

# Dart-Fire<sup>®</sup>

## Small Screw System

### Operative technique



# Operative technique

## Dart-Fire Small Screw System

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Proper surgical procedures and techniques are the responsibility of the medical professional. The following guidelines are furnished for information purposes only. Each surgeon must evaluate the appropriateness of the procedures based on his or her personal medical training and experience. Prior to use of the system, the surgeon should refer to the product package insert for complete warnings, precautions, indications, contraindications and adverse effects. Package inserts are also available by contacting the manufacturer. Contact information can be found on the back of this operative technique and the package insert is available on the website listed.

For product availability, please contact your local sales representative/distributor.

## Introduction

The Dart-Fire Small Screw System is a cannulated, partially-threaded titanium alloy screw system that is indicated for use in bone reconstruction, osteotomy, arthrodesis, joint fusion, fracture repair, and fracture fixation of bones appropriate for the size of the device. With self-drilling and self-tapping headed and headless compression screws | **Figures 1 and 2**, in diameters ranging from 2mm to 4mm (**Table 1**), the Dart-Fire Small Screw System provides extensive versatility for surgical procedures of the foot, within one comprehensive system.

**Table 1: available diameters and lengths**

**Headed screws**

Diameters	Screw lengths
2mm	10mm - 24mm
2.5mm	10mm - 36mm
3mm	10mm - 40mm
3.5mm	12mm - 50mm
4mm	14mm - 50mm

**Headless screws**

Diameters	Screw lengths
2.5mm	10mm - 36mm
3mm	10mm - 40mm



**Figure 1**

Dart-Fire Headed Compression Screw



**Figure 2**

Dart-Fire Headless Compression Screw

## System basics

- The Dart-Fire Small Screw System offers the simplicity of self-drilling and self-tapping cannulated compression screws in diameters from 2mm to 4mm.
- All Dart-Fire Small Screws are manufactured from titanium alloy (Ti 6Al-4V) to provide consistent strength.
- Screws are color-coded by diameter and head type to easily identify associated instrumentation (**Tables 2 and 3**).
- Pilot drills, countersinks, and drivers have corresponding color-coded banding to match screw diameter, simplifying the pairing of instrumentation with screw selection. | **Figure 3**
- While the screws are self-drilling, cannulated drill bits are included for use in hard cortical bone, when an oblique approach is desired, or when bicortical fixation is required.
- Cannulated countersinks are provided to recess screw heads into the cortex of the bone.



**Figure 3**  
Colored banding on the pilot drill, driver and countersink simplifies identification with screw size.

**Table 2: headed screws**

Diameter	Color	Pilot drill	Countersink	Driver	K-wire
2mm	Aqua	1.7mm	4mm	#8 star	0.9mm
2.5mm	Magenta	2mm	4mm	#8 star	0.9mm
3mm	Green	2.2mm	5mm	#10 star	1.1mm
3.5mm	Gold	2.5mm	5mm	#10 star	1.1mm
4mm	Dark blue	3mm	6mm	#15 star	1.4mm

**Table 3: headless screws**

Diameter	Color	Pilot drill	Countersink	Driver	K-wire
2.5mm	Gray	2mm	2.4mm	1.6mm hex	0.9mm
3mm	Brown	2.2mm	2.8mm	2mm hex	0.9mm

## Intended use

The Dart-Fire Compression Screws are cannulated screws offered in various diameter and lengths. Screws are available both headed and headless, and all screws are manufactured from titanium alloy.

## Indications

The Dart-Fire Compression Screws are indicated for use in bone reconstruction, osteotomy, arthrodesis, joint fusion, fracture repair, and fracture fixation of bones appropriate for the size of the device. Screws are intended for single use only.

## Contraindications

- Infection or painful, swollen or inflamed implant site
- Fracture of the implant
- Loosening or dislocation of the implant requiring revision surgery
- Bone resorption or over-production
- Allergic reaction(s) to implant material(s)
- Untoward histological responses possibly involving macrophages and/or fibroblasts
- Migration of particle wear debris possibly resulting in a bodily response
- Embolism

Prior to use of the system, the surgeon should refer to the product package insert for complete warnings, precautions, indications, contraindications and adverse effects. Package inserts are also available by contacting the manufacturer. Contact information can be found on the back of this operative technique and the package insert is available on the website listed.

## Dart-Fire Small Screw System operative technique

### Preoperative planning

The Dart-Fire Small Screw System is composed of a variety of small diameter screws in headed and headless versions. The correct screw selection for the procedure is extremely important, and preoperative consideration of the proper screw size and design will increase the potential for surgical success.

### K-wire placement

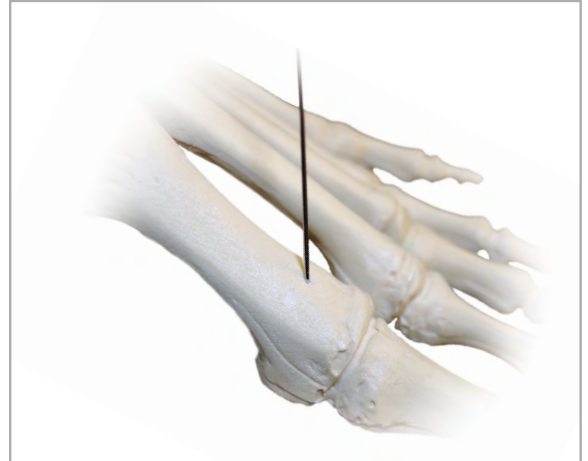
The appropriate K-wire (**Tables 2 and 3**) is advanced across the fusion or osteotomy site. | **Figure 4** Verify the desired positioning of the wire fluoroscopically.

### Screw diameter selection

Appropriate screw diameter is selected based on the procedure to be performed.

### Screw length determination

Measure screw length by using the cannulated depth gauge. | **Figure 5** Slide the tip of the cannulated depth gauge over the K-wire and down to the surface of the bone, ensuring that the gauge is seated flush to the bone. The gauge measurement indicates the depth from the surface of the bone to the tip of the K-wire; adjust accordingly for countersinking or lagging.



**Figure 4**

Insertion of an appropriate sized K-wire.



**Figure 5**

Measuring screw length with K-wire.

## Drilling

The Dart-Fire Small Screw System has been designed to be self-drilling and self-tapping. However, in some situations such as hard cortical bone, bicortical fixation, or when an oblique approach is desired, drilling may be necessary. Additionally, it is recommended to pre-drill the near cortex when using headless screws to prevent the proximal threaded portion from splitting or cracking the cortical shell. | **Figure 6**

Slide the appropriate color-banded drill bit (**Tables 2 and 3**) over the K-wire. Under power, drill just past the osteotomy or fusion site.

## Countersinking

To ensure complete seating of the headed screws, the appropriate countersink may be used. Load the appropriate color-banded countersink onto the cannulated AO driver handle, and turn the countersink in a clockwise motion to penetrate the cortex of the bone. | **Figure 7**



**Figure 6**  
Drilling of the screw canal.



**Figure 7**  
Countersink drilling.

## Verify screw length

Prior to inserting the screw, verify the length and diameter of the selected screw with the screw gauge provided on the Dart-Fire Small Screw System screw caddy. | **Figure 8**

**Note:** The use of angled tip forceps may facilitate screw removal from the caddy.

## Screw placement

Load the appropriate driver (**Tables 2 and 3**) into the cannulated AO driver handle. Place the screw over the K-wire and use the driver to advance the screw into the bone, until the head is completely countersunk within the bone. | **Figure 9** Depending on the stability of the first screw, procedure type, and patient related factors (obesity, post-operative compliance issues), multiple screws may be used for additional fixation.

In the case of soft bone, a washer may be used under the head (for headed screws only) to limit excursion of the screw into the bone. Slide the screw through the washer until it contacts the head and insert the screw over the K-wire as detailed above.

Remove the K-wire and perform surgical closure.



**Figure 8**

Verification of screw length on caddy.



**Figure 9**

Insertion of 2mm screw.



## Explant information

Removal of the Dart-Fire Small Screw implant may be performed by using the following drivers:

### Headed screws

Removal of the 2mm screw may be performed by using the #8 star driver.

Removal of the 2.5mm screw may be performed by using the #8 star driver.

Removal of the 3mm screw may be performed by using the #10 star driver.

Removal of the 3.5mm screw may be performed by using the #10 star driver.

Removal of the 4mm screw may be performed by using the #15 star driver.

### Headless screws

Removal of the 2.5mm screw may be performed by using the 1.6mm hex.

Removal of the 3mm screw may be performed by using the 2mm hex.

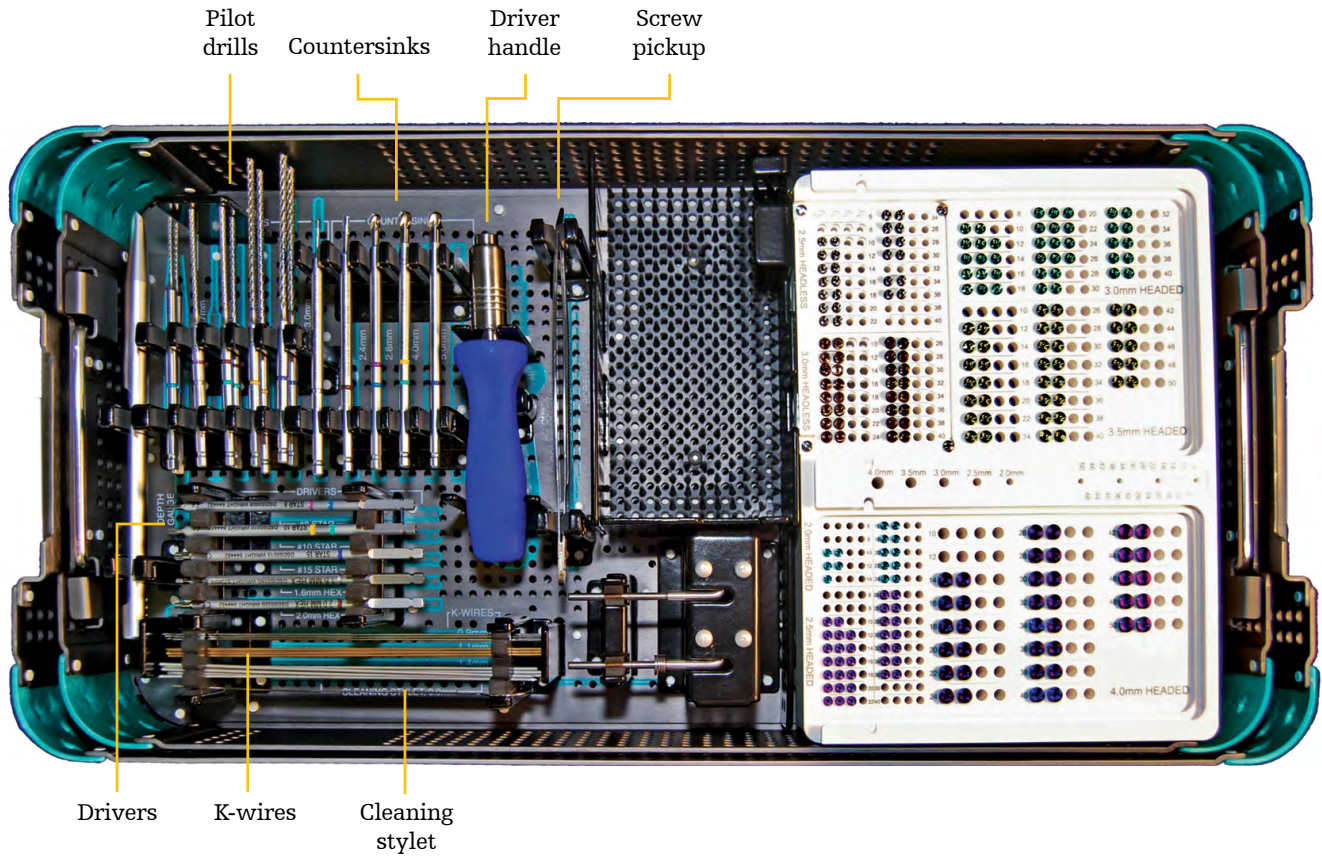
If removal of the implant is required due to revision or failure of the device, the surgeon should contact the manufacturer using the contact information located on the back cover of this operative technique to receive instructions for returning the explanted device to the manufacturer for investigation.

### Postoperative management

Postoperative care is the responsibility of the medical professional.

# Dart-Fire Small Screw Implants and Instrument Tray

## Instrument tray





Implant	Anodization color
<b>Headed screws</b>	
2mm	Aqua
2.5mm	Magenta
3mm	Green
3.5mm	Gold
4mm	Dark blue
<b>Headless screws</b>	
2.5mm	Gray
3mm	Brown

## Ordering information

## Dart-Fire Small Screw System Implants and Instruments

**DSD1KIT1DART-FIRE Small Screw Instrument Kit**  
**DSD1KITADART-FIRE Small Screw Implant Kit**

### 2mm headed screws



Part number	Description
D1N20010S	Headed screw 2mm x 10mm
D1N20012S	Headed screw 2mm x 12mm
D1N20014S	Headed screw 2mm x 14mm
D1N20016S	Headed screw 2mm x 16mm
D1N20018S	Headed screw 2mm x 18mm
D1N20020S	Headed screw 2mm x 20mm
D1N20022S	Headed screw 2mm x 22mm
D1N20024S	Headed screw 2mm x 24mm

### 2.5mm headed screws



Part number	Description
D1N25010S	Headed screw 2.5mm x 10mm
D1N25012S	Headed screw 2.5mm x 12mm
D1N25014S	Headed screw 2.5mm x 14mm
D1N25016S	Headed screw 2.5mm x 16mm
D1N25018S	Headed screw 2.5mm x 18mm
D1N25020S	Headed screw 2.5mm x 20mm
D1N25022S	Headed screw 2.5mm x 22mm
D1N25024S	Headed screw 2.5mm x 24mm
D1N25026S	Headed screw 2.5mm x 26mm
D1N25028S	Headed screw 2.5mm x 28mm
D1N25030S	Headed screw 2.5mm x 30mm
D1N25032S	Headed screw 2.5mm x 32mm
D1N25034S	Headed screw 2.5mm x 34mm
D1N25036S	Headed screw 2.5mm x 36mm

### 3mm headed screws



Part number	Description
D1N30010S	Headed screw 3mm x 10mm
D1N30012S	Headed screw 3mm x 12mm
D1N30014S	Headed screw 3mm x 14mm
D1N30016S	Headed screw 3mm x 16mm
D1N30018S	Headed screw 3mm x 18mm
D1N30020S	Headed screw 3mm x 20mm
D1N30022S	Headed screw 3mm x 22mm
D1N30024S	Headed screw 3mm x 24mm
D1N30026S	Headed screw 3mm x 26mm
D1N30028S	Headed screw 3mm x 28mm
D1N30030S	Headed screw 3mm x 30mm
D1N30032S	Headed screw 3mm x 32mm
D1N30034S	Headed screw 3mm x 34mm
D1N30036S	Headed screw 3mm x 36mm
D1N30038S	Headed screw 3mm x 38mm
D1N30040S	Headed screw 3mm x 40mm



### 3.5mm headed screws

Part number	Description
D1N35012S	Headed screw 3.5mm x 12mm
D1N35014S	Headed screw 3.5mm x 14mm
D1N35016S	Headed screw 3.5mm x 16mm
D1N35018S	Headed screw 3.5mm x 18mm
D1N35020S	Headed screw 3.5mm x 20mm
D1N35022S	Headed screw 3.5mm x 22mm
D1N35024S	Headed screw 3.5mm x 24mm
D1N35026S	Headed screw 3.5mm x 26mm
D1N35028S	Headed screw 3.5mm x 28mm
D1N35030S	Headed screw 3.5mm x 30mm
D1N35032S	Headed screw 3.5mm x 32mm
D1N35034S	Headed screw 3.5mm x 34mm
D1N35036S	Headed screw 3.5mm x 36mm
D1N35038S	Headed screw 3.5mm x 38mm
D1N35040S	Headed screw 3.5mm x 40mm
D1N35042S	Headed screw 3.5mm x 42mm
D1N35044S	Headed screw 3.5mm x 44mm
D1N35046S	Headed screw 3.5mm x 46mm
D1N35048S	Headed screw 3.5mm x 48mm
D1N35050S	Headed screw 3.5mm x 50mm

### 4mm headed screws



Part number	Description
D1N40014S	Headed screw 4mm x 14mm
D1N40016S	Headed screw 4mm x 16mm
D1N40018S	Headed screw 4mm x 18mm
D1N40020S	Headed screw 4mm x 20mm
D1N40022S	Headed screw 4mm x 22mm
D1N40024S	Headed screw 4mm x 24mm
D1N40026S	Headed screw 4mm x 26mm
D1N40028S	Headed screw 4mm x 28mm
D1N40030S	Headed screw 4mm x 30mm
D1N40032S	Headed screw 4mm x 32mm
D1N40034S	Headed screw 4mm x 34mm
D1N40036S	Headed screw 4mm x 36mm
D1N40038S	Headed screw 4mm x 38mm
D1N40040S	Headed screw 4mm x 40mm
D1N40042S	Headed screw 4mm x 42mm
D1N40044S	Headed screw 4mm x 44mm
D1N40046S	Headed screw 4mm x 46mm
D1N40048S	Headed screw 4mm x 48mm
D1N40050S	Headed screw 4mm x 50mm

**2.5mm headless screw**

Part number	Description
D2N25010	Headless screw 2.5mm x 10mm
D2N25012	Headless screw 2.5mm x 12mm
D2N25014	Headless screw 2.5mm x 14mm
D2N25016	Headless screw 2.5mm x 16mm
D2N25018	Headless screw 2.5mm x 18mm
D2N25020	Headless screw 2.5mm x 20mm
D2N25022	Headless screw 2.5mm x 22mm
D2N25024	Headless screw 2.5mm x 24mm
D2N25026	Headless screw 2.5mm x 26mm
D2N25028	Headless screw 2.5mm x 28mm
D2N25030	Headless screw 2.5mm x 30mm
D2N25032	Headless screw 2.5mm x 32mm
D2N25034	Headless screw 2.5mm x 34mm
D2N25036	Headless screw 2.5mm x 36mm

**3mm headless screws**

Part number	Description
D2N30010	Headless screw 3mm x 10mm
D2N30012	Headless screw 3mm x 12mm
D2N30014	Headless screw 3mm x 14mm
D2N30016	Headless screw 3mm x 16mm
D2N30018	Headless screw 3mm x 18mm
D2N30020	Headless screw 3mm x 20mm
D2N30022	Headless screw 3mm x 22mm
D2N30024	Headless screw 3mm x 24mm
D2N30026	Headless screw 3mm x 26mm
D2N30028	Headless screw 3mm x 28mm
D2N30030	Headless screw 3mm x 30mm
D2N30032	Headless screw 3mm x 32mm
D2N30034	Headless screw 3mm x 34mm
D2N30036	Headless screw 3mm x 36mm
D2N30038	Headless screw 3mm x 38mm
D2N30040	Headless screw 3mm x 40mm

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