



Model AS-190 Vacuum Splints

October 2010 GLO
Pub. No. 234-2124-02



*Read this Manual
and Retain for
Future Reference*

Ferno Technical Support

Customer service and product support are important aspects of each Ferno product. Please have the product reference and lot numbers available when calling, and include it in all written communications. For technical support questions:

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Ferno Customer Relations

For ordering assistance or general information:

CANADA AND THE U.S.A.

Telephone (Toll-free)	1.877.733.0911
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ALL OTHER LOCATIONS

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Lot Number _____

Location: One strap of each splint

Disclaimer

This manual contains general instructions for the use, operation and care of this product. The instructions are not all-inclusive. Safe and proper use of this product is solely at the discretion of the user. Safety information is included as a service to the user. All other safety measures taken by the user should be within and under consideration of applicable regulations. It is recommended that training on the proper use of this product be provided before using this product in an actual situation.


Retain this manual for future reference. Include it with the product in the event of transfer to new users. Additional free copies are available upon request from Customer Relations.

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USERS' MANUAL

To request additional free users' manuals, contact Ferno Customer Relations, your Ferno distributor, or visit www.ferno.com.


TABLE OF CONTENTS

Section	Page	Section	Page
Ferno Customer Relations	2	5 - Using the Splints	9
Ferno Technical Support	2	5.1 Before Placing the Splints In Service	9
1 - Safety Information	4	5.2 General Guidelines for Use	9
1.1 Warning	4	5.3 Choosing the Correct Splint	9
1.2 Important	4	5.4 Applying a Splint	10
1.3 Bloodborne Disease Notice	4	5.5 Checking an Injury After the Splint Has Been Applied	11
1.4 Symbol Glossary	4	5.6 Removing the Splint From the Patient	11
2 - Operator Skills and Training	4	5.7 Storing the Splints	11
2.1 Skills	4	6 - Maintenance	12
2.2 Training	4	6.1 Maintenance Schedule	12
3 - About the Splints	5	6.2 Disinfecting and Cleaning the Splints	12
3.1 Description	5	6.3 Inspecting the Splints	12
3.2 General Specifications	5	6.4 Using the Repair Kit	13
3.3 Components	6	7 - Parts	14
4 - Using the Pump and Valves	7	7.1 Worldwide	14
4.1 Connecting the Pump	7	7.2 Parts List	14
4.2 Evacuating the Air	8	Training Record	15
4.3 Disconnecting the Pump	8	Maintenance Record	15

1 - SAFETY INFORMATION

1.1 Warning

Warning notices indicate a potentially hazardous situation which, if not avoided, could result in injury or death.

 **WARNING**

Untrained operators can cause injury or be injured. Permit only trained personnel to apply the splints and operate the valves.

Improper use of the splints can cause injury. Use the splints only for the purpose described in this manual.

Improper application can cause injury. Apply the splints and operate the valves only as described in this manual.

An unattended patient can be injured. Stay with the patient at all times.

Improper maintenance can cause injury. Maintain the splints only as described in this manual.

Improper parts can cause injury. Use only Ferno parts with the splints.

Modifying the splints can cause injury and damage. Use the splints only as designed by Ferno.

1.2 Important

Important notices emphasize important usage or maintenance information.

Important

1.3 Bloodborne Disease Notice

To reduce the risk of exposure to bloodborne diseases such as HIV-1 and hepatitis when using the splints, follow the disinfecting and cleaning instructions in this manual.

1.4 Symbol Glossary

The symbols defined below are used on the splints and/or in this users' manual. Ferno uses symbols recognized by the International Standards Organization (ISO), American National Standards Institute (ANSI) and the emergency medical services industry.



General Warning of Potential Injury



Read the Users' Manual



Operation Requires Two Trained Operators



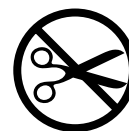
Product meets European Union Standards



Open-Valve Symbol (Red Valve Knob)



Closed-Valve Symbol (Red Valve Knob)



Do Not Cut

2 - OPERATOR SKILLS AND TRAINING

2.1 Skills

Operators using the splints need:


- a working knowledge of emergency patient-handling procedures.
- the ability to assist the patient.

2.2 Training

Operator trainees need to:

- read and understand this manual.

- be trained on the use of the splints.
- practice with the splints before using them with a patient.
- record their training information. A sample training record sheet is provided on page 15.

 **WARNING**

Untrained operators can cause injury or be injured. Permit only trained personnel to apply the splints and operate the valves.

3 - ABOUT THE SPLINTS

3.1 Description

The Model AS-190 Vacuum Splint Kit is a set of three vacuum-activated splints, a vacuum pump, a repair kit, and a carrying case. Each vacuum splint is an emergency patient-care device designed to immobilize and support an injured part of the body.

The splints are for professional use only, by a minimum of two trained operators.

The splints are made of vinyl-coated polyester and filled with polystyrene beads. The splints fasten with hook-and-loop adjustment straps.

The kit contains splints in three sizes: small (Model AS-100), medium (Model AS-120), and large (Model AS-140). Individual splints are also available as replacement parts (See *Parts*, page 14).

The splints are fitted with one of two valve styles. The use of each style is detailed in this manual. The vacuum pump included with the kit is fitted with an adapter compatible with both valve styles.

The carrying case is constructed with pockets for the splints, repair kit, and vacuum pump.

 WARNING
<p>Improper use of the splints can cause injury. Use the splints only for the purpose described in this manual.</p>

<p>Important</p>
<p>Splints purchased as replacements are not compatible with old versions of the vacuum pump. If your vacuum pump does not match the one shown on page 6, please order a new pump from Ferno (see <i>Parts</i>, page 14).</p>

3.2 General Specifications

MODEL AS-100 SPLINT (SMALL)

Length	21 in./533 mm
Width	14 in./345 mm
Thickness	1.5 in./40 mm
Weight	0.90 lb./408 g

MODEL AS-120 SPLINT (MEDIUM)

Length	29 in./735 mm
Width	24 in./610 mm
Thickness	1.5 in./40 mm
Weight	1.95 lb./885 g

MODEL AS-140 SPLINT (LARGE)

Length	43 in./1075 mm
Width	27 in./685 mm
Thickness	1.5 in./40 mm
Weight	2.90 lb./1315 g

VACUUM PUMP

Pump Length	9.5 in./241 mm
Hose Length	24 in./610 mm
Pump Diameter	3 in./76 mm
Weight	1.40 lb./635 g

CARRYING CASE

Weight	1.25 lb./567 g
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MODEL AS-190 SET*

Length	33 in./840 mm
Width	13 in./340 mm
Thickness	9 in./230 mm
Weight	8.40 lb./3810 g

* Set includes one each Model AS-100, Model AS-120 and Model AS-140 splints, vacuum pump, repair kit, and carrying case.

Most general specifications are rounded to the nearest whole number. Metric conversions are calculated before rounding the Imperial measurements. For more information, contact Ferno Customer Relations (page 2) or your Ferno distributor.

Ferno reserves the right to change specifications without notice.



3.3 Components

The Models AS-100 (small), AS-120 (medium), and AS-140 (large) splints, plus a vacuum pump, vinyl repair kit, and carrying case are included in the Model AS-190 vacuum splint set. Components may also be purchased separately.



Carrying Case



Vinyl Repair Kit



Model AS-100 Splint



Model AS-120 Splint



Model AS-140 Splint



Vacuum Pump



PUMP ADAPTER STYLES: Two pump adapters are in use: blue (at left), and purple (at right)



SPLINT AIR VALVE KNOB STYLES: Two air-valve styles are in use: a removable valve knob that is blue or black in color (left), and a non-removable red valve knob (right)

4 - USING THE PUMP AND VALVES

4.1 Connecting the Pump

The procedure to connect the pump to the splint varies depending on the valve knob style.

SPLINTS WITH NON-REMOVABLE VALVE KNOB (RED)

1. Attach the supplied valve adapter (blue or purple) to the end of the pump hose (Figure 1).

Note: *The function of the blue and purple valve adapters is identical.*

2. Slide the valve adapter over the valve stem on the splint (Figure 2 or Figure 3).
3. Turn the non-removable red valve knob counter-clockwise to open the valve.

SPLINTS WITH REMOVABLE VALVE KNOB (BLUE OR BLACK)

1. Attach the removable (blue or black) valve knob to the splint if separated and tighten securely (Figure 4).

Note: *The function of the blue and black removable valve knobs is identical.*

2. Remove the valve-plug tab from the removable valve knob if needed (Figure 6).
3. Disconnect the valve adapter from the pump hose (Figure 5).
4. Insert the pump-hose fitting into the center of the removable valve knob (Figure 6).



Figure 4 - Tightening the Removable Valve Knob



Figure 1 - Valve Adapter in Place



Figure 5 - Disconnect the Valve Adapter

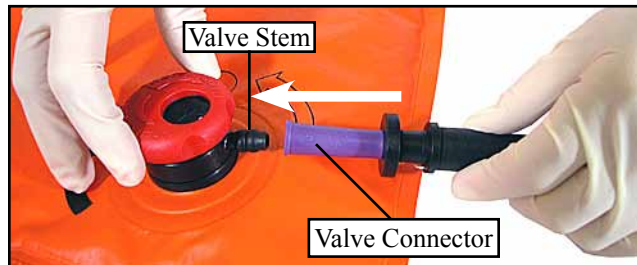


Figure 2 - Purple Adapter, Non-Removable Valve Knob

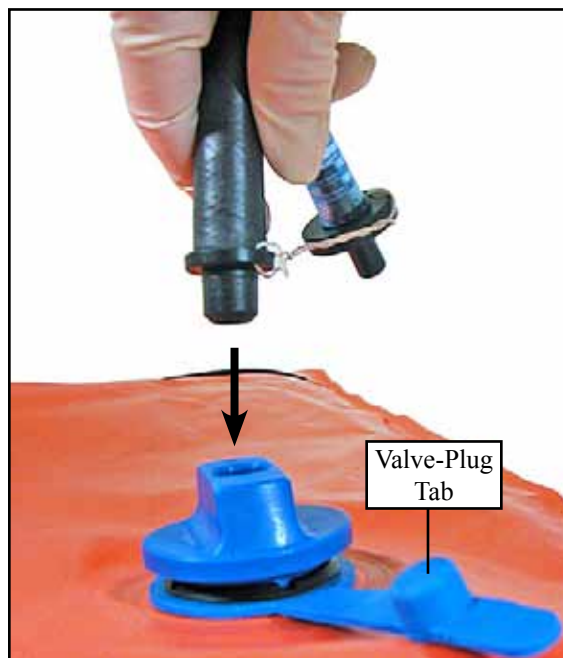


Figure 6 - Connecting the Pump To the Removable Valve Knob

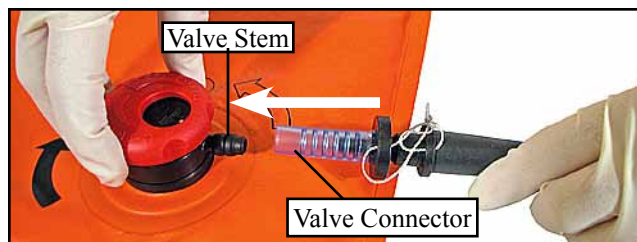


Figure 3 - Blue Adapter, Non-Removable Valve Knob

4.2 Evacuating the Air

Use the pump provided to evacuate the air from the vacuum splint. Squeeze the black plastic handle (Figure 7) repeatedly until the splint obtains the desired firmness.

Note: If air is drawn into a splint with a removable valve knob during the air-evacuation procedure, tighten the knob.



Figure 7 - Using the Vacuum Pump

4.3 Disconnecting the Pump

When the splint has been fitted to the patient and the air evacuated to provide a rigid device, disconnect the pump as follows:

NON-REMOVABLE VALVE KNOB (RED)

1. Close the valve by turning the valve knob clockwise (Figure 8). The solid arrow and dot on the splint serve as a reminder that turning the red valve knob clockwise closes the non-removable valve.
2. Disconnect the pump from the splint.

REMOVABLE VALVE KNOB (BLUE OR BLACK)

1. Disconnect the pump from the removable valve knob.
2. Insert the valve-plug tab into the knob to prevent air loss while the splint is in use (Figure 9).



Figure 8 - Closing the Non-Removable Valve Knob



Figure 9 - Plugging the Removable Valve Knob

5 - USING THE SPLINTS

5.1 Before Placing the Splints In Service

- Personnel who will work with the splints need to read this manual.
- Confirm that the splints operate properly. See *Inspecting the Splints*, page 12.

5.2 General Guidelines for Use

- Medical advice is beyond the parameters of this manual.
- It is the users' responsibility to ensure safe practices for the patient and themselves.
- Follow standard emergency patient-handling procedures when applying and operating the splints.
- Applying a vacuum splint requires a minimum of two trained operators. One operator manually stabilizes the injured area while the second operator applies the splint.
- Stay with the patient at all times.
- Use the splints only when they are fully operational.
- Do not cut the splints.
- Use caution when using sharp objects near the splints.



Operation Requires Two Trained Operators



Do Not Cut

5.3 Choosing the Correct Splint

Choose the splint size that best suits the injury. The splint should be large enough to extend beyond the joints on both sides of the injury (Figure 10 and Figure 11).

If the injury is a dislocation, the splint should be large enough to extend beyond both sides of the dislocated joint.

⚠ WARNING
 Improper application can cause injury. Apply the splints and operate the valves only as described in this manual.

⚠ WARNING
 An unattended patient can be injured. Stay with the patient at all times.

Important
 Sharp objects can damage the splints. Use care when using sharp objects near the splints.



Figure 10 - Splinting the Forearm



Figure 11 - Splinting the Shin

5.4 Applying a Splint

The vacuum splint is an airtight bag partially filled with tiny polystyrene beads.

Evacuating the air from the splint (using the vacuum pump supplied) causes the beads to interlock and the splint to become rigid. Introducing air into the splint allows the beads to move freely and the splint to become pliable.

The splints are fitted with one of two styles of air valve. The styles are easily identified by the color of the valve knob.

If the type of patient injury permits, apply the splint with the opening positioned to allow access to check the patient's injury and/or the pulse in the patient's extremity.

To apply a splint:

1. **One operator manually stabilizes the injured part of the body throughout the splinting procedure** (Figure 12). The other operator applies the splint.
2. Lay the splint flat with the valve upward and smooth the splint to a uniform thickness.
3. Using EMS-approved immobilization techniques, place the splint (valve on the outside) around the injury. Make sure you have access to the valve.
4. Secure the splint in place using the hook-and-loop adjustment straps and fastening strip (Figure 12).
5. Connect the vacuum pump to the valve. For complete instructions, see *Connecting the Pump*, page 7.
6. The pump operator begins evacuating the air from the splint by repeatedly squeezing the pump handle. If a splint with a removable (blue or black) valve knob draws air into the splint as you attempt to evacuate the air, tighten the valve knob.
7. As air is evacuated from the splint, the second operator continues to manually stabilize the splinted area of the body and, if necessary, gently molds the splint to the body (Figure 13).
8. Continue the procedure until the splint is as rigid as desired. Follow your medical protocols and training.
9. Disconnect the vacuum pump from the splint (See *Disconnecting the Pump*, page 8).
10. Tighten the adjustment straps if necessary.



Figure 12 - Securing the Splint

Important

The removable (blue or black) valve knob valve **must be tightened firmly** to function. If you hear air being drawn into the splint as you attempt to pump out the air, tighten the removable valve knob.



Figure 13 - Evacuating Air From the Splint

5.5 Checking an Injury After the Splint Has Been Applied

To check an injury once the splint is in place, manually stabilize the injured area as you carefully pull the edges of the splint back. If necessary, unfasten the adjustment straps.

After checking the injury, carefully move the edges of the splint back into position. If necessary, refasten the adjustment straps.

5.6 Removing the Splint From the Patient

The vacuum pump is not used when removing the splint from the patient.

1. **One operator manually stabilizes the injured area of the body throughout the splint removal procedure.**
2. The second operator unfastens the adjustment straps.
3. Open the air valve to allow air into the splint. As air flows in, the splint will become pliable.
 - **NON-REMOVABLE VALVE KNOB (RED):** To open the valve, turn the red valve knob counter-clockwise. The outlined arrow and dot on the splint serve as a reminder that turning the red valve knob counter-clockwise opens the valve. (Figure 14).
 - **REMOVABLE VALVE KNOB:** To open the valve, turn the (blue or black) valve knob counter-clockwise until air flows in. **Note:** You can completely unthread the valve knob from the valve if desired (Figure 15).
4. When the splint is pliable, gently remove the splint while stabilizing the injured area of the body.

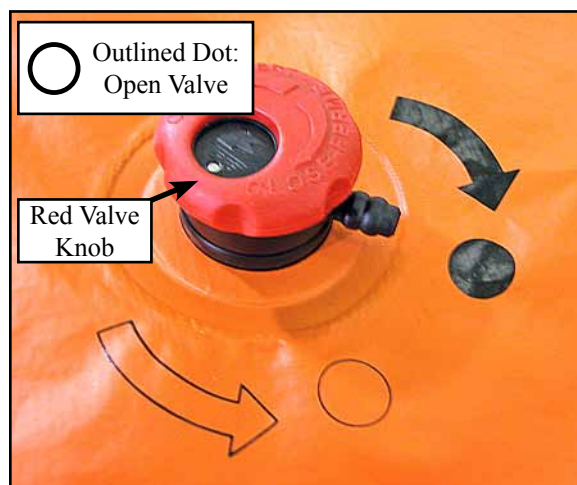


Figure 14 - Opening the Non-Removable (Red) Valve Knob



Figure 15 - Opening the Removable Valve Knob (Blue or Black)

5.7 Storing the Splints

Store clean, dry splints in the carrying case pockets. Slide the vacuum pump into the pocket in the bottom of the carrying case.

6 - MAINTENANCE

6.1 Maintenance Schedule

The splints require regular maintenance. Set up and follow a maintenance schedule. The table at right represents minimum intervals for maintenance.

Keep maintenance records. A sample maintenance record sheet is provided on page 15.

When using maintenance products, follow the manufacturers' directions and read the manufacturers' material safety data sheets. You can purchase a recommended disinfectant from your Ferno distributor or Ferno Customer Relations (page 2).

6.2 Disinfecting and Cleaning the Splints

1. **To disinfect:** Apply disinfectant to all surfaces of the splint, following the disinfectant manufacturer's instructions for application method and contact time. Ferno recommends you inspect the splint for damage as you disinfect it.
2. **To clean: Close the air valve.** Wash the splint with warm, soapy water and a soft cloth. Rinse with clear water. Dry the vinyl with a towel. Allow the hook-and-loop fastening strips to air-dry.
3. Store only clean, dry splints in the carrying case.

6.3 Inspecting the Splints

Have your service's equipment maintenance personnel inspect the splints regularly. Follow the checklist at right and operate each splint through all its functions as described in this manual. If inspection shows damage or excessive wear, remove the splint from service and repair or replace it. See *Parts*, page 14.

Note: *Minor rips or punctures in the splint can be repaired. A vinyl-repair kit is included with the full-kit Model AS-190, or order a repair kit from your Ferno distributor. See Parts, page 14.*

 **WARNING**

Improper maintenance can cause injury. Maintain the splints only as described in this manual.

Minimum Maintenance Intervals	Each Use	As Needed	Each Month
Disinfecting (this page)	•		
Cleaning (this page)		•	
Inspecting (this page)		•	•

Important

Strong solvents may soften the splint fabric. Use only soap and water to clean the splints.

Important

Disinfectants and cleaners containing bleach, phenolics, or iodines can cause damage. Do not use products containing these chemicals.

Important

Keep the interior of the splint dry. Close the air valve before cleaning. Liquids that enter the splint can cause mold and mildew.

INSPECTION CHECKLIST

- Are all components present?
- Does each splint become rigid and hold the rigidity after the air is drawn out?
- Is each splint in good condition (free of rips and punctures)?
- Does each splint valve operate properly?
- Does the pump valve connector attach properly to the air valve of each splint?
- Does the vacuum pump operate properly?
- Does the carrying case zipper operate properly?

6.4 Using the Repair Kit

Note: Use the repair kit supplied (Figure 16) to repair small rips or punctures in the vacuum splints. If the damage is large or cannot be repaired with the kit, replace the splint.

A patch can be used on any smooth part of the splint. Allow 30 minutes to 24 hours for the patch to set in place.

1. Clean and dry the area to be repaired.
2. Cut the repair patch approximately 3/4" (19 mm) larger than the hole. Round the corners of the patch.
3. Apply the glue to the patch.
4. Place the patch over the center of the hole. Press firmly and work from the center out to remove all air bubbles.
5. Allow a minimum of 30 minutes for the patch to seal. The longer the patch remains undisturbed, the stronger it will bond to the splint. If possible, wait 24 hours before using the splint.



Figure 16 - Repair Kit

7 - PARTS

7.1 Worldwide

To order Ferno parts, contact your Ferno distributor or Ferno Customer Relations, page 2.

 WARNING
Improper parts can cause injury. Use only Ferno parts with the splints.

7.2 Parts List

Description	Kit
Vacuum Pump	083-1965
Carrying Case	038-2916
Vinyl Repair Kit	083-1966
Model AS-190 (Set of 3 Splints)	037-4861
Model AS-100 (Small) Splint	037-4862
Model AS-120 (Medium) Splint	037-4863
Model AS-140 (Large) Splint	037-4864

 WARNING
Modifying the splints can cause injury and damage. Use the splints only as designed by Ferno.

TRAINING RECORD		
Date	Name	Training Method

MAINTENANCE RECORD		
Date	Maintenance Performed	By