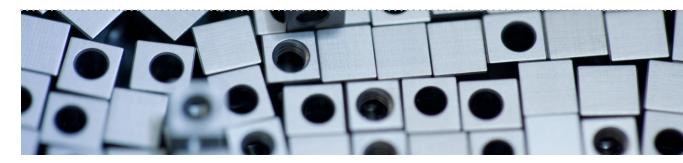
General Information

Company Profile

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.





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





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General Information						
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Company Profile						
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CRM Product Catalog

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







CRM Product Catalog

General Information

Company Profile

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.



1980s – New horizons

Our History

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.





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Company Profile	
General Information	
CRM Product Catalog	

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.

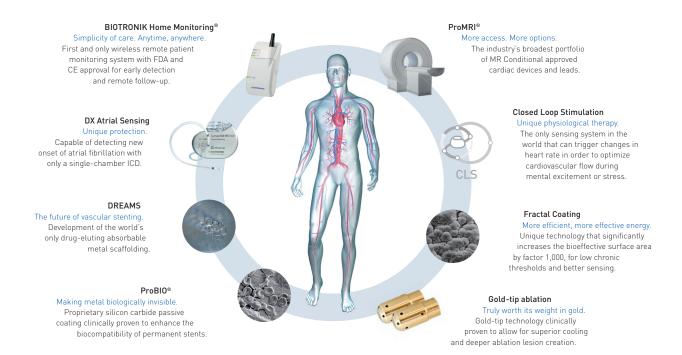


Quality & Innovation

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



General Information

Company Profile

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 awardworthy solutions.















SULLIVAN



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



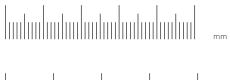


Conversion Tables

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

mm		French (F)	mm	Inch (")
1.09	н	3	1.00	0.039
1.12	н	4	1.33	0.053
1.14	н	5	1.66	0.066
1.17	\vdash	6	2.00	0.079
1.19	\vdash	7	2.33	0.092
1.22	\vdash	8	2.66	0.105
1.27	\vdash	9	3.00	0.118
1.32	⊢	10	3.33	0.131
1.37	\vdash	11	3.66	0.144
1.42	\longrightarrow	12	4.00	0.156
1.50		13	4.33	0.170
1.55	<u> </u>	14	4.66	0.184
1.60	─	15	5.00	0.197
1.63		16	5.33	0.210
1.73	─	17	5.66	0.223
1.80		18	6.00	0.236
1.83		19	6.33	0.249
1.88		20	6.66	0.263
1.93	——	22	7.33	0.288
1.96		24	8.00	0.315
2.01		26	8.66	0.341
2.08	——	28	9.33	0.367
2.18	——	30	10.00	0.393
2.34	<u> </u>	32	10.66	0.419
2.72	——	34	11.33	0.445
	1.09 1.12 1.14 1.17 1.19 1.22 1.27 1.32 1.37 1.42 1.50 1.55 1.60 1.63 1.73 1.80 1.83 1.88 1.93 1.96 2.01 2.08 2.18 2.34	1.09 1.12 1.14 1.17 1.19 1.22 1.27 1.32 1.37 1.42 1.50 1.55 1.60 1.63 1.73 1.80 1.83 1.88 1.93 1.98 1.93 1.96 2.01 2.08 2.18	1.09 H 3 1.12 H 4 1.14 H 5 1.17 H 6 1.19 H 7 1.22 H 8 1.27 H 9 1.32 H 10 1.37 H 11 1.42 H 12 1.50 H 13 1.55 H 14 1.60 H 15 1.63 H 16 1.73 H 17 1.80 H 18 1.83 H 19 1.88 H 20 1.93 H 24 2.01 26 28 2.18 30 2.34 32	1.09 H 3 1.00 1.12 H 4 1.33 1.14 H 5 1.66 1.17 H 6 2.00 1.19 H 7 2.33 1.22 H 8 2.66 1.27 H 9 3.00 1.32 H 10 3.33 1.37 H 11 3.66 1.42 H 12 4.00 1.50 H 13 4.33 1.55 H 14 4.66 1.60 H 15 5.00 1.63 H 16 5.33 1.73 H 17 5.66 1.80 H 18 6.00 1.83 H 20 6.66 1.93 H 22 7.33 1.96 H 24 8.00 2.01 H 26 8.66 2.02 2.08 2.33 30 10.00 2.34 H </td





1 atm = 1.013 bar





Single-Chamber Pacemaker

Evia SR-T

MR Conditional single-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 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 cm³	371 998
Evia SR-T coated	24 g	11 cm³	372 034



ProMRI®

Evia SR-T

Technical Data

MR Conditional

ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	V00; A00; 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

required	, res, rie
emaker parameters	
	/VIR/AAIR
	VVIR; VVI; VVT(R); V00(R); AAI(R); AAT(R); A00(R); OFF
c rate 3	30[1] 60 [1]88[2]122[3]140[5]200 ppm
ght rate C	DFF; 30(1)88(2)122(3)140(5)200 ppm
te hysteresis C	DFF; -5(-5)90 ppm
epetitive hysteresis C	DFF; 1(1)15 cycles
an hysteresis C	DFF; 1(1)15 cycles
sitivity ¹⁾ A	AUTO; 0.5(0.5)7.5 mV
e amplitude ²⁾ 0	0.2(0.1)3.0(0.1)6.0(0.5)7.5 V
e width 0	0.1; 0.2; 0.3; 0.4 ; 0.5; 0.75; 1.0; 1.25; 1.5 ms
ricular Capture Control C	DFF; ON ; ATM (monitoring only)
inimum amplitude 0	0.7 V
art amplitude 2	2.4; 3.0 ; 3.6; 4.2; 4.8 V
ıfety margin 0	0.3(0.1) 0.5 (0.1)1.2 V
	nterval [0.1; 0.3;1; 3; 6; 12; 24 h]; time of day 02:00 [00:00[00:10]23:50 hh:mm]
-Initialization C	ON
ds IS	S-1-connector
itomatic lead check C	ON
ad configuration u	unipolar; bipolar (both automatically configured)
actory period 2	200[25] 250 [25]500 ms
er rate limit ³⁾ 9	90[10] 130 [10]200 ppm
4 recording ⁴ 2	20 recordings, max. 10 seconds each, 2 triggers
cording prior to event 0	0; 25; 50; 75 ; 100 %
sor a	accelerometer
aximum activity rate 8	80(5) 120 (5)160 ppm
nsor gain 1	1423 in 27 increments [auto gain: OFF; ON]
nsor threshold v	very low; low; medium ; high; very high
ite increase 1	1[1] 4 [1]10 ppm/cycle
ite decrease 0	0.1; 0.2; 0.5 ; 1.0 ppm/cycle
te fading (rate smoothing) C	OFF; ON
sor optimization o	original, preview
	AUTO (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
lacement indication p	programmed rate minus 11 %
ery ⁵⁾ G	QMR® (open circuit voltage: 3.0 V), Li-MnO2 (open circuit voltage: 3.1 V)
	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 Ω, 50 % pacing, Home Monitoring ON)
sacement indication properly Control of the Control of	synchronous]; asynchronous; synchronous programmed rate minus 11 % QMR® (open circuit voltage: 3.0 V), Li-MnOz voltage: 3.1 V) > 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 0, 50

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 61	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 ⁷¹ , lead check, sensing amplitude ⁷¹ , pacing threshold ⁸¹ , Capture Control status ⁸¹
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	

- EN 50061 triangle pulse.
 If Capture Control is ON, the pulse amplitude is automatically selected.
 Only available for triggered modes.
 Storage of IEGMs by using intelligent memory management.
 Nominal data of the manufacturer.
 According to programmer Holter triggers.
 Programmable upper and lower limit.
 Only in WI mode.
 Programmable limit.

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



Single-Chamber Pacemaker

Evia SR

MR Conditional single-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

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	371 997
Evia SR coated	25 g	10 cm³	372 003



ProMRI®

Evia SR

Technical Data MR Conditional

ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads	
MRI modes	V00; A00; 0FF	
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	

	and the second
NBG code	VVIR/AAIR
Modes	VVIR; VVI; WT(R); V00(R); AAI(R); AAT(R); A00(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; 24h); 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	1423 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 ra 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	53×39×6.5mm/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	371 997
■ Evia SR coated	372 033

- EN 50061 triangle pulse.
 Hoapture Control is ON, the pulse amplitude is automatically selected.
 Only available for triggered modes.
 Storage of IEGMs by using intelligent memory management.
 Nominal data of the manufacturer.

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



excellence for life

Single-Chamber Pacemaker

Bradycardia Therapy

Entovis SR-T

MR Conditional single-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 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	371 994
Entovis SR-T coated	24 g	11 cm³	372 030



ProMRI®

Entovis SR-T

Technical Data MR Conditional

ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	V00, A00, 0FF
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

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Pacemaker parameters	AMID/AND
NBG code	VVIR/AAIR
Modes	VVIR; VVI; VVT(R); V00(R); AAI(R); AAT(R); A00(R); 0FF
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; 24h); 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	1423 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-MnO₂ (open circuit voltage: 3.1 V)
Nominal operating time	> 15 years (at 2.5 V, 0.4 ms, 60 ppm, 500 0, 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®

OFF; ON	
AUTO; 00:00(00:30)23:30 hh:mm	
OFF; 30; 60; 90; 120; 180 days	
OFF; ON	
	AUTO; 00:00[00:30]23:30 hh:mm OFF; 30; 60; 90; 120; 180 days

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®, Capture Control status®
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	372 030

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

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



Single-Chamber Pacemaker

Bradycardia Therapy

Entovis SR

MR Conditional single-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

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
Entovis SR uncoated	25 g	10 cm ³	371993
Entovis SR coated	25 g	10 cm³	372 029



ProMRI®

Entovis SR

Technical data MR Conditional

ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	V00, A00, 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

NBG code	VVIR/AAIR	
Modes	VVIR; VVI; VVT[R]; V00(R); AAI(R); AAT(R); A00(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; 24h]; 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	1423 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 r 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

- EN 50061 triangle pulse.
 Hoapture Control is ON, the pulse amplitude is automatically selected.
 Only available for triggered modes.
 Storage of IEGMs by using intelligent memory management.
 Nominal data of the manufacturer.

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



excellence for life

Single-Chamber Pacemaker

Cylos 990 SR

Single-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

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 cm³	359 505



ProMRI®

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	

 vp required 	YES; NU	
Pacemaker parameters		
NBG code	VVIR/AAIR	
Modes	VVIR; VVI; VVT(R); V00(R); AAI(R); AAT(R); A00(R); OFF	
Basic rate 11	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 2^{nd}]	
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	1440 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	57×39×6mm/27g
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 sin²; ventricle 40 ms sin².
 3] Only available for triggered modes.
 4] Nominal data of the battery manufacturer.
 5] Calculated with the formula T = 2740 × CBest / [Boos+|Em].

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



Estella SR-T

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

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 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

Model	Weight	Volume	Order number
Estella SR-T uncoated	24 g	11 cm³	377387
Estella SR-T coated	26 g	11 cm³	377386



Estella SR-T

Technical Data MR Conditional

ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads ¹¹	
MRI modes	V00; A00; OFF	
Pacemaker parameters		
NBG code	VVIR/AAIR	
Modes	VVIR; VVI; WT(R); V00(R); AAI(R); AAT(R); A00(R); 0FF	
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	0FF; 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:mml	
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	1423 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®

11 A4 25 2	OFF ON	
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, arrhythm statistic, Heart Failure Monitor® diagnostics	
Technical data	battery status, lead integrity measurements, programme 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®, lead check, sensing amplitude®, pacing threshold®, Capture Control status®	
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 programme	
Ordering information		
Estella SR-T uncoated	377 387	
	377 307	

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

Single-Chamber Pacemaker

Estella SR

MR Conditional single-chamber, rate-response pacemaker

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 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

Model	Weight	Volume	Order number
Estella SR uncoated	25 g	10 cm³	377 385
Estella SR coated	25 g	10 cm³	377 384







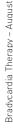
Estella SR

Technical Data

MR Conditional			
ProMRI®	MR Conditional in combination with BIOTRONIK MR		
	Conditional leads ¹⁾		
MRI modes	V00; A00; OFF		
P			
Pacemaker parameters	ANID/AND		
NBG code	VVIR/AAIR		
Modes	VVIR; VVI; VVT(R); V00(R); AAI(R); AAT(R); A00(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; 24h); 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	1423 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			
Housing Dimensions/weight	53×39×6.5 mm/25 g		
Volume	10 cm ³		
	1001115		
Electrically conductive housing surfaces	22 am²		
■ Uncoated	33 cm ²		
Coated	7 cm² SE		
X-ray identification	SF.		
Ordering information			
Estella SR uncoated	377 385		
■ Estella SR coated	377 384		

For combinations of MR Conditional leads, please see the ProMRI manual. In S0061 triangle pulse.
 For S0061 triangle pulse amplitude is automatically selected.
 Only available for triggered modes.
 Storage of IEGMs by using intelligent memory management.
 Nominal data of the manufacturer.

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





Single-Chamber Pacemaker

Ecuro SR

MR Conditional single-chamber, rate-response pacemaker

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 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

Model	Weight	Volume	Order number
Ecuro SR uncoated	25 g	10 cm³	377 369
Ecuro SR coated	25 g	10 cm³	377 368



Ecuro SR

Technical Data

MR Conditional		
ProMRI®	MR Conditional in combination with BIOTRONIK MR	
	Conditional leads ¹⁾	
MRI modes	V00; A00; OFF	
Pacemaker parameters		
NBG code	VVIR/AAIR	
Modes	VVIR; VVI; VVT(R); V00(R); AAI(R); AAT(R); A00(R); 0FF	
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	1423 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 q	
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	377 369	
■ Ecuro SR coated	377 368	

For combinations of MR Conditional leads, please see the ProMRI manual. In S0061 triangle pulse.
 For S0061 triangle pulse amplitude is automatically selected.
 Only available for triggered modes.
 Storage of IEGMs by using intelligent memory management.
 Nominal data of the manufacturer.

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



excellence for life

Single-Chamber Pacemaker

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



Model	Weight	Volume	Order number
Philos II SR uncoated	24 g	11 cm³	341824
Philos II SR coated	24 q	11 cm ³	341815





Philos II SR

Technical Data

Pacemaker parameters	VA/ID/AAID	
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	0FF ; 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	
I ead	IS-1 connector	
Automatic lead check	OFF: ON	
Lead configuration	unipolar; bipolar (automatic)	
Auto-Initialization Sensor	OFF; ON; lead detection accelerometer	
Sensor gain	1440; 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 rat	
	synchronous); asynchronous; synchronous	
Replacement indication	programmed rate minus 11 %	
Battery ⁴	1.3 Ah; Li/l	
Nominal operating time ^{5]}	10 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing)	
Housing		
Dimensions/weight	53×39×6mm/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)	
Note management		
	IEGM recording Night rate	
Discounting date		
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	341 824	
■ Philos II SR coated	341 815	

- 1] 30–34 ppm only temporarily programmable.
 2] Atrium 15 ms sin²; ventricle 40 ms sin².
 3] Only available for triggered modes.
 4] Nominal data of the battery manufacturer.
 5] Calculated with the formula T= 2740 × CBast./(Ilaos+Isrs).
 6] Availability depends on the programming software used.

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





Single-Chamber Pacemaker

Bradycardia Therapy

Philos IIS

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



Model	Weight	Volume	Order number
Philos II S uncoated	24 g	11 cm³	341 823
Philos II S coated	24 g	11 cm ³	341819



Philos IIS

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	
Magnetenect	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	11cm ³	
X-ray identification	ET	
Overview of functions ⁶ Automatic functions	Active Capture Control (ACC)	
Automatic functions	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)	
	F/R-wave tiend (331) and tong-term)	
Ordering information	r/n-wave tiend (33)) and tong-term)	
Ordering information Philos II S uncoated	F/K-wave trend (55) and tollig-term)	

- 30–34 ppm only temporarily programmable.
 Atrium 15 ms sin²; ventricle 40 ms sin².
 30 only available for triggered modes.
 41 Nominal data of the battery manufacturer.
 51 Calculated with the formula T = 2740 × CBant/llaos + IER0].
 42 Availability depends on the programming software used.

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



BIOTRONIK excellence for life

Single-Chamber Pacemaker

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 $^{\scriptsize @}$

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

Model	Weight	Volume	Order number
Effecta SR uncoated	25 g	10 cm³	371 202
Effecta SR coated	25 g	10 cm³	371 203





Effecta SR

Technical Data

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	VVIR; VVI; VVT(R); V00(R); AAI(R); AAT(R); A00(R); 0FF
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	1423 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)
Normal operating time	7 13 years (at. 2.3 V, 0.41113, 00 ppm), 300 12, 30 78 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	
	371 202
■ Effecta SR uncoated	3/1202

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

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

BIOTRONIK excellence for life

Single-Chamber Pacemaker

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

Model	Weight	Volume	Order number
Effecta S uncoated	25 g	10 cm ³	375 431
Effecta S coated	25 g	10 cm³	375 430



Effecta S

Technical Data

NBG code	VVI/AAI
Modes	VVI; VVT; V00; AAI; AAT; A00; 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

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

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



Single-Chamber Pacemaker

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.



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





Talos SR

Technical Data

Pacemaker parameters	
NBG code	VVIR/AAIR
Modes	VVIR; VVI; AAI(R); V00(R); A00(R); VVT(R); AAT(R); 0FF
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	1440 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

Housing		
Dimensions/weight	53×39×6mm/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 sin², ventricle 40 ms sin².
 3] Only available for triggered modes.
 4] Nominal data of the battery manufacturer.
 5] Calculated with the formula T=2740×CBstr/[Isos+Isn].

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

Single-Chamber Pacemaker

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.



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



Talos S

Technical Data

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 hysteresi	S	OFF; -5(5)80 ppm
■ Repetitive hyst	teresis	OFF; 1(1)10 cycles
■ Scan hysteres	is	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 lear 	d check	OFF; ON
 Lead configura 	ation	unipolar; bipolar (automatic)
Auto-Initializatio	in	OFF; ON; lead detection
Refractory perio	d	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/l
Nominal operati	na 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	356 250	
■ Talos S coated	356 251	

- 1] 30–34 ppm only temporarily programmable.
 2] Atrium 15 ms sin², ventricle 40 ms sin².
 3] Only available for triggered modes.
 4] Nominal data of the battery manufacturer.
 5] Calculated with the formula T=2740×Cmstr/llmos+ lcm).

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



Dual-Chamber Pacemaker

Evia DR-T

MR Conditional 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 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 cm³	371 996
Evia DR-T coated	25 g	12 cm³	372 032



ProMRI®

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads
MRI modes	D00; V00; A00; OFF

Closed Loop Stimulation	
CLS modes	DDD-CLS; WI-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

■ Vp required	yes; no
Pacemaker parameters	
NBG code	DDDR
Modes	DDDR; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; D00(R); VDD(R); VDI(R); VVI(R); VVT(R); V00(R); AAI(R); AAT(R); A00(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; 24h); 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	AUT0
■ 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 Dynamic AV delay	15(5)180(5)350 ms (up to 450 ms with AV hysteresis) OFF; low; medium; high; fixed; individual
byfiathic Av detay	(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
X-out-of-8 criterion (Onset criterion)Z-out-of-8 criterion (Resolution criterion)	3[1] 5 [1]8 3[1] 5 [1]8
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30 ppm
X-out-of-8 criterion [Onset criterion] Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30ppm OFF; ON
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ^S	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30ppm OFF; ON OFF; ON
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization Clock-in protection ^S Atrial overdrive ^{SI}	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization Z:1 lock-in protection ^S Atrial overdrive ^{SI}	3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection SAtriat overdrive SATRIAN S	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection S Atrial overdrive S NIPSS Upper rate limit Atrium Ventricle	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; 0N OFF; 0N OFF; 0N burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ⁵¹ Atrial overdrive ⁵¹ NIPS ⁵¹ Upper rate limit Ventricle Tachycardia behavior	3(1)5(1)8 3(1)5(1)8 0FF; -5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ^{SI} Atrial overdrive SI NIPSSI Upper rate limit Ventricle Tachycardia behavior IEGM recording SI	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; 5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization Z:1 lock-in protection ^{SI} Atrial overdrive ^{SI} NIPS ^{SI} Upper rate limit	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 %
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection S Atrial overdrive S NIPS S Upper rate limit	3(1)5(1)8 3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250[10]350(10]500 ms]
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ⁵⁾ Atrial overdrive ⁵⁾ NIPS ⁵⁾ Upper rate limit Atrium Ventricle Tachycardia behavior IEGM recording ⁶⁾ Recording prior to event PMT protection Sensor	3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; ON 0FF; ON 0FF; ON 0FF; ON 0FF; QN burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 1 lock-in protection ^{Sl} Atrial overdrive ^{Sl} NIPS ^{Sl} Upper rate limit Ventricle Tachycardia behavior IEGM recording si Recording prior to event PMT protection Sensor Maximum activity rate	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; 0N [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization Z:1 lock-in protection ^{SI} Atrial overdrive ^{SI} NIPS ^{SI} Upper rate limit	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; ON 0FF; ON 0FF; ON burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1423 in 27 increments [auto gain: OFF; ON]
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization Clock-in protection ^{SI} Atrial overdrive ^{SI} NIPS ^{SI} Upper rate limit Ventricle Tachycardia behavior IEGM recording SI Recording prior to event PMT protection Sensor Maximum activity rate	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; 0N [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1423 in 27 increments [auto gain: 0FF; 0N] very low; tow; medium; high; very high
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection S Atrial overdrive S NIPSS Upper rate limit	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; ON 0FF; ON 0FF; ON burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1423 in 27 increments [auto gain: OFF; ON]
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ⁵⁾ Atrial overdrive ⁵⁾ NIPS ⁵⁾ Upper rate limit Wentricle Tachycardia behavior IEGM recording ⁶⁾ Recording prior to event PMT protection Sensor Maximum activity rate Sensor gain Sensor threshold Rate increase	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; 0N [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1423 in 27 increments [auto gain: 0FF; 0N] very low; medium; high; very high 1(1)4(11)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ^{SI} Atrial overdrive ^{SI} NIPS ^{SI} Upper rate limit Ventricle Tachycardia behavior IEGM recording One recording One recording One recording One recording One recording One of the PMT protection Sensor Maximum activity rate Sensor gain Rate increase Rate decrease	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; SN 0FF; SN 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection ^{SI} Atrial overdrive ^{SI} NIPS ^{SI} Upper rate limit Ventricle Tachycardia behavior IEGM recording Ventricle Tachycardia prior to event PMT protection Sensor Maximum activity rate Sensor gain Rate increase Rate fading (rate smoothing)	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N 0FF; 0N 0FF; 20 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; 0N [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1423 in 27 increments [auto gain: 0FF; 0N] very low; low; medium, high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.1; 0.7; 0.8 proview AUTO [10 cycles with 90 ppm asynchronous, then basic rate
X-out-of-8 criterion (Onset criterion) Z-out-of-8 criterion (Resolution criterion) Change of basic rate Rate stabilization 2:1 lock-in protection S Atrial overdrive S NIPSS Upper rate limit	3(1)5(1)8 3(1)5(1)8 3(1)5(1)8 0FF; +5; +10(5)+30 ppm 0FF; 0N 0FF; 0N 0FF; 0N burst stimulation; programmed stimulation 0FF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 20 recordings, max. 10 seconds each, 4 triggers 0; 25; 50; 75; 100 % 0FF; 0N [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)160 ppm 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.7F; 0N

Battery ⁸⁾	QMR® (open circuit voltage: 3.0 V), Li-MnO2 (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

Implant	battery status, programmer-triggered message received
Leads	pacing impedance $[A,V]^{10l}$, lead check $[A,V]$, sensing amplitude $[A,V]^{10l}$, 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 	371 996
Evia DR-T coated	372 032

- 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

Dual-Chamber Pacemaker

Evia DR

MR Conditional 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

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

Model	Weight	Volume	Order number
Evia DR uncoated	26 g	11 cm ³	371 995
Evia DR coated	26 g	11 cm³	372 031



Evia DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Cond
MDI de-	tional leads
MRI modes	D00; V00; A00; OFF
Closed Loop Stimulation	
CLS modes	DDD-CLS; WI-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; D00(R) VDD(R); VVI(R); VVI(R); VV0(R); AAI(R); AAT(R); A00(R); 0FF
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 Start amplitude	0.5(0.1) 1.0 (0.1)4.8 V 2.4; 3.0 ; 3.6; 4.2; 4.8 V
<u> </u>	
Safety margin Search time	0.5(0.1) 1.0 (0.1)1.2 V interval (0.1; 0.3;1; 3; 6; 12; 24 h); time of day 02:00
- Scarcif time	(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 • Ventricle	AUTO 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
Construction	(programmable in 5 rate ranges)
Sense compensation AV hysteresis	OFF; -10(-5)45(-5)120 ms 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 behavi	or	2:1; WKB
IEGM recording 63		20 recordings, max. 10 seconds each, 4 triggers
 Recording prior t 	o event	0; 25; 50; 75 ; 100 %
PMT protection		OFF; ON [VA criterion: 250[10]350[10]500 ms]
Sensor		accelerometer
 Maximum activit 	y rate	80(5) 120 (5)160 ppm
 Sensor gain 		1423 in 27 increments [auto gain: OFF; ON]
■ Sensor threshold	d	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 optimizatio	n	original, preview
Magnet response		AUTO (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous
Replacement indic	ation	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	371 995
■ Evia DR coated	372 031

- EN 50061 triangle pulse.
 If Capture Control is ON, the pulse amplitude is automatically selected.
 Sou...[25]...775 ms for AAI[R], ADT modes.
 Dependent on software version.
 Dependent on software version.
 Storage of IEGMs by using intelligent memory management.
 See manual for other modes.
 Nominal data of the manufacturer.

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

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BIOTRONIK

Dual-Chamber Pacemaker

Entovis DR-T

MR Conditional 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 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

Model	Weight	Volume	Order number
Entovis DR-T uncoated	25 g	12 cm³	371 992
Entovis DR-T coated	25 g	12 cm³	372 028



Technical Data

MR Conditional ProMRI®	MR Conditional in combination with BIOTRONIK MR Cond
Promiki-	tional leads
MRI modes	D00; V00; A00; OFF
Closed Loop Stimulation	
CLS modes	DDD-CLS; WI-CLS
Maximum CLS rate	80[5]120[5]160 ppm
Expert options	The state of the s
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; D00(R) VDD(R); VDI(R); VVI(R); VVT(R); V00(R); AAI(R); AAT(R); A00(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 Sensitivity ¹⁾ Atrium	OFF; 1(1)15 cycles AUTO; 0.1(0.1)1.5(0.5)7.5 mV
Sensitivity ¹⁾ Atrium 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)
/entricular 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 Search time	0.3(0.1) 0.5 (0.1)1.2 V interval (0.1; 0.3;1; 3; 6; 12; 24 h);
Search time	time of day 02:00 (00:00(00:10)23:50 hh:mm)
Auto-Initialization	ON
_eads	IS-1-connector
Automatic lead check (A/V)	ON
Lead configuration (A/V)	unipolar; bipolar (both automatically configured)
Refractory period • Atrium ³	AUTO
■ Ventricle PVARP	200(25)250(25)500 ms
PVARP after PVC	AUT0; 175(5)250(5)600 ms 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 AV scan hysteresis	OFF ; 1(1)5(1)10 cycles OFF ; 1(1)5(1)10 cycles
/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
Jpper rate limit Atrium Ventricle	0FF; 240 ppm 90(10) 130 (10)200 ppm
Fachycardia behavior	2:1; WKB
EGM 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]
	accelerometer
bensor	80(5) 120 (5)160 ppm
Maximum activity rate	1423 in 27 increments [auto gain: OFF; ON]
Maximum activity rate Sensor gain Sensor threshold	very low; low; medium; high; very high
Maximum activity rate Sensor gain Sensor threshold Rate increase	very low; low; medium; high; very high 1[1]4[1]10 ppm/cycle
Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease	very low; low; medium ; high; very high 1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5 ; 1.0 ppm/cycle
Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate smoothing)	very low; low; medium; high; very high 1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0FF; 0N
Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate smoothing) Sensor optimization	very low; tow; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0FF; ON original, preview
Sensor Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate smoothing) Sensor optimization Magnet response	very low; low; medium; high; very high 1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0FF; 0N
Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate smoothing) Sensor optimization	very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0FF; 0N original, preview AUTO (10 cycles with 90 ppm asynchronous, then basic ra
Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate smoothing) Sensor optimization Magnet response	very low; tow; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; 0N original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rasynchronous]; asynchronous; synchronous programmed rate minus 11% [in DDD[R]] QMR* [open circuit voltage: 3.0 V], iMn02 [open circuit
Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate smoothing) Sensor optimization Magnet response Replacement indication	very low; tow; medium; high; very high 1(1)_4(1)_110 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0FF; 0N original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rasynchronous]; asynchronous; programmed rateminus 11 % [in DDD[R] ³]

Housing	
Dimensions/weight	53×44.5×6.5mm/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] ⁵⁰ , lead check [A,V], sensing amplitude [A,V] ⁵⁰ , pacing threshold (A,V], Capture Control status [A,V]	
Bradycardia	ventricular pacing percentage	
Arrhythmias number/duration of atrial arrhythmia ¹¹¹ , number/dt of mode switching ¹¹ , long ongoing atrial arrhythmi detected, number/duration of ventricular arrhythmi		
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(RI), 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.





Dual-Chamber Pacemaker

Entovis DR

MR Conditional 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

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 cm³	371 991
Entovis DR coated	26 g	11 cm³	372 027



ProMRI®

Entovis DR

Technical Data

MR Conditional		
ProMRI®	MR Conditional in combination with BIOTRONIK MR Conditional leads	
MRI modes	D00; V00; A00; OFF	
Closed Loop Stimulation		
CLS modes	DDD-CLS; WI-CLS	
Maximum CLS rate	80(5) 120 (5)160 ppm	
Expert options		
 CLS response 	very low; medium; high; very high	
Resting rate control	OFF; +10; +20; +30; +40; +50 ppm	
■ Vp required	yes; no	

■ 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) ²¹	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	
- Scarcif time	(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	1423 in 27 increments [auto gain: OFF; 0N]	
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)	0.1; 0.2; 0.5 ; 1.0 ppm/cycle 0FF ; ON	
Sensor optimization	OFF; ON original, preview	
Magnet response	AUTO (10 cycles with 90 ppm asynchronous, then basic rate	
get response	synchronous); asynchronous; synchronous	
Replacement indication	programmed rate minus 11 % (in DDD(R) ⁷¹)	
Battery®	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	371 991
■ Entovis DR coated	372 027

- EN 50061 triangle pulse.
 If Capture Control is ON, the pulse amplitude is automatically selected.
 Sou...[25]...775 ms for AAI[R], ADT modes.
 Dependent on software version.
 Dependent on software version.
 Storage of IEGMs by using intelligent memory management.
 See manual for other modes.
 Nominal data of the manufacturer.

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



Dual-Chamber Pacemaker

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

Model	Weight	Volume	Order number
Cylos 990 DR-T uncoated	31 g	14 cm³	359 484
Cylos 990 DR-T coated	31 g	14 cm³	359 504



Technical Data Closed Loop Stimulation

X-ray identification

		DDD-CLS; WI-CLS
CLS modes Maximum CLS rate		80(5)120(5)160 ppm
Expert options		оо(о) 120(о) 100 ррні
■ CLS response		very low; low; medium; high; very high
Resting rate contri	rol	OFF; +10; +20; +30; +40; +50 ppm
Vp required	00	YES; NO
- vp required		125,110
Pacemaker parame	eters	
NBG code	,,,,,,	DDDR
Modes		DDDR; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R);
		AAI(R); D00(R); V00(R); A00(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 hystere 	sis	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 Cont	rol (ACC)	OFF; ON; ATM
■ Minimum amplitu		0.1(0.1)4.8(0.2)6.4 V
■ Maximum amplitu	ıde	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; 24h) or time of the day
		(1st and 2nd)
Leads		IS-1 connector
 Automatic lead ch 		OFF; ON
 Lead configuration 	n [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	lafter Vs,VpJ	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 compensatio	n	0FF; - 15[15] 45[15] 120 ms
AV safety interval		100 ms
AV hysteresis		OFF; IRS plus; low; medium; high; negative
AV repetitive hyster	nnoic	OFF; 1[1]6 cycles
 AV repetitive nyster AV scan hysteresi 		OFF; 1(1)6 cycles
	h X/Z-out-of-8-criterion	OFF; ON
■ Intervention rate	1742 001 01 0 011011011	110(10) 160 (10)250 bpm
 X-out-of-8 criterio 	on [Oncot oritorion]	110(10)100(10)100 Dp111
		3 [1] 5 [1] 8
		3(1)5(1)8 3. (1) 5. (1) 8
■ Change of basic r	on (Resolution criterion)	3[1]5[1]8
Change of basic r 2:1 lock-in protect	on (Resolution criterion) ate	3(1) 5 (1)8 OFF; +5; +10 (5)+30 ppm
2:1 lock-in protec	on (Resolution criterion) ate	3(1)5(1)8 OFF; +5; +10(5)+30ppm OFF; ON
 2:1 lock-in protec Upper rate limit 	on (Resolution criterion) ate	3(1)5(1)8 OFF; +5; +10 (5)+30 ppm OFF; ON 100; 110; 120; 130 ; 140; 160; 185 ppm
 2:1 lock-in protec Upper rate limit Tachycardia mode 	on (Resolution criterion) ate	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB
 2:1 lock-in protec Upper rate limit 	on (Resolution criterion) ate	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; 0N 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers
 2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording 	on (Resolution criterion) ate	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2.1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms
 2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection 	on (Resolution criterion) ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2.1; WKB 2.1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250[10]380[10]500 ms]
 2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP 	on (Resolution criterion) ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2.1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250(10)380(10)500 ms] OFF ; ON [termination after 4; 6; 12 cycles]
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protection Sensor	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250(10)380(10)500 ms] OFF; ON [termination after 4; 6; 12 cycles] accelerometer
2:1 lock-in protec Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; 0N 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; 0N [VA criterion 250[10]380[10]500 ms] OFF, 0N [termination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm
2:1 lock-in protec Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; NN 100; 110; 120; 130; 140; 160; 185 ppm 20; recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250[10]380[10]500 ms] OFF; ON (termination after 4; 6; 12 cycles) accelerometer 80(5)120(5)180 ppm 1440 in 32 increments [auto gain: OFF; ON]
2:1 lock-in protec Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235ms OFF; ON [VA criterion 250(10) 380 (10)500 ms] OFF ; ON [Vermination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium , high; very high
2:1 lock-in protec Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250[10]380[10]500 ms] OFF; ON [termination after 4; 6; 12 cycles] accelerometer 80[5]120[5]180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate decrease	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250(10)380[10]500 ms] OFF; ON [termination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle
2:1 lock-in protec Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate fading (rate sn	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; 0N 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; 0N [VA criterion 250[10]380[10]500 ms] OFF; 0N [termination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate decrease	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; 0N 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235ms OFF; 0N [VA criterion 250(10)380(10)500 ms] OFF; 0N [termination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle
2:1 lock-in protec Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate fading (rate sn	on [Resolution criterion] ate tion from rate noothing]	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250(10)380(10)500 ms] OFF; ON [Va criterion 2fo(10)380(10)500 ms] OFF; ON [Va criterion 2fo(10)380(10)500 ms] 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; ssynchronous
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate decrease Rate fading frate sin Magnet effect	on [Resolution criterion] ate tion from rate noothing]	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130 ; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250[10] 380 [10]500 ms] OFF; ON [Variterion after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 22 increments [auto gain: OFF; ON] very low; low; medium ; high; very high 1; 2 ; 4; 8 ppm/cycle O1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON AUTO [10 cycles with 90 ppm asynchronous,
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate sn Magnet effect Replacement indica	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; 0N 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; 0N [VA criterion 250(10)380[10)500 ms] OFF; 0N [VA criterion 250(10)380[10]500 ms] OFF; 0N [VA criterion 250(10)380[10]500 ms] 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; 0N AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous programmed rate minus 11% [in DDD(R]]
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor threshold Rate increase Rate fading [rate sn Magnet effect Replacement indica Battery	on [Resolution criterion] ate tion	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2.1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235ms OFF; ON [VA criterion 250(10) 380 (10)500 ms] OFF; ON [Variterion 250(10)380(10)500 ms] OFF; ON [termination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 32 increments (auto gain: OFF; ON) very low; low; medium ; high; very high 1; 2 ; 4; 8 ppm/cycle 0.1; 0.2; 0.5 ; 10 ppm/cycle OFF; ON AUTO [10 cycles with 90 ppm asynchronous; synchronous programmed rate minus 11% [in DDD[R]] 1.3 Ah; Li// 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 5000; 60 ppm; 100% pacing)
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate fading [rate sn Magnet effect Replacement indica Batteryal Nominal operating	on [Resolution criterion] ate tion tion trate	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130 ; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250[10] 380 [10]500 ms] OFF ; ON [Varciterion 250[10] 380 [10]500 ms] OFF ; ON [Varciterion after 4; 6; 12 cycles] accelerometer 80[5]120[5]180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium ; high; very high 1; 2 ; 4; 8 ppm/cycle OFF; ON AUTO (10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11 % [in DDD[R]] 1.3 Ah; Li/I 10 years [at A: 1.0 V, V: 2.4 V; 0.4 ms; 5000; 60 ppm;
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor threshold Rate increase Rate fading [rate sn Magnet effect Replacement indica Battery ⁴¹ Nominal operating	on [Resolution criterion] ate tion tion trate	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2.1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235ms OFF; ON [VA criterion 250(10) 380 (10)500 ms] OFF; ON [Variterion 250(10)380(10)500 ms] OFF; ON [termination after 4; 6; 12 cycles] accelerometer 80(5)120(5)180 ppm 1440 in 32 increments (auto gain: OFF; ON) very low; low; medium ; high; very high 1; 2 ; 4; 8 ppm/cycle 0.1; 0.2; 0.5 ; 10 ppm/cycle OFF; ON AUTO [10 cycles with 90 ppm asynchronous; synchronous programmed rate minus 11% [in DDD[R]] 1.3 Ah; Li// 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 5000; 60 ppm; 100% pacing)
2:1 lock-in protect Upper rate limit Tachycardia mode IEGM recording Minimum PVARP PMT protection VES lock-in protecti Sensor Maximum activity Sensor gain Sensor threshold Rate increase Rate decrease Rate fading (rate sn Magnet effect Replacement indica Battery ^{al} Nominal operating Housing Dimensions/weight Volume	on [Resolution criterion] ate tion tion trate	3(1)5(1)8 OFF; +5; +10(5)+30 ppm OFF; ON 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 20 recordings; max. 10 seconds each; 5 triggers OFF; 235 ms OFF; ON [VA criterion 250[10]380[10]500 ms] OFF; ON [Varciterion 250[10]380[10]500 ms] OFF; ON [varciterion after 4; 6; 12 cycles] accelerometer 80[5]120[5]180 ppm 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium ; high; very high 1; 2 ; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11 % [in DDD[R] st] 1.3 Ah; Li/I 10 years [at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm; 100 % pacing]

BIOTRONIK Home Monitoring®

Home Monitoring

Pacing modes with Home Monitoring	DDD-CLS, WI-CLS and for all single- and dual-chamber modes with ventricular sensing
Programmer parameters	OFF ON
Home Monitoring	OFF; ON
ERI response	deactivation occurs 14 days after ERI
Monitoring interval Transmission types	,
Time-of-message transmission	trend message; event message; patient message 0:00(10)23:50
Time-or-message transmission	0.00(10)25.30
Transmitted Home Monitoring parameters in	ncluding 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 episodes⁸⁾ 	<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 (48 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 rate⁹ 	<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 % (12h); 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
2,1222.011.1.000100	==:=:

DDD-CLS, WI-CLS and for all single- and dual-chamber

- 1) 30-34 ppm only temporarily programmable.
 2) Atrium 15 ms sin²; ventricte 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 × Caar/[laos+lan].
 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.





Dual-Chamber Pacemaker

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.

Model	Weight	Volume	Order number
Cylos 990 DR uncoated	28 g	12 cm³	359 483
Cylos 990 DR coated	28 g	12 cm³	359 503



Cylos 990 DR

Technical Data

Closed Loop Stimulation	
CLS modes	DDD-CLS; WI-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

DDR	■ Vp required		YES; NO
NBG code			
DDR; DDD; DDIR]; DVIR]; VDIR]; VDIR	Pacemaker paramet	ters	
Basic rate	NBG code		DDDR
■ Night rate ■ Rate hysteresis ■ Rate hysteresis ■ Sean hysteresis ■ Fepetitive hysteresis ■ Feri	Modes		D00(R); V00(R); A00(R); DDT(R); DDIT(R); DVT(R); DDD(R)+;
 Rate hysteresis OFF; - 5[5] 80 ppm Repetitive hysteresis OFF; 1[1] 10 cycles Sens hysteresis OFF; 1[1] 10 cycles Sens twityi* Artrium O.5[0.5] 2.5 [0.5] 7.5 mV Ventricle O.5[0.5] 2.5 [0.5] 7.5 mV Pulse amplitude Artrium O.1 [0.1] 3.6 [0.1] 48 [0.2] 8.4 V Pulse width [AVV] O.1 (0.1] 3.6 [0.1] 48 [0.2] 8.4 V Pulse width [AV] O.1 (0.1] 48 [0.2] 6.4 V Minimum amplitude O.1 (0.1] 48 [0.2] 6.4 V Maximum amplitude Safety margin O.3 (0.1] 1.2 V Search time interval [0.1]. 0.3; 1; 3; 6; 12; 24 h] or time of the day [1 m and 2 m] Leads configuration [AV] unipotar; bipolar [automatic] Automatic lead check [AV] Unipotar; bipolar [automatic] Automatic lead check [AV] Unipotar; bipolar [automatic] Auto-Initialization OFF; ON, lead detection Refractory period Atrium* 200 (25) 425 (25) 75 ms Ventricle [after Ap) 15; 24; 23, 40; 48; 56; 72 ms Ventricle [after Ap) 15; 24; 32, 40; 48; 56; 72 ms Far-field blanking* [after Vs, Vp] 32; 40; 48; 56; 72 ms Particle [after Ap) 15; 24; 32; 40; 248; 56; 72 ms Far-field blanking* [after Vs, Vp] 32; 40; 48; 56; 72 ms Far-field blanking* [after Vs, Vp] 32; 40; 48; 56; 72 ms Far-field blanking* [after Vs, Vp] 32; 40; 48; 56; 72 ms Far-field blanking* [after Vs, Vp] 32; 40; 48; 56; 72 ms Fore [arth order of th	Basic rate ¹⁾		30[1] 60 [1]88[2]122[3]140[5]180 ppm
■ Repetitive hysteresis	■ Night rate		OFF; 30[1]60[1]88[2]122[3]140[5]180 ppm
■ Scan hysteresis ■ Atrium □ Ventricle □ Ventricle □ S., 105, 1.2. 1.2. 1.0. 1.1. 1.5. 1.0. 51 7.5 mV Pulse amplitude ■ Atrium □ Ventricle □ Ventricl	■ Rate hysteresis		OFF ; - 5(5) 80 ppm
Sensitivity	■ Repetitive hysteres	sis	OFF; 1(1)10 cycles
Ventricle	■ Scan hysteresis		OFF; 1(1)10 cycles
Putse amplitude	Sensitivity ²⁾	■ Atrium	0.1(0.1) 1.0 (0.1)1.5(0.5)7.5 mV
Pulse width [AV] O1: 0.2: 0.3: 0.4: 0.5: 0.75; 1.0: 1.5ms Active Capture Control [ACC] Fig. (N), ATM Minimum amplitude O1(0.1)4.8(0.2)6.4 V Maximum amplitude O2.4: 3.6: 4.8: 6.4 V Safety margin O3(0.1)1.2 V Search time interval (0.1: 0.3; 1; 3; 6; 12; 24h) or time of the day [1 th and 2 th] Leads S1-1 connector Automatic lead check [AV] OFF; ON Lead configuration [AV] Lead configuration [AV] Lead-tub-initialization Refractory period Atrium 2 Ventricle APP extension Blanking Atrium [after Vp] Ventricle [after Ap] E2: 40; 48; 56; 72ms AV extension O(50)350 ms Blanking Atrium [after Vp] S2: 40; 48; 56; 72ms Far-field blanking (after Vs, Vp) AV delay Dynamic AV safety interval AV hysteresis OFF; 185[15] − 45[15] − 120 ms AV safety interval AV safe hysteresis OFF; 185[15] 6 cycles AV sacan hysteresis OFF; 185[16] 6 cycles AV scan hysteresis OFF; 1[1] 6 cycles AV scan hysteresis OFF; 1[1] 6 cycles Mode switching with X/Z-out-of-8-criterion Tachycardia mode X-out-of-8-criterion [Resolution criterion] Z-out-of-8-criterion [Resolution criterion] Tachycardia mode Z-1; McK Blanking PATP protection OFF; ON Intervention OFF; ON Tachycardia mode Z-1; WKB LEGM recording Dynamic AVAPP OFF; 25 sms Tachycardia mode Z-1; WKB LEGM recording Dynamic AVAPP OFF; ON [Verrimanation after 4; 6; 12 cycles] Sensor accelerometer Maximum activity rate Sensor accelerometer Avail (10; 10; 10; 10; 10; 10; 10; 10; 10; 10;		■ Ventricle	0.5(0.5) 2.5 (0.5)7.5 mV
Pulse width [A/V] Active Capture Control [ACC] OFF, 0N; 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], 4.8, (0.2), 6.4 V ■ Safety margin 0.3.,[0.1], 4.8, (0.2), 6.4 V ■ Safety margin 0.3.,[0.1], 1.2; 0.3; 1; 3; 6; 12; 24 h] or time of the day [1 st and 2 st] Leads Isanchi lead check [A/V] OFF; 0N ■ Lead configuration [A/V] ■	Pulse amplitude	■ Atrium	0.1(0.1) 3.6 (0.1)4.8(0.6)8.4 V
Active Capture Control (ACC) ■ Minimum amplitude ■ (1.1(8.1.1.4.8(0.2)6.4 V ■ Maximum amplitude 2 (4.3.6.4.8 (6.4 V ■ Safety margin 0 .3(0.111.2 V ■ Search time interval (0.1; 0.3; 1; 3; 6; 12; 24h) □ Fearth time interval (0.1; 0.3; 1; 3; 6; 12; 24h) □ Frime or time of the day (1° and 2°°) Leads S-1 connector ■ Automatic lead check (A/V) ■ Lead configuration (A/V) Unipolar; bipolar (automatic) Auto-Initialization Refractory period		■ Ventricle	0.1[0.1] 3.6 [0.1]4.8[0.2]8.4 V
■ 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 [1* and 2**] ■ Leads IS-1 connector ■ Automatic lead check [A/V] OFF; 0N ■ Lead configuration [A/V] unipolar; bipolar (automatic) Auto-Initialization OFF; 0N; lead detection Refractory period ■ Atrium* 200[25]425[25]775 ms ■ Ventricle 170; 195; 220; 250[50]400 ms ARP extension 0[50]550m. Blanking ■ 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] 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 OFF; 10w Medium properation AV delay 0FF; 10w Dynamic AV delay 0FF; 10w Sense compensation 0FF; 10w AV seath yiterval 100ms AV seath yiterval	Pulse width (A/V)		0.1; 0.2; 0.3; 0.4 ; 0.5; 0.75; 1.0; 1.5 ms
■ Maximum amplitude ■ Salety margin ■ O.3[0.1]1.2 V ■ Salety margin ■ O.3[0.1]1.2 V ■ Search time Interval [0.1; 0.3.1; 3, 6, 12; 24h] or time of the day [1* and 2**] Leads ■ IS-1 connector ■ Automatic lead check IA/V ■ Lead configuration IA/V ■ Lead configuration IA/V Auto-Initialization ■ Atrium³ ■ 200[25]425125775 ms ■ Ventricle ■ 170; 195; 220; 250[50]400 ms ARP extension ■ Atrium [after Vp] ■ 22, 48; 56; 72 ms ■ Ventricle [after Ap] ■ Atrium [after Vp] ■ 32; 40; 48; 56; 72 ms Far-field blanking⁴ [after Vs,Vp] ■ 23; 40; 48; 56; 72; 100; 125; 150; 175; 200 ms AV delay ■ 55; 50; 75; 100; 120[10]200; 225; 250; 300 ms; dynamic OFF; 10w; medium; high; fixed; individualty programmable in 5 rate ranges Sense compensation ■ OFF; 15[15] 45[15] 120 ms AV safety interval ■ AV repetitive hysteresis ■ OFF; 11[16 cycles ■ AV scan hysteresin (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ Z-out-of-8-criterion (Resolution criterion) ■ Z-out-of-8-criterion (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ X-ou	Active Capture Contr	ol (ACC)	OFF; ON; ATM
■ Maximum amplitude ■ Salety margin ■ O.3[0.1]1.2 V ■ Salety margin ■ O.3[0.1]1.2 V ■ Search time Interval [0.1; 0.3.1; 3, 6, 12; 24h] or time of the day [1* and 2**] Leads ■ IS-1 connector ■ Automatic lead check IA/V ■ Lead configuration IA/V ■ Lead configuration IA/V Auto-Initialization ■ Atrium³ ■ 200[25]425125775 ms ■ Ventricle ■ 170; 195; 220; 250[50]400 ms ARP extension ■ Atrium [after Vp] ■ 22, 48; 56; 72 ms ■ Ventricle [after Ap] ■ Atrium [after Vp] ■ 32; 40; 48; 56; 72 ms Far-field blanking⁴ [after Vs,Vp] ■ 23; 40; 48; 56; 72; 100; 125; 150; 175; 200 ms AV delay ■ 55; 50; 75; 100; 120[10]200; 225; 250; 300 ms; dynamic OFF; 10w; medium; high; fixed; individualty programmable in 5 rate ranges Sense compensation ■ OFF; 15[15] 45[15] 120 ms AV safety interval ■ AV repetitive hysteresis ■ OFF; 11[16 cycles ■ AV scan hysteresin (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ Z-out-of-8-criterion (Resolution criterion) ■ Z-out-of-8-criterion (Resolution criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ X-ou	■ Minimum amplitud	de	0.1(0.1)4.8(0.2)6.4 V
■ Search time interval (0.1, 0.3, 1, 3, 6, 12; 24 h) or time of the day (1° and 2°°) Leads IS-1 connector ■ Automatic lead check (A/V) OFF; 0N ■ Lead configuration (A/V) unipolar; bipolar [automatic] Auto-Initialization OFF; 0N; lead detection Refractory period ■ Atrium (200, 1251, 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 ■ Ventricle [after Ap] 16; 24; 32; 40; 48; 56; 72 ms Far-field blanking (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 OFF; 10w; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation OFF; 15 [15] 45 [15] 120 ms AV va fety interval 100 ms AV hysteresis OFF; 15 [15] 45 [15] 120 ms AV va repetitive hysteresis OFF; 1 [1] 6 cycles AV acan hysteresis OFF; 1 [1] 6 cycles AV acan hysteresis OFF; 1 [1] 8 ■ Avenut-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Pref. ON) □ proprate limit 100; 110; 120; 130; 140; 140; 140; 140; 185 ppm Bench can be of protection OFF; ON [termination after 4; 6; 12 cycles] More of the day (1.1) and (1.1	■ Maximum amplitu	de	
■ Search time interval (0.1, 0.3, 1, 3, 6, 12; 24 h) or time of the day (1° and 2°°) Leads IS-1 connector ■ Automatic lead check (A/V) OFF; 0N ■ Lead configuration (A/V) unipolar; bipolar [automatic] Auto-Initialization OFF; 0N; lead detection Refractory period ■ Atrium (200, 1251, 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 ■ Ventricle [after Ap] 16; 24; 32; 40; 48; 56; 72 ms Far-field blanking (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 OFF; 10w; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation OFF; 15 [15] 45 [15] 120 ms AV va fety interval 100 ms AV hysteresis OFF; 15 [15] 45 [15] 120 ms AV va repetitive hysteresis OFF; 1 [1] 6 cycles AV acan hysteresis OFF; 1 [1] 6 cycles AV acan hysteresis OFF; 1 [1] 8 ■ Avenut-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Resolution criterion) 3 [1] 5 [1] 8 ■ Z-out-of-8-criterion (Pref. ON) □ proprate limit 100; 110; 120; 130; 140; 140; 140; 140; 185 ppm Bench can be of protection OFF; ON [termination after 4; 6; 12 cycles] More of the day (1.1) and (1.1	■ Safety margin		0.3(0.1)1.2 V
or time of the day [1 st and 2 ^{std}] Leads IS-1 connector Automatic lead check [A/V] OFF; DN Lead configuration [A/V] unipolar; bipolar (automatic) Auto-initialization OFF; ON, lead detection Refractory period Atrium 200[25]42575 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 (after Vs, Vp) 32; 40; 48; 56; 72 ms Far-field blanking (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; (bw; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation OFF; IS-∫ 45[15] − 120 ms AV safety interval 100 ms AV safety interval 100 ms AV safety interval 100 ms AV safety interval 0FF; IRSplein; low; medium; high; negative AV repetitive hysteresis OFF; I[1]6 cycles AV scan hysteresis OFF; I[1]6 cycles Mode switching with X/Z-out-of-8-criterion Intervention rate 110,[10]160[10]250 bpm X-out-of-8-criterion (Onset criterion) 3[1]5[1]8 Change of basic rate OFF; 9N Upper rate limit 100; 110; 120; 130; 140; 160; 185 ppm 2-21 lock-in protection OFF; ON With protection OFF; ON Accelerometer Maximum activity rate 80[5]120[5]180 ppm Sensor accelerometer 1440 in 32 increments [auto gain			interval (0.1; 0.3; 1; 3; 6; 12; 24 h)
■ Automatic lead check [A/V] ■ Lead configuration [A/V] Auto-Initialization Refractory period ■ Atrium at 200[25]42575 ms ■ Ventricle 170; 195; 220; 250[60]400 ms ARP extension Blanking ■ Atrium [after Vp] 32; 40; 48; 56; 72 ms Blanking ■ Ventricle [after Ap] 16; 24; 32; 40; 48; 56; 72 ms Far-field blanking at [after Vs,Vp] 32; 40; 48; 56; 72; 100; 125; 150; 175; 200 ms AV delay Dynamic AV			or time of the day [1st and 2nd]
■ Lead configuration (A/V) Auto-Initialization Refractory period ■ Atrium □ 200[25]42575 ms ■ Ventricle 170, 195; 220, 250[60]400 ms ARP extension Blanking ■ Atrium (after Vp) 32, 40; 48; 56; 72 ms ■ Ventricle [after Ap] 16; 24; 32; 40; 48; 56; 72 ms ■ Ventricle [after Ap] 16; 24; 32; 40; 48; 56; 72 ms Far-field blanking □ (after Vs, Vp) 32, 40; 48; 56; 72 ms Far-field blanking □ (after Vs, Vp) 32; 40; 48; 56; 72 ms Far-field blanking □ (after Vs, Vp) 32; 40; 48; 56; 72 ms Far-field velay 15; 50; 75; 100; 120[10]200; 225; 250; 300 ms; dynamic Dynamic AV delay 0FF; 15[15] − 45[15] − 120 ms AV detay 0FF; 15[15] − 45[15] − 120 ms AV safety interval 100 ms AV s	Leads		IS-1 connector
Auto-Initialization	 Automatic lead che 	eck (A/V)	OFF; ON
Refractory period	■ Lead configuration	[A/V]	unipolar; bipolar (automatic)
■ 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 ⁴⁰ (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 0FF; 10w; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation 0FF; −15[15] − 45[15] − 120 ms AV salety interval 100 ms AV salety interval 100 ms AV hysteresis 0FF; 1[1]6 cycles ■ AV scan hysteresis 0FF; 1[1]6 cycles ■ AV scan hysteresis 0FF; 1[1]6 cycles ■ AV scan hysteresis 0FF; 1[1]6 cycles ■ AV av Scan hysteresis 0FF; 1[1]6 cycles ■ Z-1[1]6 cycles ■ Z-2[1]8 □ T[1]8 □ T[1]	Auto-Initialization		OFF; ON; lead detection
■ 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 ⁴⁰ (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 0.FF; 16w; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation 0.FF; -15(15) 45(15) 120 ms AV safety interval 100 ms AV safet	Refractory period	■ Atrium ³⁾	200(25) 425 (25)775 ms
ARP extension		■ Ventricle	170; 195; 220; 250 (50)400 ms
■ 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] 32; 40; 48, 56; 72 ms Far-field blanking" [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 0FF; low; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation 0FF; 15[1] 45[15] 120 ms AV safety interval 100 ms AV safety interval 100 ms AV psteresis 0FF; II[1] 6 cycles AV repetitive hysteresis 0FF; II[1] 6 cycles AV repetitive hysteresis 0FF; II[1] 6 cycles AV san hysteresis 0FF;	ARP extension		0(50)350 ms
■ Ventricle [after Ap] 16; 24; 32; 40; 48; 56; 72 ms Far-field blanking* [after Vs,Vp] 32; 40; 48; 56; 72; 100; 125; 150; 175; 200 ms AV detay 15; 50; 75; 100; 125; 150; 175; 200 ms Dynamic AV delay 0FF; 0FF; medium; high; fixed; individually programmable in 5 rate ranges Sense compensation 0FF; - 15[15] 45[15] 120 ms AV safety interval 100 ms AV safety interval 100 ms AV hysteresis 0FF; IRSi ^{los} ; low; medium; high; negative ■ AV repetitive hysteresis 0FF; I[1]6 cycles ■ AV san hysteresis 0FF; I[1]6 cycles Mode switching with X/Z-out-of-8-criterion 0FF; 0N ■ Intervention rate 110[10]160[10]250 bpm ■ X-out-of-8-criterion [Onset criterion] 3[1]8 ■ Z-out-of-8-criterion (Resolution criterion) 3[1]8 ■ Change of basic rate 0FF; 45; +10[5]+30 ppm ■ Z-1 lock-in protection 0FF; 0N 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 0FF; 235 ms Minimum PVARP 0FF; 235 ms Minimum PVARP 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protec		Atrium (after Vp)	
Far-field blanking ⁴¹ (after Vs,Vp) 32, 40; 48, 56; 72; 100; 125; 150 ; 175; 200 ms		■ Ventricle (after Ap)	
AV delay 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 No medium; high; fixed; individually programmable in 5 rate ranges Sense compensation OFF; -15[15] 45[15] 120 ms AV safety interval No medium; high; negative AV specific protective hysteresis OFF; In[1] 6 cycles OFF; In[1] 6 cycles Mode switching with X/Z-out-of-8-criterion FF; ON Intervention rate 110[10]160[10]250 bpm X-out-of-8-criterion (Ionset criterion) X-out-of-8-criterion (Resolution criterion) Technology of basic rate OFF; SN Change of basic rate OFF; ON Upper rate limit 100; 110; 120; 130; 140; 160; 185 ppm Tachycardia mode 12:1, WKB IEGM recording 20 recordings; max. 10 seconds each; 5 triggers Minimum PVARP OFF; 235 ms Minimum PVARP OFF; 235 ms WES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON (Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]	Far-field blanking4] [a		
Dynamic AV delay OFF; low; medium; high; fixed; individually programmable in 5 rate ranges			
in 5 rate ranges Sense compensation OFF; -15[15] 45[15] 120 ms AV vafety interval OFF; IRSp ^{lux} ; low; medium; high; negative ■ AV repetitive hysteresis OFF; I[1] 6 cycles ■ AV scan hysteresis OFF; 1[1] 6 cycles AV scan hysteresis OFF; 1[1] 6 cycles Mode switching with X/Z-out-of-8-criterion □ FF; ON ■ Intervention rate 110[10] 150[10] 250 bpm ■ X-out-of-8-criterion (Onset criterion) ■ X-out-of-8-criterion (Resolution criterion) ■ Z-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 [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Isermination after 4; 6; 12 cycles] Sensor accelerometer ■ Maximum activity rate ■ Maximum activity rate ■ Maximum activity rate ■ Maximum activity rate ■ Sensor gain 1440 in 32 increments [auto gain: OFF; ON] ■ Sensor threshold ■ Rate increase 1; 2; 4; 8 ppm/cycle ■ Rate decrease O.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] ³⁰] Battery ⁴¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V, 0.4 ms; 500 Ω; 60 ppm;			
AV safety interval 100 ms AV hysteresis OFF ; IRSp ^{lux} ; low; medium; high; negative • AV repetitive hysteresis OFF ; I(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 (Ionset criterion) 3[1]5[1]8 • Change of basic rate OFF; ON • Change of basic rate OFF; ON • Change of basic rate 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 (Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [vermination after 4; 6; 12 cycles] Sensor accelerometer • Maximum activity rate 80[5]120[5]180 ppm • Sensor gain 1440 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 fading [rate smoothing] OFF; ON Magnet effect auto [10] cycles with 90 ppm asynchronous, then basic rate synchronous; asynchronous; synchronous programmed rate minus 11 % [in DDD(R] ³¹] Battery ⁴¹ 13 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V, 0.4 ms; 500 Ω; 60 ppm;	Dynamic / W detay		
AV safety interval 100 ms AV hysteresis OFF ; IRSp ^{lux} ; low; medium; high; negative • AV repetitive hysteresis OFF ; I(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 (Ionset criterion) 3[1]5[1]8 • Change of basic rate OFF; ON • Change of basic rate OFF; ON • Change of basic rate 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 (Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; ON [vermination after 4; 6; 12 cycles] Sensor accelerometer • Maximum activity rate 80[5]120[5]180 ppm • Sensor gain 1440 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 fading [rate smoothing] OFF; ON Magnet effect auto [10] cycles with 90 ppm asynchronous, then basic rate synchronous; asynchronous; synchronous programmed rate minus 11 % [in DDD(R] ³¹] Battery ⁴¹ 13 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V, 0.4 ms; 500 Ω; 60 ppm;	Sense compensation	1	OFF; - 15(15) 45(15) 120 ms
■ AV repetitive hysteresis			100 ms
■ AV repetitive hysteresis	AV hysteresis		OFF; IRSplus; low; medium; high; negative
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 tock-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 [VA criterion after 4; 6; 12 cycles] Sensor accelerometer Maximum activity rate 80[5]120[5]180 ppm Sensor gain 1440 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] ¹³] Battery ⁴¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;	■ AV repetitive hyster	resis	
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 tock-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 [VA criterion after 4; 6; 12 cycles] Sensor accelerometer Maximum activity rate 80[5]120[5]180 ppm Sensor gain 1440 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] ¹³] Battery ⁴¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;	AV scan hysteresis		OFF; 1[1]6 cycles
■ X-out-of-8-criterion (Onset criterion) 3[1]8 ■ Z-out-of-8-criterion (Resolution criterion) 3[1]8 ■ Change of basic rate			
■ X-out-of-8-criterion (Onset criterion) ■ Z-out-of-8-criterion (Resolution criterion) 3[1]5[1]8 ■ Change of basic rate □ CFF; +5; +10[5]+30 ppm □ 2-1 lock-in protection □ OFF; 0N □ Upper rate limit □ 100; 110; 120; 130; 140; 160; 185 ppm □ Tachycardia mode □ Z-1; WKB □ CFF; 235ms □ OFF; 235ms □ OFF; 235ms □ OFF; 0N [VA criterion 250[10]380[10]500 ms] □ VES lock-in protection □ OFF; 0N [VA criterion 250[10]380[10]500 ms] □ VES lock-in protection □ OFF; 0N [termination after 4; 6; 12 cycles] □ Sensor □ Accelerometer □ Maximum activity rate □ Maximum activity rate □ Sensor gain □ 1440 in 32 increments [auto gain: OFF; 0N] □ Sensor threshold □ Rate increase □ 1; 2; 4; 8 ppm/cycle □ Rate decrease □ 1; 0.2; 0.5; 1.0 ppm/cycle □ Rate fading [rate smoothing] □ OFF; 0N □ Magnet effect □ Auto [10] cycles with 90 ppm asynchronous, then basic rate synchronous; asynchronous; synchronous □ Replacement indication □ programmed rate minus 11 % [in DDD[R] □] □ Battery □ 1.3 Ah; Li/I □ Nominal operating time □ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;	■ Intervention rate		110(10) 160 (10)250 bpm
■ Z-out-of-8-criterion (Resolution criterion) 3[1]8 ■ Change of basic rate ■ Change of basic rate ■ 2:1 lock-in protection Dept. 7 N Upper rate limit 100, 110; 120; 130; 140; 140; 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; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [Va criterion 250[10]380[10]500 ms] VES lock-in protection In	■ X-out-of-8-criterio	n (Onset criterion)	
■ Change of basic rate □ Crisck-in protection □ Crisck-in protection attention 2 protection attention 2 protection attention 2 protection 2 p			
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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 0FF; 235 ms PMT protection 0FF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection 0FF; 0N [termination after 4; 6; 12 cycles] Sensor accelerometer * Maximum activity rate 80[5]120[5]180 ppm * Sensor gain 1440 in 32 increments [auto gain: 0FF; 0N] * 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) 0FF; 0N Magnet effect auto [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous Replacement indication programmed rate minus 11 % [in DDD[R] ³] Battery ⁴ⁱ 1.3 Ah; Li/I Nominal operating time ⁷ⁱ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;			
Tachycardia mode			
IEGM recording 20 recordings; max. 10 seconds each; 5 triggers			
Minimum PVARP OFF; 235 ms PMT protection OFF; 0N [VA criterion 250[10]380[10]500 ms] VES lock-in protection OFF; 0N [termination after 4; 6; 12 cycles] Sensor accelerometer ■ Maximum activity rate 80[5]120[5]180 ppm ■ Sensor gain 1440 in 32 increments [auto gain: 0FF; 0N] ■ 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; 0N Magnet effect auto [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous Replacement indication programmed rate minus 11 % [in DDD[R] ³⁰] Battery ⁴¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;			
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 1440 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, 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] ³⁰] Battery ⁴¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;			
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 1440 in 32 increments [auto gain: 0FF; 0N] ■ Sensor threshold ■ 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 Battery ⁴¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;			
Sensor accelerometer accelerometer Maximum activity rate 80[5]120[5]180 ppm Sensor gain 1440 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] ^[s]] Battery ^[s] 1.3 Ah; Li/I Nominal operating time ^[s] 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 0; 60 ppm;		20	
■ Maximum activity rate ■ 80[5]120[5]180 ppm ■ Sensor gain ■440 in 32 increments [auto gain: 0FF; 0N] ■ 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; 0N Magnet effect ■ uto [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous Replacement indication programmed rate minus 11 % [in DDD[R] ³] Battery ³ 1.3 Ah; Li/I Nominal operating time ³¹ 10 years [at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;		JII	
■ Sensor gain 1440 in 32 increments [auto gain: 0FF; 0N] ■ 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; 0N Magnet effect auto [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous Replacement indication programmed rate minus 11 % [in DDD[R] [®]] Battery [®] 1.3 Ah; Li/I Nominal operating time [®] 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;		roto	
■ 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] ³] Battery¹¹ 1.3 Ah; Li/I Nominal operating time ³¹ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;		atc	
■ 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] ^[8]] Battery ^[8] 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;			
■ 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] ³] Battery ³¹ 1.3 Ah; Li/l Nominal operating time ³¹ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;			
Rate fading (rate smoothing) Magnet effect auto [10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronous Replacement indication programmed rate minus 11 % [in DDD[R] **] Battery** 1.3 Ah; Li/I Nominal operating time** 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 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) %] Battery 4 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;			
synchronous; asynchronous; synchronous Replacement indication programmed rate minus 11 % [in DDD(R] ^[3] Battery ⁽⁴⁾ 1.3 Ah; Li/l Nominal operating time ⁷⁾ 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;		ootningj	
Replacement indication programmed rate minus 11 % [in DDD[R] ^[ii]] Battery ⁽ⁱ⁾ 1.3 Ah; Li/I Nominal operating time ^[ii] 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;	Magnet effect		
Battery ⁸¹ 1.3 Ah; Li/I Nominal operating time ⁷³ 10 years {at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 0; 60 ppm;	Renlacement indicat	ion	<u> </u>
Nominal operating time ^η 10 years (at A: 1.0 V, V: 2.4 V; 0.4 ms; 500 Ω; 60 ppm;		1011	
	ivorninat operating ti	ine.	

Housing	
Dimensions/weight	57 × 46 × 6 mm/28 g
Volume	12 cm ³
Electrically conductive housing surfaces	
■ Uncoated	37 cm ²
■ Coated	7 cm ²
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 15ms sin'; ventricle 40 ms sin'.
 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 × CBast/(IBIOS+IERD).

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

Dual-Chamber Pacemaker

Bradycardia Therapy

Estella DR-T

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

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

Model	Weight	Volume	Order number
Estella DR-T uncoated	25 g	12 cm³	377 383
Estella DR-T coated	25 g	12 cm³	377382





Technical Data

MR Conditional ProMRI®	MR Conditional in combination with BIOTRONIK MR Condi
MRI modes	tional leads ¹⁾ D00, V00, A00, OFF
viki modes	000, V00, A00, 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 Sensitivity ²⁾ Atrium	OFF; 1[1]15 cycles 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 Search time	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 PVARP after PVC	AUTO; 175(5)250(5)600 ms
Ventricular blanking after Ap	PVARP + 150 ms (max: 600 ms) automatically adjusted 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
C	[programmable in 5 rate ranges]
Sense compensation AV hysteresis	0FF; -10(-5)45(-5)120 ms 0FF; 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) Z-out-of-8 criterion (Resolution criterion) 	3(1)5(1)8 3(1)5(1)8
Change of basic rate	
	OFF; +5; +10 (5)+30 ppm
Rate stabilization	
Rate stabilization 2:1 lock-in protection	OFF; +5; +10 (5)+30 ppm OFF ; ON
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit # Atrium	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF, ON OFF; ON OFF; 240 ppm
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit # Atrium # Ventricle	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; ON Dirts stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm
Rate stabilization 1-1 lock-in protection Atrial overdrive NIPS Upper rate limit Ventricle Tachycardia behavior	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB
■ Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit ■ Atrium ■ Ventricle Tachycardia behavior	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130(10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 %
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit Atrium Ventricle Tachycardia behavior IEGM recording IIEGM recording Prior to event PMT protection	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(101130(101200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(101350(101500 ms]
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130(10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10]350(10]500 ms] accelerometer 80[5]120(5]180 ppm 1423 in 27 increments [auto gain: OFF; ON]
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit # Atrium Ventricle Tachycardia behavior IEGM recording # Recording prior to event PMT protection Sensor # Maximum activity rate Sensor gain Sensor threshold	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130(10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10]350(10]500 ms] accelerometer 80(5)120(5)180 ppm 1623 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(101130(10)200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10]350(10]500 ms] accelerometer 80(5)120(5)180 ppm 1(4)
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON DFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1«23 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)«(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON DFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130(10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10]350[10]500 ms] accelerometer 80[5]120[5]180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON original, preview
	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130(10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10]350[10]500 ms] accelerometer 80[5]120[5]180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON original, preview
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10[5]+30 ppm OFF; ON OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130[10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250[10]350[10]500 ms] accelerometer 80[5]120[5]180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON OFF; ON
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130(10]200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10]350[10]500 ms] accelerometer 80[5]120[5]180 ppm 1623 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1[1]6[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle OFF; ON original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous]; asynchronous; synchronous, then basic rat synchronous; asynchronous; synchronous [10]
Rate stabilization 2:1 lock-in protection Atrial overdrive NIPS Upper rate limit	OFF; +5; +10(5)+30ppm OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 12 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350[10]500 ms] accelerometer 80(5)120[5]180 ppm 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0FF; ON original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous; asynchronous; asynchronous programmed rate minus 11 % (in DDD(R) 7)

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	
■ Estella DR-T uncoated	377 383
■ Estella DR-T coated	377 382

- 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]...755 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, 500Ω. Default settings are printed in bold.





Dual-Chamber Pacemaker

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BIOTRONIK

Estella DR

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

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.

Model	Weight	Volume	Order number
Estella DR uncoated	26 g	11 cm ³	377381
Estella DR coated	26 g	11 cm³	377380





Estella DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK
	MR Conditional leads ¹⁾
MRI modes	D00; V00; A00; OFF
Pasamakar paramatars	
Pacemaker parameters NBG code	DDDR
Modes	DDDR; DDD; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; D00(R);
Modes	VDD(R); VDI(R); WI(R); WT(R); VOO(R); AAI(R); AAT(R);
	A00(R); 0FF
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 Scan hysteresis	OFF; 1(1)15 cycles 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
Ventrianing Contract Co. 1	(00:00(00:10)23:50 hh:mm)
Ventricular Capture Control	OFF; ON ; ATM (monitoring only)
Minimum amplitude 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	AUT0
■ 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 Far-field protection ⁵ ■ After Vs	30 (5)70 ms 100 (10)220 ms
After Vp	100[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 Intervention rate	0FF; 0N
X-out-of-8 criterion (Onset criterion)	100(10)160(10)250 bpm 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
EGM recording a prior to event	12 recordings, max. 10 seconds each, 3 triggers
Recording prior to event	0; 25; 50; 75 ; 100 % OFF; ON [VA criterion: 250[10] 350 [10]500 ms]
PMT protection Sensor	accelerometer
Maximum activity rate	80(5)120(5)180 ppm
Sensor gain	1423 in 27 increments [auto gain: 0FF; 0N]
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 rat
	synchronous); asynchronous; synchronous
Replacement indication	
	programmed rate minus 11 % (in DDD[R] 7]
Battery ⁸⁾ Nominal operating time	LiJ (open circuit voltage: 2.8 V) 12.1 years (at A/V: 2.5 V, 0.4 ms, 60 ppm, 500 Ω,

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

■ Estella DR uncoated	377 381
■ Estella DR coated	377 380

- For combinations of MR Conditional leads, please see the ProMRI manual. EN 50061 triangle pulse.
 Heapture Control is ON, the pulse amplitude is automatically selected.
 Sou. [25]. 775 ms for AAI[R], AAT[R], DDT modes.
 Post-ventricular atrial blanking.
 Storage of IEGMs by using intelligent memory management.
 See manual for other modes.
 Nominal data of the manufacturer.

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





Dual-Chamber Pacemaker

Ecuro DR

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

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 cm³	377365
Ecuro DR coated	26 g	11 cm³	377 364

ProMRI®



Ecuro DR

Technical Data

MR Conditional	
ProMRI®	MR Conditional in combination with BIOTRONIK MR Condi
MRI modes	D00; V00; A00; OFF
I-IIV IIIVUES	500, 100, 800, 011
Pacemaker parameters	
NBG code	DDDR
Modes	DDDR; DDD(R)-ADI(R); DDI(R); DVI(R); DDT; D00(R);
	VDD(R); VDI(R); WV(R); WT(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 Pulse amplitude (A/V) ³⁾	AUTO; 0.5(0.5)7.5 mV 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
Ventrianian Contrar Contrar	[00:00[00:10]23:50 hh:mm]
Ventricular Capture Control	OFF; ON; ATM (monitoring only)
Minimum amplitude 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; 24h); 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) Automatic lead check (A/V)	ON CONTRACTOR OF THE CONTRACTO
■ Lead configuration (A/V) Refractory period ■ Atrium ⁴⁾	unipolar; bipolar (both automatically configured) ALITO
Refractory period Atrium ⁴ • 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; 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) Zanta (Onset criterion)	3(1)5(1)8
Z-out-of-8 criterion (Resolution criterion)	3[1]5[1]8
Change of basic rate Rate stabilization	OFF; +5; +10(5)+30 ppm 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] accelerometer
Sensor Maximum activity rate	acceterometer 80[5]120[5]180 ppm
Sensor gain	1423 in 27 increments [auto gain: 0FF; 0N]
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
- D - () () ()	OFF; ON
Rate fading (rate smoothing) Sensor optimization	original, preview
	AUTO (10 cycles with 90 ppm asynchronous, then basic rat
Sensor optimization Magnet response	AUTO (10 cycles with 90 ppm asynchronous, then basic rat synchronous); asynchronous; synchronous
Sensor optimization Magnet response Replacement indication	AUTO (10 cycles with 90 ppm asynchronous, then basic rat synchronous); asynchronous; synchronous programmed rateminus 11 % (in DDD[R) ⁷¹)
Sensor optimization Magnet response	AUTO (10 cycles with 90 ppm asynchronous, then basic rat synchronous); asynchronous; synchronous

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	377 365	
Ecuro DR coated	377 364	

- For combinations of MR Conditional leads, please see the ProMRI manual. EN 50061 triangle pulse.
 Heapture Control is ON, the pulse amplitude is automatically selected.
 Sou. [25]. 775 ms for AAI[R], AAT[R], DDT modes.
 Post-ventricular atrial blanking.
 Storage of IEGMs by using intelligent memory management.
 See manual for other modes.
 Nominal data of the manufacturer.

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



Dual-Chamber Pacemaker

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

Model	Weight	Volume	Order number
Philos II DR-T uncoated	27 g	11.5 cm³	343 175
Philos II DR-T coated	27 g	11.5 cm ³	343 176



Technical Data

Pacing modes with BIOTRONIK Home Monitori			
Home Monitoring is possible for the following modes:	DDDR; DDTR/A; DDTR/V; DDTR; DDIR; DDIR/T; VDDF VDTR; VDIR; DDD; DDT/A; DDT/V; DDT; DDI; DDI/T;		
lottowing modes:	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 inc	luding 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 [48 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; 85248; > 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/	<50%; <100%; > 100% safety margin		
programmed sensitivity	100 %, 1100 %, 1100 % Salety 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		
2			
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		
Wean P/R-wave ampl. < 50 % safety margin	OFF; ON		
- mean i /iv wave dript. Not to safety fildfylli	o, o it		
Diagnosis and therapy			
■ Duration of Mode Switching episodes/24 h	OFF; 10 % (2.5h); 25 % (6h); 50 % (12h); 75 % (18h)		
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			
	nnnp		

■ Ventricular episode		OFF; ON	
■ Ventricular run		OFF; ON	
■ Patient message	3]	ON	
Pacemaker param	otors		
NBG-code	ictors	DDDR	
Modes		DDDR; DDD; DDIRI; DVI(R]; VDD[R]; VDI(R]; WI(R]; AAI(R); D00(R]; VOO(R); DDT(R]/A; DDT(RI/V; AOO(R); DDT(R); DDT(R]; DDT(R]; DDT(R]/A+; DDT(R]/A+ AAI(R]+; AAT(R]+; VDT(R); VDT(R); AAT(R); OFF	
Basic rate 41		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 hysteres	sis	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 Cor	ntrol (ACC)	OFF; ON; ATM	
Minimum amplitud	de	0.1[0.1]4.8 V	
Maximum amplitu	de	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 ; 24h) 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 71; 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; 1440; 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]®)	
Battery ⁹	1.3 Ah; Li/l	
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	343 175	
■ Philos II DR-T coated	343 176	

- | Measured on IEGM for Mode Switching.
 | Measured on IEGM for high ventricular rate.
 | Only if activated via programmer.
 | 30-34 ppm only temporarily programmble.
 | Atrium 15 ms sin²; ventricle 40 ms sin².
 | Total Atria Refractory Period [TARP].
 | Value depends on set atrial blanking.
 | See manual for other modes.
 | Nominal data of the battery manufacturer.
 | Oldiculated with the formula T = 2740 × Ceant / [IBOS + IER].

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





Dual-Chamber Pacemaker

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.



Model	Weight	Volume	Order number
Philos II DR uncoated	26 g	12 cm³	341826
Philos II DR coated	26 g	12 cm³	341 821



Philos II DR

Technical Data

Pacemaker parame NBG code		DDDR	
Modes		DDDR; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R);	
		AAI(R); D00(R); V00(R); DDT(R)/A; DDT(R)/V; A00(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); OFI	
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		0FF ; -5(5)80 ppm	
 Repetitive hystere 	sis	OFF; 1(1)10 cycles	
Scan hysteresis	.515	OFF; 1(1)10 cycles	
Sensitivity ²	■ Atrium	0.1(0.1) 1.0 (0.1)1.5(0.5)7.5 mV	
ocholdricy.	■ 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	
r disc diripatade	■ Ventricle	0.1(0.1) 3.6 (0.1)4.8(0.2)8.4 V	
Pulse width (A/V)	- reminese	0.1; 0.2; 0.3; 0.4 ; 0.5; 0.75; 1.0; 1.5 ms	
Active Capture Conf	rol (ACC)	OFF; ON; ATM	
 Minimum amplitu 		0.1(0.1)4.8(0.2)6.4 V	
 Maximum amplitu 		2.4; 3.6 ; 4.8; 6.4 V	
Safety margin	100	0.3(0.1)1.2 V	
Search time		interval (0.1; 0.3; 1; 3; 6; 12; 24h) or time of day	
Leads		(1st and 2nd) IS-1 connector	
 Automatic lead ch 	neck	OFF; ON	
 Lead configuratio 	n (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	<u> </u>	56 ⁵¹ ; 100; 125; 150; 175; 200 ms	
AV delay		15; 50; 75; 100; 120(10)200; 225; 250; 300 ms; dynami	
Dynamic AV delay		OFF; low; medium; high; fixed;	
		individually programmable in 5 rate ranges	
Sense compensatio	n	OFF; -15(15)45(15)120 ms	
AV safety interval		100 ms	
AV hysteresis		OFF; IRS ^{plus} ; low; medium; high; negative	
 AV repetitive hyste 	eresis	OFF; 1[1]6 cycles	
■ AV scan hysteresi	S	OFF; 1(1)6 cycles	
Atrial tachycardia re	esponse	OFF; mode switching; mode conversion	
	h X/Z-out-of-8 criterion	OFF; ON	
X-out-of-8 criterio		3(1)5(1)8	
Z-out-of-8 criterio		3(1)5(1)8	
■ Mode switching b		OFF; +5; +10 (5)+30 ppm	
 Intervention rate 		110(10) 160 (10)250 bpm	
2:1 Lock-in protect	ction	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		0FF; 235 ms	
PMT protection		OFF; ON [VA criterion 250[10]380[10]500 ms]	
VES lock-in protecti	on	OFF; ON (termination after 4; 6;12 cycles)	
Sensor	·	accelerometer	
Sensor gain		1440; in 32 increments [auto gain: OFF; ON]	
Sensor threshold		very low; medium; high; very high	
Rate increase		1; 2 ; 4; 8 ppm/cycle	
		0.1; 0.2; 0.5 ; 1.0 ppm/cycle	
Rate decrease		80(5) 120 (5)180 ppm	
		0FF ; ON	
 Max. activity rate 		1; 2; 4; 8 ppm/cycle	
 Rate decrease Max. activity rate Rate fading (rate sn RE rate increase 	nootningj		
 Max. activity rate Rate fading (rate sn RF rate increase 	nootningj		
 Max. activity rate Rate fading (rate sn RF rate increase RF rate decrease 	nootning)	0.1; 0.2; 0.5; 1.0 ppm/cycle	
 Max. activity rate Rate fading (rate sn RF rate increase RF rate decrease Magnet effect 		0.1; 0.2; 0.5; 1.0 ppm/cycle AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchrono	
 Max. activity rate Rate fading (rate sn RF rate increase RF rate decrease Magnet effect Replacement indica 		0.1; 0.2; 0.5; 1.0 ppm/cycle AUTO (10 cycles with 90 ppm asynchronous, then basic rate synchronous); asynchronous; synchronou programmed rate minus 11% [in DDD[R]4]	
 Max. activity rate Rate fading (rate sn RF rate increase RF rate decrease Magnet effect 		0.1; 0.2; 0.5; 1.0 ppm/cycle AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous	

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

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 (33h 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 15ms 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 × CBatt/[Ilios+lexi].
 9] Availability depends on the programming software used.

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

Dual-Chamber Pacemaker

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



Model	Weight	Volume	Order number
Philos II D uncoated	26 g	12 cm³	341 825
Philos II D coated	26 g	12 cm ³	341 820



Philos II D

Technical Data

Pacemaker param NBG code		DDD	
Modes		DDD; DDI(R) ¹¹ ; DVI; VDD; VDI(R) ³ ; VVI(R); AAI; D00; VOO(R); DDT/A; DDT/V; AOO; DDT; DDIT; DVT; DDD+; DDT/A; DDT/A; AAI; AAT; VDT; VVT; AAT; OFF	
		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 hystere 	esis	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	
i dise ampilitude			
	■ 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 Con		OFF; ON; ATM	
 Minimum amplitu 	ıde	0.1(0.1)4.8(0.2)6.4 V	
 Maximum amplit 	ude	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 ; 24h) or time of day (1st and 2nd)	
Leads		IS-1 connector	
 Automatic lead cl 	herk	OFF: ON	
Lead configuration	(~/ V)	unipolar; bipolar (automatic)	
Auto-Initialization	- 4: 1 (*)	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 51		56 ⁶ ; 100; 125; 150; 175; 200 ms	
AV delay		15; 50; 75; 100; 120(10)200; 225; 250; 300 ms; dynami	
Dynamic AV delay		OFF; low ; medium; high; fixed; individually programmable in 5 rate ranges	
Sense compensation	n	OFF; -15(15) -45 (15)120 ms	
AV safety interval		100 ms	
AV hysteresis		OFF; IRSplus; low; medium; high; negative	
 AV repetitive hyst 	eresis	OFF; 1(1)6 cycles	
AV scan hysteresi		0FF ; 1(1)6 cycles	
Atrial tachycardia r		OFF; mode switching; mode conversion	
	h X/Z-out-of-8 criterion	OFF; ON	
X-out-of-8 criteri		3[1]5[1]8	
 Z-out-of-8 criteri 		3[1]5[1]8	
 Mode switching b 	asic rate	OFF; +5; +10 (5)+30 ppm	
 Intervention rate 		110(10) 160 (10)250 bpm	
2:1 lock-in protec	tion	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 protect	ion	OFF; ON (termination after 4; 6; 12 cycles)	
Sensor		accelerometer	
Sensor gain		1440; 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	
	monthing	0FF ; ON	
Rate fading (rate sr	noodiingi		
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; synchronou	
Replacement indica	ation	programmed rate minus 11 % [in DDD ^{7]}	
		1.3 Ah; Li/I	
Battery ⁸ Nominal operating time ⁹		7 years (at 3.6 V; 0.4 ms; 60 ppm; 100 % pacing; DDD)	
Nominal operating			
Nominal operating		ET	
Nominal operating Housing X-ray identification		ET	
Battery® Nominal operating Housing X-ray identification Dimensions/weight Volume		ET 53×43×6 mm/26 g 12cm ³	

Volume

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 (33h 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	341 826
Philos II D coated	341 821

- Only available for Mode Switching.
 30-34 ppm only temporarily programmable.
 Atrium 15 ms sin?; ventricle 40 ms sin?.
 Total Atria Refractory Period [TARP].
 Post-ventricular atrial blanking.
 Value depends on set atrial blanking.
 See manual for other modes.
 Nominal data of the battery manufacturer.
 Calculated with the formula T = 2740 × Cost. / [IBOS+IER].
 Availability depending on the programming software used.

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

Dual-Chamber Pacemaker

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



Model	Weight	Volume	Order number
Philos II SLR uncoated	26 g	12 cm³	341 822
Philos II SLR coated	26 g	12 cm³	341816





Philos II SLR

Technical Data

Pacemaker parame	eters		
NBG code		VDDR	
Modes		VDD; VDDR; VDI(R); WI(R); VOO(R); VDT(R); WT(R); OFF	
Basic rate ¹⁾		30[1] 60 [1]88[2]122[3]140[5]180ppm	
■ Night rate		OFF; 30[1]60[1]88[2]122[3]140[5]180 ppm	
Rate hysteresis		OFF; -5; -10 (5)80 ppm	
■ Repetitive hystere	esis	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 Cont	trol (ACC)	OFF; ON; ATM	
■ Minimum amplitu	ıde	0.1(0.1)4.8(0.2)6.4 V	
■ Maximum amplitu	ıde	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 ; 24h) or time of day (1st and 2nd)	
Leads		IS-1 connector	
 Lead configuratio 	n • Atrium	bipolar	
	■ Ventricle	unipolar; bipolar (automatic)	
 Automatic lead ch 		OFF; ON	
Auto-Initialization	icen	OFF; ON; lead detection	
Refractory period	■ Atrium ³⁾	200(25) 425 (25)775 ms	
actory period	■ Ventricle	170; 195; 220; 250 (50)400 ms	
ARP extension	- ventriete	0(50)350 ms	
Blanking	 Atrium (after Vp) 	32; 40; 48; 56 ; 72 ms	
Far-field blanking ⁴		56 ⁵¹ ; 100; 125; 150; 175; 200 ms	
AV delay	(alter vs, vp)		
Dynamic AV delay		15; 50; 75; 100; 120(10)200; 225; 250; 300 ms; dynamic 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 hyste 		OFF; 1(1)6 cycles	
 AV scan hysteresi 		OFF; 1(1)6 cycles	
Atrial tachycardia re		OFF; mode switching; mode conversion	
Mode switching with	h X/Z-out-of-criterion	OFF; ON	
 X-out-of-8 criterio 	on	3(1)5(1)8	
Z-out-of-8 criterio	on	3(1)5(1)8	
 Mode switching b 	asic rate	OFF; +5; +10(5)+30 ppm	
■ Intervention rate		110(10) 160 (10)250 bpm	
■ 2:1 lock-in protec	tion	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 protect	tion	OFF; ON [termination after 4; 6; 12 cycles]	
Sensor		accelerometer	
■ Sensor gain		1440 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 sn	noothing)	OFF; ON	
RF rate increase	-	1; 2; 4; 8 ppm/cycle	
RF rate decrease		0.1; 0.2; 0.5; 1.0 ppm/cycle	
		AUTO (10 cycles with 90 ppm asynchronous;	
		then basic rate synchronous); asynchronous; synchronous	
Magnet effect		then basic rate synemonous, asynemonous, synemonous	
	ation	programmed rate minus 11 % [in VDD ⁶]	
Magnet effect	ition		

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

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 (33h and long-term)
	Ventricular threshold trend
	Ventricular pacing amplitude histogram
	P/R-wave trend (33h and long-term)

341 822 341 816

Ordering information Philos II SLR uncoated
Philos II SLR coated

- 1] 30–34 ppm only temporarily programmable.
 2] Atrium 15ms sin'; ventricle 40 ms sin'.
 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 × CBast/(Isos+Isrs).
 9] Availability depends on the programming software usedv

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

Dual-Chamber Pacemaker

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

Model	Weight	Volume	Order number
Effecta DR uncoated	26 g	11 cm ³	371 199
Effecta DR coated	26 g	11 cm³	371 201



Effecta DR

Technical Data

Pacemaker parameters NBG code	DDDR	
Modes	DDDR; DDD; DDI(R); DVI(R); DDT; DOO(R); VDD(R); VDI(R);	
Modes	VVI(R); VVT(R); V00(R); AAI(R); AAT(R); A00(R); VDF	
Basic rate	30(1) 60 (1)88(2)122(3)140(5)200 ppm	
Night rate	0FF ; 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)	
	0.5(0.1) 1.0 (0.1)4.8 V	
Minimum amplitude		
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; 24h); 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; 24h); 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)		
	2 [1] E [1] 0	
	3[1]5[1]8	
Change of basic rate	OFF; +5; +10 (5)+30 ppm	
Change of basic rate Rate stabilization	OFF; +5; +10 (5)+30 ppm OFF ; ON	
Change of basic rate Rate stabilization 2:1 lock-in protection	OFF; +5; +10(5)+30 ppm OFF ; ON OFF; ON	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON burst stimulation; programmed stimulation	
Change of basic rate Rate stabilization	OFF; +5; +10(5)+30 ppm OFF ; ON OFF; ON	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON burst stimulation; programmed stimulation	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Atrium	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON Urst stimulation; programmed stimulation OFF; 240 ppm	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Retrium Ventricle	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON DFF: CN DFF: 240 ppm 90(10)130(10)200 ppm 2:1; WKB	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording ⁵¹	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON burst stimulation; programmed stimulation OFF; 240 ppm 90[10]130[10]200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording S Recording prior to event	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; 240 ppm 90[10]130[10]200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 %	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10)350(10)500 ms]	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10[5]+30 ppm OFF; ON OFF; ON DIST: SON OFF: 240 ppm 90[10]130[10]200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON WA criterion: 250[10]350[10]500 ms] accelerometer 80[5]120[5]180 ppm	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording SI Recording prior to event PMT protection Sensor Maximum activity rate Sensor gain	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; 240 ppm 90[10]130[10]200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250[10]350[10]500 ms] accelerometer 80[5]120[6]180 ppm 1423 in 27 increments [auto gain: OFF; ON]	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording ^{SI} Recording prior to event PMT protection Sensor Maximum activity rate Sensor gain Sensor threshold	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF: 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF: 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording S Recording prior to event PMT protection Sensor Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Sensor optimization	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview	
Change of basic rate Rate stabilization 2:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording S Recording prior to event PMT protection Sensor Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Sensor optimization	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1(1421)180 ppm 1(1411)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 0.10 cycles with 90 ppm asynchronous, then basic rat	
Change of basic rate Rate stabilization 12:1 lock-in protection NIPS Upper rate limit Ventricle Tachycardia behavior IEGM recording 51 Recording prior to event PMT protection Sensor Maximum activity rate Sensor gain Sensor threshold Rate increase Rate decrease Sensor optimization Magnet response Replacement indication	OFF; +5; +10(5)+30 ppm OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90(10)130(10)200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100 % OFF; ON [VA criterion: 250(10)350(10)500 ms] accelerometer 80(5)120(5)180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1(1)4(1)10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous; asynchronous; synchronous	
Change of basic rate Rate stabilization 12:1 lock-in protection NIPS Upper rate limit	OFF; +5; +10[5]+30 ppm OFF; ON OFF; ON OFF; ON OFF; 240 ppm 90[10]130[10]200 ppm 2:1; WKB 4 recordings, max. 10 seconds each, 3 triggers 0; 25; 50; 75; 100% OFF; ON [VA criterion: 250[10]350[10]500 ms] accelerometer 80[5]120[5]180 ppm 1423 in 27 increments [auto gain: OFF; ON] very low; tow; medium; high; very high 1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous]; asynchronous; synchronous	

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 DR uncoated	371 199
■ Effecta DR coated	371 201

- EN 50061 triangle pulse.
 If Capture Control is ON, the pulse amplitude is automatically selected.
 300...[25]...350...[25]...775 ms for AAI[R], AAT[R], DDT modes.
 Post-ventricular atrial blanking.
 Storage of IEGMs by using intelligent memory management.
 See manual for other modes.
 Nominal data of the manufacturer.

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

Dual-Chamber Pacemaker

Effecta D

Dual-chamber pacemaker

Product Highlights

IRSplus 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

Model	Weight	Volume	Order number
Effecta D uncoated	26 g	11 cm ³	375 429
Effecta D coated	26 g	11 cm ³	375 428



Effecta D

Technical Data

Pacemaker parameters NBG code	DDD
Modes	DDD; DDI(R) ¹¹ ; DVI; DDT; D00; VDD; VDI; VVI(R); VVT; V00(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	0FF ; 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 2.4; 3.0 ; 3.6; 4.2; 4.8 V
Start amplitude 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
= Search time	(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	AUT0
■ 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	OFF; ON
X/Z-out-of-8-criterion	
 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	3[1]5[1]8
(Resolution criterion)	055 5 40 (5) 00
Change of basic rate	OFF; +5; +10(5)+30 ppm
Rate stabilization	OFF; ON
2:1 lock-in protection NIPS	OFF; ON
	burst stimulation; programmed stimulation
Upper rate limit Atrium Ventricle	OFF; 240 ppm 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
	1423 in 27 increments [auto gain: OFF; ON]
Sensor gain	
	very low; low; medium; high; very high
Sensor threshold	very low; low; medium; high; very high 1[1]4[1]10 ppm/cycle
Sensor threshold Rate increase	
Sensor threshold Rate increase	1[1] 4 [1]10 ppm/cycle
Sensor threshold Rate increase Rate decrease	1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5 ; 1.0 ppm/cycle original, preview
Sensor threshold Rate increase Rate decrease Sensor optimization	1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5 ; 1.0 ppm/cycle original, preview
Sensor threshold Rate increase Rate decrease Sensor optimization Magnet response Replacement indication	1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous]; asynchronous; synchronous programmed rate minus 11 % (in DDD ²¹)
Sensor threshold Rate increase Rate decrease Sensor optimization Magnet response Replacement indication Battery®	1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous]; asynchronous; synchronous programmed rate minus 11 % [in DDD ⁷⁷] LiJ [open circuit voltage: 2.8 V]
Rate increase Rate decrease Sensor optimization Magnet response Replacement indication	1[1]4[1]10 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle original, preview AUTO [10 cycles with 90 ppm asynchronous, then basic rat synchronous]; asynchronous; programmed rateminus 11 % [in DDD ^[1]]

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	375 429
■ Effecta D coated	375 428

- Only available for mode switching.
 EN 50061 triangle pulse.
 If Capture Control is ON, the pulse amplitude is automatically selected.
 If Capture Son. (25)...75 ms for AAI, AAT, DDT modes.
 Post-ventricular atrial blanking.
 Storage of IEGMs by using intelligent memory management.
 See manual for other modes.
 Nominal data of the manufacturer.

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

Dual-Chamber Pacemaker

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



Model	Weight	Volume	Order number
Talos DR uncoated	26 g	12 cm³	356 248
Talos DR coated	26 g	12 cm ³	356 249



Talos DR

Technical Data

Pacemaker parame	eters		
NBG code		DDDR	
Modes		DDDR; DDD; DDI(R); DVI(R); VDD(R); VDI(R); VVI(R); AAI(R); D00(R); V00(R); DDT(R)/A; DDT(R)/V; A00(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 hystere	sis	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 Conf		OFF; ON	
■ Minimum amplitu	de	0.7 V	
■ Maximum amplitu	ıde	3.6 V	
 Safety margin 		0.5 V	
■ Search time		7:00 AM and 7:00 PM	
Leads		IS-1 connector	
■ Automatic lead ch	eck	OFF; ON	
■ Lead configuratio	n (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 compensatio	n	OFF; -15(15)45(15)120 ms	
AV safety interval		100 ms	
IRSplus		OFF; ON	
AV hysteresis		OFF; IRSplus; ON	
■ AV repetitive hyste	eresis	OFF; ON (5 cycles)	
AV scan hysteresi		OFF; ON (5 cycles)	
Atrial tachycardia re		OFF; mode switching; mode conversion	
	x/Z-out-of-8 criterion	OFF; ON	
■ X-out-of-8 criterio		3(1)5(1)8	
■ Z-out-of-8 criterio		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		0FF; 235 ms	
PMT protection		OFF; ON [VA criterion 250[10] 350 [10]500 ms]	
Sensor		accelerometer	
Sensor gain		1440 in 32 increments [auto gain: OFF; ON]	
Sensor threshold		very low; low; medium; high; very high	
		1; 2; 4; 8 ppm/cycle	
Rate increase			
Rate decrease Maximum activity rate		0.1; 0.2; 0.5 ; 1.0 ppm/cycle 80(5) 120 (5)180 ppm	
Maximum activity rate 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	on		

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 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×CBsst/(Isos+Isn).

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



Dual-Chamber Pacemaker

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



Model	Weight	Volume	Order number
Talos D uncoated	26 g	12 cm³	356 245
Talos D coated	26 g	12 cm³	356 246



Talos D

Technical Data

DDD
DDD
DDD; DDI(R) ¹¹ ; DVI; VDD; VDI(R) ^{11, VDI} ; VVI(R); AAI; D00; VOO(R); DDT/A; DDT/V; AOO; DDT; DDIT; DVT; VDT; VVT; AAT; OFF
30(1) 60 (1)88(2)122(3)140(5)180 ppm
OFF; 30(1)60(1)88(2)122(3)140(5)180 ppm
OFF ; -5(5)80 ppm
OFF; 1(1)10 cycles
OFF; 1(1)10 cycles
0.1(0.1) 1.0 (0.1)1.5(0.5)7.5 mV
0.5(0.5) 2.5 (0.5)7.5 mV
0.1(0.1) 3.6 (0.1)4.8(0.6)8.4 V
0.1(0.1) 3.6 (0.1)4.8(0.6)6.4 V
0.1; 0.2; 0.3; 0.4 ; 0.5; 0.75; 1.0; 1.5 ms
0.1; 0.2; 0.3; 0.4; 0.3; 0.73; 1.0; 1.3115 OFF ; ON
0.7 V
3.6 V
0.5 V
7:00 AM and 7:00 PM
IS-1 connector
OFF; ON
unipolar; bipolar (automatic)
OFF; ON; lead detection
200(25) 425 (25)775 ms
170; 195; 220; 250 (50)400 ms
0 (50)350 ms
56 ms
16; 24; 32 ; 40; 48; 56; 72 ms
56; 100; 125; 150; 175; 200 ms
15; 50; 75; 100; 120(10)200; 225; 250; 300 ms; dynamic
OFF; low; medium; high; fixed;
individually programmable in 5 rate ranges
OFF; -15(15)45(15)120 ms
100 ms
OFF; ON
OFF; IRSplus; ON
OFF; ON (5 cycles)
OFF; ON (5 cycles)
OFF; mode switching; mode conversion
OFF; ON
3(1)5(1)8
3[1]5[1]8
3(1) 5 (1)8 110(10) 160 (10)250 bpm
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130 ; 140; 160; 185 ppm 2:1; WKB
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130 ; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each OFF; 235 ms OFF; ON [VA criterion 250(10)350(10)500 ms]
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each OFF; 235 ms OFF; ON [VA criterion 250(10)350(10)500 ms] accelerometer
3[1]5[1]8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N]
3(1)5(1)8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2.:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N] very low; low; medium; high; very high
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle
3[1]5[1]8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each OFF; 235 ms OFF; ON [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle
3[1]5[1]8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; ON [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; ON] very low; low; medium; high; very high 1; 2; 4; 8ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each OFF; 235 ms OFF; ON [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous, synchronous
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each OFF; 235 ms OFF; ON [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% [in DDD ⁽⁴⁾]
3[1]5[1]8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous, synchronous programmed rate minus 11 % [in DDD ^{s]} 1.3 Ah; Li/I
3(1)5(1)8 110(10)160(10)250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each OFF; 235 ms OFF; ON [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% [in DDD ⁽⁴⁾]
3(1)5(1)8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% [in DDD ^{u]} 1.3 Ah; Li/I 10 years [A: at 2.4 V; V: at 1.0 V; 0.4 ms; 50 ppm; 100 %
3(1)5(1)8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% [in DDD ^{u]} 1.3 Ah; Li/I 10 years [A: at 2.4 V; V: at 1.0 V; 0.4 ms; 50 ppm; 100 %
3(1)5(1)8 110[10]160[10]250 bpm 100; 110; 120; 130; 140; 160; 185 ppm 2:1; WKB 4 recordings; max. 10 seconds each 0FF; 235 ms 0FF; 0N [VA criterion 250[10]350[10]500 ms] accelerometer 1440 in 32 increments [auto gain: 0FF; 0N] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 01; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% [in DDD ^{4]} 1.3 Ah; Li/I 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	

- Only available for mode switching.
 30–34 ppm only temporarily programmable.
 Atrium 15 ms sin²; ventricle 40 ms sin².
 Total Atria Refractory Period [TARP].
 Sepst-ventricular atrial blanking.
 See manual for other modes.
 Nominal data of the battery manufacturer.
 Calculated with the formula T = 2740 × CBatt/[IBOS+IER].

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



Bradycardia Therapy

Dual-Chamber Pacemaker

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



Model	Weight	Volume	Order number
Talos SLR uncoated	26 g	12 cm³	356 252
Talos SLR coated	26 a	12 cm ³	356 253



Talos SLR

Technical Data

Pacemaker parameters	VDDD
NBG code	VDDR
Modes	VDD; VDDR; VDI(R); WI(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)	0FF ; 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)	
AV delay	56; 100; 125; 150; 175; 200 ms 15; 50; 75; 100; 120[10]200; 225; 250; 300 ms; dynami
Dynamic AV delay	OFF; low; medium; high; fixed; individually programmable in 5 rate ranges
AV. (
AV safety interval	100 ms
IRSplus	OFF; ON
AV hysteresis	OFF; IRSplus; 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	1440 in 32 increments [auto gain: OFF; ON]
■ Sensor gain ■ Sensor threshold	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high
■ Sensor gain ■ Sensor threshold	1440 in 32 increments [auto gain: OFF; ON]
■ Sensor gain	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high
Sensor gain Sensor threshold Rate increase	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle
Sensor gain Sensor threshold Rate increase Rate decrease	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium ; high; very high 1; 2 ; 4; 8 ppm/cycle 0.1; 0.2; 0.5 ; 1.0 ppm/cycle
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 8.0[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect Replacement indication Battery ^{al}	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% in VDD ⁵¹ 1.3 Ah; Li/I
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect Replacement indication Battery ^{al}	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rateminus 11% in VDD states.
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect Replacement indication	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 8.0[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% in VDD ^{SI} 1.3 Ah; Li/I 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD;
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect Replacement indication Battery ⁴ Nominal operating time ⁷⁾	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 8.0[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% in VDD ^{SI} 1.3 Ah; Li/I 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD;
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect Replacement indication Battery ⁴¹ Nominal operating time ⁷³ Housing	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous, synchronous programmed rate minus 11% in VDD ^{SI} 1.3 Ah; Li/I 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated]
■ Sensor gain ■ Sensor threshold ■ Rate increase ■ Rate decrease ■ Maximum activity rate Magnet effect Replacement indication Battery [®] Nominal operating time [®] Housing Dimensions/weight	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rateminus 11% in VDD ^{sl} 1.3 Ah; Li/l 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated]
■ Sensor gain ■ Sensor threshold ■ Rate increase ■ Rate decrease ■ Maximum activity rate Magnet effect Replacement indication Battery [®] Nominal operating time [®] Housing Dimensions/weight Volume	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rateminus 11% in VDD 51 1.3 Ah; Li/1 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated] 53×43×6 mm/26 g 12 cm²
■ Sensor gain ■ Sensor threshold ■ Rate increase ■ Rate decrease ■ Maximum activity rate Magnet effect Replacement indication Battery ⁴⁸ Nominal operating time ⁷⁹ Housing Dimensions/weight Volume	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rateminus 11% in VDD ^{sl} 1.3 Ah; Li/l 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated]
Sensor gain Sensor threshold Rate increase Rate decrease Maximum activity rate Magnet effect Replacement indication Battery ⁴¹ Nominal operating time ⁷³ Housing Dimensions/weight Volume X-ray identification	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rateminus 11% in VDD sl 1.3 Ah; Li/l 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated] 53×43×6 mm/26 g 12 cm²
■ Sensor gain ■ Sensor threshold ■ Rate increase ■ Rate decrease ■ Maximum activity rate Magnet effect Replacement indication Battery ⁱⁱ Nominal operating time ⁷⁾ Housing Dimensions/weight Volume X-ray identification	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rate minus 11% in VDD ^{sl} 1.3 Ah; Li/l 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated] 53×43×6 mm/26 g 12 cm ² PV
■ Sensor gain ■ Sensor threshold ■ Rate increase ■ Rate decrease ■ Maximum activity rate Magnet effect Replacement indication Battery [®] Nominal operating time [®] Housing Dimensions/weight	1440 in 32 increments [auto gain: OFF; ON] very low; low; medium; high; very high 1; 2; 4; 8 ppm/cycle 0.1; 0.2; 0.5; 1.0 ppm/cycle 80[5]120[5]180 ppm AUTO [10 cycles with 90 ppm asynchronous, then basic rate synchronous]; asynchronous; synchronous programmed rateminus 11% in VDD 51 1.3 Ah; Li/1 11.5 years [at 1.0 V; 0.4 ms; 50 ppm; 100% pacing; VDD; ACC activated] 53×43×6 mm/26 g 12 cm²

- 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 = 27.40 × CBest /[IBOS+|ERD].

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



Solia S

Bipolar MR Conditional pacing lead with active fixation

Product Highlights

ProMRI®

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

Product	Fixation	Length	Order number
Solia S 45	retractable screw	45 cm	377 176
Solia S 53	retractable screw	53 cm	377 177
Solia S 60	retractable screw	60 cm	377 179



Solia S

Technical Data

MR Conditional		
ProMRI®	MR Conditional in combination with BIOTRONIK MR Cor ditional 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	6F	
Fixation helix		
Туре	retractable, electrically active screw	
Retractable length	max. 1.8 mm	
Material	platinum/iridium	
Surface structure	iridium, fractal	
Area	4.5 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	0.65Ω/cm	
■ Proximal	2.45Ω/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	000.404	
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.



Safio S

Bipolar MR Conditional pacing lead with active fixation

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	370 945
Safio S 60	retractable screw	60 cm	370 946

ProMRI®





Safio S

ProMRI®	MR Conditional in combination with BIOTRONIK MR Cor	
Promiti-	ditional 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	7F	
Fixation helix		
Туре	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 mm²	
Diameter	2.23 mm (6.7 F)	
0 1 1		
Conductor	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	070.045	
■ Safio S 53	370 945	
■ Safio S 60	370 946	

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



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

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



Siello S

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

Fixation helix		
Туре	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 mm²	
Diameter	1.9 mm (5.9 F)	

Conductor		
Insulation	■ Distal	silicone
	■ Proximal	silicone, polyurethane
Coil material		MP35N
Resistance	■ Distal	0.65Ω/cm
	■ Proximal	2.45Ω/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	362 700	
■ Siello S 53	362 701	
■ Siello S AN	362 702	



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



Product	Fixation	Length	Order number
Setrox S 45	retractable screw	45 cm	350 973
Setrox S 53	retractable screw	53 cm	350 974
Setrox S 60	retractable screw	60 cm	350 975





Setrox S

Connector	IS-1
Polarity	bipolar
Fixation	screw
Tip-to-ring distance	10 mm
Overall length	45; 53; 60 cm
Recommended introducer	7F
Fixation helix	
Туре	retractable; electrically active
Retractable length	max. 1.8 mm
Material 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	0.65Ω/cm
■ Proximal	2.04Ω/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



Bradycardia Therapy

Lead (Active Fixation)

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



Product	Fixation	Length	Order number
Selox SR 45	retractable screw	45 cm	343 081
Selox SR 53	retractable screw	53 cm	343 083
Selox SR 60	retractable screw	60 cm	343 082





Selox SR

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

Fixation helix		
Туре	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 (7.8F)	

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 (7.2F)

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

Ordering information	
■ Selox SR 45	343 081
■ Selox SR 53	343 083
■ Selox SR 60	343 082



Bradycardia Therapy
Lead (Active Fixation)

MyoPore®

Sutureless bipolar epicardial pacing lead

Product Highlights

Reliable 7.2 F silicone lead body implantable with FasTac $^{\! \otimes }$ introducer system

Bipolar configuration with platinized electrodes for optimal pacing and sensing behavior



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



$MyoPore^{\circledast}$

Connector	IS-1
Polarity	bipolar
Fixation	screw
Length	25; 35; 54 cm
Cathode electrode	
Туре	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	
	0.10.004
■ MyoPore BP 25	360 881
■ MyoPore BP 25 ■ MyoPore BP 35	360 882



Solia T

Bipolar MR Conditional pacing lead with passive fixation

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

ProMRI®



Solia T

ProMRI®	MR Conditional in combination with BIOTRONIK MR Con ditional active implants ¹¹	
Technical data		
Connector	IS-1	
Polarity	bipolar	
Fixation	4 tines	
Tip-to-ring distance	12 mm	
Overall length	53; 60 cm	
Recommended introducer	6F	
Tip electrode		
Туре	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	2.45Ω/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		
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

Lead (Passive Fixation)

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



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





Siello T/JT

Technical data	9	
Connector		IS-1
Polarity		bipolar
Fixation		4 tines
Tip-to-ring dis	stance	12 mm
Length	■ Siello T	53; 60 cm
	■ Siello JT	45; 53 cm
Recommende	d introducer	6F
Tip electrode		

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 mm²	
Diameter	1.9 mm (5.9 F)	

Conductor		
Insulation	■ Distal	silicone
	■ Proximal	silicone, polyurethane
Coil material		MP35N
Resistance	■ Distal	0.65Ω/cm
	■ Proximal	2.45Ω/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	362 703	
■ Siello JT 53	362 704	
■ Siello T 53	362 705	
■ Siello T 60	362706	



Bradycardia Therapy

Lead (Passive Fixation)

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



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



Selox ST/JT

Connector		IS-1	
Polarity		bipolar	
Fixation		3 tines	
Tip-to-ring distance		15 mm	
	lox ST	53; 60 cm	
	lox 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 mm²	
Material		platinum; iridium	
Structure		fractal	
Diameter		2.2 mm (6.5 F)	
		2.2 mm (6.5 F)	
Diameter Conductor		2.2 mm (6.5 F)	
Conductor Insulation		silicone	
Conductor Insulation Coil material		silicone MP35N	
Conductor Insulation Coil material Resistance		silicone MP35N 1.1Ω/cm	
Conductor Insulation Coil material Resistance Pri	oximal ST	silicone MP35N 1.10/cm 1.0Ω/cm	
Conductor Insulation Coil material Resistance ■ Dis ■ Pri ■ Pri		silticone MP35N 1.1 Ω/cm 1.00/cm 0.45 Ω/cm	
Conductor Insulation Coil material Resistance Pri	oximal ST	silicone MP35N 1.10/cm 1.0Ω/cm	
Conductor Insulation Coil material Resistance	oximal ST	silticone MP35N 1.1 Ω/cm 1.00/cm 0.45 Ω/cm	
Conductor Insulation Coil material Resistance	oximal ST	silicone MP35N 1.10/cm 1.00/cm 0.450/cm 2.1 mm (6.3 F)	
Conductor Insulation Coil material Resistance	oximal ST	siticone MP35N 1.10/cm 1.00/cm 0.45 0/cm 2.1 mm (6.3 F) dexamethasone acetate [DXA]	
Conductor Insulation Coil material Resistance Pri Pri Diameter Steroid reservoir Steroid quantity	oximal ST	siticone MP35N 1.10/cm 1.00/cm 0.45 \Ozero (A.3 F) dexamethasone acetate (DXA) 0.75 mg	
Conductor Insulation Coil material Resistance	oximal ST	siticone MP35N 1.10/cm 1.00/cm 0.45 0/cm 2.1 mm (6.3 F) dexamethasone acetate [DXA]	
Conductor Insulation Coil material Resistance	oximal ST	siticone MP35N 1.10/cm 1.00/cm 0.45 \Ozero (A.3 F) dexamethasone acetate (DXA) 0.75 mg	
Conductor Insulation Coil material Resistance Dia Pri Pri Diameter Steroid reservoir Steroid quantity Steroid bonding agent Ordering information	oximal ST	silicone MP35N 1.10/cm 1.00/cm 0.450/cm 2.1 mm (6.3 F) dexamethasone acetate (DXA) 0.75 mg silicone rubber	
Conductor Insulation Coil material Resistance Pro Pro Diameter Steroid reservoir Steroid type Steroid quantity Steroid bonding agent Ordering information Selox ST 53	oximal ST	silicone MP35N 1.10/cm 1.00/cm 0.45 0/cm 2.1 mm (6.3 F) dexamethasone acetate (DXA) 0.75 mg silicone rubber	
Conductor Insulation Coil material Resistance Dia Pri Pri Diameter Steroid reservoir Steroid quantity Steroid bonding agent Ordering information	oximal ST	silicone MP35N 1.10/cm 1.00/cm 0.450/cm 2.1 mm (6.3 F) dexamethasone acetate (DXA) 0.75 mg silicone rubber	



Bradycardia Therapy

Lead (Passive Fixation)

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



Fixation	Length	Order number
3 tines	60 cm	118 804
3 tines	53 cm	124 853
3 tines	60 cm	124 854
3 tines	53 cm	120 444
3 tines	60 cm	119 684
J-shaped, 3 tines	45 cm	120 438
J-shaped, 3 tines	53 cm	120 143
	3 tines 3 tines 3 tines 3 tines 3 tines J-shaped, 3 tines	3 tines 60 cm 3 tines 53 cm 3 tines 60 cm 3 tines 53 cm 3 tines 50 cm J-shaped, 3 tines 45 cm



Synox UP/BP/J BP

	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 mm²	38 mm²
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	



Bradycardia Therapy

Lead (Passive Fixation)

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



Product	Fixation	Length	Order number
Arox 45-JBP	J-shaped, 4 tines	45 cm	338 022
Arox 53-JBP	J-shaped, 4 tines	53 cm	338 025
Arox 53-BP	4 tines	53 cm	338 023
Arox 60-BP	4 tines	60 cm	338 021





Arox BP/JBP

Technical data			
Connection system		IS-1	
Polarity		bipolar	
Tip electrode			
Area		3.5 mm ²	
Material		iridium	
Surface structure		fractal	
Ring electrode			
Active surface		22.6 mm ²	
Material		iridium	
Surface structure		fractal	
Insulation		silicone	
Tip to ring distance		15mm	
Conductor			
Conductor Resistance (straight lead)	■ Distal	1.16 Ω/cm	
Resistance (straight lead)	■ Proximal	1.05 Ω/cm	
		1.05 Ω/cm 0.55 Ω/cm	
Resistance (straight lead)	■ Proximal	1.05 Ω/cm	
Resistance (straight lead)	ProximalDistal	1.05 Ω/cm 0.55 Ω/cm	
Resistance (straight lead) Resistance (J-shaped lead)	ProximalDistal	1.05 Ω/cm 0.55 Ω/cm 1.05 Ω/cm	
Resistance (straight lead) Resistance (J-shaped lead) Connector material	ProximalDistal	1.05 Ω/cm 0.55 Ω/cm 1.05 Ω/cm stainless steel	
Resistance (straight lead) Resistance (J-shaped lead) Connector material Length of lead	ProximalDistal	1.05 Ω/cm 0.55 Ω/cm 1.05 Ω/cm stainless steel 45, 53, 60 cm	
Resistance (straight lead) Resistance (J-shaped lead) Connector material Length of lead Catheter diameter	ProximalDistal	1.05 O/cm 0.55 O/cm 1.05 O/cm stainless steel 45, 53, 60 cm 2.4 mm (7.2 F)	
Resistance (straight lead) Resistance (J-shaped lead) Connector material Length of lead Catheter diameter	ProximalDistal	1.05 O/cm 0.55 O/cm 1.05 O/cm stainless steel 45, 53, 60 cm 2.4 mm (7.2 F)	
Resistance (straight lead) Resistance (J-shaped lead) Connector material Length of lead Catheter diameter Suitable lead introducer	ProximalDistal	1.05 O/cm 0.55 O/cm 1.05 O/cm stainless steel 45, 53, 60 cm 2.4 mm (7.2 F)	
Resistance (straight lead) Resistance (J-shaped lead) Connector material Length of lead Catheter diameter Suitable lead introducer Ordering information	ProximalDistal	1.05 Q/cm 0.55 Q/cm 1.05 Q/cm stainless steel 45, 53, 60 cm 2.4 mm (7.2 F)	
Resistance (straight lead) Resistance (J-shaped lead) Connector material Length of lead Catheter diameter Suitable lead introducer Ordering information Arox 45-JBP	ProximalDistal	1.05 Ω/cm 0.55 Ω/cm 1.05 Ω/cm stainless steel 45, 53, 60 cm 2.4 mm (7.2 F) 8 F	



Lead (Passive Fixation)

Bradycardia Therapy

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

Product	Fixation	Length	Order number
PX 53-JUP	J-shaped, 4 tines	53 cm	118526
PX 45-JBP	J-shaped, 4 tines	45 cm	120 435
PX 53-JBP	J-shaped, 4 tines	53 cm	119924
PX 53-UP	4 tines	53 cm	120 441
PX 60-UP	4 tines	60 cm	118523
PX 53-BP	4 tines	53 cm	120307
PX 60-BP	4 tines	60 cm	119 687
PX 53/15-BP	4 tines	53 cm	130 050
PX 60/15-BP	4 tines	60 cm	130 051



Polyrox BP/JBP

	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				
Length	53 cm	45/53 cm	53/60 cm	53/60 cm	53/60 cm
Max. diameter	3 mm (9 F)				
Tip electrode					
Area	3.5 mm ²				
Material	titanium	titanium	titanium	titanium	titanium
Surface, structure	Ir, fractal				
Ring					
Area		42 mm ²		45 mm ²	45 mm²
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)	2.2mm (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®				
Suitable lead introducer	10F	10F	10F	10 F	10 F
Ordering information					
	■ PX 53-JUP 118526	■ PX 45-JBP 120 435	■ PX 53-UP 120441	■ PX 53-BP 120 307	■ PX 53/15-BP 130050
		■ PX 53-JBP 119924	■ PX 60-UP 118523	■ PX 60-BP 119 687	■ PX 60/15-BP 130051



Bradycardia Therapy

Lead (Passive Fixation)

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



Product	Fixation	Length	Order number
Solox 65/13-BP	3 tines	65 cm	124 540
Solox 65/15-BP	3 tines	65 cm	124542
Solox 58/13-BP	3 tines	58 cm	333 900
Solox 58/15-BP	3 tines	58 cm	333 902





Solox BP

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; 65cm
Tip electrode	
Area	3.5 mm ²
Material	90% platinum; 10% iridium
Structure	fractal
Tip-to-ring distance	31 mm
Atrial ring electrodes Area Material	25.4 mm² 80 % platinum: 20 % iridium
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	124540
■ Solox 65/15-BP	124542
	333 900
■ Solox 58/13-BP	333 700



Tachyarrhythmia Therapy

Single-Chamber ICD

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 energyefficient technologies.

Model	Volume	Thickness	Connectors	Order number
Lumax 540 VR-T DX	37 cm³	13 mm	IS-1 (2×)	368 352
			DF-1 (2×)	



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, s	tability, SMART, persistent V		
VT interval	OFF, 270(10)600 ms for VT OFF, 270(10)500 ms for VT			
Number of VT intervals for detection and redetection	detection: 10(2)60 for VT- redetection: 10(2)30			
Onset	OFF1, 4[4]32%; with SMA	RT: 20%		
Stability	OFF1, ±8(4)±48 ms; with 5	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			
VF Interval Criterion	VFF, 200(10)400 ms			
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	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;	absolute: 200(10)500 ms; adaptive: 70(5)95 %		
Scan decrement	0FF, 5(5)40 ms			
Min. ATP interval	200(5)300 ms			
ATP optimization	OFF, ON			
ATP One Shot®				
ATP type	OFF, burst, ramp, burst + PE	(S 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	$RV \rightarrow SVC + Can, RV \rightarrow Can,$	•		
Energy	1st shock: 1(1)16(2)40 J			
<i>3.</i>	2 nd shock: 2[1]16[2]40. 3 rd to n th shock: 40 J			
Confirmation (per Zone)	OFF, ON			
Post-shock duration	OFF, 10(10)50 s; 1(1)10) min		
Desing personators	Producerdia	Past Charle		
Pacing parameters Mode	Bradycardia VDD, VDI, VVI, VDDR,	Post Shock VDI if VDD(R), VDI(R);		
	VDIR,VVIR, OFF	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		

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)65ppm		
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, IRSplus, OF	F		
AV hysteresis	10[10]150 ms			
AV repetitive hysteresis (positive)	OFF, 1[1]10 cycles	OFF, 1(1)10 cycles		
AV repetitive hysteresis (negative)	OFF, 1(1)15(5)100(10	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 m	s)		
PMT protection	OFF, ON			
Sensor	accelerometer, various progr	rammable parameters		
IRS ^{plus}				
	0.55 011			

OFF, 1...[1]...10 cycles OFF, 1...[1]...10 cycles

AV hysteresis

AV repetitive AV scan AV max

Lead connections	
Pacing/sensing	IS-1 bipolar (2×)
Shock	DF-1 (2×)
B:	
Diagnostic functions	DV OFF ON
Automatic Threshold Monitoring (ATM)	RV: 0FF, 0N
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	66×55×13mm
Volume/weight	37.2 cm ³ /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 therap counters, atrial and ventricular rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters
Daniel bures	
Report types	hairmand automatically again 27 haura
Trend report	triggered automatically once every 24 hours
Event report Test report	triggered automatically after certain cardiac events triggered manually via programmer
rescreport	triggered manualty via programmer
Event types	
Implant	device status, battery status, programmer-triggered message received
Leads	sensing amplitude (RA, RV) ⁵¹ , pacing impedance (RV) ⁶¹ , shock impedance (painless, at last shock) ⁶¹ , RV pacing threshold ⁷¹
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) ⁵¹ , atrial burden ⁵¹ , mean VES/h ⁵¹
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 ⁹ , ven. monitoring episode duration ⁹ , 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
	OFF, ON
IEGM for monitoring episodes Periodic IEGM	OFF, 1, 2, 3, 4, 6 months ⁸⁾



Technical data Transmitter frequency Transmitting power

Ordering information Lumax 540 VR-T DX

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.

403 MHz < 25 μW

368352



Tachyarrhythmia Therapy

Single-Chamber ICD

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 energyefficient technologies.

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



Technical Data

Confirmation (per Zone)

Post-shock duration

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	() T
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	$RV \rightarrow SVC + Can, RV \rightarrow Can, RV \rightarrow SVC$
Energy	1st shock: 1(1)16(2)40J; 2nd shock: 2(1)16(2)40J; 3rd to nth shock: 40 J

Pacing parameters	Bradycardia	Post Shock
• • • • • • • • • • • • • • • • • • • •	<u> </u>	
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	

OFF, 10...(10)...50 s; 1...(1)...10 min

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	140
Auto gain	OFF, ON
Sensor threshold	very low, low, medium, high, very high

Pacing/sensing	IS-1 bipolar (1×)	
Shock	DF-1 (2×)	
Diagnostic functions		

Diagnostic functions	
Automatic Threshold Monitoring (ATM)	RV: OFF, ON
IEGM Holter	2×32 min
Channels	ventricle, far-field
Length of pre-history	fixed: 30s; 5s (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	Heart Failure Monitor® diagnostics, detection and therap
Transmitted data	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 ²¹ , 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 dwith fulfilled ATP time-out criterion, ven. therap episode duration ³¹ , ven. monitoring episode duration ³¹ , periodic IEGM received
Programmer settings	
Home Monitoring	OFF. ON
Time of data transmission	00:00-23:59
IEGM-Online HD®	
.==:: =::::::= ::=	OFF, ON
IEGM for therapy episodes IEGM for monitoring episodes	OFF, ON
Periodic IEGM	0FF, 1, 2, 3, 4, 6 months ⁵⁾
r criodic (2014)	011, 1, 2, 3, 4, 0 Hondis
Technical data	
Technical data Transmitter frequency	403 MHz
	403 MHz <25 μW
Transmitter frequency	400 1-1112

- PES: Programmed extrastimulus.
 RV 2.5 V/0.4 ms; 60 ppm; 700 0; RV 15% pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
 Programmable upper or lower limit.
 Programmable upper and lower limit.
 Programmable safety margin.
 If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.



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 energyefficient technologies.

Model	Volume	Thickness	Connectors	Order number
Lumax 500 VR-T	34 cm³	12 mm	IS-1	360 345
			DF-1 (2×)	



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	0FF, 1[1]15 min
Tachycardia therapy	
ATP type	burst, ramp, burst + PES ¹⁾
Attempts	OFF. 1[1]10
	1(1)10
Number S1 Add. S1	
R-S1 interval	OFF, ON
S1 decrement	absolute: 200(10)500 ms; adaptive: 70(5)95%
	5(5)40 ms
S1-S2 interval	absolute: 200(10)500 ms; adaptive: 70(5)95 %
Scan decrement	0FF, 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
<u>'</u>	1st shock: 1(1)16(2)30 J;
Energy	1 [™] shock: 1(1)16(2)30J; 2 nd shock: 2(1)16(2)30J;
	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	140	
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: 30s; 5s (with fulfilled onset or for induced episodes)
IEGM at SVT	OFF, ON

Housing		
Dimensions	66 × 55 × 12 mm	
Volume/weight	34 cm ³ /81 g	
Material	titanium	
Energy source	3.2 V, 1720 mAh	
Longevity	10.5 years 2)	

Home Monitoring

Transmitted data	Heart Failure Monitor® diagnostics, detection and therap		
	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 ³¹ , RV pacing impedance ⁴¹ , shock impedance (painless, at last shock) ⁴¹ , RV pacing threshold ⁵¹		
Bradycardia	ventricular paces ³⁾		
Arrhythmias	SVT detected, ventricular arrhythmia detected (VT1, VT 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. thera episode duration ³¹ , ven. monitoring episode duration ³² , periodic IEGM received		
D			
Programmer settings Home Monitoring	OFF, ON		
Time of data transmission	00-00-23-59		
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			

- PES: Programmed extrastimulus.
 RV 2.5 V/0.4 ms; 60 ppm; 700 0; RV 15% pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
 Programmable upper or lower limit.
 Programmable upper and lower limit.
 Programmable safety margin.
 If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.



Tachyarrhythmia Therapy

Single-Chamber ICD

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 energyefficient technologies.

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



Technical Data

Rhythm classes	bradycardic, physiologic, VT-	1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustn	nent
VT detection and redetection		
Criteria VT interval	number of intervals, onset, s	
VI Interval	OFF, 270(10)600 ms for V OFF, 270(10)500 ms for V	
Number of VT intervals for detection	detection: 10(2)60 for VT-	
and redetection	redetection: 10(2)30	
Onset	OFF; 4(4)32%	
Stability	OFF; ±8(4)±48ms	
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 thorany		
Tachycardia therapy ATP type	burst, ramp, burst + PES 1)	
ATP type 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	
ATD 0 CL -40		
ATP One Shot® ATP type	OFF, burst, ramp, burst + PE	CC 11
ATP type Stability criterion	UFF, burst, ramp, burst + PE 12%	٠ د.
ATP attempts	1 12 70	
Number S1	1(1)10	
Cardioversion/defibrillation therapy		
Number of shocks	for VT zones: 0FF; 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 . 2nd shock: 2(1)16(2)40	
	3rd to nth shock: 40 J	-
Confirmation (per zone)	OFF, ON	
Post-shock duration	OFF; 10(10)50s; 1(1)10) min
Pacing parameters	Bradycardia	Post Shock
Mode Pulse amplitude	VVIR, VVI, OFF 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 ppr
Rate hysteresis	OFF, -5(-5)90 ppm	OFF, -5(-5)65ppm
Repetitive/scan hysteresis	OFF, 1(1)15 cycles	
Sensor parameters		
Max. sensor rate	90[5]160 ppm	
Rate increase	0.5; 1(1)6ppm/cycle	
Rate decrease	0.25(0.25)1.25 ppm/cycle	
Sensor gain	140	
Auto gain Sensor threshold	OFF, ON	yory high
Jensor tillesliota	very low, low, medium, high,	very mgn
Lead connections		
Pacing/sensing	IS-1 bipolar (1×)	
Shock	DF-1 (2×)	
IEGM Holter	2×32 min	
IEGM Holter Channels	ventricle, far-field	
IEGM Holter Channels Length of pre-history	ventricle, far-field fixed: 30 s	
IEGM Holter Channels Length of pre-history	ventricle, far-field	
IEGM Holter Channels Length of pre-history IEGM at SVT	ventricle, far-field fixed: 30 s	
IEGM Holter Channels Length of pre-history IEGM at SVT Housing	ventricle, far-field fixed: 30 s OFF, ON	
IEGM Holter Channels Length of pre-history IEGM at SVT Housing Dimensions	ventricle, far-field fixed: 30 s OFF, ON 66×55×13 mm	
IEGM Holter Channels Length of pre-history IEGM at SVT Housing Dimensions Volume/weight	ventricte, far-field fixed: 30 s OFF, ON 66×55×13 mm 37.2 cm ³ /92 g	
Volume/weight Material	ventricle, far-field fixed: 30 s OFF, ON 66×55×13 mm 37.2 cm ³ /92 g titanium	
IEGM Holter Channels Length of pre-history IEGM at SVT Housing Dimensions Volume/weight	ventricte, far-field fixed: 30 s OFF, ON 66×55×13 mm 37.2 cm ³ /92 g	

Home Monitoring

Transmitted data	Heart Failure Monitor® diagnostics, detection and therap		
Transmitted data	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 XI	357.889		

- PES: Programmed extrastimulus.
 2.5. V/0.5 ms; 60 ppm; 700.0; 4 max. energy shocks/year; 15% pacing.
 3 Programmable upper or lower limit.
 Programmable upper and lower limit.





Tachyarrhythmia Therapy

Single-Chamber ICD

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.

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



Technical Data

Rhythm classes	bradycardic, physiologic, VT-	1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustn	
VT detection and redetection		
Criteria	number of intervals, onset, s	
VT interval	OFF, 270(10)600 ms for V OFF, 270(10)500 ms for V	Γ-2
Number of VT intervals for detection and redetection	detection: 10(2)60 for VT- redetection: 10(2)30	1; 10[2]40 for VT-2
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	055 000 (40) 400	
VF interval	OFF, 200(10)400 ms	
Criterion Detection counter of VF intervals	X out of Y 6(1)30 out of 8(1)31	
Detection counter of Williams	0(1)00 001 01 0(1)01	
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	hunet rome hunt DECT	
ATP type Attempts	burst, ramp, burst + PES ¹⁾ 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 + PE	S ¹⁾
Stability criterion	12%	
ATP attempts	1	
Number S1	1(1)10	
Cardioversion/defibrillation therapy	()/T	(4)
Number of shocks	for VT zones: OFF; 1(1)8;	for VF zone: 6[1]8
Waveform Polarity (per Zone)	biphasic, biphasic 2	
Energy	normal, reversed, alternating 1st shock: 1(1)16(2)40	
	2 nd shock: 2(1)16(2)40	
0.6 * (3)	3rd to nth shock: 40 J	
Confirmation (per Zone) Post-shock duration	OFF, ON	handa.
POSE-SHOCK duration	OFF, 10(10)50 s; 1(1)10	· · · · · · · · · · · · · · · · · · ·
Pacing parameters	Bradycardia	David Charalt
Mode	VVIR, VVI, OFF	Post Shock VVI
	VVIR, VVI, 0FF 0.2(0.1)6.2; 7.5 V	
Mode Pulse amplitude		VVI
Mode Pulse amplitude Pulse width Basic rate	0.2(0.1)6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis	0.2(0.1)6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm 0FF, -5(-5)90 ppm	7.5 V 1.5 ms
Mode Pulse amplitude Pulse width Basic rate	0.2(0.1)6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis	0.2(0.1)6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm 0FF, -5(-5)90 ppm	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]60 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, 0N	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]60 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, 0N	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]60 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high,	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high,	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]60 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high,	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high,	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high,	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Putse amplitude Putse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, 0N very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×]	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×] 2×32 min ventricle, far-field fixed: 30 s	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×]	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history IEGM at SVT	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×] 2×32 min ventricle, far-field fixed: 30 s	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history IIEGM at SVT Housing	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 OFF, ON very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×] 2×32 min ventricle, far-field fixed: 30 s OFF, ON	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppi 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history IEGM at SVT Housing Dimensions	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF 5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×] 2×32 min ventricle, far-field fixed: 30 s 0FF, ON	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr 0FF, -5[-5]65 ppm
Mode Pulse amplitude Pulse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history IEGM at SVT Housing Dimensions Volume/weight	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]5 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 OFF, ON very low, low, medium, high, IS-1 bipolar (1×) DF-1 [2×) 2×32 min ventricle, far-field fixed: 30 s OFF, ON	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr 0FF, -5[-5]65 ppm
Mode Putse amplitude Putse width Basic rate Rate hysteresis Repetitive/scan hysteresis Sensor parameters Max. sensor rate Rate increase Rate decrease Sensor gain Auto gain Sensor threshold Lead connections Pacing/sensing Shock Diagnostic functions IEGM Holter Channels Length of pre-history IEGM at SVT Housing Dimensions	0.2[0.1]6.2; 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF 5[-5]90 ppm 0FF, 1[1]15 cycles 90[5]160 ppm 0.5; 1[1]6 ppm/cycle 0.25[0.25]1.25 ppm/cycle 140 0FF, ON very low, low, medium, high, IS-1 bipolar [1×] DF-1 [2×] 2×32 min ventricle, far-field fixed: 30 s 0FF, ON	VVI 7.5 V 1.5 ms 30[5]100[10]160 ppr 0FF, -5[-5]65 ppm

Home Monitoring

Transmitted data	Heart Failure Monitor® diagnostics, detection and therap
Transmitted data	counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD program parameters
	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 ^a l, RV pacing impedance ⁴ l, shock impedance (painless, at last shock) ⁴ l
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 ²¹ , ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration ²¹ , ven. monitoring episode duration ²¹ , 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®	
	OFF, ON
IEGM-Online HD® IEGM for therapy episodes IEGM for monitoring episodes	OFF, ON
IEGM for therapy episodes	
IEGM for therapy episodes IEGM for monitoring episodes Periodic IEGM	OFF, ON
IEGM for therapy episodes IEGM for monitoring episodes	OFF, ON
IEGM for therapy episodes IEGM for monitoring episodes Periodic IEGM Technical data	OFF; 0N OFF; 2; 3; 4; 6 months
IEGM for therapy episodes IEGM for monitoring episodes Periodic IEGM Technical data Transmitter frequency	OFF, 0N OFF; 2; 3; 4; 6 months 403 MHz

- PES: Programmed extrastimulus.
 21 2.5 V/0.5 ms; 60 ppm; 7000; 4 max. energy shocks/year; 15% pacing.
 31 Programmable upper or lower limit.
 Programmable upper and lower limit.

Tachyarrhythmia Therapy

Single-Chamber ICD

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.

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



Technical Data

Arrhythmia detection Rhythm classes	bradycardic, physiologic, VT-	1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustm	
VT detection and redetection		
Criteria	number of intervals, onset, s	
VT interval	OFF, 270(10)600 ms for V7 OFF, 270(10)500 ms for V7	Γ-2
Number of VT intervals for detection and redetection	detection: 10(2)60 for VT- redetection: 10(2)30	1; 10(2)40 for VT-2
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	10 + (1/1 + 1 + 1	II A/T 4
Number of intervals for termination	12 out of 16 intervals slower	than VI-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	<u> </u>
S1-S2 interval	absolute: 200(10)500 ms;	adaptive: 70(5)95%
Scan decrement	0FF, 5(5)40 ms	
Min. ATP interval	200(5)300 ms	
ATP optimisation	OFF, ON	
ATP One Shot®		
ATP type	OFF, burst, ramp, burst + PE	S 11
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	9
Energy	1st shock: 1(1)16(2)30 .	
	2 nd shock: 2[1]16[2]30 3 rd to n th shock: 30 J	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	WI
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 pp
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	140	
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	
Onantico		
Length of pre-history	fixed: 30 c	
	fixed: 30 s	
	fixed: 30 s OFF, ON	
IEGM at SVT		
IEGM at SVT Housing		
IEGM at SVT Housing Dimensions	OFF, ON	
IEGM at SVT Housing Dimensions	0FF, 0N 66×55×12 mm	
IEGM at SVT Housing Dimensions Volume/weight	OFF, ON 66×55×12 mm 34.6 cm³/81 g	
Volume/weight Material	OFF, ON 66×55×12 mm 34.6 cm³/81 g titanium	

Home Monitoring

Transmitted data	Heart Failure Monitor® diagnostics, detection and therap
Transmitted data	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 ^{a)} , 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 ³¹ , ven. monitoring episode duration ³¹ , 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	0FF; 2; 3; 4; 6 months
Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 μW
Ordering information	

- 1) PES: Programmed extrastimulus.
 2) 2.5 V/0.5 ms; 60 ppm; 7000; 4 max. energy shocks/year; 15% pacing.
 3) Programmable upper or lower limit.
 4) Programmable upper and lower limit.

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 energyefficient technologies.

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





Lumax 540 DR-T

Technical Data

Arrhythmia detection Rhythm classes	bradycardic, physiologic, VT-	-1 VT-2 VF	
Ventricular sensitivity	automatic sensitivity adjustr		
Atrial sensitivity	automatic sensitivity adjustr		
	, , , , , , , , , , , , , , , , , , , ,		
/T detection and redetection			
Criteria	number of intervals, onset, s persistent VT	stability, SMART,	
VT interval	OFF, 270(10)600 ms for V	T-1;	
	OFF, 270(10)500 ms for V		
Number of VT intervals for detection and redetection	detection: 10(2)60 for VT- redetection: 10(2)30	1; 10[2]40 for VT-2	
Onset	OFF ¹ , 4(4)32%; with SMA	RT: 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	hund hu DEC"		
ATP type 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 Scan decrement	absolute: 200(10)500 ms;	adaptive: 70[5]95%	
Scan decrement Min. ATP interval	0FF, 5(5)40 ms 200(5)300 ms		
ATP optimization	0FF, 0N		
ATP One Shot®			
ATP type	OFF, burst, ramp, burst + PE 12%	ES 21	
Stability criterion ATP attempts	1 2 70		
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 Polarity (per Zone)	biphasic, biphasic 2 normal, reversed, alternatin	0	
Shock path	RV → SVC + Can, RV → Can		
· · · · · · · · · · · · · · · · · · ·			
Energy	1st shock: 1(1)16(2)40 J;		
Energy	2 nd shock: 2(1)16(2)40	3 rd to n th shock: 40 J	
	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J	J,	
Confirmation (per Zone)	2 nd shock: 2(1)16(2)40		
Confirmation (per Zone) Post-shock duration	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11	D min	
Confirmation (per Zone) Post-shock duration Pacing parameters	2 nd shock: 2[1]16[2]40 3 nd to n th shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia	0 min Post Shock	
Confirmation (per Zone) Post-shock duration Pacing parameters	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11	D min	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode	2 ^{md} shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	Post Shock DDI if DDD[R], DDI[R], AAI[R]: VDI if VDD[R], VDI[R]; VVI if WI[R], OFF	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle)	2 nd shock: 2[1]16[2]40 3 nd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle)	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 02[0,1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	Omin Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); WI if WI(R), OFF 7.5 V 1.5 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate	2 ^{ml} shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm	D min Post Shock DDI if DDDIR), DDIR), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF 7.5 V 1.5 ms 30(5)100(10)160 ppm	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 02[0,1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	Omin Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); WI if WI(R), OFF 7.5 V 1.5 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 02[0,1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium,	D min Post Shock DDI if DDD[R], DD[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160ppm	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	2 ^{ml} shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual	Post Shock DDI if DDD[R], DDI[R], AdI[R]; VDI if VDD[R], VDI[R]; WI if VVIR], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate **Rate hysteresis** **Repelitive/scan hysteresis** AV delay	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 02[0,1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium,	Post Shock DDI if DDD[R], DDI[R], AdI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDDR, VDDR, VDR, VDR, AAIR, VVIR, OFF 0.2[0,1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{plus} , OF 10[10]150 ms	Post Shock DDI if DDD[R], DDI[R], AdI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis (positive)	2 nd shock: 2[1]16[2]40 3 nd to n th shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSp ^{hice} , OF 10[10]150 ms OFF, 1[1]10 cycles	Post Shock DDI if DDD[R], DDI[R], Aal[R]; VDI if VDD[R], VDI[R]; VII if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]65 ppm fixed: 50[10]350 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate # Rate hysteresis # Repetitive/scan hysteresis AV delay AV hysteresis mode # AV hysteresis # AV prepetitive hysteresis (positive) # AV repetitive hysteresis (negative)	2 nd shock: 2[1]16[2]40 3 nd to n ^{nh} shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSp ^{bun} , OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles	Post Shock DDI if ODD(R), DDI(R), AAI(R), VDI if VDD(R), VDI(R), VDI if VDD(R), T.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV scan hysteresis	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]35 ms positive, negative, IRS ^{plus} , OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles	Post Shock DDI if ODD(R), DDI(R), AAI(R), VDI if VDD(R), VDI(R), VDI if VDD(R), T.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis (positive) AV scan hysteresis (negative) AV scan hysteresis (negative) AV scan hysteresis Upper tracking rate	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 02[0,1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{plus} , OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles 9The open of the open open of the open of the open open open open open open open ope	Dmin Post Shock DDI if DDD[R], DD[R], Aal[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (negative) AV san hysteresis Upper tracking rate Mode Switching	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]35 ms positive, negative, IRS ^{plus} , OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles	Dmin Post Shock DDI if DDD[R], DD[R], Aal[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]35 ms positive, negative, IRSplus, 50 ms positive, negative, IRSplus, 0F 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD[R]: DDI, DDIR; VDD[R]: OFF, +5[5]+30 ppm OFF, +5[5]+30 ppm	Dmin Post Shock DDI if DDD[R], DD[R], Aal[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis (positive) AV repetitive hysteresis (negative) AV scan hysteresis (negative) AV scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, VDIR, AAIR, VVI, OFF, 0.2[0,1]62, 7.5 v 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSplus, OFF, 1[1]10 cycles 0FF, 1[1]10 cycles 0FF, 1[1]10 cycles 9FF, 1[1]10 cycles 9D[10]160 ppm DDDIR]: DDI, DDIR; VDDIR]: OFF, +5[5]+30 ppm 1[1]30 min	Dmin Post Shock DDI if DDD[R], DD[R], Aal[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis is AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV as an hysteresis AV an hysteresis AV an hysteresis Post mode switch rate Post mode switch duration PVARP3	2 nd shock: 2[1]16[2]40 3 nd to n nd shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDDR, VDDR, AAI, VVI, DDDR, AAI, VVI, DDDR, AAI, VVI, DDR, AAI, VVI, DDR, AAI, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSphin, OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]15[5]100[10 OFF, 1[1]10 cycles	Dmin Post Shock DDI if DDD[R], DDI[R], Aal[R], VDI if VDD[R], VDI[R]; WI if WVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis in the state of t	2 nd shock: 2[1]16[2]40 3 nd to n ^{nh} shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSp ^{bun} , OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD[R]: DDI, DDIR; VDD[R]: OFF, +5[5]+30 ppm 0FF, +5[5]+50 ppm 1[1]30 mr AUTO, 175[25]600 ms PVARP +225 ms (max. 600 m	Dmin Post Shock DDI if DDD[R], DDI[R], Aal[R], VDI if VDD[R], VDI[R]; WI if WVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate = Rate hysteresis = Repetitive/scan hysteresis AV delay AV hysteresis mode = AV hysteresis (positive) = AV repetitive hysteresis (negative) = AV repetitive hysteresis (negative) = AV scan hysteresis Upper tracking rate Mode Switching = Change basic rate during MS = Post mode switch rate = Post mode switch duration PVARP* PVARP* PVARP* PVARP* PVARP* PVARP* PVARP* PT protection	2 nd shock: 2[1]16[2]40 3 nd to n ^{nb} shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSplus, OFF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]15[5]100[10 OFF, 1[1]15[5]100[11	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis in the state of t	2 nd shock: 2[1]16[2]40 3 nd to n ^{nh} shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSp ^{bun} , OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD[R]: DDI, DDIR; VDD[R]: OFF, +5[5]+30 ppm 0FF, +5[5]+50 ppm 1[1]30 mr AUTO, 175[25]600 ms PVARP +225 ms (max. 600 m	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis (positive) AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (Desitive) AV av repetitiv	2 nd shock: 2[1]16[2]40 3 nd to n nd shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSphin, OF 10[10]150 ms OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD[R]: DDI, DDIR; VDD[R]: OFF, +5[5]+30 ppm OFF, +5[5]+30 ppm 1[1]30 min AUTO, 175[25]600 ms PVARP +225 ms (max. 600 m OFF, ON accelerometer, various prog	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate ■ Rate hysteresis ■ Repetitive/scan hysteresis AV delay AV hysteresis mode ■ AV hysteresis (positive) ■ AV repetitive hysteresis (negative) ■ AV scan hysteresis ■ AV repetitive hysteresis (negative) ■ AV scan hysteresis Upper tracking rate Mode Switching ■ Change basic rate during MS ■ Post mode switch duration PVARP 3 PVARP 3 PVARP 3 PVARP 3 PVARP 3 PVARP 3 FORTON CONTROL OF SENSOR ENSOR BRS****	2 nd shock: 2[1]16[2]40 3 nd to n nd shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, DDIR, VDDR, AAIR, VVIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]90 ppm OFF, 1[1]10 cycles 0FF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD(R): DDI, DDIR; VDD(R): OFF, 5[5]+30 ppm OFF, 5[5]+30 ppm 1[1]30 min AUTO, 175[25]600 ms PVARP +225 ms [max. 600 m OFF, ON accelerometer, various prog	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV scan hysteresis Duper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARP PVARP after VES PMT protection Sensor IRS ^{Blase} IRS ^{Blase} IRS ^{Blase} AV hysteresis	2 nd shock: 2[1]16[2]40 3 rd to n th shock: 40 J 0FF, 0N 0FF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm 0FF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSplus, OF 10[10]150 ms 0FF, 1[1]10 cycles 0FF, 1[1]10 cycles 9FF, 1[1]10 cycles 9FF, 1[1]10 cycles 90[10]160 ppm DDDIR]: DDI, DDIR; VDDIR]: 0FF, +5[5]+30 ppm 0FF, +5[5]+30 ppm 1[1]30 min AUTO, 175[25]600 ms PVARP +225 ms (max. 600 m 0FF, ON accelerometer, various prog	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR	
Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate = Rate hysteresis = Repetitive/scan hysteresis AV delay AV hysteresis mode = AV hysteresis (positive) = AV repetitive hysteresis (negative) = AV repetitive hysteresis (negative) = AV scan hysteresis Upper tracking rate Mode Switching = Change basic rate during MS = Post mode switch rate = Post mode switch duration PVARP* PVARP* PVARP* PVARP* PVARP* PVARP* PVARP* PT protection	2 nd shock: 2[1]16[2]40 3 nd to n nd shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, DDIR, VDDR, AAIR, VVIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]90 ppm OFF, 1[1]10 cycles 0FF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD(R): DDI, DDIR; VDD(R): OFF, 5[5]+30 ppm OFF, 5[5]+30 ppm 1[1]30 min AUTO, 175[25]600 ms PVARP +225 ms [max. 600 m OFF, ON accelerometer, various prog	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR	

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	3×32min
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

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and ther counters, rhythm control statistics, lead integrity measurements, battery and system status, ICD progra 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] ^{SI} , pacing impedance [RA, RV] ^{SI} , shock impedance [painless, at last shock] ^{SI} , RV pacing threshold ^{7I}
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 ³ , ven. episod with fulfilled ATP time-out criterion, ven. therapy episo 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 ⁸⁾
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h
T	
Technical data	/02 MII-
Transmitter frequency	403 MHz
Transmitting power	< 25 μW

Ordering information Lumax 540 DR-T

- OFF cannot be programmed if SMART is active.
 PES: Programmed extrastimulus.
 PVARP. Post ventricular atrial refractory period.
 RA/RV 2.5 V/0.4 ms; 60 ppm; 7000; RA 50%, RV 15% pacing; 4 max. energy shocks/year; Home Monitoring ON; diagnostics ON.
 Programmable upper or lower limit.
 Programmable upper and lower limit.
 Programmable safety margin.
 If periodic IEGM is enabled the system generates an additional IEGM message one week after activation.



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 energyefficient technologies.

Model	Volume	Thickness	Connectors	Order number
Lumax 500 DR-T	34 cm³	12 mm	IS-1 (2×)	360 341
			DF-1 (2×)	





Lumax 500 DR-T

Technical Data

Arrhythmia detection Rhythm classes	bradycardic, physiologic, VT-	1 VT-2 VF
Ventricular sensitivity	automatic sensitivity adjustm	
Atrial sensitivity	automatic sensitivity adjustr	
	sensiting adjustin	
VT detection and redetection		
Criteria	number of intervals, onset, s persistent VT	tability, SMART,
VT interval	OFF, 270(10)600 ms for V7	Γ-1·
	OFF, 270(10)500 ms for V1	Γ-2
Number of VT intervals for detection and redetection	detection: 10(2)60 for VT- redetection: 10(2)30	1; 10(2)40 for VT-2
Onset	OFF ¹⁾ , 4(4)32%; with SMA	RT: 20%
Stability	OFF ¹⁾ , ±8(4)±48 ms; with	
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5(5)	
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	40	U. VT 4
Number of intervals for termination Forced termination	12 out of 16 intervals slower	than VT-1
ruicea 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 R-S1 interval	OFF, ON absolute: 200(10)500 ms;	adantive: 70 (5) 050/
S1 decrement	5(5)40 ms	auaptive: /u[3]73%
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 + PE	S ²⁾
Stability criterion	12%	
ATP attempts	1	
Number S1	1(1)10	
Number 51	1[1]10	
	1(1)10	
Cardioversion/defibrillation therapy		for VF zone: A (1) 8
Cardioversion/defibrillation therapy Number of shocks	1[1]10 for VT zones: 0FF, 1[1]8; 1 biphasic, biphasic 2	for VF zone: 6[1]8
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone)	for VT zones: OFF, 1(1)8;	
Cardioversion/defibrillation therapy Number of shocks Waveform	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can,	3 RV → SVC
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path	for VT zones: OFF, 1(1)8; 1 biphasic, biphasic 2 normal, reversed, alternating RV > SVC + Can, RV + Can, 1st shock: 1(1)16(2)30 J	B RV → SVC
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can,	B RV → SVC
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30. 2 st shock: 2[1]16[2]30.	B RV → SVC
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Shock path Energy Confirmation (per Zone)	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1st shock: 1[1]16[2]302m 3rd to n th shock: 30[1]16[2]303rd to n th shock: 30[2]303rd to n th shock: 30[2]30216[2]216[2]30216[2]216	3 RV → SVC
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30. 2 st shock: 2[1]16[2]30. 3 st to n th shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10	J RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30 2 st shock: 2[1]16[2]30 3 st to n th shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]10 Bradycardia	RV → SVC
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30, 3 st to n th shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR,	RV → SVC J Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R),
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30 2 st shock: 2[1]16[2]30 3 st to n th shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	RV → SVC J J Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; WI if WI[R], OFF
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle]	for VT zones: OFF, 1[1]8; 1 biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30 . 2 st shock: 2[1]16[2]30 . 0 FF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V	RV → SVC J J Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF 7.5 V
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width [atrium/ventricle]	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30 2 st shock: 2[1]16[2]30 3 st to n th shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF	RV → SVC J Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5ms
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1" shock: 1[1]16[2]30. 3" to n" shock: 3[1]16[2]30. OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	RV → SVC J Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5ms
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 ²⁴ shock: 1[1]16[2]30 3 ²⁵ to n ²⁶ shock: 2[1]16[2]30 3 ²⁶ to n ²⁶ shock: 3.0 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, RV → Can, 11" shock: 1[1]16[2]30 3" to 11" shock: 2[1]16[2]30 3" to 11" shock: 3[1]10 OFF, 10[1]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium,	RV → SVC J Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VDI(R); VDI(R); SV 1.5 v 1.5 ms 30[5]100[10]160 ppm
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1st shock: 1[1]16[2]30 . 3rd to nth shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[5]90 ppm OFF, 1[1]15 cycles	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]302 st shock: 2[1]16[2]3030 oFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 ²⁴ shock: 1[1]16[2]30. 3 ²⁵ to 1[2]30. 3 ²⁶ to 1[2]30. 3 ²⁷ to 1[2]30. 3 ²⁸ to 1[2]30. 3 ²⁹ to 1[2]30 JFF, 0.N OFF, 1[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm 0FF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{plus} , OFI 10[10]150 ms	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis [positive]	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30 2 st shock: 2[1]16[2]30 3 st to n st shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{stus} , OFI 10[10]150 ms OFF, 1[1]15 ms	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Past-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis [positive] AV repetitive hysteresis [negative]	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30. 3 rd to n th shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, DDIR, VDDR, VDDR, AAIR, VVIR, OFF 0.2[0,1]160 ppm OFF, 5[5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 m OFF, 1[1]150 ms OFF, 1[1]10 cycles	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV expenditive hysteresis [negative]	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis is positive] AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV scan hysteresis AV grand hysteresis AV repetitive hysteresis [negative]	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30. 3 rd to n th shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, DDIR, VDDR, VDDR, AAIR, VVIR, OFF 0.2[0,1]160 ppm OFF, 5[5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 m OFF, 1[1]150 ms OFF, 1[1]10 cycles	RV → SVC J Post Shock DDI if DDD[R], DDI[R], AAI[R], VDI if VDD[R], VDIRI, VVI if VVIRI, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Cardioversion / defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV say say hysteresis Upper tracking rate Mode Switching	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 ²⁴ shock: 1[1]16[2]30. 3 ²⁵ to n ²⁶ shock: 2[1]16[2]30. 3 ²⁶ to n ²⁶ shock: 3.0 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSeles, OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]15 cycles OFF, 1[1]10 cycles	RV → SVC J Post Shock DDI if DDD[R], DDI[R], AAI[R], VDI if VDD[R], VDIRI, VVI if VVIRI, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Cardioversion / defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis [positive] AV repetitive hysteresis [underwise] AV can hysteresis Upper tracking rate Mode Switching Change basic rate during MS	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 st shock: 1[1]16[2]30 2 st shock: 2[1]16[2]30 3 st to n th shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{plus} , OFI 10[10]150 ms OFF, 1[1]15 cycles OFF, 1[1]10 cycles OFF, 1[1][RV → SVC J Post Shock DDI if DDD[R], DDI[R], AAI[R], VDI if VDD[R], VDIRI, VVI if VVIRI, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis is AV repetitive hysteresis [nositive] AV repetitive hysteresis [nositive] AV scan hysteresis AV repetitive hysteresis [nositive] AV av scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 rd shock: 1[1]16[2]30. 3 rd to n rd shock: 2[1]16[2]30. 3 rd to n rd shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{plata} , OFF 10[1]15 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDIR]: DDIR, DDIR; VDD[R]: OFF, +5[5]430 ppm DFF, +5[5]430 ppm 1[1]30 min	RV → SVC J Post Shock DDI if DDD[R], DDI[R], AAI[R], VDI if VDD[R], VDIRI, VVI if VVIRI, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate # Rate hysteresis # Repetitive/scan hysteresis AV delay AV hysteresis mode # AV hysteresis [positive] # AV repetitive hysteresis [negative] # AV repetitive hysteresis [negative] # AV repetitive hysteresis Upper tracking rate Mode Switching # Change basic rate during MS # Post mode switch duration PVARPOIL	for VT zones: OFF, 1[1]8; ibiphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 ²¹ shock: 1[1]16[2]30 2 ²⁴ shock: 2[1]16[2]30 3 ²⁵ to n ²⁵ shock: 3.0 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, VDI, VDI, VDI, VDI,	RV -> SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [upositive] AV av an hysteresis Change basic rate during MS Change basic rate during MS Post mode switch duration PVARP® PVARP after VES	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV -> SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode # AV hysteresis [positive] # AV repetitive hysteresis [negative] # AV race thing rate Mode Switching # Change basic rate during MS # Post mode switch rate # Post mode switch duration PVARPail PVARP alter VES PMT protection	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode # AV hysteresis [positive] # AV repetitive hysteresis [negative] # AV race thing rate Mode Switching # Change basic rate during MS # Post mode switch rate # Post mode switch duration PVARPail PVARP alter VES PMT protection	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis is AV repetitive hysteresis [negative] Post mode Switching Change basic rate during MS Post mode switch duration PVARP ²¹ PVARP after VES PMT protection Sensor	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV av repetitive hysteresis [negative] AV av repetitive hysteresis [negative] AV scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARPail PVARPail PVARPafter VES PMT protection Sensor	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Shock path Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis is AV repetitive hysteresis [negative] AV prepetitive hysteresis [negative] AV scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARPal PVARP after VES PMT protection Sensor IRSelus IRSelus AV hysteresis AV hysteresis	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → Can, 1 rd shock: 1[1]16[2]30. 3 rd to n rd shock: 2[1]16[2]30. 3 rd to n rd shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRS ^{plato} , OFF 10[1]15 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDD[R]: DDIR, DDIR; VDD[R]: OFF, +5[5]450 ppm 1[1]30 min AUTO, 175[25]600 ms PVARP +225 ms [max. 600 ms OFF, ON accelerometer, various progr	RV → SVC J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone)	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternating RV → SVC + Can, RV → C	RV → SVC J

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	3×32min
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	66×55×12mm
Volume/weight	34 cm³/81 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	9.4 years 41

Home Monitoring	
Transmitted data	Heart Failure Monitor® diagnostics, detection and therapy counters, rhythm control statistics, lead integrit 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] ⁶], shock impedance [painless, at last shock] ⁶], 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) ⁵¹ , atrial burden ⁵¹ , mean VES/h ⁵¹
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of artial rhythm ³ , ven. episod with fulfilled ATP time-out criterion, ven. therapy episod 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®
Ongoing atrial episodes	OFF, 0.5, 6, 12, 18 h

Transmitter frequency

Ordering information

Transmitting power

403 MHz

< 25 µW

- 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 VIO.4 ms; 60 ppm; 7000; 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.



Cardiac Rhythm Management

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.

Model	Volume	Thickness	Connectors	Order number
Lumax 340 DR-T	$37\mathrm{cm}^3$	13 mm	IS-1 (2×)	355 267
			DF-1 (2×)	



Lumax 340 DR-T

Technical Data Arrhythmia detection

Arrhythmia detection		
Rhythm classes	bradycardic, physiologic, VT-	1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustm	nent
Atrial sensitivity	automatic sensitivity adjustm	nent
VT detection and redetection		
Criteria	number of intervals, onset, s	tability, SMART,
ACT :	persistent VT	F 4
VT interval	OFF, 270(10)600 ms for V7 OFF, 270(10)500 ms for V7	
Number of VT intervals for detection	detection: 10(2)60 for VT-	
and redetection	redetection: 10(2)30	1, 10(2)40 101 ¥1 2
Onset	OFF ¹⁾ , 4(4)32%; with SMA	RT: 20%
Stability	OFF1, ±8(4)±48 ms; with	
Sustained VT	OFF, 0.5, 1.0, 2.0, 3.0, 5(5)	
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 + PE	S ^{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; t	for VE zone: 6 [1] 8
INDITIDET OF SHOCKS	101 11 201103: 011, 1(1)0, 1	01 11 20110. 0(1)0
Waveform	biphasic, biphasic 2	or 11 2011c. 0(1)0
Waveform	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40	J
Waveform Polarity (per Zone)	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2nd shock: 2[1]16[2]40	J
Waveform Polarity (per Zone) Energy	biphasic, biphasic 2 normal, reversed, alternating 1" shock: 1[1]16[2]40 2"d shock: 2[1]16[2]40 3"d to n th shock: 40 J	J
Waveform Polarity (per Zone) Energy Confirmation (per Zone)	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to ns shock: 40 J OFF, ON	J
Waveform Polarity (per Zone) Energy Confirmation (per Zone)	biphasic, biphasic 2 normal, reversed, alternating 1" shock: 1[1]16[2]40 2"d shock: 2[1]16[2]40 3"d to n th shock: 40 J	J
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to nt shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10	3 J J Omin
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nth shock: 40 J 0FF, 0N 0FF, 10[10]50 s; 1[1]10 Bradycardia	g J J min Post Shock
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to nt shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10	3 J J Omin
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to ns shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI,	J J I min Post Shock DDI if DDD(R), DDI(R),
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode	biphasic, biphasic 2 normal, reversed, alternatin, 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR,	Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R),
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle)	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nthe shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, WIR, OFF	Post Shock DDI if DDD[R], DDI[R], VDI[R]; WI if VVD[R], VDI[R]; WI if VVI[R], OFF
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle)	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nth shock: 40 J OFF, ON OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIIR), OFF 7.5 V 1.5ms
Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate	biphasic, biphasic 2 normal, reversed, alternatin, 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, WIR, OFF 0.2(0,1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIIR), OFF 7.5 V 1.5ms
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to nst shock: 40 J 0FF, 0N 0FF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, 0FF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nst shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nst shock: 40 J 0FF, 0N 0FF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles fixed, low, medium, high, individual	Post Shock DDI if DDD[R], DDI[R], AA[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nth shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, 5[5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms	Post Shock DDI if DDD[R], DDI[R], ALI[R]; VDI if VDD[R], VDI[R]; VV if VVI[R], OFF 7.5 V 1.5 ms 0FF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3st to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 02(0.1)62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 5(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSstue, OFI	Post Shock DDI if DDD[R], DDI[R], ALI[R]; VDI if VDD[R], VDI[R]; VV if VVI[R], OFF 7.5 V 1.5 ms 0FF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 2st shock: 2(1)16(2)40 3st to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSyster, OFI OFF, 10(10)150 ms	Post Shock DDI if DDD[R], DDI[R], ALI[R]; VDI if VDD[R], VDI[R]; VV if VVI[R], OFF 7.5 V 1.5 ms 0FF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis (positive)	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 2st shock: 2[1]16[2]40 3st to nth shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed 15, 40[5]350 ms positive, negative, IRSplus, OFI OFF, 1[1]15 ms OFF, 1[1]15 ms	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); WI if VVI(R), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn 0FF, -5[-5]65 ppm
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis (positive) AV repetitive hysteresis (negative)	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 3st to nthe shock: 40] 0FF, 0N 0FF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDB, DDIR, DDIR, VDDR, VDIR, AAIR, WIR, OFF 0.2[0.1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm 0FF, -5[-5]90 ppm 0FF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSpilus, OFF, 10[10]150 ms 0FF, 1[1]10 cycles 0FF, 1[1]10 cycles	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); WI if VVI(R), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn 0FF, -5[-5]65 ppm
Waveform Potarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Putse amplitude (atrium/ventricte) Putse width (atrium/ventricte) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV rescan hysteresis	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3rd to nst shock: 2(1)16(2)40 3rd to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSslus, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 cycles OFF, 1(1)1551100(10) OFF, 1(1)1515100(10)	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); WI if VVI(R), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn 0FF, -5[-5]65 ppm
Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV reach ysteresis AV repetitive hysteresis [negative] AV aV scan hysteresis Upper tracking rate	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3rd to nst shock: 2(1)16(2)40 3rd to nst shock: 40 J OFF, 0N Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSstar, OFF, 10(10)150 ms OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles 90(10)160 ppm	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [upstrive] AV repetitive hysteresis [upstrive]	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3rd to nst shock: 2(1)16(2)40 3rd to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSslus, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 cycles OFF, 1(1)1551100(10) OFF, 1(1)1515100(10)	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (negative) AV san hysteresis Upper tracking rate Mode Switching	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3rd to nst shock: 2(1)16(2)40 3rd to nst shock: 40 J OFF, 0N Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSstar, OFF, 10(10)150 ms OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles 90(10)160 ppm	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (upper tracking rate) Mode Switching Change basic rate during MS	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 3st to nst shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, -1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSelue, OFF, OFF, 1[1]10 cycles	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (upper tracking rate) Mode Switching Change basic rate during MS	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 3st to nst shock: 2[1]16[2]40 3st to nst shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDDR, VDDR, VDDR, VDR, VD	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Potarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Putse amplitude (atrium/ventricle) Putse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (negative) AV scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3st to nst shock: 2(1)16(2)40 3st to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 02(0.1)62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSstan, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 cycles 90(10)160 ppm DDF, 1(1)150 ppm DFF, 1(1)150 ppm DFF, 1(1)150 ppm DFF, 1(1)150 ppm DDIR): DDI, DDIR; VDDIR; VDDIR]: OFF, +5(5)+50 ppm OFF, +5(5)+50 ppm	Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VDI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms
Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV read Nysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1(1)16(2)40 3rd to nst shock: 2(1)16(2)40 3rd to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, VDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplas, OFI OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles 90(10)160 ppm DDD(R): DDI, DDIR; VDD(R): OFF, +5(5)+30 ppm 1(1)30 min	District DDI DDI
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV as an hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch duration PVARP® PVARP after VES	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 3st to nst shock: 2[1116[2]40 3st to nst shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSelue, OFF, 1[1]10 cycles	District DDI DDI
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV av con hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARPai PVARPai PVARPai PVARP after VES PMT protection	biphasic, biphasic 2 normal, reversed, alternatin, 1st shock: 1(1)16(2)40 3st to nst shock: 2(1)16(2)40 OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, WIR, OFF 0.2(0,1)6.2, 7.5 v 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSpelso, OFF, 1(1)15 uycles OFF, 1(1)15 uycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)1550 mp DDIR(R): DDI, DDIR, VDDIR(R): OFF, 5(5)430 ppm OFF, +5(5)450 ppm 1(1)30ms PVARP +225 ms [max. 600 ms	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIR), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV av con hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARPai PVARPai PVARPai PVARP after VES PMT protection	biphasic, biphasic 2 normal, reversed, alternatin, 1shock: 1(1)16(2)40 3shock: 2(1)16(2)40 3shock: 2(1)16(2)40 3shock: 3(1)16(2)40 3shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 02(10)16, 2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSses, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 cycles 90(10)160 ppm DDD(R): DDI, DDIR, VDD(R): 0FF, 5(5)430 ppm DDD(R): DDI, DDIR, VDD(R): 0FF, +5(5)+50 ppm 1(1)30 min AUTO, 175(25)600 ms PVARP +225 ms [max. 600 ms	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIR), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [upstive] AV repetitive hysteresis [upstive]	biphasic, biphasic 2 normal, reversed, alternatin, 1shock: 1(1)16(2)40 3shock: 2(1)16(2)40 3shock: 2(1)16(2)40 3shock: 3(1)16(2)40 3shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 02(10)16, 2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSses, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 cycles 90(10)160 ppm DDD(R): DDI, DDIR, VDD(R): 0FF, 5(5)430 ppm DDD(R): DDI, DDIR, VDD(R): 0FF, +5(5)+50 ppm 1(1)30 min AUTO, 175(25)600 ms PVARP +225 ms [max. 600 ms	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIR), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV as can hysteresis Change basic rate during MS Post mode switch frate Post mode switch duration PVARPa PVARP after VES PMT protection Sensor	biphasic, biphasic 2 normal, reversed, alternatin, 1shock: 1(1)16(2)40 3shock: 2(1)16(2)40 3shock: 2(1)16(2)40 3shock: 3(1)16(2)40 3shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 02(10)16, 2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSses, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 cycles 90(10)160 ppm DDD(R): DDI, DDIR, VDD(R): 0FF, 5(5)430 ppm DDD(R): DDI, DDIR, VDD(R): 0FF, +5(5)+50 ppm 1(1)30 min AUTO, 175(25)600 ms PVARP +225 ms [max. 600 ms	Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIR), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch duration PVARPOIL	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 3st to nst shock: 2[1116[2]40 3st to nst shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSelus, OFF, 1[1]10 cycles OFF, 2[1]10 cycles OFF, 2	Driin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIRI), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5(-5]65 ppm fixed: 50[10]350 ms F.
Waveform Potarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Putse amplitude (atrium/ventricle) Putse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (negative) AV av repetitive hysteresis (negative) AV repetitive hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARPail PVARPail PVARP after VES PMT protection Sensor	biphasic, biphasic 2 normal, reversed, alternatin, 1st shock: 1(1)16(2)40 3st to nst shock: 2(1)16(2)40 3st to nst shock: 40 J OFF, 0N OFF, 10(10)50 s; 1(1)10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 02(0.1)62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30(5)100(10)160 ppm OFF, 5(5)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplus, OFI OFF, 1(1)150 ms OFF, 1(1)150 ms OFF, 1(1)150 ppm DFF, 1(1)150 ppm DFF, 1(1)150 ppm DFF, 1(1)150 ppm DFF, 1(1)150 ppm DDIR]: DDI, DDIR; VDDIR]: OFF, +5(5)+30 ppm OFF, +5(5)+30 ppm 1(1)30 min AUTO, 175(25)600 ms PVARP +225 ms [max. 600 ms OFF, ON OFF, ON	Driin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIRI), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5(-5]65 ppm fixed: 50[10]350 ms F.
Waveform Potarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis is (positive) AV repetitive hysteresis (positive) AV repetitive hysteresis (negative) AV repetitive hysteresis (negative) AV repetitive hysteresis (negative) AV repetitive hysteresis (positive) AV prost mode switch duration PVARPal PVARP After VES PMT protection Sensor IRSalus AV hysteresis	biphasic, biphasic 2 normal, reversed, alternating 1st shock: 1[1]16[2]40 3st to nst shock: 2[1]16[2]40 3st to nst shock: 40 J OFF, 0N OFF, 10[10]50 s; 1[1]10 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, VDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 1.5 ms 30[5]100[10]160 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSstar, OFF, 1[1]10 cycles OFF, 1[1]10 cycles OFF, 1[1]10 cycles 90[10]160 ppm DDDIRI: DDIR, DDIR; VDD[R]: OFF, +5[5]+30 ppm 1[1]30 min AUTO, 175[5]400 ms PVARP +225 ms [max. 600 ms OFF, ON automatic	Driin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRI; WI if VVIRI), OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5(-5]65 ppm fixed: 50[10]350 ms F.

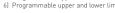
Lead connections	10 41 1 (0)	
Pacing/sensing	IS-1 bipolar (2×)	
Shock	DF-1 (2×)	
Diagnostic functions		
AT/AF rate	100(10)250 ppm	
IEGM Holter	3×32 min	
Channels	atrium, right ventricle, far-field	
Length of pre-history	fixed: 30 s	
IEGM at SVT	OFF, ON	
IEGM at AT/AF	OFF, ON	
Ongoing atrial episode	OFF, 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 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	055.011
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	
Luca and 2/0 DD T	255.277

Lumax 340 DR-T

- OFF cannot be programmed if SMART is active.
 PES: Programmed extrastimulus.
 PARP: Post ventricular atrial refractory period.
 L 25 V/O. 5ms; 60 ppm; 7000; 4 max energy shocks/year; 50 % RA pacing; 15 % RV pacing.
 Programmable upper or lower limit.
 Programmable upper and lower limit.





Tachyarrhythmia Therapy

Dual-Chamber ICD

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.

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



Lumax 300 DR-T

Technical Data

Arrhythmia detection Rhythm classes	bradycardic, physiologic, VT-	-1, VT-2, VF
Ventricular sensitivity	automatic sensitivity adjustr	
Atrial sensitivity	automatic sensitivity adjustr	nent
VT detection and redetection		
Criteria	number of intervals, onset, s	stability, SMART.
	persistent VT	
VT interval	OFF, 270(10)600 ms for V OFF, 270(10)500 ms for V	
Number of VT intervals for detection	detection: 10(2)60 for VT-	
and redetection	redetection: 10(2)30	
Onset	OFF ¹⁾ , 4(4)32%; with SMA	
Stability Sustained VT	OFF 11, ±8(4)±48 ms; with OFF, 0.5, 1.0, 2.0, 3.0, 5(5)	
SMART detection, redetection	OFF, ON	.30111111
*	•	
VF detection and redetection		
VF interval Criterion	OFF, 200(10)400 ms 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 Add. S1	1(1)10	
Add. S1 R-S1 interval	OFF, ON absolute: 200(10)500 ms;	adaptive: 70[5] 95%
S1 decrement	5(5)40 ms	1
S1-S2 interval	absolute: 200(10)500 ms;	adaptive: 70(5)95%
Scan decrement	OFF, 5(5)40 ms	
Min. ATP interval ATP optimization	200(5)300 ms OFF, ON	
ATT OPERITIZATION	011,010	
ATP One Shot®		
ATP type	OFF, burst, ramp, burst + PE	ES 2)
Stability criterion	12%	
ATP attempts	1	
Number S1	1 (1) 10	
Number S1	1(1)10	
Cardioversion/defibrillation therapy		
Cardioversion/defibrillation therapy Number of shocks	for VT zones: 0FF, 1[1]8;	for VF zone: 6[1]8
Cardioversion/defibrillation therapy Number of shocks Waveform	for VT zones: OFF, 1(1)8; biphasic, biphasic 2	
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone)	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1[1]16[2]30	g J
Cardioversion/defibrillation therapy	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1shock: 1[1]16[2]30 2shock: 2[1]16[2]30	g J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1[1]16[2]30	g J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy Confirmation (per Zone)	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1shock: 1(1)16(2)30 2shock: 2(1)16(2)30 3rd to nishock: 30 J	7 T B
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1 st shock: 1[1]16[2]30 2 ^{sd} shock: 2[1]16[2]30 3 rd to n th shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]11	9 J J
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1shock: 1(1)16(2)30 2sh shock: 2(1)16(2)30 3shock: 2(1)(1)30 OFF, ON OFF, 10(10)50 s; 1(1)11 Bradycardia	g J J Omin Post Shock
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1shock: 1(1)16(2)30 2shock: 2(1)16(2)30 3shock: 2(1)16(2)30 OFF, ON OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR,	g J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R],
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2ms shock: 2(1)16(2)30 3rd to nist shock: 30 J 0FF, 0N 0FF, 10(10)50 s; 1(1)1	g J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; WI if WI[R], OFF
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle)	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1s shock: 1[1]16[2]30 2s shock: 2[1]16[2]30 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAI, VVI, DAAI, VVID, AAI, VVID, AAI, VVID, AAI, VVID, AAI, VVID, CFF 0.2[0.1]6.2, 7.5 V	g J J Dmin Post Shock DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); WI if VVI(R), OFF 7.5 V
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle)	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2st shock: 2(1)16(2)30 3st to nst shock: 30 J OFF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0,1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms	g J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1s shock: 1[1]16[2]30 2s shock: 2[1]16[2]30 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAI, VVI, DAAI, VVID, AAI, VVID, AAI, VVID, AAI, VVID, AAI, VVID, CFF 0.2[0.1]6.2, 7.5 V	g J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1[1]16[2]30 2sh shock: 2[1]16[2]30 3sh to nsh shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles	9 J J Dmin Post Shock DDI if DDD[R], DDI[R], AJ[R]; VDI if VDD[R], VDI[R]; WI if WI[R], OFF 7.5 V 1.5 ms 30(5)100(10)160 ppn OFF, -5(-5)65 ppm
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	for VT zones: OFF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1shock: 1[1]16[2]30 2st shock: 2[1]16[2]30 3st to nth shock: 30 J OFF, ON OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium,	g J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; WI if WI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1[1]16[2]30 2sh shock: 2[1]16[2]30 3sh to nsh shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles	9 J J Dmin Post Shock DDI if DDD[R], DDI[R], AJ[R]; VDI if VDD[R], VDI[R]; WI if WI[R], OFF 7.5 V 1.5 ms 30(5)100(10)160 ppn OFF, -5(-5)65 ppm
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2st shock: 2(1)16(2)30 J OFF, ON OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5ms 30(5)100(10)160 ppm OFF, -5(-5)90 ppm OFF, -5(-5)90 ppm OFF, -1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSpliss, OFF.	9 J J J Omin Post Shock DDI if DDD[R], DDI[R], AJ[R]; VDI if VDD[R], VD[R]; WI if WI[R], OFF 7.5 V 1.5 ms 30(5)100(10)160 ppn OFF, -5(-5)65 ppm fixed: 50[10]350 ms
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repelitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2nd shock: 2(1)16(2)30 3rd to nith shock: 30 J OFF, ON OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; sms 30(5)100(10)160 ppm OFF, 5(-5)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplan, OF 10(10)150 ms	9 J J J Omin Post Shock DDI if DDD[R], DDI[R], AJ[R]; VDI if VDD[R], VD[R]; WI if WI[R], OFF 7.5 V 1.5 ms 30(5)100(10)160 ppn OFF, -5(-5)65 ppm fixed: 50[10]350 ms
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricte] Pulse width [atrium/ventricte] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis [positive]	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2ms shock: 2(1)16(2)30 3rd to nist shock: 30 J OFF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDDR, VDDR, VDDR, VDDR, VDDR, VDDR, VDDR, AAIR, VVIR, OFF 0.2(0, 1)(1, 2, 5 ms 30(5)100(10)160 ppm OFF, -5(-5)90 ppm OFF, -1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplum, OFF 10(10)150 ms OFF, 1(1)15 ms OFF, 1(1)15 cycles	g J J J Dmin Post Shock DDii i DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; WI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV drepetitive hysteresis [positive] AV repetitive hysteresis [negative]	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2nd shock: 2(1)16(2)30 3rd to nith shock: 30 J OFF, ON OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; sms 30(5)100(10)160 ppm OFF, 5(-5)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplan, OF 10(10)150 ms	g J J J Dmin Post Shock DDii i DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; WI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone) Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width (atrium/ventricle) Basic rate = Rate hysteresis = Repetitive/scan hysteresis AV delay AV hysteresis mode = AV hysteresis = AV repetitive hysteresis (positive) = AV repetitive hysteresis (negative) = AV scan hysteresis	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2st shock: 2(1)16(2)30 3st to ns shock: 30 J OFF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, DDIR, VDDR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30(5)100(10)160 ppm OFF, 5(-15)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplus, OFF 10(10)150 ms OFF, 1(1)150 m	g J J J Dmin Post Shock DDii i DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; WI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricte) Pulse width (atrium/ventricte) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis [positive] AV repetitive hysteresis (negative) AV Scan hysteresis Upper tracking rate Mode Switching	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2ms shock: 2(1)16(2)30 2ms shock: 3(1)16(2)30 0FF, 0N 0FF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDR,	9 J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VV if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [upper tracking rate Mode Switching Change basic rate during MS	for VT zones: 0FF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1[1]16[2]30 2ms shock: 2[1]16[2]30 3ms to ns shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDR, ADIR, VDR, ADIR, VDR, ADIR, UNIS, 0FF 0.2[0, 1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSplus, 0FF 10[10]150 ms OFF, 1[1]10 cycles ODDR(R): DDI, DDIR, VDDIR; DDIR, VDDIR; VDDIR; DDIR, VDDIR; DDIR, VDDIR; DFF, 5[5]+30 ppm	9 J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VV if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm fixed: 50[10]350 ms F
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis (positive) AV repetitive hysteresis (negative) AV scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1[1]16[2]30 2sh shock: 2[1]16[2]30 3sh to nsh shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2[0.1]6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSphus, 0F 10[10]150 ms OFF, 1[1]10 cycles ODIR]. DDIR, DDIR, DDIR, VDDIR; VDDIR	g J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm fixed: 50[10]350 ms F
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch rate	for VT zones: 0FF, 1[1]8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1[1]16[2]30 2ms shock: 2[1]16[2]30 3ms to ns shock: 30 J OFF, 0N OFF, 10[10]50 s; 1[1]11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDR, ADIR, VDR, ADIR, VDR, ADIR, UNIS, 0FF 0.2[0, 1]62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30[5]100[10]160 ppm OFF, 5[-5]90 ppm OFF, 1[1]15 cycles fixed, low, medium, high, individual fixed 15, 40[5]350 ms positive, negative, IRSplus, 0FF 10[10]150 ms OFF, 1[1]10 cycles ODDR(R): DDI, DDIR, VDDIR; DDIR, VDDIR; VDDIR; DDIR, VDDIR; DDIR, VDDIR; DFF, 5[5]+30 ppm	g J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm fixed: 50[10]350 ms F
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricte) Pulse width (atrium/ventricte) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis (negative) AV aV scan hysteresis AV av scan hysteresis Upper tracking rate Mode Switching Change basic rate during MS Post mode switch duration PVARP®	for VT zones: OFF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2nd shock: 2(1)16(2)30 3rd to nith shock: 30 J OFF, ON OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, VDIR, AAIR, VVIR, OFF 0.2(0.1)6.2, 7.5 V 0.4: 0.5: 0.7; 1.0; 1.2; sms 30(5)100(10)160 ppm OFF, 5(-5)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSpina, OF 10(10)150 ms OFF, 1(1)10 cycles OFF, 1(1)15 cycles 90(10)160 ppm DDD(R): DDI, DDIR; VDD(R): OFF, +5(5)+30 ppm 1(1)30 min	9 J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDI[R]; VVI if VVI[R], OFF 7.5 V 15.5 w 30[5]100[10]160 ppn fixed: 50[10]350 ms F VDI, VDIR
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [upper tracking rate Mode Switching Change basic rate during MS Post mode switch duration PVARP all PVARP all PVARP all PVARP after VES PMT protection	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1(1)16(2)30 2sh shock: 2(1)16(2)30 3sh to nsh shock: 30 J OFF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, DDIR, VDDR, AAIR, VVIR, 0FF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30(5)100(10)160 ppm OFF, 5(-15)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplus, 0FF, 1(1)10 cycles OFF, 1(1)	9 J J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRR]; VVI if VVIIR], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation (per Zone) Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricle) Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV repetitive hysteresis [negative] AV repetitive hysteresis [negative] AV repetitive hysteresis [upper tracking rate Mode Switching Change basic rate during MS Post mode switch duration PVARP all PVARP all PVARP all PVARP after VES PMT protection	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2st shock: 2(1)16(2)30 2st shock: 3(1)16(2)30 0FF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VII, DDDR, DDIR, VDDR, VDIR, AAIR, VIIR, 0FF 0.2(0.1)62, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30(5)100(10)160 ppm OFF, 5(-5)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplus, OF 10(10)150 ms OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)150 ppm DDIR(1: DDI, DDIR; VDDIR): OFF, +5(5)+30 ppm OFF, +5(5)+30 ppm 1(1)30 min AUTO, 175(25)600 ms PVARP +225 ms (max. 600 m	9 J J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRR]; VVI if VVIIR], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude (atrium/ventricte) Pulse width (atrium/ventricte) Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis [uper live] AV repetitive hysteresis [uper live] AV and sharp sha	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1(1)16(2)30 2sh shock: 2(1)16(2)30 3sh to nsh shock: 30 J OFF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, DDIR, VDDR, AAIR, VVIR, 0FF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30(5)100(10)160 ppm OFF, 5(-15)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplus, 0FF, 1(1)10 cycles OFF, 1(1)	9 J J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRR]; VV if VVIRR, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricte] Pulse width [atrium/ventricte] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV repetitive hysteresis [positive] AV repetitive hysteresis [ugative] AV repetitive hysteresis [ugative] AV AV repetitive hy	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1sh shock: 1(1)16(2)30 2sh shock: 2(1)16(2)30 3sh to nsh shock: 30 J OFF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDDR, DDIR, VDDR, DDIR, VDDR, DDIR, VDDR, AAIR, VVIR, 0FF 0.2(0.1)6.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30(5)100(10)160 ppm OFF, 5(-15)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSplus, 0FF, 1(1)10 cycles OFF, 1(1)	9 J J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRR]; VVI if VVIIR], OFF 7.5 V 1.5 ms 30[5]100[10]160 ppn OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity [per Zone] Energy Confirmation [per Zone] Post-shock duration Pacing parameters Mode Pulse amplitude [atrium/ventricle] Pulse width [atrium/ventricle] Basic rate Rate hysteresis Repetitive/scan hysteresis AV delay AV hysteresis mode AV hysteresis [positive] AV repetitive hysteresis [negative] AV repetitive hysteresis [upper tracking rate Mode Switching Change basic rate during MS Post mode switch rate Post mode switch duration PVARP after VES PMT protection Sensor IRSpins	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1shock: 1(1)16(2)30 2shock: 2(1)16(2)30 3shock: 2(1)16(2)30 0FF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VVI, DDR, DDIR, VDDR, DDIR, VDDIR; DDIR, VDDI	9 J J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRR]; VV if VVIRR, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR
Cardioversion/defibrillation therapy Number of shocks Waveform Polarity (per Zone)	for VT zones: 0FF, 1(1)8; biphasic, biphasic 2 normal, reversed, alternatin 1st shock: 1(1)16(2)30 2st shock: 2(1)16(2)30 2st shock: 3(1)16(2)30 0FF, 0N OFF, 10(10)50 s; 1(1)11 Bradycardia DDD, DDI, VDD, VDI, AAI, VI, DDDR, DDIR, VDDR, VDIR, AAIR, VIR, 0FF 0.2(0, 116.2, 7.5 V 0.4; 0.5; 0.7; 1.0; 1.2; 5 ms 30(5)100(10)160 ppm OFF, 5(-1)90 ppm OFF, 1(1)15 cycles fixed, low, medium, high, individual fixed 15, 40(5)350 ms positive, negative, IRSp ^{bio} , 0F 10(10)150 ms OFF, 1(1)10 cycles OFF, 1(1)10 cycles OFF, 1(1)10 cycles 90(10)160 ppm DDD(R): DDI, DDIR, VDD(R): OFF, +5(5)+30 ppm 1(1)30 min AUTO, 175(25)600 ms PVARP +225 ms [max. 600 m OFF, 0N accelerometer, various progi	9 J J J J Dmin Post Shock DDI if DDD[R], DDI[R], AAI[R]; VDI if VDD[R], VDIRR]; VV if VVIRR, OFF 7.5 V 1.5 ms 30[5]100[10]160 ppm OFF, -5[-5]65 ppm fixed: 50[10]350 ms F VDI, VDIR

Lead connections		
Pacing/sensing	IS-1 bipolar (2×)	
Shock	DF-1 (2×)	
Diagnostic functions		
AT/AF rate	100(10)250 ppm	
IEGM Holter	3×32min	
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	66×55×12mm	
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) $^{\rm SI}$, atrial burden $^{\rm SI}$, mean VES/h $^{\rm SI}$
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm ³¹ , ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration ³² , ven. monitoring episode duration ³³ , 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
0.1	
Ordering information	255.277

Lumax 300 DR-T

- OFF cannot be programmed if SMART is active.
 PES: Programmed extrastimulus.
 PES: Programmed extrastimulus.
 PES: Programmed extrastimulus.
 PVARP: Post ventricular atrial refractory period.
 12.5 V/O.5 ms; 60 ppm; 7000; 4 max. energy shocks/year; 50% RA pacing; 15% RV pacing.
 programmable upper or lower limit.
 programmable upper and lower limit.



Lead (Active Fixation)

Tachyarrhythmia Therapy

Linox^{smart} SDX

Pentapolar ICD lead with active fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide $^{\circ}$ 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



Product	Fixation	Length	Dipole-to-tip distance	Order number
Linox ^{smart} S DX 65/15	retractable, electrically active screw	65 cm	15 cm	365 500
Linox ^{smart} S DX 65/17	retractable, electrically active screw	65 cm	17 cm	365 501



Linox^{smart} S DX

Connector		2×IS-1; DF-1		
Polarity		pentapolar		
Application		right ventricle		
Overall length		65cm		
		000111		
Tip electrode				
Surface area		4.5 mm ²		
Material		platinum/iridium		
Structure		iridium, fractal		
Fixation		retractable, electrically active screw		
Extension of screw				
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		
Tip to Ting distance				
Protek® shock coil				
Length • v	entricle	50 mm		
Diameter		2.6 mm (7.8 F)		
Surface area • v	entricle	290 mm ²		
Material		platinum/iridium		
Distance to tip • v	entricle	17 mm		
er er er er e				
Floating atrial dipole		2/ 5 2		
Surface area Material		24.5 mm² platinum/iridium		
Structure		iridium, fractal		
Distance to tip		1E0 /170 mm		
· · · · · · · · · · · · · · · · · · ·		150/170 mm		
· · · · · · · · · · · · · · · · · · ·		150/170 mm 15 mm		
Atrial dipole distance				
Atrial dipole distance Conductor				
Atrial dipole distance Conductor Construction		15mm		
Atrial dipole distance Conductor Construction Insulation		15mm wire coil, cable		
Atrial dipole distance Conductor Construction Insulation		15mm wire coil, cable silicone		
Distance to tip Atrial dipole distance Conductor Construction Insulation Structure Diameter Introducer		15mm wire coil, cable silicone Silglide® surface coating		
Atrial dipole distance Conductor Construction Insulation Structure Diameter Introducer		15mm wire coil, cable silicone Silglide® surface coating 2.6mm (7.8F)		
Atrial dipole distance Conductor Construction Insulation Structure Diameter		15mm wire coil, cable silicone Silglide® surface coating 2.6mm (7.8F)		



Cardiac Rhythm Management
Tachyarrhythmia Therapy
Lead (Active Fixation)

Linoxsmart 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

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



Linox^{smart} S

Technical data	
Connector	IS-1; DF-1
Polarity	tripolar
Application	right ventricle
Fixation	screw
Overall length	61; 65; 75 cm
Fixation helix	
Туре	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 (7.8F)
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	8F
Necommended introducer	01
Steroid	
Steroid type	dexamethasone acetate (DXA)
Steroid quantity	1 mg
	silicone rubber
Steroid bonding agent	
Ordering information	375 012
Ordering information Linox ^{mant} S60 Linox ^{mant} S65	375 012 369 818



Lead (Active Fixation)

Tachyarrhythmia Therapy

Linoxsmart SD

Quadrupolar ICD lead with active fixation

Product Highlights

Thin 7.8 F silicone lead body with Silglide $^{\circ}$ 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



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



Linoxsmart SD

Connector		IS-1; 2×DF-1
Polarity		quadrupolar
Application		right ventricle; vena cava superior
Overall length		60; 65; 75cm
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 comple	te ejection	max. 20
Steroid type		dexamethasone acetate (DXA)
Steroid quantity		1 mg
Steroid bonding agent		silicone rubber
Ring electrode		24.5 mm²
Surface area		
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distance		11 mm
Protek® shock coil		
Length • v	entricle	50 mm
= v	ena cava	70 mm
Diameter		2.6 mm (7.8 F)
Surface area • v	entricle	290 mm ²
= v	ena cava	410 mm ²
Material		platinum/iridium
Distance to tip • v	entricle	17 mm
= v	ena cava	160; 180 mm
Conductor		
Construction		wire coil, cable
Insulation		silicone
Structure		Silglide® surface coating
Diameter		2.6 mm (7.8F)
Introducer		8F
Ordering information		
■ Linox ^{smart} SD 60/16		359 065
■ Linoxsmart SD 65/16		359 066
		050015
Linox ^{smart} SD 65/18		359 067





Tachyarrhythmia Therapy

Lead (Active Fixation)

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

Product	Fixation	Length	Order number
Linox S 65	retractable screw	65 cm	351 333
Linox S 75	retractable screw	75 cm	351334





Linox S

Technical data Connector		IC 1 DE 1	
		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 scre	W	1.8 mm	
Revolutions until	complete ejection	max. 20	
Steroid type		dexamethasone acetate (DXA)	
Steroid quantity		1 mg	
Steroid bonding a	gent	silicone rubber	
Ring electrode			
Surface area		24.5 mm ²	
Material		platinum/iridium	
Structure		iridium, fractal	
Tip-to-ring distan	ce	11 mm	
D . 1.6 1 1	••		
Protek® shock co	■ ventricle	50mm	
Length Diameter	• ventricle	2 6 mm (7 8 F)	
		2.6 mm (7.8 F) 290 mm ²	
Surface area Material	ventricle ventricle	platinum/iridium	
		With the state of	
Distance to tip	■ ventricle	17 mm	
Conductor			
Construction		wire coil, cable	
Insulation		silicone	
Structure		Introtek®	
Diameter		2.6 mm (7.8 F)	
Introducer		8F	
01:::	tion		
	uon		
 Ordering informa Linox S 65 		351 333	



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



Product	Fixation	Length	Proximal coil-to-tip distance	Order number
Linox SD 65/16	retractable screw	65 cm	16 cm	350 053
Linox SD 65/18	retractable screw	65 cm	18 cm	350 054
Linox SD 75/16	retractable screw	75 cm	16 cm	350 055
Linox SD 75/18	retractable screw	75 cm	18 cm	350 056



Linox SD

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 mm²
Material		platinum/iridium
Structure Fixation		iridium, fractal
Extension of scre		retractable, electrically active screw 1.8 mm
		max. 20
	complete ejection	max. 20 dexamethasone acetate (DXA)
Steroid type		
Steroid quantity	annt	1 mg silicone rubber
Steroid bonding a	igent	Sucone fubber
Ring electrode		
Surface area		24.5 mm ²
Material		platinum/iridium
Structure		iridium, fractal
Tip-to-ring distar	nce	11 mm
Protek® shock co	oil	
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		8F
Ordering informa	ation	
 Linox SD 65/16 		350 053
 Linox SD 65/18 		350 054
 Linox SD 75/16 		350 055
 Linox SD 75/18 		350 056



Linoxsmart 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

Product	Fixation	Length	Order number
Linox ^{smart} T65	4 tines	65 cm	369820





Linox^{smart} T

Connector	IS-1: DF-1
Polarity	tripolar
Application	right ventricle
Fixation	4 tines
Overall length	65cm
Overatt terigiri	63(11)
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 mm²
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	8F
Ordering information	
Linox ^{smart} T 65	369 820



Tachyarrhythmia Therapy

Lead (Passive Fixation)

Linoxsmart 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



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	359075





Linox^{smart} TD

Technical data			
Connector		IS-1; 2×DF-1	
Polarity		quadrupolar	
Application		right ventricle; vena cava superior	
Overall length		65; 75 cm	
Tip electrode		4.0 2	
Surface area		1.8 mm²	
Material		platinum/iridium	
Structure		iridium, fractal	
Fixation		passive with 4 tines	
Steroid type		dexamethasone acetate (DXA)	
Steroid quantity		0.75 mg	
Steroid bonding ag	gent	silicone rubber	
Ring electrode			
Surface area		24.5 mm ²	
Material		platinum/iridium	
Structure		iridium, fractal	
Tip-to-ring distant	ce	9 mm	
Protek® shock coi	l		
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		8F	
oddeel			
Ordering informat	tion		
■ Linox ^{smart} TD 65/	16	359 073	
■ Linox ^{smart} TD 65/	18	359 074	
■ Linox ^{smart} TD 75/		359 075	



Linox T

Tripolar ICD lead with passive fixation

Product Highlights

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

 $\mathsf{Protek}^{\circledast}$ 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

Product	Fixation	Length	Order number
Linox T 65	4 tines	65 cm	351353
Linox T 75	4 tines	75 cm	351354



Linox T

Connector		IS-1; DF-1
COMMECTOR		<u> </u>
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 distant	ce	9 mm
Protek® shock coi	=	50
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		8F
Ordering informat	tion	
■ Linox T 65		351353
- LITTON T UJ		351354



Tachyarrhythmia Therapy

Lead (Passive Fixation)

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

Product	Fixation	Length	Order number
Linox TD 65/16	4 tines	65 cm	351337
Linox TD 65/18	4 tines	65 cm	351338
Linox TD 75/16	4 tines	75 cm	351339
Linox TD 75/18	4 tines	75 cm	351340



Linox TD

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 distan	ce	9 mm		
Protek® shock co		F0		
Length	Ventricle Vena cava	50 mm 70 mm		
Diameter	■ Vena cava ■ Ventricle	2.6 mm (7.8 F)		
Diameter	Ventricte Vena cava	2.6 mm (7.8F)	_	
Surface area	Vena cava Ventricle	2.6 mm (7.8F) 290 mm ²	_	
Surrace area	Ventricte Vena cava	410 mm ²		
Material	Vena cava Ventricle	· · · · · · · · · · · · · · · · · · ·		
Material		platinum/iridium		
Di-t	■ Vena cava	platinum/iridium		
Distance to tip	■ Ventricle	15mm		
	■ Vena cava	160; 180 mm		
Conductor				
Construction		wire coil, cable		
Insulation		silicone		
Structure		Introtek®		
Diameter		2.6 mm (7.8 F)		
Introducer		8F		
Ordering informa	tion			
Linox TD 65/16		351337		
■ Linox TD 65/18		351 338		
		351339		
 Linox TD 75/16 				



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

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





Kentrox A+ Steroid

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 mm²
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	16mm
'	
Conductor	
Construction	wire coil, cable
Insulation	silicone
Diameter	3.1 mm (9.3 F)
Introducer	10F
Ordering information	
■ Kentrox A+ 75/15 Steroid	345 633
■ Kentrox A+ 75/17 Steroid	345 634





Lead (Vena Cava Superior)

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

Product	Fixation	Length	Order number
Kainox VCS 60	none	60 cm	124325





Kainox VCS

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	



Cardiac Resynchronization Therapy

Three-Chamber Pacemaker

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

Model	Weight	Order number
Stratos LV-T uncoated	30 g	338 202
Stratos LV-T coated	30 g	338 203



Technical Data

Stratos LV-T	00000
NBG Code 11 Mode	DDDRV
Mode	<pre>DDD(R); DDT(R); DDT(R)/A; DDI(R)/T; DVI(R); DVT(R); D00(R); VDD(R); VDT(R); VDI(R); VVI(R); VVT(R); V00(R); AAI(R); AAT(R); A00(R); OFF</pre>
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) Polarity sense (A/RV/LV4)	unipolar; bipolar (3 separate channels) unipolar; bipolar
AV delay	15(5)300; dynamic
Dynamic AV delay	OFF; 15(15) 150 (5)300 ms at lower rate;
Dynamic / W detay	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 ; 10100 ms
VV delay after sense	0; 5 ; 10/2010100 ms temporary
D ()	
Refractory periods	AUTO OOF (OF) BBF
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	0FF; 0N
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 Preventive overdrive pacing	OFF; 200 ppm OFF; ON
Preventive overdrive pacing 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 Post AES pacing	5(5)25(5)50 %
Post AES pacing	OFF ; ON 5(5) 20 (5)40 ppm
AES step size Sensor	
	accelerometer 80 (5) 120 (5) 180 ppm
Max. sensor rate Sensor gain	80[5] 120 [5]180 ppm
Sensor gain Sensor threshold	automatic, 1440, programmable in 32 steps 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	0FF; ON
Automatic lead check	OFF; ON (3 separate channels)
Magnet effect	automatic (10 cycles asynchronous with 90 ppm, thereafter basic rate synchronous); asynchronous;
Replacement indication	synchronous 80 ppm magnet rate
	50 ppm magnerrate
Holter IEGM recording	OFF 2 (4) 24 (FOL)
AF recording	0FF; 3(1)31 IEGMs
AF detection rate	100(10)400 ppm
AF resolution rate	100(10)400 ppm
Mode switching recording	0FF; 3(1)31 IEGMs
VT recording	OFF; 3[1]31 IEGMs
Ventricular detection rate	OFF; 100(10)250 ppm
Patient triggered recording	0FF; 3[1]31 IEGMs
Recording before event	0(10) 80 %
Recording at termination	0FF; 0N
Battery ⁵	1.3 Ah, Li/l
Longevity ⁶	7.5 years
X-ray identification Dimensions/volume/mass	SV 55 :: 50 :: 4 mm/1/ cm ³ /20 c
LILLIPUSIONS/VOLLIMA/Macc	55 × 50 × 6 mm/14 cm³/30 g
Lead connection	IS-1

Home Monitoring

atrial sensing (%), delivered CRT ventricular pacing (%), mean ventricular heart rate (bpm), 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/24 h (%) heart rate during Mode Switching, ventricular episodes, run counter, PMT detection AV synchrony (%), pacing statistics pacing impedance in atrium and ventricle (0), date of measurement battery status (DK, ERI), battery impedance (k0) battery voltage (VI, date of measurement ERI (fixed) 0.1; 0.3; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 4 200, 250, 300, 350, 500 0 or
run counter, PMT detection AV synchrony (%), pacing statistics pacing impedance in atrium and ventricle (Ω), date of measurement battery status (DK, ERI), battery impedance (kΩ) battery voltage (V), date of measurement ERI (fixed) 0.1; 0.3; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV v. 200, 250, 300, 350, 500 Ω or
pacing impedance in atrium and ventricle {\Omega}, date of measurement battery status {\OK, ERI}, battery impedance {k\Omega} battery voltage {VI, date of measurement} ERI {fixed} 0.1; 0.3; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 4.200, 250, 300, 350, 500 Omega or control of the status of the statu
measurement battery status (DK, ERI), battery impedance (k0) battery voltage (VI, date of measurement ERI (fixed) 0.1; 0.3; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 4.200, 250, 300, 350, 500 0 or
voltage (V), date of measurement ERI (fixed) 0.1; 0.3; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 mV < 200, 250, 300, 350, 500 0 or
0.1; 0.3; 0.5 ; 1.0; 1.5; 2.0; 2.5; 3.0 mV 0.5; 1.0; 1.5 ; 2.0; 2.5; 3.0 mV < 200, 25 0, 300, 350, 500 Ω or
0.1; 0.3; 0.5 ; 1.0; 1.5; 2.0; 2.5; 3.0 mV 0.5; 1.0; 1.5 ; 2.0; 2.5; 3.0 mV < 200, 25 0, 300, 350, 500 Ω or
0.5; 1.0; 1.5 ; 2.0; 2.5; 3.0 mV < 200, 250 , 300, 350, 500 Ω or
0.5; 1.0; 1.5 ; 2.0; 2.5; 3.0 mV < 200, 250 , 300, 350, 500 Ω or
> 1000, 1500 , 2000, 2500, 3000 Ω
ventricular episode (> 8 consec. VES), ventricular run (48 consec. VES), PMT detected, patient message (if activated via the programmer)
50[10]80, 85, 90 , 95 %
70, 80, 90 [10]120 ppm
> 10, 50 , 100, 250
ON, OFF
ON, OFF
10% (2.5h), 25% (6h), 50% (12h), 75% (18h)
once every 24 hours
after a triggered event
after magnet application by the patient (if activated via the programmer)
ON, OFF
ON, OFF
ON, OFF
00:00 23:00 23:59
00:008:0023:59
4 h (fixed)
403 MHz
< 25 μW
338 202 338 203

- 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 identicat to RV (only for IEGM).
 5] Nominal data of the battery manufacturer.
 6] DDDBN, 100% ventricle pacing [2.4 V/0.4 ms, 70 ppm, 750 \, 01), 100% LV pacing [3.6 \, V/0.4 ms, 70 ppm, 750 \, 01).
 7] Triggered event types are to be programmed in the Home Monitoring Service Center.

Default settings are printed in bold.



Cardiac Rhythm Management
Cardiac Resynchronization Therapy

Three-Chamber ICD

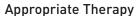
Lumax 540 HF-T

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.



- 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.



- 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.

Model	Volume	Thickness	Connectors	Order number
Lumax 540 HF-T	39 cm³	13 mm	IS-1 (3×)	360347
			DF-1 (2×)	





Lumax 540 HF-T

Arrhythmia detection Rhythm classes		hradycan	dic physiologic VT-1 VT-2 VE		
Sensitivity (RA/RV/LV)		bradycardic, physiologic, VT-1, VT-2, VF automatic sensitivity adjustment			
Selisitivity (RA/RV/LV)		automatic sensitivity aujustment			
VT detection and redete	ection				
Criteria		number of intervals, onset, stability, SMART, persistent VT			
VT interval			(10)600 ms for VT-1; (10)500 ms for VT-2		
Number of VT intervals and redetection	for detection	detection: 10[2]60 for VT-1; 10[2]40 for VT-2 redetection: 10[2]30		40 for VT-2	
Onset		OFF ^{1]} , 4[4]32%; with SMART: 20%			
Stability		OFF 11, ±8	(4)±48ms; with SMART: ±1	2 %	
Sustained VT		OFF, 0.5,	1.0, 2.0, 3.0, 5(5)30 min		
SMART detection, redet	ection	OFF, ON			
VF detection and redete	ection				
VF interval		OFF, 200	(10)400 ms		
Criterion		X out of Y			
Detection counter of VF	intervals		out of 8[1]31		
Termination detection		40			
Number of intervals for	termination		16 intervals slower than VT-1		
Forced termination	0FF, 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: 7	0(5)95%	
S1 decrement		5(5)40 ms			
S1-S2 interval			absolute: 200[10]500 ms; adaptive: 70[5]95 %		
Scan decrement		OFF, 5(
Min. ATP interval		200(5)	300 ms		
ATP optimization		OFF, ON			
ATP One Shot®					
ATP type		OFF, burs	st, ramp, burst + PES ²⁾		
Stability criterion		12%			
ATP attempts		1			
Number S1		1[1]10			
Cardioversion/defibrill	ation therany				
Number of shocks	anon therapy	for VT zor	nes: OFF, 1(1)8; for VF zone	· 6 [1] 8	
Waveform			biphasic 2		
		eversed, alternating			
Shock path			$C + Can, RV \rightarrow Can, RV \rightarrow SVC$:	
Energy 1st shock: 1(1)16		: 1[1]16[2]40 J; : 2[1]16[2]40 J;			
Confirmation (per Zone)		OFF, ON			
Post-shock duration			(10)50 s; 1(1)10 min		
Pacing parameters	Bradycardia		Post Shock	Tachycardia (ATI	
Mode	DDD, DDI, VDD, VD VVI, DDDR, DDIR, V		DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R);	V00	

Pacing parameters	Bradycardia		Post Shock	Tachycardia (ATP)	
Mode	DDD, DDI, VDI VVI, DDDR, DD VDIR, AAIR, VV	IR, VDDR,	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	V00	
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)65ppm		
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 m		ns		
Initially paced chamber RV, LV					
LV polarity pace	polarity pace LV -Tip \Rightarrow LV - LV -Ring \Rightarrow R		-Ring, LV-Tip → RV-Ring, LV-R RV-Ring	ng → LV-Tip,	
LV polarity sense		unipolar, bip	olar		
AV hysteresis mode		positive, neg	ative, OFF		
AV hysteresis		10(10)150)ms		
AV repetitive hysteres	sis (positive)	OFF, 1[1]	10 cycles		
AV repetitive hysteres	sis (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 du	ring MS	OFF, +5(5)+30 ppm			
Post mode switch rat	e	OFF, +5(5).	OFF, +5(5)+50 ppm		
Post mode switch duration		1(1)30 min			
PVARP ^{3]}		AUTO, 175	AUTO, 175(25)600 ms		
PVARP after VES		PVARP + 225	PVARP + 225 ms (max. 600 ms)		
PMT protection		OFF, ON			
Sensor		accelerometer, various programmable parameters			

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	
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 messa received
Leads	sensing amplitude [RA, RV, LV] ⁵¹ , pacing impedance [RA, RV, LV] ⁶¹ , shock impedance (painless, at last shock), RV/ LV pacing threshold ⁷¹
Arrhythmias	atrial arrhythmia detected (ongoing, monitor, SVT), ventricu arrhythmia detected (VT-1, VT-2, VF), ineffective max. energ shock
Heart Failure Monitor®	percentage of CRT pacing, mean heart rate [24 h, at rest] ^{SI} , atrial burden ^{SI} , mean VES/h ^{SI}
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm ^{SI} , ven. episode with fulfilled AT time-out criterion, ven. therapy episode duration ^{SI} , ven. monitoring episode duration ^{SI} , periodic IEGM received
Programmer settings	OFF ON
Home Monitoring Time of data transmission	0FF, 0N 00:00-23:59
Time of data transmission	00:00-23:37
IEGM-Online HD®	
IEGM for therapy episodes	OFF, ON
IEGM for monitoring episodes	OFF, ON
Periodic IEGM	OFF, 1, 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
311	·
Ordering information	
Lumax 540 HF-T	360347

- 4) RA/RV 2.5V/0.4ms; LV 4.8 V/0.4ms; 60 ppm; 7000; 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.



Cardiac Rhythm Management

Cardiac Resynchronization Therapy

Three-Chamber ICD

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.

Model	Volume	Thickness	Connectors	Order number
Lumax 500 HF-T	39 cm³	13 mm	IS-1 (3×)	360 342
			DF-1 (2×)	





Lumax 500 HF-T

Technical Data

Rhythm classes		bradycardic, physiologic, VT-1, VT-2, VF		
Sensitivity (RA/RV/LV)		automatic sensitivity adjustment		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		, , , , , , , , , , , , , , , , , , ,		
VT detection and rede	etection			
Criteria		number of intervals, onset, stability, SM	ART, persistent VT	
VT interval		OFF, 270(10)600 ms for VT-1; OFF, 27 VT-2	70(10)500 ms for	
Number of VT interval and redetection	ls for detection	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: ±1:	2 %	
Sustained VT		OFF, 0.5, 1.0, 2.0, 3.0, 5(5)30 min		
SMART detection, red	etection	OFF, ON		
VF detection and rede	atection			
VF interval	2.000.011	OFF, 200(10)400 ms		
Criterion		X out of Y		
Detection counter of \	/E intervals	6[1]30 out of 8[1]31		
Detection counter or v	/F IIItel Vats	6[1]30 001 01 6[1]31		
Termination detection	n			
Number of intervals f	or termination	12 out of 16 intervals slower than VT-1		
Forced termination		OFF, 1(1)15 min		
Tachycardia therapy				
		burst, ramp, burst + PES2)		
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	1 (5) 95%	
Scan decrement		OFF, 5(5)40 ms	J(J)7070	
Min. ATP interval		200(5)300 ms		
ATP optimization		0FF, 0N		
ATF OPUITIZATION		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/defibri	llation therapy			
Number of shocks		for VT zones: OFF, 1(1)8; for VF zone: 6(1)8		
Waveform		biphasic, biphasic 2		
Polarity (per Zone) norr		normal, reversed, alternating		
		$RV \rightarrow SVC + Can, RV \rightarrow Can, RV \rightarrow SVC$		
Energy	1st shock: 1[1]16[2]30 J; 2nd shock: 2[1]16[2]30 J; 3nd to nth shock: 30 J			
Confirmation (per Zor	nel	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, VD	I, AAI, DDI if DDD(R), DDI(R),	V00	

Pacing parameters	Bradycardia		Post Shock	Tachycardia (ATP
Mode	DDD, DDI, VDD, VDI, VVI, DDDR, DDIR, VD VDIR, AAIR, VVIR, OF	DDR,	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	V00
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 + RVE	S	OFF, RVs, RVs + RVES	
Max. trigger rate	AUTO, 90(10)160	ppm		
Basic rate	30(5)100(10)1	60 ppm	30(5)100(10)160 ppm	
Rate hysteresis	OFF, -5(-5)90 pp	m	OFF, -5(-5)65 ppm	
Repetitive/ scan hysteresis	OFF, 1(1)15 cycle	S		
AV delay	fixed, low, medium, high, individual fixed 15, 40(5)350 ms		fixed: 50(10)350 ms	
VV delay after Vp 0(0(5)10	00 ms	
Initially paced chamber		RV, LV		
LV polarity pace			LV-Ring, LV-Tip \rightarrow RV-Ring, L' \rightarrow RV-Ring	V-Ring → LV-Tip,
LV polarity sense		unipolar,	bipolar	
AV hysteresis mode		positive,	negative, OFF	
■ AV hysteresis		10(10)	.150 ms	
AV repetitive hysteres	sis (positive)	OFF, 1(1)10 cycles	
AV repetitive hysteres	sis (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 du	iring 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]}			5(25)600 ms	
PVARP after VES		PVARP + 225 ms (max. 600 ms)		
PMT protection		OFF, ON		
Sensor		accelerometer, various programmable parameters		

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	66×59×12mm
Volume/weight	37 cm ³ /83 g
Material	titanium
Energy source	3.2 V, 1720 mAh
Longevity	6.6 years ⁴⁾

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 mes- sage received
Leads	sensing amplitude (RA, RV, LV) ^{SI} , pacing impedance (RA, RV, LV) ^{SI} , shock impedance (painless, at last shock), RV/LV pacing threshold ^{7I}
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) ⁵¹ atrial burden ⁵³ , mean VES/h ⁵³
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm ^{s1} , ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration ^{s1} , ven. monitoring episode duration ^{s1} , 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

- | 1 OFF cannot be programmed if SMART is active.
 | 2 PES: Programmed extrastimulus.
 | 3 PVARP: Post ventricular atrial refractory period.
 | 4 RA/RY 2.5V/0.4ms; LV 4.8 V/0.4ms; 60 ppm; 7000; 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.



Cardiac Rhythm Management

Cardiac Resynchronization Therapy

Three-Chamber ICD

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.

Model	Volume	Thickness	Connectors	Order number
Lumax 340 HF-T	$39\mathrm{cm}^3$	13 mm	IS-1 (3×)	355 263
			DF-1 (2×)	





Lumax 340 HF-T

Technical Data

Arrhythmia detection Rhythm classes		bradycardic, physiologic, VT-1, VT-2, VF			
Ventricular sensitivity (RV/I VI	automatic sensitivity adjustment			
Atrial sensitivity	(V/LV)	automatic sensitivity adjustment			
7 till de Serisitivity		adomatic Sensitivity adjustment			
VT detection and redet	ection				
Criteria		number of intervals, onset, stability, SM	ART, persistent VT		
VT interval		OFF, 270(10)600 ms for VT-1 OFF, 270(10)500 ms for VT-2			
Number of VT intervals and redetection	for detection	detection: 10(2)60 for VT-1; 10(2) redetection: 10(2)30	40 for VT-2		
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, redet	ection	OFF, ON			
WE data the state of the state					
VF detection and redet VF interval	ection	OFF, 200(10)400 ms			
Criterion		X out of Y			
Detection counter of VF	intorvale	6(1)30 out of 8(1)31			
Detection counter of VE	mervats	0[1]30 001 01 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 thorany					
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: 7	0 [5] 95%		
S1 decrement		5(5)40 ms			
S1-S2 interval		absolute: 200(10)500 ms; adaptive: 7	0 [5] 95%		
Scan decrement		OFF, 5(5)40 ms	(-,		
Min. ATP interval		200(5)300 ms			
ATP optimisation		OFF, ON			
ATP type		OFF, burst, ramp, burst + PES ²			
Stability criterion		12%			
ATP attempts		1			
Number S1		1(1)10			
Cardioversion/defibrill	ation 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			
Davis a server at	Dan dunandia	Deat Charle	Tankanadia (ATE		
Pacing parameters Mode	DDD, DDI, VDD, VI	Post Shock DI, AAI, DDI if DDD(R), DDI(R),	Tachycardia (ATP VOO		
	VVI, DDDR, DDIR, VDIR, AAIR, VVIR,	VDDR, AAI(R); VDI if VDD(R),	.00		
Pulse amplitude	0.2[0.1]6.2, 7.5		7.5 V		

Pacing parameters	Bradycardia		Post Shock	Tachycardia (ATP)
Mode	DDD, DDI, VDD, VE VVI, DDDR, DDIR, V VDIR, AAIR, VVIR, I	VDDR,	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	V00
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 + RV	/ES	OFF, RVs, RVs + RVES	
Max. trigger rate	AUTO, 90[10]16	0 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)65ppm	
Repetitive/ scan hysteresis	OFF, 1(1)15 cyc	les		
AV delay	fixed, low, medium, high, individual fixed 15, 40(10)350 ms 0(5)100 ms		fixed: 50(10)350 ms	
VV delay after Vp				
Initially paced chamber	RV, LV			
LV polarity pace			LV-Ring, LV-Tip → RV-Ring, → RV-Ring	LV-Ring \rightarrow LV-Tip,
LV polarity sense		unipolar,	bipolar	
AV hysteresis mode		positive, r	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 MS	OFF, +5(5)+30 ppm		
Post mode switch rate		OFF, +5(5)+50 ppm		
Post mode switch durati	on	1[1]30	Imin	
PVARP ³⁾		AUT0. 17	5(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 x)	
Diagnostic functions		
AT/AF Rate	100(10)250 ppm	
IEGM Holter	3×32min	
LV sensing	OFF, Standard	
Channels	atrium, right ventricle, left ventricle (if LV sensing is enabl	
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

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 mes- sage received
Leads	sensing amplitude (RA, RV, LV) ^{S)} , pacing impedance (RA, RV,LV) ^{S)} , shock impedance (painless, at last shock) ^{S)}
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] $^{\rm 5l}$, atrial burden $^{\rm 5l}$, mean VES/h $^{\rm 5l}$
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm ⁸¹ , ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration ⁸¹ , ven. monitoring episode duration ⁸¹ , 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	355 263

- OFF cannot be programmed if SMART is active.
 PSS: Programmed extrastimulus.
 PVARP: Post ventricular atrial refractory period.
 DDD-BN; 60 ppm; RAPV 2.4 V/0.5ms; LV 4.8 V/0.5ms; 700 Ω; stimulation: RA 15%, RV/LV 100%; quarterly shocks; Home Monitoring DN and diagnostics ON.
 Programmable upper or lower limit.



Cardiac Rhythm Management
Cardiac Resynchronization Therapy

Three-Chamber ICD

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.

Model	Volume	Thickness	Connectors	Order number
Lumax 300 HF-T	$37\mathrm{cm}^3$	12 mm	IS-1 (3×)	355 262
			DF-1 (2×)	





Lumax 300 HF-T

Technical Data

Arrhythmia detection Rhythm classes		hradycar	dic, physiologic, VT-1, VT-2, V	F
	1//11/1			г
Ventricular sensitivity (RV/LV) Atrial sensitivity			ic sensitivity adjustment ic sensitivity adjustment	
Attriat Sensitivity		automati	ic sensitivity adjustinent	
VT detection and redete	ction			
Criteria		number	of intervals, onset, stability, S	MART, persistent VT
VT interval			(10)600 ms for VT-1 (10)500 ms for VT-2	
			n: 10(2)60 for VT-1; 10(2).	40 for VT-2
and redetection			ion: 10(2)30	
Onset			.(4)32 % with SMART: 20 %	100/
Stability Sustained VT			3(4)±48 ms with SMART: ± , 1, 2, 3, 5(5)30 min	12%
SMART detection, redete	ection	0FF, 0N	1, 2, 3, 3[3]3011111	
on attraction, reacte	CHOT	011,011		
VF detection and redete	ection			
VF Interval			(10)400 ms	
Criterion		X out of \		
Detection counter of VF	intervals	6[1]30	0 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, ra	mp, burst + PES ²⁾	
Attempts		OFF; 1(
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			5)40 ms	
Min. ATP interval		200(5)	.300 ms	
ATP optimisation		OFF, ON		
ATP One Shot®				
ATP type		OFF bur	st, ramp, burst + PES ²⁾	
Stability criterion		12%	5t, ramp, bar5t - 1 E5	
ATP attempts		1		
Number S1		1[1]10)	
Cardioversion/defibrilla	ation therapy	for VT.	nos. 0. (1) 0. 6VE /	(1) 0
Number of shocks Waveform			nes: 0(1)8; for VF zone: 6 , biphasic 2	.(1)0
Polarity (per Zone)			reversed, alternating	
Energy			: 1(1)16(2)30 J	
z.i.c. gy		2 nd shock	k: 2(1)16(2)30 J shock: 30 J	
Confirmation (per Zone)		OFF, ON		
Post-shock duration			.(10)50 s; 1(1)10 min	
Pacing parameters	Bradycardia		Post Shock	Tachycardia (ATP
Mode	DDD, DDI, VDD, V	DI, AAI,	DDI if DDD(R), DDI(R),	VOO
	VVI, DDDR, DDIR, VDIR, AAIR, VVIR,	VDDR,	AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	
		V	7.5 V	7.5 V
	0.2[0.1]6.2, 7.5			
(atrium, RV, LV) Pulse width	0.2(0.1)6.2, 7.5		1.5 ms	1.5 ms
(atrium, RV, LV)	0.4, 0.5, 0.7, 1.0, 1.			
(atrium, RV, LV) Pulse width (atrium, RV, LV) Ventricular pacing			1.5 ms RV, BiV OFF, ON	1.5 ms RV, LV, BiV
(atrium, RV, LV) Pulse width (atrium, RV, LV) Ventricular pacing LV T-Wave protection	0.4, 0.5, 0.7, 1.0, 1. RV, LV, BiV	2, 1.5 ms	RV, BiV	
(atrium, RV, LV) Pulse width (atrium, RV, LV) Ventricular pacing	0.4, 0.5, 0.7, 1.0, 1. RV, LV, BiV OFF, ON	.2, 1.5 ms	RV, BiV OFF, ON	

Pacing parameters	Bradycardia		Post Shock	Tachycardia (ATP)
Mode	DDD, DDI, VDD, VE VVI, DDDR, DDIR, VDIR, AAIR, VVIR,	VDDR,	DDI if DDD(R), DDI(R), AAI(R); VDI if VDD(R), VDI(R); VVI if VVI(R), OFF	V00
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 + R	VES	OFF, RVs, RVs + RVES	
Max. Trigger rate	AUTO, 90[10]16	0 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 cyc	les		
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-Ring, LV-Tip \rightarrow RV-Ring \rightarrow RV-Ring	, LV-Ring $ ightarrow$ LV-Tip,
LV polarity sense		unipolar,	bipolar	
AV hysteresis mode		positive, r	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 cy	cles
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 durati	on	1[1]30	min	
PVARP3)		AUT0, 17	5(25)600 ms	
PVARP after VES		PVARP +	225 ms (max. 600 ms)	
PMT protection		OFF, ON		
Sensor		acceleror	neter, various programmabl	e 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

titanium 3.2 V, 1720 mAh

6.7 years^{4]}

Home Monitoring

Material

Energy source Longevity

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
F	
Event types Implant	device status hattanustatus programmas triggered mas
Implant	device status, battery status, programmer-triggered mes- sage received
Leads	sensing amplitude (RA, RV, LV) ^{SI} , pacing impedance (RA, RV,LV) ^{SI} , shock impedance (painless, at last shock) ^{SI}
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] ⁵¹ , atrial burden ⁵¹ , mean VES/h ⁵¹
Episodes	ven. episode with two or more started shocks, ven. episode with acceleration of ventricular rhythm, ven. episode with acceleration of atrial rhythm ² , ven. episode with fulfilled ATP time-out criterion, ven. therapy episode duration ³ , ven monitoring episode duration ³ , periodic IEGM recodoit IEGM recodoit
Test report	triggered manually via programmer
Programmer settings	
Home Monitoring	OFF, ON
Time of data transmission	00:00-23:59
IEGM-Online HD®	
.==:: =::::::::::::::::::::::::::::::::	OFF ON
IEGM for therapy episodes IEGM for monitoring episodes	OFF, ON OFF, ON
Periodic IFGM	0FF, 0N 0FF, 2, 3, 4, 6 months
Ongoing atrial episodes	OFF, 2, 3, 4, 6 HORRIS OFF, 0.5, 6, 12, 18 h
ongoing attract episodes	5. 1 , 5.5, 0, 12, 10 11
Technical data	
Transmitter frequency	403 MHz
Transmitting power	< 25 μW

Ordering information Lumax 300 HF-T

- 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/0.5ms; LV 4.8 V/0.5ms; 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.





Cardiac Rhythm Management

Cardiac Resynchronization Therapy

Lead

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Corox OTW BP

Bipolar LV lead for Cardiac Resynchronization Therapy

Product Highlights

Thin $5.4\,\mathrm{F}$ silicone lead body with polyurethane coating compatible with $7\,\mathrm{F}$ 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



Product	Fixation	Length	Order number
Corox OTW 75-BP	progressive helix	77 cm	354805
Corox OTW 85-BP	progressive helix	87 cm	354807



Corox OTW BP

Technical data	10.4	
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	
oteroid boriding agent	Sideone rabber	
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	0.08Ω/cm	
Connector material	stainless steel	
Stylets included (can be ordered sep	arately)	
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	7F	
Recommended introducer	ScoutPro ACS	
Applicable guide wire		
Guide wire	0.014" (0.36 mm)	
Recommended guide wire	VisionWire	
01::/		
Ordering information	05.005	
Corox OTW 75-BP	354 805	
Corox OTW 85-BP	354807	



Cardiac Rhythm Management
Cardiac Resynchronization Therapy
Lead

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Corox OTW-S BP

Bipolar LV lead for Cardiac Resynchronization Therapy

Product Highlights

Thin $5.4\,\text{F}$ silicone lead body with polyurethane coating compatible with $7\,\text{F}$ 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



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



Corox OTW-S BP

Connector	IS-1
Polarity	bipolar
Overall length	77; 87 cm
Fip 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
_ength of silicone screw	18mm
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	18mm
·	
Conductor	
nsulation	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 sep	
S 75-K OTW (green; medium)	346 978
5 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	7F
Recommended introducer	ScoutPro ACS
Applicable guide wire	
Guide wire	0.014" (0.36 mm)
Recommended guide wire	VisionWire
Ordering information	2FF 1/0
Corox OTW-S 75-BP Corox OTW-S 85-BP	355 148 355 149



Cardiac Rhythm Management
Cardiac Resynchronization Therapy
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Corox OTW-L BP

Left ventricular lead for Cardiac Resynchronization Therapy

Product Highlights

Thin $5.4\,\text{F}$ silicone lead body with polyurethane coating compatible with $7\,\text{F}$ 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



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



Corox OTW-L BP

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	02	
Surface area	8 mm²	
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 sep		
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 or Streamer	
0.1		
Ordering information	0/00/5	
Corox OTW-L 75-BP	368345	
Corox OTW-L 85-BP	368346	

ardiac Rhythm Management
ardiac Resynchronization Therapy
.ead

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



Product	Fixation	Length	Order number
Corox OTW 75-UP Steroid	progressive helix	77 cm	346 542
Corox OTW 85-UP Steroid	progressive helix	87 cm	346 543



Corox OTW UP

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 sep	
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
neconinciaca introducer	50500.70 A05
Applicable guide wire	
Guide wire	0.014" (0.36 mm)
Recommended guide wire	VisionWire
Ordering information	
Corox 0TW 75-UP Steroid	346 542
Corox OTW 85-UP Steroid	346 543



Cardiac Rhythm Management
Cardiac Resynchronization Therapy
Lead Delivery System

ScoutPro ACS

Coronary sinus lead delivery system*

Product Highlights

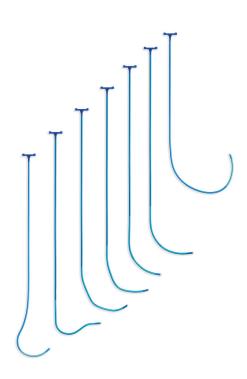
Optimal catheter stiffness segmentation for optimal pushability Slittable hub allows start-to-finish slitting for easy catheter removal

Compatible with ScoutPro Inner Catheters

Compatible with passive Safe Sheath hemostatic valve

Product	Length	Order number
ScoutPro ACS Accessory Kit		362688
SafeSheath Hemostatic Valve (5 pcs.)		369826
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	368099
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	359371
ScoutPro ACS Sheath "Straight L"	50 cm	361 536

Availability limited to CE and FDA region





ScoutPro ACS

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
Outer material	FEDAX
Dilator	
Working length	53; 59 cm (Long)
Hemostatic valve	
Maximum diameter	13.2 F (4.4 mm)
Maximum diameter	10.21 (4.41111)
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	
C+D ACC "DIO 2"	2/0110
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	
3, 4, 5, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4,	
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 quiding 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	
- , and or guiding carrieter	
ScoutPro ACS "Extended Hook"	368103
ScoutPro ACS "Extended Hook L" (Long)	368105
1 guiding catheter	
1 dilator for guiding catheter	
ScoutPro ACS "Straight"	250 271
	359 371
ScoutPro ACS "Straight L"	361 536
1 guiding catheter 1 dilator for guiding catheter	

^{*} Availability limited to CE and FDA region



Cardiac Rhythm Management Cardiac Resynchronization Therapy

Lead Delivery System

ScoutPro 7F

Coronary sinus lead delivery system

Product Highlights

Gradual sheath stiffness and soft tip for atraumatic cannulation

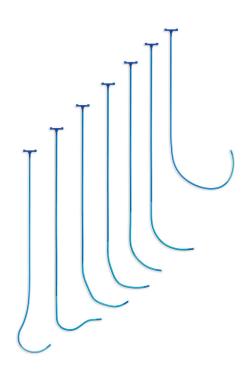
Excellent gliding properties for easy lead introduction

Ergonomic hemostatic valve and advanced slitter tool for optimal handling

Length	Order number
45 cm	350 239
45 cm	359374
50 cm	361529*
45 cm	359373
50 cm	361533*
45 cm	350 236
50 cm	361532*
45 cm	350 237
50 cm	361534*
45 cm	350 235
50 cm	361527*
45 cm	359370
50 cm	361531*
45 cm	359369
50 cm	361530*
	45 cm 45 cm 50 cm 45 cm









ScoutPro 7F

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	50.50 *(1)
Working length	53; 59 cm* (Long)
Hemostatic Valve	
Maximum diameter	13.2 F (4.4 mm)
Ordering information	
ScoutPro 7F 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)	
= 2 Stitler toots (leads 4.7 F and 6.3 F)	
ScoutPro 7F Sheath "BIO 2"	359374
ScoutPro 7F Sheath "BIO 2 L" (Long)	361529*
1 guiding catheter	
1 dilator for guiding catheter	
ScoutPro 7F Sheath "Multipurpose EP" (MPEP)	359373
ScoutPro 7F Sheath "Multipurpose EP L" (MPEP) (Long)	361533*
1 quiding catheter	
1 dilator for guiding catheter	
ScoutPro 7F Sheath "Hook"	350236
ScoutPro 7F Sheath "Hook L" (Long)	361532*
1 guiding catheter	
= 1 dilator for guiding catheter	
ScoutPro 7F Sheath "Multipurpose Hook"	350 237
ScoutPro 7F Sheath "Multipurpose Hook L" (Long)	361534*
1 guiding catheter	
1 dilator for guiding catheter	
ScoutPro 7F Sheath "Amplatz 6.0"	350235
ScoutPro 7F Sheath "Amplatz 6.0 L" (Long)	361527*
1 guiding catheter	55.527
1 dilator for quiding catheter	
for galaxing cuttieses	
ScoutPro 7F Sheath "Extended Hook Right" [EH-R]	359370
ScoutPro 7F Sheath "Extended Hook Right L" (EH-R) (Long)	361531*
1 guiding catheter	
1 dilator for guiding catheter	
ScoutPro 7F Sheath "Extended Hook"	359369
ScoutPro 7F Sheath "Extended Hook L" (Long)	361530*
	00.000
 1 guiding catheter 	

^{*} ScoutPro 7F Long versions only available in CE region and USA

Cardiac Resynchronization Therapy

Catheter

ScoutPro 7F IC

Inner catheters for ScoutPro 7F 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

Product	Length	Order number
ScoutPro IC 50	65 cm	361 537
ScoutPro IC 90	65 cm	361 538



ScoutPro 7F IC

Technical data	
Working length	65 cm
Inner diameter	3.6F (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	



Cardiac Rhythm Management
Cardiac Resynchronization Therapy
Guide Wire

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



Product	Tip configuration	Length	Order number
VisionWire	straight, floppy	175 cm	352023



VisionWire

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 mm²
Electrode coil length	15 mm
Tip configuration	straight
Tip flexibility	floppy
Shaft flexibility	extra support
Ordering information	
VisionWire	352 023



Cardiac Rhythm Management

Cardiac Resynchronization Therapy

Guide Wire

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



Product	Tip configuration	Length	Order number
Streamer ES	straight, high flexible	195 cm	363724
Streamer ES-J	J-shaped, high flexible	195 cm	363725
Streamer XT	straight, high flexible	195 cm	363726
Streamer XT-J	J-shaped, high flexible	195 cm	363727



Streamer

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.

Patient Device
•••••
Home Monitoring
•••••
Cardiac Rhythm Management

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



Product	Order number
CardioMessenger® II-S Kit	362444





CardioMessenger® II-S

CardioMessenger® II-S Kit	CardioMessenger® II-S
Cardiomesseriger II-5 Nit	Power supply (wall mounted)
	Manual including Short Guide
	Manual Including Short Odide
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), 2W (900 MHz),1W (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	5V DC
Permissible environmental conditions (operati	on)
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
W . I .	
Weight	/F0 -
Approximate	450 g
Dimensions (H×W×D)	
Approximate	203×136.5×80 mm
, pp. omnec	200100-00011111
Ordering information	
CardioMessenger® II-S Kit	362 444

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

Patient Device

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



Product	Order number
CardioMessenger® II Kit	354 921





CardioMessenger® II

Condinate on the State of the S
CardioMessenger® II Mobile
CardioMessenger® II charging station
Power supply MPP 15
Manual
Carrying strap
Power cord
Soft case
2 m (6 feet)
20 cm (7 inches)
Medical Implant Communication Service
FSK
402–405 MHz, 9 channels, 300 kHz band width
25 uW EIRP
Global System for Mobile Communications
GMSK
900/1800 MHz, 850/1900 MHz
0.8 W (850 MHz), 2 W (900 MHz), 1 W (1800/1900 MHz)
0.0 W (030 MHZ), 2 W (700 MHZ), 1 W (1000/1700 MHZ)
5.2 V DC
Lithium ions
3 years or 500 charging cycles
1.8 Ah
max. 6 h
min. 24 h
11111. 24 11
6 V DC
5.2 V DC
3.2 V DC
100-240 V AC, 50-60 Hz
6 V DC
ion)
ion)
II
II 0 to +40 °C (32 to 104 °F)
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F]
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75%
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F]
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75% 700 to 1060 hPa
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1040 hPa
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa e) -20 to +60 °C (-4 to 140 °F)
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa e) -20 to +60 °C [-4 to 140 °F] 30 to 75 %
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa e) -20 to +60 °C (-4 to 140 °F)
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa e) -20 to +60 °C [-4 to 140 °F] 30 to 75 %
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa el -20 to +60 °C (-4 to 140 °F) 30 to 75 % 700 to 1060 hPa
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75 % 700 to 1060 hPa
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa el -20 to +60 °C (-4 to 140 °F) 30 to 75 % 700 to 1060 hPa
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75 % 700 to 1060 hPa
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75% 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75% 700 to 1060 hPa
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75% 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75% 700 to 1060 hPa
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75% 700 to 1060 hPa e) -20 to +60 °C [-4 to 140 °F] 30 to 75% 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm approx. 82 × 90 × 105 mm
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa el -20 to +60 °C (-4 to 140 °F) 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 × 45 mm approx. 82 × 90 × 105 mm
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm approx. 82 × 90 × 105 mm
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75% 700 to 1060 hPa e) -20 to +60 °C [-4 to 140 °F] 30 to 75% 700 to 1060 hPa 205 g 163 g approx. 132×60×45 mm approx. 82×90×105 mm
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75% 700 to 1060 hPa e) -20 to +60 °C [-4 to 140 °F] 30 to 75% 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm approx. 82 ×90 ×105 mm 354 921 354 956 354 954 342 413
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa el -20 to +60 °C (-4 to 140 °F) 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 × 45 mm approx. 82 × 90 × 105 mm 354 921 354 956 354 954 342 413 354 950
II 0 to +40 °C [32 to 104 °F] -5 to +40 °C [23 to 104 °F] -5 to +40 °C [23 to 104 °F] 30 to 75 % 700 to 1060 hPa el -20 to +60 °C [-4 to 140 °F] 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm approx. 82 × 90 × 105 mm 354 921 354 956 354 954 342 413 354 950 356 993
II 0 to +40 °C (32 to 104 °F) -5 to +40 °C (23 to 104 °F) 30 to 75 % 700 to 1060 hPa el -20 to +60 °C (-4 to 140 °F) 30 to 75 % 700 to 1060 hPa 205 g 163 g approx. 132 ×60 ×45 mm approx. 82 × 90 × 105 mm 354 921 354 956 354 954 342 413 354 950





Patient Device
• • • • • • • • • • • • • • • • • • • •
Home Monitoring
Cardiac Rhythm Management

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



Product	Order number
CardioMessenger®-S Kit	370328





CardioMessenger®-S

CardioMessenger®-S Kit	CardioMessenger®-S
Cardiomessenger -5 Mil	Power supply (wall mounted)
	Technical manual with quick reference quide
	recimical 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	5V DC
Electrical data: power supply	
Input voltage	100-240 V AC 50-60 Hz
Output voltage	5V DC
Permissible environmental conditions (opera	ation)
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 (stora	
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
D: : (W II D)	
Dimensions (W×H×D)	000 404 5 00
Approximate	203 × 136.5 × 80 mm
0-4::	
Ordering information CardioMessenger®-S Kit	370.328

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 geographical factors outside of BIOTRONIK'S control, individual data transmissions could be delayed
or impaired in certain cases.



External Devices

Implantation and Follow-Up System

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



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	354877





ICS 3000

Entire system Classification	active implant modical device (00/205/EWO)
Dimensions (h/w/d)	active implant medical device (90/385/EWG) 322/168/332mm
Principions (II/W/u)	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 Mo	
Dimensions (h/w/d)	318/85/270 mm
Weight	3.2 kg
Battery	
Type	NiMH
Service time	1.5h
Charging time LCD module	4 h
	TFT color, touchscreen
Type Size	12.1" active diagonal
Resolution	800 × 600 pixels SVGA
ECG module	000 - 000 pixelo 040/1
Protection	BF defibrillation-resistant
- Leads	3 Einthoven
Sampling rate	5001000 Hz
Monitoring function ("miniclinic")	
Measurement of the pacing functions in any	pacing rate, interval duration, pulse width (A+V)
implanted pacemaker	AV conduction delay
Programming head ICS 3000 PGH	
Dimensions (h/w/d)	145/97/42mm
• 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	J
■ 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: WI, DDD, DDI, VDD, OFF
	AAI, OFF
Pacing parameters	
• 1	each channel independently: ON/OFF
Pacing	each channel independently: ON/OFF 30[1]100[2]180 ppm
Pacing Pacing frequency Pacing amplitude (all channels)	30(1)100(2)180 ppm 0.1(0.1)10 V
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V	30[1]100[2]180 ppm 0.1[0.1]10 V 0.1[0.05]2[0.1]2.5 ms 0.3[0.1]5[0.2]20 mV 0.5[0.1]5[0.2]20 mV
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay VV conduction delay after pace	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5]300 ms -100(10)10; -5; 0; 5; 10(10)100 ms
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay W conduction delay after pace Max. resynchronization rate (UTR)	30(1)100(2)180ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(51300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180ppm
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay W conduction delay after pace Max. resynchronization rate (UTR)	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180 ppm bipotar [BP], common ring bipotar [CRBP],
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay VV conduction delay after pace Max. resynchronization rate (UTR) Lead configuration (pace polarity)	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180 ppm bipolar (BP), common ring bipolar (CRBP), invers bipolar (IVBP), ring ring bipolar (RRBP)
Pacing parameters Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay WV conduction delay after pace Max. resynchronization rate (UTR) Lead configuration (pace polarity) High rate/burst (A+V)	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180 ppm bipotar [BP], common ring bipotar (CRBP),
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay Wy conduction delay after pace Max. resynchronization rate (UTR) Lead configuration (pace polarity) High rate/burst (A+V)	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180 ppm bipolar (BP), common ring bipolar (CRBP), invers bipolar (IVBP), ring ring bipolar (RRBP)
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay VV conduction delay after pace Max. resynchronization rate (UTR) Lead configuration (pace polarity) High rate/burst (A+V) Electrophysiological measurements	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180 ppm bipolar (BP), common ring bipolar (CRBP), invers bipolar (IVBP), ring ring bipolar (RRBP)
Pacing Pacing frequency Pacing amplitude (all channels) Pulse width Sensitivity A Sensitivity V AV delay VV conduction delay after pace Max. resynchronization rate (UTR) Lead configuration (pace polarity)	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(11)100(2)180 ppm bipotar [BP], common ring bipotar (CRBP), invers bipotar [IVBP], ring ring bipotar [RRBP] 60–1000 ppm
Pacing Pacing frequency Pacing frequency Pacing amplitude (all channels) Putse width Sensitivity A Sensitivity V AV delay VV conduction delay after pace Max. resynchronization rate (UTR) Lead configuration (pace polarity) High rate/burst (A+V) Electrophysiological measurements IEGM sampling rate	30(1)100(2)180 ppm 0.1(0.1)10 V 0.1(0.05)2(0.1)2.5 ms 0.3(0.1)5(0.2)20 mV 0.5(0.1)5(0.2)20 mV 15(5)300 ms -100(10)10; -5; 0; 5; 10(10)100 ms 60(1)100(2)180 ppm bipolar (BP), common ring bipolar (CRBP), invers bipolar (IVBP), ring ring bipolar (RRBP) 60-1000 ppm

Defibrillation	
Shock functions	
Shock energy	130 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	2080 Hz
Pacing duration	0.55 s
Amplitude	0.57.5 V
Pulse width	1 ms
HF burst induction (coil)	
Pacing frequency	2080 Hz
Pacing duration	0.55 s
Amplitude	12 V
Pulse width	1 ms
T-wave shock induction	
Overstimulation	80180 ppm
Burst length	112 s
Amplitude	0.57.5 V
Coupling interval	40600 ms
Shock form	monophasic, biphasic
Shock energy	0.530 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	335 284
PK lead clip (forceps adapter for surface ECG) PK lead clip	340 293
PK-67 (lead measurement cable) Lead measurement cable	123 672
PK-141 (lead measurement cable with Alligator forceps)	353 181
PA-2 (pace/sense adapter with IS-1 connectors) DTF measurement cable	123 157
PA-4 (pace/sense adapter with Alligator forceps) USB memory stick	123 090
PK-144 (DFT measurement cable)	353 906
PA-3 (shock adapter with DF-1 connectors)	354 030
Printer paper	348 728
USB memory stick (compatible with ICS 3000)	350017
Ordering information	
ICS 3000 system	349 528
ICS 3000 implantation system	354877



External Devices

Implantation and Follow-Up System

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



Model	Dimensions (l×w×h)	Weight	Order number
Renamic	476×345×125 mm	10 500 g	371 960







Renamic

Dimensions (l×w×h)	1]	47.6×34.5×12.5cm	
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	11.2×12.5cm, 210	
External printing		via Bluetooth ^{® 3]} or USB	
Device interrogation			
Programming head	= Dimensions (l×w×h)	14.5×9.7×4.2cm	
9			
	Cable length	2 97 m	
Wandless RF teleme	= Cable length try ⁴⁾	2.97 m BIOTRONIK SafeSync®	
Wandless RF teleme		=::::::::::::::::::::::::::::::::::::::	
Wandless RF teleme		=::::::::::::::::::::::::::::::::::::::	
		=::::::::::::::::::::::::::::::::::::::	
PC functionality		BIOTRONIK SafeSync®	
PC functionality Operating system Internal hard disk	try ⁴	BIOTRONIK SafeSync® Windows XP embedded	
PC functionality Operating system Internal hard disk Ordering information	rtry ⁴	BIOTRONIK SafeSync® Windows XP embedded	
PC functionality Operating system Internal hard disk	rtry ⁴	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	try ⁴ n tandard accessories	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	n andard accessories = Programming head	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960 371 588	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	n landard accessories = Programming head = Power cord	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960 371 588 country-specific ^{SI}	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	n tandard accessories = Programming head = Power cord = Stylus	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960 371 588 country-specific® 371 586	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	n tandard accessories = Programming head = Power cord = Stylus = ECG cable (PK-222)	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371960 371588 country-specific SI 371586 country-specific SI	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	nandard accessories Programming head Power cord Stylus ECG cable (PK-222) ECG electrode clip	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371960 371588 country-specific sl 371586 country-specific sl 340293	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	nandard accessories Programming head Power cord Stylus ECG cable [PK-222] ECG electrode clip Printer paper ^{al}	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960 371 588 country-specific 81 371 586 country-specific 81 340 293 348 728	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	andard accessories Programming head Power cord Stylus ECG cable (PK-222) Printer paper ⁴ USB Bluetooth ⁸ stick	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960 371 588 country-specific si 371 586 country-specific si 340 293 348 728 367 929	
PC functionality Operating system Internal hard disk Ordering information Renamic including st	n tandard accessories = Programming head = Power cord = Stylus = ECG cable (PK-222) = ECG electrode clip = Printer paper ⁴ = USB Bluetooth [®] stick = VGA adapter	BIOTRONIK SafeSync® Windows XP embedded min. 40 GB 371 960 371 588 country-specific® 371 586 country-specific® 340 293 348 728 367 929 377 292	

- Including two compartments for power cord, ECG cable and programming head.
 Including power cord, ECG cable, stylus and programming head.
 Additional USB port for Bluetooth® stick.
 For implantable devices supporting wandless telemetry.
 See manual for order number.
 Two blocks of printer paper in starter kit.

External Devices

Pacing System Analyzer

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®



Model	Dimensions (l×w×h)	Weight	Order number
Reliaty	220×180×60 mm	1200g*	365530

^{*} Including batteries in two compartments



Reliaty

Technical Data

	n	
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 r	ate)	80(10)1 000 ppm
Intracardiac measu	rements	
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 stand	ard)	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	on	
Order number		365530

¹⁾ With recommended battery Duracell® MN1500 AA LR6 in two compartments and pacing at 70 ppm, 5 V, 0.5 ms, 5000.
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

External Pacemaker

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



Model	Dimensions (l×w×h)	Weight	Order number
Reocor S	160×80×35 mm	245 g	365 528
Reocor D	160×80×35 mm	260 g	365 529





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 (burs	t 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 refrac	tory period		30–120 ppm: AV delay + 175 ms (min. 400 ms) 121–250 ppm: AV delay + 175 ms (min. 240 ms)
Battery			
Туре		alkaline manganese cells, 9 V	alkaline manganese cells, 9 V
Service time	after replacement 13	600 h	300 h
	after battery warning	36 h	36 h
	during replacement	30 sec	30 sec
Continuous statu	s 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		160×80×35mm	160×80×35mm
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 informa	ation		
Order number		365528	365 529

¹⁾ With recommended battery Duracell $^{\oplus}$ Plus, 6LR61 and pacing at 70 ppm, 5 V, 500 0. 2) Including battery.

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