ServiceManual

731 Series Ventilators

IMPACT®

Impact Instrumentation, Inc.

Uni-Vent®

P/N 906-0731-04
Revision B

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Table of Contents

INTRODUCTION

Conventions

WARNING!

A WARNING statement identifies conditions or information that could have an adverse effect upon the patient or operator which if not avoided, could result in death or serious injury.

CAUTION!

A CAUTION statement provides important information about a potentially hazardous situation which if not avoided may result in minor or moderate injury to the patient, operator or damage to the equipment or other property.

NOTE:

A NOTE provides additional information intended to avoid inconvenience during operation.

Terminology and Abbreviations

A/C- Assist/Control
ACLS- Advanced Cardiac Life Support
ALS- Advanced Life Support
ATLS- Advanced Trauma Life Support

ACV- Assist-Control Ventilation

ATPD - Atmospheric Temperature and Pressure, Dry
BPM - Breaths per Minute
B/V - Bacterial/Viral Filter
cm H_2O - Centimeters of Water
CPR - Cardiopulmonary Resuscitation
DISS - Diameter Index Safety System
FIO_2 - Fraction of Inspired Oxygen
HME - Heat and Moisture Exchanger
HME/BV - Heat and Moisture Exchanger/Bacterial Viral filter combined
Hz – Hertz (as in frequency, cycles per second)
ID - Internal Diameter
L - Liters
LED - Light Emitting Diode
LPM - Liters per Minute
ml - Milliliters
mm - Millimeter
NPPV – Noninvasive Positive Pressure Ventilation
O_2 - Oxygen
P_{aw} - Airway Pressure
PEEP - Positive End Expiratory Pressure
PIP - Peak Inspiratory Pressure
psig - Pounds per Square Inch Gage
USP - United States Pharmacopeia
VAC - Volts AC
VDC - Volts DC

V_T - Tidal Volume

WOB – Work of Breathing

General Warnings

The design and intended use of 731 series ventilators requires that the operation of the product be restricted to trained medical professionals. US federal law restricts this device for sale by or on the order of a physician.

The information contained herein is restricted for use by personnel certified by Impact Instrumentation, Inc. in the care and servicing of this product. Impact® does not authorize or assume any obligations resulting from unauthorized servicing of its products nor will it be held liable for any injuries or damages incurred therefrom.

This device has been classified "life supporting" and "life sustaining" by the United States Food & Drug Administration. If you have not been trained and certified by Impact Instrumentation, Inc in the care and servicing of this product, DO NOT attempt to service this device. Should factory based servicing become necessary, or technical assistance is required, please have the device's Model and Serial Number available and contact the Impact® service team. All service requests, including requests to schedule service training, may be addressed to the Service Manager, Impact Instrumentation, Inc., 19 Fairfield Place, West Caldwell, New Jersey 07006, 973/882-1212 or email: service@impactii.com .

Cautionary Note

Prior to servicing this device, be aware of the presence of potentially dangerous operating voltages.

Disconnect power supply and the internal battery prior to performing any service.

Internal components are susceptible to damage from static discharge. All servicing operations MUST be done in an ESD controlled environment.

Please review all warnings and cautions in this manual, the device's Operation manual and the RCS Operation manual prior to servicing the 731 series ventilator.

Helpful Hints

Before attempting to service this instrument, please take a few moments to ensure that the problem is not accessory-related. Always check the integrity of all tubing and fittings and verify that tubing is not crimped or cracked.

Always safeguard your personal well being when troubleshooting electronic circuitry. Keep jewelry and liquids from the vicinity of active circuitry.

Limited Copyright Release

Warranty

Impact Instrumentation, Inc. warrants 731 series devices and their replacement service part kits to be free from all defects in material and workmanship for a period of one (1) year from the date of delivery to the final purchaser

During the warranty period, Impact will repair or replace the device or any part which upon examination is shown to be defective. At its sole discretion, Impact may choose to supply a new or equivalent replacement product or refund the amount of the purchase price. To qualify for such repair, replacement, or refund, the defective device must be returned to Impact or Impact's authorized service provider within thirty (30) days from the date that the defect is discovered. This warranty does not apply if the device has been repaired or modified without the authorization of Impact or if the damage was caused by incorrect storage, failure to perform recommended maintenance, use of the product in applications not described in the intended use statement, negligence or an accident.

Batteries, which by their nature are consumable and subjected to environmental extremes, will be warranted for a period of ninety (90) days. Accessories, also consumable in usage, such as connecting hose and breathing circuits, are not warranted.

DISCLAIMER OF IMPLIED & OTHER WARRANTIES:

THE PRECEDING WARRANTY IS THE EXCLUSIVE WARRANTY AND IMPACT INTRUMENTATION, INC. MAKES NO OTHER WARRANTY OR REPRESENTATION OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, WITH RESPECT TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER MATTER. THE REMEDIES STATED IN THIS DOCUMENT WILL BE THE EXCLUSIVE REMEDIES AVAILABLE FOR ANY DEFECTS OR FOR DAMAGES RESULTING FROM ANY CAUSE WHATSOEVER AND WIHOUT LIMITATION.

IMPACT INSTRUMENTATION, INC. WILL NOT IN ANY EVENT BE LIABLE FOR CONSEQUENTIAL OR INCEDENTAL DAMAGES OF ANY KIND, WHETHER FROM DEFECTIVE OR NONCONFORMING PRODUCTS, BREACH OR REPUDIATION OF ANY TERM OR CONTTION OF THE DOCUMENT, NEGLIGENCE, OR ANY OTHER REASON

THE WARRANTIES SET FORTH ABOVE ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WHICH ARE HEREBY DISCLAIMED AND EXCLUDED BY SELLER, INCLUDING WITHOUT LIMITATION ANY WARRANY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE OR USE.

Masimo Pulse Oximeter

This device uses Masimo SET® technology to provide continuous pulse oximeter and heart rate monitoring and is covered under one or more of the following U.S.A. patents: 5,758,644, 5,823,950, 6,011,986, 6,157,850, 6,263,222, 6,501,975 and other applicable patents listed at www.masimo.com/patents.htm.

WARNINGS AND CAUTIONS REGARDING USE

731Series and Pulse Oximeter

WARNING! Electric shock hazard: Do not remove equipment covers except to replace batteries! An operator may only perform maintenance procedures specifically described in this manual. Refer servicing to Impact or an authorized Impact Service Center in the repair of this equipment.
WARNING! The device is intended for use by qualified personnel only! The operator should read this manual, all precautionary information, and specifications before using the device!
WARNING! Possible explosion hazard if used in the presence of flammable anesthetics or other flammable substances in combination with air, oxygen-enriched environments or nitrous oxide!
WARNING! During operation the device should not be stacked on top of or under other medical equipment due to the possibility of electromagnetic interference between the device and other equipment. (The device was subjected to EMC testing in accordance with Military Mil-STD-461F and Commercial IEC 60601-1-2 and FDA Reviewers Guidance specifications.)
WARNING! Grounding: • Connect the device only to a three-wire, grounded, hospital-grade receptacle! The three-conductor plug must be inserted into a properly wired three-wire receptacle; if a three-wire receptacle is not available, a qualified electrician must install one in accordance with the governing electrical code. • Do not under any circumstances remove the grounding conductor from the power plug! • Do not use extension cords or adapters of any type! The power cord and plug must be intact and undamaged. • If there is any doubt about the integrity of the protective earth conductor arrangement, operate the oximeter on internal battery power until the AC power supply protective conductor is fully functional!
WARNING! To ensure patient electrical isolation, connect only to other equipment with electronically isolated circuits!
WARNING! Do not use antistatic or conductive hoses or tubing with this device!
WARNING! Do not connect to an electrical outlet controlled by a wall switch or dimmer!
WARNING! As with all medical equipment, carefully route the ventilator circuit hose and tubing, patient cabling, and external power cables to reduce the possibility of patient entanglement or strangulation!
WARNING! Do not place the device or external power supply in any position that might cause it to fall on the patient! Do not lift the device by the power supply cord, ventilator circuit or pulse oximeter patient cable!
WARNING! Do not use the device, its pulse oximeter or pulse oximetry sensors during magnetic resonance imaging (MRI) scanning! Induced current could potentially cause burns. The device and/or its pulse oximeter may affect the MRI image and the MRI unit may affect device operation or the accuracy of the oximetry measurements.
WARNING! The device must be connected to a grounded AC power supply when connected to AC power. The device and its integrated pulse oximeter are referred to as an IEC 601/F device in the summary situation table contained in IEC-601-1-1.
WARNING! USB Interconnection: Do not operate the device on a patient when the USB is connected to any other device.
NOTE: The USB interconnection does not support automatic record keeping.
WARNING! The Impact supplied ventilator circuit's labeling provides the resistance and compliance values for the circuits under normal operating conditions. If added accessories are used (e.g. humidification, filters etc.), the operator should assure they do not degrade the performance of the device. If non-Impact circuits are used, the operator should assure these circuits do not affect the performance of the device.
CAUTION! Federal law restricts this device to sale by or on the order of a physician.
CAUTION! Service is to be performed by qualified biomedical equipment technicians only.

CAUTION! Internal components are susceptible to damage from static discharge. Do not remove device covers. 
NOTE: This Operation Manual is not meant to supersede any controlling standard operating procedure regarding the safe use of assisted ventilation.
NOTE: Follow all governing regulations regarding the disposal of any part of this medical device.
NOTE: Follow all governing regulations regarding the handling of materials contaminated by body fluids.
NOTE: Follow all governing regulations regarding shipment of the Li batteries.

Pulse Oximeter Specific Warnings And Cautions

WARNING! A pulse oximeter should not be used as an apnea monitor.
WARNING! A pulse oximeter should be considered an early warning device. As a trend towards patient deoxygenation is indicated, blood samples should be analyzed by a laboratory co-oximeter to completely understand the patient's condition.
WARNING! MEASUREMENTS If the accuracy of any measurement does not seem reasonable, first check the patient's vital signs by alternate means and then check the pulse oximeter for proper functioning. Inaccurate measurements may be caused by: • Incorrect sensor application or use • Significant levels of dysfunctional hemoglobin (e.g., carboxyhemoglobin or methemoglobin) • Intravascular dyes such as indocyanine green or methylene blue • Exposure to excessive illumination, such as surgical lamps (especially ones with a xenon light source), bilirubin lamps, fluorescent lights, infrared heating lamps, or direct sunlight (exposure to excessive illumination can be corrected by covering the sensor with a dark or opaque material) • Excessive patient movement • Venous pulsations • Placement of a sensor on an extremity with a blood pressure cuff, arterial catheter, or intravascular line • The pulse oximeter can be used during defibrillation, but the readings may be inaccurate for a short time.
WARNING! Interfering Substances: Carboxyhemoglobin may erroneously increase readings. The level of increase is approximately equal to the amount of carboxyhemoglobin present. Dyes, or any substance containing dyes, that change usual arterial pigmentation may cause erroneous readings.
WARNING! ALARMS Check alarm limits each time the pulse oximeter is used to ensure that they are appropriate for the patient being monitored.
WARNING! Loss of pulse signal can occur in any of the following situations: • The sensor is too tight • There is excessive illumination from light sources such as a surgical lamp, a bilirubin lamp, or sunlight • A blood pressure cuff is inflated on the same extremity as the one with a SpO_2 sensor attached • The patient has hypotension, severe vasoconstriction, severe anemia, or hypothermia • There is arterial occlusion proximal to the sensor • The patient is in cardiac arrest or is in shock

WARNING! Sensors:

- Before use, carefully read the LNCS® sensor directions for use.
- Use only Masimo oximetry sensors for SpO_2 measurements. Other oxygen transducers (sensors) may cause improper performance.
- Tissue damage can be caused by incorrect application or use of an LNCS® sensor, for example by wrapping the sensor too tightly. Inspect the sensor site as directed in the sensor Directions for Use to ensure skin integrity and correct positioning and adhesion of the sensor.
- Do not damage LNCS® sensors. Do not use an LNCS® sensor with exposed optical components. Do not immerse the sensor in water, solvents, or cleaning solutions (the sensors and connectors are not waterproof). Do not sterilize by irradiation, steam or ethylene oxide. See the cleaning instructions in the directions for reusable Masimo LNCS® sensors.
- Do not use damaged patient cables. Do not immerse the patient cables in water, solvents or cleaning solutions (the patient cables are not waterproof). Do not sterilize by irradiation, steam or ethylene oxide. See the cleaning instructions in the directions for reusable Masimo patient cables.

CAUTION! Possession or purchase of this device does not convey any expressed or implied license to use the device with unauthorized sensors or cables which would, alone, or in combination with this device fall within the scope of one or more of the patents relating to this device. Impact cannot assure the proper functioning of this device if it is used with unauthorized sensors or cables.

MAINTENANCE

This device should be incorporated into a regular maintenance program to ensure safe and effective operation. Electro-mechanical and pneumatic components are subject to wear and fatigue over time and components will deteriorate more quickly when used continuously. To maintain safe operation, it is the user's responsibility to ensure that periodic inspections and maintenance is performed and that recommended maintenance is performed by Impact or a certified Impact trained technician.

Routine Inspections

Routine inspections should be performed on this ventilator at regular intervals and prior to its being placed into service. Routine inspections consist of the following:

Operational inspection – after every 1,000 hours of use or more frequently if the ventilator has been used in austere environments, confirm that that device functions properly by power cycling the ventilator while it is connected to a ventilator circuit and test lung. Operate the ventilator at its default settings and exercise the membrane buttons and the rotary optical encoder to ensure they operate as intended.
Accessory inspection – replace power supply if there is damaged or cracked casing, plugs, or cut/frayed or exposed wiring.
Filter inspection – check the foam and disk filter for dust/dirt build up and/or physical damage. Replace if dirt is visible or filter is damaged.
Battery inspection – check the battery icon to ensure battery is charging and that the ventilator operates correctly.
Breathing circuit inspection – check on a daily basis the breathing circuit for damage or wear including but not limited to cracking, discoloration or disfigurement. If there is any sign of physical degradation or the unit is indicating breathing circuit problems, replace with a new breathing circuit.
High Pressure Hoses inspection: Examine hoses for cracking, discoloration and disfigurement. Wipe the exterior wall with a damp, soapy cloth. Dry with a lint-free cloth. Examine end connection fittings for damaged threads and sharp edges. Replace if defective, DO NOT attempt to repair.

Cleaning

1. The ventilator's outer case should be cleaned with a damp soapy cloth and thoroughly dried with a lint-free cloth. Make sure that all exposed surfaces are cleaned and dried.
2. For general decontamination/cleaning situations, a 10% bleach solution applied with a damp cloth is an effective decontaminant that can be used. Since the potential amount of contaminants that our ventilators might be exposed to is so large, it is difficult to provide an appropriate cleaning method for each type of exposure. An effective cleaning agent for one type of exposure may not be effective with another and cleaning and sterilizing practices may vary between institutions. Impact Instrumentation, Inc. suggests that each facility have in place a procedure for the cleaning and disinfection of its medical equipment and that these procedures be consulted for further guidance.

3. Care must be taken to prevent liquids from entering the ventilator. Never submerge the ventilator and avoid using excessive amounts of water that might enter the unit.
4. Never use abrasives or chlorinated hydrocarbon based cleansers when cleaning the ventilator, they will damage the plastic and interface lens.

WARNING! Never use oil or grease of any kind with O_2 or compressed gas equipment.

Storage Information

For optimal prolonged storage periods, the device should be stored indoors. The environment should be clean and out of direct sunlight. Storage in non-controlled environments is permissible if batteries are removed.

For long-term storage, the optimum storage temperature range is -15°C to 21°C (5°F to 71°F). Battery life is diminished at temperatures above 35°C (95°F). It is recommended that batteries be discharged to 50% capacity if long term storage above 35°C (95°F) is expected. DO NOT store batteries in a discharged condition. Short-term, less than 10 days, storage temperatures should range between -15°C to 49°C (5°F and 120°F) with no degradation to the device.

CAUTION! DO NOT store batteries in a discharged condition.

When batteries are in extended storage, it is recommended that they receive a refresh charge at recommended intervals when not continuously connected to an external power source:

STORAGE AMBIENT	RECHARGE INTERVAL
Below 68°F (20°C)	12-months
68°F to 86°F (20°C to 30°C)	6-months
86°F to 104°F (30°C to 40°C)	3-months

Following periods of extended storage in non-controlled environments, allow the device sufficient time to stabilize to a temperature within its specified operating range (see section entitled BATTERY CARE AND RECHARGING).

If the device is subject to 6-months of continuous storage/non-use, or longer, this device should be powered on to initiate the device's self test routine. The user should confirm that the batteries are sufficiently charged before patient-use is attempted.

Post-Contaminated Environment Cleaning

If the ventilator is operated in an environment where it may have been exposed to contamination from a hazardous materials accident, mass epidemic or weapon of mass destruction, Impact recommends that the guidelines below be followed.

1. The ventilator's outer case should be cleaned with a damp soapy cloth and thoroughly dried with a lint-free cloth. Make sure that all exposed surfaces are cleaned and dried.
2. For general decontamination/cleaning situations, a 10% bleach solution applied with a damp cloth is an effective decontaminant that can be used. Since the potential amount of contaminants that our ventilators might be exposed to is so large, it is difficult to provide an appropriate cleaning method for each type of exposure. An effective cleaning agent for one type of exposure may not be effective with another and cleaning and sterilizing practices may vary between institutions. Impact Instrumentation, Inc. suggests that each facility have in place

a procedure for the cleaning and disinfection of its medical equipment and that these procedures be consulted for further guidance.

3. Care must be taken to prevent liquids from entering the ventilator. Never submerge the ventilator and avoid using excessive amounts of water that might enter the unit.
4. Never use abrasives or chlorinated hydrocarbon based cleansers when cleaning the ventilator, they will damage the plastic and interface lens.
5. Always follow the decontamination procedures specified by the local Incident Command Safety Officer.
6. Equipment should be cleaned and decontaminated as soon as possible after use. Personnel should always wear the appropriate Personal Protective Equipment while decontaminating equipment.
7. The ventilator's outer case should be cleaned with a damp soapy cloth and thoroughly dried with a lint-free cloth. Make sure that all exposed surfaces are cleaned and dried.
8. For general decontamination/cleaning situations, a 10% bleach solution applied with a damp cloth is an effective decontaminant that can be used. Since the potential amount of contaminants that our ventilators might be exposed to is so large, it is difficult to provide an appropriate cleaning method for each type of exposure. An effective cleaning agent for one type of exposure may not be effective with another and cleaning and sterilizing practices may vary between institutions. Impact Instrumentation, Inc. suggests that each facility have in place a procedure for the cleaning and disinfection of its medical equipment and that these procedures be consulted for further guidance.
9. Care must be taken to prevent liquids from entering the ventilator. Never submerge the ventilator and avoid using excessive amounts of water that might enter the unit.
10. Never use abrasives or chlorinated hydrocarbon based cleansers when cleaning the ventilator, they will damage the plastic and interface lens.

Removable Foam Filter Replacement

Removable Foam Filter: The Removable Foam Filter is located on the right side of the ventilator. It should be inspected and replaced if needed every 1,000 hours of operation or more frequently if used in dusty environments. Remove the filter using a pair of tweezers or similar tool. Examine the filter for dirt, lint, or general wear. Replace if necessary (Part # 465-0028-00). DO NOT attempt to clean this filter.

CAUTION! Do not operate the compressor without a filter in place.

Fresh Gas/Emergency Air Intake Disk Filter Replacement

Fresh Gas/Emergency Air Intake Disk Filter: The Fresh Gas/Emergency Air Intake Disk Filter (Part #465-0027-00) is located behind the Removable Foam Filter. This filter provides a second level of filtration to the ambient air that is delivered to the patient. This filter must be checked periodically and replaced when necessary. The device triggers an alarm when the combination of Removable Foam Filter and Fresh Gas/Emergency Air Intake Disk Filter become dirty. This alarm signifies that the device is still able to deliver the correct tidal volume but one or more of its filters need replacement. The Fresh Gas/Emergency Air Intake Disk Filter can be visually inspected after the Removable Foam Filter is removed. If the filter appears discolored it must be replaced. See Appendix 5 in the Operation Manual: Internal Filter Change/Insertion.

CAUTION! There are no user serviceable parts except the filter components described above.

CAUTION! When used in dusty/dirty environments the foam and disk filters should be checked, and replaced as needed. This will prevent particle build up on the transducer screen and the need to take the unit out of service for maintenance by a biomedical technician.

CAUTION! If filters have been exposed to biological matter dispose of them following Universal Precaution procedures for your facility.
NOTE: Do not attempt to clean this filter and do not operate internal compressor without filter in place.

Battery Capacity, Care and Recharging

While the unit is operating on battery power, users can best determine the relative amount of charge in the internal battery by looking at the BATTERY Icon/Indicator. The BATTERY icon appears in outline form and is filled with horizontal rows of lines indicating its current capacity. Each line represents approximately 5% of battery capacity.

The device uses a rechargeable lithium-ion battery which offers a wide temperature operating range, does not exhibit "memory" characteristics (reduced capacity) or vent hydrogen gas. The life of this battery depends, to a great extent, upon the care it receives. Avoid exposing it to direct sunlight or heat sources and never store the battery at temperatures above 76 °C (170 °F) for more than 2 hours. Following these simple guidelines will prevent premature charge depletion and reduction of battery life.

If the unit was supplied without the battery installed or battery replacement is required see Appendix 4: Internal Battery Change/Insertion.

CAUTION! Only use the Power Supply provided with the unit. Use of any other power supply could cause damage or create a fire and/or destroy the battery and unit.
CAUTION! If you witness a battery or the battery compartment starting to balloon, swell up, smoke or feel excessively hot, turn off the unit, disconnect external power and observe it in a safe place for approximately 15 minutes and send the unit for service. Never puncture or disassemble the battery packs or cells.
CAUTION! Never attempt to completely discharge the battery by shorting or some other method and never ship the battery in a completely discharged state.
CAUTION! During continuous, uninterrupted use (>100 hours) it is recommended that the ventilator be disconnected from AC power for 30 seconds to allow the battery to run diagnostics while the battery is discharging.
NOTE: The ventilator continuously monitors the available power sources; occasionally a false low priority power alarm can be triggered for ~1 second. These false alarms immediately clear themselves.

1. Battery charging is controlled by ventilator in the temperature range of 0°C to 45°C (32F to 113°F) to provide the best life time for the battery
2. The battery has a discharge (operational) temperature range of -25° to 49° C (-13° F to 120° F) (as validated by Impact Instrumentation).
3. DO NOT store the ventilator with the batteries discharged. Always store with the battery fully charged.
4. For long-term storage, the optimum storage temperature range is -15°C to 21°C (5°F to 71°F).

Lithium-ion batteries exhibit excellent charge retention characteristics. Prolonged periods of disuse will not substantially reduce operating capability. If long-term storage/non-use is common, recharge the unit every six months; this will insure that battery charge is maintained at 80% capacity or better. The 731 series devices' battery rapidly recharges to 90% of its capacity in approximately 2 hours. It will take approximately another 2 hours of trickle-charging to top off the battery to 100% of its capacity. Continuous charging is permissible with the supplied 12 VDC Power Cable or AC/DC Power Supply.

Operating power will always default to the external power source to preserve the internal battery charge. This assures that power is available for transport use or emergency back-up. If the *EXTERNAL POWER LOW/ FAIL* alarm occurs, the device will automatically revert to its internal batteries for operating power.

The BATTERY Icon/Indicator **–** indicates (1) the presence of a functional battery, (2) when the battery is charging and (3) what its current capacity is. The BATTERY icon appears in outline form and is filled with

horizontal rows of lines indicating its current capacity. When the battery is charging, these horizontal rows of lines cyclically scroll vertically, one row at a time, from the bottom row to the top. When the battery is fully charged, the icon is completely filled with lines and scrolling stops. Each line represents approximately 5% of battery capacity. During internal battery operation a horizontal line "disappears" as battery capacity is reduced by a 5% increment. The BATTERY icon will flash off/on when a *BATTERY POWER LOW* alarm occurs. The icon will flash off/on and present with a diagonal line when no battery is connected.

Preventive Maintenance (PM)

Scheduled replacement of filters, batteries, seals and mechanical/pneumatic moving parts will ensure the device is always operating at peak performance. The table below describes the scheduled interval for routine parts replacement, calibration and functional testing. Ventilators used in extreme environments may warrant earlier or more frequent maintenance scheduling.

Maintenance Activity	Year after initial purchase of ventilator							
	1	2	3	4	5	6	7	8
Replace inlet oxygen and compressor foam and disk filters	*	*	*	*	*	*	*	*
Perform a Periodic Maintenance Check (PMC)	*	*	*	*	*	*	*	*
Replace the main battery				*				*
Replace the real time clock battery (RTC)				*				*
Inspect and replace if needed any internal tubing, gaskets, or O-Rings that show signs of wear				*				*
Inspect internal pneumatic & electro-mechanical components				*				*

Table 1 Maintenance Schedule.

Periodic Maintenance Check (PMC)

At start up, the device performs a self check that includes a check for pre-existing alarm conditions. Following start up, the presence of alarm conditions is checked continuously. When in operation the ventilator circuit connects to a pressure transducer in the ventilator. Periodically, the transducer recalibrates itself using the ambient air pressure as a reference. This process maintains a consistent transducer baseline over a wide temperature and altitude range to assure display, monitoring and triggering accuracy.

The ventilator also automatically performs an AUTO CAL procedure that affects 3 transducer systems: Compressor Flow, Oxygen Flow and Airway Pressure. The purpose of AUTO CAL is to compensate for small temperature related drifts in the transducer offset (zeroing). The AUTO CAL is performed at start up during the self check and then every 5 minutes thereafter. However, if a temperature change emceeing +/-1.5^{o}C is sensed, the AUTO CAL time interval is reduced automatically to assure a stable pressure measurement baseline. This continuous correction for variations in ambient temperature and pressure enable the ventilator to deliver targeted volumes and pressure over the entire operating altitude and temperature ranges described in the operations manual.

The automated self check at start up and the AUTO CAL tests confirm that the device is operating within its specifications when in use. If the start up or AUTO CAL tests fail, the unit will not operate. Because the automated tests do not confirm that flow and pressure outputs from the device are verified against a controlled external pressure, flow and temperature measurement device, the PMC procedure should be done every 12 months or after 1,500 hours of use, or to reset the 'performance maintenance check' low

priority alarm, to document that the ventilator has been maintained and is operating properly. The PMC should also be performed whenever the operator suspects that the device is not functioning properly or following mass deployment and before the device is returned to storage. If the device fails the PMC it should be maintained by a certified Impact service technician in the field or at Impact authorized service locations. A secure record of PMC results should be maintained for devices not returned to Impact for maintenance.

Impact's 731 series service tool the RCS is needed to perform the PMC and reset the 'performance maintenance check' low priority alarm. This tool includes can be purchased from Impact for use by Impact trained and certified biomedical technicians. Alternatively, 731 series can be sent to an Impact authorized service center for PMC or other service requirements.

In addition to automating and documenting the PMC process, the RCS is also capable of calibrating the device and installing and verifying software upgrades and updates to the 731 series of devices.

If you would like to return the ventilator to Impact for service please contact Impact prior to returning this instrument. (Telephone 973.882.1212, email service@impactii.com). A Returned-Goods-Authorization number (RGA #) will be issued. The RGA # must appear on both the packing slip and address label. This will facilitate better tracking of the returned item and result in improved scheduling and handling.

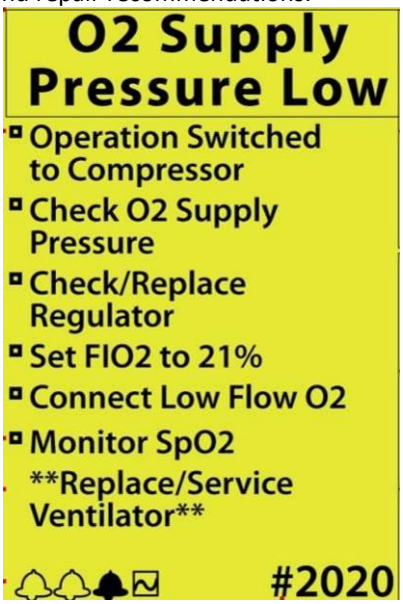
Annual and 4-Year PM Kits are available to trained personnel and service centers.

Picture	Description	Kit #
	Annual Preventive Maintenance Kit	712-0731-20
	4-Year Preventive Maintenance Kit	712-0731-21

Troubleshooting and Repairs

The device uses a comprehensive suite of alarms to alert the operator and guide their actions to resolve the alarm condition and assure patient safety. At the onset of an alarm, the screen displays the alarm name and then a series of context-sensitive help messages (see Figure 2 example). These messages serve to guide the operator by presenting suggestions as to the cause and resolution of a particular alarm. When multiple alarms occur they are prioritized and displayed based on the risk to the patient. Should the operator not be able to correct the problem, the ventilator should be taken out of use and sent to an authorized Impact repair facility.

Trained bio-med technicians are encouraged to use a systematic approach to solving issues with the ventilator. Use the Alarm Category and Service Code matrices listed in Appendix to resolve the problem or to identify the suggested replacement service kit. Check on-hand availability or order the kit(s) from Impact, then follow the detailed instructions listed to replace the kit. Trained repair facilities can contact Impact's technical service department via email: service @impactii.com or by telephone toll free: 800-969-0750 or 973-882-1212 for troubleshooting and repair recommendations.



ALARM & PLOT LIST: FIGURE 2

Service Kits

Service kits, which are preassembled and factory tested subassemblies, are available should physical damage or problems of an unforeseen nature arise. Service kits are available only to qualified trained biomedical personnel or authorized Impact service centers. Each kit replacement must be followed by a HiPot test (See section titled **HiPot Testing**), then either by a functional test or a calibration and functional test using the Remote Calibration System (RCS).The following table lists the kits for each 731 series model.

Service Kit Listing

Description	EMVP		Eagle II	
	Picture	Kit #	Picture	Kit#
Membrane Panel Kit		712-0731-01		712-EGL2-01
SPM/Vent Assembly Kit		712-0731-02		712-EGL2-02
Battery Compartment Kit		712-0731-03		712-EGL2-03
				712-EGL2-13 (MR)
Outer Air Intake Kit		712-0731-04		712-EGL2-04
Bezel Assembly Kit		712-0731-05 (EMVP)		712-EGL2-05
Power Knob Kit		712-0731-06		712-EGL2-06
USB Connector Plate Kit		712-0731-07		712-EGL2-07
Front Case Assembly Kit		712-0731-08 (EMVP)		712-EGL2-08
Battery Case Bottom Cover Kit		712-0731-09		712-EGL2-08
EMV Chassis Kit		712-0731-10		712-EGL2-10
Connector Panel Kit		712-0731-11		712-EGL2-11
Back Case Kit		712-0731-12		712-EGL2-12
PIM Board Kit		702-0731-02		702-0731-02
CPU/UIM & SPO2 Stack Kit		712-0731-14		712-0731-14
USB Connector Kit		712-0731-15		712-0731-15
Gas Output Kit		712-0731-16		712-0731-16
Power Input Kit		712-0731-17		712-0731-17
Oxygen Inlet Fitting Kit		712-0731-18		712-0731-18
Selector Knob Kit		712-0731-19		392-0066-00

Replacement Instructions

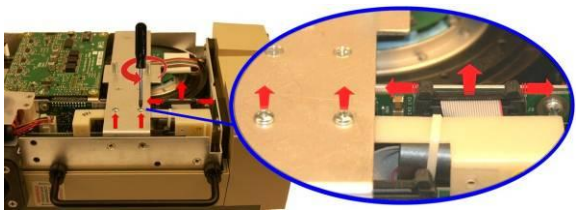
CAUTION! Internal components are susceptible to damage from static discharge. All servicing operations MUST be done in an ESD controlled environment.
CAUTION! Disconnect external power and battery pack prior to performing any service.

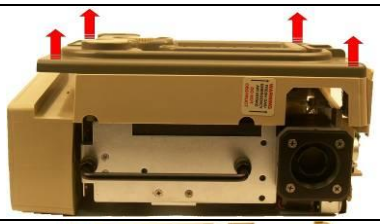
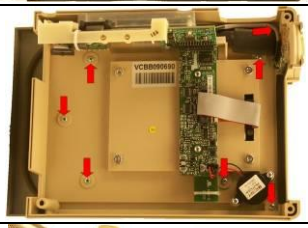
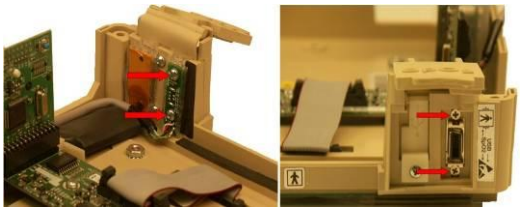
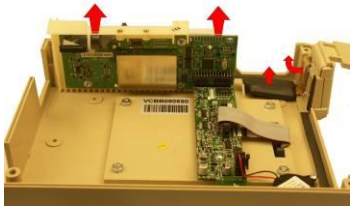
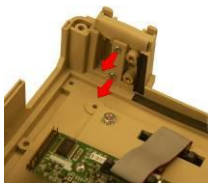
Membrane Panel Kit 712-0731-01 / 712-EGL2-01

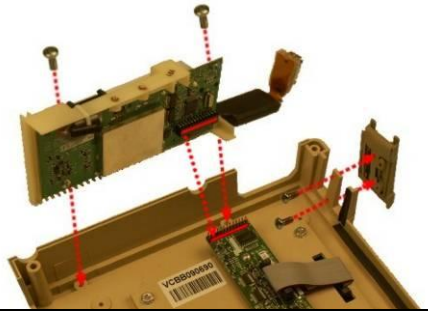
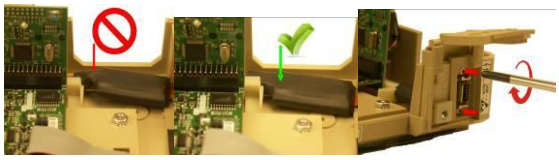
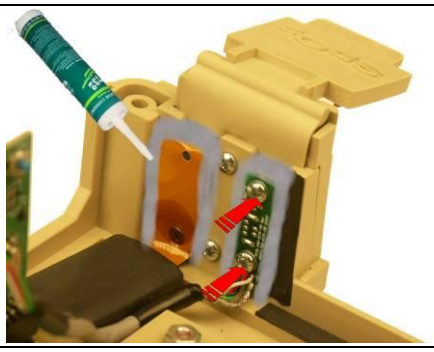
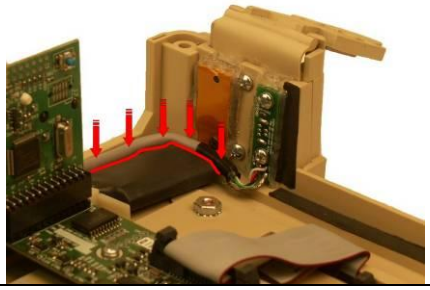
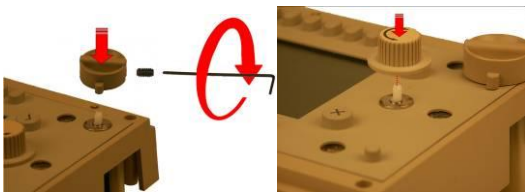
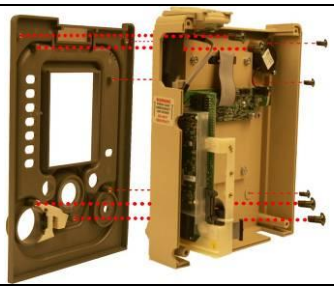
Contents:

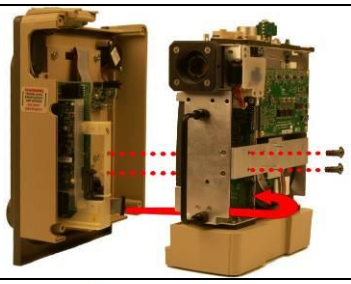
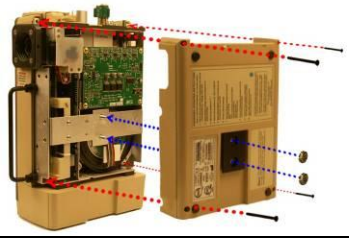
ITEM	QTY	DESCRIPTION
	1	Membrane Panel Assembly
	7	Screw, Phillips, Pan Head, Zinc Plated, 4-40 X 1/4
	1	Power Select Knob with Set screw
	1	Selector Knob

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.

4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Remove the bezel by loosening and removing the (7) 4-40 X ¼ screws that hold the bezel to the front case.
6		Using a sharp knife, carefully cut the RTV sealant around the USB Printed Circuit Board and around the SPO2 Connector. Be careful not to cut either cable.
7		Loosen and remove the two 4-40 X 3/16 screws holding the Mini USB Cable Assembly to the front case. Loosen and remove the two M2.5 X 5mm screws holding the SPO2 cable to the front case.
8		Loosen and remove the two (2) 6-32 X 5/16 screws that hold the CPU/UIM & SPO2 Stack to the front case.
9		Lift the CPU/UIM & SPO2 Stack up from the front case. Handle the SPO2 cable with extreme care. Do not pull on the cable.
10		Loosen and remove the two 4-40 X 5/16 screws holding the USB Connector Plate to the front case.

11		Tighten the two 4-40 X 5/16 screws holding the USB Connector Plate to the replacement front case. Tighten the two (2) 6-32 X 5/16 screws that hold the CPU/UIM & SPO2 Stack to the front case. Make sure that all the pins on the header mate correctly.
12		Make sure the SPO2 Flex Cable lays flat against the front case and is assembled correctly into the UIM Bracket and SPO2 Isolation Shield. Insert and tighten the two M2.5 X 5mm screws holding the SPO2 cable to the front case.
13		Remove any excess RTV sealant from the SPO2 flex cable and USB PCB. Tighten the two 4-40 X 3/16 screws holding the USB PCB to the front case. Apply RTV sealant to USB PCB and SPO2 flex cable. Allow to dry/cure.
14		Dress the USB Connector cable along the case and over the SPO2 flex cable.
15		Place the included power knob on the new membrane panel switch - align with flat on switch – insert the included 6-32 X ¼ set screw and tighten. Push the included selector knob on the membrane panel switch - align with flat on switch .
16		Place the front case assembly on to the bezel and tighten the included (7) 4-40 X ¼ screws.

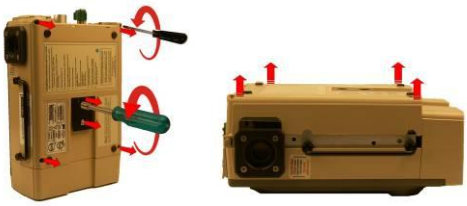
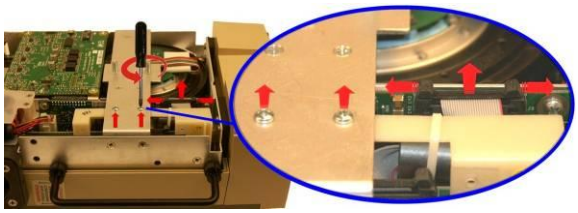
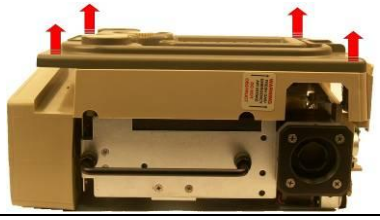
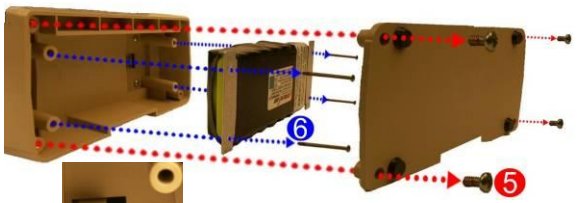
17		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
18		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
19		Tighten the (4) 8-32 X 3 screws on the outer air intake.
20		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

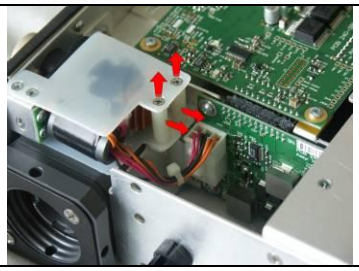
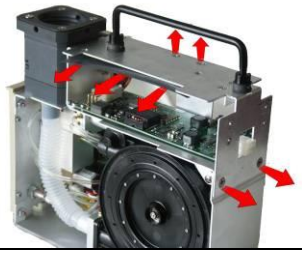
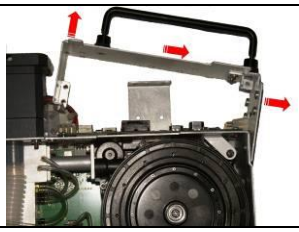
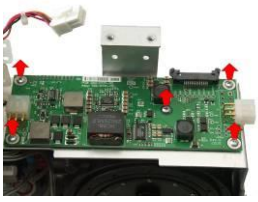
SPM Kit 712-0731-02 / 712-EGL2-02

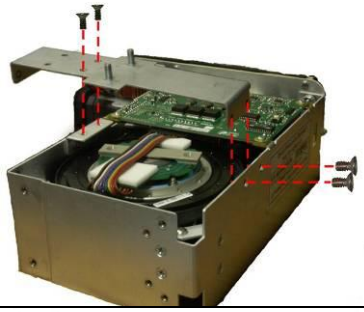
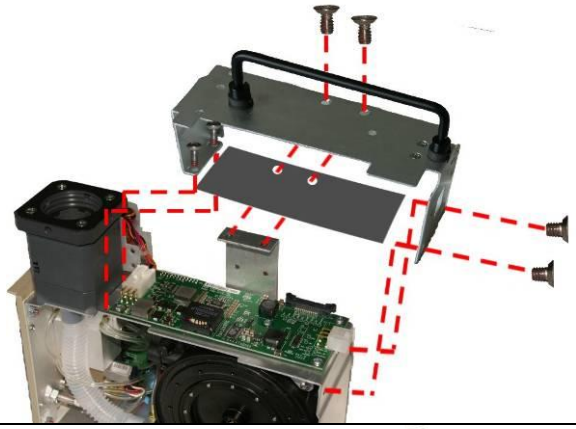
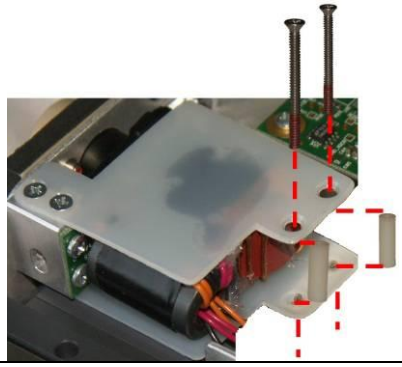
Contents:

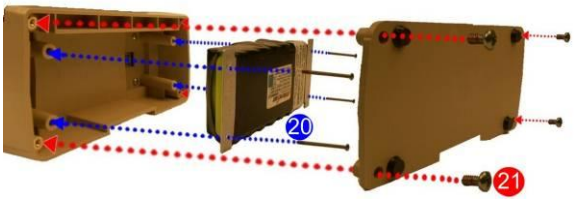
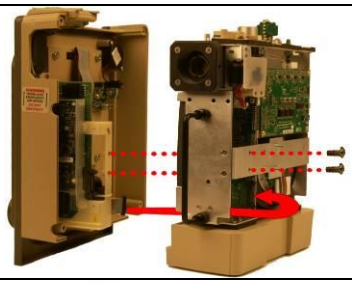
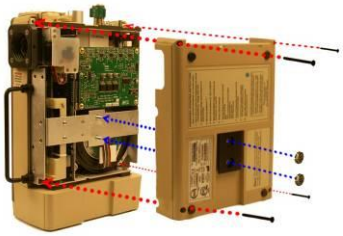
ITEM	QTY	DESCRIPTION
	1	SPM/Vent Assembly

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Remove the battery compartment cover by unscrewing the (4) 6-32 X 5/16 screws.
6		Remove the battery by unscrewing the (4) 6-32 X 2 ¼ screws and detaching the plug from its locking latch.

7		Unscrew the (4) 6-32 X 5/16 Phillips screws to remove the damaged battery compartment case.
8		Loosen and remove the (2) 4-40 X 1 ¼ Screws and nylon spacers supporting the Power Input assembly unto the chassis.
9		Loosen and remove the (2) 6-32 X ¼ screws holding the chassis to the dovetail mounting bracket and remove the SPO2 insulator. Loosen and remove the (2) 8-32 X ¼ screws holding the chassis to the vent module.
10		Insert screwdriver through the holes on the chassis to loosen and remove the (2) 6-32 x 5/16 screws holding the chassis to the vent module.
11		Lift the damaged chassis from the ventilator module.
12		Disconnect the Power Input cable from the PIM PCB by pressing on the locking latch and pulling the cable straight up from the connector.
13		Remove the PIM PCB by loosening the (5) 4-40 X 5/16 screws.

14		Remove the Dovetail stabilizer bracket by loosening and removing the (2) 6-32 x ¼ and the (2) 4-40 X ¼ screws.
15		Install the dovetail stabilizer bracket onto the new SPM assembly by tightening the (2) 6-32 X ¼ and (2) 4-40 X ¼ screws.
16		Secure the PIM Board to the new SPM with the (5) 4-40 x 5/16 screws.
17		Secure the chassis to the vent module using the (2) 6-32 X ¼ screws with SPO2 insulator, the (2) 8-32 X ¼ and the (2) 6-32 x 5/16 screws.
18		Secure the Power Input assembly to the Chassis using the (2) spacers and (2) 4-40 X 1 ¼ screws. Do not over-tighten the screws.

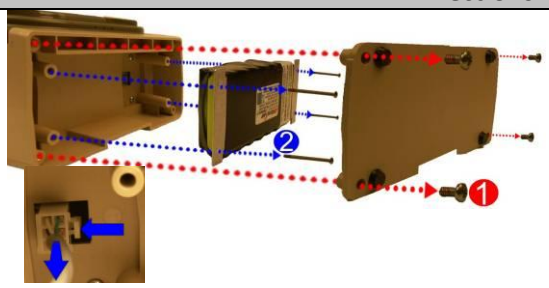
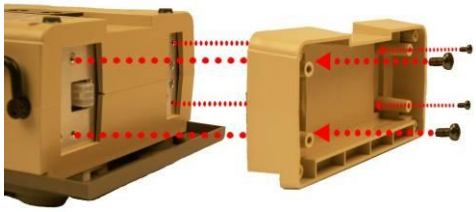
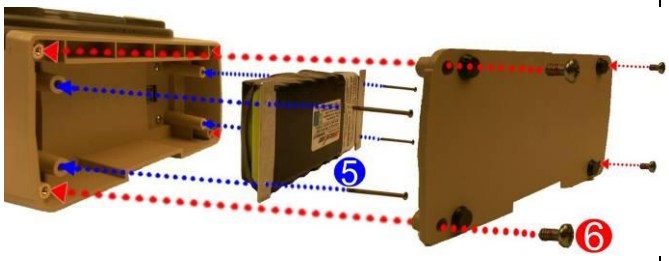
19		Rotate battery compartment to mate with upper and lower case cutouts and press firmly into place. Secure with (4) 6-32 X 5/16 screws provided.
20		Re-assemble the battery by connecting its cable to the connector (pull on cable to insure it is locked in place) then tightening the (4) 6-32 X 2 ¼ screws.
21		Re-assemble the battery compartment cover by tightening the (4) 6-32 X 5/16 screws.
22		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
23		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
24		Tighten the (4) 8-32 X 3 screws on the outer air intake.
25		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

Battery Compartment Kit 712-0731-03 / 712-EGL2-03

Contents:

ITEM	QTY	DESCRIPTION
	1	Battery Compartment Case with Gaskets
	4	Screw, Phillips, Pan Head, SS, 6-32 X 5/16

Instructions:

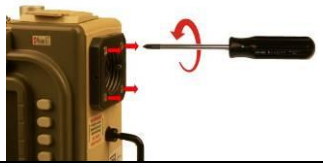
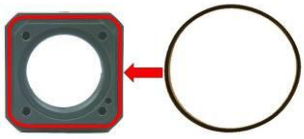
Step No.	Directions	
1		Remove the battery compartment cover by unscrewing the (4) 6-32 X 5/16 screws.
2		Remove the battery by unscrewing the (4) 6-32 X 2 ¼ screws and detaching the plug from its locking latch.
3		Unscrew the (4) 6-32 X 5/16 Phillips screws to remove the damaged battery compartment case.
4		Rotate battery compartment to mate with upper and lower case cutouts and press firmly into place. Secure with (4) 6-32 X 5/16 screws provided.
5		Re-assemble the battery by connecting its cable to the connector (pull on cable to insure it is locked in place) then tightening the (4) 6-32 X 2 ¼ screws.
6		Re-assemble the battery compartment cover by tightening the (4) 6-32 X 5/16 screws.
7		Perform HiPot Testing then perform Functional Test using the RCS.

Outer Air Intake Kit 712-0731-04 / 712-EGL2-04

Contents:

ITEM	QTY	DESCRIPTION
	1	Plate, Intake
	4	Screw, PFH, SS, 8-32 X 3
	1	Adapter, 40mm with O-Ring
	1	O-Ring, Buna, 2-3/8X2.5X1/16" (Pre-installed into 40mm adapter)

Instructions:

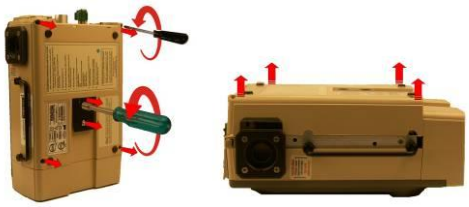
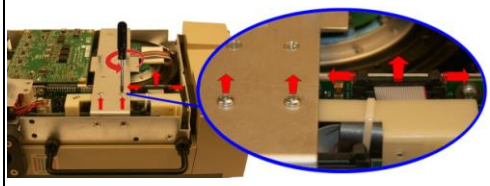
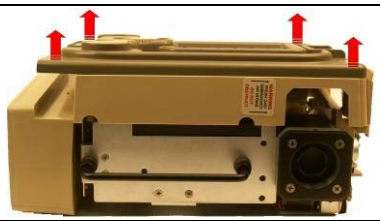
STEP NO.	DIRECTIONS	
1		Remove the damaged Outer Air Intake by unscrewing the (4) 8-32 X 3 screws.
2		The O-Ring is pre-installed into the groove on 40mm Adapter. Verify it is inserted correctly.
3		Place Intake Plate over 40mm Adapter and the 4 8-32 X 3 screws through Intake Plate and 40mm Adapter.
4		Rotate assembly such that the alignment pin on the BV Filter Holder mates with the alignment hole on the 40mm Adapter.
5		Place entire assembly into BV Filter Holder and tighten the included (4) 8-32 X 3 screws.
6		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

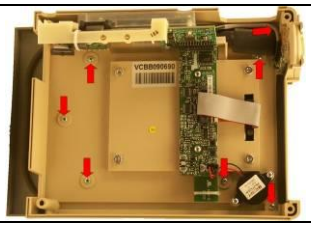
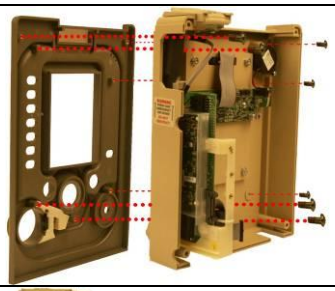
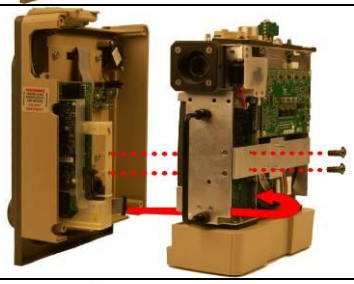
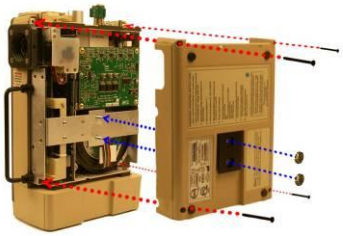
Bezel Assembly Kit 712-0731-05 / 712-EGL2-05

Contents:

ITEM	QTY	DESCRIPTION
	1	Bezel Assembly
	7	Screw, Phillips, Pan Head, Zinc Plated, 4-40 X 1/4
	1	EMV Label
	1	EMVP Label

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.

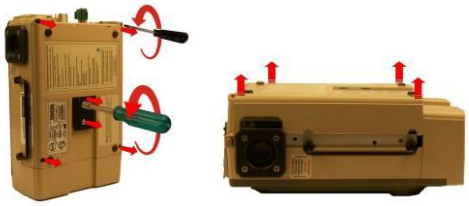
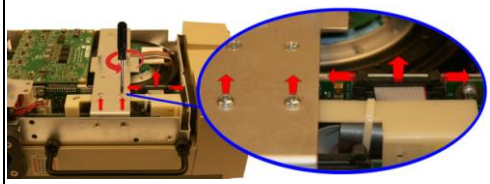
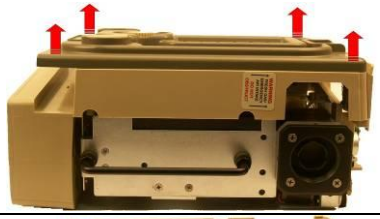
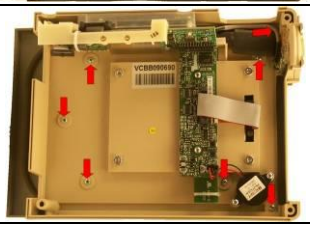
5		Remove the bezel by loosening and removing the (7) 4-40 X ¼ screws that hold the bezel to the front case.
6		Select the correct label for your device, peel the backing off and affix to the front bezel.
7		Install the new bezel by tightening the included (7) 4-40 X ¼ screws.
8		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
9		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
10		Tighten the (4) 8-32 X 3 screws on the outer air intake.
11		Perform HiPot Testing then perform Functional Test using the RCS.

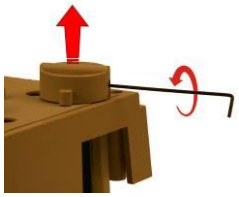
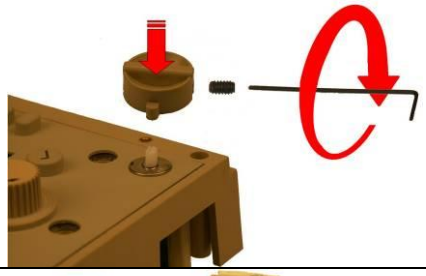
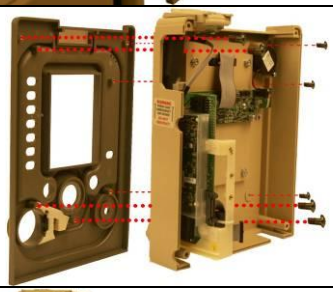
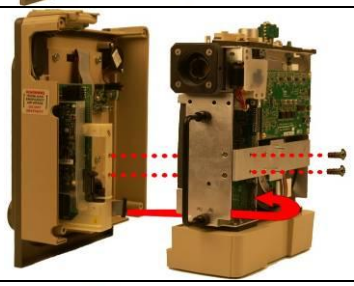
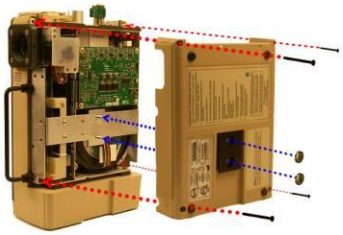
Power Knob Kit 712-0731-06 / 712-EGL2-06

Contents:

ITEM	QTY	DESCRIPTION
	1	Power Knob
	1	Screw, Socket, Cup Point, Set, 6-32 X 1/4 (installed into knob)

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Remove the bezel by loosening and removing the (7) 4-40 X ¼ screws that hold the bezel to the front case.

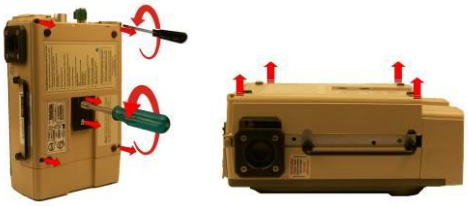
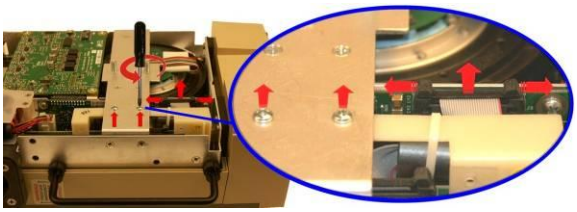
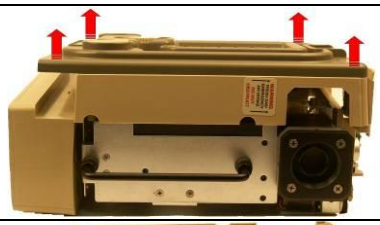
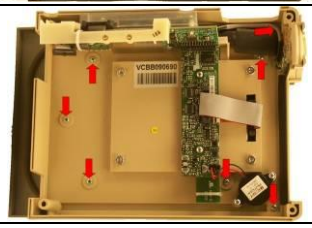
6		On the membrane panel assembly, loosen the 6-32 X ¼ set screw using a 1/16 Ball Hex Driver (located in the power knob) and lift the damaged knob from the membrane panel.
7		Place the replacement knob on the membrane panel switch - align with flat on switch – insert the included 6-32 X ¼ set screw and tighten.
8		Install the new bezel by tightening the included (7) 4-40 X ¼ screws.
9		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
10		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
11		Tighten the (4) 8-32 X 3 screws on the outer air intake.
12		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

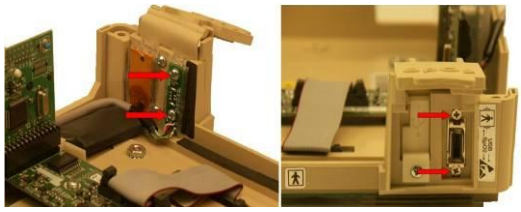
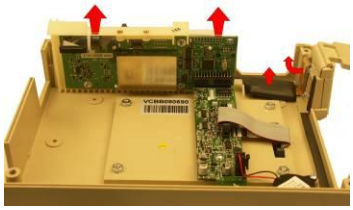
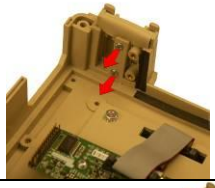
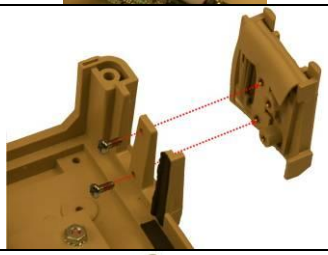
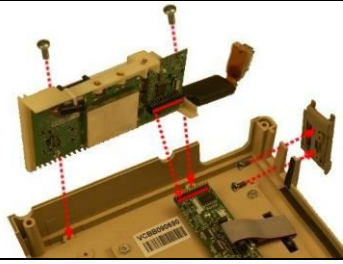
USB Connector Plate Kit 712-0731-07 / 712-EGL2-07

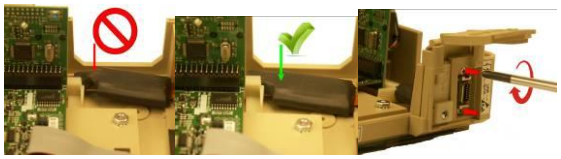
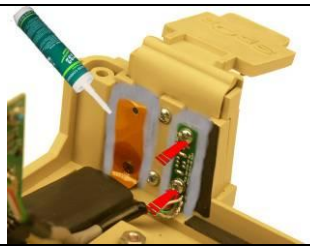
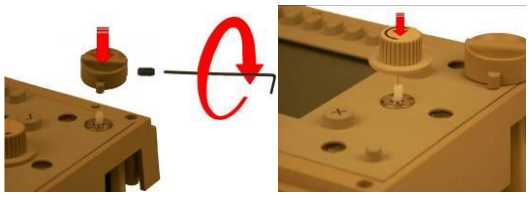
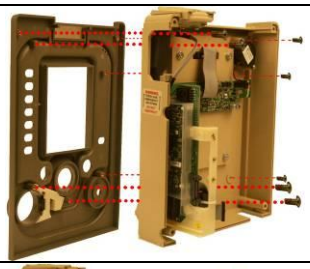
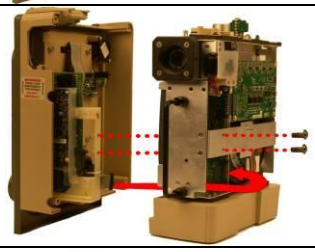
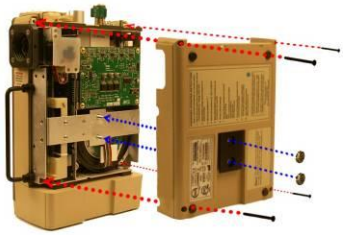
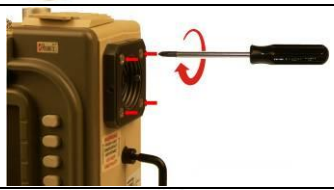
Contents:

ITEM	QTY	DESCRIPTION
	1	USB Connector Plate Assembly
	2	Screw, Phillips, Pan Head, Zinc Plated, 4-40 X 5/16

Instructions:

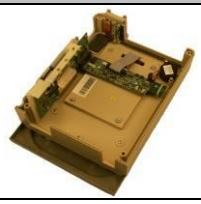
STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Remove the bezel by loosening and removing the (7) 4-40 X ¼ screws that hold the bezel to the front case.

6		Using a sharp knife, carefully cut the RTV sealant around the USB Printed Circuit Board and around the SPO2 Connector. Be careful not to cut either cable.
7		Loosen and remove the two 4-40 X 3/16 screws holding the Mini USB Cable Assembly to the front case. Loosen and remove the two M2.5 X 5mm screws holding the SPO2 cable to the front case.
8		Loosen and remove the two (2) 6-32 X 5/16 screws that hold the CPU/UIM & SPO2 Stack to the front case.
9		Lift the CPU/UIM & SPO2 Stack up from the front case. Handle the SPO2 cable with extreme care. Do not pull on the cable.
10		Loosen and remove the two 4-40 X 5/16 screws holding the damaged USB Connector Plate to the front case.
11		Insert and tighten the two included 4-40 X 5/16 screws holding the replacement USB Connector Plate to the front case.
12		Tighten the two (2) 6-32 X 5/16 screws that hold the CPU/UIM & SPO2 Stack to the front case. Make sure that all the pins on the header mate correctly.

13		Make sure the SPO2 Flex Cable lays flat against the front case and is assembled correctly into the UIM Bracket and SPO2 Isolation Shield. Insert and tighten the two M2.5 X 5mm screws holding the SPO2 cable to the front case.
14		Remove any excess RTV sealant from the SPO2 flex cable and USB PCB. Tighten the two 4-40 X 3/16 screws holding the USB PCB to the front case. Apply RTV sealant to USB PCB and SPO2 flex cable. Allow to dry/cure.
15		Place the included power knob on the new membrane panel switch - align with flat on switch – insert the included 6-32 X ¼ set screw and tighten. Push the included selector knob on the membrane panel switch - align with flat on switch .
16		Place the front case assembly on to the bezel and tighten the included (7) 4-40 X ¼ screws.
17		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
18		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
19		Tighten the (4) 8-32 X 3 screws on the outer air intake.
20		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

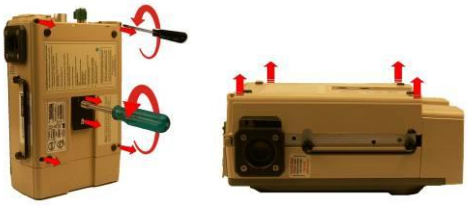
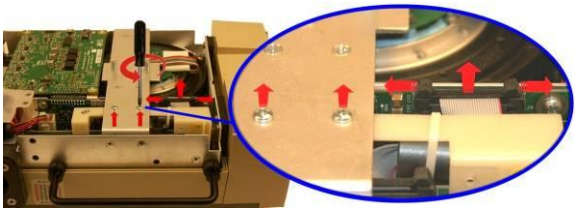
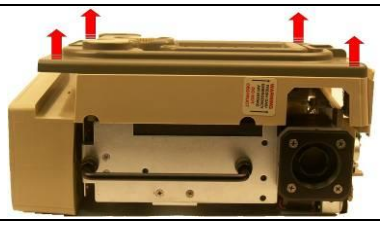
Front Case Assembly Kit 712-0731-08 / 712-EGL2-08

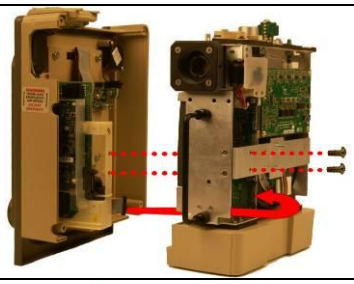
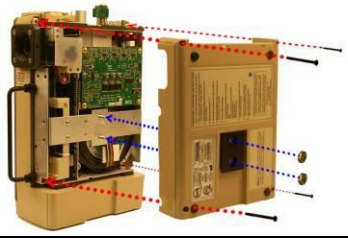
Contents:

ITEM	QTY	DESCRIPTION
	1	Front Case Assembly
	2	Screw, Phillips, Pan Head, Zinc Plated, 4-40 X 1/4
	1	EMV Label
	1	EMVP Label

Instructions:

WARNING: Disconnect external power and battery pack prior to performing service.

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the damaged front case assembly by lifting it straight up away from the ventilator module.

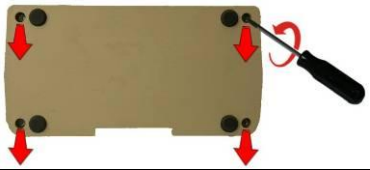
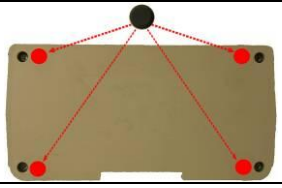
5		Place the replacement front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
6		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
7		Tighten the (4) 8-32 X 3 screws on the outer air intake.
8		Select the correct label for your device, peel the backing off and affix to the front bezel.
9		Update serial numbers using the RCS: a. Use the “C:\program files\impact\EMV\bin\ EmvDLGui.exe” to change the serial numbers. b. Use the RCS FD app to re-flash the firmware.
10		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

Battery Case Bottom Cover Kit 712-0731-09 / 712-EGL2-09

Contents:

ITEM	QTY	DESCRIPTION
	1	Battery case bottom cover
	4	Screw, Phillips, Pan Head, SS, 6-32 X 5/16
	4	Bumper, Rubber, Foot, P/S, Round, 1/2" Dia. X 1/8", Blk

Instructions:

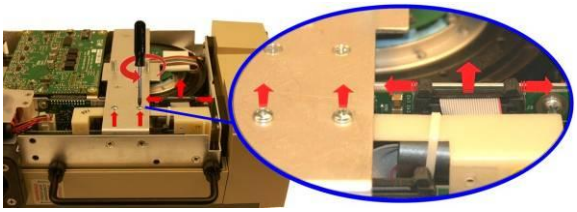
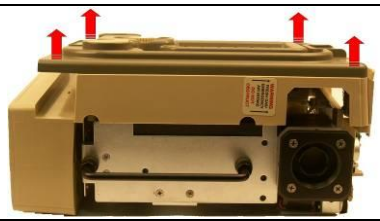
STEP NO.	DIRECTIONS	
1		Remove the damaged cover by unscrewing the (4) 6-32 X 5/16 screws.
2		Remove backing from Bumper feet and place one at each corner of Battery case bottom cover.
3		Rotate cover to align with battery compartment then insert and tighten the (4) 6-32 X 5/16 screws.
4		Perform HiPot Testing then perform Functional Test using the RCS.

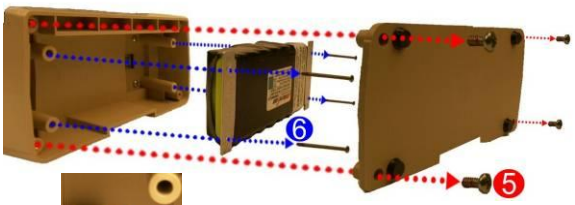
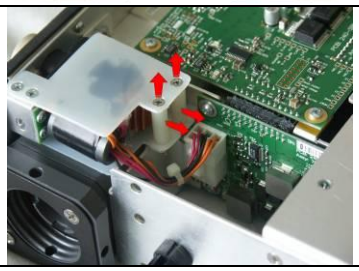
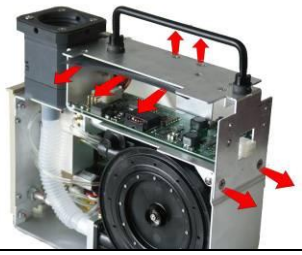
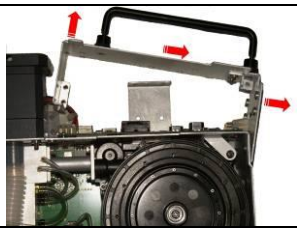
EMV Chassis Kit 712-0731-10 / 712-EGL2-10

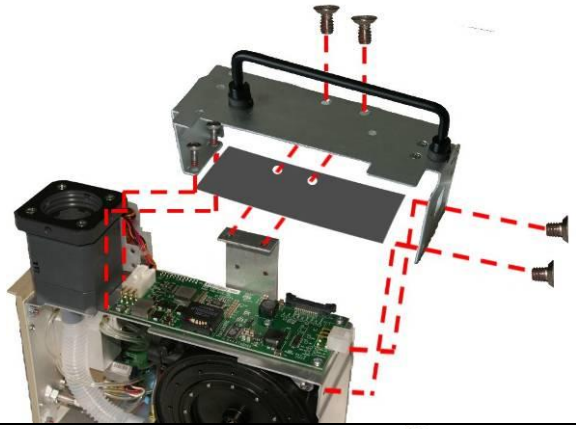
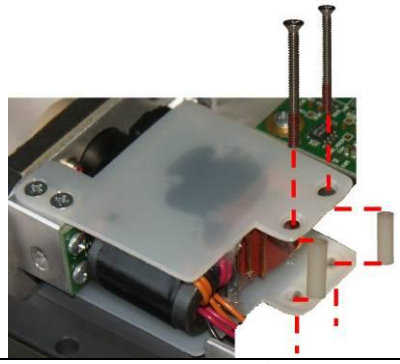
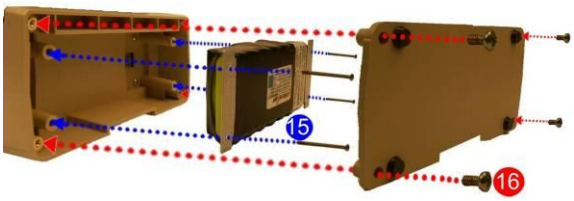
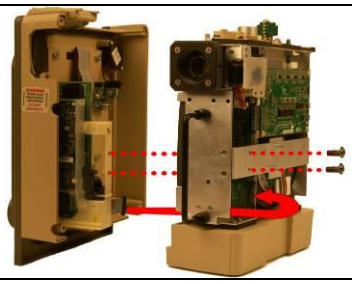
Contents:

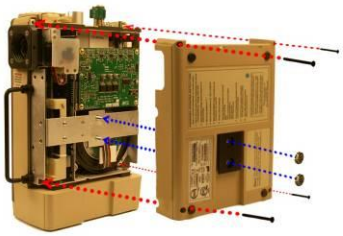
ITEM	QTY	DESCRIPTION
	1	EMV Chassis Assembly
	2	Screw, Phillips, Pan Head, SS, 6-32 X 5/16
	2	Screw, Phillips, Flat Head, 8-32 X 1/4, Undercut, ZP
	2	Screw, Phillips, Flat Head, 6-32 X 1/4, Undercut
	1	SPO2 Insulator

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.

5		Remove the battery compartment cover by unscrewing the (4) 6-32 X 5/16 screws.
6		Remove the battery by unscrewing the (4) 6-32 X 2 ¼ screws and detaching the plug from its locking latch.
7		Unscrew the (4) 6-32 X 5/16 Phillips screws to remove the damaged battery compartment case.
8		Loosen and remove the (2) 4-40 X 1 ¼ Screws and nylon spacers supporting the Power Input assembly unto the chassis.
9		Loosen and remove the (2) 6-32 X ¼ screws holding the chassis to the dovetail mounting bracket and remove the SPO2 insulator. Loosen and remove the (2) 8-32 X ¼ screws holding the chassis to the vent module.
10		Insert screwdriver through the holes on the chassis to loosen and remove the (2) 6-32 x 5/16 screws holding the chassis to the vent module.
11		Lift the damaged chassis from the ventilator module.

12		Secure the replacement Chassis to the vent module using the included (2) 6-32 X ¼ screws with SPO2 insulator, the (2) 8-32 X ¼ and the (2) 6-32 x 5/16 screws.
13		Secure the Power Input assembly to the Chassis using the (2) spacers and (2) 4-40 X 1 ¼ screws. Do not over-tighten the screws.
14		Rotate battery compartment to mate with upper and lower case cutouts and press firmly into place. Secure with (4) 6-32 X 5/16 screws provided.
15		Re-assemble the battery by connecting its cable to the connector (pull on cable to insure it is locked in place) then tightening the (4) 6-32 X 2 ¼ screws.
16		Re-assemble the battery compartment cover by tightening the (4) 6-32 X 5/16 screws.
17		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.

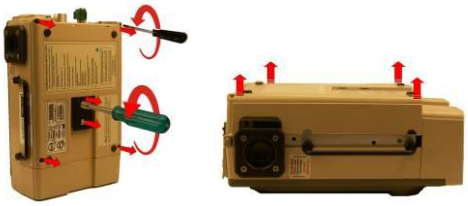
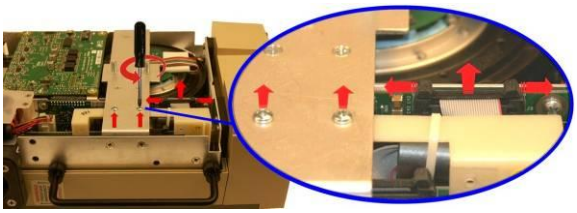
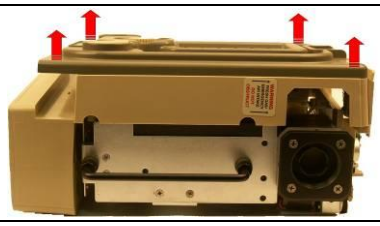
18		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
19		Tighten the (4) 8-32 X 3 screws on the outer air intake.
20		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

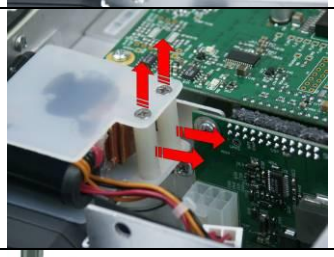
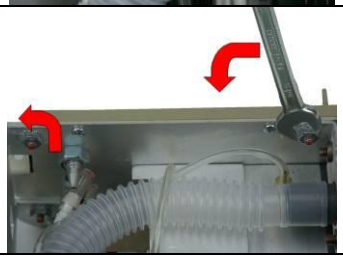
Connector Panel Kit 712-0731-11 / 712-EGL2-11

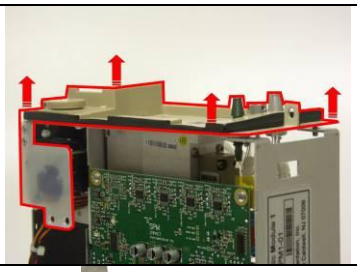
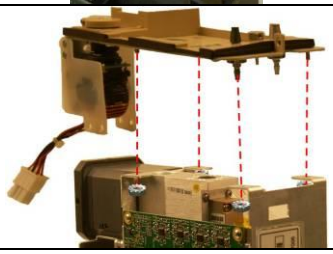
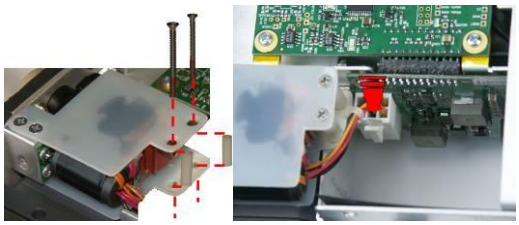
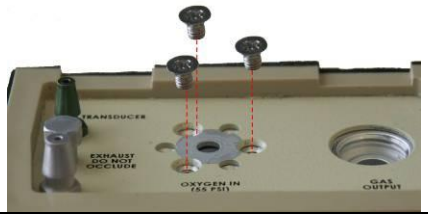
Contents:

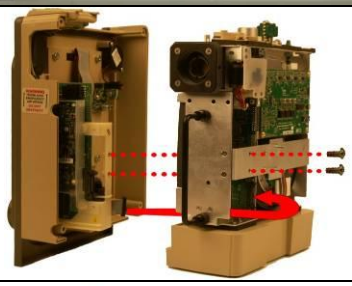
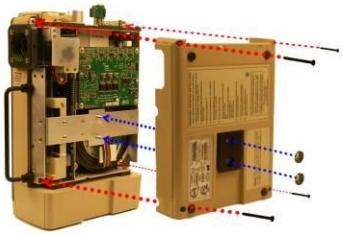
ITEM	QTY	DESCRIPTION
	1	Connector Panel Assembly
	3	8-32 X 1/4 Screw
	4	6-32 Keps Nut
	2	O-Ring ½" OD X 3/8" ID

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking "ears".
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.

5		Remove the O2 Inlet fitting by unscrewing the dust cap then unscrewing the (3) 8-32 X 7/16 screws.
6		Loosen and remove the (3) 8-32 X ¼ screws. Loosen and remove the Gas Output fitting using a 1-inch deep-socket wrench.
7		Disconnect the Power Input cable by pressing on the locking latch and pulling the cable straight up from the connector.
8		Loosen and remove the (2) 4-40 X 1 ¼ Screws and nylon spacers supporting the Power Input assembly unto the chassis.
9		Loosen and remove the (2) 6-32 Keps nuts using a 5/16 open-end wrench.
10		Using a needle nose pliers, carefully remove the 3 tubing on the “Transducer”, “Exhaust Do not Occlude”, and “Exhalation Valve” fittings.
11		Loosen and remove the (2) 6-32 Keps nuts using a 5/16 open-end wrench.

12		Lift the damaged connector panel assembly out from the SPM.
13		Place the included ½" OD X 3/8" ID O-ring onto the manifold.
14		Position the replacement Connector Panel over the SPM and secure with the (4) included 6-32 Keps nuts.
15		Secure the Power Input assembly to the Chassis using the (2) spacers and (2) 4-40 X 1 ¼ screws. Do not over-tighten the screws. Connect the Power Input cable by inserting into connector. Insure that locking latch engages.
16		Insert the 3 tubing unto their correct connectors. "V_BACKUP" to "Exhalation Valve", V_ACAL" to "Transducer" and smallest tubing to "Exhaust do Not occlude"
17		Secure the connector panel to the vent module using the (3) included 8-32 X ¼ screws.
18		Insert the included 3/8" ID O-Ring unto the Oxygen Inlet fitting and the existing 1/2" ID O-ring unto the Gas Output adapter.

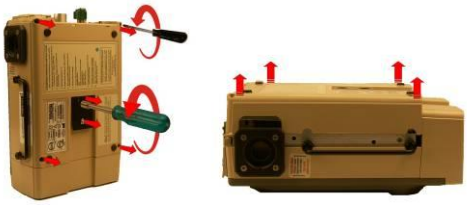
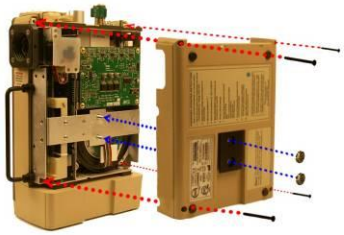
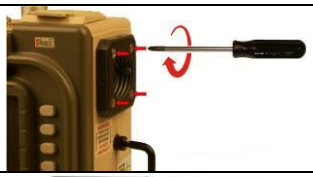
19		Place Oxygen Inlet Fitting over the connector panel then insert and tighten with the (3)8-32 X 7/16 screws. Place fitting and O-ring unto Gas Output and tighten with a 1” deep socket wrench. (Do not cross thread).
20		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
21		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
22		Tighten the (4) 8-32 X 3 screws on the outer air intake.
23		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

Back Case Kit 712-0731-12 / 712-EGL2-12

Contents:

ITEM	QTY	DESCRIPTION
	1	Back Case Assembly
	4	Screw, Phillips, Pan Head, SS, Black Oxide, 6-32 X 2
	2	Nut, Keps, 10-32

Instructions:

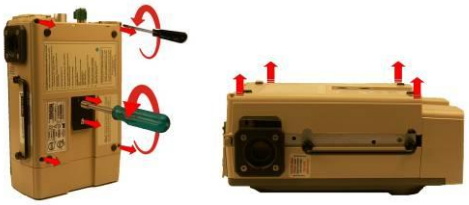
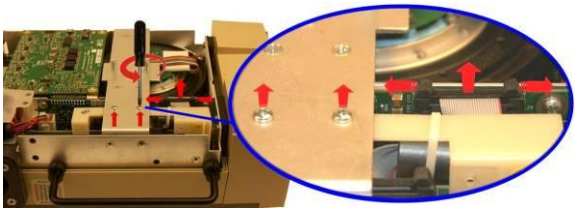
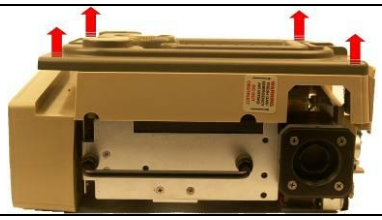
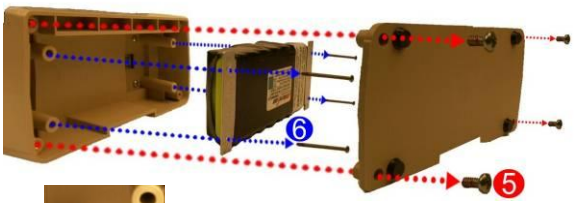
STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the case by lifting from the ventilator.
3		Place the replacement cover over ventilator and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
4		Tighten the (4) 8-32 X 3 screws on the outer air intake.
5		Perform HiPot Testing then perform Functional Test using the RCS.

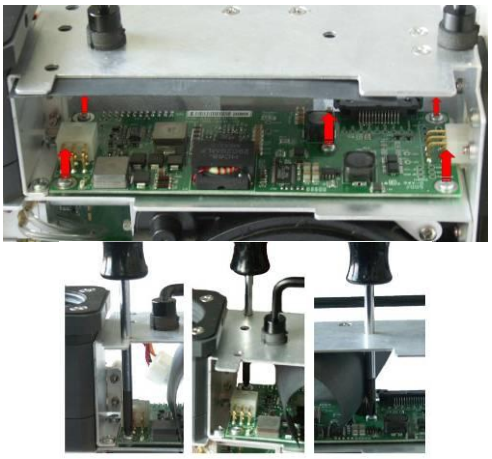
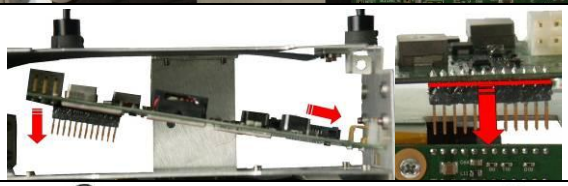
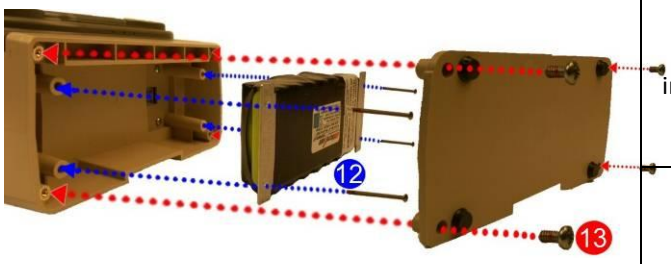
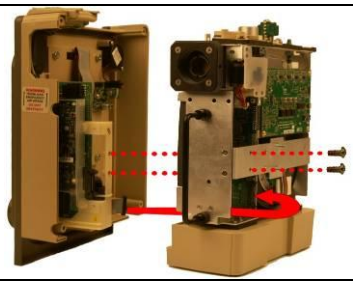
PIM Board Kit 702-0731-02

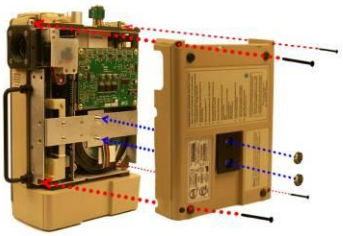
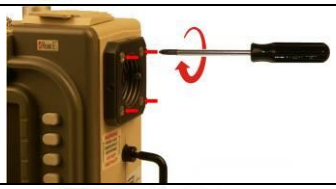
Contents:

ITEM	QTY	DESCRIPTION
	1	PIM PCB

Instructions:

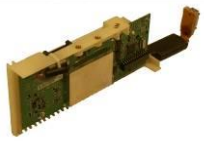
STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking "ears".
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Remove the battery compartment cover by unscrewing the (4) 6-32 X 5/16 screws.
6		Remove the battery by unscrewing the (4) 6-32 X 2 ¼ screws and detaching the plug from its locking latch.
7		Disconnect the Power Input cable from the PIM PCB by pressing on the locking latch and pulling the cable straight up from the connector.

8		Loosen and remove the(5) 4-40 X 5/16 screws holding the PIM PCB to the ventilator module. Position SPO2 Insulator out of the way (Do Not Fold) and insert screwdriver through the holes to aid in removing screws.
9		Lift the defective PIM Board out of the ventilator module.
10		Place the new PIM Board Unto the vent module (make sure male header pins are inserted correctly into the mating header.
11		Secure the PIM Board with the (5) 4-40 x 5/16 screws.
12		Re-assemble the battery by connecting its cable to the connector (pull on cable to insure it is locked in place) then tightening the (4) 6-32 X 2 ¼ screws.
13		Re-assemble the battery compartment cover by tightening the (4) 6-32 X 5/16 screws.
14		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.

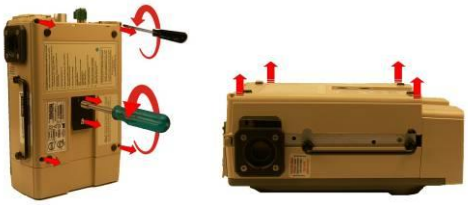
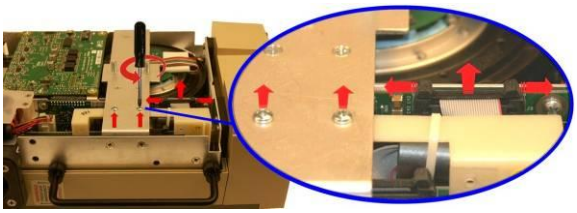
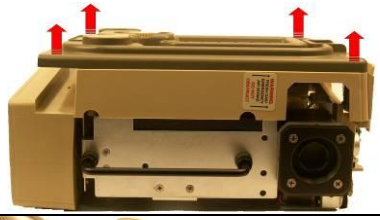
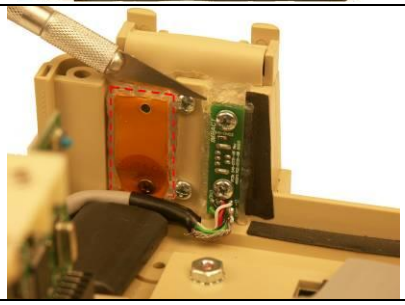
15		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
16		Tighten the (4) 8-32 X 3 screws on the outer air intake.
17		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

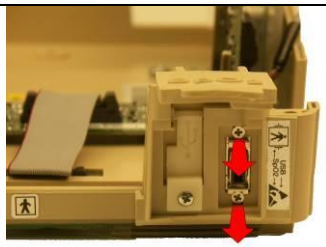
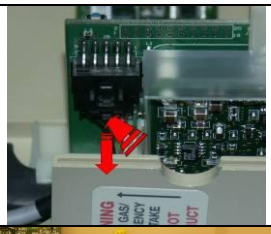
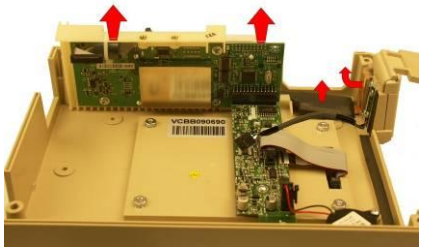
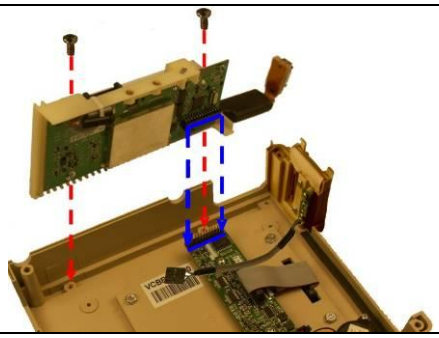
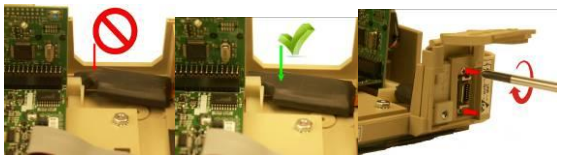
CPU/UIM & SPO2 Stack Kit 712-0731-14

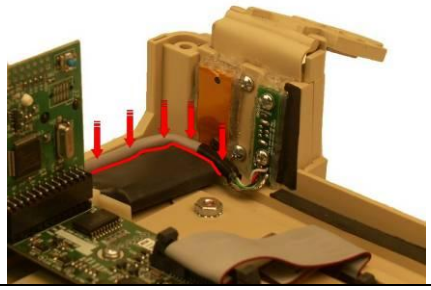
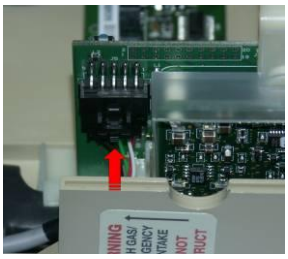
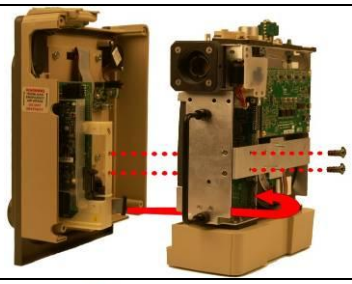
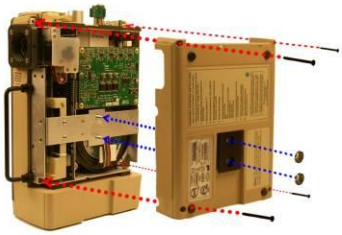
Contents:

ITEM	QTY	DESCRIPTION
	1	CPU/UIM & SPO2 Stack
	2	Screw, Phillips, Pan Head, SS, 6-32 X 5/16
	2	Screw, Metric, Phillips, Flat Head, M2.5 x 5mm Stainless Steel

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Using a sharp knife, carefully cut the RTV sealant around the SPO2 Cable.

6		Loosen and remove the two M2.5 X 5mm screws holding the SPO2 cable to the front case.
7		Disconnect the USB cable by pressing on locking tab and pulling cable downwards.
8		Loosen and remove the two (2) 6-32 X 5/16 screws that hold the CPU/UIM & SPO2 Stack to the front case.
9		Lift the CPU/UIM & SPO2 Stack up from the front case. Handle the SPO2 cable with extreme care. Do not pull on the cable.
10		Tighten the two (2) 6-32 X 5/16 screws that hold the CPU/UIM & SPO2 Stack to the front case. Make sure that all the pins on the header mate correctly.
11		Make sure the SPO2 Flex Cable lays flat against the front case and is assembled correctly into the UIM Bracket and SPO2 Isolation Shield. Insert and tighten the two M2.5 X 5mm screws holding the SPO2 cable to the front case.

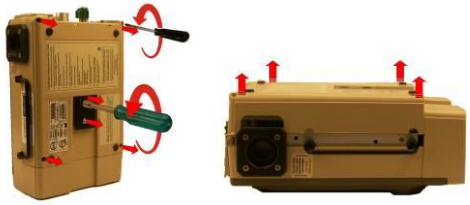
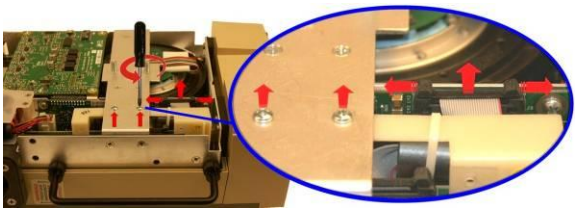
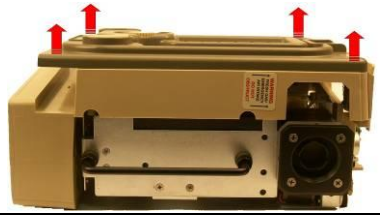
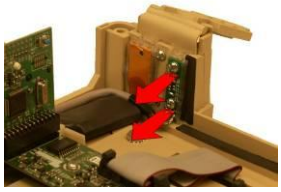
12		Apply RTV Sealant around the SPO2 Flex Cable and allow to dry.
13		Dress the USB Connector cable along the case and over the SPO2 flex cable.
14		Attach USB Connector cable to its mating connector on the CPU PCB. Make sure tab locks the cable in place.
15		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
16		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
17		Tighten the (4) 8-32 X 3 screws on the outer air intake.
18		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

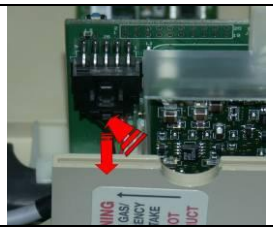
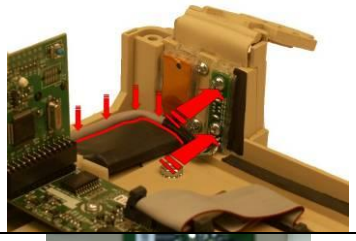
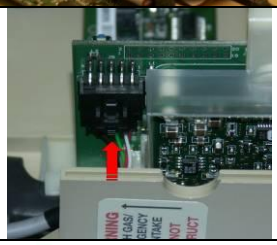
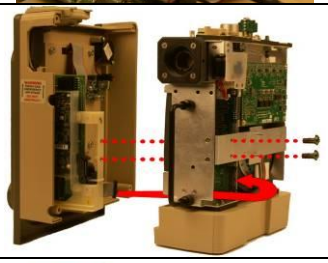
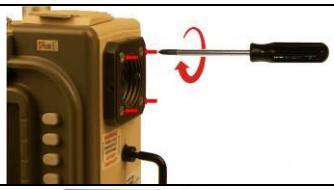
USB Connector Kit 712-0731-15

Contents:

ITEM	QTY	DESCRIPTION
	1	USB Connector Assembly
	2	Screw, Phillips, Pan Head, Zinc Plated, 4-40 X 3/16

Instructions:

STEP NO.	DIRECTIONS	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Using a sharp knife, carefully cut the RTV sealant around the USB Printed Circuit Board.
6		Loosen and remove the two 4-40 X 3/16 screws holding the Mini USB Cable Assembly to the front case.

7		Remove the damaged cable by pressing on locking tab and pulling cable downwards.
8		Remove any excess RTV from the case. Insert and tighten the two included 4-40 X 3/16 screws holding the new USB Connector to the front case. Dress the USB Connector cable along the case and over the SPO2 flex cable.
9		Attach USB Connector cable to its mating connector on the CPU PCB. Make sure tab locks the cable in place.
10		Apply RTV Sealant around USB PCB and allow to dry.
11		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
12		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
13		Tighten the (4) 8-32 X 3 screws on the outer air intake.
14		Perform HiPot Testing then perform Functional Test using the RCS.

Gas Output Kit 712-0731-16

Contents:

ITEM	QTY	DESCRIPTION
	1	Fitting, Patient, Outlet, SPM
	1	O-Ring, Neoprene, 1/2" ID

Instructions:

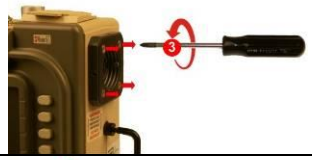
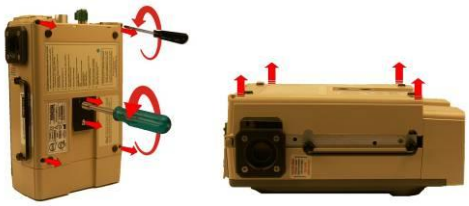
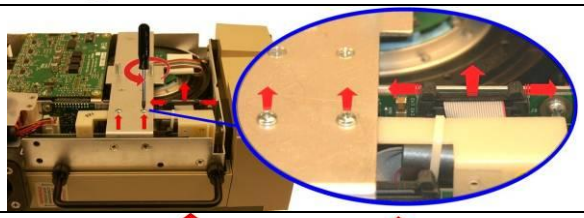
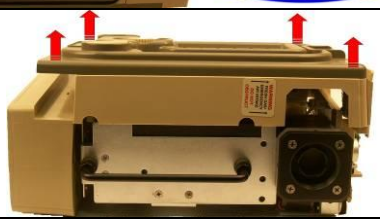
Step No.	Directions	
1		Remove the damaged fitting by unscrewing with a 1-inch deep socket wrench.
2		Place O-ring unto underside of outlet fitting.
3		Place fitting and O-ring unto Gas Output and tighten with a 1” deep socket wrench. (Do not cross thread).
4		Perform HiPot Testing then perform Functional Test using the RCS.

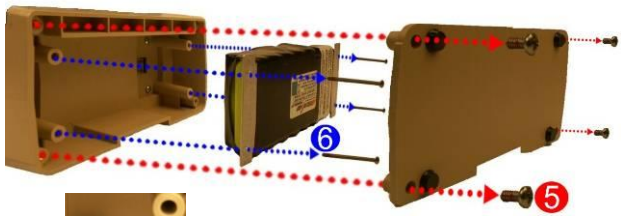
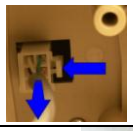
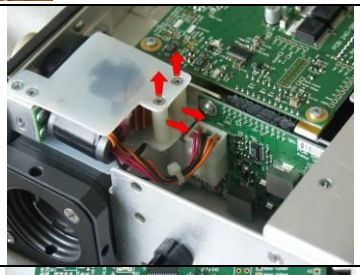
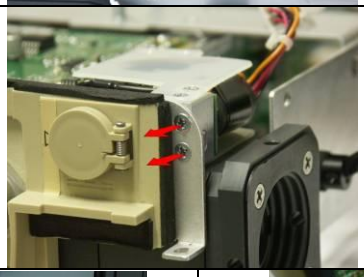
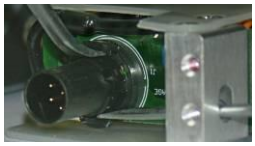
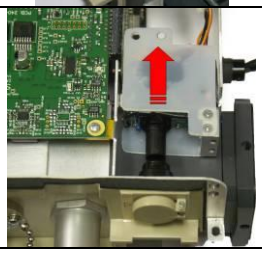
Power Input Kit 712-0731-17

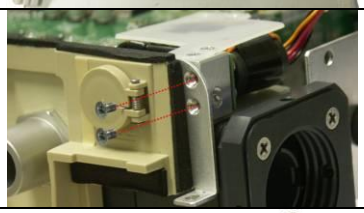
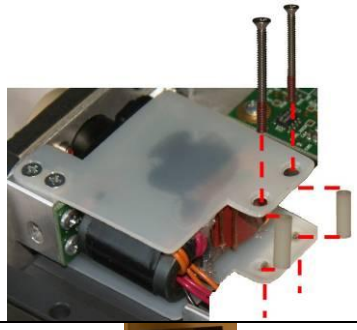
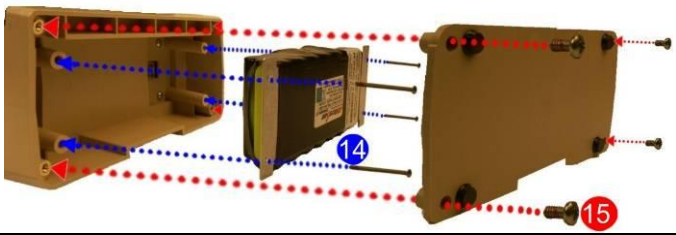
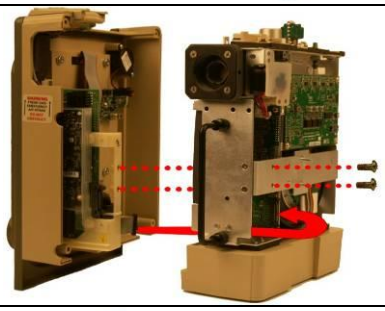
Contents:

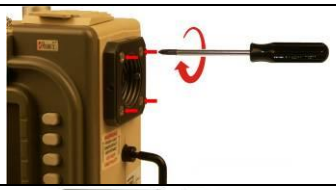
ITEM	QTY	DESCRIPTION
	1	Power Input Assembly
	2	Screw, Phillips, Flat Head, Zinc Plated, 4-40 X 1/4
	2	Screw, Phillips, Flat Head, 4-40 X 1 1/4
	2	Spacer, Nylon, #4, x .812 Long

Instructions:

Step No.	Directions	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.

5		Remove the battery compartment cover by unscrewing the (4) 6-32 X 5/16 screws.
6		Remove the battery by unscrewing the (4) 6-32 X 2 ¼ screws and detaching the plug from its locking latch.
7		Loosen and remove the (2) 4-40 X 1 ¼ Screws and nylon spacers supporting the Power Input assembly unto the chassis.
8		Disconnect the Power Input cable from the PIM PCB by pressing on the locking latch and pulling the cable straight up from the connector.
9		Loosen and remove the (2) 4-40 X ¼ screws holding the Power Input to the connector panel.
10	   Unobstructed view 	Using two small flat blade screwdrivers, separate the two locking tabs on the power plug and pull the power input assembly away from the connector panel.

11		Insert the new power input assembly into the connector panel socket and pull on the assembly to insure the locking tabs have engaged.
12		Secure the Power Input assembly to the Connector Panel using the (2) included 4-40 X ¼ screws.
13		Secure the Power Input assembly to the Chassis using the (2) included spacers and (2) included 4-40 X 1 ¼ screws. Do not over-tighten the screws.
14	 	Re-assemble the battery by connecting its cable to the connector (pull on cable to insure it is locked in place) then tightening the (4) 6-32 X 2 ¼ screws.
15		Re-assemble the battery compartment cover by tightening the (4) 6-32 X 5/16 screws.
16		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
17		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.

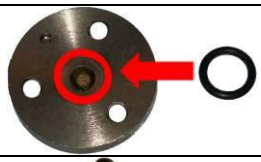
18		Tighten the (4) 8-32 X 3 screws on the outer air intake.
19		Perform HiPot Testing then perform Calibration and Functional Test using the RCS.

Oxygen Inlet Fitting Kit 712-0731-18

Contents:

ITEM	QTY	DESCRIPTION
	1	Oxygen Inlet Fitting with Filter, Cap and Chain
	3	Screw, Phillips, Flat Head, 8-32 X 7/16, ZP
	1	O-Ring, Black, Neoprene, 1/2"O.D.X 3/8"I.D. (Nominal)

Instructions:

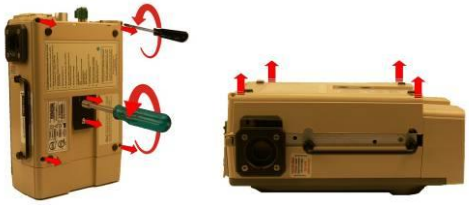
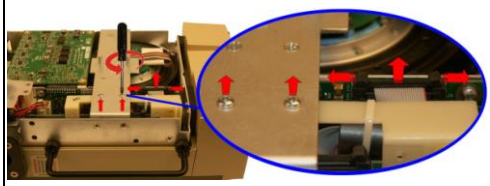
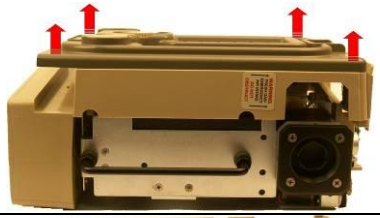
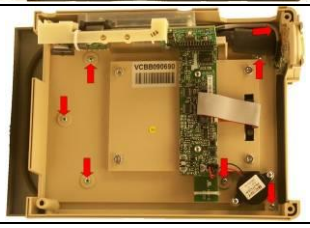
STEP NO.	DIRECTIONS	
1		Remove the damaged O2 Inlet fitting by unscrewing the dust cap then unscrewing the (3) 8-32 X 7/16 screws.
2		Install the included O-Ring into groove on underside of inlet fitting.
3		Place Oxygen Inlet Fitting over the ventilators connector panel then insert and tighten the 3 supplied 8-32 X 7/16 screws.
4		Perform HiPot Testing then perform Functional Test using the RCS.

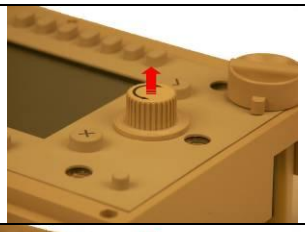
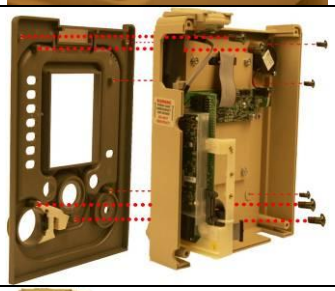
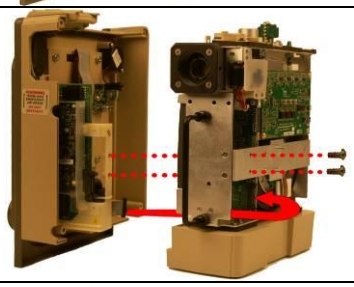
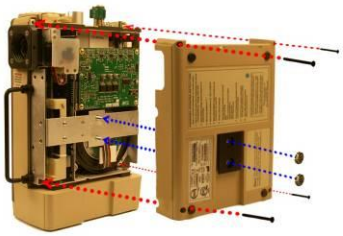
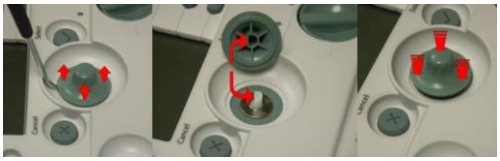
Selector Knob Kit 712-0731-19 / 392-0066-00

Contents:

ITEM	QTY	DESCRIPTION
	1	Selector Knob with label

Instructions:

STEP NO.	DIRECTIONS (For Eagle II go to step no. 12)	
1		Loosen but do not remove the (4) 8-32 X 3 screws on the outer air intake.
2		Loosen and remove the (2) 10-32 Keps nuts and the (4) 6-32 X 2 screws. Remove the back case by lifting from the ventilator.
3		Remove the (2) 4-40 X ¼ screws on the Dovetail Mounting Bracket and disconnect the ribbon cable on the PIM PCB by simultaneously applying pressure on the two locking “ears”.
4		Flip the ventilator over and remove the front case assembly by lifting it straight up away from the ventilator module.
5		Remove the bezel from the membrane panel assembly by loosening and removing the (7) 4-40 X ¼ screws that hold the bezel to the front case.

6		Lift the damaged selector knob from the membrane panel assembly.
7		Push the replacement knob on the membrane panel switch - align with flat on switch .
8		Install the new bezel by tightening the included (7) 4-40 X ¼ screws.
9		Place the front case assembly over the vent module and tighten the (2) 4-40 X ¼ screws unto the dovetail mounting bracket. Reconnect the ribbon cable unto the PIM PCB. Make sure the two locking “ears” lock into position.
10		Attach the back case to the vent module and align cover with handle, air intake housing and dovetail mounting studs. Insert and tighten the included (2) 10-32 Keps nuts and the (4) 6-32 X 2” screws.
11		Tighten the (4) 8-32 X 3 screws on the outer air intake.
12		For Eagle II ventilators the Selector knob can be removed by prying the knob up from the case. Align flats on knob and shaft and push down to install.
13		Perform HiPot Testing then perform Functional Test using the RCS.

Troubleshooting

A list of alarms by category and service codes follows with a description of each alarm and possible service kit(s) or action to use to repair the device.

Alarm Category

Ventilator Alarm Category	Comments	Service Kit / Resolution
CPU Failure	user interface goes blank; audible and red LED indicators activated; backup vent; Mute/Cancel no effect	712-0731-14
Compressor Fault/Failure	no compressor	712-0731-02
	restrictions through pneumotach screen or internal gas path detected by internal sensor; outside normal operating conditions	712-0731-02
O2 Valve Fault/Failure	no O2 Valve	712-0731-02
	restrictions through pneumotach screen or internal gas path detected by internal sensor; outside normal operating conditions	712-0731-02
O2 Supply Pressure Low Fault/Failure	inability to detect presence of high-pressure O2; trigger < 35 psig, clear > 45 psig	712-0731-02
O2 Supply Pressure High Fault/Failure	inability to detect presence of high-pressure O2; trigger > 80 psig, clear < 75 psig	712-0731-02
Fresh Gas Intake Fault/Failure	obstructions of Fresh Gas / Emergency Air Intake; internal filter dirty/clogged (pressure drop across filter monitored)	712-0731-02
Power Fault/Failure	failure of internal power management system	702-0731-02
Low Battery Power	remaining operating time	703-0731-01
Missing Battery	not able to detect internal battery	702-0731-02
SPM Change	CPU does not recognize SPM; indicative of complete unit not properly calibrated after new SPM installed	Recalibrate using RCS
Calibration Fault/Failure	associated with internal sensors monitoring and controlling breath delivery	712-0731-02
Exhalation System Fault/Failure	associated with control of exhalation valve and airway pressure; triggers (airway pressure): > 40, 75 cmH2O	712-0731-02
Airway Pressure High	trigger (factory default) > 35 cmH2O	712-0731-02

PEEP Leak	airway pressure	712-0731-02
Disconnect	airway pressure	712-0731-02
Calibration Due	time since last calibration	Recalibrate using RCS
Ambient Pressure Fault	ambient pressure range: -2000 to +25,000 ft altitude	712-0731-02
Ambient Temperature Fault	ambient temperature range: -25 to +50C	712-0731-02

Service Codes

Service Code	Alarm Name	Comments	Service Kit / Resolution
1001	Compressor Failure (Compressor Control Fault - No Backup)	compressor fails to operate or provide enough flow	712-0731-02
2001	Compressor Fault (Compressor Control Fault - Backup Available)	communication between compressor controller and SPM fails	
3001	Compressor Fault (Compressor Control Fault - Backup Selected)	compressor fails to operate or provide enough flow	
1002	Compressor Failure (Compressor Signal Chain Fault - No Backup)	communication between compressor controller and SPM is lost	712-0731-02
2002	Compressor Fault (Compressor Signal Chain Fault - Backup Available)	communication between compressor controller and SPM is lost	
3002	Compressor Fault (Compressor Signal Chain Fault - Backup Selected)	communication between compressor controller and SPM is lost	
1003	Self Check Failure	flow error > +/- 20%	712-0731-02
1010	O2 Valve Failure (O2 Valve Failed Open)	O2 Valve fails in open position	712-0731-02
1011	O2 Valve Failure (O2 Valve Control Fault - No Backup)	O2 Valve not delivering required flow	712-0731-02
2011	O2 Valve Fault (O2 Valve Control Fault - Backup Available)	signal to O2 Valve outside of calibration range for given flow	
3011	O2 Valve Fault (O2 Valve Fault - Backup Selected)	signal to O2 Valve outside of calibration range for given flow	
1012	O2 Valve Failure (O2 Valve Signal Chain Fault - No Backup)	communication between O2 Valve and SPM fails	712-0731-02
2012	O2 Valve Fault (O2 Valve Signal Chain Fault - Backup Available)	communication between O2 Valve and SPM fails	
3012	O2 Valve Fault (O2 Valve Signal Chain Fault - Backup Selected)	communication between O2 Valve and SPM fails	
1020	O2 Supply Failure (O2 Tank Pressure Low - No Backup)	O2 supply pressure: trigger < 35 psig, clear > 40 psig	712-0731-02

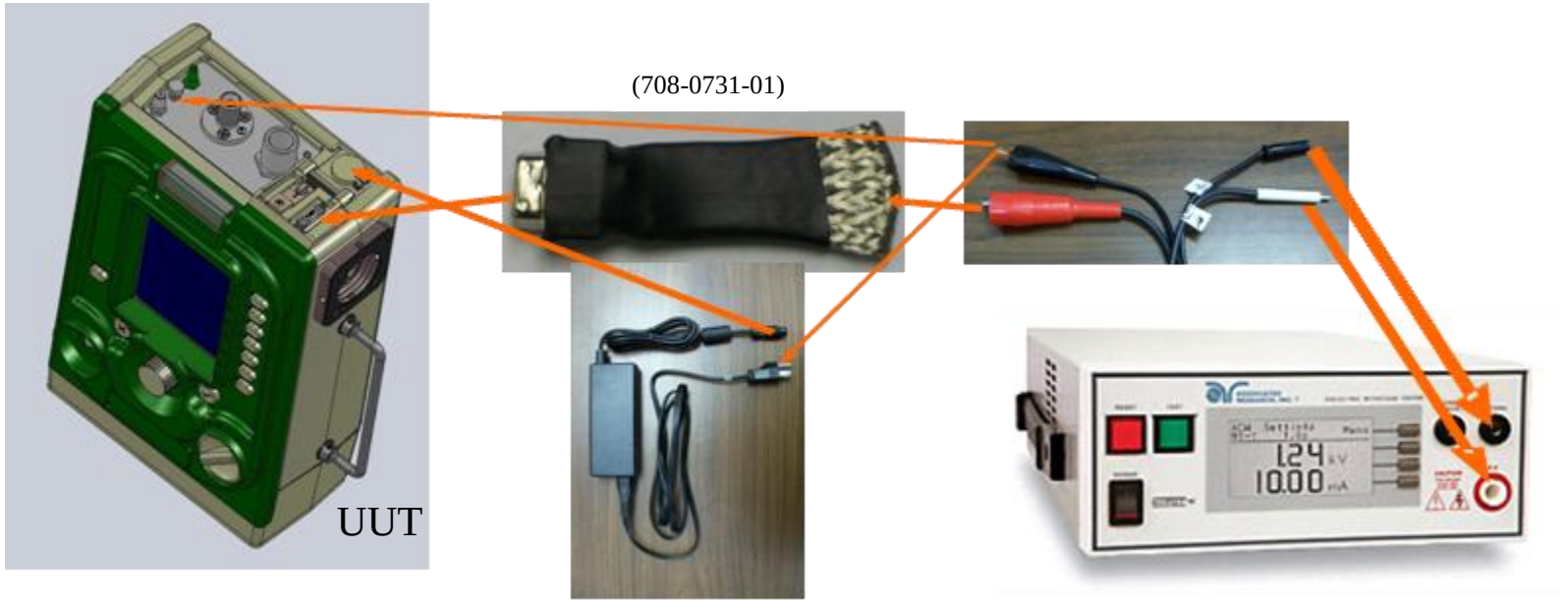
2020	O2 Supply Pressure Low (O2 Tank Pressure Low)	O2 supply pressure: trigger < 35 psig, clear > 40 psig	
1030	Fresh Gas Intake Failure	Fresh Gas / Emergency Air Inlet blocked	712-0731-02
2030	Fresh Gas Intake Fault (Compressor Intake Blocked - Backup Available)	Fresh Gas / Emergency Air Inlet blocked	
3030	Fresh Gas Intake Fault (Compressor Intake Blocked - Backup Selected)	Fresh Gas / Emergency Air Inlet blocked	
3031	Fresh Gas Intake Fault (Compressor Intake Restricted)	Fresh Gas / Emergency Air Inlet blocked	712-0731-02
3032	Fresh Gas Intake Fault (Intake Pressure Signal Chain Failure)	communication between Fresh Gas / Emergency Air Inlet pressure sensor and SPM lost	712-0731-02
1041	O2 Supply Pressure High Failure (O2 Tank Pressure Excessive - No Backup)	O2 supply pressure > 80 psig	Lower Oxygen input pressure
3041	O2 Supply Pressure High (O2 Tank Pressure High)	O2 supply pressure: trigger > 75 psig, clear < 68 psig	
1051	Run-Time Calibration Failure	failure of calibration system	712-0731-02
1052	Airway Pressure Sensing Failure	communication between airway pressure sensor and SPM is lost	712-0731-02
2053	Suspicious Triggers (False Trigger or Bad Baseline)	airway pressure sensor fails to calibrate during expiratory phase of breath	712-0731-02
1060	Exhalation System Failure (Exhalation Valve Failure)	exhalation control valve fails to operate	712-0731-02
1061	Exhalation System Failure (Excessive Airway Pressure)	triggers (airway pressure): > 40, 75 cmH2O	712-0731-02
2062	Exhalation System Fault (Gas Trapped)	airway pressure at end of expiration > 5 cmH2O above PEEP	712-0731-02
2070	Airway Pressure High	Paw > high limit	712-0731-02
2071	Low Airway Pressure	Paw < low limit	712-0731-02
2072	High Tidal Volume	Vt > high limit	Check internal/external tubing connections
2073	Low Tidal Volume	Vt < low limit	
2074	High Breath Rate	BPM > high limit	
2075	Low Breath Rate / Apnea	BPM < low limit	
2076	Apnea	BPM < low limit	
2090	PEEP Leak	Paw < [PEEP - 2 cmH2O] during expiration	
3091	Incomplete Exhalation	exhaled flow from patient continues throughout expiratory period	
3092	Patient Inspiratory Demand Not Met	end inspiratory Paw < -1.0 cmH2O	
2095	Insufficient Flow	pressure target not reached during inspiratory period during pressure-targeted ventilation	

2100	Patient Disconnect	Paw < [PEEP + 7 cmH2O]	
3110	RTC Battery Fault (RTC Battery Low)	Vstby < 2.5V	712-0731-02
3120	Self Check Fault (Calibration Due)	> 365 days since last calibration	Recalibrate using RCS
3130	Ambient Pressure Fault (Excessive Altitude Sensor Failure)	ambient pressure transducer has failed	712-0731-02
3131	Ambient Pressure Fault (Excessive Altitude)	ambient pressure transducer: altitude > 25,000 ft	Ventilator being used outside of specification limits
3132	Ambient Pressure Fault (Excessive Altitude)	ambient pressure transducer: altitude < -2,000 ft	
3140	Operational Temperature Fault	ambient temperature > 55C	
3141	Operational Temperature Fault (Excessive Temperature Low)	ambient temperature < -10C	
3143	Self Check Fault	failure of internal temperature sensors	712-0731-02
2170	Spontaneous Breath - PIP High	Paw > high limit during 2 consecutive spontaneous breaths	
2171	Spontaneous Breath - PIP Low	Paw < low limit during 2 consecutive spontaneous breaths	
1172	Run-Time Self Check Alarm	supply voltage to circuitry NG	712-0731-02
2172	Spontaneous Breath - Vt High	Vt > high limit during 2 consecutive spontaneous breaths	
1173	Internal Comm Failure	communication between EMV and SPM fails	Check Cable from PIM board to CPU; 702-0731-02
2173	Spontaneous Breath - Vt Low	Vt < low limit during 2 consecutive spontaneous breaths	
1174	Self Check Failure	failure of PGA offset control detected during startup	712-0731-02
1175	Internal Comm Failure	SPM DSP unable to communicate with PGA's	712-0731-02
1176	Offset Self-check Failure	calibration file fails its integrity test	712-0731-02
2300	Pulse Ox Module Failed		712-0731-14
3300	Pulse Ox Module Failed		
2301	Internal Comm Failed	communication between pulse oximeter module and CPU fails	712-0731-14
3301	Internal Comm Failed (Comm Failure EMV-Pulse Ox - Monitor Not In Use)	communication between pulse oximeter module and CPU fails	
3310	Pulse Ox Sensor Not Connected	pulse oximeter detects SpO2 sensor disconnect; no power from either internal battery or external source	712-0731-14
3311	Defective Pulse Ox Sensor (Defective Sensor)		
3312	Pulse Search (Pulse Search)		
3313	Pulse Ox Signal Interference		

2314	Pulse Ox Sensor Off Patient		
3315	Pulse Ox Light Contamination		
3316	Invalid Pulse Ox Sensor		
3317	Low SpO2 Perfusion		
3318	Low SpO2 Perfusion		
2401	SpO2 Low		
2410	Heart Rate High		
2411	Heart Rate Low		
1420	Complete Power Failure		
2421	Input Protection Circuit Failed	failure of input protection circuit	702-0731-02
3421	External Power Fail/Disconnect	external power < 5 VDC	
3422	Missing Battery	communication between battery and CPU has failed	703-0731-01; 702-0731-02
2423	Power Circuit Hardware Fault	internal power circuit has failed, external power connected but cannot be used	702-0731-02
3423	Battery Charge Circuit Failed		
1430	Empty Battery		703-0731-01
2430	Low Battery (Low Battery - No Backup)	< 5 min of battery operation remaining	
3430	Low Battery (Low Battery - Warning)	< 30 min of battery operation remaining	
3431	Low Battery (Low Battery - With Backup)	< 30 min of battery operation remaining	703-0731-01
3441	External Power Failed (External Power High)	external power: trigger > 33 VDC, clear < 30 VDC	702-0731-02
3442	External Power Failed (External Power Low)	5V < external power < 11.5V	702-0731-02
3444	External Power Failed	external power voltage polarity reversed	Use Impact Power supply Only
2450	Battery Fault - No External Power Connected (Battery Nearly Too Hot for Discharge)	battery temperature > 70C	
3450	Battery Fault - With External Power Connected (Battery Nearly Too Hot for Discharge)	battery temperature > 70C	
3451	Battery Fault - With External Power Connected (Battery Too Hot for Discharge)	battery temperature > 75C	703-0731-01
3452	Battery Fault (Battery Too Hot for Charging)	battery temperature > 45C	
3453	Battery Fault - With External Power Connected (Battery Too Cold for Charging)	battery temperature < 0C	
2455	Battery Fault - No External Power Connected (Communication Failure)	EMV not able to communicate with internal battery	703-0731-01; 702-0731-02

3455	Battery Fault - With External Power Connected (Battery Communication Failure)	EMV not able to communicate with internal battery	
3470	Internal Communication (Comm) Failure Fault - PIM Comm	EMV not able to communicate with PIM	Check Cable from PIM board to CPU; 702-0731-02
1471	Internal Communication (Comm) Failure	CPU unable to communicate with UIM and interface controls	Check Flex cable to LCD; 712-0731-14
1472	Internal Communication (Comm) Failure	CPU unable to communicate with SPM	Check Cable from PIM board to CPU; 702-0731-02
1473	Internal Comm Failure	no valid data sent from SPM	Check Cable from PIM board to CPU; 702-0731-02
1474	Internal Comm Failure	CRC check between EMV and SPM fails	Check Cable from PIM board to CPU; 702-0731-02
1475	LCD Control Failure	CPU unable to control LCD contrast	712-0731-08
1480	SPM Compatibility Failure	EMV and SPM software revs incompatible	Recalibrate using RCS
3480	SPM Compatibility Fault	EMV software detects that it has not been calibrated with SPM inside unit	
1485	Power-On Self-Check Failure	SPM software fails and is shut down	712-0731-02

HiPot Testing



Equipment required: 1) Masimo cable (708-0731-01) with braided conductors. 2) Associated Research Hypot III Dielectric Withstand Tester Model 3765 and test leads.

1) DON'T TOUCH THE UUT OR THE CONNECTIONS DURING THE TEST. HANDLE TEST CLIPS BY INSULATION ONLY, NEVER TOUCH CLIPS DIRECTLY. DO **NOT** WEAR AN ESD WRISTSTRAP. Do not attempt to operate the Hipot if impaired for any reason including medication, illness, alcohol, Mental stress etc.
2) Perform continuity and AC Hipot test on the Hipot before testing a unit to ensure the hipots functionality.
3) Insure that the hipot tester's POWER switch is off. Connect the line cord to the back of the hipot tester and to a grounded 120VAC outlet.
4) Connect the black then white test leads to the hipot tester as indicated
5) Connect the UUT's power supply to the UUT as indicated.
6) Connect the modified Masimo cable to the UUT as indicated.
7) Connect the black alligator clip to the UUT's Exhaust Fitting not on the holes as indicated.
8) Connect the red alligator clip to the modified Masimo cable as indicated.
9) Turn the POWER switch ON.
10) Set the HiPot tester as follows: Voltage = 5.00kV, Current = 50uA, Duration = 0.5 sec.
11) Press the green TEST button. The HIGH VOLTAGE ON indicator flashes during the test.
12) If the UUT passes the test, the tester will beep and display the results.
13) If there is a failure, the tester will alarm and the red failure indicator will light up. To stop the alarm press the red RESET button. Record the failure on the DHR and apply a rejected tag identifying the non conformity after completing steps 13. Place UUT into the NCM area.
14) Turn the POWER switch OFF.
15) Disconnect black test lead from exhaust port and connect to power supply plug ground repeat above starting at step 8.
16) Disconnect the Masimo cable from the UUT.
17) Disconnect the black alligator clip from the power supply plug ground.
18) If there are more units to test, go to step 4.
19) If there are no more units to test, disconnect the white then black test leads from the hypot tester.