. Use the [EMI Frequency dialog](#) to select 50 Hz or 60 Hz.

Shock Coil Parameters

The annotated picture is part of the [SICD Parameters Dialog](#).
Use this to set the parameters of the Shock Coil.

Thresholds	Coil	Post Shock
Atrium (J) <input type="text" value="8"/> 1	Condition <input type="text" value="Normal"/> 5	Asystole (s) <input type="text" value="2"/> 6
<input type="checkbox"/> +/- 25% 2		
Ventride (J) <input type="text" value="15"/> 3		
<input type="checkbox"/> +/- 25% 4		

1 Atrial ICD Threshold

An atrial tachycardia will be terminated by a shock if the delivered energy is greater than this threshold in J.

2 Atrial ICD Threshold Variation

This provides the option to randomly vary the Atrial ICD Thresholds in a range of +/- 25%.

3 Ventricular ICD Threshold

A ventricular tachycardia will be terminated by a shock if the delivered energy is greater than this threshold in J.

4 Ventricular ICD Threshold Variation

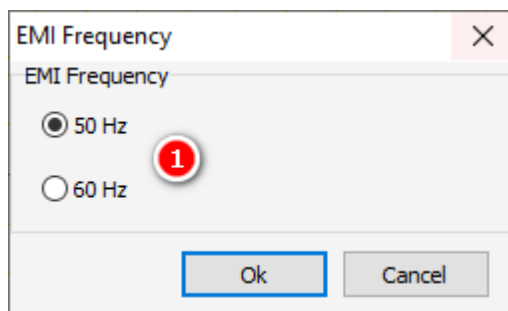
This provides the option to randomly vary the Ventricular ICD Thresholds in a range of +/- 25%.

5 Coil Defect Condition

Use this to set a fracture of the shock (coil) electrode. Possible values are Normal, Fracture.

6 Post Shock Asystole

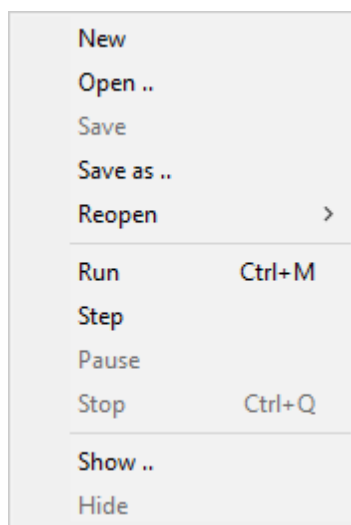
Use this to set the duration in s of an asystole after a delivered shock. The range is from 0 s to 180 s.

EMI Frequency**1 EMI Frequency**

Use 50 or 60 Hz as mains frequency. This frequency affects the 50 Hz or 60 Hz EMI settings, respectively. The Alternating Current Demos are also affected by this setting.

Macro

The Macro menu contains all commands necessary to deal with Simulator Macros. Consult the macro manual for a detailed explanation of the macro language.



New

The New Menu Item shows the [Macro Window](#). A frame for a new macro will be created. If the window currently contains an unsaved macro, a dialog will appear, allowing the macro to be saved if desired.

Open

The menu item opens the Open Macro Dialog. If the [Macro Window](#) currently contains an unsaved macro, a dialog will appear, allowing the macro to be saved if desired.
See also [Folders](#).

Save

The Save menu item saves a macro. If the macro has not been saved before, [Save As](#) is called instead.
See also [Folders](#).

Save As

The Save As menu item opens the Save Macro Dialog.
See also [Folders](#).

Reopen

Click Reopen to open the list of recently saved or loaded macro files. Click the filename of the macro you want to load again.

Run

Click this menu item to start a macro. The macro will not start if it contains an error. In this case the dot at the left of the [Macro Window](#) shows the error position and the error description is shown in the message area of this window.
See [Run Button](#).

Step

It is possible to execute a macro step by step by pressing this menu item. See [Step Button](#).

Pause

The Pause menu item will interrupt a running macro. See [Pause Button](#).

Stop

The Stop menu item terminates a long or endlessly running macro. See [Stop button](#).

Show

The Show Macro menu item shows a hidden [Macro Window](#).

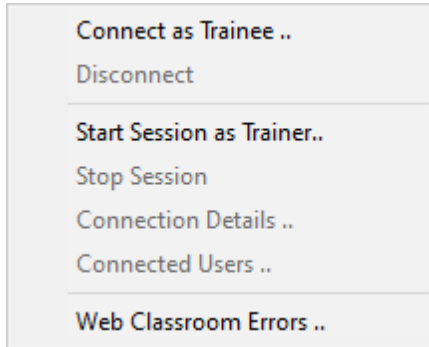
Hide

The Hide menu item hides a visible [Macro Window](#). The macro itself will not be affected. Use this command if it is not necessary to watch the macro execute or to temporarily hide the window for any reason. The [Show](#) menu item

displays the [Macro Window](#) again.

Classroom

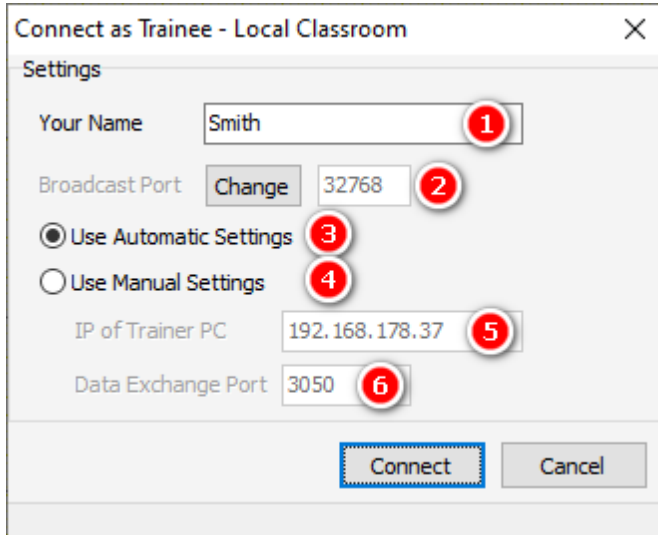
The Classroom menu is available when the Enable Classroom checkbox is selected in the [Settings](#) dialog. The dialogs that opened with the menu items "Connect as Trainer" and "Start Session as Trainer" differ depending on whether Local or Web Classroom has been selected.



Connect as Trainee - Local Classroom

This Connect as Trainee dialog is available when:

- the Enable Classroom checkbox in the [Settings dialog](#) is selected
- the Local Classroom radio button in the [Settings dialog](#) is selected
- **the PC has not been set up as a Trainer (master) device**
- the trainee is currently not connected



1 Your Name

Every trainee must enter a name of their choice of at least 3 characters.

2 Broadcast Port

It should not be necessary to change the Broadcast Port. It is used to find the Trainer PC automatically in the network.

3 Use Automatic Settings

Use this to let InterSim connect automatically to the Trainer PC.

4 Use Manual Settings

Use this if an automatic connection is not successful.

5 IP of Trainer PC

The IP of the Trainer PC is necessary for a manual connection.

6 Data Exchange Port

It should not be necessary to change the Data Exchange Port. It is used to communicate with the Trainer PC.

See [Connect as Trainee - Web Classroom](#) and [Classroom functionality](#).

Connect as Trainee - Web Classroom

This Connect as Trainee dialog is available when:

- the Enable Classroom checkbox in the [Settings dialog](#) is selected
- the Web Classroom radio button in the [Settings dialog](#) is selected
- the trainee is currently not connected

1 Connect to

The setting "Standard Server" should be used. Select "Alternative Server" only in case of a malfunction. The trainer and every trainee must use the same server.

2 Name

Every trainee must enter a name of their choice of at least 3 characters.

3 Session ID

The Session ID is a twelve-digit number and must be purchased (pay per use). The trainer and every trainee must use the same Session ID.

See [Connect as Trainee - Local Classroom](#) and [Classroom functionality](#).

Disconnect

The Disconnect menu item is available when:

- the Enable Classroom checkbox in the [Settings dialog](#) is selected
- the trainee is currently connected

Use this to disconnect from a session.

Start Session as Trainer - Local Classroom

The Start Session as Trainer menu item is enabled when:

- the Enable Classroom checkbox in the [Settings dialog](#) is selected
- the Local Classroom radio button in the [Settings dialog](#) is selected
- the PC is set up as Trainer (Master) device
- no session is currently active

See [Classroom functionality](#).

Start Session as Trainer - Web Classroom

The Start Session as Trainer menu item is enabled when:

- the Enable Classroom checkbox in the [Settings dialog](#) is selected
- the Web Classroom radio button in the [Settings dialog](#) is selected
- no session is currently active

Connect as Trainer - Web Classroom

Settings

Connect to

Standard Server **1**

Alternative Server

Admin Key **2**

Session ID **3**

By pressing the OK button, you agree that your IP address will be stored on the server for operation of the classroom and follow-up. Furthermore, every command that is executed during an active session, every state file that is loaded and every macro that is executed is also stored on the server.

Ok Cancel



Connect to

The setting "Standard Server" should be used. Select "Alternative Server" only in case of a malfunction. The trainer and every trainee must use the same server.

2 Admin Key

The Admin Key is a twelve-digit number and is supplied together with the Session ID (see below). The trainer should not share the admin key as it can be used to start and end sessions.

3 Session ID

The Session ID is a twelve-digit number and must be purchased (pay per use). The trainer and every trainee must use the same Session ID.

See [Classroom functionality](#).

Stop Session

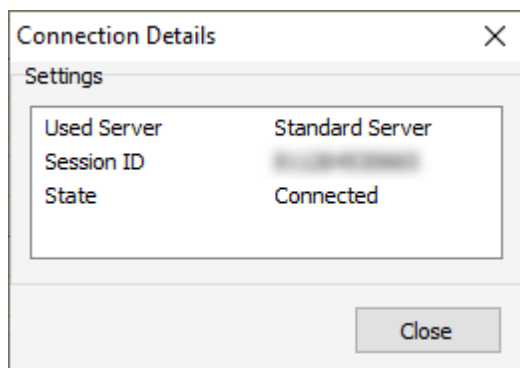
The Stop Session menu item is enabled when

- the Enable Classroom checkbox in the [Settings dialog](#) is selected
- the Web Classroom radio button in the [Settings dialog](#) is selected
- a session is currently active and started by the current PC

See [Classroom functionality](#).

Connection Details

Use this dialog to see a summary of the data used.



See [Classroom functionality](#).

Connected Users

Use this dialog to see the currently connected users.

Connected Users - the dialog can be left open

Name 1	PC Name 2	IP 3	Resp. Time 4
Miller			0 ms
Smith			0 ms

2 users Close

1 Name

This column shows the name used by the trainee.

2 PC Name

This column shows the PC Name the trainee is working with. The column is filled only when working in the local classroom.

3 IP

The column shows the IP address assigned to the trainee's PC.

4 Resp. Time

The column shows the response time of the trainee's PC. In Local Classroom mode, the response time should not be much more than 10 ms. In Web Classroom mode, the response time can extend into the seconds range, depending on the user's location.

See [Classroom functionality](#).

Web Classroom Errors

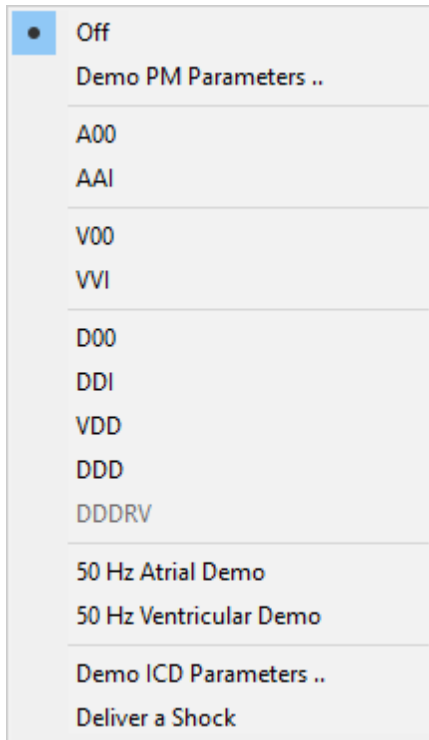
For troubleshooting purposes, any errors are listed in this dialog in Web Classroom mode.

See [Classroom functionality](#).

Demos

A number of pacemaker models and a defibrillation model are included in InterSim III that allow you to

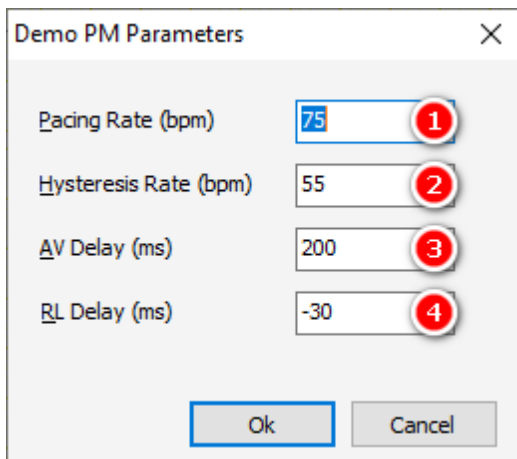
demonstrate basic functions of these devices. You should, however, be aware that these models are limited to the basic behavior and do not include advanced device features. Use the InterSim III Interface and the Adapter Box to demonstrate the features of your products.



Off

Use the Off menu item to turn off a demo pacemaker and switch to the device connected via the adapter box.

Demo PM Parameters



1

Pacing Rate

Use this to set the pacing rate of the demo pacemaker. The range is from 25 bpm to 405 bpm for A00, V00 and D00 and from 25 bpm to 150 bpm for all others.

2

Hysteresis Rate

Use this to set the hysteresis rate of the demo pacemaker. The range is from 25 bpm to 150 bpm.

3 AV Delay

Use this to set the AV delay of the demo pacemaker.
The range is from 50 ms to 200 ms.

4 RL Delay

Use this to set the RL delay of the DDDRV demo pacemaker.
The range is from -100 ms (left before right) to 100 ms (right before left).

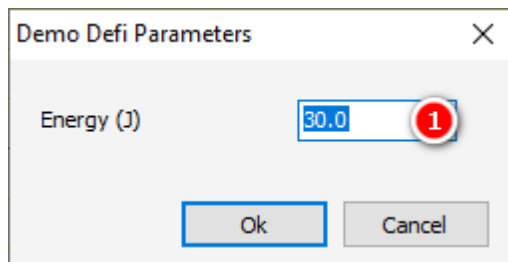
A00, AAI, V00, VVI, D00, DDI, VDD, DDD, DDD0V

Select one of the menu items to apply a Demo pacemaker according to the NASPE/BPEG code. Only the basic behavior is simulated.

50 Hz Atrial Demo, 50 Hz Ventricular Demo

These demo features show the induction of an atrial or a ventricular tachycardia, respectively, by means of 50 Hz stimulation. The result of the ventricular induction depends on the [Chances for Induction](#) settings. An accident with a power cable can be a similar situation.

Demo ICD Parameters



1 Energy

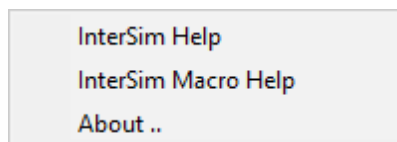
Use this to set the energy of the demo ICD. The range is from 0.5 to 40 J.

Deliver a Shock

The Shock menu item demonstrates a defibrillation shock. The shock appears after a charging period of about 5 seconds, terminates fibrillation and provokes a pause of the heart activity corresponding to the [post shock asystole](#).

Help

The Help menu contains menu items to invoke the InterSim Help, the Macro Manual, and information about the simulator and the application.



InterSim Help

Use the InterSim Help menu item to access this help.

InterSim Macro Help

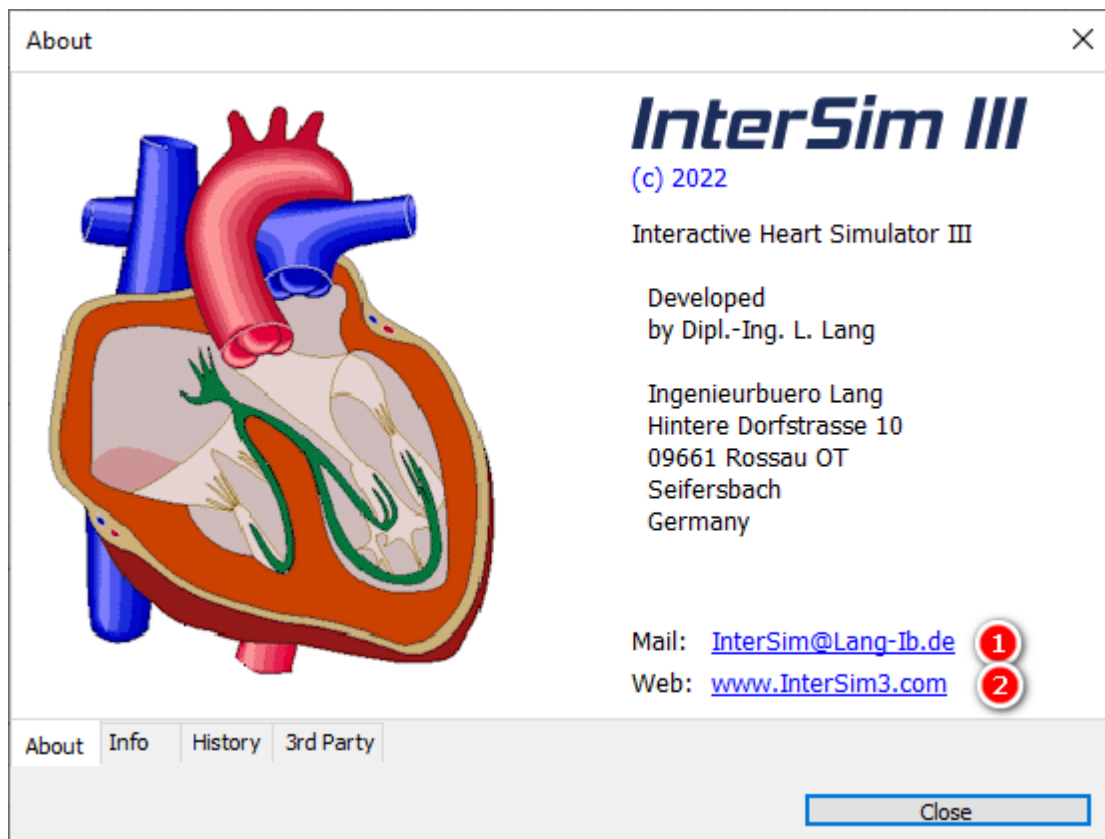
Use the InterSim Macro Help menu item to provoke the Macro help.

About

The About Dialog summarizes some information about the simulator.

About Tab

The following image is part of the [About dialog](#).



1 E-Mail Address

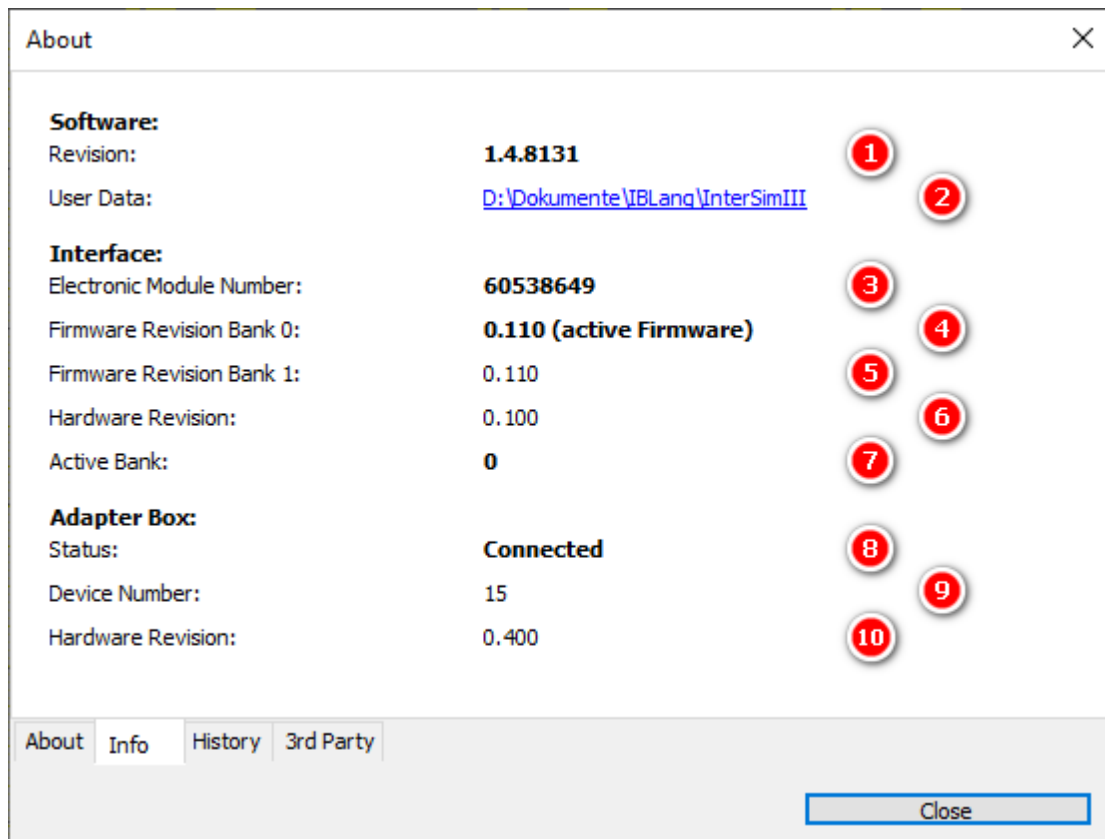
Use the link to send an e-mail to the InterSim team using your default e-mail program.

2 Web

Use this to open the InterSim homepage.

Info Tab

The following image is part of the [About dialog](#).



1 Software Revision

This entry shows the current software revision. The software revision can also be found in the [title bar](#).

2 User Data Folder

This entry shows where the User Data Folder is located. This is where log (journal) files, states, macros, application settings and other files are stored. Click on this link to open the User Data Folder in the explorer.

The next entries are available when an InterSim III Interface is connected.

3 Electronic Module Number

This is the unique number of the electronic module.

The simulator firmware is located in two different locations (banks) and may have different revision numbers.

4 Firmware Revision at Bank 0

The revision of the firmware on bank 0,

5 Firmware Revision at Bank 1

The revision of the firmware on bank 1,

6 Hardware Revision

The revision of the Interface hardware.

7 Active Bank

The bank that is currently used by the simulator. By default, the firmware with the higher revision number is used. If both banks contain the same firmware revision, bank 0 is used.

The next entries are available when an InterSim III Interface is connected in combination with an Adapter Box.

8**Status**

The status of the Adapter Box: Connected or Not Connected

9**Device Number**

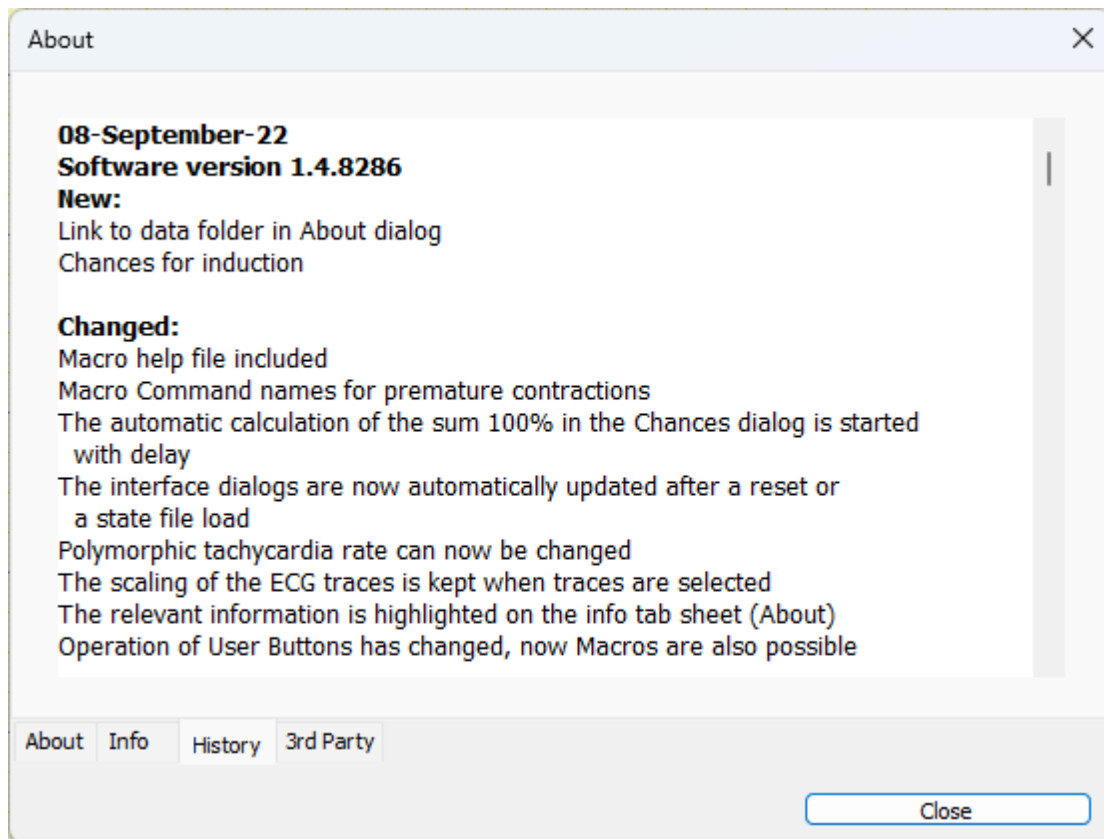
The unique number of the Adapter Box.

10**Hardware Revision**

The revision of the Adapter Box hardware.

History Tab

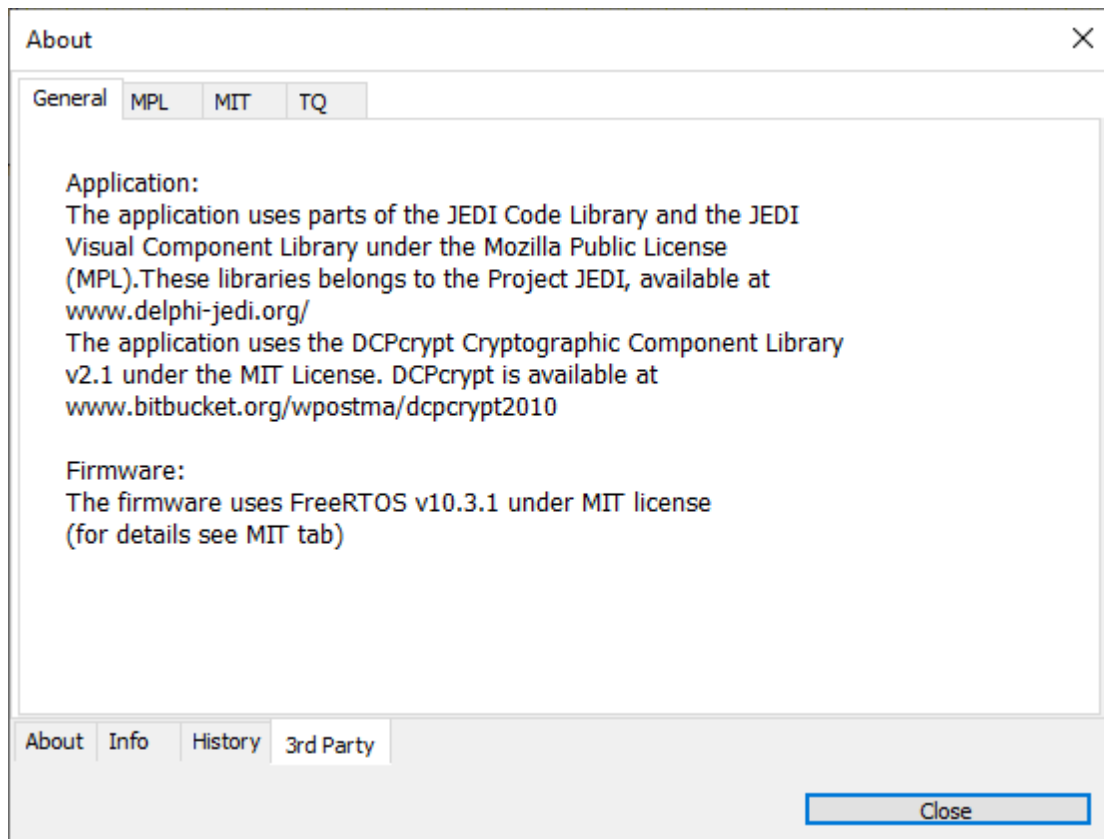
The following image is part of the [About dialog](#).



See the Application Release History.

3rd Party Tab

The following image is part of the [About dialog](#).



The 3rd Party tab contains information about 3rd Party Licenses.

Miscellaneous

Antitachycardia Pacing, Cardioversion, and Defibrillation

Atrium

Basic Rhythm	Action	Result	Example Simulator Settings	Example Implant Settings
Atrial Fibrillation	1.5 sec 50 Hz	Sinus Rhythm	Atrial Fibrillation	atrial 50 Hz ~1.5 s
Any type	3 sec 50 Hz	Atrial Fibrillation	Sinus Rhythm	atrial 50 Hz ~3 s
Sinus Rhythm Sinus Brady Sinus Arrest	7 consecutive pulses in between 450 and 550 ms + 3 extras just outside the refractory	Atrial Flutter	Sinus Rhythm 68 bpm	S1 500 ms 7x S2 300 ms S3 300 ms S4 300 ms
Sinus Rhythm Sinus Brady Sinus Arrest	3 extras just outside the refractory	Sinus Tachy 120 bpm	Sinus Rhythm 68 bpm	S1 300 ms 3x
Sinus Tachy < 180 bpm	3 extras just outside the refractory	in accordance with " Chances for ATP ": default 100% Termination	Sinus Tachy 120 bpm	S1 260 ms 3x
Sinus Tachy > 180 bpm	3 extras just outside the refractory	Atrial Fibrillation	Sinus Tachy 220 bpm	S1 250 ms 3x
Atrial Flutter	3 extras just outside the refractory	Atrial Fibrillation	Atrial Flutter 2:1 220 bpm	S1 200 ms 3x
Atrial Flutter	5 pulses fall between 90 and 75%	Sinus Rhythm	Atrial Flutter 2:1 230 bpm	S1 230 ms 5x

Ventricle

Basic Rhythm	Action	Result	Example Simulator Settings	Example Implant Settings
Ventricular Fibrillation	2 sec 50 Hz	Sinus Rhythm		ventricular 50 Hz ~1.5 s
Any type	5 sec 50 Hz	in accordance with " Chances for Induction ": default 100% Ventricular Fibrillation		ventricular 50 Hz ~3 s
Sinus Rhythm Sinus Brady Sinus Arrest	5 consecutive pulses in between 550 and 650 ms + 3 extras just outside the refractory	LVTachy 167 bpm	Sinus Rhythm 68 bpm PR 190 ms	S1 600 ms 5x S2 310 ms S3 310 ms S4 310 ms
Sinus Rhythm Sinus Brady Sinus Arrest	5 consecutive pulses in between 450 and 550 ms + 3 extras just outside the refractory	LVTachy 200 bpm	Sinus Rhythm 68 bpm PR 190 ms	S1 500 ms 5x S2 310 ms S3 310 ms S4 310 ms
Sinus Rhythm Sinus Brady Sinus Arrest	5 consecutive pulses in between 350 and 450 ms + 3 extras just outside the refractory	LVTachy 214 bpm	Sinus Rhythm 68 bpm PR 190 ms	S1 400 ms 5x S2 310 ms S3 310 ms S4 310 ms
LV Tachy RV Tachy <182 bpm	4 pulses fall between 88 and 81%	in accordance with " Chances for ATP ": default 100% Termination	LV Tachy 165 bpm	ATP 4 pulses 84%
LV Tachy	8 pulses fall between	Sinus Rhythm	LV Tachy	ATP 8 pulses 88%

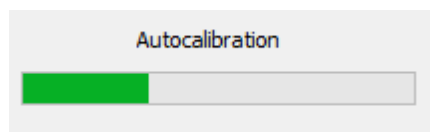
Basic Rhythm	Action	Result	Example Simulator Settings	Example Implant Settings
RV Tachy >182 bpm	93 and 83%		220 bpm	
Polymorphous VT, Torsade de Pointes (sometimes coupling is difficult) Ventricular Flutter (reliable)	4 pulses fall between 88 and 81%	Ventricular Fibrillation	Polymorphous VT	commanded ATP 84% 4 pulses minimum interval 160 ms

Defibrillation

Basic Rhythm	Action	Result	Example Simulator Settings	Example Implant Settings
Any type except Ventricular Flutter, Ventricular Fibrillation	T wave energy between 0.5 - 5 J	in accordance with " Chances for Induction ": default Ventricular Fibrillation	Sinus Rhythm 68 bpm	S1 400 ms * 8 S2 310 ms 1.1 J
LV Tachy RV Tachy Polymorphous VT Torsade de Pointes	QRS energy < 50% of ventricular threshold	no reaction	Simulator threshold Ventricle 30 J Polymorphous VT	Commanded Shock Sync 11 J
LV Tachy RV Tachy Polymorphous VT Torsade de Pointes	QRS energy between 50% and 100% of ventricular threshold	in accordance with " Chances for Induction ": default Ventricular Fibrillation	Simulator threshold Ventricle 20 J LV Tachy 250 bpm	Commanded Shock Sync 17 J
LV Tachy RV Tachy Polymorphous VT Torsade de Pointes	QRS energy > 100% of ventricular threshold	termination of ventricular rhythm	Simulator threshold Ventricle 15 J Ventricular Flutter	Commanded Shock Sync 21 J
Any type	energy > 100% of ventricular threshold	termination of ventricular rhythm	Simulator threshold Ventricle 15 J Ventricular Flutter	Therapy 21 J
Any type except Sinus Tachy	energy > 100% of atrial threshold	termination of atrial rhythm	Simulator thresholds: Ventricle 15 J Atrium 8 J Dual Tachycardia: Atrial Fibrillation Ventricular Fibrillation	Therapy Shock 1 14 J Shock 2 21 J
Any type	8 V, 2 s direct current pulse through the high voltage electrode	in accordance with " Chances for Induction ": default Ventricular Fibrillation	Sinus Rhythm	Pulse 8 V, 2 s

Auto calibration

The auto calibration starts after each connection of the adapter box.



Calibration is used to minimize possible common mode voltages and maximize the accuracy of the pace pulse and shock measurement.

Chronotropic Incompetence

It is possible to show the chronotropic incompetence disease pattern and the related therapy by using a pacemaker with QT response. To do this:

- Insert a QT response capable pacemaker into the adapter box
- Choose the appropriate Device Type
- Reset the simulator by touching the Reset button
- Open the simulation state ChronotropicIncompetence or go to the Parameters menu, Exercise submenu item, and change the Sinus Rate Max to 78 bpm
- Check the Box Auto Sinus & Auto PR Interval
- Set the Workload to a value of 100% (or any other value but 0)
- Observe the change of the Exercise Level and the pacing rate of the pacemaker

Classroom functionality

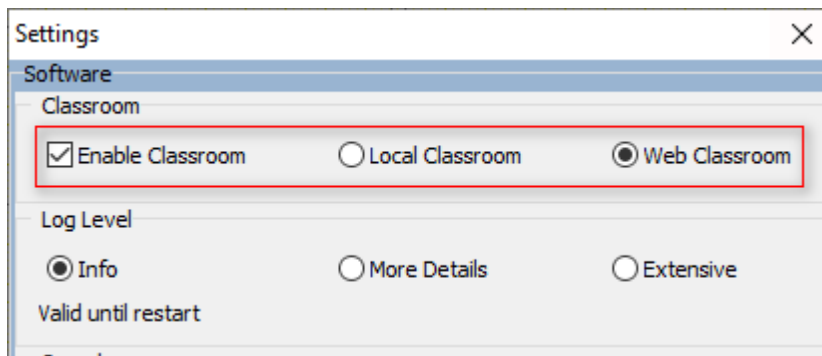
With the classroom version, InterSim III becomes the perfect companion in group training situations. Hook up as many as 20 InterSim III devices on a shared network or over the web. Use one trainer device to handle simulations on numerous simulators at the same time. The only requirement is an additional classroom package. In the case of the Local Classroom package, the integrated router spans a dedicated Ethernet or WIFI network. With the Web Classroom package, session IDs are included for immediate launch.

Regardless if you use InterSim III Interface, InterSim III Touch or multiple devices of both types combined – the classroom version gives you the freedom to combine them any way you want.

Use the Classroom as a Trainee

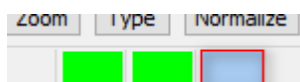
If you want to join a classroom session as a user, please follow these steps:

1. If the Classroom menu is not available, please turn it on via the [File](#) menu, [Settings](#) menu entry.



Select **Local Classroom** for a face-to-face training or **Web Classroom** if you are participating in an online training.

The third colored field should light blue-gray after closing the dialog.



2. When instructed by the trainer, select the [Classroom](#) menu, Connect as Trainee menu item.
 - [Connect as Trainee, Local Classroom](#):

Connect as Trainee - Local Classroom

Settings

Your Name

Broadcast Port 32768

Use Automatic Settings

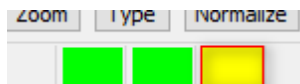
Use Manual Settings

IP of Trainer PC

Data Exchange Port

Enter your name and press **Connect**.

When a connection is established, the dialog should close and the third colored field should light yellow.



- [Connect as Trainee, Web Classroom:](#)

Connect as Trainee - Web Classroom

Settings

Connect to

Standard Server

Alternative Server

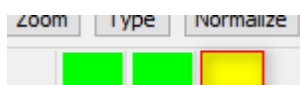
Name

Session ID

By pressing the OK button, you agree that your name and IP address will be stored on the server for operation of the classroom and follow-up.

Enter your name and the Session ID provided by the trainer and press Ok.

When a connection is established, the dialog should close and the third colored field should light yellow.

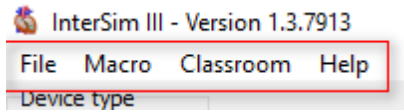


3. As soon as the trainer starts the session, the InterSim screen will change.

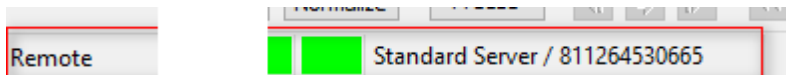
- The third colored field should light green.



- There are only a few menu entries left.



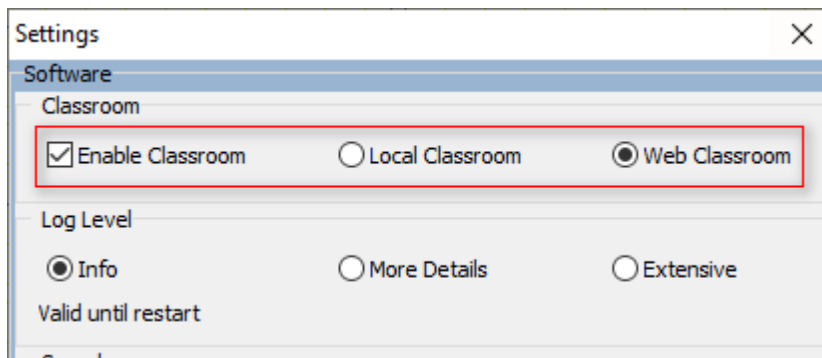
- The [Animated Heart](#), the [Parameters_group](#), the [Prematures_group](#), the [Current States_group](#), and the [Exercise_group](#) are hidden.
- The [status_bar](#) shows only the entries **Remote**, the **server** used, and the **Session ID**.



Use the Classroom as a Trainer

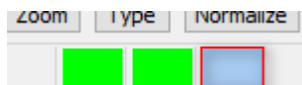
If you want to start and lead a classroom session as a trainer, please follow these steps:

1. If the [Classroom_menu](#) is not available, please turn it on via the [File](#) menu, [Settings](#) menu entry.

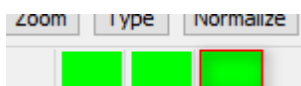


Select **Local Classroom** for a face-to-face training or **Web Classroom** if you are going to start an online training.

The third colored field should light blue-gray after closing the dialog.

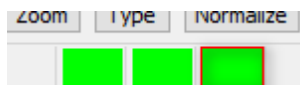


2. When you are ready to start a session, select the [Classroom](#) menu, Start Session as Trainer menu item.
 - [Start Session as Trainer, Local Classroom:](#)
No further input is necessary. You can recognize the established connection by the third colored field, which should be green.



- [Start Session as Trainer, Web Classroom:](#)

Enter the supplied twelve-digit Admin Key and the twelve-digit Session ID. After pressing OK, the third colored field should light green.

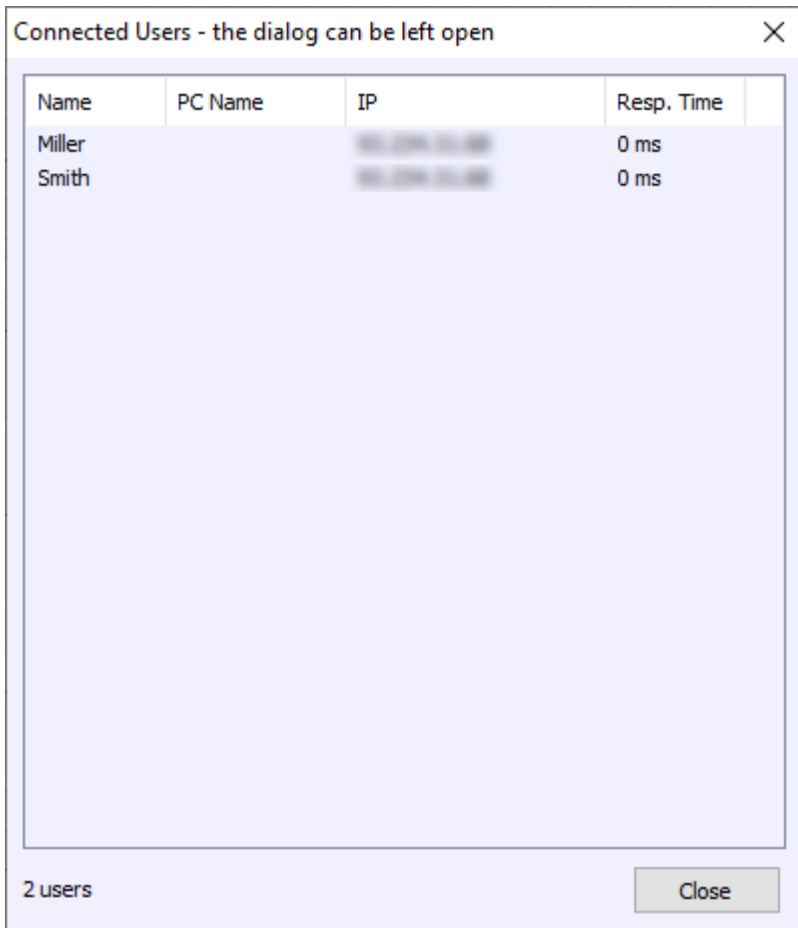


If in very rare cases there are problems with the Standard Server, try the Alternative Server and vice versa. This setting must be communicated to and used by all trainees.

3. Now you can make your simulator settings, load a [State file](#) or start a [Macro](#). All actions are immediately transmitted to all connected trainees.
4. If you want to see the data used go to the Classroom menu, [Connection Details](#) menu item.

Used Server	Standard Server
Session ID	XXXXXXXXXX
State	Connected

5. If you want to see the currently connected Trainees, go to the Classroom menu, [Connected Users](#) menu item. The PC name is filled only for the Local Classroom.



6. Stop the Session with the [Stop Session](#) menu item.

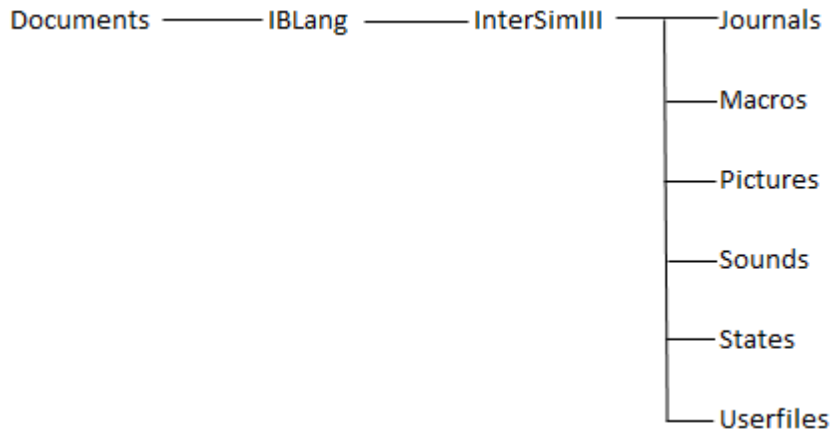
Electrode Conditions

The simulator can simulate different electrode conditions:

Condition	Impedance per strand	Threshold	Amplitude	EMI
Normal	defined by the Impedance edit control	defined by the Threshold edit control (strength duration curve)	defined by the Amplitude edit control	defined by the EMI controls
Fracture	> 3000 Ω	no capture	0	small artifacts
Leakage	< 200 Ω	3.5 V or defined by the Threshold edit control, whichever value is greater	0 (next FW release: 20% of the Amplitude edit control)	no
Scar	defined by the Impedance edit control	3.5 V or defined by the Threshold edit control, whichever value is greater	40% of Amplitude edit control	defined by the EMI controls

Folders

InterSim III uses a folder structure in the user's documents folder.



Journals: storage location of log files

Macros: storage location of macros

Pictures: storage location of ECG pictures

Sounds: storage location of sound files

States: storage location of state files

Userfiles: storage location of user files created by macros

Heartbeat Sound

It is possible to play a heartbeat sound with every heartbeat resp. every hiccup. The simulator looks for the following WAVE files in the folder "[Sounds](#)":

- ASense.wav
- APace.wav
- LVSense.wav
- LVPace.wav
- RVSense.wav
- RVPace.wav
- Hiccup.wav

The simulator plays the sound if

- the appropriate event occurs
- the corresponding file is available
- the checkbox "Play Heartbeat Sound" in the [Settings Dialog](#) is checked.

See also [Folders](#).

Impedances

The resulting impedance of a pacemaker channel consists of different parts. Note that the measured impedance can differ from the expected value.

Unipolar impedance

If no defect condition is selected, the unipolar impedance is calculated by the strand impedance and the body impedance . With the values shown, the resulting unipolar impedance is 435 Ω . With a selected defect, the impedance is mainly determined by the defect strand. The impedance is more than

3000 Ω with a Fracture condition. The impedance is less than 200 Ω with a Leakage condition.

Bipolar impedance

If no defect condition is selected, the bipolar impedance is calculated by two strand impedances, for example the impedance of RA Tip and RA Ring . With the value shown, the resulting atrial bipolar impedance is 550 Ω .

With a Fracture condition, the bipolar impedance will reach a value of more than 3000 Ω .

With a Leakage condition in one strand, you should consider the impedance in the other strand. For example, the resulting bipolar impedance is 250 Ω in case of a Leakage condition in the RA Tip strand and an impedance of 200 Ω in the RA Ring strand. You should select a Leakage condition in both strands to get a true bipolar Leakage condition.

Look at the automatically calculated values of the resulting impedances for a quick overview.

ICD Shock impedance

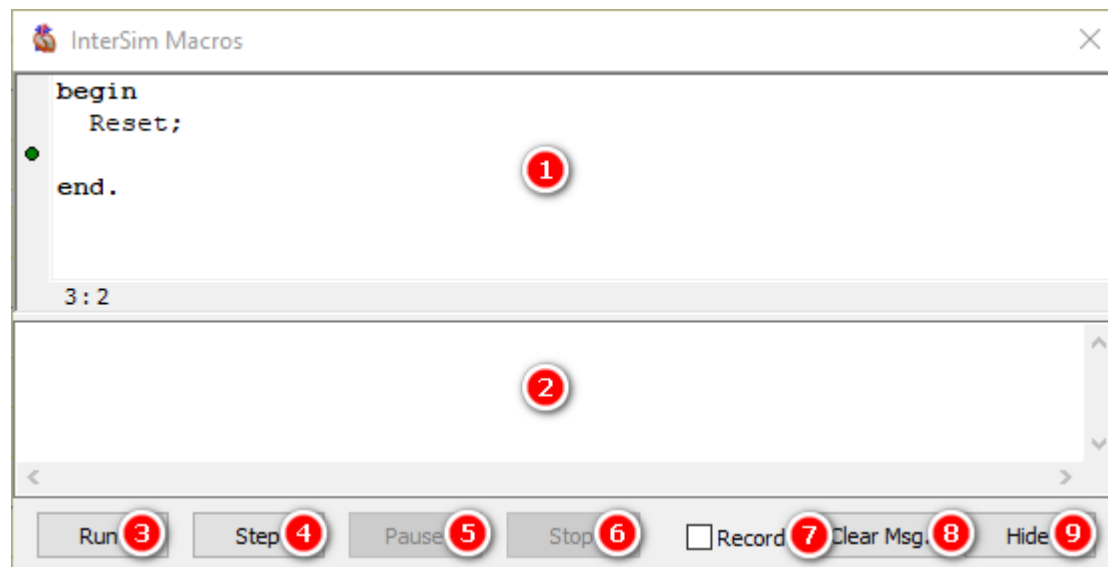
The shock impedance is composed of three individual impedances. The RV coil strand has an impedance of 20 Ω , the SVC coil strand 30 Ω , and the CAN strand 59 Ω . This results in a shock impedances dependent on the shock path:

Shock Path	Impedance
RV coil - CAN	79 Ω
RV coil - CAN SVC coil	40 Ω
RV coil - SVC coil	50 Ω
RV coil SVC coil - CAN	71 Ω

If the Fracture condition is selected for RV coil, the resulting shock impedance is a high-impedance state.

For sensing and pacing, the resulting impedance is the sum of the particular PM strand, the pocket impedance, the shock CAN strand, and the RV coil strand.

Macro Window



1

Macro Area

The Macro Area shows the currently loaded or created macro. It provides the necessary functions to enter or edit a Macro. The small green dot to the left of the text shows the position at which a new command will be inserted using the Record function. The dot turns red when the macro is running. In this case, the dot shows the command that is just executed.

2 Message Area

This area shows the macro message output. Use Clear Msg. to clear all messages.

3 Run

Press this button to start a macro. The macro will not start if it contains an error. In this case the dot at the left shows the error position and the error description is shown in the message area.

4 Step

It is possible to execute a macro step by step by pressing this button.

5 Pause

The Pause button will interrupt a running macro.

6 Stop

The Stop button terminates a long or endlessly running macro.

7 Record

Check this box to start the recording function. Every command taken or every parameter changed will be recorded by this function. The small green dot on the left indicates the position where the next entry will be inserted.

8 Clear Msg.

Use this to clear the message area.

9 Hide

This hides the window. The macro itself will not be affected. Use this button if it is not necessary to watch the macro execute or to temporarily hide the window for any reason. The [Show](#) menu item displays the Macro Window again.

PMT

Use the following PM settings to induce a PMT:

- PVARP: 220-280 ms
- Paced AV delay: 80-180 ms
- Sensitivity A: 0.25 mV
- Maximum tracking rate: 130 bpm

Load the predefined [State](#) PMT.dat.

Start the PMT with a coupled [premature](#) ventricular contraction rPVC.

Reentry Loop

It is possible to demonstrate a reentry loop that includes the accessory pathway.

- [Reset](#) the Simulator
- Enable [Accessory Pathway](#) (Blocks menu)
- Set [PR interval](#) to 150 ms (Parameters menu, Intervals menu item)
- Trigger the reentry loop with a [JPVC \(Prematures\)](#)

The JPVC can pass through the accessory pathway and is transmitted to the atria because they are no longer refractory. From there, the wavefront is again conducted through the AV node back down to the ventricles. The delta waves disappear during the tachycardia because the ventricles are activated through the regular AV

pathway.

- Stop the reentry tachycardia with a repeat IPVC.



1 Delta Wave

Due to the Accessory Pathway, delta waves appear.

2 IPVC

The IPVC triggers the reentry tachycardia.

3 Reentry Tachycardia

The delta waves disappear due to the regular AV pathway.

Reset Values

Parameter	Value after Reset
Rates	
Atrial Rate	68 bpm
AVN Rate	40 bpm
Ventricular Rate	28 bpm
Intervals	
PR Interval	170 ms
RP Interval	280 ms
Block Rate	171 bpm
Coupling Interval	250 ms
Vulnerable Phase	60 ms
BBB QRS Width	160 ms
Exercise	
Exercise	Off
Workload	0%
Sinus Rest Rate	68 bpm
Sinus Max Rate	136 bpm
PR Rest Interval	170 ms
PR Min Interval	115 ms
Chances for ATP	
Termination	100%
Acceleration 50 ms	0%
Acceleration 70 ms	0%
Degeneration	0%
No Response	0%
Chances for Induction	
Monomorphic Tachycardia 170 bpm	0%

Polymorphic Tachycardia	0%
Fibrillation	100%
No Response	0%
Far-Field R Wave	
Far-Field R Wave	Off
Intrinsic Far-Field VA Interval	40 ms
Paced Far-Field VA Interval	110 ms
PVC Amplitudes	
Left PVC	100%
Right PVC	100%
T Wave Amplitude Type	
T Wave Amplitude Type	Normal
Miscellaneous	
A-Pace Crosstalk	Off
A-Pace Crosstalk Latency	0 ms
A-Pace Crosstalk Width	80 ms
A-Pace-P Latency	10 ms
V-Pace-Q Latency	10 ms
R Wave Variability with Respirational Cycle	7%
ERAF	Off
ERVT	Off
Rhythms	
Rhythm	Sinus Rhythm
Dual Tachycardia	Off
Blocks	
AV Block	1:1 Conduction
Retrograde Conduction	Off
Accessory Pathway	Off
LBBB	
RBBB	
PM Parameters	
Body Impedance	35 Ω
Amplitude Atrium	2.5 mV
Threshold Atrium	1.0 V
Condition Atrial Tip	Normal
Impedance Atrial Tip	400 Ω
Condition Atrial Ring	Normal
Impedance Atrial Ring	150 Ω
EMI Atrium	Off
Amplitude Right Ventricle	12.5 mV
Threshold Right Ventricle	1.0 V
Condition Right Ventricular Tip	Normal
Impedance Right Ventricular Tip	380 Ω
Condition Right Ventricular Ring	Normal
Impedance Right Ventricular Ring	150 Ω

EMI Right Ventricle	Off
Left Ventricle Setup	
Condition Left Ventricular Tip1	Normal
Impedance Left Ventricular Tip1	400 Ω
RV-LV Interval Left Ventricular Tip1	no BBB 0 ms LBBB 100 ms RBBB 100 ms
Amplitude Left Ventricular Tip1	12.5 mV
EMI Left Ventricular Tip1	Off
Condition Left Ventricular Ring2	Normal
Impedance Left Ventricular Ring2	390 Ω
RV-LV Interval Left Ventricular Ring2	no BBB 5 ms LBBB 105 ms RBBB 95 ms
Amplitude Left Ventricular Ring2	12.5 mV
EMI Left Ventricular Ring2	Off
Condition Left Ventricular Ring3	Normal
Impedance Left Ventricular Ring3	440 Ω
RV-LV Interval Left Ventricular Ring3	no BBB 10 ms LBBB 110 ms RBBB 90 ms
Amplitude Left Ventricular Ring3	12.5 mV
EMI Left Ventricular Ring3	Off
Condition Left Ventricular Ring4	Normal
Impedance Left Ventricular Ring4	400 Ω
RV-LV Interval Left Ventricular Ring4	no BBB 15 ms LBBB 115 ms RBBB 85 ms
Amplitude Left Ventricular Ring4	12.5 mV
EMI Left Ventricular Ring4	Off
All Thresholds	1.0 V
All RV (anodal) Thresholds	n.c.
All PNS Thresholds	n.c.
MPP reduces BBB QRS Width	Off
ICD Parameters	
Amplitude RV Coil	2.9 mV
Impedance Condition	Normal
Post Shock Asystole	2 s
Threshold Atrium	8 J
Threshold Variation Atrium	Off
Threshold Ventricle	15 J
Threshold Variation Ventricle	Off
EMI RV Coil	Off
EMI Frequency	
Frequency	no default value
Demos	
Demo Pacemaker	Off
SICD Parameters	

Primary Amplitude	4.0 mV
Secondary Amplitude	2.5 mV
Threshold Atrium	8 J, same as ICD
Threshold Variation Atrium	Off, same as ICD
Threshold Ventricle	15 J, same as ICD
Threshold Variation Ventricle	Off, same as ICD
Body Impedance	35 Ω , same as PM
Primary Condition	Normal
Primary Impedance	150 Ω
Secondary Condition	Normal
Secondary Impedance	380 Ω
Coil Condition	Normal
Primary EMI	Off
Secondary EMI	Off
Post Shock Asystole	2 s, same as ICD
CCM Parameters	
Pace-LS Latency	30 ms
RV-LS Interval	10 ms
A-Pace Crosstalk Amplitude	Off

Rhythm Characteristics

Rhythm	Characteristic
Sinus Rhythm	Sinus rate 68 bpm
Sinus Brady	Sinus rate 39 bpm
Sinus Arrest	Sinus rate 0 bpm The ventricles follow an AV node escape rhythm.
Idioventr. Rhythm	Sinus rate 0 bpm AVN rate 0 bpm Ventricle rate 41 bpm Retrograde conduction on
Sinus Tachy	Sinus rate 120 bpm
Brady-Tachy Syndr.	The rhythm randomly alternates between Sinus Rhythm, Sinus Brady, Sinus Arrest, and Atrial Tachycardia.
Parox. Atrial Tachy	The rhythm randomly alternates between Sinus Rhythm and Atrial Tachycardia.
Atrial Flutter 2:1	Sinus rate 230 bpm Block rate 184 bpm
Atrial Flutter 3:1	Sinus rate 230 bpm Block rate 103 bpm
Atrial Flutter 4:1	Sinus rate 230 bpm Block rate 69 bpm
Atrial Fibrillation	Sinus rate randomly varies between 400 and 600 bpm
Comb. Atrial Flutter/Fib.	The rhythm randomly alternates between Atrial Flutter and Atrial Fibrillation.
AVNRT	AVN rate 180 bpm
LV Tachy Slow 130 bpm	Left ventricle rate 130 bpm
LV Tachy Medium 165 bpm	Left ventricle rate 165 bpm
LV Tachy Fast 220 bpm	Left ventricle rate 220 bpm

LV Tachy Very Fast 250 bpm	Left ventricle rate 250 bpm
RV Tachy Slow 130 bpm	Right ventricle rate 130 bpm
RV Tachy Medium 165 bpm	Right ventricle rate 165 bpm
RV Tachy Fast 220 bpm	Right ventricle rate 220 bpm
RV Tachy Very Fast 250 bpm	Right ventricle rate 250 bpm
Polymorphous VT	Ventricle rate between 200 and 250 bpm
Torsade de Pointes Coarse and Fine	Ventricle rate 221 bpm Coarse and Fine differ in the ECG
Ventricular Flutter	Ventricle rate 300 bpm
Ventricular Fibrillation Fine	Ventricle rate 214 and 250 bpm
Ventricular Fibrillation Coarse	Ventricle rate 250 and 300 bpm

Block Characteristics

Block	Characteristic
1:1 Conduction	Sinus Rate 68 bpm Block Rate 171 bpm PR interval 170 ms
AV Block I	PR conduction time is prolonged to 250 ms.
AV Block II Mobitz II 2:1	Sinus Rate 78 bpm Block Rate 52 bpm PR interval 170 ms Every second atrial action is transferred to the ventricle.
AV Block II Mobitz II 3:1	Sinus Rate 78 bpm Block Rate 52 bpm PR interval 170 ms Every third atrial action is transferred to the ventricle.
AV Block II Mobitz II 4:1	Sinus Rate 78 bpm Block Rate 52 bpm PR interval 170 ms Every fourth atrial action is transferred to the ventricle.
AV Block II Mobitz I	Sinus Rate 68 bpm Block Rate 63 bpm With each atrial action the PR conduction time is prolonged, so that the ventricular rate value constantly corresponds to the lower "block rate". The PR conduction time is prolonged until a ventricle action fails.
AV Block III	The AV conduction is completely interrupted.
Retrograde Conduction	Retrograde P waves are initiated according to ventricle actions under the condition that the conduction system is not refractory.
Accessory Pathway	An accessory pathway between the atrium and the upper left ventricle is connected. As a result of this accessory pathway, PR interval is reduced, Q wave in the surface ECG is superimposed by so-called delta wave and the entire QRS complex is prolonged.
LBBB	A left bundle branch block is switched on.
RBBB	A right bundle branch block is switched on.

Simulation States

Simulation States

A Simulation State is like a snapshot of all current settings (rates, intervals, rhythms, blocks, thresholds, impedances, etc.). The before saved states can be restored easily. It is possible to store as many states as the hard disc capacity allows.

MyStart State

This special state will be loaded at program start-up if it is available. Create this state by using the [Save as MyStart](#) menu item.

User Button States

A User Button State is an often used state accessible by the [User State Buttons](#).

Trainer States

A Trainer State is a special Simulation State. Go to [File Menu, Save as Trainer State](#) to create such a state. When a Trainer state is reloaded, most of the entries and controls will be invisible. Select End Trainer State in the File menu to show all invisible entries and controls again.

See also [Folders](#).

Create and use Simulation States step by step

1. Press [Reset](#) for default values of all parameters.
2. Set [atrial_rate](#) to 80 bpm.
3. Set [AV block III](#).
4. [Save the state](#) as MyFirstState.
5. Press Reset again or close and restart the simulator. All parameters are reset to default values.
6. [Open](#) your saved state.
7. Check the [atrial_rate](#), it should have 80 bpm.
Check the [AV block](#). AV block III should be selected.

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