Aesculap Trilliance®

Triple Tapered Polished Hip Stem

Aesculap Orthopaedics

B BRAUN
SHARING EXPERTISE

Trilliance®
Triple Tapered Polished Hip Stem

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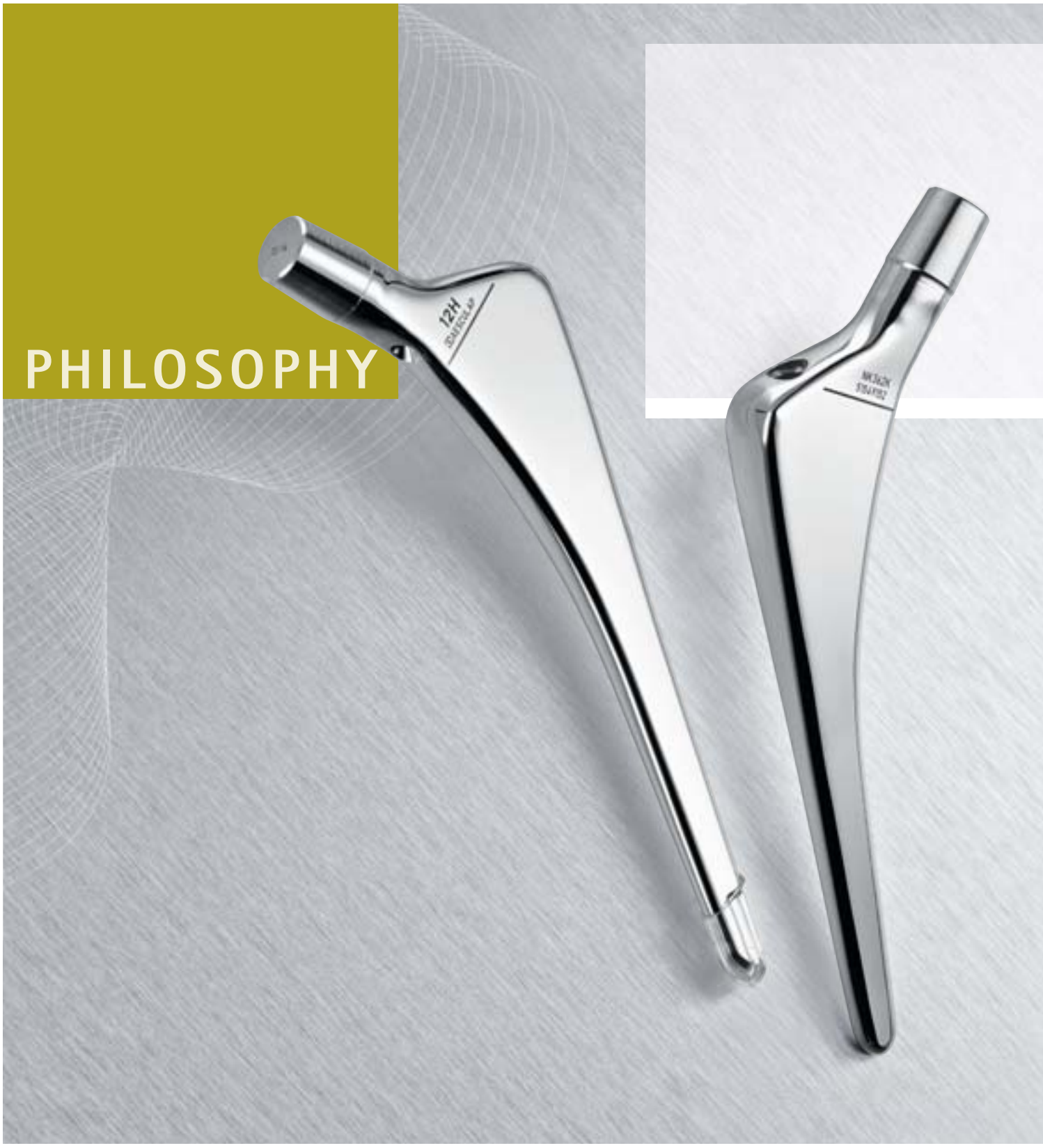
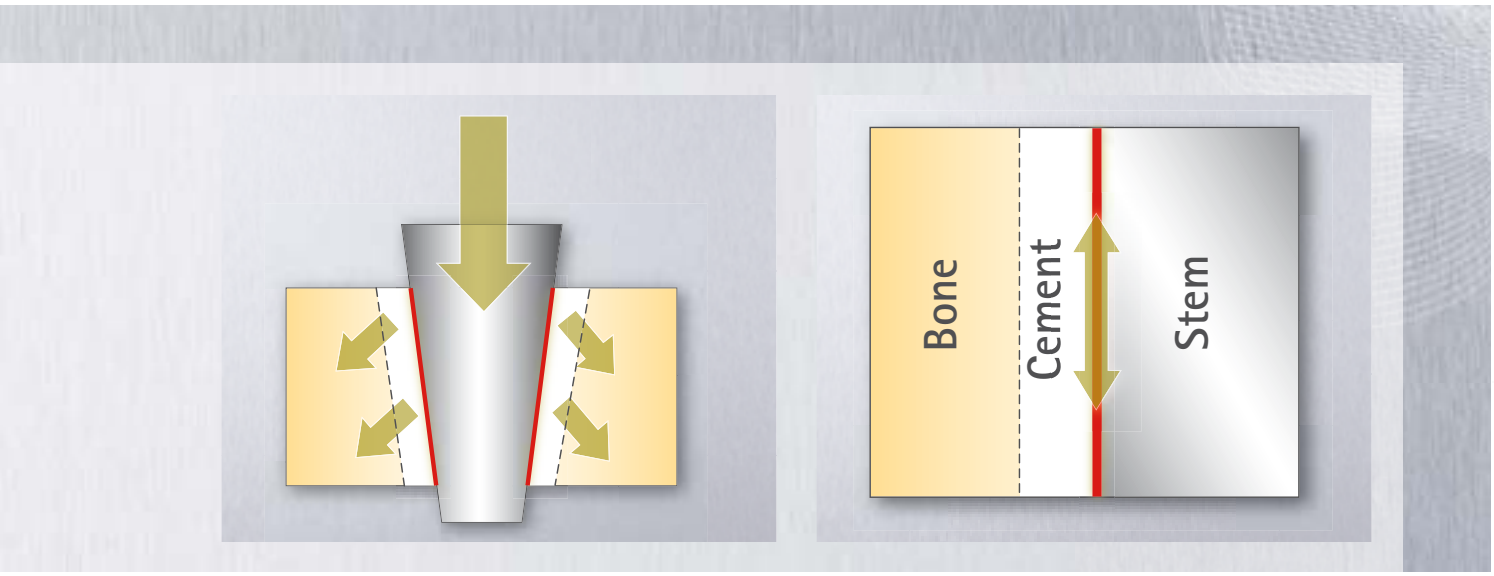
Trilliance® Implant Philosophy





Taper Loading

Polished Interface

The basic principle of hip implant fixation with bone cement is based on the long-term mechanical integrity of the bone cement layer between implant and bone. The success of cemented hip replacement depends on the mechanical properties of bone cement, sufficient thickness of the cement mantle, cement penetration into the bone and the accurate method of surgical cement application.
Since the beginning of cemented hip replacement considerations to use polished implant surfaces were taken to reduce the mechanical load and stress transfer to the bone cement.
The design philosophy of polished hip stems aims towards a minimization of cement damage. Tapered surfaces and the absence of a collar allow the hip stem to subside within the cement mantle, maintaining a compressive load transfer between prosthesis and cement and also between the cement and bone interface.

A certain axial subsidence of a polished hip stem happens between implant and cement and the tapered design balances the cement creepage for in vivo loading conditions.
As cement micro cracks can be observed in any cemented implant application, polished hip stem surfaces minimize the primary introduction of cracks and their secondary propagation in higher loaded bone cement zones.
Initially, polished hip stem designs were single tapered in the sixties followed by double tapered prosthesis in the seventies. The following evolution of an implant generation with triple tapered polished hip stems features a tapered design both in the frontal and lateral view and within the anterior-posterior cross-section.
The philosophy of the Trilliance® triple tapered polished hip stem is a design evolution of this type of cemented hip stem prosthesis.

Trilliance® Design Principles

DESIGN

Proportional Implant Sizing

Linear Offset Progression

The Trilliance® hip stem is designed for cemented implantation. The design features are based on the third generation of straight polished hip stems.
The polished Trilliance® hip stems are triple tapered and produced from forged CoCr alloy.
Trilliance® implants provide a linear increasing lateralisation by implant size. The CCD is 135 deg.
Trilliance® implant size parameters increase proportionally by size. The mechanical strength of the design features is proven by mechanical fatique testing.

The nominal thickness of the Trilliance® cement mantle can be influenced by the rasp and implant size selection. Rasp and implant measurements are equal.
The fully teethed rasps provide an additional length of 5 mm to include the position of the optional modular distal Centralizer.
The Trilliance® distal centralizers are dedicated to each implant size and are produced from PMMA. The cap type design allows a safe axial stem setting within the cement mantle.

Trilliance® Implant Range

IMPLANTS

Hybrid

Bipolar **cemented**

Implants

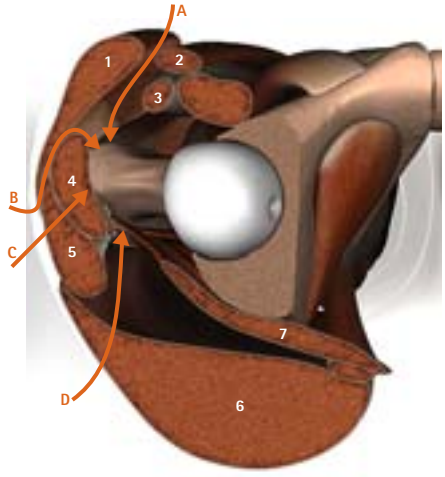
The Trilliance® hip stem can be combined with Bipolar Cups or cemented and cementless acetabular implants for total hip arthroplasty. The Plasmacup® acetabular system includes Biolox® ceramic on ceramic or ceramic on polyethylene as well as metal on polyethylen articulation.

Trilliance® stem length and offset characteristrics are summarized in the table below.

Trilliance® stem size	femoral offset	stem length
8	39.8 mm	130 mm
10	42.0 mm	135 mm
12	44.2 mm	140 mm
14	45.2 mm	145 mm
16	46.2 mm	150 mm

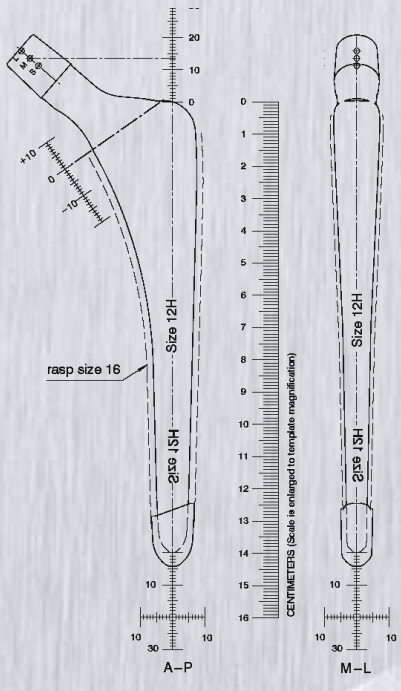
Trilliance® Surgical Technique

SURGERY



A – direct anterior
B – antero-lateral
C – direct lateral, transgluteal
D – posterior

1 M. – tensor fasciae latae
2 M. – sartorius
3 M. – rectus femoris
4 M. – glutaeus minimus
5 M. – glutaeus medius
6 M. – glutaeus maximus
7 M. – piriformis



Indications and preoperative Planning

The Trilliance® hip stem is indicated for cemented primary hip arthroplasty in the case of degenerative, dysplastic or inflammatory osteoarthritis and medial hip fractures.

Preoperative planning considers the situation of the contra-lateral hip joint and the necessary acetabular implant component. Therefore, the following aspects should be taken into account:

- Optimal positioning of components
- Determine position and distance between expected positioning of components and anatomical landmarks
- Trilliance® stem size and cement layer
- Adjustment of leg length discrepancy compared with the contra-lateral side.

Trilliance® X-ray templates are used to plan the stem position in AP and lateral projection with magnification of 15%.

The center of rotation the shape and size for a cement layer of 2 mm in dotted lines and the position of the distal centralizer are provided.

A radiograph showing the anterior-posterior view of the proximal femur with 15 degrees internal rotation and a lateral view of femur should be prepared.

The Trilliance® stem should be placed parallel to the femoral axis. The scales on upper part and medial part of stem provide references to the greater and lesser trochanter and facilitate templating for intraoperative landmarks for the osteotomy.

Adjusting of leg length discrepancy is possible using different femoral heads. If appropriate adjusting of leg length discrepancy is not achieved, repositioning of both components in the femoral and acetabular sides should be considered. Caution should also be taken to confirm that the expected femoral component can be implanted into the femoral canal in lateral view.

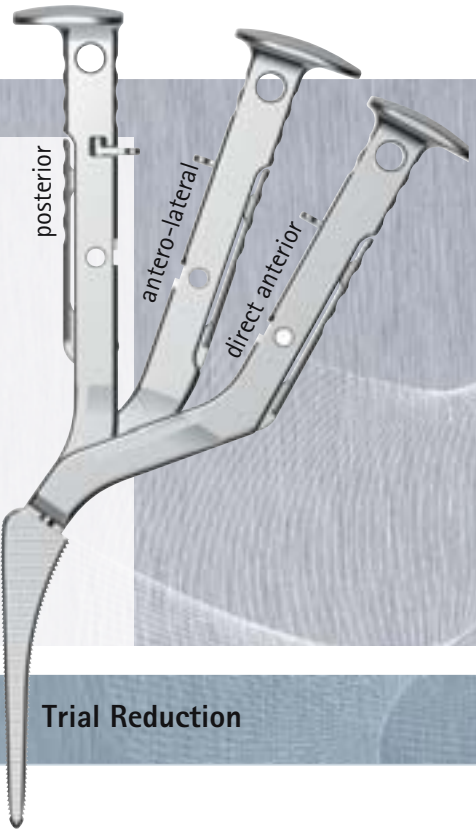
Trilliance® Osteotomy and Femoral Preparation

Neck Resection

The Trilliance® osteotomy angle is at a standard angle of 55 degrees. The orientation of the osteotomy can be planned pre-operative in relation to the lesser trochanter. The Trilliance® x-ray templates show the relation between stem position and osteotomy level.

Box Osteotome

The medullary canal is opened with the box osteotome ND769R, which is inserted postero-laterally and determines the femoral antetorsion angle.



Intermedullary Rasping

The medullary canal is prepared with increasing sized Trilliance® rasps until the desired size, depth and stability are achieved. Caution should be used with the applied rasp force and not to oversize the rasp to avoid femoral bone fissures or fractures. The osteotomy plane of 55 deg. is clearly indicated.
Different rasp handles are available for posterior (NG229R), antero-lateral (NG230R) and direct anterior (NG228R) approaches to the hip joint.

Trial Reduction

Each Trilliance® rasp size can be coupled with a corresponding trial neck adapter.

Appropriate trial heads, are used for trial reduction and joint inspection. Range of motion, joint stability and leg length discrepancy are checked and adjusted using different trial heads. Maximum available neck length is XL.

Trilliance® Cement Application and Implantation

Cement Plug Preparation and Bone Cement Application

The application of a cement plug is mandatory before the application of the bone cement. If an artificial cement plug is used, the application of the cement plug depends on its instruction for use.
The distal femoral canal size is measured 10 – 20 mm below the distal implant tip level with intramedulary probes.
The intramedulary probes can be attached to a T-handle.

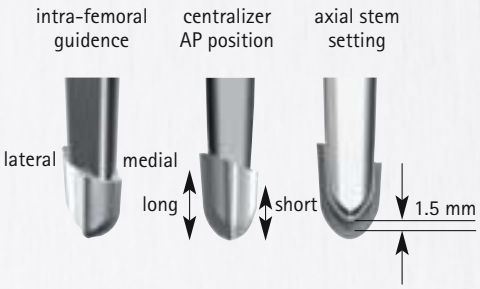
After the cement plug has been placed intramedulary, the bone cement can be inserted into the femoral canal.

The bone cement application depends on the instruction for use of the bone cement and the used cement application system.

When using a distal bone plug, dedicated bone plug reamers (ND185R – ND189R) facilitate the preparation of a conical bone plug from the resected femoral head. The bone plug reamer can be attached to a power drill tool via a standardized Harris connection. The bone plug impactor (ND706R and ND707R) can be used for insertion and impaction of the bone plug.

Trilliance® Stem Implantation

The instrument for the stem insertion NG930R is used to achieve the final stem position and can also be used to guide the rotational orientation of the Trilliance® stem. The Trilliance® stem has a laser marking on the proximal part, which can be used as a guideline for the insertion depth.
Don't hammer during the stem insertion. The stem should be inserted carefully and slowly to assure a homogenous cement mantle. The cement extruding from the bone cavity should be removed carefully.



Trilliance® Centralizer

The upper, open end of the centralizer is cut in an angle for a correct orientation of the centralizer on the distal tip of the Trilliance® stem. The longer side of the centralizer has to be on the lateral side of the stem and the shorter one on the medial side. The centralizer has to be attached before insertion into the cemented femoral canal.

Centralizer Sizing

The Trilliance® PMMA centralizer should be used to achieve an appropriate stem seating.
The size of the Trilliance® stem and the size of the centralizer have to correspond. The stem size is one or two sizes smaller than the final rasp size for preparation in order to achieve a cement mantle of > 1 mm or > 2 mm (see table below).

Femoral Head Insertion

After the cement has hardened thoroughly, trial heads can be applied to the stem for final trial reduction.
When the appropriate femoral head is confirmed, the femoral head implant is applied to the stem.

Final rasp		Trilliance® stem size	Trilliance® Centralizer	
cement > 1 mm	cement > 2 mm			
10	12	8	8	NJ488
12	14	10	10	NJ490
14	16	12	12	NJ492
16	18	14	14	NJ494
18	-	16	16	NJ496

Trilliance® Implants

12/14

size 12/14	Trilliance® stem	Trilliance® centraliser
8	NK358K	NJ488
10	NK360K	NJ490
12	NK362K	NJ492
14	NK364K	NJ494
16	NK366K	NJ496

ISODUR®$_F$ CoCr29Mo ISO 5832-12 PMMA

Trilliance® centralizer fit only with the appropriate stem as listed in the table above.

Modular heads

12/14

12/14	28 mm	32 mm	36 mm
S	NK460D	NK560D	NK650D
M	NK461D	NK561D	NK651D
L	NK462D	NK562D	NK652D
XL	-	NK563D	NK653D

Biolox® delta Al_2O_3 matrix ceramic

12/14

12/14	28 mm	32 mm
S	NK429K	NK529K
M	NK430K	NK530K
L	NK431K	NK531K
XL	NK432K	NK532K

ISODUR®$_F$ CoCr29Mo ISO 5832-12

Bipolar Cup

28 mm

41 mm	–	46 mm	NK046S	51 mm	NK051S
42 mm	–	47 mm	NK047S	52 mm	NK052S
43 mm	NK043S	48 mm	NK048S	53 mm	NK053S
44 mm	NK044S	49 mm	NK049S	54 mm	NK054S
45 mm	NK045S	50 mm	NK050S	55 mm	NK055S

ISODUR®$_S$ Implant steel alloy ISO 5832-1 /UHMWPE ISO 5834-2

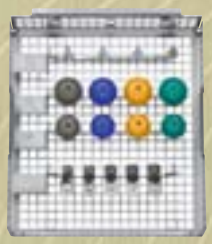
Trilliance® Instruments

NG162
Trilliance® Instruments

Trilliance® Instruments tray

Tray dimensions: 489 x 253 x 74 mm

Trilliance® trail neck component tray



Trilliance® rasps

size	8	10	12	14	16	18
	NG248R	NG250R	NG252R	NG254R	NG256R	NG258R

NG163R	Trays for set NG162
TE968	Graphic template for NG163R
JH217R*	Lid
ND017R	Cross bar for Rasp handle
ND769R	Box osteotome
ND050	Head impactor
NG930R	Stem impactor
NG229R*	Rasp handle THA posterior
NG230R*	Rasp handle THA lateral

* please order separately

Trilliance® rasp adapters

size	8	10	12	14	16
12/14	NT238R	NT240R	NT242R	NT244R	NT246R

Trilliance® trial heads

size	28 mm	32 mm	36 mm
S	NG296	NG306	NG326*
M	NG297	NG307	NG327*
L	NG298	NG308	NG328*
XL	NG299	NG309	NG329*

* please order separately

NG166
Trilliance® Bone plug preparation and insertion

Tray dimensions: 489 x 253 x 74 mm

Femoral canal probes

ø 10 mm	ø 12 mm	ø 14 mm	ø 16 mm	ø 18 mm
NG710R	NG712R	NG714R	NG716R	NG718R

Bone plug reamers

8 – 10 mm	10 – 12.5 mm	12.5 – 15 mm	15 – 18 mm
ND185R	ND186R	ND187R	ND188R

NG167R	Tray for set NG166
TE970	Graphic template for NG167R
JH217R*	Lid
ND144R	T-handle 125 mm HARRIS
NG706R	Introducer for bone plugs straight
ND707R	Introducer for bone plugs curved

* please order separately

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