Color illustrations by Lisa Clark.
For more information about DePuy Trauma and Extremities products, visit our web site at **www.jnjgateway.com**.

DePuy Orthopaedics, Inc.
700 Orthopaedic Drive
Warsaw, IN 46581-0988
USA
Tel: +1 (800) 366 8143
Fax: +1 (574) 267 7196

DePuy International Ltd
St Anthony's Road
Leeds LS11 8DT
England
Tel: +44 (113) 270 0461
Fax: +44 (113) 272 4191

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THE ACE-FISCHER® SYSTEM
CREATED FOR HEALING.
DESIGNED FOR VERSATILITY.

DePuy
a Johnson & Johnson company

A SYSTEM DESIGNED FOR DIVERSE NEEDS

Proper reconstruction and healing demand structure as well as options. That's why we designed the ACE-Fischer® System with one main attribute in mind: versatility. In fact, this fixator's versatility has helped give it a successful clinical history.

TABLE OF CONTENTS

From simple fractures to complex reconstruction, this modular system can be configured for many different applications, including:

TIBIAL, FEMORAL AND HUMERAL FRACTURES

UNSTABLE DIAPHYSEAL COMMINUTION

OPEN WOUND/FRACTURE MANAGEMENT

SEPSIS

ARTHRODESIS

OSTEOTOMY

LIMB LENGTHENING/ OSTEOGENESIS

DEFORMITY CORRECTION

CHARCOT FOOT MANAGEMENT

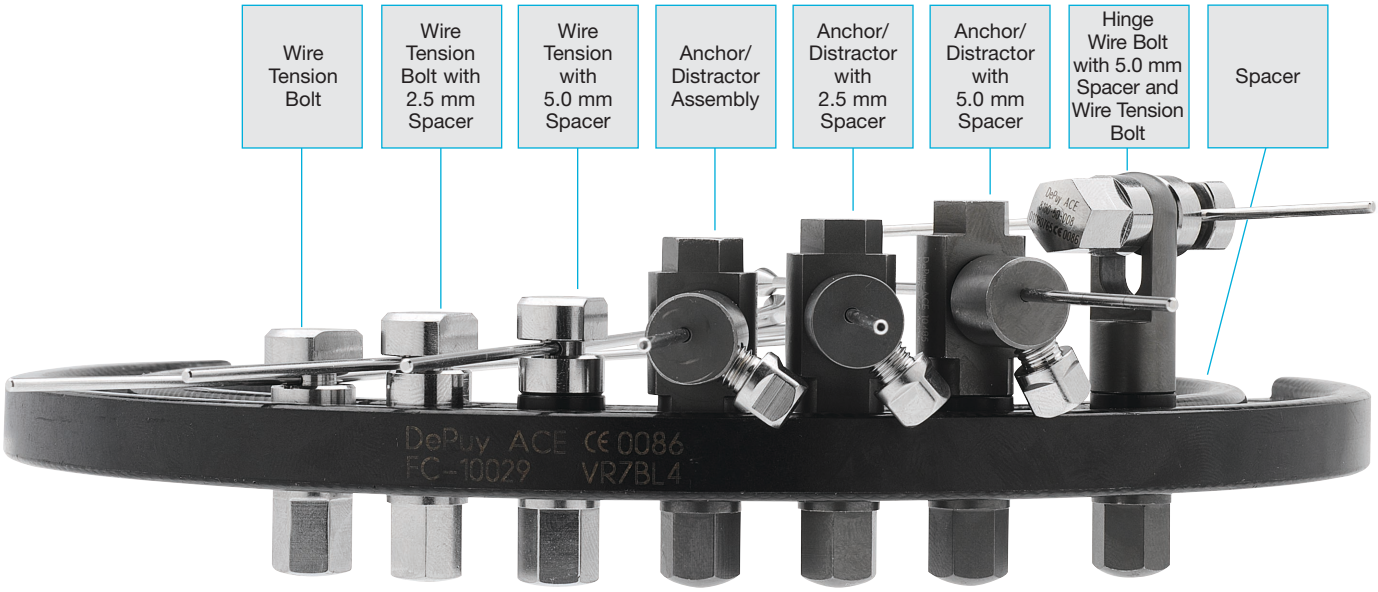
TEMPORARY FIXATION

The ACE-Fischer System is comprised of lightweight carbon fiber, aluminum and titanium materials. The simple design of this system keeps in mind the needs and requirements of the patient, surgeon, OR team and hospital staff.

FEATURES	ADVANTAGES
Connecting Rods	
Gross compression/distraction	Frame acts as a reduction tool
Fine compression/distraction	Postoperative adjustments
Universal joints	Versatility
Carbon Fiber Rings	
Radiolucent	Unobstructed radiographic views
Lightweight	Weight reduction for patient comfort
Three diameters	Flexibility for patient size
Half pin/thin wire options	Intraoperative options
Wire Tensioner	
One-squeeze tensioning	Saves OR time
	User friendly
Tensioner head options (cannulated/offset)	Accommodates wire placement
Half Pins	
Double lead fine thread	Allows for quicker insertion
Self-tapping	Alleviates need to pre-tap
Various thread lengths	Ability to bury threads below soft tissue
Stainless steel and titanium	Options to suit surgeon preferences

WIRE FIXATION BOLTS

Varying bolt heights provide the flexibility to drive wires at different levels in order to address comminuted fractures and to keep thin wires from intersecting. Wire height may be varied utilizing the following components:



GUIDELINES FOR PROPER STABILITY

A minimum of one ring per bone segment with three fixation points per ring is recommended. Utilize any half pin and thin wire combination.

A greater distance between fixation points leads to greater frame stability.

Three connecting rods are recommended per construct. They should be placed in a circumferential manner around the leg.

SIMPLE TECHNIQUES. VARIOUS USES.

The versatility of the ACE-Fischer System will provide the flexibility to create multiple constructs based on surgical indication. The following technique suggestions will facilitate application and assembly.

THIN WIRE INSERTION TECHNIQUE

1 Make a nick incision and bluntly insert the wire through the skin and soft tissues until the wire contacts the bone. Do not start drilling until the wire has made contact with the near cortex. Lightly press the wire against the near cortex and begin drilling through the bone, stopping the drill every couple of seconds. **NOTE:** The start-stop method will reduce the risk of heat build-up and/or thermal necrosis.

2 Once the wire has been drilled through the far cortex, stop the drill and tap the wire through the soft tissues using a mallet and pliers. This technique will help minimize the risk of soft tissue complications.

3 When the wire reaches the skin, make a nick incision over the tip of the wire to allow it to pass through the skin.

4 Be sure to relieve the skin of any tension wire insertion may have caused.

WIRE TENSIONING TECHNIQUE

1 Prior to tensioning, ensure that the opposite wire fixation bolt is tightened and anchored to the ring. When tightening wire bolts to the ring, apply counter-pressure to counteract tightening torque and wire bending.

2 Confirm that the tensioner handles are completely open and the ratchet is not engaged. If the handles are not completely open, the internal jaws will be engaged, preventing the tensioner from sliding over the wire.

3 Slide the wire tensioner with its appropriate tensioning head over the wire until the head engages the fixation bolt. (Fig. 1)

4 Referencing the calibrations on the tensioner head, compress the tensioner handles until the desired tension level is achieved. **NOTE:** 100-125 kg of tension is recommended. (Fig. 2)

5 With the tensioner still engaged over the bolt, securely tighten the nut-and-bolt assembly to retain tension.

6 Prior to removing the tensioner from the wire, release the lock and confirm that the tensioner handles are completely open and the ratchet is not engaged.

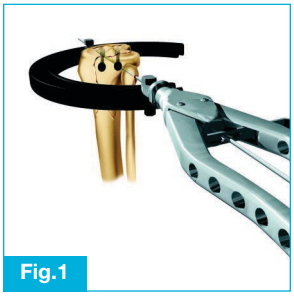


Fig.1

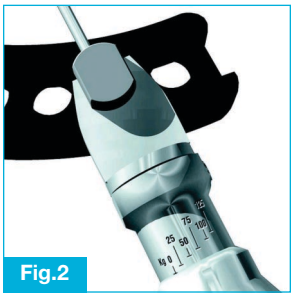


Fig.2

HALF PIN INSERTION TECHNIQUE

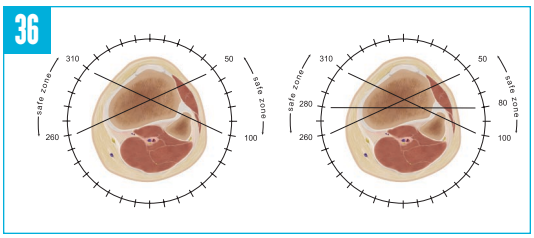
1. Make a stab incision in the skin.
2. Bluntly insert the sheath and trocar through soft tissue until it hits the near cortex.
3. Lightly tap the trocar to seat on the bone.
4. Remove the trocar.
5. Insert the drill bit through the sheath.

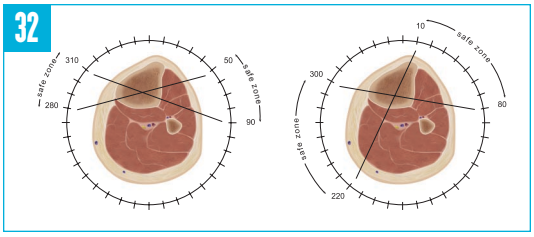
6A **Calibrated Drill Bit:** Begin drilling through the near cortex using a start-stop method to avoid heat build-up and/or thermal necrosis. Upon encountering, but not penetrating the second cortex, take a measurement from the calibrated drill bit, referencing the top of the sheath. Add 5-10 mm, pending the radiographic review. Select the appropriate length half pin.

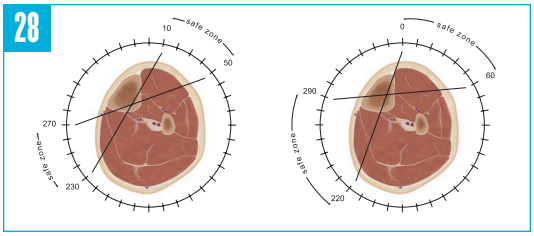
6B **Hooked Depth Gauge:** A hooked depth gauge may also be utilized to measure the half pin length. Insert the 4.1 mm drill bit through the sheath and drill through both cortices, utilizing a start-stop method to avoid heat build-up and/or thermal necrosis. Remove the drill bit and insert the hooked depth gauge and hook the far cortex.

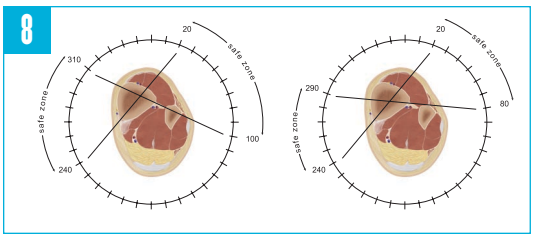
NOTE: Take a measurement from the depth gauge, referencing the top of the sheath. Select the appropriate length of half pin.

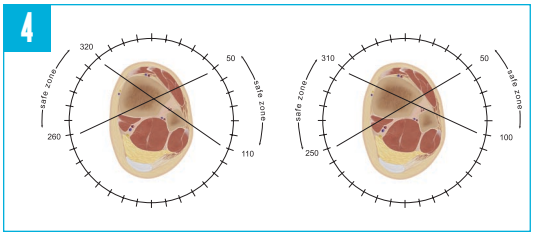
Once the appropriate half pin has been selected, insert the pin by hand through the sheath using a pin inserter.

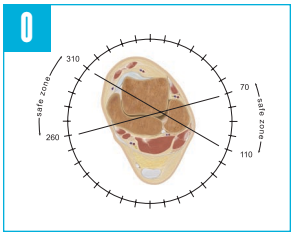






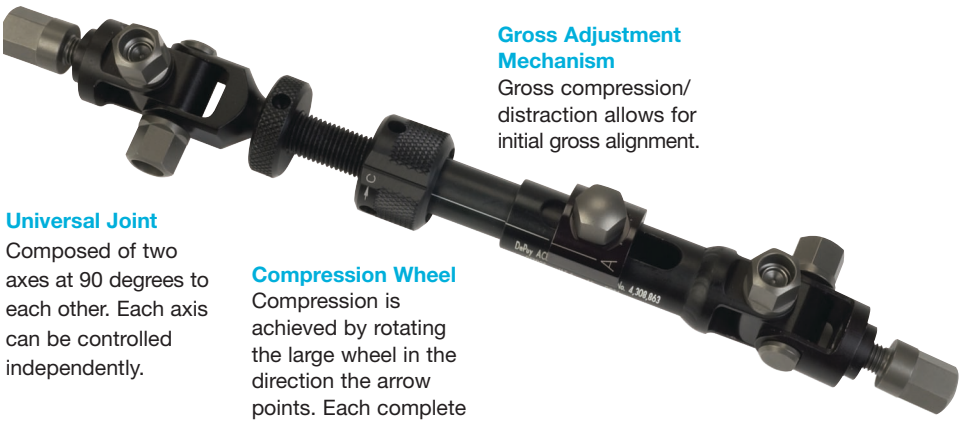






INCREASED VERSATILITY THROUGH CONNECTING RODS

The features of the connecting rods are efficiently consolidated into a single component allowing you to use fewer parts than typically found in competitive systems. To ensure maximum adjustability, align all of the universal joints in the same plane and place the compression/distraction wheels proximally. When this orientation is achieved, the ACE-Fischer System is at its maximum versatility. Other adjustments on the connecting rods are achieved as follows.



Gross Adjustment Mechanism
Gross compression/ distraction allows for initial gross alignment.

Universal Joint
Composed of two axes at 90 degrees to each other. Each axis can be controlled independently.

Compression Wheel
Compression is achieved by rotating the large wheel in the direction the arrow points. Each complete revolution produces 1 mm of compression or distraction. The smaller wheel locks the large compression wheel in place.

Length: Restore length and gross alignment using the gross compression/ distraction adjustment mechanism.

Reduction: Accomplish initial reduction by loosening the gross adjustment mechanism and universal joints to allow rings to act as reduction tools. Ensure all of the connecting rod bolts are loose.

Rotation: Correct the rotational deformities by loosening the gross adjustment mechanism and all universal joints. Rotation is corrected manually, utilizing rings as reduction tools. **NOTE:** Major rotational correction will alter length if gross distraction is not loose.

Translation: Correct translation by loosening the four universal bolts in the affected plane only. Using the rings as reduction tools, correct the translational deformity.

Angulation: Correct the angulation by loosening the gross adjustment mechanism and all universal joints. Once gross alignment is achieved, lock the universal joints and fine-tune the reduction using the fine compression/distraction wheels.

Displacement: Correct the displacement by loosening the four universal bolts in the affected plane. Displacement is corrected manually.

Axial Compression and Distraction: Axial compression and distraction is obtained by turning the compression/ distraction wheels. Connecting rods must be aligned straight up and down, paralleling the affected bone.

Tighten all bolts once all the appropriate adjustments have been made.

POTENTIAL REALIZED

SAMPLE CONSTRUCTS OF THE ACE-FISCHER SYSTEM

The following constructs are some of the many healing options available to you with the ACE-Fischer System.

This foot support system may be utilized in a noninvasive fashion to maintain a patient's foot in neutral dorsiflexion, preventing foot drop.

HEALING SUPPORT:

THE TIBIAL PILON FRAME WITH FOOT PAD CONSTRUCT

When you need to stabilize highly comminuted fractures in the distal tibia where soft tissue preservation is crucial, utilize the tibial pilon frame.

COMPONENTS		
quantity	**catalog number**	**description**
2	10469	1.8 mm straight wire
4	8180-50-005	Stainless steel cannulated wire fixation bolt
4	8180-50-008	Stainless steel nut for wire fixation bolt
1	10492	2.5 mm spacers with bolt
1	10495	5.0 mm spacers with bolt
3	See page 16 for sizing	5 mm half pin
1	FA-10365	3 pin holder
1	FA-10355	1 pin holder
2	FC-10029	Medium 2/3 ring
3	FA-10000-2	Medium connecting rods
FOOT		
1	FF-10600	Foot support bar
1	A18/200	200 mm connecting rod
1	FT1	Foot support bar
1	FF-10605	8 mm adapter rod
1	FF-10610	Articulation

1 Using a 2/3 ring at the distal portion of the tibia, secure three fixation points with any half pin and thin wire combination. Ensure that the pins and wires are parallel and at least 5 mm proximal to the joint surface.

2 A second 2/3 ring will be placed at the proximal portion of the tibia. Secure three fixation points using any half pin and thin wire combination. The third fixation point should be at a 60-90 degree spread from the aforementioned fixation points.

3 Select the appropriate length connecting rods and attach them to the rings posterior-medially, posterior-laterally and anteriorly.

Take care to position the connecting rods out of the AP and lateral fluoroscopic views.

Additional detailed case information can be found on the ACE-Fischer CD-ROM, Cat. No. 0602-87-000.

AN OPTION FOR REDUCTION:

THE TIBIAL PLATEAU CONSTRUCT

When you need to stabilize highly comminuted fractures in the proximal tibia where soft tissue preservation is crucial, utilize the tibial plateau frame.

COMPONENTS		
quantity	**catalog number**	**description**
2	10469	1.8 mm straight wire
4	8180-50-005	Stainless steel cannulated wire fixation bolt
4	8180-50-008	Stainless steel nut for wire fixation bolt
1	10492	2.5 mm spacers with bolt
1	10495	5.0 mm spacers with bolt
4	See page 16 for sizing	5 mm half pin
1	FA-10365	3 pin holder
2	FA-10355	1 pin holder
2	FC-10029	Medium 2/3 ring
3	FA-10000-2	Medium connecting rods

1 Using a 2/3 ring at the proximal portion of the tibia, secure three fixation points with any half pin or thin wire combination. Ensure that they are parallel and at least 10 mm distal to the joint surface.

2 A second 2/3 ring will be placed at the distal portion of the tibia. Secure three fixation points using any half pin and thin wire combination. The third fixation point should be at a 60-90 degree spread from the aforementioned fixation points.

3 Select appropriate length connecting rods and attach them to the rings posterior-medially, posterior-laterally and anteriorly.

Take care to position the connecting rods out of the AP and lateral fluoroscopic views.

Additional detailed case information can be found on the ACE-Fischer CD-ROM, Cat. No. 0602-87-000.

A FOCUS ON CONNECTIONS:

THE SPANNING PILON CONSTRUCT

Utilize this frame to temporarily span tibial pilon fractures.

COMPONENTS		
quantity	**catalog number**	**description**
2	10469	1.8 mm straight wire
2	8180-50-005	Stainless steel cannulated wire fixation bolt
2	8180-50-008	Stainless steel nut for wire fixation bolt
1	10480	Distraction assembly
1	10485	Anchor assembly
2	See page 16 for sizing	5 mm half pin
1	FA-10365	3 pin holder
2	FC-10029	Medium 2/3 ring
3	FA-10000-2	Medium connecting rod

1 Place one thin wire into the talar neck and one in the calcaneal tuberosity. Attach the wires to a 2/3 ring, with the opening positioned anteriorly.

2 Place two half pins into the tibial shaft and attach to the second 2/3 ring, with the opening positioned anterior-laterally.

3 Select the appropriate length connecting rods and attach them in a circumferential manner around the leg.

Take care to position the connecting rods out of the AP and lateral fluoroscopic views.

HEALING LARGER BONES:
THE DISTAL FEMUR CONSTRUCT

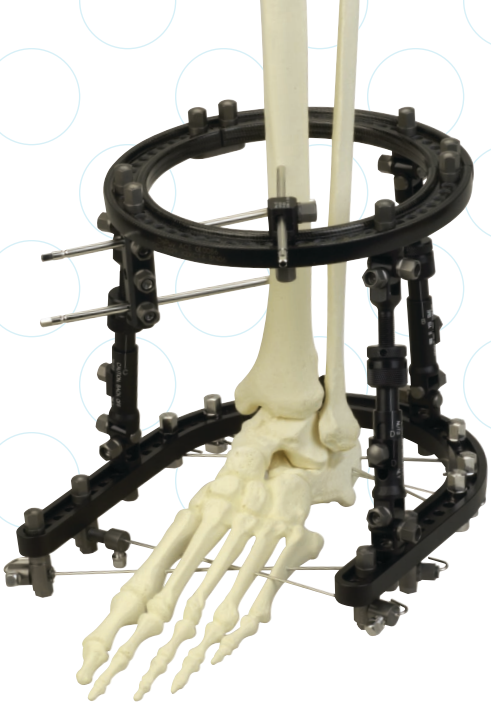
This configuration is used in distal femoral fractures.

COMPONENTS		
quantity	**catalog number**	**description**
2	10469	1.8 mm straight wire
4	8180-50-005	Stainless steel cannulated wire fixation bolt
4	8180-50-008	Stainless steel nut for wire fixation bolt
5	See page 16 for sizing	5 mm half pin
2	FA-10365	3 pin holder
1	FA-10355	1 pin holder
2	FC-10029	Medium 2/3 ring
4	FA-10000-2	Medium connecting rods

1 On the distal portion of the femur, secure the frame using four fixation points in any combination of half pins and thin wires and attach the 2/3 ring.

2 With any half pin or thin wire combination, secure the femur's proximal portion with four fixation points and attach the 2/3 ring. The spread among the last fixation point should be 60-90 degrees from the aforementioned fixation points.

3 Attach four connecting rods in a circumferential manner around the leg.



STABILIZING MORE DISTAL BODY PARTS:

THE FOOT AND ANKLE CONSTRUCTS

When the ankle and subtalar joints are no longer thought to be salvageable, employ the Tibio-Talar Calcaneal Fusion Frame.

For midfoot, hindfoot and ankle indications, utilize the foot and ankle frame construct.

COMPONENTS		
quantity	**catalog number**	**description**
3	10469	1.8 mm straight wire
2	10420	1.8 mm olive wires
6	8180-50-005	Stainless steel cannulated wire fixation bolt
6	8180-50-008	Stainless steel nut for wire fixation bolt
1	10492	2.5 mm spacers with bolt
1	10495	5.0 mm spacers with bolt
2	10480	Distraction assembly
2	10485	Anchor assembly
3	See page 16 for sizing	5 mm half pin
1	FA-10365	3 pin holder
1	FA-10355	1 pin holder
1	FC-10029	Medium 2/3 ring
1	FC-10030	Medium 1/3 ring
1	8180-04-008	Medium foot ring
2	FF-10023	Ring connector

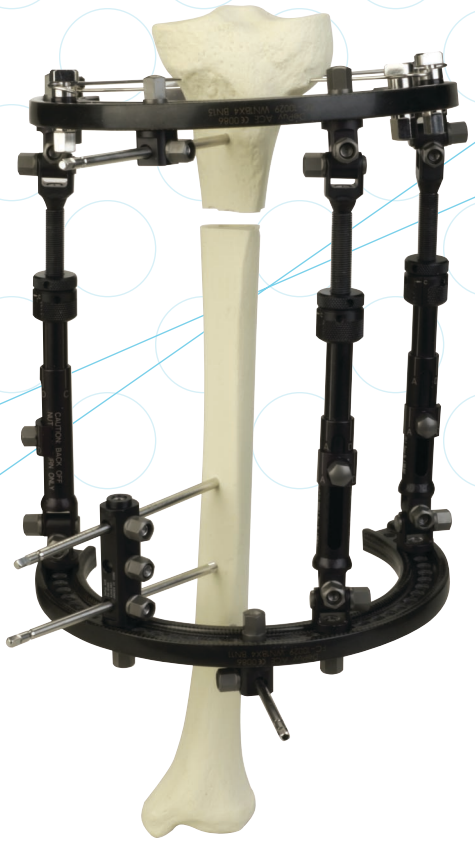
THE TIBIO-TALAR CALCANEAL FUSION FRAME/ CHARCOT FRAME CONFIGURATION

1 Place one thin wire through the calcaneal tubercle. Place one additional thin wire through the metatarsals. Attach the wires to the ring. This technique will define the position of the foot ring. Add two additional wires through the calcaneal tubercle and one additional wire through the metatarsals.

2 Three fixation points are recommended on the proximal ring and can be composed of any half pin and thin wire combination. **NOTE:** A 60 - 90 degree spread between the fixation points is recommended.

3 Attach three connecting rods, medially, laterally and posteriorly.

4 Gain initial alignment with the gross compression/distraction feature on the connecting rods, utilizing the fine compression/distraction wheels to fine-tune ankle alignment and final compression.



EXPANDING YOUR OPTIONS:

THE LIMB LENGTHENING CONSTRUCT

The Limb Lengthening construct can be used to lengthen a portion of bone that has a severe limb length discrepancy from that of the other limb.

COMPONENTS		
quantity	**catalog number**	**description**
2	10469	1.8 mm straight wire
4	8180-50-005	Stainless steel cannulated wire fixation bolt
4	8180-50-008	Stainless steel nut for wire fixation bolt
1	10492	2.5 mm spacers with bolt
4	See page 16 for sizing	5 mm half pin
1	FA-10365	3 pin holder
2	FA-10355	1 pin holder
2	FC-10029	Medium 2/3 ring
3	FA-10000-2	Medium connecting rods

1 Utilizing two 2/3 rings, apply the frame and stabilize the proximal metaphyseal/diaphyseal along regions of the bone with any half pin or thin wire combination.

2 Attach three connecting rods, ensuring they are parallel to the bone.

3 Make a corticotomy/osteotomy at the metaphyseal/diaphyseal junction through the cortical bone, preserving the periosteum and bone marrow.

4 Depending on the patient's age, allow 5-10 days as a rest period post-corticotomy before beginning distraction.

5 Distract by turning the compression/distraction wheels one quarter turn four times a day, which returns 1 mm every 24 hours.

STRAIGHT HEALING:

THE ANGULAR DEFORMITY CORRECTION CONSTRUCT

This frame is used to correct a long bone angular deformity.

COMPONENTS		
quantity	**catalog number**	**description**
2	10469	1.8 mm straight wire
4	8180-50-005	Stainless steel cannulated wire fixation bolt
4	8180-50-008	Stainless steel nut for wire fixation bolt
4	See page 16 for sizing	5 mm half pin
1	FA-10365	3 pin holder
2	FA-10355	1 pin holder
2	FC-10029	Medium 2/3 ring
2	FA-10000-2	Medium connecting rods
2	10730-10	Threaded rod 10 cm
1	10740	Universal joint
6	10019	Locking nuts

1 Identify the Center of Rotation of Angulation (CORA).

2 Ensure the proximal ring is parallel to the proximal joint surface and the distal ring is parallel to the distal joint surface.

3 Secure three fixation points per ring using any half pin and thin wire combination.

4 Perform a corticotomy/osteotomy at the CORA.

5 At the identified CORA, place the universal joint in the plane of the deformity that is to be corrected. The universal joint must be loose in this plane to allow the correction to occur.

6 Compress one quarter turn four times a day on the long connecting rod using the compression/distraction wheels. Distract the short connecting rod using the compression/distraction wheels and turning one quarter turn four times a day. When the rings are parallel, the deformity has been corrected.

TOGETHER, IT DOES MORE:

THE KNEE FUSION CONSTRUCT

When the risk of knee replacement is high or contraindicated:

COMPONENTS		
quantity	**catalog number**	**description**
6	See page 16 for sizing	5 mm half pin
2	FA-10365	3 pin holder
2	FA-10355	1 pin holder
2	FC-10029	Medium 2/3 ring
4	FA-10000-2	Medium connecting rods

1 Place three half pins in the femur. Place anterolaterally and anteromedially.

2 With the same technique, place three pins into the tibia and attach them to the 2/3 ring.

3 Attach four connecting rods in a circumferential manner around the leg.

4 Utilize the compression/distraction wheels to dial in final compression.

PREVENTING INFECTION:

POSTOPERATIVE PIN CARE

Pin loosening is a potential risk associated with infection. Therefore, it is essential that pin sites be cared for correctly to prevent infection and allow more comfortable healing. The following is one option:

IMMEDIATE POSTOPERATIVE PIN CARE

Step 1:	Wash hands thoroughly, including between fingers and the back of each hand.
Step 2:	Gently massage the skin around the pin sites with fingertips to bring drainage to the surface that is then cleaned away.
Step 3:	Saturate a sterile cotton swab with a solution made up of one-half saline and one-half peroxide. Apply the solution to one pin site at a time, removing any drainage and/or crust. After cleaning each pin site, dry the pin site with a new cotton swab.
Step 4:	Clean the entire pin with the same solution using a new cotton swab for each pin.
Step 5:	Cover the pin site with the preferred dressing.

Once the wounds have healed, the patient can shower daily with a liquid antibacterial soap. The pin sites will no longer need to be covered with a dressing; however, they will still need daily cleansing with saline solution until the frame is removed.

ACE-FISCHER® COMPONENTS

Miscellaneous Items	
10019	Locking nut
10095	Spherical nut and washer assembly
10730-10	Threaded rod 10 cm
10730-15	Threaded rod 15 cm
10730-20	Threaded rod 20 cm
10730-25	Threaded rod 25 cm
10730-30	Threaded rod 30 cm
10730-35	Threaded rod 35 cm
10730-40	Threaded rod 40 cm
10740	Universal joint

Instrumentation	
FF-10503	Drill bit for 5 mm pins
FF-10551	5 mm tip caps
FF-10516	Depth gauge
FF-10504	Pin inserter
FF-10525	Sheath and trocar
FF-10502	Open end wrench
8280-03-010	Rachet wrench
FF-10507	Socket wrench
S9	Spanner wrench
8282-20-000	Tommy bar
FF-10511	Universal joint positioner
AC-11514	Wrench combo

5 mm Half Pins	
Stainless Steel	
FS-10150.10	5 mm Half pin 150 mm
FS-10155.15	5 mm Half pin 155 mm
FS-10160.20	5 mm Half pin 160 mm
FS-10165.25	5 mm Half pin 165 mm
FS-10170.30	5 mm Half pin 170 mm
FS-10175.35	5 mm Half pin 175 mm
FS-10180.40	5 mm Half pin 180 mm
FS-10185.45	5 mm Half pin 185 mm
FS-10190.50	5 mm Half pin 190 mm
FS-10200.60	5 mm Half pin 200 mm
FS-10210.70	5 mm Half pin 210 mm
FS-10220.80	5 mm Half pin 220 mm
Titanium	
FF-10150.10	5 mm Half pin 150 mm
FF-10155.15	5 mm Half pin 155 mm
FF-10160.20	5 mm Half pin 160 mm
FF-10165.25	5 mm Half pin 165 mm
FF-10170.30	5 mm Half pin 170 mm
FF-10175.35	5 mm Half pin 175 mm
FF-10180.40	5 mm Half pin 180 mm
FF-10185.45	5 mm Half pin 185 mm
FF-10190.50	5 mm Half pin 190 mm
FF-10200.60	5 mm Half pin 200 mm
FF-10210.70	5 mm Half pin 210 mm
FF-10220.80	5 mm Half pin 220 mm

Transfixing Pins	
Stainless Steel	
FS-11250.40	5 mm Transfixing pin 250 mm x 40 mm
FS-11250.50	5 mm Transfixing pin 250 mm x 50 mm
FS-11300.60	5 mm Transfixing pin 300 mm x 60 mm
FS-11300.70	5 mm Transfixing pin 300 mm x 70 mm
Titanium	
FF-11250.40	5 mm Transfixing pin 250 mm x 40 mm
FF-11250.50	5 mm Transfixing pin 250 mm x 50 mm
FF-11300.60	5 mm Transfixing pin 300 mm x 60 mm
FF-11300.70	5 mm Transfixing pin 300 mm x 70 mm

Wire Tension Components	
10485	Anchor assembly
10480	Distraction assembly
8180-50-008	Nut for wire fixation bolt
8180-50-005	Cannulated wire fixation bolt
8180-50-006	Slotted wire fixation bolt
10735	Olive wire distractor with Allen wrench
10492	2.5 mm spacers w/bolt
10495	5.0 mm spacer w/bolt
10470	Gap gauge
8180-50-000	Wire tensioner
8180-50-004	Anchor tension head
8180-50-001	Cannulated hole head
8180-50-002	Offset hole head
10419	1.5 mm Olive wires
10420	1.8 mm Olive wires
10466	1.5 mm Straight wires
10469	1.8 mm Straight wires

Connecting Rods	
FA-10000-0	Extra short connecting rods
FA-10000-1	Short connecting rods
FA-10000-2	Medium connecting rods
FA-10000-3	Long connecting rods

Pin Holders	
FA-10355	1 Pin holder
FA-10360	2 Pin holder
FA-10365	3 Pin holder
FF-10023	Ring connector

Rings	
8180-04-008	Medium foot ring
FC-10027	Small 2/3 ring
FC-10028	Small 1/3 ring
FC-10029	Medium 2/3 ring
FC-10030	Medium 1/3 ring
FC-10031	Large 2/3 ring
FC-10032	Large 1/3 ring

Foot Support System	
FF-10605	8 mm Adapter rod
FF-10606	90 degree Adapter rod
FF-10610	Articulation
A18/150	150 mm Connecting rod
A18/200	200 mm Connecting rod
A18/250	250 mm Connecting rod
FF-10600	Foot support bar
FT1	Foot support pad

Miscellaneous	
FF-10615	5 mm Peg
FA-10054-2	90 degree Pin holder adapter
8180-50-009	Hinge wire bolt

Sterilization Modules and Cases	
10282	Connecting rod module
10283	Miscellaneous hardware module
10280	Pin/wire module
10281	Ring/pin holder module
14603	Sterilization case

ESSENTIAL PRODUCT INFORMATION

IMPORTANT

This Essential Product Information does not include all of the information necessary for selection and use of a device. Please see full labeling for all necessary information.

INDICATIONS

External fixation devices are indicated for long bone fractures to include tensioned wire fixation of periarticular fractures, arthrodesis, limb lengthening, osteotomy, reconstruction and others.

CONTRAINDICATIONS

Conditions that restrict the patient's ability or willingness to follow post-operative instructions during the healing process.

Foreign body sensitivity—where material sensitivity is suspected, appropriate tests should be made and sensitivity ruled out prior to implantation.

WARNINGS AND PRECAUTIONS

Proper understanding of the devices and techniques are essential. Placement of pins and wires requires strict anatomical consideration to avoid damage to nerves, vessels and soft tissues. Pin and wire drilling should be done slowly to avoid heat necrosis of tissues. The diameter of circular fixation rings should be 3 cm larger than the maximum diameter of the limb segment. Wires should not be bent, scratched or marred during frame assembly. Appropriate tension must be applied to wires. All components should be securely fastened with the appropriate instrumentation. Meticulous care of the pin and wire site is recommended. Physiological use of the affected limb is recommended. Fixator components should be checked regularly, as bending, breakage or loosening may occur.

ADVERSE EFFECTS

The following are the most frequent adverse effects following the use of an external fixation device:

Damage to nerves or vessels, pin or wire tract infection, swelling and/or compartment syndrome, joint contracture or loss of range of motion, septic arthritis, premature consolidation during elongations, loosening or breakage of pins and wires, bending or breakage of rings, bone deformity, intractable pain, secondary equinus contracture, non-union or pseudoarthrosis, fracture of regenerated bone, joint subluxation or dislocation, persistence or recurrence of the initial condition, reoperation, foreign body reaction, abnormal growth plate development, tissue necrosis, excessive operative bleeding, loss of bone, persistent drainage, skin pressure problems, limb length discrepancy and inadvertent injury caused by wire.