INTRASKAN DC

High Frequency
Intraoral X-Ray System

9992720100

INSTALLATION & SERVICE MANUAL

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Table of contents

1 Introduction

1.1 About Intraskan DC

- The Intraskan DC High Frequency Intraoral X-ray has been engineered and manufactured to provide many years of reliable service. The system houses two microprocessors, one for control/supervisory functions and another to provide the user/machine interface. The technology incorporates feedback circuits to ensure accuracy and reproducibility of X-ray output for dental diagnostic radiography. The Intraskan DC will create radiographs of excellent quality, performing equally well using digital or film-based imaging media.
- The High Frequency Intraoral X-ray is hereafter referred to as Intraskan DC in this manual. Review and follow the guidelines included in both this manual and the User's Manual supplied with the equipment to thoroughly become familiar with the installation requirements as well as operating and safety procedures. This will ensure that your Intraskan DC gives you the highest level of service.

1.2 Scope of this Manual

- This manual provides trained service technician with the necessary information for installation/setup, and maintenance for Intraskan DC models listed by Table 1-1. This manual or the User's Manual supplied with the equipment is not to be used as a replacement for training in radiography. The User's Manual supplied with the Intraskan DC provides instructions for the day-to-day operation and maintenance of the Intraskan DC. This manual is intended for the installation and performance of the unit. It contains safety tips to prevent unwanted X-ray exposures, physical injury and proper functioning of the equipment. Location and meaning of the various labels are provided.
- Review and follow the procedures included in this Installation Manual to ensure precision installation of the Intraskan DC allowing the accuracy and reproducibility of X-ray output.

Table 1-1. Intraskan DC Floor mount Model

Description	Part No.
Intraskan DC High Frequency Intraoral Mobile X-Ray Mobile	9992720100

1.3 Symbols in this Manual

- The following caution symbol is used in this manual.

Caution Symbol

Used in this manual to alert users to important instructions that require caution. Since the instructions following this symbol relate to personnel safety, they must be read carefully to avoid any problems or injuries.

Note! Symbol

This symbol points to an important detail/tip in the operation of the unit. Read carefully to avoid any problems.

2 Safety and Precautions

2.1 General Safety Tips

	❑ Installation of the Intraskan DC must be done only by an authorized service engineer. Consult the factory or dealer as necessary.
	❑ Make sure that the Intraskan DC is assembled and installed in compliance with all applicable laws and recommendations concerning electrical safety.
	❑ The unit contains and generates high voltages. Only a trained service personal should attempt to open the protective plastic covers or repair the unit.
	❑ This X-ray equipment may be dangerous to the patient and the operator unless safe exposure factors and operating instructions are observed. Follow proper X-ray radiation safety rules.
	• Follow instructions specified in this manual when carrying out exposures during service. • Do not use non prescribed exposures. • Ensure there are no Patients or other person near the machine when exposures are being done. • Always be at a distance of more than 2 meters away from the Tube head while carrying out exposures.
	❑ Exercise caution when operating and installing the mechanical suspension arm. The arm is spring loaded and can bounce out if proper installation procedures are not followed.
	❑ Where complete safeguarding of the equipment is not possible, due care must be taken to ensure that no part of your body or clothing can be trapped or injured by any part of the equipment. In particular, make sure that fingers are not caught or pinched during scissor arm movement.
	❑ Ensure proper electrical grounding. A bad grounding can be dangerous for the operator and can generate malfunctioning of the device.
	❑ Turn Off and remove all power before opening any plastic covers. Wait for at least 2 minutes after mains power off before opening and accessing the covers. During this time, remove the mains plug from the wall socket

	**Scissor arm can open out during installing and servicing of the unit which may cause injury to persons/patient standing close to the equipment. Always make sure to lock the movement of the scissor arm in folded condition.**

2.2 Safety Symbols

- The following safety related symbols are found on the equipment.

	**Caution Symbol** This symbol indicates the user to be cautious and refer to the user manual for safe operating instructions.
	**Protective Earth Ground** Mains Earth Ground is required for continued protection against shock hazards.
	**Type of Insulation** Class 1, Type B Insulation. Protection against electric shock (UL60601-1:2003). Requires protective Earth Connection.
	**High Voltage** Dangerous voltages present.
	**Caution: X-Ray** X-Ray Source Assembly / Tube-head capable of generating X-Rays. This X-Ray unit may be dangerous to patient & operators unless safe exposure factors and operating instructions are observed.
	**WEEE Symbol** Indicates that the unit conforms with WEEE Directive 2002/96/EC and must be disposed of only at the appropriate facilities for recovery and recycling.
	**X-Ray Emission Status** X-Ray Emission /ON
	**Focal Spot**
	**Mains Neutral Connection**
	**Mains Line Connection**
	**Follow Instructions for use**

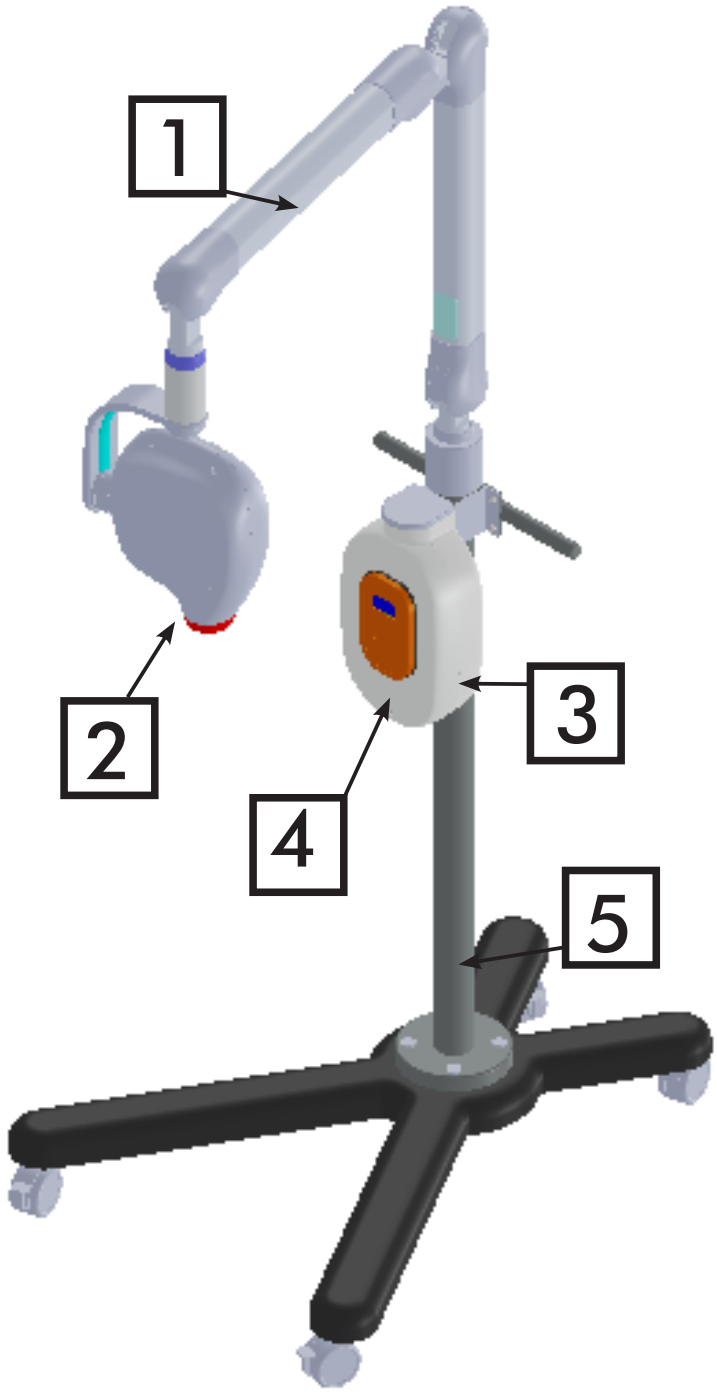
2.3. Labels on Product

- Refer to User Manual for the list and location of each label used on the equipment.

3 Product Overview

3.1 Intraskan DC Floor Mount System Components

Item	Description
1	Scissor Arm Assembly (includes cables)
2	Tube head Assembly
3	Base Unit Assembly
4	Control Console
5	Base Stand Assembly



Intraskan DC Floor mount Supplied System Components

CAUTION

Do not cut cable tie securing the scissor arm with attached tube head unless the scissor arm is securely installed to the X-ray floor stand. Always make sure to hold both arms of the assembly simultaneously while lifting or moving the scissor arm.

4 Pre-installation Requirements

4.1 Tools and Consumable Material

- Table 4-1 lists the contents of the tool kit supplied with each unit. Table 4-2 provides a consolidated list of the tools and consumable material not supplied, which are typically required for executing the installation and service procedures provided by this manual.

Table 4-1 Useful Tools and Consumables

Tools

- ❑ Long nose Plies w/Cutter
- ❑ L-type Allen key Set(in mm)
- ❑ Hook Wire for pulling wire
- ❑ Tweezers
- ❑ Soldering Iron
- ❑ ESD Wrist Wrap
- ❑ Screwdriver set
- ❑ Jeweler's Screwdriver set
- ❑ Measuring Tape
- ❑ Digital Multi-meter

Consumable Material

- ❑ Grease & Waste Cotton
- ❑ Cable Ties & Mounts (if required)
- ❑ Lead Cap for Blocking Cone
- ❑ Insulation Tape (if required for Trouble shooting)
- ❑ Solder (Lead) (if required for Trouble shooting)
- ❑ Disposable Gloves (for applying grease)

4.2 Installation/Service/Maintenance Reporting Form

- Every Equipment Installation/Service/Maintenance should be reported in the respective forms and checklists as annexed at the end of this manual. Additionally it is mandatory to report every installation by filling the Form FDA 2579 May 2010 and submitting it to:
- FDA “Electronic Product Reports, Radiological Health Document Control (HFZ-309), Office of Communication, Education, and Radiation Programs, 9200 Corporate Blvd., Rockville, MD 20850,” or Any e-Submission as per FDA Guidelines.

4.3 Site Preparation

4.3.1 Site Survey

- Make sure that the location allows the Dental X-ray Unit to be used with ease for all possible imaging procedures on the patient with respect to the patient chair location.
- Make sure the location allows sufficient space for movement of the arms in the extended condition.

4.3.2 Site Environment Requirements

- The unit is designed for indoor usage.
- It should not be subjected to direct sunlight for expanded duration.
- Place it away from sources of liquid ingress.
- If The X-ray unit is stored below 10° C, time must be provided for X-ray unit to reach room temperature (keeping in room temperature) before connecting it to the mains voltage.

4.3.3 Electrical Outlets & Requirements

- The mains outlet should have a good Ground connection. Grounding of the system must be checked before connecting the Intraskan DC.
- Additional wiring required for the site must done by a qualified electrician. All wiring should conform to requirements provided by the User manual.
- The mains outlet should be capable of supplying 16A (110V) of current. It shall have fuse protection or provided with a circuit breaker of 16A (110V).
- It is recommended to have an ELCB (Earth Leakage Circuit Breaker) for protection against earth leakage.

The scissor arm with tube head attached is shipped tied close. Do not remove the locking system holding the scissor arm in folded position until directed during installation. Always make sure to hold both arms of the assembly simultaneously while lifting or moving the Scissor Arm.

4.4 Electrical Power Requirements

- The system requires a three-wire power supply. The three-wires provide two power lines (L) Line and (N) Neutral and a Ground.

Line Voltage	120 VAC +/- 10%	Exposure Current	8 Amp
Standby Current	0.5 Amp Max.	Main Fuse Rating	10 Amp

5 Installation:

This section provides the instructions necessary to install the Intraskan DC Floorstand unit. Install the Intraskan DC by performing the tasks summarized below and provided by the following pages.

- Install the Base stand.
- Install the Scissor Arm attached with Tube Head on the base stand.
- Install the base unit.
- Perform operational check procedures to make sure the Intraskan DC operates properly after installation.

5.1 Installation of Base stand:

- Open the bigger box and remove the top level foams. Lift the base casting holding at corners and place it on the floor as shown in Figure 1 and Figure 2. Lock the wheels.
- Remove 4 M10X30 Hex Socket Head Cap Screws along with M10 Spring washers fixed on the base casting using 8MM Allen key as shown in Figure 2 and keep them aside. Align the rubber gasket such that all the four holes are accessible.

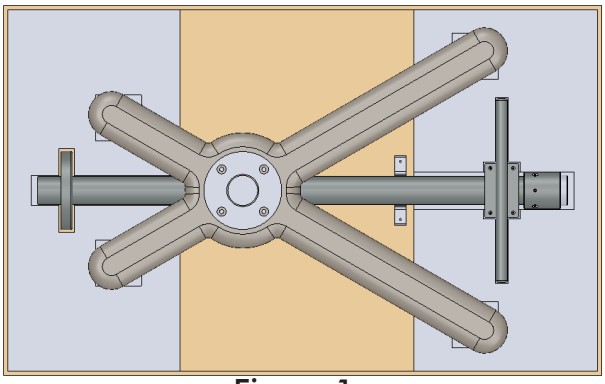


Figure 1

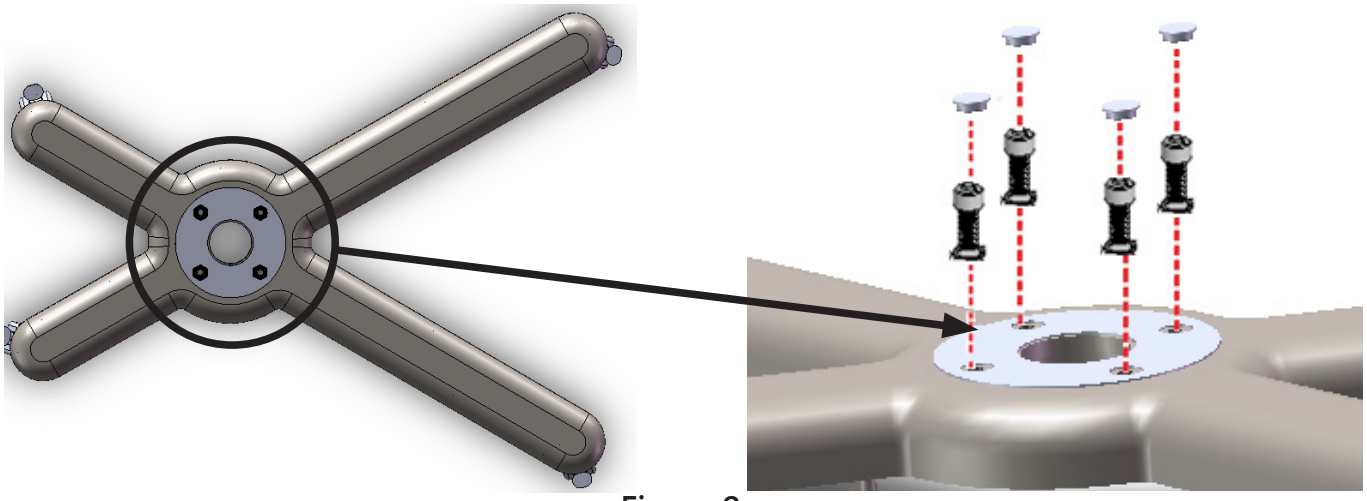


Figure 2

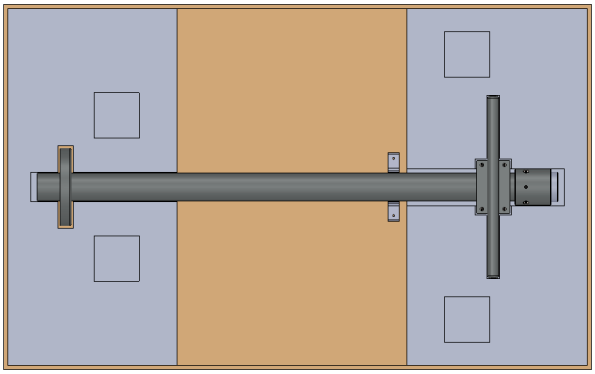


Figure 3

- Take base column from the packing box and remove all the four rubber caps available on the holes as shown in Figure 3.

- Fix the base column on the base casting so that hole for cable routing on the base column should be aligned to the front side of the base casting as shown in Figure 4.
- Fix 4 M10x30 Hex Socket Head Cap screws along with M10 Spring washers using 8mm allen key and fix back 4 rubber caps at the screw locations as shown in Figure 4.

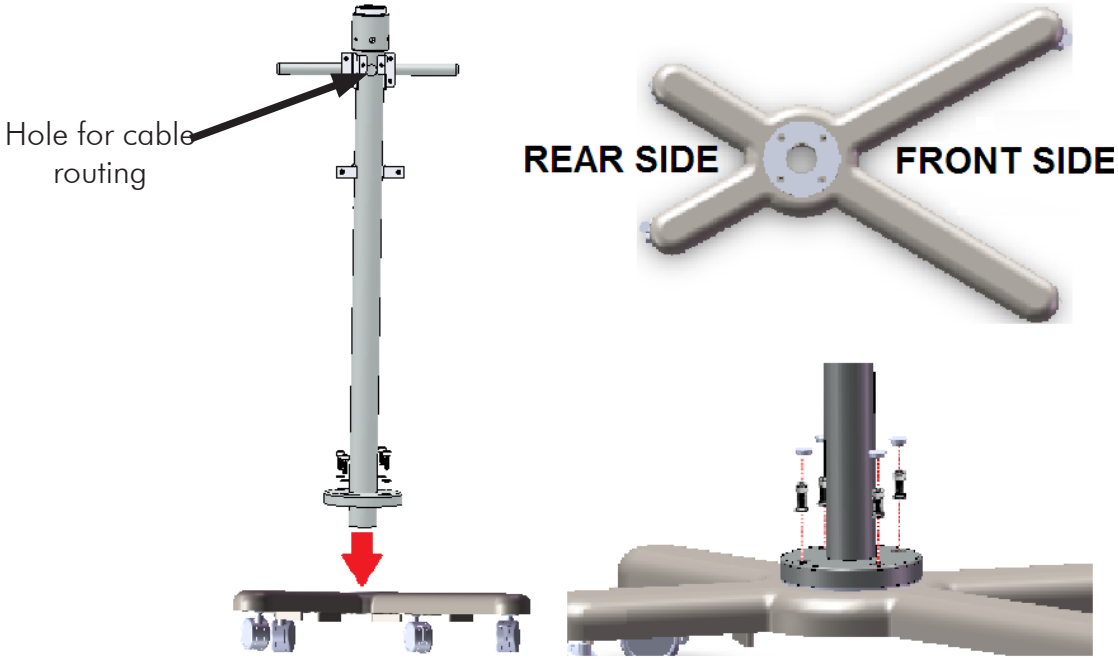


Figure 4

5.2 Installation of the Scissor-Arm:

- Open the smaller packing box. Lift the scissor-arm and bring it near the base stand as shown in Figure 5.

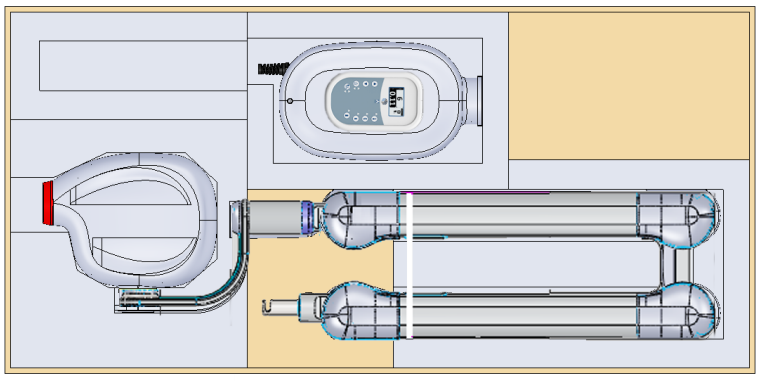


Figure 5

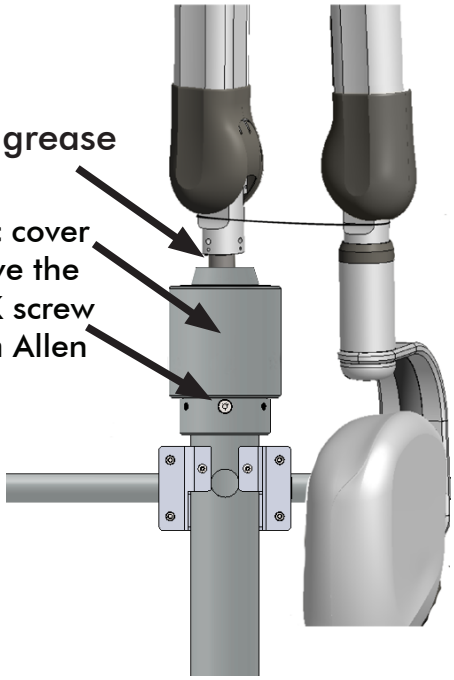


Figure 6

- Lift asthetic cover and remove the M6x30 CSK screw using 4mm Allen key as shown in Figure 6.
- Apply thin layer of Grease to the Scissor-Arm guide rod and inner area of base stand as shown in Figure 6.
- Insert the scissor-arm cables into top hole of the base stand and simultaneously pull out from the front hole of the base stand as shown in Figure 6 (If required use the guide wire).

- Fix the scissor-arm attached with tube head on the base stand without damaging the cables as shown in Figure 7. Remove the locking system of the scissor-arm and open the scissor-arm.

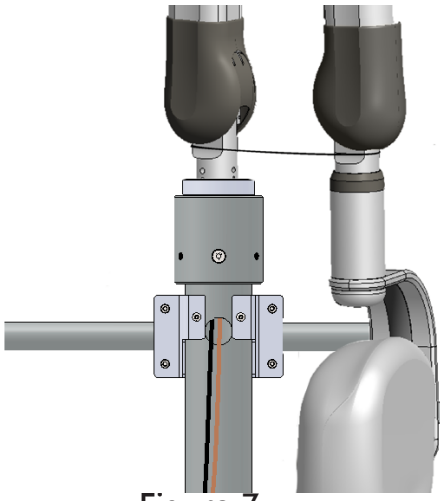


Figure 7

5.3 Installation of the Base unit:

- Remove two M4x16 Hex. Socket head cap screws from the base column using 3 mm allen key as shown in Figure 8 and keep them aside.
- Take the base unit from the packing box and keep it on the cushioned surface. Remove the 2 M4X16 Hex Socket head cap screws from the rear side of the base unit using 2.5mm allen key as shown in Figure 9 and keep the screws aside and put back the console assembly in the slot.

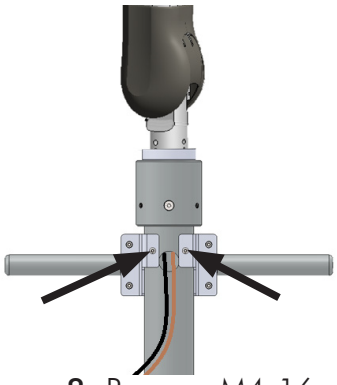


Figure 8: Remove M4x16 screws

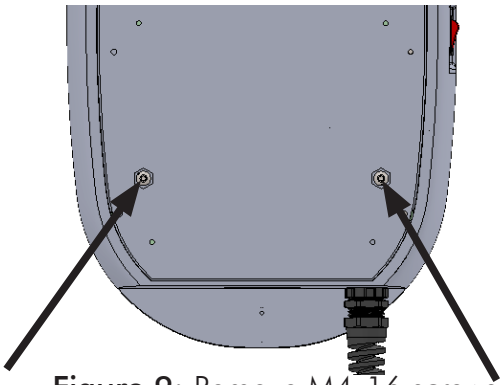


Figure 9: Remove M4x16 screws

- Lift the top cap of the base unit and remove two M3x6 HSHC screws along with M3 washers using 2.5mm Allen key as shown in Figure 10.
- Remove the rubber plug and screw(M3x25 self tapping screw) located at buttom side of the base unit using phillips screw driver as shown in Figure 10.

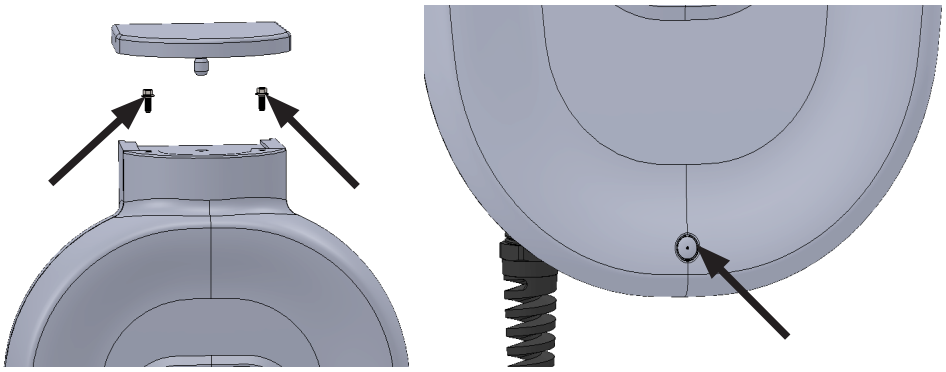


Figure 10: Remove 2 M3x6 screws using 2.5mm allen key and M3x25 screw using phillips screw driver

- Lift the front cover and dis-connect the console cable from the J4 connector located at the bottom side of the base unit as shown in Figure 11. Keep the base unit cover along with console assembly aside.

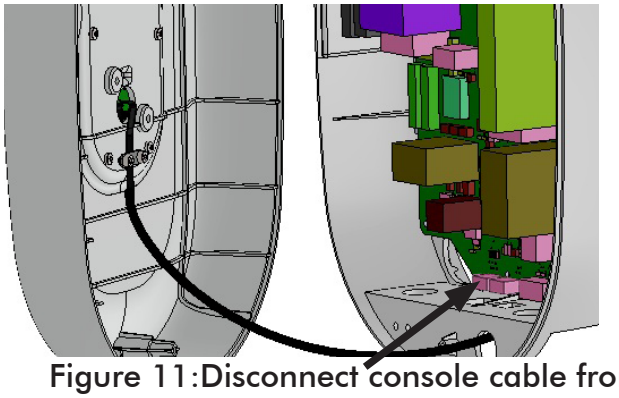


Figure 11:Disconnect console cable from J4 connector.

- Bring the base unit assembly near the base stand and route the wires through the hole located on the top side as shown in Figure 12.
- Fix the base unit plate to the base column with 4 M4X16 Hex Socket head cap screws with plane washer & spring washer(2 on front side and 2 on rear side of base unit) using 3 mm allen key as shown in Figure 13.

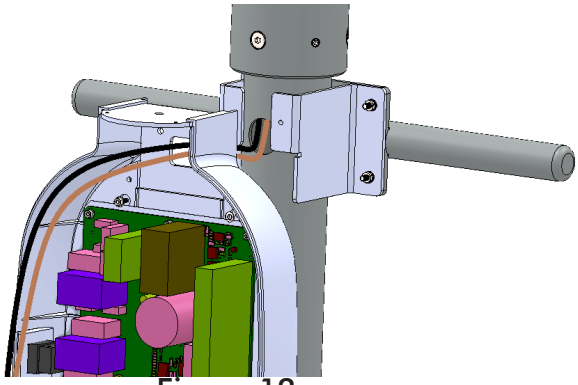


Figure 12

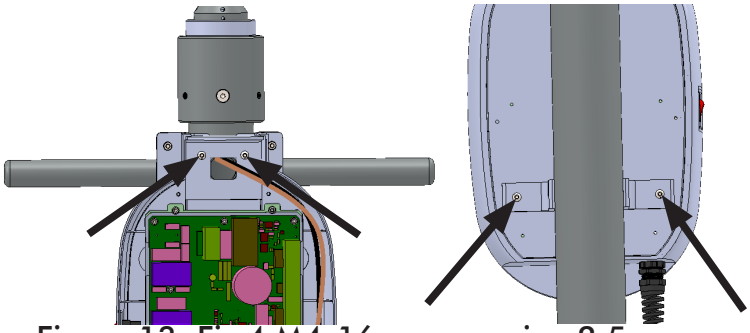


Figure 13: Fix 4 M4x16 screws using 2.5mm Allen key

- Route the wires through the right side of the power board.
- Connect the Communication cable to the J2 connector on the power board as shown in Figure 14 and fix the inverter cable(2 pin terminal) to J1 connector using jewel screw driver(Non-polarized) as shown in Figure 14. Using a 2.5mm allen key connect the GND wires of both the communication & INV Power cables in the Base Unit to the Power Board by fixing M3X6 Hex socket head cap screws at the location shown in Figure 14.

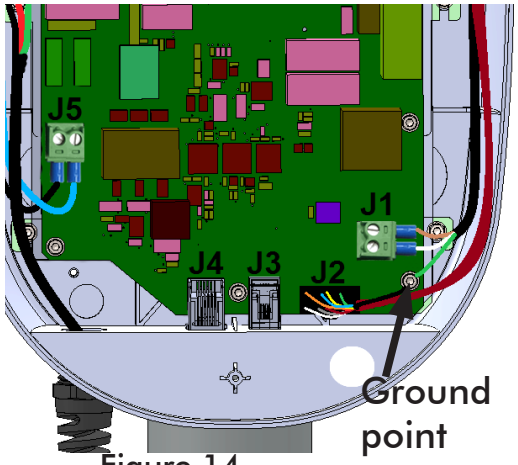


Figure 14

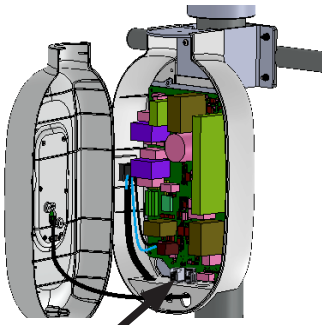


Figure 15:Connect cable to J4 connector .

- Tie the cables using cables ties on the cable mounts located at the right inner side the base unit rear cover. Route the console cable through the hole and connect the cable to the J4 connector from the bottom side of the base unit as shown in Figure 15.

- Fix the base unit front cover by fixing two M3x6 HSHC screws along with M3 washers on top using 2.5mm Allen key and M3x25 self tapping screw on front bottom side using phillips screw driver as shown in Figure 16. Fix the rubber cap on top and rubber plug at bottom screw location.

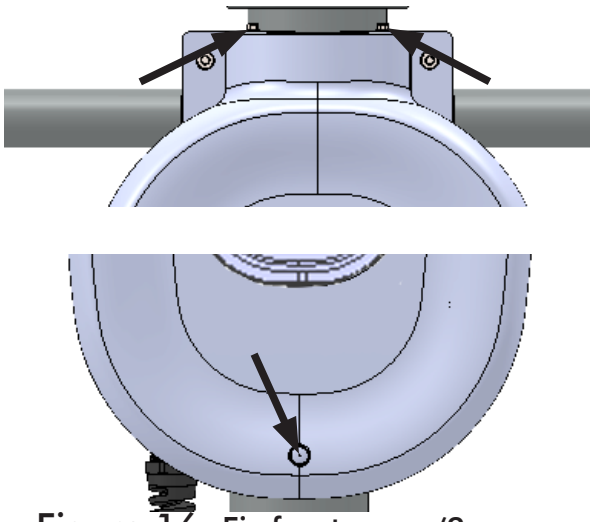


Figure 16: Fix front cover (2 screws on top & 1 screw on bottom)

Figure 17: Connect the exposure switch cable.

- Connect the exposure switch cable to the J3 connector of power board from the bottom side of the base unit as shown in Figure 17.

5.4 Scissor-Arm Operation Check:

Move the Scissor arm and ensure there is no drift as per steps given below.

- Keep the Vertical Arm in vertical position vertical and horizontal arm in horizontal position.
- Move the horizontal arm down (folding movement) in small jerk free incremental steps of approx 10°.
- At each step as above, leave the scissor arm and ensure that there is no drift movement. Continue till the horizontal arm reaches vertical position.
- Keep the Vertical Arm vertical and horizontal arm horizontal position.
- Pull the L Arm in small jerk free incremental steps of approx 10° such that the horizontal arm stays horizontal always and the Vertical arm moves down.
- At each step as above, leave the scissor arm and ensure that there is no drift movement. Continue till the maximum expanded position of the scissor arm is reached.
- Keep the Scissor arm in folded position.

5.5 Other Checks:

- Ensure that the Scissor-arm rotation above the base column 35°-40° approximately on either side of the center axis of the Base Unit.
- Ensure that the Tube head rotation about the axis is approximately 300°-310°.
- Ensure that the L arm rotation angle is approximately 520°-540°.

5.6 Ground Connection Check:

(**Note**: Ground point of the Wall Outlet should be considered instead of Power Plug Earth pin in the following procedure).

Using a DMM, check the continuity between the following points:-

Between Power Plug Earth pin and Tube Head inner Cone metal part as shown in Figure 18.

Between Power Plug Earth pin and Scissor Arm Guide rod as shown in Figure 18.

Between Power Plug Earth pin and Base Unit Mounting plate as shown in Figure 18.

If any of the check fails then check the Ground connections inside Base Unit & Tube Head for Cable fault.

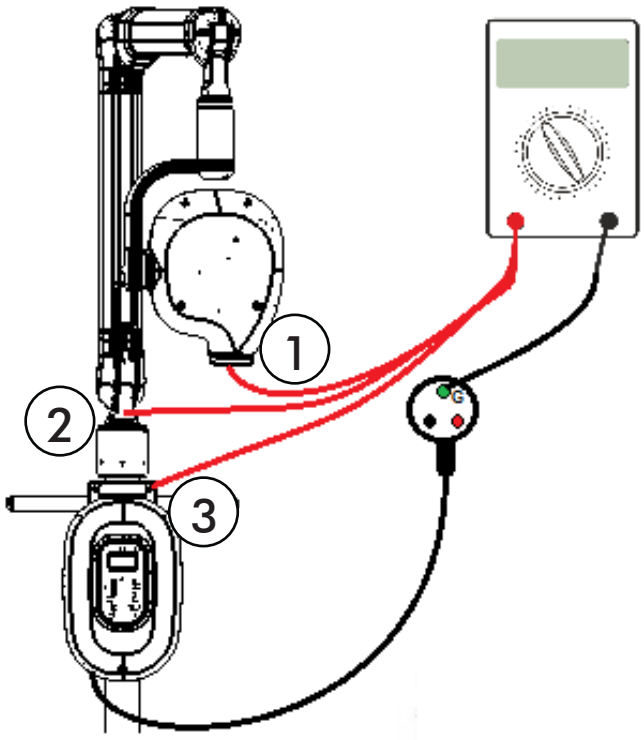


Figure 18: Ground connection check.

5.7 Power On Check:

For new Installation, if installation date is > 6 months of manufacturing date of Tube Head, carry out 5.8 X-Ray Tube Seasoning procedure before proceeding. Keep the Power switch of the Unit in OFF position. Connect the Input Power Chord of the Unit to the wall Electrical Outlet. Switch On the power in the base unit and using Console give following exposures.

70kV/8mA, 2 Sec Exposure 2 Times

55kV/4mA 40 ms Exposure 2 Times

If no errors are reported, then the Unit is ready to use.

5.8 X-Ray Tube Seasoning

In case of non-usage for long period (>6 months) X Ray Tube Seasoning is recommended. Cover the Cone with Lead Cap. Using the Control Console set the parameters as per Table below . Give Exposure and repeat exposure 5 times for each combination of kV, mA and ms. After all the exposures are completed, the Unit is ready for use.

Tube Seasoning Protocol					
kV	mA	Time (ms)	kV	mA	Time (ms)
55	4	40	60	4	500
55	6	40	60	6	500
55	8	40	60	8	500
55	4	500	70	4	40
55	6	500	70	6	40
55	8	500	70	8	40
60	4	40	70	4	500
60	6	40	70	6	500
60	8	40	70	8	500

Note: For changing kV follow the steps given below:

Restart the unit and while starting press the UP/Increment and DOWN/Decrement Keys simultaneously within 2 seconds after the logo appears which changes the screen to "CONFIGURATION MENU" screen.

Press DOWN/Decrement button till "**Select kV**" option gets highlighted and press "**S/mA**" button kV change display.

Change kV to desired value and press "**S/mA**" which saves the value and returns to "**Configuration Menu**" screen. Press "Down/Decrement" button till Continue option gets highlighted and press "S/mA" which returns to Home screen.

Follow the above steps for changing kV every time.

5.9 Mechanical Adjustments

Before starting any mechanical adjustments ensure the power to the Unit is switched OFF.

Adjustment of Spring Tension of Scissor Arm:

Remove rectangular caps from the spring adjusting windows of the Scissor Arm as shown in Figure 19 .

Step 1:- Keep vertical arm in vertical position and the horizontal arm in horizontal position as shown in the in Figure 20(illustration 2). The scissor arm should not droop from its position. If it droops, tighten the horizontal arm spring using screwdriver through the spring adjustment window (by tightening the slotted nut as shown in Figure 19).

Note: If over tightened, the effort required to move the horizontal arm is high in which case loosening may be required.

Step 2:- Keep the scissor arm with both arms vertical (folded position) as shown in the Figure 20(illustration 1). The Scissor Arm should stay in its locked position without moving or drifting. If unstable, replace the Scissor Arm.

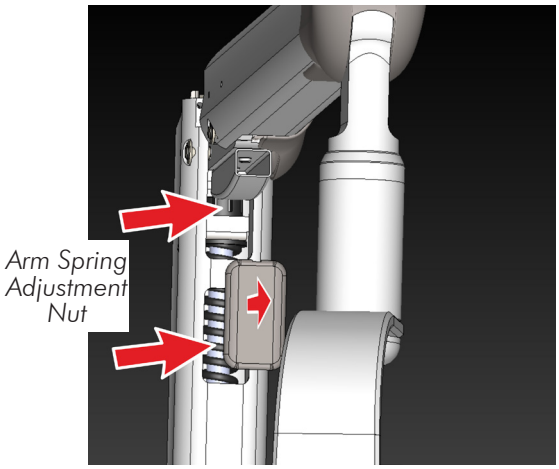


Figure 19

Step 3:-

Keep the vertical arm in horizontal position and horizontal arm in vertical position as shown in the Figure 20 (illustration 3). Both the arms should stay in position without moving. In this position the horizontal arm is in locked position and no adjustments are required for the horizontal arm. If the vertical arm is unstable adjust the vertical arm spring by loosening (by loosening the slotted nut) using screwdriver through the spring adjustment window as shown in Figure 19.

Movement Check -1:

Move the scissor arm very slowly in small increments from step 3 to step 2 position as above and then move back similarly from step 2 to step 3 position in small increments. The scissor arm should stay stable without drooping at all positions.

If it droops, tighten the vertical arm spring using screwdriver through the spring adjustment window (by tightening the slotted nut). Once it reaches Step 3 position, if the Vertical arm moves up (unstable) then adjust the vertical arm spring by loosening (by loosening the slotted nut) using screwdriver through the spring adjustment window as shown in Figure 19. Repeat the "Movement Check-1" procedure to reconfirm or fine tune adjustments.

Movement Check -2:

Move the scissor arm very slowly in small increments from step 3 to fully expanded position. The scissor arm should stay stable at all positions. If unstable, scissor Arm need to be replaced.

Movement Check -3:

Move the vertical arm from 0° to 90° stopping at every 10° increment approximately. For every position move the horizontal arm from one extreme end to another extreme end stopping at every 10° increment. At each position the scissor arm should be stable. If unstable, Scissor Arm need to be replaced. Fix the 2 rectangular scissor-arm caps to the spring adjusting windows of the scissor arm.

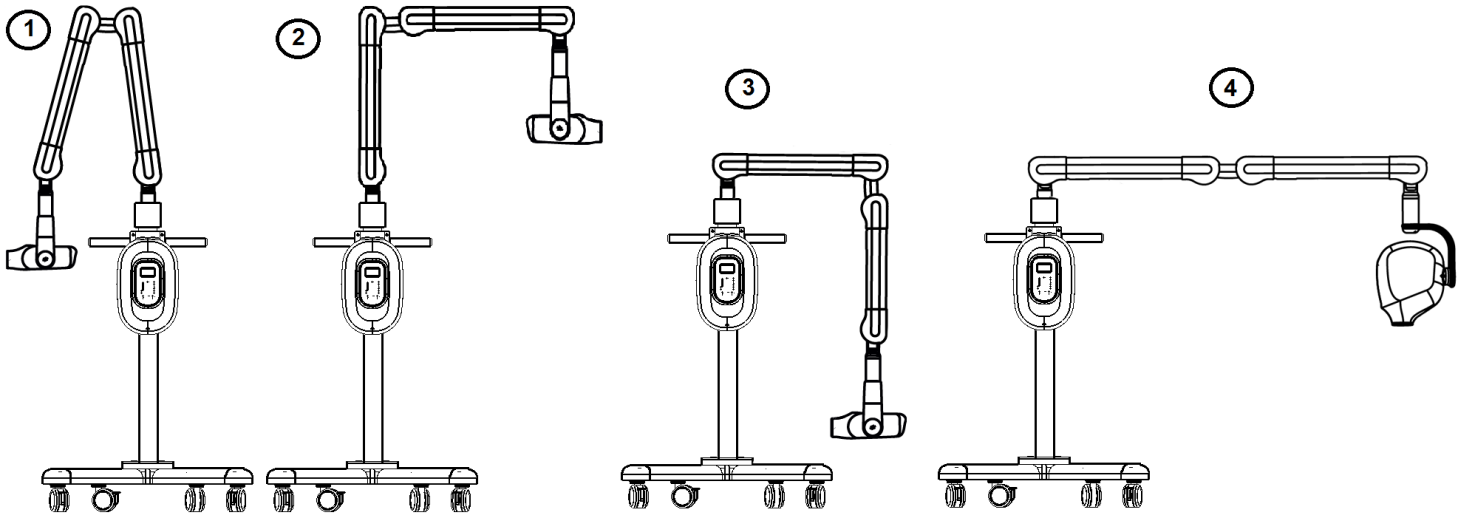


Figure 20: Scissor Arm movement check

6 Console Interface

6.1 Console as a Tool

The control console of Intraskan DC stores information about the exposures delivered using it and the errors it encountered in the process. Hence it may be used as a black box for evaluating the performance of the unit or track down certain faults.

6.2 Direct Access

The console may be used directly to display a list of 40 most recent exposures. This list contains the selected kV, mA and ms parameters.

6.3 Event Log

Event log is available in console in two formats. One is event summary which lists down the number of times each event has occurred. The other is the list of individual events with the most recent one on top. Console saves details of 408 most recent error events. Each error is detailed with an Event Type, Event Code and additional Flags as described in the tables below. The flag is hexadecimal bit-mask string and may be used to check for any other errors that occurred along with the reported error.

Table 1: Event Type CAN

Table 2: CAN Event flag bit-mask

Table 3: Event type Keyboard

Table 4: Keyboard event flag bit mask

Table 6-1: Event Type CAN

Event Code	Description
1	Communication error
2	Console & Tube head incompatible
3	Prep time out
4	Anode Arc Fault
5	Cathode Arc Fault
6	Over kV Fault
7	Over mA Fault
8	kV Regulation Fault
9	Filament Open Fault
10	Filament Limit Fault
11	CAN Fault

Table 6-2: CAN Event flag bit-mask

Bit Position	Description
0	Filament limit fault
1	Filament open fault
2	Anode arc fault
3	Over mA fault
4	Over kV fault
5	Cathode arc fault
6	kV regulation fault
7	Tube temperature warning
8	Tube temperature fault
9	Ambient temperature fault
10	CAN fault
11	kV fail fault
12	mA regulation warning
13	Anode over mA fault
14	Anode over kV fault
15~28	<unused>
29	One or more of the errors are resettable
30	One or more of the errors were fatal external errors.
31	One or more of the errors were fatal internal errors.

Table 6-3: Event type Keyboard

Event Code	Description
1	Key stuck error

Table 6-4: Keyboard event flag bitmask

Bit Position	Description
0	Exposure key stuck
1~12	<unused>
13	Set / Select / Mode key stuck
14	Bitewing / Age / Up key stuck
15	Occlusal / Molar / Canine key stuck

7 Trouble shooting Techniques

7.1 Errors and Warnings

When in a fault state, the unit would display an error message with a corresponding error code as defined here.

Table 7-1: Error Codes

ERROR CODE	ERROR
CN001	Communication Error
CN002	Console & Tube head incompatible
CN003	X Ray Preparation (Prep) time out
CN004	Anode Arc Fault
CN005	Cathode Arc Fault
CN006	Over kV Fault
CN007	Over mA Fault
CN008	kV Regulation Fault
CN009	Filament Open Fault
CN010	Filament Limit Fault
CN011	CAN Fault
KB001	Key Jam Error

General Note: Power Recycling:-After switching OFF the Unit wait at least for 5 min before restarting the Power.

Table 7-2: TROUBLE SHOOTING CHART (ELECTRICAL)

	OBSERVED PROBLEM	RECOMMENDED ACTION
1.	Error state with display indicating CN001	**Communication Error:** Replace the Console
2.	Error state with display indicating CN002	**Console & Tube head incompatible:** Recycle the power. Retry to give exposures. If the problem persists, replace the Console first & if problem still persists then replace control boards. If the Control board is replaced the Tube head has to undergo re-calibration as mentioned in "9.2 Tube Head Re-Calibration."
3.	Error state with display indicating CN003	**Prep Time out:** Recycle the power. Retry to give the Exposure. If the problem Exists Replace the Control board and if still problem persists, then replace Power Board. **Note:** If the Control board is replaced the Tube head has to undergo re-calibration as mentioned in 9.2 Tube Head Re-Calibration.
4.	Error state with display indicating CN004	**Anode Arc Fault:** Recycle the power. Retry to give the Exposure. If the problem persists, replace the tube Head.
5.	Error state with display indicating CN005	**Cathode Arc Fault:** Recycle the power. Retry to give the Exposure. If the problem persists, replace the tube Head.
6.	Error state with display indicating CN006	**Over kV fault:** Recycle the power, retry to give the exposure. If the problem persists, check the communication cable & replace (try with external spare cable), if problem persists then replace the Control board. If problem exists then replace the Tube Head. **Note:** If the Control board is replaced the Tube head has to undergo re-calibration.
7.	Error state with display indicating CN007	**Over mA fault:** Recycle the power, retry to give the exposure. If the problem persists, calibrate the tube head. If the problem Still persists, replace Tube head.

8.	Error state with display indicating CN008	**kV Regulation Fault:** Recycle the power. Retry to give the exposure. If the problem persists, check the continuity of the INV-power cable & replace (try with external spare cable), if problem persists then replace the Power board in the Base unit.
9.	Error state with display indicating CN009	**Filament Open Fault:** Recycle the power. Retry to give the exposure, If the problem persists, calibrate the tube head. If the problem still persists, replace tube head.
10.	Error state with display indicating CN010	**Filament Limit Fault:** Recycle the power. Retry to give the exposure. If the problem persists, calibrate the tube head. If the problem still persists, replace tube head.
11.	Error state with display indicating CN011	**CAN Fault:** Recycle the power. Clean the contacts of the Console connector Spiral chord. Retry to give exposure. If the problem persists, replace the console. If problem persists, then check communication Cable continuity (try with external spare cable) and if still not resolved at the end replace Control Board. **Note:** Once the Control board is replaced the Tube head has to undergo re-calibration.
12.	Error state with display indicating KB001	Ensure that none of the console keys depressed accidentally. Recycle the Power. If the problem persists replace the console.
13.	The unit does not power on when mains is switched on.	Remove the Base Unit Top cover. Check if neon pilot lamp is ON in the power board. If not, there may be a loose contact at the wall socket end or the wall outlet is not receiving power. Check local electrical circuit for trips. If neon lamp is ON then check the following. Ensure that the spiral cable connection to the base Unit is proper. Recycle the power. If problem persists then replace the Console. If the problem still persists replace the power Board.
14.	No x-ray image even though the unit indicates normal exposure	Ensure that there is no Error in the Console. If OK then check the Image receptor used.

Table 7-3: TROUBLE SHOOTING CHART (MECHANICAL)

	OBSERVED PROBLEM	RECOMMENDED ACTION
1.	Scissor Arm is Drifting from its released position / does not stay in set position	Adjust the spring tension as described in Section "5.9 Mechanical Adjustments". If still the drift problem exists then replace the Scissor arm.
2.	Scissor Arm Movement is Tight	Replace the Scissor Arm.
3.	Noise during Scissor arm movement	Remove the rectangular caps of the Scissor Arm at both ends and apply grease to the springs. If still problem persists then replace the scissor Arm.
4.	Straight-Arm Movement is tight	Remove the Straight-Arm and put back after applying grease to all rotating parts. If still problem persists then replace the defective part.
5.	Tube Head movement is loose	Remove the cap on the Tube Head L- Arm and check the screw tightening. You can try to slightly tighten the screw in case they are loose. Later put back the cap. If the problem still exists then replace the Scissor Arm.
6.	Plastic or Rubber Parts damaged	Replace the damaged parts as per the FRU (Field Replacement Units) list.
7.	Oil leaking from the Tube Head	Replace the Tube Head.

8 Service Procedure

8.1 Replacement Guide

Table 8-1: Replacement Parts list

Part Failed	Part to be replaced
If the Scissor Arm or parts of Scissor arm including L- Arm fails/is damaged	Scissor Arm
Anything fails inside the Tank	Tube Head
If the control Board inside the Tube Head fails	Control Board
If the Tube Head Cover is damaged	Tube Head Covers
If the Power Board fails	Power Board
If the Base Unit Cover is damaged	Base Unit Cover
If exposure Switch with Cable is damaged	Exposure switch with cable
If the Scissor Arm cables fails/damaged	Scissor Arm cable harness
If the Console Board/ Key Pad/cable/cover fails	Entire Console assembly
If the Plastic Caps for Scissor Arm is damaged	Plastic Caps for Scissor Arm
If input switch fails	Input Switch
If console extension cable fails	Console extension cable

8.2 Replacing the Scissor-Arm:

8.2.1 Removing the old Scissor-Arm:

8.2.1.1 Power Off:

Before starting this procedure, ensure Power to the Unit is OFF, and Console Display is OFF. During the disassembly procedure collect & keep all removed hardware and small parts in a separate clean container as it is required for reassembly.

8.2.1.2 Tube Head Cover Removal:

- Remove the “extension cone” from the tube head (if used).
- Remove the “rubber fixing ring” on the tube head as shown in the Figure 21.
- Push the “rubber dial ring” out of the slot as shown in the Figure 22.
- On the bottom side of the Tube head remove the rubber plugs at 4 locations where the screws are fixed on the Tube Head and remove the 2 M3X6 Hex. Soc. button head screws as shown in Figure 23 using 2 mm allen Key.

Figure 21

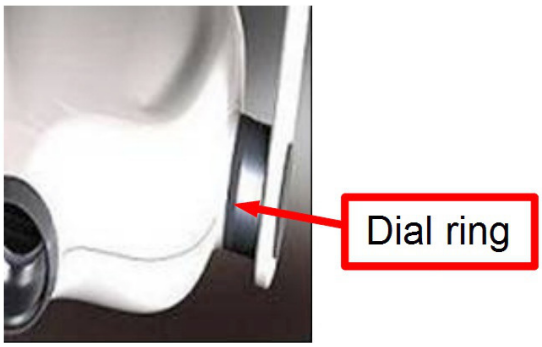


Figure 22

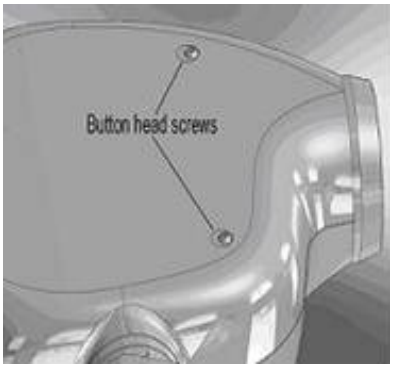


Figure 23

- Remove the 2 M3X16 self tapping pan head screws using phillips screw driver and remove the bottom cover as shown in the Figure 24.
- Remove the 4 M3X16 self tapping pan head screws with M3 plain washers using phillips screw driver as shown in the Figure 25 and remove the top cover from the Tube Head.

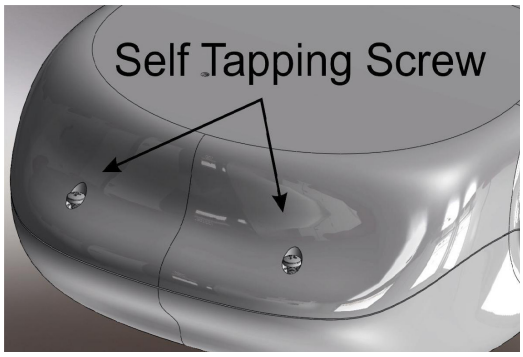


Figure 24

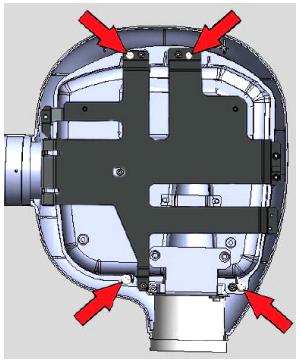


Figure 25

8.2.1.3 Base Unit Cover removal:

- On the Base Unit assembly, remove the rubber plug at the Bottom screw location and then remove the M3X25 self tapping pan head screw using phillips screw driver as shown in Figure 26.
- Lift the rubber cap on the top and remove the 2 M3X6 Hex. socket Head cap screws with M3 plain washers on top using 2.5 MM allen key as shown in the Figure 27.
- Lift the base unit front cover slowly and disconnect the Console cable from J5 connector of Console extension board-internal located on the power board as shown in Figure 28.

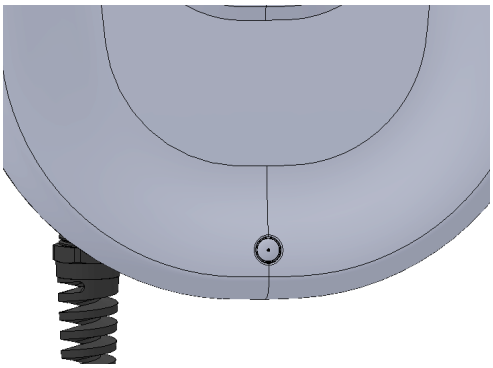


Figure 26

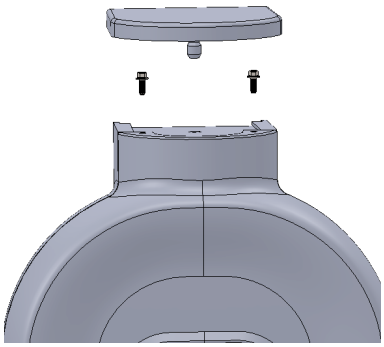


Figure 27

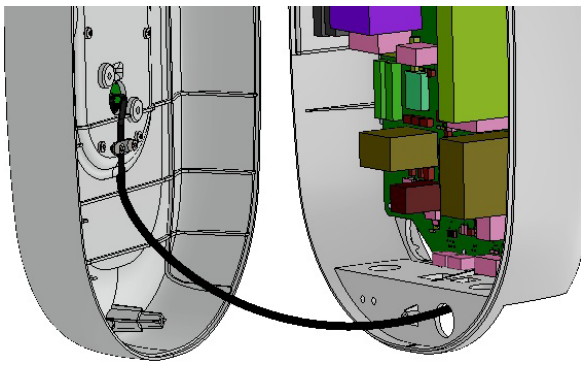


Figure 28

8.2.1.4 Scissor-arm cables disconnecting

- Cut the 2 cable ties used to hold the cables on the right inner side of the Base Unit using cutter.
- Disconnect the communication cable connector (Pressing the lock) from J2 connector of the power board as shown in the Figure 29.
- Disconnect the INV power cable (2 wires with pin terminals) from the J1 connector (holding the connector) of the power board using Jewel screw driver as shown in Figure 29.
- Disconnect the GND ring terminals of both INV cable and communication cable by removing the M3X6 Hex. Socket head cap screw using 2.5 mm allen key from the power board at the location shown in the Figure 29.

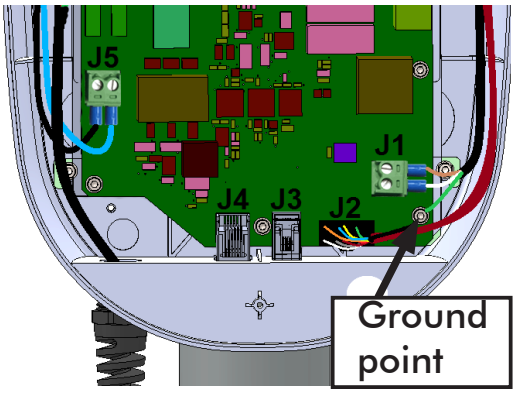


Figure 29

- Use an ESD wrist strap during HV Tank removal procedure and connect its GND connection to the HV Tank Clamp.
- On the HV Tank cut the cable ties used to hold the scissor arm cables using cutter.
- Press the connector locking tab and pull the cable connector (communication cable) connected to J4 connector of the control board as shown in the Figure 30.
- Disconnect the INV power cable from the sealing board 3 pin connector -pins 1 & 3 as shown in the Figure 30 (hold the connector firmly by hand while removing) using Jewel screw driver.
- Remove the screws used for GND wire connections for both cables at 3 corners of the Control board using 2.5MM allen key as shown in Figure 30 and put back the screws in its location.
- Now the communication and INV power cables are disconnected from the HV Tank.

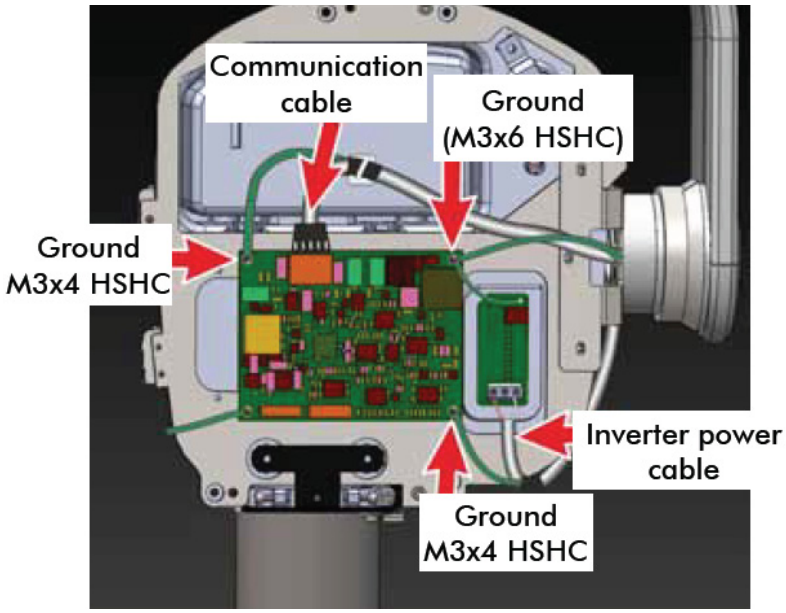


Figure 30

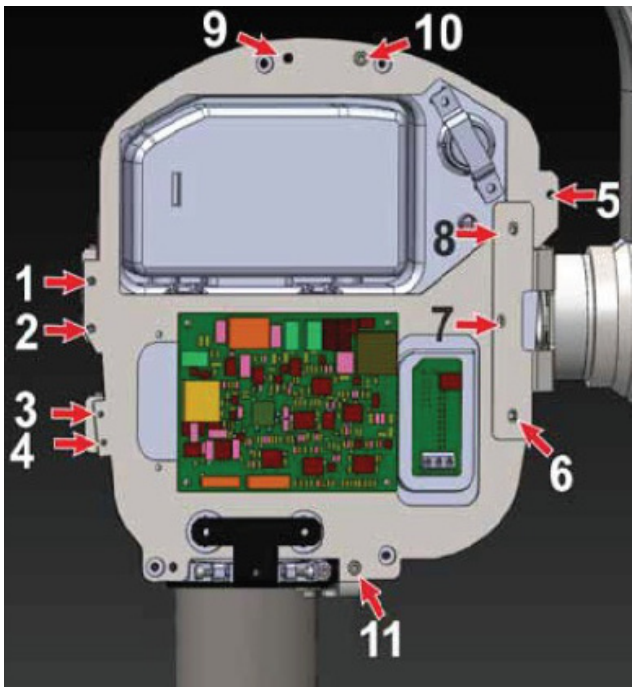


Figure 31

8.2.1.5 HV Tank removal

- To remove the HV Tank from the clamp, remove the 5 (M3X6 Hex. socket button head) screws (from 1 to 5 as shown in Figure 31) using 2 mm allen key.
- Remove 3 (M3X6 Hex. Soc. Head cap) Screws (From 6 to 8 as shown in Figure 31) on the top of the clamp near Tube head arm using 2.5 mm allen key.
- Remove 3 (M3X14 Hex Soc. head cap) screws (from 9 to 11 as shown in Figure 31) along with M3 plain washers & M3 nut using 2.5 mm allen key and 5.5mm Nut driver.
- Keep the Tank in a clean place.

8.2.1.6 Base unit plate removal

- Remove the Base Unit plate from the Base Column by removing the 2 M4x16 Hex socket head cap screws along with spring washers and plain washers (Figure 32) at top inner side (using 3mm Allen key) and 2 M4x16 Hex socket head cap screws along with spring washers and plain washers behind the base unit using 3mm Allen key as shown in Figure 33. Remove the base unit plate from the base stand as shown in Figure 34 and fix back the screws in its locations.

Note: Be careful not to damage the cables while removing the Base Unit plate.

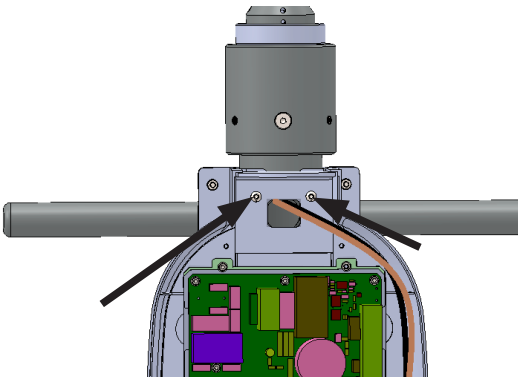


Figure 32

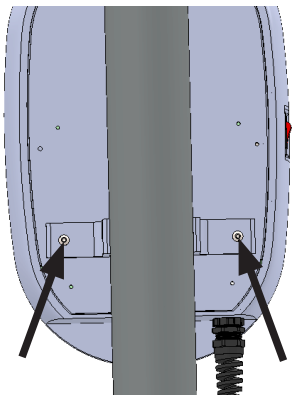


Figure 33

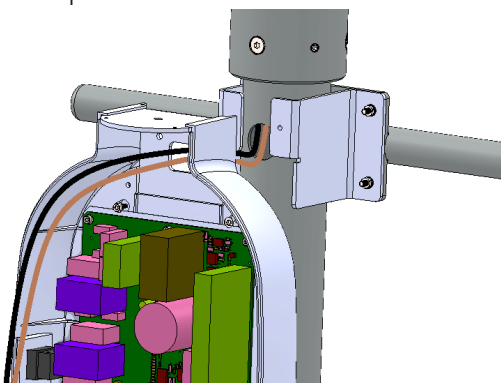


Figure 34

8.2.1.7 Final Steps before Removal

- Lock the scissor arm in folded position by tying with a long cloth & tying a knot or using a long cable tie as shown in Figure 35.
- Hold the scissor arm firmly with both hands and slowly lift it (Figure 35) simultaneously pulling the extra length of cable out of the Base Unit and base column carefully.
- Keep the Scissor arm separate on a cushioned surface.

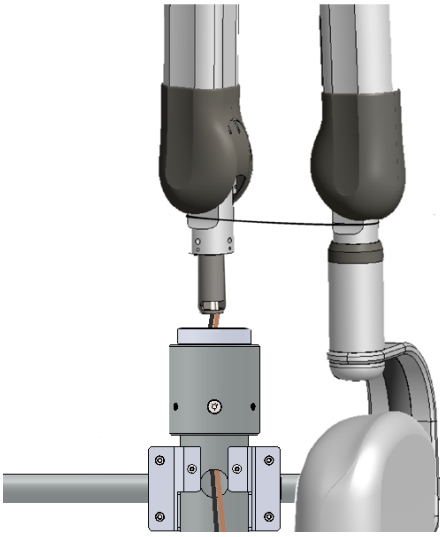


Figure 35

8.2.2 Installing the New Scissor Arm

8.2.2.1 Assembling the new Scissor arm

- Apply thin layer of Grease to the Scissor-Arm guide rod and inner area of base stand.
- Insert the scissor-arm cables into top hole of the base stand and simultaneously pull out from the front hole of the base stand as shown in Figure 35 (If required use the guide wire).
- Fix the scissor-arm attached with tube head on the base stand without damaging the cables as shown in Figure 36.
- Remove the locking system of the scissor-arm by cutting the cable ties and open the scissor-arm.

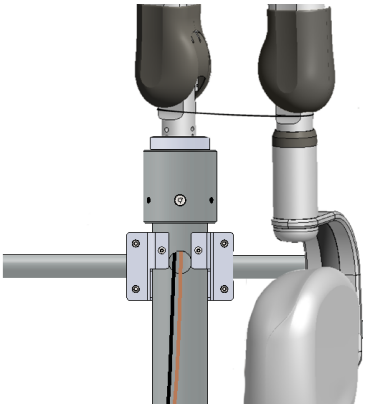


Figure 36

8.2.2.2 Fixing the base unit plate

- Take the base unit near the base column and insert the cables into base unit through the hole provided on the rear plate of base unit as shown in Figure 34 and pulling from other side.
- Fix the base unit plate to the base column with 2 M4 X 16 Hex socket head cap screws along with spring washers and plain washers using 3 mm allen key as shown in Figure 32.
- Fix the 2 M4x16 Hex socket head cap screws along with spring and plane washers using 2.5 mm allen key as shown in Figure 33.

8.2.2.3 HV Tank Assembly:

- Use an ESD wrist strap during HV Tank fixing procedure as below and connect its GND connection to the HV Tank metal clamp.
- Route the scissor-arm cables as shown in Figure 37.
- Take the HV-Tank and fix it to the clamp using the following sequence:-
- Using 2.5mm allen key & 5.5mm nut driver fix 3 Hex. Soc. head cap screws(M3X16) with M3 plain washers & M3 nuts (at the locations 9 to 11 as in Figure 38) such that the screw along with M3 plain washer should be inserted from bottom and nut along with M3 plain washer should be on the top of the H V Tank.
- Fix 5 button head screws(M3X6) using 2mm allen key(at the locations 1 to 5 as in Figure 38).
- Fix 3 Hex. Soc. Head cap screws(M3X6) on the top of the clamp near Tube head arm at the locations (6 to 8 as in Figure 38) using 2.5 mm Allen key.

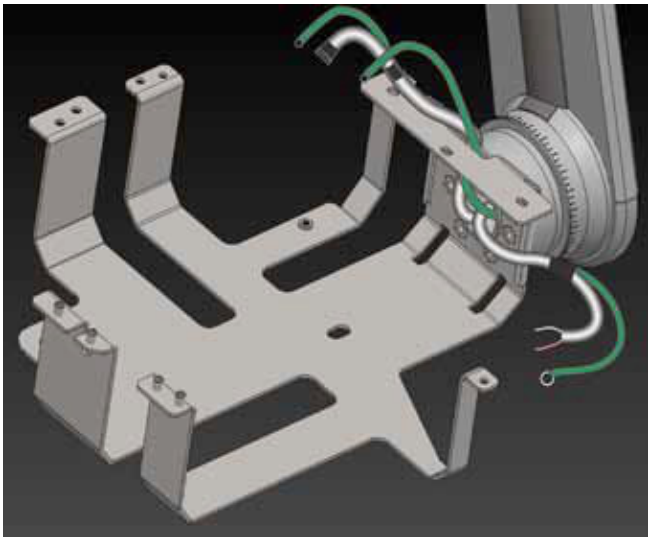


Figure 37

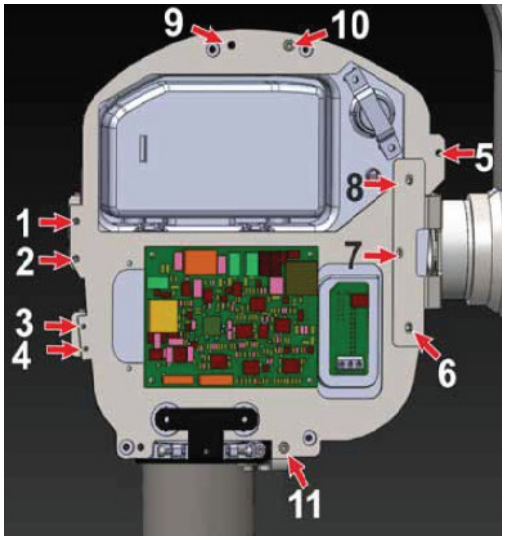


Figure 38

8.2.2.4 Scissor-arm cable connection:

- Using a 2.5mm allen key connect the GND wires(Ring terminals) of both the Communication & INV power cables in the Base Unit to the Power Board fixing screw as shown in Figure 39.
- Connect the INV power cable to J1 connector (Non-polarised) using a Jewel screwdriver (holding the connector) as shown in Figure 39.
- Connect the communication cable connector to J2 connector of the power board as shown in the Figure 39.
- Route the cables as shown in Figure 39 along the right inner side the Bas e Unit. Use new Cable ties to fix the cables on the existing cable mounts & cut the extra length of cable ties using a cable tie cutter.

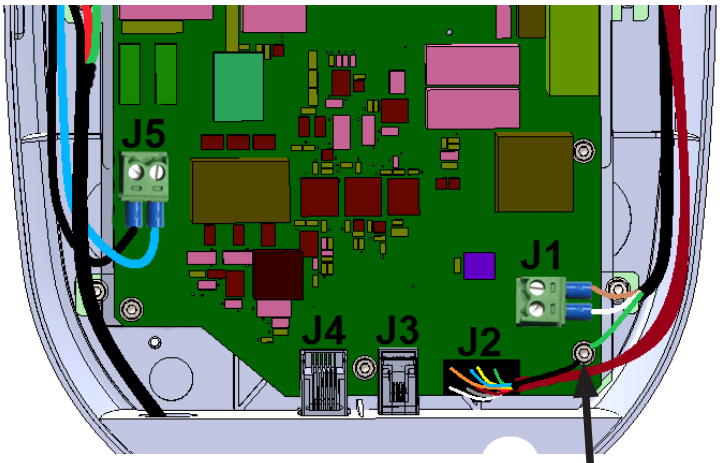


Figure 39

- Route the INV power cable as shown in the Figure 40 and connect it to the sealing board 3 pin connector (Pin 1 & 3). Hold the connector firmly while tightening the terminal screws.
- Using a 2.5mm allen key connect the GND ring terminal of the INV cable to the nearest control board fixing screw(M3x4 HSHC) as shown in the Figure 40.
- Route the communication cable and connect it to the J4 connector of the control board as shown in Figure 40.
- Using a 2.5mm allen key connect the GND ring terminal of the communication cable to the nearest control board fixing screw(M3x4 HSHC) as shown in the Figure 40.
- Fix the scissor-arm grounding cable on the control board along with sealing board grounding cable with M3X6 Hex. Socket Head cap screw using 2.5MM Allen key as shown in Figure 40.
- Using cable ties(100MM length or 50MM length is enough) ties the cables on the HV Tank. Tighten & cut the extra length of cable ties using a cable tie cutter.

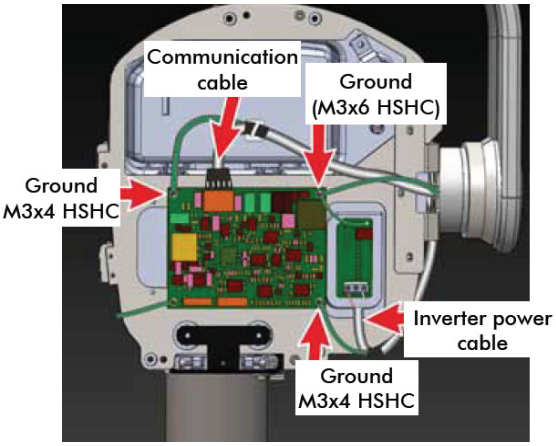


Figure 40

8.2.2.5 Tube Head Covers Fixing:

- Take the tube head top cover and fix it using 4 (M3X16 self tapping pan head) screws with 4 (M3) plane washers at the locations shown in the Figure 41 using a screw driver.
- Fix the bottom cover to the tube head assembly using 2 M3X6 hex socket button head screws using 2 mm allen key and fix 2 M3x16 self tapping pan head screws using screw driver as shown in the Figure 42. Ensure there is no gap between the covers. Put back the 4 rubber plugs at the screw locations on the Tube Head.

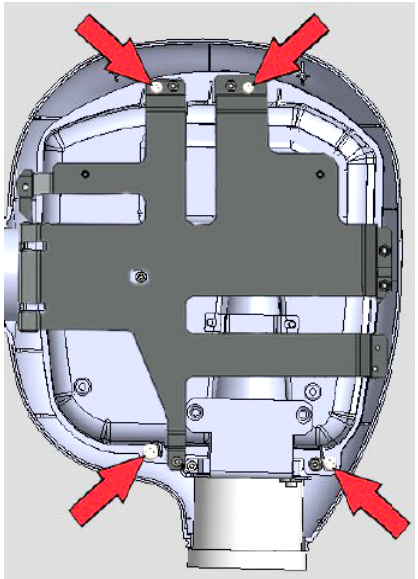


Figure 41

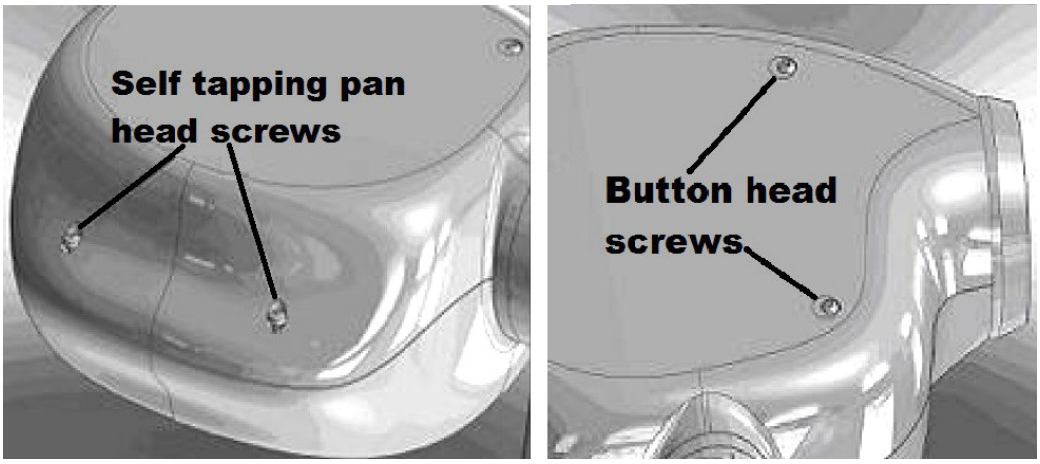


Figure 42

- Fix the rubber fixing ring on the positioning cone as shown in Figure 43(1) and slide the rubber dial ring and fix it in the slot so that the arrow mark on ring should be aligned to centre line of tube head covers on the front side as shown in Figure 43(2).

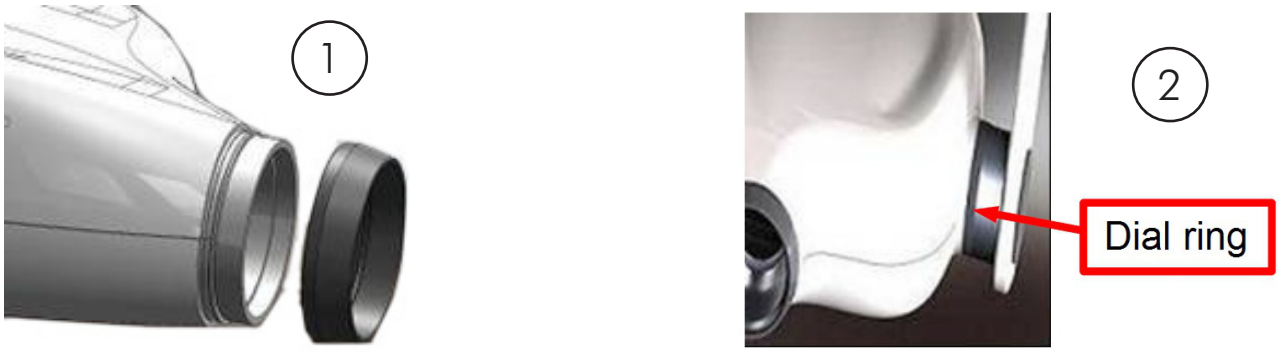


Figure 43

8.2.2.6 Base unit cover fixing

- Route the console cable through the hole and connect the cable to the J4 connector from the bottom side of the base unit as shown in Figure 44.
- Fix the base unit front cover by fixing two M3x6 HSHC screws along with M3 washers on top using 2.5mm allen key as shown in Figure 45 and M3x25 self tapping screw on front bottom side using phillips screw driver as shown in Figure 46. Fix the rubber cap on top and rubber plug at bottom screw location.

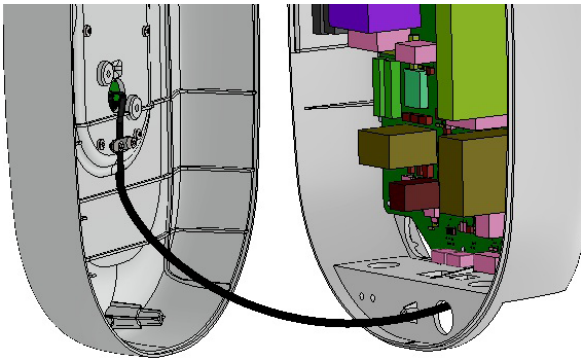


Figure 44

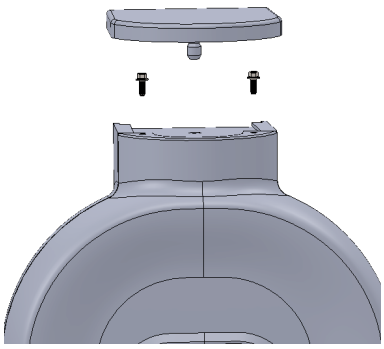


Figure 45

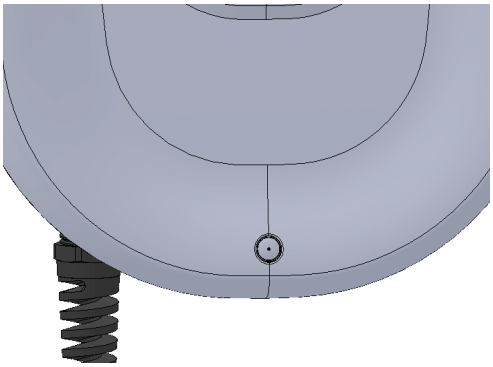


Figure 46

- Perform "5.4 Scissor-Arm Operation Check:"
- Perform "5.5 Other Checks:".
- Perform "5.6 Ground Connection Check:" as above.
- Perform "5.7 Power On Check:" as above.

8.3 Replacing the Power Board

8.3.1 Removing the Power Board

- Execute the Steps in "8.2.1.1 Power Off:"
- Execute the steps in 8.2.1.3 Base Unit Cover removal:
- Cut the 2 cable ties inside the base unit located on the right side of the power board.
- Disconnect the Inverter power cable from J1 connector using screw driver and communication cable from J2 connector on the power board as shown in Figure 47.
- Remove the GND wires of both the cables by removing M3x6 HSHC screws using 2.5 mm Allen key as shown in. Figure 47.

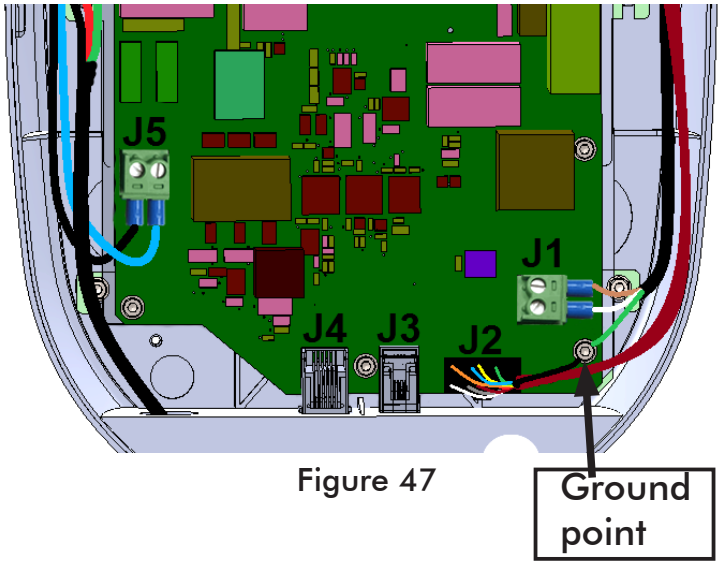


Figure 47

- Disconnect the "Live(Blue) and Neutral(Black) wires(pin terminals)" from the J5 connector on the power board plate using 2.5mm allen key as shown in Figure 47.
- Disconnect the GND(ring terminal) wire from the GND terminal on power board plate located just below the switch by removing the M3X6 HSHC screw using 2.5 mm allen key as shown in the Figure 48
- Remove 4 M3X6 HSHC screws on the power board assembly (2 on right side and 2 on left side) using 2.5 mm allen key as in Figure 48.
- Hold the Power Board assembly with its plate and slowly remove the remaining 2 M3X6 HSHC screws on the top side of the power board using 2.5 mm allen key as shown in Figure 48.
- Remove the Power Board along with plate by lifting it up slowly and ensuring that the connectors at the bottom come out of the Base Unit rear cover.

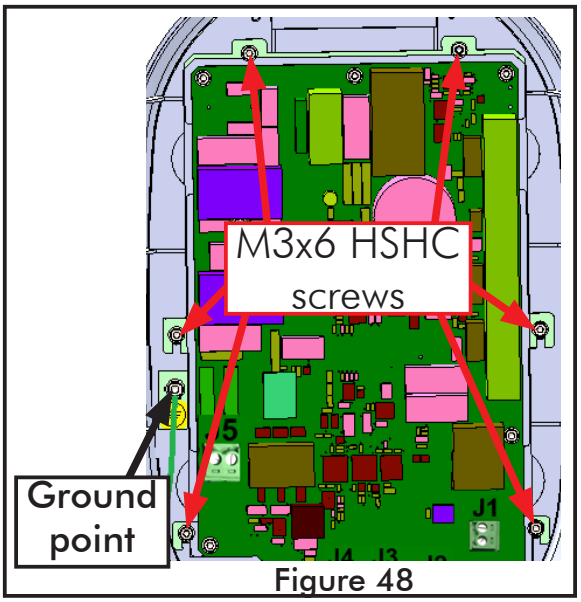


Figure 48

8.3.2 Fixing the power board

- Take the new power board (along with its plate) and fix it (ensure that J3 & J4 connectors are inserted into the Base Unit rear cover) with 2 M3X6 HSHC screw on the top side of Power board using 2.5 mm allen key as shown in the Figure 48.
- Fix the 4 M3X6 HSHC screw (2 on left side & 2 on right side) of the Power Board using 2.5 mm allen key to the rear cover as shown in Figure 48.
- Connect the GND wire(ring terminal) to the GND terminal on power board plate just below the switch using 1 M3X6 HSHC screw (with washers) using 2.5 mm allen key as shown in the Figure 48.
- Connect the "Live(Blue) and Neutral(Black)" wires(Ring terminals) coming from switch to the J5 connector on the power board using screw driver as shown in Figure 47.
- Connect the Inverter power cable to J1 connector(Non-polarised) using screw driver and connect communication cable connector to J2 connector on the power board by pressing the lock as shown in Figure 47.

- Connect the GND wires of both the cables by fixing with M3x6 HSHC screws using 2.5 mm allen key as shown in Figure 47.
- Use new cable ties to fix the cables on the existing cable mounts & cut the extra length of cable ties using a cable tie cutter.
- Execute the steps in "8.2.2.6 Base unit cover fixing".
- Perform "5.6 Ground Connection Check:".
- Perform "5.7 Power On Check:".

8.4 Replacing the tube head

8.4.1 Removing the tube head

- Perform the steps in "8.2.1.1 Power Off:".
- Perform the steps in "8.2.1.2 Tube Head Cover Removal:".
- Use an ESD wrist strap during HV Tank removal procedure and connect its GND connection to the HV Tank Clamp.
- On the HV Tank cut the cable ties used to hold the scissor arm cables using cutter.
- Press the connector locking tab and pull the cable connector (communication cable) connected to J4 connector of the control board as shown in the Figure 49 .
- Disconnect the INV power cable from the sealing board 3 pin connector -pins 1 & 3 as shown in the Figure 49 (hold the connector firmly by hand while removing) using Jewel screw driver.
- Remove the screws used for GND wire connections for both cables at 3 corners of the Control board using 2.5MM allen key as shown in Figure 49 and put back the screws in its location.
- Now the communication and INV power cables are disconnected from the HV Tank.

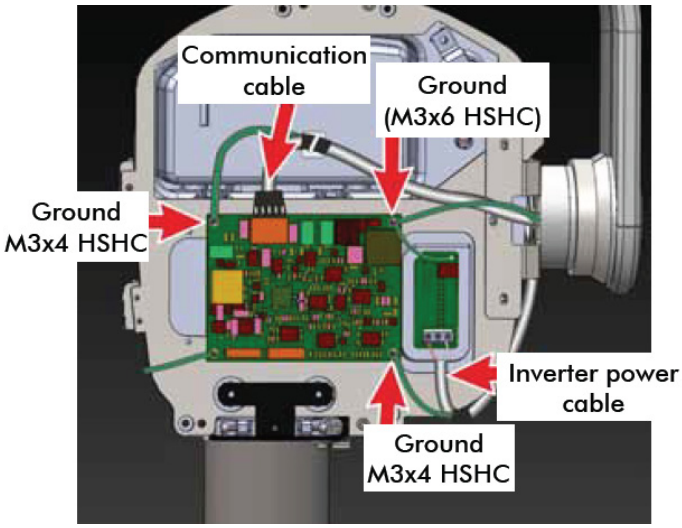


Figure 49

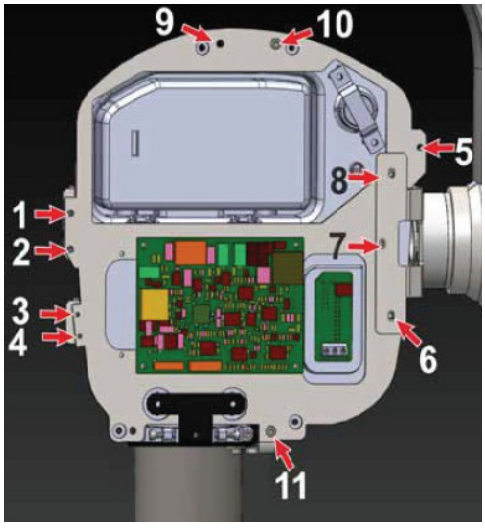


Figure 50

- To remove the HV Tank from the clamp, remove the 5 (M3X6 Hex. socket button head) screws (from 1 to 5 as shown in Figure 50) using 2mm allen key.
- Remove 3 (M3X6 Hex. Soc. Head cap) Screws (From 6 to 8 as shown in Figure 50) on the top of the clamp near Tube head arm using 2.5mm allen key.
- Remove 3 (M3X14 Hex Soc. head cap) screws (from 9 to 11 as shown in Figure 50) along with M3 plain washers & M3 nut using 2.5mm allen key and 5.5mm Nut driver.
- Keep the Tank in a clean place.

8.4.2 Fixing the new tube head

- Take the HV-Tank and fix it to the clamp using the following sequence:-
- Using 2.5mm allen key & 5.5mm nut driver fix 3 Hex. Soc. head cap screws(M3X16) with M3 plain washers & M3 nuts (at the locations 9 to 11 as in Figure 50) such that the screw along with M3 plain washer should be inserted from bottom and nut along with M3 plain washer should be on the top of the HV Tank.
- Fix 5 button head screws(M3X6) using 2mm allen key(at the locations 1 to 5 as in Figure 50).
- Fix 3 Hex. Soc. Head cap screws(M3X6) on the top of the clamp near Tube head arm at the locations (6 to 8 as in Figure 50) using 2.5 mm Allen key.
- Route the INV power cable as shown in the Figure 49 and connect it to the sealing board 3 pin connector (Pin 1 & 3). Hold the connector firmly while tightening the terminal screws. Using a 2.5mm allen key connect the GND ring terminal of the INV cable to the nearest control board fixing screw(M3x4 HSHC) as shown in the Figure 49 .
- Route the communication cable and connect it to the J4 connector of the control board as shown in Figure 49 and using a 2.5mm allen key connect the GND ring terminal of the communication cable to the nearest control board fixing screw(M3x4 HSHC) as shown in the Figure 49 .
- Fix the scissor-arm grounding cable on the control board along with sealing board grounding cable with M3X6 Hex. Socket Head cap screw using 2.5MM Allen key as shown in Figure 49 .
- Using cable ties(100MM length or 50MM length is enough) ties the cables on the HV Tank. Tighten & cut the extra length of cable ties using a cable tie cutter.
- Execute the steps "8.2.2.5 Tube Head Covers Fixing:".
- Perform “5.6 Ground Connection Check:”.
- Perform “5.7 Power On Check:”.

8.5 Replacing the Control Board

8.5.1 Removing the Control Board

- Execute the Steps in "8.2.1.1 Power Off:".
- Execute the Steps in " 8.2.1.2 Tube Head Cover Removal:".
- Use an ESD wrist strap while connecting and disconnecting the cables of the control board and connect its GND connection to the HV Tank Clamp.
- On the HV Tank cut the cable ties used to hold the scissor arm cables using cutter.
- Press the connector locking tab and pull the cable connector (communication cable) connected to J4 connector of the control board as shown in the Figure 51 .
- Disconnect the INV power cable from the sealing board 3 pin connector-pins 1 & 3 (hold the connector firmly by hand while removing) using Jewel screw driver as shown in the Figure 51 .
- Remove the screws used for GND wire connections for both cables at all 4 corners of the Control board using 2.5MM Allen key as shown in Figure 51 .
- Remove the Control Board and keep it in an Antistatic cover or protected from Static charges.

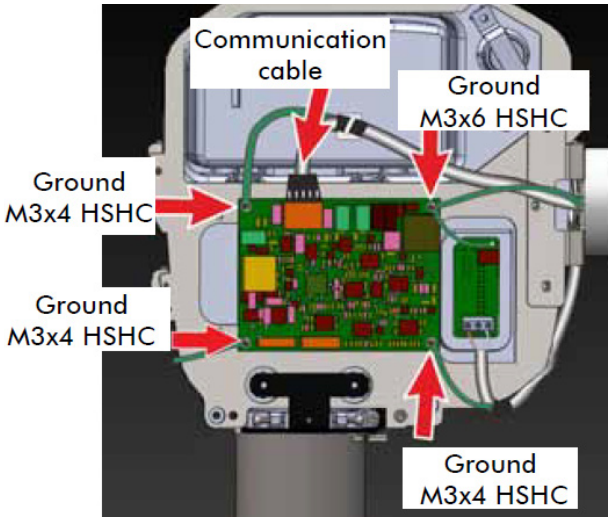


Figure 51

8.5.2 Fixing the Control Board

- Fix the new Control Board by connecting J3 connector of control board to J3 connector of sealing board and fix the scissor-arm earthing cable and sealing board earthing wires(Ring terminals) to the nearest control board fixing screw(M3x6 HSHC) using 2.5 mm allen key as shown in Figure 51 .
- Connect the INV power cable to the sealing board 3 pin connector (Non polarised pin terminal wires to pins 1 & 3) using Jewel screw driver as shown in Figure 51 (Hold the connector firmly while tightening the terminal screws) and fix its GND ring terminal to the nearest control board fixing screw(M3x4-HSHC) using 2.5mm allen key as shown in the Figure 51 .
- Route the communication cable and connect it to the J4 connector of the control board as shown in Figure 51 and fix its ground ring terminal to the nearest control board fixing screw(M3x4 HSHC) as shown in the Figure 51 .
- Fix the tube head ground ring terminal(near the collimator) with M3x4 HSHC screws on the control board using 2.5 mm allen key as shown in Figure 51 .
- Execute the Steps in "8.2.2.5 Tube Head Covers Fixing:".
- Perform "5.6 Ground Connection Check:".
- Switch on the power.
- Perform "9.2 Tube Head Re-Calibration".
- Perform "5.7 Power On Check:".

8.6 Replacing the Control Console

8.6.1 Removing the console assembly

- Execute the Steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.3 Base Unit Cover removal:".
- Cut the cable tie holding the console cable as shown in Figure 52 .
- Remove the console assembly from base unit front cover by removing 4 self tapping screws using screw driver as shown in Figure 52 and Figure 53 .

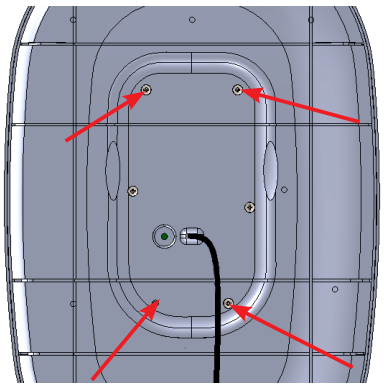


Figure 52

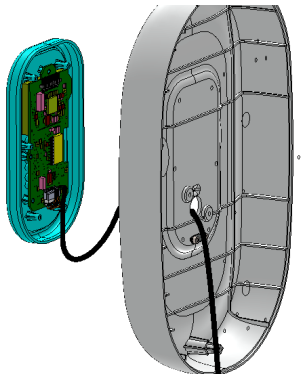


Figure 53

8.6.2 Removing the console assembly

- Take the new console assembly and route the console cable through the hole of front cover as shown in Figure 53 .
- Align the gasket properly and fix the console assembly to the base unit front cover with 4 self tapping screws at the screw locations shown in Figure 52 using screw driver. Lock the cable on the cable mount using cable tie as shown in Figure 52 .
- Perform "8.2.2.6 Base unit cover fixing".
- Perform "5.7 Power On Check:".

8.7 Replacing the Tube Head Covers

- Execute the Steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.2 Tube Head Cover Removal:" and remove old tube head covers.
- Execute the steps in "8.2.2.5 Tube Head Covers Fixing:" using new tube head covers.
- Execute the steps in "5.7 Power On Check:".

8.8 Replacing the Base unit Covers

- Execute the steps in "8.3.1 Removing the Power Board".
- Remove the old base unit rear cover by removing 6 M3x6 HSHC screws and M3 plane washers at the locations shown in Figure 54 using 2.5mm allen key.
- Fix the new base unit rear cover by fixing 6 M3x6 HSHC screws at the locations shown in Figure 54 using 2.5 mm allen key.
- Execute the steps in "8.3.2 Fixing the power board".

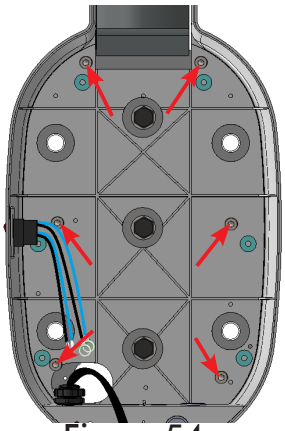


Figure 54

8.9 Replacing the Scissor Arm cable harness

8.9.1 Removing the Scissor arm cables

- Execute the Steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.2 Tube Head Cover Removal:".
- Execute the steps in "8.2.1.3 Base Unit Cover removal:".
- Execute the steps in "8.2.1.4 Scissor-arm cables disconnecting".
- Execute the steps in "8.2.1.5 HV Tank removal".
- Keep the Vertical Arm of the scissor arm in Vertical position and Horizontal Arm in horizontal position as shown in Figure 55.
- Remove the rubber plugs of the wire cup using tweezer and then remove the wire cup on the L-arm by removing the 2 M3X30 HSHC screws using 2.5mm allen key as shown in Figure 56.
- Remove the rubber Cable cover on the L-Arm by pulling out as shown in Figure 57.

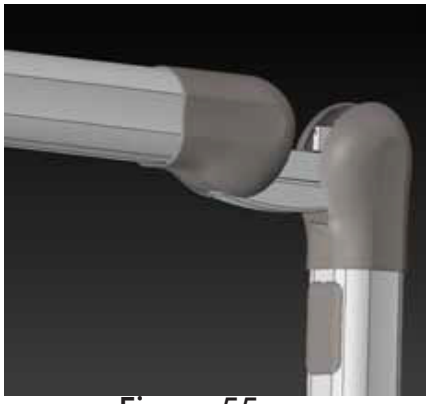


Figure 55

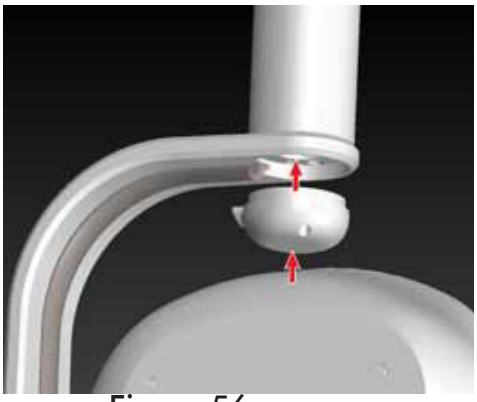


Figure 56

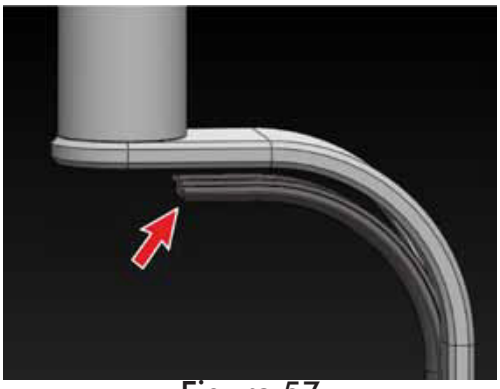


Figure 57

- Remove all the four scissor-arm end caps by opening the caps. Do not remove the rubber part shown in Figure 58 .
- Remove the bottom caps of straight arm by removing M3x6 self tapping CSK head screws using screw driver. Remove the side cap of the tube head arm.
- Without removing the Scissor arm, first remove the Inverter Power cable from the scissor arm.
- Next remove the Communication cable (with connector) from the scissor arm. If required put a tape on the cable ends for easy removal. Use guide wire if required to pull the cable from the Straight Arm through the slot.
- Remove the base unit cover fixing clamp by removing 2 M3x6 HSHC screws using 2.5 mm allen key.

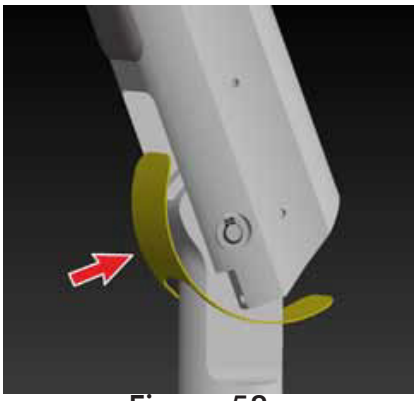


Figure 58

8.9.2 Assembly Steps for Scissor-Arm Cable

- Hold the end of the Cable harness (Figure 59) and insert the communication wire (cable with connector) from the hole of swivel guide (Figure 60) till it comes out of the tube head arm as shown in Figure 61.
- Now insert the Inverter power cable (cable without connector) in the same way till it comes out of the tube head arm as shown in the Figure 60 and Figure 61.
- Pull both the cables together such that the communication cable measures 27.5" (approx) & Inverter power cable measures 21.2"(approx) from the opening of the tube head arm end as shown in the Figure 61.

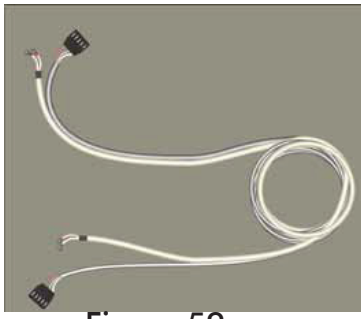


Figure 59

Figure 60

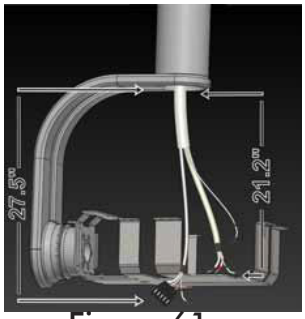


Figure 61

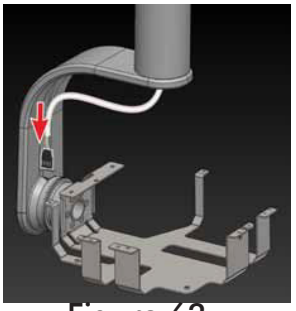


Figure 62

- Insert the communication cable inside the hole provided on the wire slot side of the tube head arm as shown in the Figure 62 & then the Inverter power cable along with the scissor arm earthing wire as shown in the Figure 62 such that the wire comes out of the L arm circular bush.
- Insert the cables (scissor arm cables along with scissor arm earthing wire) from the hole of the rotating bush such that it comes out of the L-Clamp as shown in the Figure 63. Ensure that the other end of the Scissor arm earthing wire is already connected firmly to the L arm (near the rotating bush).

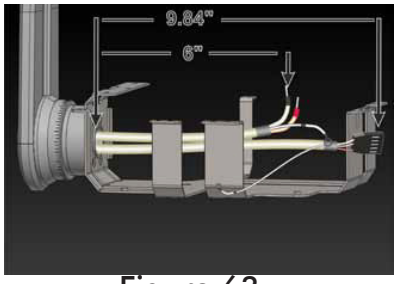


Figure 63

- Pull the scissor arm cables such that the length of the communication cable measures 9.84"(approx) from the connector to the surface of the L-Clamp and length of the Inverter power cable measures 6"(approx) from the connector to the surface of the L-Clamp as shown in the Figure 63 using measuring tape.

Imp Note: - Keeping the L-Clamp as reference, route the cables such that the communication cable is towards the dual hole end & the Inverter power cable along with the scissor arm grounding wire is towards the single hole end end of the L-Clamp.

- Keeping the cable length (towards the L-Clamp end) fixed, route the communication cable near the rotating bush (inside the outer hole of L Arm) as shown in the Figure 64 (Leave extra length of 1 turn of communication cable within the circular area as shown in Figure 64).
- Rotate the tube head arm and hold it at central position (approximate 270° position) of the full rotation (i.e., 0° to 540° as shown in Figure 65). At this position route the cables (scissor arm cables along with scissor arm earthing wire) inside the slot of the tube head arm such that the cables are flexible.

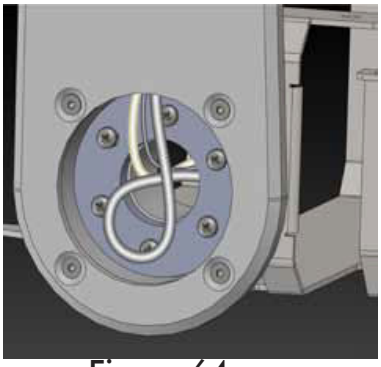


Figure 64

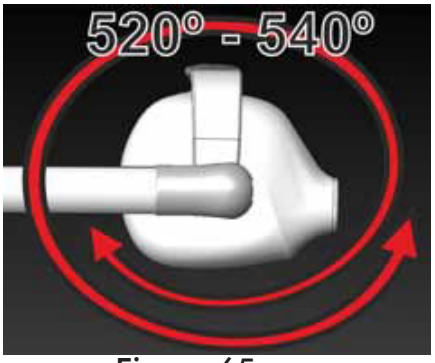


Figure 65

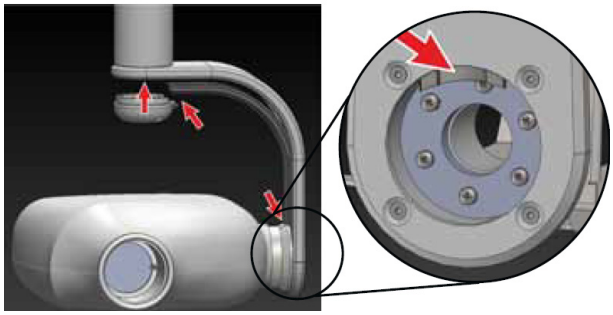


Figure 66

- In the position fix the flexible cable cover in the slot of the tube head arm by sliding through the arm till it comes out the as shown in Figure 66 and fix the cable cup with 2 M3x25 HSHC screws using 2.5mm allen key as shown in Figure 66 and fix the rubber plugs in the holes.

Figure 67

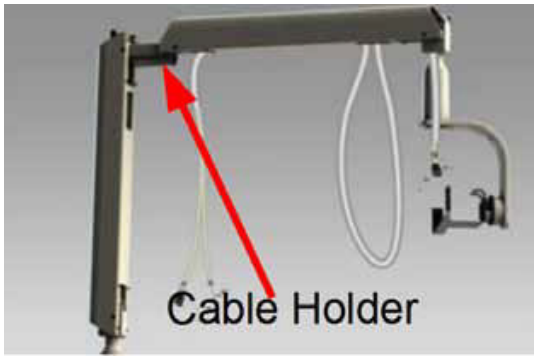


Figure 68

Figure 69

- Now the scissor arm cables has to be routed through out the scissor arm starting from tube head arm till the base unit as mentioned below.
- Take the other end of the scissor arm cable and route it from the bottom of the horizontal arm outer cover till it comes out from the arm as shown in the Figure 67 & Figure 68. Make sure that the cables are inserted in between the outer cover and the internal plastic sheet(not visible in the figure).
- Insert the cables into cable holder fixed on the fulcrum and take out from other end as shown in Figure 68.
- Pull the extra length of cable and insert it through the outer cover of the vertical arm as shown in the Figure 69 & Figure 70 (First route the communication cable and then route the Inverter power cable).
- Push the cable such that it comes out of the other end of the vertical arm's outer cover as shown in the Figure 69. Pull out the extra length of cable from the outer cover.

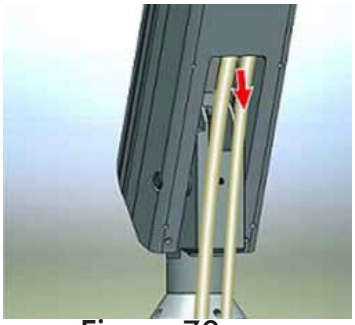


Figure 70

- Keeping the vertical arm in vertical position and horizontal arm in horizontal position, route the cable inside the horizontal arm such a way that the cable is pushed 20 mm (approx) inside the outer cover as shown in the Figure 71. Make sure that the cables are inserted in between the outer cover and the inner plastic sheet (not visible in picture).

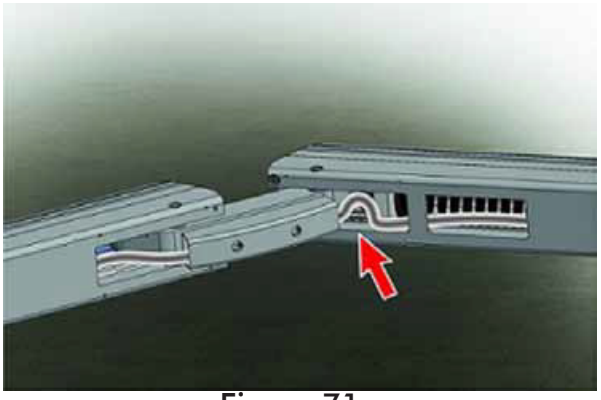


Figure 71

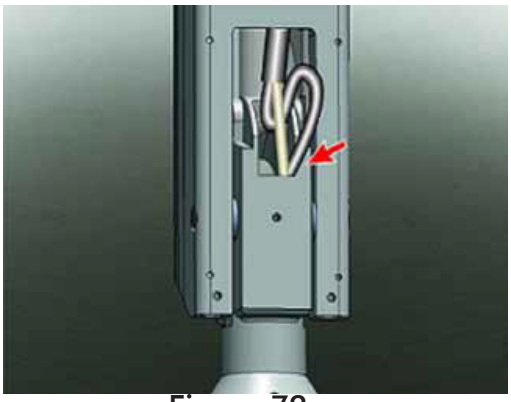


Figure 72

- Insert the scissor-arm cable(first communication cable and then Inverter power cable) into the scissor arm swivel guide as shown in the Figure 72 such that it comes out from the bottom hole of the straight arm as shown in the Figure 73. Use guide wire to route the cables through the straight arm till it comes inside the base unit as shown in Figure 74.

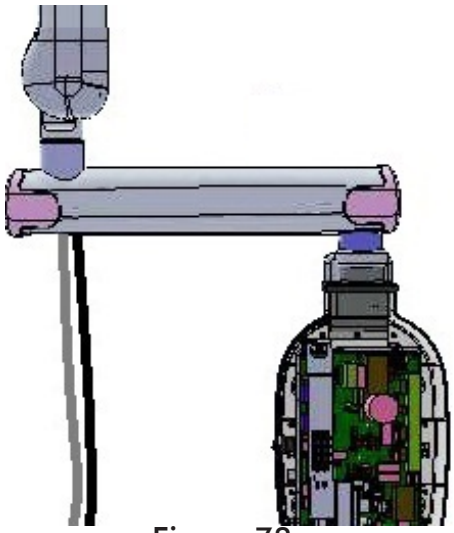


Figure 73

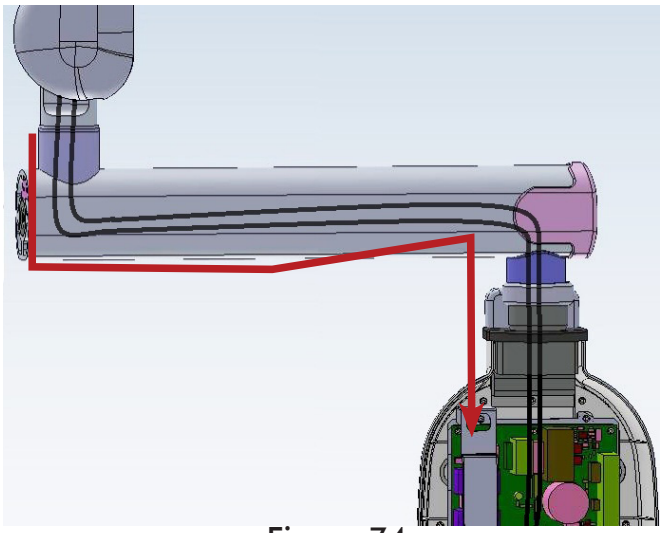


Figure 74

- Execute the Steps as in "8.2.2.3 HV Tank Assembly:".
- Execute the Steps as in "8.2.2.4 Scissor-arm cable connection:".
- Execute the Steps as in "8.2.2.5 Tube Head Covers Fixing:".
- Execute the Steps as in "8.2.2.6 Base unit cover fixing".
- Execute the Steps as in "5.6 Ground Connection Check:".

8.9.3 Fixing the Scissor-Arm End caps

- For fixing back the scissor-arm end caps first, align the rubber part of scissor-arm as shown in Figure 75.
- Take end cap of one side (half) and fix to the scissor-arm such that the rubber part should be aligned in the slot as shown in Figure 76.
- Now take another half of end cap and insert such that the holes provided in both the caps are aligned properly and insert the other side of rubber part into the slot provided in the second half of the end cap as shown in Figure 77.

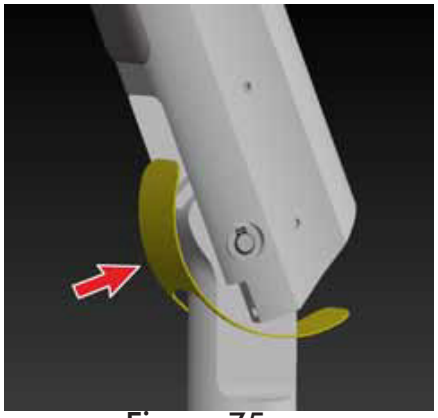


Figure 75

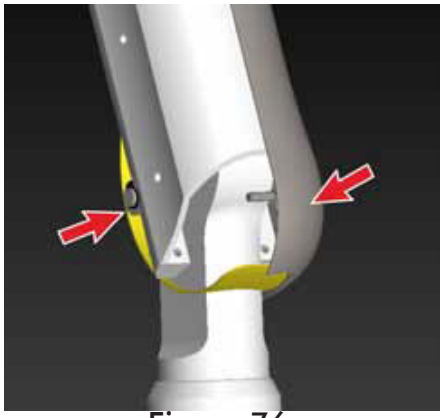


Figure 76

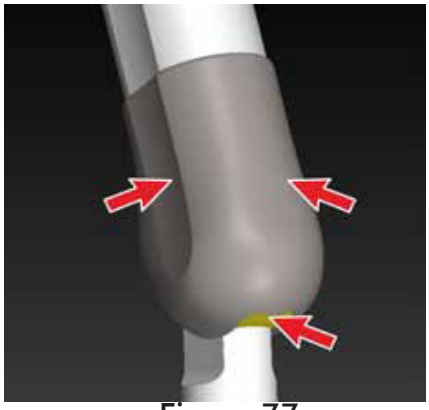


Figure 77

- Fix the bottom caps of the straight-arm with M3x6 self tapping CSK head screws using screw driver.
- Execute the Steps as in "5.7 Power On Check:".

8.10 Replacing the exposure switch

- Execute the Steps in "8.2.1.1 Power Off:".
- Disconnect the defective exposure switch by disconnecting the cable from the bottom side of the base unit as shown in Figure 78 .
- Take the new exposure switch and connect its cable at the bottom side of the base unit as shown in Figure 78 .
- Perform "5.7 Power On Check:".

Figure 78

8.11 Replacing the Scissor-arm end caps

- Execute the Steps in "8.2.1.1 Power Off:".
- Remove the defective end caps. Do not remove the rubber part shown in Figure 79.
- Execute the steps in " 8.9.3 Fixing the Scissor-Arm End caps".
- Perform "5.7 Power On Check:".

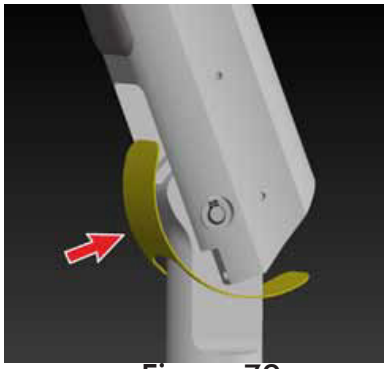


Figure 79

8.12 Replacing the Input switch

8.12.1 Removing the Input Switch

- Execute the Steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.3 Base Unit Cover removal:".
- De-solder the "Live(Blue) and Neutral(Black) wires of power cord from the switch.
- If required disconnect the GND(ring terminal) wire of the power cord connected at the earthing point on power board plate located just below the switch by removing the M3X6 HSHC screw using 2.5 mm allen key.

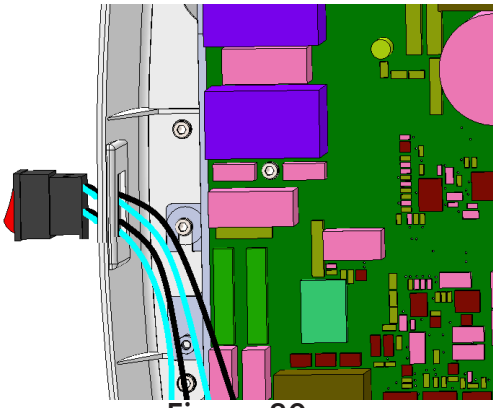


Figure 80

- Disconnect the wires(Pin terminals) from the J5 connector on the power board using a Jewel screw driver(Live=Blue & Neutral=Black).
- Pull out defective switch from the base unit rear cover as shown in Figure 80.

8.12.2 Replacing the Input swich

- Take the new switch and fix it in the base unit rear cover by inserting from outside as shown in Figure 80.
- Solder the "Live" and "Neutral" wires of the power cord to the switch as per the details shown in Figure 81 and Figure 82.

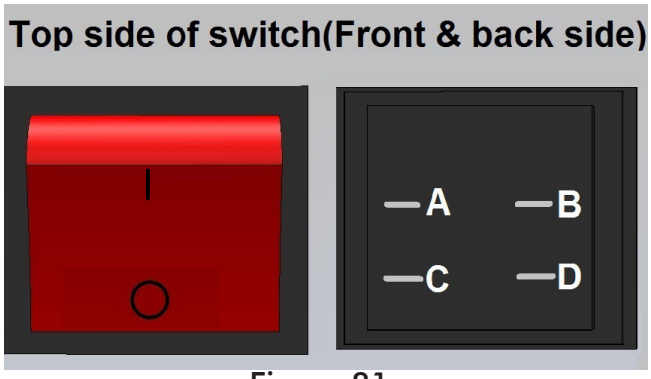


Figure 81

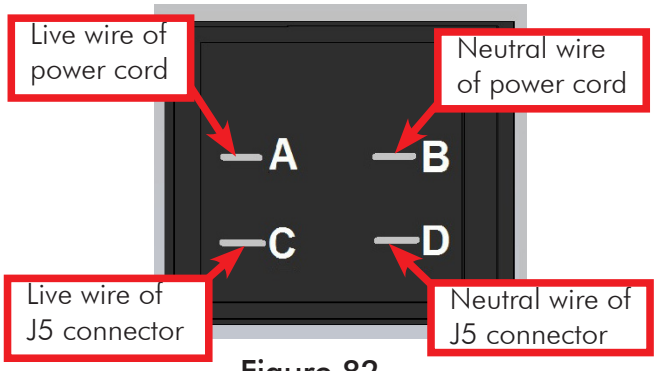


Figure 82

- Connect the wires(Pin terminals) of the switch to the J5 connector on the power board using a Jewel screw driver as shown in Figure 83(Live=Blue & Neutral=Black).
- Connect the GND(ring terminal) wire to the Earthing point (If removed) on the power board plate located just below the switch by fixing the M3X6 HSHC screw using 2.5 mm allen key as shown in the Figure 83.
- Execute the Steps as in "8.2.2.6 Base unit cover fixing".
- Execute the Steps as in "5.7 Power On Check:".

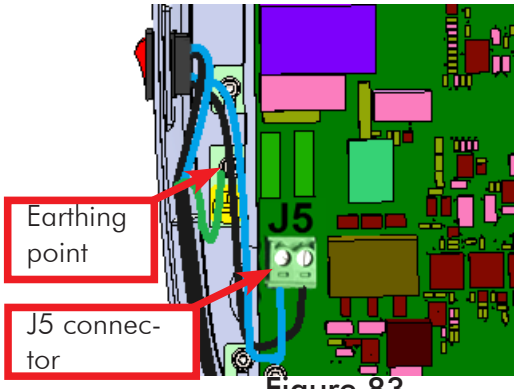


Figure 83

8.13 Replacing the input power cord

8.13.1 Removing the old input power cord

- Execute the Steps as in “8.2.1.1 Power Off:”.
- Execute the steps as in “8.2.1.3 Base Unit Cover removal:”.
- De-solder the "Live(Blue) and Neutral(Black) wires of power cord from the switch.
- Disconnect the GND(ring terminal) wire of the power cord connected at the earthing point on power board plate located just below the switch by removing the M3X6 HSHC screw using 2.5 mm allen key.
- Loosen the cable grommet clamp as shown in Figure 84. Loosen the grommet nut inside the Base Unit as shown in Figure 84 and remove the grommet & the cable out of the Base Unit (through the cable entry hole).

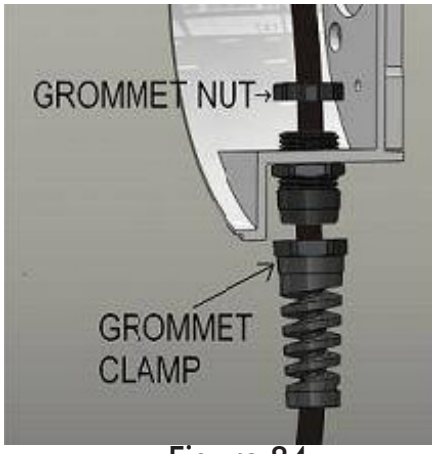


Figure 84

8.13.2 Fixing the new Input power cord

- Take the new power cord which comes along with grommet assembly and separate the grommet assembly into three parts as shown in Figure 85 then take out the grommet nut and keep aside.
- Insert the power cord cable along with the cable grommet holding part & cable grommet flexible part from the bottom side of the base unit as shown in the Figure 86.

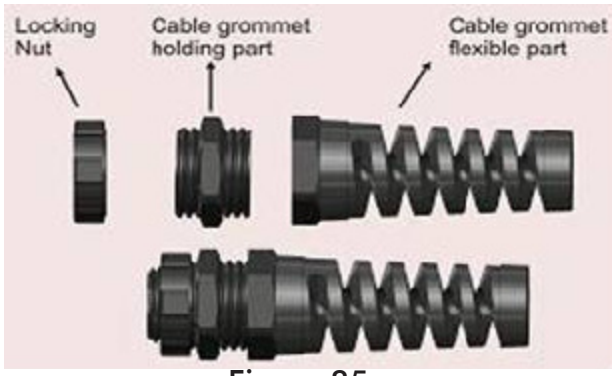


Figure 85

Figure 86

Figure 87

Note: Do not tighten the cable grommet flexible part till the procedure tell to do so.

- Fix the locking nut of cable grommet (flat portion first) into the cable from inner side of the base unit as shown in the Figure 86.
- Pull the power cord inside the base unit upto required length and tighten the cable grommet nut holding the grommet flexible part at bottom side of the base unit as shown in Figure 87.

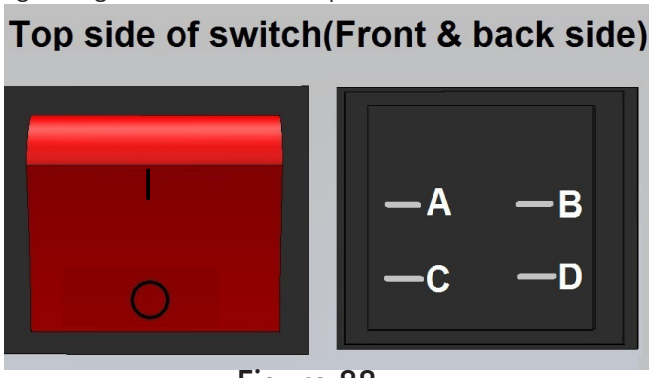


Figure 88

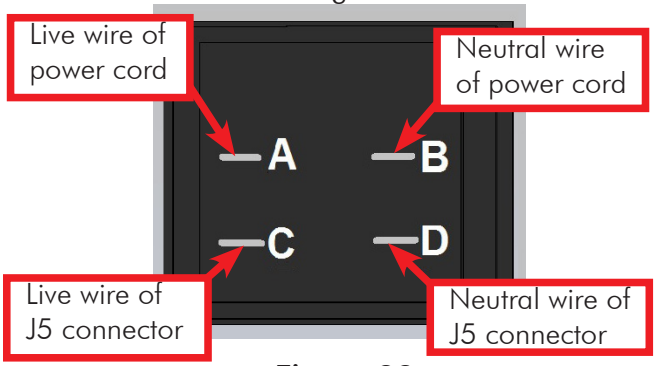


Figure 89

- Solder the "Live" and "Neutral" wires of the power cord to the switch as per the details shown in Figure 88 and Figure 89.
- Connect the wires(Pin terminals) of the switch to the J5 connector on the power board using a Jewel screw driver as shown in Figure 90(Live=Blue & Neutral=Black).
- Connect the GND(ring terminal) wire to the Earthing point (If removed) on the power board plate located just below the switch by fixing the M3X6 HSHC screw using 2.5 mm allen key as shown in the Figure 90.
- Execute the Steps as in "8.2.2.6 Base unit cover fixing".
- Execute the Steps as in "5.7 Power On Check:".

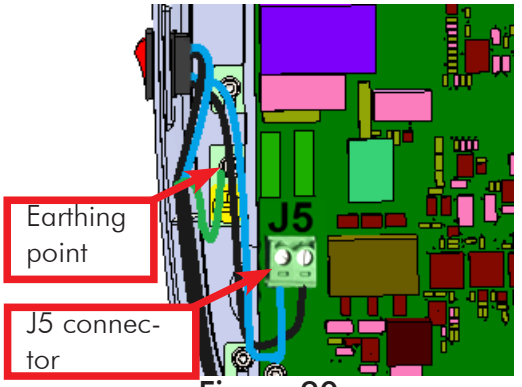


Figure 90

8.14 Replacing the wheel

8.14.1 Removing the wheel

- Execute the steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.3 Base Unit Cover removal:".
- Execute the steps in "8.2.1.6 Base unit plate removal".
- Lock the scissor arm in folded position by tying with a long cloth & tying a knot or using a long cable tie as shown in Figure 91 .
- Hold the scissor arm firmly with both hands and slowly lift it (Figure 92) simultaneously pulling the extra length of cable out of the Base Unit and base column carefully.
- Keep the Scissor arm separate on a cushioned surface.
- Provide wooden pieces or any other strong support below the Base casting arm (having defective wheel) such that the casting end is lifted by 15cms approx from the ground level.
- Remove 4 Hex socket head cap screws (M5X16) along with with M5 plain washer and M5 spring washer using 4mm allen key and remove the defective wheel.

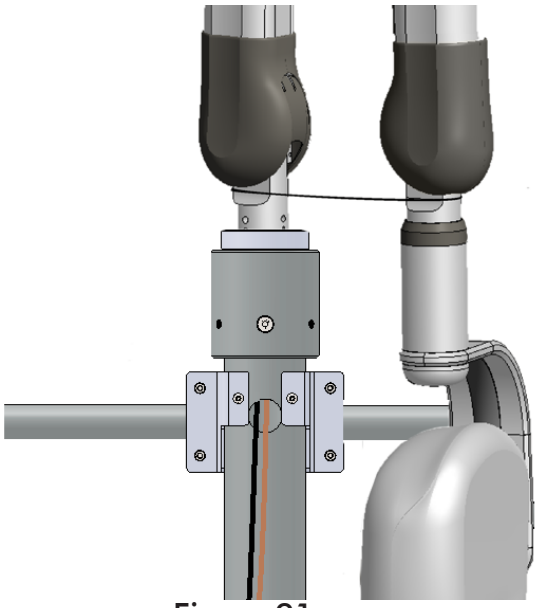


Figure 91

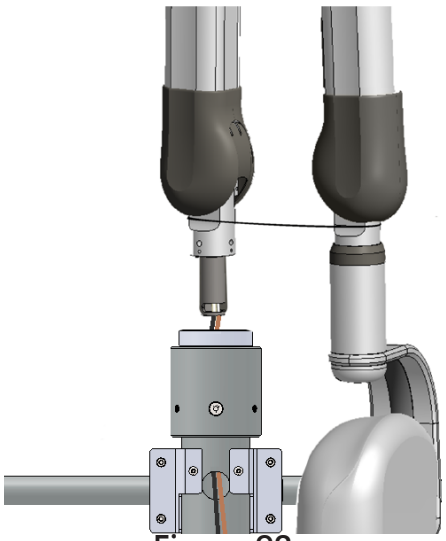


Figure 92

8.14.2 Fixing the wheel

- Fix the new wheel with 4 Hex socket head cap screws (M5X16) along with M5 plain washer and M5 spring washer using 4 mm allen key.
- Hold the scissor arm firmly with both hands and bring it near the base stand.
- Insert the cables from the top hole of the base stand simultaneously pulling out from the front hole.
- Fix the scissor-arm on the base stand carefully ensuring the safety of the cables.
- Execute the steps in "8.2.2.2 Fixing the base unit plate".
- Execute the steps in "8.2.2.6 Base unit cover fixing".
- Perform "5.6 Ground Connection Check:".
- Perform "5.7 Power On Check:.

8.15 Replacing the Console extension cables

- Console wxtension cable set contain two cables in the package:
  a)Console communication cable connected between power board and console extension board.
  b) Console board cable connected between console board and Console extension board.

Replace the particular defective cable by following the procedure given below.

- Execute the steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.3 Base Unit Cover removal:"

If console communication cable fails:

- Disconnect one end of the defective cable from the J4 connector on the power board by accessing from the bottom side of the base unit and other end from Connector "PB" on the console extension board.
- Connect one end of the new console communication cable to the connector-PB of the console extension board and route the cable through the hole on the base unit rear cover and connect the other end of the cable to the J4 connector of the power board from the bottom side of the base unit.

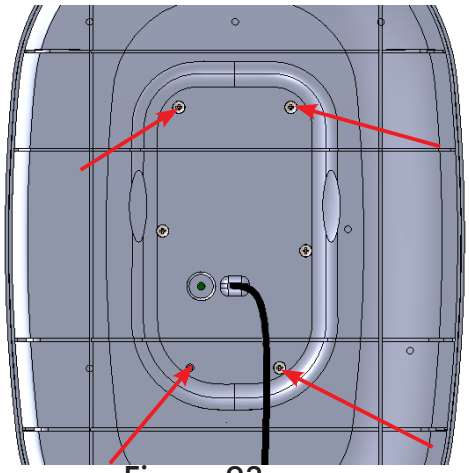


Figure 93

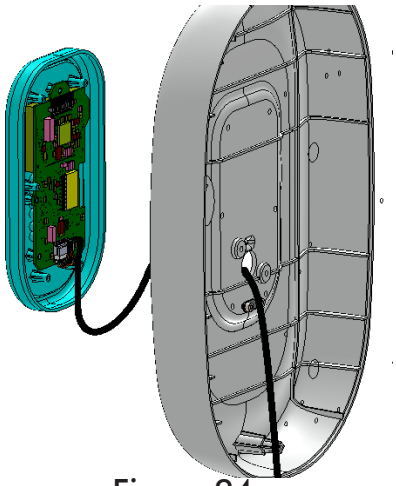


Figure 94

If Console board cable fails:

- Remove the console assembly from the base unit front cover by removing 4 M3x16 self tapping screws using star screw driver as shown in Figure 93 and Figure 94 .
- Disconnect the console cable from the console board.
- Fix back the new console cable on the console board.
- Route the cable through the slot provided on the base unit front cover as shown in Figure 94 and fix the console assembly to the front cover with 4 M3x16 self tapping screws using phillips screw driver as shown in Figure 93 .
- Execute the steps in "8.2.2.6 Base unit cover fixing".
- Perform "5.7 Power On Check:".

9 General Service & maintenance

9.1 Cleaning and disinfecting (if required)

- Switch OFF the Unit.
- Use a soft cloth damped in a mild soap solution for cleaning the outside surfaces of the unit.
- Do not spray or let the cleaning fluid enter the unit. Disinfect with a compatible low or intermediate level instrument grade disinfectant after cleaning. Use a non-acetone based disinfectant liquid. Very mild detergent is recommended for cleaning the equipment.

9.2 Tube Head Re-Calibration

The X-ray Tube Head requires re-calibration in the event of the following operational faults:

❑Over mA

❑Filament Open

❑ Filament Limit.

- Place the Power Switch to the OFF position and wait till the Control Console display is turned off.
- Remove the exposure switch cable from J3 connector on the power board from the bottom side of the base unit.

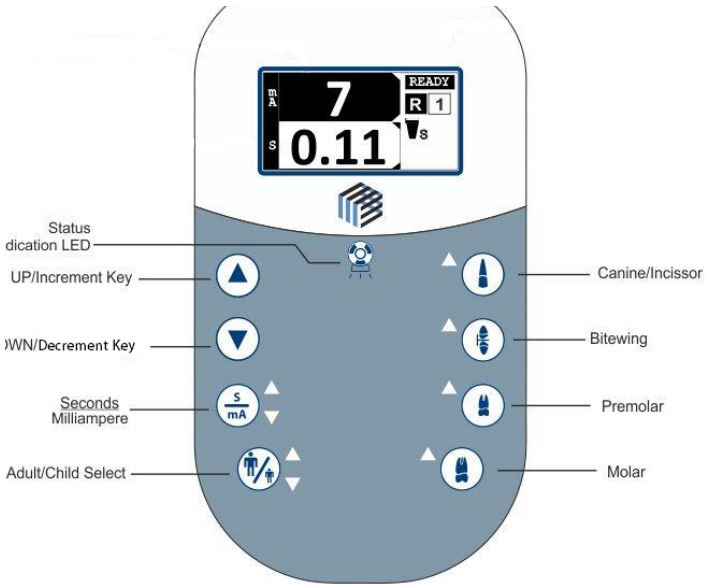


Figure 95

CONFIGURATION MENU
Set exposure mode >
Select kV >
Extension cone >
Save parameters
Restore parameters >
Show feedback >
Service >
< continue

Figure 96

Service
Firmware version >
Exposure count >
Exposure history >
Event history >
Event log >
Calibrate >
< back

Figure 97

- Re-calibrate the Tube Head by performing the following procedures:
- Cover X-ray outlet by lead cap.
- Place the Power Switch to the "ON" position and press "**UP**" & "**DOWN**" keys simultaneously within 2 seconds after the logo appears then the screen changes to "**CONFIGURATION MENU**" as shown in Figure 96. Press "**DOWN/Decrement**" key till "**Service**" option gets highlighted and then press S/mA button.
- Using the Control Console press the keys **Molar** followed by **bitewing, canine, premolar, molar, canine, bitewing and S/mA** as shown in Figure 95.
- Then display changes to "**SERVICE**" screen as shown in Figure 97. Press "**Down/Decrement**" key till "**Calibrate**" gets highlighted. Press set key then console display changes showing message "**Insert short link**".

Figure 98

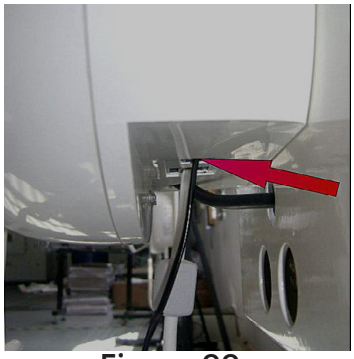


Figure 99

- Now insert Dead Man Switch Connector Jig to the J3 connector on power board from the bottom side of the power board as shown in Figure 98 and Figure 99.
- After insertion of Dead Man Switch Connector Jig clear the area within 10 seconds and then console starts calibration showing "**Calibrating**" in display with continuous beep sound.
- A long beep is heard during the calibration process, which will take about 15 minutes to complete.
- Observe that at the end of the calibration process the Control Console will display "Calibrated remove short link and restart the unit".
- Switch OFF the power and wait till the Control Console is turned off. Remove the Dead Man Switch Connector Jig which is connected at the bottom of the Base Unit as shown in Figure 99.
- Connect the exposure switch cable to the J3 connector on the power board.
- Place the Power Switch to the ON position.
- Check functioning by performing trial exposures.
- With successful completion of trial exposures, the equipment is ready to use.

9.3 Exposure history through Console:

- Switch off the power to the unit.
- Switch ON the unit and press "**UP**" & "**DOWN**" keys simultaneously within 2 seconds after the logo appears then the screen changes to "**CONFIGURATION MENU**" as shown in Figure 96. Press "**DOWN/Decrement**" key till "**Service**" option gets highlighted as shown in Figure 96.
- Using the Control Console press the keys **Molar** followed by **bite-wing, canine, premolar, molar, canine, bitewing and S/mA** as shown in Figure 95.
- Then display changes to "**SERVICE**" screen as shown in Figure 100. Press "**Down/Decrement**" key till "**Exposure count**" gets highlighted as shown in Figure 100.
- In the Figure 100 "X" corresponds to alpha/ numerical digit displayed.
- Note the total exposures shown in the report and Switch off the unit.

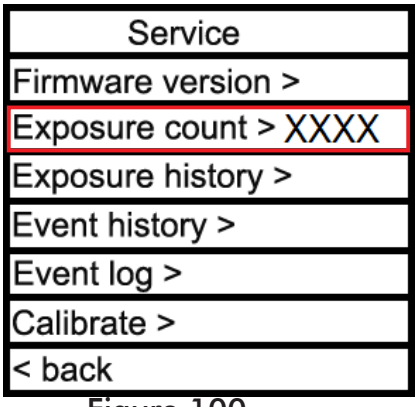


Figure 100

9.4 Preventive Maintenance

- Recommended once in a year (after 1st year of usage) :-
- Check all the Scissor Arm movements & adjust as per “5.9 Mechanical Adjustments”.
- Inspect all the cables & replace wherever defective.
- Inspect all the fasteners for tightness & tighten accordingly.
- In case of non-usage for long period (>6 months) :-
- X-Ray Tube Seasoning has to be carried out.

9.5 Disposal of the Unit

- Some parts of the equipment contain material and fluids which must be disposed off in special areas designated by the local health authorities or other local regulations at the end of the equipment’s life cycle.
- The Manufacturer and the Distributor do not accept any responsibility for the disposal of equipment or parts discarded by the user and the related costs.
- All parts that need to be disposed shall be listed in the Service report with a comment “ The following parts are handed over to <customer name> for disposal as per local health authorities or other local regulations” during handing over to Customer.
- In particular the equipment contains the following materials and /or components:
- Tube head: External packages in non-biodegradable plastic, dielectric oil, lead, copper, brass, aluminum, tungsten.
- Power supply and remote control: external packages in non biodegradable plastic, iron, populated printed circuit boards, copper.
- Tube head extension: Iron, Aluminum, Copper & Silicon rubber.

10 Spare Parts List

S. No.	Parts	Order Code (with Packing Box)
1	Tube Head	SK305000460
2	Tube Head Cover(Top and Bottom)	SK305000461
3	Control board	SK305000462
4	Extension cone	SK305000463
5	Power Board	SK305000464
6	Base unit covers(Front and back)	SK305000465
7	Mains power cord assembly	SK305000466
8	Mains input Switch assembly	SK305000467
9	Exposure switch cable assembly	SK305000468
10	Plastic caps kit(Scissor-arm)	SK305000469
11	Base unit console assembly	SK305000470
12	Scissor-arm replacement kit	SK305000471
13	Scissor-arm cables	SK305000472
14	Asthetic kit(Includes all rubber / plastic caps, plugs & rings)	SK305000481
15	Console extension cable set	305-000506-0
16	Wheel – Floor mount (2 Wheels kit)	SK305000482