SynReam

The DePuy Synthes Reaming System

Surgical Technique

approved by AO Technical Commission

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of DePuy Synthes reusable devices, instrument trays and cases, as well as processing of DePuy Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

Note: The Monobloc Flexible Reamers and the associated graphic case (60.028.000 and 60.028.001) follow different cleaning guidelines than the standard DePuy Synthes cleaning guidelines. For cleaning instructions for the Monobloc Flexible Reamers and associated graphic case part numbers 03.028.060–03.028.105 and 60.028.000–60.028.001, refer to www.avalign.com/ifu; packaging insert # RD_IFU-0001.

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The AO Principles of Fracture Management

Mission

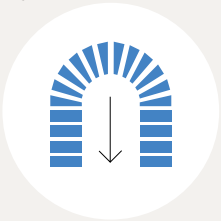
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

AO Principles[1,2]

1.

Fracture reduction and fixation to restore anatomical relationships.

2.



Fracture fixation providing absolute or relative stability, as required by the "personality" of the fracture, the patient, and the injury.

3.

Preservation of the blood supply to soft-tissues and bone by gentle reduction techniques and careful handling.

4.

Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg New York: Springer 1991.
[2] Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

Flexible Reamers for Intramedullary Nails

- Single shaft to drive reamer heads
- Reamer heads are coupled to the shaft without hand contact with the reamer head
- Ball of 2.5 mm reaming rod will fit through the cannulation of the DePuy Synthes nail connecting screws

Flexible Shaft (352.040, 352.044*)

The NITINOL shaft allows driving of reamer-head sizes with one shaft diameter only. The front coupling has a hexagon for torsional transmission. In addition, the shaft is equipped with a click-on mechanism that primarily fixes the reamer heads onto the flexible shaft.

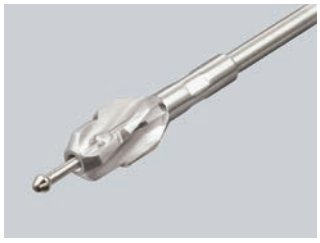
Pass the reaming rod through the shaft and reamer or reduction head to ensure a secure, positive connection between both parts. The insertion of the reaming rod connects both parts firmly to one another.

▲ Precaution:

Never ream without using a reaming rod, as it secures the connection between the reamer head and the flexible shaft.

The coupling of the machine corresponds to that of the standard system (large DePuy Synthes quick coupling). The system allows coupling with the attachment for medullary reaming as well as with the angular drive. Use the individual reamer heads to ream in 0.5 mm increments.

Reamer Heads (352.085–352.190)



The chip spaces ensure facilitated chip flow. The 8.5 mm reamer head is equipped with front-cutting edges. For this reason, this diameter should be selected as the starting diameter. Reamer heads are available in diameters of 8.5 to 19 mm (in 0.5 mm increments).

■ Notes:

- Inspect the reamer heads for damages, as blunt reamer heads can increase intramedullary pressure and temperature.
- For technical reasons (cutting geometry), the reamer heads cannot be resharpened.
- Damaged reamer heads have to be replaced.

* Optional

Reaming Rod, ∅ 2.5 mm, length 1150 mm (352.033**)

The length of the reaming rod has been increased by 200 mm to allow the use of the motor with attachment for medullary reaming instead of the angular drive. The reaming rod has a diameter of 2.5 mm.

The reaming rod is pushed into the medullary cavity and helps to guide the flexible shaft over the reduced fracture. The olive shaped tip of the reaming rod prevents the flexible shaft from being pushed over the reaming-rod tip. It also aids in the removal of jammed reamer head. The flattened end of the reaming rod provides a holding surface for the reaming rod holding forceps.

▲ Precautions:

- Check the reaming rod for damages before using it. Otherwise, both the reamer heads and the flexible shaft cannot advance smoothly, as a result the reaming rod might end up in the knee adjacent joint cavity.

A reaming rod of 950 mm is also available (352.032**).

Tray for Reaming Heads (675.504)

The click-on connection of SynReam allows the reamer heads to click directly onto the shaft. Place the reamer heads into the holder with the tip pointing downwards. The reamer head can now be clipped onto the shaft. Always make sure that the reamer head is fully engaged.

** Also available Sterile

Medullary Reamer Heads

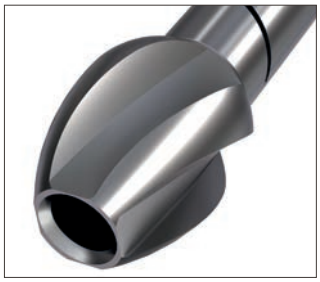
- Sizes from 8.5 to 19.0 mm, in 0.5 mm increments
- The 8.5 mm reamer head is front-cutting, all others are side-cutting
- The 8.5 mm reamer head should only be used in a medullary canal with an isthmus of 8.0 mm or more. If necessary, use the hand reamers or Monobloc Flexible Reamers to open the canal to 8.0 mm first

Good reaming practices

- Inspect reamer heads for dullness before every surgery that requires reaming
- Ream with a ball tipped reaming rod
- Widen canals narrower than 8.0 mm with the hand reamers or Monobloc Flexible Reamers
- Ream in 0.5 mm increments; do not skip reamer head sizes

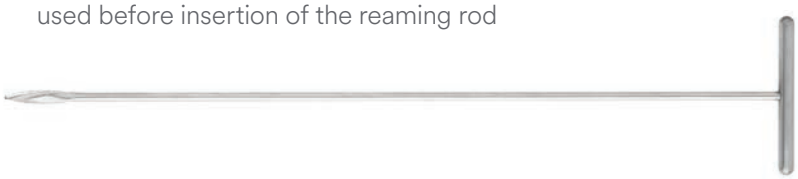
Monobloc Flexible Reamers*

- From sizes 6–10.5 in 0.5 mm increments
- 385 mm length
- Flexible laser pattern, one piece, front-cutting reamers
- Couples with Modified Trinkle drill couplings or Jacobs Chuck drill couplings



Hand Reamers, 6.0 mm, 7.0 mm, 8.0 mm

- For use in medullary canals with an isthmus smaller than 8.0 mm
- 450 mm length
- Use hand reamers incrementally to widen the medullary canal to 8.0 mm, before using the front-cutting 8.5 mm medullary reamer head under power
- In sclerotic medullary canals, the hand reamers may be used before insertion of the reaming rod



* Optional

Reduction Heads, straight or angled

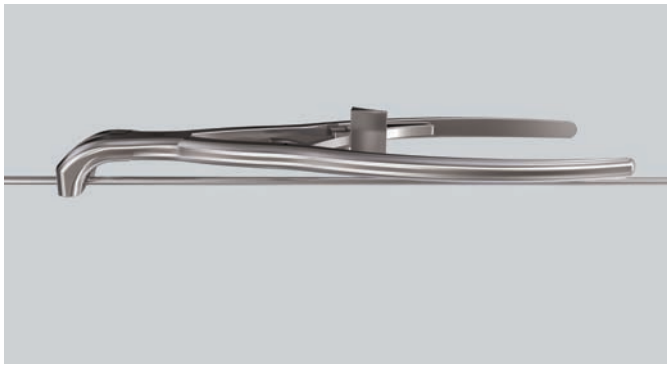
- Attach to the flexible shaft
- Aids in the passage of the reaming rod
- Must be used with the 2.5 mm reaming rod

Holding Forceps

- Used to insert and maintain placement of the reaming rod in the medullary canal

Handling Technique for Reaming Rod and Medullary Reamers

1. Insertion

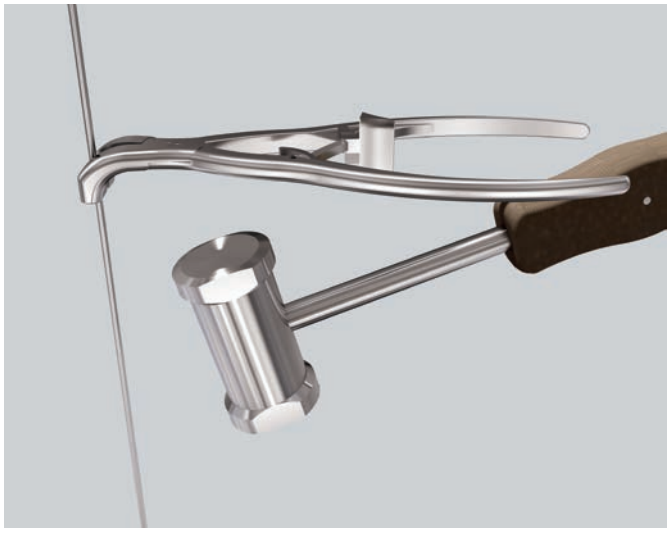


2. Holding

During reaming, grasp the end of the reaming rod to prevent its withdrawal. After the reamer head is removed from the canal, grasp the reaming rod between the reamer head and the canal entry point.

3. Emergency Application

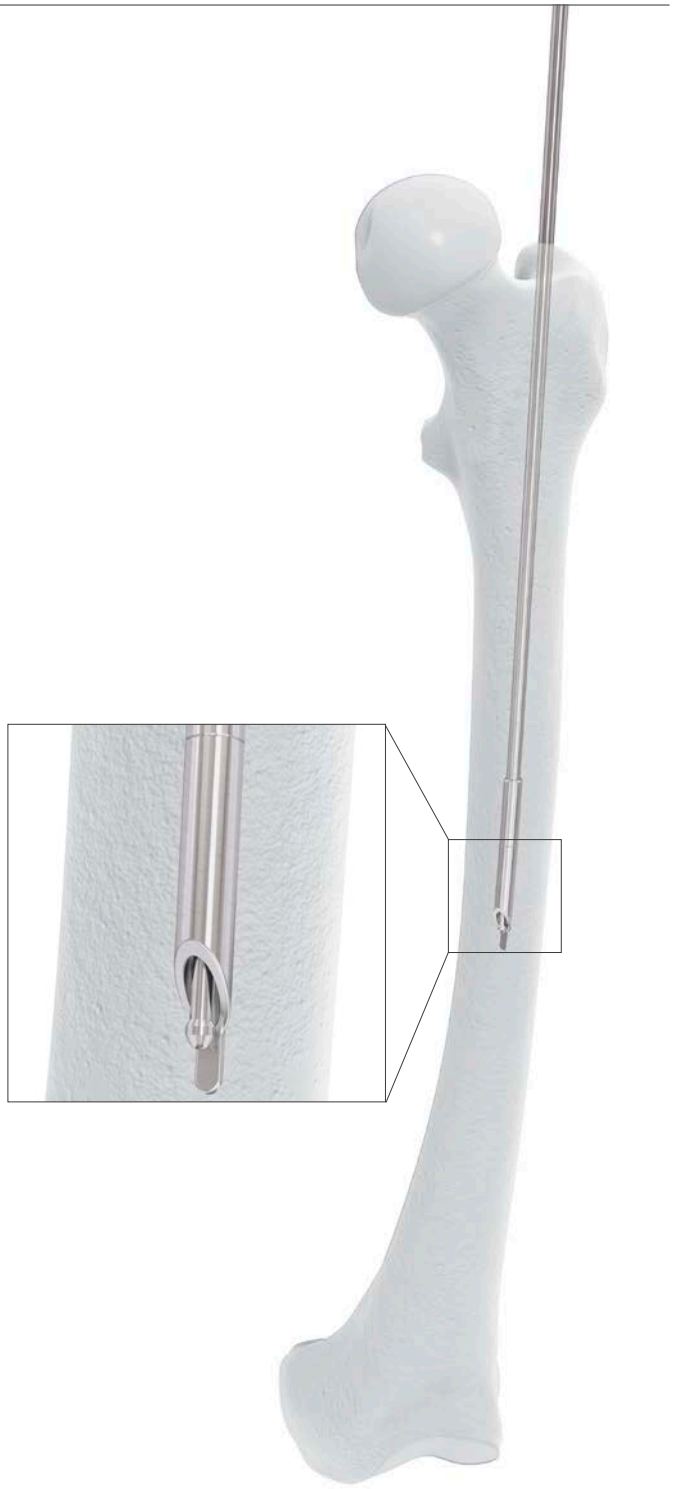
If a reamer head jams, use the holding forceps for reaming rods to grasp the back end of the reaming rod. Then, remove the jammed reamer with light hammer blows on the holding forceps.



Reduction Fracture

1. Reduce Fracture

Instruments	
351.150	T-Handle with Quick Coupling
352.040	SynReam Flexible Shaft
	Reduction Heads
352.050	straight
352.055	angled
	SynReam Reaming Rods ∅ 2.5 mm
352.032**	short, length 950 mm
352.033**	long, length 1150 mm



** Also available in Sterile

Assemble one of the reduction heads onto the 5.0 mm flexible shaft (A).

Attach the shaft to the flexible shaft handle (B).

Insert the smooth end of a 2.5 mm reaming rod (C) into the tip of the 7.0 mm reduction head until the ball tip touches the reduction head (D).

Insert the reduction system into the medullary cavity and reduce the fracture under imaging.

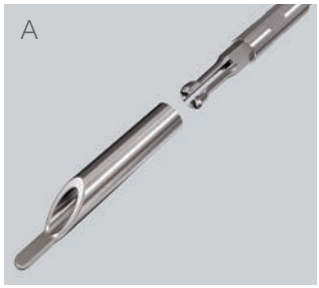
▲ Precaution:

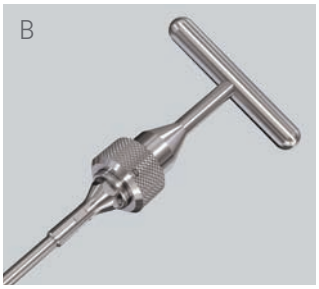
A secure fixation of the reduction head is not guaranteed if the reduction system is used without the reaming rod. The reduction head may be lost in the medullary canal.

After reduction has been achieved, remove the reduction assembly and leave the reaming rod in the canal. Advance the reaming rod to the desired depth of implant.

▲ Precaution:

As each manipulation in the medullary cavity causes an intramedullary pressure increase, reduction of the fracture, using the reduction system also increases the pressure. Manipulations should therefore be minimized. As an alternative, reduction can be carried out using the reaming rod alone.

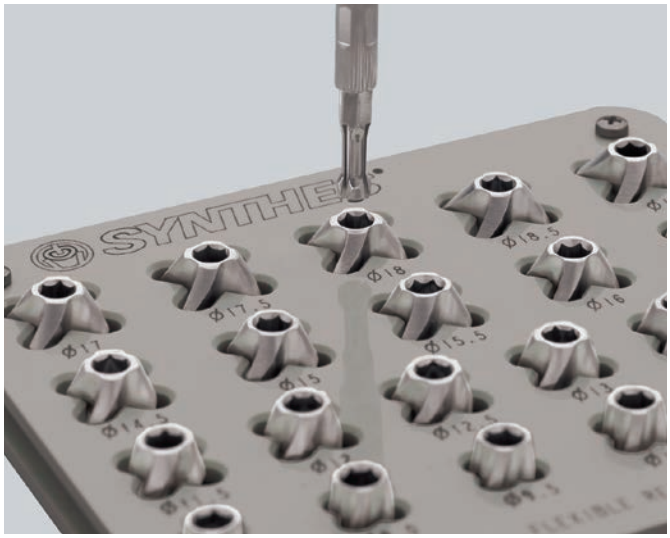




Medullary Reaming

2. Ream Medullary Canal

Instruments	
351.050	Tissue Protector
352.032** 352.033**	SynReam Reaming Rods ∅ 2.5 mm short, length 950 mm long, length 1150 mm
351.782	Holding Forceps for SynReam Reaming Rod ∅ 2.5 mm
689.063	Insert w/Removing Device f/VC No. 689.060
351.920 351.930 351.940	Hand Reamers for Medullary Canal ∅ 6.0 mm for Medullary Canal ∅ 7.0 mm for Medullary Canal ∅ 8.0 mm
03.028.060 –03.028.105	Hand Reamer MONOBLOC FLEXIBLE REAMER 6.0–10.5 mm, 385 mm
352.040	SynReam Flexible Shaft
352.044*	Flexible Shaft ∅ 7mm, long
352.085	SynReam Medullary Reamer Head ∅ 8.5 mm
511.785	Attachment for Acetabular and Medullary Reaming, for Compact Air Drive and Power Drive
511.701	ComPact Air Drive II
05.001.210	Attachment for Acetabular and Medullary Reaming, for Trauma Recon System
05.001.201	Battery Handpiece, modular, for Trauma Recon System



* Optional
** Also available in Sterile

In medullary canals with an isthmus narrower than 8.0 mm, or in sclerotic medullary canals, use the hand reamer(s) or the Monobloc Flexible Reamers over the 2.5 mm reaming rod to widen the canal to 8.0 mm before using the power driven, front-cutting 8.5 mm reamer head.

▲ Precaution:

Monobloc Flexible Reamers must be used with drill power configurations only. DO NOT use reaming power configurations as it will cause reamer breakage in the event that the reamer is incarcerated.

Clip the shaft onto the reamer head in the tray. If necessary, rotate the shaft slightly until the connection fits.

For the initial reaming, the flexible shaft (352.040, 352.044) is usually equipped with the 8.5 mm Reamer Head (352.085). Clip the shaft onto the reamer head in the Tray for Reaming Heads (675.504). If the click-on connection does not fit, turn the shaft slightly until the hexagon matches.

▲ Precaution:

This is only a primary connection. Always ream over the reaming rod to ensure a secure connection.

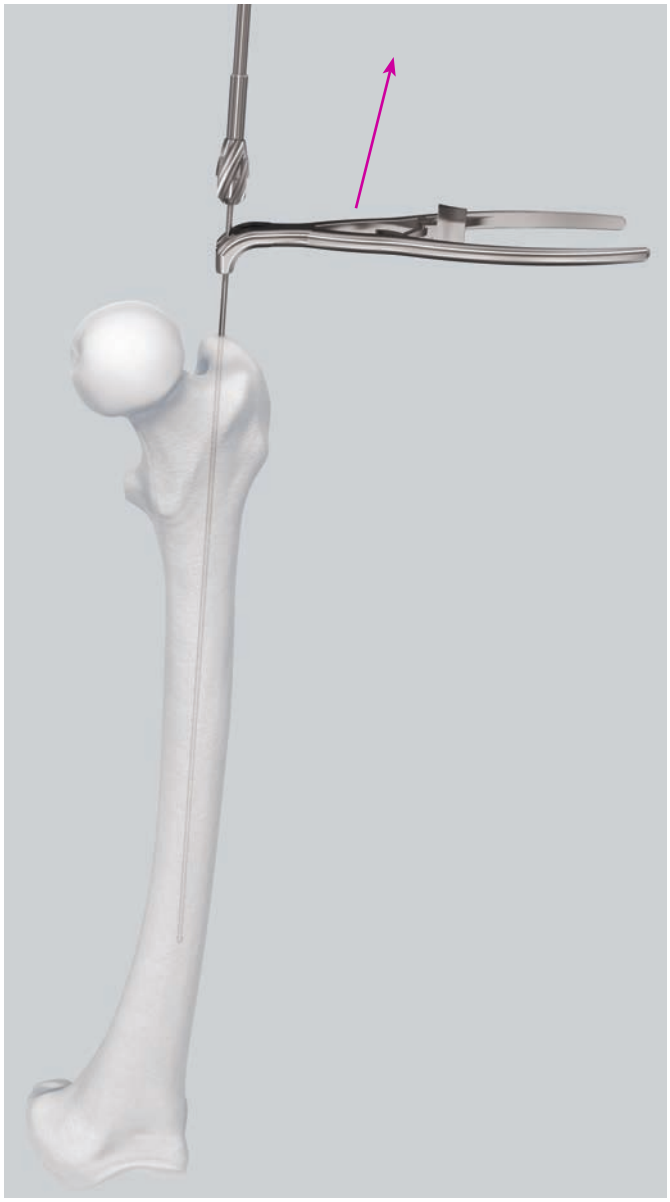
Use the ComPact Air Drive II with the reduction drive unit or the Trauma Recon System with the AO reaming attachment (as the driving unit). Guide the reaming system over the reaming rod.

Do not rotate the reamer head when inserting it into the medullary canal. The tissue protector protects the soft tissues. Use the highest speed and slight but uniform force to advance the reamer head into the medullary canal. Move the reaming shaft back and forth to remove bone chips from the reamer head blade cavities, and prevent jamming of the reamer head .

After reaming, withdraw the reaming shaft until the entire reamer head is visible. To prevent a loss of reduction, grasp the reaming rod at the canal entry point and hold the rod in place using the holding forceps.

If a reamer jams while reaming, disconnect the reduction drive unit. Use the holding forceps to grasp the reaming rod. Use gentle hammer blows on the holding forceps to withdraw a jammed reamer head from the medullary canal. Alternatively, release the reamer head by rotating the shaft in reverse.

The reamer head can be removed from the flexible shaft with the removal tool. Place the reamer head in the slot on the side of the removal tool. Hold the removal tool with one hand whilst pulling on the flexible shaft with the other. The reamer head will detach from the shaft.



Use the sideways cutting reamer heads for the subsequent reaming steps. Reaming should always be performed in 0.5 mm increments.

Leave the 2.5 mm reaming rod in position for insertion of the cannulated nail.

■ Note:

The 2.5 mm ball tip reaming rod can be passed through the cannulation of DePuy Synthes titanium nails and their respective instruments. When used with other nailing systems, the cannulation of the nail connecting screw must be larger than 3.5 mm.

▲ Precaution:

Remove the reaming rod before locking the intramedullary nail.

A used reamer head can be removed from the flexible shaft, without touching it, by pulling the reamer head through the recess of the Removing Tool (689.063).

▲ Precaution:

The reamer head can only be disengaged from the shaft if the reaming rod has been removed.

Cleaning Flexible Shaft

Cleaning flexible shaft

Instrument	
352.041	Cleaning Brush ∅ 3.6 mm, length 600 mm, for flexible shafts
352.045*	Cleaning Brush, long, for flexible shaft

Cleaning Brush (352.041 and 352.045)

Use this cleaning brush to clean the cannulation of the flexible shaft. In case of an obstructed cannulation, use the reaming rod to push through it.
The cleaning brush cannot be autoclaved.

▲ Precaution:

The Cleaning Brush is intended for cleaning purposes only and may not be brought into the sterile field in the operating theater.

■ Note:

The Monobloc Flexible Reamers and the associated graphic case (60.028.000 and 60.028.001) follow different cleaning guidelines than the standard DePuy Synthes cleaning guidelines. For cleaning instructions for the Monobloc Flexible Reamers and associated graphic case part numbers 03.028.060–03.028.105 and 60.028.000–60.028.001, refer to www.avalign.com/ifu.

* Optional

Instruments

351.150	T-Handle with Quick Coupling

352.033**	SynReam Reaming Rod ∅ 2.5 mm, long, length 1150 mm

351.782	Holding Forceps for SynReam Reaming Rod ∅ 2.5 mm

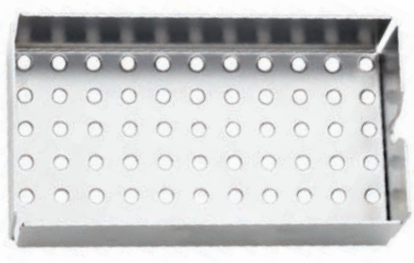
The holding forceps for reaming rods combines three instruments of the current reaming system. It combines the function of the following products:

391.880	Vice Grip, length 180 mm

393.100	Universal Chuck with T-Handle

351.780	Holding Forceps, length 170 mm

689.063	Insert with Removing Device for Synream Medullary Reamers



** Also available in Sterile

352.040	SynReam Flexible Shaft
352.041	Cleaning Brush ∅ 3.6 mm, length 600 mm, for flexible shafts
352.050	Reduction Head, straight
352.055	Reduction Head, angled
352.085– 352.190	SynReam Medullary Reamer Head ∅ 8.5 to 19.0 mm (0.5 mm increments)
675.504	Tray for Medullary Reamer Head, for No. 675.500

MONOBLOC FLEXIBLE REAMER – 385 mm

03.028.060	6.0 mm
03.028.065	6.5 mm
03.028.070	7.0 mm
03.028.075	7.5 mm
03.028.080	8.0 mm
03.028.085	8.5 mm
03.028.090	9.0 mm
03.028.095	9.5 mm
03.028.100	10.0 mm
03.028.105	10.5 mm

60.028.000	Base – Monobloc Flexible Reamer Case
60.028.001	Lid – Monobloc Flexible Reamer Case

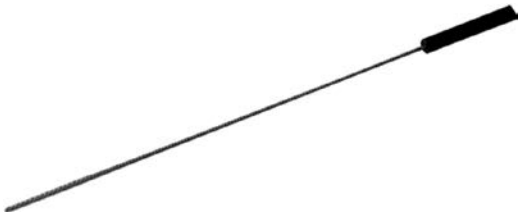
Optional Instruments

352.032**	SynReam Reaming Rod ∅ 2.5 mm, short, length 950 mm	
351.020	Reverse Awl, small	
351.050	Tissue Protector	
351.060	Centering Pin ∅ 4.0 mm, length 400 mm, for No. 351.240	
351.240	Cutter for UTN/CTN and for Universal Medullary Nail, ∅ 11.0 mm, length 350 mm	
351.260	Protection Sleeve, for No. 351.240	

** Also available in Sterile

351.920	Hand Reamer for Medullary Canal ∅ 6.0 mm
351.930	Hand Reamer for Medullary Canal ∅ 7.0 mm
351.940	Hand Reamer for Medullary Canal ∅ 8.0 mm

352.041	Cleaning Brush ∅ 3.6 mm, length 600 mm, for flexible shafts
352.045	Cleaning brush, long, for flexible shaft



352.175	SynReam Medullary Reamer Head ∅ 17.5 mm
352.180	SynReam Medullary Reamer Head ∅ 18.0 mm
352.185	SynReam Medullary Reamer Head ∅ 18.5 mm
352.190	SynReam Medullary Reamer Head ∅ 19.0 mm

352.044	Flexible Shaft ∅ 7 mm, long

393.100	Universal Chuck with T-Handle

Not all products are currently available in all markets.
This publication is not intended for distribution in the USA.
Intended use, Indications and Contraindications can be found in the corresponding system Instructions for Use.
All Surgical Techniques are available as PDF files at www.depuysynthes.com/ifu

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