Proximal Femoral Nailing system
Vitus PF

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Note:
The following surgical technique describe the surgical procedure which is recommended by the Authors. Each surgeon must decide himself which surgical procedure and approach is the most successful for his patients.
Vitus-PF Proximal Femoral Nail

**Indications**

1. **Indications for the short Vitus-PF nail**
   - Fractures of the trochanteric region (Type 31A1-3 according to the AO classification)
   - Transcervical femoral neck fracture (Type 82 according to the AO classification)
   - High subtrochanteric fractures

2. **Contraindications**
   - Low subtrochanteric fractures
   - Fractures of the femoral shaft
   - Isolated medial femoral neck fractures

**Indications**

1. **Indications for the long Vitus-PF nail**
   - Low and extensive subtrochanteric fractures
   - Combined fractures of the trochanteric area and the femoral shaft
   - Pathological fractures

2. **Contraindications**
   - Isolated or combined medial femoral neck fractures
   - Condylar fractures
Vitus-PF - Proximal Femoral Nail

1. System characteristics

- Cannulated nail
- Anatomically femur-adapted design
- Individual placing of the hip screw by means of three different CCD angles
- Additional stabilisation of fragments in reversed fracture by means of a screw that can be anchored in the nail in an angle stable position
- Possibility of dynamic or static distal locking
- Safeguarded rotational movement of the femoral neck over a self-cutting and self-drilling stabilizing screw
- Radiolucent targeting device
- User-friendly due to
  - simple assembling of the targeting device
  - self-explanatory mounting instructions due to a logical arrangement of the components in the Steri-Box
  - simple length measurements

Dimensions of the Vitus-PF nail

- Length: 200 mm
- Proximal diameter: 15,5 mm
- Distal diameter: 10 mm / 11 mm
- CCD-angle: 125° / 130° / 135°
- Cannulation: 5 mm
- Mediolateral angle: 40°
- Material: Ti6Al4V Typ II anodization

Vitus-PF - Proximal Femoral Nail, long

1. System characteristics

- Cannulated nail
- Anatomically femur-adapted design
- Long nail with anterior curvature for tension-free implantation into the femur. Right and left version
- Additional stabilisation of fragments in reversed fracture by means of a screw that can be anchored in the nail in an angle stable position
- Possibility of dynamic or static distal locking
- Safeguarded rotational movement of the femoral neck over a self-cutting and self-drilling stabilizing screw
- Radiolucent targeting device
- User-friendly due to
  - simple assembling of the targeting device
  - self-explanatory mounting instructions due to a logical arrangement of the components in the Steri-Box
  - simple length measurements

Dimensions of the Vitus-PF nail, right and left

- Length: 300, 340, 380, 420 mm
- Proximal diameter: 15,5 mm
- Distal diameter: 10,5 mm
- CCD-angle: 130°
- Cannulation: 5 mm
- Mediolateral angle: 40°
- Material: Ti6Al4V Typ II anodization
**D  Vitus - PF Hip Screw**

- **1. Characteristics of the Vitus- PF hip screw**
  - Easy screwing due to a self-cutting thread.
  - The special thread effects a very good hold in the cancellous bone structure
  - The distal collar prevents too deep medial sliding

![Image of Vitus-PF Hip Screw]

**Dimensions of the hip screw**
- Outer diameter: 10.00 mm
- Core diameter: 5.80 mm
- Length L: 80 mm - 120 mm
- Cannulation: 3.50 mm
- Thread length: 28 mm
- Pitch: 3.20 mm
- Material: Ti6AL4V Typ II anodization

**D  Vitus - PF Stabilization Screw**

- **1. Characteristics of the Vitu-PF stabilization screw**
  - Safeguarding rotation
  - Easy implantation due to self-drilling and self-tapping stabilization screw
  - Hexagonal screw
  - The distal collar prevents too deep medial sliding

![Image of Vitus-PF Stabilization Screw]

**Dimensions of the stabilization screw**
- Length L: 60 mm - 100 mm
- Outer diameter: 5 mm
- Thread length: 35 mm
- Core diameter: 3.20 mm
- Pitch: 1.75 mm
- Outer hexagon edge: 4 mm
- Material: Ti6AL4V Typ II anodization
D Vitus - PF Cap Screw

1. Characteristics of the cap screw

- Individual length adaptation by means of different head height 0 mm / 5 mm / 10 mm.
- Conical thread design for rapid and safe placing of the cap screw in the nail

Dimensions of the cap screw

- Length: 19.5 mm / 24.5 mm / 29.5 mm
- Head height: 0 mm / 5 mm / 10 mm
- Cannulation: 3.20 mm
- Inner hexagon: 3.50 mm
- Material: Ti6Al4V Typ II anodization

D Vitus - PF Locking Screw 0 4.9 mm

1. Characteristics of the distal locking screw

- Ideal and easy screwing behaviour by means of self-cutting thread
- Optimised thread effects excellent contact with bone

Dimensions of the locking screw

- Length L: 25mm-80mm
- Thread diameter: 4.90mm
- Core diameter: 4.30mm
- Head diameter: 8mm
- Pitch: 1.75mm
- Innerhexagon: 3.50mm
- Material: Ti6Al4V Typ II anodization
D  Vitus - PF Reversed Fracture Screw

1. Characteristics of the reversed fracture screw

- Screw with metric thread that can be angle stable anchored in the nail
- Integrated washer for ideal surface pressure on the trochanter. It is possible to refix the gluteal

Dimensions of the reversed fracture screw

- Length L: 20mm-50mm
- Thread diameter: M6
- Core diameter: 4.77mm
- Head diameter: 9mm
- Pitch: 1.00mm
- Inner hexagon: 3.50mm
- Material: Ti6Al4V

D  Vitus - PF Blocking Screw

1. Characteristics of the blocking screw

- The blocking screw is used to stabilize the femoral head via the hip screw without using a stabilization screw. Afterwards, the cap screw can be used to prevent the bone from growing into the hexagon socket.
D Operation manual

• 1. Reposition of fracture and patient

The patient is positioned in the extended supine position with 10 - 15° adduction on an X-ray transparent operation table. Closed manual fracture repositioning by pulling should be primarily attempted until approximately full repositioning is achieved. Fracture repositioning must be verified by X-ray fluoroscopy in two planes. In the event that a correct manual fracture repositioning by pulling is impossible, open repositioning is recommended. The healthy leg should be placed in a cushioned leg rest in abduction and outer rotation. Thus, an optimal imaging by the mobile image transducer can be achieved in both axial and A-P directions (Fig. 08).

• 2. Positioning of the image transducer

The image transducer should be placed whenever possible in such a way that by uncomplicated rotation by 90° the trochanteric region and the femoral neck can be visualised in two planes. The femoral neck of the leg that is about to undergo the operation can be used as reference line for the rotation axis of the image transducer. (Fig. 09 and 10)

Note:
The proximal and distal end of the nails should be displayed without interference.
D Operation manual

• 3. Approach

A 4.5 cm long longitudinal incision proximally to the trochanter major, pointing cranially. Sharp penetration down to the fascia lata, longitudinal splitting of the fascia. The middle gluteus muscle is bluntly pushed aside along the course of its fibres until the apex of the trochanter major can be felt.

Note: In adipose patients, the skin incision must sometimes be enlarged.

• 4. Approach to the medullary cavity

4.1. The point of entry of the nail:

Using imaging control in both planes, the point of entry for the nail should be first determined by a 3.2 mm guide wire (REF: 09.20120.012). The guide wire is inserted 150 mm deep into the medullary cavity and, thus, the fractured segments are threaded.

Note: In order to avoid a varus misalignment, special attention must be paid, particularly in multi-segment fractures, that the cortical entry is properly drilled.

The correct point of entry is located centrally above the highest point of the trochanter major at the border line between the anterior third and the posterior trochanteric region (Fig. 11 and 12). If the guide wire is falsely placed, it should be replaced on the trochanteric apex and drilled into the medullary cavity.
D Operation manual

4.2. Opening of the Trochanter major

Variant 1: Opening using the spiral drill:

The cannulated trocar (REF:09.20010.255) of the tissue protectoring sleeve is inserted into the 17 mm spiral drill tissue protectoring sleeve (REF:09.20010.250). The assembled instrument is inserted through the soft tissue coating onto the trochanteric apex using the 3.2-mm guide wire. (Fig. 13)

Subsequently, the trocar is removed. The rapid coupling grip for the Vitus PF (REF:09.20010.270) is assembled with the 17 mm drill bit (REF: 90.20010.240). (Fig. 14)

The threaded 17 mm drill bit is then inserted over the 3.2 mm guide wire through the tissue protecting sleeve. The opening of the trochanter is performed manually using moderate pressure by rotating the drill clockwise. The drilling procedure is continued until the stopper of the drill bit touches the tissue protector sleeve. By the conical shape of the spiral drill, the bone canal for the nail is prepared in the proximal part of the femur. (Fig. 15)

**Note:**
Because of the very long infeed of the 17 mm drill bit, it is recommended to always perform the opening of the trochanter major manually.

After opening the medullary cavity, the drill bit and the tissue protectoring sleeve can be removed. The 3.2 mm guide wire stays in the medullary cavity.

**Note:**
If the distal portion of the medullary cavity is smaller than or equal to the 0.10 mm Vitus PF nail, it is recommended to further drill the distal medullary cavity by means of commercially available medullary drills, whereby tension, which could cause fractures of the distal cortical bone, can be avoided.

Variant 2: Opening by awl:

The trochanter can also be opened using the awl (REF:09.20010.400) located on the tray, followed by distal medullary cavity drilling.
5. Assembling the targeting device

5.1. Assembling the targeting device with the targeting module:

The choice of the nail as planned prior to the operation is compared with the intraoperative data. The implant is determined by the femoral neck angle to be reconstructed and the nail diameter. After choosing the appropriate nail, the targeting module (CCD angle $125^\circ$ / $130^\circ$ / $135^\circ$) (REF:09.20010.110 - 130) envisioned for the nail is adapted onto the coupling arm (REF:09.20010.100) and fixed by means of the eccentric coupling screw (REF:09.20010.150) (Fig. 16 and 17).

**Note:**
The eccentric connection should only be fastened manually

5.2. Assembling the targeting device with the Vitus PF nail

The connecting screw (REF:09.20010.140) for adapting the nail is initially screwed into the targeting device. Thus, it can be warranted that the screw cannot loosen and fall while the nail is fixed on the targeting device. The nail is brought to its proper position over the grooves and the connecting screw is screwed into the targeting device by means of the cardan wrench (REF:09.20010.230). (Fig. 16, 18 and 19)

**Note:**
For fixing, the nail can be screwed onto the targeting device by one or two full turns performed by hand before it is finally positioned in the grooves of the targeting device.
D Operation manual

- 6. Verifying the compatibility between nail and targeting module

Prior to the implantation of the nail, it should be verified that the nail and the targeting module are mutually compatible.
The test is performed using the drill, which is necessary for the femoral neck screw and the pre-drill for stabilization screw (REF: 09.20010.260 and 09.20010.280).
For this purpose, the double drill sleeve is mounted onto the targeting module and both drills are gradually inserted into the appropriate drill sleeves of the double drill sleeve. The drills must pass the nail holes without resistance. Only then it is secured that the selected femoral neck angle of the targeting module is consistent with the nail. (Fig. 20)
7. Implanting the Vitus PF nail

7.1 Inserting the Vitus PF nail into the proximal femur

The Vitus PF nail is inserted into the femoral bone with fluoroscopic monitoring via the previously inserted 3.2 mm guide wire. The insertion is performed with slight rotational movements from proximal to distal. (Fig. 21)

In simple fractures, the nail can also be inserted without the 03.2 mm guide wire under fluoroscopic control.

**Note:**
It must be verified that the nail can be inserted into the medullary cavity without tension. By no means should the nail be inserted by strokes on the targeting device.

In the event that tension is present while inserting the nail, further drilling of the medullary cavity is strongly recommended.

The groove in the targeting module is designated to help the surgeon in determining the optimal position of the nail by placing the 3.2 mm guide wire. This step is performed with fluoroscopic monitoring. If the nail should be inserted only a few millimetres deeper under moderate resistance, then in this case the impaction bolt can be inserted into the targeting device. The nail can then be punched in by gentle taps on the impaction bolt in the exact direction of force. For this purpose, the guide wire via which the nail has been inserted must be removed. (Fig. 21 and 22)

**Caution:**
Prior to undertaking the next operative steps, the 3.2 mm guide wire must be removed.

7.2 Inserting the double drill sleeve

The double drill sleeve (REF:09.20010.200) with the appropriate trocar (REF:09.20010.205) is inserted under fluoroscopic control over the targeting module through a 4 cm incision into the lateral cortical bone.

The double drill sleeve is locked in this position, in tight contact with the bone, by the fastening eccentric bolt (REF:09.20010.160). Subsequently, the trocar is removed and replaced by the guide sleeve for the 3.2 mm guide wire (REF:09.20010.210). (Fig. 23)
7.3 Inserting the guide wire

The 3.2 mm guide wire is inserted through the 3.2 mm guide wire sleeve (REF:09.20010.210) into the subchondral area of the femoral head under fluoroscopic monitoring using the image transducer in two planes.

The guide wire can be placed in an area lying in the A-P beam path between the femoral calcar serving as caudal border and the middle of the femoral head as cranial border. In the axial beam path the wire should lie centrally. Positioning of the guide wire in the anterior or superior quadrant of the femoral head should be avoided to prevent the protrusion of the screws from the femoral head. (Fig. 24 and 25)

**Note:**
In the event that the guide wire is not correctly placed in the femoral neck or if it was bent during the insertion, it must be repositioned. The guiding wire should be removed and the nail position corrected concerning height or rotation.

7.4 Measuring the hip screw length

**Variant 1:** Measuring the length using the scaled guide wire

At the end of the guide sleeve, the length of the femoral neck can be measured by the scale on the guide wire.

Whereby, 8 = 80 mm, 10 = 100 mm etc.

**Variant 2:** Measuring the length using the measuring device for the 3.2 mm guide wire

In a similar manner, the length can be also measured on the measuring device for the 3.2 mm guide wire. The measuring device is inserted over the 3.2 mm guide wire and advanced until the guide sleeve. The length of the guide wire introduced into the bone can be read on the measuring device at the end of the guide wire. (Fig. 26)

**Note:**
The hip screw to be implanted should be, if possible, always by 10 mm shorter than the measured length. The stabilization screw to be implanted depends on the length of the hip screw and its chosen length should be usually by 10 to 20 mm shorter than that of the hip screw.

**Note:**
For the correct length reading, attention should be paid that the double drill sleeve touches the bone.
D Operation manual

7.5 Inserting the stabilization screw

The stabilization screw is designed for additionally securing the femoral head rotation in unstable fractures.

At first, the cortical bone layer entry is opened using the stabilization screw reamer (REF: 09.20010.280) through the double drill sleeve. The marking on the drill is for orientation. Importantly, the depth of the drill depends on the selected nail and on the femoral neck angulation. For CCD angles of 125° or 130°, the first mark on the reamer should be accepted as orientation line. The second mark serves as orientation for the CCD angle of 135°. (Fig. 27)

The stabilization screw envisioned for use (by 10 - 20 mm shorter than the pre-defined hip screw) is connected with the stabilization screw setting instrument (REF: 09.20010.295) and with the connecting screw of the stabilization screw setting instrument (REF: 09.20010.290). (Fig. 28 and 29)

Note:
The connection of the stabilization screw with the setting device is performed by the SW 3.5 mm screwdriver (REF: 09.20010.410). The stabilization screw setting instrument should be held by hand while the stabilization screw is being fastened. (Fig. 29)

The stabilization screw is screwed onto the femoral neck down to the appropriate mark through the double drill sleeve, (Fig. 30)

Note:
The three chuck lining of the drilling machine need be mounted only on the designated attachment piece of the stabilization screw-fitting instrument. (Fig. 28)

The mark on the stabilization screw-fitting instrument serves for orientation. It is important to note that the insertion depth of the stabilization screw depends on the nail selection and on the femoral neck angle. For CCD angles of 125° or 130°, the first mark on the stabilization screw setting instrument should be used as the orientation line. The second mark serves as orientation for the CCD angle of 135°. (Fig. 30)

When the stabilization screw is at its correct position and at the appropriate depth, the stabilization screw setting instrument along with the connecting screw can be removed. For the removal of the stabilization screw-fitting instrument, the connecting screw is unscrewed from the stabilization screw-fitting instrument by means of the SW 3.5 mm hexagon wrench key. The ring wrench for the stabilization screw-fitting instrument (REF: 09.20010.300) is used as counterholder.

Attention:
The ring wrench must be used only for removing the stabilization screw-fitting instrument.
D Operation manual

7.6 Inserting the hip screw

7.6.1 Drilling the hip screw

The selected length of the hip screw (measured guide wire length minus 10 mm) is adapted by the stopper onto the 0.6.2/11 mm step drill (REF:09.20010.260). For this purpose, first the screw nut (REF:09.20010.330) is mounted on the drill in the arrow direction and advanced up to the selected length. Subsequently, the nut is fixed with the chuck (REF:09:20010.325).

After removing the guide sleeve for the 3.2 mm guide wire, the step drill is connected by means of the rapid coupling for Vitus PF (REF:09.20010.270) or the drilling machine. Next, the step drill is advanced through the double drill sleeve over the guide wire and the drilling performed until stop. Due to the self-tapping hip screw, tapping is not necessary. Fig. 31.

Note:
In the event that the guide wire is strongly bent, it must be removed and replaced by a new wire placed in a correct position.

7.6.2 Positioning the hip screw

The selected hip screw is screwed upon the hip screw screwdriver (REF:09.20010.365).

For this purpose, the connecting screw (REF:09.20010.370) is placed in the hip screw screwdriver and the selected hip screw is screwed on the connecting screw in such manner that the grooves and pins stably fit to each other. (Fig. 32).

The compression sleeve for the hip screw (REF:09.20010.360) is screwed upon the hip screw screwdriver as far as the stopper allows. (Fig. 33).

The hip screw is screwed over the guide wire through the double drill sleeve into the femoral neck. (Fig. 34).

7.6.3 Fracture compression

After correct positioning of the hip screw, it is possible to achieve an inter-fragment compression by means of the compression sleeve. Through right-turning the femoral head can be tightened to the femur. Of note, a 360° turn corresponds to 1 mm compression. (Fig. 34, small picture)

Note:
A too tight compression can cause torsion of the targeting device and thus false drilling at the distal locking.
D Operation manual

8. Distal locking

Static and dynamic distal locking can be achieved by means of the guide-frame module.

A guide sleeve (REF: 09.20010.220) with a trocar (REF: 09.20010.225) for distal locking is advanced through a puncture incision and through the guide-frame module down to the bone and held in place by the eccentric for drill sleeves (REF: 09.20010.160).

Note: Static and dynamic locking or both can be chosen.

Note: In high subtrochanteric fractures, static and dynamic distal locking must always be chosen.

After the guide sleeve has been advanced to the cortical bone layer, the trocar is removed and the bone is drilled through the guide sleeve by the spiral drill (REF: 09.20010.310) until the opposite cortical layer to create the distal locking hole. (Fig. 35)

The required screw length (in this example 40 mm) can be read directly from the scale on the drill at the end of the guide sleeve for the distal locking. (Fig. 35).

For instance, 4 = 40 mm.

Optionally, the screw length can be assessed also by the measuring gauge for screw length (REF: 09.20010.345) and the appropriate sleeve (REF: 09.20010.340). (Fig. 36)

Note: Because the measurement renders exactly the length of the drilling hole, it is recommended to select a screw, which is longer by 2 mm, whereby a secure fixation of the screw in the opposite cortical layer is guaranteed.

The fixation of the locking screw is performed by the SW 3.5 mm hexagon screw driver (REF: 09.20010.410) through the guide sleeve for the distal locking. (Fig. 37)
**D Operation manual**

- **9. Cap Screw**

  **Note:**
  The marker ring at the intersection of the targeting device and the nail is used to select the required cap screw. (Fig. 18)

  Once the targeting device has been removed completely, the cap screw (REF: 09.01015.195S - 295S) is fixed by means of the hexagon screwdriver size 3.5mm (REF: 09.20010.410).

  **Note:**
  Optionally, the cap screw can be inserted by means of the Cardan wrench (REF: 09.20010.230).

  If the proximal end of the nail is fully inserted into the bone, cap screws with elongated caps can be used, resulting in a nail extension of 5 and 10 mm, respectively, and raising the nail end into the cortical layer. (Fig. 38)

  **Note:**
  In the event of a reversed fracture, please refer to pages 20 and 21 prior to removing the targeting device.

- **10. Surgical technique using the blocking screw**

  **10.1 Drilling the hip screw hole**

  **Note:**
  Before inserting the hip screw steps 1 - 7.4 of this operative technique must be performed.

  Set the required length of the hip screw (length of the guide wire minus 10 mm) with the help of the drill stop on the 0 5.8110mm step drill (REF: 09.20010.265). To do so, first mount the chuck (REF: 09.20010.325) on the drill in the direction indicated by the arrow and move until reaching the desired length. Then fix the chuck with the nut (REF: 09.20010.330).

  After removing the guide sleeve for the 3.2 mm guide wire, connect the step drill to the quick coupler for Vitus-PF (REF: 09.20010.270) or to the drilling machine. Then slide the step drill through the double drill sleeve over the guide wire and drill up to the stop. Since the hip screw is a self-tapping screw, no tapping is needed. (Fig. 39)

  **Note:**
  Should the guide wire be strongly bent, it must be removed and replaced by a new wire in the correct position.
10.2 Insertion of the hip screw

Mount the selected hip screw onto the hip screw screwdriver (REF: 09.20010.370).
For this purpose, place the connecting screw (REF: 09.20010.368) in the hip screw screwdriver and screw the selected hip screw onto the connecting screw in such a way that the pins fit into the grooves.
Tighten the compression sleeve for the hip screw (REF: 09.20010.360) on the screwdriver up to the stop.

By means of the guide wire the hip screw is screwed through the double drill sleeve up to the mark into the femoral neck. (Fig. 40)

Note:
In order to make sure that the blocking screw fits into the grooves in the hip screw, it is absolutely necessary that the T-handle is either in the horizontal or in vertical position.

Fracture compression

Nach korrekter Positionierung der Hüftschraube besteht die Möglichkeit, eine interfragmentäre Kompression mit der Kompressionszange zu erzeugen. Durch Drehen der Hüftschraube von 360° wird eine Kompression von 1 mm erreicht. (Fig. 40, small picture)

Note:
Excessive compression can cause torsion of the targeting device and thus incorrect drilling during distal locking.

10.3 Blocking screw

Once the hip screw is in its final position, the position of the T-handle must be checked again. Then the blocking screw (REF: 09.01102.000S) is inserted with the cardan screwdriver (REF: 09.20010.460) by means of the targeting device.

To ensure dynamization of the hip screw, it is necessary to turn back the blocking screw half a turn (by 180°). Otherwise the system is statically locked and allows no dynamization.

Note:
Do not bend the cardan screwdriver when inserting the blocking screw. The blocking screw must be inserted along the screwdriver axis. (Fig. 41a & b)
10.4 Cap screw

The use of a cap screw (REF: 09.01103.000S) is optional in order to prevent the bone from growing into the nail.
D Operation manual

• 10. Preliminary remarks regarding reversed
When treating a reversed fracture, it is important to reposition all fragments with fluoroscopic monitoring and, if necessary, by open repositioning.

While inserting the intra-medullary guide wire for the nail, it is important to pay attention that the lateral trochanter fragment is accessed by a separate puncture incision at the distal fragment edge, repositioned and held in place, for instance, by a bone-holding rod with a blunt round tip. By this measure, a correct placement of the intra-medullary guide wire at the trochanteric apex can be achieved without tilting a fragment. Only thus, a correct cutting of the trochanter and of the additional trochanteric fragment by means of the 0.17 mm drill is possible.

The trochanteric fragment must be held fix by the bone holding rod until the nail is inserted. Thereafter the lateral trochanteric fragment is repositioned on the shaft by means of the double drill sleeve and the guide sleeve for reverse fracture treatment and then fixed by a pulling screw in order to enable the proper preparation of the lateral trochanteric segment with the stepping drill. (Fig. 39)

• 11. Reversed-Fracture
In the event of a reversed fracture, the targeting module for reversed fracture (REF: 09.20010.090) with two proximal drilling holes should be used. These drilling holes, one of them running from the ventral direction and the other one from dorsal, enable an additional fixation of the trochanter according to the line of fracture. The reverse attachment can be fixed by a pulling screw (REF: 09.20010.095) at the provided site of the coupling arm. The guide sleeve for reversed fracture (REF: 09.20010.180) is pushed with the trocar (REF: 09.20010.185) into the reverse attachment and advanced until contact is established between the guide sleeve and the bone.

Subsequently, the fixation of the fixing screw for reversed fracture (REF: 09.20010.170) is performed through the reverse attachment for the fixation of the guide sleeve. The fixation screw should be only fixed as far as the guide sleeve can still be rotated round the bone over the screw thread.

By further advancement or fastening the guide sleeve for reversed fracture, the trochanter major is more compressed.

The fixing screw is only then to be fixed. (Fig. 40 small picture)

11.1 Length measurement
The measuring gauge for the reversed fracture screw (REF: 09.20010.190) is inserted into the bore hole in the reverse attachment until it locks. The length of the reversed fracture screw (REF: 09.00960.020 - 050) can now be read on the reversed fracture measuring gauge at the end of the reversed fracture guide sleeve (in this example 30 mm). (Fig. 41)
D Operation manual

11.2 Drilling

The measured drill length is adjusted on the drill bit (REF:09.20010.320) by mounting the stop chuck (REF:09.20010.325) on the drill up to the desired length mark (in this example 30 mm) and securing it by a screw nut (REF:09.20010.330). (Fig. 42) The bore hole can be only performed for the distance limited by the stopping device of the stop chuck on the drill sleeve. (Fig. 43)

11.3 Insertion

The reversed fracture screw (REF: 09.00960.020 - 050) is tightened by the SW 3.5 mm hexagonal screwdriver (REF:09.20010.410) through the reversed fracture guide sleeve (REF:09.20010.180) and secures the fragment in a stable angular position by an additional thread of the nail. (Fig. 44)

Note:
The fixed reversed fracture screw can also serve for suspension and restraint of the gluteal musculature on the femoral shaft at open reduction.

11.4 Locking the nail

After the removal of the complete targeting device the next step is tightening of the cap screw (REF:09.00017.195-295) by the SW 3.5 mm hexagonal screwdriver. (REF:09.20010.410)

When the proximal nail end is completely engaged in the bone, closure screws with elongated caps can be used, whereby the nail is lengthened by 5 to 10 mm and raises the nail end up to the cortical layer. (Fig. 45)

Note:
As an option the cap screw can inserted by means of the cardan wrench (REF: 09.20010.230)
12. Removal of the Vitus PF nail

12.1 Removal of the proximal locking screws

Following the X-ray localisation of the distal locking screw(s), it (they) is (are) removed through a puncture incision by means of the SW 3.5 mm hexagonal screw driver (REF: 09.20010.410). (Fig. 46)

12.2 Removal of the reversed fracture screw

Following the X-ray localisation, the reversed fracture screw is removed through a small puncture incision by means of the SW 3.5 mm hexagonal screw driver (REF: 09.20010.410). (Fig. 47)

12.3 Removal of the cap screw

Following the preparation of the proximal nail end the locking screw is removed by means of the SW 3.5 mm hexagonal screw driver (REF: 09.20010.410). (Fig. 48)
D Operation manual

12.4 Removal of the stabilization screw

Following X-ray localisation of the stabilization and hip screw, the stabilization screw is removed through a puncture incision by means of the screw driver (REF:09.20010.420). (Fig. 49)

12.5 Removal of the hip screw

The screw driver for the hip screw (REF:09.20010.370) is connected with the corresponding connecting screw (REF:09.20010.365). Subsequently, the screw driver is placed in the grooves of the hip screw and the connecting screw is fastened to enable pulling out the hip screw. (Fig. 50)

It is recommended to use the 3.2 mm guide wire as screwdriver guide into the hip screw.

12.6 Removal of the Vitus PF nail

The proximal nail end is visualised by a skin incision and the extractor (REF:09.20010.435) is fastened onto the proximal femoral nail.

The nail is extracted by means of gentle controlled taps. (Fig. 51)
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Code</th>
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<tbody>
<tr>
<td>Double drill sleeve for targeting device</td>
<td>09.20010.200</td>
</tr>
<tr>
<td>Trocar, large</td>
<td>09.20010.205</td>
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<td>Guide sleeve for 3.2 mm guide wire</td>
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<td>Guide sleeve for distal locking</td>
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<td>Cardan wrench</td>
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<td>Drill bit 15.5 mm</td>
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<td>Tissue protecting sleeve for 15.5 mm drill bit</td>
<td>09.20010.246</td>
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<td>Trocar for 15.5 mm tissue protecting sleeve</td>
<td>09.20010.257</td>
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<td>Connecting screw for targeting device - nail</td>
<td>09.20010.141</td>
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<td>Connecting screw targeting device - module</td>
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<tr>
<td>Excentric bolt for drill sleeves</td>
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<td>Blocking screw for reversed fracture guide sleeve</td>
<td>09.20010.170</td>
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<tr>
<td>Locking bolt for reverse module</td>
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<td>Guide sleeve for reversed fracture</td>
<td>09.20010.180</td>
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<tr>
<td>Measuring device for reversed fracture</td>
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<tr>
<td>Item Description</td>
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<td>Pin wrench</td>
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<td>Impactor bolt for targeting device</td>
<td>09.2001.390</td>
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<tr>
<td>Awl, small</td>
<td>09.2001.040</td>
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<tr>
<td>3.5 mm hexagon screwdriver</td>
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<tr>
<td>Extractor screwdriver for stabilization screw</td>
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<td>Extractor</td>
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<td>Guide Wire 3.2 mm</td>
<td>09.2012.012</td>
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<tr>
<td>Push chuck</td>
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<td>Screw nut for push chuck</td>
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<tr>
<td>Sleeve for screw length measuring gauge</td>
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<tr>
<td>Screw length measuring gauge</td>
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<td>Measuring device for 0.32 mm guide wire</td>
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<tr>
<td>Compression sleeve for hip screw</td>
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<td>Connecting screw for hip screw screwdriver</td>
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<td>Screwdriver for hip screw</td>
<td>09.2001.374</td>
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<tr>
<td>Step drill 0.58 mm/10 mm</td>
<td>09.2001.265</td>
</tr>
<tr>
<td>Handle with quick coupling</td>
<td>09.2001.270</td>
</tr>
<tr>
<td>Pre-drill for stabilization screw</td>
<td>09.2001.280</td>
</tr>
<tr>
<td>Coupling screw for stabilization screw setting instrument</td>
<td>09.2001.290</td>
</tr>
<tr>
<td>Stabilization screw setting instrument</td>
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<tr>
<td>Ring wrench for stabilization screw setting instrument</td>
<td>09.2001.300</td>
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<tr>
<td>Drill bit for the distal locking</td>
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<tr>
<td>Drill bit for reversed fracture</td>
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Vitus-PF Proximal Femoral Nail

D Implants

VITUS-PF Nail, short

![Vitus-PF Nail, short](image)

<table>
<thead>
<tr>
<th>Article no.</th>
<th>CCD</th>
<th>Diameter</th>
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<td>10mm 115.5mm</td>
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<tr>
<td>09.33010.130S</td>
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<td>09.33011.125S</td>
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<td>11mm 115.5mm</td>
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<tr>
<td>09.33011.130S</td>
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<td>11mm 115.5mm</td>
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VITUS-PF Nail, long

![Vitus-PF Nail, long](image)

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<th>Length</th>
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<td>09.33301.130S</td>
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<td>left</td>
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**Vitus-PF Proximal Femoral Nail**

**Implants**

**VITUS-PF Hip Screw 0 10.0mm**

<table>
<thead>
<tr>
<th>Article no.</th>
<th>Screw length</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.03100.075S</td>
<td>75 mm</td>
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<td>09.03100.080S</td>
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<tr>
<td>09.03100.085S</td>
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<tr>
<td>09.03100.090S</td>
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<tr>
<td>09.03100.095S</td>
<td>95 mm</td>
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<td>09.03100.100S</td>
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<td>09.03100.105S</td>
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<tr>
<td>09.03100.110S</td>
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<td>09.03100.115S</td>
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<td>09.03100.120S</td>
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</table>

**VITUS-PF Stabilization Screw 0 5.0mm**

<table>
<thead>
<tr>
<th>Article no.</th>
<th>Screw length</th>
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<tbody>
<tr>
<td>09.03004.060S</td>
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<tr>
<td>09.03004.070S</td>
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<tr>
<td>09.03004.080S</td>
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<td>09.03004.090S</td>
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**VITUS-PF Distal Locking screw 0 4.9mm**

<table>
<thead>
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<th>Article no.</th>
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<tbody>
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<td>09.03849.025S</td>
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<td>09.03849.030S</td>
<td>30 mm</td>
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<td>09.03849.032S</td>
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<td>09.03849.034S</td>
<td>34 mm</td>
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<td>09.03849.036S</td>
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<tr>
<td>09.03849.038S</td>
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<tr>
<td>09.03849.040S</td>
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<td>09.03849.042S</td>
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<td>09.03849.046S</td>
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<td>09.03849.048S</td>
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<td>09.03849.050S</td>
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<td>09.03849.052S</td>
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<td>09.03849.075S</td>
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<td>09.03849.080S</td>
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<td>09.03849.095S</td>
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<tr>
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D Implants

Reversed-Fracture-Screw

<table>
<thead>
<tr>
<th>Article no.</th>
<th>Screw length</th>
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<tbody>
<tr>
<td>09.01960.022S</td>
<td>22 mm</td>
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<td>09.01960.024S</td>
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<td>09.01960.026S</td>
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<td>09.01960.028S</td>
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<tr>
<td>09.01960.030S</td>
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<tr>
<td>09.01960.032S</td>
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<td>09.01960.034S</td>
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<tr>
<td>09.01960.036S</td>
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<td>09.01960.038S</td>
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Blocking Screw for Vitus-PF Nail

<table>
<thead>
<tr>
<th>Article no.</th>
<th>Description</th>
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<tbody>
<tr>
<td>09.01103.000S</td>
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<tr>
<td>09.01102.000S</td>
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Cap Screw for Vitus-PF Nail

<table>
<thead>
<tr>
<th>Article no.</th>
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<tbody>
<tr>
<td>09.01015.195S</td>
<td>16,0 mm</td>
<td>0 mm</td>
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<td>09.01015.245S</td>
<td>21,0 mm</td>
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<tr>
<td>09.01015.295S</td>
<td>26,0 mm</td>
<td>10 mm</td>
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