Service Manual

Joerns® Advanced Support Surfaces
Dolphin Fluid Immersion Simulation® System

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Revision History

Date	Version	Description	Author

1. Foreword

The Dolphin Fluid Immersion Simulation® (FIS) advanced therapy system was originally developed by the US Navy to safely transport specially trained marine mammals outside of water. This advanced surface creates a level of immersion and buoyancy sufficient to alleviate the forces of gravity to such an extent as to maintain organ tissue perfusion and prevent skin injury related to pressure and shearing forces that compromise blood flow. The technology is used to prevent pressure ulcers and to advance the healing of complex pressure ulcers, surgical flaps, skin grafts, burns, and other wound conditions.

The Dolphin FIS software uses complex algorithms, a microprocessor and sophisticated dynamic pressure waveform analysis to precisely adjust the density of the surface for the unique anatomical features of the patient. It continuously monitors the patient's weight, 3D surface area and movements to automatically calculate the exact settings to effectively manage the pressure of the patient's body in the medium. This results in individualized immersion of the patient based on their specific characteristics and movements creating a near neutrally buoyant state on the support surface.

About this manual

Read, understand and follow all information contained in this manual including the Safety Precautions prior to accessing the Dolphin Fluid Immersion Simulation advanced therapy systems
This manual contains the necessary safety, and service information for service professionals, approved by Joerns Healthcare, to perform service on the Dolphin Fluid Immersion Simulation advanced therapy systems.
At the time of publication, the information contained herein was current and up to date. However, due to continual technological improvements and increased clinical knowledge, Joerns Healthcare's reserves the right to make periodic changes and improvements to their equipment and documentation without any obligation on the part of Joerns Healthcare.

For additional information contact:

Joerns Healthcare

2. Safety Precautions

Important Notice: The equipment must be installed and operated in the manner for which it was intended. Facility staff/user is responsible for reading and understanding the product user manual and contacting Joerns Healthcare if anything in this manual is unclear. Joerns will not be held responsible for any injuries resulting from failure to comply with the instructions and precautions in this manual.

Warning: Joerns specialty support surfaces are designed as mattress replacement systems. The risk of entrapment may occur when the equipment is placed on bed frames that leave gaps of even a few inches between the mattress and the head panel, foot panel, and bed or side rails. The equipment is NOT to be used when such gaps are present.

Facility staff/user is responsible for ensuring that all mattresses properly fit the bed frames. Joerns is not responsible for the placement of its equipment on bed frames that leave gaps between the mattress and the head panel, foot panel or bed or side rails which present a risk of harm to patients.

Warning: An optimal bed system assessment should be conducted on each patient by a qualified clinician or medical provider to ensure maximum safety of the patient. The assessment should be conducted within the context of, and in compliance with, the state and federal guidelines related to the use of restraints and bed system entrapment guidance, including the *Clinical Guidance for the Assessment and Implementation of Side Rails* published by the Hospital Bed Safety Workgroup of the U.S. Food and Drug Administration. Further information can be obtained at the following web address:

http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/GeneralHospitalDevicesandSupplies/HospitalBeds/default.htm

When using the mattress system, always ensure that the patient is positioned properly within the confines of the bed. Do not let any extremities protrude over the side or between the bed rails when the mattress is being used.

Danger Explosion Hazard: Do not use in the presence of flammable anesthetics. Do not use in the presence of smoking materials or open flame. Air flowing through the air mattress will support combustion.

Caution: Do not place the control unit on the floor. Position the power cord to prevent tripping hazards.

Danger: To reduce the risk of shock, adhere to the following instructions. Failure to do so could result in personal injury or equipment damage.

- Immediately after using the Dolphin Fluid Immersion Simulation System, unplug it from its power source.
- Do not place or store the product where it can fall or be pulled into a tub or sink.
- Do not place or drop the product into water or other liquid.
- Do not remove the back of the control unit. Refer servicing to Joerns.

Warning: To reduce the risk of burns, shock, fire, or personal injury, adhere to the following instructions. Failure to do so could result in personal injury or equipment damage.

1. Use this product only for its intended purpose as described in this manual. Only use attachments and/or accessories that are recommended by the manufacturer.
2. If this product has a damaged power cord or plug, is not working properly, has been dropped or damaged, or has been dropped into water, do not operate it. For examination and repair, return the product to Joerns.
3. Keep the control unit and power cord away from heated surfaces, e.g. space heaters.
4. Never block the air openings of the product. Do not place the control unit on a surface, such as a bed or couch, where the air opening and/or filter compartment, located on the back of the control unit, may be blocked. Keep the air openings free of lint and hair.
5. Never drop or insert any object into any opening or hose.
6. Do not spill food or liquids onto the control unit. If a spillage does occur, turn off the unit, disconnect it from its power supply and allow at least 24 hours for drying.
7. Do not use the product outdoors, or where aerosol-spray products are used.
8. Plug this product only into a properly grounded outlet. Refer to “Grounding Instructions”.
9. Ensure nothing is placed on the power cord and ensure it is not located where it can be stepped on or tripped over.
10. Do not attempt to service the control unit. Please call Joerns for any service requests.
11. The therapy pad (top cover) of this product is

not air permeable and may present a suffocation risk. It is the responsibility of the caregiver to ensure that the patient can use this product safely.

i. Bed System Entrapment Information

In April 1999, the U.S. Food and Drug Administration (FDA) in partnership with representatives from the hospital and post-acute bed industry, including Joerns Healthcare, national healthcare organizations, resident advocacy groups, and other federal agencies formed the Hospital Bed Safety Workgroup (HBSW). The workgroup's goal is to improve the safety of bed frames for residents and patients in all health care settings who are most vulnerable to the risk of entrapment. The efforts of the FDA and the HBSW culminated in the FDA's release of recommended guidelines intended to reduce the risk of entrapment, including dimensional limits for critical gaps and spaces between bed system components and clinical guidance for assessment and implementation of bed side rails in various health care settings.

Entrapment zones involve the relationship of bed components often directly assembled by the healthcare facility rather than the manufacturer. Therefore, compliance is the responsibility of the facility.

As the leading manufacturer of long-term care beds and a frontrunner in addressing this critical issue, Joerns can offer you the expertise, assistance and products to bring your facility into compliance.

ii. Joerns® Compliance Solutions

Matching the right bed components in order to meet regulatory guidelines can be complex. That is why Joerns offers a wide array of compliance options. We assist customers in selecting compliant accessories recommended for their specific bed model.

iii. Creating a Safer Care Environment

While the guidelines apply to all healthcare settings (hospitals, nursing homes and home care), long- term care facilities have particular exposure since serious entrapment events typically involve frail, elderly or dementia residents.

iv. For More Information

To learn more about compliance options with Joerns products, visit our website at http**://joerns.com/**

To learn more about entrapment zones, assessment methods, and guidelines concerning entrapment, contact Joerns at 800.826.0270 or the FDA website:
http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/GeneralHospitalDevicesandSupplies/HospitalBeds/default.htm

Warning: The risk of entrapment can arise when equipment is placed on bed frames that leave gaps of even a few inches between the therapy mattress and the head panel, foot panel, and bed or side rails. The equipment is NOT to be used when such gaps are present. See "Important Precautions" section of this manual.

v. Shear and Friction Reduction

Friction results when a patient's skin rubs against another surface. Shear injury occurs when the skin is stationary in relation to the support surface, while the underlying tissues and vessels are stretched and damaged. The exterior surface of the Dolphin FIS System therapy pad is constructed from a very smooth nylon fabric with low friction and low shear properties to protect the patient's skin from these damaging forces.

vi. Grounding Instructions

⚠**Warning:** Use a properly grounded, AC outlet for this product. Failure to use a grounded outlet could result in personal injury or damage to equipment or structure wiring, including risk of fire. A qualified electrician should be contacted to correct the wiring and ensure a properly grounded outlet.

Before installing this product, have the electrical system checked to make sure the electrical circuits and the electrical service are properly grounded. There is always a chance of a loose connection or poor installation of a ground wire that causes the loss of proper ground at the outlet. Inadequate grounding at electrical outlets can occur even if there is a ground wire. Wires can become loose over time at the connection to the outlet. **Note:** To install new wires on a circuit requires a qualified electrician.

vii. How to determine proper outlet Grounding

Most hardware stores sell circuit testers that can be used to test an outlet for proper grounding. The tester plugs into an outlet and by observing the indicator lights you can determine if the outlet is properly grounded. For a higher level of assurance, an electrician should be requested to thoroughly test the electrical system with more reliable equipment. If repair or replacement of the cord or plug is necessary, please contact Joerns Healthcare for assistance.

3. Theory of Operation

The Dolphin FIS System is comprised of two components:

- Therapy control unit
- Therapy mattress system or specialty surface (wheelchair cushion, stretcher pad)

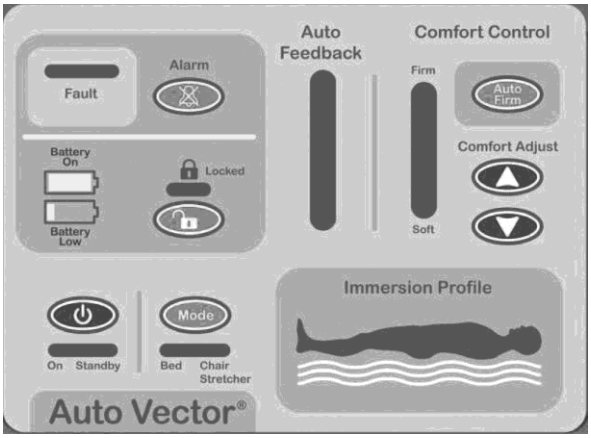


Figure 1: Dolphin Control Unit User Interface

i. Therapy Control Unit

- Easy to read graphics for intuitive set up and therapy control (Figure 1~~Figure 1~~).
- The *Bed* position operates the system when the patient is in a traditional healthcare bed. *Chair/ Stretcher* position can be used when the patient
- Is on a smaller specialty surface; the timing cycle adjusts for use on the smaller surface (i.e. Dolphin Wheelchair Cushion).
- Requires no manual data input – automatically adjusts to patient's body weight and profile to create a neutrally buoyant, 3D support environment.
- A microprocessor and proprietary firmware analyzes the patient's shape in a 3D volumetric format.
- Continuously monitors the surface more than 100 times per second for any patient movement.
- *Comfort Adjust* for manual pressure adjustment to accommodate patient preference - recommended manual adjust up one LED or down one LED for comfort as needed. **Note (applies to therapy mattress):** If patient is over 250 lbs. (113.6
- Kg), moving the *Comfort Adjust* indicator to one LED above the *Auto Feedback* LED may improve comfort. If patient is less than 100 lbs. (45.4 Kg), moving the *Comfort Adjust* indicator to one LED below *Auto Feedback* LED may improve comfort.
- *Autofirm* mode may be desirable for patient transfer and other patient care procedures. The system will automatically return to the previous setting after approximately 15 minutes.
- An alarm will sound and LED will illuminate in the event of a fault condition (see *Alarm* fault conditions; p.8).
- The rechargeable battery back-up will provide alternate power to the control unit for approximately 12 hours in the event that the system is disconnected or during a power failure. The battery will begin to recharge when power is restored.

ii. Therapy Mattress System and Specialty Surface Features

- State-of-the-art pressure redistribution technology designed to alleviate vertical shear forces.
- Customizable therapy mattress that can fit any healthcare bed frame, including bariatric frames, up to 48" (122 cm) wide.
- Conforms to specific shape of the patient, minimizing soft tissue distortion, reducing ischial tuberosity penetration into muscle fascia, and promoting improved blood flow compared to traditional surfaces
- Able to accommodate patients up to 1000 lbs
- (454.5 Kg)[1] for therapy mattresses
- Able to accommodate patients up to 700 lbs
- (318.1 Kg)[2] for stretcher pad
- Able to accommodate patients up to 250 lbs
- (113.6 Kg)[3] for wheelchair cushion
- Quick CPR deflation valve on the therapy mattress
- For Low Profile Therapy Mattress Models Only: Contains a foam based safety cell to protect patients from bottoming out in the event of a power failure that exceeds battery life.
- For V-Matt Therapy Mattress Models Only: an air-filled safety cell to protect patients from bottoming out in the event of a power failure that exceeds battery life for step-deck bed frames.
- For V-Matt Therapy Mattress Models Only: CairEdge feature wraps around the bed frame edge at point of ingress/egress, providing extra padding.

[1]Mattress weight capacity only; total weight must not exceed bed frame manufacturers' specified load capacity, and when paired with an appropriate surface.

[2]Stretcher surface weight capacity only; total weight must not exceed stretcher manufacturers' specified load capacity, and when paired with an appropriate surface.

[3]Wheelchair cushion weight capacity only; total weight must not exceed wheelchair manufacturers' specified load capacity, and when paired with an appropriate surface.

iii. Therapy Pad

- Constructed from smooth nylon fabric with low friction and low shear properties to protect the patient's skin from these damaging forces.
- Breathable, moisture vapor permeable fabric allows air to circulate beneath the pad and wicks away excess moisture. This helps to keep your patient dry and helps prevent skin maceration.

⚠**Warning:** A possible fire hazard exists. This product is suitable for use with oxygen administering equipment of the nasal, mask, or half bed-length, tent-type only. To prevent personal injury or equipment damage ensure that the oxygen tent does not extend below the mattress.

iv. CPR

CPR deflation can be done by twisting the CPR valve. The therapy mattress will deflate rapidly (deflation time depends on patient weight and profile).

For V-Matt Therapy Mattress Models Only: For quick CPR deflation, locate the red CPR flag and twist the valve lightly. The mattress will rapidly deflate. **Note:** The safety cell will remain inflated.

v. Battery Back-up

A sealed 12 VDC rechargeable battery automatically provides all necessary power to the system when normal AC source is removed or fails for approximately 12 hours. The Dolphin FIS System will continue to provide therapy. This allows a patient to be moved freely without the AC cord being attached to an outlet. When reconnected to an AC source or power is restored, the AC section of the system automatically re-initializes and the battery is recharged.

Note: The *Storage Switch* must be in the *Battery On* position to recharge.
⚠ **Warning:** When storing unplugged unit for any length of time, it is critical that the battery button be place in battery "off" position.

vi. Transport

To transport the patient in bed, unplug the power cord from the main power outlet. Store the power cord in the space provided under the unit to avoid damaging the cord during transport. The battery back-up will provide power for continued therapy mattress system operation for approximately 12 hours.

vii. Keyboard Display

Storage Switch (Figure 2~~Figure 2~~**)**
The *Storage Switch* is located on the bottom of the control unit by the power cord. Turn the *Storage Switch* to *Battery On* for normal operation of the control unit and to ensure the battery charges when connected to AC power. Turn the *Storage Switch* to *Storage Mode* when the control unit will not be in use.

viii. Power Button

Use the *Power* button to turn the power on and off. (Figure 3~~Figure 3~~).

ix. Mode

In the *Bed* position, the system operates normally, but when switched to the *Chair/Stretcher* position, the timing cycles change to allow use on a specialty surface (Figure 3~~Figure 3~~).
Using the specialty surface allows the system to be moved from the patient bed to a wheelchair cushion or stretcher pad, providing the normal functions of the system.

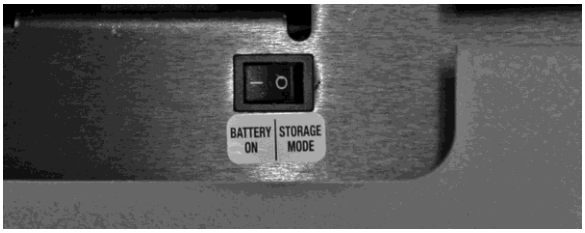


Figure 2: Dolphin Storage Switch located at the bottom of the Control Unit

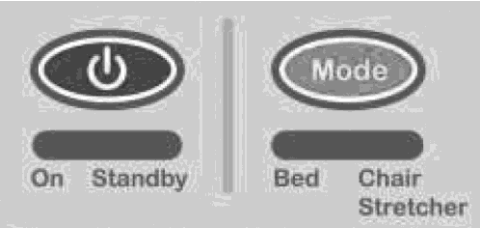


Figure 3: Dolphin Power Button located at the bottom of the Control Unit

x. Alarm (Figure 4~~Figure 4~~)

The warning or alarm subsystem consists of LED's and a beeper which displays red and beeps when a fault condition occurs.

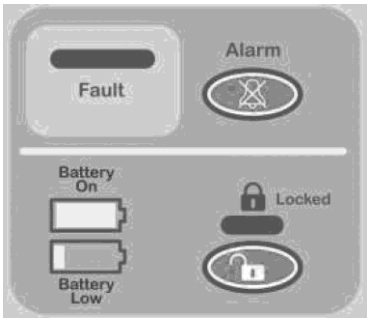


Figure 4: Dolphin alarm system

A fault condition is considered to be any of the following conditions:

- Pressure too hard for more than a 10 second period
- Pressure too soft for more than a 30 minute period
- Differential error between "Comfort Adjust setting" and "Auto Feedback" for more than a 30 minute period

The beeper may be manually disabled for up to 30 minutes by pressing the yellow *Alarm* button.

This feature avoids annoyance while a fault is being corrected, but will automatically re-assert itself after 30 minutes time, or until the fault is corrected. The LED's continue to function normally, regardless of the *Alarm* on/off state.The *Lock* button and associated yellow LED permit the entire control panel to be locked from further adjustments. When locked, pressing the *Lock* button again restores normal operation and the yellow LED is extinguished.

xi. Battery Indicators (Figure 4~~Figure 4~~)

The Battery indicator will blink when the AC power has been interrupted and the control unit is running on the battery back-up power.

The *Battery Low* indicator will blink when the battery back-up is at the end of its charge life. Plug control unit back into a power outlet as soon as possible to resume normal operation. Upon restoration of AC power, the battery back-up will begin the recharge process. **Note:** To ensure the battery recharges when connected to AC power, the *Storage Switch* must be in the *Battery On* position.

xii. Immersion Profile Window (Figure 5~~Figure 5~~)

The *Immersion Profile* indicates the system response to patient initial positioning and position change. When in optimal position, the green LED will illuminate. When the system is in transition, the yellow/red LEDs will illuminate. The Dolphin FIS System will recreate the optional profile based on individual patient body characteristics. No manual adjustment is needed.

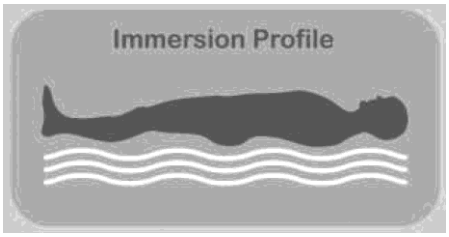


Figure 5: Dolphin Immersion Profile

xiii. Comfort Controls (Figure 6~~Figure 6~~)

a. Autofirm

- The *Autofirm* mode is used for patient transfers, repositioning, and to quickly inflate the surface when it has not been in use.
- To override the *Autofirm* mode, press the *Autofirm* button again.
- The *Autofirm* button causes the therapy mattress or specialty surface to fill to maximum inflation. After 15 minutes, the system will automatically reset to the previous inflation level.

While in the *Autofirm* mode, the *Comfort Adjust* indicator LED will remain on its normal setting to show where the inflation will return upon resumption of normal operation. Also, the *Comfort Adjust* indicator will blink amber at the firm position when in *Autofirm* mode. There is no restriction against the user immediately returning to the *Autofirm* mode once leaving that mode. The *Comfort Adjust* indicator indicates where the manual pressure adjustment is set by the *Comfort Adjust* arrows.

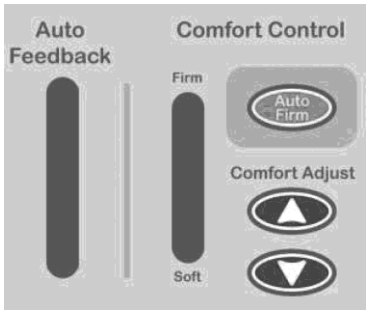


Figure 6: Comfort Controls

b. Comfort Adjust

Joerns recommends that caregivers allow the
Dolphin FIS System to set and control the immersion profile. However, to accommodate individual patient preference, caregivers can press the *Comfort Adjust* arrows to manually adjust comfort settings. It is recommended that manual adjustments of more than one (1) LED step up or down from the system profile be avoided.

c. Auto Feedback

Note (applies to therapy mattress): If patient is over 250 lbs. (113.6 (Kg), moving the *Comfort Adjust* indicator to one LED above the *Auto Feedback* LED may improve comfort. If patient is less than100 lbs. (45.4 Kg), moving the *Comfort Adjust* indicator to one LED below *Auto Feedback* LED may improve comfort.

The *Auto Feedback* indicator scale is represented by 10 LED's and covers the full control range from *Soft* to *Firm*.

When operating within normal parameters, the *Auto Feedback* LED scale will be amber. Should the system be outside of normal parameters, the LED scale will move from amber to red, indicating a potential need to manually adjust with *Comfort Adjust* arrows.

It is normal for the *Auto Feedback* LED to move to red when the patient is transitioning on the therapy mattress. Allow the Dolphin FIS System to optimize. If the LED lights remain consistently red after the system has had the chance to optimize, manual adjustment with the *Comfort Adjust* arrows is needed.

xiv. Surface Setup:

a. Therapy Mattress

- Remove the existing mattress from the bed.
- Unpack the therapy mattress with the hose connection at the foot end of the bed and the therapy cells facing up. Secure the therapy mattress straps to the movable part of the bed frame.
- If the therapy pad is not already on the therapy mattress, place it on the therapy mattress. Attach the therapy mattress using either the straps or zipper depending on the mattress configuration.
- Hang the control unit on the foot of the bed facing away from the bed.
- Connect hose set from the therapy mattress to the control unit securely. When properly installed, the hose connectors should click into place.
- Turn Storage Switch to Battery On position. The Storage Switch is located on the underside of the unit.
- Plug in the control unit and the yellow Standby light will illuminate. Press the Power button. The control unit will start and the green light will illuminate. Keep the control unit ON while the patient is on the therapy mattress.
- The control unit must be set to the Bed setting using the Mode button when connected to a therapy mattress. Use the Chair/Stretcher mode when the control unit is connected to a specialty surface.
- Inflate the therapy mattress using the Autofirm button. The therapy mattress is fully inflated when the immersion profile is indicated in green.
- Place the patient on the therapy mattress and allow system to optimize. Note: If patient is over 250 lbs. (113.6 Kg), moving the Comfort Adjust indicator to one LED above the Auto Feedback LED may improve comfort. If patient is less than 100 lbs. (45.4 Kg), moving the Comfort Adjust indicator to one LED below Auto Feedback may improve comfort.
- When the Dolphin FIS System is working properly, no hand check is normally recommended.

If needed, a traditional hand check may be performed as outlined below:

1. Begin by placing the back section of the bed in the appropriate position based on the patient's clinical condition.
2. Select the highest or most firm *Comfort Adjust* setting.
3. Hand Check: Place a hand with three (3) fingers (if head of bed at 30° or higher) or four (4) fingers (if head of bed lower than 30°) stacked vertically beneath the cells of the mattress and above the safety mattress directly between the lowest point of the patient's sacral area/buttocks. The smallest finger should be resting on the safety mattress.
4. Sequentially reduce the *Comfort Adjust* setting to the firmness level where the height of the three (3) or four (4) fingers can slide with minimal resistance between the patient's sacral area/buttocks and the lower safety mattress. This is the proper *Comfort Adjust* setting for the patient to assure proper inflation of the air cells and prevent bottoming out of the mattress.
5. Document the patient's *Comfort Adjust* setting for future reference, and re-evaluate with the hand check as the patient's condition warrants.

b. Wheelchair Cushion

- Remove any existing cushion from the wheelchair.
- Unpack the wheelchair cushion with the hose connection at the back of the wheelchair and the therapy cells facing up. Secure the wheelchair cushion straps to the seat section of the wheelchair frame.
- If the therapy pad is not already on the wheelchair cushion, place it on the wheelchair cushion. Attach the zipper around the perimeter of the wheelchair cushion.
- Secure the control unit to the back of the wheelchair.
- Connect hose set from the wheelchair cushion to the control unit securely. When properly installed, the hose connectors should click into place.
- Turn Storage Switch to Battery On position. The Storage Switch is located on the underside of the unit.
- Press the Power button. The control unit will start and the green light will illuminate. Keep the control unit ON while the patient is on the wheelchair cushion. Note: The control unit battery must be periodically recharged. Follow instructions under Battery Indicators.
- The control unit must be set to the Chair/Stretcher setting using the Mode button when connected to a wheelchair cushion. Use the Bed mode when the control unit is connected to a therapy mattress.
- The wheelchair cushion is inflated and ready for use when the immersion profile is indicated in green.
- Place the patient on the wheelchair cushion and allow system to optimize.

c. Stretcher Pad

- Remove any existing pad from the stretcher
- Unpack the stretcher pad and place on the stretcher with the hose connection at the foot of the wheelchair. Use the hook and loop fastener on the underside of the pad to attach the pad
- to the stretcher by peeling off the outer layer of white tape and laying the pad firmly back on the stretcher.
- Secure the control unit to the stretcher using the hooks on the back of the unit.
- Connect the hose set from the stretcher pad to the control unit securely. When properly installed, the hose connectors should click into place.
- Turn Storage Switch to Battery On position. The Storage Switch is located on the underside of the unit.
- Press the Power button. The control unit will start and the green light will illuminate. Keep the control unit ON while the patient is on the stretcher pad. Note: The control unit battery must be periodically recharged. Follow the instructions under Battery Indicators.
- The control unit must be set to the Chair/Stretcher setting using the Mode button when connected to a stretcher pad. Use the Bed mode when the control unit is connected to a therapy mattress.

- The stretcher pad is inflated and ready for use when the immersion profile is indicated in green.
- Place the patient on the stretcher pad and allow the system to optimize.

4. Nomenclature

AWI	Associate Work Instructions
CPU	Central Processing Unit
PCB	Printed Circuit Board
DHR	Device History Record
DLPH-000000DMJ-CU	Control Unit, Dolphin, Joerns
DLPH-000000DMU-CU	Control Unit, Dolphin, Joerns
DLPH-000000EUJ-CU	Control Unit, Dolphin, Europe, Joerns
DLPH-000000UKJ-CU	Control Unit, Dolphin, UK, Joerns
EMC	Electromagnetic Compatibility Information
ESD	Electrostatic Discharge
ETL	Electrical Testing Lab (Product Tested by Intertek in compliance with National Standards
FIS	Fluid Immersion System, The Dolphin pump
LED	Light Emitting Diode
900T-CU	Dolphin Pump (Control, Unit Dolphin)
MSDS	Material Safety Data Sheet; includes ingredients and all pertinent information for chemicals used
Powered Therapy Surface	Any therapy surface containing therapy cells and requiring a control unit for operation
Non-powered Therapy Surface	Any therapy surface that does not require a control unit
Tube or Hose	Either term refers to fluid lines for air flow connected by various types of fittings

5. Specifications

Dimensions

Control Unit:
11.5" (29.2 cm) W x 12.5" (31.8 cm) H x 6" (15.2 cm) D

Standard Therapy Mattress:
35" (89 cm) W x 82" (208 cm) L x 10" (25 cm) D
42" (107 cm) W x 82" (208 cm) L x 10" (25 cm) D
48" (122 cm) W x 82" (208 cm) L x 10" (25 cm) D

Low Profile Therapy Mattress:
35" (89 cm) W x 82" (208 cm) L x 8" (20 cm) D
42" (107 cm) W x 82" (208 cm) L x 8" (20 cm) D
48" (122 cm) W x 82" (208 cm) L x 8" (20 cm) D

Step-Deck (Dolphin V-Matt):
35" (89 cm) W x 88" (224 cm) L x 10" (25 cm) D

Wheelchair Cushion:
17" (43 cm) W x 17" (43 cm) L x 4" (10 cm) D

Stretcher Pad:
36" (91 cm) x 76" (193 cm) x 5" (13 cm)

Electrical Specifications

90/240 VAC, 50/60 Hz

Operating Conditions:
Ambient Temperature: +10°C to +40°C
Relative Humidity: 30% to 75% Non-Condensing

Storage and Shipping: Ambient Temperature: 10°C to +40°C Relative Humidity: 10% to 100%

Control Unit Classifications

North America: UL 60601-1, CAN/CSA C22.2 No. 601.1

Europe: Conforms to IEC/EN 60601-1 and IEC/EN 60601-1-2 CE

Call for Assistance

If you have any questions or require service on a product, please call Joerns Healthcare at:
North America - 800.862.0270
Europe - (+31) 30.6363.700

6. Troubleshooting

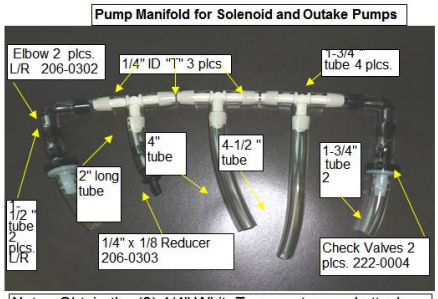
PROBLEM	POSSIBLE CAUSE	REMEDY
Support Surface Not Inflating properly	Improper hose connections from the therapy mattress into CU	When properly installed, hose connectors click into place into CU.
	No power	Ensure CU is plugged into AC outlet or is set to Battery Back-up.
	On Standby	If on Standby, press the Power button.
	Air Cells not connected or leaking at hose connections	Unsnap cover to check for disconnected quick-connect fittings or for loose or detached hose connections. (Look in Replacing Air Cells, P. 29)
	Mode Switch set wrong	Ensure Bed Mode switch position set for therapy mattresses
	Battery Storage Switch set wrong	Ensure that the switch is turned to the Battery On position.
	CPR valve is open	Rotate CPR valve clockwise completely to close
	CU runs constantly and can't establish the optimized Immersion Profile or desired Comfort Control	Check for faulty connections, leaking surfaces, or damaged control unit (loose internal hoses/fittings, kinked hoses, cold-soldered electrical connections on pumps or valves, disconnected terminals)
	Auto Feedback light always RED	Check for proper surface inflation and unit operation
	Control Board faulty	Replace Control Board (Look in Install PCB & Cables, P. 28)
Cannot change Therapy Mode or adjust Comfort Control	Lock function is engaged	To disable Lock function, press the Lock button
Unit does not work in battery mode and/or membrane display flashes randomly	Dead, discharged, or disconnected battery	Recharge battery but if not restored after four hours of charging, replace battery. (Look in Assembling Electrical Parts, P.26)
No power in AC mode	Fault in AC cable or DC power supply	Check AC cable and connection to and from power supply. Replace AC cable, reconnect to power supply, replace power supply, replace output harness, or reconnect to control board depending on point of failure. (Look in Assembling Electrical Parts, P. 26)
Error in control panel function	Fault in control board or membrane	Replace control board. (Look in Install PCB & Cables, P. 28) If error continues, replace membrane. (Look in Install CU Overlay Decals, P.27)
CU more noisy than usual	Loose hardware, faulty pumps, faulty solenoid, cold-solder joints	Check all screws and metal plates for tightness and correct seating. If noise continues replace pumps first then solenoid. (Look in Pump Manifold with Solenoid Assy, P.22)

7. Removal & Replacement Procedures

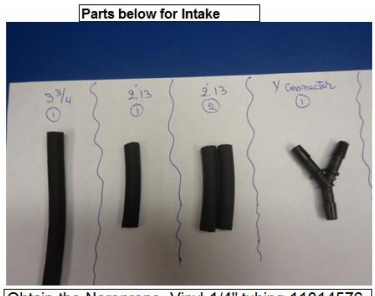
All Tools Required:

Phillips #1 Screwdriver
Phillips #2 Screwdriver
Scissors
3/16 Deep Socket & Wrench
Adjustable 6-10" Crescent Wrench
Voltmeter
0-2 psi or 0-5 psi rated manometer
Tube Cutter, Clean Room Devices, LLC, Model CRD130 (or equivalent)
Hi-Pot Tester-III, Associated Research, Inc., Model-3765 (or equivalent)
Leakage Current Tester-Electrical Safety Analyzer, Fluke-175 Biomedical, Model ESA175-15A/250V (or equivalent)
Flow Gauge, VFB Series (690KPa Max 65 degree Celsius Max) (or equivalent)

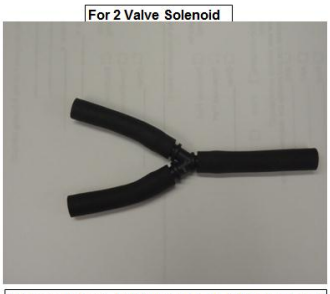
i. Various Hose Assemblies



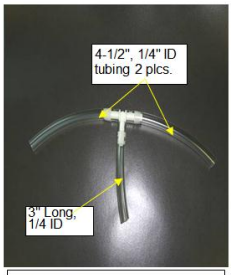
Note: Obtain the (3) 1/4" WhiteT connectors and attach the center "T" connector with the 4" long vertical tubing and 1-3/4" Lx1/4 ID tubing at each end of the center "T" connector, with attaching the L/R "T" connectors there after with 1-3/4" long tubing. Install the Right End side "T" connector with a 4-1/2" long vertical tube and the Left side "T" with a 2" long 1/4" ID tube adding the Reducer with tapered end facing down.



Obtain the Noreprene, Vinyl 1/4" tubing 11014576, "Y" connector part number 206-0301 and Econo Tube Cutter to cut (1) 3-3/4" tube, (1) 2-.13" and (2) 2.13" long tubing as shown above. Note: All tubes must be cut to +0.0",-.05" tolerance (per drawing specifications, 31009255).



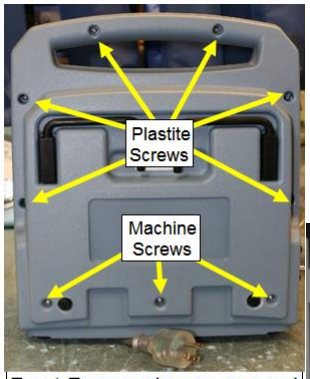
Connect the 2.13" tubes on all 3 branches of the "Y" connector. Refernce drawing, 31009255.



Install the 3" long tubing, 1/4" ID in the center of the "T" connector. Install the 4-1/2" tubing, 1/4" ID to each end of the "T" 206-0300-1/4 ID connector.

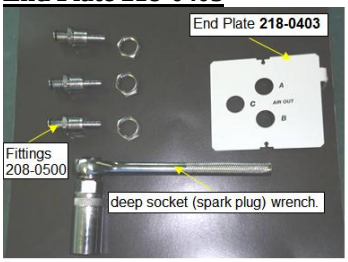
Disassembly

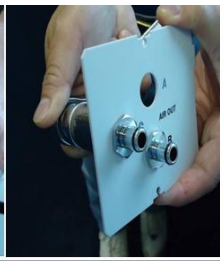
Rear Housing 210-0053



Front-Rear enclosure secured with 9 screws. Parts Needed:
3 - machine screws- 208-0503
6 - plastite screws-208-0508
Tools Needed:
#2 Phillips head screwdriver

End Plate 218-0403





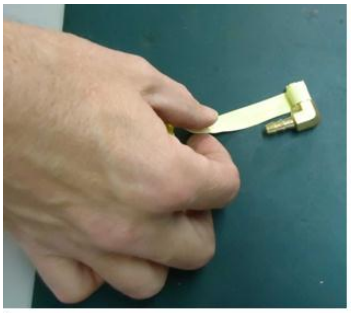
Obtain 3 hose fittings (panel mount 1/4" ID 208-0500). Remove the (3) nuts from fittings and use a 13/16 dee End Plate- 218-0403.

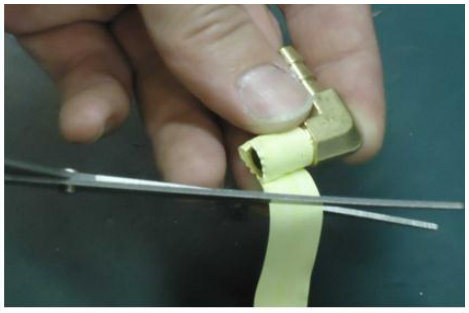
ii. Bed hooks



Obtain the Brackets (218-0400) Hook assembly, screws, #2, (208-0505), 10-32x3/8 and #10-flat washers-208-0510. Use a #2 phillips screwdriver.
Install the Right and Left Brackets to the rear housing, using hardwares 208-0505, #2 screws and flat washers, #10, 208-0510.
Use a # 2 phillips screw driver to install the left and right brackets (hook- 218-0400). Hand tighten with the #2 phillips screwdriver.
Make sure that the (Bed Hook) handles resist movement. If they are loose use allen wrench to tighten the set screw.

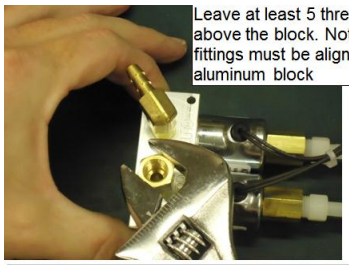
iii. Dolphin Pump Manifold with Solenoid Assy



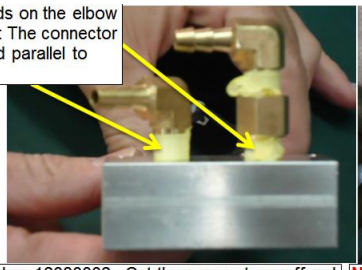


Obtain Teflon tape, two Brass Elbows, part number 12080001 and 1 Standoff, part number 12080002.Use teflon tape and wrap around the threads of the Brass Elbows and Standoff as shown above. Use scissors to trim off excess tape as shown above.

Install the Brass Elbow in selinoid block shown above using a crescent wrench.



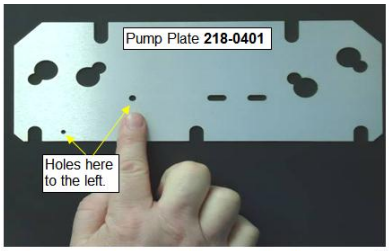
Leave at least 5 threads on the elbow above the block. Note: The connector fittings must be aligned parallel to aluminum block



Apply the teflon tape on the Standoff, part number 12080002. Cut the excess tape off and install the Standoff part in the solenoid block as shown using the crescent wrench.Note: Make sure the Brass Elbows are orientated in the solenoid block (to prevent hose kinking.

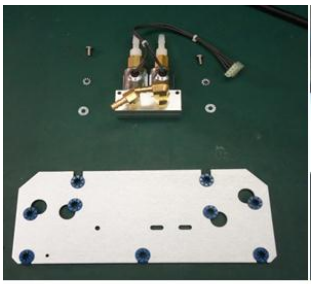
Note: Make final adjustment in-line with tubes as much as possible to avoid tube contact with battery.

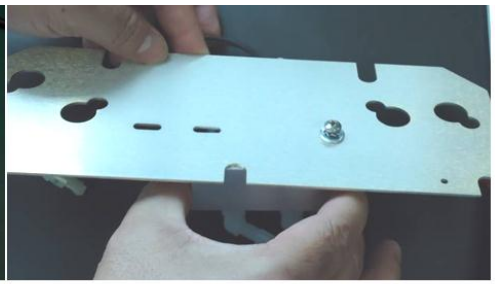
iv. Pump Plate

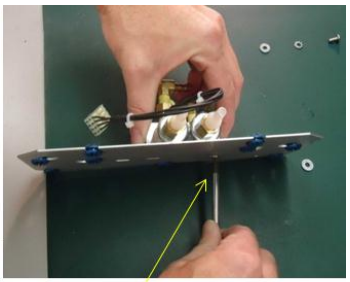


Pump Plate 218-0401. Note:Small holes are to the left, which means the plate is right side up.

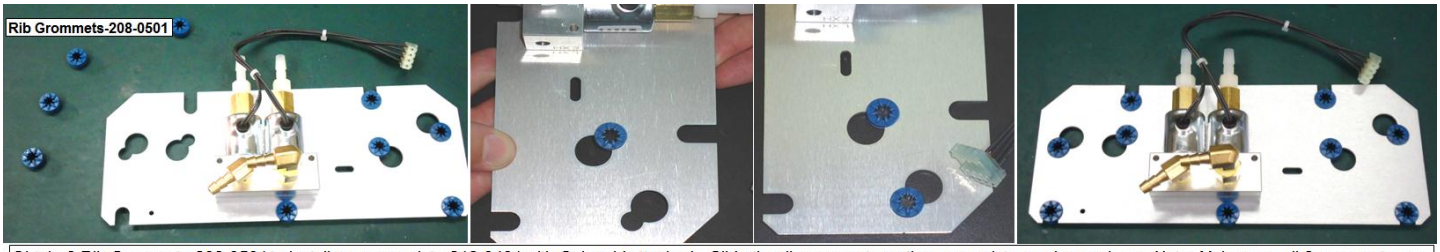
Obtain (9) of the Rib Grommets, 208-0501, (9) 208-0502, CR3 6/32x.5, (4) #10, 208-0505- 10-32x3/8, (2) # 8 208-0500, (4) #10 208-0510 flat washers, #8 208-0509 flat washers.







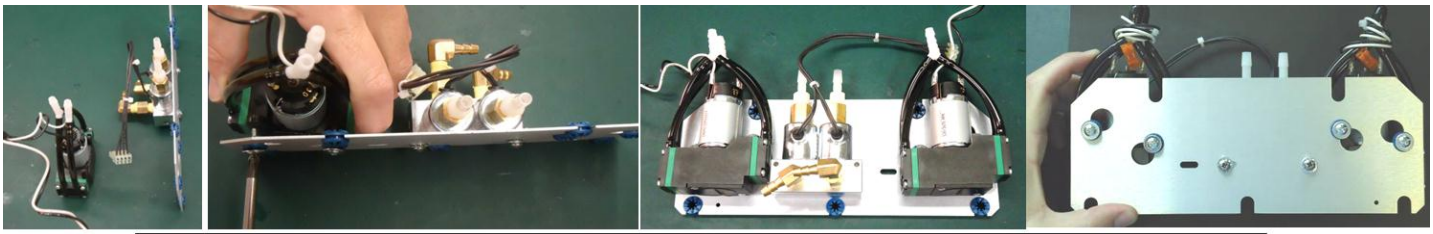
Obtain Solenoid Plate-218-0401, Solenoid Pump-121-0030, 2- #8 flat washers-208-0509 ,2 lock washers-208-0512 and 2 # 8 Machine Screws-208-0504. Turn the Selonoid plate over and install # 8 flat washer with lock washers and machine screws as shownTool required- #2 Phillips screwdriver.



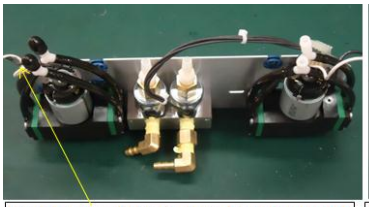
Obtain 8 Rib Grommets-208-0501 to install on pump plate-218-0401 with Solenoid attached. Slide the rib grommets on the pump plate as shown above. Note: Make sure all 8 grommets are installed and orientated on the solenoid plate as shown above.

v. Pump & Solenoid Valve Assembly (continued)

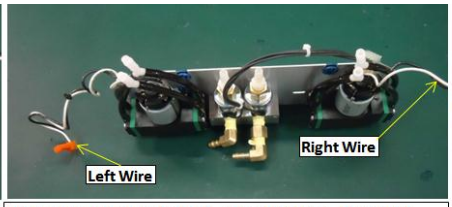
Obtain 4 machine screws-208-0502, 6/32 x .5 CR3
Insert the machine screws through the rib grommets as shown above. Install screws with a #2 Phillips screwdriver.



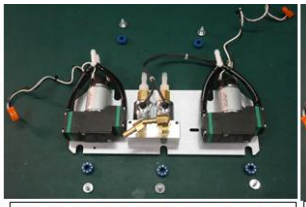
Note: Make sure all screws are tightend properly on the Solenoid and Thomas Pump as shown.



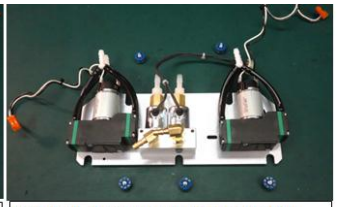
Remove the 4 Black Caps from the top of the Solenoid Pumps by pulling from top



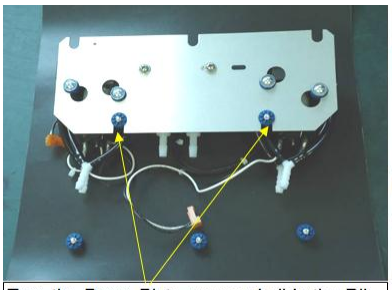
After removing all 4 black caps from the Solenoid Pumps, pull the Left and Right Solenoid wires out and seperate the wires to the right and left . Note: The orange connector on the right and the other orange connector on the left as shown above.



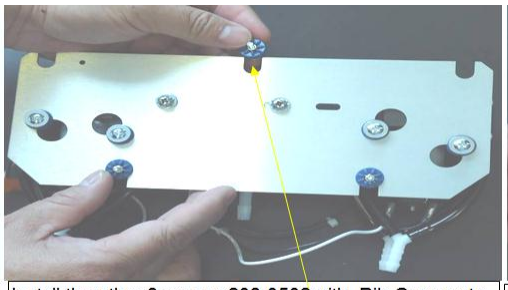
Obtain 5 Rib Grommets 208-0501 and 5 screws-208-0502.



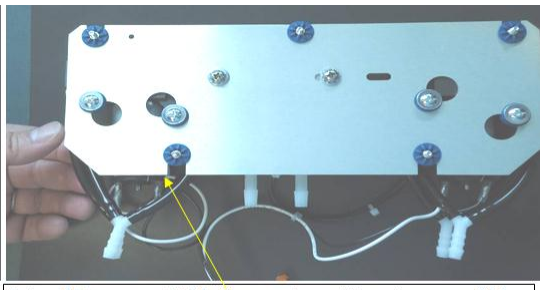
Insert all 5 screws through the Rib Grommets to prepare for installing on the pump plate.



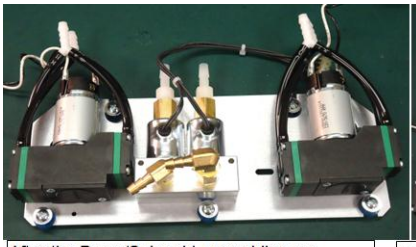
Turn the Pump Plate over and slide the Rib Grommets with 208-0502 screws attached on "U" slots on the bottom of the pump



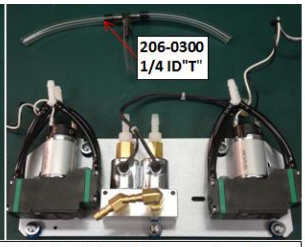
Install the other 3 screws 208-0502 with Rib Grommets attached on the top "U" Slots as shown above.



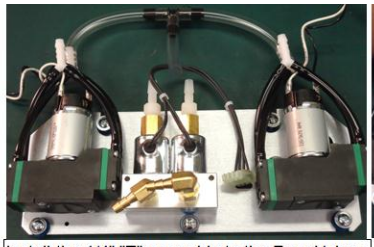
Note: Make sure all Rib Grommets and thread screws 208-0502 are facing upward and the head of the screws are facing downward on the opposite side of the Pump Plate.



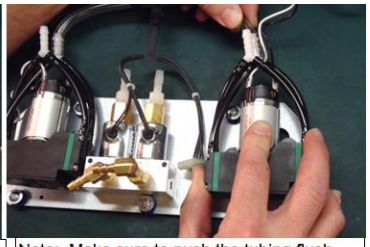
After the Pump/Solenoid assemblies are completed, obtain the Intake Pump Assembly.



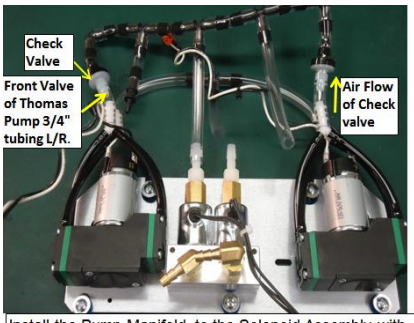
Obtain the 1/4 ID "T" connector with 1/4" ID tubes attached as shown above.



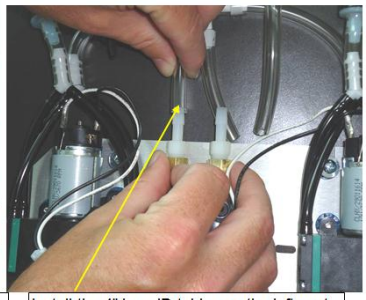
Install the 1/4" "T" assembly to the Rear Valves of the Thomas Pumps as shown above.



Note: Make sure to push the tubing flush down on the Rear Valves of Thomas Pumps.

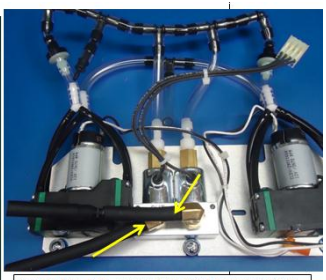


Install the Pump Manifold to the Solenoid Assembly with Check Valves attached on the Thomas Pump front valves Left and Right. Note: Make sure the tubing are flush on each pump valve.



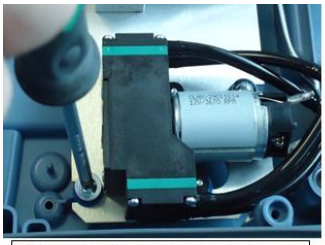
Install the 4" long ID tubing on the left post of the Solenoid Valve as shown above.

Install the 4-1/2" long ID tubing on the right post of the Selonoid Valve as shown above. Note: Make sure that both tubings are flush on each solenoid posts as shown.

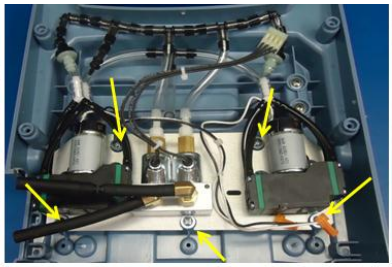


Install the "Y" assembly 1/4" hose to the right elbow of the solenoid. Note: Make sure there is no hose kinking. Install the 3-3/4", 1/4" ID hose on the left/right brass elbows on the solenoid. Make sure tubes are pushed in thoroughly.

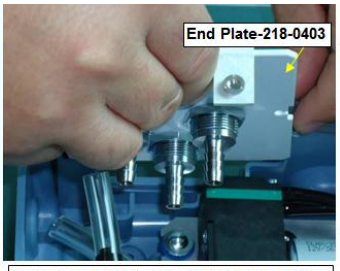
End Plate Assembly



Obtain the Rear Housing enclosure and align and place the solenoid pump assembly on the bosses of the housing enclosure to tighten.



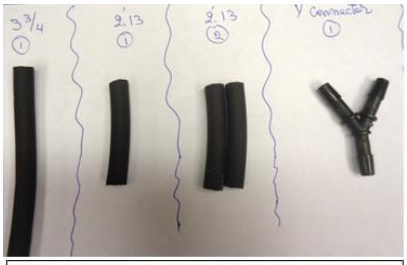
Attach the pump system to the rear housing enclosure using the bolts 208-0502 with rib grommets that were inserted into the plate using #2 phillips head screwdriver



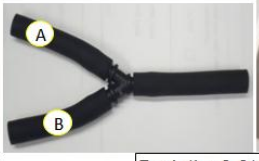
Install End Plate-218-0403 by pushing down between the opening of the Rear Housing as shown above.

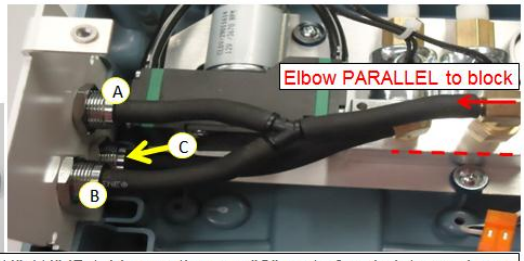
Note: Make sure "A", "B" and "C" ports are tightened properly. Use the deep socket (spark plug) wrench to tighten all ports on the end plate.

vi. Hose Assembly Connecting End Plate to Pump & Solenoid Valve Assembly



Prepare to connect the 3-3/4", 1/4" ID tubing and "Y" connector with the (2) 2.13" long 1/4" ID tubing the the End Plate inserts.





Push the 3-3/4" 1/4" ID tubing on the rear "C" port of end plate as shown above. Make sure the tubing is secured thoroughly but **NOT KINKED**. Install the"Y" connector to the "A" and "B" ports.

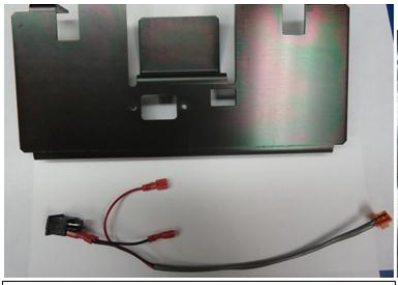
vii. CU Overlay Decals

Obtain the Front Housing-204-0201. Inside of housing shown above.

Outside of Front Housing-204-0202.

Joerns Brand Overlay 216-3001 or OnCare's brand overlay 216-3002.

viii. Assembling Electrical Parts

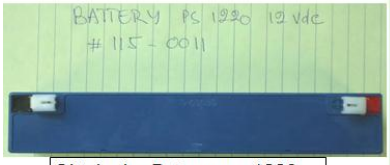


Obtain the Battery Bottom Plate, 11014512 and the Battery Wire Harness, 330-0301.

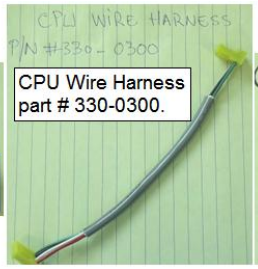
Obtain the CPU-Joerns, part number 370-1401.

Obtain the Membranes AV, With Fiber Optics part number 216-3005.

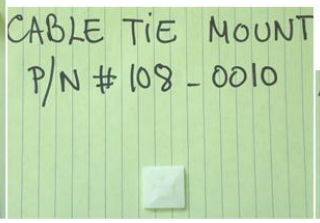
Obtain the Power Supply, part number 115-0010.



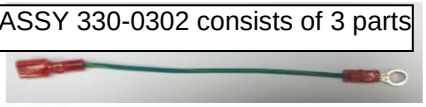
Obtain the Battery, ps 1220, 12vdc, part number 115-0011.

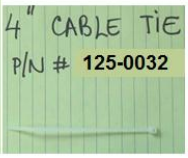


CPU Wire Harness part # 330-0300.



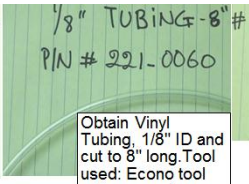
ASSY 330-0302 consists of 3 parts



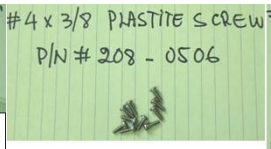


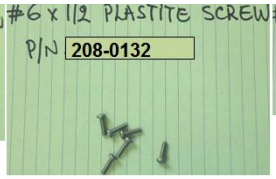
New Part #'s
104-0030-term ring, 125-0021-green stranded hookup wire 18awg, & 104-0024B-receptacle, battery harness.

Note: Double Crimped wire assembly, 330-0302.

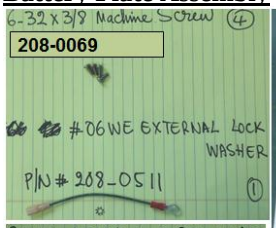


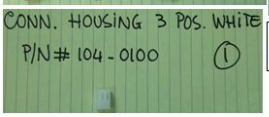
Obtain Vinyl Tubing, 1/8" ID and cut to 8" long. Tool used: Econo tool cutter, or scissors.

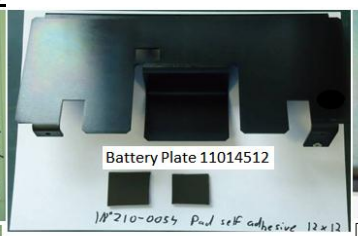




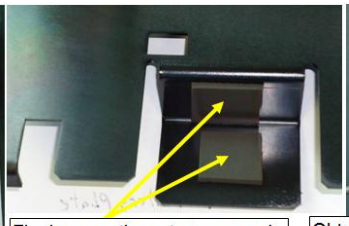
Battery Plate Assembly



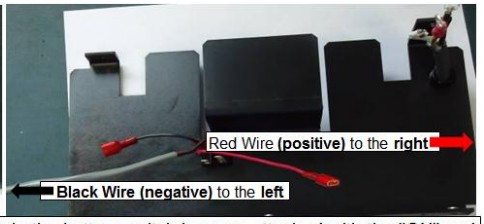




Use scissors to cut 2 , 31mm x 31mm square pads from part number 210-0054.



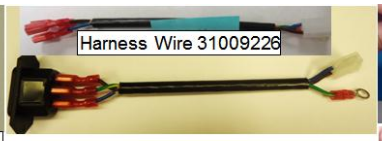
Firmly press the cut square pads on the top and bottom flanges.

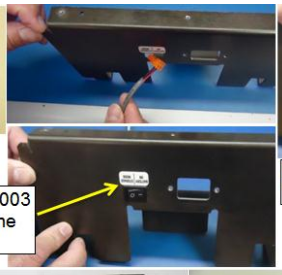


Obtain the battery switch harness attached with the "ON" and "OFF" switch part number 330-0301. Orientate the black wire (negative) to the left and the red wire (positive) to the right.

ix. Battery Plate Assembly (continued)

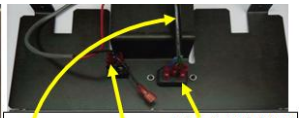
Inlet Part # 11014474
Note **Brown** wire to line
Yellow & Green to ground
Blue to Neutral.



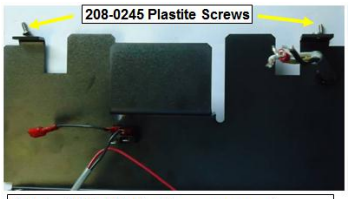


Install the Battery Switch label 216-3003 above the switch. Note: "ON" is on the Right and "OFF" is on the Left.

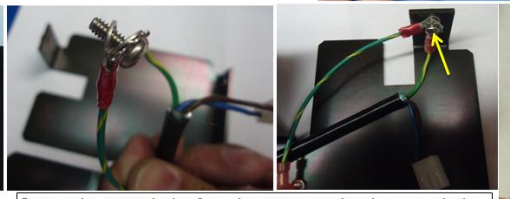
2 screws for AC Inlet, Part 12540619



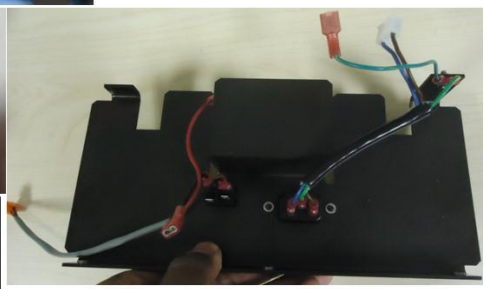
Inlet-11014474
Battery Wire Harnes-330-0301
Assembly Harness Wire-31009226



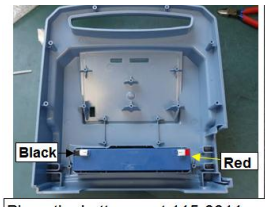
Obtain 2 #6x3/8 Plastite screws part number 208-0245 and insert through the left and right of the battery plate bottom flanges. Note: The plastite screws are put on in advance and not to be tightend until installed in the front housing.



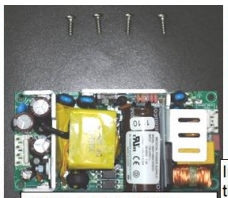
Secure the ground wire from the power cord to the ground wire assembly and the battery bracket with a star washer and screw. Order: screw, star washer, power cord ground cable, ground wire assembly, bracket. Parts Needed:
1 - ground wire assembly, 125-0034, 104-0024B, 104-0030
1 - lock star washer part number 208-0511
1 - #6x32/3/8 machine screw, part number 208-00069
Tools Needed: #2 -Phillips head screwdriver.



x. Power Supply



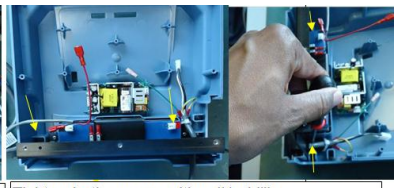
Place the battery part 115-0011 ps 1220, 12 vdc in the front cover housing. Note: Positive post (red) is on right and (black) post is on left.



Obtain power supply 115-0010 and 4 #4x3/8 plastite screws 208-0506.

Install the 4 - # 4 screws 208-0506 into the boss of the front housing. Use a #1 Phillips scewdriver to secure screws.

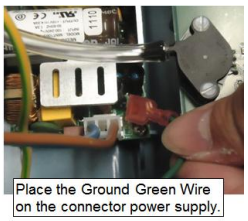
Install the battery plate (218-0402) by sliding down into the grooves of the front housing.



Tighten both screws with a #1 phillips

xi. Install CU Overlay Decals

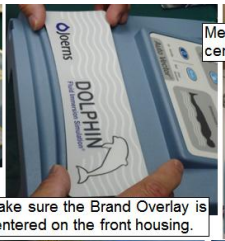
Connect the White Molex connector to the white connector on the power supply.



Place the Ground Green Wire on the connector power supply.

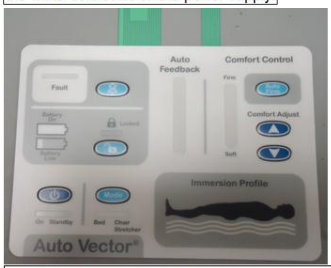
Obtain Joerns Brand Overlay, part # 216-3001 or 216-3002

Peel the adhesive back lining and place the adhesive side down on bottom lower front housing.



Make sure the Brand Overlay is centered on the front housing.

Membrane and Brand Overlay centered on fthe front housing.



Obtain the membrane AW w/Fiberoptics part number 216-3005 to installl on front housing.

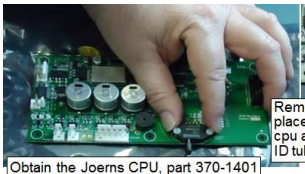
Remove the adhesive backing of mebrane.

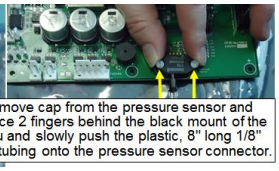
Make sure surface is clean before applying the Fiber Optics Membrane. Insert the Fiber Optic wires through the square cut-out.

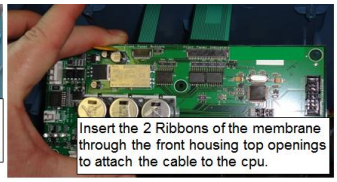
Apply pressure around the membrane edges for the adhesive to adhere to the face of the front housing.

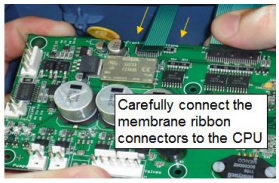
Make sure all corners of the membrane are pressed down firmly on the front housing..

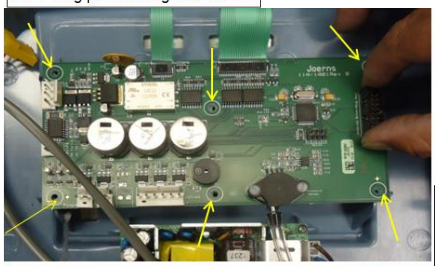
xii. Install PCB & Cables

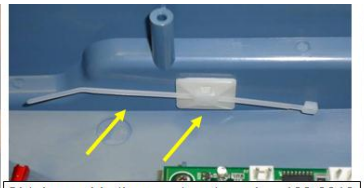

Obtain the Joerns CPU, part 370-1401 and 8" long plastic tubing with 1/8" ID.

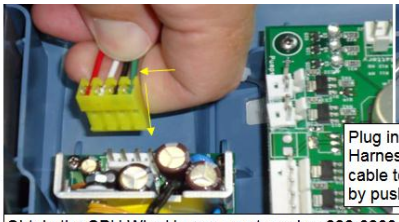

Remove cap from the pressure sensor and place 2 fingers behind the black mount of the cpu and slowly push the plastic, 8" long 1/8" ID tubing onto the pressure sensor connector.

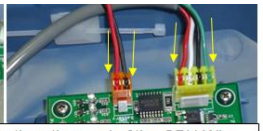

Insert the 2 Ribbons of the membrane through the front housing top openings to attach the cable to the cpu.


Carefully connect the membrane ribbon connectors to the CPU

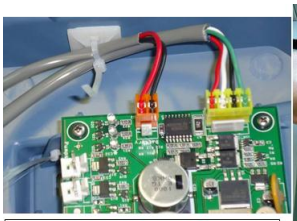

Install 6 #4x3/8 plastite screws part number 208-0506.Use #1 Phillips screwdriver to install cpu board onto bosses.


Obtain a cable tie mount part number 108-0010 and place on the inside left of housing.
Obtain a 4" long cable tie part number 125-0077 and route through the cable mount as shown.

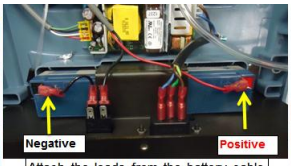

Obtain the CPU Wire Harness part number 330-0300 and plug in the yellow connector of the harness to the power supply. The green wire of the connector should be on the right when plugging into the power supply.


Plug in the other end of the CPU Wire Harness to the PCB.Attach the battery cable to the PCB, 4 lead white connector by pushing the connector end down.

xiii. Quick Battery Check

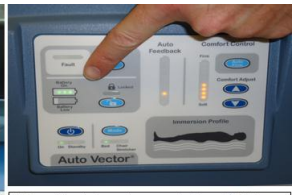

Secure the wire assembly cable and the battery cable to the side of the housing with the zip tie. Tools Needed: needlenose pliers


Using a multimeter touch both battery terminals. The multimeter should read above 12. volts. At or above 12 volts is "passing". Tools Needed: 1 - Multimeter

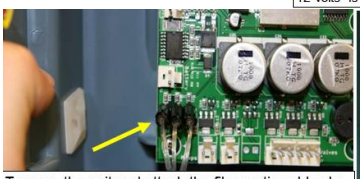


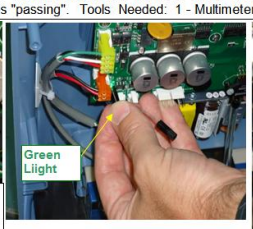
Attach the leads from the battery cable to the battery terminals. Place the black (negative) cable to left terminal and the red (positive) cable to the right side terminal as shown above in illustration. Make sure battery light is "ON" in the front of the housing. Once done turn the switch to storage mode.

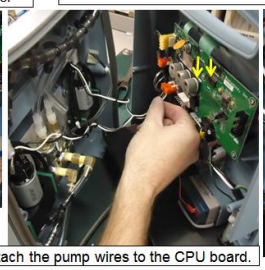

Plug the power cord into an inlet. Turn the battery switch on. Switch Battery to "Storage Mode" to conserve battery life for longer use.

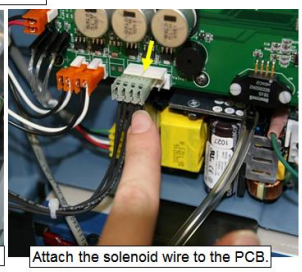


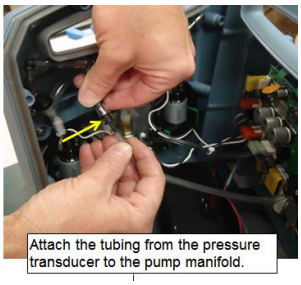
Note: Check to make sure battery light is on. The battery light should show "GREEN".


Turn on the unit and attach the fiber optic cables by checking the 1st, 2nd and 3rd positions. Gently snap the fiber optics in place. Note: Green light , First position, the 2nd (Middle) is the yellow and the Left one is Red. Make sure battery switch is turned to "Storage Mode" after this procedure.

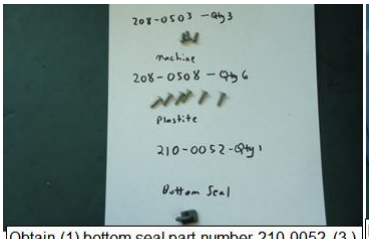



Attach the pump wires to the CPU board.


Attach the solenoid wire to the PCB.


Attach the tubing from the pressure transducer to the pump manifold.

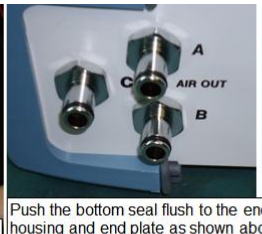
xiv. Enclosure Hardware



Obtain (1) bottom seal part number 210-0052, (3) machine screws part number 208-0503 and (6) #6 plastite screws part number208-0508.

Assemble Endplate to Enclosure

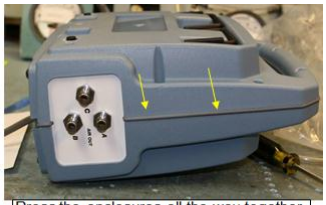
Install the bottom seal on the bottom of rear housing and end plate.



Push the bottom seal flush to the end of housing and end plate as shown above.


Line up the front and rear enclosures. Slide together and insert the rear seal.

Final Assembly Steps


Press the enclosures all the way together. Check the gaskets. Check to make sure there are no overlays. Before closing Dolphin Unit, perform visual check for any kinked tubing or other potential problems.

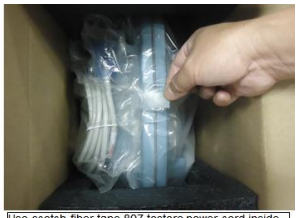
xv. Packaging CU

Attach 2 flat bumpers on rear housing, part number 214-0100 with loctite. Add to the backside of rear housing, ETL label part number 11014102 for DLPH-000000DMJ-CU and DLPH-000000DMU-CU or CE label part number 11014409 for DLPH-000000EUJ-CU and DLPH-000000UKJ-CU.
Parts needed:
2-flat bumpers 214-0100
Loctite 411

Attach 4 dome bumpers on the bottom housing of pump , part number 214-0101 with loctite.
Parts Needed: 4 - Dome Bumpers-214-0101
loctite 411
Place power cord to ship as shown above for

Place the serial number label part number 11012452 on the rear housing per shown above.

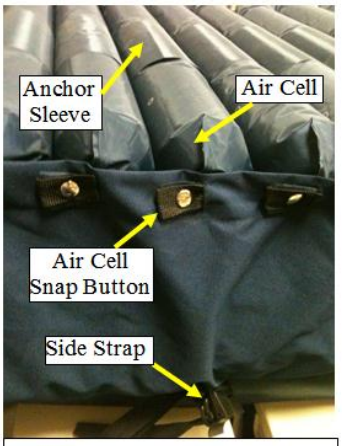
Use polybag part number 12040005 to pack power cord as shown above.



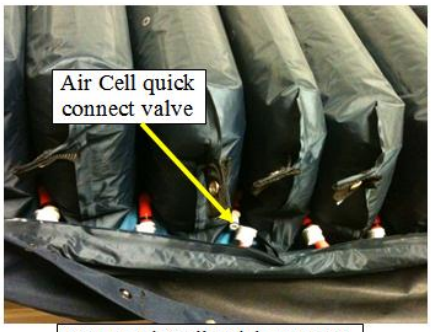
Use scotch fiber tape 897 tostore power cord inside of carton with Dolphin Unit as shown above.

Note: Make sure to packout the pump using the Polybag 24"x20, part number 12040022 along with 2 Packaging Inserts, part number 43001695 ,User Manual part number 6110109 and Quick Reference Guide part number 62202281.

xvi. Replacing Air Cells



Remove top cover (not shown) held by side straps and unsnap Air Cell buttons on both ends of Air Cell.

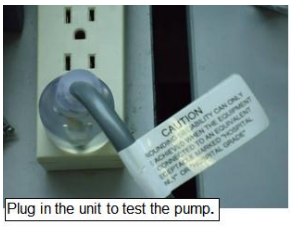


Unsnap Air Cell quick-connect valve located at end of Air Cell.

Pull Air Cell through Anchor sleeve to remove. Reverse procedure to install new Air Cell.

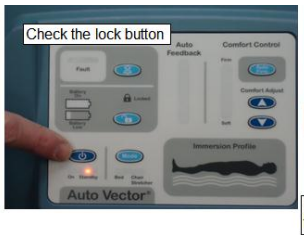
Make sure the Air Cell is not twisted when installed but is oriented from one end to the other end straight and flat

8. Performance Test Procedures/Calibration


Plug in the unit to test the pump.

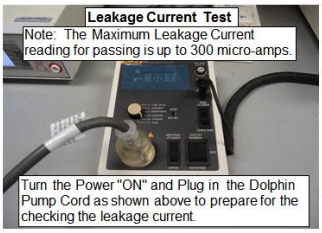

Note: Standby Button


Press Blue "Power Button"




Check the chair and mattress mode funtions, as well as the comfort levels.


Digital Analyzer to check the leakage current for the Pump. Note: Make sure the digital analyzer has an up-to-date calibration sticker before use.

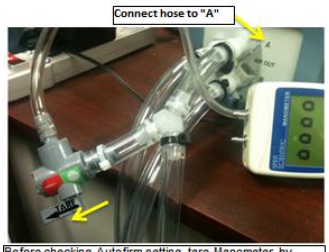



Attach the "Test Lead" to ground to the Battery Plate as shown above.

Plug in pump for the Hi-Pot Tester and turn on the pump. Note: Make sure to test every power cord before packaging.


The test result is "Pass". Record the result on DHR form FA10.05, Rev. "C".


Check the Biologics Pump Flow by using a flow gauge. Attach the 3 hoses to the end plate inserts as shown in illustration. The Flow reading should be between 12-15 lpm. If the Flow is less than 12 lpm, check all of the plastic tube connections to see if they are fully engaged or flush at each end of the connections. Re-test. Record results on DHR form FA10.05



Before checking Autofirm setting, tare Manometer by turning the valve switch to "Tare" pointing away from the Control Unit and then press "Hold" button as usual to tare Manometer. Do the tare at least once each day before testing any Control Units.

After tare, the pressure should read 0.0 +/- .1mmHg. Next, rotate valve switch 180 degrees pointing back toward the Control Unit.

Lay flat on the surface while testing Autofirm. When Autofirm stabilizes for at leat 30 seconds, record pressure and Pass or Fail results on DHR form FA10.05.

Endline Fuctional Test Procedures

1. Plug in Unit.

2. Push the "Blue" power button to turn the pump "ON". Note: The unit will default to bed mode.
   A) Power LED Light will be "ON" Record "Pass or "Fail" on the DHR form FA 10.05.
   B) Bed/Chair Light "ON" Record Pass or Fail results on DHR form FA 10.05.
   C) Green profile LED Light "ON". Record Pass or Fail results on DHR form FA 10.05.
   D) Yellow LED on norm setting, comfort side on. Record Pass or Fail results on DHR form FA 10.05.

3. Press lock button. Push bed/chair button. Adjust up/down "Blue Buttons". Yellow Hard Button. Pump will stay in mode or comfort. Set before pushing "Lock Button" . Note: This locks pump in place. Release the button when done. Record pass or fail results on DHR form FA 10.05.

4. While pump is "ON", unplug the pump and the Green Battery Light will come "ON". Note: If Battery is "LOW", the RED Light will appear. Record pass or fail results on DHR form FA 10.05.

5. Perform Hi-Pot Test with hi-pot test equipment on every unit assembled. The voltage test requirements are 1000 volts within 60 seconds, or 1200 volts within 1 second. Record pass or fail result on DHR form FA10.05. Note: Program the Hi-Pot Tester, test mode=ACW, Voltage=1.2kV, Upper Limit=7mA, Lower limit=0.0mA, ramping time=0.5seconds and testing time=1second.

6. Leakage Test- See page 18, Step 73 to perform current leakage test. Note: Record current leakage results on the DHR form FA10.05.

System Response Loading Test Procedures:

1. Connect wheel chair cushion to pump. Turn it on. Press "Bed/Chair" "Blue Button" to put in "Chair Mode". The "Green" light will appear under the "Chair" symbol.

2. The pump will come "ON" and will start pumping air into the cushion. When the pressure builds up, it will default to norm position on "Set Comfort" side with "Yellow LED Lights" Test cushion by feeling each baffle is full and firm to the touch. Record Pass or Fail results on DHR form FA 10.05.

3. Sit on cushion. The Unit will let air out until it reaches default setting at "Norm".
   A) Lean to side, pump should release air into cushion until it reaches appropriate setting. Next drop 2 notches on the control button, set cmfort side and the pump will release the pressure(air) and turn "OFF". Record Pass or Fail results on DHR form FA 10.05.

4. Attach the three plastic hoses from the mattress by connecting the bed quick connects to the inserts located on the end plate side of the pump. Turn the unit "ON" and press the "Blue" mode button to bed. The pump will come on to fill the mattress. Once the mattress is full (default norm setting) test all the baffles to make sure they are all firm to the touch. Record Pass or Fail results on DHR form FA 10.05.
   A) Press the "Auto Firm" button, **(See Page 24 for Tare Manometer Test)** until the pressure builds up in the pump, once completed with pressure, "Press Auto Firm Again" to release the pressure out of the pump.
   B) Once the pump has finished releasing the pressure out the pump, lay on the mattress again, preferably on your back to make sure you can see the controls on the front of the pump and Manometer. The pump will release more air pressure until it defaults to "Norm" setting. Also try to move your feet towards you which also helps make the pump release pressure. Record Pass or Fail results on DHR form FA 10.05.

   C) Adjust the settings to "Comfort Down" to two settings below the "Norm " setting. The pump will start releasing air pressure until it reaches it normal settings.

Completing DHR
1. A Device History Record (DHR) Form FA 10.05 shall be completed for each 900T-CU unit assembled and tested.
2. Quality and Manufacturing will be required to review and sign each DHR.
3. All DHRs shall be kept in the QA department.

9. Replacement Parts – Control Unit

Note: The item numbers refer to the exploded diagrams on the subsequent pages.

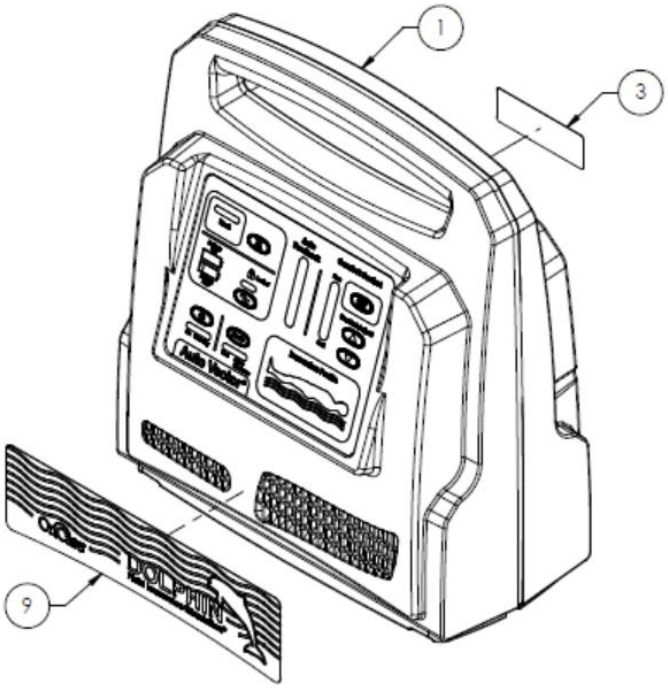
900T-CU			
ITEM	**PART**	**DESCRIPTION**	**QTY**
58	12080002	Straight expander, brass	1
57	109-0035	Thomas pump 1420-0003 w/wires solder on	2
56	218-0400	Hook Assembly	2
55	218-0401	Plate, Pump	1
54	11014512	Plate, Bottom	1
53	218-0403	End plate	1
52	370-1401	DOLPHIN CONTROL CARD	1
51	121-0030	2 valve solenoid	1
50	216-3005	Membranes AV. w/fiber optics	1
49	210-0053	Rear housing w/main, handle seal attached	1
48	204-0202	Front housing	1
47	210-0052	Bottom Seal	1
46	115-0010	Mint1065A157C01 power supply	1
44	115-0011	ps 1220 12 vdc battery	1
43	12540619	6-32 X 3/8 PFHMS, BLACK FINISH	2
42	330-0300	CPU wire harness	1
41	330-0301	Battery wire harness	1
40	208-0500	Panel mount 1/4" id ss insert	3
39	208-0501	rib grommet	9
38	208-0502	6/32/x .5 CR3	9
37	208-0069	Screw, PH, PAN, 6-32 x 3/8" zinc plated	4
36	208-0504	8-32 x 3/8 machine screw	2
35	208-0505	10-32 x 3/8	4
34	208-0506	#4 x 3/8 plastite screw	10
33	208-0245	#6 x 3/8 plastite screw	2
32	208-0132	#6 x 1/2 plastite screw	6
31	208-0509	washer, flat, #8	2
30	208-0510	washer, flat, #10	4
29	208-0511	lock washer, #6	1
28	208-0512	lock washer, #8	2
27	210-0054	Pad, Battery	4
26	214-0100	Flat bumper	2
25	214-0101	dome top bumper	4
NS	125-0062	8.5" cable tie	2
NS	125-0032	4" cable tie	1
NS	108-0009	cable tie mount	1
21	221-0060-	2 Tube, CPU sensor (vinyl tubing 1/8" ID)	8.5
20	31009255	Assembly, Output Hoses, Dolphin	1
18	320-0423	Manifold, Pump and Solenoid	1
17	350-0451	Tube assembly, Pump	1
16	12080001	90 degree elbow, brass	2
15	104-0101	shunt w/handle jumper 2 pos	1
14	330-0302	Ground wire harness assembly	1
13	216-3003	Label, Battery	1
12	31009226	Harness, Wire, Dolphin	1
10	11014474	Inlet, Appliance C-14	1
NS	12040005	BAG,POLY 9 X 12	1

CONTROL UNIT DLPH-OOOOOODMJ-CU			
ITEM	**PART**	**DESCRIPTION**	**QTY**
45	11014475	CABLE, MAINS, US RIGHT ANGLE	1
11	11014102	LABEL, ETL, DOLPHIN AUTOVECTOR	1
NS	60000001	WORK INSTRUCTIONS	1
NS	6110109	USER MANUAL, DOLPHIN	1
NS	6220281	QUICK REFERENCE GUIDE, DOLPHIN	1
NS	12040022	BAG, POLY, 20" X 24"	1
NS	43001695	INSERT, PACKING	2
NS	201079-CC	BOX, PACKING	1
3	11012452	PRODUCT/SERIAL LABEL	1
2	216-3001	OVERLAY, JOERNS	1
1	900T-CU	CONTROL UNIT, DOLPHIN	1

CONTROL UNIT, ONCARE DLPH-OOOOOODMU-CU			
ITEM	**PART**	**DESCRIPTION**	**QTY**
45	11014475	CABLE, MAINS, US RIGHT ANGLE	1
11	11014102	LABEL, ETL, DOLPHIN AUTOVECTOR	1
NS	60000001	WORK INSTRUCTIONS	1
9	216-3002	OVERLAY, ONCARE	1
NS	6110127	USER MANUAL, ONCARE	1
NS	6220281	QUICK REFERENCE GUIDE, DOLPHIN	1
NS	12040022	BAG, POLY, 20" X 24"	1
NS	43001695	INSERT, PACKING	2
NS	201079-CC	BOX, PACKING	1
3	11012452	PRODUCT.SERIAL LABEL	1
1	900T-CU	CONTROL UNIT, DOLPHIN	1

CONTROL UNIT, EUR, JOERNS DLPH-OOOOOOOEUJ-CU			
ITEM	**PART**	**DESCRIPTION**	**QTY**
60	11014476	CABLE, MAINS, EU RIGHT ANGLE	1
59	11014409	LABEL, CE, DOLPHIN AUTOVECTOR	1
NS	60000001	WORK INSTRUCTIONS	1
NS	6110109	USER MANUAL, DOLPHIN	1
NS	6220281	QUICK REFERENCE GUIDE, DOLPHIN	1
NS	12040022	BAG, POLY, 20" X 24"	1
NS	43001695	INSERT, PACKING	2
NS	201079-CC	BOX, PACKING	1
3	11012452	PRODUCT/SERIAL LABEL	1
2	216-3001	OVERLAY, JOERNS	1
1	900T-CU	CONTROL UNIT, DOLPHIN	1

CONTROL UNIT, UK, JOERNS DLPH-OOOOOOOUKJ-CU			
ITEM	**PART**	**DESCRIPTION**	**QTY**
61	11014477	CABLE, MAINS, UK RIGHT ANGLE	1
59	11014409	LABEL, CE, DOLPHIN AUTOVECTOR	1
NS	60000001	WORK INSTRUCTIONS	1
NS	6110109	USER MANUAL, DOLPHIN	1
NS	6220281	QUICK REFERENCE GUIDE, DOLPHIN	1
NS	12040022	BAG, POLY, 20" X 24"	1
NS	43001695	INSERT, PACKING	2
NS	201079-CC	BOX, PACKING	1
3	11012452	PRODUCT/SERIAL LABEL	1
2	216-3001	OVERLAY, JOERNS	1
1	900T-CU	CONTROL UNIT, DOLPHIN	1



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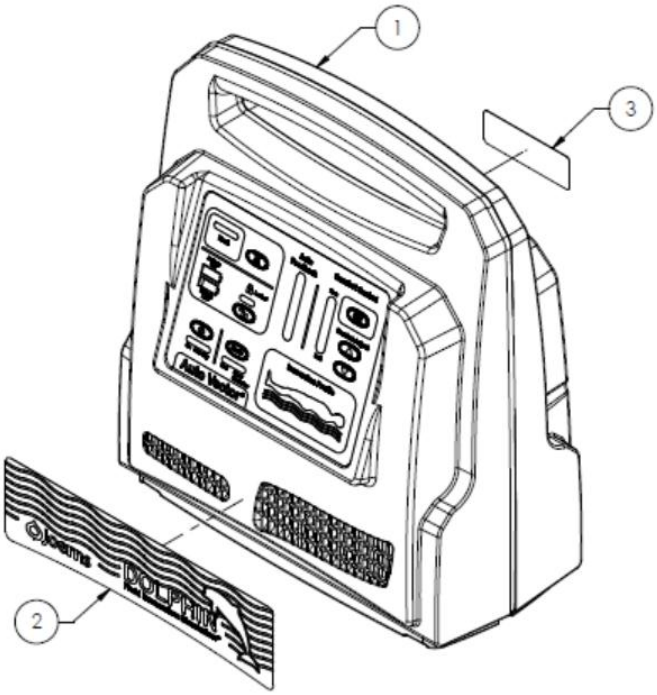

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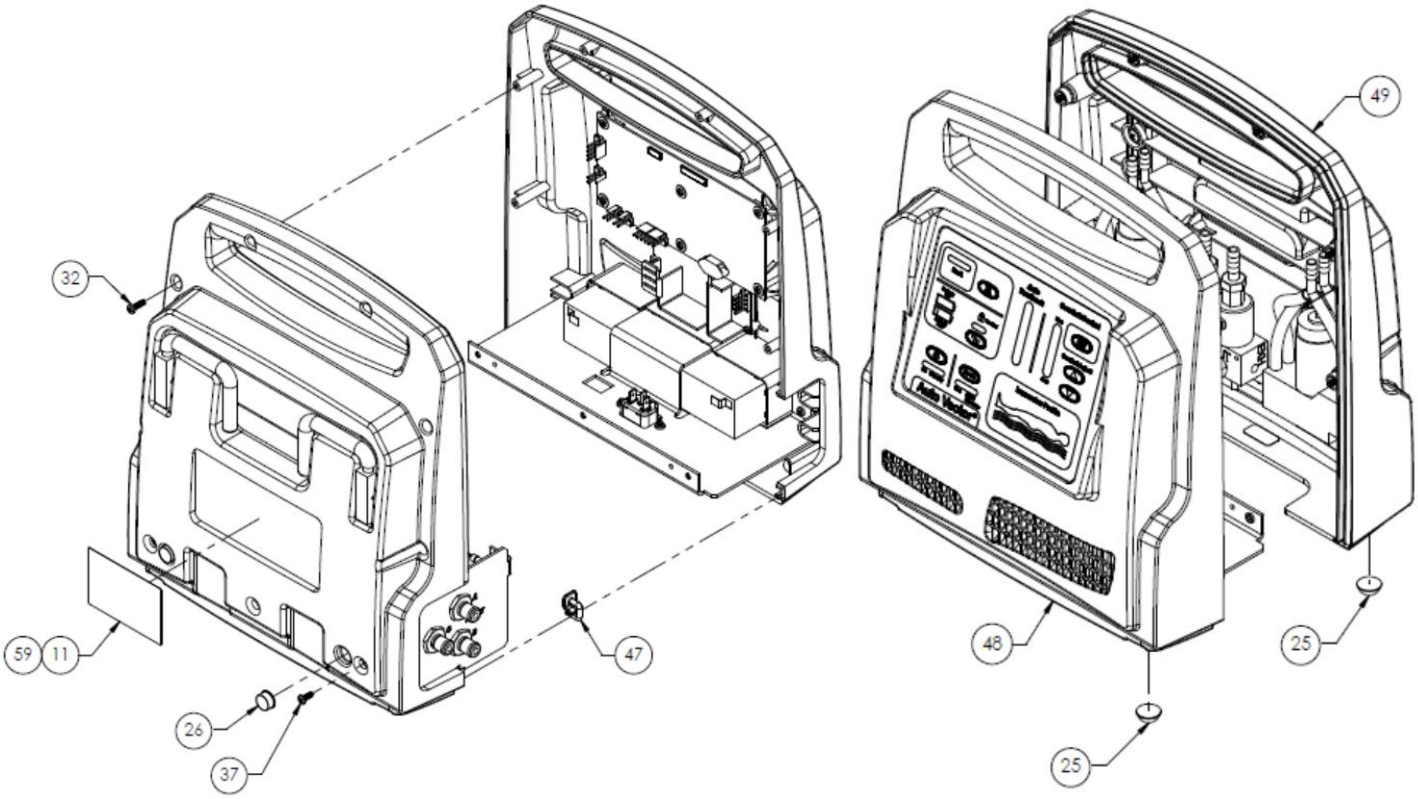

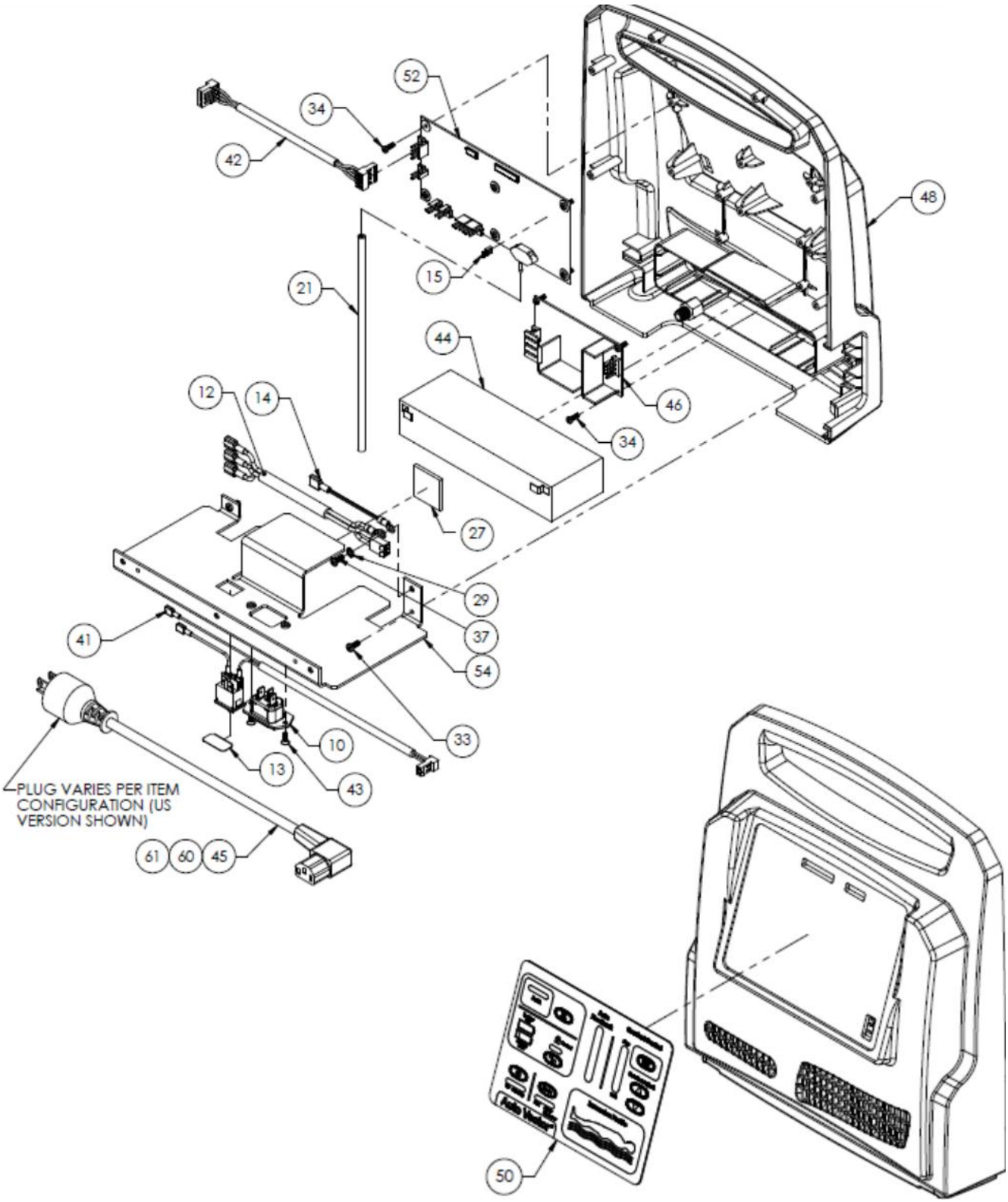
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PLUG VARIES PER ITEM CONFIGURATION (US VERSION SHOWN)
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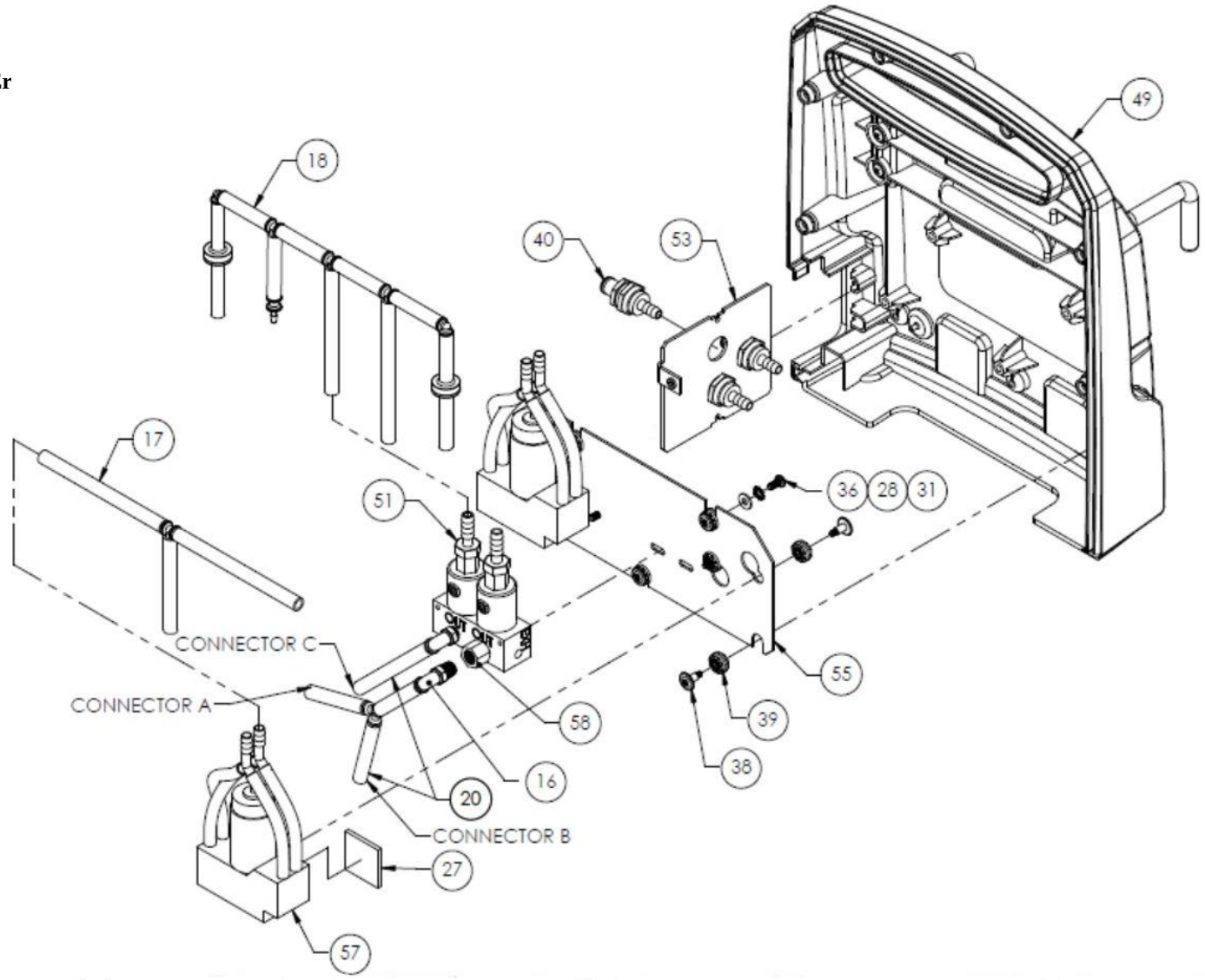
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CONNECTOR C
CONNECTOR A
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CONNECTOR B
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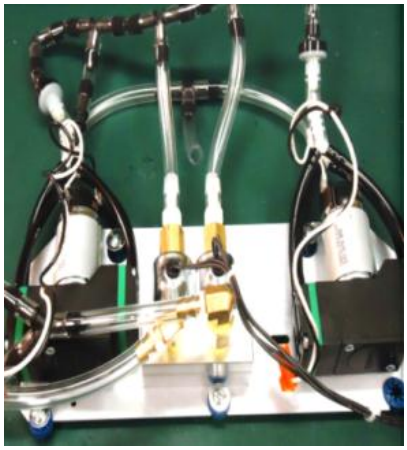
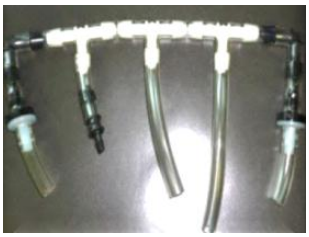
10. Specific Replacement Kits

	**Dolphin Front Housing Kit** Front Housing- 204-0201 Membrane- 216-3005 Joerns Overlay- 216-3001 Carton- 43001231	**Kit Part No.** 39001281
	**Dolphin Rear Housing Kit** Bracket Hooks- 218-0400 qty. (2) #2 Screw-208-0505 qty. (4) #10 Flat Washer- 208-510 qty. (4) Dome Bumper-214-0101 qty. (4) Flat Bumper-214-0100 qty. (2) Carton- 43001231	**Kit Part No** 39001282
	**Dolphin 2 Valve Solenoid Pump/Elbows** Elbows-12080001 qty. (2) Standoff-12080002 qty (1) Carton-43001235	**Kit Part No.** 39001283
	**Dolphin Thomas Pump** Bumper Pad- 210-0054 qty. (1) Carton- 43001235	**Kit Part No.** 39001284

	**Dolphin Pump Manifold with Solenoid Assy** Solenoid Pump-stand off 121-0030 12080002 qty. (1) Shoulder Screw, CR3 6/32 x .5 208-0502 qty. (9) #10 10-32 x 3/8 208-0505 qty. (4) #10 Flat Washer-208-0510 qyt. (4) #10 Flat Washer-208-0509 qyt. (2) Thomas Pumps-109-0035 qty. (2) Bumper Pads- 210-0054 qty.(2) 1/4" id "T" Nylon Black Connector- 206-0300 qty. (4) 1/4" Vinyl Tubing- 221-0061-2 qty. (.333 ft.) 1/4" id Elbow Black Nylon Connector- 206-0302 qty. (2) 1/4 x 1/8 Black Nylon Reducer- 206-0303 Valve Check Nylon 1/4- 222-0004 1/4' "Y" Black Nylon Connector- 206-0301 Vinyl Tubing- 1/8" 221-0060-2 qty. (.78 ft.) Carton-43001541	**Kit Part No.** 39001285

	**Dolphin End Plate, Air Outlet Assy** Insert Nuts-208-0500 qty. (3) Carton-43001235	**Kit Part No.** 39001286
	**Dolphin Flat & Dome Bumpers** Flat Bumper- 214-0100 qty. (2) Dome Bumper- 214-0101 qty. (4) Polybag- 12040004 Carton- 43001235	
	**Dolphin, Manifold Pump/Solenoid Outake**	**Kit Part No.** 39001288

	**Dolphin, Tube Assembly, Pump**	**Kit Part No.**350-0451

11. Replacements Parts – Surface/Mattress

Product Number	Product Name	Product Description
Standard Mattress Replacement Parts		
DLPH-3582OOOOJ-M	Dolphin Fluid Immersion Simulation® Advanced Therapy Mattress	Dolphin Fluid Immersion Simulation® 35" x 82" x 10" Advanced Therapy Surface Replacement
DLPH-4282OOOOJ-M	Dolphin Fluid Immersion Simulation® Advanced Therapy Mattress	Dolphin Fluid Immersion Simulation® 42" x 82" x 10" Advanced Therapy Expanded Surface Replacement
DLPH-4882OOOOJ-M	Dolphin Fluid Immersion Simulation® Advanced Therapy Bariatric Mattress	Dolphin Fluid Immersion Simulation® 48" x 82" x 10" Advanced Therapy Bariatric Surface Replacement
DLPH-3588OVOOJ-M	Dolphin Fluid Immersion Simulation® Advanced Therapy Mattress	Dolphin Fluid Immersion Simulation® 35" x 88" x 10" Advanced Therapy Surface Replacement for Step Deck beds
Specialty Surface Replacement Parts		
DLPH-1717WCOOJ-C	Dolphin Fluid Immersion Simulation® Advanced Therapy Surface	Dolphin Fluid Immersion Simulation® 17" x 17" x 5" Advanced Therapy Wheel Chair Cushion Replacement
DLPH-3176OSOOJ-P	Dolphin Fluid Immersion Simulation® Advanced Therapy Surface	Dolphin Fluid Immersion Simulation® 31" x 76" x 5" Advanced Therapy Stretcher Pad Replacement
General Replacement Parts		
310-0700	Dolphin Fluid Immersion Simulation® Therapy Pad	Dolphin Therapy Pads - 35" x 82"
310-0701	Dolphin Fluid Immersion Simulation® Therapy Pad	Dolphin Therapy Pads - 42" x 82"
310-0702	Dolphin Fluid Immersion Simulation® Therapy Pad	Dolphin Therapy Pads - 48" x 82"
320-0161	Dolphin Fluid Immersion Simulation® Mattress CPR Valve	Dolphin Fluid Immersion Simulation® Mattress CPR Valve, Quick Deflate
6110109	Dolphin Fluid Immersion Simulation® User Manual	Dolphin Fluid Immersion Simulation® User Manual
General Air Cell Parts		
216-4104-1	Dolphin Fluid Immersion Simulation® Mattress Sacral Replacement Air Cell	Dolphin Fluid Immersion Simulation® Mattress Replacement Air Cell, Vented, Sacral, 35" x 10",
216-4105-1	Dolphin Fluid Immersion Simulation® Mattress Sacral Replacement Air Cell	Dolphin Fluid Immersion Simulation® Mattress Replacement Air Cell, Vented, Sacral, 42" x 10"
216-4106-1	Dolphin Fluid Immersion Simulation® Mattress Sacral	Dolphin Fluid Immersion Simulation® Mattress

	Replacement Air Cell	Replacement Air Cell, Vented, Sacral, 84" x 10"
216-4104	Dolphin Fluid Immersion Simulation® Mattress Head and Foot Replacement Air Cell	Dolphin Fluid Immersion Simulation® Mattress Replacement Air Cell, Vented, Head & Foot, 35"x10"
216-4105	Dolphin Fluid Immersion Simulation® Mattress Head and Foot Replacement Air Cell	Dolphin Fluid Immersion Simulation® Mattress Replacement Air Cell, Vented, Head & Foot, 42"x10"
216-4106	Dolphin Fluid Immersion Simulation® Mattress Head and Foot Replacement Air Cell	Dolphin Fluid Immersion Simulation® Mattress Replacement Air Cell, Vented, Head & Foot, 84"x10"

12. Maintenance

⚠**Warning:** Only facility-authorized personnel trained by Joerns Healthcare should perform preventative maintenance. Preventative maintenance performed by unauthorized personnel could result in personal injury or equipment damage.

Any maintenance done without Joerns' authorization will invalidate any warranties on this product.

13. Storage and Care

When the product is not in use, store the power cord properly. Failure to do so could result in personal injury.

Note: Clean the Dolphin FIS System as described in the previous section prior to storage.

Control Unit

The power cord may be stored in the space provided under the unit for convenience. Wrap the unit in a plastic bag for dust resistance then store the unit in an area appropriate for an electronic medical device. Turn the Storage switch to *Storage Mode* when not in use. The Storage switch is located at the underside of the unit.

Therapy Mattress and Specialty Surfaces

Gently roll up the therapy mattress or specialty surface, expelling any residual air, for temporary storage. The therapy mattress or specialty surface should be wrapped in plastic and/or a clean bag for storage.

14. Cleaning

⚠**Warning:** Unplug the control unit from its power source. Failure to do so could result in personal injury or equipment damage.

⚠**Warning:** Do not expose the unit to excessive moisture that would allow for liquid pooling. Personal injury or equipment damage could occur.

⚠**Caution:** Do not use harsh cleansers/detergents, such as scouring pads and heavy-duty grease removers, or solvents, such as acetone. Equipment damage could occur.

Preferred Cleaning Supplies & Chemicals

- Obtain the following recommended cleaning supplies (or equivalents):
  - Disposable Rubber Gloves, Apron, terry cloths or towels
  - Eye Protection
  - Zep Professional Foaming Citrus Spray or Orange Sol Medi-Sol
  - PDI Germicidal Wipes or Steris LPHse disinfectant (dilute per label instruction on the bottle)
    - (0.5 ounces of concentrate per 1 gallon of water (Contact time 10 minutes). NOTE: After diluted the LPHse is good for 14 days, If transferred into another container/bottle it is necessary to label and date.
  - Steris Coverage Spray TB: Ready to use spray disinfectant. (Contact time 5 minutes)
  - SilverClene 24 disinfectant: Ready to use spray disinfectant.
  - Tide HE (High Efficiency): Ready to use laundry detergent.
  - Orange Sol Medi-Sol: Ready to use. Spray to remove glue from labels. (Contact time 10 minutes)
  - SA8 Liquid Detergent: Ready to use laundry detergent
  - SA8 Pre-Wash Spot Treatment: Ready to use stain remover

Control Unit Procedure

- Wipe off dust if necessary.
- Use PDI Germicidal wipes to pre-clean the Housing and Power Cord.
- Apply Zep Professional-Quat spray or Zep Professional Foaming Citrus Spray to clean control unit housing and power cord. Leave on for 10 minutes. Use a terry cloth or towel to remove any excess.
- Let product dry. Place the used cleaning wipes into a plastic bag, seal and discard into trash.

Therapeutic Support Surface Procedure

- Put on a pair of rubber gloves (Nitrile Chemical Resistant Gloves)
- Remove the dirty therapy pad, if applicable.
- Unsnap all therapy cells down the side of the therapy surface opposite the hose assembly.
- Inflate the therapy surface with the appropriate control unit.
- Open the therapy surface into a "butterfly" position by turning the therapy cells and support cells so that the inside of the enclosure and bottom of the support cells are both facing up.
- Spray the enclosure as needed with LPHse solution; leave on for 10 minutes then wipe with a terry cloth. All corners and available surface areas must be wiped thoroughly.
- Spray the bottom of the support cell and thoroughly wipe the entire surface.
- Turn the support cell so that the bottom is touching the enclosure and the top surface is exposed.
- As needed, spray the top of the support cell with LPHse solution leave on for 10 minutes then wipe with a terry cloth.
- Spray the exposed hoses and ends of the therapy cells and wipe.
- Spray the bottom surface of the therapy cells and CairRails (if applicable)/Anchor Sheet and wipe with a terry cloth.
- Close the "butterfly" position so that the top surface of the therapy cells is facing up normally.
- Deflate the therapy surface and re-snap all therapy cells to the enclosure.
- Re-inflate the therapy surface and generously spray the top of the therapy cells and CairRails (if applicable).
- Wipe the entire surface of the therapy cells and CairRails with a terry cloth.
- Raise the therapy surface onto one side, spray the table underneath and wipe down the table.
- Turn the therapy surface so that the top of the therapy cells are down on the newly cleaned table.
- Spray all sides and bottom of the enclosure as needed with LPHse solution; leave on for 10 minutes & wipe thoroughly.

- Wipe down all straps and buckles. Turn the therapy surface over.
- Remove the hose cover and wipe down with the LPHse disinfectant solution.
- Spray the hose assembly with LPHse solution; leave on for 10 minutes then wipe down.
- Disassemble the entire therapy surface into its individual parts for laundering & follow laundering instructions:
    - Therapy cells
    - CairRails (if applicable)
    - Anchor Sheet (if applicable)
    - Support Cell (if applicable)
    - Enclosure
- The following parts should be removed and wiped down with LPHse solution, but should NOT be laundered:
    - Hose Assembly
    - Head Raise Sensor (if applicable)
    - Turn Sensor (if applicable)
- Transfer the therapy surface to the assembly area, re-inflate the therapy surface and allow to air dry. The therapy surface may be hung to dry if excessively wet.

Laundering

These laundering instructions apply to therapy pads, therapy cells, support cells, enclosures, CairRails, and anchor sheets.

- Set the washing machine to use warm water (120º F).
- Spray any soiled or stained areas with appropriate cleanser pre-wash spot treatment before washing.
- Hand-scrub the stain thoroughly with an approved scrub brush.
- Place the product in the washing machine.
- Add 4 ounces of Tide HE or 2 ounces of SA8 Liquid Detergent or other appropriate detergent.
- Add 5 ounces of LPHse disinfectant solution to the bleach dispenser.
- Set the washer to normal wash and turn the machine on.
- Once the washer has completed the full wash cycle transfer the clean product to the dryer.
- Check for the following prior to placing the product in the dryer:
    - Verify that all soap has been removed. If necessary, rinse again to remove any residual soap.
    - Verify all therapy pad stains have been removed. If stains are still present re-wash. DO NOT dry until all stains are gone.
- Tumble dry the product on warm setting for 45 minutes.
- NOTE: Assembled mattresses are to be hung to dry if necessary, not placed in the dryer.
- Once the product is dry move it to the assembly area.

General Cleaning

If there is no visible soilage with possible body fluids, clean the therapy mattress and specialty surface with a mild detergent and warm water. If disinfection is desired, use a combination cleanser/disinfectant as explained in "Disinfecting" area.

- Patient care equipment that does not come in contact with mucous membranes or non-contact skin requires low-level disinfection. Wiping surfaces with a properly prepared detergent or disinfectant carries out low level disinfecting.
- Processing of dirty patient care equipment should take place in a designated area away from clean or sterile supplies and food preparation areas.
- Detergent/disinfectants should not be mixed with other germicides or detergents. Using the proper dilution ensures the most effective killing power of the disinfectant.
- Wash hands often and well, including after removal of gloves.
- Patient care equipment that is used in isolation areas should be disinfected in accordance with all internal policies and procedures regarding such equipment.

Disinfecting

When there is visible soilage and between patients, we recommend that you disinfect the unit and therapy mattress or specialty surface with a tuberculocidal disinfectant. Disinfectant should be registered with the Environmental Protection Agency (EPA).

- Use rubber gloves and eye protection.
- Prepare detergent/disinfectant (registered by EPA as hospital disinfectant) solution according to instructions on label for correct use-dilution.
- With the therapy mattress or specialty surface deflated, thoroughly wipe down entire mattress, as air cells will lie flat. Be sure to reach all areas underneath and in-between air cells. Allow to air dry.
- If dust or other soiling has accumulated along air hoses, remove using swabs moistened with detergent/disinfectant as necessary. Allow all components to air dry. Wrap therapy mattress or specialty surface in plastic and return to storage area.
- Thoroughly wipe down outside of control unit and allow to air dry. Cover with plastic and return to storage area.
- Remove gloves and dispose; wash hands.

Therapy Pad

The therapy pad can be wiped down with a disinfectant solution or a mild detergent with a damp cloth. If heavily soiled, the therapy pad can be laundered in a washer and dryer with warm water (no more than 120°F/48.9°C). A non-bleach detergent should be used sparingly. Wipe dry or allow to air dry.

Steam Cleaning

Do not use any steam cleaning device on the unit. Excessive moisture can damage mechanisms in this unit.

15. System Specifications

Table 1; Table of Specifications

Weight	Control Unit	Therapy Mattress:	Stretcher Pad	Wheelchair Cushion:
Safe Working Load (Max Capacity)	10 lbs (4.5 Kg)	1000 lbs (454.5 Kg)	700 lbs (318.1 Kg)	250 lbs (113.6 Kg)

Appendix A: Electromagnetic Compatibility (EMC)

AutoVector® Fluid Immersion Simulator

Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this manual.

Portable and mobile RF communications equipment can affect Medical Electrical Equipment.

The use of Accessories, transducers, and cables other than those specified by the manufacturer, may result in increased Emissions or decreased Immunity of the Auto Vector Fluid Immersion Simulator.

The AutoVector Fluid Immersion Simulator should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the Auto Vector Fluid Immersion Simulator should be observed to verify normal operation in the configuration in which it will be used.

Guidance and Manufacturer's Declaration –Electromagnetic Emissions

The AutoVector Fluid Immersion Simulator is intended for use in the electromagnetic environment specified below. The customer or the user of the Auto Vector Fluid Immersion Simulator should assure that it is used in such an environment.

Table 2: Guidance and Manufacturer's Declaration–Electromagnetic Emissions

Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The AutoVector Fluid Immersion Simulator uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	The AutoVector Fluid Immersion Simulator is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage Fluctuations/Flicker IEC 61000-3-3	Complies	

Guidance and Manufacturer's Declaration - Electromagnetic Immunity:

The AutoVector® Fluid Immersion Simulator is intended for use in the electromagnetic environment specified below. The customer or the user of the Auto Vector Fluid Immersion Simulator should assure that it is used in such an environment.

Immunity Test	IEC60601 Test Level	Compliance	Electromagnetic Environment-Guidance
Electrostatic discharge (ESD)	±6 kV contact		±6 kV contact
	±8 kV air		±8 kV air
IEC 61000-4-2			Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst	±2 kV for power supply lines		±2 kV for power supply lines
IEC 61000-4-4	±1 kV for input/ output lines		Not applicable
Surge	±1 kV line(s) to line(s)		±1 kV line(s) to line(s)
IEC 61000-4-5	±2 kV line(s) to earth		±2 kV line(s) to earth
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% $U\tau$ (>95% dip in $U\tau$) for 0,5 cycle		<5% $U\tau$ (>95% dip in $U\tau$) for 0,5 cycle
	40% $U\tau$ (60% dip in $U\tau$) for 5 cycles		40% $U\tau$ (60% dip in $U\tau$) for 5 cycles
	70% $U\tau$ (30% dip in $U\tau$) for 25 cycles		70% $U\tau$ (30% dip in $U\tau$) for 25 cycles
	<5% $U\tau$ (>95% dip in $U\tau$) for 5 sec		<5% $U\tau$ (>95% dip in $U\tau$) for 5 sec
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A / m	Not applicable	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Not applicable Mains power quality should be that of a typical commercial or hospital environment.

Mains power quality should be that of a typical commercial or hospital environment.

Mains power quality should be that of a typical commercial or hospital environment. If the user of the AutoVector Fluid Immersion Simulator requires continued operation during power mains interruptions, it is recommended that the Auto Vector Fluid Immersion Simulator be powered from an uninterruptible power supply or a battery.

Note: $U\tau$ is the a.c. mains voltage prior to application of the test level.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity			
The AutoVector®Fluid Immersion Simulator is intended below. The customer or the user ofthe Auto Vector Flui such an environment.			use in the electromagnetic environment specified immersion Simulator should assure that it is used in
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Auto Vector Fluid Immersion Simulator, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 V/m	Recommended separation distance $d=1.2\sqrt{P}$ $d=1.2\sqrt{P}$ 80 MHz to 800 MHz $d=2.3\sqrt{P}$ 800 MHz to 2,5 GHz Where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Auto Vector Fluid Immersion Simulator is used exceeds the applicable RF compliance level above, the Auto Vector Fluid Immersion Simulator should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Auto Vector Fluid Immersion Simulator.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the Auto Vector Fluid Immersion Simulator

The AutoVector Fluid Immersion Simulator is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the AutoVector Fluid Immersion Simulator can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the AutoVector Fluid Immersion Simulator as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d=1.2\sqrt{P}$	**80 MHz to 800 MHz** $d=1.2\sqrt{P}$	**800 MHz to 2,5 GHz** $d=2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Notes:

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16. Joerns Healthcare Warranty Program

Joerns Healthcare warrants the Dolphin FIS System advanced support surfaces to be sold free from defects in workmanship and materials, under normal and proper use, for a period of two (2) years on
the advanced support surfaces, and two (2) years on the electromechanical mattress components (compressors, valves, printed circuit boards, hoses, and couplers). Damages arising from improper use will not be covered by this warranty.

Improper use is defined as, but not limited to, those
caused by:

- Burns
- Use of improper chemical agents
- Needle punctures, cuts, or abrasions
- Excessive loads
- Staining
- Negligent or excessive usage
- Improper maintenance, handling and/or cleaning
- Failure to use in the manner indicated in the
  Dolphin FIS System user manual

Any modification, repair or alteration done to the Dolphin FIS System that was not authorized in writing by Joerns Healthcare will void this warranty.

Damage caused by use in unsuitable environmental conditions, abuse or failure to maintain the product in accordance with user and service instructions is not covered.

This warranty is extended to the original purchaser of the equipment.

I. Parts

Joerns' Dolphin FIS System contains various parts that wear from normal use. Joerns Healthcare's obligation under this warranty is limited to supplying replacement parts, servicing or replacing, at its option, any product which is found by Joerns to be defective. When requested by Joerns, parts must be returned for inspection at the customer's expense. Credit will be issued only after inspection.

II. Service

Most service requests can be handled by the facility Maintenance Department with assistance from the Joerns Healthcare Product Service Department.

Most parts requested can be shipped next day air at the customer's expense.

Should a technician be required, one will be provided by Joerns Healthcare, at our discretion. Only the Joerns Healthcare Product Service Department can dispatch authorized technicians

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