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PROGRAMMING DEVICE FOR PROGRAMMING AN IMPLANTABLE MEDICAL DEVICE FOR STIMULATING A HUMAN OR ANIMAL HEART

The present invention relates to a programming device according to the preamble of claim 1, to a computer program product according to the preamble of claim 9, to an arrangement comprising such a programming device and an implantable medical device according to the preamble of claim 10, and to a method for programming an implantable medical device with such a programming device according to the preamble of claim 15.

Implantable medical devices for stimulating a human or animal heart, such as pacemakers, have been known for a long time. They can perform different functions. Different stimulation programs can be carried out by an appropriate pacemaker to restore the treated heart to a normal state. Pacemakers are also known to stimulate the His bundle.

The His bundle is a bundle of specific heart muscle cells that is part of the cardiac conduction system. The His bundle is located distally of the atrioventricular node towards the apex of the heart. The His bundle forms part of the ventricular conduction system.

There exist specific devices adapted for His bundle pacing, wherein a detecting (sensing) and stimulation electrode is not implanted into the ventricle of the human or animal heart to be treated, but rather at or near to the His bundle of the heart. Such use of a His bundle electrode enables a particularly physiologic stimulation of the human or animal heart.

In many cases, conventional pacemakers are used for His bundle pacing. In such a case, the port to which the His bundle electrode is connected is provided with specific stimulation/sensing parameters in order to achieve an appropriate sensing of electric signals at the His bundle and to allow a sufficient but still physiologic stimulation of the

His bundle in case His bundle pacing is applied. These specific stimulation/sensing parameters differ from stimulation/sensing parameters used for conventional cardiac pacing.

5 The available programming devices for such implantable medical devices do not yet address the need of setting specific stimulation parameters in case of His bundle pacing. Rather, the desired stimulation parameters need to be manually chosen without assistance by the used programming devices. In some cases, the available parameter value range is insufficient for properly programming an implantable medical device for His bundle
10 pacing. In some cases, preset standard values are inappropriate for His bundle pacing and need to be manually adjusted by a user in each case. Some parameters necessary for His bundle pacing do not exist in case of conventional cardiac pacing so that similar conventional parameters are often used. This bears the risk that the set parameters are incorrectly interpreted during follow-up care so that incorrect conclusions on the patient's
15 health condition are drawn.

It is an object of the present invention to facilitate programming of an implantable medical device for stimulating a human or animal heart that can adopt a conventional electrode lead configuration and an atypical electrode lead configuration, namely an electrode lead
20 configuration appropriate for His bundle pacing.

This object is achieved with a programming device having the features of claim 1. Such a programming device serves for programming an implantable medical device for stimulating a human or animal heart. The programming device comprises a first processor and a first memory unit. The first memory unit comprises a first computer-readable
25 program that causes the first processor to perform the steps explained in the following when executed on the first processor.

First, a selection between at least two electrode lead configurations of an implantable
30 medical device for stimulating a human or animal heart is made possible. The at least two electrode lead configurations comprise a first electrode lead configuration and a second electrode lead configuration. In the first electrode lead configuration, an atrial electrode

lead and a right ventricular electrode lead are connected to corresponding electrode lead ports of the implantable medical device. In the second electrode lead configuration, an atrial electrode lead and a His bundle electrode lead are connected to corresponding electrode lead ports of the implantable medical device.

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The atrial electrode lead is intended to be implanted or is already implanted in an atrium (in particular the right atrium) of the heart to be stimulated so as to be able to sense electric signals at the atrium or to stimulate the atrium by delivering electric pulses.

10 The right ventricular electrode is intended to be implanted or is already implanted in the right ventricle of the human heart to be stimulated. Typically, the right ventricular electrode is implanted in an apical region of the right ventricle so as to be able to stimulate the right ventricular cardiac tissue with an electric pulse in order to achieve a stimulation of the heart to be stimulated.

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The His bundle electrode is intended to be implanted or is already implanted at or near to the His bundle of the heart to be stimulated so as to be able to sense electric signals at the His bundle of the heart to be stimulated or to deliver electric pulses for a stimulation of the His bundle in order to achieve a subsequent contraction of the heart to be stimulated.

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If the first electrode lead configuration was selected, the programming device allows to select a first timing parameter value from a first set of timing parameter values. If, however, the second electrode lead configuration was previously selected, the programming device allows to select a second timing parameter value from a second set of timing parameter values. In this context, the first timing parameter value is a value of an atrioventricular interval. The second timing parameter value is a value of an atrial-His interval.

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The atrioventricular interval is the time period required between an atrial event like in an atrial pacing event or an atrial sensing event and a subsequent ventricular stimulus (also denoted as atrioventricular transition time). The atrioventricular interval depends on the physiologic conditions within the heart to be stimulated.

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The atrial-His interval is the time period required between an atrial event like an atrial pacing event or an atrial sensing event and a subsequent His bundle stimulus (also denoted as atrial-His transition time). For one and the same cardiac cycle, the atrioventricular interval is typically longer than the atrial-His interval.

Conventional implantable medical devices for stimulating the human or animal heart only enable setting an atrioventricular interval value. The presently claimed programming device enables also to adjust the value of an atrial-His interval.

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Since the second set of timing parameter values is different from the first set of timing parameter values, it is possible to include physiologically relevant timing parameter values into the second set of timing parameter values for setting the atrial-His interval that are not considered in conventional implantable medical devices for stimulating the human or animal heart when setting the atrioventricular interval. Furthermore, it is possible to exclude physiologically irrelevant timing parameter values from the second set of timing parameter values. As a result, no compromises are any longer necessary when setting or adjusting the atrial-His interval, whereas such setting or adjustment is compromised in case of conventional programming devices. Due to the novel functionality, an adequate and safe His bundle electrode configuration is made possible so that the risk of an incorrect programming of an implantable medical device for stimulating the human or animal heart is significantly reduced. Furthermore, it is possible to clearly indicate the second timing parameter as “atrial-His interval” (and only the first timing parameter as “atrioventricular interval”) so that a wrong interpretation of the settings in follow-up care is also significantly reduced. This facilitates the programming and use of an implantable medical device adapted for His bundle pacing.

In an embodiment, the first set of timing parameter values comprises values lying in a time range of from 40 ms to 350 ms, in particular from 45 ms to 345 ms, in particular from 50 ms to 340 ms, in particular from 55 ms to 335 ms, in particular from 60 ms to 330 ms, in particular from 65 ms to 325 ms, in particular from 70 ms to 320 ms, in particular from 75 ms to 315 ms, in particular from 80 ms to 310 ms, in particular from 85 ms to 305 ms, in

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particular from 90 ms to 300 ms, in particular from 95 ms to 295 ms, in particular from 100 ms to 290 ms, in particular from 105 ms to 285 ms, in particular from 110 ms to 280 ms, in particular from 115 ms to 275 ms, in particular from 120 ms to 270 ms, in particular from 125 ms to 265 ms, in particular from 130 ms to 260 ms, in particular from 135 ms to 255 ms, in particular from 140 ms to 250 ms, in particular from 145 ms to 245 ms, in particular from 150 ms to 240 ms, in particular from 155 ms to 235 ms, in particular from 160 ms to 230 ms, in particular from 165 ms to 225 ms, in particular from 170 ms to 220 ms, in particular from 175 ms to 215 ms, in particular from 180 ms to 210 ms, in particular from 185 ms to 205 ms, in particular from 190 ms to 200 ms, in particular from 190 ms to 195 ms.

In an embodiment, the first set of timing parameters comprises a plurality (more than two) of timing parameter values chosen from the precedingly mentioned intervals or values so that an individual value can be selected as first timing parameter value.

In an embodiment, the first timing parameter value is preset to a time lying in a range of from 150 ms to 210 ms, in particular from 155 ms to 205 ms, in particular from 160 ms to 200 ms, in particular from 165 ms to 195 ms, in particular from 170 ms to 190 ms, in particular from 175 ms to 185 ms, in particular from 175 ms to 180 ms.

Such a value of the first timing parameter value is appropriate for covering most of conventional pacing scenarios so that presetting the first timing parameter to a value falling in this range facilitates use of the programming device. If a user wants to accept the preset value, no other value needs to be chosen. However, it is still possible to amend the first timing parameter value to a value different from the preset value so that presetting the first timing parameter value does not limit the configuration possibilities.

In an embodiment, the second set of timing parameter values comprises values lying in a time range of from 15 ms to 300 ms, in particular from 20 ms to 295 ms, in particular from 25 ms to 290 ms, in particular from 30 ms to 285 ms, in particular from 35 ms to 280 ms, in particular from 40 ms to 275 ms, in particular from 45 ms to 270 ms, in particular from 50 ms to 265 ms, in particular from 55 ms to 260 ms, in particular from 60 ms to 255 ms,

in particular from 65 ms to 250 ms, in particular from 70 ms to 245 ms, in particular from 75 ms to 240 ms, in particular from 80 ms to 235 ms, in particular from 85 ms to 230 ms, in particular from 90 ms to 225 ms, in particular from 95 ms to 220 ms, in particular from 100 ms to 215 ms, in particular from 105 ms to 210 ms, in particular from 110 ms to 205 ms, in particular from 115 ms to 200 ms, in particular from 120 ms to 195 ms, in particular from 125 ms to 190 ms, in particular from 130 ms to 185 ms, in particular from 135 ms to 180 ms, in particular from 140 ms to 175 ms, in particular from 145 ms to 170 ms, in particular from 150 ms to 165 ms, in particular from 155 ms to 160 ms.

10 In an embodiment, the second set of timing parameters comprises a plurality (more than two) of timing parameter values chosen from the precedingly mentioned intervals or values so that an individual value can be selected as second timing parameter value.

In an embodiment, the second timing parameter value is preset to a time lying in a range of
15 from 80 ms to 140 ms, in particular from 85 ms to 135 ms, in particular from 90 ms to 130 ms, in particular from 95 ms to 125 ms, in particular from 100 ms to 120 ms, in particular from 105 ms to 115 ms, in particular from 105 ms to 110 ms.

Such a value of the second timing parameter value is appropriate for covering most of His
20 bundle pacing scenarios so that presetting the second timing parameter to a value falling in this range facilitates use of the programming device. If a user wants to accept the preset value, no other value needs to be chosen. However, it is still possible to amend the second timing parameter value to a value different from the preset value so that presetting the second timing parameter value does not limit the configuration possibilities.

25 In an embodiment, the first computer-readable program causes the first processor to prevent selecting the second timing parameter value if the first electrode lead configuration is selected. Likewise, the first computer-readable program causes the first processor to prevent selecting the first timing parameter value if the second electrode lead configuration
30 is selected. Such prevention can be effected, e.g., by greying out individual fields in a graphic user interface or by presenting an input mask that is specifically adapted either for

selecting the first timing parameter value or for selecting the second timing parameter value.

In an embodiment, the first computer-readable program causes the first processor to allow
5 both selecting the first timing parameter value and selecting the second timing parameter value if the second electrode lead configuration is selected. Such a possibility of choosing both timing parameters is particularly appropriate if the implantable medical device to be programmed does not only comprise a His bundle electrode lead, but also a His bundle electrode backup lead. Such a His bundle electrode backup lead is typically realized in
10 form of a right ventricular electrode lead that is implanted into the right ventricle of the heart to be stimulated, e.g., in an apical region of the right ventricle. If a cardiac stimulation using the His bundle electrode is not possible, the His bundle electrode backup lead can be used for a conventional right ventricular cardiac stimulation. Since the His bundle electrode backup lead is typically operated under the similar or the same
15 stimulation/sensing parameters like a conventional right ventricular electrode (i.e., different than a His bundle electrode), it is helpful to set a physiologic appropriate first timing parameter for such His bundle electrode backup lead. Then, the second timing parameter value will be used in case of His bundle pacing, whereas the first timing parameter value is used in case that His bundle pacing has not been successful and backup
20 pacing by the His bundle electrode backup lead is necessary.

In an embodiment, the at least two electrode lead configurations do not only comprise the first electrode lead configuration and the second electrode lead configuration, but additionally a third electrode lead configuration. In this third electrode lead configuration,
25 an atrial electrode lead, a His bundle electrode lead, and a His bundle electrode backup lead are connected to corresponding electrode lead ports of the implantable medical device. It is possible that the option of allowing both selecting the first timing parameter value and selecting the second timing parameter value is only available if the third electrode lead configuration is selected. Then, the first timing parameter value can only be chosen in case
30 that either a conventional right ventricular electrode is connected to an electrode lead port of the implantable medical device or in case that a His bundle electrode backup lead is

provided, but not in case that only a His bundle electrode lead is used for His bundle pacing without providing a His bundle electrode backup lead.

In an embodiment, the first computer-readable program causes the first processor to transfer the selected first timing parameter value or the selected second timing parameter value to an appliance remote from the programming device. In doing so, the selected first timing parameter value or the selected second timing parameter value can be converted into a data form that is conceivable by the appliance or a user of the appliance. However, it is also possible to transfer the selected first timing parameter value or the selected second timing parameter value to the appliance without conversion. The appliance is chosen from the group consisting of a printout (or a printer for making a printout), a database, and a home monitoring system. A particular appropriate database is a database comprising electronic health records (EHR). To give an example, a clinic information system might be an appropriate database. Upon transferring the selected first timing parameter value or the selected second timing parameter value to such an appliance, the selected first timing parameter value or the selected second timing parameter value will be available in the appliance at a later time point. Then, it is particularly easy to identify the concrete settings of the intended conventional cardiac pacing or the intended His bundle pacing, even though the programming device might not be at hand at that time point.

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In an aspect, the present invention relates to a computer program product comprising computer-readable code that causes a processor to perform the steps explained in the following when executed on the processor.

First, a selection between at least two electrode lead configurations of an implantable medical device for stimulating a human or animal heart is made possible. The at least two electrode lead configurations comprise a first electrode lead configuration and a second electrode lead configuration. In the first electrode lead configuration, an atrial electrode lead and a right ventricular electrode lead are connected to corresponding electrode lead ports of the implantable medical device. In the second electrode lead configuration, an atrial electrode lead and a His bundle electrode lead are connected to corresponding electrode lead ports of the implantable medical device.

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If the first electrode lead configuration was selected, the programming device then allows to select a first timing parameter value from a first set of timing parameter values. If, however, the second electrode lead configuration was previously selected, the programming device allows to select a second timing parameter value from a second set of timing parameter values. In this context, the first timing parameter value is a value of an atrioventricular interval. The second timing parameter value is a value of an atrial-His interval.

10 In an aspect, the present invention relates to an arrangement of the programming device according to the preceding explanations and an implantable medical device for stimulating a human or animal heart. In addition to the components explained above, the programming device also comprises a first data communication unit. Furthermore, the implantable medical device comprises a second processor, a second memory unit, a second data communication unit, a stimulation unit, and a detection unit. The stimulation unit is configured to stimulate a cardiac region of a human or animal heart. The detection unit is configured to detect an electric signal at the same or a different cardiac region of the same heart. The stimulation unit and the detection unit comprise an electrode lead. This electrode lead can be the same or a different for the stimulation unit and the detection unit.

20 By such an arrangement, it is possible to use the programming device for programming the implantable medical device, e.g., to set specific stimulation/sensing parameters, in particular first and/or second timing parameters.

In an embodiment, the implantable medical device is an implantable pulse generator (IPG), an implantable cardioverter-defibrillator (ICD), or a device for cardiac resynchronization therapy (CRT).

In an embodiment, the first data communication unit and the second data communication unit serve for transferring data from the programming device to the implantable medical device and/or in the opposite direction, i.e. from the implantable medical device to the programming device. Thus, the programming device cannot only be used to program the

implantable medical device, but also to read out specific settings of the implantable medical device.

In an embodiment, the data communication units serve for transferring data in a wireless manner. All standard data transmission protocols or specifications are appropriate for such
5 a wireless data communication. Examples of standard data transmission protocols or specifications are the Medical Device Radiocommunications Service (MICS), the Bluetooth Low Energy (BLE) protocol and the Zigbee specification.

10 In an embodiment, the second memory unit comprises a second computer-readable program that causes the second processor to perform the steps explained in the following when executed on the second processor.

First, a dataset comprising a first timing parameter value and/or a second timing parameter
15 value is received with the second data communication unit. The first timing parameter value is a value of an atrioventricular interval and the second timing parameter value is a value of an atrial-His interval.

Afterwards, an atrioventricular interval to be applied by the stimulation unit is set to the
20 first timing parameter value of the received dataset if the implantable medical device comprises an atrial electrode lead and a right ventricular electrode lead (i.e., if the first electrode lead configuration has been selected in the programming device). Otherwise, an atrial-His interval to be applied by the stimulation unit is set to the second timing parameter value of the received dataset if the implantable medical device comprises an
25 atrial electrode lead and a His bundle electrode lead (i.e., if the second electrode lead configuration has been selected in the programming device).

In an embodiment, the second memory unit comprises a second computer-readable program that causes the second processor to perform the steps explained in the following
30 when executed on the second processor.

In a first step, a presence of a His bundle electrode lead is automatically detected. Such a His bundle electrode lead is configured to stimulate the His bundle and/or to detect an electric signal at the His bundle. The His bundle electrode is intended to be implanted or is implanted at or near to the His bundle.

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Alternatively, a dataset is received from the second memory unit that indicates such a presence of a His bundle electrode. Such a dataset can be generated by the programming device and can be transferred to the implantable medical device after having made a selection of an appropriate electrode lead configuration in the programming device. It is then stored in the second memory unit.

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In a further step, the second data communication unit is caused to transfer a dataset indicating the presence of the His bundle electrode lead to the first data communication unit. Thus, the implantable medical device is able to actively inform the programming device on a presence of the His bundle electrode lead so that the selection of the electrode lead configuration to be made on the programming device can be automatically performed on the basis of such transferred dataset.

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To be more precise, in an embodiment, the first computer-readable program causes the first processor to perform the steps explained in the following. First, the dataset indicating the presence of the His bundle electrode lead is received with the first data communication unit. Afterwards, the second electrode lead configuration is automatically selected in response to having received this dataset.

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This embodiment is particularly appropriate if a selection of an appropriate electrode lead configuration has already been done at an earlier time point and has been stored in the implantable medical device. If a data connection is established between the implantable medical device and the programming device at a later stage, the programming device can automatically receive an information on a presence of a His bundle electrode lead and can thus automatically select the second electrode configuration for subsequent programming purposes. In such a case, a selection of the correct electrode lead configuration is made

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particularly easy and reliable. This enhances the overall operational safety of the respective implantable medical device.

In an aspect, the present invention relates to a method for programming an implantable medical device for stimulating a human or animal heart with the programming device according to the preceding explanations. In addition to the components explained above, the programming device also comprises a first data communication unit. Furthermore, the implantable medical device comprises a second processor, a second memory unit, a second data communication unit, a stimulation unit, and a detection unit. The stimulation unit is configured to stimulate a cardiac region of a human or animal heart. The detection unit is configured to detect an electric signal at the same or a different cardiac region of the same heart. The stimulation unit and the detection unit comprise an electrode lead. This electrode lead can be the same or a different for the stimulation unit and the detection unit. This method comprises the steps explained in the following.

First, a selection between at least two electrode lead configurations of an implantable medical device for stimulating a human or animal heart is made possible. The at least two electrode lead configurations comprise a first electrode lead configuration and a second electrode lead configuration. In the first electrode lead configuration, an atrial electrode lead and a right ventricular electrode lead are connected to corresponding electrode lead ports of the implantable medical device. In the second electrode lead configuration, an atrial electrode lead and a His bundle electrode lead are connected to corresponding electrode lead ports of the implantable medical device.

If the first electrode lead configuration was selected, the programming device then allows to select a first timing parameter value from a first set of timing parameter values. If, however, the second electrode lead configuration was previously selected, the programming device allows to select a second timing parameter value from a second set of timing parameter values. In this context, the first timing parameter value is a value of an atrioventricular interval. The second timing parameter value is a value of an atrial-His interval.

In a further step, a dataset comprising the first timing parameter value and/of the second timing parameter value is generated with the programming device.

Afterwards, the dataset is transmitted to the implantable medical device with the first data
5 communication unit.

The implantable medical device receives this dataset with the second data communication unit.

10 Finally, an atrioventricular interval to be applied by the stimulation unit is set to the first timing parameter value of the received dataset if the implantable medical device comprises an atrial electrode lead and a right ventricular electrode lead (i.e., if the first electrode lead configuration has been selected). Otherwise, an atrial-His interval to be applied by the stimulation unit is set to the second timing parameter value of the received dataset if the
15 implantable medical device comprises an atrial electrode lead and a His bundle electrode lead (i.e., if the second electrode lead configuration has been selected).

All embodiments of the described programming device can be combined in any desired way and can be transferred either individually or in any arbitrary combination to the
20 arrangement, to the computer program product, and to the method. Furthermore, all embodiments described with respect to the arrangement can be combined in any desired way and can be transferred either individually or in any arbitrary combination to the described programming device, to the described computer program product, and to the described method. Likewise, all embodiments described with respect to the computer
25 program product can be combined in any desired way and can be transferred either individually or in any arbitrary combination to the described programming device, to the described arrangement, and to the described method. Finally, all embodiments described with respect to the method can be combined in any desired way and can be transferred either individually or in any arbitrary combination to the described programming device, to
30 the arrangement, and to the computer program product.

Further details of aspects of the present invention will be described in the following making reference to exemplary embodiments and accompanying Figures. In the Figures:

Figure 1A shows a first arrangement of a pacemaker and a programming device;

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Figure 1B shows a second arrangement of a pacemaker and a programming device;

Figure 2 shows an embodiment of a set of atrioventricular intervals; and

10 Figure 3 shows an embodiment of a set of atrial-His intervals.

Figure 1A shows a first arrangement of a pacemaker 1 serving as implantable medical device and a programming device 2. The pacemaker 1 comprises a first port 3 serving as electrode lead port into which a right atrial electrode lead 4 is inserted. The right atrial electrode lead 4 comprises an electrode pole 5 at its distal end which is implanted into the cardiac tissue of the right atrium 6 of a human heart 7.

The pacemaker 1 comprises a second port 8 serving as electrode lead port into which a right ventricular electrode lead 9 is inserted. The right ventricular electrode lead 9 comprises an electrode pole 10 at its distal end which is implanted into the cardiac tissue of an apical region of the right ventricle 11 of the human heart 7.

The programming device 2 comprises a display 12 for enabling an interaction with a user of the programming device 2. The programming device 2 and the pacemaker 1 are operatively coupled to each other by a wireless radio communication 13. This wireless radio communication 13 is established by a first data communication unit in the programming device 2 and a second data communication unit in the pacemaker 1. Due to this wireless radio communication 13, it is possible to program the pacemaker 1 with the help of the programming device 2.

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For carrying out such programming, the programming device 2 first requests a selection between two electrode lead configurations. The first electrode lead configuration is a

standard (or conventional) electrode lead configuration with a right atrial electrode lead 4 and a right ventricular electrode lead 9, as depicted in Figure 1A. If this first electrode lead configuration is selected, a value of an atrioventricular interval serving as first timing parameter value can be afterwards selected from a set of atrioventricular interval values (cf. Figure 2).

The second electrode lead configuration is an electrode lead configuration in which a right atrial electrode lead and a His bundle electrode lead are present. Such an electrode lead configuration is shown in Figure 1B. In this context, similar elements are denoted in this and all following Figures with the same numeral references.

The general setting of the pacemaker 1 and the programming device 2 is identical to the setting of Figure 1A. Therefore, reference is made to the explanations given above with respect to Figure 1A. The only difference is that in the embodiment of Figure 1B no right ventricular electrode is present. Rather, a His bundle electrode 14 is connected to the second port 8. The His bundle electrode lead 14 comprises an electrode pole 15 at its distal end which is implanted into the His bundle 16 of the human heart 7.

In case of the embodiment shown in Figure 1B, the second electrode lead configuration is selected. This automatically results in the possibility of selecting an atrial-His interval value from a set of atrial-His interval values (cf. Figure 3). The atrial-His interval value serves as second timing parameter value.

Figure 2 shows an embodiment of a set of atrioventricular intervals that serves as first set of timing parameter values. This set of atrioventricular intervals will be presented on the display 12 by the software of the programming device 2 (cf. Figure 1A) after the first electrode lead configuration has been selected. The set of atrioventricular intervals comprises distinct atrioventricular interval values lying in a range of from 40 ms to 350 ms. A user can select an individual atrioventricular interval by clicking on the respective time when operating the programming device. It is also possible to confirm the selection by pressing a distinct confirmation button. An atrioventricular interval 16 (serving as first timing parameter value) of 180 ms is highlighted. This atrioventricular interval is

preselected so that the user can easily accept this value by clicking on it or by clicking on a separate confirmation button. However, the user is free to select any other atrioventricular interval value of the set of atrioventricular intervals.

- 5 Figure 3 shows a set of atrial-His intervals serving as second set of timing parameter values. This set of atrial-His interval will be presented on the display 12 by the software of the programming device 2 (cf. Figure 1B) after the second electrode lead configuration has been selected. The set of atrial-His intervals comprises distinct time values in a range of from 50 ms to 300 ms. An atrial-His interval 18 (serving as second timing parameter value)
- 10 of 110 ms is highlighted so as to indicate that this atrial-His interval is preselected by the software of the programming device 2. This facilitates a choice of an appropriate atrial-His interval to be made by the user. The user of the programming device can simply click on the field indicating 110 ms so as to select the atrial-His interval 18 of 110 ms. However, the user is free to select any other atrial-His interval value of the set of atrial-His intervals
- 15 if such other value better suits the concrete needs of the pacemaker 1 to be programmed by the programming device 2.