INTRASKAN DC

High Frequency
Intraoral X-Ray System

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 for all 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. The manual also covers debugging of anticipated problems and their correction. Location and meaning of the various labels are provided.

Review and follow the procedures included in this Installation and Service Manual to ensure precision installation of the Intraskan DC allowing the accuracy and reproducibility of X-ray output.

Table 1-1. Intraskan DC Models

Description	Part No.
Intraskan DC, FS05 , Wall Mount 15" arm without remote switch	9992720300
Intraskan DC, FS05 , Wall Mount 24" arm without remote switch	9992720200
Intraskan DC, FS05 , Wall Mount 33" arm without remote switch	9992720000

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 installation.
- 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 Performing Any Service. Wait for at least 5 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 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
N	Mains Neutral Connection
L	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 System Components and Sub assemblies

Table 3.1. Intraskan DC System Components	
Description	
Models Available	Intraskan DC, FS05 , Wall Mount 15" arm
	Intraskan DC, FS05 , Wall Mount 24" arm
	Intraskan DC, FS05 , Wall Mount 33" arm
Straight Arm Assembly (one only)	15" Straight arm Assembly
	24" Straight arm Assembly
	33" Straight arm Assembly
Note: The Tube-head is shipped attached to the Scissor Arm	
Sub parts	Scissor Arm Assembly (includes cables)
	Tube-head Assembly
	Base Unit Assembly
	Exposure switch with cable
	Template for Wall Plate Installations
Optional	Remote Keypad Console
	Switch door bell assembly
	Two stud mounting wall plate

Check for all the sub assemblies available in the packing box.

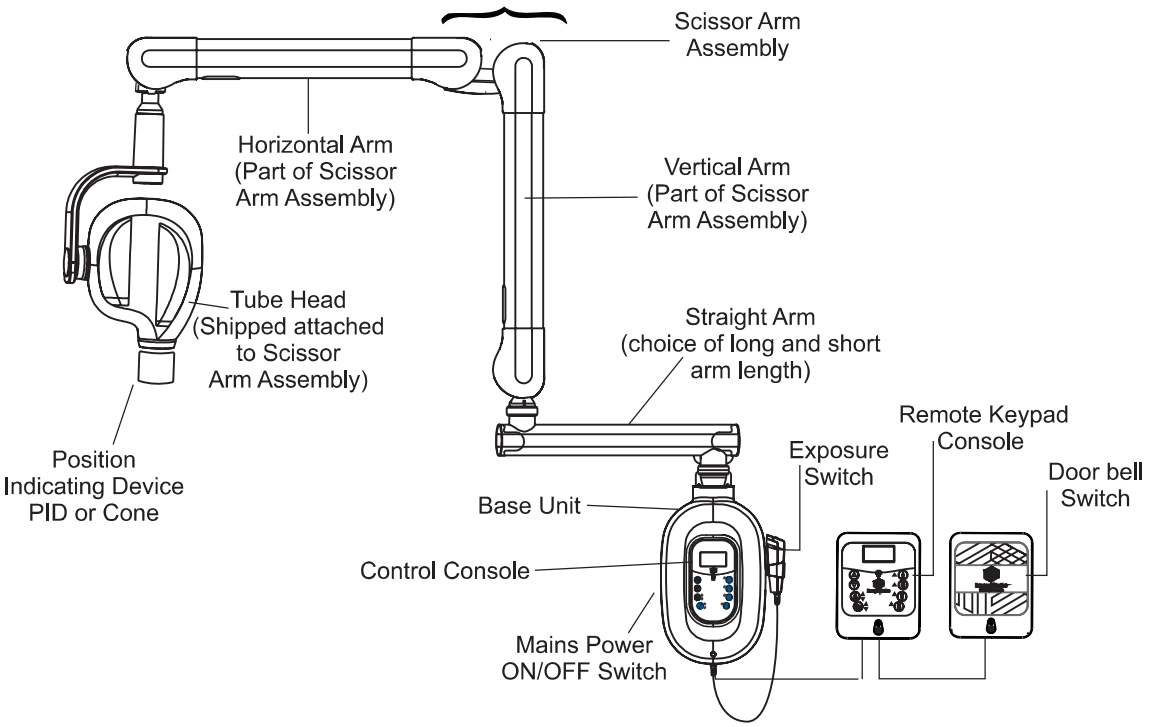


Figure 1

4 Pre-Installation Requirements

4.1 Tools and Consumable Material

Table 4-1 provides a consolidated list of the tools and consumable material which are typically required for executing the installation and service procedures provided by this manual.

Table 4-1. Useful Tools and Consumable Material	
❑ L- type allen Wrench Set including 2 mm, 2.5 mm,3 mm, 5 mm and 6 mm.	❑ Hand-held Drilling machine
❑ 1/2 inch Drive Socket Wrench with 8 mm and 17 mm Sockets.	❑ 5/32" wood drill bit.
❑ Nut Drivers	❑ Crimping tool with Dies 2035
❑ Screwdrivers set(Phillips & flat)	❑ Long nose Pliers w/Cutter / Tweezers
❑ Jeweler's Screwdrivers (Phillips & flat)	❑ ESD Wrist Wrap
❑ Hook Wire for routing wire	❑ Digital Multi-meter
❑ Surface Level (Level I ndicator)	❑ Soldering Iron
❑ Measuring Tape	❑ A Long Spirit Level with 3 indications
❑ Lead Cup for Blocking Cone	❑ 17 mm box spanner
Consumable Material	
❑ Grease & Waste Cotton	❑ Insulation Tape (if required for Trouble shooting)
❑ Cable Ties & Mounts (if required)	❑ Solder (Lead) (if required for Trouble shooting)
❑ Non-insulated Ferrule/Dowel Stud for wiring.	❑ 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 wall for mounting is strong enough for the installation and meet the support load requirements of 4.4 Support Load Requirements.
- ❑ Make sure that wall is levelled in both vertical and horizontal direction. Use a level indicator as shown in Figure 2 and Figure 3 below. If the wall is not level, unit to be installed using additional 16" wall plate (optional) and to be levelled by inserting shims as required between 16" wall plate and base unit plate.
- ❑ Make sure that there shall be no electrical wiring conduits running around the area to be drilled for the installation bolts.

- ❑ Make sure that the reference hole of the base unit plate is at the height of 49" from the floor in both Single stud mounting and two stud mounting as shown in Figure 4 and Figure 5. However this can change based on site condition without affecting the functionality of the system.
- ❑ 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.
- ❑ Mount it away from sources of liquid ingress.
- ❑ If The X-ray unit is stored below 10° C , time must be allowed for X-ray unit to reach room temperature before connecting it to the mains voltage.
- ❑ Make sure that wall is levelled in both vertical and horizontal direction using surface level.
- ❑ Make sure that there shall be no electrical wiring conduits running around the area to be drilled for the installation bolts.

Horizontal direction

Figure 2

vertical direction

Figure 3

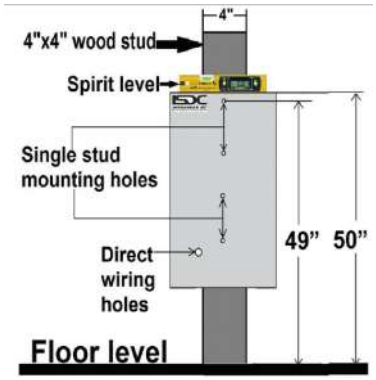


Figure 4

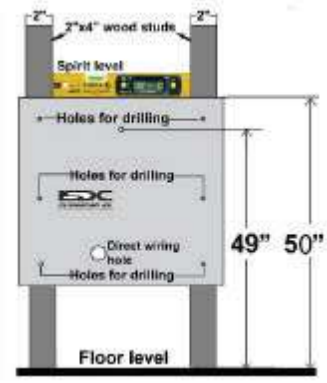


Figure 5

CAUTION

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.

4.3.3 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.

4.4 Support Load Requirements

The Intraskan DC is designed to mount on a single wood 4" x 4" wood stud and two wood 2" x 4" wood studs that are spaced 16" on center and drywall or equivalent wall support.

The wall support and mounting hardware for the Intraskan DC must withstand 150 pounds shear load, and a withdrawal force at each of the mounting bolts of 800 pounds. The wall fabrication and attachments to the building structure must be capable of withstanding a load moment of 1100 pounds.

4.5 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	110 VAC +/- 10%	Exposure Current	8 Amp
Standby Current	0.25 Amp Max.	Main Fuse Rating	10 Amp

4.6 Wiring Length and Gauge Requirements

Maximum length of wire and minimum gauge wire (AWG) from the power panel box to the Base Unit.

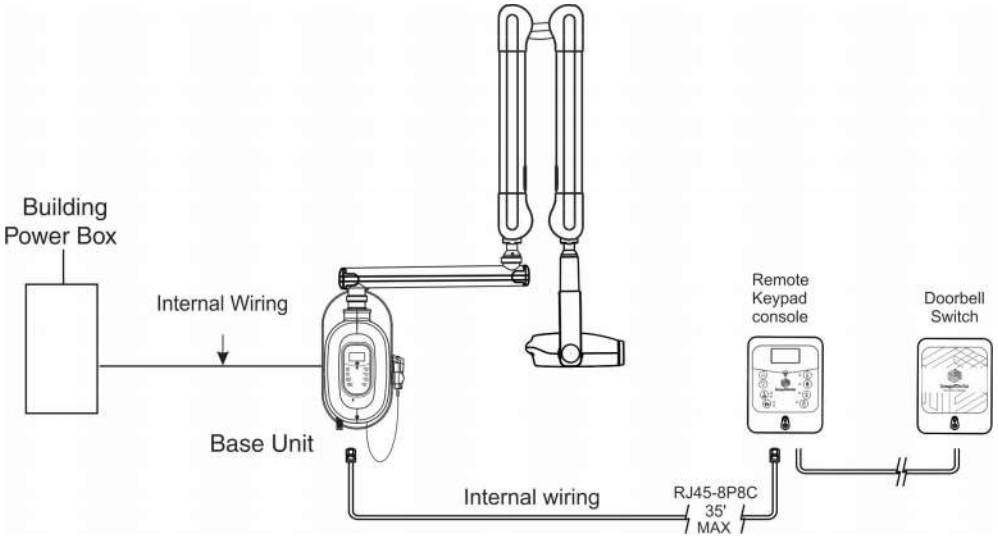


Figure 6. Intraskan DC external wiring Schematic

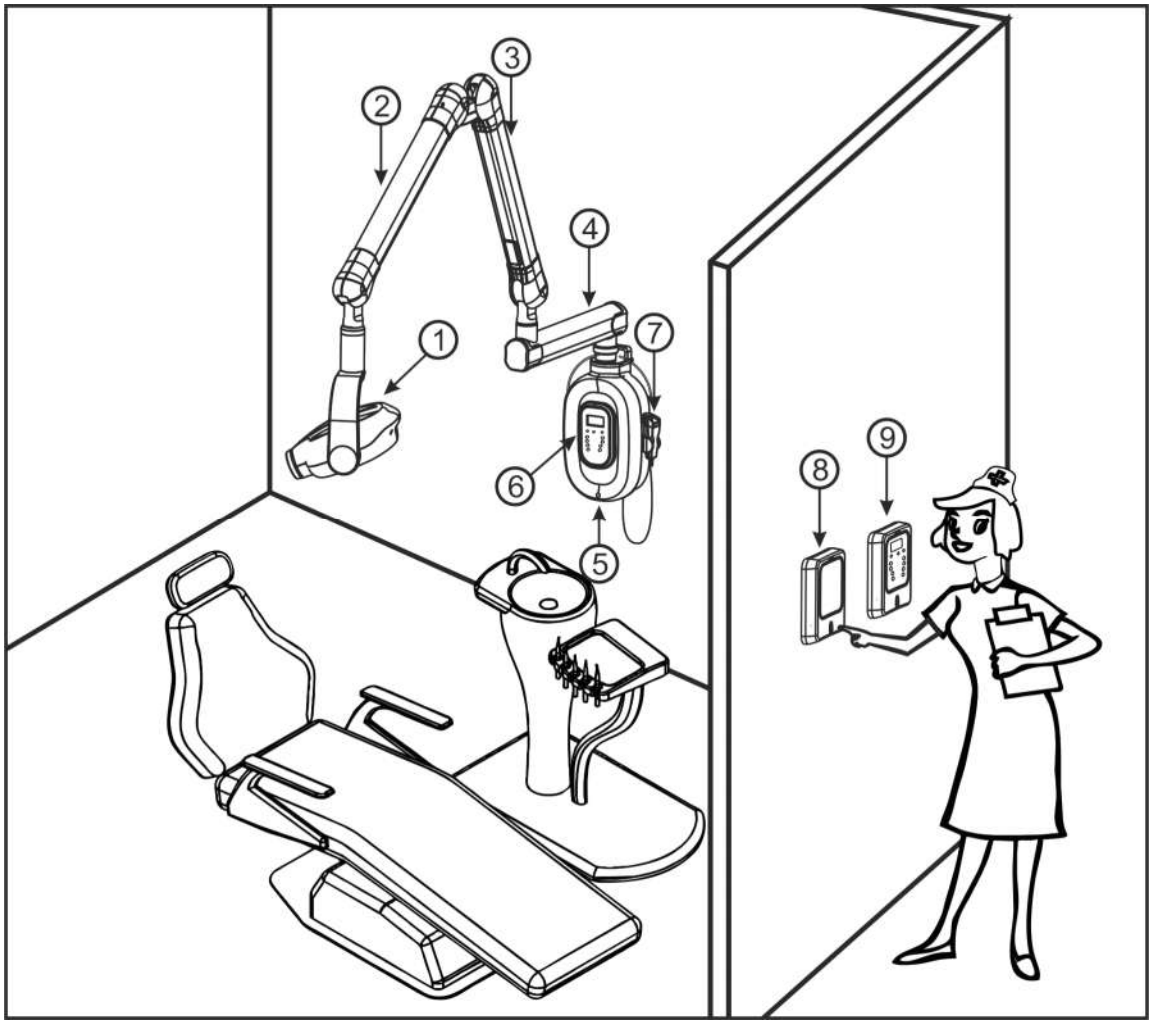
Note -1

Maximum Length	Minimum Size
0-50 feet	14 gauge minimum
50-100 feet	12 gauge minimum
100-150 feet	10 gauge minimum
150-250 feet	8 gauge minimum
250-400 feet	6 gauge minimum

When using Remote console configurations recommended cable length (for 8P8C, 6P4C and 3 wire) is 35' maximum.
No crossover in any of the RJ45 and RJ14 connector cables used for remote console configuration(i.e,.1 to 1 connections).

4.7 Included System Components

Figure 7 shows the major components and accessories included with a wall mounted Intraskan DC. Verify that all listed items were received for the unit. If any item is missing, take appropriate action to get the missing parts.



1	Tube Head
2	Horizontal Arm
3	Vertical Arm
4	Straight Arm
5	Base Unit
6	Control Console with Cable
7	Exposure switch
8	Doorbell Switch
9	Remote keypad console

Figure 7:Typical Wall Mounted Intraskan DC Installation

5 Installation Procedure Summary

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

1. Unpacking.
2. Base Unit fixing using Wall Mounting Options
   a. Single stud (4" x 4") Installation.
   b. Two stud (16" on Center) Mount Installation.
3. Input wiring.
4. Install the Straight Arm onto the Base Unit.
5. Install the Scissor Arm with Tube Head onto the Straight Arm.
6. Scissor-arm cable connections.
7. Remote console & Doorbell switch Configuration(Optional If required)
8. Perform operational check procedures to make sure the Intraskan DC operates properly after installation.

Remove all the sub assemblies from the packing box and keep them on the plain surface.

5.1 Base Unit Mounting

Intraskan DC Wall mount Unit comes packed in Single stud mounting configuration. Follow the steps mentioned below to fix the base unit.

5.1.1 Single stud mounting

5.1.1.1 Marking the drill locations:

- Fix the base unit on the 4"x4" wood stud as per the steps given below:
- Place the template on the wall aligning to the centre of the 4"x4" wood stud as shown in Figure 9 .

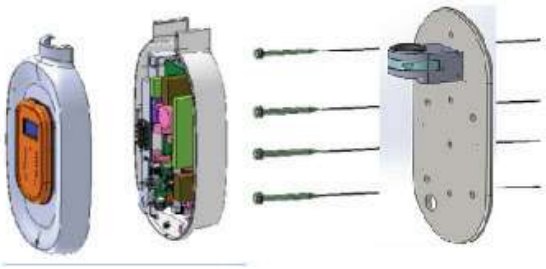


Figure 8: Exploded view of base unit in single stud fixing

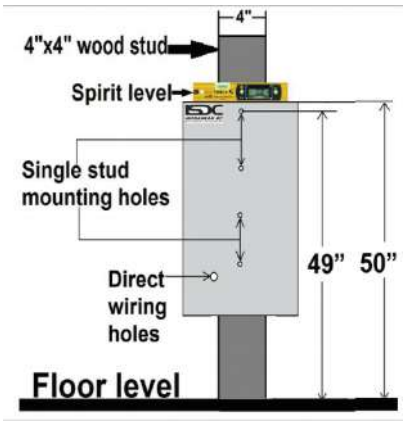


Figure 9: Mark and drill 4 mounting holes using 5/32" wood drill bit

- Place the template such that the top surface of the template is at the height of 50" from the floor as shown in Figure 9 .
- Ensure the level of template using spirit level as shown in Figure 9 .
- Mark the 4 drilling points and direct wiring hole as shown in Figure 9 .

- Drill pilot hole using 5/32" wood drill bit to the depth of approximately 4".
- Drill the wiring hole.

5.1.1.2 Base plate mounting:

- Route the input power cable and communication cable(if available) through the hole provided for wiring on the base plate and fix the base plate on the wall with 4 no's of M10 wood screws along with M10 plain washer using 17mm box spanner as shown in Figure 10 . Do not tighten the screws completely.
- Using level indicator check and adjust the level of the base plate as shown in Figure 11 . Reconfirm the level and tighten all the wood screws using 17 mm box spanner as shown in Figure 12 .
- Install power and control wiring, following all local codes for electrical work. Pull out the power cable and communication cable(if used) from the wall as shown in Figure 11 .
- Fix the base unit to the base plate with 6 no's of M3x14 socket head screws and M3 plain washers using 2.5mm Allen key as shown in Figure 13 . Fix the ground wire coming from terminal block to the ground location with M3x6 HSHC screw and M3 plain washer using 2.5mm allen key as shown in Figure 13 Reconfirm the level of the base plate.

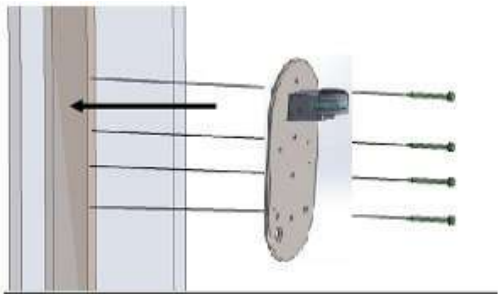


Figure 10: Fixing of Base Plate

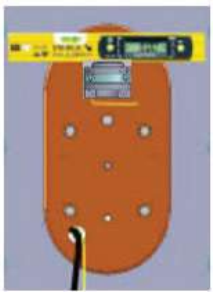


Figure 11:

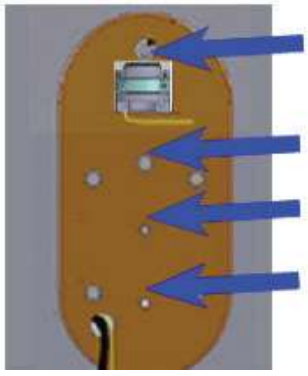


Figure 12: Check level and tighten lag screws.

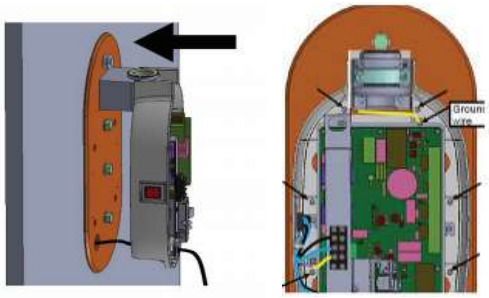


Figure 13: Fix base unit rear cover along with power board.

5.1.2 Two Stud Mounting

Install the Intraskan DC using the 16-inch on center mounting configuration method by performing the following procedures.

5.1.2.1 Marking the drill locations:

- Place the template on the wall aligning the holes for drilling to centre of the 2″x4″ two wood studs″as shown in Figure 15 .
- Place the template such that the top surface of template is at the height of 50″ from the floor as shown in Figure 15 .
- Ensure the level of the template using spirit level as shown in Figure 15 .
- Drill pilot holes at 6 locations for fixing wall plate using 5/32″ wood drill bit to the depth of approximately 4".
- Drill the wiring hole.
- Route the input power cable and communication cable(if used) along with the optional plate grounding wire through the wire routing hole as shown in Figure 16 and fix the optional wall plate on the wall with 6 no's of M10X80 wood screws and M10 plain washers using 17mm box spanner. Ensure the plate is level and tighten completely using 17mm box spanner.

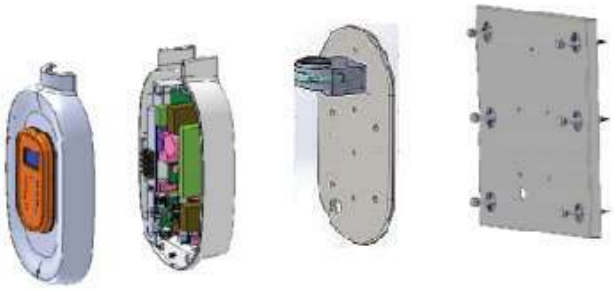


Figure 14: Exploded view of base unit parts in two stud mounting.

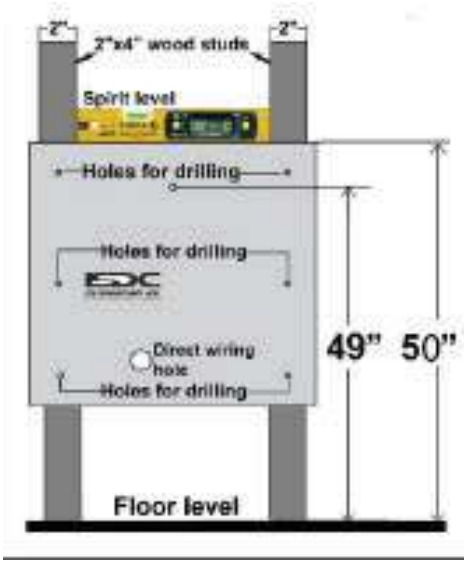


Figure 15: Mark and drill 6 mounting holes using 5/32-inch wood drill bit.

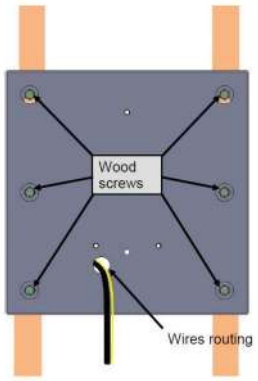


Figure 16: Fix optional plate with 6 lag screws using 17mm box spanner

- Fix the rubber plugs at all the screw locations.
- Take the base unit plate and route the cables through the hole provided for direct wiring. as shown in Figure 17 .

Note: After drilling all the holes, the wall powder should be cleaned up in all the holes. Failed to do so may result in weak joint between the Base Unit and the wall leading to potential damage to the equipment.

- Fix the base unit plate to optional plate using 6 no's of M10x22 Hexagonal head bolts along with M10 washers using 17 mm box spanner as shown in Figure 17
- Check the level of the base plate and tighten the screws using 17mm box spanner as shown in Figure 18
- Route the cable and fix the base unit to the base plate with 6 no's of M3x10 socket head screws and M3 plain washers using 2.5mm Allen key as shown in Figure 19 .
- Route ground wire of wall mount plate along with input power cable and connect nearest ground point on the power board (TB holder).
- Fix the rubber cap for the top Hexagonal bolt on the base unit plate as shown in Figure 19 .

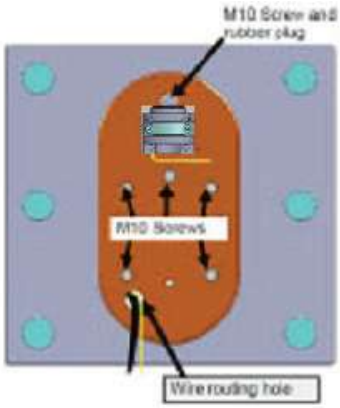


Figure 17: Fix base unit plate on optional plate with 6 M10x22 Hex head bolts.

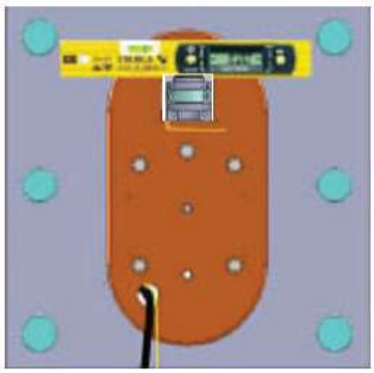


Figure 18

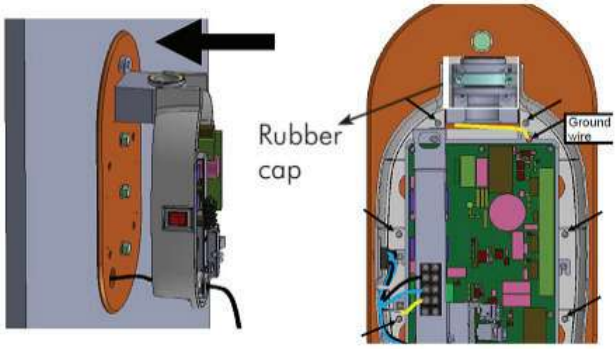


Figure 19: Fix base unit rear cover along with power board assembly and fix ground wire.

5.2 Procedure for Input wiring [For the units where Input Power Cord (Factory Assembled) not used]:

- Strip the insulation on each input wire for a length of approximately 5 mm. Using the Paladin Crimping Tool with Dies 2035 or equivalent, Crimp the three dowel studs to the Line, Neutral and Ground wires of the Input power cable from wall as shown in Figure 20 .
- Remove the cable clamp (located near the input wiring hole) by removing two (M3x6 HSHC) screws using 2.5 mm allen key as shown in Figure 22 (1). Using screw driver fix the line, neutral and earthing wires coming from the wall to the terminal block such that Line wire

Figure 20: Dowel stud and Crimping tool

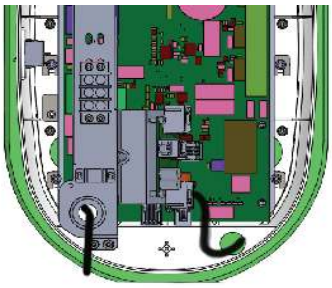


Figure 21: 2 M3x6 hex socket head cap screws (Use 2.5mm allen key)

matches with label “L”, Neutral wire matches with label "N" and Earth wire matches Label "E" as shown in Figure 22 (1)

- Fix back the cable clamp routing the input cable through the clamp with two (M3x6) screws using 2.5 mm allen key as shown in Figure 22 (1).

5.2.1 If Factory Supplied Power Cord:

- Take out the power cord assy from the packing box.

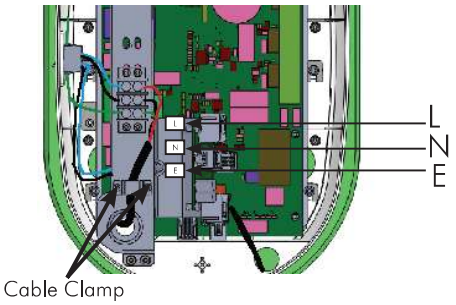


Figure 22(1): M3x6 hex socket head cap screws (Use 2.5mm allen key)

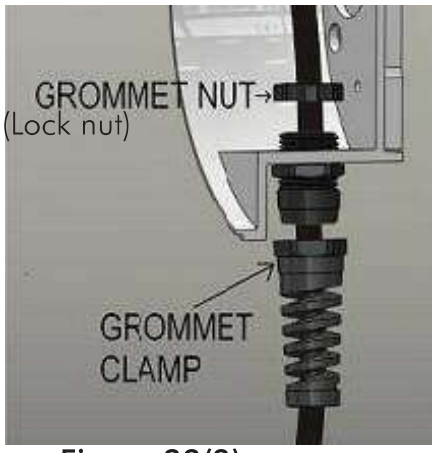


Figure 22(2)

- Insert power cord into the base unit bottom cover as shown in Figure 22 (2).
- Insert & tighten the lock nut into the cable as shown in Figure 22 (2), fix the dowel insulated lug coming from power cord to the Live (Black) neutral (White) & grounding (Green).
- Lock the locking nut to the cable gland pigtail of power cord as shown in Figure 22 (2).
- Fix the stress relieving clamp on the terminal block holder using 2 No's. of M3x4 HSHC screws as shown in Figure 22 (1).

5.3 Straight- Arm Installation:

- Take the straight-arm and remove the M6 stopper screw using 5mm Allen key and keep it separately Figure 23 .
- Loosen the 2 no's of M4 x 16 HSHC screw at the location shown in Figure- 24 by using 3mm Allen key(Ensure free movement of Friction clamp while inserting Straight Arm), Route the guide wire (straight Arm) and ground wire through the slot of Bearing Block and mount the Straight Arm on the Base unit Bearing Block
- Tighten the 2 no's of M4 x 16 HSHC Screws at the location shown in Figure 24 by using 3mm Allen key ensuring the smooth movement of straight arm.
- Check and confirm the level of the straight-arm using spirit level by rotating to all directions as shown in Figure 25 . If not level, vertical leveling can be done by adding shims between optional wall plate and base unit plate.
- Check the level of the straight arm as shown in Figure 25 .
- Horizontal leveling can be done by tilting the base unit plate.
- Connect the Ground wire (Straight Arm) to the ground point as shown in Figure 25 *(A) and* Figure 25 *(B)*

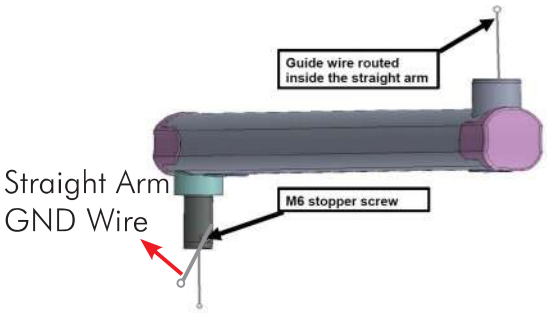


Figure 23

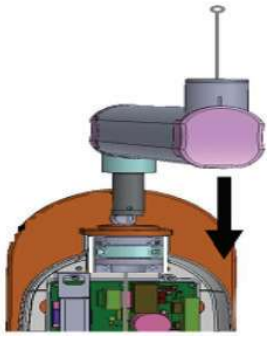


Figure 24

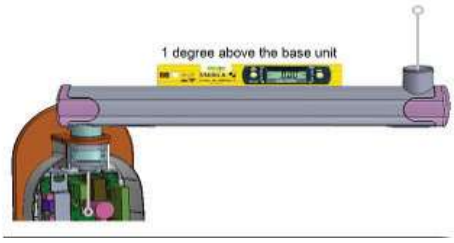


Figure 25

Route the Straight Arm
GND Wire

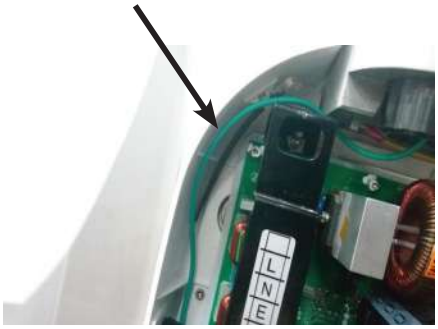


Figure 25(A)

Connect the Straight Arm
GND Wire

Figure 25(B)

5.4 Scissor Arm Installation

- Remove the end cap of the straight arm by removing 1 no. of M3 screw using Phillips screw driver as shown in Figure 26 .
- Remove the bottom caps of the straight arm by removing M3 screws(2 for each cap) using screw driver as shown in Figure 27 .
- Remove the M8 locking screw along with M8 spring washer and plain washer using 6mm Allen key as shown in Figure 28 .
- Route the guide wire to the bottom side of the straight arm Figure 29 .
- Take the scissor-arm and insert the cables into the straight arm as shown in Figure 30 .

Figure 26: Remove end cap (M3x6 self tapping Counter sunk screws)Use screw driver

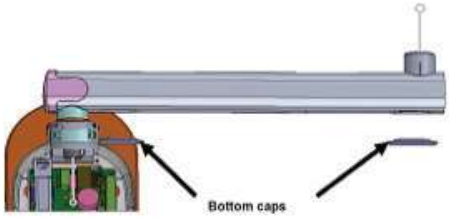
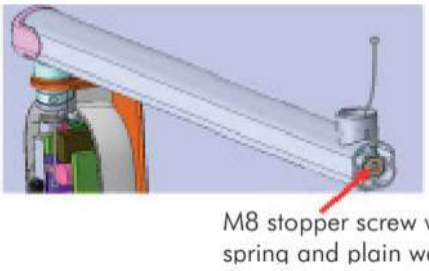


Figure 27:Remove bottom caps (M3x6 self tapping Counter sunk screw)Use screw driver



M8 stopper screw with
spring and plain washer

Figure 28

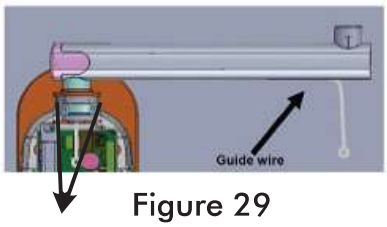


Figure 29

M4 x 16
HSHC Screw

CAUTION

Scissor Arm with tube head tied close by securing cable tie. Remove the securing cable tie only when directed during installation. The scissor arm can spring open causing injury.

Always make sure to hold both arms of the assembly simultaneously while lifting or moving the scissor arm.

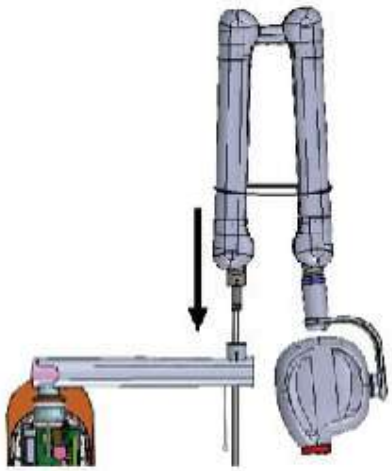


Figure 30

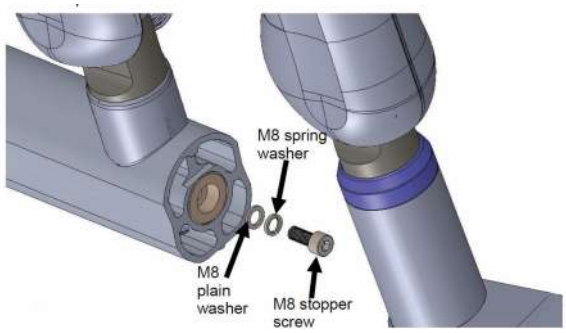


Figure 31

- Fix it on to the straight arm.
- Cut the cable tie holding the scissor- arm and open the scissor-arm.
- Rotate and position the Scissor-arm in line to the straight arm as shown in Figure 31 .
- Fix the M8 locking screw along with M8 spring washer and M8 plain washer using 6mm Allen key as shown in Figure 31 .

5.5 Scissor Arm Cables Connection

- Tie the end of the cables to the guide wire with magic twister as shown in Figure 32 .
- Route the cable into straight arm till it comes inside the base unit by pulling the guide wire as shown in Figure 33.
- Remove the guide wire / Nylon Tube and magic twister after routing the cables into the base unit.

- Route the cables on the right side of the base unit as shown in Figure 34 .
- Connect the communication cable connector coming from scissor-arm to the J2 connector on the power board as shown in Figure 34 .
- Connect the wires of the inverter cable(Non-polarised) to the J1 connector using jewel screw driver as shown in Figure 34 .
- Connect the GND wires at the screw location available at the right bottom screw as shown in Figure 34 .
- Lock the scissor-arm cables on the cable mounts available beside the power board using cable ties..
- Fix the M6 stopper screw to the straight arm shaft using 5mm Allen key as shown in Figure 35 .

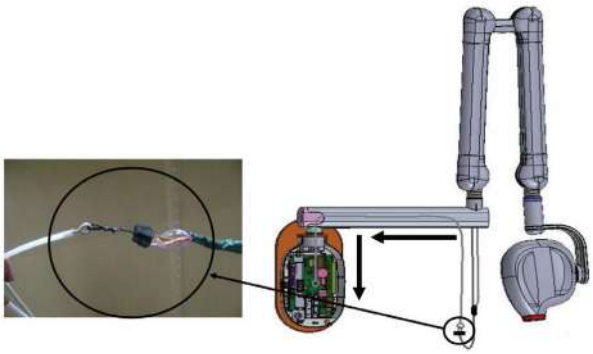


Figure 32

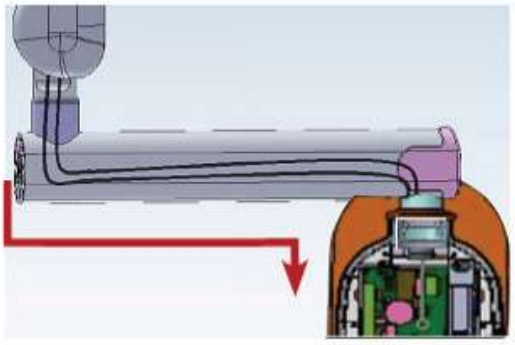


Figure 33

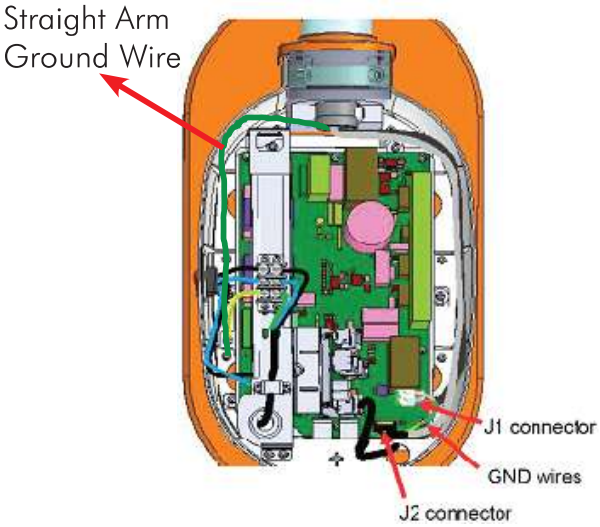


Figure 34

Lay cables flushed along the right inner side. Carefully pull any excess length.

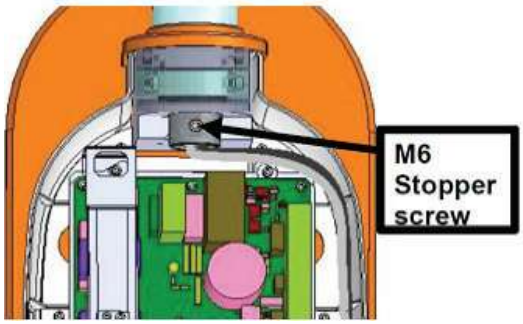


Figure 35

5.6 Ground Connection Check:

Using a Multimeter, check the continuity between the following points as shown in Figure 36 :-

1) Between Ground point of power cord and Tube Head inner Cone metal part,

2) Between Ground point of power cord and Scissor Arm Guide rod

3) Between Ground point of power cord and Base Unit Wall mounting plate as shown in Figure 36 .

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

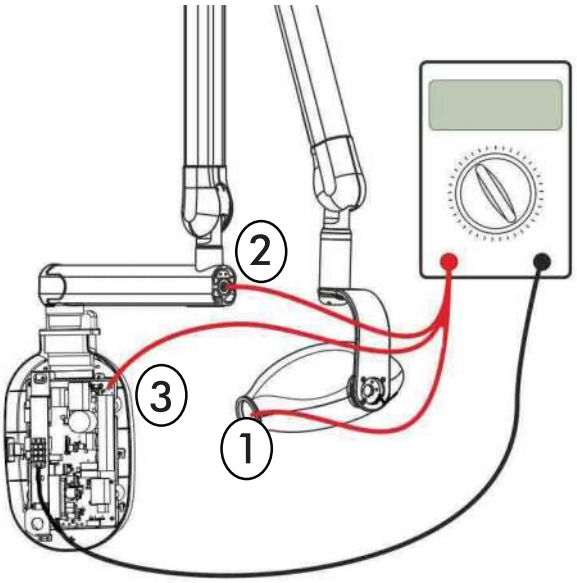


Figure 36: Check the continuity of ground connection

5.7 Remote console and Door bell switch Installation (Optional):

- Take the remote console template from packing box and fix it at the desired location on the stud.
- Confirm the level of the template using spirit level. Mark the locations for the 2 mounting holes on the template and mark the wiring hole also at the locations shown in Figure 37 .
- Drill the 2 mounting holes marked using 5/32" drill bit to the depth of 1.26" and drill the direct wiring hole(>1.5" dia).
- Take the remote keypad console assembly. Pull out the console from the slot and remove 4 No's. M3x6 socket head screw with M3 plain washers using 2.5 mm allen key as shown in Figure 38 .
- Lift the cover along with console assembly and disconnect the console cable from the J8 connector of the board and keep the parts aside as shown in Figure 39 .
- Take the base plate of remote keypad console and route the remote console communication cable through the hole provided on the plate and fix the remote console plate on the stud with 2 No's of 6.3x32mm self tap wood screw using 8 mm box spanner at the locations shown in Figure 40 .

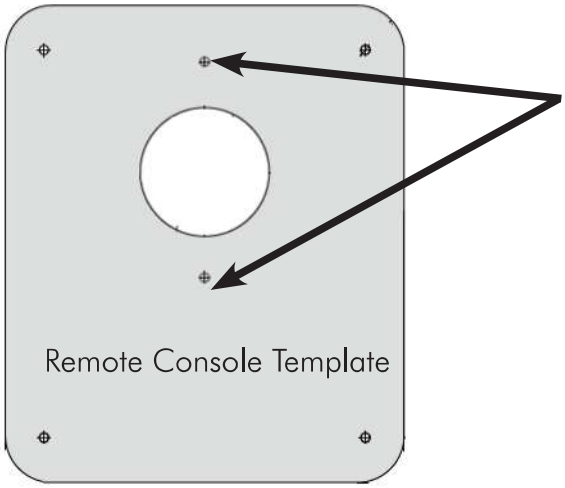


Figure 37: 2 Mounting holes

Figure 38-: 4 M3x6Hex socket head cap screws

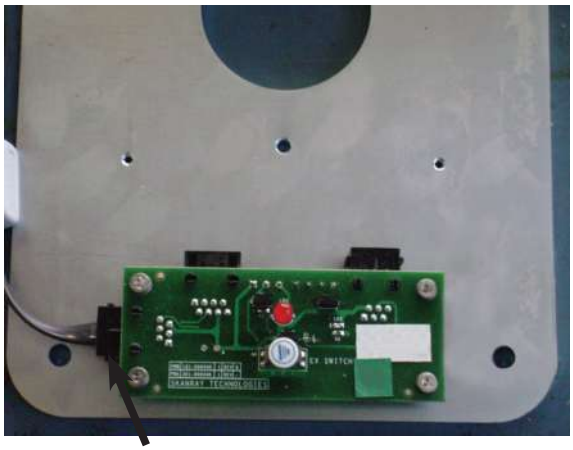
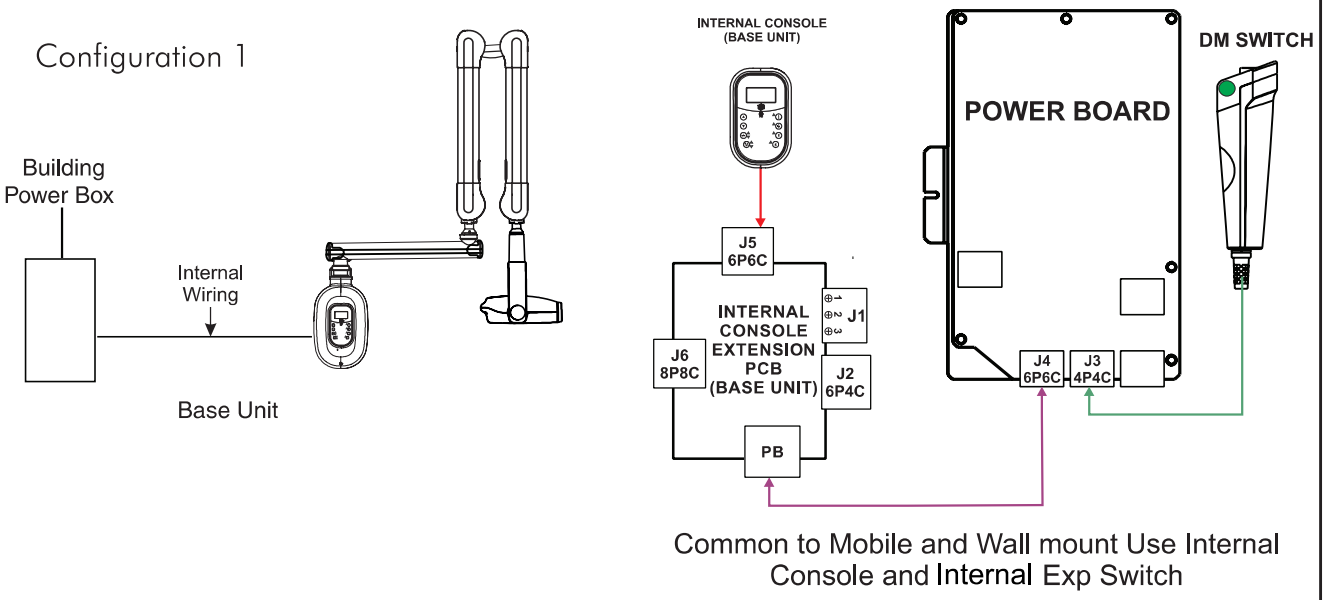


Figure 39: Console cable

- Connect the remote console communication cable as per the connections shown below in "5.8 Intraskan DC Console configurations:".
- Follow the same steps for fixing the Door bell switch assembly as above if door bell switch is used.
- Connect the external console cable to J8 connector as shown in Figure 39 and close the cover of the remote console by fixing 4 No's. M3x6 socket head screw using 2.5 mm allen key as shown in Figure 38 . Fix back the remote keypad console in the slot of the cover.

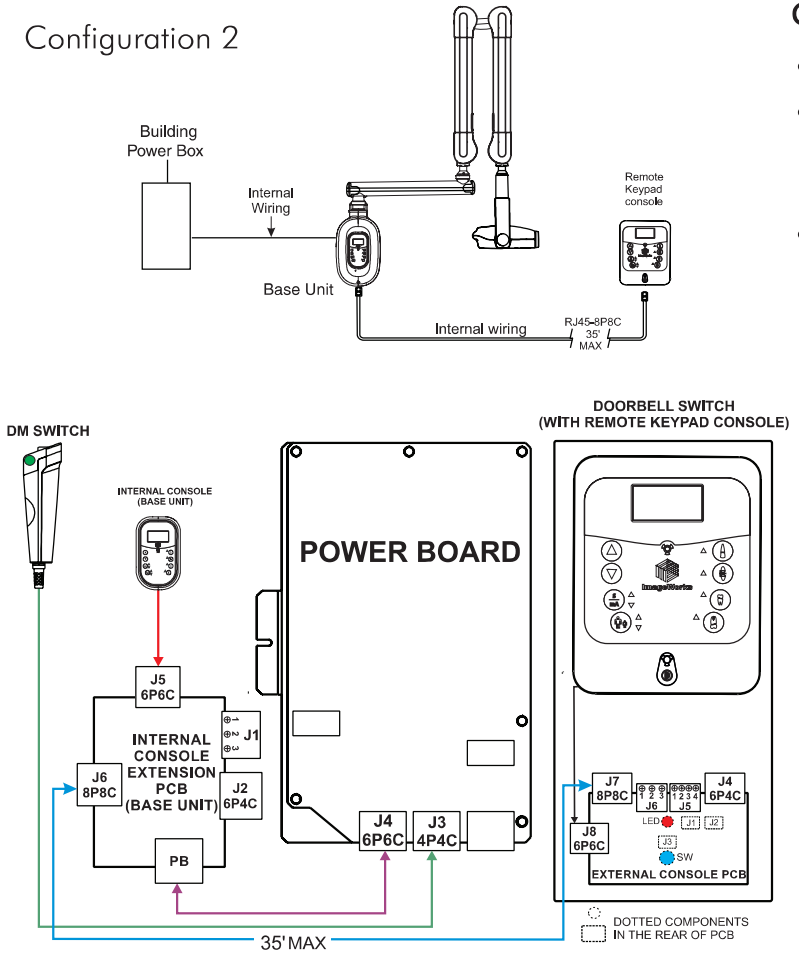
Figure 40: Wire routing hole & 2 mounting holes

5.8 Intraskan DC Console configurations:



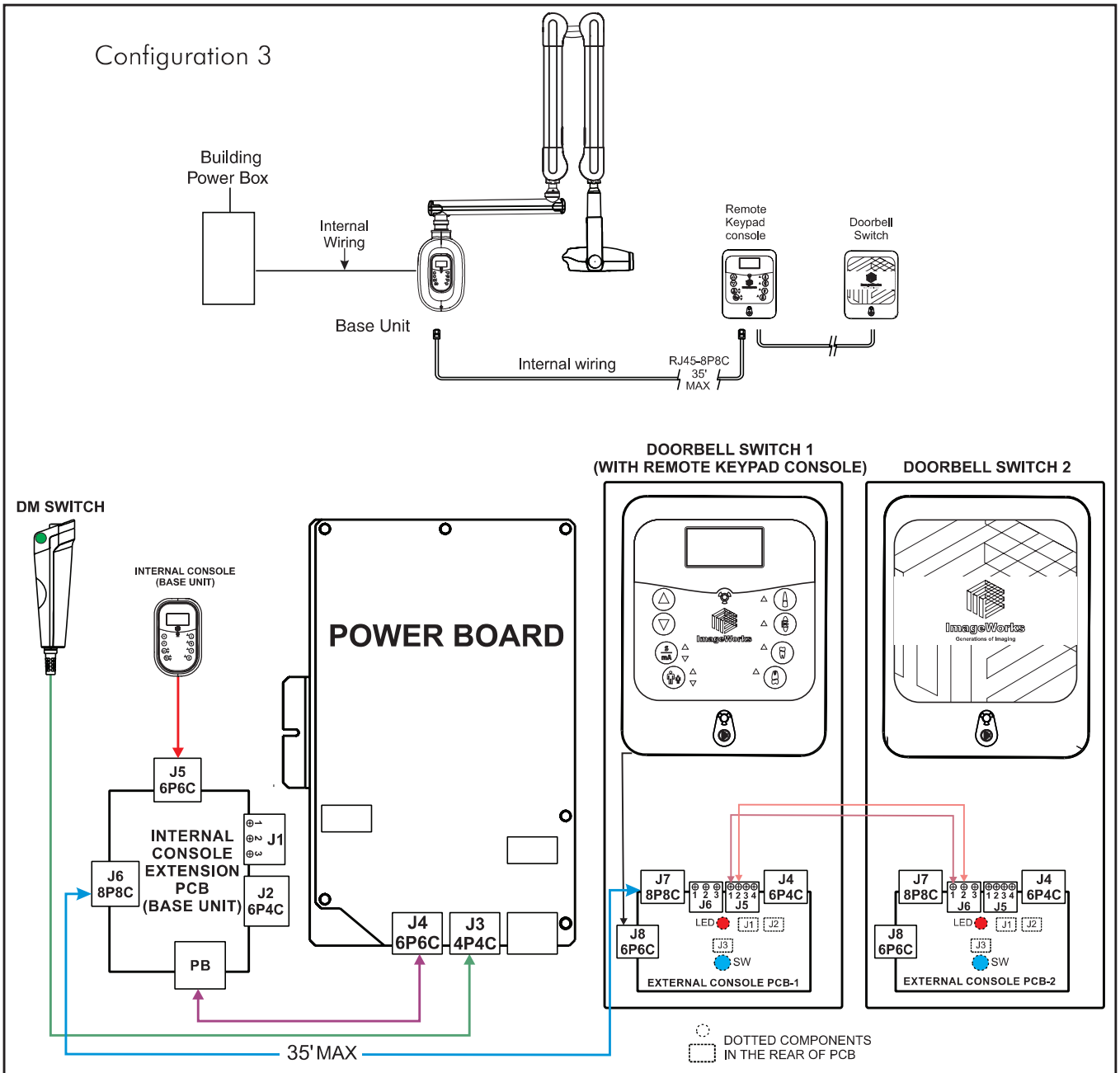
Configuration-1:

Can use Internal Console and Internal Exposure Switch.



Configuration-2:

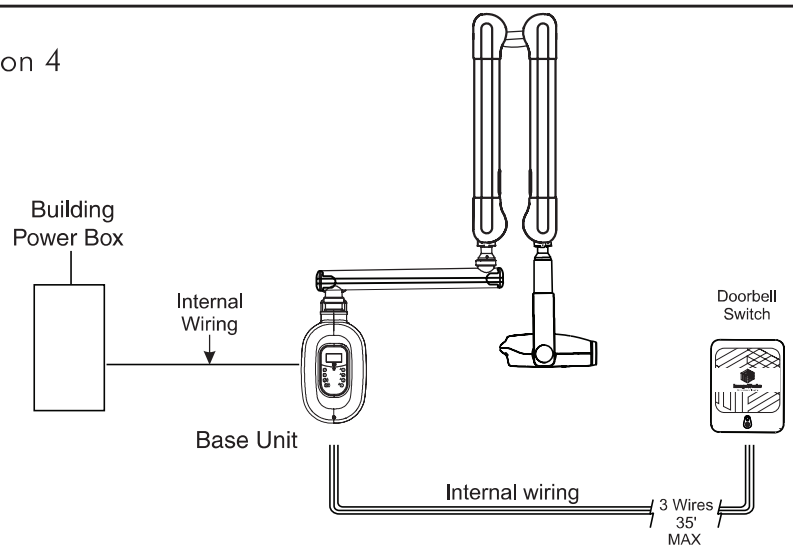
- 8P8C with single door bell switch.
- Can use two Consoles with Internal Exposre Switch and single door bell switch.
- J3: Open and J1, J2:Short on external console PCB.

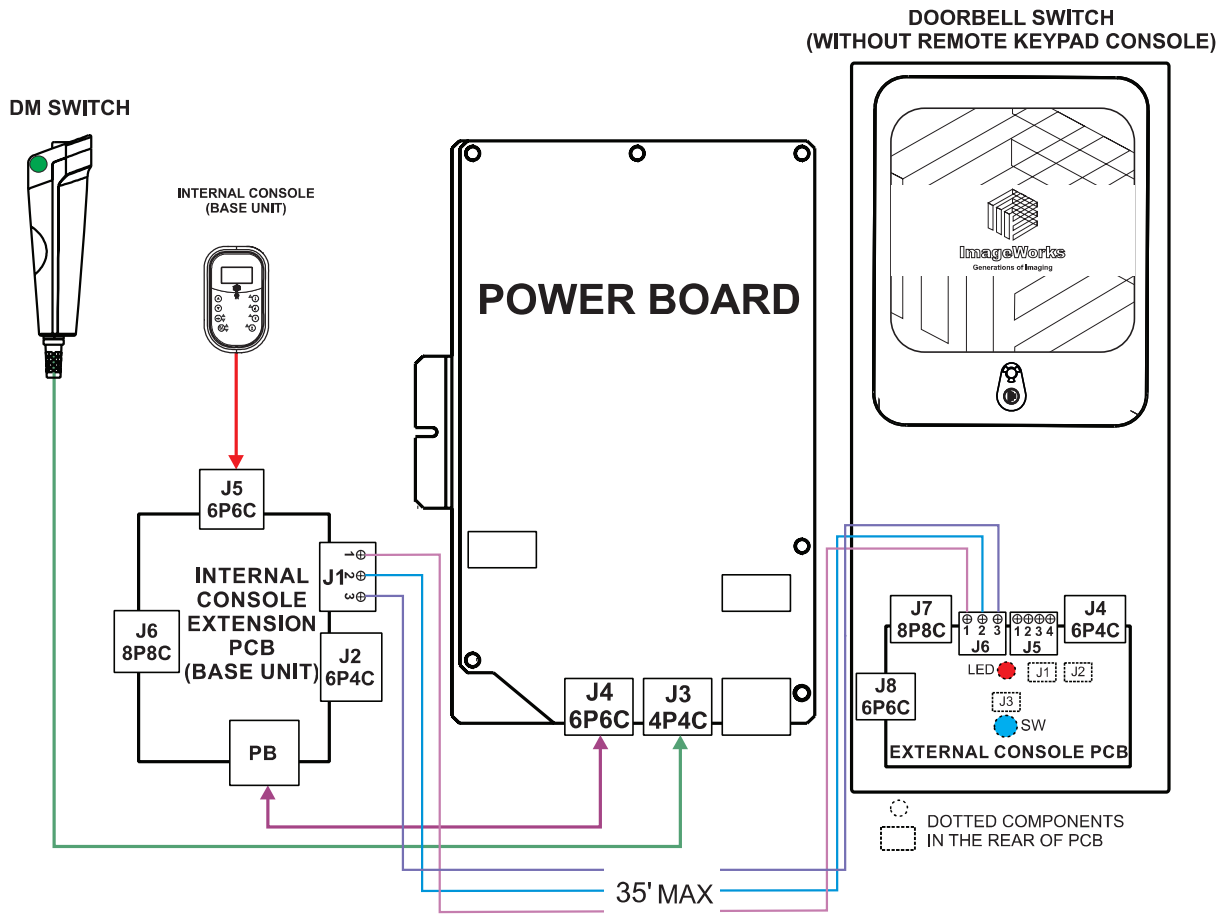


Configuration-3:

- 8P8C with door bell switch.
- Can use two Consoles with Internal Exposure Switch and double door bell switch.
- J1,J3 Open, J2 Short on External console PCB-1.
- J1,J3 Open, J2 Short on External console PCB-2.

Configuration 4

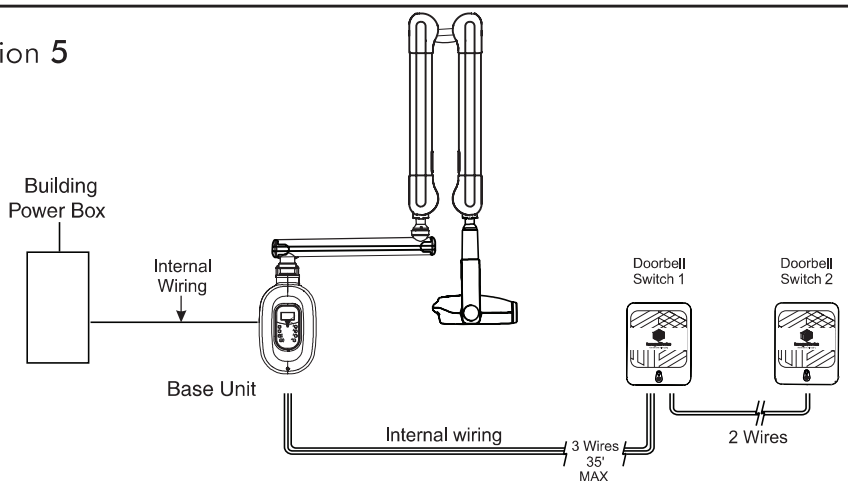


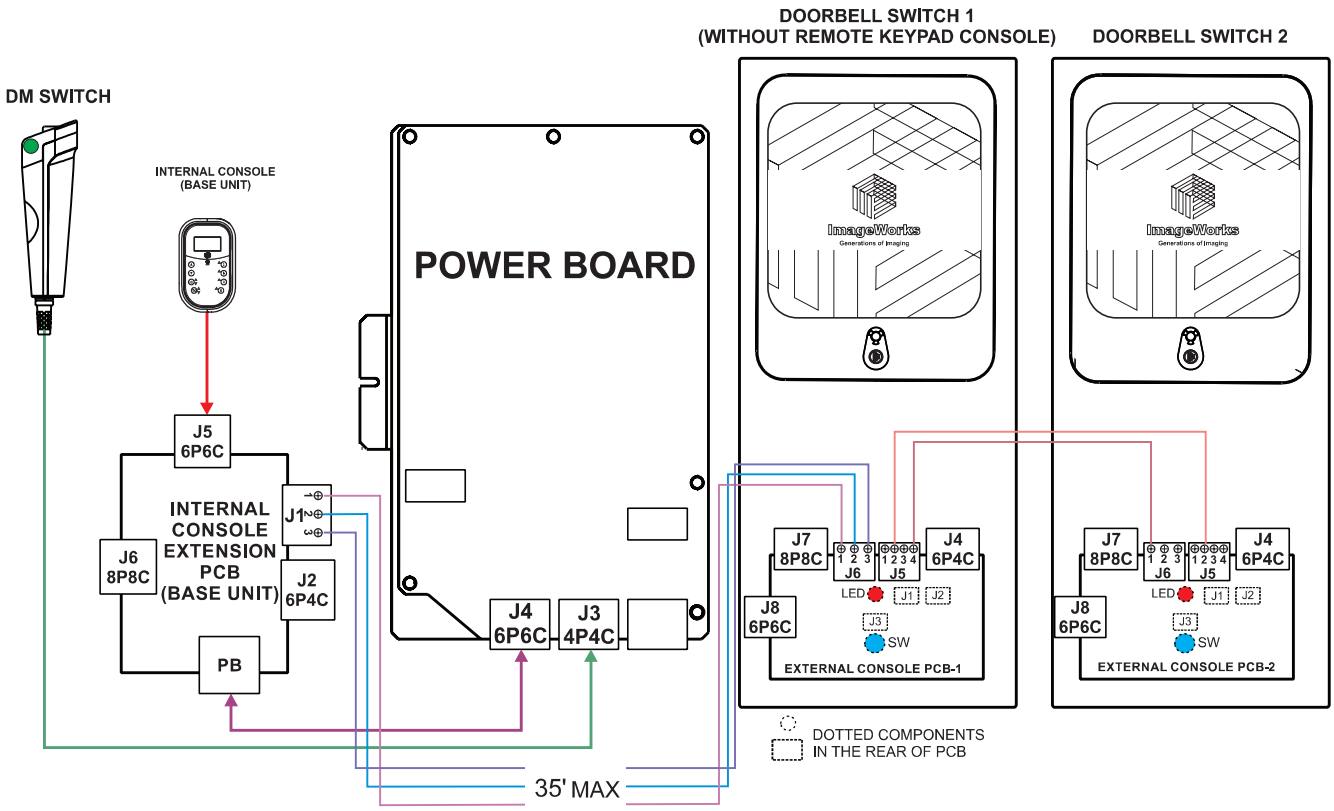


Configuration-4:

- 3 WIRE WITH SINGLE DOORBELL SWITCH.
- J1, J3 are open while J2 is shorted on External console PCB.
- Can use Internal Console with Internal Exposure Switch and single door bell switch.

Configuration 5

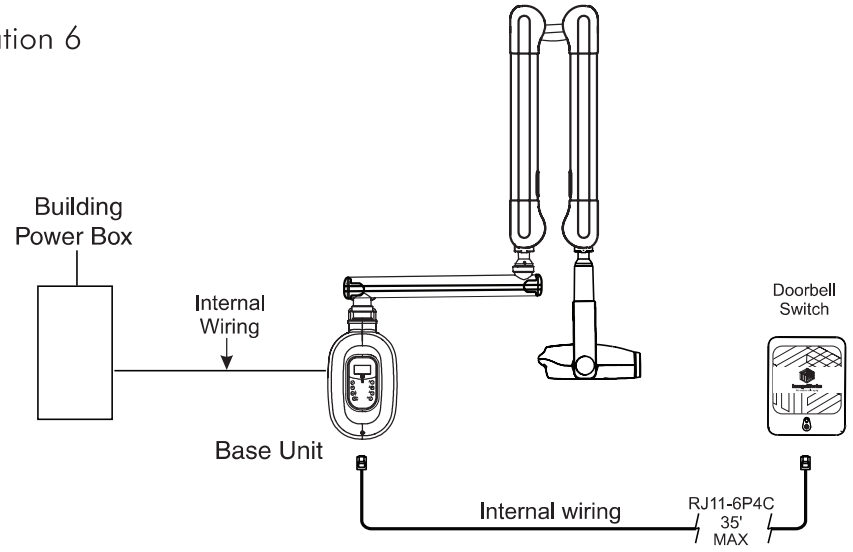


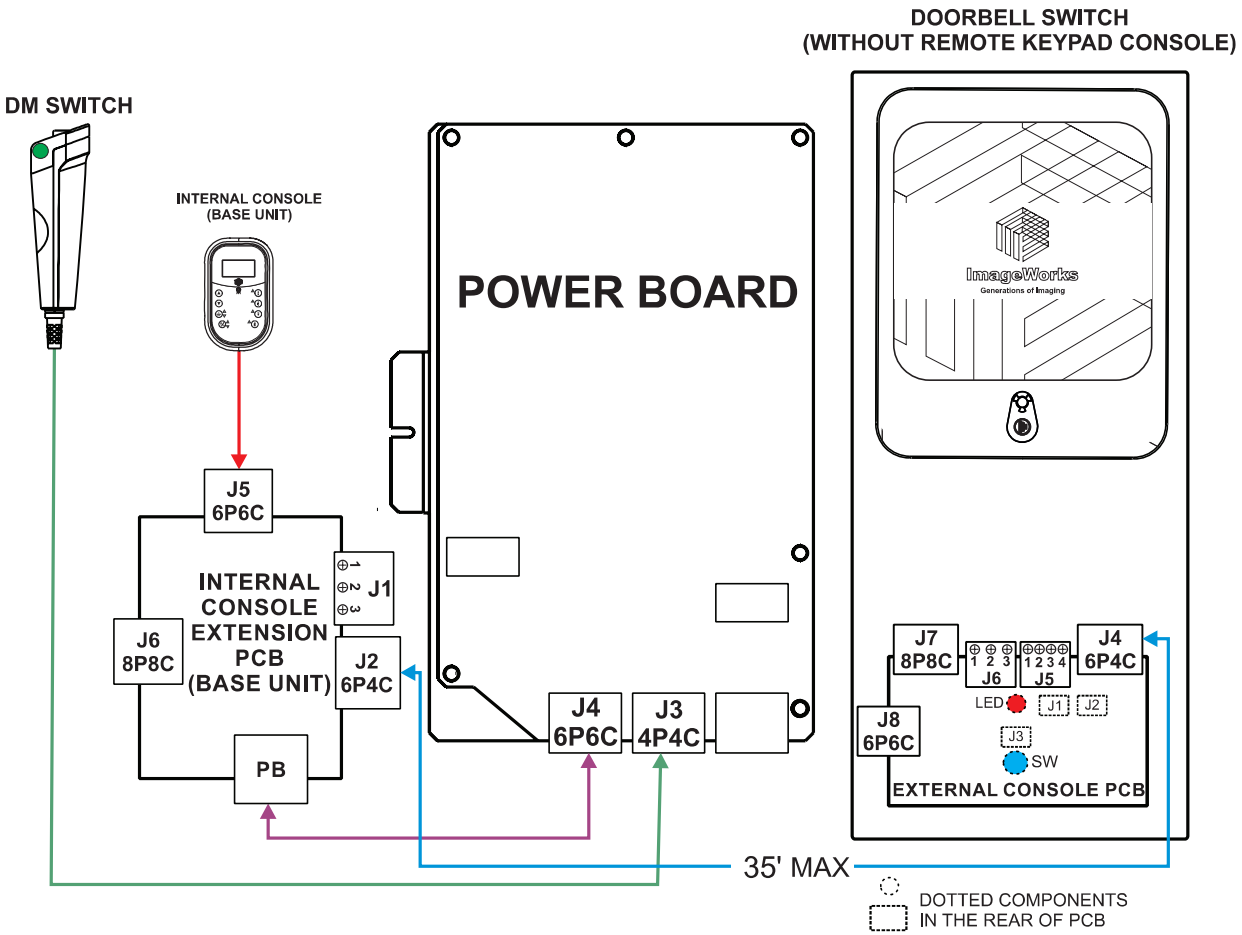


Configuration-5:

- 3 WIRE WITH DOUBLE DOORBELL SWITCH
- Can use Internal Console with Internal Exposure Switch and double door bell switch.
- J1,J2 and J3 Open on External console PCB-1.
- J1,J2 and J3 Open on External console PCB-2.

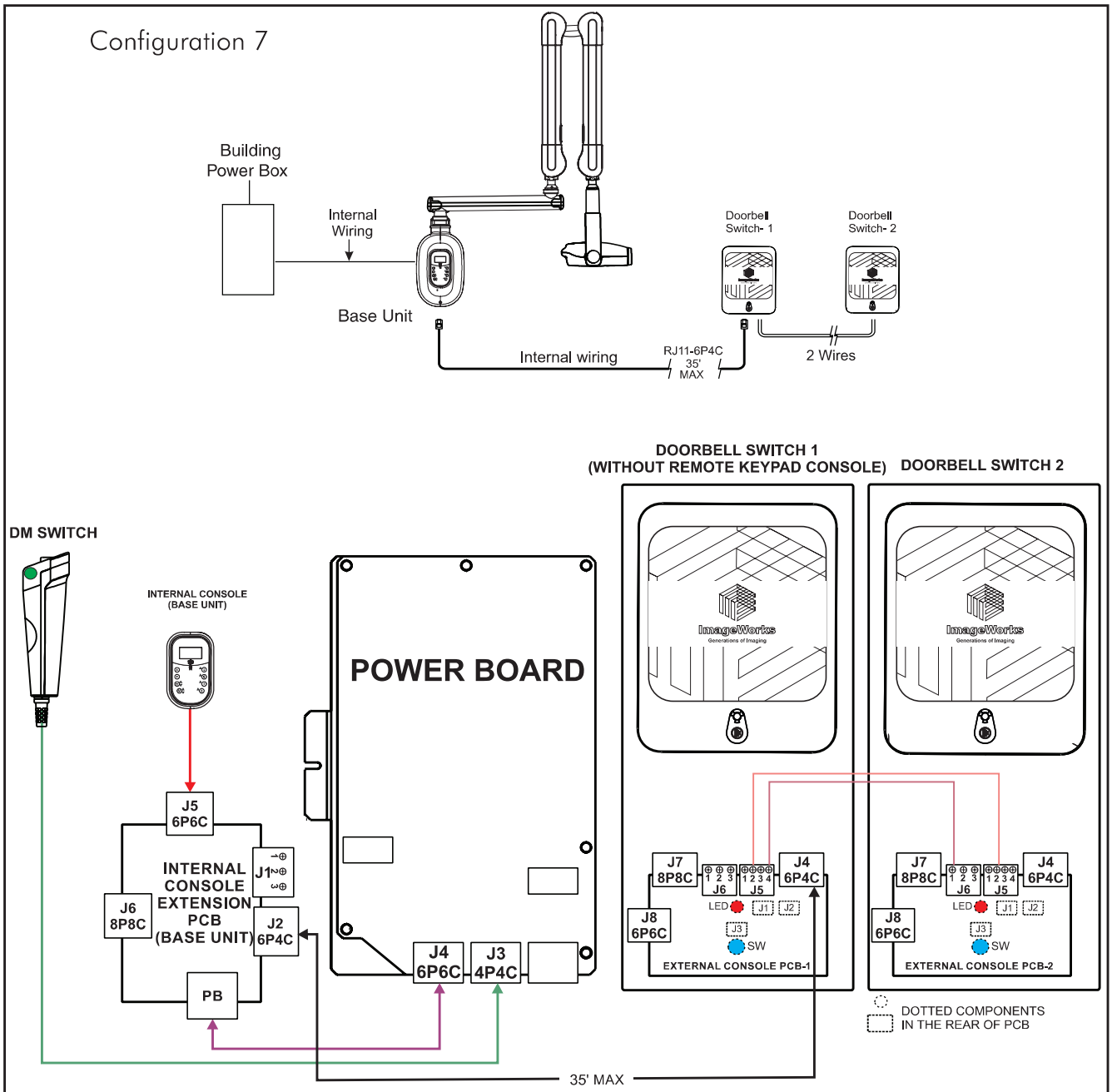
Configuration 6





Configuration-6

- 6P4C WITH SINGLE DOORBELL SWITCH.
- J1, J3 are open while J2 is shorted on External console extension PCB.
- Can use Internal Console with Internal Exposure Switch and single door bell switch.



Configuration-7

- 6P4C WITH DOUBLE DOORBELL SWITCH.
- Can use Internal Console with Internal Exposure Switch and double door bell switch.
- J1,J2 and J3 Open on External console extension PCB-1.
- J1,J2 and J3 Open on External console extension PCB-2.

5.9 Base unit cover fixing:

- Take the base unit cover and connect the console cable(RJ25) to the J5 connector on the communication board as shown in Figure 41 .
- Fix 2 no's of M3x6 screws and plain washers using 2.5mm Allen key as shown in Figure 42 .
- Fix KA30x25 self tapping screw using screw driver & fix the rubber plug at the screw location as shown in Figure 42 .
- Connect the exposure switch cable to the J3 connector located at the bottom side of the base unit as shown in Figure 43 .
- Fix the end cap of straight arm by fixing M3x6 self tapping CSK screw at bottom side using screw driver and fix the two bottom caps of the straight arm by fixing M3x6 self tapping CSK screws (2 screws for each cap) using screw driver as shown in Figure 44 .

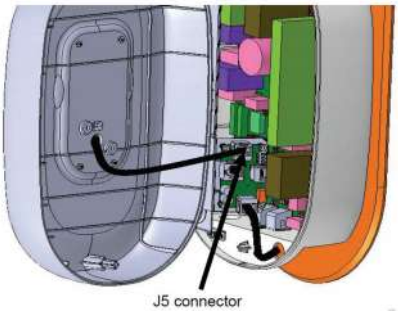


Figure 41

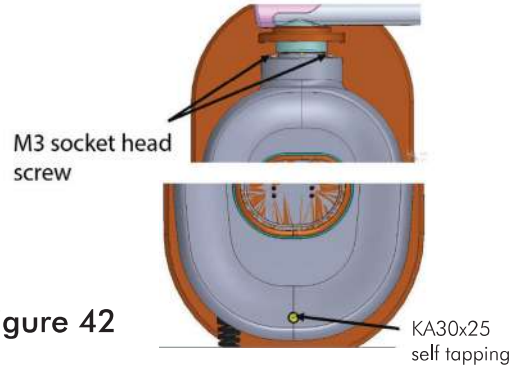


Figure 42

Figure 43: Fix exposure switch cable

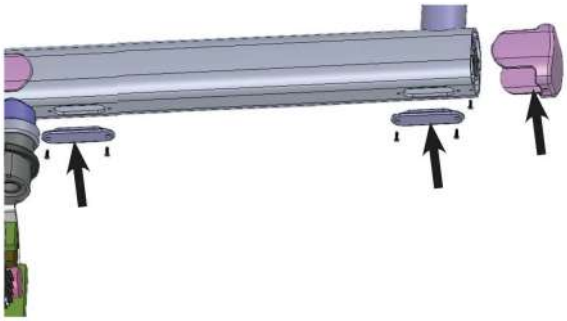


Figure 44: Fix end cap and bottom caps(M3x6 self tapping Counter sunk screws)Use screw driver.

5.10 Scissor-Arm Operation Checking

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

- Keep the Vertical Arm in vertical position and horizontal arm in horizontal position.
- Move the horizontal arm down (folding movement) in small jerk free incremental steps of approximately 10 degrees.
- 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 approximately 10° so 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.
- Refer "5.14 Mechanical Adjustments" in case of minor adjustments of scissor-arm.

5.11 Other Checks:

- Ensure that the Straight-Arm rotation is 170-190° approximately from end to end of the Base Unit.
- Ensure that the Tube Head rotation about the axis is 300-310° approximately.
- Ensure that the L arm rotation angle is 520-540° approximately.
- Ensure that the scissor-arm rotation about the straight-arm is 210-230° approximately.

5.12 Power On Check:

- For new Installation, if installation date is > 6 months of manufacturing date of Tube Head, carry out Tube seasoning procedure (5.13 X-Ray Tube Seasoning) before proceeding.
- Switch On the power and give the following exposures using internal console and exposure switch. Also give exposures using external switch configuration if installed.
    - 70kV/6mA, 2 Sec Exposure 2 Times
    - 55kV/4mA 40 ms Exposure 2 Times
- If no errors are reported, then the Unit is ready to use.

5.13 X-Ray Tube Seasoning

- In case of non-usage for long period (>6months) 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.

Table 5.14-1: Tube Seasoning Protocol

kV	mA	Time (ms)	kV	mA	Time (ms)	kV	mA	Time (ms)
55	4	40	60	4	40	70	4	40
55	6	40	60	6	40	70	6	40
55	8	40	60	8	40	70	8	40
55	4	500	60	4	500	70	4	500
55	6	500	60	6	500	70	6	500
55	8	500	60	8	500	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.

5.14 Mechanical Adjustments

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

Adjustment of Spring Tension of Scissor Arm:

- Remove the rectangular caps from the spring adjusting windows of the Scissor Arm as shown in Figure 46 .

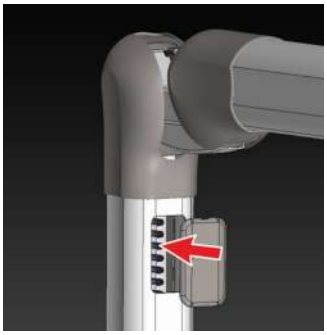


Figure 45

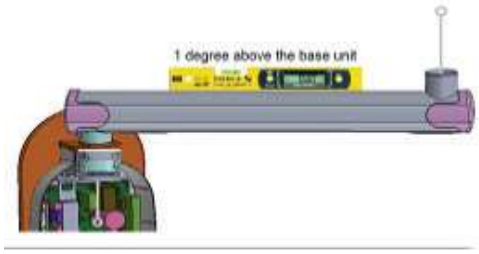


Figure 46

- Check the Straight-Arm level using spirit level. The Straight-Arm end should be at an angle of 1° gradient approximately above the base unit end as shown in Figure 45 . If the angle is less then check the Straight-Arm & the Base Unit for wear out.

Step 1:-

- Keep vertical arm in vertical position and the horizontal arm in horizontal position as shown in the Figure 47 (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 46).

Step 2:-

- Keep the Scissor Arm with both arms vertical (folded /locked position) as shown in the Figure 47 (illustration 1). The Scissor Arm should stay in its locked position without moving or drifting. If unstable, replace the Scissor Arm.

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

Step 3:-

- Keep the vertical arm in horizontal position and horizontal arm in vertical position as shown in the Figure 47 (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 46 .

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 as shown in Figure 46). 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 as shown in Figure 46) using screwdriver through the spring adjustment window. Repeat the "Movement Check-1" procedure to reconfirm or fine tune adjustments.

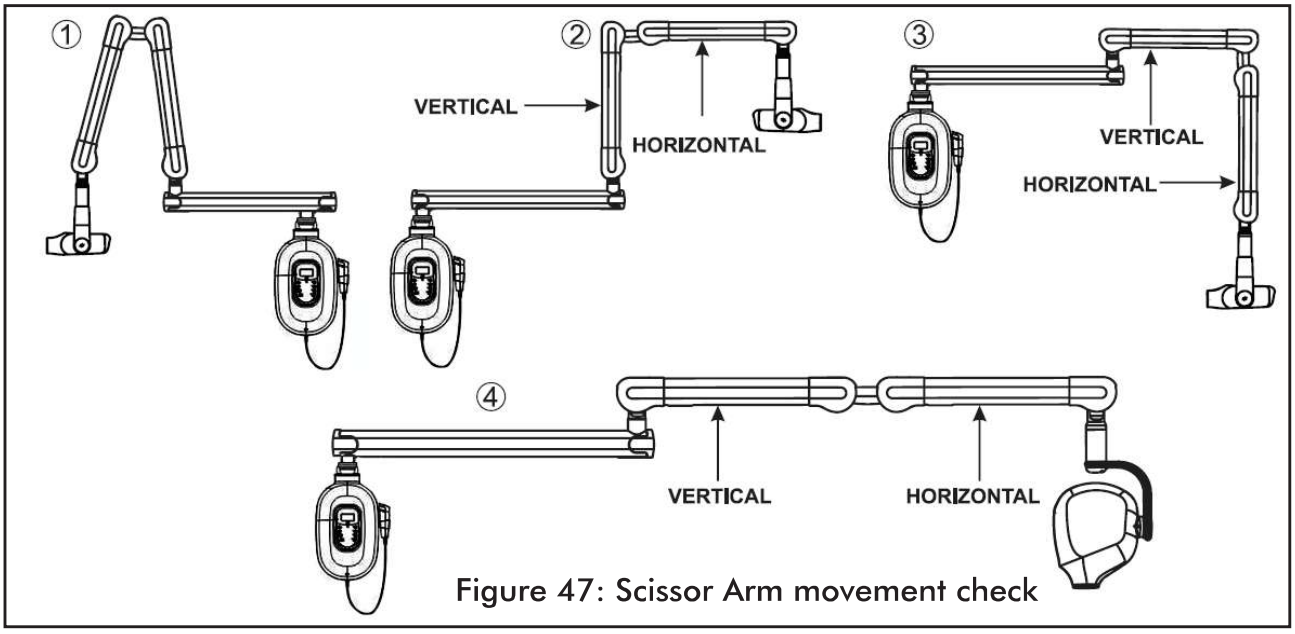


Figure 47: Scissor Arm movement check

Movement Check-2:

- Move the Scissor Arm very slowly in small increments from step 3 to fully expanded position as shown in illustration 4 of Figure 47 . 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 no's rectangular S-ARM caps to the spring adjusting windows of the Scissor Arm.

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

Table 7-2: TROUBLE SHOOTING CHART (ELECTRICAL)

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

	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 "5.14 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 remote Keypad Console fails	Remote keypad console
If door bell Switch fails	DC Door bell Switch
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 the Straight-Arm fails/is damaged	Straight-Arm
If input switch fails	Input Switch
If Console extension board-Internal fails	Console extension board Internal
If console extension cables 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 by rotating anti-clockwise (if used).
- Remove the “rubber fixing ring” on the Tube Head as shown in the Figure 48 .
- Push the “rubber dial ring” out of the slot as shown in the Figure 49 .
- 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 No's of M3X6 button head screws as shown in Figure 50 using 2 mm allen Key.

Figure 48

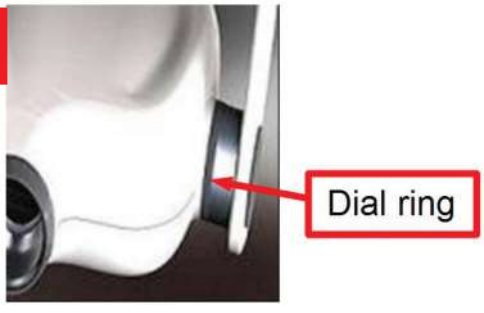


Figure 49

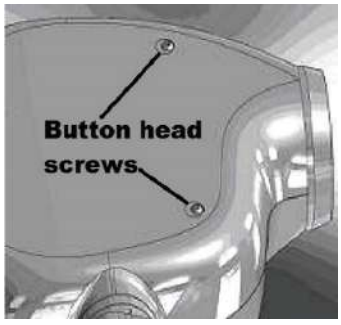


Figure 50

- Remove the 2 No's of KA30x8 self tapping pan head screws using phillips screw driver and remove the bottom cover as shown in the Figure 51 .
- Remove the 4 no's of KA30x16 self tapping pan head screws with M3 plain washers using phillips screw driver as shown in the Figure 52 and remove the top cover from the Tube Head.

Figure 51

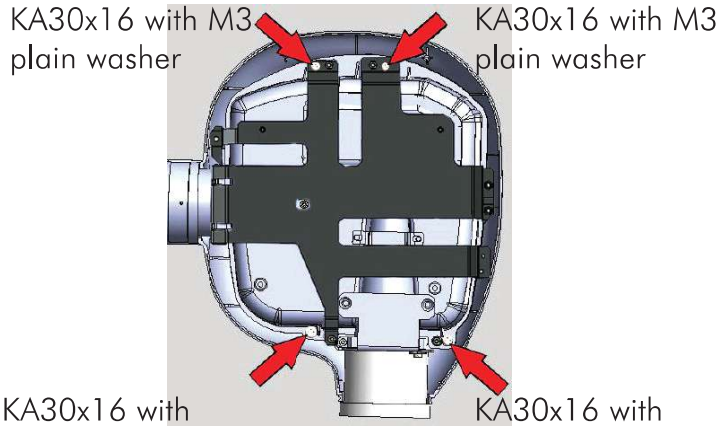


Figure 52

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 KA30x25 self tapping pan head screw using phillips screw driver as shown in Figure 53 .
- Lift the rubber cap on the top and remove the 2 no's of M3X6 Hex. socket Head cap screws with M3 plain washers on top using 2.5 mm allen key as shown in the Figure 54 .

Figure 53

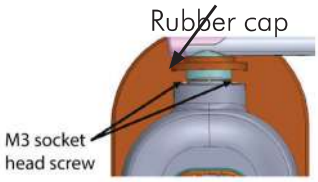


Figure 54

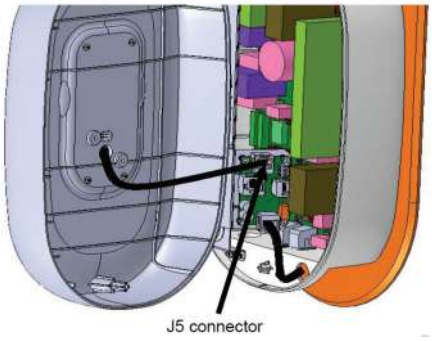


Figure 55

- 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 55 .

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 as shown in Figure 56 .
- Disconnect the communication cable connector (Pressing the lock) from J2 connector of the power board as shown in the Figure 56 .

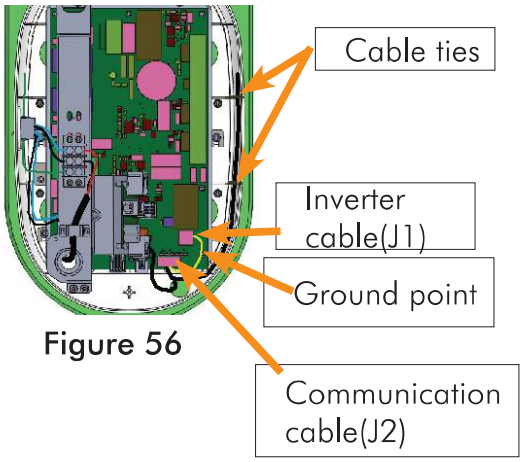


Figure 56

- 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 56 .
- 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 56 .
- Use an electro static 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 57 .

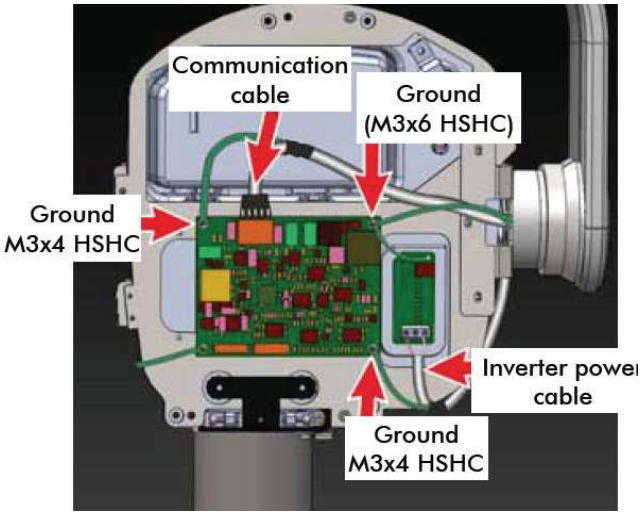


Figure 57

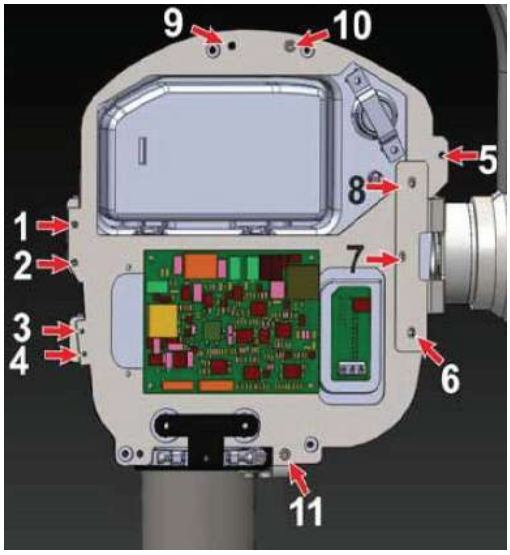


Figure 58

- Disconnect the INV power cable from the sealing board 3 pin connector -pins 1 & 3 as shown in the Figure 57 (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 57 and put back the screws in its location.
- Now the communication and INV power cables are disconnected from the HV Tank.

8.2.1.5 HV Tank removal

- To remove the HV Tank from the clamp, remove the 5 no's of (M3X6 Hex. socket button head) screws (from 1 to 5 as shown in Figure 58) using 2mm allen key.
- Remove 3 no's of (M3X6 Hex. Soc. Head cap) Screws (From 6 to 8 as shown in Figure 58) on the top of the clamp near Tube Head arm using 2.5mm allen key.
- Remove 3 no's of (M3X16 Hex. Soc. head cap) screws (from 9 to 11 as shown in Figure 58) along with M3 plain washers & M3 nut using 2.5mm allen key and 5.5mm Nut driver.
- Keep the Tank in a clean place.

8.2.1.6 Final Steps before Removal

- Remove 2 no's of bottom caps of the straight arm by removing M3x6 screws (2 screws for each cap) using phillips screw driver as shown in Figure 60 .
- Remove front end cap of straight arm by removing one M3x6 screw at bottom side using phillips screw driver as shown in Figure 59 .

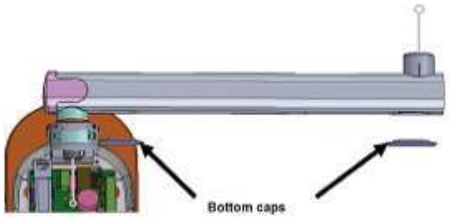


Figure 60

Figure 59

M8 Stopper screw with spring and plain washer

Figure 61

CAUTION

The scissor arm with tube head tied close by securing cable tie. Remove the securing cable tie only when directed during installation. The scissor arm can spring open causing injury.

Always make sure to hold both arms of the assembly simultaneously while lifting or moving the scissor arm.

- Remove M8x25 positive lock screw and M8 spring & plain washers from the straight arm using 6mm allen key as shown in Figure 61 .
- Lock the Scissor Arm in folded position by tying with a knot or using a long cable tie.
- Remove the M6 stopper screw from the straight arm shaft using 5mm Allen key and pull out the cable from base unit as shown in Figure 62 .
- Hold the scissor-arm firmly with both hands and slowly lift it simultaneously pulling the cables out of the straight arm carefully as shown in Figure 63 . Keep the Scissor-arm separate on a cushioned surface.

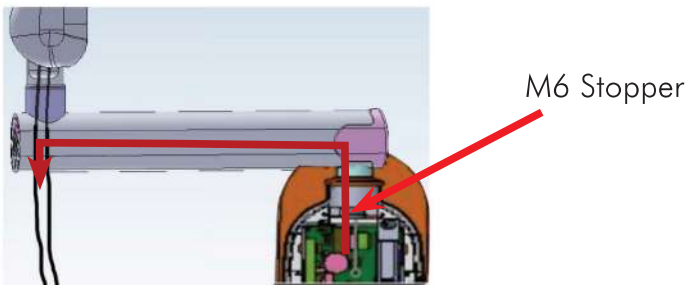


Figure 62

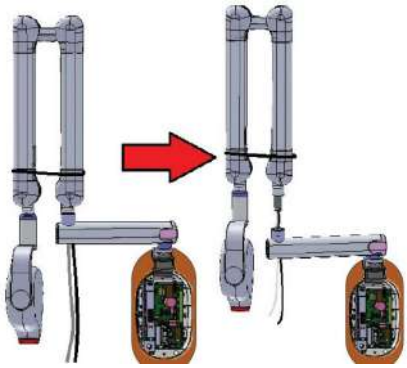


Figure 63

8.2.2 Installing the New Scissor Arm

8.2.2.1 Initial setup

- Ensure that the new scissor-arm is in locked position (folded & locked properly).
- Holding the scissor-arm close to the straight arm, insert the cables inside the straight arm (free end) through the top hole of the straight arm till it comes out at the free end of straight arm and slowly insert the Scissor-Arm assembly into the straight arm without damaging the cables as shown in Figure 64 .

CAUTION

The scissor arm with tube head tied close by securing cable tie.. Remove the securing cable tie only when directed during installation. The scissor arm can spring open causing injury.

Always make sure to hold both arms of the assembly simultaneously while lifting or moving the scissor arm.

- Rotate and position Scissor Arm in line to the Straight Arm as shown in Figure 65 (1) & fix M8x25 positive locking screw and M8 spring & plain washers to lock the Scissor Arm to straight arm using 6mm allen key as shown in Figure 65 (2).
- Route the scissor-arm cables through the straight-arm till it comes inside the base unit (Use guide wire for routing and guide with finger from the slots available bottom side of the straight arm) as shown in Figure 65 (2).
- Fix the M6 Stopper screw to the straight arm shaft using 5mm Allen key as shown in Figure 65 (2).
- Fix the end cap of straight arm by fixing M3x6 CSK screw at bottom side using screw driver and fix the two bottom caps of the straight arm by fixing M3x6 self tapping CSK screws (2 screws for each cap) using screw driver as shown in Figure 66 .

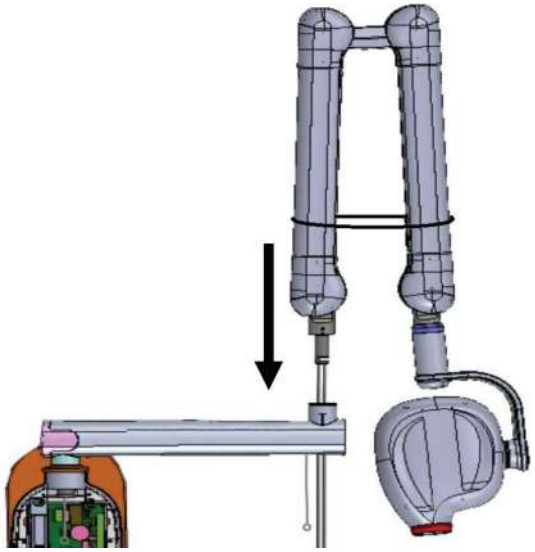


Figure 64

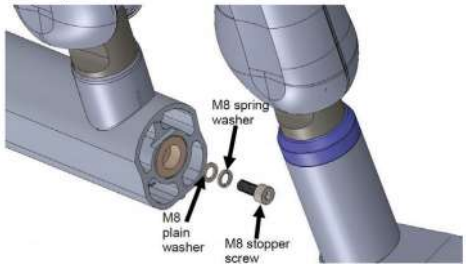


Figure 65(1)

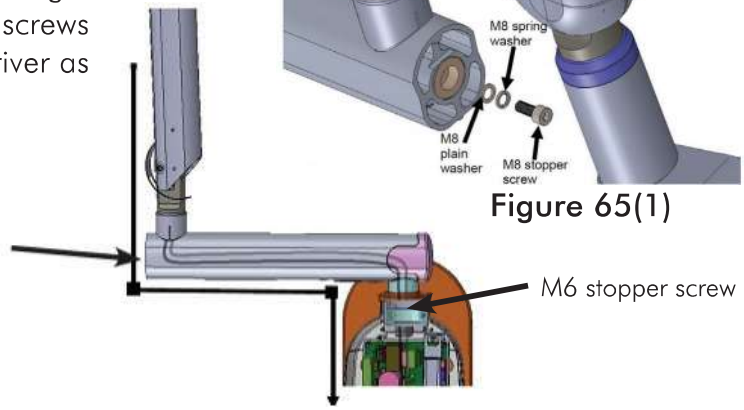


Figure 65 (2)

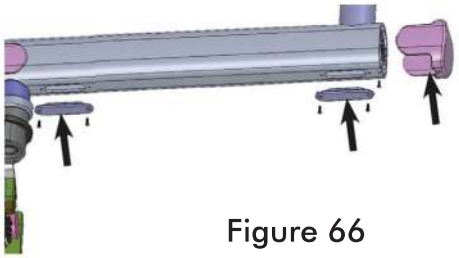


Figure 66

8.2.2.2 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 67 .
- Insert the H V Tank into the clamp by sliding from the side as shown in Figure 68 .

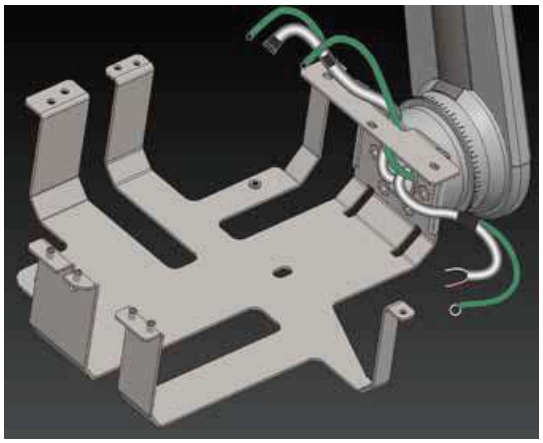


Figure 67

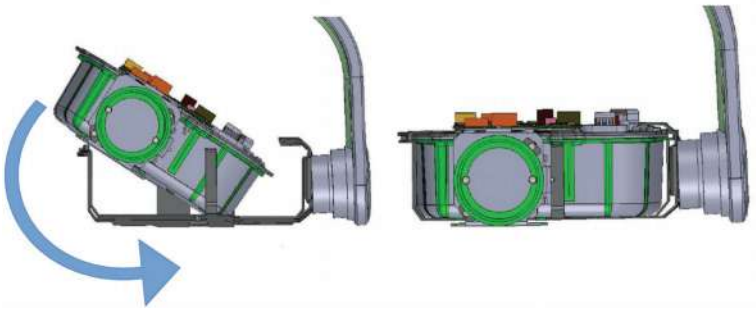


Figure 68

- Fix the Tube Head on the scissor-arm clamp by following the steps given below:-
- Using 2.5mm allen key & 5.5mm nut driver fix 3 no's of Hex. Soc. head cap screws(M3X16) with M3 plain washers & M3 nuts (at the locations 9 to 11 as in Figure 69) 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 no's of button head screws(M3X6) using 2mm allen key(at the locations 1 to 5 as in Figure 69).
- Fix 3 no's of 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 69) using 2.5 mm Allen key.

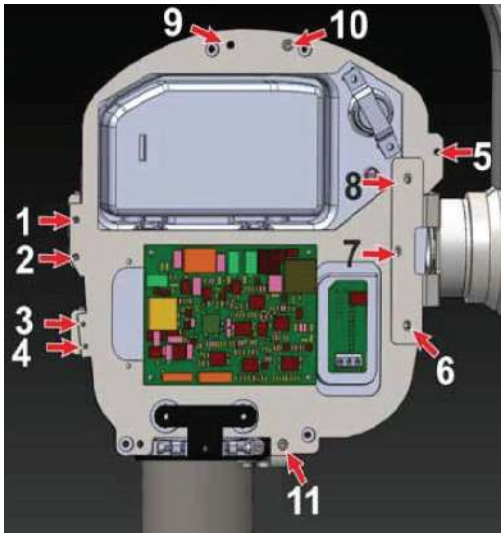


Figure 69

8.2.2.3 Scissor-arm cable connection(Base Unit):

- Using a 2.5mm allen key connect the GND wires(Ring terminals) of both the Communication & inverter power cables in the Base Unit to the Power Board fixing screw as shown in Figure 70 .
- Connect the inverter power cable to J1 connector(Non-polarised) using a Jewel screwdriver (holding the connector) as shown in Figure 70 .
- Connect the communication cable connector to J2 connector of the power board as shown in the Figure 70 .

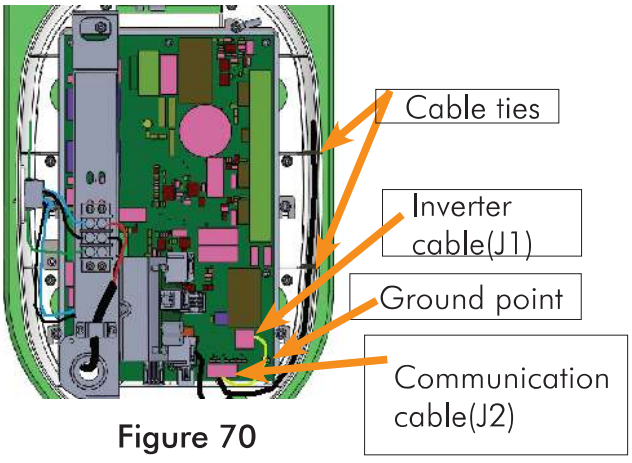


Figure 70

- Align the cables on the base unit and lock the cables on the cable mount as shown in Figure 70 . 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.
- Route the INV power cable as shown in the Figure 71 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 Socket head cap screw) as shown in the Figure 71 .

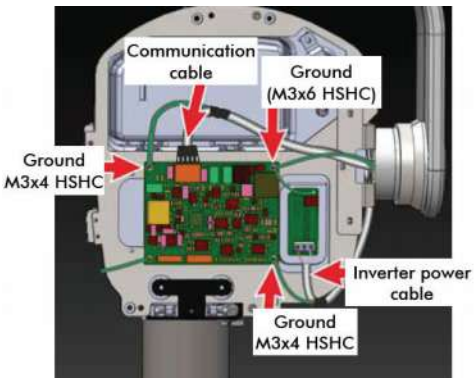


Figure 71

- Route the communication cable and connect it to the J4 connector of the control board as shown in Figure 71 .
- Using a 2.5mm allen key connect the GND ring terminal of the communication cable to the nearest control board fixing screw(M3x4 Socket head cap screw) as shown in the Figure 71 .
- 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 71 .
- 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.

8.2.2.4 Tube Head Covers Fixing:

- Take the Tube Head top cover and fix it using 4 no's of (KA30X16 self tapping pan head) screws with 4 no's of (M3) plain washers at the locations shown in the Figure 72 using a screw driver.
- Fix the bottom cover of the Tube Head assembly using M3x6 button head screws using 2 mm allen key and fix 2 no's of KA30x8 self tapping pan head screws using screw driver as shown in the Figure 73 . Ensure there is no gap between the covers. Put back the 4 no's of rubber plugs at the screw locations on the Tube Head.

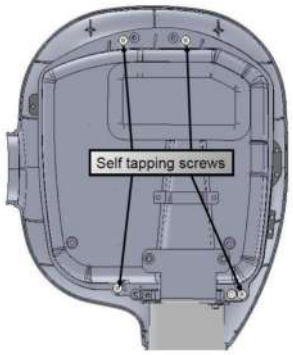


Figure 72

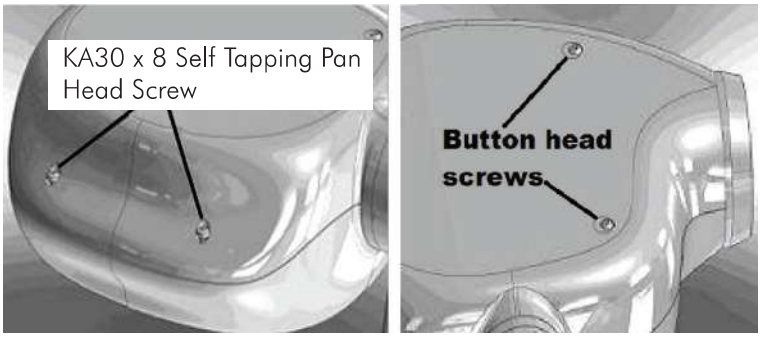


Figure 73

Note:- Ensure both Tube Head Top & Bottom are pasted / fixed with M3 nylon washers on the screw fixing bosses. (Factory Assembled)

Figure 74

- Ensure ground connectivity & fix the rubber fixing ring on the positioning cone as shown in Figure 74 (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 74 (2).

8.2.2.5 Base unit Covers Fixing:

- Take the base unit front cover and connect the console cable to the J5 connector on the "Console extension PCB-Internal" located top of the power board as shown in Figure 75 .
- Fix the base unit cover with two M3x6 socket head cap screws and M3 plain washers on top using 2.5mm allen key and one KA30x25 self tapping screw at bottom using phillips screw driver as shown in Figure 76 . Put back the rubber caps on top and bottom at the screw locations.

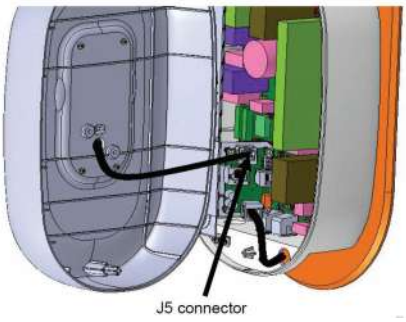


Figure 75

- Perform "5.10 Scissor-Arm Operation Checking" as above.
- Perform "5.12 Power On Check:" as above.

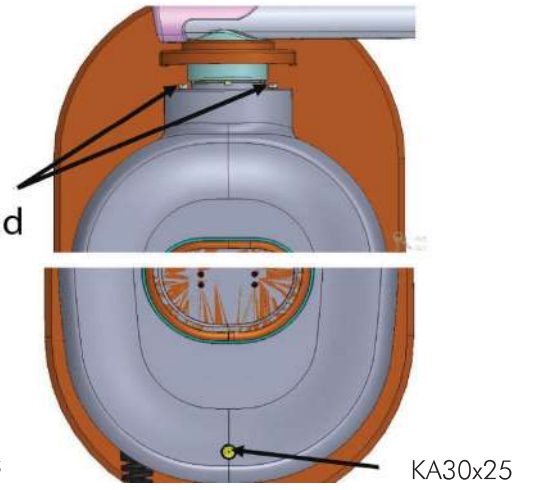


Figure 76

8.3 Replacing the Straight-Arm(Applicable for all length)

8.3.1 Removing the Straight-Arm

- Execute the Steps in "8.2.1.1 Power Off:" above.
- Execute the steps "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 as shown in Figure 77 .
- 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 77 .
- Remove the GND wires of both the cables (Scissor Arm) & Straight Arm by removing M3x6 socket head cap screws using 2.5 mm Allen key as shown in Figure 77 .
- Remove 2 no's of bottom caps of the straight arm by removing M3x6 CSK screws (2 screws for each cap) using phillips screw driver as shown in Figure 78 .
- Remove front end cap of straight arm by removing one M3x6 CSK screw at bottom side using phillips screw driver as shown in Figure 78 .

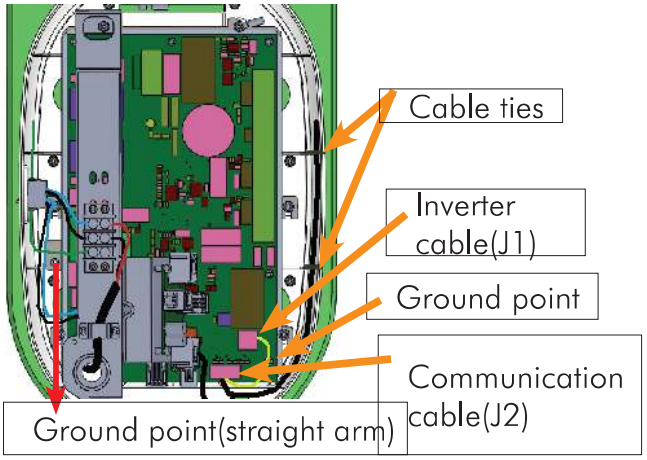
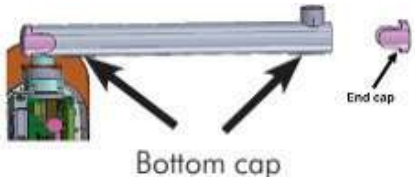


Figure 77

- Remove M8x25 positive lock screw and M8 spring & plain washers from the straight arm using 6mm allen key as shown in Figure 79 .



Bottom cap

Figure 78

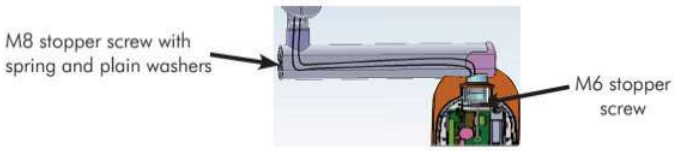


Figure 79

The scissor arm with tube head tied close by securing cable tie. Remove the securing cable tie only when directed during installation. The scissor arm can spring open causing injury.

Always make sure to hold both arms of the assembly simultaneously while lifting or moving the scissor arm.

- Remove the M6 stopper screw from the straight arm shaft using 5mm Allen key as shown in Figure 79 .
- Pull out the cables from the straight-arm and take it out through the bottom side hole at the free end of the straight arm as shown in Figure 80 .
- Lock the Scissor Arm in folded position by tying with a knot or using a long cable tie as shown in Figure 80 .
- Hold the scissor-arm firmly with both hands and slowly lift it simultaneously pulling the cables out of the straight arm carefully as shown in Figure 80 .

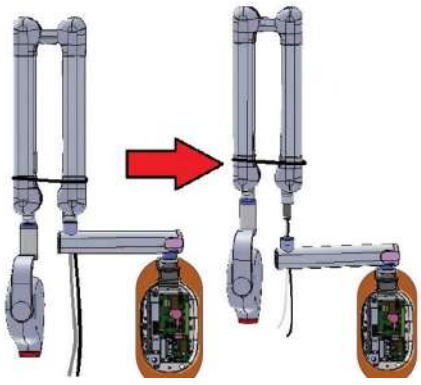


Figure 80

- Keep the Scissor-arm along with Tube Head separate on a cushioned surface.
- Ensure to loose 2 no's of M4 x 16 HSHC Screws at the location shown in Figure 80 (a) by using 3mm Allen key.
- Remove the straight arm from base unit and keep it separately.

8.3.2 Fixing the Straight-Arm

- Take the new straight arm, remove M6x6 mm stopper screw using 5mm allen key from the shaft & keep it separately
- Route the guide wire and ground wire (Straight) through the slot of Bearing Block and mount the Straight Arm on the Base unit Bearing Block (Ensure free movement of Friction Clamp while inserting Straight arm) and then tighten 2 no's of M4 x 16 HSHC Screws at the location shown in Figure 81 by using 3mm Allen key. Check and confirm the level of the straight-arm using spirit level by rotating to all directions as shown in Figure 82 .

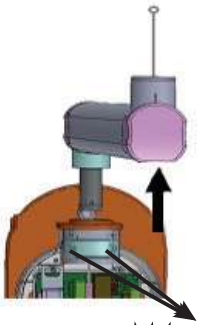


Figure 80(a)

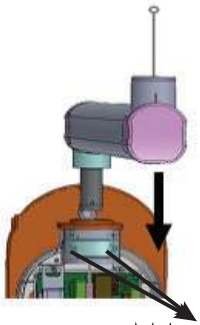


Figure 81

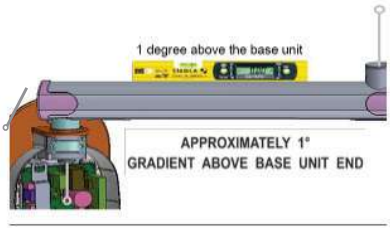


Figure 82

- Connect the Ground wire (Straight Arm) to the ground point as shown in Figure 82 (A) & Figure 82 (B).
- Remove the bottom caps of the new straight-arm by removing M3x6 counter sunk screws using screw driver and remove the end cap of the straight-arm by removing M3x6 counter sunk screw using screw driver as shown in Figure 78 .

Route the Straight Arm
GND Wire

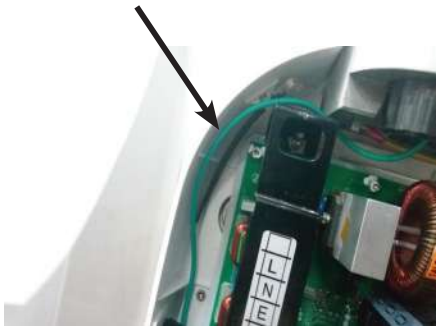


Figure 82(A)

Connect the Straight Arm
GND Wire

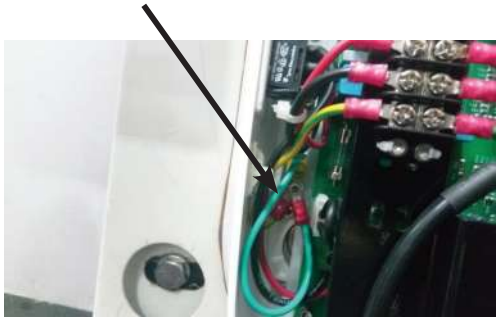


Figure 82(B)

- Remove M8x25 positive lock screw of the new straight arm using 6 mm Allen key as shown in Figure 79 . Keep it safely or separately.
- Ensure that the new scissor-arm is in locked position (folded & Route the guide wire to the bottom side of the straight arm).
- Holding the scissor-arm close to the straight arm, insert the cables inside the straight arm

Remove the securing cable tie only when directed during installation. The scissor arm can spring open causing injury.

Always make sure to hold both arms of the assembly simultaneously while lifting or moving the scissor arm.

(free end) through the top hole into the straight arm till it comes out bottom side of straight arm and slowly insert the Scissor-Arm assembly into the straight arm without damaging the cables and place the Scissor Arm inside the straight arm slowly as shown in Figure 83 .

- Rotate and position the Scissor Arm in line to the Straight Arm as shown in Figure 84 (1)
- Fix M8x25 positive lock screw and M8 spring & plain washers to lock the Scissor Arm to straight arm using 6mm allen key as shown in Figure 84 (2).

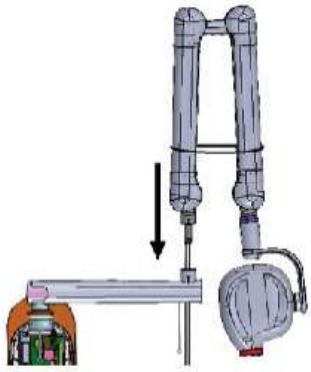


Figure 83

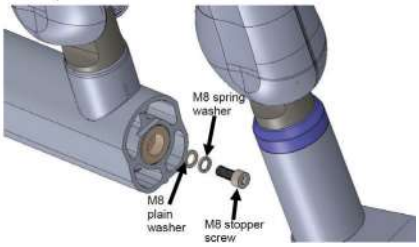


Figure 84(1)

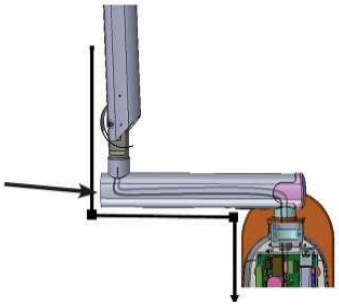


Figure 84(2)

- Route the scissor-arm cables through the straight-arm till it comes inside the base unit (Use guide wire for routing and guide with finger from the slots available bottom side of the straight arm) as shown in Figure 84 .
- Connect the Inverter power cable from J1 connector(Non-polarised) using screw driver and communication cable to J2 connector on the power board as shown in Figure 85 .
- Fix the GND wires of both the cables by fixing M3x6 Hex. socket head cap screws using 2.5mm allen key as shown in Figure 85 .

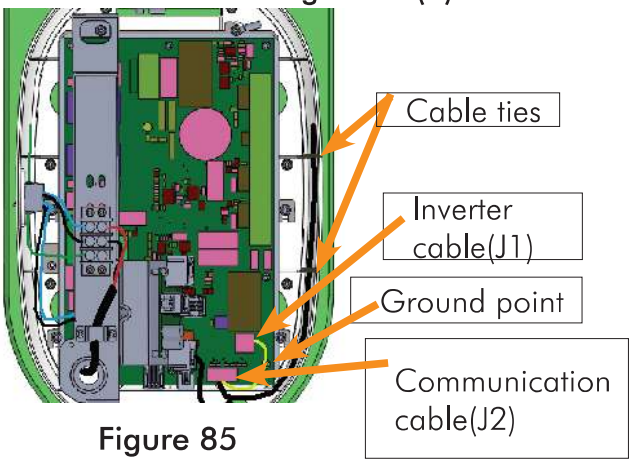


Figure 85

- Route the cables as shown in Figure 85 on the right inner side of the Base 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.
- Perform “5.6 Ground Connection Check:”.
- Execute the steps in "5.9 Base unit cover fixing:".
- Perform "5.10 Scissor-Arm Operation Checking".
- Perform "5.11 Other Checks:".
- Perform “5.12 Power On Check:”.

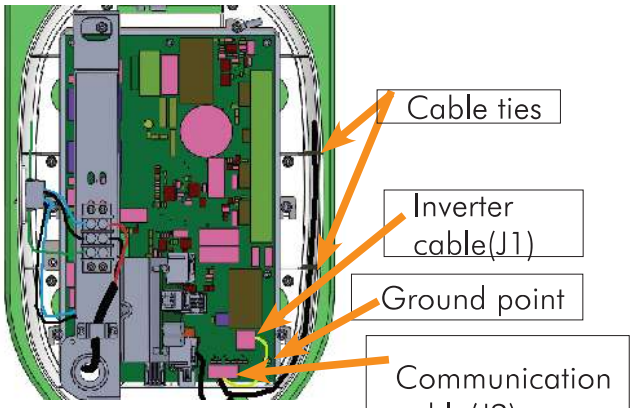


Figure 86

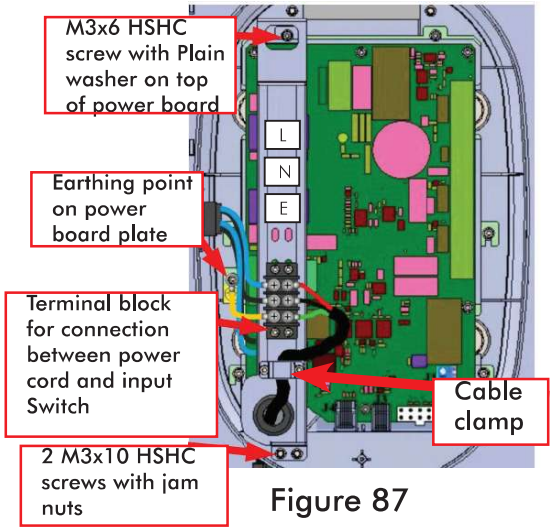


Figure 87

8.4 Replacing the Power Board

8.4.1 Removing the Power Board

- Execute the Steps in “8.2.1.1 Power Off:” above.
- Execute the steps in “8.2.1.3 Base Unit Cover removal:” above.
- Cut the 2 cable ties inside the base unit located on the right side of the power board as shown in Figure 86 .

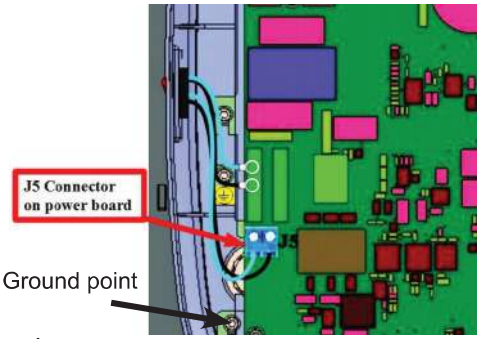


Figure 88

- 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 86 .
- Remove the GND wires of both the cables by removing M3x6 Hex. socket head cap screw using 2.5 mm Allen key as shown in Figure 86 .
- Disconnect the "Live(Black) and Neutral(Blue) wires(Ring terminals) of switch" from the terminal block fixed on the power board clamp using phillips screw driver as shown in Figure 87 .
- Remove the console cable from communication board & cable coming from power board.

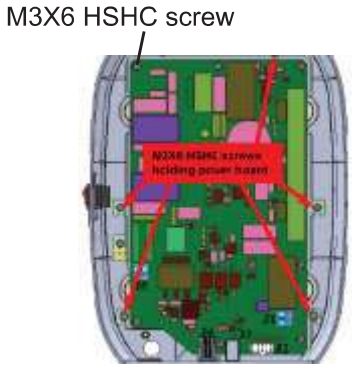


Figure 89

- Disconnect the GND(ring terminal) wire and Ground ring terminal of optional plate(applicable if optional plate is used) from the GND terminal on power board plate located just below the switch by removing the M3X6 Hex. socket head cap screw using 2.5mm allen key as shown in the Figure 87 .
- Remove the power board clamp from the base unit by removing 1 no. of M3X6 Hex. socket head cap Screw on top side of the power board using 2.5mm allen key and 2 no's of M3X10 Hex. socket head cap screws, plain washers and Jam nuts (screws will be inserted from rear side and nut with washer to be fixed from front side) using 2.5mm allen key and 5.5mm nut driver at the locations shown in Figure 87 .

- Disconnect the wires(Pin terminals) from the J5 connector on the power board using a Jewel screw driver as shown in Figure 88 (Live=Black & Neutral=Blue).
- Remove the 5 no's of M3X6 Hex. socket head cap screws on the power board assembly 2 on right side, 2 on left side and 1 on top using 2.5mm allen key as in Figure 89 .
- Hold the Power Board assembly with its plate and slowly remove the remaining 1 no. of M3X6 HSHC screws on the top side of the power board using 2.5 mm allen key as shown in Figure 89 .
- 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.

8.4.2 Fixing the power board

- Take the new power board and insert it in the base unit rear cover ensuring the connectors are inserted properly. Connect the ground wire coming from the bearing block with M3x6 hex. socket head cap screw using 2.5mm Allen key at the location as shown in the Figure 89 .
- Fix the 4 Nos. of M3X6 Hex. socket head cap screw 2 on left & 2 on right side of the Power Board using 2.5mm allen key to the rear cover as shown in Figure 89 .
- Connect the wires(Pin terminals) coming from the switch to the J5 connector on the power board (holding the connector firmly by hand) as shown in Figure 88 (Live=Black & Neutral=Blue) using a Jewel screwdriver.
- Fix back the power board clamp to the base unit by fixing 1 no. of M3X6 HSHC Screw on top of the power board using 2.5mm allen key and 2 no's of M3X10 Hex. socket head cap screws, plain washers and Jam nuts (screws to be inserted from rear side and nut with washer to be fixed from front side) using 2.5mm allen key and 5.5mm nut driver shown in Figure 87 .
- Connect the GND wire terminal block and ground wire coming from optional plate(applicable if optional 16" plate is used) terminal on power board plate just below the switch using 1M3X6 Hex. socket head cap screw (with washers) using 2.5mm allen key as shown in the Figure 87 .
- Connect the “Live(Black) and Neutral(Blue) wires(Ring terminals) coming from switch to the terminal block fixed on the base unit clamp using phillips screw driver as shown in Figure 87 .
- 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 86 .
- Connect the GND wires of both the cables by fixing with M3x6 Hex. socket head cap screws using 2.5mm allen key as shown in Figure 86 .
- 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 as shown in Figure 86 .
- Perform “5.6 Ground Connection Check:”.
- Execute the steps in "5.9 Base unit cover fixing:".
- Perform “5.12 Power On Check:”.

8.5 Replacing the Tube Head

8.5.1 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:".
- Perform the steps in "8.2.1.3 Base Unit Cover removal:.
- Use an ESD wrist strap during HV Tank removal procedure and connect its GND connection to the HV Tank Clamp.

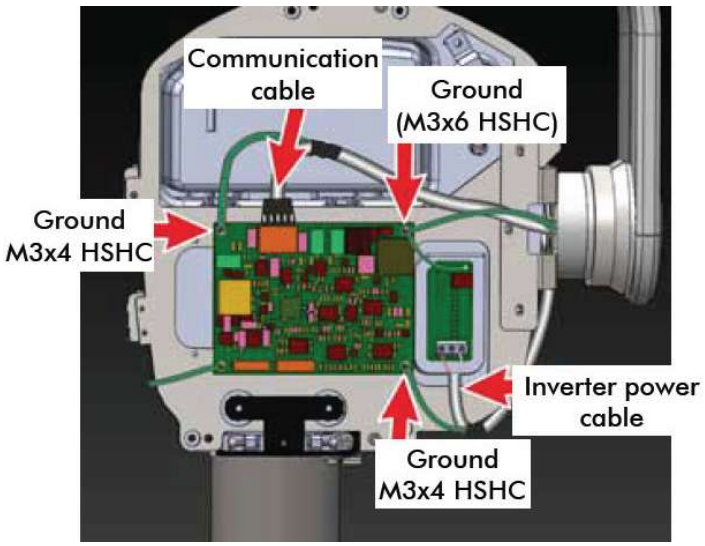


Figure 90

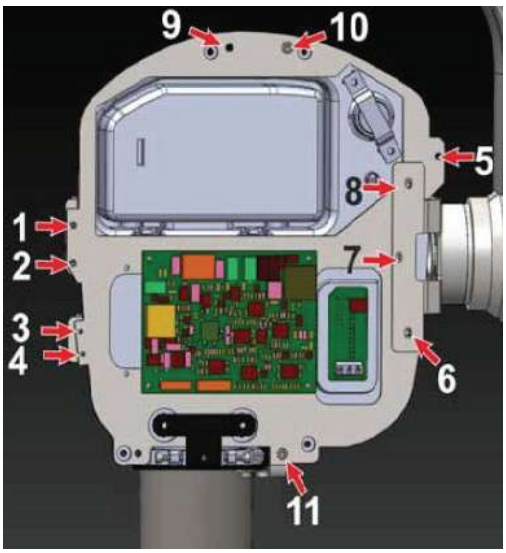


Figure 91

- 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 90 .
- Disconnect the INV power cable from the sealing board 3 pin connector -pins 1 & 3 as shown in the Figure 90 (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 90 and put back the screws in its location.
- Now the communication and INV power cables are disconnected from the HV Tank.
- To remove the HV Tank from the clamp, remove the 5 no's of (M3X6 Hex. socket button head) screws (from 1 to 5 as shown in Figure 91) using 2mm allen key.
- Remove 3 no's of (M3X6 Hex. Soc. Head cap) Screws (From 6 to 8 as shown in Figure 91) on the top of the clamp near Tube Head arm using 2.5mm allen key.
- Remove 3 no's of (M3X14 Hex. Soc. head cap) screws (from 9 to 11 as shown in Figure 91) along with M3 plain washers & M3 nut using 2.5mm allen key and 5.5mm Nut driver.
- Keep the Tank in a clean place.

8.5.2 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 no's of Hex. Soc. head cap screws(M3X16) with M3 plain washers & M3 nuts (at the locations 9 to 11 as in Figure 91) 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 no's of button head screws(M3X6) using 2mm allen key(at the locations 1 to 5 as in Figure 91).
- Fix 3 no's of 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 91) using 2.5 mm Allen key.
- Route the INV power cable as shown in the Figure 90 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 Hex. socket head cap) as shown in the Figure 90 .
- Route the communication cable and connect it to the J4 connector of the control board as shown in Figure 90 and using a 2.5mm allen key connect the GND ring terminal of the communication cable to the nearest control board fixing screw(M3x4 Hex. socket head cap) as shown in the Figure 90 .
- 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 90 .
- 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 “8.2.2.4 Tube Head Covers Fixing:”.
- Perform “5.6 Ground Connection Check:”.
- Perform "5.9 Base unit cover fixing:".
- Perform “5.12 Power On Check:”.

8.6 Replacing the Control Board

8.6.1 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:".
- Execute the steps in "8.2.1.3 Base Unit 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 92 .

Figure 92

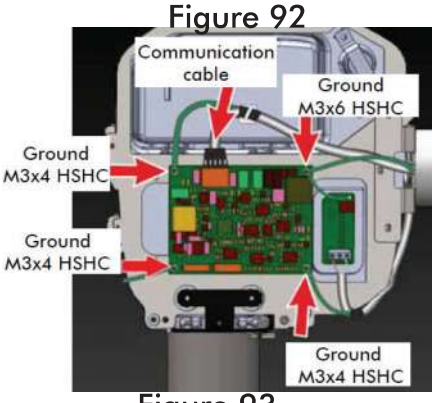


Figure 93

- 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 92 .
- Remove the Control Board and keep it in an Antistatic cover or protected from Static charges.

8.6.2 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 Hex. socket head cap) using 2.5mm allen key as shown in Figure 92 .
- Route the communication cable and connect it to the J4 connector of the control board as shown in Figure 92 and fix its ground ring terminal to the nearest control board fixing screw(M3x4 Hex. socket head cap) as shown in the Figure 92 .
- Fix the Tube Head ground ring terminal(near the collimator) with M3x4 Hex. socket head cap screws on the control board using 2.5mm allen key as shown in Figure 92 .
- Execute the Steps in "8.2.2.4 Tube Head Covers Fixing:".
- Perform "5.6 Ground Connection Check:".
- Execute the steps in "5.9 Base unit cover fixing:".
- Switch on the power.
- Perform "9.2 Tube Head Re-Calibration".
- Perform "5.12 Power On Check:".

8.7 Replacing the Console Assembly

8.7.1 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 94 (2)
- Remove the console assembly from base unit front cover by removing 4 no's of self tapping screws using screw driver as shown in Figure 94 (1) and Figure 95 .

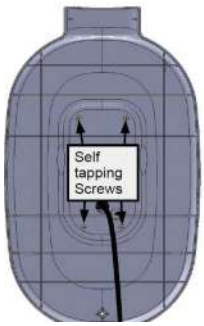


Figure 94(1)

Figure 94(2)

Figure 95

8.7.2 Fixing the console assembly

- Take the new console assembly and route the console cable through the hole of front cover as shown in Figure 95 .
- 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 94 (1) using screw driver. Lock the cable on the cable mount using cable tie as shown in Figure 94 (2).
- Perform "5.9 Base unit cover fixing:".
- Perform “5.12 Power On Check:”.

8.8 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 "8.2.2.4 Tube Head Covers Fixing:" using new Tube Head covers.
- Execute the steps in "5.12 Power On Check:".
- Mark the Tube Head serial # and Part # on Tube Head cover using marker.

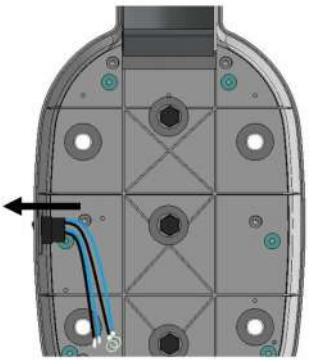


Figure 96

8.9 Replacing the Base unit Covers

- 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 "8.4.1 Removing the Power Board".
- Remove the old base unit rear cover by removing 6 no's of M3x6 HSHC screws and M3 plain washers at the locations shown in Figure 98 using 2.5mm allen key.
- Fix the new base unit rear cover by fixing 6 no's of M3x6 HSHC screws at the locations shown in Figure 98 using 2.5 mm allen key.
- Remove the switch from the base unit by pushing it out from the rear cover of the base unit as shown in Figure 96 .
- Fix back the old Switch to the rear cover as shown in Figure 97 .
- Execute the steps in "8.4.2 Fixing the power board".
- Execute the steps in "8.2.2.5 Base unit Covers Fixing:" for fixing new cover.
- Execute the steps in "5.12 Power On Check:".
- Mention the Part # & Serial # on new cover using marker.

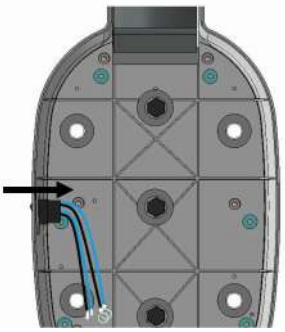


Figure 97

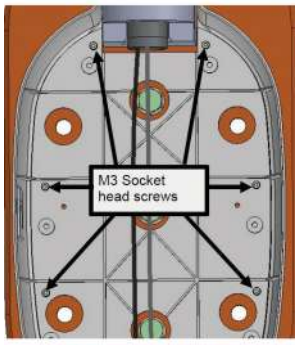


Figure 98

8.10 Replacing the Scissor Arm cable harness

8.10.1 Removing the Scissor Arm cables

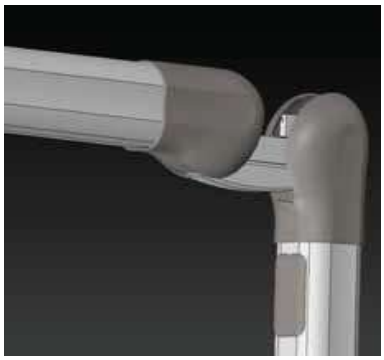


Figure 99

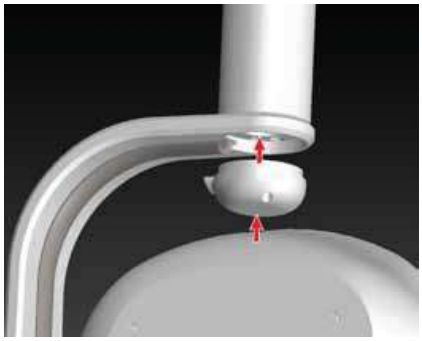


Figure 100

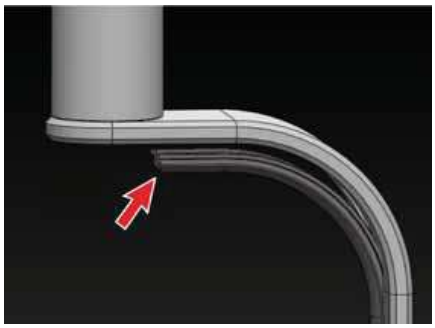


Figure 101

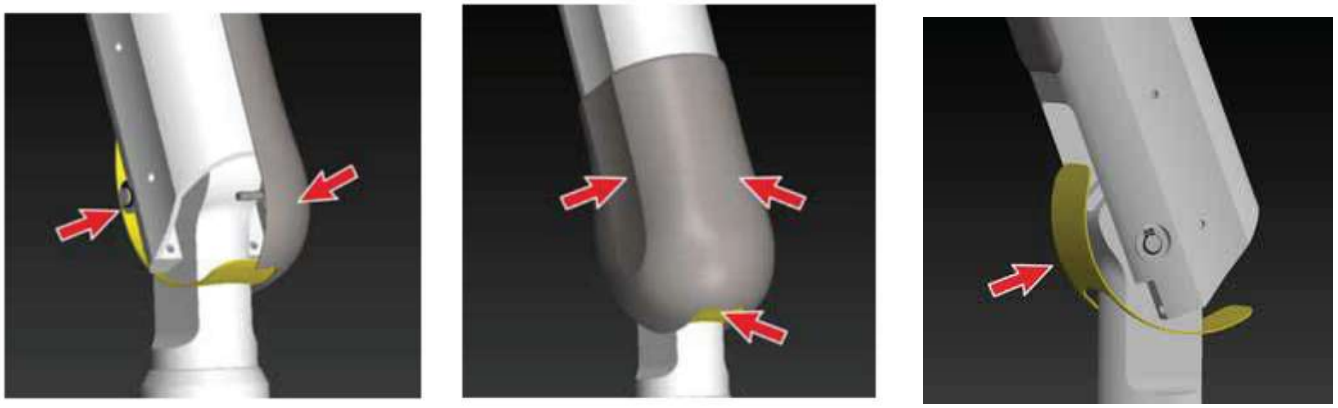


Figure 102

- 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".
- Execute the steps in "8.2.1.6 Final Steps before Removal".
- Keep the Vertical Arm of the Scissor Arm in Vertical position and Horizontal Arm in horizontal position as shown in Figure 99 .
- Remove the rubber plugs of the wire cup using tweezer and then remove the wire cup on the L-arm by removing the 2 no's of M3X25 screws using 2.5mm allen key as shown in Figure 100.
- Remove the rubber Cable cover on the L-Arm by pulling out as shown in Figure 102 .
- Remove all the four scissor-arm end caps by opening the caps. Do not remove the rubber part shown in Figure 101 .
- Remove the bottom caps of straight arm by removing M3x6 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 no's of M3x6 HSHC screws using 2.5mm allen key.

8.10.2 Assembly Steps for Scissor-Arm Cable

- Hold the end of the Cable harness (Figure 103) and insert the communication wire (cable with connector) from the hole of swivel guide (Figure 104) till it comes out of the Tube Head arm as shown in Figure 105 .

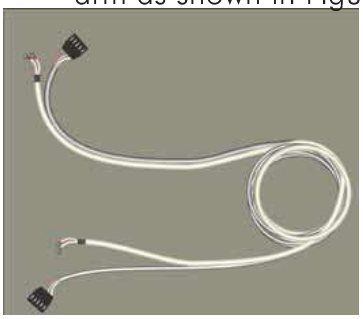


Figure 103

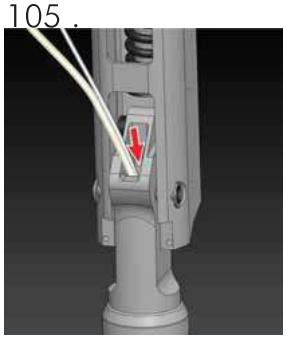


Figure 104

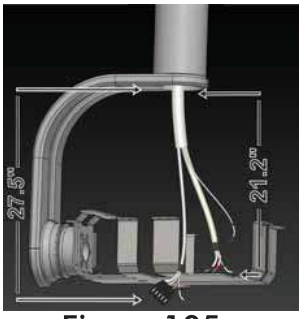


Figure 105

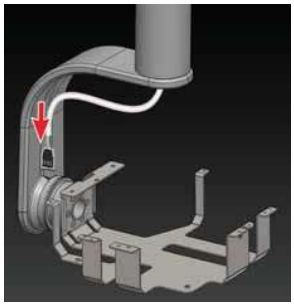


Figure 106

- 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 104 and Figure 105 .
- 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 105 .

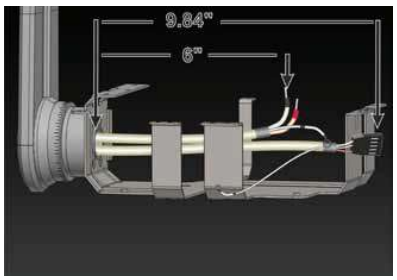


Figure 107

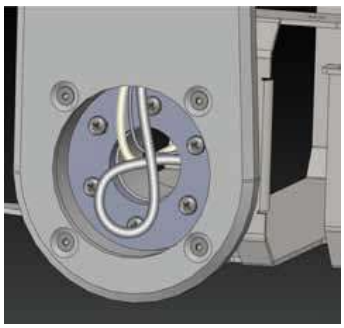


Figure 108

Figure 109

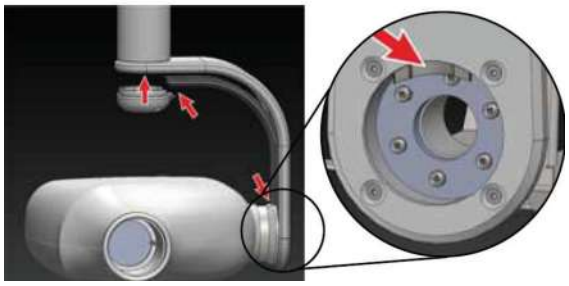


Figure 110

- Insert the communication cable inside the hole provided on the wire slot side of the Tube Head arm as shown in the Figure 106 & then the Inverter power cable along with the Scissor Arm earthing wire as shown in the Figure 107 such that the wire comes out of the L arm circular bush.
- Insert the communication cable (Cable with 10-pin connector) from the hole of the rotating bush such that it comes out of the L-Clamp.

- Then insert the inverter power cable(Cable with 3-wires) from the hole of the rotating bush such that it comes out of the L-Clamp.
- Ensure that the other end of the Scissor Arm earthing wire is already connected firmly to the L arm (near the rotating bush on the top end).
- 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 107 using measuring tape.
- 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 107 (Leave extra length of 1 turn of communication cable within the circular area as shown in Figure 108).
- 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 108). 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.
- 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 as shown in Figure 109 and fix the cable cup with 2 no's of M3x30 HSHC screws using 2 mm allen key as shown in Figure 109 and fix the rubber plugs in the holes.
- 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.

Figure 111

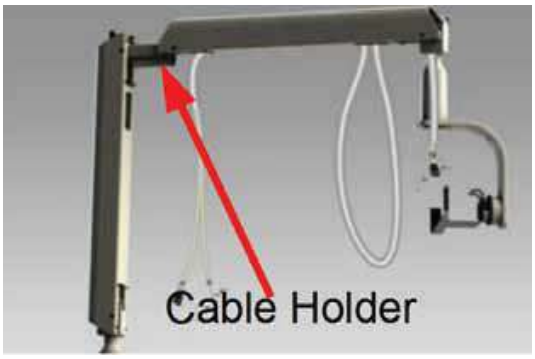


Figure 112

Figure 113

Keeping the L-Clamp as reference, route the cables such that the inverter cable is

towards the dual slot end & the communication cable along with the scissor arm grounding wire is towards

the single slot end of the L-Clamp.

- Take the other end of the Scissor Arm cable and route it from the bottom side of the horizontal arm outer cover till it comes out from the arm as shown in the Figure 111 & Figure 112 . Make sure that the cables are inserted in between the outer cover and the internal plastic sheet(not visible in the figure).

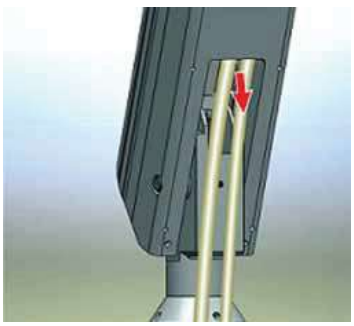


Figure 114

- Insert the cables into cable holder fixed on the fulcrum and take out from other end as shown in Figure 113 .
- Pull the extra length of cable and insert it through the outer cover of the vertical arm as shown in the Figure 113 & Figure 114 (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 113 . Pull out the extra length of cable from the outer cover.
- 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 20mm (approx) inside the outer cover as shown in the Figure 115. Make sure that the cables are inserted in between the outer cover and the inner plastic sheet (not visible in picture).

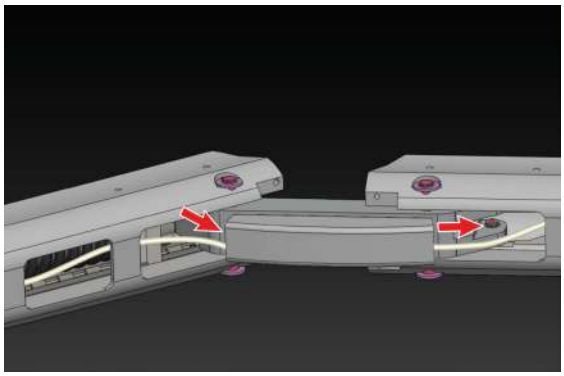


Figure 115

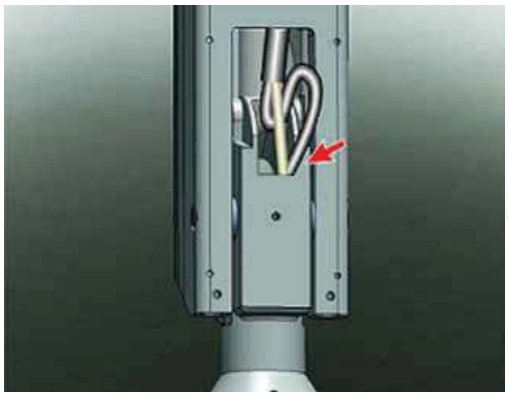


Figure 116

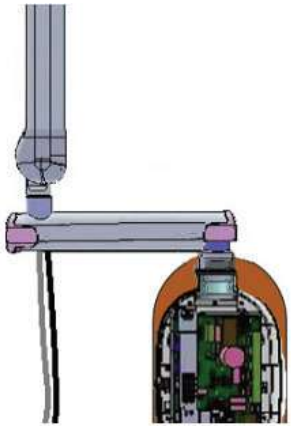


Figure 117

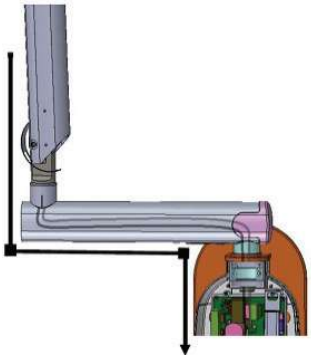


Figure 118

Figure 119 (1)

Figure 119(2)

- Insert the scissor-arm cable(First communication cable and then Inverter power cable) into the Scissor Arm swivel guide as shown in the Figure 116 such that it comes out from the bottom hole of the straight arm as shown in the Figure 117 . Use guide wire to route the cables through the straight arm till it comes inside the base unit as shown in Figure 118 .
- Pull the cables such that it comes out from the bottom hole of the straight arm.
- NOTE: Do not hold the connector while pulling.

- Execute the Steps as in “8.2.2.2 HV Tank Assembly:”.
- Execute the Steps as in "8.2.2.3 Scissor-arm cable connection(Base Unit):".
- Execute the Steps as in “8.2.2.4 Tube Head Covers Fixing:”.
- Execute the Steps as in "5.6 Ground Connection Check:".
- Execute the Steps as in "5.9 Base unit cover fixing:".
- Cable to be tied using cable tie after cable routing as shown in Figure 119 (1) & Figure 119 (2).

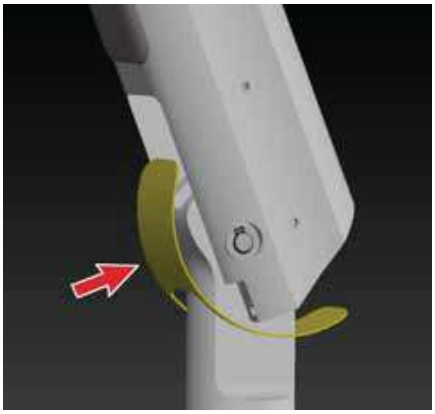


Figure 120

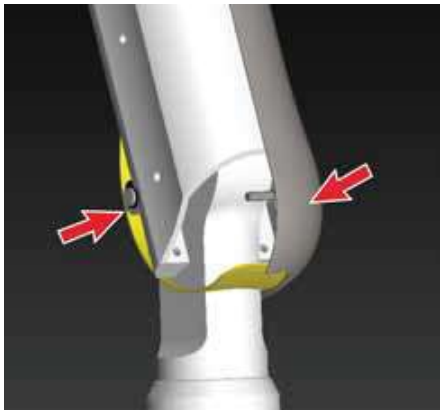


Figure 121

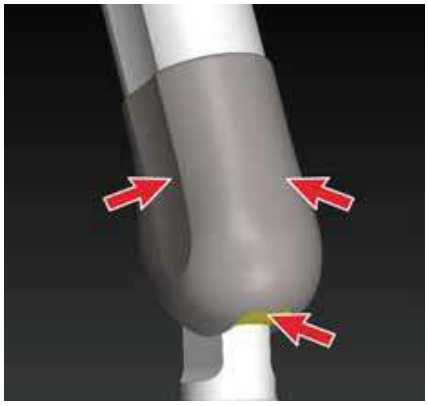


Figure 122

8.10.3 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 120 .
- 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 121 .
- 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 122 .

Figure 123 (1)

Figure 123(2)

- Fix the bottom caps of the straight-arm with M3x6 self tapping CSK head screws using screw driver.
- Execute the Steps as in “5.12 Power On Check:”.
- Apply 1-2 drops of Fevikwik to End cap locking part as shown in Figure 123 (1) immediately hold both the End caps(1min approx.) as shown in Figure 123 (2)

8.11 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 124 .
- Take the new exposure switch and Connect the new exposure switch to the connector(RJ-11) located at the bottom side of the base unit as shown in Figure 124 .
- Perform “5.12 Power On Check:”.

Figure 124

8.12 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 125 .
- Execute the steps in " 8.10.3 Fixing the Scissor-Arm End caps".
- Perform "5.12 Power On Check:".

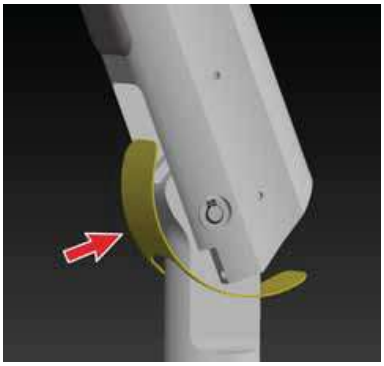


Figure 125

8.13 Replacement of Remote Keypad console:

8.13.1 Removing the Remote Keypad console:

- Execute the steps in “8.2.1.1 Power Off:”.
- Pull out the console assembly from the slot on the Keypad console and remove the front cover by removing 4 no's of M3×6 HSHC Screws using 2.5mm Allen key as shown in Figure 126 .
- Holding the front cover along with console assembly disconnect the console cable from the Console extension board-external as shown in Figure 127 . Keep the removed parts aside.
- Disconnect the communication cable coming from the base unit through the wall from the Console extension board-external.
- Remove the Console extension board-external PCB from the wall plate by removing 4 no's of M3X6 HSHC screws using 2.5mm allen key as shown in Figure 128 .

Figure 126

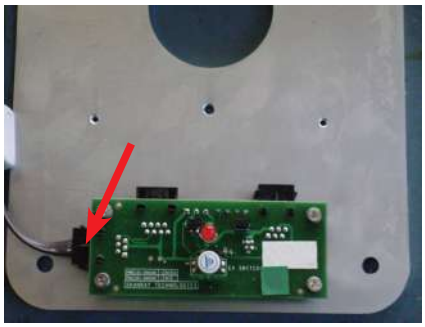


Figure 127

Figure 128

8.13.2 Replacing the Remote Keypad console:

- Take the new keypad console assembly from the packing box and pull out the console assembly from the slot on the Keypad console and remove the front cover by removing 4 no's of M3×6 HSHC Screws using 2.5mm Allen key as shown in Figure 126 .
- Holding the front cover along with console assembly disconnect the console cable from the Console extension board-external(If connected) at the location shown in Figure 127 . Keep the removed parts aside.
- Remove the PCB from the wall plate by removing 4 no's of M3×6 HSHC screws using 2.5mm Allen key as shown in Figure 128 .
- If required remove the old wall plate by removing 2 No.s of 6.3x32 lag bolts using 8mm box spanner and fix the new wall plate on the wall with 2 No.s of 6.3x32 lag bolts using 8mm box spanner.
- Take the new PCB and fix it to the wall plate with 4 no's of M3×6 HSHC screws using 2.5mm Allen key as shown in Figure 128 .
- Connect the communication cable to the appropriate connector by referring the configuration connection diagrams in Section “5.8 Intraskan DC Console configurations:”.
- Take the new front cover with new console assembly and route the console cable through the hole provided on the front cover and connect the console cable to the J8 connector on the PCB as shown in Figure 127 . Fix the front cover with 4 M3×6 HSHC screws using 2.5mm Allen key as shown in Figure 126 .
- Fix the Console assembly in the slot and switch on the unit and give exposures from the external switch.
- Perform "5.12 Power On Check:" by giving exposures from external console configuration.

8.14 Replacement of Doorbell switch:

8.14.1 Removing the Door bell switch:

- Execute the steps in “8.2.1.1 Power Off:”.
- Pull out the Dummy Logo assembly from the slot on the Door bell switch assembly and remove the front cover by removing 4 no's of M3×6 HSHC Screws using 2.5mm Allen key. Keep the removed parts aside.
- Disconnect the communication cable coming from the base unit from the Console extension board-External. Remove the Console extension board-External from the wall plate by removing 4 no's of M3×6 HSHC screws using 2.5mm Allen key.

8.14.2 Replacing the Door bell switch:

- Take the new Door bell switch assembly from the packing box and pull out the Dummy Logo assembly from the slot on the Door bell switch assembly and remove the front cover by removing 4 No's of M3×6 HSHC screws using 2.5mm Allen key.
- Keep the removed parts aside carefully. Remove the Console extension board-External from the wall plate by removing 4 No's of M3×6 HSHC screws at the four corners using 2.5mm allen key.

- If required remove the old wall plate from wall 2 No's of 6.3x32 lag bolts using 8mm box spanner and fix the new wall plate on the wall with 2 No's of 6.3x32 lag bolts using 8mm box spanner.
- Take the new Console extension board-External and fix it to the wall plate with 4 no's of M3×6 HSHC screws using 2.5mm Allen key.
- Connect the communication cable to the appropriate connector by referring the configuration connection diagrams in Section "5.8 Intraskan DC Console configurations:".
- Take the new front cover and fix it on the wall plate with 4 no's of M3×6 HSHC screws using 2.5mm Allen key. Fix the Dummy Logo assembly in the slot and switch on the unit and give exposures from the external switch.

8.15 Replacement of Console extension board-internal

8.15.1 Removing the Console extension board-internal

- Execute the steps in "8.2.1.1 Power Off:".
- Execute the steps in "8.2.1.3 Base Unit Cover removal:".
- Disconnect the external communication cable coming from the wall from the respective connector(as given below) on the Communication board.(Refer"5.8 Intraskan DC Console configurations:") shown in Figure 129 Remove the Console extension board-internal from the base unit plate by removing 4 M3×6 HSHC screws at the locations as shown in Figure 129 using 2.5mm allen key .
- From J6 connector (If 8P8C/RJ45 cable is connected)
- From J2 connector (If 6P6C/RJ25 cable is connected)
- From J1 connector (If 3-wire connection is used) as shown in Figure 130 .

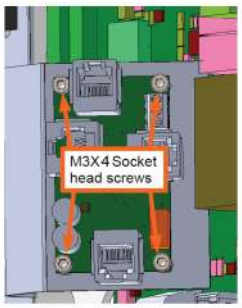


Figure 129

8.15.2 Replacing the Console extension board-internal:

- Take the new Console extension board-internal from the packing box and fix it in the base unit with 4 no's of M3×4 HSHC screws using 2.5mm allen key at the locations shown in Figure 129 . Connect the cable coming from power board to the PB/J4 connector on the Console extension board-internal.
- Connect the communication cable coming from wall to the appropriate connector on the Console extension board-Internal board by referring the configuration connection diagrams in Section "5.8 Intraskan DC Console configurations:".

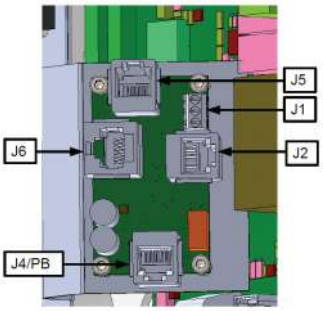


Figure 130

- Execute the steps in "5.9 Base unit cover fixing:" and "5.12 Power On Check:".

8.16 Replacing the Input switch

8.16.1 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:".
- Disconnect the "Live(Black) and Neutral(Blue) wires(Ring terminals) of switch" from the terminal block fixed on the power board clamp using phillips screw driver as shown in Figure 131 .
- If required 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 2.5mm allen key as shown in the Figure 131 .

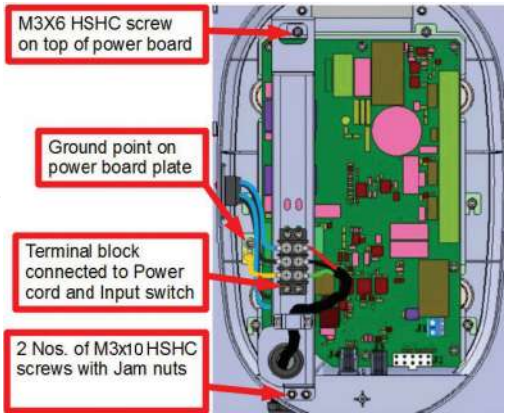


Figure 131

- Remove the console connection cable if required from Extension board on TB Holder (Power Board Clamp)
- Remove the power board clamp from the base unit by removing 1 no. of M3X6 HSHC Screw on top side of the power board using 2.5mm allen key and 2 no's of M3X10 HSHC screws, plain washers and Jam nuts (screws will be inserted from rear side and nut with washer to be fixed from front side) using 2.5mm allen key and 5.5mm nut driver at the locations shown in Figure 131 .
- Disconnect the wires(Pin terminals) from the J5 connector on the power board using a Jewel screw driver as shown in Figure 132 (Live=Black & Neutral=Blue).
- Pressing the locking flanges on upper & lower side of switch push the switch out from the inner side of the base unit cover.as shown in Figure 133 .

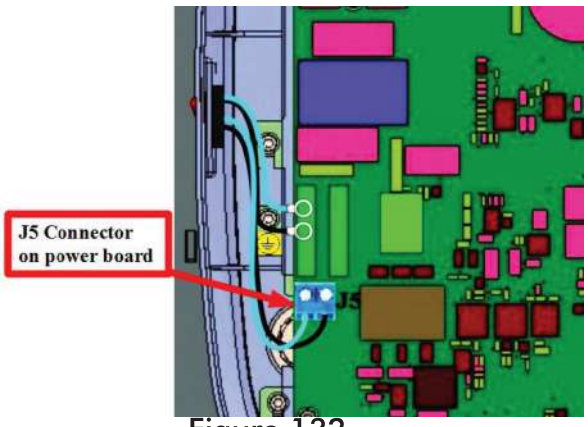


Figure 132

Figure 133

8.16.2 Replacing the Input switch

- Take the new switch and fix it in the base unit rear cover by inserting from outside as shown in Figure 133 .
- Connect the switch wires(Pin terminals) to the J5 connector on the power board using a Jewel screw driver as shown in Figure 132 (Live=Black & Neutral=Blue).

- Fix the power board clamp from the base unit by fixing 1 no. of M3X6 HSHC Screw on top side of the power board using 2.5mm allen key and 2 no's of M3X8 HSHC screws, plain washers and Jam nuts (screws to be inserted from bottom rear side and nut with washer to be fixed from front side) using 2.5mm allen key and 5.5mm nut driver at the locations shown in Figure 131 .
- Connect the GND(ring terminal) wire to the GND terminal along with the other GND wire(If removed) on 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 131 .
- Connect the "Live(Black) and Neutral(Blue) wires(Ring terminals) of switch" to the terminal block fixed on the power board clamp using phillips screw driver as shown in Figure 131 .
- Execute the Steps as in "5.9 Base unit cover fixing:".
- Execute the Steps as in "5.12 Power On Check:".

8.17 Replacing the input power cord (Applicable if Factory supplied cable used)

8.17.1 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:".
- Disconnect the "Live, Neutral and GND wires(Ring terminals) of power cord connected to the terminal block using screw driver as shown in Figure 134 and remove the clamp which is used to hold the power cord at bottom to the terminal block by removing 2 M3X6 HSHC screws using 2.5 mm allen key as shown in Figure 134 .

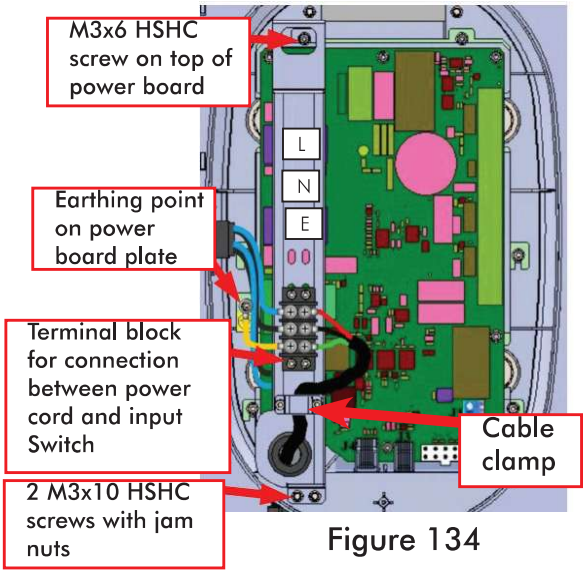


Figure 134

- Remove the power board clamp from the base unit by removing 1 no. of M3X6 HSHC Screw on top side of the power board using 2.5 mm allen key and 2 no's of M3X10 HSHC screws, plain washers and Jam nuts (screws will be inserted from rear side and nut with washer to be fixed from front side) using 2.5 mm allen key and 5.5 mm nut driver at the locations shown in Figure 134 .
- Loosen the cable grommet clamp as shown in Figure 135 . Loosen the grommet nut inside the Base Unit as shown in Figure 135 and remove the grommet & the cable out of the Base Unit (through the cable entry hole).

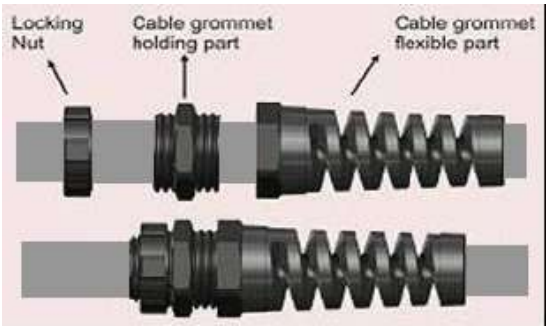


Figure 135

8.17.2 Fixing the new Input power cord

- Take the power cord available in the packing box as shown in Figure 136
- Separate the cable grommet assembly into three parts as shown in Figure 136 .
- Take out the locking nut only from the cable.
- Insert the input power cable from the bottom side of the base unit and fix the locking nut to the cable grommet holding part from inner side of the base unit as shown in the Figure 137 .

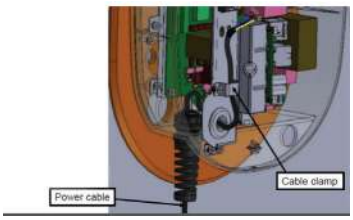


Figure 136

Figure 137

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

- Pull the cable as much as required and fix the cable grommet flexible part to the cable grommet holding part. Figure 137 .
- Remove the cable clamp by removing 2 no's of M3 socket head screws using 2.5mm Allen key as shown in Figure 134 .
- Fix back the cable clamp holding the power cable with 2 no's of M3 Socket head screws using 2.5mm Allen key as shown in Figure 134 .
- 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 138 .

Figure 138

- Route the power cord cable through the hole provided in the base unit clamp as shown in Figure 134 . Connect the “Line, Neutral and earthing wires (Ring terminals) of the power cord on the terminal block using cross recessed screw driver as shown in Figure 134 . Fix the clamp used for holding the power cord at the bottom side of the terminal block as shown in Figure 134 .
- Execute the steps in "8.2.2.5 Base unit Covers Fixing:"
- Perform "5.6 Ground Connection Check:".
- Perform "5.12 Power On Check:".

8.18 Replacing the Console extension cables

- Console extension 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"/J4 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.

If Console board cable fails:

- Execute the base unit cover removal procedure.
- Remove the console assembly from the base unit front cover by removing 4 no's of KA30x8 self tapping screws using star screw driver as shown in Figure 140 and Figure 139 .
- 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 139 and fix the console assembly to the front cover with 4 no's of KA30x8 self tapping screws using phillips screw driver as shown in Figure 140 .
- Execute the steps in "8.2.2.5 Base unit Covers Fixing:".
- Perform "5.12 Power On Check:".

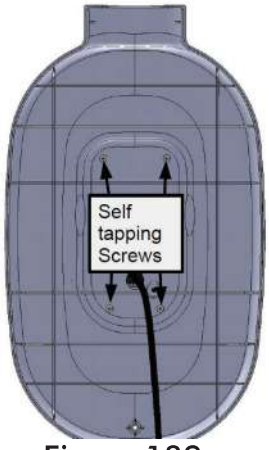


Figure 139

Figure 140

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.
- Re-calibrate the Tube Head by performing the following procedure:
- Remove Base Unit Top cover as per 8.2.2.3 Scissor-arm cable connection(Base Unit):{Point 1 & 2)
- Take out calibration fixture (short link as shown in Figure 144) from base unit

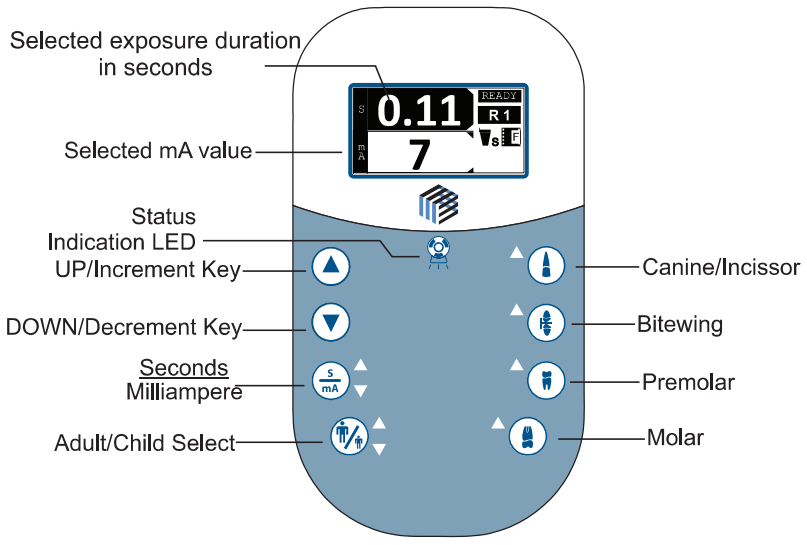


Figure 141

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

Figure 142

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

Figure 143

- Fix back Base Unit top cover
- 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 142 . 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 141 .

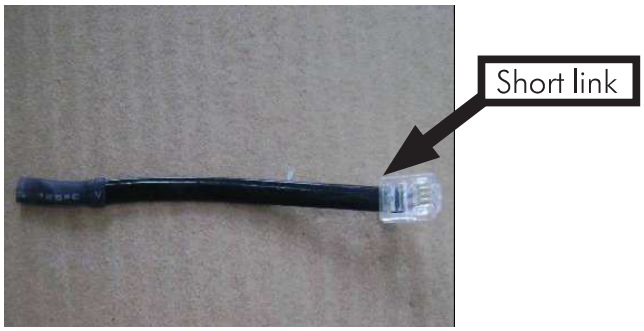


Figure 144

Figure 145

- Then display changes to "**SERVICE**" screen as shown in Figure 143 . Press "**Down/Decrement**" key till "**Calibrate**" gets highlighted. Press "S/mA" key then console display changes showing message "**Insert short link**".
- Now insert Short link Jig to the J3 connector on power board from the bottom side of the base unit as shown in Figure 144 and Figure 145 . After insertion of Short link 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.
- Fix the base unit cover
- Remove the base unit cover & place back calibration fixture as earlier and close Base Unit top cover.
- Connect the exposure switch cable to the J3 connector on the power board.
- Fix the base unit cover.
- 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.
- Now insert Short link Jig to the J3 connector on power board from the bottom side of the base unit. as shown in Figure 144 .
- Cover X-ray outlet on Tube Head by lead cap.

9.3 Exposure history through Console:

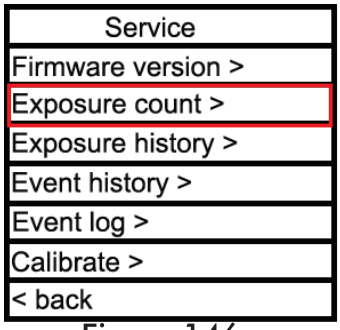


Figure 146

- 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 142 . Press "**DOWN/Decrement**" key till "**Service**" option gets highlighted.
- Using the Control Console press the keys **Molar** followed by **bitewing, canine, premolar, molar, canine, bitewing and S/ mA** as shown in Figure 146 .
- Then display changes to "**SERVICE**" screen as shown in Figure 146 . Press "**Down/Decrement**" key till "**Exposure count**" gets highlighted.
- Note the total exposures shown in the report and Switch off the unit.

9.4 Preventive Maintenance

- Recommended once in a year (after 1st year of usage) :-
- Check all the Scissor Arm movements & adjust as per "5.14 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 (>6months) :-
- 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	305-000460-0
2	Tube Head Cover(Top and Bottom)	305-000461-0
3	Control board	305-000462-0
4	Extension cone	305-000463-0
5	Power Board	305-000464-0
6	Base unit covers(Front and back)	305-000465-0
7	Mains power cord assembly	305-000466-0
8	Mains input Switch assembly	305-000467-0
9	Exposure switch cable assembly	305-000468-0
10	Plastic caps kit(Scissor-arm)	305-000469-0
11	Base unit console assembly	305-000470-0
12	Scissor-arm replacement kit	305-000471-0
13	Scissor-arm cables	305-000472-0
14	15" Straight arm assembly	305-000473-0
15	24" Straight arm assembly	305-000474-0
16	33" Straight arm assembly	305-000475-0
17	Plastic caps(Straight-arm)	305-000476-0
18	Console extension board assembly	305-000477-0
19	Remote keypad console assembly	305-000478-0
20	Doorbell switch assembly	305-000479-0
21	Asthetic kit(Includes all rubber / plastic caps, plugs & rings)	305-000480-0
22	Wall plate-2 stud	305-000572-0
23	Console extension cable set with packing box	305-000506-0
24	Oval Plate & Accessories with Packing Box	305-000725-0
25	Remote keypad ans switch door bell assembly	305-000571-0
26	Wheel floor mount (2 wheels kit) with Packing Box	305-000482-0