Philips Medical Systems Nederland B.V.
% Ms. Susan Quick
Regulatory Affairs Specialist
Philips Medical Systems (Cleveland), Inc.
595 Miner Road
CLEVELAND OH 44143

August 3, 2018

Re: K181479
Trade/Device Name: Ingenia Ambition S and Ingenia Ambition X
Regulation Number: 21 CFR 892.1000
Regulation Name: Magnetic resonance diagnostic device
Regulatory Class: II
Product Code: LNH, LNI
Dated: May 31, 2018
Received: June 5, 2018

Dear Ms. Quick:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/CombinationProducts/GuidanceRegulatoryInformation/ucm597488.htm); good

manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/) and CDRH Learn (http://www.fda.gov/Training/CDRHLearn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (http://www.fda.gov/DICE) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Michael D. O'Hara For

Robert Ochs, Ph.D.
Director
Division of Radiological Health
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*

K181479

Device Name
Ingenia Ambition S and Ingenia Ambition X

Indications for Use *(Describe)*

This system is a Magnetic Resonance Medical Electrical Systems indicated for use as a diagnostic device. The system can produce cross-sectional images, spectroscopic images and/or spectra in any orientation of the internal structure of the head, body or extremities.

Magnetic Resonance images represent the spatial distribution of protons or other nuclei with spin. Image appearance is determined by many different physical properties of the tissue and the anatomy, and the MR scan technique applied. The image acquisition process can be synchronized with the patient's breathing or cardiac cycle. The systems can use combinations of images to produce physical parameters, and related derived images.

Images, spectra, and measurements of physical parameters, when interpreted by a trained physician, provide information that may assist the diagnosis and therapy planning. The accuracy of determined physical parameters depends on system and scan parameters, and must be controlled and validated by the clinical user. The use of contrast agents for diagnostic imaging applications should be performed consistent with the approved labeling for the contrast agent.

In addition the Philips MR systems provide imaging capabilities, such as MR fluoroscopy, to guide and evaluate interventional and minimally invasive procedures in the head, body and extremities.

MR Interventional procedures, performed inside or adjacent to the Philips MR system, must be performed with MR Conditional or MR Safe instrumentation as selected and evaluated by the clinical user for use with the specific MR system configuration in the hospital. The appropriateness and use of information from a Philips MR system for a specific interventional procedure and specific MR system configuration must be validated by the clinical user.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

DO NOT SEND YOUR COMPLETED FORM TO THE PRA STAFF EMAIL ADDRESS BELOW.

The burden time for this collection of information is estimated to average 79 hours per response, including the time to review instructions, search existing data sources, gather and maintain the data needed and complete and review the collection of information. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden, to:

Department of Health and Human Services
Food and Drug Administration
Office of Chief Information Officer
Paperwork Reduction Act (PRA) Staff
PRAStaff@fda.hhs.gov

"An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB number."

PHILIPS

Ingenia Ambition S and Ingenia Ambition X

Section 5

510(k) Summary

510(k) Summary of Safety and Effectiveness

This 510(k) summary of safety and effectiveness information is prepared in accordance with 21 CFR §807.92.

Date Prepared:	June 01, 2018	
Manufacturer:	Philips Medical Systems Nederland B.V. Veenpluis 4-6, 5684 PC, Best, The Netherlands Establishment Registration Number: 3003768277	
Primary Contact Person: **Secondary Contact Person**	Jan van de Kerkhof Sr. Manager Regulatory Affairs Phone: +31 613300542 E-mail: jan.van.de.kerkhof@philips.com Susan Quick Regulatory Affairs Specialist Telephone: (440) 869-4612 E-mail: susan.quick@philips.com	
Device Name:	Ingenia Ambition S and Ingenia Ambition X	
Classification:	Classification name:	Magnetic Resonance Diagnostic Device (MRDD)
	Classification Regulation:	21CFR 892.1000
	Classification Panel:	Radiology
	Device Class:	Class II
	Primary Product Code:	90LNH 90LNI
Primary Predicate Device:	Trade name:	Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4
	Manufacturer:	Philips Medical Systems Nederland B.V.
	510(k) Clearance:	K173079
	Classification Regulation:	21CFR 892.1000
	Classification name:	Magnetic Resonance Diagnostic Device (MRDD)
	Classification Panel:	Radiology
	Device class	Class II
	Product Code:	90LNH 90LNI
Reference Device:	Trade name:	Ingenia Elition S and Ingenia Elition X
	Manufacturer:	Philips Medical Systems Nederland B.V.
	510(k) Clearance:	K173451
	Classification Regulation:	21CFR 892.1000
	Classification name:	Magnetic Resonance Diagnostic Device (MRDD)
	Classification Panel:	Radiology

	Device class	Class II
	Product Code:	90LNH 90LNI
Device Description:	The proposed **Ingenia Ambition S and Ingenia Ambition X** R5.5 with sealed magnet, modified RF amplifier and Workflow Solution are modifications of the 70 cm Ingenia 1.5T system, included in the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018). The systems and control software provided with the proposed **Ingenia Ambition S and Ingenia Ambition X** are substantially equivalent to the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018). Hereafter in this submission, **Ingenia Ambition S and Ingenia Ambition X** will be used to indicate the proposed device **Ingenia Ambition S and Ingenia Ambition X** R5.5 with sealed magnet, modified RF amplifier and Workflow Solution. The proposed **Ingenia Ambition S and Ingenia Ambition X** also includes minor software changes since the clearance of the legally marketed predicate device, Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018). The following modifications to the proposed **Ingenia Ambition S and Ingenia Ambition X** are included in this submission: 1. Introduction of sealed magnet and modified RF amplifier; 2. Introduction of new product name and covers; 3. VitalScreen: Touch Screen for guidance for patient setup: Touch screen at magnet façade to give user guidance on how to prepare a patient; 4. Autostart: automatic start of scanning at RF Door Closure: Possibility for an operator to start a sequence by pressing the Start button at the controls at the magnet façade, the scan will then start the necessary preparations to be able to start the sequence (transmitting and receiving of RF-signals and generating gradient waveforms) when the RF door is closed. 5. VitalEye: automatic breathing detection using camera: A camera solution for detecting breathing patterns of the patient. The MR scanner translates real-time camera images of the patient, to real-time breathing wave forms. The acquisition system of the MR scanner will use these breathing wave forms to synchronize the internals of the sequence;	

	6. ContrastCards: offers the ability to add information on the contrast agent. After applying the contrast agent, which is done independent from the MR system, information on the applied contrast is added to the DICOM images. When viewing these images on the MR system the images which have been taken while contrast was applied are marked with an indication “Contrast”. The feature helps the operator to indicate which sequence needs contrast and after applying contrast it helps indicate which images are taken while contrast was injected. Still, the use of contrast agents for diagnostic imaging applications shall be performed consistent with the approved labeling for the contrast agent. 7. SyntAc (MDME): acquisition of Multi-Dynamic Multi-Echo (MDME) images. These images can be processed by 3rd party (Synthetic MRI) software to produce the relevant radiological contrasts. Note: The VitalScreen (3), AutoStart (4), VitalEye (5), ContrastCards (6) and SyntAc (MDME) (7) features have been already cleared for the legally marketed reference device Ingenia Elition S and Ingenia Elition X systems (K173451) and are integrated in the proposed Ingenia Ambition S and Ingenia Ambition X without any further modifications compared to K173451. The proposed **Ingenia Ambition S and Ingenia Ambition X** are intended to be marketed with the following pulse sequences and coils that were previously cleared by FDA: 1. mDIXON K102344 2. SWIp K131241 3. mDIXON-Quant K133526 4. MRE K140666 5. mDIXON XD K143128 6. O-MAR K143253 7. MultiBand SENSE K143606 8. Ingenia Coils, see Appendix 004

Indications for Use:	This system is a Magnetic Resonance Medical Electrical Systems indicated for use as a diagnostic device. The system can produce cross-sectional images, spectroscopic images and/or spectra in any orientation of the internal structure of the head, body or extremities. Magnetic Resonance images represent the spatial distribution of protons or other nuclei with spin. Image appearance is determined by many different physical properties of the tissue and the anatomy, and the MR scan technique applied. The image acquisition process can be synchronized with the patient's breathing or cardiac cycle. The systems can use combinations of images to produce physical parameters, and related derived images. Images, spectra, and measurements of physical parameters, when interpreted by a trained physician, provide information that may assist the diagnosis and therapy planning. The accuracy of determined physical parameters depends on system and scan parameters, and must be controlled and validated by the clinical user. The use of contrast agents for diagnostic imaging applications should be performed consistent with the approved labeling for the contrast agent. In addition the Philips MR systems provide imaging capabilities, such as MR fluoroscopy, to guide and evaluate interventional and minimally invasive procedures in the head, body and extremities. MR Interventional procedures, performed inside or adjacent to the Philips MR system, must be performed with MR Conditional or MR Safe instrumentation as selected and evaluated by the clinical user for use with the specific MR system configuration in the hospital. The appropriateness and use of information from a Philips MR system for a specific interventional procedure and specific MR system configuration must be validated by the clinical user.

Design Features/ Fundamental Scientific Technology:	The proposed design of the **Ingenia Ambition S and Ingenia Ambition X** is based on the principle that certain atomic nuclei present in the human body will emit a weak relaxation signal when placed in a strong magnetic field. These atomic nuclei are excited by a radio signal at the precession frequency. The emitted relaxation signals are analyzed by the system and a computed image reconstruction is displayed on a video screen. The principal technological components (transmit body coil, gradient coil, receive coils and patient support) of the proposed **Ingenia Ambition S and Ingenia Ambition X** are identical to those used in the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018). The magnet for the proposed **Ingenia Ambition S and Ingenia Ambition X** has similar superconducting coils and cryostat construction as the magnet of legally marketed predicate devices Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018), but has a different internal cooling system. The coils are located in the vacuum space of the cryostat instead of in a helium vessel and they are cooled by helium flow through tubes that are in thermal connection with the superconducting coils. The helium in these tubes circulates and is cooled, via a heat exchanger, at a cold point at the cold head, the cold head being similar to the cold head used in the magnet for noted predicate devices. The cooling system is filled with helium at the time of magnet manufacturing. During steady state operation the liquid-equivalent amount of helium corresponds to approximately 7 liters. The cooling system is closed and therefore helium will generally not require replenishment over the lifecycle of the system. No quench vent pipe is required for the magnet. The modified RF amplifier for the proposed **Ingenia Ambition S and Ingenia Ambition X** is an in-house development, designed for high reliability and with the same: • system requirements, • peak power, • average power, • signal fidelity, • and system behavior as the existing RF amplifier provided with the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018).

	The new colors (coils, positioning aids) and new covers are the same as provided with the legally marketed reference device (Ingenia Elition X and Ingenia Elition S) and are incorporated in the proposed **Ingenia Ambition S and Ingenia Ambition X** without further changes. The **Workflow Solution (VitalScreen, AutoStart, VitalEye, and ContrastCards)** provided with the proposed **Ingenia Ambition S and Ingenia Ambition X** adds workflow enhancements in patient preparation as well as data administration enhancements. This combination of features (VitalEye, VitalScreen, Autostart and Contrast Card) has been already cleared for the legal marketed reference device Ingenia Elition S and Ingenia Elition X systems (K173451) and is integrated in the proposed Ingenia Ambition S and Ingenia Ambition X without any further modifications compared to K173451. The **SyntAc (MDME)** feature provided with the proposed **Ingenia Ambition S and Ingenia Ambition X** gives possibility to acquire Multi-Dynamic Multi-Echo (MDME) images. These images can be processed by 3rd party (Synthetic MRI) software to produce the relevant radiological contrasts. This feature has been already cleared for the legally marketed reference device Ingenia Elition S and Ingenia Elition X systems (K173451) and is integrated in the proposed Ingenia Ambition S and Ingenia Ambition X without any further modifications compared to K173451. Based on the information provided above, the proposed **Ingenia Ambition S and Ingenia Ambition X** do not raise different questions of safety and effectiveness compared to the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018).

Summary of Non-Clinical Performance Data:	The proposed **Ingenia Ambition S and Ingenia Ambition X** comply with the following international and FDA-recognized consensus standards: • IEC60601-1 Edition 3 • IEC60601-1-2 Edition 4 • IEC60601-1-6 Edition 3 • IEC62366-1 Edition 1 • IEC60601-1-8 Edition 2 • IEC60601-2-33 Edition 3 • IEC 62304 Edition 1 • NEMA MS-1 2008 • NEMA MS-4 2010 • NEMA MS-8 2008 • NEMA PS 3.1-PS 3.20 • ISO 14971 Edition 2 • Device specific guidance document, entitled "Guidance for the Submission Of Premarket Notifications for Magnetic Resonance Diagnostic Devices" (issued November 18, 2016 – document number 340) • Guidance for Industry and FDA Staff – Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices (issued May 11, 2005 – document number 337) • Guidance for Industry and FDA Staff – Content of Premarket Submissions for Management of Cybersecurity in Medical Devices (issued October 2, 2014 – document number 1825) • Guidance for Industry and FDA Staff – Applying Human Factors and Usability Engineering to Medical Devices (issued February 3, 2016 – document number 1757) • Guidance for Industry and FDA Staff – Use of International Standard ISO 10993-1, "Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process" (issued June 16, 2016 – document number 1811) • Guidance for Industry and FDA Staff – Information to Support a Claim of Electromagnetic Compatibility (EMC) of Electrically-Powered Medical Devices (issued July 11, 2016 – document number 1400057) • Guidance for Industry and FDA Staff – Design Considerations and Premarket Submission Recommendations for Interoperable Medical Devices (issued September 6, 2017 – document number 1500015)

	Non-Clinical verification and or validation tests have been performed with regards to the intended use, the technical claims, the requirement specifications and the risk management results. Additionally, a representative set of clinical images of the proposed **Ingenia Ambition S and Ingenia Ambition X** systems have also been generated and provided in DICOM format together with this submission. The verification and/or validation test results and the set of clinical images demonstrate that that the proposed **Ingenia Ambition S and Ingenia Ambition X**: • Comply with the aforementioned international and FDA recognized consensus standards and Device specific guidance document, entitled "Guidance for the Submission Of Premarket Notifications for Magnetic Resonance Diagnostic Devices – November 18, 2016" • Meet the acceptance criteria and is adequate for its intended use. Therefore, the proposed **Ingenia Ambition S and Ingenia Ambition X** are substantially equivalent to the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018) in terms of safety and effectiveness.
Summary of Clinical Data:	The proposed **Ingenia Ambition S and Ingenia Ambition X** did not require a clinical study since substantial equivalence to the legally marketed predicate device was proven with the verification/validation testing.
Substantial Equivalence:	The proposed **Ingenia Ambition S and Ingenia Ambition X** and the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018) have the same indications for use with respect to the following: • Providing cross-sectional images based on the magnetic resonance phenomenon • Interpretation of the images is the responsibility of trained physicians • Images can be used for interventional and treatment planning purposes The proposed **Ingenia Ambition S and Ingenia Ambition X** are substantially equivalent to the legally marketed predicate device Ingenia 1.5T, Ingenia 1.5T S, Ingenia 1.5T CX, Ingenia 3.0T, and Ingenia 3.0T CX R5.4 (K173079, 04/04/2018) in terms of design features,

	fundamental scientific technology, indications for use, and safety and effectiveness. Additionally, substantial equivalence was demonstrated with non-clinical performance (verification and validation) tests, which complied with the requirements specified in the international and FDA-recognized consensus standards and device-specific guidance.
Conclusion:	The results of these tests demonstrate that the proposed **Ingenia Ambition S and Ingenia Ambition X** meet the acceptance criteria and is adequate for its intended use.