Surgical Technique

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NANOS

Neck Preserving Hip Stem

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Table of Contents

Nota Bene

The technique description herein is made available to the healthcare professional to illustrate the authors' suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the patient.

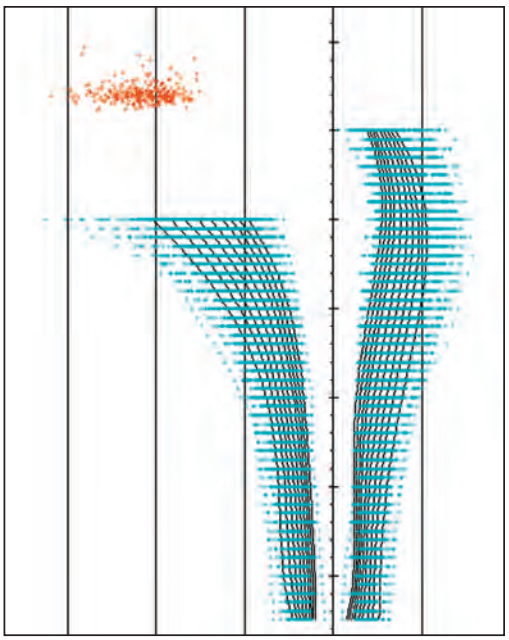
Introduction

The NANOS femoral neck prosthesis was developed to create a system with metaphyseal anchorage and load distribution. The implant requires only minimal bone resection. The cancellous bone around the metaphysis and the greater trochanter are retained to ensure load distribution and transfer. This upholds the principle of the «second line of defence» for this prosthesis concept.

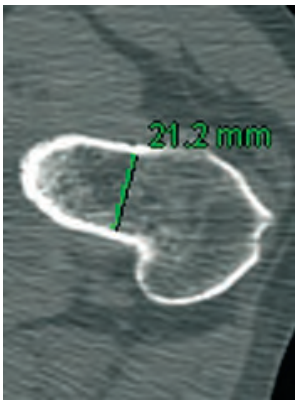
Ten sizes designed to complement each other and a clearly arranged set of instruments make it easier for the surgeon to intraoperatively determine and select the suitable implant.

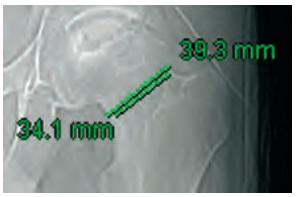
The NANOS femoral neck prosthesis has been developed based on clinical experience of various «short stem prostheses» and is the third generation of this type of prosthesis.

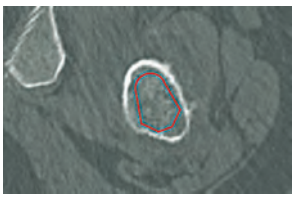
Development/Concept



In the development of the NANOS femoral neck prosthesis 565 CTs of patients under the age of 65 have been assessed. The analysis included determining the medial and lateral internal cortical geometries and the position of the ball head center.
The concept of the prosthesis is to have as long as possible an attachment in the region of the calcar in order to ensure optimum load transfer and to have a cortical attachment in the distal-lateral side to support and compensate loads in the varus direction.







Cortical support in the axial view is also very important with short-stem prostheses. Over 50 CT images were assessed to measure the region of the femoral neck from just subcapital down to the greater trochanter towards the femoral neck level.
The isthmus was determined and measured in two levels to allow far proximal cortico – cancellous anchorage. The CT images were also used to define the transverse geometry, allowing the cortical ring to be fully retained at the circumferences, and to ensure a uniform load transfer.

The materials selected for the NANOS femoral neck prosthesis are also state-of-the-art. The implant is made of a proximal osteoconductive coated titanium forged-alloy (ISO 5832-3).

The surface roughness of the titanium plasma coating on one hand increases the surface area and on the other ensures superior primary stability. The additional calcium phosphate (BONIT®) allows to accelerate the osseointegration process.

There are a total of 10 sizes available. This allows individual, optimum sizing to be carried out in the preoperative planning stage and implemented intraoperatively. The part of the femoral neck below the conus has been tapered to increase the range of motion.

Indications/Contraindications

The following criteria should be taken into account to ensure optimum durability of the NANOS femoral neck prosthesis:

Indications

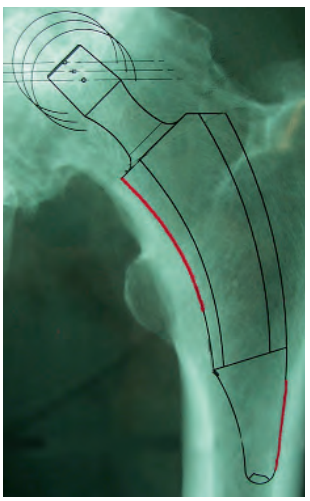
- Primary and secondary osteoarthritis of the hip
- Dysplasia osteoarthritis
- Avascular and post-traumatic femoral head necrosis
- Patients with good bone density and intact femoral neck

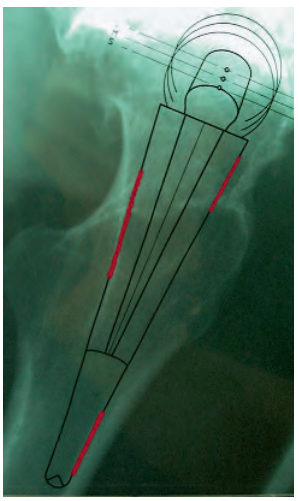
Contraindications

- Marked osteoporosis
- Previous operations that no longer guarantee the planned support
- Marked coxa valga
- Marked coxa vara with a femoral neck implant bed < 125°

The use of skirted femoral heads (XL and XXL) reduces the range of motion (ROM) by about 30°, flexion and extension obtain values between 80° and 100°.

Preoperative Planning

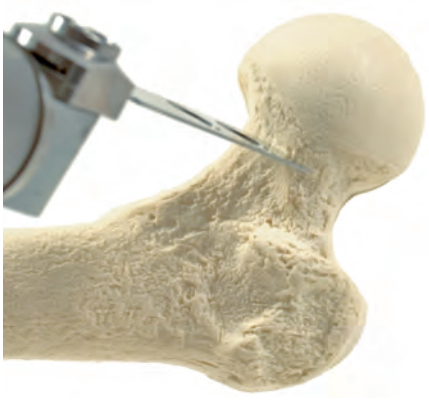




X-ray templates with 15% enlargement are available to preoperatively determine the size of the prosthesis. The size and position of the prosthesis are planned using the anterior/posterior and the axial x-ray image. Depending on the system requirements, attachment is advised in the anterior/posterior region on the calcar femoris, and the lateral corticalis in the region of the tip of the prosthesis.

In the axial x-ray a proximal pressfit in the ventro/dorsal region and support of the tip of the prosthesis in the region of the dorsal femoral cortical bone is achieved.

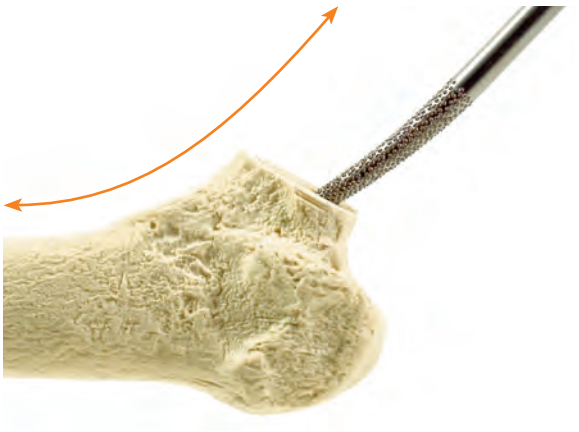
Resection of the femoral neck



A maximum amount of bone is preserved during the resection of the femoral neck.

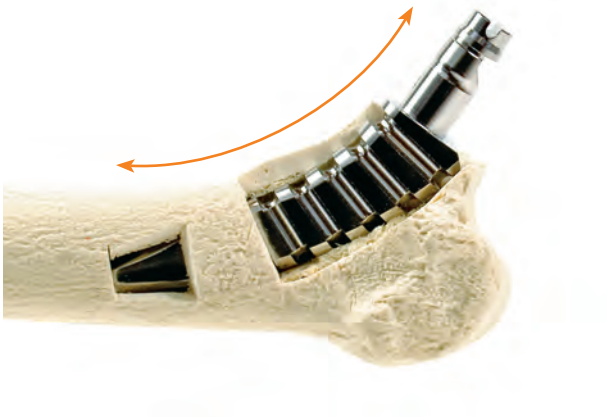
The resection level for the removal of the femoral head is approximately 0.5 to 1.0 cm subcapital, close to a right angle to the femoral neck.

Preparing the femoral neck



The curved universal rasp is used to prepare the path for the forming rasps. The rasp is inserted with a slight curved motion until the lateral cortical bone is reached approximately at the height of the bottom edge of the lesser trochanter.

Rasping is then carried out in stages starting with a size 0 rasp and then with the cancellous compactor.



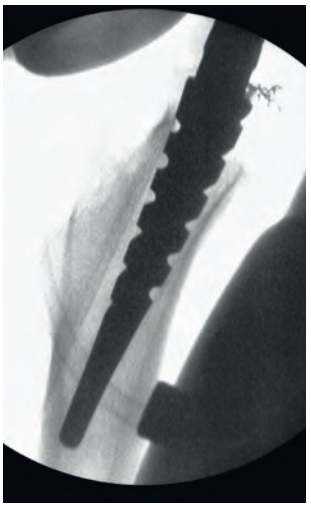
The aim of the preparation is not to rasp out the cancellous bone but to compact it. The preparation is carried out in stages until the planned size is reached and until the compactor is in cortical contact in the load-bearing zones. Cortical contact is reached when the sound changes.

The rasps or compactors should be used in a slightly curved motion to ensure that there are no gaps between compactor and bone.

Trial position

Remove the impacting/extraction adapter and fit the trial head of the corresponding neck length on the compactor.

Trial heads are available with a diameter of 28, 32 and 36 mm.



It is advisable to carry out a C-arm check with the compactor in place, to assess that the implant will be adequately seated.

Remove the trial head and the compactor.

Implanting the stem

Manually insert the original prosthesis of the same size and then impact it to the same depth as the compactor using the inserter.

Carefully clean the conus, fit the femoral head, reposition manually and then impact slightly.

The wound is sutured in the standard way according to the surgeon's preference.

Prosthesis Removal

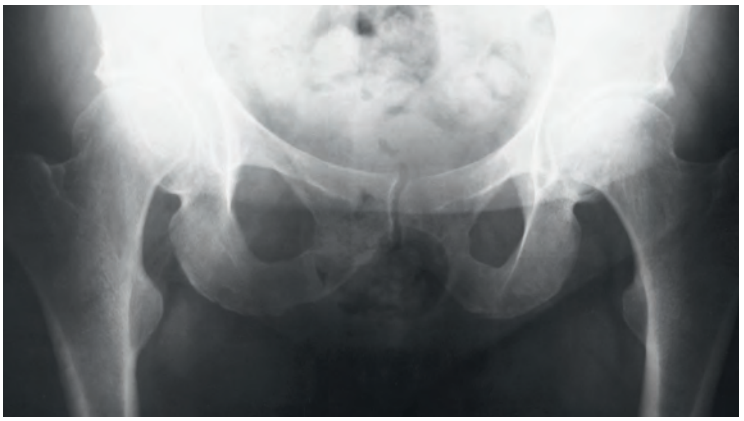
If it is necessary to intraoperatively remove an original prosthesis, the extraction instrument can be used.

This can be fitted to the cone and connected to the impactor/extraction adapter to remove the implant.

Postoperative Treatment

Postoperatively the leg should be placed in a splint in abduction and neutral rotation. On the second day the drains are removed. Mobilization with the three-point gait (partial load bearing of 15 to 20 kg) is carried out starting on the first postoperative day for a period of 4–6 weeks. After this period load bearing is increased depending on x-ray findings.

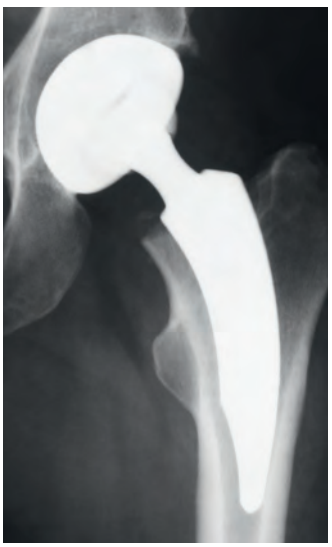
Case Studies

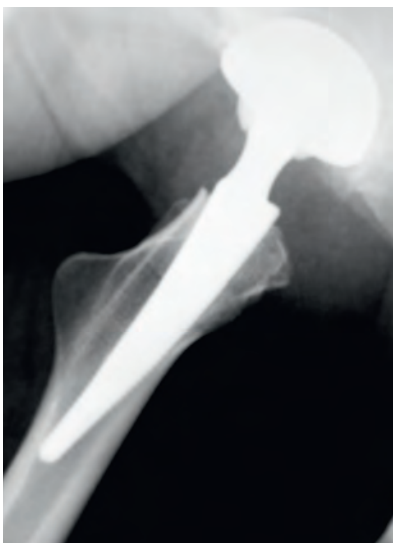


Case 1

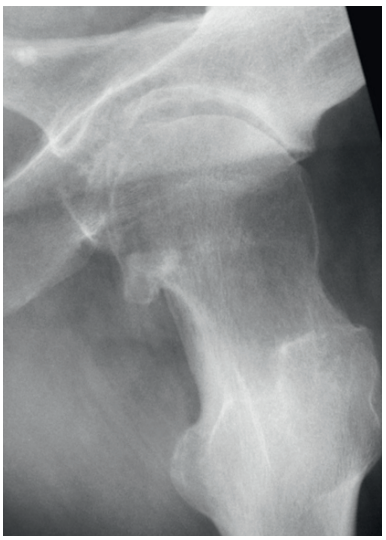
S.R., 49 years of age, female

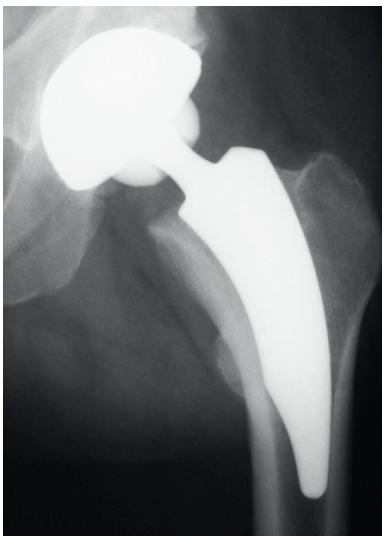
Intraoperative sizing and x-ray control of the compactor.





Postoperative x-ray.
Good position of the NANOS femoral neck prosthesis.

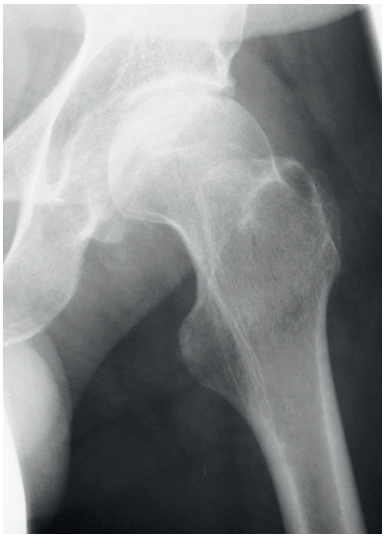




Case 2

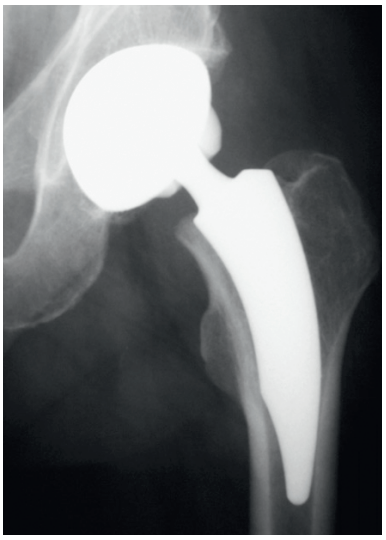
Left:
E.M., 49 years of age, male

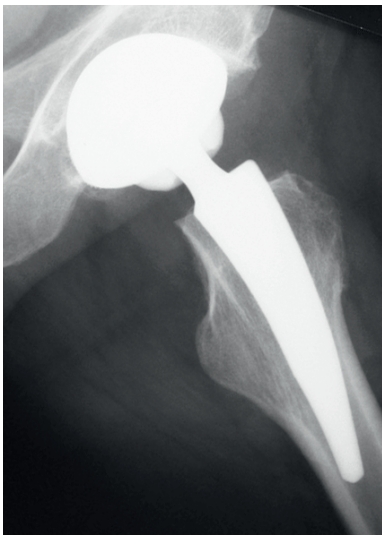
Right:
Postoperative x-ray.
Good position of the NANOS femoral neck prosthesis.



Case 3

S.H., 48 years of age, male





Postoperative x-ray.
Good position of the NANOS femoral neck prosthesis.

Implants

SAP No.	Art. No.	Description	Size
75008154	EN425000	NANOS femoral neck prosthesis	0
75008155	EN425001	NANOS femoral neck prosthesis	1
75008156	EN425002	NANOS femoral neck prosthesis	2
75008157	EN425003	NANOS femoral neck prosthesis	3
75008158	EN425004	NANOS femoral neck prosthesis	4
75008159	EN425005	NANOS femoral neck prosthesis	5
75008160	EN425006	NANOS femoral neck prosthesis	6
75008161	EN425007	NANOS femoral neck prosthesis	7
75008162	EN425008	NANOS femoral neck prosthesis	8
75008163	EN425009	NANOS femoral neck prosthesis	9

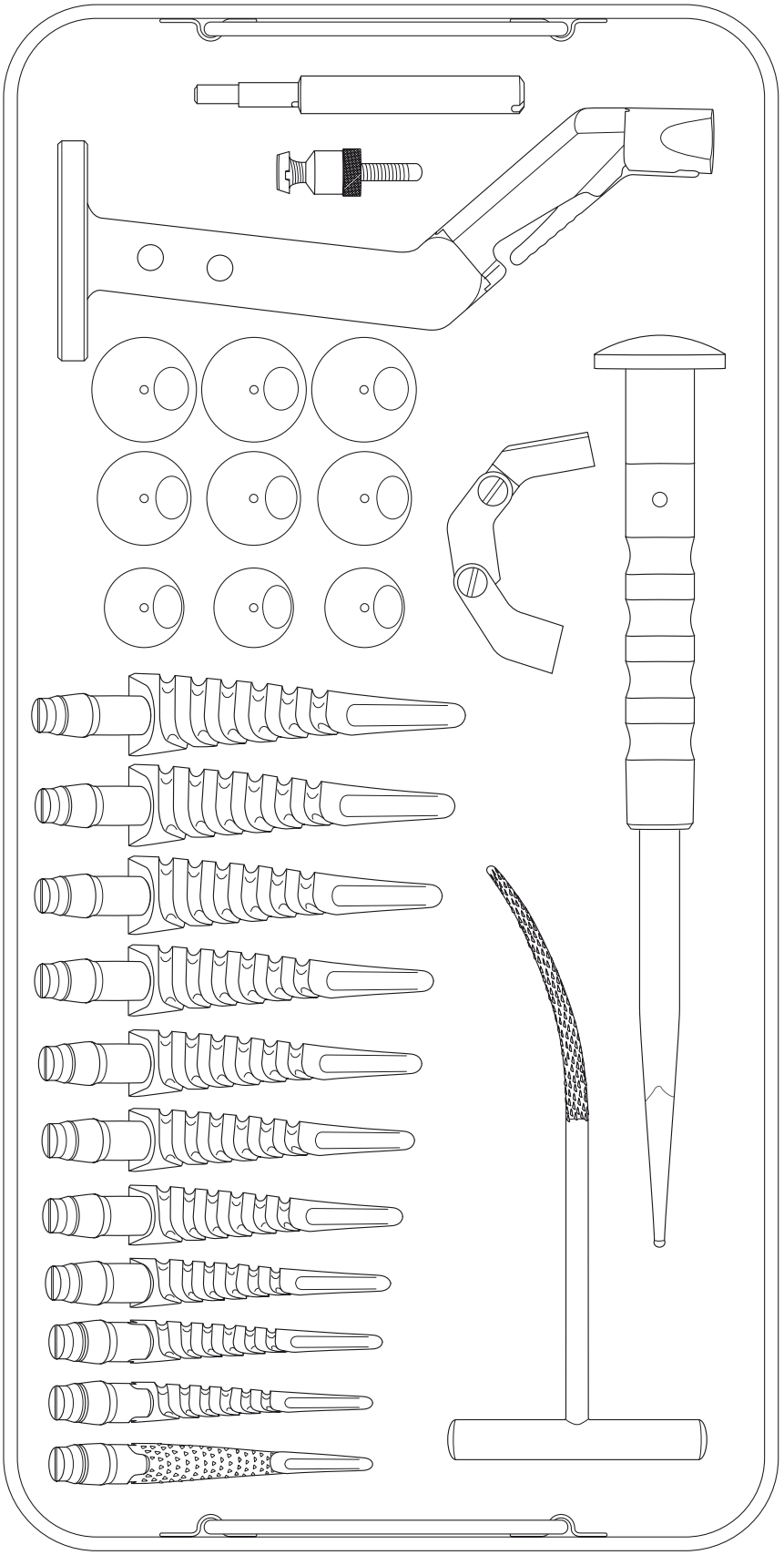
(Ti6Al4V forged-alloy ISO 5832-3,
Ti-Plasma-coating and CaP BONIT®)

Instrumentation

SAP No.	Art. No.	Description	Size
75008174	EN506-1159	Case basket NANOS Femoral Neck-Prosthesis	
75008175	EN506-1160	NANOS compactor	0
75008176	EN506-1161	NANOS compactor	1
75008177	EN506-1162	NANOS compactor	2
75008178	EN506-1163	NANOS compactor	3
75008179	EN506-1164	NANOS compactor	4
75008180	EN506-1165	NANOS compactor	5
75008181	EN506-1166	NANOS compactor	6
75008182	EN506-1167	NANOS compactor	7
75008183	EN506-1168	NANOS compactor	8
75008378	EN506-1253	NANOS compactor	9
75008184	EN506-1169	NANOS rasp handle	
75008185	EN506-1170	NANOS rasp	0
75008317	EN512-280	Trial ball head	28 S
75008318	EN512-281	Trial ball head	28 M
75008319	EN512-282	Trial ball head	28 L
75008321	EN512-320	Trial ball head	32 S
75008322	EN512-321	Trial ball head	32 M
75008323	EN512-322	Trial ball head	32 L
75008325	EN512-361	Trial ball head	36 S
75008326	EN512-362	Trial ball head	36 M
75008327	EN512-363	Trial ball head	36 L
75008173	EN506-1155	Awl with handle 90° rotated	
75008172	EN506-1056	NANOS impactor	
75008168	EN506-073	Stem extractor	
75008169	EN506-075	Handle adapter extractor	
75008164	EN506-015	Rod for handle	

Optional instruments (depending on approach):

75094887	EN506-1210	IMT rasp adapter, spring hook, straight
75030476	EN506-1245	Rasp holder, spring hook, curved, 180° rotated tensioning mechanism
75008196	EN506-1204	Rasp handle, spring hook, straight
75030323	EN506-1220	Extended awl with handle, 90° rotated



Sterilization

Implants

All the implants described in this Surgical Technique are sterile when they are delivered by the manufacturer. Resterilization is not allowed.

Instruments

System components and instruments are not sterile when they are delivered. Before use they must be cleaned by the usual methods in accordance with internal hospital regulations and sterilized in an autoclave in accordance with the legal regulations and guidelines applicable in the relevant country. (For detailed information please refer to leaflet Lit. No. 1363.)

The correct settings are given in the instructions for use issued by the autoclave manufacturer. Instrument manufacturers and dealers accept no responsibility for sterilization of products by the customer.

Notes

Notes

Manufacturer
OHST Medizintechnik AG
Rathenow
Germany

Contact

Lit. No. 1716-e Ed. 01/11

CE 0482