OPENMARK 5000

Dual-Pillar 0.51T MRI system

Product Proposal

Shenzhen Anke High-tech Co., Ltd.

Address: Block B, LingYa Industrial Zone, Tangtou No.1 Road, Bao'an District, Shenzhen, 518108, P.R. China
Tel: +86-755-21622518 26688889
Fax: +86-755-26695307 26685908
Email: anke@anke.com
Website: www.anke.com

Linkedin: www.linkedin.com/company/shenzhen-anke-high-tech-co--ltd
Facebook: https://www.facebook.com/ankemri
Twitter: twitter.com/ankeint

Insight into life

ANKE

Contents

OPENMARK 5000 Product Introduction

OPENMARK 5000 is a whole-body permanent MRI system newly upgraded and listed by ANKE, which complies with the international trend and equipped with a large horizontal opening angle, integrated wide-body electric patient table, high-performance gradient comparable to high field MRI and other characteristics.

Once launched, the product has been widely welcomed by international markets such as the Middle East, Africa, Latin America, Europe, central Asia and southeast Asia as well as domestic customers. After years of continuous optimization and improvement, OPENMARK 5000 has become an outstanding work of today's permanent MRI technology.

This system adopts the international advanced hardware platform, combined with more than 30 years experience of research and development of MRI software, scanning sequence, imaging technology, makes the OPENMARK 5000 system highly stable.

With OPENMARK 5000, doctors can obtain high SNR value, high resolution and high con- trast clinic images easily, which will provides the most reliable diagnostic basis for clinical application.

Magnet system

Large openness structure

A-Shimming technology

Intelligent temperature control
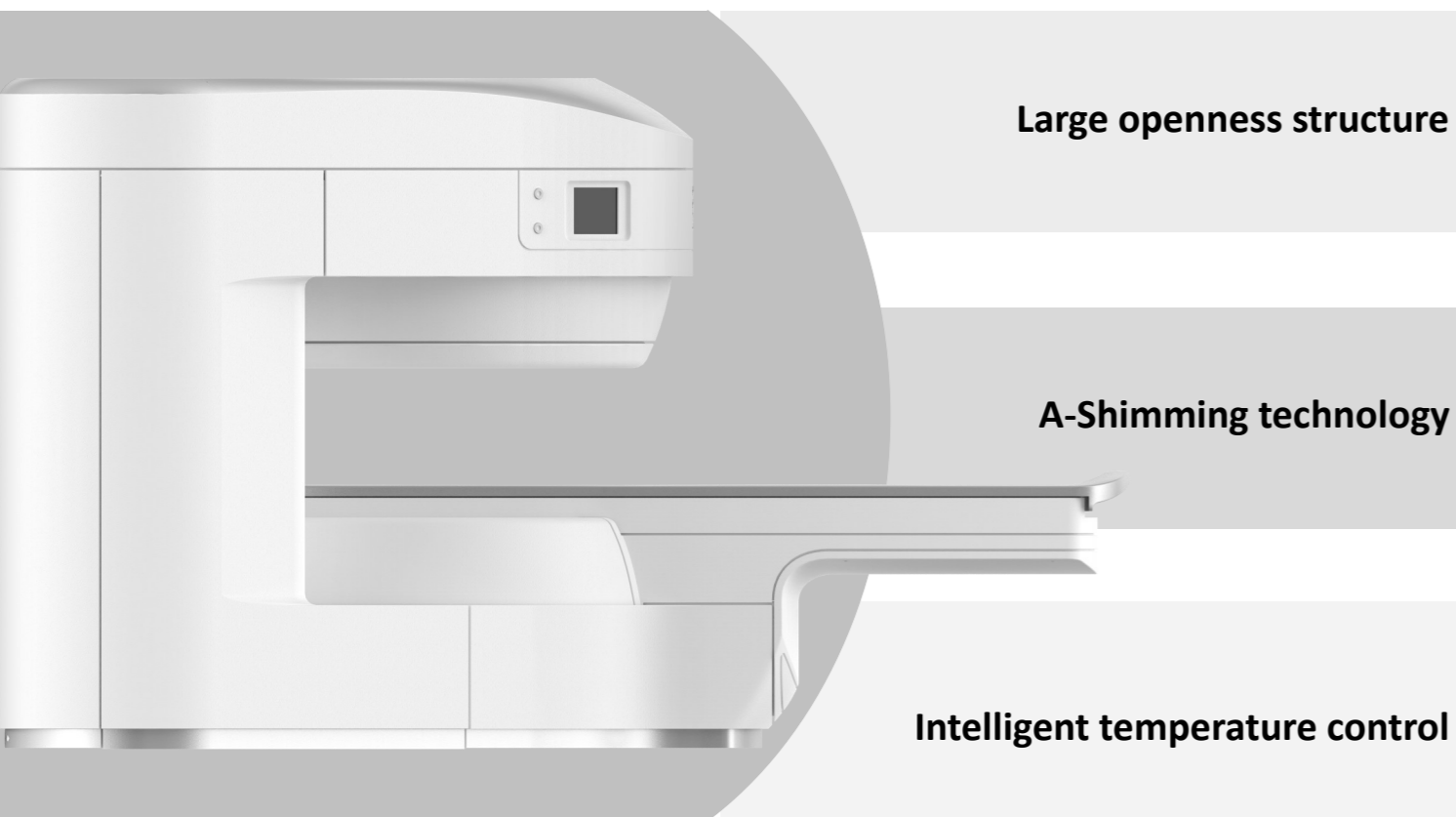
Large openness magnet

Magnet appearance	Dual-pillar
Horizontal front opening angle of magnet	280°
Magnet type	Permanent magnet
Magnetic field strength	0.51T ± 5%
5 Gaussian line range	X, Y, Z directions ≤ 2.5m

Unique A-shimming technology, ensure a high level homogeneity.

Shimming method	Active & passive
Homogeneity of magnetic field	≤ 1.6 ppm @ 40cm, DSV, VRMS

Intelligent temperature control system

Automatic constant temperature system, keep the magnet at a constant temperature for a long time, which will ensure a high stability of magnetic field.

Gradient system

Technical features

- Advanced RF-Gradient integration coils
- Self-shielding technology
- Eddy-'0' technology, extremely reduce eddy currents
- Air cooling gradient coils and amplifier

High performance for each axis

Max. amplitude (single axis)	30 mT/m
Max. slew rate (single axis)	100 T/m/s
Min. rise time	0.3 ms

Scan parameters

|	
Maximum FOV	400mm
Minimum FOV	5mm
Shortest TE (spin echo)	5ms
Shortest TR (spin echo)	11ms
Shortest TE (gradient echo)	1ms
Shortest TR (gradient echo)	3ms
Minimum 2D layer thickness	1.0mm
Minimum 3D layer thickness	0.1mm
Maximum acquisition matrix	1024 × 1024
DWI maximum b value	2000s/mm^2

RF system

transmitting and receiving parameters	
System type	Full digital transmission and reception
RF power	6kW
Receiving channels	4 channels
Receiving bandwidth	1.25MHz

Coils

- Head coil
- Neck coil
- 17" body coil
- 20" body coil
- Knee coil
- Shoulder coil
- Ankle coil*
- 14" body coil*
- Wrist coil*
- Breast coil*

Patient care design

- Emergency call button
- Two-way intercom system
- Respiratory gating
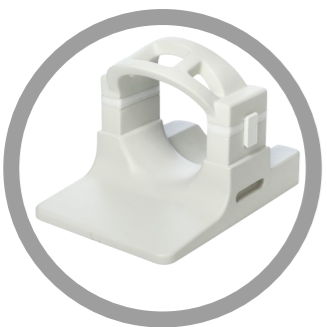
Patient table

Integrated electric patient table	
Patient table	electric / manual dual mode
Max. weight load	200kg
Cross cursor positioning	Laser cross cursor positioning
positioning accuracy	1mm
Patient table control	Touch screen control

ANKE
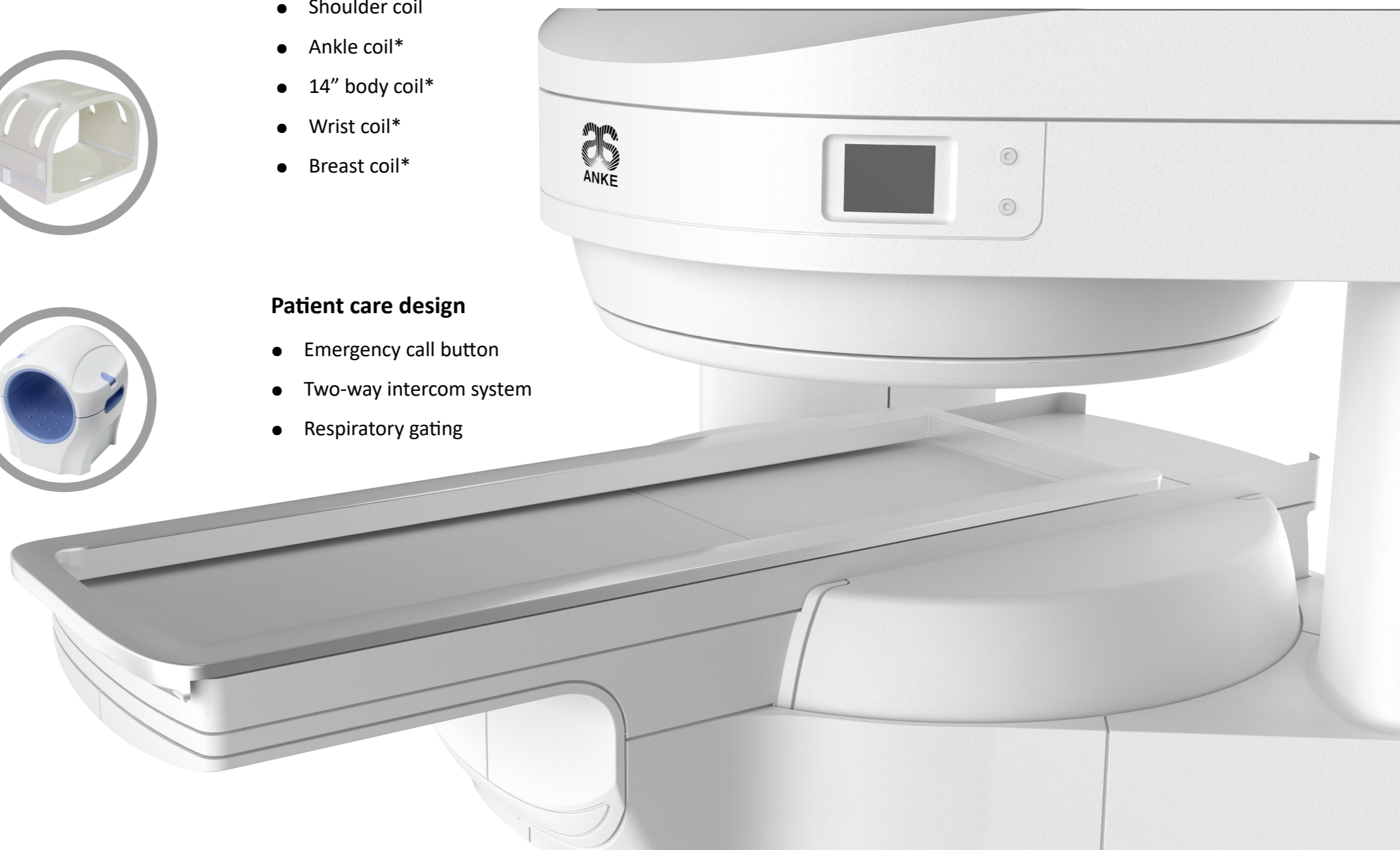
Marked with '*' means it's not a standard offer, please contact us for further information.

PA receiving coils package

PA head coil

Coil type	Phased array receiving coil
Number of channels	4
Inside dimension	260*211*234 (mm)
Outside dimension	360*340*320 (mm)
Connector	Mix multi-strand plugs
Accessory	Head support
Weight	5.1 Kg

Applications
- Head examination
- MR Head Angiography
- TMJ (temporomandibular joint) imaging

PA 17" body coil

Coil type	Phased array receiving coil
Number of channels	4
Inside dimension	323*430*280 (mm)
Outside dimension	323*552*322 (mm)
Connector	Mix multi-strand plugs
Weight	6.5 Kg

Applications
- Thoracic region examination
- Thoracic & Lumbar spine examination
- Abdomen examination
- Pelvis & Hip examination

PA Neck coil

Coil type	Phased array receiving coil
Number of channels	2
Inside dimension	451*169*192 (mm)
Outside dimension	451*342*312 (mm)
Connector	Mix multi-strand plugs
Accessory	Neck coil mattress
Weight	3.3 Kg

Applications
- Neck examination
- Cervical spine examination
- MR Neck Angiography

PA 20" body coil

Coil type	Phased array receiving coil
Number of channels	4
Inside dimension	323*508*295 (mm)
Outside dimension	323*631*337 (mm)
Connector	Mix multi-strand plugs
Weight	7.0 Kg

Applications
- Thoracic region examination
- Thoracic & Lumbar spine examination
- Abdomen examination
- Pelvis & Hip examination

PA Knee coil

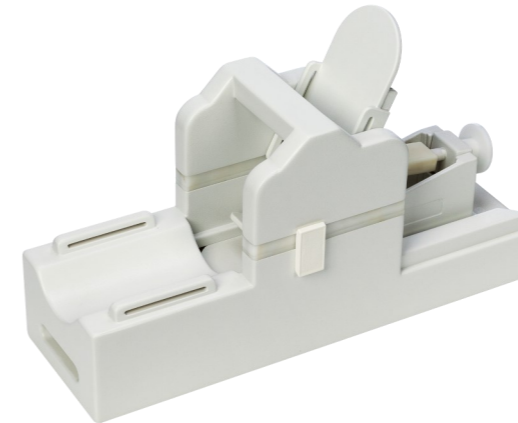| Coil type	Phased array receiving coil
Number of channels	2
Inside dimension	280*144*155 (mm)
Outside dimension	328*385*328 (mm)
Connector	Mix multi-strand plugs
Weight	3.2 Kg

Applications	• High resolution knee imaging
	• Lower limb joints examination

PA Ankle coil*

Coil type	Phased array receiving coil
Number of channels	2
Inside dimension	180*115*175 (mm)
Outside dimension	530*170*340 (mm)
Connector	Mix multi-strand plugs
Accessory	foot fixed frame
Weight	5.0 Kg

Applications	• High resolution ankle imaging
	• High resolution foot imaging

PA shoulder coil

Coil type	Phased array receiving coil
Number of channels	2
Inside dimension	180*190*200 (mm)
Outside dimension	412*255*222 (mm)
Connector	Mix multi-strand plugs
Accessory	Base of shoulder coil
Weight	2.3 Kg

Applications	• High resolution shoulder imaging

PA 14" body coil*

Coil type	Phased array receiving coil
Number of channels	4
Inside dimension	323*356*244 (mm)
Outside dimension	323*463*286 (mm)
Connector	Mix multi-strand plugs
Weight	6.0 Kg

Applications	• Thoracic region examination
	• Thoracic & Lumbar spine examination
	• Abdomen examination
	• Pelvis & Hip examination

Marked with '*' means it's not a standard offer, please contact us for further information.

PA Wrist coil*

Coil type	Phased array receiving coil
Number of channels	2
Inside dimension	160*110*60 (mm)
Outside dimension	160*210*200 (mm)
Connector	Mix multi-strand plugs
Weight	1.3 Kg

Applications	● High resolution hand imaging ● High resolution wrist imaging

PA Breast coil*

Coil type	Phased array receiving coil
Number of channels	4
Inside dimension	162*162*119 (mm)
Outside dimension	355*436*148(mm)
Connector	Mix multi-strand plugs
Accessory	Breast coil mattress
Weight	3.1 Kg

Applications	● High resolution breast imaging

Computer System

DIS system

DIS (Data integrity & security) is a protection system for patient and system data, we set 2 independent hard disk, Double system partitions, Double data partitions, you can switch to the backup disk quickly when you meet a problem of software, such as virus, software bugs, avoid the loss of data.

Host computer

operating system	Windows7_ Professional
CPU frequency	3.6 GHz, or comparable
RAM	≥ 8.0 GB
Image reconstruction speed (256 × 256 matrix)	3300 fps
Hard drive capacity	1TB × 2
Image storage capacity (256 × 256 matrix)	≥ 4,000,000
Storage media	DVD & USB
DICOM 3.0 interface	Provided
Ethernet connection	Provided

Color LCD Monitor

|	
Monitor size	24"
Resolution of monitor	1920×1080

Accessories

● Operation console
● Operation chair
● 1KVA UPS (Supply power for computer)

Marked with '*' means it's not a standard offer, please contact us for further information.

APEX MRI Software

Integrated exam programs

- Executable with few mouse clicks, select examinations with less interaction;

- Allows queuing of multiple scanning-sequence during an examination;

- Pending scanning-sequence can be removed from the queue, as required;

- Allows for the appending and deleting of scanning-sequence;

- Scanning-sequence can be saved to the exam explorer;

- Enables easy edit scanning-sequence.
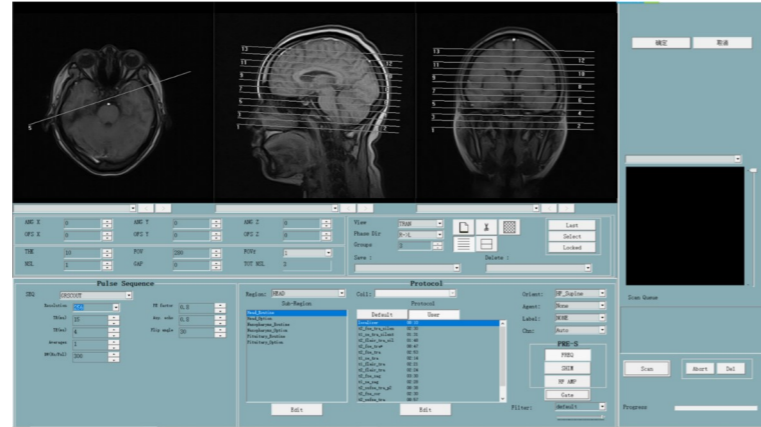
Scan preparation

- Automatic adjustment of Frequency, Gain and Shimming;

- Dynamic receiver gain control, significantly reducing scan time;

- Auto coil tuning, also saving examination time.

3D scout

- Fast localizer scanning;

- Allows for arbitrary orientations (multi-slice, multi-angle).

Image recall

- Images are stored in DICOM 3.0 format, allowing fast image access and recall;

- Image recall according examination date;

- Image recall according patient name;

- Image recall according patient ID;

- Image file operation, including load image, last scan, previous and next scan.

Image display and select

- Images are stored in DICOM 3.0 format, allowing fast image access and recall;

- Various display layouts selectable;

- Multiple patients handled simultaneously the viewer;

- Image annotation and labeling;

- Non-interpolated display;

- Image select: select all, close all, save selected, close selected, deselect and delete selected;

- Display control: zoom, local enlarge, magnifier, restore, roam and negative image;

- Image clip and scout: rectangle clip, ellipse clip, select scout and show/hide scout;

- Image information control: display all information, display important information and display different information;

- Image group display: combine, break and fanning;

- Post-processing: print to film, post-processing, export as BMP and send to DICOM.

Window width and window center

- Freely selectable window width and center;

- Auto saves window width and center.

Image evaluation

- Statistical evaluation;

- Rectangle statistics, Ellipse statistics, Polygon statistics;

- Add positive arrow, Add negative arrow, Add notation;

- Distance measure, Angle measure.

Imaging sequences and techniques

Filming

- Filming
- Connection via DICOM basic print
- Film management，including film data load，close，save and delete
- Interactive filming
- Filming parallel to other activities
- Freely selectable positioning of images onto virtual film sheet
- Selectable various film layouts
- Window adjusting, image zoom on film sheet
- Configurable image text
- Simultaneous handling of multiple film jobs

DICOM Services

- DICOM Send/Receive
- DICOM Query/Retrieve
- DICOM SC Storage commitment
- DICOM Basic Print
- DICOM Modality Worklist

Scanning Sequence

|	
Spin echo (SE) series	Spin echo (SE 2D/3D)
	Dual echo (DE)
	Spin dual echo (DSE)
	Multi-slice multi-echo (MSME)
Fast spin echo (FSE) series	Fast spin echo (FSE 2D/3D)
	Fast recovery of fast spin echo (FRFSE)
	Single shot fast spin echo (SSFSE 2D/3D)
	Multiple shot of fast spin echo (MSFSE)
Inversion recovery (IR) series	Inversion recovery sequence (IR)
	Inversion recovery spin echo (IRSE)
	Inverse recovery fast spin echo (IRFSE)
	Short time inversion recovery sequence (STIR)
	Water-fat separation imaging (DIXON)
Fast inversion recovery (FIR) series	Fast inversion recovery sequence (FIR)
	Fluid attenuated inversion recovery (FLAIR)
	T2 weight fluid attenuated inversion recovery (T2-FLAIR)
	T1 weight fluid attenuated Inversion recovery (T1-FLAIR)
Gradient echo (GRE) series	Gradient recall echo (GRE 2D/3D)
	Dual gradient echo (DGRE)
	Fast gradient echo (FGRE 2D/3D)
	Steady state process gradient echo (SSPGRE)
	True steady state fast process gradient echo (TureFISP)
	Magnetic resonance angiography (TOF 2D/3D)
	Linear scan diffusion weighted imaging (LSDW)
	Spin echo diffusion weighted imaging (DWISE)
	Planar echo imaging (EPI)*
	Propeller imaging

Marked with '*' means it's not a standard offer, please contact us for further information.

Imaging technology

Fast imaging technology	Batch imaging technology (Scan Sequence Queued Waiting)
	Interval scanning technology
	Off-center Imaging
	Rectangular FOV imaging technology
	Arbitrary slice scanning technology
	Partial acquisition technology
	Partial echo technology
	Echo sharing technology
	Optimization bandwidth acquisition technology
	Phase encode gradient optional technology
	Ellipse-encoded acquisition imaging technology
	Parallel acquisition technology
Artifact suppression technology	Flow compensation technology
	Multi-slice & multi-angle pre-saturation technology
	Pre-saturated automatic tracking technology
	Magnetization transfer contrast technology (MTC)
	Tilted optimized non-saturating excitation technology (TONE)
	Breath-holding imaging technology
	Respiratory gating technology
	Motion artifact suppression
	Metal artifact suppression technology
	Over sampling technology
	Phase encoding direction anti-wrap technology
	Slice encoding direction anti-wrap technology

| Automatic Workflow | Automatic RF correction |
	Automatic frequency locking
	Automatic gain adjustment
	Automatic coil identification
	Automatic phase correction
	Automatic shimming linear compensation
	Scanning scheme presetting and selection techniques
GRSCOUT three-dimensional positioning scan	3-dimensional 3-slice rapid positioning scan technology
	3-dimensional 9-slice rapid positioning scan technology
	Multiple groups of arbitrary positioning technology
Advanced image post processing	Maximum intensity projection
	Minimum intensity projection
	Multiplanar reconstruction
	Online image filtering technology
	Online post-processing technology
	Advanced post-processing technology

Clinical applications

Head
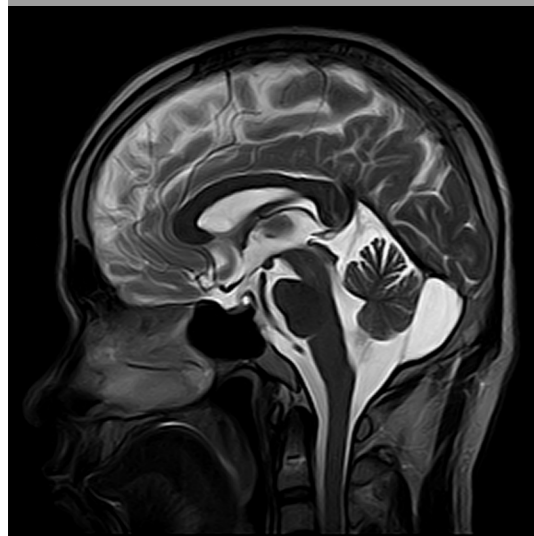
Outstanding phased array head coil will improve the SNR of images. Comprehensive head examinations can be performed with dedicated programs that are optimized for clinical examinations. High resolution protocols and fast protocols for uncooperative patients are provided.

Protocol package

- High resolution 2D T1WI, T2WI imaging based on SE and FSE2D
- T2 and T1 weight fluid attenuated inversion recovery (FLAIR) imaging
- Diffusion weighted imaging with a high b value
- Fat suppression imaging based on STIR
- Water-fat separation imaging (DIXON)*
- 3D T1WI, T2WI imaging based on FSE3D and GRE3D, suitable for Inner ear, pituitary with thin slices high resolution images
- Head arteries (MRA) and veins (MRV) angiography based on 2D and 3D Time-of-flight (TOF)
- MIP, MinIP, MPR for reconstruction of MRA and MRV
- Propeller imaging
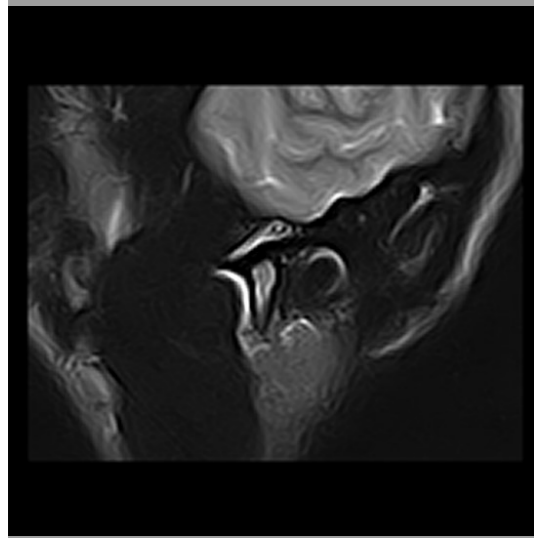
Spine

Spine is a common package for daily examinations. Outstanding phased array head coil will improve the SNR of images. Flexible protocol settings will supply a good operating experience and high resolution images.

Protocol package

- High resolution 2D T1WI, T2WI and PDWI imaging based on SE and FSE2D
- Fat suppression imaging based on STIR
- T2* weight imaging based on GRE sequence
- Fast 2D and 3D Magnetic resonance myelography (MRM)
- Neck arteries (MRA) and veins (MRV) angiography based on 2D and 3D Time-of-flight (TOF)
- MIP, MinIP, MPR for reconstruction of 3D MRM, MRA and MRV

Marked with '*' means it's not a standard offer, please contact us for further information.
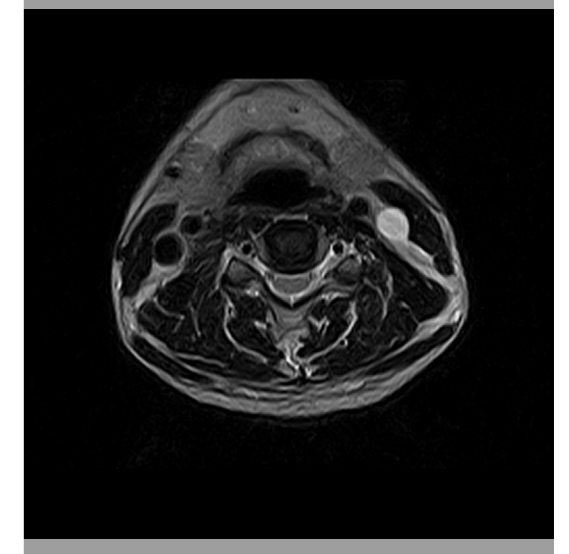
Abdomen

For body examinations, we supply 3 size phased array body coil*, to accommodate patients of different sizes. Rich scanning protocol can meet your clinical needs.

Protocol package

- Breath hold and Respiratory gating functions to reduce the artifact of breath.
- High resolution 2D T1WI, T2WI imaging based on SE, FSE2D, GRE2D
- Fat suppression imaging based on STIR
- Water-fat separation imaging (DIXON)*
- Fast 2D and 3D Magnetic resonance cholangiopancreatography (MRCP)
- Fast 2D and 3D Magnetic resonance urography (MRU)
- Diffusion weighted imaging with a high b value
- MIP, MinIP, MPR for reconstruction of 3D MRCP and MRU
- Propeller imaging
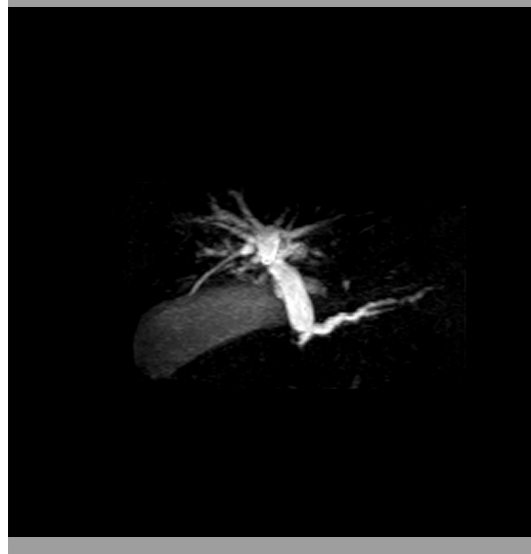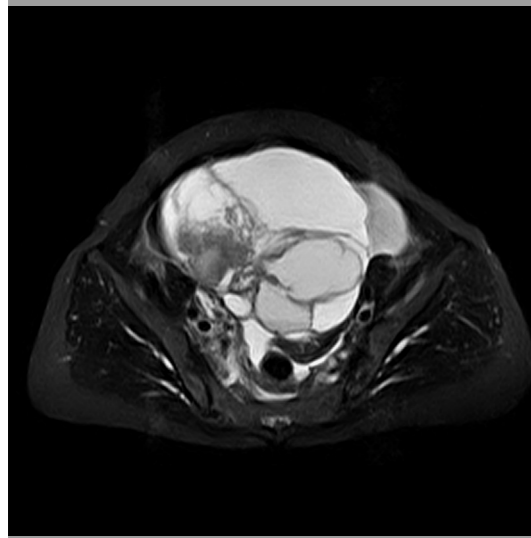
Joint

Limbs examination is an important package in clinical application, we provide complete phased array coil package and protocols to cover all the limbs examination, include Knee, Hip, Ankle, Foot, Leg, Elbow, Wrist, Hand, etc.

Protocol package

- High resolution 2D T1WI, T2WI and PDWI imaging based on SE, FSE2D, GRE2D
- Fat suppression imaging based on STIR
- Water-fat separation imaging (DIXON)*
- T2* weight imaging based on GRE sequence
- 3D T1WI, T2WI imaging based on FSE3D and GRE3D, suitable for small joints with thin slices high resolution images

Marked with '*' means it's not a standard offer, please contact us for further information.
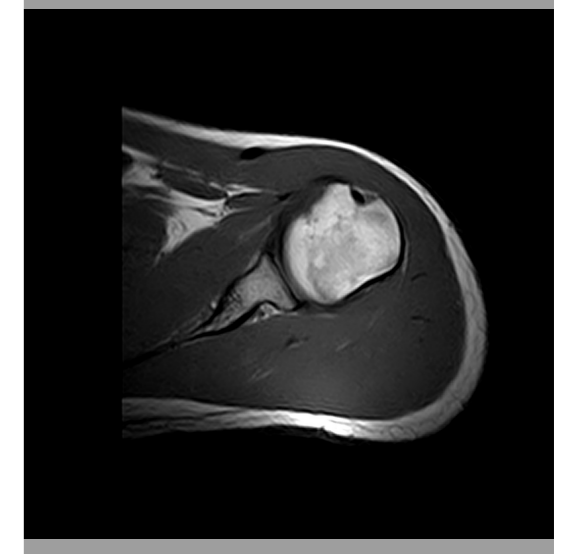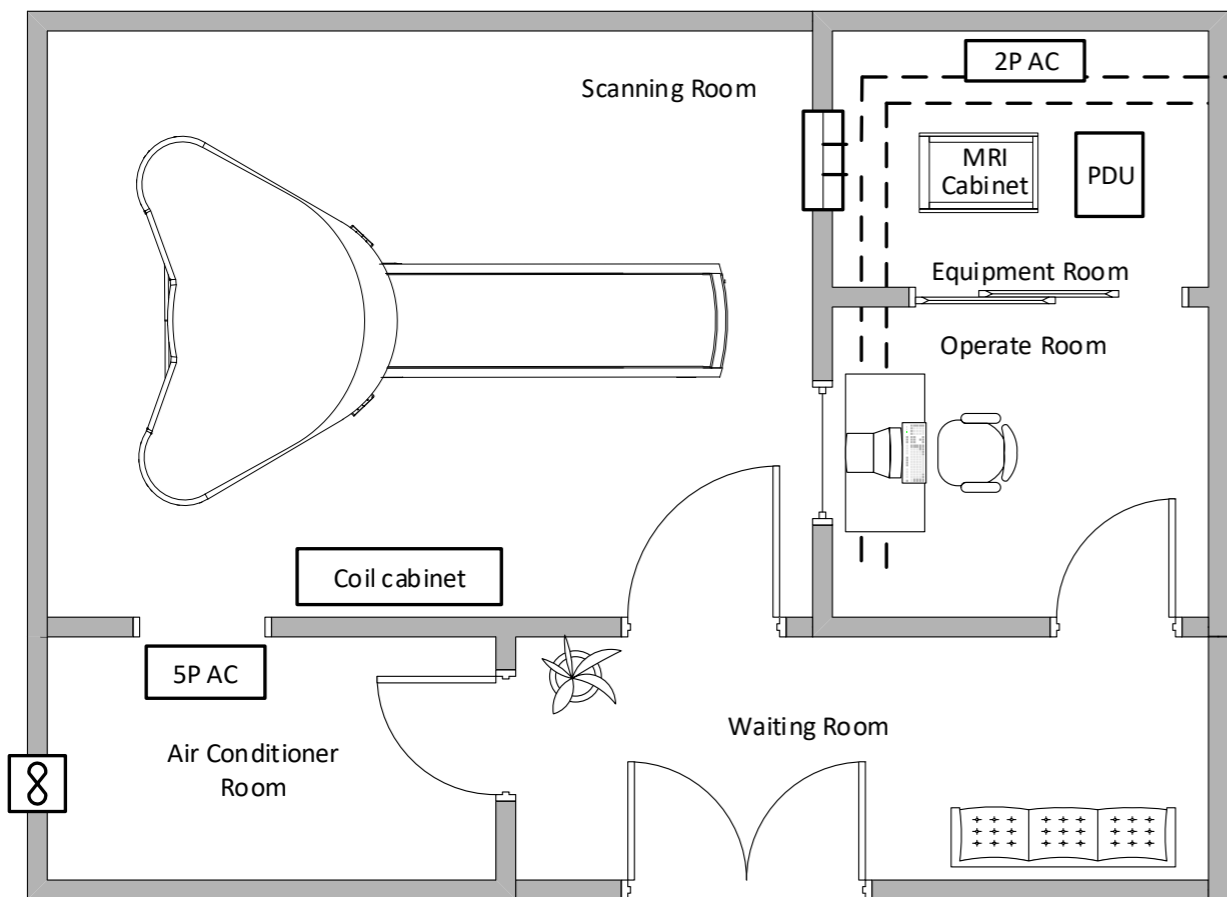
Installation

Magnet specification

Magnet Weight: 23T

Magnet Size (Without cover): 2780×1678×1784 (mm)

Magnet Size (With cover): 2.87×2.92×1.7 (m)

Site drawing

Room	Recommended Dimension L×W×H (m)	Full-function Smallest Dimension L×W×H (m)	Unfull-function Smallest Dimension L×W×H (m)
Scanning Room	5.0×6.5×3.2	4.5×5.6×2.9	4.5×3.8×2.9
Equipment Room	2.0×3.0×3.2	2.0×3.0×2.9	2.0×3.0×2.9
Operation Room	3.8×4.5×3.2	3.0×2.0×2.5	3.0×2.0×2.5
Air Conditioner Room	1.5×2.0×3.2	0	0

Note:

1. If no more space, we can install Air Conditioner in Equipment Room, remove Air Conditioner Room from the site drawing.

1. Full-function Smallest Dimension means the minimum size needed under the premise of satisfying the convenience of operation, sufficient space for security coil cabinet, and convenient installation and maintenance of equipment.

2. Unfull-function Smallest Dimension means the minimum size needed for installation the system, but there may not be enough space for coil cabinet and convenient operation, sometimes it can cause anxiety in patients.

Power Supply

Voltage: 3-Phase & 5-wire, 380V±10%, 50±1Hz;

System Peak Power: ≤10KW;

GND Standard: Separated with other device, Less than 1 Ω.

Environment

Metal Parts Safety Distance (Vehicle, Elevator, Electric Car, Water Pipe, Oil Pipe etc.)

Metal Parts Weight	≤200Kg	≤900Kg	≤4500Kg	Train
Safety Distance (m)	5	6	15	100

Safety Distance (m) of Power cable, Transformer, Power Generator.

Type	AC Power cable (Less than $10mm^2$)	High-Current low-Voltage cable (Between $10mm^2$-$35mm^2$)	Transformer, High-Voltage cable (More than $35mm^2$)
Distance (m)	5	10	25

Note: All the distance should be calculated from the center of the magnet

Others

1. Steady Vibration: 0.5-80hz less than $0.001M/S^2$, Transient less than $0.01M/S^2$, Site should be far away from vibration source.

2. Positioning route: There should be a router for the magnet to enter the scanning room. The room can't be used if not way for positioning.

3. Load-bearing request: Scanning room need to bear the weight of the magnet. The additional bearing reconstruction is needed if it is empty under the room.

Warranty

Shenzhen Anke High-tech Co., Ltd. is a professional enterprise which integrates research, development, manufacture, sales and marketing of products such as Magnetic Resonance Imaging (MRI), computed tomography (CT), and Digital Radiology (DR). We are the leading manufacturer of medical equipment in China and our products are the first choice of most Chinese hospitals, also have exported to more than 30 countries around the world.

OPENMARK 5000 supplied by ANKE will be, under normal and proper use and care, free from all defects or deficiency in design, material and workmanship for the Warranty Period as specified below:

1. Warranty Period (from acceptance date)：12 months.

2. The warranty shall not extend to:

    1) any Products that are misused or that have malfunction attributable to negligence or accidents;

    2) any Products where ANKE's original serial number tag or product identification markings have been altered or removed;

    3) any Products repaired by anyone unauthorized by ANKE.

The guarantee covers all the materials, main accessories that will be shipped directly from the factory and we offer the service technically by the Internet of 7 x 24 hours.

Insight Into life.
www.anke.com