InterSim® III Interface

Interactive Heart Simulator
Your virtual patient.

The InterSim® III Interface is used to simulate the human heart. In combination with the InterSim® III Adapter Box, the electrical and electrochemical properties of the cardiac system of humans can be simulated and the interaction with implantable pacemakers and defibrillators can be learned.

HIGHLIGHTS

- USB interface electronics
- Easy to use software (compatible with Windows® 8/10)
- Full support of IS-1, IS-4, DF-1 and DF-4
- Support for all shock vectors
- Classroom compatible
- Additional adapter box for safe handling of ICDs
- High voltage resistant (up to 1500 V)
- CE certification
- NRTL certification for US and Canada

APPLICATION VARIANTS

InterSim® III Adapter Box	Connection of implantable pulse generators (CRT-P, CRT-D or ICD) Standard version (support for IS-1; optionally DF-1 or DF-4) Extended version (support for IS-1 and IS-4; optionally DF-1 or DF-4)
InterSim® III Adapter for Temporary Pacemaker	Connection of 2-channel external pacemakers Two different connection types (2 mm banana plugs and Medtronic compatible connectors)

SYSTEM REQUIREMENTS

A separate PC, laptop or tablet with the following minimum requirements is required:

- 2 GHz clock frequency or higher (Intel i5/i7 or equivalent AMD)
- 4 GB RAM or higher
- USB 2.0 Hi-Speed port
- Microsoft Windows® 10 Pro or Enterprise (64 bit)
- At least 30 MB installation space (only for simulator software)
- Display device with a resolution of 1280x720 or higher ('True Color' or 'High Color')
- DirectX 10 (or above) installed

Note: Only one InterSim® III Interface can be connected simultaneously at one computer.

FEATURES

Basic functionalities

Device types	Two chamber Biventricular Quadripolar
Rhythms	Sinus Rhythm, Sinus Brady, Sinus Arrest Idioventricular Rhythm Sinus Tachy, Brady-Tachy Syndrome, Paroxysmal Atrial Tachy Atrial Flutter, Atrial Fibrillation, AVNRT, Combined Atrial Flutter/Fibrillation LV Tachy (slow, medium, fast, very fast) RV Tachy (slow, medium, fast, very fast) Polymorphous VT, Torsade de Pointes Ventricular Flutter, Ventricular Fibrillation Dual tachycardia
Blocks	1:1 conduction AV Block I AV Block II Mobitz II (2:1, 3:1, 4:1) AV Block II Mobitz I AV Block III Retrograde Conduction Accessory Pathway LBBB RBBB
Visualization	Showing of up to 7 ECG traces (with time measurement functionality) 4 different ‚sweep speeds' 3 different sizes of ECG display Stopping and reviewing ECG (up to 8 min back) Saving InterSim III ECG as Jpg
Miscellaneous	Saving and reloading states of the simulator including all settings Developing of self-running scenarios (macros) Support of all possible sensing and pacing vectors Support for all shock vectors (±RV coil – SVC coil || CAN, ±RV coil – CAN, ±RV coil – SVC coil) Measurement of shock energy, polarity and vector

Parameters

Rates	
Atrial	2...245 bpm
AVN	2...200 bpm
Ventricular	2...250 bpm
Intervals	
PR	50...400 ms
RP	130...600 ms
Block rate	20...250 bpm
Coupling	100...1000 ms
Vulnerable phase	40...80 ms
BBB QRS width	80...220 ms
RV-LV	10...[BBB QRS width] ms
Thresholds	
A, RV, LV	0.5...3.75 V (no capture; strength-duration curve)
RV coil	0...80 J (25 % variation optional)
Workload	0...100 %
Far-field R-wave	
Status	off, small, large
Intrinsic VA interval	0...100 ms
Paced VA interval	50...200 ms
Amplitude T-Wave	normal, medium, large, extra-large, high angle
A-pace crosstalk	
Latency	0...50 ms
Width	5...102 ms
A-Pace-P latency	1...150 ms
Y-Pace-Q latency	1...150 ms
Defects	
A, RV, LV	normal, fracture, leakage, scar
RV coil	fracture
EMI for pacemaker/ICD	50/60 Hz 5 mV, 50/60 Hz 0.5 mV, artifacts, noise

Miscellaneous

Chances (ATP)
ERAF (early recurrence of AF)
ERVT (early recurrence of VT)
Post shock asystole (up to 180 ms)

DEVICE DATA

Size	
Basic device	200 x 160 x 60 mm
Adapter Box	150 x 125 x 60 mm
Ambient temperature	
Operation	+5...+40 °C
Storage / transport	-20...+60 °C
Max. relative humidity (non-condensing)	90 %
Max. altitude during operation	2000 m above sea level
Place of use	Indoor use only
Power supply	100 – 240 V AC, 50 – 60 Hz
Country-specific plug attachments	EU, UK, US

ELECTRICAL DATA

Surface ECG

Channels (limb lead)	LA (aVL), LL (aVF), RA (aVR), RL (connected to ground)
Surface ECG output	
Amplitude	-50...+50 mV (±5 %)
Frequency	1 kHz
Output impedance	510 Ω

Intracardiac ECG

Channels	
Terminal pin IS-1	A, RV, LV (always tip/ring)
Terminal pin IS-4	LV (LV1-LV4)
HV terminal DF-4	RV (tip/ring)
Intracardiac ECG output	
Amplitude	-30...+30 mV (±10 %)
Frequency	1 kHz
Pulse detection	
Pulse amplitude	0.4...7.5 V
Pulse duration	0.1...20 ms
Max. measurement error	±2 % (Amplitude) / ±1 % (Duration)
Input impedance (unipolar)	
normal	170...550 Ω (±5 %)
leakage / short cut	50 Ω (±5 %)
fracture / broken	> 5000 Ω
Input impedance (bipolar)	
normal	300...1000 Ω (±5 %)
leakage / short cut	100 Ω (±5 %)
fracture / broken	> 5000 Ω
Input voltage protection	1.5 kV

Defibrillator channels

Channels	
HV terminal DF-1	RV coil, SVC coil
HV terminal DF-4	RV coil, SVC coil
Intracardiac ECG output	
Amplitude	-12...+12 mV (±10 %)
Frequency	1 kHz
Defibrillator pulse detection	
Pulse amplitude	-1.5...+1.5 kV
Max. pulse energy	80 J
Max. measurement error	±10 % (amplitude) / ±2.5 % (energy)
Input impedance	
RV coil to CAN	79 Ω (±5 %)
RV coil to SVC coil	50 Ω (±5 %)
RV coil to SVC coil ‖ CAN	40 Ω (±5 %)
RV coil (fracture / broken)	open
Pause times between defibrillator pulses	
After single pulse	≥60 s
After pulse series (max. 5 pulses)	≥180 s
DC fibber detection (via RV coil)	
Pulse amplitude	6.2 V (typ.)
Pulse duration	1.9 s

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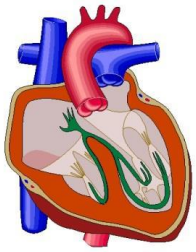

InterSim® III is a joint venture product between Ingenieurbüro Lang and TQ-Systems GmbH. Production, sales and service for the product is carried out exclusively by TQ-Systems GmbH.