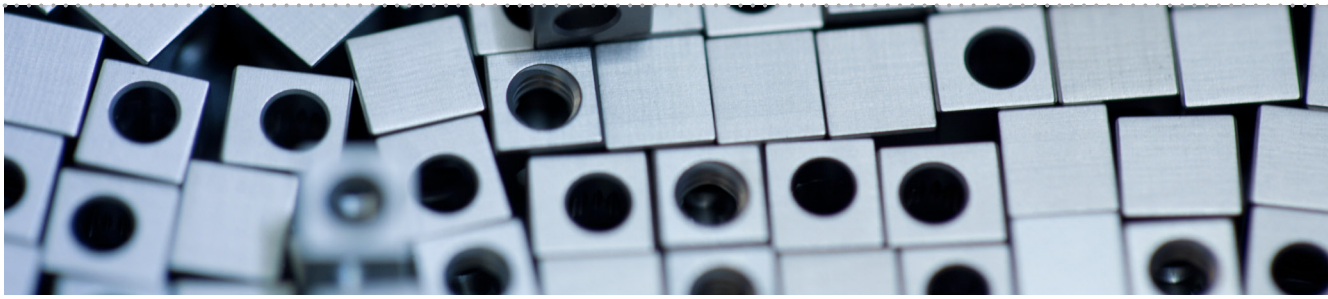
Company Profile



Saving lives. Providing security.

BIOTRONIK is a leading European company in the field of biomedical technology. We focus on devices for vascular intervention and electrotherapy of the heart. Our products help physicians save lives and improve their patients' quality of life.

Global player

BIOTRONIK operates a global network. More than 5 600 employees research, develop, produce and sell BIOTRONIK products – and support our customers on every continent.

Our motto: "excellence for life"

Company founder Prof. Dr. Max Schaldach developed the first German pacemaker some 40 years ago. Since then, BIOTRONIK has had a reputation for focusing on high-quality patient care and developing innovative solutions. We believe that only those who surpass the average can achieve excellence. Close collaboration with expert physicians and researchers characterize this corporate mindset. This approach considerably accelerates the development of an idea into a widely available, high-quality, lifesaving product.

BIOTRONIK
excellence for life

Company Profile

Business focus

BIOTRONIK has concentrated in two distinct business areas – electrotherapy and vascular intervention – which has enabled the company to provide customers with a wide range of products.

Electrotherapy

Electrotherapy offers diagnostic tools and options for treating arrhythmias. The purpose of first-generation pacemakers was to save patients' lives. However, modern implants fulfill a broad range of functions. Improving a patient's quality of life and monitoring the heart using diagnostic features are becoming increasingly important.

In the field of electrotherapy, BIOTRONIK offers the following devices:

- Pacemakers
- Defibrillators
- Leads and catheters
- External devices for processing implant data
- Measurement and ablation devices for electrophysiology
- Wireless remote patient monitoring
- Electronic health record

Vascular Intervention

Vascular intervention provides solutions for stenosis and occlusion of arterial vessels. Every year, about a million coronary stents are being implanted worldwide. Stents are also useful in treating stenosis in peripheral arteries. An innovative silicon-carbide coating guarantees excellent hemocompatibility for BIOTRONIK products and reduces the risk of restenosis in the damaged area.

In the field of vascular intervention, BIOTRONIK offers the following devices:

- Guide wires
- Balloon catheters
- Stents
- Diagnostic catheters
- Accessory products

General Information – August 2011

BIOTRONIK
excellence for life

Company Profile

BIOTRONIK has a European heart and a strong international pulse. Our company headquarters are in Berlin, a city that has always been special among European capitals. Separated from the rest of Germany for decades, it was a challenge to build up an extensive and vital network from this location. These very circumstances have strengthened the bond within all BIOTRONIK branches even more, and they certainly produced a unique, creative and inspiring working environment. Today, our network consists of more than 20 direct subsidiaries, and we have a presence in more than 100 countries around the world.

Headquarters

BIOTRONIK SE & Co. KG
Corporate Headquarters: Berlin, Germany

Cardiac rhythm management, general management, human resources, global marketing, finance, R&D, production, quality assurance, regulatory affairs, international sales

BIOTRONIK SE & Co. KG
Woermannkehre 1
12359 Berlin · Germany
Tel +49 (0) 30 68905-0
Fax +49 (0) 30 6852804
sales@biotronik.com
www.biotronik.com

BIOTRONIK AG
VI Headquarters: Bülach, Switzerland

Products for minimally invasive coronary and peripheral intervention, R&D, production, quality control, regulatory affairs, marketing, sales, business management

BIOTRONIK AG
Ackerstrasse 6
8180 Bülach · Switzerland
Tel +41 (0) 44 8645111
Fax +41 (0) 44 8645005
info.vi@biotronik.com
www.biotronik.com

BIOTRONIK
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General Information – August 2011

BIOTRONIK
excellence for life

Our History

1960s – Exploring opportunities

BIOTRONIK was founded in 1963, as physicist Max Schaldach and electrical engineer Otto Franke developed the first German implantable pacemaker. In the early years, BIOTRONIK's primary focus was on solving basic problems.

These included short battery service time, the uncertainty of the remaining battery power, and developing a reliable method for connecting the lead to both the pacemaker and the heart. Research and development (R&D) produced a series of innovations that are considered milestones in pacemaker technology today.

1970s – Expanding the playing field

The appointment of Dr. Schaldach as professor for biomedical engineering at Erlangen's Friedrich-Alexander University boosted the company's R&D work. In 1976, the company opened headquarters in Berlin-Neukölln, Sieversufer 8, and eventually moved next door to Woermannkehre 1 in 1987.

Upon acquiring Stimulation Technology, Inc., BIOTRONIK set up production facilities in Lake Oswego, Oregon, in the United States. At this time, the company also began developing and producing advanced hybrid circuitry and modules for the biomedical industry. This was the harbinger to breakthrough technology in the pacemaker industry. These pioneering achievements make BIOTRONIK stand out in medical technology history.

BIOTRONIK also met the demands of clients and patrons who required pacemakers and diagnostic devices for electrophysiological studies, thus enlarging the range of its customer base.

Our History

1980s – New horizons

The development of physiological stimulation marked the beginning of a new phase in pacemaker therapy. Dual-chamber pacing technology responded more accurately to a patient's actual needs. These DDD pacemakers were especially sensitive to spontaneous heart contractions and triggered a stimulus only when necessary. However, this new generation of products were prone to accidental interactions between atrium and ventricle.

Having prior experience with dual-chamber pacemakers during the 1960s, BIOTRONIK was prepared and quickly focused on addressing the challenges of DDD technology, subsequently becoming a European market leader with the Diplos 03 pacemaker. Thanks to other technological and commercial successes in the 1980s, BIOTRONIK was able to expand into Europe, South America and Asia.

1990s – Widening the product range

In 1993, BIOTRONIK expanded its product range with implantable defibrillators. BIOTRONIK's philosophy of challenging R&D to designing products that would work as naturally as possible, enabled the company to develop a key achievement: Closed Loop Stimulation. This technology integrated the pacemaker into the body's natural regulatory system, which allows it to react to the patient's changing physical and related mental activity.

Another innovation of the 1990s, fractal coating of implantable leads, was also based on a principle of nature. The coating optimizes the lead's electrically active surface, which significantly improves its electrical sensing and pacing properties. BIOTRONIK is still the forerunner in this field, and the only manufacturer of fractal-coated leads.

In 1995, BIOTRONIK added vascular intervention devices such as balloon catheters and stents for the treatment of coronary and peripheral vessels to its product range.

In the 1990s, the company also added diagnostic and therapeutic catheters as well as radio-frequency generators for ablation, further developing the work started in the 1970s. BIOTRONIK now offers a complete portfolio of products for heart electrotherapy.

BIOTRONIK
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Our History

Accepting the challenges of the new millenium

BIOTRONIK's Home Monitoring® service provides physicians with current data from their patients implants, regardless of the patients' location. This innovative technology combines optimal therapy with the most efficient care, thus increasing and protecting the patient's security.

The ability to follow up on patients at home after surgical recovery has given physicians the ability to monitor patients in their homes, where they have less stress and are more likely to recover. Innovative technologies have also improved treatment success in the area of vascular intervention. BIOTRONIK's drug-eluting absorbable metal scaffold is performing successfully in the testing phase.

Improved patient safety and quality of life are among of BIOTRONIK's major concerns, and the company intends to continue its focus in this direction in the years to come.

BIOTRONIK
excellence for life

Quality & Innovation

The foundation of “excellence for life”

BIOTRONIK innovates to make a significant difference in cardiac rhythm management, electrophysiology and vascular intervention. We have pioneered some of the most important superior quality solutions for increasing therapy efficacy, streamlining clinic workflow and improving quality of life. Several of the many unique technologies we’ve delivered remain unmatched in the industry.

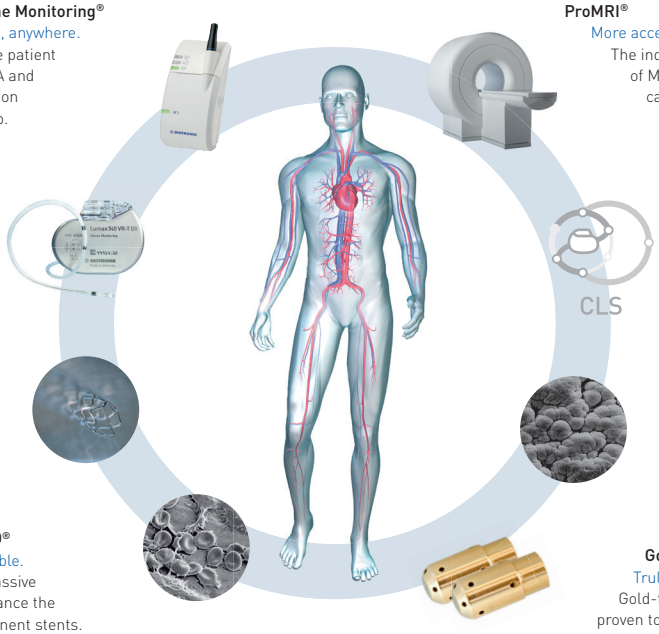
Unsurpassed pioneering solutions from BIOTRONIK

BIOTRONIK Home Monitoring®
Simplicity of care. Anytime, anywhere.
First and only wireless remote patient monitoring system with FDA and CE approval for early detection and remote follow-up.

DX Atrial Sensing
Unique protection.
Capable of detecting new onset of atrial fibrillation with only a single-chamber ICD.

DREAMS
The future of vascular stenting.
Development of the world’s only drug-eluting absorbable metal scaffolding.

ProBIO®
Making metal biologically invisible.
Proprietary silicon carbide passive coating clinically proven to enhance the biocompatibility of permanent stents.



ProMRI®
More access. More options.
The industry’s broadest portfolio of MR Conditional approved cardiac devices and leads.

Closed Loop Stimulation
Unique physiological therapy.
The only sensing system in the world that can trigger changes in heart rate in order to optimize cardiovascular flow during mental excitement or stress.

Fractal Coating
More efficient, more effective energy.
Unique technology that significantly increases the bioeffective surface area by factor 1,000, for low chronic thresholds and better sensing.

Gold-tip ablation
Truly worth its weight in gold.
Gold-tip technology clinically proven to allow for superior cooling and deeper ablation lesion creation.

General Information – August 2011

BIOTRONIK
excellence for life

BIOTRONIK Awards and Prestigious Nominations

Visionary thinking does not go unrecognized in an industry where creativity and customer-focused R&D result in lives saved. Our pioneering efforts have thus led to several award-worthy solutions.

Frost & Sullivan Remote Monitoring Customer Service Leadership Award 2010
Winner for BIOTRONIK Home Monitoring®

Cardiostim Innovation Award 2010
Winner for BIOTRONIK Home Monitoring®

German Innovation Award 2009
Top 3 finalist for BIOTRONIK Home Monitoring®

Wolfgang Trautwein Award of the German Cardiac Society in 2009
Winner in collaboration with the University Clinic of Würzburg for research in the MRI field

EuroPCR – Novelty Award 2007
Winner for absorbable metal stent (AMS) program

Actualidad Economica: Las mejores ideas del año 2006
Winner for LUMAX DR-T

Frost & Sullivan Product Differentiation Innovation Award 2007
Winner for Talos Pacemaker System

Frost & Sullivan Product Innovation of the Year 2006
Winner for Closed Loop Stimulation

FDA Technology Hall of Fame
BIOTRONIK Home Monitoring® was awarded a place in 2001

BIOTRONIK
excellence for life

Conversion Tables

French (F)	mm
1.0	0.33
2.4	0.80
2.6	0.87
2.9	0.90
3.0	1.00
3.3	1.10
3.4	1.13
3.7	1.23
4.0	1.33
4.5	1.50
5.0	1.66
6.0	2.00
7.0	2.33
8.0	2.66
9.0	3.00
10.0	3.33
11.5	3.83
15.5	5.17
18.0	6.00
22.0	7.33

Inch (")	mm
1.000	25.40
0.010	0.25
0.012	0.30
0.014	0.36
0.018	0.46
0.020	0.51
0.021	0.53
0.025	0.64
0.026	0.66
0.027	0.69
0.028	0.71
0.029	0.74
0.030	0.76
0.031	0.79
0.032	0.81
0.033	0.84
0.034	0.86
0.035	0.89
0.036	0.91
0.037	0.94
0.038	0.97
0.039	0.99
0.040	1.02
0.041	1.04
0.042	1.07

Inch (")	mm
0.043	1.09
0.044	1.12
0.045	1.14
0.046	1.17
0.047	1.19
0.048	1.22
0.050	1.27
0.052	1.32
0.054	1.37
0.056	1.42
0.059	1.50
0.061	1.55
0.063	1.60
0.064	1.63
0.068	1.73
0.071	1.80
0.072	1.83
0.074	1.88
0.076	1.93
0.077	1.96
0.079	2.01
0.082	2.08
0.086	2.18
0.092	2.34
0.107	2.72

French (F)	mm	Inch (")
3	1.00	0.039
4	1.33	0.053
5	1.66	0.066
6	2.00	0.079
7	2.33	0.092
8	2.66	0.105
9	3.00	0.118
10	3.33	0.131
11	3.66	0.144
12	4.00	0.156
13	4.33	0.170
14	4.66	0.184
15	5.00	0.197
16	5.33	0.210
17	5.66	0.223
18	6.00	0.236
19	6.33	0.249
20	6.66	0.263
22	7.33	0.288
24	8.00	0.315
26	8.66	0.341
28	9.33	0.367
30	10.00	0.393
32	10.66	0.419
34	11.33	0.445

mm

inches

1 atm = 1.013 bar

BIOTRONIK
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Evia SR-T

MR Conditional single-chamber, rate-response pacemaker with Closed Loop Stimulation and BIOTRONIK Home Monitoring®

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)
- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Evia SR-T uncoated	24 g	11 cm^3	371998
Evia SR-T coated	24 g	11 cm^3	372034

BIOTRONIK
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Evia SR-T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	VOO; AOO; OFF

Closed Loop Stimulation	
CLS mode	VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[1]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[3]	90…(10)…**130**…(10)…200 ppm
IEGM recording[4]	20 recordings, max. 10 seconds each, 2 triggers
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80…(5)…**120**…(5)…160 ppm
■ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[5]	QMR® (open circuit voltage: 3.0 V), Li-MnO_2 (open circuit voltage: 3.1 V)
Nominal operating time	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm / 24 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

BIOTRONIK Home Monitoring®

Programmer settings	
Home Monitoring	**OFF**; ON
Time of data transmission	AUTO; 00:00…(00:30)…23:30 hh:mm
Periodic IEGM	OFF; 30; 60; 90; 120; 180 days
High rate[6]	OFF; ON

Transmitted data	
Clinical data	threshold, sensing amplitude, pacing statistic, arrhythmia statistic, Heart Failure Monitor® diagnostics
Technical data	battery status, lead integrity measurements, programmed parameters

IEGM-Online® HD	
Periodic IEGM	sequence of 10 sec native settings, 10 sec encouraged sensing and 10 sec encouraged pacing

Event types	
Implant	battery status, programmer-triggered message received
Leads	pacing impedance[7], lead check, sensing amplitude[7], pacing threshold[8], Capture Control status[8]
Arrhythmias	number of high rate arrhythmias[9]
Heart Failure Monitor®	mean heart rate[9]

Message types	
Message types	trend message based on Intelligent Message Bundling, event message triggered daily after clinical or technical events, test message triggered manually via programmer

Ordering information	
■ Evia SR-T uncoated	371 998
■ Evia SR-T coated	372 034

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) Only available for triggered modes.
4) Storage of IEGMs by using intelligent memory management.
5) Nominal data of the manufacturer.
6) According to programmer Holter triggers.
7) Programmable upper and lower limit.
8) Only in VVI mode.
9) Programmable limit.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
excellence for life

Evia SR

MR Conditional single-chamber, rate-response pacemaker with Closed Loop Stimulation

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)

- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®

- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Evia SR uncoated	25 g	10 cm^3	371997
Evia SR coated	25 g	10 cm^3	372003

BIOTRONIK
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Evia SR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	VOO; AOO; OFF

Closed Loop Stimulation	
CLS mode	VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[1]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[3]	90…(10)…**130**…(10)…200 ppm
IEGM recording[4]	20 recordings, max. 10 seconds each, 2 triggers
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80…(5)…**120**…(5)…160 ppm
■ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[5]	LiJ (open circuit voltage: 2.8 V)
Nominal operating time	> 15 years (at: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm / 25 g
Volume	10 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Evia SR uncoated	371997
■ Evia SR coated	372033

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) Only available for triggered modes.
4) Storage of IEGMs by using intelligent memory management.
5) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Entovis SR-T

MR Conditional single-chamber, rate-response pacemaker with Closed Loop Stimulation and BIOTRONIK Home Monitoring®

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)
- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Entovis SR-T uncoated	24 g	11 cm^3	371994
Entovis SR-T coated	24 g	11 cm^3	372030

BIOTRONIK
excellence for life

Entovis SR-T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	VOO, AOO, OFF

Closed Loop Stimulation	
CLS mode	VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[1]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[3]	90…(10)…**130**…(10)…200 ppm
IEGM recording[4]	20 recordings, max. 10 seconds each, 2 triggers
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80…(5)…**120**…(5)…160 ppm
■ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[5]	QMR® (open circuit voltage: 3.0 V), Li-MnO_2 (open circuit voltage: 3.1 V)
Nominal operating time	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/24 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

BIOTRONIK Home Monitoring®

Programmer settings	
Home Monitoring	**OFF**; ON
Time of data transmission	AUTO; 00:00…(00:30)…23:30 hh:mm
Periodic IEGM	OFF; 30; 60; 90; 120; 180 days
High rate[6]	OFF; ON

Transmitted data	
Clinical data	threshold, sensing amplitude, pacing statistic, arrhythmia statistic, Heart Failure Monitor® diagnostics
Technical data	battery status, lead integrity measurements, programmed parameters

IEGM-Online® HD	
Periodic IEGM	sequence of 10 sec native settings, 10 sec encouraged sensing and 10 sec encouraged pacing

Event types	
Implant	battery status, programmer-triggered message received
Leads	pacing impedance[7], lead check, sensing amplitude[7], pacing threshold[8], Capture Control status[8]
Arrhythmias	number of high rate arrhythmias[9]
Heart Failure Monitor®	mean heart rate[9]

Message types	
Message types	trend message based on Intelligent Message Bundling, event message triggered daily after clinical or technical events, test message triggered manually via programmer

Ordering information	
■ Entovis SR-T uncoated	371994
■ Entovis SR-T coated	372030

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) Only available for triggered modes.
4) Storage of IEGMs by using intelligent memory management.
5) Nominal data of the manufacturer.
6) According to programmer Holter triggers.
7) Programmable upper and lower limit.
8) Only in VVI mode.
9) Programmable limit.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Entovis SR

MR Conditional single-chamber, rate-response pacemaker with Closed Loop Stimulation

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)

- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®

- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides back-up ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen.

Ordering Information

Model	Weight	Volume	Order number
Entovis SR uncoated	25 g	10 cm^3	371993
Entovis SR coated	25 g	10 cm^3	372029

BIOTRONIK
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Entovis SR

Technical data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	VOO, AOO, OFF

Closed Loop Stimulation	
CLS mode	VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[1]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[3]	90…(10)…**130**…(10)…200 ppm
IEGM recording[4]	20 recordings, max. 10 seconds each, 2 triggers
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80…(5)…**120**…(5)…160 ppm
■ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[5]	LiJ (open circuit voltage: 2.8 V)
Nominal operating time	> 15 years (at: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/25 g
Volume	10 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Entovis SR uncoated	371 993
■ Entovis SR coated	372 029

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) Only available for triggered modes.
4) Storage of IEGMs by using intelligent memory management.
5) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

BIOTRONIK
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Cylos 990 SR

Single-chamber, rate-response pacemaker with Closed Loop Stimulation

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)

- Unique physiological rate response modulation during episodes of physical and emotional stress

ProgramConsult®

- To store and program predefined programming settings

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

Trendview®

- To view trends in pacing and lead characteristics

Wide-band IEGM

Ordering Information

Model	Weight	Volume	Order number
Cylos 990 SR uncoated	27 g	11 cm^3	359 485
Cylos 990 SR coated	27 g	11 cm^3	359 505

BIOTRONIK
excellence for life

Cylos 990 SR

Technical Data

Closed Loop Stimulation	
CLS mode	VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
▪ CLS response	very low; low; **medium**; high; very high
▪ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
▪ Vp required	YES; **NO**

Pacemaker parameters		
NBG code		VVIR/AAIR
Modes		**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate [1]		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Night rate		**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Rate hysteresis		**OFF**; -5…(5)…-80 ppm
▪ Repetitive hysteresis		**OFF**; 1…(1)…10 cycles
▪ Scan hysteresis		**OFF**; 1…(1)…10 cycles
Sensitivity [2]	▪ Atrium	0.4…(0.4)…2.0…(0.4)…6.0 mV
	▪ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude (A/V)		0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
▪ Minimum amplitude		0.1…(0.1)…4.8…(0.2)…6.4 V
▪ Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
▪ Safety margin		0.3…(0.1)…1.2 V
▪ Search time		interval (0.1; 0.3; 1; 3; 6; 12; 24 h) or **time of the day** (1st and 2nd)
Upper rate limit [3]		100; 110; 120; 130; 140; 160; 185 ppm
Refractory period (A/V)		170; 195; 220; 250; **300**; 350; 400 ms
Lead		IS-1 connector
▪ Automatic lead check		**OFF**; ON
▪ Lead configuration		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Sensor		accelerometer
▪ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
▪ Sensor gain		1…**4**…40 in 32 increments (auto gain: OFF; **ON**)
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
Rate fading (rate smoothing)		**OFF**; ON
IEGM recording		20 recordings; max. 10 seconds each; 2 triggers
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 %
Battery [4]		1.3 Ah; Li/I
Nominal operating time [5]		11.5 years (at V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm; 100 % pacing)

Housing	
Dimensions/weight	57 × 39 × 6 mm/27 g
Volume	11 cm^3
Electrically conductive housing surfaces	
▪ Uncoated	37 cm^2
▪ Coated	7 cm^2
X-ray identification	SF

Ordering information	
▪ Cylos 990 SR uncoated	359 485
▪ Cylos 990 SR coated	359 505

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Only available for triggered modes.
4) Nominal data of the battery manufacturer.
5) Calculated with the formula $T = 2740 \times C_{Batt}/(I_{BOS}+I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Estella SR-T

MR Conditional single-chamber, rate-response pacemaker with BIOTRONIK Home Monitoring®

ProMRI®

Product Highlights

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides back-up ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Estella SR-T uncoated	24 g	11 cm^3	377387
Estella SR-T coated	26 g	11 cm^3	377386

BIOTRONIK
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Estella SR-T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads [1]
MRI modes	VOO; AOO; OFF

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Night rate	**OFF**; 30...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Rate hysteresis	**OFF**; -5...(-5)...-90 ppm
■ Repetitive hysteresis	**OFF**; 1...(1)...15 cycles
■ Scan hysteresis	**OFF**; 1...(1)...15 cycles
Sensitivity [2]	**AUTO**; 0.5...(0.5)...7.5 mV
Pulse amplitude [3]	0.2...(0.1)...3.0...(0.1)...6.0...(0.5)...7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3...(0.1)...**0.5**...(0.1)...1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200...(25)...**250**...(25)...500 ms
Upper rate limit [4]	90...(10)...**130**...(10)...200 ppm
IEGM recording [5]	12 recordings, max. 10 seconds each, 1 trigger
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80...(5)...**120**...(5)...180 ppm
■ Sensor gain	1...4...23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1...(1)...**4**...(1)...10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery [6]	QMR® (open circuit voltage: 3.0 V), Li-MnO_2 (open circuit voltage: 3.1 V)
Nominal operating time	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/24 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

BIOTRONIK Home Monitoring®

Programmer settings	
Home Monitoring	**OFF**; ON
Time of data transmission	AUTO; 00:00...(00:30)...23:30 hh:mm
Periodic IEGM	OFF; 30; 60; 90; 120; 180 days
High rate [7]	OFF; ON

Transmitted data	
Clinical data	threshold, sensing amplitude, pacing statistic, arrhythmia statistic, Heart Failure Monitor® diagnostics
Technical data	battery status, lead integrity measurements, programmed parameters

IEGM-Online® HD	
Periodic IEGM	sequence of 10 sec native settings, 10 sec encouraged sensing and 10 sec encouraged pacing

Event types	
Implant	battery status, programmer-triggered message received
Leads	pacing impedance [8], lead check, sensing amplitude [8], pacing threshold [9], Capture Control status [9]
Arrhythmias	number of high rate arrhythmias [10]
Heart Failure Monitor®	mean heart rate [10]

Message types	
Message types	trend message based on Intelligent Message Bundling, event message triggered daily after clinical or technical events, test message triggered manually via programmer

Ordering information	
■ Estella SR-T uncoated	377 387
■ Estella SR-T coated	377 386

1) For combinations of MR Conditional leads, please see the ProMRI manual.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) Only available for triggered modes.
5) Storage of IEGMs by using intelligent memory management.
6) Nominal data of the manufacturer.
7) According to programmer Holter triggers.
8) Programmable upper and lower limit.
9) Only in VVI mode.
10) Programmable limit.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Estella SR

MR Conditional single-chamber, rate-response pacemaker

ProMRI®

Product Highlights

ProMRI®

- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides back-up ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Estella SR uncoated	25 g	10 cm^3	377385
Estella SR coated	25 g	10 cm^3	377384

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Estella SR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads[1]
MRI modes	VOO; AOO; OFF

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[2]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[3]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[4]	90…(10)…**130**…(10)…200 ppm
IEGM recording[5]	12 recordings, max. 10 seconds each, 1 trigger
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80…(5)…**120**…(5)…180 ppm
■ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[6]	LiJ (open circuit voltage: 2.8 V)
Nominal operating time	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/25 g
Volume	10 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Estella SR uncoated	377385
■ Estella SR coated	377384

1) For combinations of MR Conditional leads, please see the ProMRI manual.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) Only available for triggered modes.
5) Storage of IEGMs by using intelligent memory management.
6) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

BIOTRONIK
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Ecuro SR

MR Conditional single-chamber, rate-response pacemaker

ProMRI®

Product Highlights

ProMRI®

- Allows patients to undergo MR scanning under specific conditions.

Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides back-up ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Ecuro SR uncoated	25 g	10 cm^3	377 369
Ecuro SR coated	25 g	10 cm^3	377 368

BIOTRONIK
excellence for life

Ecuro SR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads[1]
MRI modes	VOO; AOO; OFF

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[2]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[3]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[4]	90…(10)…**130**…(10)…200 ppm
IEGM recording[5]	12 recordings, max. 10 seconds each, 1 trigger
■ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
■ Maximum activity rate	80…(5)…**120**…(5)…180 ppm
■ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)	**OFF**; ON
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[6]	LiJ (open circuit voltage: 2.8 V)
Nominal operating time	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/25 g
Volume	10 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Ecuro SR uncoated	377369
■ Ecuro SR coated	377368

1) For combinations of MR Conditional leads, please see the ProMRI manual.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) Only available for triggered modes.
5) Storage of IEGMs by using intelligent memory management.
6) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

BIOTRONIK
excellence for life

Philos II SR

Single-chamber, rate-response pacemaker

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Expanded IEGM memory to allow 15 recordings

Timesaving diagnostic and follow-up options

Ordering Information

Model	Weight	Volume	Order number
Philos II SR uncoated	24 g	11 cm^3	341824
Philos II SR coated	24 g	11 cm^3	341815

BIOTRONIK
excellence for life

Philos II SR

Technical Data

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; AAI(R); VOO(R); AOO(R); VVT(R); AAT(R); OFF
Basic rate[1]	30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
■ Night rate	**OFF**; 30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm
■ Rate hysteresis	**OFF**; -5...(5)...-80 ppm
■ Repetitive hysteresis	**OFF**; 1...(1)...10 cycles
■ Scan hysteresis	**OFF**; 1...(1)...10 cycles
Sensitivity[2] ■ Atrium	0.4...(0.4)...2.0...(0.4)...6.0 mV
■ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)	OFF; ON; **ATM**
■ Minimum amplitude	0.1...(0.1)...4.8...(0.2)...6.4 V
■ Maximum amplitude	2.4; **3.6**; 4.8; 6.4 V
■ Safety margin	0.3...(0.1)...1.2 V
■ Search time	**interval** (0.1; 0.3; 1; 3; 6; **12**; 24 h) or time of day (1st and 2nd)
Upper rate limit[3]	100; 110; 120; 130; 140; 160; 185 ppm
Refractory period	170; 195; 220; 250; **300**; 350; 400 ms
Lead	IS-1 connector
■ Automatic lead check	**OFF**; ON
■ Lead configuration	**unipolar**; bipolar (automatic)
Auto-Initialization	OFF; **ON**; lead detection
Sensor	accelerometer
■ Sensor gain	1...**4**...40; in 32 increments (auto gain: OFF, **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1; **2**; 4; 8 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Max. activity rate	80...(5)...**120**...(5)...180 ppm
Rate fading (rate smoothing)	**OFF**; ON
■ RF rate increase	1; 2; 4; 8 ppm/cycle
■ RF rate decrease	0.1; 0.2; 0.5; 1.0 ppm/cycle
IEGM recording	12 recordings; max. 10 seconds each; 5 triggers
Magnet effect	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[4]	1.3 Ah; Li/I
Nominal operating time[5]	10 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6 mm/25 g
Volume	11 cm^3
X-ray identification	ET

Overview of functions[6]	
Automatic functions	Active Capture Control (ACC)
	Auto-Initialization
	Lead check
	Guided follow-up
	Ventricular threshold test
	Remaining service life calculation
Rate management	Rate fading (rate smoothing)
	IEGM recording
	Night rate
Diagnostic data	Memory for follow-up data in pacemaker
	High-resolution impedance trend (33 h and long-term)
	Ventricular threshold trend
	Ventricular pacing amplitude histogram
	P/R-wave trend (33 h and long-term)

Ordering information	
■ Philos II SR uncoated	341824
■ Philos II SR coated	341815

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Only available for triggered modes.
4) Nominal data of the battery manufacturer.
5) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS}+I_{ERI})$.
6) Availability depends on the programming software used.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

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Philos II S

Single-chamber pacemaker

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Expanded IEGM memory to allow 12 recordings

Timesaving diagnostic and follow-up options

Ordering Information

Model	Weight	Volume	Order number
Philos II S uncoated	24 g	11 cm^3	341823
Philos II S coated	24 g	11 cm^3	341819

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Philos II S

Technical Data

Pacemaker parameters	
NBG code	VVI/AAI
Modes	**VVI**; AAI; VOO; AOO; VVT; AAT; OFF
Basic rate[1]	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
■ Night rate	**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
■ Rate hysteresis	**OFF**; –5…(5)…–80 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…10 cycles
■ Scan hysteresis	**OFF**; 1…(1)…10 cycles
Sensitivity[2] ■ Atrium	0.4…(0.4)…2.0…(0.4)…6.0 mV
■ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)	OFF; ON; **ATM**
■ Minimum amplitude	0.1…(0.1)…4.8…(0.2)…6.4 V
■ Maximum amplitude	2.4; **3.6**; 4.8; 6.4 V
■ Safety margin	0.3…(0.1)…1.2 V
■ Search time	**interval** (0.1; 0.3; 1; 3; 6; **12**; 24 h) or time of day (1st and 2nd)
Upper rate limit[3]	100; 110; 120; 130; 140; 160; 185 ppm
Refractory period	170; 195; 220; 250; **300**; 350; 400 ms
Lead	IS-1 connector
■ Automatic lead check	**OFF**; ON
■ Lead configuration	**unipolar**; bipolar (automatic)
Auto-Initialization	OFF; **ON**; lead detection
Rate fading (rate smoothing)	**OFF**; ON
■ Maximum activity rate	80…(5)…120…(5)…180 ppm
■ RF rate increase	1; 2; 4; 8 ppm/cycle
■ RF rate decrease	0.1; 0.2; 0.5; 1.0 ppm/cycle
IEGM recording	12 recordings; max. 10 seconds each; 2 triggers
Magnet effect	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[4]	1.3 Ah; Li/I
Nominal operating time[5]	10 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6 mm/25 g
Volume	11 cm^3
X-ray identification	ET

Overview of functions[6]	
Automatic functions	Active Capture Control (ACC)
	Auto-Initialization
	Lead check
	Guided follow-up
	Ventricular threshold test
	Remaining service life calculation
Rate management	Rate fading (rate smoothing)
	IEGM recording
	Night rate
Diagnostic data	Memory for follow-up data in pacemaker
	High-resolution impedance trend (33 h and long-term)
	Ventricular threshold trend
	Ventricular pacing amplitude histogram
	P/R-wave trend (33 h and long-term)

Ordering information	
■ Philos II S uncoated	341 823
■ Philos II S coated	341 819

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Only available for triggered modes.
4) Nominal data of the battery manufacturer.
5) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS} + I_{ERI})$.
6) Availability depends on the programming software used.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Effecta SR

Single-chamber, rate-response pacemaker

Product Highlights

Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds thresholds. Provides backup ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Auto-Initialization

- Automatic activation of pacemaker functions after lead connection

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Effecta SR uncoated	25 g	10 cm^3	371 202
Effecta SR coated	25 g	10 cm^3	371 203

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Effecta SR

Technical Data

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
▪ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
▪ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
▪ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
▪ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[1]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.7; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
▪ Minimum amplitude	0.7 V
▪ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
▪ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
▪ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
▪ Automatic lead check	ON
▪ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[3]	90…(10)…**130**…(10)…200 ppm
IEGM recording[4]	4 recordings, max. 10 seconds each, 1 trigger
▪ Recording prior to event	0; 25; 50; **75**; 100 %
Sensor	accelerometer
▪ Maximum activity rate	80…(5)…**120**…(5)…180 ppm
▪ Sensor gain	1…4…23 in 27 increments (auto gain: OFF; **ON**)
▪ Sensor threshold	very low; low; **medium**; high; very high
▪ Rate increase	1…(1)…**4**…(1)…10 ppm/cycle
▪ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
Sensor optimization	original, preview
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[5]	LiJ (open circuit voltage: 2.8 V)
Nominal operating time	> 15 years (at: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/25 g
Volume	10 cm^3
Electrically conductive housing surfaces	
▪ Uncoated	33 cm^2
▪ Coated	7 cm^2
X-ray identification	SF

Ordering information	
▪ Effecta SR uncoated	371 202
▪ Effecta SR coated	371 203

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) Only available for triggered modes.
4) Storage of IEGMs by using intelligent memory management.
5) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

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Effecta S

Single-chamber pacemaker

Product Highlights

Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Auto-Initialization

- Automatic activation of pacemaker functions after lead connection

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Effecta S uncoated	25 g	10 cm^3	375431
Effecta S coated	25 g	10 cm^3	375430

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Effecta S

Technical Data

Pacemaker parameters	
NBG code	VVI/AAI
Modes	**VVI**; VVT; VOO; AAI; AAT; AOO; OFF
Basic rate	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate	**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis	**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…15 cycles
■ Scan hysteresis	**OFF**; 1…(1)…15 cycles
Sensitivity[1]	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2]	0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width	0.1; 0.2; 0.3; **0.4**; 0.5; 0.7; 1.0; 1.25; 1.5 ms
Ventricular Capture Control	OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude	0.7 V
■ Start amplitude	2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin	0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time	interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization	ON
Leads	IS-1-connector
■ Automatic lead check	ON
■ Lead configuration	**unipolar**; bipolar (both automatically configured)
Refractory period	200…(25)…**250**…(25)…500 ms
Upper rate limit[3]	90…(10)…**130**…(10)…200 ppm
IEGM recording[4]	4 recordings, max. 10 seconds each, 1 trigger
■ Recording prior to event	0; 25; 50; **75**; 100 %
Magnet response	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[5]	LiJ (open circuit voltage: 2.8 V)
Nominal operating time	> 15 years (at: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6.5 mm/25 g
Volume	10 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Effecta S uncoated	375 431
■ Effecta S coated	375 430

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) Only available for triggered modes.
4) Storage of IEGMs by using intelligent memory management.
5) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

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Talos SR

Single-chamber, rate-response pacemaker

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Wide-band IEGM recording

User-friendly programming

- New one-touch features allow fast and efficient patient follow-ups while reducing the potential for programming errors.

Ordering Information

Model	Weight	Volume	Order number
Talos SR uncoated	25 g	11 cm^3	356 254
Talos SR coated	25 g	11 cm^3	356 255

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Talos SR

Technical Data

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	**VVIR**; VVI; AAI(R); VOO(R); AOO(R); VVT(R); AAT(R); OFF
Basic rate [1]	30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
■ Night rate	**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
■ Rate hysteresis	**OFF**; –5…(5)…–80 ppm
■ Repetitive hysteresis	**OFF**; 1…(1)…10 cycles
■ Scan hysteresis	**OFF**; 1…(1)…10 cycles
Sensitivity [2] ■ Atrium	0.4…(0.4)…2.0…(0.4)…6.0 mV
■ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude (A/V)	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width (A/V)	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)	**OFF**; ON
■ Minimum amplitude	0.7 V
■ Maximum amplitude	3.6 V
■ Safety margin	0.5 V
■ Search time	7:00 AM and 7:00 PM
Lead	IS-1 connector
■ Automatic lead check	**OFF**; ON
■ Lead configuration	**unipolar**; bipolar (automatic)
Auto-Initialization	OFF; **ON**; lead detection
Refractory period (A/V)	170; 195; 220; 250; **300**; 350; 400 ms
Upper rate limit [3]	100; 110; 120; 130; 140; 160; 185 ppm
IEGM recording	4 recordings; max. 10 seconds each
Sensor	accelerometer
■ Sensor gain	1…**4**…40 in 32 increments (auto gain: OFF; **ON**)
■ Sensor threshold	very low; low; **medium**; high; very high
■ Rate increase	1; **2**; 4; 8 ppm/cycle
■ Rate decrease	0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Maximum activity rate	80…(5)…**120**…(5)…180 ppm
Magnet effect	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery [4]	1.3 Ah; Li/I
Nominal operating time [5]	11.5 years (at 1.0 V; 0.4 ms; 50 ppm; 100 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6 mm/25 g
Volume	11 cm^3
X-ray identification	PV

Ordering information	
■ Talos SR uncoated	356 254
■ Talos SR coated	356 255

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Only available for triggered modes.
4) Nominal data of the battery manufacturer.
5) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS} + I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Talos S

Single-chamber pacemaker

Product Highlights

Wide-band IEGM recording

User-friendly programming

- New one-touch features allow fast and efficient patient follow-ups while reducing the potential for programming errors.

Ordering Information

Model	Weight	Volume	Order number
Talos S uncoated	24 g	11 cm^3	356 250
Talos S coated	24 g	11 cm^3	356 251

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Talos S

Technical Data

Pacemaker parameters	
NBG code	VVI/AAI
Modes	**VVI**; AAI; VOO; AOO; VVT; AAT; OFF
Basic rate[1]	30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
■ Night rate	**OFF**; 30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm
■ Rate hysteresis	**OFF**; –5...(5)...–80 ppm
■ Repetitive hysteresis	**OFF**; 1...(1)...10 cycles
■ Scan hysteresis	**OFF**; 1...(1)...10 cycles
Sensitivity[2] ■ Atrium	0.4...(0.4)...2.0...(0.4)...6.0 mV
■ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude (A/V)	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width (A/V)	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Leads	IS-1 connector
■ Automatic lead check	**OFF**; ON
■ Lead configuration	**unipolar**; bipolar (automatic)
Auto-Initialization	OFF; **ON**; lead detection
Refractory period	170; 195; 220; 250; **300**; 350; 400 ms
Upper rate limit[3]	100; 110; 120; 130; 140; 160; 185 ppm
IEGM recording	4 recordings; max. 10 seconds each
Magnet effect	**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication	programmed rate minus 11 %
Battery[4]	1.3 Ah; Li/I
Nominal operating time[5]	11.5 years (at 1.0 V; 0.4 ms; 50 ppm; 100 % pacing)

Housing	
Dimensions/weight	53 × 39 × 6 mm/25 g
Volume	11 cm^3
X-ray identification	PV

Ordering information	
■ Talos S uncoated	356250
■ Talos S coated	356251

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Only available for triggered modes.
4) Nominal data of the battery manufacturer.
5) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS} + I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Evia DR-T

MR Conditional dual-chamber, rate-response pacemaker with Closed Loop Stimulation and BIOTRONIK Home Monitoring®

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)
- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®
- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

EasyAV®
- Facilitates programming of optimal AV timing

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Evia DR-T uncoated	25 g	12 cm^3	371996
Evia DR-T coated	25 g	12 cm^3	372032

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Evia DR-T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	DOO; VOO; AOO; OFF

Closed Loop Stimulation	
CLS modes	DDD-CLS; VVI-CLS
Maximum CLS rate	80...(5)...**120**...(5)...160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Night rate		**OFF**; 30...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Rate hysteresis		**OFF**; -5...(-5)...-90 ppm
■ Repetitive hysteresis		**OFF**; 1...(1)...15 cycles
■ Scan hysteresis		**OFF**; 1...(1)...15 cycles
Sensitivity[1]	■ Atrium	**AUTO**; 0.1...(0.1)...1.5...(0.5)...7.5 mV
	■ Ventricle	**AUTO**; 0.5...(0.5)...7.5 mV
Pulse amplitude[2] (A/V)		0.2...(0.1)...3.0...(0.1)...6.0...(0.5)...7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5...(0.1)...**1.0**...(0.1)...4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5...(0.1)...**1.0**...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3...(0.1)...**0.5**...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium[3]	AUTO
	■ Ventricle	200...(25)...**250**...(25)...500 ms
PVARP		**AUTO**; 175...(5)...250...(5)...600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**...(5)...70 ms
Far-field protection[4]	■ after Vs	**100**...(10)...220 ms
	■ after Vp	100...(10)...**150**...(10)...220 ms
AV delay		15...(5)...**180**...(5)...350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10...(-5)...**-45**...(-5)...-120 ms
AV hysteresis		**OFF**; IRS[plus]; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1...(1)...5...(1)...10 cycles
■ AV scan hysteresis		**OFF**; 1...(1)...5...(1)...10 cycles
V_P Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1...(1)...6...(1)...8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100...(10)...**160**...(10)...250 bpm
■ X-out-of-8 criterion (Onset criterion)		3...(1)...**5**...(1)...8
■ Z-out-of-8 criterion (Resolution criterion)		3...(1)...**5**...(1)...8
■ Change of basic rate		OFF; +5; **+10**...(5)...+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection[5]		OFF; **ON**
Atrial overdrive[5]		**OFF**; ON
NIPS[5]		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90...(10)...**130**...(10)...200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording[6]		20 recordings, max. 10 seconds each, 4 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250...(10)...**350**...(10)...500 ms]
Sensor		accelerometer
■ Maximum activity rate		80...(5)...**120**...(5)...160 ppm
■ Sensor gain		1...4...23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1...(1)...**4**...(1)...10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R) [7])

Battery [8]	QMR® (open circuit voltage: 3.0 V), Li-MnO_2 (open circuit voltage: 3.1 V)
Nominal operating time	11.8 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)

Housing	
Dimensions/weight	53 × 44.5 × 6.5 mm/25 g
Volume	12 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

BIOTRONIK Home Monitoring®

Programmer settings	
Home Monitoring	**OFF**; ON
Time of data transmission	AUTO; 00:00...(00:30)...23:30 hh:mm
Periodic IEGM	OFF; 30; 60; 90; 120; 180 days
High atrial rate[9]	OFF; mode switching; AT
Ongoing atrial episode	6h; 12h; 18h
High ventricular rate[9]	OFF; ON

Transmitted data	
Clinical data	atrial/ventricular thresholds, atrial/ventricular sensing amplitudes, pacing statistics, atrial/ventricular arrhythmia statistics, Heart Failure Monitor® diagnostics
Technical data	battery status, lead integrity measurements, programmed parameters

IEGM-Online® HD	
Periodic IEGM	sequence of 10 sec native settings, 10 sec encouraged sensing and 10 sec encouraged pacing

Event types	
Implant	battery status, programmer-triggered message received
Leads	pacing impedance (A,V)[10], lead check (A,V), sensing amplitude (A,V)[10], pacing threshold (A,V), Capture Control status (A,V)
Bradycardia	ventricular pacing percentage
Arrhythmias	number/duration of atrial arrhythmia[11], number/duration of mode switching[11], long ongoing atrial arrhythmia detected, number/duration of ventricular arrhythmia[11]
Heart Failure Monitor®	mean heart rate[11], atrial burden[11], mean VES/h[11]

Message types	
Message types	trend message based on Intelligent Message Bundling, event message triggered daily after clinical or technical events, test message triggered manually via programmer

Ordering information	
■ Evia DR-T uncoated	371996
■ Evia DR-T coated	372032

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) 300...(25)...775 ms for AAI(R), AAT(R), DDT modes.
4) Post-ventricular atrial blanking.
5) Dependent on software version.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.
9) According to programmer Holter triggers.
10) Programmable upper and lower limit.
11) Programmable limit.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Evia DR

MR Conditional dual-chamber, rate-response pacemaker with Closed Loop Stimulation

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)
- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®
- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

EasyAV®
- Facilitates programming of optimal AV timing.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Evia DR uncoated	26 g	11 cm^3	371995
Evia DR coated	26 g	11 cm^3	372031

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Evia DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	DOO; VOO; AOO; OFF

Closed Loop Stimulation	
CLS modes	DDD-CLS; VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate		**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis		**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis		**OFF**; 1…(1)…15 cycles
■ Scan hysteresis		**OFF**; 1…(1)…15 cycles
Sensitivity [1]	■ Atrium	**AUTO**; 0.1…(0.1)…1.5…(0.5)…7.5 mV
	■ Ventricle	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude (A/V) [2]		0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5…(0.1)…**1.0**…(0.1)…4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5…(0.1)…**1.0**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium [3]	AUTO
	■ Ventricle	200…(25)…**250**…(25)…500 ms
PVARP		**AUTO**; 175…(5)…250…(5)…600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**…(5)…70 ms
Far-field protection [4]	■ After Vs	**100**…(10)…220 ms
	■ After Vp	100…(10)…**150**…(10)…220 ms
AV delay		15…(5)…**180**…(5)…350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10…(-5)…**-45**…(-5)…-120 ms
AV hysteresis		**OFF**; IRS[plus]; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
■ AV scan hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
Vp Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1…(1)…6…(1)…8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100…(10)…**160**…(10)…250 bpm
■ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
■ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
■ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection [5]		OFF; **ON**
Atrial overdrive [5]		**OFF**; ON
NIPS [5]		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90…(10)…**130**…(10)…200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording [6]		20 recordings, max. 10 seconds each, 4 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
■ Maximum activity rate		80…(5)…**120**…(5)…160 ppm
■ Sensor gain		1…4…23 in 27 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R) [7])
Battery [8]		LiJ (open circuit voltage: 2.8 V)
Nominal operating time		12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 43 × 6.5 mm/26 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Evia DR uncoated	371995
■ Evia DR coated	372031

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) 300…(25)…775 ms for AAI(R), AAT(R), DDT modes.
4) Post-ventricular atrial blanking.
5) Dependent on software version.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Entovis DR-T

MR Conditional dual-chamber, rate-response pacemaker with Closed Loop Stimulation and BIOTRONIK Home Monitoring®

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)
- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®
- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Entovis DR-T uncoated	25 g	12 cm^3	371992
Entovis DR-T coated	25 g	12 cm^3	372028

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Entovis DR-T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	DOO; VOO; AOO; OFF

Closed Loop Stimulation	
CLS modes	DDD-CLS; VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate		**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis		**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis		**OFF**; 1…(1)…15 cycles
■ Scan hysteresis		**OFF**; 1…(1)…15 cycles
Sensitivity[1]	■ Atrium	**AUTO**; 0.1…(0.1)…1.5…(0.5)…7.5 mV
	■ Ventricle	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[2] (A/V)		0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5…(0.1)…**1.0**…(0.1)…4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5…(0.1)…**1.0**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium[3]	AUTO
	■ Ventricle	200…(25)…**250**…(25)…500 ms
PVARP		**AUTO**; 175…(5)…250…(5)…600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**…(5)…70 ms
Far-field protection[4]	■ After Vs	**100**…(10)…220 ms
	■ After Vp	100…(10)…**150**…(10)…220 ms
AV delay		15…(5)…**180**…(5)…350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10…(-5)…**-45**…(-5)…-120 ms
AV hysteresis		**OFF**; IRSplus; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
■ AV scan hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
Vp Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1…(1)…6…(1)…8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100…(10)…**160**…(10)…250 bpm
■ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
■ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
■ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection[5]		OFF; **ON**
Atrial overdrive[5]		**OFF**; ON
NIPS[5]		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90…(10)…**130**…(10)…200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording[6]		20 recordings, max. 10 seconds each, 4 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
■ Maximum activity rate		80…(5)…**120**…(5)…160 ppm
■ Sensor gain		1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R)[7])
Battery[8]		QMR® (open circuit voltage: 3.0 V), Li-MnO_2 (open circuit voltage: 3.1 V)
Nominal operating time		11.8 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)

Housing	
Dimensions/weight	53 × 44.5 × 6.5 mm/25 g
Volume	12 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

BIOTRONIK Home Monitoring®

Programmer settings	
Home Monitoring	**OFF**; ON
Time of data transmission	AUTO; 00:00…(00:30)…23:30 hh:mm
Periodic IEGM	OFF; 30; 60; 90; 120; 180 days
High atrial rate[9]	OFF; mode switching; AT
Ongoing atrial episode	6 h; 12 h; 18 h
High ventricular rate[9]	OFF; ON

Transmitted data	
Clinical data	atrial/ventricular thresholds, atrial/ventricular sensing amplitudes, pacing statistics, atrial/ventricular arrhythmia statistics, Heart Failure Monitor® diagnostics
Technical data	battery status, lead integrity measurements, programmed parameters

IEGM-Online® HD	
Periodic IEGM	sequence of 10 sec native settings, 10 sec encouraged sensing and 10 sec encouraged pacing

Event types	
Implant	battery status, programmer-triggered message received
Leads	pacing impedance (A,V)[10], lead check (A,V), sensing amplitude (A,V)[10], pacing threshold (A,V), Capture Control status (A,V)
Bradycardia	ventricular pacing percentage
Arrhythmias	number/duration of atrial arrhythmia[11], number/duration of mode switching[11], long ongoing atrial arrhythmia detected, number/duration of ventricular arrhythmia[11]
Heart Failure Monitor®	mean heart rate[11], atrial burden[11], mean VES/h[11]

Message types	
Message types	trend message based on Intelligent Message Bundling, event message triggered daily after clinical or technical events, test message triggered manually via programmer

Ordering information	
■ Entovis DR-T uncoated	371 992
■ Entovis DR-T coated	372 028

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) 300…(25)…775 ms for AAI(R), AAT(R), DDT modes.
4) Post-ventricular atrial blanking.
5) Dependent on software version.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.
9) According to programmer Holter triggers.
10) Programmable upper and lower limit.
11) Programmable limit.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Entovis DR

MR Conditional dual-chamber, rate-response pacemaker with Closed Loop Stimulation

ProMRI®

Product Highlights

Closed Loop Stimulation (CLS)

- Unique physiological rate response modulation during episodes of physical and emotional stress

ProMRI®

- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®

- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Entovis DR uncoated	26 g	11 cm^3	371991
Entovis DR coated	26 g	11 cm^3	372027

BIOTRONIK
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Entovis DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	DOO; VOO; AOO; OFF

Closed Loop Stimulation	
CLS modes	DDD-CLS; VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	yes; **no**

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate		**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis		**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis		**OFF**; 1…(1)…15 cycles
■ Scan hysteresis		**OFF**; 1…(1)…15 cycles
Sensitivity [1]	■ Atrium	**AUTO**; 0.1…(0.1)…1.5…(0.5)…7.5 mV
	■ Ventricle	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude (A/V) [2]		0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5…(0.1)…**1.0**…(0.1)…4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5…(0.1)…**1.0**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium [3]	AUTO
	■ Ventricle	200…(25)…**250**…(25)…500 ms
PVARP		**AUTO**; 175…(5)…250…(5)…600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**…(5)…70 ms
Far-field protection [4]	■ After Vs	**100**…(10)…220 ms
	■ After Vp	100…(10)…**150**…(10)…220 ms
AV delay		15…(5)…**180**…(5)…350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10…(-5)…**-45**…(-5)…-120 ms
AV hysteresis		**OFF**; IRSplus; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
■ AV scan hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
V_P Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1…(1)…6…(1)…8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100…(10)…**160**…(10)…250 bpm
■ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
■ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
■ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection [5]		OFF; **ON**
Atrial overdrive [5]		**OFF**; ON
NIPS [5]		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90…(10)…**130**…(10)…200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording [6]		20 recordings, max. 10 seconds each, 4 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
■ Maximum activity rate		80…(5)…**120**…(5)…160 ppm
■ Sensor gain		1…4…23 in 27 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R)[7])
Battery [8]		LiJ (open circuit voltage: 2.8 V)
Nominal operating time		12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 43 × 6.5 mm/26 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Entovis DR uncoated	371991
■ Entovis DR coated	372027

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) 300…(25)…775 ms for AAI(R), AAT(R), DDT modes.
4) Post-ventricular atrial blanking.
5) Dependent on software version.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Cylos 990 DR-T

Dual-chamber, rate-response pacemaker with Closed Loop Stimulation and BIOTRONIK Home Monitoring®

Product Highlights

Closed Loop Stimulation (CLS)
- Unique physiological rate response modulation during episodes of physical and emotional tress.

Intrinsic Rhythm Support (IRS^{plus}) to minimize unnecessary ventricular pacing

AV AdVisor® facilitates determining optimal AV timing

ProgramConsult® to store and program predefined programming settings

Active Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Cylos 990 DR-T uncoated	31 g	14 cm^3	359 484
Cylos 990 DR-T coated	31 g	14 cm^3	359 504

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Cylos 990 DR-T

Technical Data

Closed Loop Stimulation	
CLS modes	DDD-CLS; VVI-CLS
Maximum CLS rate	80…(5)…**120**…(5)…160 ppm
Expert options	
▪ CLS response	very low; low; **medium**; high; very high
▪ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
▪ Vp required	YES; **NO**

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R); AAI(R); D0O(R); VOO(R); AOO(R); DDT(R); DDIT(R); DVT(R); DDD(R)+; AAI(R)+; AAT(R)+; VDT(R); VVT(R); AAT(R); OFF
Basic rate[1]		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Night rate		**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Rate hysteresis		**OFF**; – 5…(5)… – 80 ppm
▪ Repetitive hysteresis		**OFF**; 1…(1)…10 cycles
▪ Scan hysteresis		**OFF**; 1…(1)…10 cycles
Sensitivity[2]	▪ Atrium	0.1…(0.1)…**1.0**…(0.1)…1.5…(0.5)…7.5 mV
	▪ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude	▪ Atrium	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.6)…8.4 V
	▪ Ventricle	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
▪ Minimum amplitude		0.1…(0.1)…4.8…(0.2)…6.4 V
▪ Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
▪ Safety margin		0.3…(0.1)…1.2 V
▪ Search time		interval (0.1; 0.3; 1; 3; 6; 12; 24 h) or **time of the day** (1st and 2nd)
Leads		IS-1 connector
▪ Automatic lead check (A/V)		**OFF**; ON
▪ Lead configuration (A/V)		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[3]	200…(25)…**425**…(25)…775 ms
	▪ Ventricle	170; 195; 220; **250**…(50)…400 ms
ARP extension		**0**…(50)…350 ms
Blanking	▪ Atrium (after Vp)	32; 40; 48; **56**; 72 ms
	▪ Ventricle (after Ap)	16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking[4] (after Vs,Vp)		32; 40; 48; 56; 72; 100; 125; **150**; 175; 200 ms
AV delay		15; 50; 75; 100; 120…(10)…200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
Sense compensation		OFF; – 15…(15)… **– 45**…(15)… – 120 ms
AV safety interval		100 ms
AV hysteresis		**OFF**; IRS[Plus]; low; medium; high; negative
▪ AV repetitive hysteresis		**OFF**; 1…(1)…6 cycles
▪ AV scan hysteresis		**OFF**; 1…(1)…6 cycles
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
▪ Intervention rate		110…(10)…**160**…(10)…250 bpm
▪ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
▪ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
▪ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
▪ 2:1 lock-in protection		OFF; **ON**
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2:1; **WKB**
IEGM recording		20 recordings; max. 10 seconds each; 5 triggers
Minimum PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250…(10)…**380**…(10)…500 ms]
VES lock-in protection		**OFF**; ON [termination after 4; 6; 12 cycles]
Sensor		accelerometer
▪ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
▪ Sensor gain		1…**4**…40 in 32 increments [auto gain: OFF; **ON**]
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
Rate fading (rate smoothing)		**OFF**; ON
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % [in DDD(R)[5]]
Battery[6]		1.3 Ah; Li/I
Nominal operating time[7]		10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm; 100 % pacing)

Housing	
Dimensions/weight	57 × 46 × 6 mm/31 g
Volume	14 cm^3
Electrically conductive housing surfaces	
▪ Uncoated	37 cm^2
▪ Coated	7 cm^2
X-ray identification	FV

BIOTRONIK Home Monitoring®

Home Monitoring	
Pacing modes with Home Monitoring	DDD-CLS, VVI-CLS and for all single- and dual-chamber modes with ventricular sensing

Programmer parameters	
Home Monitoring	OFF; **ON**
ERI response	deactivation occurs 14 days after ERI
Monitoring interval	1 day
Transmission types	trend message; event message; patient message
Time-of-message transmission	**0:00**…(10)…23:50

Transmitted Home Monitoring parameters including value ranges	
Atrial rhythm	
▪ Number of mode switching episodes/24 h	0; 1; 2…(1)…60; >60
▪ Duration of mode switching episodes/24 h	0; 3…(3)…100 %
▪ Max. ventricular rate at mode switching episodes[8]	<120; ≥120; ≥140; ≥160; ≥180; ≥200; ≥220 ppm
▪ AT counter/24 h	0; ≥1; >10; >20
▪ Afl counter/24 h	0; ≥1; >10; >20
▪ AF counter/24 h	0; ≥1; >10; >20
Ventricular rhythm	
▪ % Vs	0; 3…(3)…100 %
▪ Number of ventric. episodes (>8 consecutive VES)	0; 1; 2; >2
▪ Number of ventric. runs (4…8 consecutive VES)	0; 1; 2…(1)…5; >5; >10
▪ Maximum VES/h	0; ≥1; >10; >30
Heart rate	
▪ Mean ventricular heart rate	<52…(2)…174; >174 ppm
▪ Maximum ventricular heart rate[9]	OFF; 84–248; >252 ppm
▪ Duration of maximum ventricular heart rate[9]	<0.5; ≥0.5; ≥1.0; ≥2.0; ≥5 min
Sensing/pacing	
▪ Last mean P-/R-wave amplitude/ programmed sensitivity	<50 %; <100 %; ≥100 % safety margin
▪ Current ventricular threshold	<0.3; 0.3; 0.5…(0.2)…4.7; >4.8 V
System status	
▪ Atrial/ventricular lead check	OFF; OK; bipolar lead failure; unipolar lead failure
▪ ACC status	OFF; OK; disabled
▪ Battery status	OK; ERI

Online configuration of event types	
System integrity	
▪ Battery status	**ON** (fixed)
▪ Atrial/ventricular lead check	OFF; **ON**
▪ Active Capture Control deactivated	**OFF**; ON
▪ Increase of ventricular threshold >1.0 V	**OFF**; ON
▪ Decrease of ventricular threshold >1.0 V	**OFF**; ON
▪ Ventricular threshold >4.8 V	OFF; **ON**
▪ Mean P-/R-wave amplitude <50 % safety margin	OFF; **ON**
Diagnosis and therapy	
▪ Duration of mode switching episodes/24 h	**OFF**; 10 % (2.5 h); 25 % (6 h); 50 % (12 h); 75 % (18 h)
▪ First mode switching episodes of the day or since last follow-up	**OFF**; ON
▪ Ventricular episode	**OFF**; ON
▪ Ventricular run	**OFF**; ON
▪ Patient message[10]	ON

Ordering information	
▪ Cylos 990 DR-T uncoated	359 484
▪ Cylos 990 DR-T coated	359 504

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Total Atrial Refractory Period (TARP).
4) Post-ventricular atrial blanking.
5) See manual for other modes.
6) Nominal data of the battery manufacturer.
7) Calculated with the formula $T = 2740 \times C_{Batt}/(I_{BOS}+I_{ERI})$.
8) Measured on IEGM for mode switching.
9) Measured on IEGM for high ventricular rate.
10) Only if activated via programmer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Cylos 990 DR

Dual-chamber, rate-response pacemaker with Closed Loop Stimulation

Product Highlights

Closed Loop Stimulation (CLS)

- Unique physiological rate response modulation during episodes of physical and emotional stress

Intrinsic Rhythm Support (IRS^{plus}) to minimize unnecessary ventricular pacing

AV AdVisor® facilitates determining optimal AV timing

ProgramConsult® to store and program predefined programming settings

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

Ordering Information

Model	Weight	Volume	Order number
Cylos 990 DR uncoated	28 g	12 cm^3	359 483
Cylos 990 DR coated	28 g	12 cm^3	359 503

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Cylos 990 DR

Technical Data

Closed Loop Stimulation	
CLS modes	DDD-CLS; VVI-CLS
Maximum CLS rate	80...(5)...**120**...(5)...160 ppm
Expert options	
■ CLS response	very low; low; **medium**; high; very high
■ Resting rate control	OFF; +10; **+20**; +30; +40; +50 ppm
■ Vp required	YES; **NO**

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R); AAI(R); D00(R); VOO(R); AOO(R); DDT(R); DDIT(R); DVT(R); DDD(R)+; AAI(R)+; AAT(R)+; VDT(R); VVT(R); AAT(R); OFF
Basic rate [1]		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
■ Night rate		**OFF**; 30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm
■ Rate hysteresis		**OFF**; – 5...(5)... – 80 ppm
■ Repetitive hysteresis		**OFF**; 1...(1)...10 cycles
■ Scan hysteresis		**OFF**; 1...(1)...10 cycles
Sensitivity [2]	■ Atrium	0.1...(0.1)...**1.0**...(0.1)...1.5...(0.5)...7.5 mV
	■ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude	■ Atrium	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.6)...8.4 V
	■ Ventricle	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
■ Minimum amplitude		0.1...(0.1)...4.8...(0.2)...6.4 V
■ Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
■ Safety margin		0.3...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3; 1; 3; 6; 12; 24 h) or **time of the day** (1st and 2nd)
Leads		IS-1 connector
■ Automatic lead check (A/V)		**OFF**; ON
■ Lead configuration (A/V)		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	■ Atrium [3]	200...(25)...**425**...(25)...775 ms
	■ Ventricle	170; 195; 220; **250**...(50)...400 ms
ARP extension		**0**...(50)...350 ms
Blanking	■ Atrium (after Vp)	32; 40; 48; **56**; 72 ms
	■ Ventricle (after Ap)	16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking [4] (after Vs,Vp)		32; 40; 48; 56; 72; 100; 125; **150**; 175; 200 ms
AV delay		15; 50; 75; 100; 120...(10)...200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
Sense compensation		OFF; – 15...(15)... **– 45**...(15)... – 120 ms
AV safety interval		100 ms
AV hysteresis		**OFF**; IRS^{plus}; low; medium; high; negative
■ AV repetitive hysteresis		**OFF**; 1...(1)...6 cycles
■ AV scan hysteresis		**OFF**; 1...(1)...6 cycles
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		110...(10)...**160**...(10)...250 bpm
■ X-out-of-8-criterion (Onset criterion)		3...(1)...**5**...(1)...8
■ Z-out-of-8-criterion (Resolution criterion)		3...(1)...**5**...(1)...8
■ Change of basic rate		OFF; +5; **+10**...(5)...+30 ppm
■ 2:1 lock-in protection		OFF; **ON**
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2:1; **WKB**
IEGM recording		20 recordings; max. 10 seconds each; 5 triggers
Minimum PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250...(10)...**380**...(10)...500 ms]
VES lock-in protection		**OFF**; ON [termination after 4; 6; 12 cycles]
Sensor		accelerometer
■ Maximum activity rate		80...(5)...**120**...(5)...180 ppm
■ Sensor gain		1...**4**...40 in 32 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1; **2**; 4; 8 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
Rate fading (rate smoothing)		**OFF**; ON
Magnet effect		**auto** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % [in DDD(R) [5]]
Battery [6]		1.3 Ah; Li/I
Nominal operating time [7]		10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm; 100 % pacing)

Housing	
Dimensions/weight	57 × 46 × 6 mm/28 g
Volume	12 cm³
Electrically conductive housing surfaces	
■ Uncoated	37 cm²
■ Coated	7 cm²
X-ray identification	FV

Ordering information	
■ Cylos 990 DR uncoated	359 483
■ Cylos 990 DR coated	359 503

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin²; ventricle 40 ms sin².
3) Total Atrial Refractory Period (TARP).
4) Post-ventricular atrial blanking.
5) See manual for other modes.
6) Nominal data of the battery manufacturer.
7) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS+IERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Estella DR-T

MR Conditional dual-chamber, rate-response pacemaker with Vp Suppression® and BIOTRONIK Home Monitoring®

ProMRI®

Product Highlights

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®
- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

BIOTRONIK Home Monitoring®
- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Estella DR-T uncoated	25 g	12 cm^3	377383
Estella DR-T coated	25 g	12 cm^3	377382

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Estella DR-T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads[1]
MRI modes	DOO, VOO, AOO, OFF

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate		**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis		**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis		**OFF**; 1…(1)…15 cycles
■ Scan hysteresis		**OFF**; 1…(1)…15 cycles
Sensitivity[2]	■ Atrium	**AUTO**; 0.1…(0.1)…1.5…(0.5)…7.5 mV
	■ Ventricle	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude[3] (A/V)		0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5…(0.1)…**1.0**…(0.1)…4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5…(0.1)…**1.0**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium[4]	AUTO
	■ Ventricle	200…(25)…**250**…(25)…500 ms
PVARP		**AUTO**; 175…(5)…250…(5)…600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**…(5)…70 ms
Far-field protection[5]	■ After Vs	**100**…(10)…220 ms
	■ After Vp	100…(10)…**150**…(10)…220 ms
AV delay		15…(5)…**180**…(5)…350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10…(-5)…**-45**…(-5)…-120 ms
AV hysteresis		**OFF**; IRS[plus]; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
■ AV scan hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
Vp Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1…(1)…6…(1)…8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100…(10)…**160**…(10)…250 bpm
■ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
■ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
■ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection		OFF; **ON**
Atrial overdrive		**OFF**; ON
NIPS		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90…(10)…**130**…(10)…200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording[6]		12 recordings, max. 10 seconds each, 3 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
■ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
■ Sensor gain		1…4…23 in 27 increments (auto gain: OFF; **ON**)
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R)[7])
Battery[8]		QMR® (open circuit voltage: 3.0 V), Li-MnO_2 (open circuit voltage: 3.1 V)
Nominal operating time		11.8 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)

Housing	
Dimensions/weight	53 × 44.5 × 6.5 mm/25 g
Volume	12 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

BIOTRONIK Home Monitoring®

Programmer settings	
Home Monitoring	**OFF**; ON
Time of data transmission	AUTO; 00:00…(00:30)…23:30 hh:mm
Periodic IEGM	OFF; 30; 60; 90; 120; 180 days
High atrial rate[9]	OFF; mode switching; AT
Ongoing atrial episode	6 h; 12 h; 18 h
High ventricular rate[9]	OFF; ON

Transmitted data	
Clinical data	atrial/ventricular thresholds, atrial/ventricular sensing amplitudes, pacing statistics, atrial/ventricular arrhythmia statistics, Heart Failure Monitor® diagnostics
Technical data	battery status, lead integrity measurements, programmed parameters

IEGM-Online® HD	
Periodic IEGM	sequence of 10 sec native settings, 10 sec encouraged sensing and 10 sec encouraged pacing

Event types	
Implant	battery status, programmer-triggered message received
Leads	pacing impedance (A,V)[10], lead check (A,V), sensing amplitude (A,V)[10], pacing threshold (A,V), Capture Control status (A,V)
Bradycardia	ventricular pacing percentage
Arrhythmias	number/duration of atrial arrhythmia[11], number/duration of mode switching[11], long ongoing atrial arrhythmia detected, number/duration of ventricular arrhythmia[11]
Heart Failure Monitor®	mean heart rate[11], atrial burden[11], mean VES/h[11]

Message types	
Message types	trend message based on Intelligent Message Bundling, event message triggered daily after clinical or technical events, test message triggered manually via programmer

Ordering information	
■ Estella DR-T uncoated	377383
■ Estella DR-T coated	377382

1) For combinations of MR Conditional leads, please see the ProMRI manual.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) 300…(25)…775 ms for AAI(R), AAT(R), DDT modes.
5) Post-ventricular atrial blanking.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.
9) According to programmer Holter triggers.
10) Programmable upper and lower limit.
11) Programmable limit.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Estella DR

MR Conditional dual-chamber, rate-response pacemaker with Vp Suppression®

ProMRI®

Product Highlights

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®
- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen.

Ordering Information

Model	Weight	Volume	Order number
Estella DR uncoated	26 g	11 cm^3	377381
Estella DR coated	26 g	11 cm^3	377380

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Estella DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads[1]
MRI modes	DOO; VOO; AOO; OFF

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate		**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis		**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis		**OFF**; 1…(1)…15 cycles
■ Scan hysteresis		**OFF**; 1…(1)…15 cycles
Sensitivity[2]	■ Atrium	**AUTO**; 0.1…(0.1)…1.5…(0.5)…7.5 mV
	■ Ventricle	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude (A/V)[3]		0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5…(0.1)…**1.0**…(0.1)…4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5…(0.1)…**1.0**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium[4]	AUTO
	■ Ventricle	200…(25)…**250**…(25)…500 ms
PVARP		**AUTO**; 175…(5)…250…(5)…600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**…(5)…70 ms
Far-field protection[5]	■ After Vs	**100**…(10)…220 ms
	■ After Vp	100…(10)…**150**…(10)…220 ms
AV delay		15…(5)…**180**…(5)…350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10…(-5)…**-45**…(-5)…-120 ms
AV hysteresis		**OFF**; IRS^{plus}; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
■ AV scan hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
V_P Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1…(1)…6…(1)…8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100…(10)…**160**…(10)…250 bpm
■ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
■ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
■ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection		OFF; **ON**
Atrial overdrive		**OFF**; ON
NIPS		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90…(10)…**130**…(10)…200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording[6]		12 recordings, max. 10 seconds each, 3 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
■ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
■ Sensor gain		1…4…23 in 27 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R)[7])
Battery[8]		LiJ (open circuit voltage: 2.8 V)
Nominal operating time		12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 43 × 6.5 mm/26 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Estella DR uncoated	377381
■ Estella DR coated	377380

1) For combinations of MR Conditional leads, please see the ProMRI manual.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) 300…(25)…775 ms for AAI(R), AAT(R), DDT modes.
5) Post-ventricular atrial blanking.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Ecuro DR

MR Conditional dual-chamber, rate-response pacemaker with Vp Suppression®

ProMRI®

Product Highlights

ProMRI®
- Allows patients to undergo MR scanning under specific conditions.

Vp Suppression®
- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control
- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®
- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Follow-Up Center with FastFollowUp®
- Streamlined in-office follow-up by presenting all essential follow-up information in one screen.

Ordering Information

Model	Weight	Volume	Order number
Ecuro DR uncoated	26 g	11 cm^3	377365
Ecuro DR coated	26 g	11 cm^3	377364

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Ecuro DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads[1]
MRI modes	DOO; VOO; AOO; OFF

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Night rate		**OFF**; 30…(1)…88…(2)…122…(3)…140…(5)…200 ppm
■ Rate hysteresis		**OFF**; -5…(-5)…-90 ppm
■ Repetitive hysteresis		**OFF**; 1…(1)…15 cycles
■ Scan hysteresis		**OFF**; 1…(1)…15 cycles
Sensitivity[2]	■ Atrium	**AUTO**; 0.1…(0.1)…1.5…(0.5)…7.5 mV
	■ Ventricle	**AUTO**; 0.5…(0.5)…7.5 mV
Pulse amplitude (A/V)[3]		0.2…(0.1)…3.0…(0.1)…6.0…(0.5)…7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5…(0.1)…**1.0**…(0.1)…4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5…(0.1)…**1.0**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3…(0.1)…**0.5**…(0.1)…1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00…(00:10)…23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium[4]	AUTO
	■ Ventricle	200…(25)…**250**…(25)…500 ms
PVARP		**AUTO**; 175…(5)…250…(5)…600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**…(5)…70 ms
Far-field protection[5]	■ After Vs	**100**…(10)…220 ms
	■ After Vp	100…(10)…**150**…(10)…220 ms
AV delay		15…(5)…**180**…(5)…350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 5 rate ranges)
Sense compensation		OFF; -10…(-5)…**-45**…(-5)…-120 ms
AV hysteresis		**OFF**; IRS[plus]; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
■ AV scan hysteresis		**OFF**; 1…(1)…5…(1)…10 cycles
V_P Suppression		available in the modes DDDR-ADIR and DDD-ADI
■ Pacing suppression		1…(1)…6…(1)…8 consecutive Vs
■ Pacing support		1; 2; 3; 4 out of 8 cycles without Vs
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100…(10)…**160**…(10)…250 bpm
■ X-out-of-8 criterion (Onset criterion)		3…(1)…**5**…(1)…8
■ Z-out-of-8 criterion (Resolution criterion)		3…(1)…**5**…(1)…8
■ Change of basic rate		OFF; +5; **+10**…(5)…+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection		OFF; **ON**
Atrial overdrive		**OFF**; ON
NIPS		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90…(10)…**130**…(10)…200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording[6]		12 recordings, max. 10 seconds each, 3 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
■ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
■ Sensor gain		1…4…23 in 27 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1…(1)…**4**…(1)…10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
■ Rate fading (rate smoothing)		**OFF**; ON
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R)[7])
Battery[8]		LiJ (open circuit voltage: 2.8 V)
Nominal operating time		12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 43 × 6.5 mm/26 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Ecuro DR uncoated	377365
■ Ecuro DR coated	377364

1) For combinations of MR Conditional leads, please see the ProMRI manual.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) 300…(25)…775 ms for AAI(R), AAT(R), DDT modes.
5) Post-ventricular atrial blanking.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

BIOTRONIK
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Philos II DR-T

Dual-chamber, rate-response pacemaker with BIOTRONIK Home Monitoring®

Product Highlights

IRS^{plus} with 300 ms AV hysteresis

- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization

Rate Fading

- Avoids sudden changes in paced heart rate.

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

BIOTRONIK Home Monitoring®

- Unique automatic wireless remote monitoring and early detection of clinical and device-related events

Ordering Information

Model	Weight	Volume	Order number
Philos II DR-T uncoated	27 g	11.5 cm^3	343175
Philos II DR-T coated	27 g	11.5 cm^3	343176

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Philos II DR-T

Technical Data

Pacing modes with BIOTRONIK Home Monitoring®	
Home Monitoring is possible for the following modes:	DDDR; DDTR/A; DDTR/V; DDTR; DDIR; DDIR/T; VDDR; VDTR; VDIR; DDD; DDT/A; DDT/V; DDT; DDI; DDI/T; VDD; VDT; VDI; DDD+; DDT/A+; DDT/V+; DDDR+; DDTR/A+; DDTR/V+

Housing	
Dimensions/weight	51 × 44 × 6 mm/27 g
Volume	header: 2.4 cm^3; housing: 9.12 cm^3 (total: 11.52 cm^3)
Electrically conductive housing surfaces	
■ Uncoated	35.6 cm^2
■ Coated	7.23 cm^2
X-ray identification	KP

Transmitted Home Monitoring parameters including value ranges	
Atrial rhythm	
■ Number of Mode Switching episodes/24 h	0; 1; 2...(1)...60; > 60
■ Duration of Mode Switching episodes/24 h	0; 3...(3)...100 %
■ Max. Ven. rate at Mode Switching episodes[1]	< 120; ⩾ 120; ⩾ 140; ⩾ 160; ⩾ 180; ⩾ 200; ⩾ 220 ppm
■ AT counter/24 h	0; ⩾ 1; > 10; > 20
■ Afl counter/24 h	0; ⩾ 1; > 10; > 20
■ AF counter/24 h	0; ⩾ 1; > 10; > 20
Ventricular rhythm	
■ Number of ventricular episodes (> 8 consecutive VES)	0; 1; 2; > 2
■ Number of ventricular runs (4...8 consecutive VES)	0; 1; 2...(1)...5; > 5; > 10
■ Max. VES/h	0; ⩾ 1; > 10; > 30
Heart rate	
■ Mean ventricular heart rate	⩽ 52...(2)...174; > 174 ppm
■ Max. ventricular heart rate[2]	< 85; 85...248; > 248 ppm
■ Duration of max. ventricular heart rate[2]	< 0.5; ⩾ 0.5; ⩾ 1.0; ⩾ 2.0; ⩾ 5 min
Sensing/pacing	
■ Last mean P/R-wave amplitude/ programmed sensitivity	< 50 %; < 100 %; ⩾ 100 % safety margin
■ Last measured ventricular threshold	< 0.3; 0.3; 0.5...(0.2)...4.7; > 4.8 V
System status	
■ Atrial/ventricular lead check	OFF; OK; bipolar lead failure; unipolar lead failure
■ ACC-status	OFF; OK; disabled
■ Battery status	OK, ERI

Programmer parameters	
Home Monitoring	OFF; **ON**
ERI response	deactivation occurs 14 days after ERI
Monitoring interval	1 day
Transmission modes	trend message, event message, patient message
Time-of-message transmission	0:00...(10)...23:50

Online configuration of event types	
System integrity	
■ Battery status	**ON** (fixed)
■ Atrial/ventricular lead check	OFF; **ON**
■ Active Capture Control deactivated	**OFF**; ON
■ Increase of ventricular threshold > 1.0 V	**OFF**; ON
■ Decrease of ventricular threshold > 1.0 V	**OFF**; ON
■ Ventricular threshold > 4.8 V	OFF; **ON**
■ Mean P/R-wave ampl. < 50 % safety margin	OFF; **ON**

Diagnosis and therapy	
■ Duration of Mode Switching episodes/24 h	**OFF**; 10 % (2.5 h); 25 % (6 h); 50 % (12 h); 75 % (18 h)
■ First Mode Switching episodes of the day or since last follow-up	**OFF**; ON
■ Ventricular episode	**OFF**; ON
■ Ventricular run	**OFF**; ON
■ Patient message[3]	**ON**

Pacemaker parameters		
NBG-code		DDDR
Modes		**DDDR**; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R); AAI(R); D00(R); VOO(R); DDT(R)/A; DDT(R)/V; AOO(R); DDT(R); DDIT(R); DVT(R); DDD(R)+; DDT(R)/A+; DDT(R)/V+; AAI(R)+; AAT(R)+; VDT(R); VVT(R); AAT(R); OFF
Basic rate[4]		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
Night rate		**OFF**; ON (30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm)
Rate hysteresis		**OFF**; – 5...(5)... – 80 ppm
Repetitive hysteresis		**OFF**; 1...(1)...10
Scan hysteresis		**OFF**; 1...(1)...10
Sensitivity[5]	■ Atrium	0.1...(0.1)...**1.0**...(0.1)...1.5...(0.5)...7.5 mV
	■ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude	■ Atrium	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.6)...8.4 V
	■ Ventricle	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
Minimum amplitude		0.1...(0.1)...4.8 V
Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
Safety margin		0.3...(0.1)...1.2 V
Scan time		Intervall (0.1; 0.3; 1; 3; 6; **12**; 24 h) or time of the day (1st and 2nd time of day)
Leads		IS-1 connector

Automatic lead check		**OFF**; ON
Lead configuration (A/V)		unipolar; bipolar (automatic)
Auto-Initialization		OFF; lead detection; **ON**
Refractory period	■ Atrium[6]	200...(25)...**425**...(25)...775 ms
	■ Ventricle	170; 195; 220; **250**...(50)...400 ms
ARP extension		**0**...(50)...350 ms
Blanking time atrium (after Vp)		32; 40; 48; **56**; 72 ms
Ventricle (after Ap)		16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking (after Vs, Vp)		**56**[7]; 100; 125; 150; 175; 200 ms
AV delay values		15; 50; 75; 100; 120...(10)...200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay values		OFF; **low**; medium; high; independently programmable in 5 ranges
Sense compensation		OFF; -15...(15)... **-45**...(15)...-120 ms
AV safety interval		100 ms
AV hysteresis		**OFF**; low, medium, high, negative
AV repetitive hysteresis		**OFF**; 1...(1)...6
AV scan hysteresis		**OFF**; 1...(1)...6
Atrial tachycardia response		OFF; **Mode Switching**; mode conversion
Mode Switching with X/Z-out-of-8-criterion		OFF; **ON**
X-out-of-8 criterion		3...(1)...**5**...(1)...8
Z-out-of-8 criterion		3...(1)...**5**...(1)...8
Mode Switching basic rate		OFF, +5; **+10**...(5)...+30 ppm
Intervention rate		110...(10)...**160**...(10)...250 ppm
2 : 1 Lock-in protection		**OFF**; ON
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2:1; **WKB**
IEGM recording		12 recordings; max. 10 seconds each; 5 triggers
Min. PVARP		OFF; **ON**
PMT protection		OFF; **ON** (VA criterion 250...(10)...380...(10)...500 ms)
VES lock-in protection		**OFF**; ON (termination after 4; 6; 12 cycles)
Sensor		accelerometer
Sensor gain		AUTO; 1...**4**...40; programmable in 32 increments
Sensor threshold		very low; low; **medium**; high; very high
Rate increase		1; **2**; 4; 8 ppm/cycle
Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
Max. activity rate		80...(5)...**120**...(5)...180 ppm
Rate fading (rate smoothing)		**OFF**; ON
RF rate increase		1; 2; 4; 8 ppm/cycle
RF rate decrease		0.1; 0.2; 0.5; 1.0 ppm/cycle
Magnet rate		**AUTO** (10 cycles with 90 ppm asynchronous; then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD[R][8])
Battery[9]		1.3 Ah; Li/I
Nominal operating time[10]		7 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing; DDD[R])

Ordering information	
■ Philos II DR-T uncoated	343175
■ Philos II DR-T coated	343176

1) Measured on IEGM for Mode Switching.
2) Measured on IEGM for high ventricular rate.
3) Only if activated via programmer.
4) 30–34 ppm only temporarily programmble.
5) Atrium 1.5 ms sin^2; ventricle 40 ms sin^2.
6) Total Atrial Refractory Period (TARP).
7) Value depends on set atrial blanking.
8) See manual for other modes.
9) Nominal data of the battery manufacturer.
10) Calculated with the formula $T = 2740 \times C_{Batt}/(I_{BOS} + I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Philos II DR

Dual-chamber, rate-response pacemaker

Product Highlights

IRS^{plus} with 300 ms AV hysteresis

- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Rate Fading

- Avoids sudden changes in paced heart rate.

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

Ordering Information

Model	Weight	Volume	Order number
Philos II DR uncoated	26 g	12 cm^3	341826
Philos II DR coated	26 g	12 cm^3	341821

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Philos II DR

Technical Data

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R); AAI(R); D00(R); VOO(R); DDT(R)/A; DDT(R)/V; AOO(R); DDT(R); DDIT(R); DVT(R); DDD(R)+; DDT(R)/A+; DDT(R)/V+; AAI(R)+; AAT(R)+; VDT(R); VVT(R); AAT(R); OFF
Basic rate[1]		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
▪ Night rate		**OFF**; 30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm
▪ Rate hysteresis		**OFF**; -5...(5)...-80 ppm
▪ Repetitive hysteresis		**OFF**; 1...(1)...10 cycles
▪ Scan hysteresis		**OFF**; 1...(1)...10 cycles
Sensitivity[2]	▪ Atrium	0.1...(0.1)...**1.0**...(0.1)...1.5...(0.5)...7.5 mV
	▪ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude	▪ Atrium	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.6)...8.4 V
	▪ Ventricle	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
▪ Minimum amplitude		0.1...(0.1)...4.8...(0.2)...6.4 V
▪ Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
▪ Safety margin		0.3...(0.1)...1.2 V
▪ Search time		**interval** (0.1; 0.3; 1; 3; 6; **12**; 24 h) or time of day (1st and 2nd)
Leads		IS-1 connector
▪ Automatic lead check		**OFF**; ON
▪ Lead configuration (A/V)		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[3]	200...(25)...**425**...(25)...775 ms
	▪ Ventricle	170; 195; 220; **250**...(50)...400 ms
ARP extension		**0**...(50)...350 ms
Blanking	▪ Atrium (after Vp)	32; 40; 48; **56**; 72 ms
	▪ Ventricle (after Ap)	16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking[4] (after Vs,Vp)		**56**[5]; 100; 125; 150; 175; 200 ms
AV delay		15; 50; 75; 100; 120...(10)...200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
Sense compensation		OFF; -15...(15)...**-45**...(15)...-120 ms
AV safety interval		100 ms
AV hysteresis		**OFF**; IRS^{plus}; low; medium; high; negative
▪ AV repetitive hysteresis		**OFF**; 1...(1)...6 cycles
▪ AV scan hysteresis		**OFF**; 1...(1)...6 cycles
Atrial tachycardia response		OFF; **mode switching**; mode conversion
Mode switching with X/Z-out-of-8 criterion		OFF; **ON**
▪ X-out-of-8 criterion		3...(1)...**5**...(1)...8
▪ Z-out-of-8 criterion		3...(1)...**5**...(1)...8
▪ Mode switching basic rate		OFF; +5; **+10**...(5)...+30 ppm
▪ Intervention rate		110...(10)...**160**...(10)...250 bpm
▪ 2:1 Lock-in protection		**OFF**; ON
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2:1; **WKB**
IEGM recording		12 recordings; max. 10 seconds each; 5 triggers
Min. PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** (VA criterion 250...(10)...**380**...(10)...500 ms)
VES lock-in protection		**OFF**; ON (termination after 4; 6;12 cycles)
Sensor		accelerometer
▪ Sensor gain		1...**4**...40; in 32 increments (auto gain: OFF; **ON**)
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
▪ Max. activity rate		80...(5)...**120**...(5)...180 ppm
Rate fading (rate smoothing)		**OFF**; ON
▪ RF rate increase		1; 2; 4; 8 ppm/cycle
▪ RF rate decrease		0.1; 0.2; 0.5; 1.0 ppm/cycle
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R)[6])
Battery[7]		1.3 Ah; Li/I
Nominal operating time[8]		7 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing; DDD(R))

Housing	
Dimensions/weight	53 × 43 × 6 mm/26 g
Volume	12 cm³
X-ray identification	ET

Overview of functions[9]	
Automatic functions	Active Capture Control (ACC)
	Auto-Initialization
	Lead check
	Guided follow-up
	Ventricular threshold test
	Remaining service life calculation
Arrhythmia management	Mode switching with 2:1 Lock-in Protection
	PMT management
	IEGM recording
	AT classification
	Preventive overpacing DDD(R)+ (overdrive)
Rate management	Rate fading (rate smoothing)
	Rate hysteresis
	AV hysteresis (including negative AV hysteresis)
	Night rate
Diagnostic data	Memory for follow-up data in pacemaker
	High-resolution impedance trend (33 h and long-term)
	Ventricular threshold trend
	Ventricular pacing amplitude histogram
	P/R-wave trend (33 h and long-term)

Ordering information	
▪ Philos II DR uncoated	341826
▪ Philos II DR coated	341821

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin²; ventricle 40 ms sin².
3) Total Atrial Refractory Period (TARP).
4) Post-ventricular atrial blanking.
5) Value depends on set atrial blanking.
6) See manual for other modes.
7) Nominal data of the battery manufacturer.
8) Calculated with the formula $T = 2740 \times C_{BAT} / (I_{BOS} + I_{ERI})$.
9) Availability depends on the programming software used.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Philos II D

Dual-chamber pacemaker

Product Highlights

Active Capture Control:

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Wide-band IEGM recordings up to 12 recordings

State-of-the-art atrial arrhythmia management

Timesaving diagnostic and follow-up options

Ordering Information

Model	Weight	Volume	Order number
Philos II D uncoated	26 g	12 cm^3	341825
Philos II D coated	26 g	12 cm^3	341820

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Philos II D

Technical Data

Pacemaker parameters		
NBG code		DDD
Modes		**DDD**; DDI(R)[1]; DVI; VDD; VDI(R)[2]; VVI(R); AAI; D00; V00(R); DDT/A; DDT/V; A00; DDT; DDIT; DVT; DDD+; DDT/A+; DDT/V+; AAI+; AAT+; VDT; VVT; AAT; OFF
Basic rate[2]		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
▪ Night rate		**OFF**; 30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm
▪ Rate hysteresis		**OFF**; -5...(5)...-80 ppm
▪ Repetitive hysteresis		**OFF**; 1...(1)...10 cycles
▪ Scan hysteresis		**OFF**; 1...(1)...10 cycles
Sensitivity[3]	▪ Atrium	0.1...(0.1)...**1.0**...(0.1)...1.5...(0.5)...7.5 mV
	▪ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude	▪ Atrium	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.4)...8.4 V
	▪ Ventricle	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
▪ Minimum amplitude		0.1...(0.1)...4.8...(0.2)...6.4 V
▪ Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
▪ Safety margin		0.3...(0.1)...1.2 V
▪ Search time		**interval** (0.1; 0.3; 1; 3; 6; **12**; 24 h) or time of day (1st and 2nd)
Leads		IS-1 connector
▪ Automatic lead check		**OFF**; ON
▪ Lead configuration (A/V)		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[4]	200...(25)...**425**...(25)...775 ms
	▪ Ventricle	170; 195; 220; **250**...(50)...400 ms
ARP extension		**0**...(50)...350 ms
Blanking	▪ Atrium (after Vp)	32; 40; 48; **56**; 72 ms
	▪ Ventricle (after Ap)	16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking[5] (after Vs,Vp)		**56**[6]; 100; 125; 150; 175; 200 ms
AV delay		15; 50; 75; 100; 120...(10)...200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
Sense compensation		OFF; -15...(15)...**-45**...(15)...-120 ms
AV safety interval		100 ms
AV hysteresis		**OFF**; IRS[plus]; low; medium; high; negative
▪ AV repetitive hysteresis		**OFF**; 1...(1)...6 cycles
▪ AV scan hysteresis		**OFF**; 1...(1)...6 cycles
Atrial tachycardia response		OFF; **mode switching**; mode conversion
Mode switching with X/Z-out-of-8 criterion		OFF; **ON**
▪ X-out-of-8 criterion		3...(1)...**5**...(1)...8
▪ Z-out-of-8 criterion		3...(1)...**5**...(1)...8
▪ Mode switching basic rate		OFF; +5; **+10**...(5)....+30 ppm
▪ Intervention rate		110...(10)...**160**...(10)...250 bpm
▪ 2:1 lock-in protection		**OFF**; ON
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2:1; **WKB**
IEGM recording		12 recordings; max. 10 seconds each; 5 triggers
Min. PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250...(10)...**380**...(10)...500 ms]
VES lock-in protection		**OFF**; ON (termination after 4; 6; 12 cycles)
Sensor		accelerometer
▪ Sensor gain		1...**4**...40; in 32 increments (auto gain: OFF; **ON**)
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
▪ Max. activity rate		80...(5)...**120**...(5)...180 ppm
Rate fading (rate smoothing)		**OFF**; ON
▪ RF rate increase		1; 2; 4; 8 ppm/cycle
▪ RF rate decrease		0.1; 0.2; 0.5; 1.0 ppm/cycle
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % [in DDD[7]]
Battery[8]		1.3 Ah; Li/I
Nominal operating time[9]		7 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing; DDD)

Housing	
X-ray identification	ET
Dimensions/weight	53 × 43 × 6 mm/26 g
Volume	12 cm³

Overview of functions[10]	
Automatic functions	Active Capture Control (ACC)
	Auto-Initialization
	Lead check
	Guided follow-up
	Ventricular threshold test
	Remaining service life calculation
Arrhythmia management	Mode switching with 2:1 lock-in protection
	PMT management
	IEGM recording
	AT classification
	Preventive overpacing DDD+ (overdrive)
Rate management	Rate fading (rate smoothing)
	Rate hysteresis
	AV hysteresis (including negative AV hysteresis)
	Night rate
Diagnostic data	Memory for follow-up data in pacemaker
	High-resolution impedance trend (33 h and long-term)
	Ventricular threshold trend
	Ventricular pacing amplitude histogram
	P/R-wave trend (33 h and long-term)

Ordering information	
▪ Philos II D uncoated	341826
▪ Philos II D coated	341821

1) Only available for Mode Switching.
2) 30–34 ppm only temporarily programmable.
3) Atrium 15 ms sin²; ventricle 40 ms sin².
4) Total Atrial Refractory Period (TARP).
5) Post-ventricular atrial blanking.
6) Value depends on set atrial blanking.
7) See manual for other modes.
8) Nominal data of the battery manufacturer.
9) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS}+I_{ERI})$.
10) Availability depending on the programming software used.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Philos II SLR

Single-lead, dual-chamber, rate-response pacemaker (VDDR)

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Expanded IEGM memory to allow 15 recordings

State-of-the-art atrial arrhythmia management

Timesaving diagnostic and follow-up options

Ordering Information

Model	Weight	Volume	Order number
Philos II SLR uncoated	26 g	12 cm^3	341822
Philos II SLR coated	26 g	12 cm^3	341816

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Philos II SLR

Technical Data

Pacemaker parameters		
NBG code		VDDR
Modes		**VDD**; VDDR; VDI(R); VVI(R); VOO(R); VDT(R); VVT(R); OFF
Basic rate[1]		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
▪ Night rate		**OFF**; 30...(1)...60...(1)...88...(2)...122...(3)...140...(5)...180 ppm
▪ Rate hysteresis		OFF; -5; **-10**...(5)...-80 ppm
▪ Repetitive hysteresis		**OFF**; 1...(1)...10 cycles
▪ Scan hysteresis		**OFF**; 1...(1)...10 cycles
Sensitivity[2]	▪ Atrium	0.1; **0.2**...(0.1)...1.5...(0.5)...7.5 mV
	▪ Ventricle	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Pulse amplitude	▪ Ventricle	0.1...(0.1)...**3.6**...(0.1)...4.8...(0.2)...8.4 V
Pulse width	▪ Ventricle	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		OFF; ON; **ATM**
▪ Minimum amplitude		0.1...(0.1)...4.8...(0.2)...6.4 V
▪ Maximum amplitude		2.4; **3.6**; 4.8; 6.4 V
▪ Safety margin		0.3...(0.1)...1.2 V
▪ Search time		**interval** (0.1; 0.3; 1; 3; 6; **12**; 24 h) or time of day (1st and 2nd)
Leads		IS-1 connector
▪ Lead configuration	▪ Atrium	**bipolar**
	▪ Ventricle	**unipolar**; bipolar (automatic)
▪ Automatic lead check		**OFF**; ON
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[3]	200...(25)...**425**...(25)...775 ms
	▪ Ventricle	170; 195; 220; **250**...(50)...400 ms
ARP extension		**0**...(50)...350 ms
Blanking	▪ Atrium (after Vp)	32; 40; 48; **56**; 72 ms
Far-field blanking[4] (after Vs, Vp)		**56**[5]; 100; 125; 150; 175; 200 ms
AV delay		15; 50; 75; 100; 120...(10)...200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
AV safety interval		100 ms
AV hysteresis		**OFF**; IRSplus; low; medium; high; negative
▪ AV repetitive hysteresis		OFF; 1...(1)...6 cycles
▪ AV scan hysteresis		OFF; 1...(1)...6 cycles
Atrial tachycardia response		OFF; **mode switching**; mode conversion
Mode switching with X/Z-out-of-criterion		OFF; **ON**
▪ X-out-of-8 criterion		3...(1)...**5**...(1)...8
▪ Z-out-of-8 criterion		3...(1)...**5**...(1)...8
▪ Mode switching basic rate		OFF; +5; **+10**...(5)...+30 ppm
▪ Intervention rate		110...(10)...**160**...(10)...250 bpm
▪ 2:1 lock-in protection		**OFF**; ON
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2:1; **WKB**
IEGM recording		12 recordings; max. 10 seconds each; 5 triggers
Min. PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250...(10)...**380**...(10)...500 ms]
VES Lock-in protection		**OFF**; ON [termination after 4; 6; 12 cycles]
Sensor		accelerometer
▪ Sensor gain		1...**4**...40 in 32 increments [auto gain: OFF; **ON**]
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
▪ Max. activity rate		80...(5)...**120**...(5)...180 ppm
Rate fading (rate smoothing)		**OFF**; ON
▪ RF rate increase		1; 2; 4; 8 ppm/cycle
▪ RF rate decrease		0.1; 0.2; 0.5; 1.0 ppm/cycle
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous; then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % [in VDD[4]]
Battery[7]		1.3 Ah; Li/I
Nominal operating time[8]		10 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing; VDD)

Housing	
Dimensions/weight	53 × 43 × 6 mm/26 g
Volume	12 cm³
X-ray identification	ET

Overview of functions[9]	
Automatic functions	Active Capture Control (ACC)
	Auto-Initialization
	Lead check
	Guided follow-up
	Ventricular threshold test
	Remaining service life calculation
Arrhythmia management	Mode switching with 2:1 lock-in protection
	PMT management
	IEGM recording
	AT classification
Rate management	Rate fading (rate smoothing)
	Rate hysteresis
	AV hysteresis (including negative AV hysteresis)
	Night rate
Diagnostic data	Memory for follow-up data in pacemaker
	High-resolution impedance trend (33 h and long-term)
	Ventricular threshold trend
	Ventricular pacing amplitude histogram
	P/R-wave trend (33 h and long-term)

Ordering information	
▪ Philos II SLR uncoated	341822
▪ Philos II SLR coated	341816

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin²; ventricle 40 ms sin².
3) Total Atrial Refractory Period (TARP).
4) Post-ventricular atrial blanking.
5) Value depends on set atrial blanking.
6) See manual for other modes.
7) Nominal data of the battery manufacturer.
8) Calculated with the formula $T = 2740 \times C_{BAT} / (I_{BOS} + I_{ERI})$.
9) Availability depends on the programming software usedv

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Effecta DR

Dual-chamber, rate-response pacemaker

Product Highlights

IRS^{plus} with 400 ms AV hysteresis

- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Auto-Initialization

- Automatic activation of pacemaker functions after lead connection.

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Effecta DR uncoated	26 g	11 cm^3	371 199
Effecta DR coated	26 g	11 cm^3	371 201

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Effecta DR

Technical Data

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR**; DDD; DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
Basic rate		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Night rate		**OFF**; 30...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Rate hysteresis		**OFF**; -5...(-5)...-90 ppm
■ Repetitive hysteresis		**OFF**; 1...(1)...15 cycles
■ Scan hysteresis		**OFF**; 1...(1)...15 cycles
Sensitivity [1]	■ Atrium	**AUTO**; 0.1...(0.1)...1.5...(0.5)...7.5 mV
	■ Ventricle	**AUTO**; 0.5...(0.5)...7.5 mV
Pulse amplitude (A/V) [2]		0.2...(0.1)...3.0...(0.1)...6.0...(0.5)...7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5...(0.1)...**1.0**...(0.1)...4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5...(0.1)...**1.0**...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3...(0.1)...**0.5**...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium [3]	AUTO
	■ Ventricle	200...(25)...**250**...(25)...500 ms
PVARP		175...(5)...**250**...(5)...600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**...(5)...70 ms
Far-field protection [4]	■ After Vs	**100**...(10)...220 ms
	■ After Vp	100...(10)...**150**...(10)...220 ms
AV delay		15...(5)...**180**...(5)...350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 6 rate ranges)
Sense compensation		OFF; -10...(-5)...**-45**...(-5)...-120 ms
AV hysteresis		**OFF**; IRS^{plus}; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1...(1)...5...(1)...10 cycles
■ AV scan hysteresis		**OFF**; 1...(1)...5...(1)...10 cycles
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100...(10)...**160**...(10)...250 bpm
■ X-out-of-8 criterion (Onset criterion)		3...(1)...**5**...(1)...8
■ Z-out-of-8 criterion (Resolution criterion)		3...(1)...**5**...(1)...8
■ Change of basic rate		OFF; +5; **+10**...(5)...+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection		OFF; **ON**
NIPS		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90...(10)...**130**...(10)...200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording [5]		4 recordings, max. 10 seconds each, 3 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250...(10)...**350**...(10)...500 ms]
Sensor		accelerometer
■ Maximum activity rate		80...(5)...**120**...(5)...180 ppm
■ Sensor gain		1...4...23 in 27 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1...(1)...**4**...(1)...10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD(R) [6])
Battery [7]		LiJ (open circuit voltage: 2.8 V)
Nominal operating time		12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 43 × 6.5 mm/26 g
Volume	11 cm³
Electrically conductive housing surfaces	
■ Uncoated	33 cm²
■ Coated	7 cm²
X-ray identification	SF

Ordering information	
■ Effecta DR uncoated	371 199
■ Effecta DR coated	371 201

1) EN 50061 triangle pulse.
2) If Capture Control is ON, the pulse amplitude is automatically selected.
3) 300...(25)...**350**...(25)...775 ms for AAI(R), AAT(R), DDT modes.
4) Post-ventricular atrial blanking.
5) Storage of IEGMs by using intelligent memory management.
6) See manual for other modes.
7) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

Bradycardia Therapy – August 2011

BIOTRONIK
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Effecta D

Dual-chamber pacemaker

Product Highlights

IRS^{plus} with 400 ms AV hysteresis

- Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Atrial & Ventricular Capture Control

- Increases patient safety and extends device longevity by automatically adapting pacing output to changing pacing thresholds. Provides backup ventricular pacing when needed.

AutoSensing®

- Ensures optimal pacing behavior by automatically optimizing sensing settings.

Auto-Initialization

- Automatic activation of pacemaker functions after lead connection

Follow-Up Center with FastFollowUp®

- Streamlined in-office follow-up by presenting all essential follow-up information in one screen

Ordering Information

Model	Weight	Volume	Order number
Effecta D uncoated	26 g	11 cm^3	375429
Effecta D coated	26 g	11 cm^3	375428

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Effecta D

Technical Data

Pacemaker parameters		
NBG code		DDD
Modes		**DDD**; DDI(R)[1]; DVI; DDT; DOO; VDD; VDI; VVI(R); VVT; VOO(R); AAI; AAT; AOO; OFF
Basic rate		30...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Night rate		**OFF**; 30...(1)...88...(2)...122...(3)...140...(5)...200 ppm
■ Rate hysteresis		**OFF**; -5...(-5)...-90 ppm
■ Repetitive hysteresis		**OFF**; 1...(1)...15 cycles
■ Scan hysteresis		**OFF**; 1...(1)...15 cycles
Sensitivity[2]	■ Atrium	**AUTO**; 0.1...(0.1)...1.5...(0.5)...7.5 mV
	■ Ventricle	**AUTO**; 0.5...(0.5)...7.5 mV
Pulse amplitude (A/V)[3]		0.2...(0.1)...3.0...(0.1)...6.0...(0.5)...7.5 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms
Atrial Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.5...(0.1)...**1.0**...(0.1)...4.8 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.5...(0.1)...**1.0**...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Ventricular Capture Control		OFF; **ON**; ATM (monitoring only)
■ Minimum amplitude		0.7 V
■ Start amplitude		2.4; **3.0**; 3.6; 4.2; 4.8 V
■ Safety margin		0.3...(0.1)...**0.5**...(0.1)...1.2 V
■ Search time		interval (0.1; 0.3;1; 3; 6; 12; 24 h); **time of day 02:00** (00:00...(00:10)...23:50 hh:mm)
Auto-Initialization		ON
Leads		IS-1-connector
■ Automatic lead check (A/V)		ON
■ Lead configuration (A/V)		**unipolar**; bipolar (both automatically configured)
Refractory period	■ Atrium[4]	AUTO
	■ Ventricle	200...(25)...**250**...(25)...500 ms
PVARP		175...(5)...**250**...(5)...600 ms
PVARP after PVC		PVARP + 150 ms (max: 600 ms) automatically adjusted
Ventricular blanking after Ap		**30**...(5)...70 ms
Far-field protection[5]	■ After Vs	**100**...(10)...220 ms
	■ After Vp	100...(10)...**150**...(10)...220 ms
AV delay		15...(5)...**180**...(5)...350 ms (up to 450 ms with AV hysteresis)
Dynamic AV delay		OFF; **low**; medium; high; fixed; individual (programmable in 6 rate ranges)
Sense compensation		OFF; -10...(-5)...**-45**...(-5)...-120 ms
AV hysteresis		**OFF**; IRS[plus]; negative; low; medium; high
■ AV repetitive hysteresis		**OFF**; 1...(1)...5...(1)...10 cycles
■ AV scan hysteresis		**OFF**; 1...(1)...5...(1)...10 cycles
Mode switching with X/Z-out-of-8-criterion		OFF; **ON**
■ Intervention rate		100...(10)...**160**...(10)...250 bpm
■ X-out-of-8 criterion (Onset criterion)		3...(1)...**5**...(1)...8
■ Z-out-of-8 criterion (Resolution criterion)		3...(1)...**5**...(1)...8
■ Change of basic rate		OFF; +5; **+10**...(5)...+30 ppm
■ Rate stabilization		**OFF**; ON
2:1 lock-in protection		OFF; **ON**
NIPS		burst stimulation; programmed stimulation
Upper rate limit	■ Atrium	OFF; **240** ppm
	■ Ventricle	90...(10)...**130**...(10)...200 ppm
Tachycardia behavior		2:1; **WKB**
IEGM recording[6]		4 recordings, max. 10 seconds each, 3 triggers
■ Recording prior to event		0; 25; 50; **75**; 100 %
PMT protection		OFF; **ON** [VA criterion: 250...(10)...**350**...(10)...500 ms]
Sensor		accelerometer
■ Maximum activity rate		80...(5)...**120**...(5)...180 ppm
■ Sensor gain		1...4...23 in 27 increments [auto gain: OFF; **ON**]
■ Sensor threshold		very low; low; **medium**; high; very high
■ Rate increase		1...(1)...**4**...(1)...10 ppm/cycle
■ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
Sensor optimization		original, preview
Magnet response		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % (in DDD[7])
Battery[8]		LiJ (open circuit voltage: 2.8 V)
Nominal operating time		12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing)

Housing	
Dimensions/weight	53 × 43 × 6.5 mm/26 g
Volume	11 cm^3
Electrically conductive housing surfaces	
■ Uncoated	33 cm^2
■ Coated	7 cm^2
X-ray identification	SF

Ordering information	
■ Effecta D uncoated	375429
■ Effecta D coated	375428

1) Only available for mode switching.
2) EN 50061 triangle pulse.
3) If Capture Control is ON, the pulse amplitude is automatically selected.
4) 300...(25)...**350**...(25)...775 ms for AAI, AAT, DDT modes.
5) Post-ventricular atrial blanking.
6) Storage of IEGMs by using intelligent memory management.
7) See manual for other modes.
8) Nominal data of the manufacturer.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Talos DR

Dual-chamber, rate-response pacemaker

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Intrinsic Rhythm Support (IRS^{plus}) to minimize ventricular pacing

Wide-band IEGM recording

Ordering Information

Model	Weight	Volume	Order number
Talos DR uncoated	26 g	12 cm^3	356 248
Talos DR coated	26 g	12 cm^3	356 249

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Talos DR

Technical Data

Pacemaker parameters		
NBG code		DDDR
Modes		**DDDR;** DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R); AAI(R); D00(R); VOO(R); DDT(R)/A; DDT(R)/V; AOO(R); DDT(R); DDIT(R); DVT(R); VDT(R); VVT(R); AAT(R); OFF
Basic rate[1]		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Night rate		**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Rate hysteresis		**OFF**; –5…(5)…–80 ppm
▪ Repetitive hysteresis		**OFF**; 1…(1)…10 cycles
▪ Scan hysteresis		**OFF**; 1…(1)…10 cycles
Sensitivity[2]	▪ Atrium	0.1…(0.1)…**1.0**…(0.1)…1.5…(0.5)…7.5 mV
	▪ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude	▪ Atrium	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.6)…8.4 V
	▪ Ventricle	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		**OFF**; ON
▪ Minimum amplitude		0.7 V
▪ Maximum amplitude		3.6 V
▪ Safety margin		0.5 V
▪ Search time		7:00 AM and 7:00 PM
Leads		IS-1 connector
▪ Automatic lead check		**OFF**; ON
▪ Lead configuration (A/V)		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[3]	200…(25)…**425**…(25)…775 ms
	▪ Ventricle	170; 195; 220; **250**…(50)…400 ms
ARP extension		**0**…(50)…350 ms
Blanking	▪ Atrium (after Vp)	56 ms
	▪ Ventricle (after Ap)	16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking[4] (after Vs, Vp)		**56**; 100; 125; 150; 175; 200 ms
AV delay		15; 50; 75; 100; 120…(10)…200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
Sense compensation		OFF; –15…(15)…**–45**…(15)…–120 ms
AV safety interval		100 ms
IRS^{plus}		**OFF**; ON
AV hysteresis		**OFF**; IRS^{plus}; ON
▪ AV repetitive hysteresis		**OFF**; ON (5 cycles)
▪ AV scan hysteresis		**OFF**; ON (5 cycles)
Atrial tachycardia response		OFF; **mode switching**; mode conversion
Mode switching with X/Z-out-of-8 criterion		OFF; **ON**
▪ X-out-of-8 criterion		3…(1)…**5**…(1)…8
▪ Z-out-of-8 criterion		3…(1)…**5**…(1)…8
▪ Intervention rate		110…(10)…**160**…(10)…250 bpm
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2 : 1; **WKB**
IEGM recording		4 recordings; max. 10 seconds each
Minimum PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
▪ Sensor gain		1…**4**…40 in 32 increments [auto gain: OFF; **ON**]
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
▪ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % [in DDD(R)[5]]
Battery[6]		1.3 Ah; Li/I
Nominal operating time[7]		10 years (A: at 2.4 V; V: at 1.0 V; 0.4 ms; 50 ppm; 100 % pacing; DDD(R); ACC activated

Housing	
Dimensions/weight	53 × 43 × 6 mm/26 g
Volume	12 cm^3
X-ray identification	PV

Ordering information	
▪ Talos DR uncoated	356 248
▪ Talos DR coated	356 249

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Total Atrial Refractory Period (TARP).
4) Post-ventricular atrial blanking.
5) See manual for other modes.
6) Nominal data of the battery manufacturer.
7) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS} + I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Talos D

Dual-chamber pacemaker

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Intrinsic Rhythm Support (IRS^{plus}) to minimize ventricular pacing

Wide-band IEGM recording

Ordering Information

Model	Weight	Volume	Order number
Talos D uncoated	26 g	12 cm^3	356 245
Talos D coated	26 g	12 cm^3	356 246

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Talos D

Technical Data

Pacemaker parameters		
NBG code		DDD
Modes		**DDD**; DDI(R)[1]; DVI; VDD; VDI(R)[1]; [VDI]; VVI(R); AAI; D00; VOO(R); DDT/A; DDT/V; AOO; DDT; DDIT; DVT; VDT; VVT; AAT; OFF
Basic rate[2]		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Night rate		**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Rate hysteresis		**OFF**; –5…(5)…–80 ppm
▪ Repetitive hysteresis		**OFF**; 1…(1)…10 cycles
▪ Scan hysteresis		**OFF**; 1…(1)…10 cycles
Sensitivity[3]	▪ Atrium	0.1…(0.1)…**1.0**…(0.1)…1.5…(0.5)…7.5 mV
	▪ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude	▪ Atrium	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.6)…8.4 V
	▪ Ventricle	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		**OFF**; ON
▪ Minimum amplitude		0.7 V
▪ Maximum amplitude		3.6 V
▪ Safety margin		0.5 V
▪ Search time		7:00 AM and 7:00 PM
Leads		IS-1 connector
▪ Automatic lead check		**OFF**; ON
▪ Lead configuration (A/V)		**unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[4]	200…(25)…**425**…(25)…775 ms
	▪ Ventricle	170; 195; 220; **250**…(50)…400 ms
ARP extension		**0**…(50)…350 ms
Blanking	▪ Atrium (after V_P)	56 ms
	▪ Ventricle (after A_P)	16; 24; **32**; 40; 48; 56; 72 ms
Far-field blanking[5] (after V_S, V_P)		**56**; 100; 125; 150; 175; 200 ms
AV delay		15; 50; 75; 100; 120…(10)…200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
Sense compensation		OFF; –15…(15)…**–45**…(15)…-120 ms
AV safety interval		100 ms
IRS^{plus}		**OFF**; ON
AV hysteresis		**OFF;** IRS^{plus}; ON
▪ AV repetitive hysteresis		**OFF**; ON (5 cycles)
▪ AV scan hysteresis		**OFF**; ON (5 cycles)
Atrial tachycardia response		OFF; **mode switching**; mode conversion
Mode switching with X/Z-out-of-8 criterion		OFF; **ON**
▪ X-out-of-8 criterion		3…(1)…**5**…(1)…8
▪ Z-out-of-8 criterion		3…(1)…**5**…(1)…8
▪ Intervention rate		110…(10)…**160**…(10)…250 bpm
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2 : 1; **WKB**
IEGM recording		4 recordings; max. 10 seconds each
Minimum PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
▪ Sensor gain		1…**4**…40 in 32 increments [auto gain: OFF; **ON**]
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
▪ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11 % [in DDD[6]]
Battery[7]		1.3 Ah; Li/I
Nominal operating time[8]		10 years (A: at 2.4 V; V: at 1.0 V; 0.4 ms; 50 ppm; 100 % pacing; DDD; ACC activated)

Housing	
Dimensions/weight	53 × 43 × 6 mm/26 g
Volume	12 cm^3
X-ray identification	PV

Ordering information	
▪ Talos D uncoated	356 245
▪ Talos D coated	356 246

1) Only available for mode switching.
2) 30–34 ppm only temporarily programmable.
3) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
4) Total Atrial Refractory Period (TARP).
5) Post-ventricular atrial blanking.
6) See manual for other modes.
7) Nominal data of the battery manufacturer.
8) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS} + I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Talos SLR

Single-lead, dual-chamber, rate-response pacemaker (VDDR)

Product Highlights

Active Capture Control

- Increases patient safety and extends device longevity by automatically adapting ventricular pacing output to changing pacing thresholds.

Intrinsic Rhythm Support (IRS^{plus}) to minimize ventricular pacing

Wide-band IEGM recording

Ordering Information

Model	Weight	Volume	Order number
Talos SLR uncoated	26 g	12 cm^3	356 252
Talos SLR coated	26 g	12 cm^3	356 253

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Talos SLR

Technical Data

Pacemaker parameters		
NBG code		VDDR
Modes		**VDD**; VDDR; VDI(R); VVI(R); VOO(R); VDT(R); VVT(R); OFF
Basic rate[1]		30…(1)…**60**…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Night rate		**OFF**; 30…(1)…60…(1)…88…(2)…122…(3)…140…(5)…180 ppm
▪ Rate hysteresis		OFF; –5; **–10**…(5)…–80 ppm
▪ Repetitive hysteresis		**OFF**; 1…(1)…10 cycles
▪ Scan hysteresis		**OFF**; 1…(1)…10 cycles
Sensitivity[2]	▪ Atrium	0.1; **0.2**…(0.1)…1.5…(0.5)…7.5 mV
	▪ Ventricle	0.5…(0.5)…**2.5**…(0.5)…7.5 mV
Pulse amplitude	▪ Atrium	0.1…(0.1)…3.6…(0.1)…4.8…(0.6)…8.4 V
	▪ Ventricle	0.1…(0.1)…**3.6**…(0.1)…4.8…(0.2)…8.4 V
Pulse width (A/V)		0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.5 ms
Active Capture Control (ACC)		**OFF**; ON
▪ Minimum amplitude		0.7 V
▪ Maximum amplitude		3.6 V
▪ Safety margin		0.5 V
▪ Search time		7:00 AM and 7:00 PM
Leads		IS-1 connector
▪ Automatic lead check		**OFF**; ON
▪ Lead configuration (A/V)		A: **bipolar**, V: **unipolar**; bipolar (automatic)
Auto-Initialization		OFF; **ON**; lead detection
Refractory period	▪ Atrium[3]	200…(25)…**425**…(25)…775 ms
	▪ Ventricle	170; 195; 220; **250**…(50)…400 ms
ARP extension		**0**…(50)…350 ms
Blanking	▪ Atrium (after Vp)	56 ms
Far-field blanking[4] (after Vs, Vp)		**56**; 100; 125; 150; 175; 200 ms
AV delay		15; 50; 75; 100; 120…(10)…200; 225; 250; 300 ms; **dynamic**
Dynamic AV delay		OFF; **low**; medium; high; fixed; individually programmable in 5 rate ranges
AV safety interval		100 ms
IRS^{plus}		**OFF**; ON
AV hysteresis		**OFF**; IRS^{plus}; ON
▪ AV repetitive hysteresis		**OFF**; ON (5 cycles)
▪ AV scan hysteresis		**OFF**; ON (5 cycles)
Atrial tachycardia response		OFF; **mode switching**; mode conversion
Mode switching with X/Z-out-of-8 criterion		OFF; **ON**
▪ X-out-of-8 criterion		3…(1)…**5**…(1)…8
▪ Z-out-of-8 criterion		3…(1)…**5**…(1)…8
▪ Intervention rate		110…(10)…**160**…(10)…250 bpm
Upper rate limit		100; 110; 120; **130**; 140; 160; 185 ppm
Tachycardia mode		2 : 1; **WKB**
IEGM recording		4 recordings; max. 10 seconds each
Minimum PVARP		OFF; **235 ms**
PMT protection		OFF; **ON** [VA criterion 250…(10)…**350**…(10)…500 ms]
Sensor		accelerometer
▪ Sensor gain		1…**4**…40 in 32 increments [auto gain: OFF; **ON**]
▪ Sensor threshold		very low; low; **medium**; high; very high
▪ Rate increase		1; **2**; 4; 8 ppm/cycle
▪ Rate decrease		0.1; 0.2; **0.5**; 1.0 ppm/cycle
▪ Maximum activity rate		80…(5)…**120**…(5)…180 ppm
Magnet effect		**AUTO** (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indication		programmed rate minus 11% in VDD[5]
Battery[6]		1.3 Ah; Li/I
Nominal operating time[7]		11.5 years (at 1.0 V; 0.4 ms; 50 ppm; 100 % pacing; VDD; ACC activated)

Housing	
Dimensions/weight	53 × 43 × 6 mm/26 g
Volume	12 cm^3
X-ray identification	PV

Ordering information	
▪ Talos SLR uncoated	356 252
▪ Talos SLR coated	356 253

1) 30–34 ppm only temporarily programmable.
2) Atrium 15 ms sin^2; ventricle 40 ms sin^2.
3) Total Atrial Refractory Period (TARP).
4) Post-ventricular atrial blanking.
5) See manual for other modes.
6) Nominal data of the battery manufacturer.
7) Calculated with the formula $T = 2740 \times C_{Batt.}/(I_{BOS} + I_{ERI})$.

All data at 37 °C, 500 Ω.
Default settings are printed in bold.

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Solia S

Bipolar MR Conditional pacing lead with active fixation

ProMRI®

Product Highlights

BIOTRONIK ProMRI® provides access to MRI scans

Ultrathin 5.6 F silicone lead body with polyurethane coating compatible with 6 F lead introducer

Same handling characteristics as conventional state-of-the-art pacing leads

Advanced screw mechanism for atraumatic fixation

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Solia S 45	retractable screw	45 cm	377176
Solia S 53	retractable screw	53 cm	377177
Solia S 60	retractable screw	60 cm	377179

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Solia S

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional active implants[1]

Technical data	
Connector	IS-1
Polarity	bipolar
Fixation	screw
Tip-to-ring distance	10 mm
Overall length	45; 53; 60 cm
Recommended introducer	6 F

Fixation helix	
Type	retractable, electrically active screw
Retractable length	max. 1.8 mm
Material	platinum/iridium
Surface structure	iridium, fractal
Area	4.5 mm^2

Ring electrode	
Material	platinum/iridium
Surface structure	iridium, fractal
Area	17.4 mm^2
Diameter	1.9 mm (5.9 F)

Conductor		
Insulation	▪ Distal	silicone
	▪ Proximal	silicone, polyurethane
Coil material		nickel-cobalt alloy
Resistance	▪ Distal	0.65 Ω/cm
	▪ Proximal	2.45 Ω/cm
Diameter		1.8 mm (5.6 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.85 mg
Steroid bonding agent	silicone rubber

Ordering information	
▪ Solia S 45	377 176
▪ Solia S 53	377 177
▪ Solia S 60	377 179

1) For combinations with MR Conditional active implants, please see the ProMRI manual.

Bradycardia Therapy – August 2011

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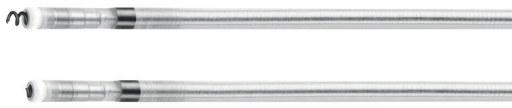
Safio S

Bipolar MR Conditional pacing lead with active fixation

ProMRI®



Product Highlights

BIOTRONIK ProMRI® provides access to MRI scans

Thin 6.6 F silicone lead body compatible with 7 F lead introducer

Same handling characteristics as conventional state-of-the-art pacing leads

Advanced screw mechanism for atraumatic fixation

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Safio S 53	retractable screw	53 cm	370945
Safio S 60	retractable screw	60 cm	370946

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Safio S

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional active implants[1]

Technical data	
Connector	IS-1
Polarity	bipolar
Fixation	screw
Tip-to-ring distance	10 mm
Overall length	53; 60 cm
Recommended introducer	7 F

Fixation helix	
Type	retractable; electrically active
Retractable length	max. 1.8 mm
Material	platinum/iridium
Surface	iridium, fractal
Area	4.5 mm^2

Ring electrode	
Material	platinum/iridium
Surface	iridium, fractal
Area	17.5 mm^2
Diameter	2.23 mm (6.7 F)

Conductor		
Insulation		silicone
Coil material		nickel-cobalt alloy
Resistance	▪ Distal	0.65 Ω/cm
	▪ Proximal	2.04 Ω/cm
Diameter		2.2 mm (6.6 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.75 mg
Steroid bonding agent	silicone rubber

Ordering information	
▪ Safio S 53	370 945
▪ Safio S 60	370 946

1) For combinations with MR Conditional active implants, please see the ProMRI manual

Bradycardia Therapy – August 2011

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Siello S

Bipolar pacing lead with active fixation

Product Highlights

Ultrathin 5.6 F silicone lead body with polyurethane coating compatible with 6 F lead introducer

Advanced screw mechanism for atraumatic fixation

Color coding at proximal connector indicating different lengths

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Siello S 45	retractable screw	45 cm	362700
Siello S 53	retractable screw	53 cm	362701
Siello S 60	retractable screw	60 cm	362702

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Siello S

Technical Data

Connector	IS-1
Polarity	bipolar
Fixation	screw
Tip-to-ring distance	10 mm
Length	45; 53; 60 cm
Recommended introducer	6 F

Fixation helix	
Type	retractable, electrically active
Retractable length	max. 1.8 mm
Material	platinum/iridium
Surface structure	iridium, fractal
Area	4.5 mm^2

Ring electrode	
Material	platinum/iridium
Surface area	iridium, fractal
Area	17.4 mm^2
Diameter	1.9 mm (5.9 F)

Conductor		
Insulation	▪ Distal	silicone
	▪ Proximal	silicone, polyurethane
Coil material		MP35N
Resistance	▪ Distal	0.65 Ω/cm
	▪ Proximal	2.45 Ω/cm
Diameter		1.8 mm (5.6 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.85 mg
Steroid bonding agent	silicone rubber

Ordering information	
▪ Siello S 45	362700
▪ Siello S 53	362701
▪ Siello S 60	362702

Bradycardia Therapy – August 2011

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Setrox S

Bipolar pacing lead with active fixation

Product Highlights

Thin 6.6 F silicone lead body with Introtek® surface coating compatible with 7 F lead introducer

Proven outer insulation thickness for uncompromised safety

Advanced screw design for atraumatic fixation

Tip design reduces myocardial stress

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Setrox S 45	retractable screw	45 cm	350973
Setrox S 53	retractable screw	53 cm	350974
Setrox S 60	retractable screw	60 cm	350975

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Setrox S

Technical Data

Technical data	
Connector	IS-1
Polarity	bipolar
Fixation	screw
Tip-to-ring distance	10 mm
Overall length	45; 53; 60 cm
Recommended introducer	7 F

Fixation helix	
Type	retractable; electrically active
Retractable length	max. 1.8 mm
Material	70 % platinum; 30 % iridium
Surface	iridium, fractal
Area	4.5 mm^2

Ring electrode	
Material	90 % platinum; 10 % iridium
Surface	iridium, fractal
Area	17.5 mm^2
Diameter	2.23 mm (6.7 F)

Conductor		
Insulation		silicone
Coil material		MP35N
Resistance	■ Distal	0.65 Ω/cm
	■ Proximal	2.04 Ω/cm
Diameter		2.2 mm (6.6 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.75 mg
Steroid bonding agent	silicone rubber

Ordering information	
■ Setrox S 45	350 973
■ Setrox S 53	350 974
■ Setrox S 60	350 975

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Selox SR

Bipolar pacing lead with active fixation

Product Highlights

Durable 7.2 F silicone lead body compatible with 8 F lead introducer

Easy-to-handle screw mechanism for maximum fixation stability

Small pacing surface for optimal pacing characteristics

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Selox SR 45	retractable screw	45 cm	343081
Selox SR 53	retractable screw	53 cm	343083
Selox SR 60	retractable screw	60 cm	343082

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Selox SR

Technical Data

Technical data	
Connector	IS-1
Polarity	bipolar
Fixation	screw
Tip-to-ring distance	10 mm
Overall length	45; 53; 60 cm
Recommended introducer	8 F

Fixation helix	
Type	retractable; electrically active
Retractable length	max. 1.9 mm
Material	70 % platinum; 30 % iridium
Surface	fractal
Area	2.0 mm^2

Ring electrode	
Material	iridium
Surface	fractal
Area	38.0 mm^2
Diameter	2.6 mm (7.8 F)

Conductor		
Insulation		silicone
Coil material		MP35N
Resistance	▪ Distal 53 and 60 cm	0.2 Ω/cm
	▪ Proximal 53 and 60 cm	1.2 Ω/cm
	▪ Distal 45 cm	0.5 Ω/cm
	▪ Proximal 45 cm	1.2 Ω/cm
Diameter		2.4 mm (7.2 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	1 mg
Steroid bonding agent	silicone rubber

Ordering information	
▪ Selox SR 45	343081
▪ Selox SR 53	343083
▪ Selox SR 60	343082

Bradycardia Therapy – August 2011

BIOTRONIK
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MyoPore®

Sutureless bipolar epicardial pacing lead

Product Highlights

Reliable 7.2 F silicone lead body implantable with FasTac® introducer system

Bipolar configuration with platinized electrodes for optimal pacing and sensing behavior

Ordering Information

Product	Fixation	Length	Order number
MyoPore BP 25	fixed screw	25 cm	360881
MyoPore BP 35	fixed screw	35 cm	360882
MyoPore BP 54	fixed screw	54 cm	360883

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MyoPore®

Technical Data

Technical data	
Connector	IS-1
Polarity	bipolar
Fixation	screw
Length	25; 35; 54 cm

Cathode electrode	
Type	electrically active screw
Penetration depth	3.5 mm
Material	platinum; iridium
Surface coating	platinized coating
Area	10 mm^2

Anode electrode	
Material	titanium
Area	62 mm^2

Conductor	
Construction	coiled wire
Material	MP35N
Insulation material	silicone
Diameter	7.2 F
Introducer	FasTac®

Ordering information	
▪ MyoPore BP 25	360 881
▪ MyoPore BP 35	360 882
▪ MyoPore BP 54	360 883

Bradycardia Therapy – August 2011

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Solia T

Bipolar MR Conditional pacing lead with passive fixation

ProMRI®

Product Highlights

BIOTRONIK ProMRI® provides access to MRI scans

Ultrathin 5.6 F lead body diameter with polyurethane coating compatible with 6 F lead introducer

Same handling characteristics as conventional state-of-the-art pacing leads

Advanced tine fixation for atraumatic fixation

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Solia T 53	4 tines	53 cm	377 180
Solia T 60	4 tines	60 cm	377 181

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Solia T

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional active implants [1]

Technical data	
Connector	IS-1
Polarity	bipolar
Fixation	4 tines
Tip-to-ring distance	12 mm
Overall length	53; 60 cm
Recommended introducer	6 F

Tip electrode	
Type	passive with 4 tines
Material	platinum/iridium
Surface structure	iridium, fractal
Area	2.1 mm²

Ring electrode	
Material	platinum/iridium
Surface structure	iridium, fractal
Area	17.4 mm²
Diameter	1.9 mm (5.9 F)

Conductor		
Insulation	▪ Distal	silicone
	▪ Proximal	silicone, polyurethane
Coil material		nickel-cobalt alloy
Resistance	▪ Distal	0.65 Ω/cm
	▪ Proximal	2.45 Ω/cm
Diameter		1.8 mm (5.6 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.27 mg
Steroid bonding agent	silicone rubber

Ordering information	
▪ Solia T 53	377 180
▪ Solia T 60	377 181

1) For combinations with MR Conditional active implants, please see the ProMRI manual.

Bradycardia Therapy – August 2011

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Siello T/JT

Bipolar pacing lead with passive fixation

Product Highlights

Ultrathin 5.6 F silicone lead body with polyurethane coating compatible with 6 F lead introducer

Advanced screw mechanism for atraumatic fixation

Color coding at proximal connector indicating different lengths

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Siello JT 45	J-shaped, 4 tines	45 cm	362703
Siello JT 53	J-shaped, 4 tines	53 cm	362704
Siello T 53	4 tines	53 cm	362705
Siello T 60	4 tines	60 cm	362706

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Siello T/JT

Technical Data

Technical data		
Connector		IS-1
Polarity		bipolar
Fixation		4 tines
Tip-to-ring distance		12 mm
Length	▪ Siello T	53; 60 cm
	▪ Siello JT	45; 53 cm
Recommended introducer		6 F

Tip electrode	
Material	platinum/iridium
Surface structure	iridium, fractal
Area	2.1 mm^2

Ring electrode	
Material	platinum/iridium
Surface structure	iridium, fractal
Area	17.4 mm^2
Diameter	1.9 mm (5.9 F)

Conductor		
Insulation	▪ Distal	silicone
	▪ Proximal	silicone, polyurethane
Coil material		MP35N
Resistance	▪ Distal	0.65 Ω/cm
	▪ Proximal	2.45 Ω/cm
Diameter		1.8 mm (5.6 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.27 mg
Steroid bonding agent	silicone rubber

Ordering information	
▪ Siello JT 45	362703
▪ Siello JT 53	362704
▪ Siello T 53	362705
▪ Siello T 60	362706

Bradycardia Therapy – August 2011

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Selox ST/JT

Bipolar pacing lead with passive fixation

Product Highlights

Thin and durable 6.3 F silicone lead bodies compatible with 7 F lead introducer

Small pacing surface for optimal pacing characteristics

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Selox ST 53	3 tines	53 cm	346 366
Selox ST 60	3 tines	60 cm	346 367
Selox JT 45	J-shaped, 3 tines	45 cm	346 369
Selox JT 53	J-shaped, 3 tines	53 cm	346 368

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Selox ST/JT

Technical Data

Technical data		
Connector		IS-1
Polarity		bipolar
Fixation		3 tines
Tip-to-ring distance		15 mm
Length	■ Selox ST	53; 60 cm
	■ Selox JT	45; 53 cm
Recommended introducer		7 F

Tip Electrode	
Pacing surface	1.3 mm^2
Material	platinum; iridium
Structure	fractal

Ring electrode	
Pacing surface	25 mm^2
Material	platinum; iridium
Structure	fractal
Diameter	2.2 mm (6.5 F)

Conductor		
Insulation		silicone
Coil material		MP35N
Resistance	■ Distal	1.1 Ω/cm
	■ Proximal ST	1.0 Ω/cm
	■ Proximal JT	0.45 Ω/cm
Diameter		2.1 mm (6.3 F)

Steroid reservoir	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.75 mg
Steroid bonding agent	silicone rubber

Ordering information	
■ Selox ST 53	346366
■ Selox ST 60	346367
■ Selox JT 45	346369
■ Selox JT 53	346368

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Synox UP/BP/J BP

Uni- and bipolar pacing lead with passive fixation

Product Highlights

Thin and durable silicone lead bodies (UP 4.2 F, BP 6 F, J BP 6.6 F) compatible with 7 F or 8 F lead introducer

Small pacing surfaces for optimal pacing characteristics

31 mm or 15 mm tip-to-ring distances for a variety of pacing and sensing options

Fractal coating of all electrically active surface areas for low thresholds

Ordering Information

Product	Fixation	Length	Order number
SX 60-UP	3 tines	60 cm	118 804
SX 53/15-BP	3 tines	53 cm	124 853
SX 60/15-BP	3 tines	60 cm	124 854
SX 53-BP	3 tines	53 cm	120 444
SX 60-BP	3 tines	60 cm	119 684
SX 45-J BP	J-shaped, 3 tines	45 cm	120 438
SX 53-J BP	J-shaped, 3 tines	53 cm	120 143

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Synox UP/BP/J BP

Technical Data

	Unipolar	Bipolar	
Connection system	IS-1	IS-1	IS-1
Polarity	unipolar	bipolar	bipolar
Tip electrode			
Area	1.3 mm^2	1.3 mm^2	1.3 mm^2
Material	titanium	titanium	titanium
Surface, structure	iridium, fractal	iridium, fractal	iridium, fractal
Fixation	3 tines	3 tines	3 tines
Ring electrode			
Area		34 mm^2	38 mm^2
Material		80 % Pt, 20 % Ir	80 % Pt, 20 % Ir
Surface, structure		iridium, fractal	iridium, fractal
Conductor			
Diameter	1.4 mm (4.2 F)	2 mm (6 F)	2.2 mm (6.6 F)
Isolation	silicone	silicone	silicone
Coil material	DFT	MP35N	MP35N
Number of filaments	4	4	4
Total length	60 cm	53.60 cm	45.53 cm
Resistance distal	0.1 Ω/cm	1.4 Ω/cm	1.4 Ω/cm
Resistance proximal		1.4 Ω/cm	0.6 Ω/cm
Tip-to-ring distance		15 mm, 31 mm	31 mm
Lead introducer	7 F	8 F	8 F
Ordering information			
	■ SX 60-UP 118 804	■ SX 53/15-BP 124 853	■ SX 45-J BP 120 438
		■ SX 60/15-BP 124 854	■ SX 53-J BP 120 143
		■ SX 53-BP 120 444	
		■ SX 60-BP 119 684	

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Arox BP/JBP

Bipolar pacing lead with passive fixation

Product Highlights

Durable 7.2 F silicone lead body compatible with 8 F lead introducer

Fractal coating of all electrically active surface areas for low thresholds

Ordering Information

Product	Fixation	Length	Order number
Arox 45-JBP	J-shaped, 4 tines	45 cm	338022
Arox 53-JBP	J-shaped, 4 tines	53 cm	338025
Arox 53-BP	4 tines	53 cm	338023
Arox 60-BP	4 tines	60 cm	338021

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Arox BP/JBP

Technical Data

Technical data		
Connection system		IS-1
Polarity		bipolar

Tip electrode		
Area		3.5 mm²
Material		iridium
Surface structure		fractal

Ring electrode		
Active surface		22.6 mm²
Material		iridium
Surface structure		fractal
Insulation		silicone
Tip to ring distance		15mm

Conductor		
Resistance (straight lead)	▪ Distal	1.16 Ω/cm
	▪ Proximal	1.05 Ω/cm
Resistance (J-shaped lead)	▪ Distal	0.55 Ω/cm
	▪ Proximal	1.05 Ω/cm
Connector material		stainless steel
Length of lead		45, 53, 60 cm
Catheter diameter		2.4 mm (7.2 F)
Suitable lead introducer		8 F

Ordering information	
▪ Arox 45-JBP	338022
▪ Arox 53-JBP	338025
▪ Arox 53-BP	338023
▪ Arox 60-BP	338021

Bradycardia Therapy – August 2011

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Polyrox BP/JBP

Uni- and bipolar pacing lead with passive fixation

Product Highlights

Durable silicone lead bodies (JUP 7.5 F, JBP and UP 5 F, BP and 15/BP 6.6 F) compatible with 10 F lead introducer

31 mm or 15 mm tip-to-ring distances for a variety of pacing and sensing options

Fractal coating of all electrically active surface areas for low thresholds

Ordering Information

Product	Fixation	Length	Order number
PX 53-JUP	J-shaped, 4 tines	53 cm	118526
PX 45-JBP	J-shaped, 4 tines	45 cm	120435
PX 53-JBP	J-shaped, 4 tines	53 cm	119924
PX 53-UP	4 tines	53 cm	120441
PX 60-UP	4 tines	60 cm	118523
PX 53-BP	4 tines	53 cm	120307
PX 60-BP	4 tines	60 cm	119687
PX 53/15-BP	4 tines	53 cm	130050
PX 60/15-BP	4 tines	60 cm	130051

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Polyrox BP/JBP

Technical Data

	PX-JUP	PX-JBP	PX-UP	PX-BP	PX 15-BP
Connection system	IS-1	IS-1	IS-1	IS-1	IS-1
Polarity	unipolar	bipolar	unipolar	bipolar	bipolar
Fixation	4 tines	4 tines	4 tines	4 tines	4 tines
Length	53 cm	45/53 cm	53/60 cm	53/60 cm	53/60 cm
Max. diameter	3 mm (9 F)	3 mm (9 F)	3 mm (9 F)	3 mm (9 F)	3 mm (9 F)
Tip electrode					
Area	3.5 mm^2	3.5 mm^2	3.5 mm^2	3.5 mm^2	3.5 mm^2
Material	titanium	titanium	titanium	titanium	titanium
Surface, structure	Ir, fractal	Ir, fractal	Ir, fractal	Ir, fractal	Ir, fractal
Ring					
Area		42 mm^2		45 mm^2	45 mm^2
Material		90 % Pt, 10 % Ir		90 % Pt, 10 % Ir	90 % Pt, 10 % Ir
Surface, structure		Ir, fractal		Ir, fractal	Ir, fractal
Tip-to-ring distance		15 mm		31 mm	15 mm
Conductor					
Insulation	silicone	silicone	silicone	silicone	silicone
Catheter diameter	1.7 mm (7.5 F)	2.6 mm (5 F)	1.7 mm (5 F)	2.2 mm (6.6 F)	2.2 mm (6.6 F)
Coil material	MP35N	MP35N	MP35N	MP35N	MP35N
No. of filaments	4	4	4	4	4
Resistance, distal	0.5 Ω/cm	1.2 Ω/cm	1.2 Ω/cm	1.2 Ω/cm	1.2 Ω/cm
Resistance, proximal		0.3 Ω/cm		1.1 Ω/cm	1.1 Ω/cm
Connector material	AISI 316L®	AISI 316L®	AISI 316L®	AISI 316L®	AISI 316L®
Suitable lead introducer	10 F	10 F	10 F	10 F	10 F
Ordering information					
	▪ PX 53-JUP 118526	▪ PX 45-JBP 120435	▪ PX 53-UP 120441	▪ PX 53-BP 120307	▪ PX 53/15-BP 130050
		▪ PX 53-JBP 119924	▪ PX 60-UP 118523	▪ PX 60-BP 119687	▪ PX 60/15-BP 130051

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Solox BP

Bipolar VDD pacing lead with passive fixation

Product Highlights

Durable 8.1 F silicone lead body compatible with 9 F lead introducer

13 cm or 15 cm atrioventricular distances allows adaptation to individual patient requirements

Fractal coating of all electrically active surface areas for low thresholds

Ordering Information

Product	Fixation	Length	Order number
Solox 65/13-BP	3 tines	65 cm	124540
Solox 65/15-BP	3 tines	65 cm	124542
Solox 58/13-BP	3 tines	58 cm	333900
Solox 58/15-BP	3 tines	58 cm	333902

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Solox BP

Technical Data

Technical data		
Connector		IS-1
Polarity	▪ Atrial	bipolar
	▪ Ventricular	bipolar
Fixation		passive fixation with 3 tines
Atrioventricular distance		13; 15 cm
Diameter		2.7 mm (8.1 F)
Recommended introducer		9 F
Overall length		58; 65 cm

Tip electrode	
Area	3.5 mm^2
Material	90 % platinum; 10 % iridium
Structure	fractal
Tip-to-ring distance	31 mm

Atrial ring electrodes	
Area	25.4 mm^2
Material	80 % platinum; 20 % iridium
Structure	fractal
Pole distance	10 mm

Ventricular ring electrode	
Area	25.4 mm^2
Material	80 % platinum; 20 % iridium
Structure	fractal

Conductor	
Insulation	silicone
Coil material	MP35N

Ordering information	
▪ Solox 65/13-BP	124 540
▪ Solox 65/15-BP	124 542
▪ Solox 58/13-BP	333 900
▪ Solox 58/15-BP	333 902

Bradycardia Therapy – August 2011

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Lumax 540 VR-T DX

Single-chamber ICD with atrial diagnostics

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy via automatic optimization of the ATP sequence.
- DFT Manager – Ensures effective defibrillation through expanded shock therapy management and 40 J maximum shock energy.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 9.4 years longevity – Avoids risks associated with device replacement procedures by extending device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 540 VR-T DX	37 cm^3	13 mm	IS-1 (2×)	368 352
			DF-1 (2×)	

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Lumax 540 VR-T DX

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF[1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF[1], ±8...(4)...±48 ms; with SMART: ±12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES[2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES[2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...40 J; 2nd shock: 2...(1)...16...(2)...40 J; 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	VDD, VDI, VVI, VDDR, VDIR,VVIR, OFF	VDI if VDD(R), VDI(R); VVI if VVI(R), OFF
Pulse amplitude (ventricle)	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width (ventricle)	0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms
AV hysteresis mode	positive, negative, IRS[plus], OFF	
▪ AV hysteresis	10...(10)...150 ms	
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles	
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles	
Upper tracking rate	90...(10)...160 ppm	
Mode Switching	VDD(R): VDI, VDIR	
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm	
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm	
▪ Post mode switch duration	1...(1)...30 min	
PVARP[3]	AUTO, 175...(25)...600 ms	
PVARP after VES	PVARP +225 ms (max. 600 ms)	
PMT protection	OFF, ON	
Sensor	accelerometer, various programmable parameters	

IRS[plus]	
IRS[plus]	OFF, ON
AV hysteresis	automatic
AV repetitive	OFF, 1...(1)...10 cycles
AV scan	OFF, 1...(1)...10 cycles
AV max	400 ms

Lead connections	
Pacing/sensing	IS-1 bipolar (2×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON
AT/AF Rate	100...(10)...250 ppm
IEGM Holter	3×32 min
Channels	atrium, right ventricle, far-field
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×55×13 mm
Volume/weight	37.2 cm³/92 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	9.4 years[4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, atrial and ventricular rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV)[5], pacing impedance (RV)[4], shock impedance (painless, at last shock)[4], RV pacing threshold[7]
Bradycardia	ventricular paces[5]
Arrhythmias	atrial arrhythmia detected (long, monitor, SVT), ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest)[5], atrial burden[5], mean VES/h[5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm[5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration[5], ven. monitoring episode duration[5], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months[8]
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 540 VR-T DX	368352

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) RV 2.5 V/0.4 ms; 60 ppm; 700 Ω; RV 15 % pacing; 4 max.energy shocks/year; Home Monitoring ON; diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.
7) Programmable safety margin.
8) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 540 VR-T

Single-chamber ICD with Automatic Threshold Monitoring

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy by automatic optimization of ATP sequence.
- DFT Manager – Ensures effective defibrillation through expanded shock therapy management and 40 J maximum shock energy.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 9.8 years longevity – Avoids risks associated with device replacement procedures by extending device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 540 VR-T	37 cm^3	13 mm	IS-1	360 348
			DF-1 (2×)	

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Lumax 540 VR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF, 4...(4)...32 %
Stability	OFF, ± 8...(4)...± 48 ms
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [1]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [1]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...40 J; 2nd shock: 2...(1)...16...(2)...40 J; 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	VVIR, VVI, OFF	VVI
Pulse amplitude	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width	0.4, 0.5, 0.7, 1.0, 1.2, 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	

Sensor parameters	
Max. sensor rate	90...(5)...160 ppm
Rate increase	0.5, 1...(1)...6 ppm/cycle
Rate decrease	0.25...(0.25)...1.25 ppm/cycle
Sensor gain	1...40
Auto gain	OFF, ON
Sensor threshold	very low, low, medium, high, very high

Lead connections	
Pacing/sensing	IS-1 bipolar (1×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON
IEGM Holter	2×32 min
Channels	ventricle, far-field
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON

Housing	
Dimensions	66×55×13 mm
Volume/weight	37.2 cm³/92 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	9.8 years [2]

Home Monitoring

Transmitted data	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer triggered message received
Lead	RV sensing amplitude [3], RV pacing impedance [4], shock impedance (painless, at last shock) [4], RV pacing threshold [5]
Bradycardia	ventricular paces [3]
Arrhythmias	SVT detected, ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest) [3]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [3], ven. monitoring episode duration [3], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months [6]

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 540 VR-T	360348

1) PES: Programmed extrastimulus.
2) RV 2.5 V/0.4 ms; 60 ppm; 700 Ω; RV 15 % pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
3) Programmable upper or lower limit.
4) Programmable upper and lower limit.
5) Programmable safety margin.
6) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 500 VR-T

Single-chamber ICD with Automatic Threshold Monitoring

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy by automatic optimization of ATP sequence.
- DFT Manager – Ensures effective defibrillation by expanded shock therapy management and 30 J maximum shock energy.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 10.5 years longevity – Avoids risks associated with device replacement procedures by extending device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 500 VR-T	34 cm^3	12 mm	IS-1	360 345
			DF-1 (2×)	

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Lumax 500 VR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF, 4...(4)...32 %
Stability	OFF, ± 8...(4)...± 48 ms
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES[1]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES[1]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...30 J; 2nd shock: 2...(1)...16...(2)...30 J; 3rd to nth shock: 30 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	VVIR, VVI, OFF	VVI
Pulse amplitude	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width	0.4, 0.5, 0.7, 1.0, 1.2, 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	

Sensor parameters	
Max. sensor rate	90...(5)...160 ppm
Rate increase	0.5, 1...(1)...6 ppm/cycle
Rate decrease	0.25...(0.25)...1.25 ppm/cycle
Sensor gain	1...40
Auto gain	OFF, ON
Sensor threshold	very low, low, medium, high, very high

Lead connections	
Pacing/sensing	IS-1 bipolar (1×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON
IEGM Holter	2×32 min
Channels	ventricle, far-field
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON

Housing	
Dimensions	66×55×12 mm
Volume/weight	34 cm³/81 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	10.5 years[2]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer-triggered message received
Lead	RV sensing amplitude[3], RV pacing impedance[4], shock impedance (painless, at last shock)[4], RV pacing threshold[5]
Bradycardia	ventricular paces[3]
Arrhythmias	SVT detected, ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest)[3]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration[3], ven. monitoring episode duration[3], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months[5]

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 500 VR-T	360345

1) PES: Programmed extrastimulus.
2) RV 2.5 V/0.4 ms; 60 ppm; 700 Ω; RV 15 % pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
3) Programmable upper or lower limit.
4) Programmable upper and lower limit.
5) Programmable safety margin.
6) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 340 VR-T XL

Single-chamber ICD with extended longevity

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy by automatic optimization of ATP sequence.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 40 J maximum shock energy.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- 9.7 years longevity – Avoids risks associated with device replacement procedures by extending device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 340 VR-T XL	37 cm^3	13 mm	IS-1	357 889
			DF-1 (2×)	

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Lumax 340 VR-T XL

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF; 4...(4)...32 %
Stability	OFF; ± 8...(4)...± 48 ms
Sustained VT	OFF; 0.5; 1.0; 2.0; 3.0; 5...(5)...30 min

VF detection and redetection	
VF interval	OFF; 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF; 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [1]
Attempts	OFF; 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimisation	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [1]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF; 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...40 J 2nd shock: 2...(1)...16...(2)...40 J 3rd to nth shock: 40 J
Confirmation (per zone)	OFF, ON
Post-shock duration	OFF; 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	VVIR, VVI, OFF	VVI
Pulse amplitude	0.2...(0.1)...6.2; 7.5 V	7.5 V
Pulse width	0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	

Sensor parameters	
Max. sensor rate	90...(5)...160 ppm
Rate increase	0.5; 1...(1)...6 ppm/cycle
Rate decrease	0.25...(0.25)...1.25 ppm/cycle
Sensor gain	1...40
Auto gain	OFF, ON
Sensor threshold	very low, low, medium, high, very high

Lead connections	
Pacing/sensing	IS-1 bipolar (1×)
Shock	DF-1 (2×)

Diagnostic functions	
IEGM Holter	2 × 32 min
Channels	ventricle, far-field
Length of pre-history	fixed: 30 s
IEGM at SVT	OFF, ON

Housing	
Dimensions	66 × 55 × 13 mm
Volume/weight	37.2 cm^3/92 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	9.7 years [2]

Home Monitoring

Transmitted data	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer triggered message received
Lead	RV sensing amplitude [3], RV pacing impedance [4], shock impedance (painless, at last shock) [4]
Bradycardia	ventricular paces [3]
Arrhythmias	SVT detected, ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest) [3]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [3], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [3], ven. monitoring episode duration [3], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF; 2; 3; 4; 6 months

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 340 VR-T XL	357889

1) PES: Programmed extrastimulus.
2) 2.5 V/0.5 ms; 60 ppm; 700 Ω; 4 max. energy shocks/year; 15 % pacing.
3) Programmable upper or lower limit.
4) Programmable upper and lower limit.

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Lumax 340 VR-T

Single-chamber ICD with IEGM-Online HD®

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy via automatic optimization of the ATP sequence.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 40J maximum shock energy.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- 6.75 years longevity – Avoids risks associated to device replacement procedures by superior device longevity due to energy efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 340 VR-T	37 cm^3	13 mm	IS-1	355 271
			DF-1 (2×)	

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Lumax 340 VR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF; 4...(4)...32 %
Stability	OFF; ± 8...(4)...± 48 ms
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES[1]
Attempts	OFF; 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimisation	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES[1]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF; 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...40 J 2nd shock: 2...(1)...16...(2)...40 J 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	VVIR, VVI, OFF	VVI
Pulse amplitude	0.2...(0.1)...6.2; 7.5 V	7.5 V
Pulse width	0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	

Sensor parameters	
Max. sensor rate	90...(5)...160 ppm
Rate increase	0.5; 1...(1)...6 ppm/cycle
Rate decrease	0.25...(0.25)...1.25 ppm/cycle
Sensor gain	1...40
Auto gain	OFF, ON
Sensor threshold	very low, low, medium, high, very high

Lead connections	
Pacing/sensing	IS-1 bipolar (1×)
Shock	DF-1 (2×)

Diagnostic functions	
IEGM Holter	2 × 32 min
Channels	ventricle, far-field
Length of pre-history	fixed: 30 s
IEGM at SVT	OFF, ON

Housing	
Dimensions	66 × 55 × 13 mm
Volume/weight	37.2 cm^3/92 g
Material	titanium
Energy source	3.2 V, 1280 mAh
Longevity	6.75 years[2]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer triggered message received
Lead	RV sensing amplitude[3], RV pacing impedance[4], shock impedance (painless, at last shock)[4]
Bradycardia	ventricular paces[3]
Arrhythmias	SVT detected, ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest)[3]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm[3], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration[3], ven. monitoring episode duration[3], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF; 2; 3; 4; 6 months

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 340 VR-T	355271

1) PES: Programmed extrastimulus.
2) 2.5 V/0.5 ms; 60 ppm; 700 Ω; 4 max. energy shocks/year; 15 % pacing.
3) Programmable upper or lower limit.
4) Programmable upper and lower limit.

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Lumax 300 VR-T

Single-chamber ICD with IEGM-Online HD®

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy via automatic optimization of the ATP sequence.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 30J maximum shock energy.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- 7.2 years longevity – Avoids risks associated to device replacement procedures by superior device longevity due to energy efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 300 VR-T	34 cm^3	12 mm	IS-1	355 270
			DF-1 (2×)	

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Lumax 300 VR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF; 4...(4)...32 %
Stability	OFF; ± 8...(4)...± 48 ms
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [1]
Attempts	OFF; 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimisation	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [1]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF; 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...30 J 2nd shock: 2...(1)...16...(2)...30 J 3rd to nth shock: 30 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	VVIR, VVI, OFF	VVI
Pulse amplitude	0.2...(0.1)...6.2; 7.5 V	7.5 V
Pulse width	0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	

Sensor parameters	
Max. sensor rate	90...(5)...160 ppm
Rate increase	0.5; 1...(1)...6 ppm/cycle
Rate decrease	0.25...(0.25)...1.25 ppm/cycle
Sensor gain	1...40
Auto gain	OFF, ON
Sensor threshold	very low, low, medium, high, very high

Lead connections	
Pacing/sensing	IS-1 bipolar (1×)
Shock	DF-1 (2×)

Diagnostic functions	
IEGM Holter	2 × 32 min
Channels	ventricle, far-field
Length of pre-history	fixed: 30 s
IEGM at SVT	OFF, ON

Housing	
Dimensions	66 × 55 × 12 mm
Volume/weight	34.6 cm^3/81 g
Material	titanium
Energy source	3.2 V, 1280 mAh
Longevity	7.2 years [2]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer triggered message received
Lead	RV sensing amplitude [3], RV pacing impedance [4], shock impedance (painless, at last shock) [4]
Bradycardia	ventricular paces [3]
Arrhythmias	SVT detected, ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest) [3]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [3], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [3], ven. monitoring episode duration [3], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF; 2; 3; 4; 6 months

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 300 VR-T	355 270

1) PES: Programmed extrastimulus.
2) 2.5 V/0.5 ms; 60 ppm; 700 Ω; 4 max. energy shocks/year; 15 % pacing.
3) Programmable upper or lower limit.
4) Programmable upper and lower limit.

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Lumax 540 DR-T

Dual-chamber ICD with Automatic Threshold Monitoring

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy via automatic optimization of the ATP sequence.
- DFT Manager – Ensures effective defibrillation through expanded shock therapy management and 40 J maximum shock energy.
- Intrinsic Rhythm Support IRS^{plus} – Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 8.8 years longevity – Avoids risks associated with device replacement procedures by extending device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 540 DR-T	37 cm³	13 mm	IS-1 (2×)	360 346
			DF-1 (2×)	

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Lumax 540 DR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF[1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF[1], ± 8...(4)...± 48 ms; with SMART: ± 12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES[2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES[2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...40 J; 2nd shock: 2...(1)...16...(2)...40 J; 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF
Pulse amplitude (atrium/ventricle)	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width (atrium/ventricle)	0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms
AV hysteresis mode	positive, negative, IRS[plus], OFF	
▪ AV hysteresis	10...(10)...150 ms	
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles	
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles	
Upper tracking rate	90...(10)...160 ppm	
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR	
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm	
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm	
▪ Post mode switch duration	1...(1)...30 min	
PVARP[3]	AUTO, 175...(25)...600 ms	
PVARP after VES	PVARP +225 ms (max. 600 ms)	
PMT protection	OFF, ON	
Sensor	accelerometer, various programmable parameters	

IRS[plus]	
IRS[plus]	OFF, ON
AV hysteresis	automatic
AV repetitive	OFF, 1...(1)...10 cycles
AV scan	OFF, 1...(1)...10 cycles
AV max	400 ms

Lead connections	
Pacing/sensing	IS-1 bipolar (2×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON
AT/AF rate	100...(10)...250 ppm
IEGM Holter	3×32 min
Channels	atrium, right ventricle, far-field
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×55×13 mm
Volume/weight	37.2 cm³/92 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	8.8 years[4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV)[5], pacing impedance (RA, RV)[4], shock impedance (painless, at last shock)[4], RV pacing threshold[7]
Bradycardia	ventricular paces[5]
Arrhythmias	atrial arrhythmia detected (long, monitor, SVT), ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest)[5], atrial burden[5], mean VES/h[5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm[5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration[5], ven. monitoring episode duration[5], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months[8]
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 540 DR-T	360346

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) RA/RV 2.5 V/0.4 ms; 60 ppm; 700 Ω; RA 50 %, RV 15 % pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.
7) Programmable safety margin.
8) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 500 DR-T

Dual-chamber ICD with Automatic Threshold Monitoring

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy by automatic optimization of ATP sequence.
- DFT Manager – Ensures effective defibrillation by expanded shock therapy management and 30J maximum shock energy.
- Intrinsic Rhythm Support IRS^{plus} – Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 9.4 years longevity – Avoids risks associated with device replacement procedures by extending device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 500 DR-T	34 cm^3	12 mm	IS-1 (2×)	360 341
			DF-1 (2×)	

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Lumax 500 DR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF [1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF [1], ± 8...(4)...± 48 ms; with SMART: ± 12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...30 J 2nd shock: 2...(1)...16...(2)...30 J 3rd to nth shock: 30 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF
Pulse amplitude (atrium/ventricle)	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width (atrium/ventricle)	0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms
AV hysteresis mode	positive, negative, IRS^{plus}, OFF	
▪ AV hysteresis	10...(10)...150 ms	
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles	
Upper tracking rate	90...(10)...160 ppm	
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR	
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm	
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm	
▪ Post mode switch duration	1...(1)...30 min	
PVARP [3]	AUTO, 175...(25)...600 ms	
PVARP after VES	PVARP +225 ms (max. 600 ms)	
PMT protection	OFF, ON	
Sensor	accelerometer, various programmable parameters	

IRS^{plus}	
IRS^{plus}	OFF, ON
AV hysteresis	automatic
AV repetitive	OFF, 1...(1)...10 cycles
AV scan	OFF, 1...(1)...10 cycles
AV max	400 ms

Lead connections	
Pacing/sensing	IS-1 bipolar (2×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON
AT/AF rate	100...(10)...250 ppm
IEGM Holter	3×32 min
Channels	atrium, right ventricle, far-field
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×55×12 mm
Volume/weight	34 cm³/81 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	9.4 years [4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer triggered message received
Leads	sensing amplitude (RA, RV) [5], pacing impedance (RA, RV) [4], shock impedance (painless, at last shock) [4], RV pacing threshold [7]
Bradycardia	ventricular paces [5]
Arrhythmias	atrial arrhythmia detected (long, monitor, SVT), ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest) [5], atrial burden [5], mean VES/h [5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [5], ven. monitoring episode duration [5], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months [8]
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 500 DR-T	360341

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) RA/RV 2.5 V/0.4 ms; 60 ppm; 700 Ω; RA 50 %, RV 15 % pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.
7) Programmable safety margin.
8) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 340 DR-T

Dual-chamber ICD with IEGM-Online HD®

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy by automatic optimization of ATP sequence.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 40 J maximum shock energy.
- Intrinsic Rhythm Support IRS^{plus} – Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- 6.1 years longevity – Avoids risks associated to device replacement procedures by superior device longevity due to energy efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 340 DR-T	37 cm³	13 mm	IS-1 (2×)	355 267
			DF-1 (2×)	

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Lumax 340 DR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF [1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF [1], ± 8...(4)...± 48 ms; with SMART: ± 12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...40 J 2nd shock: 2...(1)...16...(2)...40 J 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF
Pulse amplitude (atrium/ventricle)	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width (atrium/ventricle)	0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms
AV hysteresis mode	positive, negative, IRS^{plus}, OFF	
▪ AV hysteresis	OFF, 10...(10)...150 ms	
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles	
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles	
Upper tracking rate	90...(10)...160 ppm	
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR	
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm	
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm	
▪ Post mode switch duration	1...(1)...30 min	
PVARP [3]	AUTO, 175...(25)...600 ms	
PVARP after VES	PVARP +225 ms (max. 600 ms)	
PMT protection	OFF, ON	
Sensor	accelerometer, various programmable parameters	

IRS^{plus}	
IRS^{plus}	OFF, ON
AV hysteresis	automatic
AV repetitive	OFF, 1...(1)...10 cycles
AV scan	OFF, 1...(1)...10 cycles
AV max	400 ms

Lead connections	
Pacing/sensing	IS-1 bipolar (2×)
Shock	DF-1 (2×)

Diagnostic functions	
AT/AF rate	100...(10)...250 ppm
IEGM Holter	3×32 min
Channels	atrium, right ventricle, far-field
Length of pre-history	fixed: 30 s
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×55×13 mm
Volume/weight	37.2 cm³/92 g
Material	titanium
Energy source	3.2 V, 1280 mAh
Longevity	6.1 years [4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer triggered message received
Leads	sensing amplitude (RA, RV) [5], pacing impedance (RA, RV) [6], shock impedance (painless, at last shock) [6]
Bradycardia/CRT	ventricular paces [5]
Arrhythmias	atrial arrhythmia detected (long, monitor, SVT), ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest) [5], atrial burden [5], mean VES/h [5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [5], ven. monitoring episode duration [5], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 2, 3, 4, 6 months
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 340 DR-T	355 267

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) 2.5 V/0.5 ms; 60 ppm; 700 Ω; 4 max energy shocks/year; 50 % RA pacing; 15 % RV pacing.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.

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Lumax 300 DR-T

Dual-chamber ICD with IEGM-Online HD®

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- ATP Optimization – Enables faster delivery of effective ATP therapy via automatic optimization of the ATP sequence.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 30 J maximum shock energy.
- Intrinsic Rhythm Support IRS^{plus} – Avoids unnecessary ventricular pacing to minimize associated risks such as AF and HF hospitalization.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for inappropriate therapies.
- 6.5 years longevity – Avoids risks associated to device replacement procedures by superior device longevity due to energy efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 300 DR-T	37 cm^3	12 mm	IS-1 (2×)	355 266
			DF-1 (2×)	

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Lumax 300 DR-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF [1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF [1], ±8...(4)...±48 ms; with SMART: ±12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...30 J 2nd shock: 2...(1)...16...(2)...30 J 3rd to nth shock: 30 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF
Pulse amplitude (atrium/ventricle)	0.2...(0.1)...6.2, 7.5 V	7.5 V
Pulse width (atrium/ventricle)	0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	1.5 ms
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm
▪ Repetitive/scan hysteresis	OFF, 1...(1)...15 cycles	
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms
AV hysteresis mode	positive, negative, IRS^{plus}, OFF	
▪ AV hysteresis	10...(10)...150 ms	
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles	
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles	
Upper tracking rate	90...(10)...160 ppm	
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR	
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm	
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm	
▪ Post mode switch duration	1...(1)...30 min	
PVARP [3]	AUTO, 175...(25)...600 ms	
PVARP after VES	PVARP +225 ms (max. 600 ms)	
PMT protection	OFF, ON	
Sensor	accelerometer, various programmable parameters	

IRS^{plus}	
IRS^{plus}	OFF, ON
AV hysteresis	automatic
AV repetitive	OFF, 1...(1)...10 cycles
AV scan	OFF, 1...(1)...10 cycles
AV max	400 ms

Lead connections	
Pacing/sensing	IS-1 bipolar (2×)
Shock	DF-1 (2×)

Diagnostic functions	
AT/AF rate	100...(10)...250 ppm
IEGM Holter	3×32 min
Channels	atrium, right ventricle, far-field
Length of pre-history	fixed: 30 s
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing AT/AF episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×55×12 mm
Volume/weight	34.6 cm³/81 g
Material	titanium
Energy source	3.2 V, 1280 mAh
Longevity	6.5 years [4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer triggered message received
Leads	sensing amplitude (RA, RV) [5], pacing impedance (RA, RV) [6], shock impedance (painless, at last shock) [6]
Bradycardia/CRT	ventricular paces [5]
Arrhythmias	atrial arrhythmia detected (long, monitor, SVT), ventricular arrhythmia detected (VT1, VT2, VF), ineffective max. energy shock
Heart Failure Monitor®	mean heart rate (24 h, at rest) [5], atrial burden [5], mean VES/h [5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [5], ven. monitoring episode duration [5], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 2, 3, 4, 6 months
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 300 DR-T	355 266

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) 2.5 V/0.5 ms; 60 ppm; 700 Ω; 4 max. energy shocks/year; 50 % RA pacing; 15 % RV pacing.
5) programmable upper or lower limit.
6) programmable upper and lower limit.

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Linox^{smart} S DX

Pentapolar ICD lead with active fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide® surface coating compatible with 8 F lead introducer

Floating atrial dipole enables optimal atrial sensing for advanced SVT discrimination

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

Advanced screw mechanism for atraumatic fixation

True bipolar ventricular sensing and pacing with 11 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Dipole-to-tip distance	Order number
Linox^{smart} S DX 65/15	retractable, electrically active screw	65 cm	15 cm	365500
Linox^{smart} S DX 65/17	retractable, electrically active screw	65 cm	17 cm	365501

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Linox^{smart} S DX

Technical Data

Technical data	
Connector	2×IS-1; DF-1
Polarity	pentapolar
Application	right ventricle
Overall length	65 cm

Tip electrode	
Surface area	4.5 mm^2
Material	platinum/iridium
Structure	iridium, fractal
Fixation	retractable, electrically active screw
Extension of screw	1.8 mm
Revolutions until complete ejection	max. 20
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	1 mg
Steroid bonding agent	silicone rubber

Ring electrode	
Surface area	24.5 mm^2
Material	platinum/iridium
Structure	iridium, fractal
Tip-to-ring distance	11 mm

Protek® shock coil		
Length	■ ventricle	50 mm
Diameter		2.6 mm (7.8 F)
Surface area	■ ventricle	290 mm^2
Material		platinum/iridium
Distance to tip	■ ventricle	17 mm

Floating atrial dipole	
Surface area	24.5 mm^2
Material	platinum/iridium
Structure	iridium, fractal
Distance to tip	150/170 mm
Atrial dipole distance	15 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Silglide® surface coating
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
■ Linox^{smart} S DX 65/15	365500
■ Linox^{smart} S DX 65/17	365501

Tachyarrhythmia Therapy – August 2011

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Linox^{smart} S

Tripolar ICD lead with active fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide® surface coating compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

Advanced screw mechanism with maximum flexibility for atraumatic fixation

True bipolar sensing and pacing with 11 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Linox^{smart} S 60	retractable screw	61 cm	375 012
Linox^{smart} S 65	retractable screw	65 cm	369 818
Linox^{smart} S 75	retractable screw	75 cm	369 819

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Linox^{smart} S

Technical Data

Technical data	
Connector	IS-1; DF-1
Polarity	tripolar
Application	right ventricle
Fixation	screw
Overall length	61; 65; 75 cm

Fixation helix	
Type	retractable, electrically active screw
Retractable length	1.8 mm
Revolutions until complete ejection	max. 20
Material	platinum/iridium
Surface structure	iridium, fractal
Area	4.5 mm^2

Ring electrode	
Tip-to-ring distance	11 mm
Material	platinum/iridium
Surface structure	iridium, fractal
Area	24.5 mm^2

Protek® shock coil	
Length	50 mm
Diameter	2.6 mm (7.8 F)
Surface area	290 mm^2
Material	platinum/iridium
Distance to tip	17 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Silglide® surface coating
Diameter	2.6 mm (7.8 F)
Recommended introducer	8 F

Steroid	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	1 mg
Steroid bonding agent	silicone rubber

Ordering information	
■ Linox^{smart} S 60	375012
■ Linox^{smart} S 65	369818
■ Linox^{smart} S 75	369819

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Linox^{smart} SD

Quadrupolar ICD lead with active fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide® surface coating compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

Advanced screw mechanism with maximum flexibility for atraumatic fixation

True bipolar sensing and pacing with 11 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Proximal coil-to-tip distance	Order number
Linox^{smart} SD 60/16	retractable screw	61 cm	16 cm	359 065
Linox^{smart} SD 65/16	retractable screw	65 cm	16 cm	359 066
Linox^{smart} SD 65/18	retractable screw	65 cm	18 cm	359 067
Linox^{smart} SD 75/18	retractable screw	75 cm	18 cm	359 068

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Linox^{smart} SD

Technical Data

Technical data		
Connector		IS-1; 2 × DF-1
Polarity		quadrupolar
Application		right ventricle; vena cava superior
Overall length		60; 65; 75 cm

Tip electrode		
Surface area		4.5 mm²
Material		platinum/iridium
Structure		iridium, fractal
Fixation		retractable, electrically active screw
Extension of screw		1.8 mm
Revolutions until complete ejection		max. 20
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		1 mg
Steroid bonding agent		silicone rubber

Ring electrode		
Surface area		24.5 mm²
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		11 mm

Protek® shock coil		
Length	■ ventricle	50 mm
	■ vena cava	70 mm
Diameter		2.6 mm (7.8 F)
Surface area	■ ventricle	290 mm²
	■ vena cava	410 mm²
Material		platinum/iridium
Distance to tip	■ ventricle	17 mm
	■ vena cava	160; 180 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Silglide® surface coating
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
■ Linox^{smart} SD 60/16	359 065
■ Linox^{smart} SD 65/16	359 066
■ Linox^{smart} SD 65/18	359 067
■ Linox^{smart} SD 75/18	359 068

Tachyarrhythmia Therapy – August 2011

BIOTRONIK
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Linox S

Tripolar ICD lead with active fixation

Product Highlights

Reliable 7.8 F silicone lead body compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

Advanced screw mechanism for atraumatic fixation

True bipolar sensing and pacing with 11 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Linox S 65	retractable screw	65 cm	351 333
Linox S 75	retractable screw	75 cm	351 334

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Linox S

Technical Data

Technical data		
Connector		IS-1; DF-1
Polarity		tripolar
Application		right ventricle
Overall length		65; 75 cm

Tip electrode		
Surface area		4.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Fixation		retractable, electrically active screw
Extension of screw		1.8 mm
Revolutions until complete ejection		max. 20
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		1 mg
Steroid bonding agent		silicone rubber

Ring electrode		
Surface area		24.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		11 mm

Protek® shock coil		
Length	▪ ventricle	50 mm
Diameter	▪ ventricle	2.6 mm (7.8 F)
Surface area	▪ ventricle	290 mm^2
Material	▪ ventricle	platinum/iridium
Distance to tip	▪ ventricle	17 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Introtek®
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
▪ Linox S 65	351 333
▪ Linox S 75	351 334

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Linox SD

Quadrupolar ICD lead with active fixation

Product Highlights

Reliable 7.8 F silicone lead body compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

Advanced screw mechanism for atraumatic fixation

True bipolar sensing and pacing with 11 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Proximal coil-to-tip distance	Order number
Linox SD 65/16	retractable screw	65 cm	16 cm	350053
Linox SD 65/18	retractable screw	65 cm	18 cm	350054
Linox SD 75/16	retractable screw	75 cm	16 cm	350055
Linox SD 75/18	retractable screw	75 cm	18 cm	350056

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Linox SD

Technical Data

Technical data		
Connector		IS-1; 2 × DF-1
Polarity		quadrupolar
Application		right ventricle; vena cava superior
Overall length		65; 75 cm

Tip electrode		
Surface area		4.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Fixation		retractable, electrically active screw
Extension of screw		1.8 mm
Revolutions until complete ejection		max. 20
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		1 mg
Steroid bonding agent		silicone rubber

Ring electrode		
Surface area		24.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		11 mm

Protek® shock coil		
Length	■ Ventricle	50 mm
	■ Vena cava	70 mm
Diameter	■ Ventricle	2.6 mm (7.8 F)
	■ Vena cava	2.6 mm (7.8 F)
Surface area	■ Ventricle	290 mm^2
	■ Vena cava	410 mm^2
Material	■ Ventricle	platinum/iridium
	■ Vena cava	platinum/iridium
Distance to tip	■ Ventricle	17 mm
	■ Vena cava	160; 180 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Introtek®
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
■ Linox SD 65/16	350053
■ Linox SD 65/18	350054
■ Linox SD 75/16	350055
■ Linox SD 75/18	350056

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Linox^{smart} T

Tripolar ICD lead with passive fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide® surface coating compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

Advanced tip design with maximum flexibility for atraumatic fixation

True bipolar sensing and pacing with 9 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Linox^{smart} T 65	4 tines	65 cm	369 820

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Linox^{smart} T

Technical Data

Technical data	
Connector	IS-1; DF-1
Polarity	tripolar
Application	right ventricle
Fixation	4 tines
Overall length	65 cm

Tip electrode	
Surface area	1.8 mm^2
Material	platinum/iridium
Structure	iridium, fractal
Fixation	passive with 4 tines
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.75 mg
Steroid bonding agent	silicone rubber

Ring electrode	
Surface area	24.5 mm^2
Material	platinum/iridium
Structure	iridium, fractal
Tip-to-ring distance	9 mm

Protek® shock coil	
Length	50 mm
Diameter	2.6 mm (7.8 F)
Surface area	290 mm^2
Material	platinum/iridium
Distance to tip	15 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Silglide® surface coating
Diameter	2.6 mm (7.8)
Introducer	8 F

Ordering information	
Linox^{smart} T 65	369 820

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Linox^{smart} TD

Quadrupolar ICD lead with passive fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide® surface coating compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

True bipolar sensing and pacing with 9 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Linox^{smart} TD 65/16	4 tines	65 cm	359 073
Linox^{smart} TD 65/18	4 tines	65 cm	359 074
Linox^{smart} TD 75/18	4 tines	75 cm	359 075

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Linox^{smart} TD

Technical Data

Technical data		
Connector		IS-1; 2 × DF-1
Polarity		quadrupolar
Application		right ventricle; vena cava superior
Overall length		65; 75 cm

Tip electrode		
Surface area		1.8 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Fixation		passive with 4 tines
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		0.75 mg
Steroid bonding agent		silicone rubber

Ring electrode		
Surface area		24.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		9 mm

Protek® shock coil		
Length	■ Ventricle	50 mm
	■ Vena cava	70 mm
Diameter		2.6 mm (7.8 F)
Surface area	■ Ventricle	290 mm^2
	■ Vena cava	410 mm^2
Material		platinum/iridium
Distance to tip	■ Ventricle	15 mm
	■ Vena cava	160; 180 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Silglide® surface coating
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
■ Linox^{smart} TD 65/16	359 073
■ Linox^{smart} TD 65/18	359 074
■ Linox^{smart} TD 75/18	359 075

Tachyarrhythmia Therapy – August 2011

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Linox T

Tripolar ICD lead with passive fixation

Product Highlights

Reliable 7.8 F silicone lead body with compatible 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

True bipolar sensing and pacing with 9 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Linox T 65	4 tines	65 cm	351 353
Linox T 75	4 tines	75 cm	351 354

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Linox T

Technical Data

Technical data		
Connector		IS-1; DF-1
Polarity		tripolar
Application		right ventricle
Overall length		65; 75 cm

Tip electrode		
Surface area		1.8 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Fixation		passive with 4 tines
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		0.75 mg
Steroid bonding agent		silicone rubber

Ring electrode		
Surface area		24.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		9 mm

Protek® shock coil		
Length	■ Ventricle	50 mm
Diameter	■ Ventricle	2.6 mm (7.8 F)
Surface area	■ Ventricle	290 mm^2
Material	■ Ventricle	platinum/iridium
Distance to tip	■ Ventricle	15 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Introtek®
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
■ Linox T 65	351 353
■ Linox T 75	351 354

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Linox TD

Quadrupolar ICD lead with passive fixation

Product Highlights

Reliable 7.8 F silicone lead body compatible with 8 F lead introducer

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

True bipolar sensing and pacing with 9 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Linox TD 65/16	4 tines	65 cm	351 337
Linox TD 65/18	4 tines	65 cm	351 338
Linox TD 75/16	4 tines	75 cm	351 339
Linox TD 75/18	4 tines	75 cm	351 340

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Linox TD

Technical Data

Technical data		
Connector		IS -1; 2 × DF -1
Polarity		quadrupolar
Application		right ventricle; vena cava superior
Overall length		65; 75 cm

Tip electrode		
Surface area		1.8 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Fixation		passive with 4 tines
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		0.75 mg
Steroid bonding agent		silicone rubber

Ring electrode		
Surface area		24.5 mm^2
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		9 mm

Protek® shock coil		
Length	■ Ventricle	50 mm
	■ Vena cava	70 mm
Diameter	■ Ventricle	2.6 mm (7.8 F)
	■ Vena cava	2.6 mm (7.8 F)
Surface area	■ Ventricle	290 mm^2
	■ Vena cava	410 mm^2
Material	■ Ventricle	platinum/iridium
	■ Vena cava	platinum/iridium
Distance to tip	■ Ventricle	15 mm
	■ Vena cava	160; 180 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Structure	Introtek®
Diameter	2.6 mm (7.8 F)
Introducer	8 F

Ordering information	
■ Linox TD 65/16	351 337
■ Linox TD 65/18	351 338
■ Linox TD 75/16	351 339
■ Linox TD 75/18	351 340

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Kentrox A+ Steroid

Pentapolar ICD lead with passive fixation

Product Highlights

Durable 9.3 F silicone lead body compatible with 10 F lead introducer

Floating atrial dipole enables atrial sensing for advanced SVT discrimination

Protek® shock-coil design for minimal tissue ingrowths and increased energy efficiency

True bipolar ventricular sensing and pacing with 9 mm tip-to-ring distance

Fractal coating and steroid elution for low thresholds and optimal sensing

Ordering Information

Product	Fixation	Length	Order number
Kentrox A+ 75/15 Steroid	4 tines	75 cm	345 633
Kentrox A+ 75/17 Steroid	4 tines	75 cm	345 634

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Kentrox A+ Steroid

Technical Data

Technical data	
Polarity	pentapolar
Connection	2 × IS-1, DF-1
Application	right ventricle, right atrium
Overall length	75 cm

Tip electrode	
Surface area	1.8 mm^2
Material	platinum/iridium
Surface, structure	iridium, fractal
Fixation of lead	passive (silicone tines)
Steroid	0.75 mg dexamethasone acetate (DXA)
Steroid binder	silicone

Ring electrode	
Surface area	39 mm^2
Material	platinum/iridium
Surface, structure	iridium, fractal
Distance to tip	9 mm

Atrial ring electrodes	
Surface area	30.2 mm^2
Material	platinum/iridium
Surface, structure	iridium, fractal
Distance dipol	15 mm (center to center)
Distance to tip	150 mm/170 mm

Protek® shock coil	
Length	45 mm
Diameter	3.1 mm (9.3 F)
Surface area	3.1 cm^2
Material	platinum/iridium
Distance to tip	16 mm

Conductor	
Construction	wire coil, cable
Insulation	silicone
Diameter	3.1 mm (9.3 F)
Introducer	10 F

Ordering information	
▪ Kentrox A+ 75/15 Steroid	345 633
▪ Kentrox A+ 75/17 Steroid	345 634

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Kainox VCS

Unipolar ICD lead for vena cava superior

Product Highlights

Durable 7.9 F silicone lead body compatible with 9 F lead introducer

Floating vena cava superior shock coil

Ordering Information

Product	Fixation	Length	Order number
Kainox VCS 60	none	60 cm	124325

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Kainox VCS

Technical Data

Technical data	
Polarity	unipolar
Connector	DF-1
Application	vena cava superior
Total length	60 cm

Shock coil	
Length	70 mm
Diameter (max.)	2.6 mm (7.9 F)
Surface area	4.0 cm^2
Material	platinum/iridium (80 %/20 %)
Surface finish	iridium, fractal structure
Resistance	< 0.1 Ω

Conductor	
Design	coil
Diameter including insulation	1.7 mm (5.2 F)
Insulation	silicone
Introducer	LI-9 (9 F)

Ordering information	
Kainox VCS 60	124325

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Stratos LV-T

Rate adaptive, three-chamber pacemaker for cardiac resynchronization therapy with BIOTRONIK Home Monitoring®

Product Highlights

First CRT pacemaker with BIOTRONIK Home Monitoring®

- Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System)

BiV/LV/RV pacing, three independent channels – Optimal prevention with three pacing algorithms

- Overdrive pacing
- Post-AES pacing
- Rate fading during mode switching

100 % resynchronization by RV tracking

Three AF prevention algorithms

24-hour, Superior diagnostics

- Percentage of CRT pacing
- Mean heart rate
- Mean heart rate at rest
- Daily activity log
- Number of VES per hour
- Daily AF burden

Ordering Information

Model	Weight	Order number
Stratos LV-T uncoated	30 g	338 202
Stratos LV-T coated	30 g	338 203

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Stratos LV-T

Technical Data

Stratos LV-T	
NBG Code[1]	DDDRV
Mode	**DDD**(R); DDT(R); DDT(R)/A; DDI(R)/T; DVI(R); DVT(R); D0O(R); VDD(R); VDT(R); VDI(R); VVI(R); VVT(R); VOO(R); AAI(R); AAT(R); AOO(R); OFF
VV synchronization	OFF, **BiV RV RV-T**[2], LV RV RV-T[3]
Basic rate (day/night)	32 ...(1)...**60**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
Rate dynamic hysteresis	**OFF**; -5...(-5)...-90 ppm
Rate repetitive hysteresis	**OFF**; 1...(1)...15
Rate scan hysteresis	**OFF**; 1...(1)...15
Pulse amplitude (A/RV/LV)	0.2...(0.1)...**3.6**....(0.1)...6.2; 7.2 V (3 separate channels)
Pulse width (A/RV/LV)	0.1; 0.2; 0.3; **0.4**; 0.5; 0.75; 1.0; 1.25; 1.5 ms (3 separate channels)
Sensitivity (A)	0.1...(0.1)...**1.0**...(0.5)...7.5 mV
Sensitivity (RV/LV)[4]	0.5...(0.5)...**2.5**...(0.5)...7.5 mV
Polarity pace (A/RV/LV)	**unipolar**; bipolar (3 separate channels)
Polarity sense (A/RV/LV[4])	**unipolar**; bipolar
AV delay	15...(5)...300; **dynamic**
Dynamic AV delay	OFF; 15...(15)...**150**...(5)...300 ms at lower rate; 15...(5)...**120**...(5)...300 ms at high rate
Sense compensation	OFF; -5...(-5)...**-50**...(-5)...-120 ms
AV safety interval	100 ms
AV hysteresis	**OFF**; 10...(10)...100 ms
AV repetitive hysteresis	**OFF**; 1...(1)...10
AV scan hysteresis	**OFF**; 1...(1)...10
First chamber paced	**RV**; LV
VV delay after pace	0; **5**; 10...10...100 ms
VV delay after sense	0; **5**; 10/20...10...100 ms temporary

Refractory periods	
Atrial refractory period	**AUTO**; 225...(25)...775 ms
Farfield protection after Vp	30...(10)...**100**...(10)...220 ms
Farfield protection after Vs	30...(10)...**100**...(10)...200 ms
PMT protection	AUTO; 175...(25)...**250**...(25)...600 ms
PMT detection/termination	OFF; **ON**
PMT VA criterion	250...(10)...**350**...(10)...500 ms
Ventricular blanking after Ap	**30**...(5)...70 ms
Ventricular refractory period	150...(25)...**250**...(25)...500 ms
VES discrimination after As	OFF; 250...(50)...**350**...(50)...450 ms
Mode Switching	OFF; **ON**
X-out-of-8 criterion	3...(1)...**5**...(1)...8
Z-out-of-8 criterion	3...(1)...**5**...(1)...8
Intervention rate	100...(10)...**160**...(10)...250 ppm
Mode Switching basic rate	32...(1)...**70**...(1)...88...(2)...122...(3)...140...(5)...180 ppm
Upper tracking rate	90...(10)...**130**...(10)...180 ppm
Tachycardia mode	2:1; **WRL**
Upper tracking rate atrium	OFF; **200** ppm
Preventive overdrive pacing	**OFF**; ON
Maximum overdrive rate	90...(5)...**120**...(5)...160 ppm
Rate increase	2...(2)...**8**...(2)...10 ppm
Rate decrease	after 1...(1)...**20**...(1)...32 cycles
AES prematurity	5...(5)...**25**...(5)...50 %
Post AES pacing	**OFF**; ON
AES step size	5...(5)...**20**...(5)...40 ppm
Sensor	accelerometer
Max. sensor rate	80...(5)...**120**...(5)...180 ppm
Sensor gain	automatic, 1...**4**...40, programmable in 32 steps
Sensor threshold	very low; low; **mean;** high; very high
Rate increase	0.5; 1; **2**...(1)...6 ppm/cycle
Rate drop	0.25; **0.5**...(0.25)...1.25 ppm/cycle
Rate fading	**OFF**; ON
Automatic lead check	OFF; **ON** (3 separate channels)
Magnet effect	**automatic** (10 cycles asynchronous with 90 ppm, thereafter basic rate synchronous); asynchronous; synchronous
Replacement indication	80 ppm magnet rate

Holter IEGM recording	
AF recording	**OFF**; 3...(1)...31 IEGMs
AF detection rate	100...(10)...400 ppm
AF resolution rate	100...(10)...400 ppm
Mode switching recording	**OFF**; 3...(1)...31 IEGMs
VT recording	**OFF**; 3...(1)...31 IEGMs
Ventricular detection rate	**OFF**; 100...(10)...250 ppm
Patient triggered recording	**OFF**; 3...(1)...31 IEGMs
Recording before event	0...(10)...**80 %**
Recording at termination	**OFF**; ON
Battery[5]	1.3 Ah, Li/I
Longevity[6]	7.5 years
X-ray identification	SV
Dimensions/volume/mass	55 × 50 × 6 mm/14 cm³/30 g
Lead connection	IS-1

Home Monitoring

Transmitted parameters	
Resynchronization diagnostics	atrial sensing (%), delivered CRT ventricular pacing (%), mean ventricular heart rate (bpm), mean ventricular heart rate at rest (bpm), mean VES/h, daily activity (h), number of Mode Switching /24 h, Mode Switching duration/24h (%)
Ventricular rhythm	heart rate during Mode Switching, ventricular episodes/ run counter, PMT detection
Atrio-ventricular conduction	AV synchrony (%), pacing statistics
Sensing/pacing	pacing impedance in atrium and ventricle (Ω), date of measurement
System status	battery status (OK, ERI), battery impedance (kΩ) battery voltage (V), date of measurement

Triggered event types[7]	
System integrity	ERI (fixed)
Mean P-wave amplitude	0.1; 0.3; **0.5**; 1.0; 1.5; 2.0; 2.5; 3.0 mV
Mean R-wave amplitude	0.5; 1.0; **1.5**; 2.0; 2.5; 3.0 mV
Lead impedance A, RV, LV	< 200, **250**, 300, 350, 500 Ω or > 1000, **1500**, 2000, 2500, 3000 Ω
Episode diagnostics	ventricular episode (> 8 consec. VES), ventricular run (4...8 consec. VES), PMT detected, patient message (if activated via the programmer)

CHF diagnostics	
CRT % ventricular pacing	50...(10)...80, 85, **90**, 95 %
Mean ventricular heart rate at rest	70, 80, **90**...(10)...120 ppm
Mean VES/h	> 10, **50**, 100, 250
1st Mode Switching since last follow-up	**ON**, OFF
1st Mode Switching per day	ON, **OFF**
Mode Switching duration	10 % (2.5 h), 25 % (6 h), 50 % (12 h), **75 %** (**18 h**)

Reports	
Trend report	once every 24 hours
Event report	after a triggered event
Patient message	after magnet application by the patient (if activated via the programmer)

Programmer settings	
Home monitoring	ON, **OFF**
Event message	**ON**, OFF
Patient message	ON, **OFF**
Time of transmission	00:00...**23:00**...23:59
Start of resting period	00:00...**8:00**...23:59
Resting period duration	4 h (fixed)

Technical data	
Transmitter frequence	403 MHz
Transmitting power	< 25 µW

Ordering information	
▪ Stratos LV-T uncoated	338 202
▪ Stratos LV-T coated	338 203

1) Analog new NBG code: pacemaker for multisite ventricular pacing.
2) Analog NBG code: pacing in RV & LV, sensing in RV, trigger form RV to LV.
3) Analog NBG code: pacing in LV, sensing in RV, trigger form RV to LV.
4) LV identical to RV (only for IEGM).
5) Nominal data of the battery manufacturer.
6) DDDBiV, 100 % ventricle pacing (2.4 V/0.4 ms, 70 ppm, 750 Ω), 100 % LV pacing (3.6 V/0.4 ms, 70 ppm, 750 Ω).
7) Triggered event types are to be programmed in the Home Monitoring Service Center.

Default settings are printed in bold.

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Lumax 540 HF-T

Three-chamber ICD with Automatic Threshold Monitoring

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- DFT Manager – Ensures effective defibrillation through expanded shock therapy management and 40 J maximum shock energy.

Effective Resynchronization

- MultiSelect LV pacing options – Allows electric repositioning of the left ventricular lead by four different LV pacing configurations.
- Negative AV Hysteresis & RVsense Triggering – Secure continuous delivery of resynchronization therapy despite dynamic shifts in native AV conduction.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® & AF Monitoring Zone – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for worsening of patients' HF status.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 6.25 years longevity – Avoids risks associated with device replacement procedures because of superior device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 540 HF-T	39 cm^3	13 mm	IS-1 (3×)	360347
			DF-1 (2×)	

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Lumax 540 HF-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Sensitivity (RA/RV/LV)	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF [1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF [1], ± 8...(4)...± 48 ms; with SMART: ± 12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...40 J; 2nd shock: 2...(1)...16...(2)...40 J; 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock	Tachycardia (ATP)
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	VOO
Pulse amplitude (atrium, RV, LV)	0.2...(0.1)...6.2, 7.5 V	7.5 V	7.5 V
Pulse width (atrium, RV, LV)	0.4, 0.5, 0.7, 1.0, 1.2, 1.5 ms	1.5 ms	1.5 ms
Ventricular pacing	RV, LV, BiV	RV, BiV	RV, LV, BiV
LV T-Wave Protection	OFF, ON	OFF, ON	
Triggering	OFF, RVs, RVs + RVES	OFF, RVs, RVs + RVES	
Max. trigger rate	AUTO, 90...(10)...160 ppm		
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm	
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm	
▪ Repetitive/ scan hysteresis	OFF, 1...(1)...15 cycles		
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms	

VV delay after Vp	0...(5)...100 ms
Initially paced chamber	RV, LV
LV polarity pace	LV-Tip → LV-Ring, LV-Tip → RV-Ring, LV-Ring → LV-Tip, LV-Ring → RV-Ring
LV polarity sense	unipolar, bipolar
AV hysteresis mode	positive, negative, OFF
▪ AV hysteresis	10...(10)...150 ms
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles
Upper tracking rate	90...(10)...160 ppm
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm
▪ Post mode switch duration	1...(1)...30 min
PVARP [3]	AUTO, 175...(25)...600 ms
PVARP after VES	PVARP + 225 ms (max. 600 ms)
PMT protection	OFF, ON
Sensor	accelerometer, various programmable parameters

Lead connections	
Pacing/sensing	IS-1 bipolar (3×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON; LV: OFF, ON
AT/AF Rate	100...(10)...250 ppm
IEGM Holter	3×32 min
LV sensing	OFF, Standard
Channels	atrium, right ventricle, left ventricle (if LV sensing is enabled)
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×59×13 mm
Volume/weight	39.8 cm^3/94 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	6.25 years [4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV, LV) [5], pacing impedance (RA, RV, LV) [6], shock impedance (painless, at last shock), RV/ LV pacing threshold [7]
Arrhythmias	atrial arrhythmia detected (ongoing, monitor, SVT), ventricular arrhythmia detected (VT-1, VT-2, VF), ineffective max. energy shock
Heart Failure Monitor®	percentage of CRT pacing, mean heart rate (24 h, at rest) [5], atrial burden [5], mean VES/h [5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [5], ven. monitoring episode duration [5], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months [8]
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 540 HF-T	360347

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period
4) RA/RV 2.5V/0.4ms; LV 4.8 V/0.4ms; 60 ppm; 700 Ω; RA 15 %, RV/LV 100 % pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.
7) Programmable safety margin.
8) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 500 HF-T

Three-chamber ICD with Automatic Threshold Monitoring

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- DFT Manager – Ensures effective defibrillation by expanded shock therapy management and 30 J maximum shock energy.

Effective Resynchronization

- MultiSelect LV pacing options – Allows electric repositioning of the left ventricular lead by four different LV pacing configurations.
- Negative AV Hysteresis & RVsense Triggering – Secure continuous delivery of resynchronization therapy despite dynamic shifts in native AV conduction.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® & AF Monitoring Zone – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for worsening of patients' HF status.
- Automatic Threshold Monitoring – Permits remote evaluation of ventricular pacing thresholds.
- 6.6 years longevity – Avoids risks associated with device replacement procedures because of superior device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 500 HF-T	39 cm^3	13 mm	IS-1 (3×)	360 342
			DF-1 (2×)	

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Lumax 500 HF-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Sensitivity (RA/RV/LV)	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1; OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF [1], 4...(4)...32 %; with SMART: 20 %
Stability	OFF [1], ± 8...(4)...± 48 ms; with SMART: ± 12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES [2]
Attempts	OFF, 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimization	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES [2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: OFF, 1...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Shock path	RV → SVC + Can, RV → Can, RV → SVC
Energy	1st shock: 1...(1)...16...(2)...30 J; 2nd shock: 2...(1)...16...(2)...30 J; 3rd to nth shock: 30 J
Confirmation (per Zone)	OFF, ON
Post shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock	Tachycardia (ATP)
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	VOO
Pulse amplitude (atrium, RV, LV)	0.2...(0.1)...6.2, 7.5 V	7.5 V	7.5 V
Pulse width (atrium, RV, LV)	0.4, 0.5, 0.7, 1.0, 1.2, 1.5 ms	1.5 ms	1.5 ms
Ventricular pacing	RV, LV, BiV	RV, BiV	RV, LV, BiV
LV T-Wave Protection	OFF, ON	OFF, ON	
Triggering	OFF, RVs, RVs + RVES	OFF, RVs, RVs + RVES	
Max. trigger rate	AUTO, 90...(10)...160 ppm		
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm	
▪ Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm	
▪ Repetitive/ scan hysteresis	OFF, 1...(1)...15 cycles		
AV delay	fixed, low, medium, high, individual fixed 15, 40...(5)...350 ms	fixed: 50...(10)...350 ms	
VV delay after Vp	0...(5)...100 ms		
Initially paced chamber	RV, LV		
LV polarity pace	LV-Tip → LV-Ring, LV-Tip → RV-Ring, LV-Ring → LV-Tip, LV-Ring → RV-Ring		
LV polarity sense	unipolar, bipolar		
AV hysteresis mode	positive, negative, OFF		
▪ AV hysteresis	10...(10)...150 ms		
▪ AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles		
▪ AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles		
▪ AV scan hysteresis	OFF, 1...(1)...10 cycles		
Upper tracking rate	90...(10)...160 ppm		
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR		
▪ Change basic rate during MS	OFF, +5...(5)...+30 ppm		
▪ Post mode switch rate	OFF, +5...(5)...+50 ppm		
▪ Post mode switch duration	1...(1)...30 min		
PVARP [3]	AUTO, 175...(25)...600 ms		
PVARP after VES	PVARP + 225 ms (max. 600 ms)		
PMT protection	OFF, ON		
Sensor	accelerometer, various programmable parameters		

Lead connections	
Pacing/sensing	IS-1 bipolar (3×)
Shock	DF-1 (2×)

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON; LV: OFF, ON
AT/AF Rate	100...(10)...250 ppm
IEGM Holter	3×32 min
LV sensing	OFF, Standard
Channels	atrium, right ventricle, left ventricle (if LV sensing is enabled)
Length of pre-history	fixed: 30 s; 5 s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×59×12 mm
Volume/weight	37 cm^3/83 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	6.6 years [4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events
Test report	triggered manually via programmer

Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV, LV) [5], pacing impedance (RA, RV, LV) [6], shock impedance (painless, at last shock), RV/LV pacing threshold [7]
Arrhythmias	atrial arrhythmia detected (ongoing, monitor, SVT), ventricular arrhythmia detected (VT-1, VT-2, VF), ineffective max. energy shock
Heart Failure Monitor®	percentage of CRT pacing, mean heart rate (24 h, at rest) [5], atrial burden [5], mean VES/h [5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm [5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration [5], ven. monitoring episode duration [5], periodic IEGM received

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 2, 3, 4, 6 months [8]
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 500 HF-T	360 342

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) RA/RV 2.5 V/0.4 ms; LV 4.8 V/0.4 ms; 60 ppm; 700 Ω; RA 15 %, RV/LV 100 % pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.
7) Programmable safety margin.
8) If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.

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Lumax 340 HF-T

Three-chamber ICD with IEGM-Online HD®

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 40 J maximum shock energy.

Effective Resynchronization

- MultiSelect LV pacing options – Allows electric repositioning of the left ventricular lead by four different LV pacing configurations.
- Negative AV Hysteresis & RVsense Triggering – Secure continuous delivery of resynchronization therapy despite dynamic shifts in native AV conduction.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® & AF Monitoring Zone – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for worsening of patients' HF status.
- 6.4 years longevity – Avoids risks associated with device replacement procedures because of superior device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 340 HF-T	39 cm^3	13 mm	IS-1 (3×)	355 263
			DF-1 (2×)	

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Lumax 340 HF-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity (RV/LV)	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1 OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF[1], 4...(4)...32 % with SMART: 20 %
Stability	OFF[1]; ±8...(4)...±48 ms with SMART: ±12 %
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES[2]
Attempts	OFF; 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimisation	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES[2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: 0...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...40 J 2nd shock: 2...(1)...16...(2)...40 J 3rd to nth shock: 40 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock	Tachycardia (ATP)
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	VOO
Pulse amplitude (atrium, RV, LV)	0.2...(0.1)...6.2, 7.5 V	7.5 V	7.5 V
Pulse width (atrium, RV, LV)	0.4, 0.5, 0.7, 1.0, 1.2, 1.5 ms	1.5 ms	1.5 ms
Ventricular pacing	RV, LV, BiV	RV, BiV	RV, LV, BiV
LV T-Wave Protection	OFF, ON	OFF, ON	
Triggering	OFF, RVs, RVs + RVES	OFF, RVs, RVs + RVES	
Max. trigger rate	AUTO, 90...(10)...160 ppm		
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm	
Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm	
Repetitive/ scan hysteresis	OFF, 1...(1)...15 cycles		
AV delay	fixed, low, medium, high, individual fixed 15, 40...(10)...350 ms	fixed: 50...(10)...350 ms	
VV delay after Vp	0...(5)...100 ms		
Initially paced chamber	RV, LV		
LV polarity pace		LV-Tip → LV-Ring, LV-Tip → RV-Ring, LV-Ring → LV-Tip, LV-Ring → RV-Ring	
LV polarity sense		unipolar, bipolar	
AV hysteresis mode		positive, negative, OFF	
AV hysteresis		OFF, 10...(10)...150 ms	
AV repetitive hysteresis (positive)		OFF, 1...(1)...10 cycles	
AV repetitive hysteresis (negative)		OFF, 1...(1)...15...(5)...100...(10)...180 cycles	
AV Scan Hysteresis		OFF, 1...(1)...10 cycles	
Upper tracking rate		90...(10)...160 ppm	
Mode Switching		DDD(R): DDI, DDIR; VDD(R): VDI, VDIR	
Change basic rate during MS		OFF, +5...(5)...+30 ppm	
Post mode switch rate		OFF, +5...(5)...+50 ppm	
Post mode switch duration		1...(1)...30 min	
PVARP[3]		AUTO, 175...(25)...600 ms	
PVARP after VES		PVARP + 225 ms (max. 600 ms)	
PMT protection		OFF, ON	
Sensor		accelerometer, various programmable parameters	

Lead connections	
Pacing/sensing	IS-1 bipolar (3×)
Shock	DF-1 (2×)

Diagnostic functions	
AT/AF Rate	100...(10)...250 ppm
IEGM Holter	3×32 min
LV sensing	OFF, Standard
Channels	atrium, right ventricle, left ventricle (if LV sensing is enabled)
Length of pre-history	fixed: 30 sec
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×59×13 mm
Volume/weight	39.8 cm³/94 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	6.4 years[4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV, LV)[5], pacing impedance (RA, RV,LV)[6], shock impedance (painless, at last shock)[6]
Arrhythmias	atrial arrhythmia detected (ongoing, monitor, SVT), ventricular arrhythmia detected (VT-1, VT-2, VF), ineffective max. energy shock
Heart Failure Monitor®	percentage of CRT pacing, mean heart rate (24 h, at rest)[5], atrial burden[5], mean VES/h[5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm[5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration[5], ven. monitoring episode duration[5], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 2, 3, 4, 6 months
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 340 HF-T	355263

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) DDD-BiV; 60 ppm; RA/RV 2.4 V/0.5 ms; LV 4.8 V/0.5 ms; 700 Ω; stimulation: RA 15 %, RV/LV 100 %; quarterly shocks; Home Monitoring ON and diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.

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Lumax 300 HF-T

Three-chamber ICD with IEGM-Online HD®

Product Highlights

Reliable Sensing & Detection

- SelectSense® – Enables adaptation of sensing characteristics to patients' individual needs via a sophisticated automatic sensitivity control (ASC) algorithm and several preset options.
- SMART Detection® – Reduces inadequate therapies via a clinically proven SVT discrimination algorithm.

Appropriate Therapy

- ATP One Shot® – Allows painless termination of fast and stable VTs with antitachycardia pacing (ATP) before charging.
- DFT Manager – Ensures effective defibrillation by comprehensive shock therapy management and 30 J maximum shock energy.

Effective Resynchronization

- MultiSelect LV pacing options – Allows electric repositioning of the left ventricular lead by four different LV pacing configurations.
- Negative AV Hysteresis & RVsense Triggering – Secure continuous delivery of resynchronization therapy despite dynamic shifts in native AV conduction.

Advanced Patient Management

- BIOTRONIK Home Monitoring® – Enables unique automatic wireless remote monitoring and early detection of clinical and device-related events by color-coded event notifications (Traffic Light System).
- Heart Failure Monitor® – Enables early detection of changes in patients' heart failure conditions by the continuous monitoring of crucial clinical parameters.
- IEGM-Online HD® & AF Monitoring Zone – Facilitates remote assessment of therapy appropriateness and early detection of potential causes for worsening of patients' HF status.
- 6.7 years longevity – Avoids risks associated with device replacement procedures because of superior device longevity through the use of energy-efficient technologies.

Ordering Information

Model	Volume	Thickness	Connectors	Order number
Lumax 300 HF-T	37 cm^3	12 mm	IS-1 (3×)	355 262
			DF-1 (2×)	

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Lumax 300 HF-T

Technical Data

Arrhythmia detection	
Rhythm classes	bradycardic, physiologic, VT-1, VT-2, VF
Ventricular sensitivity (RV/LV)	automatic sensitivity adjustment
Atrial sensitivity	automatic sensitivity adjustment

VT detection and redetection	
Criteria	number of intervals, onset, stability, SMART, persistent VT
VT interval	OFF, 270...(10)...600 ms for VT-1 OFF, 270...(10)...500 ms for VT-2
Number of VT intervals for detection and redetection	detection: 10...(2)...60 for VT-1; 10...(2)...40 for VT-2 redetection: 10...(2)...30
Onset	OFF[1], 4...(4)...32 % with SMART: 20 %
Stability	OFF[1]; ± 8...(4)...± 48 ms with SMART: ± 12 %
Sustained VT	OFF, 0.5, 1, 2, 3, 5...(5)...30 min
SMART detection, redetection	OFF, ON

VF detection and redetection	
VF Interval	OFF, 200...(10)...400 ms
Criterion	X out of Y
Detection counter of VF intervals	6...(1)...30 out of 8...(1)...31

Termination detection	
Number of intervals for termination	12 out of 16 intervals slower than VT-1
Forced termination	OFF, 1...(1)...15 min

Tachycardia therapy	
ATP type	burst, ramp, burst + PES[2]
Attempts	OFF; 1...(1)...10
Number S1	1...(1)...10
Add. S1	OFF, ON
R-S1 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
S1 decrement	5...(5)...40 ms
S1-S2 interval	absolute: 200...(10)...500 ms; adaptive: 70...(5)...95 %
Scan decrement	OFF, 5...(5)...40 ms
Min. ATP interval	200...(5)...300 ms
ATP optimisation	OFF, ON

ATP One Shot®	
ATP type	OFF, burst, ramp, burst + PES[2]
Stability criterion	12 %
ATP attempts	1
Number S1	1...(1)...10

Cardioversion/defibrillation therapy	
Number of shocks	for VT zones: 0...(1)...8; for VF zone: 6...(1)...8
Waveform	biphasic, biphasic 2
Polarity (per Zone)	normal, reversed, alternating
Energy	1st shock: 1...(1)...16...(2)...30 J 2nd shock: 2...(1)...16...(2)...30 J 3rd to nth shock: 30 J
Confirmation (per Zone)	OFF, ON
Post-shock duration	OFF, 10...(10)...50 s; 1...(1)...10 min

Pacing parameters	Bradycardia	Post Shock	Tachycardia (ATP)
Mode	DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	VOO
Pulse amplitude (atrium, RV, LV)	0.2...(0.1)...6.2, 7.5 V	7.5 V	7.5 V
Pulse width (atrium, RV, LV)	0.4, 0.5, 0.7, 1.0, 1.2, 1.5 ms	1.5 ms	1.5 ms
Ventricular pacing	RV, LV, BiV	RV, BiV	RV, LV, BiV
LV T-Wave protection	OFF, ON	OFF, ON	
Triggering	OFF, RVs, RVs + RVES	OFF, RVs, RVs + RVES	
Max. Trigger rate	AUTO, 90...(10)...160 ppm		
Basic rate	30...(5)...100...(10)...160 ppm	30...(5)...100...(10)...160 ppm	
Rate hysteresis	OFF, -5...(-5)...-90 ppm	OFF, -5...(-5)...-65 ppm	
Repetitive/ scan hysteresis	OFF, 1...(1)...15 cycles		
AV delay	fixed, low, medium, high, individual fixed 15, 40...(10)...350 ms	fixed: 50...(10)...350 ms	
VV delay after Vp	0...(5)...100 ms		
Initially paced chamber	RV, LV		
LV polarity pace	LV-Tip → LV-Ring, LV-Tip → RV-Ring, LV-Ring → LV-Tip, LV-Ring → RV-Ring		
LV polarity sense	unipolar, bipolar		
AV hysteresis mode	positive, negative, OFF		
AV hysteresis	OFF, 10...(10)...150 ms		
AV repetitive hysteresis (positive)	OFF, 1...(1)...10 cycles		
AV repetitive hysteresis (negative)	OFF, 1...(1)...15...(5)...100...(10)...180 cycles		
AV scan hysteresis	OFF, 1...(1)...10 cycles		
Upper tracking rate	90...(10)...160 ppm		
Mode Switching	DDD(R): DDI, DDIR; VDD(R): VDI, VDIR		
Change basic rate ruring ms	OFF, +5...(5)...+30 ppm		
Post mode switch rate	OFF, +5...(5)...+50 ppm		
Post mode switch duration	1...(1)...30 min		
PVARP[3]	AUTO, 175...(25)...600 ms		
PVARP after VES	PVARP + 225 ms (max. 600 ms)		
PMT protection	OFF, ON		
Sensor	accelerometer, various programmable parameters		

Lead connections	
Pacing/sensing	IS-1 bipolar (3×)
Shock	DF-1 (2×)

Diagnostic functions	
AT/AF rate	100...(10)...250 ppm
IEGM Holter	3×32 min
LV sensing	OFF, Standard
Channels	atrium, right ventricle, left ventricle (if LV sensing is enabled)
Length of pre-history	fixed: 30 sec
IEGM at SVT	OFF, ON
IEGM at AT/AF	OFF, ON
Ongoing atrial episode	OFF, 0.5, 6, 12, 18 h

Housing	
Dimensions	66×59×12 mm
Volume/weight	37.1 cm^3/83 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	6.7 years[4]

Home Monitoring

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters

Report types	
Trend report	triggered automatically once every 24 hours
Event report	triggered automatically after certain cardiac events

Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV, LV)[5], pacing impedance (RA, RV,LV)[4], shock impedance (painless, at last shock)[6]
Arrhythmias	atrial arrhythmia detected (ongoing, monitor, SVT), ventricular arrhythmia detected (VT-1, VT-2, VF), ineffective max. energy shock
Heart Failure Monitor®	percentage of CRT pacing, mean heart rate (24 h, at rest)[5], atrial burden[5], mean VES/h[5]
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm[5], ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration[5], ven. monitoring episode duration[5], periodic IEGM received
Test report	triggered manually via programmer

Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00–23:59

IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 2, 3, 4, 6 months
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 µW

Ordering information	
Lumax 300 HF-T	355 262

1) OFF cannot be programmed if SMART is active.
2) PES: Programmed extrastimulus.
3) PVARP: Post ventricular atrial refractory period.
4) DDD-BiV; 60 ppm; RA/RV 2.4 V/0.5 ms; LV 4.8 V/0.5 ms; 700 Ω; stimulation: RA 15 %, RV/LV 100 %; quarterly shocks; Home Monitoring ON and diagnostics ON.
5) Programmable upper or lower limit.
6) Programmable upper and lower limit.

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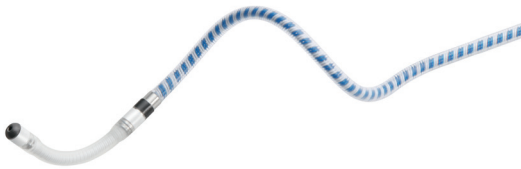
Corox OTW BP

Bipolar LV lead for Cardiac Resynchronization Therapy

Product Highlights



Thin 5.4 F silicone lead body with polyurethane coating compatible with 7 F lead introducer

Progressive helix fixation designed for medium to large vessels

TwinFlex Technology® with co-radial design for maximum flexibility

True OTW & stylet functionality for handling versatility during implantation

MultiSelect LV pacing options for electronic repositioning

Fractal coating and steroid elution for low thresholds

Ordering Information

Product	Fixation	Length	Order number
Corox OTW 75-BP	progressive helix	77 cm	354 805
Corox OTW 85-BP	progressive helix	87 cm	354 807

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Corox OTW BP

Technical Data

Technical data	
Connector	IS-1
Polarity	bipolar
Overall length	77; 87 cm

Tip electrode	
Surface area	5 mm^2
Diameter	1.95 mm (5.8 F)
Material	platinum/iridium
Surface	iridium, fractal
Fixation of lead	helix at distal end
Helix length (straightened)	5–7 cm
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.5 mg
Steroid bonding agent	silicone rubber

Ring electrode	
Surface area	8 mm^2
Diameter	1.95 mm (5.8 F)
Material	platinum/iridium
Surface	iridium, fractal
Distance to tip	18 mm

Conductor	
Insulation	silicone
Thickness of insulation	0.3 mm
Construction	co-radial coil (2 × 2 filaments)
Coil material	MP35N; DFT
Coil insulation	ETFE
Coil diameter	1.0 mm
Diameter	1.8 mm (5.4 F)
Proximal surface coating	polyurethane
Resistance	0.08 Ω/cm
Connector material	stainless steel

Stylets included (can be ordered separately)	
S 75-K OTW (green; medium)	346 978
S 75-G OTW (violet; soft)	346 977
S 85-K OTW (green; medium)	346 980
S 85-G OTW (violet; soft)	346 979

Applicable introducer	
CS introducer	7 F
Recommended introducer	ScoutPro ACS

Applicable guide wire	
Guide wire	0.014" (0.36 mm)
Recommended guide wire	VisionWire

Ordering information	
▪ Corox OTW 75-BP	354 805
▪ Corox OTW 85-BP	354 807

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Corox OTW-S BP

Bipolar LV lead for Cardiac Resynchronization Therapy

Product Highlights

Thin 5.4 F silicone lead body with polyurethane coating compatible with 7 F lead introducer

“Thread” fixation designed for small-sized vessels

TwinFlex Technology® with co-radial design for maximum flexibility

True OTW & stylet functionality for handling versatility during implantation

MultiSelect LV Pacing Options for electronic repositioning

Fractal coating and steroid elution for low thresholds

Ordering Information

Product	Fixation	Length	Order number
Corox OTW-S 75-BP	silicone thread	77 cm	355 148
Corox OTW-S 85-BP	silicone thread	87 cm	355 149

Cardiac Resynchronization Therapy – August 2011

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Corox OTW-S BP

Technical Data

Technical data	
Connector	IS-1
Polarity	bipolar
Overall length	77; 87 cm

Tip electrode	
Surface area	5 mm^2
Diameter	1.95 mm (5.8 F)
Material	platinum/iridium
Surface	iridium, fractal
Fixation of lead	silicone thread between tip and ring electrode
Length of silicone screw	18 mm
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	2 × 0.5 mg
Steroid bonding agent	silicone rubber

Ring electrode	
Surface area	8 mm^2
Diameter	1.95 mm (5.8 F)
Material	platinum/iridium
Surface	iridium, fractal
Distance to tip	18 mm

Conductor	
Insulation	silicone
Thickness of insulation	0.3 mm
Construction	co-radial coil (2 × 2 filaments)
Coil material	MP35N; DFT
Coil insulation	ETFE
Coil diameter	1.0 mm
Diameter	1.8 mm (5.4 F)
Proximal surface coating	polyurethane
Resistance	0.08 Ω/cm
Connector material	stainless steel

Stylets included (can be ordered separately)	
S 75-K OTW (green; medium)	346 978
S 75-G OTW (violet; soft)	346 977
S 85-K OTW (green; medium)	346 980
S 85-G OTW (violet; soft)	346 979

Applicable introducer	
CS introducer	7 F
Recommended introducer	ScoutPro ACS

Applicable guide wire	
Guide wire	0.014" (0.36 mm)
Recommended guide wire	VisionWire

Ordering information	
▪ Corox OTW-S 75-BP	355 148
▪ Corox OTW-S 85-BP	355 149

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Corox OTW-L BP

Left ventricular lead for Cardiac Resynchronization Therapy

Product Highlights

Thin 5.4 F silicone lead body with polyurethane coating compatible with 7 F lead introducer

S-curve fixation designed for medium to large vessels

TwinFlex Technology® with co-radial design for maximum flexibility

True OTW & stylet functionality for handling versatility during implantation

MultiSelect LV Pacing Options for electronic repositioning

Fractal coating and steroid elution for low thresholds

Ordering Information

Product	Fixation	Length	Order number
Corox OTW-L 75-BP	S-curve	77 cm	368345
Corox OTW-L 85-BP	S-curve	87 cm	368346

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Corox OTW-L BP

Technical Data

Technical data	
Connector	IS-1
Polarity	bipolar
Overall length	77; 87 cm

Tip electrode	
Surface area	5 mm^2
Diameter	1.95 mm (5.8 F)
Material	platinum/iridium
Surface	iridium, fractal
Fixation of lead	s-shaped curve
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	2 × 0.5 mg
Steroid bonding agent	silicone rubber

Ring electrode	
Surface area	8 mm^2
Diameter	1.95 mm (5.8 F)
Material	platinum/iridium
Surface	iridium, fractal
Distance to tip	18 mm

Conductor	
Insulation	silicone
Thickness of insulation	0.3 mm
Construction	co-radial coil (2 × 2 filaments)
Coil material	MP35N; DFT
Coil insulation	ETFE
Coil diameter	1.0 mm
Diameter	1.8 mm (5.4 F)
Proximal surface coating	polyurethane
Resistance	0.08 Ω/cm
Connector material	stainless steel

Stylets included (can be ordered separately)	
S 75-K OTW (green; medium)	346978
S 75-G OTW (violet; soft)	346977
S 85-K OTW (green; medium)	346980
S 85-G OTW (violet; soft)	346979

Applicable introducer	
CS introducer	7 F
Recommended introducer	ScoutPro ACS

Applicable guide wire	
Guide wire	0.014" (0.36 mm)
Recommended guide wire	VisionWire or Streamer

Ordering information	
▪ Corox OTW-L 75-BP	368345
▪ Corox OTW-L 85-BP	368346

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Corox OTW UP

Left ventricular lead for Cardiac Resynchronization Therapy

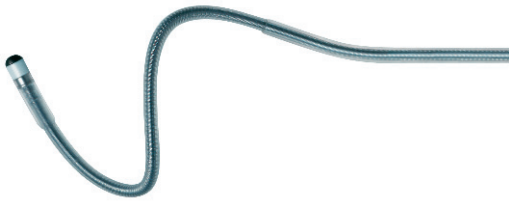
Product Highlights

Thin 4.8 F silicone lead body with polyurethane coating compatible with 7 F lead introducer

Progressive helix fixation for maximum fixation stability

True OTW & stylet functionality for handling versatility during implantation

Fractal coating and steroid elution for low thresholds



Ordering Information

Product	Fixation	Length	Order number
Corox OTW 75-UP Steroid	progressive helix	77 cm	346542
Corox OTW 85-UP Steroid	progressive helix	87 cm	346543

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Corox OTW UP

Technical Data

Technical data	
Connector	IS-1
Polarity	unipolar
Overall length	77; 87 cm

Tip electrode	
Surface area	5 mm^2
Diameter	1.95 mm (5.8 F)
Material	80 % platinum; 20 % iridium
Surface	iridium, fractal
Fixation of lead	helix at distal end
Helix length (straightened)	5–7 cm
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	0.5 mg
Steroid bonding agent	silicone rubber

Conductor	
Insulation	silicone
Thickness of insulation	0.3 mm
Construction	wire coil
Coil material	MP35N
Coil diameter	0.75 mm
Diameter	1.6 mm (4.8 F)
Proximal surface coating	polyurethane
Resistance	0.98 Ω/cm
Connector material	stainless steel

Stylets included (can be ordered separately)	
S 75-K OTW (green; medium)	346978
S 75-G OTW (violet; soft)	346977
S 85-K OTW (green; medium)	346980
S 85-G OTW (violet; soft)	346979

Applicable introducer	
CS introducer	7 F
Recommended introducer	ScoutPro ACS

Applicable guide wire	
Guide wire	0.014" (0.36 mm)
Recommended guide wire	VisionWire

Ordering information	
▪ Corox OTW 75-UP Steroid	346542
▪ Corox OTW 85-UP Steroid	346543

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ScoutPro ACS

Coronary sinus lead delivery system*

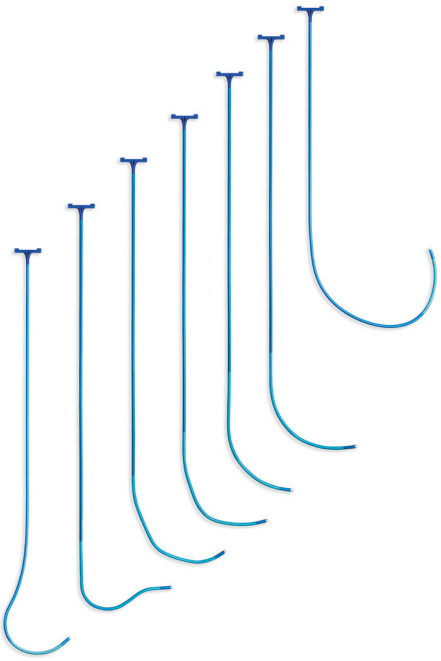
Product Highlights

Optimal catheter stiffness segmentation for optimal pushability

Slittable hub allows start-to-finish slitting for easy catheter removal

Compatible with ScoutPro Inner Catheters

Compatible with passive Safe Sheath hemostatic valve



Ordering Information

Product	Length	Order number
ScoutPro ACS Accessory Kit		362 688
SafeSheath Hemostatic Valve (5 pcs.)		369 826
ScoutPro ACS Sheath "BIO 2"	45 cm	368 118
ScoutPro ACS Sheath "BIO 2 L"	50 cm	368 119
ScoutPro ACS Sheath "Multipurpose EP"	45 cm	368 120
ScoutPro ACS Sheath "Multipurpose EP L"	50 cm	368 121
ScoutPro ACS Sheath "Hook"	45 cm	368 122
ScoutPro ACS Sheath "Hook L"	50 cm	368 123
ScoutPro ACS Sheath "Multipurpose Hook"	45 cm	368 116
ScoutPro ACS Sheath "Multipurpose Hook L"	50 cm	368 117
ScoutPro ACS Sheath "Amplatz 6.0"	45 cm	368 108
ScoutPro ACS Sheath "Amplatz 6.0 L"	50 cm	368 110
ScoutPro ACS Sheath "Right"	45 cm	368 099
ScoutPro ACS Sheath "Right L"	50 cm	368 101
ScoutPro ACS Sheath "Extended Hook"	45 cm	368 103
ScoutPro ACS Sheath "Extended Hook L"	50 cm	368 105
ScoutPro ACS Sheath "Straight"	45 cm	359 371
ScoutPro ACS Sheath "Straight L"	50 cm	361 536

* Availability limited to CE and FDA region

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ScoutPro ACS

Technical Data

Guiding catheter	
Working length	45; 50 cm (Long)
Inner diameter	7.1 F (2.38 mm)
Outer diameter	8.7 (2.90 mm)
Inner material	PTFE
Outer material	PEBAX

Dilator	
Working length	53; 59 cm (Long)

Hemostatic valve	
Maximum diameter	13.2 F (4.4 mm)

Ordering information	
ScoutPro ACS Accessory Kit	362688
▪ 1 hemostatic valve	
▪ 2 transvalvular insertion tools	
▪ 1 guide wire 100 cm	
▪ 1 torquer	
▪ 1 slitter Tool Advanced	
ScoutPro ACS "BIO 2"	368118
ScoutPro ACS "BIO 2 L" (Long)	368119
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Multipurpose EP" (MPEP)	368120
ScoutPro ACS "Multipurpose EP L" (MPEP) (Long)	368121
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Hook"	368122
ScoutPro ACS "Hook L" (Long)	368123
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Multipurpose Hook"	368116
ScoutPro ACS "Multipurpose Hook L" (Long)	368117
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Amplatz 6.0"	368108
ScoutPro ACS "Amplatz 6.0 L" (Long)	368110
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Right"	368099
ScoutPro ACS "Right L" (Long)	368101
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Extended Hook"	368103
ScoutPro ACS "Extended Hook L" (Long)	368105
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro ACS "Straight"	359 371
ScoutPro ACS "Straight L"	361 536
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	

* Availability limited to CE and FDA region

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ScoutPro 7 F

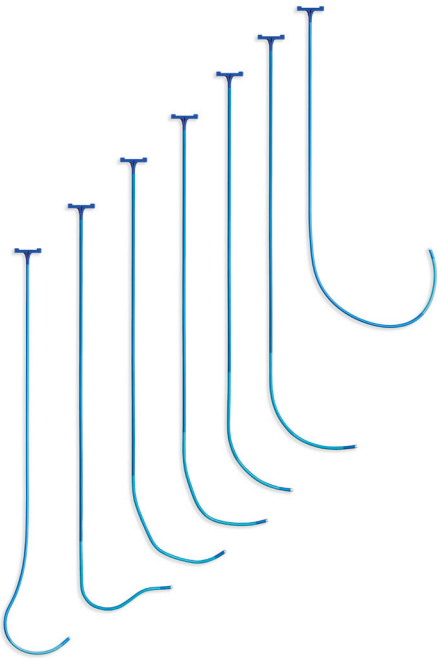
Coronary sinus lead delivery system

Product Highlights

Gradual sheath stiffness and soft tip for atraumatic cannulation

Excellent gliding properties for easy lead introduction

Ergonomic hemostatic valve and advanced slitter tool for optimal handling



Ordering Information

Product	Length	Order number
ScoutPro 7 F Kit (sheath "BIO 2" & "MPEP")	45 cm	350 239
ScoutPro 7 F Sheath "BIO 2"	45 cm	359 374
ScoutPro 7 F Sheath "BIO 2 L"	50 cm	361 529*
ScoutPro 7 F Sheath "Multipurpose EP"	45 cm	359 373
ScoutPro 7 F Sheath "Multipurpose EP L"	50 cm	361 533*
ScoutPro 7 F Sheath "Hook"	45 cm	350 236
ScoutPro 7 F Sheath "Hook L"	50 cm	361 532*
ScoutPro 7 F Sheath "Multipurpose Hook"	45 cm	350 237
ScoutPro 7 F Sheath "Multipurpose Hook L"	50 cm	361 534*
ScoutPro 7 F Sheath "Amplatz 6.0"	45 cm	350 235
ScoutPro 7 F Sheath "Amplatz 6.0 L"	50 cm	361 527*
ScoutPro 7 F Sheath "Extended Hook Right"	45 cm	359 370
ScoutPro 7 F Sheath "Extended Hook Right L"	50 cm	361 531*
ScoutPro 7 F Sheath "Extended Hook"	45 cm	359 369
ScoutPro 7 F Sheath "Extended Hook L"	50 cm	361 530*

* Availability limited to CE and FDA region

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ScoutPro 7 F

Technical Data

Guiding catheter	
Working length	45; 50 cm* (Long)
Inner diameter	7.1 F (2.38 mm)
Outer diameter	9 F (3.0 mm)
Inner material	PTFE
Outer material	PEBAX

Dilator	
Working length	53; 59 cm* (Long)

Hemostatic Valve	
Maximum diameter	13.2 F (4.4 mm)

Ordering information	
ScoutPro 7 F Kit	350 239
▪ 2 guiding catheters: "BIO 2" and "Multipurpose EP" (MPEP)	
▪ 1 dilator for guiding catheter 7 F	
▪ 1 hemostatic valve	
▪ 1 peel away introducer	
▪ 1 guide wire 100 cm	
▪ 1 cannula	
▪ 1 syringe	
▪ 2 slitter tools (leads 4.9 F and 6.3 F)	
ScoutPro 7 F Sheath "BIO 2"	359 374
ScoutPro 7 F Sheath "BIO 2 L" (Long)	361 529*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro 7 F Sheath "Multipurpose EP" (MPEP)	359 373
ScoutPro 7 F Sheath "Multipurpose EP L" (MPEP) (Long)	361 533*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro 7 F Sheath "Hook"	350 236
ScoutPro 7 F Sheath "Hook L" (Long)	361 532*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro 7 F Sheath "Multipurpose Hook"	350 237
ScoutPro 7 F Sheath "Multipurpose Hook L" (Long)	361 534*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro 7 F Sheath "Amplatz 6.0"	350 235
ScoutPro 7 F Sheath "Amplatz 6.0 L" (Long)	361 527*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro 7 F Sheath "Extended Hook Right" (EH-R)	359 370
ScoutPro 7 F Sheath "Extended Hook Right L" (EH-R) (Long)	361 531*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	
ScoutPro 7 F Sheath "Extended Hook"	359 369
ScoutPro 7 F Sheath "Extended Hook L" (Long)	361 530*
▪ 1 guiding catheter	
▪ 1 dilator for guiding catheter	

* ScoutPro 7 F Long versions only available in CE region and USA

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ScoutPro 7F IC

Inner catheters for ScoutPro 7 F coronary sinus lead delivery system

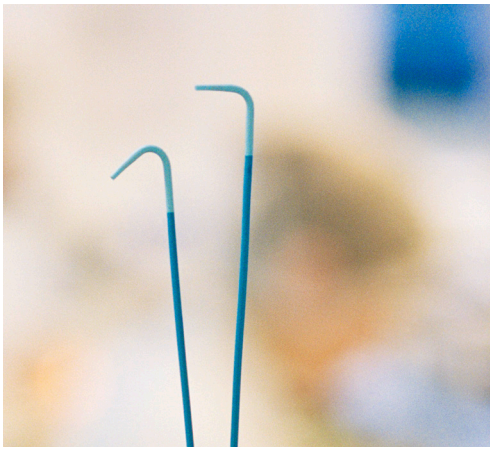
Product Highlights

Advanced catheter design for vessel sub-selection

50° and 90° tip angle for cannulation of different CS anatomies

Soft tip design for maximum atraumaticity

1:1 torque transmission and high kinking stability for optimal handling characteristics



Ordering Information

Product	Length	Order number
ScoutPro IC 50	65 cm	361 537
ScoutPro IC 90	65 cm	361 538

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ScoutPro 7F IC

Technical Data

Technical data	
Working length	65 cm
Inner diameter	3.6 F (1.2 mm)
Outer diameter	6.6 F (2.2 mm)
Inner material	PTFE
Outer material	PEBAX
Tip angle	50° or 90°
Guide wire compatibility	0.014"–0.035"
Proximal connection	female luer-lock

Ordering information	
ScoutPro IC 50	361537
▪ 1 inner catheter 50°	
▪ 1 three-way stopcock	
ScoutPro IC 90	361538
▪ 1 inner catheter 90°	
▪ 1 three-way stopcock	

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VisionWire

Insulated guide wire for electrical LV lead implantation

Product Highlights

Flexible design for easy maneuvering

PTFE insulation for intra-operative measuring

0.014" OTW leads compatible

Shaft design for extra support

Radiopaque electrode coil

Ordering Information

Product	Tip configuration	Length	Order number
VisionWire	straight, floppy	175 cm	352 023

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VisionWire

Technical Data

Technical data	
Length	175 cm
Insulation length	169.5 cm
Insulation material	PTFE
Diameter	0.014" (0.36 mm)
Core material	stainless steel
Coil material	platinum tungsten alloy
Electrically active surface	17 mm^2
Electrode coil length	15 mm
Tip configuration	straight
Tip flexibility	floppy
Shaft flexibility	extra support

Ordering information	
VisionWire	352 023

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Streamer

Polymer guide wire for LV lead implantation

Product Highlights

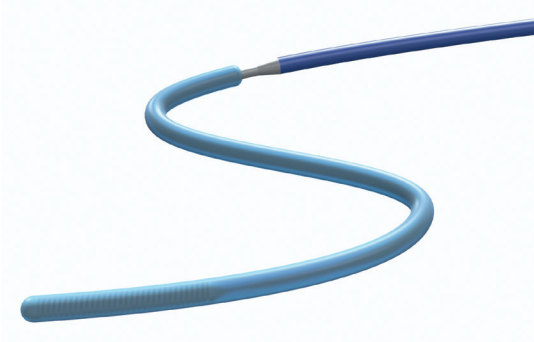
Flexible design with superb torque control

Polymer sleeve provides best possible lubricity

0.014" OTW leads compatible

Core design for optimal LV lead support

Available as "Extra Support" and "Extreme Support" flexibilities for high implantation versatility



Ordering Information

Product	Tip configuration	Length	Order number
Streamer ES	straight, high flexible	195 cm	363 724
Streamer ES-J	J-shaped, high flexible	195 cm	363 725
Streamer XT	straight, high flexible	195 cm	363 726
Streamer XT-J	J-shaped, high flexible	195 cm	363 727

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Streamer

Technical Data

Technical data	
Length	195 cm
Diameter	0.014" (0.36 mm)
Core material	AFT* stainless steel
Coil material	platinum tungsten alloy
Length of distal coil	30 mm
Polymer sleeve	polyurethane, hydrophilic coated
Length of polymer sleeve	300 mm
Proximal coating	PTFE
Tip configuration	straight; J-shaped
Tip flexibility	high flexible (HF)
Shaft flexibility	extra support (ES); extreme support (XT)

Ordering information	
▪ Streamer ES	363724
▪ Streamer ES-J	363725
▪ Streamer XT	363726
▪ Streamer XT-J	363727

* The proprietary AFT processing method of the stainless steel core wire prevents major plastic deformation and significantly improves the torque response.

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CardioMessenger® II-S

Patient device for BIOTRONIK Home Monitoring®

Product Highlights

Advanced quad-band mobile telecommunication technology for boundless travel and global usage

Bed-side only application

Well-suited for travelling or vacation

No patient support or special maintenance required

Patient callback light

Radiofrequency RF-2 telemetry for the most efficient data transfer Lumax 300, 340, 540 and Evia series

Ordering Information

Product	Order number
CardioMessenger® II-S Kit	362444

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CardioMessenger® II-S

Technical Data

Technical equipment	
CardioMessenger® II-S Kit	CardioMessenger® II-S
	Power supply (wall mounted)
	Manual including Short Guide

Wireless network data	
Max. distance Implant-CardioMessenger® II-S	2 m (6 feet) guaranteed
Min. distance Implant-CardioMessenger® II-S	20 cm (7 inches)
MICS (Implant-CardioMessenger® II-S)	Medical Implant Communication Service
▪ Modulation	FSK
▪ Frequency band	402–405 MHz, 9 channels, 300 kHz band width
▪ Output power	25 µW EIRP
GSM (CardioMessenger® II-S – Service Center)	Global System for Mobile Communications
▪ Modulation	GMSK
▪ Frequency bands	900/1800 MHz, 850/1900 MHz
▪ Output power	0.8 W (850 MHz), 2 W (900 MHz),1 W (1800/1900 MHz)

Electrical data: CardioMessenger® II-S	
Input voltage	5 V DC

Electrical data: power supply	
Input voltage	100–240 V AC 50–60 Hz
Output voltage	5 V DC

Permissible environmental conditions (operation)	
Operation Mode	continuously
Protection Grade	IP 30
Temperature	+10 to +40 °C (50 to 104 °F)
Relative humidity	30 to 75 %
Atmospheric pressure	700 to 1060 hPa

Permissible environmental conditions (storage)	
Temperature	-10 to +60 °C (14 to 140 °F)
Relative humidity	30 to 75 %
Atmospheric pressure	700 to 1060 hPa

Weight	
Approximate	450 g

Dimensions (H × W × D)	
Approximate	203 × 136.5 × 80 mm

Ordering information	
CardioMessenger® II-S Kit	362444

* T-Mobile has a worldwide roaming system that generally supports daily, automatic, wireless CM II and CM II-S transmissions while the patient is travelling, on vacation, or residing temporarily outside the home. Since cellular roaming functions may vary between countries or may be influenced by geographical factors outside of BIOTRONIK's control, individual data transmissions could be delayed or impaired in certain cases.

Home Monitoring – August 2011

BIOTRONIK
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CardioMessenger® II

Transmitter for BIOTRONIK Home Monitoring®

Product Highlights

Advanced quad-band mobile telecommunication technology for boundless travel and global usage

Well-suited for travelling or vacation

Mobile operation allowing flexible day-to-day use (at least 24h service time)

Intuitive user interface

Radiofrequency RF-2 telemetry for the most efficient data transfer compatible with Lumax 300, 340, 540 and Evia series

Patient callback light

Ordering Information

Product	Order number
CardioMessenger® II Kit	354 921

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CardioMessenger® II

Technical Data

Technical equipment	
CardioMessenger® II Kit	CardioMessenger® II Mobile
	CardioMessenger® II charging station
	Power supply MPP 15
	Manual
	Carrying strap
	Power cord
	Soft case

Wireless network data	
Max. distance Implant – CardioMessenger® II	2 m (6 feet)
Min. distance Implant – CardioMessenger® II	20 cm (7 inches)
MICS (Implant – CardioMessenger® II)	Medical Implant Communication Service
▪ Modulation	FSK
▪ Frequency band	402–405 MHz, 9 channels, 300 kHz band width
▪ Output power	25 µW EIRP
GSM (CardioMessenger® II – Service Center)	Global System for Mobile Communications
▪ Modulation	GMSK
▪ Frequency bands	900/1800 MHz, 850/1900 MHz
▪ Output power	0.8 W (850 MHz), 2 W (900 MHz), 1 W (1800/1900 MHz)

Electrical data (mobile unit)	
Input voltage	5.2 V DC
Battery	Lithium ions
▪ Service life	3 years or 500 charging cycles
▪ Capacity	1.8 Ah
▪ Charging time	max. 6 h
▪ Operation time (charged)	min. 24 h

Electrical data (charging station)	
Input voltage	6 V DC
Output voltage	5.2 V DC

Electrical data (power supply)	
Input voltage	100–240 V AC, 50–60 Hz
Output voltage	6 V DC

Permissible environmental conditions (operation)	
Protection class	II
Temperature (charg. stat.)	0 to +40 °C (32 to 104 °F)
Temperature (mobile unit)	-5 to +40 °C (23 to 104 °F)
Relative humidity	30 to 75 %
Atmospheric pressure	700 to 1060 hPa

Permissible environmental conditions (storage)	
Temperature	-20 to +60 °C (-4 to 140 °F)
Relative humidity	30 to 75 %
Atmospheric pressure	700 to 1060 hPa

Weight	
Mobile unit	205 g
Charging station	163 g

Dimensions (H × W × D)	
Mobile unit	approx. 132 × 60 × 45 mm
Charging station	approx. 82 × 90 × 105 mm

Ordering information	
▪ CardioMessenger® II Kit	354 921
▪ CardioMessenger® II Mobile	354 956
▪ CardioMessenger® II charging station	354 954
▪ Power supply MPP 15	342 413
▪ Manual	354 950
▪ Carrying strap	356 093
▪ Power cord	351 842
▪ Soft case	348 305

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CardioMessenger®-S

Patient device for BIOTRONIK Home Monitoring®

Product Highlights

Triband cellular telecommunication technology

Bed-side only application

Well-suited for travelling or vacation

No patient support or special maintenance required

Patient call-back light

Compatible with Lumos, Lexos, Belos, Cylos, Philos II and Philos series

Ordering Information

Product	Order number
CardioMessenger®-S Kit	370328

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CardioMessenger®-S

Technical Data

Technical equipment	
CardioMessenger®-S Kit	CardioMessenger®-S
	Power supply (wall mounted)
	Technical manual with quick reference guide

Wireless network data	
Max. distance Implant-CardioMessenger®	2 m (6 feet) guaranteed
Min. distance Implant-CardioMessenger®	20 cm (7 inches)
MICS (Implant-CardioMessenger®)	Medical Implant Communication Service
▪ Modulation	FSK
▪ Frequency band	403.65 MHz, 300 kHz band width
▪ Output power	25 µW EIRP
GSM (CardioMessenger® – Service Center)	Global System for Mobile Communications
▪ Modulation	GMSK
▪ Frequency bands	900/1800 MHz, 850/1900 MHz
▪ Output power	2 W (850/900 MHz), 1 W (1800/1900 MHz)

Electrical data: CardioMessenger®-S	
Input voltage	5 V DC

Electrical data: power supply	
Input voltage	100 – 240 V AC 50 – 60 Hz
Output voltage	5 V DC

Permissible environmental conditions (operation)	
Operation Mode	continuously
Protection Grade	IP 30
Temperature	+10 to +40 °C (50 to 104 °F)
Relative humidity	30 to 75 % (non-condensing)
Atmospheric pressure	700 to 1060 hPa

Permissible environmental conditions (storage)	
Temperature	-10 to +60 °C (14 to 140 °F)
Relative humidity	30 to 75 % (non-condensing)
Atmospheric pressure	700 to 1060 hPa

Weight	
Approximate	450 g

Dimensions (W × H × D)	
Approximate	203 × 136.5 × 80 mm

Ordering information	
CardioMessenger®-S Kit	370328

* T-Mobile has a worldwide roaming system that generally supports daily, automatic, wireless CardioMessenger®-S transmissions while the patient is travelling, on vacation, or residing temporarily outside the home. Since cellular roaming functions may vary between countries or may be influenced by geographcal factors outside of BIOTRONIK'S control, individual data transmissions could be delayed or impaired in certain cases.

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ICS 3000

Implantation and follow-up system

Product Highlights

Mobile ICS 3000 programmer option for flexible usage in daily clinic life

Triple-chamber functionality for optimized CRT programming

Integrated data management system to store follow-up and implantation data on the programmer

CD-RW drive, USB and Bluetooth® interfaces for easy data export and import

Internal printer for real-time printouts

Ordering Information

Model	Dimensions (l × w × h)	Weight	Order number
ICS 3000 System	332 × 322 × 168 mm	7500 g	349 528
ICS 3000 Implantation System	332 × 322 × 210 mm	9200 g	354 877

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ICS 3000

Technical Data

Entire system	
Classification	active implant medical device (90/385/EWG)
Dimensions (h/w/d)	322/168/332 mm
	322/210/332 mm (with implant module)
Weight	7.5 kg
	9.2 kg (with implant module)
Interfaces	VGA, Bluetooth®, IRDA, serial (RS 232)
Support for removable media	USB, CD (RW)

Mobile programmer ICS 3000 OM (Operation Module)	
Dimensions (h/w/d)	318/85/270 mm
Weight	3.2 kg
Battery	
▪ Type	NiMH
▪ Service time	1.5 h
▪ Charging time	4 h
LCD module	
▪ Type	TFT color, touchscreen
▪ Size	12.1" active diagonal
▪ Resolution	800 × 600 pixels SVGA
ECG module	
▪ Protection	BF defibrillation-resistant
▪ Leads	3 Einthoven
▪ Sampling rate	500…1000 Hz
Monitoring function ("miniclinic")	
▪ Measurement of the pacing functions in any implanted pacemaker	pacing rate, interval duration, pulse width (A+V), AV conduction delay
Programming head ICS 3000 PGH	
▪ Dimensions (h/w/d)	145/97/42 mm
▪ Weight	0.5 kg
▪ Connection cables	2.3 m, spiral cable, extensible
	2.1 m, straight cable
	2.9 m, straight cable

Docking station ICS 3000 DS	
Dimensions (h/w/d)	284/103/322 mm
Weight	3.8 kg
Power pack	
▪ Voltage	110/230 V
▪ Frequency	50/60 Hz
Printer	
▪ Internal thermoprinting	8 points/mm
▪ Paper width	112 mm
▪ Printing width	104 mm
▪ Paper speed	5, 10, 25, 50 mm/s
▪ External printing	via Bluetooth® or PDF

Implant module	
Dimensions (h/w/d)	274/42/332 mm
Weight	1.7 kg
Power supply	via ICS 3000
Pacing modes	for RV, LV or BiV: VVI, DDD, DDI, VDD, OFF
	AAI, OFF

Pacing parameters	
Pacing	each channel independently: ON/OFF
Pacing frequency	30…(1)…100…(2)…180 ppm
Pacing amplitude (all channels)	0.1…(0.1)…10 V
Pulse width	0.1…(0.05)…2…(0.1)…2.5 ms
Sensitivity A	0.3…(0.1)…5…(0.2)…20 mV
Sensitivity V	0.5…(0.1)…5…(0.2)…20 mV
AV delay	15…(5)…300 ms
VV conduction delay after pace	-100…(10)…-10; -5; 0; 5; 10…(10)…100 ms
Max. resynchronization rate (UTR)	60…(1)…100…(2)…180 ppm
Lead configuration (pace polarity)	bipolar (BP), common ring bipolar (CRBP), invers bipolar (IVBP), ring ring bipolar (RRBP)
High rate/burst (A+V)	60–1000 ppm

Electrophysiological measurements	
IEGM sampling rate	500 Hz
Atrial/Ventricular lead impedance	100–3000 Ω
Atrial slew-rate	0.5–2.5 V
Ventricular slew-rate	0.5–2.5 V

Defibrillation	
Shock functions	
▪ Shock energy	1…30 J
▪ Shock coupling	0–1000 ms
▪ Shock form	monophasic, biphasic, biphasic II
▪ Shock type	cardioversion, defibrillation
▪ Max. charging time	4 s

HF burst induction (tip–ring)	
Pacing frequency	20…80 Hz
Pacing duration	0.5…5 s
Amplitude	0.5…7.5 V
Pulse width	1 ms

HF burst induction (coil)	
Pacing frequency	20…80 Hz
Pacing duration	0.5…5 s
Amplitude	12 V
Pulse width	1 ms

T-wave shock induction	
Overstimulation	80…180 ppm
Burst length	1…12 s
Amplitude	0.5…7.5 V
Coupling interval	40…600 ms
Shock form	monophasic, biphasic
Shock energy	0.5…30 J

Emergency shock	
Energy	40 J
Shock form	biphasic
Coupling interval	0 ms (nonsynchronized)
Shock polarity	normal

Accessories	
PK-222 (3-channel patient cable) 3-channel patient cable	335284
PK lead clip (forceps adapter for surface ECG) PK lead clip	340293
PK-67 (lead measurement cable) Lead measurement cable	123672
PK-141 (lead measurement cable with Alligator forceps)	353181
PA-2 (pace/sense adapter with IS-1 connectors) DTF measurement cable	123157
PA-4 (pace/sense adapter with Alligator forceps) USB memory stick	123090
PK-144 (DFT measurement cable)	353906
PA-3 (shock adapter with DF-1 connectors)	354030
Printer paper	348728
USB memory stick (compatible with ICS 3000)	350017

Ordering information	
ICS 3000 system	349528
ICS 3000 implantation system	354877

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Renamic

Implantation and follow-up system

Product Highlights

BIOTRONIK SafeSync® for wandless telemetry between the programmer and the implanted device

Two integrated compartments for easy storage of the power cord, the ECG cable and the programming head

Integrated data management system to store follow-up and implantation data on the programmer

Streamlined user interface for easy software navigation

USB, Wi-Fi™, GSM and Bluetooth® interfaces for data import, export or external printing

Internal printer for real-time printouts

Retractable touchscreen display for safe transportation with a handle or a carrying strip

Ordering Information

Model	Dimensions (l × w × h)	Weight	Order number
Renamic	476 × 345 × 125 mm	10 500 g	371 960

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Renamic

Technical Data

Housing		
Dimensions (l × w × h)[1]		47.6 × 34.5 × 12.5 cm
Weight[2]		10.5 kg
Display screen		retractable, adjustable tilt
Screen		touchscreen
Input/output	▪ 3 USB ports	external printer; memory stick; external hard disk; VGA adapter; mouse
	▪ 2 cable connectors	ECG cable, programming head
Printer		
Internal printing	▪ Printer type	thermal printer for real-time printing
	▪ Paper size, number of sheets	11.2 × 12.5 cm, 210
External printing		via Bluetooth®[3] or USB
Device interrogation		
Programming head	▪ Dimensions (l × w × h)	14.5 × 9.7 × 4.2 cm
	▪ Cable length	2.97 m
Wandless RF telemetry[4]		BIOTRONIK SafeSync®
PC functionality		
Operating system		Windows XP embedded
Internal hard disk		min. 40 GB
Ordering information		
Renamic including standard accessories		371 960
Accessories	▪ Programming head	371 588
	▪ Power cord	country-specific[5]
	▪ Stylus	371 586
	▪ ECG cable (PK-222)	country-specific[5]
	▪ ECG electrode clip	340 293
	▪ Printer paper[6]	348 728
	▪ USB Bluetooth® stick	367 929
	▪ VGA adapter	377 292
	▪ Shoulder strap	371 962
	▪ Protective cover	376 999
	▪ Serial adapter (RS-232)	376 437

1) Including two compartments for power cord, ECG cable and programming head.
2) Including power cord, ECG cable, stylus and programming head.
3) Additional USB port for Bluetooth® stick.
4) For implantable devices supporting wandless telemetry.
5) See manual for order number.
6) Two blocks of printer paper in starter kit.

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Reliaty

Pacing system analyzer

Product Highlights

Streamlined user interface for intuitive handling

Triple-chamber functionality for optimized CRT programming

Direct activation of safe pacing program for immediate patient care

Definition of preferred test settings for quick and easy reference

Two battery compartments for mobile power supply of more than 12 hours

Universal electric power cord for continuous stationary supply worldwide

USB interface for test data export or external printing via Bluetooth®

Ordering Information

Model	Dimensions (l × w × h)	Weight	Order number
Reliaty	220 × 180 × 60 mm	1200 g *	365530

* Including batteries in two compartments

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Reliaty

Technical Data

Pacemaker function		
Pacing modes		activating/deactivating lead channels or selecting predefined pacing modes
Pacing rate		30…(1)…**90**…(1)…100…(2)…180 ppm
Pulse amplitude		0.1…(0.1)…**5**…(0.1)…10 V
Pulse width		0.1…(0.1)…**0.5**…(0.1)…2.0 ms
Sensitivity	▪ Atrium	0.2…(0.1)…**0.5**…(0.1)…20 mV
	▪ Ventricle	0.5…(0.1)…**2.5**…(0.1)…20 mV
Refractory period	▪ Atrium	425 ms
	▪ Ventricle	250 ms
AV delay		0…(5)…**120**…(5)…300 ms
VV delay		–100…(5)…**5**…(5)…100 ms
Fast pacing (burst rate)		80…(10)…1 000 ppm
Intracardiac measurements		
Signal amplitude	▪ Atrium	0.2…(0.1)…30 mV
	▪ Ventricle	0.5…(0.1)…30 mV
Lead impedance		audible signal if < 100 Ω or > 3000 Ω
Input/output		
USB port (2.0 standard)		memory stick; Bluetooth® adapter
VGA port		external screens
Power cord outlet		barrel connector (5 mm/2.1 mm)
Redel connector		2 connectors for compatible BIOTRONIK cables
Power supply		
Battery	▪ Type	Mignon AA
	▪ Number of batteries	2 × 4 batteries in two separate compartments
	▪ Service time[1]	> 12 h[2]
Power cord		100 V – 240 V, 50/60 Hz
Ordering information		
Order number		365530

1) With recommended battery Duracell® MN1500 AA LR6 in two compartments and pacing at 70 ppm, 5 V, 0.5 ms, 500 Ω.
2) 2 hours prior to end of service: alert with visual signal, 30 minutes prior to end of service: audible signal every 20 seconds.

Default settings are printed in bold.

External Devices – August 2011

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Reocor S/D

External pacemaker

Product Highlights

High pacing output of up to 17 V for effective stimulation

High pacing rate of up to 250 ppm, especially for pediatric care

Burst rate for managing atrial tachyarrhythmias

Long battery service time of 500 hours (Reocor D)/600 hours (Reocor S) permanent pacing

Backup power supply of 30 seconds for battery replacement during operation

Continuous status monitoring with alerts for low battery power, out-of-range lead impedances and high pacing rates

Ordering Information

Model	Dimensions (l × w × h)	Weight	Order number
Reocor S	160 × 80 × 35 mm	245 g	365528
Reocor D	160 × 80 × 35 mm	260 g	365529

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Reocor S/D

Technical Data

Parameters		Reocor S	Reocor D
Pacing modes		S00; SSI; SST	DDD; D00; VDD; VVI; VOO; VVT
Pacing rate		30–250 ppm	30–250 ppm
Fast pacing (burst rate)		60–1000 ppm	60–1000 ppm
AV delay			15–400 ms
Pulse amplitude/pulse width		0.1–17 V/1 ms	0.1–17 V/1 ms
Polarity		unipolar; bipolar	unipolar; bipolar
Sensitivity		1–20 mV	0.2–10 mV (atrium), 1–20 mV (ventricle)
Refractory period		30–150 ppm: 225 ms 151–200 ppm: 200 ms 201–250 ppm: 175 ms	30–150 ppm: 225 ms (ventricle) 151–200 ppm: 200 ms (ventricle) 201–250 ppm: 175 ms (ventricle)
Total atrial refractory period			30–120 ppm: AV delay + 175 ms (min. 400 ms) 121–250 ppm: AV delay + 175 ms (min. 240 ms)
Battery			
Type		alkaline manganese cells, 9 V	alkaline manganese cells, 9 V
Service time	▪ after replacement [1]	600 h	300 h
	▪ after battery warning	36 h	36 h
	▪ during replacement	30 sec	30 sec
Continuous status monitoring			
Lead impedance		audible signal if < 100 Ω or > 3 000 Ω	audible signal if < 100 Ω or > 3 000 Ω
Battery status		red LED indicates ERI	red LED indicates ERI
High rate		one-time audible signal if > 180 ppm	one-time audible signal if > 180 ppm
Housing			
Dimensions		160 × 80 × 35 mm	160 × 80 × 35 mm
Weight [2]		approx. 245 g	approx. 260 g
Connector		temporary catheters and heartwires with 2 mm connectors directly; all other and implanted leads via BIOTRONIK cables	
Ordering information			
Order number		365 528	365 529

1) With recommended battery Duracell® Plus, 6LR61 and pacing at 70 ppm, 5 V, 500 Ω.
2) Including battery.

External Devices – August 2011

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