Global TOP 10 in Healthcare

Professional LED Light System
for Medical Surgery

Luvis

LUVIS L400 SERVICE MANUAL

Surgical Luminaire

DENTIS CO., LTD.

99, Seongseoseo–ro, Dalseo–gu, Daegu, Korea

Tel. +82–53–583–2804, FAX. +82–53–583–2806 www.dentis.co.kr / www.luvis.co.kr

CONTENTS

“WARNING: Modification of this equipment is not allowed”

1. Standards

- Certification of DENTIS
    - EN ISO 13485:2016
    - Relevant EC Regulation: REGULATION (EU) 2017/745
- Applied Standards:
    - EN ISO 15223-1:2016, Medical devices – Symbols to be used with medical device labels, labelling and information to be supplied – Part 1: General requirements
    - EN 1041:2008/A1:2013, Information supplied by the manufacturer with medical devices
    - EN ISO 13485:2016, Medical devices – Quality management systems – Requirements for regulatory purpose
    - EN ISO 14971:2019, Medical devices – Application of risk management to medical devices
    - EN 60601-1:2006+A2:2021, Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
    - EN 60601-1-2:2015, Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic disturbances – Requirements and tests
    - EN 60601-1-6:2010, Medical electrical equipment-Part 1-6: General requirements for basic safety and essential performance – Collateral Standard: Usability
    - EN ISO 7010:2019, Graphical symbols – Safety colors and safety signs-Registered safety signs
    - EN 62471:2008, Photo biological safety of lamps and lamps systems
    - EN 62366-1:2015, Medical devices – Application of usability engineering to medical devices
    - IEC 60601-2-41:2009/A1:2015, Medical electrical equipment – Part 2-41: Particular requirements for the basic safety and essential performance of surgical luminaires and luminaires for diagnosis
    - IEC 62133:2012, Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
    - IEC 62304:2006/A1:2015, Medical device software, Software life-cycle processes

2. Cautions and Warnings

CAUTION

This ME Equipment is intended only for use in the professional healthcare facility environment, e.g. public and private hospitals, specialized medical offices, etc. This ME Equipment is intended for direct use on operation theatres and nearby HF surgical equipments, where the intensity of EM DISTURBANCES complies with the applicable standards. For further instructions please follow the chapter “Electromagnetic compatibility” of the User's Manual.

CAUTION

If this ME Equipment is lost or degraded the performance due to EM DISTURBANCES, result in improper operation and degradation of the performance.

CAUTION

All cables and maximum lengths of coaxial cables that are replaceable by the DENTIS and that are likely to affect compliance of the this ME Equipment with the requirements of EMC(Electro-Magnetic Compatibility).
Do not modify this ME Equipment.

CAUTION

The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 Class A). If it is used in a residential environment (for which CISPR 11 Class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

WARNING

Use of this ME Equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

WARNING

Use of accessories, transducers and cables other than those specified or provided by DENTIS of this ME Equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

WARNING

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm(12 inches) to any part of the L400, including cables specified by DENTIS. Otherwise, degradation of the performance of this equipment could result.

WARNING

The instructions given in this document must be followed when handling the product. Failure to do so may endanger the safety of the installers or users.
As well as specific information on operating the entire product and conducting preventive maintenance, are provided in the USER'S MANUAL. For further information, please contact our sales network or our local network.

WARNING

The electrical connections must be performed by a qualified technician only.
The Lithium Battery replacement must be performed by a qualified technician only.
The electrical installation must be planned, performed and inspected by electrical engineers.

WARNING

The LIGHTHEAD is designed to operate using a AC 100–240V 50/60Hz. Higher or lower voltages may affect the light intensity and operating life of the LEDs.

WARNING

Damaged wire insulation may result in the risk of electric shock.
To protect against the risk of electrocution, connect the power cables carefully.

WARNING

Major Surgical Luminaire(LUVIS L400) is Class I equipment. In order to avoid the risk of an electric shock, the equipment must be connected to a mains supply with PE(Protective Earth).

WARNING

A main control switch must be installed for turning the system power–off.

WARNING

The power supplies may be installed and connected only by an electrician or a DENTIS authorized service agent.

WARNING

This product may only be repaired and special assembly work may only be carried out by DENTIS or a company that has been authorized by DENTIS.

WARNING

Check the polarity of all electrical connections before turning on the power.

WARNING

The LIGHTHEAD must be connected to a backup power supply(BATTERY PACK or UPS). Always should be checked Battery capacity level before use by pressing the BATTERY CHECK BUTTON. A backup lifetime of a BATTERY PACK or UPS should be greater than 3 hours on power cut condition

WARNING

DENTIS is not responsible for the customer’s backup power supply.(BATTERY PACK or UPS)

WARNING

Take care when handling the circuit boards: these boards are supplied in an electrostatic envelope and must be handled with great care.

WARNING

Do not look directly into light source(LED).

WARNING

The LIGHTHEAD brakes are adjusted during installation. Like all mechanical parts, the brakes are subject to wear.
Read just the brakes if the LIGHTHEAD no longer remains steady in any position.
Check the condition of the mounting surface.

WARNING

The operation and safety of the device may be affected by the removal of certain components during servicing operations.

WARNING

All the information in this manual has been checked out carefully and discerned as accurate one at the time of publication.
However, DENTIS takes no responsibilities of the results caused by default, omission, or misuse of it.

WARNING

DENTIS has rights to modify the product itself or specifications of the product without any prior notice, as well as rights not to renew that modification on this manual.

WARNING

Do not press more than two buttons simultaneously.
In case of abnormal operation (overpower) of this product, stop the medical treatment and contact the place of purchase.

WARNING

The circuit of medical device must be installed in the state with the means to electrically separate with in all poles from the POWER SUPPLY.

WARNING

If you have existing LUVIS CONTROL installed, please delete it.
If you do not delete an existing application, there is a risk of malfunction.

WARNING

You should not run any other apps or switch apps while running the LUVIS CONTROL APP. It may cause malfunction. DENTIS takes no responsibilities of the results caused by misuse of it.

WARNING

The LUVIS CONTROL APP is recommended on Android 7.1. It may not work with other OS versions.
The LUVIS CONTROL APP must be installed on 8-inch(1280 x 800 pixels) TABLET PC. DENTIS is not responsible for any problems that arise when installing on an equipment other than 8-inch(1280 x 800 pixels) TABLET PC.

WARNING

The instructions given in this document must be followed when handling the product. Failure to do so may endanger the safety of the installers or users.
As well as specific information on operating the entire product and conducting preventive maintenance, are provided in the USER'S MANUAL. For further information, please contact our sales network or our local network.

WARNING

Do not install any other software on your TABLET PC. Maintenance by software is not our responsibility. If there is an error in installing the APP, please back up the data and factory reset the TABLET PC and reinstall the APP.

WARNING

The LUVIS CONTROL APP is subject to change and upgrade without notice.

WARNING

To upgrade the version of the LUVIS CONTROL APP, please check the homepage for the latest version.

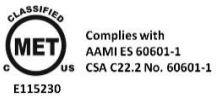
WARNING

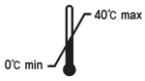
Please notify the manufacturer of bugs and errors in LUVIS CONTROL APP.

WARNING

Customer service is not provided regarding the LUVIS CONTROL APP.

3. Symbol

Symbol	Meaning	Remark
	**CE Mark** The device bears the CE mark and complies with the requirements of Regulation (EU) MDR 2017/745 for medical device.	④, ⑤, ⑥
	MEDICAL – GENERAL MEDICAL EQUIPMENT AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH [ANSI/AAMI ES60601-1:2005/(R)2012 and A1:2012, C1:2009/(R)2012 and A2:2010/(R)2012, CAN/CSA C22.2 No. 60601-1:14]	⑥
	MEDICAL – GENERAL MEDICAL EQUIPMENT AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH [ANSI/AAMI ES60601-1:2005/(R)2012 and A1:2012, C1:2009/(R)2012 and A2:2010/(R)2012, CAN/CSA C22.2 No. 60601-1:14]	⑥
	Recommendation	⑤
	Protective earth (ground)	②
	Alternating current	②
	Stand-by	③
	Do not throw away with general household waste	⑤
	Caution	⑤
	Warning	⑤
	Operating instructions	⑤
	Follow instructions for use	⑥
	General mandatory action	①
	Pushing prohibited	①
	KEEP AWAY FROM RAIN	④

	USE NO HAND HOOKS	④
	FRAGILE, HANDLE WITH CARE	④
	THIS WAY UP	④
	Do not build up more than 5 boxes	④
	Manufacturer	④, ⑤, ⑥
	Europe Representative	⑤, ⑥
	Date of manufacture	⑤, ⑥
	Temperature between 0 - 40℃	④
	Humidity between 0 - 80%RH	④
	Recycling	④, ⑤

No.	Location
①	Marking on the outside of ME EQUIPMENT
②	Marking on the inside of ME EQUIPMENT
③	Marking on the controls of ME EQUIPMENT
④	Marking on the packing label of ME EQUIPMENT
⑤	Marking on the manual of ME EQUIPMENT
⑥	Marking on the label of ME EQUIPMENT

4. Safety instruction

4.1 Instruction

RECOMMENDATION

- Service personnel must be trained by DENTIS or sales network.
- This document may not be reproduced, in whole or in part, without our permission.
- Given the confidential nature of the information in this document, it is distributed exclusively to customers and installers of DENTIS products.
- Check with the DENTIS network to ensure that you have the latest versions of these documents.
- If you are authorized to engage the services of a contractor for all or part of the installation and/or to manufacture certain installation subassemblies, ensure that such subcontracting complies with the terms of the contract which binds you and DENTIS.
- Make sure that your subcontractor is properly qualified for the job and ask for proof of certification. Perform regular inspections at the subcontractor's premises and make sure that the subcontractor's facilities meet your own requirements.
- If installing on existing studs, guarantees that the studs will withstand the new stresses must be obtained.
- Control units must meet applicable standards and fully ensure safe operation, particularly with regard to electric shock. These guarantees must be obtained from the subcontractors.
- DENTIS may not be held liable for any damage or injury resulting from failure to follow these recommendations.

4.2 Electromagnetic Compatibility: Emissions

This ME equipment is intended for use in Professional healthcare facility environment.		
Emission test	**Compliance**	**Guidance**
Conducted Disturbance CISPR 11(EN 55011)	Complies (Group 1, Class A)	This ME equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Radiated Disturbance CISPR 11(EN 55011)		
Harmonic current IEC 61000-3-2	Complies	This ME equipment is suitable for use in all establishments other than domestic premises and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations and flicker IEC 61000-3-3	Complies	

4.3 Electromagnetic Compatibility: Immunity

<table>
<tr><td colspan="3">This ME equipment is intended for use in Professional healthcare facility environment.</td></tr>
<tr><td>Immunity test</td><td>EN 60601-1-2:2015</td><td>Compliance</td></tr>
<tr><td>Electrostatic Discharge(ESD) IEC 61000-4-2</td><td>Direct: ± 8 kV Contact
± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV Air
Indirect: ± 8 kV HCP/VCP</td><td>Complies</td></tr>
<tr><td>Radio Frequency Electromagnetic Fields IEC 61000-4-3</td><td>3 V/m @ 80 MHz ~ 2.7 GHz
80 % AM at 1 kHz</td><td>Complies</td></tr>
<tr><td>Proximity fields from RF wireless communications equipment IEC 61000-4-3</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Modulation</th><th>Immunity Level (V/m)</th></tr>
<tr><td>385</td><td>**Pulse Modulation: 18 Hz</td><td>27</td></tr>
<tr><td>450</td><td>*FM
± 5Hz deviation: 1 kHz sine</td><td>28</td></tr>
<tr><td>710
745
780</td><td>**Pulse Modulation: 217 Hz</td><td>9</td></tr>
<tr><td>810
870
930</td><td>**Pulse Modulation: 18 Hz</td><td>28</td></tr>
<tr><td>1 720
1 845
1 970</td><td>**Pulse Modulation: 217 Hz</td><td>28</td></tr>
</table>
</td><td>Complies</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>2 450</td><td>**Pulse Modulation: 217 Hz</td><td>28</td></tr>
<tr><td>5 240
5 500
5 785</td><td>**Pulse Modulation: 217 Hz</td><td>9</td></tr>
</table>
** The carrier shall be modulated using a 50 % duty cycle square wave signal.
* As an alternative to FM modulation, 50 % pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.
</td><td></td></tr>
<tr><td>Fast Transients
IEC 61000-4-4</td><td>
<table>
<tr><td>Voltage</td><td>AC/DC power ports</td><td>Signal ports</td></tr>
<tr><td>Test voltage</td><td>± 2 kV</td><td>± 1 kV</td></tr>
</table>
- 100 kHz repetition frequency
</td><td>Complies</td></tr>
<tr><td>Surges
IEC 61000-4-5</td><td>
<table>
<tr><td>Voltage</td><td>Power lines</td></tr>
<tr><td>Test voltage</td><td>Line to Line : ± 0.5 kV, ± 1 kV
Line to ground: ± 0.5 kV, ± 1 kV, ± 2 kV</td></tr>
</table>
</td><td>Complies</td></tr>
<tr><td>RF Continuous Conducted
IEC 61000-4-6</td><td>3 V @ 0.15 MHz ~ 80 MHz
6 V @ in ISM bands between 0.15 MHz and 80 MHz
80 % AM at 1 kHz</td><td>Complies</td></tr>
<tr><td>Power Frequency Magnetic Fields
IEC 61000-4-8</td><td>30 A/m @ 50 Hz or 60 Hz</td><td>Complies</td></tr>
<tr><td>Voltage Dips, Interruptions, and Variations
IEC 61000-4-11</td><td>• Voltage Dips
0 % UT; 0,5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°
0 % UT; 1 cycle and 70 % UT; 25/30 cycles Single phase: at 0°

• Voltage Interruptions
0 % UT; 250/300 cycle

• Voltage Variations
<table>
<tr><td>Frequency (Hz)</td><td>Ranges</td></tr>
<tr><td>50</td><td>49, 50, 51</td></tr>
<tr><td>60</td><td>59, 60, 61</td></tr>
</table>
</td><td>Complies</td></tr>
</table>

5. LIGHTHEAD specification

5.1 Technical specification (In accordance with EN/IEC 60601–2–41)

- **STANDARD SPECIFICATION**

Specifications		Unit	LUVIS L400	Remark
Normal Mode				
Central illuminance Ec (@1m)		lx	160,000	
Electronic adjustment range		%	25 ~ 100	
Light field diameter d10		cm	18 ~ 30	
Light field diameter d50		cm	10 ~ 18	
Diameter d50/d10		N/A	> 0.55	
Depth of illumination at 60%		cm	65	
Color temperature (4 levels)		K	3,600/4,200/4,800 /5,400	±300K
Color rendering index Ra		N/A	97	±3
Special color rendering index R9		N/A	97	±3
Shadow dilution	With tube	%	95	
	With one mask	%	90	
	With two mask	%	65	
	With one mask, at base of tube	%	85	
	With two mask, at base of tube	%	60	
Turbulence intensity(DIN 1946-4)		%	13.57	Result of manufacturer's simulation
Radiation energy		mW/㎡·lx	3.7	
Illumination energy(Ee)		W/㎡	570	
Endo Mode				
Illumination		lx	8,000	Ec * 5%

* Optical values are measured with a tolerance of ±10%

5.2 Electrical specification (In accordance with EN/IEC 60601–1)

- **SMPS TECHNICAL DATA**

Content	Single LIGHTHEAD	Dual LIGHTHEAD
Input	AC 100–240 V, 50/60 Hz (1.8/0.8 A typical at AC 115/230 V full load)	AC 100–240 V, 50/60 Hz (1.8/0.8 A typical at AC 115/230 V full load) x 2
Output	DC 28 V, 6.4 A	(DC 28 V, 6.4 A) x 2

- **RATING**

Content	Rating	Remark
L400 LIGHTHEAD	AC 100–240 V, 105 VA, 50/60 Hz	Single LIGHTHEAD
	AC 100–240 V, 153 VA, 50/60 Hz	Single LIGHTHEAD with CAMERA and BATTERYPACK
BATTERY PACK	DC 14.8 V, 26 Ah	Lithium-ion Battery

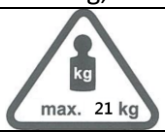
5.3 Mechanical specification

Specifications	Length(mm)	Weight(kg)	Remark
CEILING COVER	600	1.0	
CEILING TUBE	Φ300/300	19.2	
CENTRAL AXIS	2Fold (850/700)	25.3	
	1Fold (850)	14.8	
SPRING ARM	860	6.5	AC2000 STD(3Axis)
	860	5.9	Valia LCH17(2Axis)
	860	6.5	AC2000 Mobile(2Axis)
LIGHTHEAD L400	∅ 73	17.5 (18.5)	3Axis (INTERNAL CAMERA : 1kg)

	Ø 73	14.5	2Axis
MOBILE ARM	–	28.4	Except SPRING ARM
BATTERY PACK	L x W x H : 244 x 164 x 120	3.8	

* SPRING ARM Type of INTERNAL CAMERA : AC 2000(W/S)

5.4 Configuration of SPRING ARM & LIGHTHEAD

<table>
<tr><th>Content</th><th>AC2000(STD)
3 Axis</th><th>Valia(LCH17)
2 Axis</th><th>AC2000(STD)
3 Axis</th></tr>
<tr><td rowspan="2">L200</td><td>REF 1871102
: AA910,N,3p,
13.5-21kg,R9010</td><td rowspan="7">REF 600679
VA, LCH17, 3P,
125Nm, R9010
 
</td><td rowspan="2">-</td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="2">M200,
M210</td><td rowspan="2">-</td><td>REF 1896156
: AA910,N,3p,
9-15kg,R9010</td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="2">M300,
M310</td><td>REF 1871102
: AA910,N,3p,
13.5-21kg,R9010</td><td rowspan="2">-</td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="2">L400,
M400</td><td>REF 1871102
: AA910,N,3p,
13.5-21kg,R9010</td><td rowspan="2"></td></tr>
<tr><td> 
</td></tr>
</table>

* Check and install the Payload of the AC2000 and Valia Spring Arm, considering the LIGHTHEAD weight

5.5 Configuration of SPRING ARM & Specific options

Content	AC2000(W/S) 3 Axis-Monitor	AC2000(W/S) 3 Axis-Internal camera	AC2000(W/S) 2 Axis-Mobile
L200, M200, M210, M300, M310, L400, M400	**REF 1938769** : AA910,N,nEwS, 9-15kg,R9010	**REF 1938711** : AA910,N,nEwS,13, 5-21kg,R9010	**REF 1917125** : AALCH,D,3p, 95-176Nm,R9002
			

* Check and install the Payload of the Specific options(Monitor, Internal camera etc.)

5.6 INTERNAL CAMERA(optional) specification

Content	Specifications		REMARK
	Wire	Wireless	
Image Sensor	1/2.8 type CMOS		
Zoom Ratio	30X Optical Zoom		
Image Point	Approx. 2.13 Megapixels		
Min. Object Distance	10mm to 1200mm		
Video System	1080p/60		
Video Output Signal	3G HD–SDI SMPTE 424M & 292M		75Ω BNC
Wireless Frequency	-	5.0GHz	
Wireless Bandwidth	-	20MHz	
Wireless Max Distance	-	120m	
Transmission Latency	-	0.1s	

6. Other characteristic

Specifications	LUVIS L400	Remark
Protection against electric shock	Class I Protection	
Protection against harmful ingress of water or particulate matter	Ordinary	Head part: IP42
Method of sterilization	See the USER'S MANUAL	

7. Tool for installation

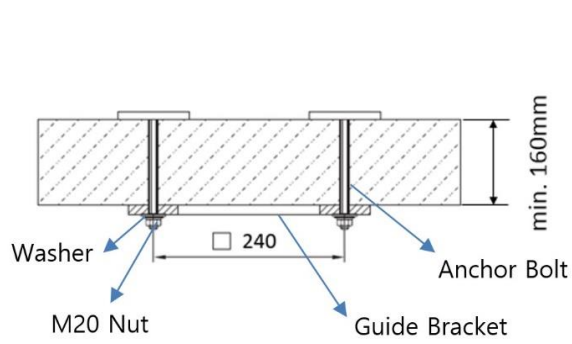
Tool	Description
Allen wrench	To adjust the spring tension
Pin(Φ4mm x 110mm)	To adjust the spring tension
Phillips screwdriver	To install the screw
Flat–head screwdriver	To adjust the brake force on the pendant system
Snap ring plier	To install the SNAP RING

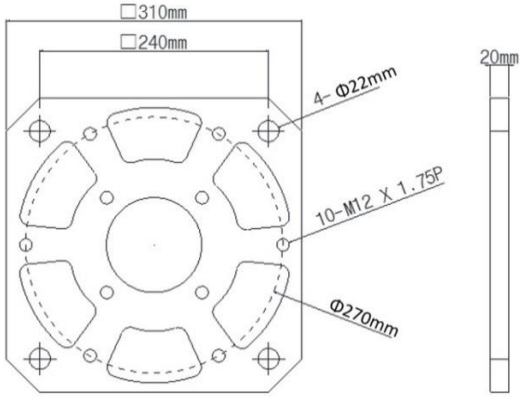
8. Part for Installation

- Screws : M4 x 10 mm
- Screws : M3 x 8 mm

9. Installing Ceiling type

9.1 Mounting the GUIDE BRACKET





Check the position of the anchor bolt, inserting the guide bracket.
Tighten in M20 nut to fix.
ANCHOR BOLT POSITION: 240(W) x 240(L) mm

- Tighten the Hexagonal nuts M20 to a torque of 390N·m.

RECOMMENDATION

The position of the GUIDE BRACKET must be vertical (±1°). Place a level on the GUIDE BRACKET and verify on 360°. The stability of the installation is directly dependent on the position.

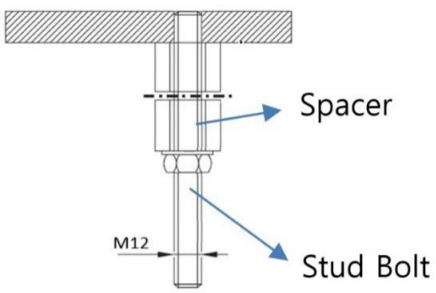
※ STUD Installation

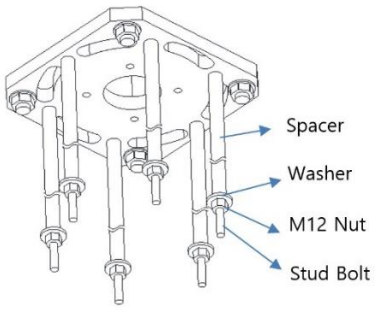
Tighten the stud bolt 6 places in guide bracket.
Firmly fixing the spacers 6 points after the insert washers and M12 nuts on the stud bolts.

Tighten the Hexagonal nuts(or hexagonal screws) M12 to a torque of 83N·m

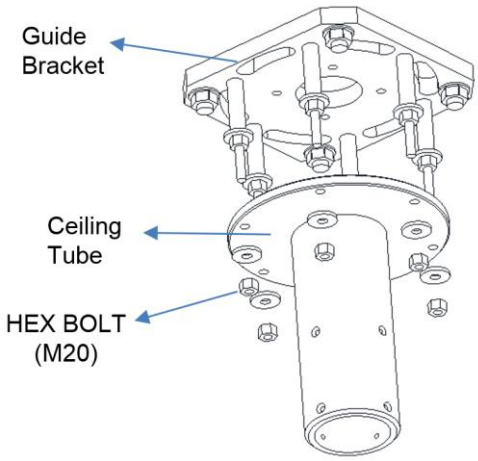
Applications

if the ceiling height is high and there is any vibration problem.
Please use spacer related parts. but It's not supplied factory.



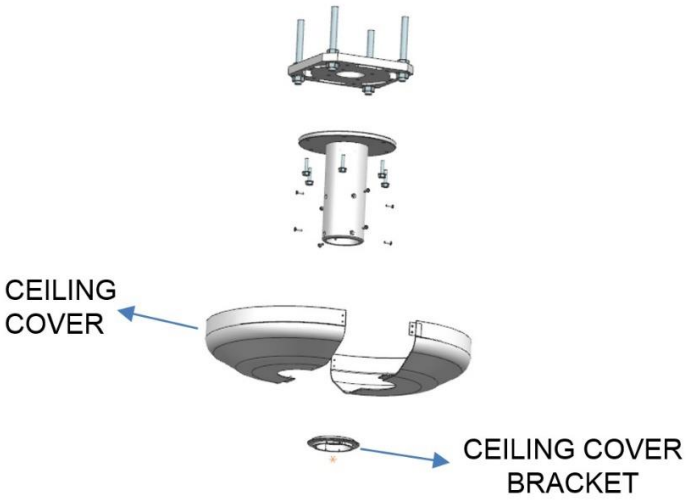


9.2 Adjusting the verticality



- Combine the GUIDE BRACKET and the CEILING TUBE by WRENCH BOLT
- Adjust the verticality of the CEILING TUBE by tightening the bottom hex bolt(M20).
- Tighten the Hexagonal nuts M20 to a torque of 390N·m.
- Using a torque wrench, tighten the bottom hex nuts.
- Lastly, check the vertical alignment of the CEILING TUBE.

9.3 Installing the CEILING COVER

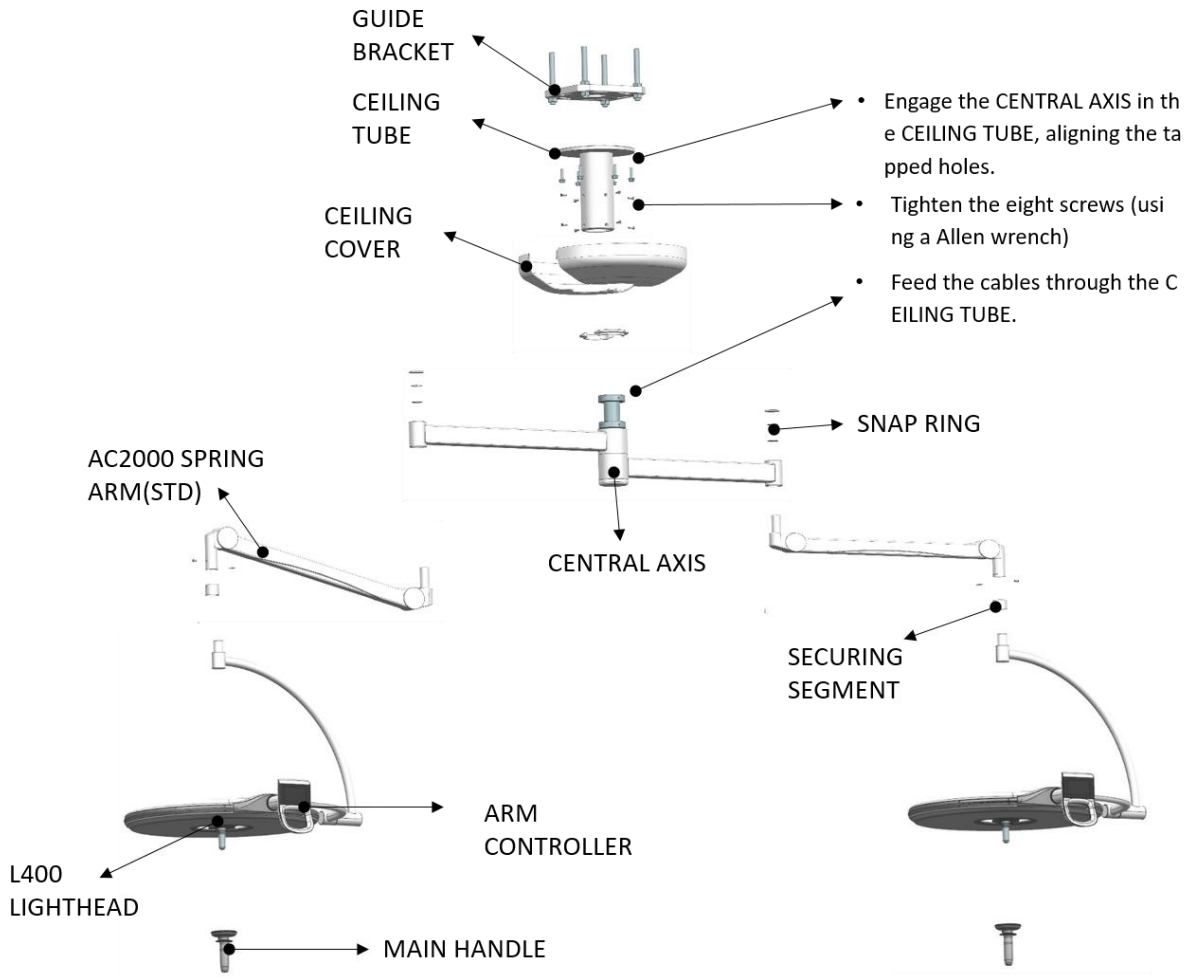


- Fit the retaining bracket to secure the CEILING COVER.

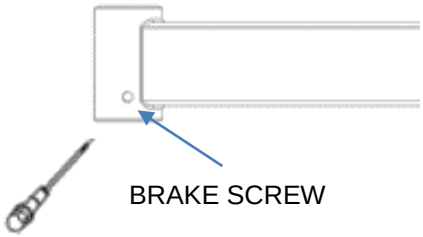
10. Mounting the CENTRAL AXIS

RECOMMENDATION

See Ondal's SERVICE MANUAL



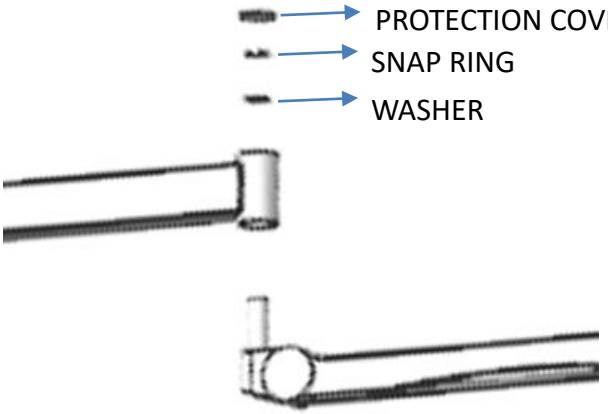
11. Mounting the SPRING ARM



- Disassemble two brake screws

WARNING

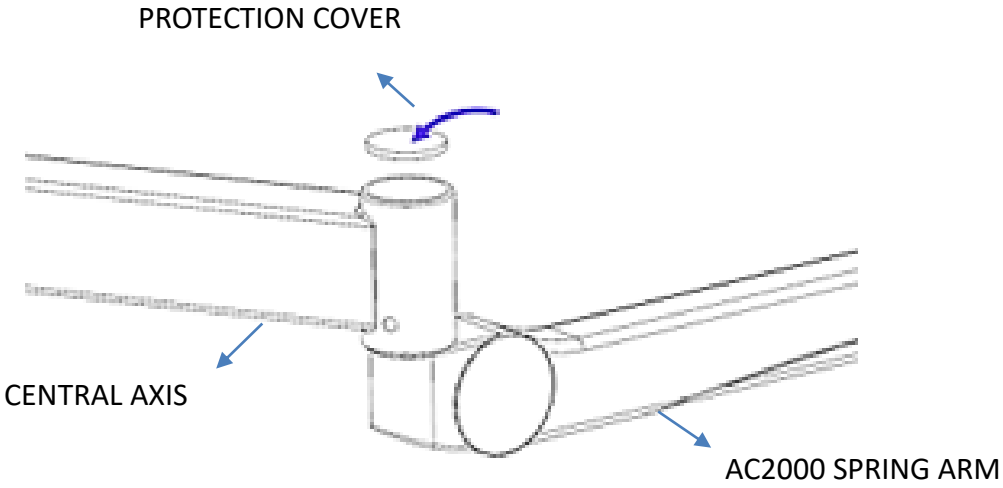
Take care that the components do not fall.
The pendant system can drop if the SNAP RING is overstretched.



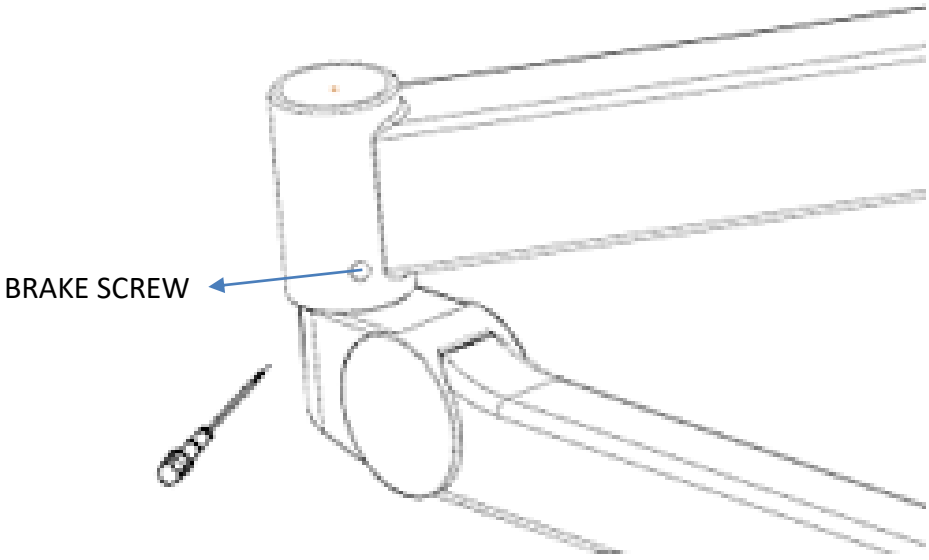
- Remove the protection cover
- Remove the SNAP RING and the WASHER(using snap ring plier)

WARNING

The SNAP RING should be fully seated in its groove and turn freely.
Never use a bent SNAP RING.
Acoustic inspection :
– The SNAP RING must audibly snap in place in the groove of the SPRING ARM pivot
Visual inspection :
– The disc Ø 39mm of the AC2000 SPRING ARM with plug coupling, swivel range greater than 360 degrees, or the 2 discs Ø 39mm of the AC2000 SPRING ARM, Empty, with end stop, swivel range less than 360 degrees, must be mounted under the SNAP RING.
– The SNAP RING must not be non–circular.
– The distance between the ring lugs in the SNAP RING must correspond to the distance in the loose state. If the distance is higher, the SNAP RING has not been correctly mounted.
Correct position :
– The SNAP RING is correctly mounted if it can be rotated in its groove.

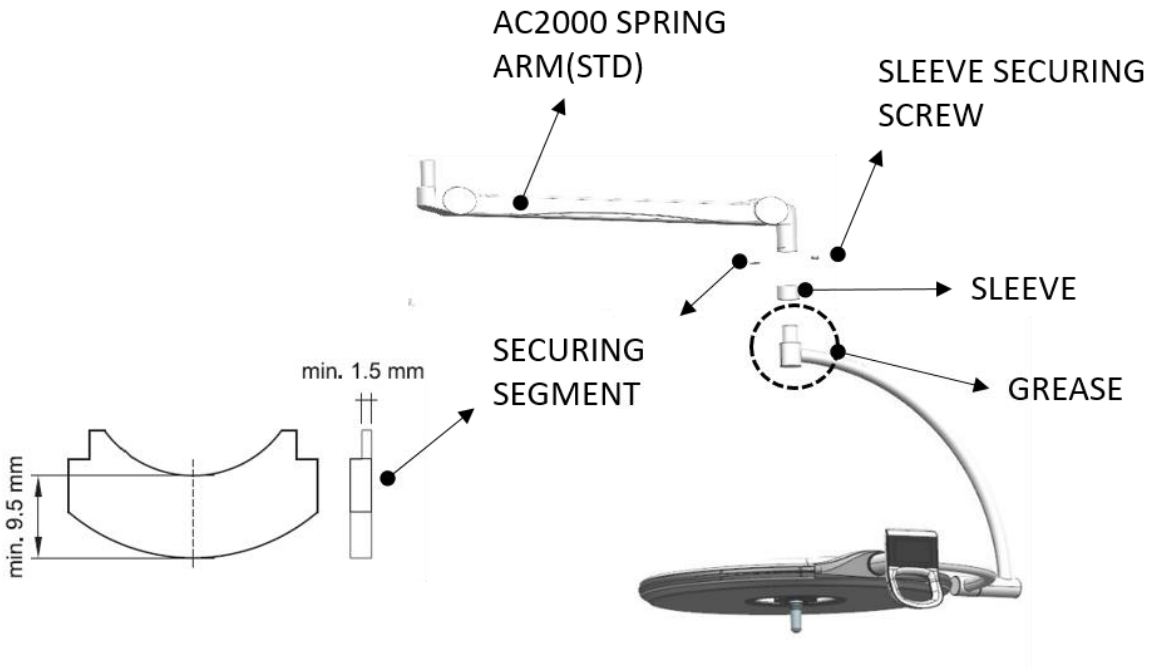


- Insert the AC2000 SPRING ARM in the hole of CENTRAL AXIS
- Check from above that the cables have been inserted correctly
- Insert the SNAP RING and the WASHER(using snap ring plier)
- Fit the PROTECTION COVER



- Fit two brake screws (Flat–head screwdriver).

11.1 Installing L400 LIGHTHEAD on the SPRING ARM(AC2000 STD)

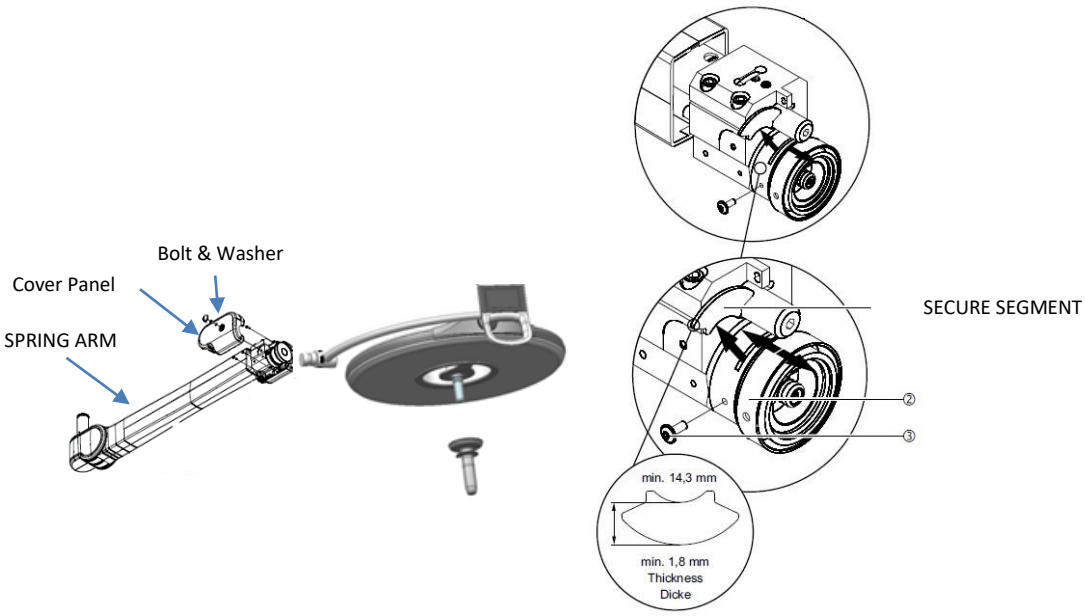


- Remove the SLEEVE SECURING SCREW from the SLEEVE
- Slide SLEEVE upwards.
- Insert the LIGHTHEAD in the SPRING ARM
- Insert the SECURING SEGMENT
- Lower the SLEEVE onto the SECURING SEGMENT
- Refit the SLEEVE SECURING SCREW
- When mounting the LIGHTHEAD, a light coat of acid-free grease should be applied to the HEAD ARM SPINDLE.

WARNING

It ensures that the LIGHTHEAD is secured correctly.
Do not apply grease if lubricated parts are installed. (eg bearings, bushings).

11.2 Installing L400 LIGHTHEAD on the SPRING ARM(LCH17)



- Separate the cover panel by removing the bolts and washers of the cover panel of the spring arm
- Loosen DAMPER Bolt - ③ of Spring arm and Insert the SECURING DEVICE - ②
- Insert the LIGHTHEAD in the SPRING ARM(Check the Cable)
- Secure with the SECURE SEGMENT and bolts.
- Fasten the cover panel to the SPRING ARM using bolts and washers.
- When mounting the LIGHTHEAD, a light coat of acid-free grease should be applied to the HEAD ARM SPINDLE.

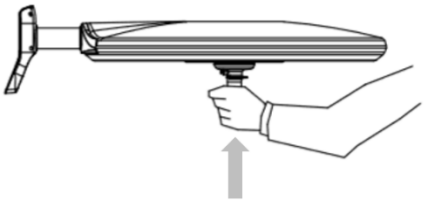
WARNING

Do not apply grease if lubricated parts are installed. (eg bearings, bushings).

11.3 Attaching/Detaching the MAIN HANDLE

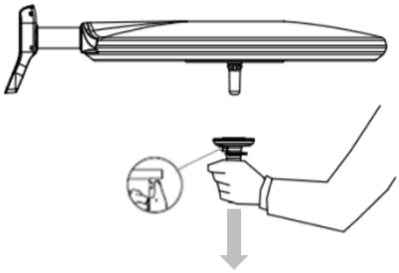
WARNING

Check the compatibility of the MAIN HANDLE used with the product.
Check MAIN HANDLE for cracks
Check that the handle clicks into place correctly on the LIGHTHEAD.



Attaching the MAIN HANDLE

- Insert the MAIN HANDLE into the mount until it clicks into place.



Detaching the MAIN HANDLE

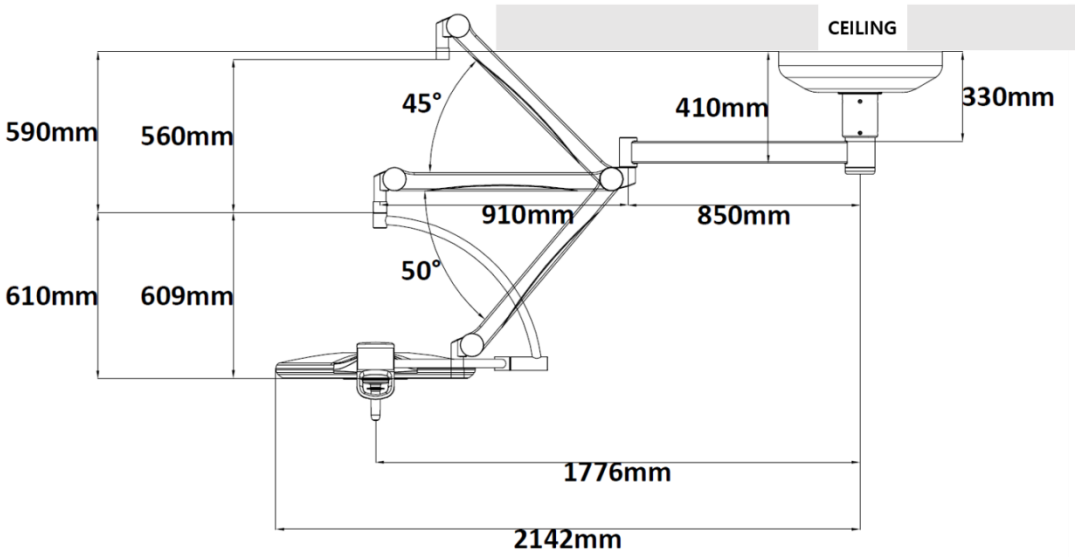
- Press down on the push button while removing the MAIN HANDLE.

11.4 Installation example

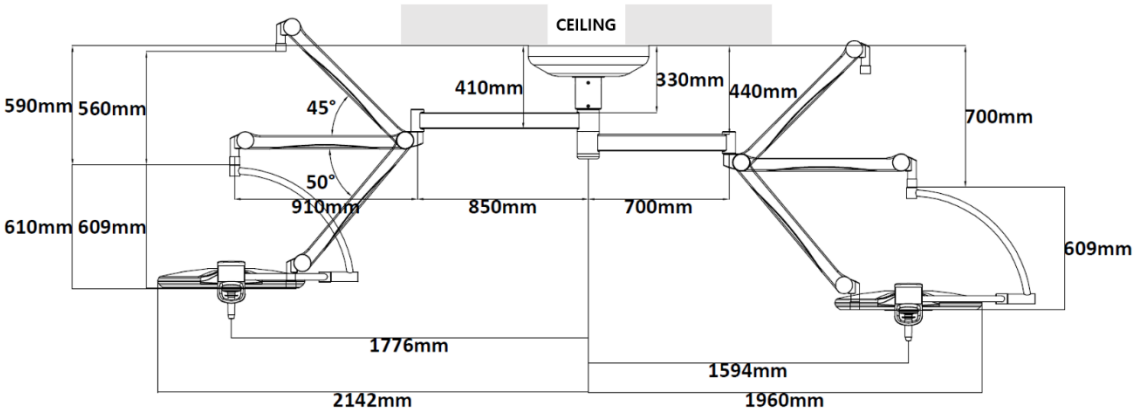
WARNING

Check the following installation drawing.
Check the installation height.
Check the bed location and height.

(1) 3 axis HEAD ARM

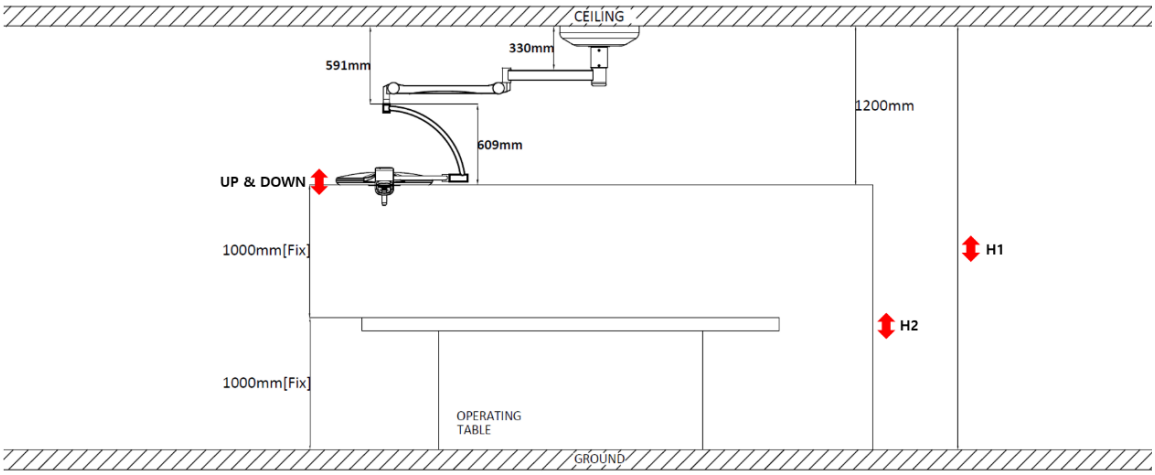


[Single Ceiling]

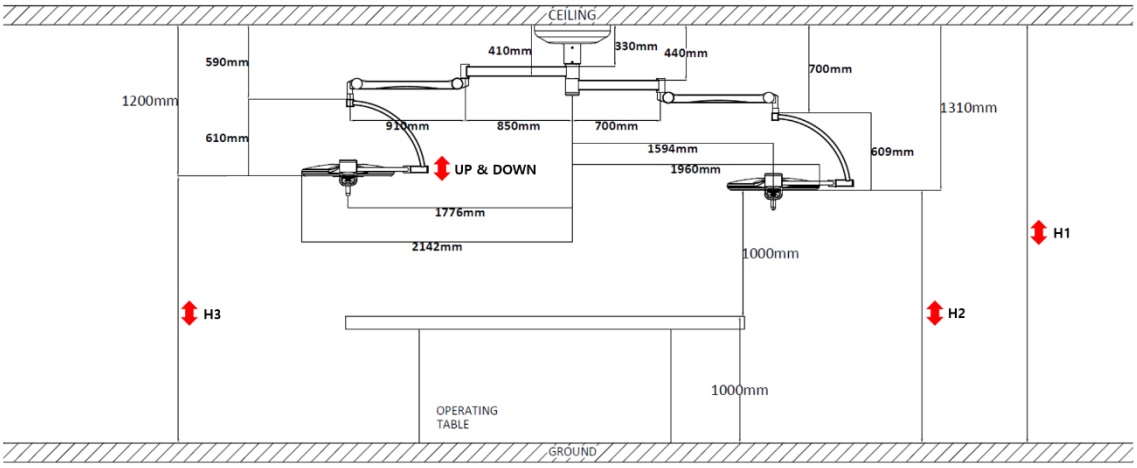


[Dual Ceiling]

(2) Operating room installation height (3 axis HEAD ARM)



[Single Ceiling]

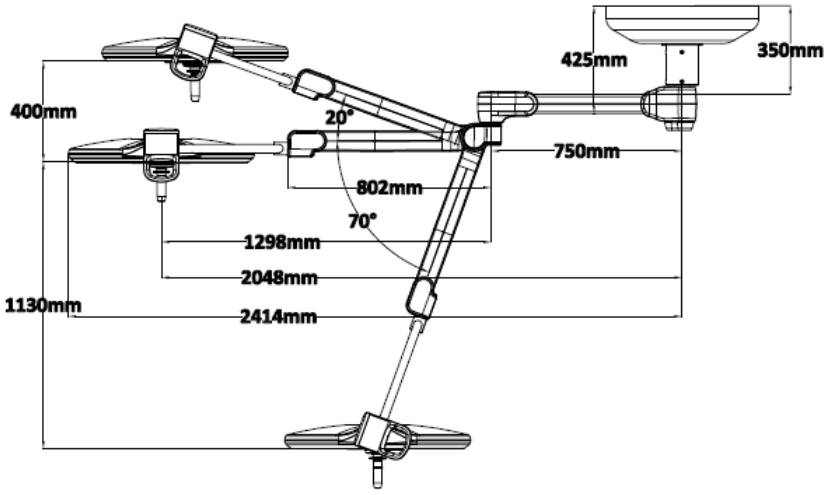


[Dual Ceiling]

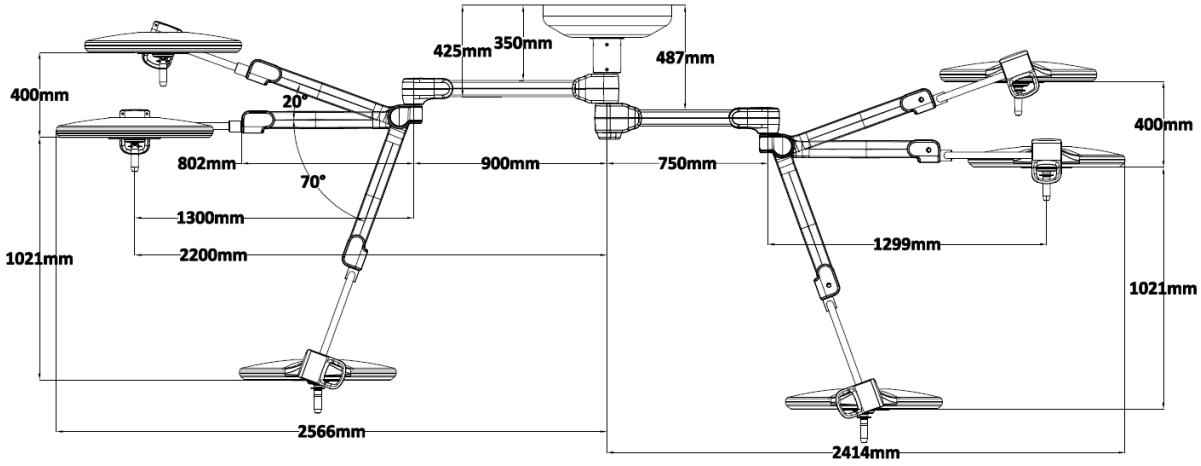
Illumination distance 1m standard							
Single Ceiling			Dual Ceiling				
H1 (mm)	H2 (mm)	HEAD 1 (mm)	H1 (mm)	H2 (mm)	H3 (mm)	HEAD 1 (mm)	HEAD 2 (mm)
2,900	1,700	300 UP	2,900	1,590	1,700	300 UP	410 UP
3,000	1,800	200 UP	3,000	1,690	1,800	200 UP	310 UP
3,100	1,900	100 UP	3,100	1,790	1,900	100 UP	210 UP
3,200	2,000	-	3,200	1,890	2,000	-	110 UP
3,300	2,100	100 DOWN	3,300	1,990	2,100	100 DOWN	10 UP
3,400	2,200	200 DOWN	3,400	2,090	2,200	200 DOWN	90 DOWN
3,500	2,300	300 DOWN	3,500	2,190	2,300	300 DOWN	190 DOWN
3,600	2,400	400 DOWN	3,600	2,290	2,400	400 DOWN	290 DOWN

※ Setting the height of LIGHTHEAD along the height of the ceiling

(3) 2 axis HEAD ARM

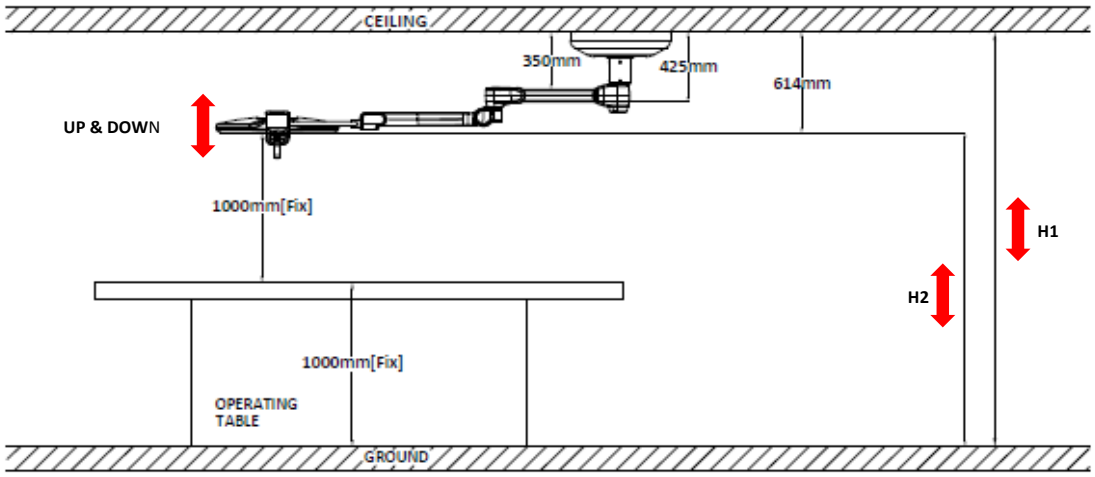


[Single Ceiling]

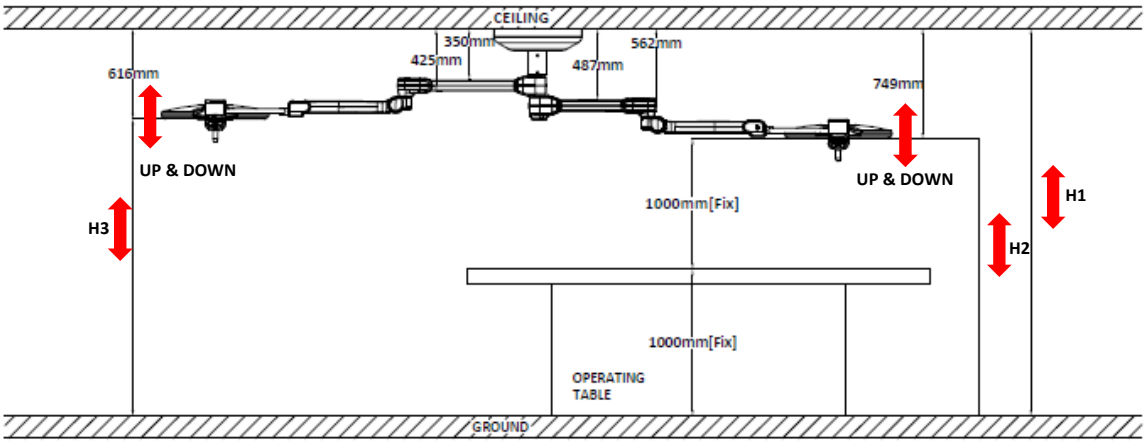


[Dual Ceiling]

(4) Operating room installation height (2 axis HEAD ARM)



[Single Ceiling]



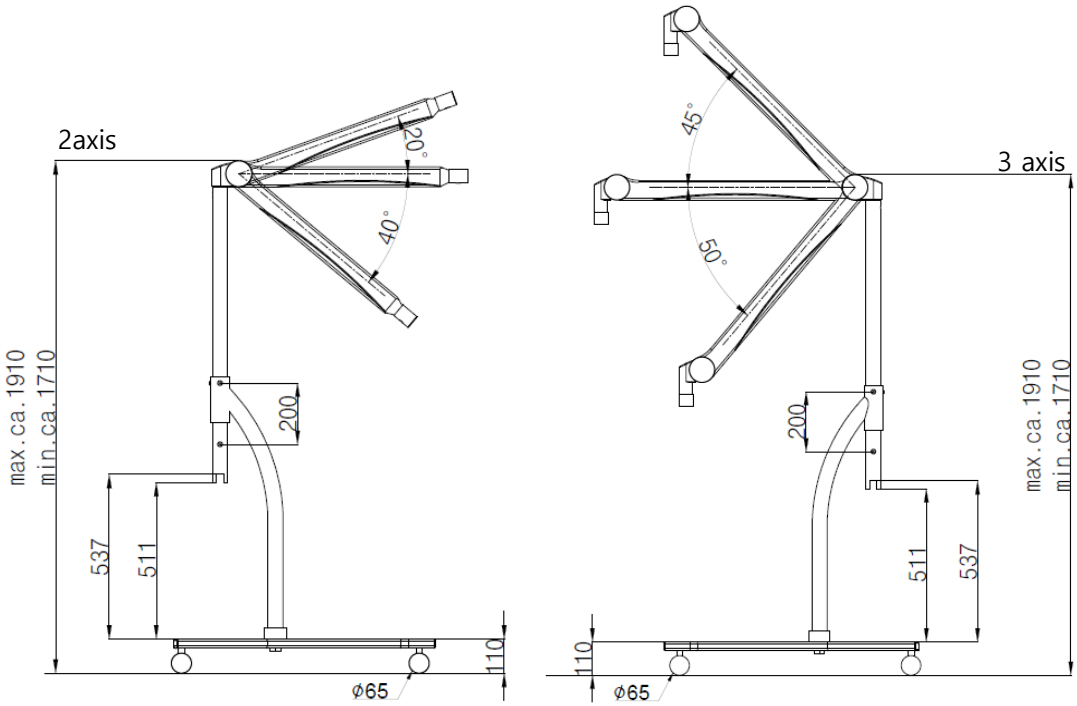
[Dual Ceiling]

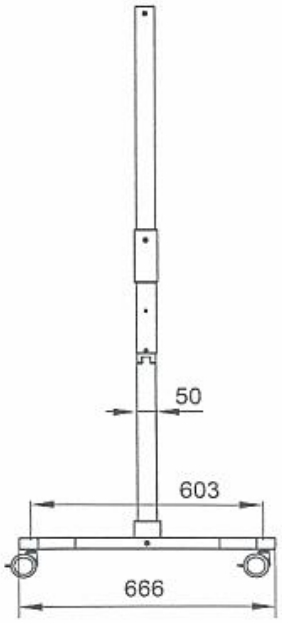
Illumination distance 1m standard							
Single Ceiling			Dual Ceiling				
H1 (mm)	H2 (mm)	HEAD 1 (mm)	H1 (mm)	H2 (mm)	H3 (mm)	HEAD 1 (mm)	HEAD 2 (mm)
2,400	1,786	214 UP	2,400	1,651	1,784	216 UP	349 UP
2,500	1,886	114 UP	2,500	1,751	1,884	116 UP	249 UP
2,600	1,986	14 UP	2,600	1,851	1,984	16 UP	149 UP
2,700	2,086	86 DOWN	2,700	1,951	2,084	84 DOWN	49 UP
2,800	2,186	186 DOWN	2,800	2,051	2,184	184 DOWN	51 DOWN
2,900	2,286	286 DOWN	2,900	2,151	2,284	284 DOWN	151 DOWN
3,000	2,386	386 DOWN	3,000	2,251	2,384	384 DOWN	251 DOWN
3,100	2,486	486 DOWN	3,100	2,351	2,484	484 DOWN	351 DOWN
3,200	2,586	586 DOWN	3,200	2,451	2,584	584 DOWN	451 DOWN

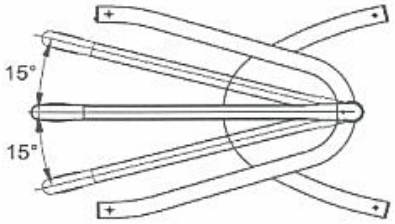
※ **Setting the height of LIGHTHEAD along the height of the ceiling**

(5) Mobile

Unit : mm







12. Electrical connection

WARNING

The electrical connections must be performed by a authorized service personnel only.

WARNING

Check the polarity of all electrical connections before turning on the power.
Insert the power cables carefully to protect against the risk of electrocution

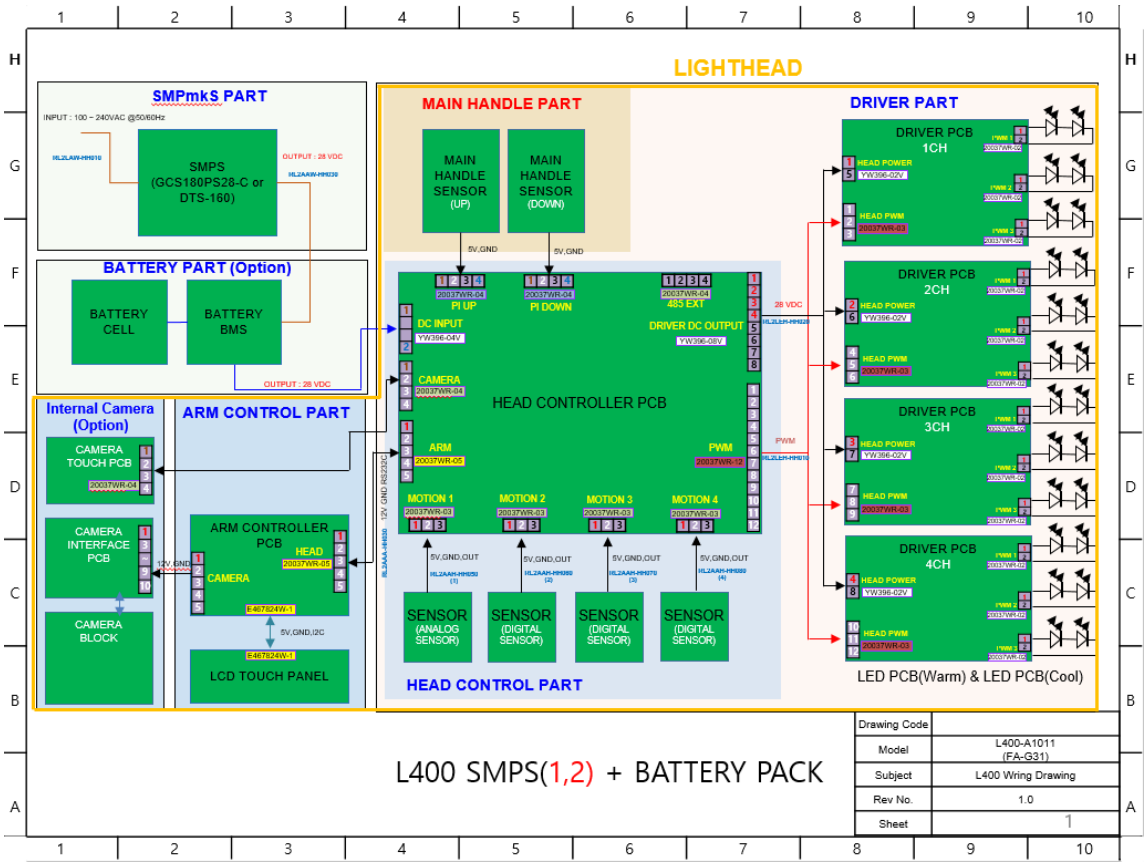
WARNING

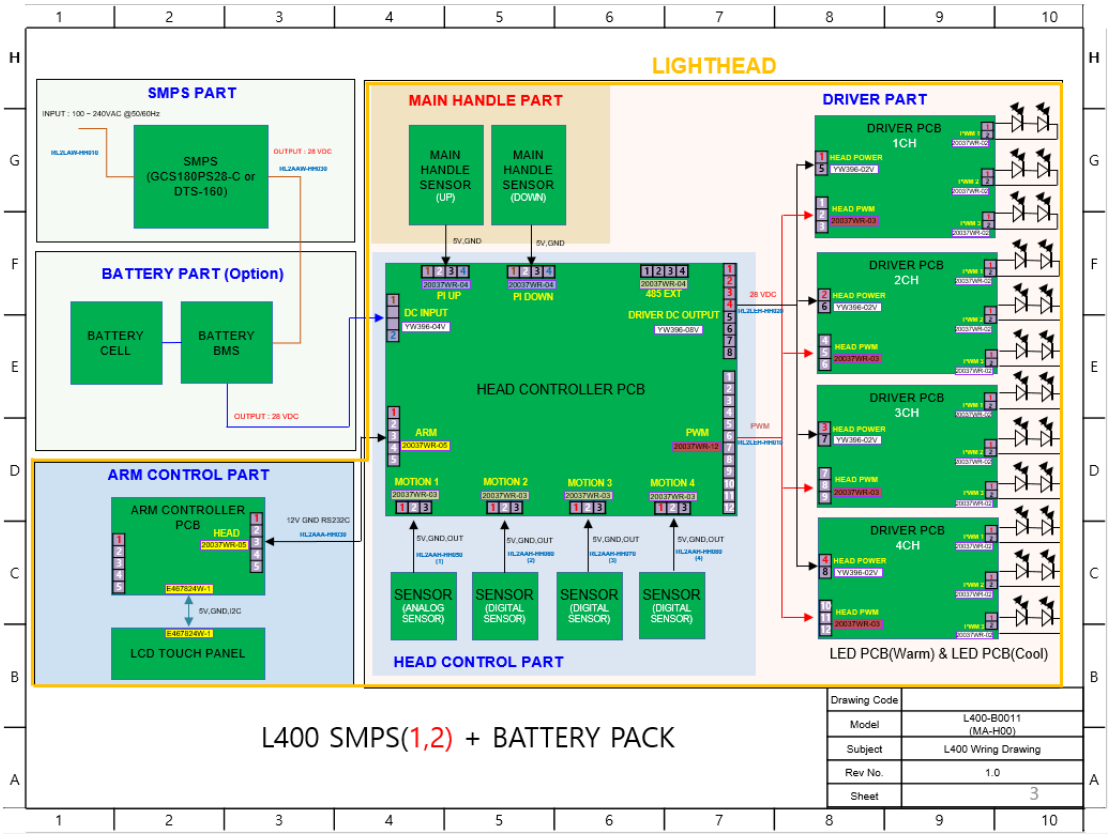
Do not remove covers or perform service other than as described in this equipment manual.
Refer servicing to qualified service personnel.

Power supply information

- See 5.2 Electrical specification

12.1 Block diagram



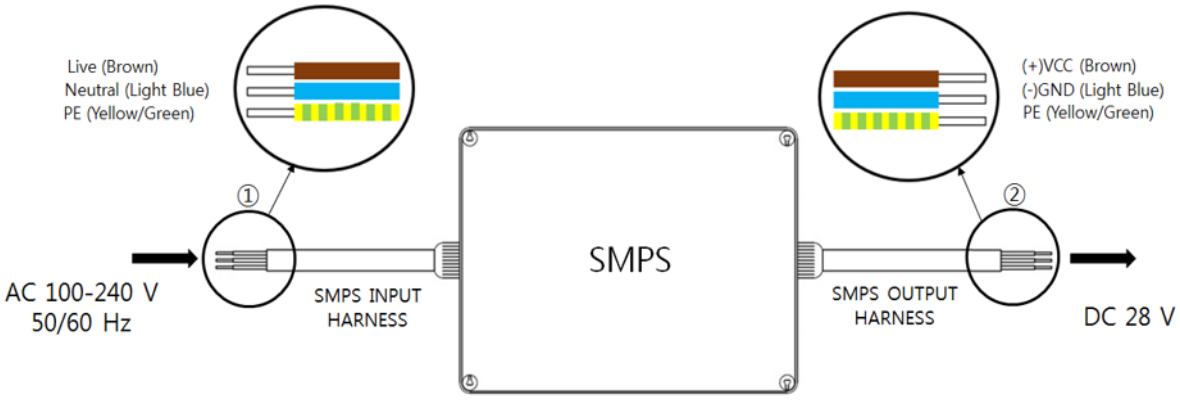


12.2 Connecting the power supply

WARNING

The cable connections must be performed by a authorized service personnel only.

- Connect the Power line(AC 100–240 V 50/60 Hz) to the SMPS INPUT HARNESS(Live, Neutral, PE) of the SMPS.
- Connect the SMPS OUTPUT HARNESS((+)VCC, (-)GND, PE) to the LIGHTHEAD.
- See Chapter 17 for BATTERY PACK models



*** SMPS INPUT HARNESS**

No.	Part name	Colour
①	Live	Brown
	Neutral	Light Blue
	PE	Yellow/Green

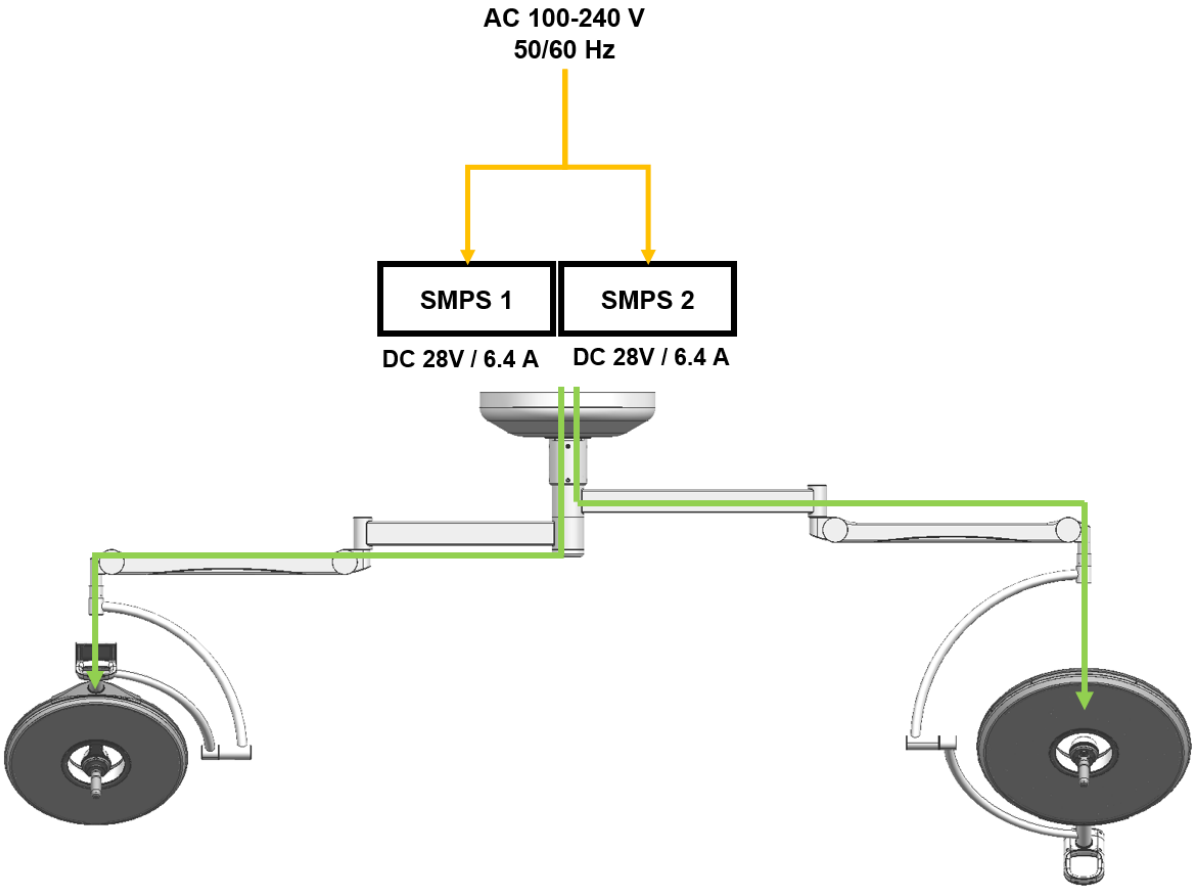
* Live, Neutral, PE : Protective Earth

*** SMPS OUTPUT HARNESS**

No.	Part name	Colour
②	(+)VCC	Brown
	(-)GND	Light Blue
	PE	Yellow/Green

13. Electrical wiring diagram

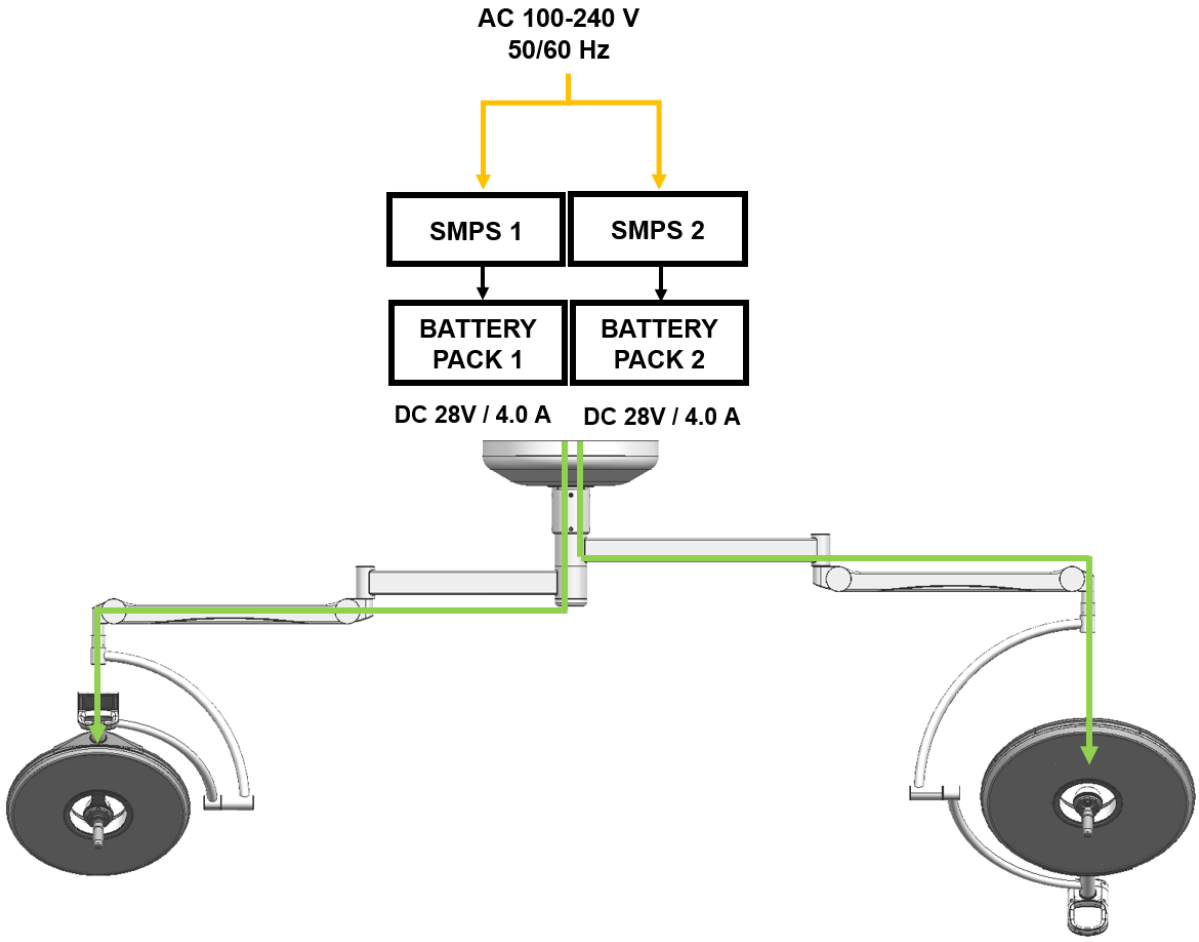
13.1 LIGHTHEAD part



13.2 LIGHTHEAD + BATTERY PACK(Optional)

WARNING

Must check the voltage of the BATTERY PACK label
The voltage is DC 28V

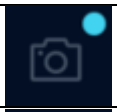
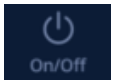
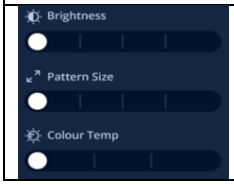


14. Controlling the LIGHTHEAD

14.1 Controlling the LIGHTHEAD with the ARM CONTROLLER

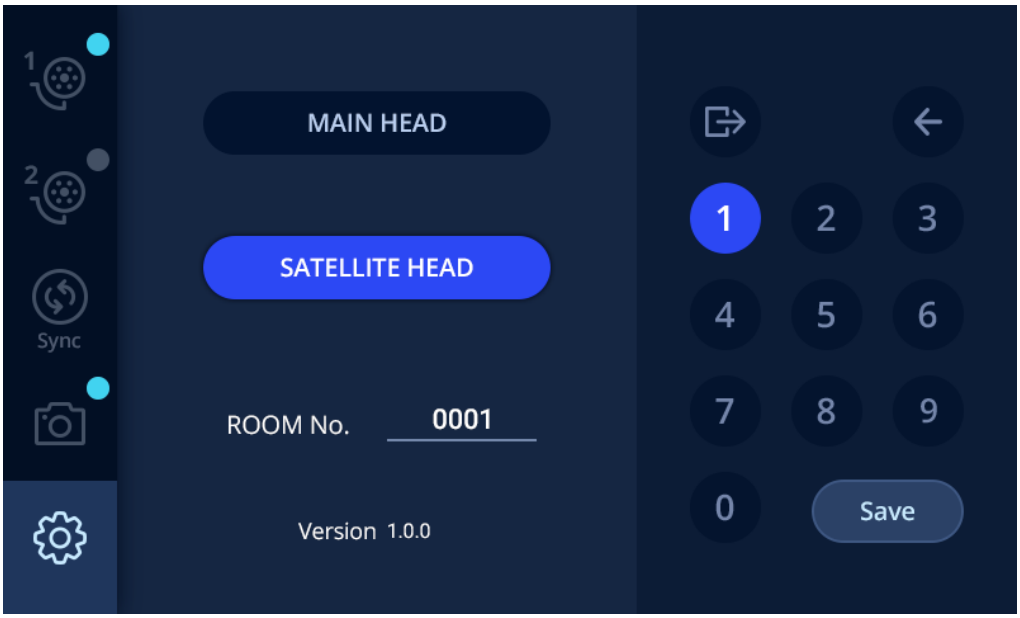
14.1.1 MAIN

FUNCTION

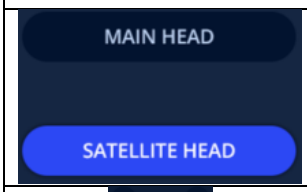
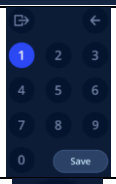
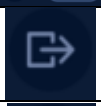
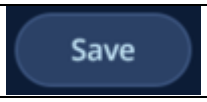
LUVIS L400		
	MAIN HEAD	• Select MAIN HEAD
	SATELLITE HEAD	• Select SATELLITE HEAD
	Synchronization	• Synchronizing LIGHTHEADs with each other. • The setting is automatically applied to the Dual LIGHTHEAD.
	CAMERA	• CAMERA setting
	Setting	• LIGHTHEAD setting • Select for three seconds and go in
	On/Off (Standby)	• On/Off button. • The light turns on, at the last illumination level stored in its memory.
	Level adjustment for the selected function	• Five light field diameter levels • Five illumination levels • Four color temperature levels 3,600K / 4,200K / 4,800K / 5,400K

	Maximum mode	• Illumination : Level 5 • Light field diameter : Level 5
	ENDO mode	• Ambient light mode.
	Depth mode	• Depth mode On/Off.
	Handle control mode	• Handle control mode On/Off.
	Status	• Illumination, Pattern size, Color temperature

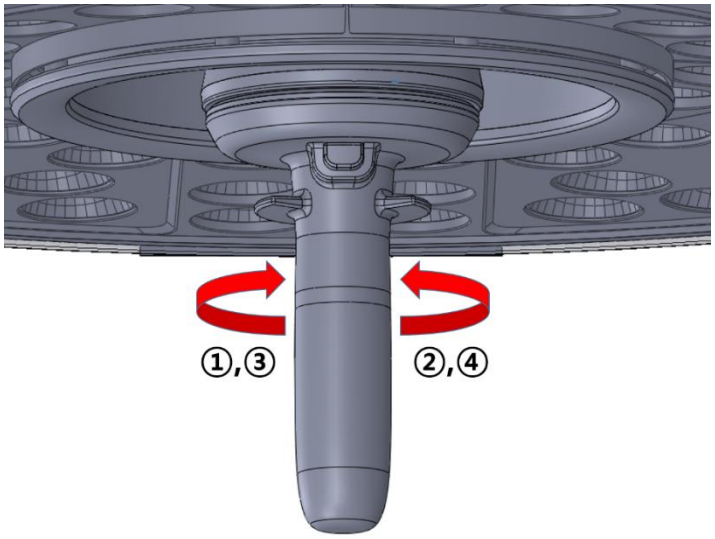
14.1.2 SETTING



FUNCTION

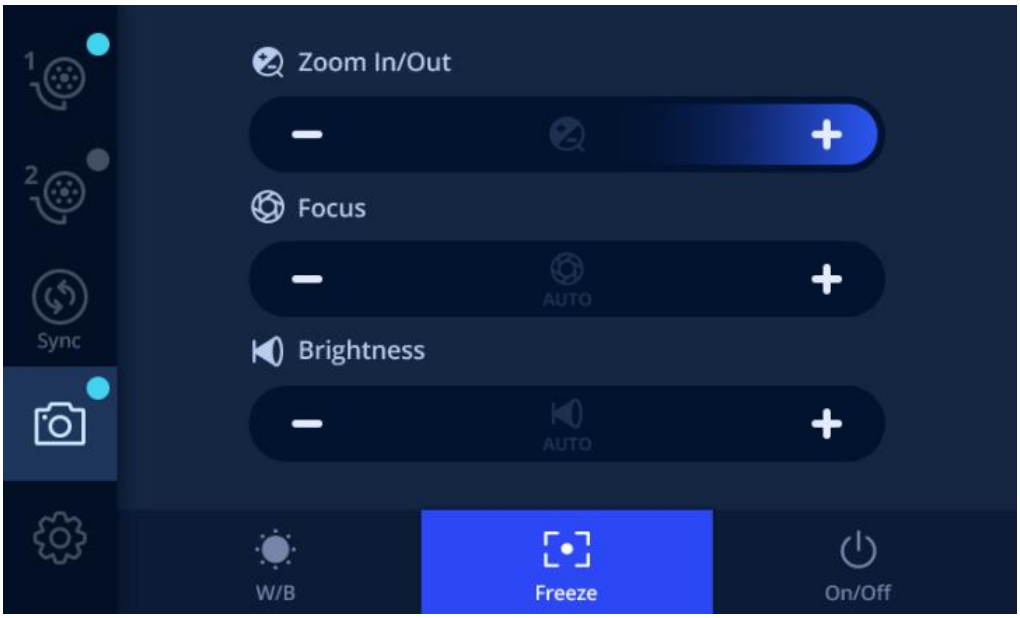
LUVIS L400		
	Operating room No.	• Operating room number setting.
	VERSION	• Firmware version
	LIGHTHEAD	• Select MAIN HEAD or SATELLITE HEAD. • If Single LIGHT, Select MAIN HEAD.
	Number key pad	• Input the operating room number.
	Page exiting	• Exiting from the setting page.
	Backspace	• Erasing the operating room number.
	Save	• Saving the setting value.

14.2 Light functions operated at the HANDLE CONTROLLER

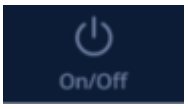


No.	Function	Description
①	Decrease of light field diameter step	Turn the handle to the anti-clockwise for less than 1 second to decrease the light field diameter.
②	Increase of light field diameter step	Turn the handle to the anti-clockwise for less than 1 second to increase the light field diameter.
③	Decrease of illumination step	Turn the handle to the anti-clockwise for more than 1.5 second to decrease the illumination.
④	Increase of illumination step	Turn the handle to the clockwise for more than 1.5 second to increase the illumination.

14.3 Controlling the CAMERA with the ARM CONTROLLER (optional)



FUNCTION

LUVIS L400		
	CAMERA On/Off (Standby)	• CAMERA On/Off button. • The CAMERA turns on, at the last condition stored in its memory.
	White balance	• White balance control button
	Freeze	• CAMERA freezing button
	Zoom in/out	• Zoom control button
	Focus in/out, Auto	• Focus control button
	Aperture Narrow/Wide, Auto	• Aperture control button

15. Android application(Optional)

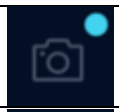
15.1 Controlling the LIGHTHEAD with the Android application

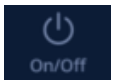
Installing with the Android application

Refer to the LUVIS website for the installation of the application.
http://www.luvis.co.kr/eng/

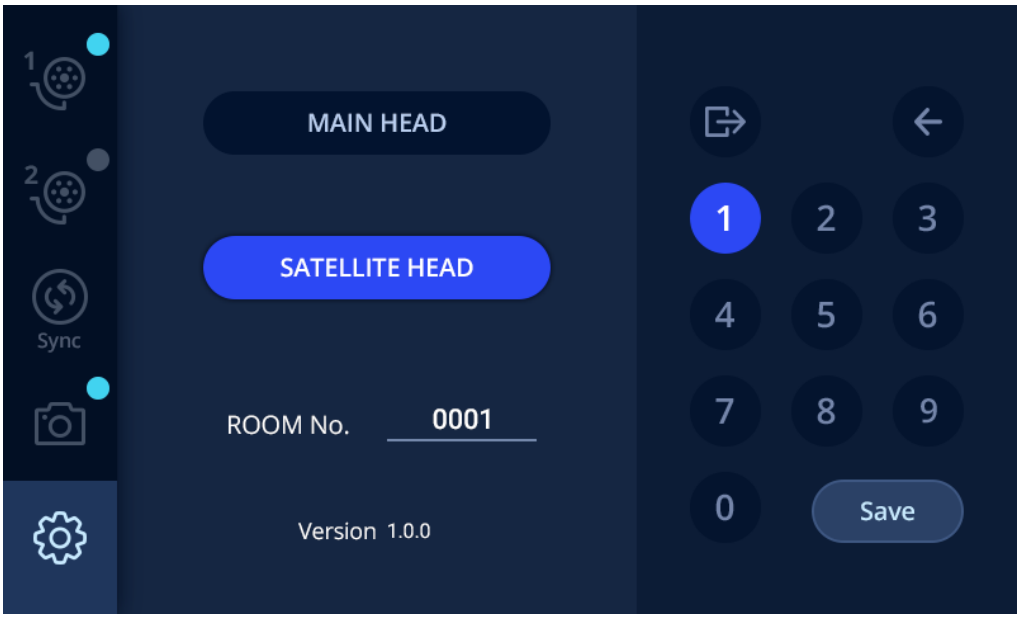
15.1.1 MAIN

FUNCTION

LUVIS L400		
	MAIN HEAD	• Select MAIN HEAD
	SATELLITE HEAD	• Select SATELLITE HEAD
	Synchronization	• Synchronizing LIGHTHEADs with each other. • The setting is automatically applied to the Dual LIGHTHEAD.
	CAMERA	• CAMERA setting
	Setting	• LIGHTHEAD setting

	On/Off (Standby)	• On/Off button. • The light turns on, at the last illumination level stored in its memory.
	Level adjustment for the selected function	• Five light field diameter levels • Five illumination levels • Four color temperature levels 3,600K / 4,200K / 4,800K / 5,400K
	Maximum mode	• Illumination : Level 5 • Light field diameter : Level 5
	ENDO mode	• Ambient light mode.
	Depth mode	• Depth mode On/Off.
	Handle control mode	• Handle control mode On/Off.
	Status	• Illumination, Pattern size, Color temperature

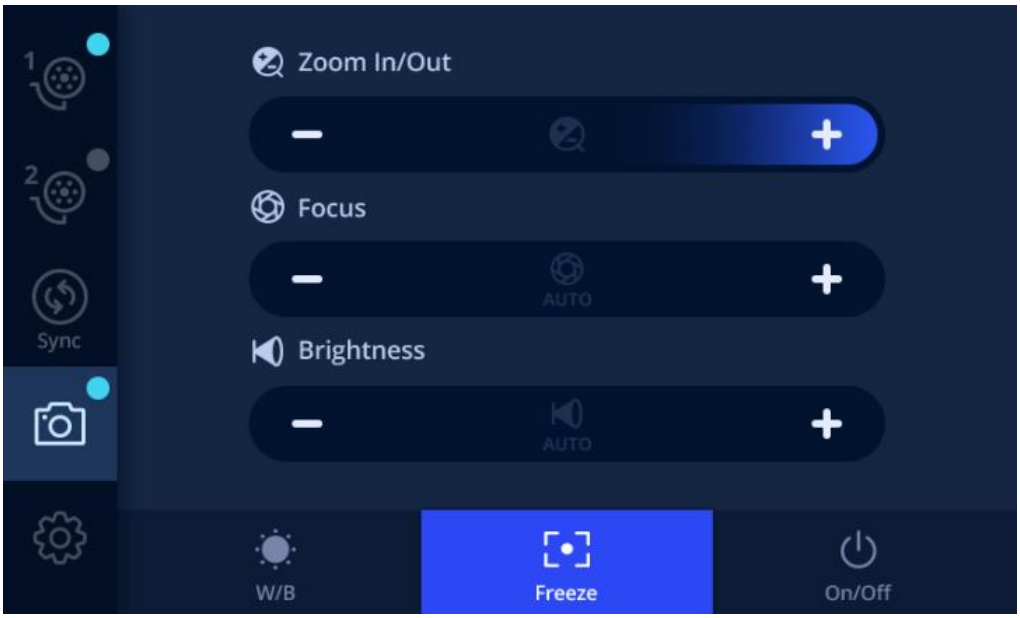
15.1.2 SETTING



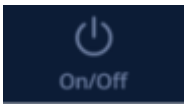
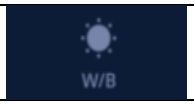
FUNCTION

LUVIS L400		
ROOM No. 0001	Operating room No.	• Operating room number setting.
MAIN HEAD SATELLITE HEAD	LIGHTHEAD status indication	• Displaying the Wi-Fi communication status of the LIGHTHEAD and the TABLET.
Version 1.0.0	VERSION	• Firmware version
	Number key pad	• Input the operating room number.
	Page Exiting	• Exiting from the setting page.
	Backspace	• Erasing the operating room number.
Save	Save	• Saving the setting value.

15.1.3 CAMERA



FUNCTION

LUVIS L400		
	CAMERA On/Off (Standby)	• CAMERA On/Off button. • The CAMERA turns on, at the last condition stored in its memory.
	White balance	• White balance control button
	Freeze	• CAMERA freezing button
	Zoom in/out	• Zoom control button
	Focus in/out, Auto	• Focus control button
	Aperture Narrow/Wide, Auto	• Aperture control button

WARNING

The LUVIS control application is recommended on Android 7.1. It may not work with other OS versions.
The LUVIS control application must be installed on 8-inch(1280 x 800 pixels) TABLET PC. DENTIS is not responsible for any problems that arise when installing on an equipment other than 8-inch(1280 x 800 pixels) TABLET PC.

WARNING

Do not install any other software on your TABLET PC. Maintenance by software is not our responsibility. If there is an error in installing the APP, please back up the data and factory reset the TABLET PC and reinstall the APP.

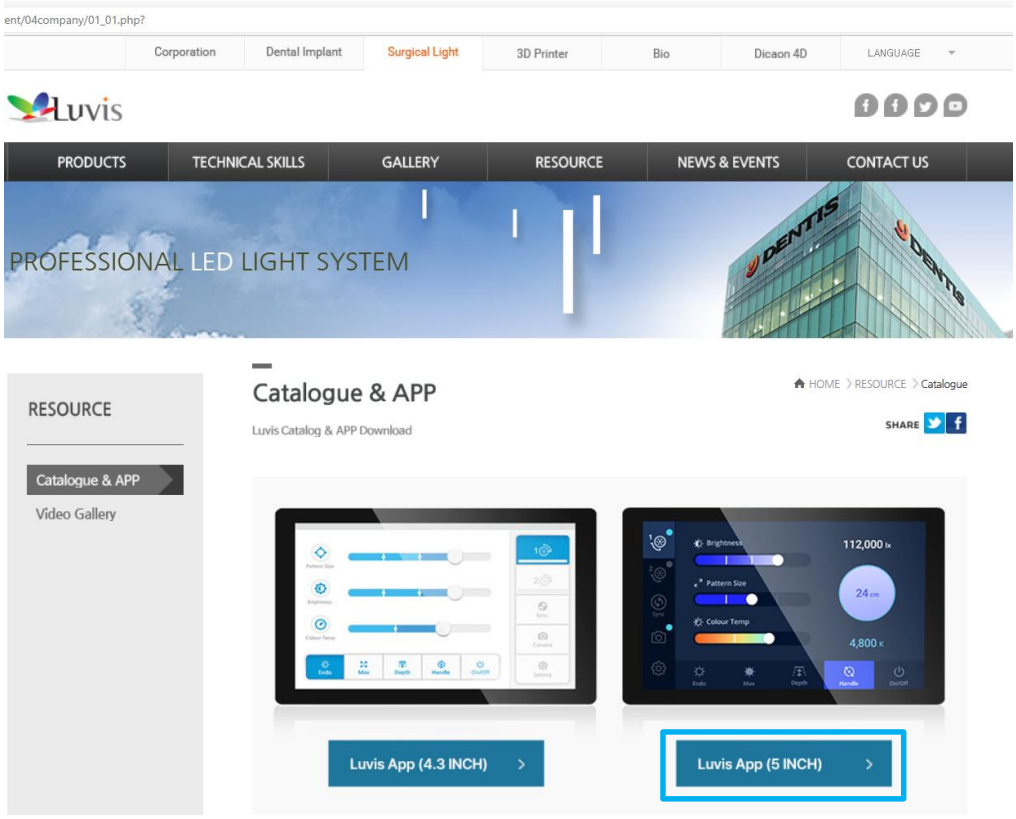
15.2. Download the LUVIS CONTROL APP

15.2.1 Download the LUVIS CONTROL APP using PC

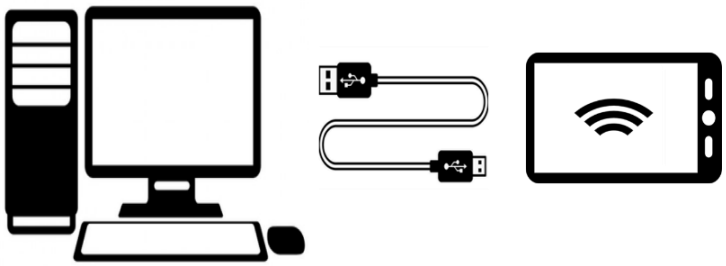
- Connect the luvis website using PC and download the LUVIS CONTROL APP
- You need ID and password to download the LUVIS CONTROL APP
- If you are not registered as a member, please register as a member
- http://luvis.co.kr/eng/content/04company/01_01.php

WARNING

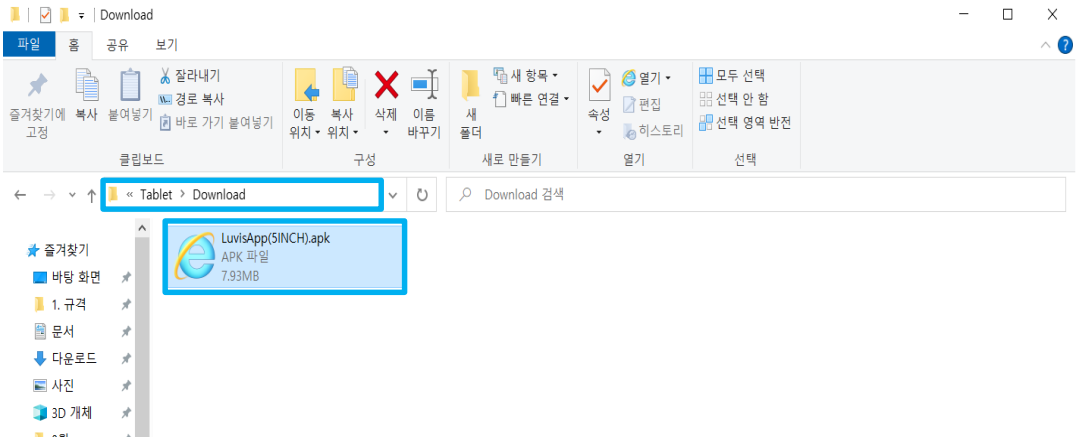
If you can't connect to the website, contact your supplier or DENTIS.



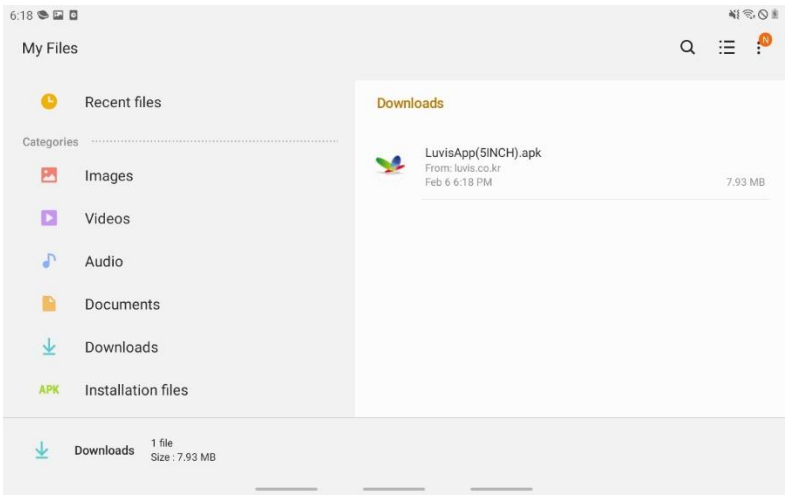
- Press the button to download the application to a specific location.
- Connect TABLET and PC using the usb cable included with TABLET.



- Please put the downloaded LUVIS CONTROL APP on the TABLET.
- Download location : Tablet\Download

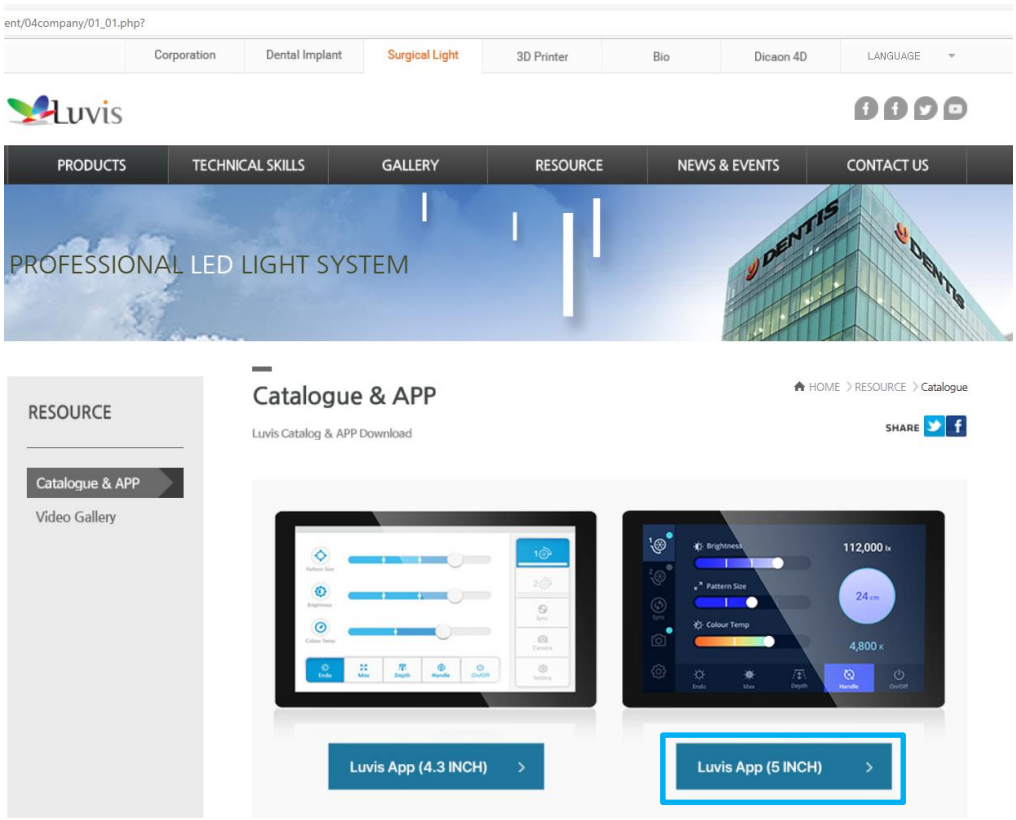


- Please check if LUVIS CONTROL APP downloading is completed in Installation files.
- File location : Tablet\Download

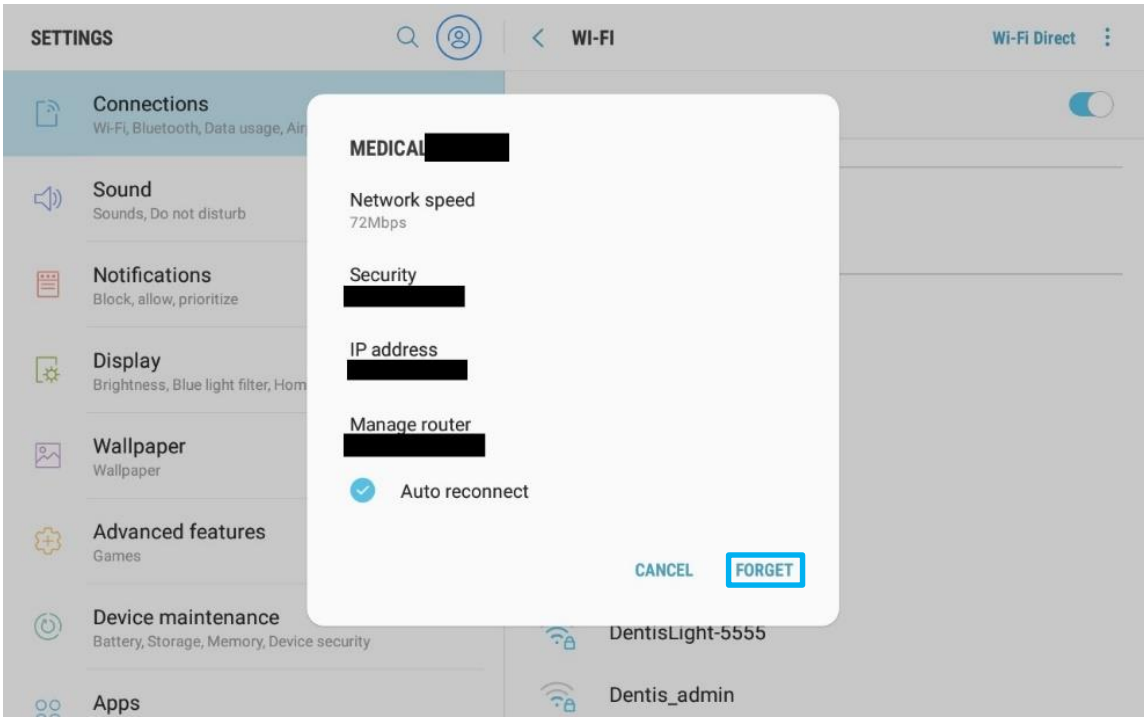


15.2.2 Download the LUVIS CONTROL APP using TABLET

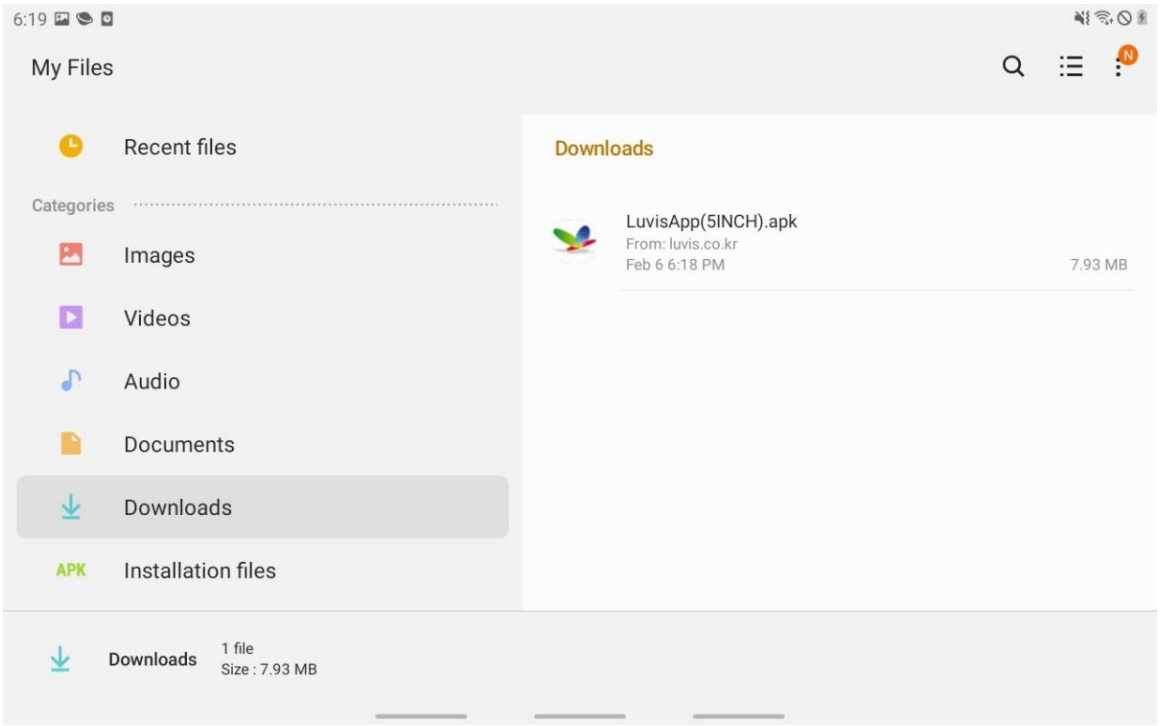
- Connect the luvis website using TABLET and download the LUVIS CONTROL APP
- You need ID and password to download the LUVIS CONTROL APP
- If you are not registered as a member, please register as a member
- http://luvis.co.kr/eng/content/04company/01_01.php



- Press the “APP Download” button to download the application to a specific location.
- Download location : Galaxy Tab A (2017)\Tablet\Download
- After downloading the LUVIS CONTROL APP, clik the FORGET button to delete the connected Wi-Fi



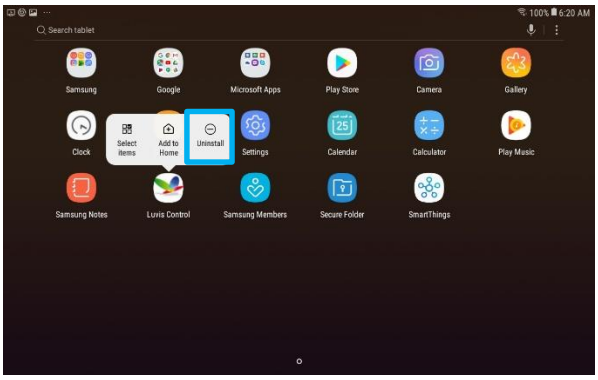
- Please check if LUVIS CONTROL APP downloading is completed in “Installation files”.
- Download location : Tablet\Download

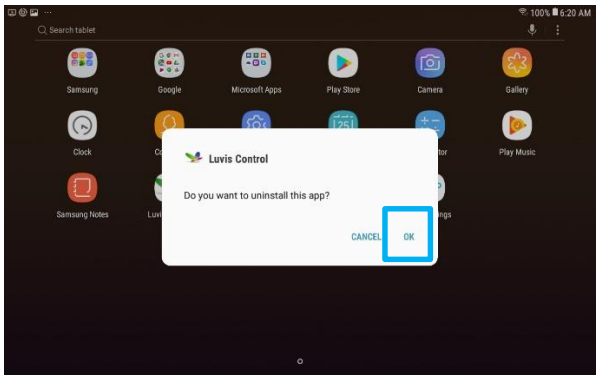


15.3 Installing and setting the LUVIS CONTROL APP

15.3.1 Installing the LUVIS CONTROL APP

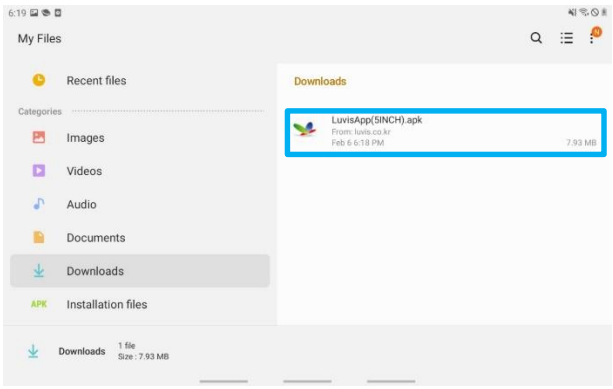
- Please go to the setting page of LIGHTHEAD Arm controller
- If you have existing LUVIS CONTROL APP installed, please delete it.
- Press Uninstall button
- Press OK button



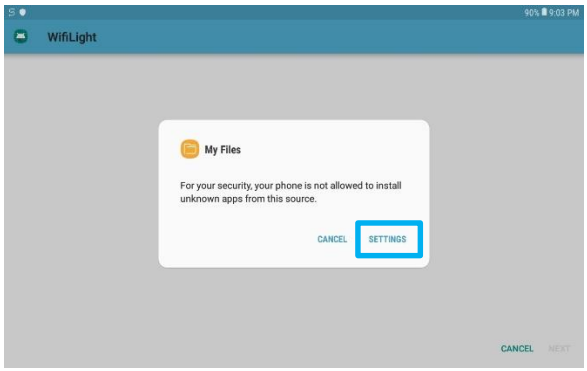


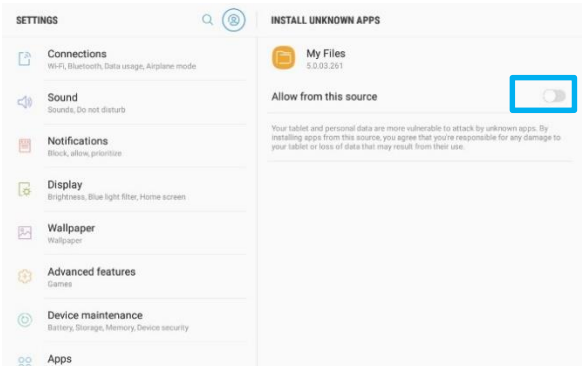
- Follow the path below to see if there is an APP.

  (My File → Installation files → LuvisApp(5INCH).apk)



- Make sure the version of the application is up to date.
- Press LuvisApp(5INCH).apk to install
- Press SETTINGS to enter the setting page

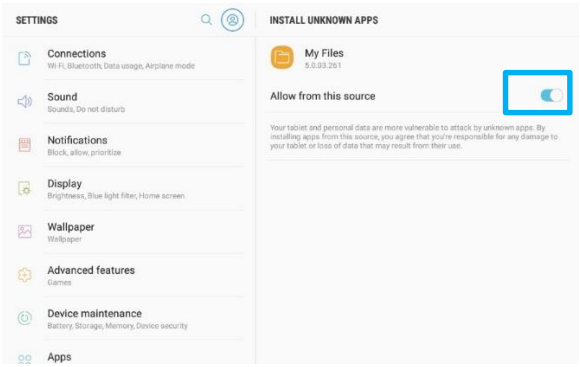


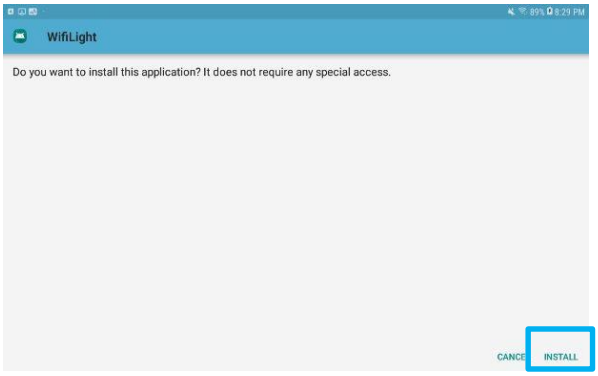


- You must allow “Allow from this source” in the setting

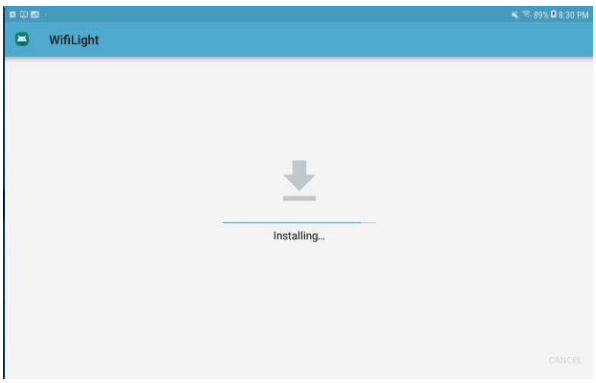
  (Setting → Security → Install unknown apps → My File)

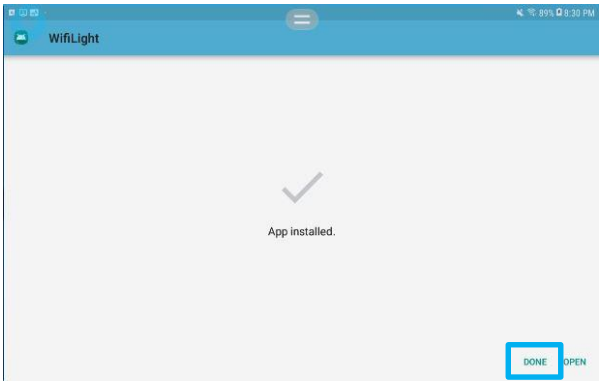
- Activate “Allow from this source”





- Press the back button
- Press INSTALL
- Start the installation
- Press DONE



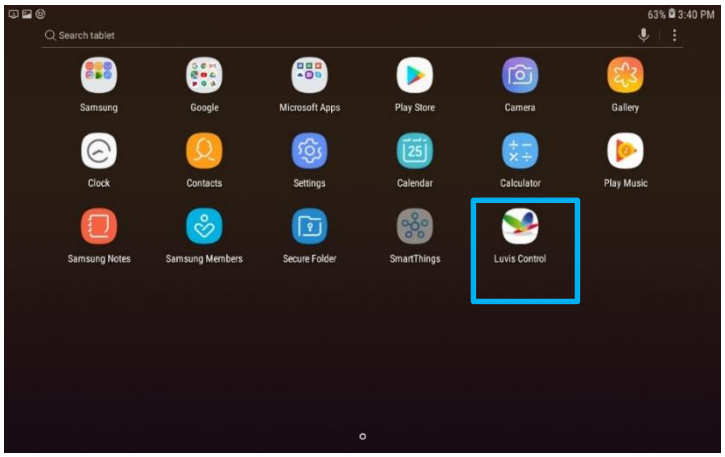


15.3.2 Setting the License Key of the LUVIS CONTROL APP

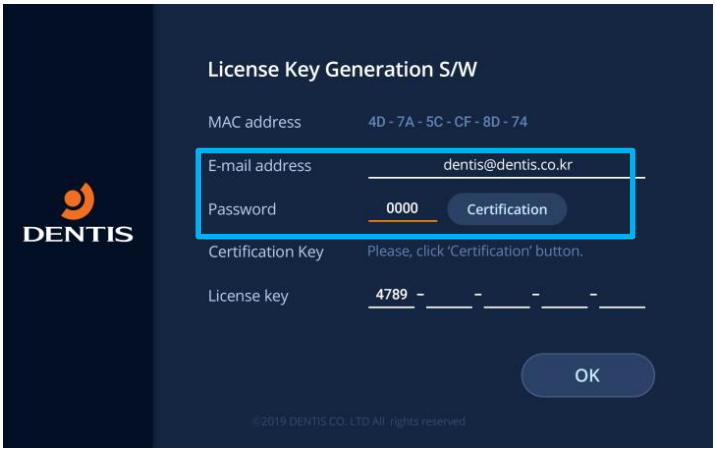
WARNING

If you lost license key, contact supplier or DENTIS

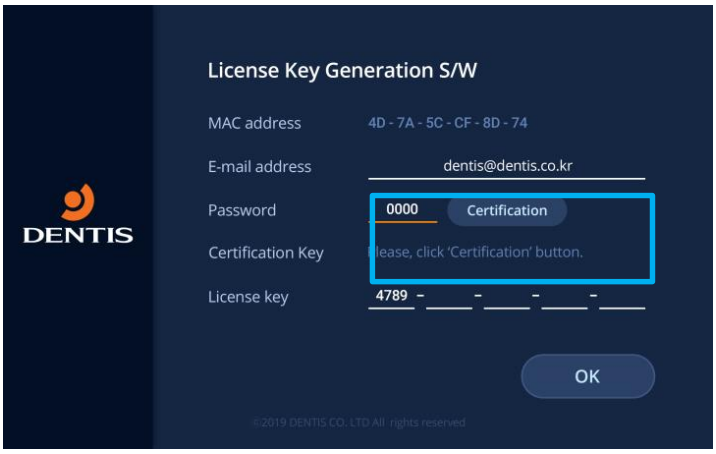
- Run the LUVIS CONTROL APP



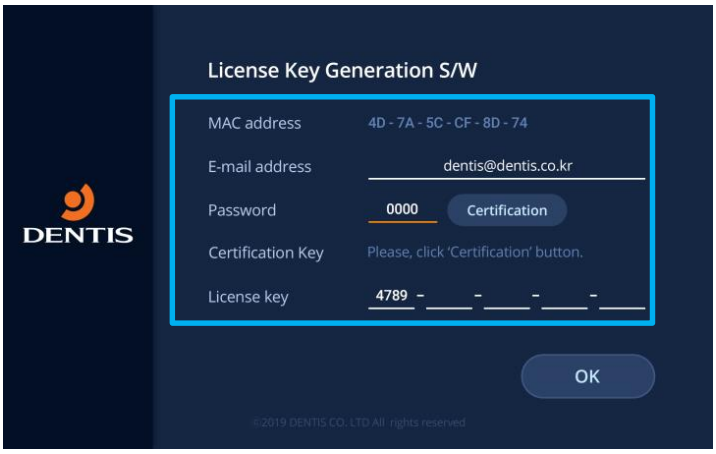
- Please enter the dealer's email address and Password.



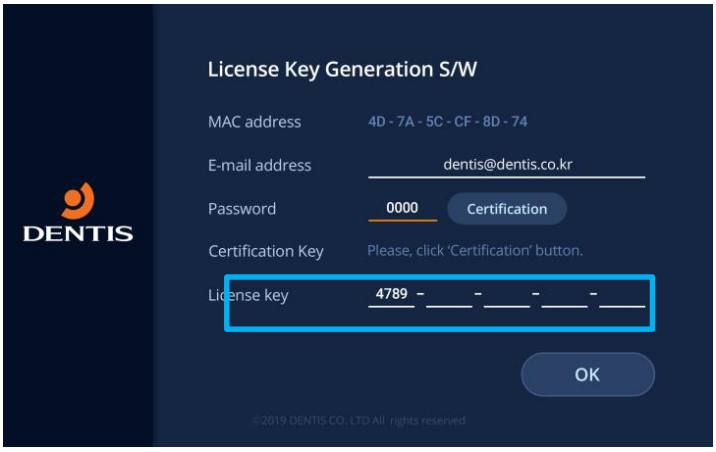
- Click certification button to generate Certification Key.



- Capture the generated certification key value and screen and send it to the DENTIS sales team using email.



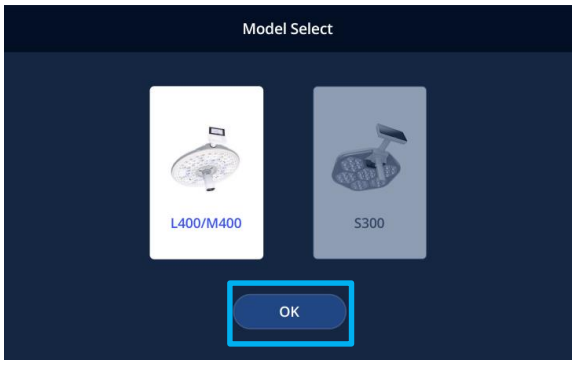
- Enter the contents of License key in the email answered on the app.

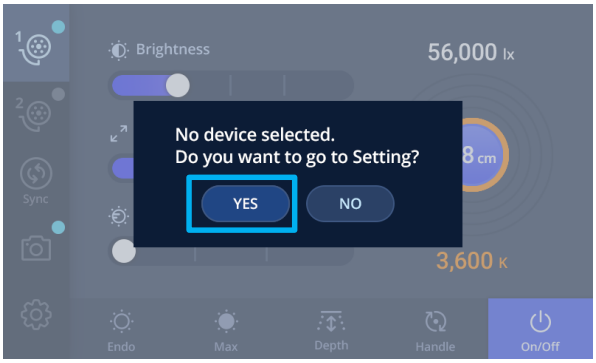


- Click the OK button to go to the model selection step.

15.3.3 Initial setting of the LUVIS CONTROL APP

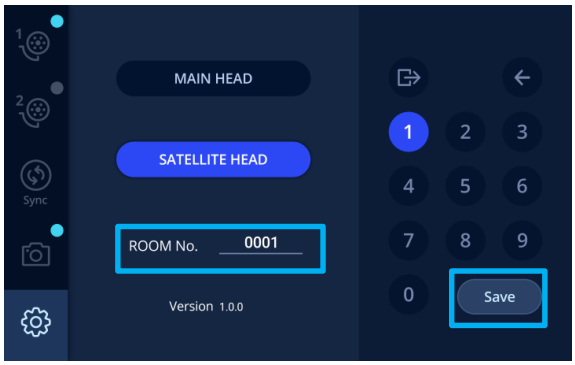
- Select the model
- Select the model and click the OK button
- Press the YES button

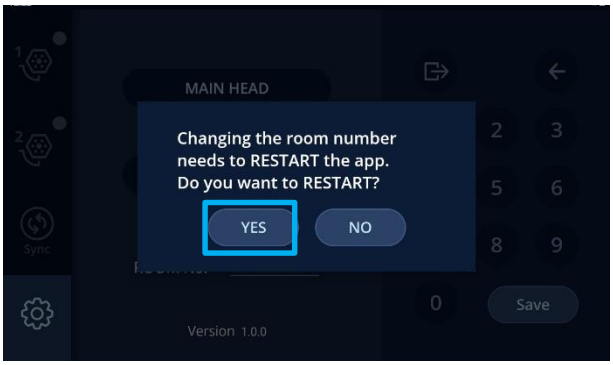




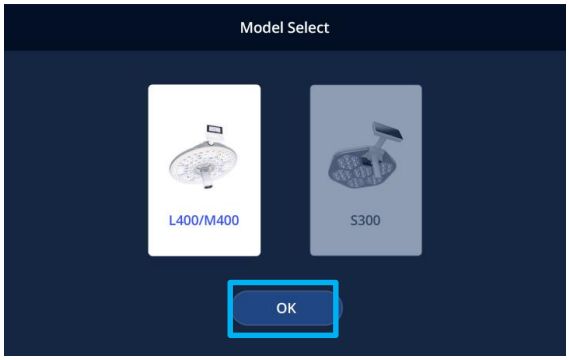
<L400/M400>

- Enter the same ROOM No. as LIGHTHEAD Room no.
- Press SAVE(Save) button
- Press the YES button



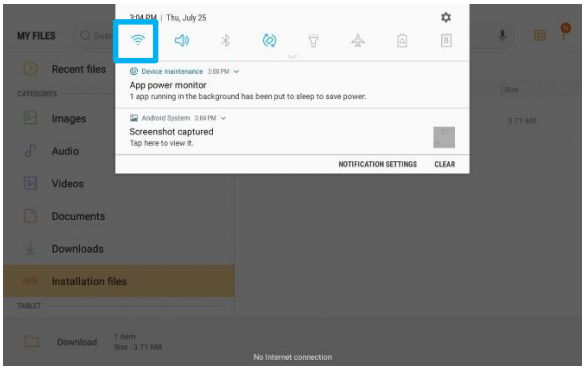


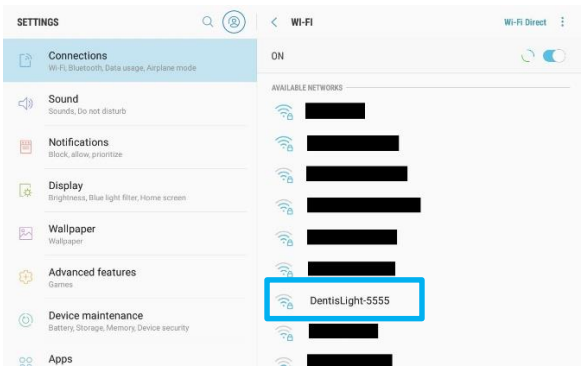
- Press the OK button to connect with LIGHTHEAD



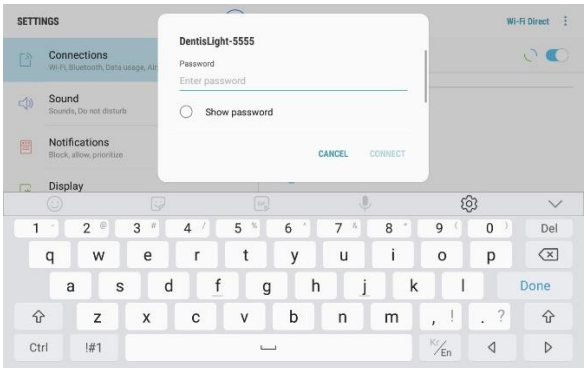
15.3.4 Setting the Wi-Fi

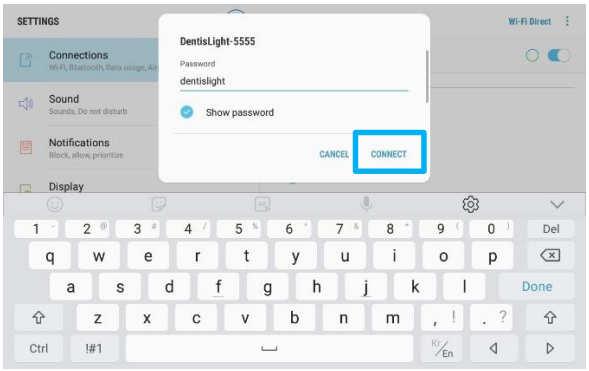
- Slide from top to bottom to open the widget.
- Press and hold the Wi-Fi icon.
- Check the ROOM No. through the LIGHTHEAD's setting page.
- Select the same number of Wi-Fi as the ROOM No. in LIGHTHEAD.



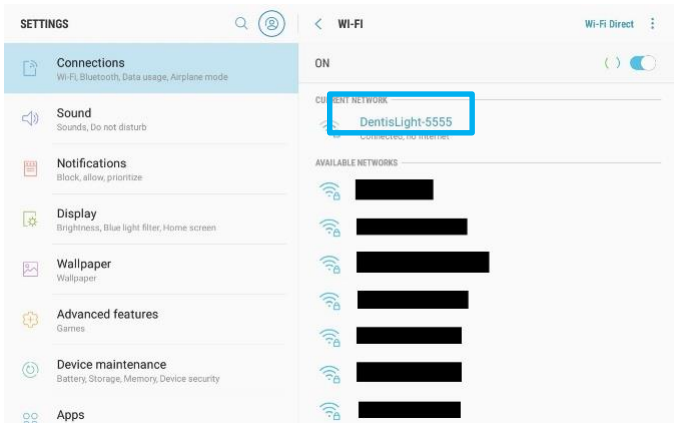


- Enter Wi-Fi password(dentislight).
- Press the CONNECT.



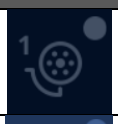


- Check the Wi-Fi connection.



- Run the application.
- Press the On/Off button(On/Off) to operate the LIGHTHEAD.

- Check the Wi-Fi state

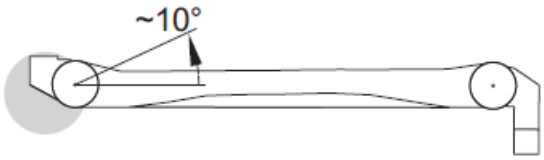
State	Description
	• Before LIGHTHEAD selection • Disconnection Wi-Fi
	• Selection LIGHTHEAD • Disconnection Wi-Fi
	• Before LIGHTHEAD selection • Connection Wi-Fi
	• Selection LIGHTHEAD • Connection Wi-Fi

16. Setting

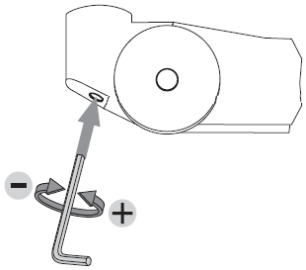
RECOMMENDATION

See Ondal's SERVICE MANUAL

16.1 Adjusting the balancing of the SPRING ARM



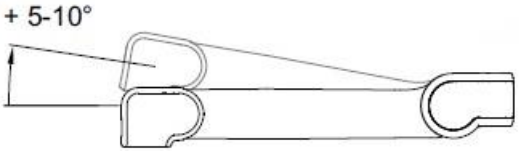
AC2000 SPRING ARM(STD)



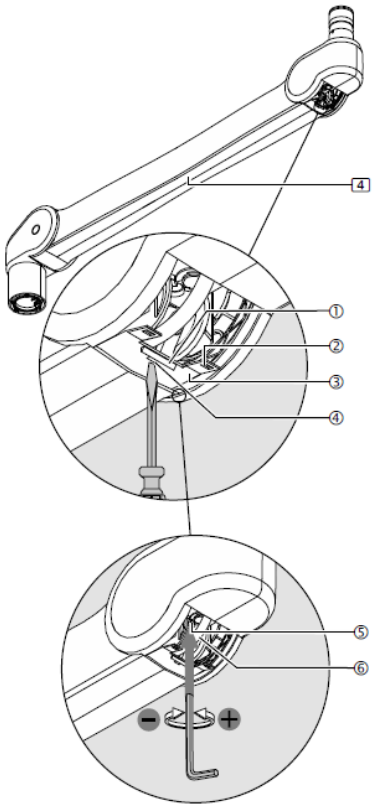
- Slightly pull down the SPRING ARM in order to relieve the adjustment screw in the SPRING ARM
- If the SPRING ARM moves down, the spring tension is too low. Turn the Allen key to the left(anti–clockwise)
- If the SPRING ARM moves up, the spring tension is too high. Turn the Allen key to the right(clockwise)

WARNING

The SPRING ARM contains a powerful spring. When the LIGHTHEAD is dismantled, the SPRING ARM can suddenly jump up and may cause serious injury
Make sure the apparent weight of the LIGHTHEAD is the same when raised and lowered and that it is stable in any position.



LCH17 SPRING ARM(LCH)



Disengaging the cover plate

1. Insert a suitable slotted screwdriver into the mounting aperture - ④ .
2. Slightly push the slotted Screwdriver upwards and route the snap-in hook - ① out of the cover.
3. Push the slotted screwdriver with the cover plate - ③ backwards.

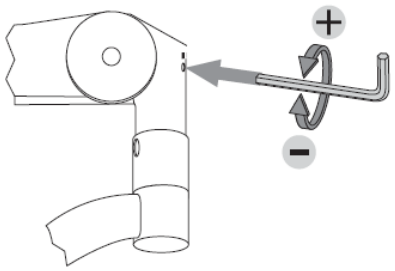
Adjust TENSION

If the spring arm moves down, the spring tension is too low
• Turn the Allen key to the left (anti-clockwise) as illustrated in the Figure.
If the spring arm moves up, the spring tension is too high
• Turn the Allen key to the right (clockwise) as illustrated in the Figure.

WARNING

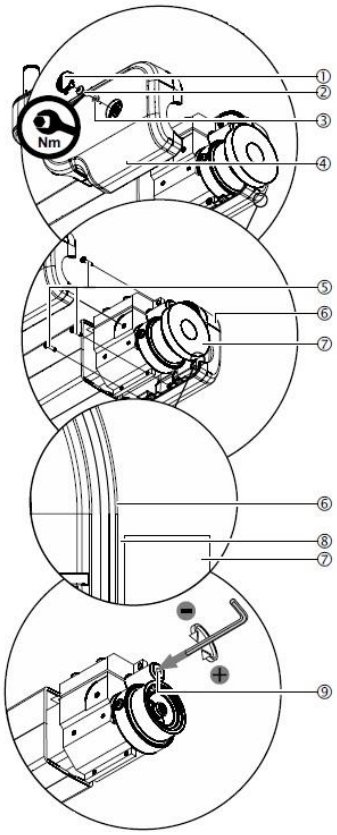
The SPRING ARM contains a powerful spring. When the LIGHTHEAD is dismantled, the SPRING ARM can suddenly jump up and may cause serious injury
Make sure the apparent weight of the LIGHTHEAD is the same when raised and lowered and that it is stable in any position.

16.2 Adjusting the vertical lift on the SPRING ARM(AC2000 STD)



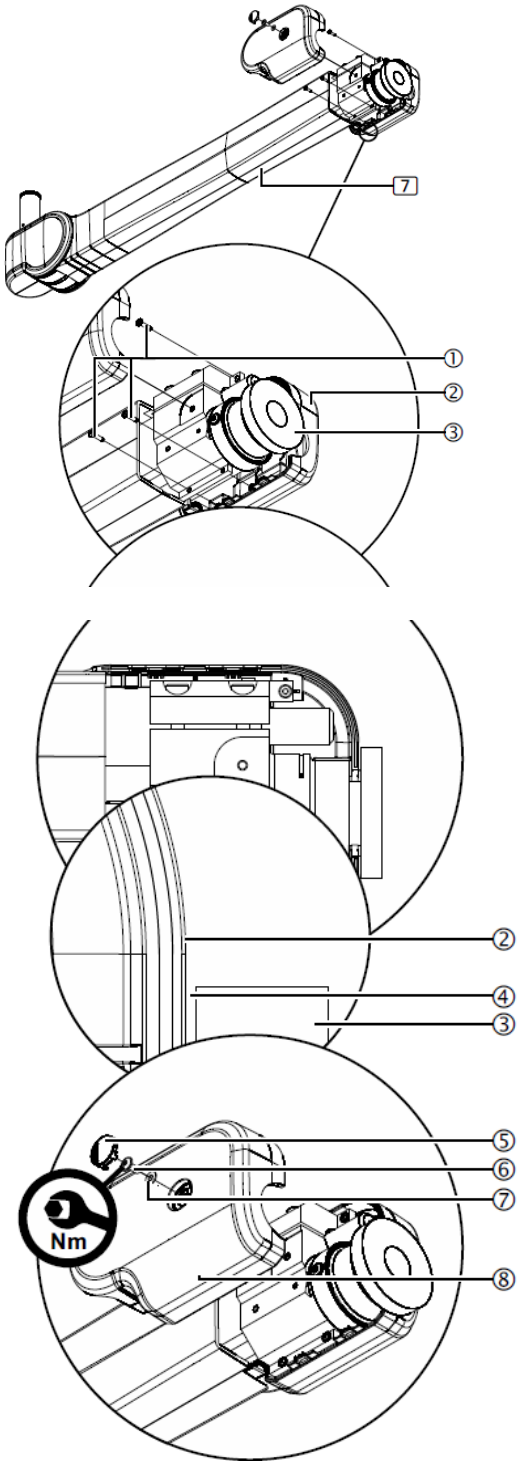
- To reduce the swivel range. Turn the Allen key to the right (clockwise)
- To extend the swivel range. Turn the Allen key to the left (anti–clockwise)
- Perform a function test.

16.3 Adjusting the vertical lift on the SPRING ARM(LCH17)



- (Remove the push button and loosen 2 bolts) Remove the 2 cover panels.
- To reduce the swivel range. Turn the Allen key to the right (clockwise)
- To extend the swivel range. Turn the Allen key to the left (anti–clockwise)

16.4 Mounting Cover Panel

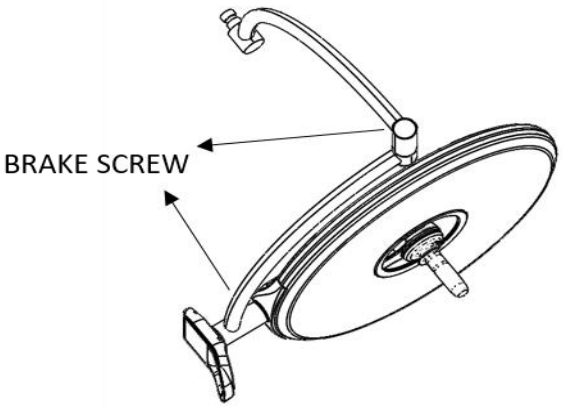


Mounting the right-hand cover panel
1. Place the right-hand cover panel - ② and screw it on using 3 PT screws 3 x 12 - ① .
• When placing the cover panel - ② , make sure that a sufficient gap - ④ is left between the connecting pin - ③ of the adaption and the cover panel - ② .

Mounting the left-hand cover panel
2. Place the left-hand cover panel - ⑧ .
• When placing the cover panel - ⑧ , make sure that a sufficient gap - ④ is left between the connecting pin - ③ of the adaption and the cover panel - ⑧ . Gently engage the latches during installation.
3. Screw in 1 cross recessed head screw M4 x 10mm - ⑥ – 10.9 with 1 washer - ⑦ , internal Ø 4.3mm, and tighten it to 1 Nm.
• Use a Torx T10 torque screwdriver.
4. Insert the PUSH button - ⑤ such that it is flush with the cover panel - ⑧ .
• The PUSH button - ⑤ must not protrude.

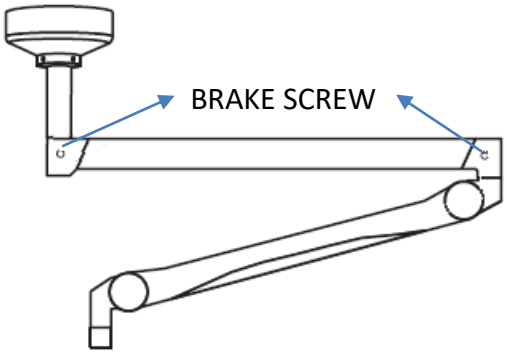
16.5 Adjusting the brake force

16.5.1 L400 HEAD ARM



- To increase the brake force : Insert the flat–head screwdriver into the brake screw of the HEAD ARM and turn to the clockwise (+) direction.
- To reduce the brake force : Insert the flat–head screwdriver into the brake screw of the HEAD ARM and turn to the anti–clockwise (–) direction.

16.5.2 CENTRAL AXIS



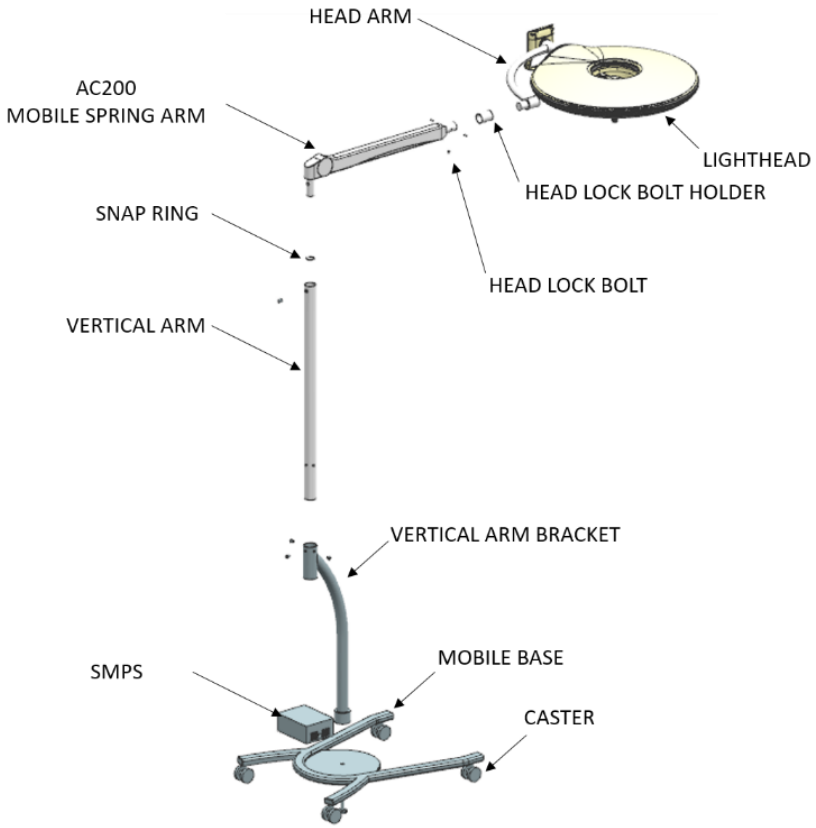
- To increase the brake force : Insert the flat–head screwdriver into the brake screw of the CENTRAL AXIS and turn to the clockwise (+) direction.
- To reduce the brake force : Insert the flat–head screwdriver into the brake screw of the CENTRAL AXIS and turn to the anti–clockwise (–) direction.

17. Installing Mobile type

SMPS

RECOMMENDATION

See Ondal's SERVICE MANUAL

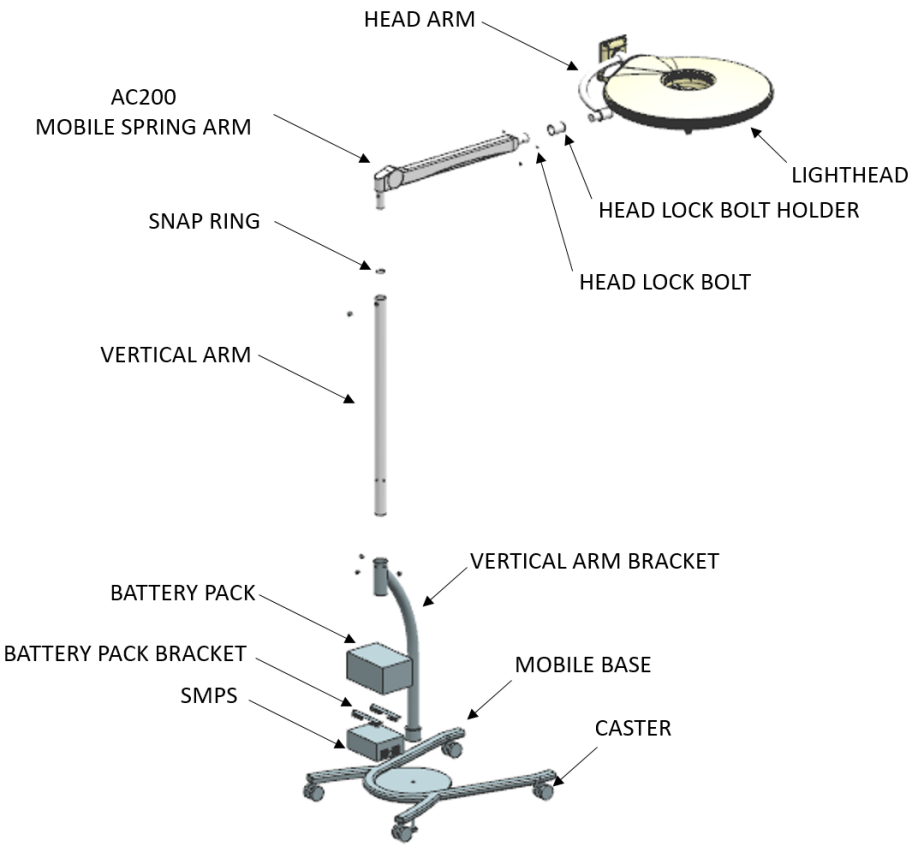


- Make sure all parts.
- Make the assembly MOBILE BASE, VERTICAL ARM BRACKET and VERTICAL ARM.
- Then assemble the AC2000 MOBILE SPRING ARM.
- Check that the cables have been inserted correctly.
- Remove the HEAD LOCK BOLT.
- Insert the LIGHTHEAD in the AC2000 MOBILE SPRING ARM.
- Insert the HEAD LOCK BOLT.
- Adjust tension of the AC2000 MOBILE SPRING ARM.

SMPS and BATTERY PACK

RECOMMENDATION

See Ondal's SERVICE MANUAL



- Make sure all parts.
- Make the assembly MOBILE BASE, VERTICAL ARM BRACKET and VERTICAL ARM.
- Then assemble the AC2000 MOBILE SPRING ARM.
- Check that the cables have been inserted correctly.
- Remove the HEAD LOCK BOLT.
- Insert the LIGHTHEAD in the AC2000 MOBILE SPRING ARM.
- Insert the HEAD LOCK BOLT.
- Adjust tension of the AC2000 MOBILE SPRING ARM.

WARNING

Do not lean and sit on this ME Equipment.
Do not push when the wheels are fixed.

WARNING

Grab the SPRING ARM and VERTICAL ARM when moving this ME Equipement.

WARNING

Be careful of collision, obstruction and trip over the wire when moving this ME Equipment.

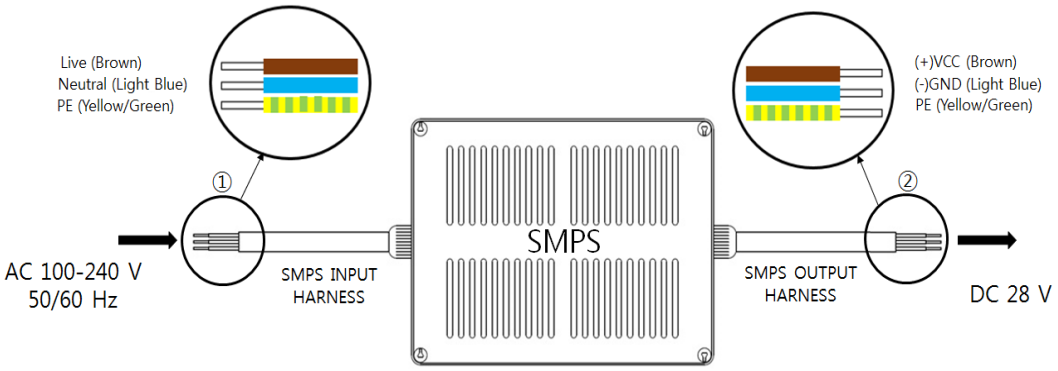
WARNING

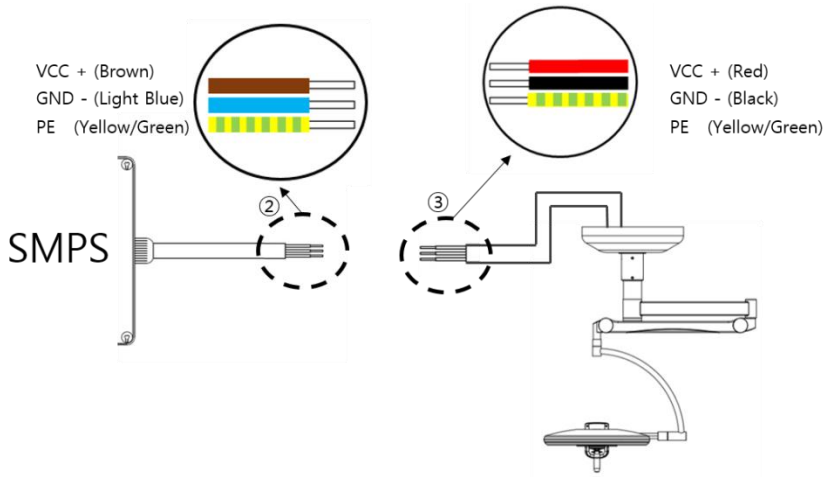
When cleaning the floor using liquid, please move this ME Equipment elsewhere and keep it.

18. Installation

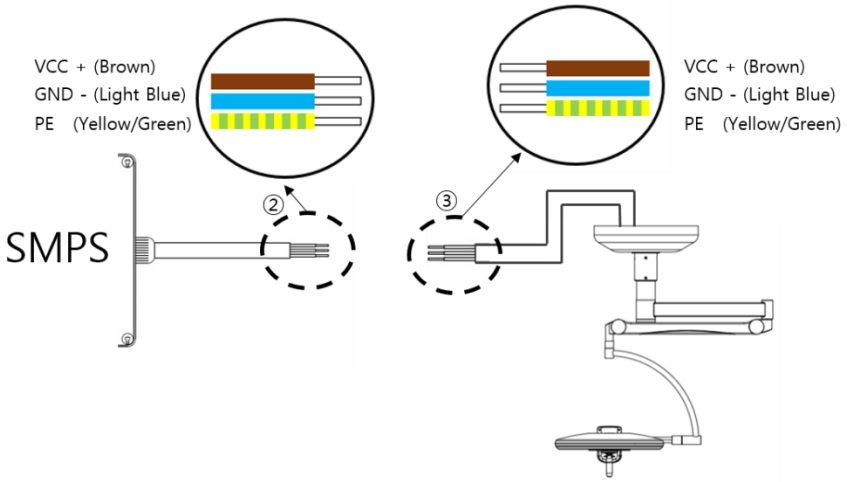
18.1 Installation of Ceiling Type

- SMPS





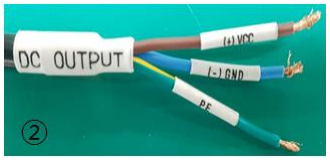
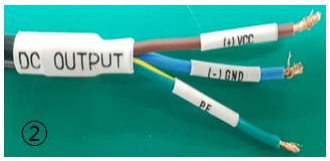
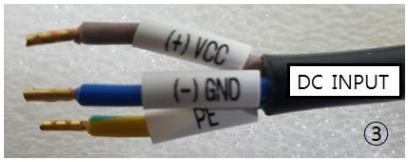
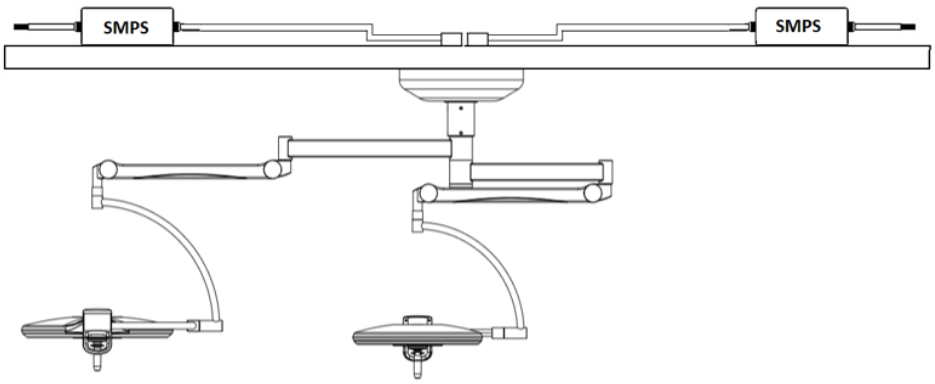
Central Axis Type1



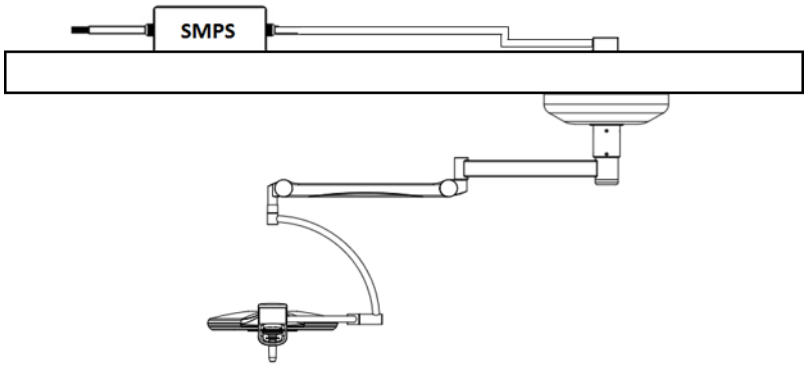
Central Axis Type2

※ Cable③'s Colour can be changed : (+)VCC(Red or Brown), (-)GND(Black or Blue), PE(Yellow/Green)

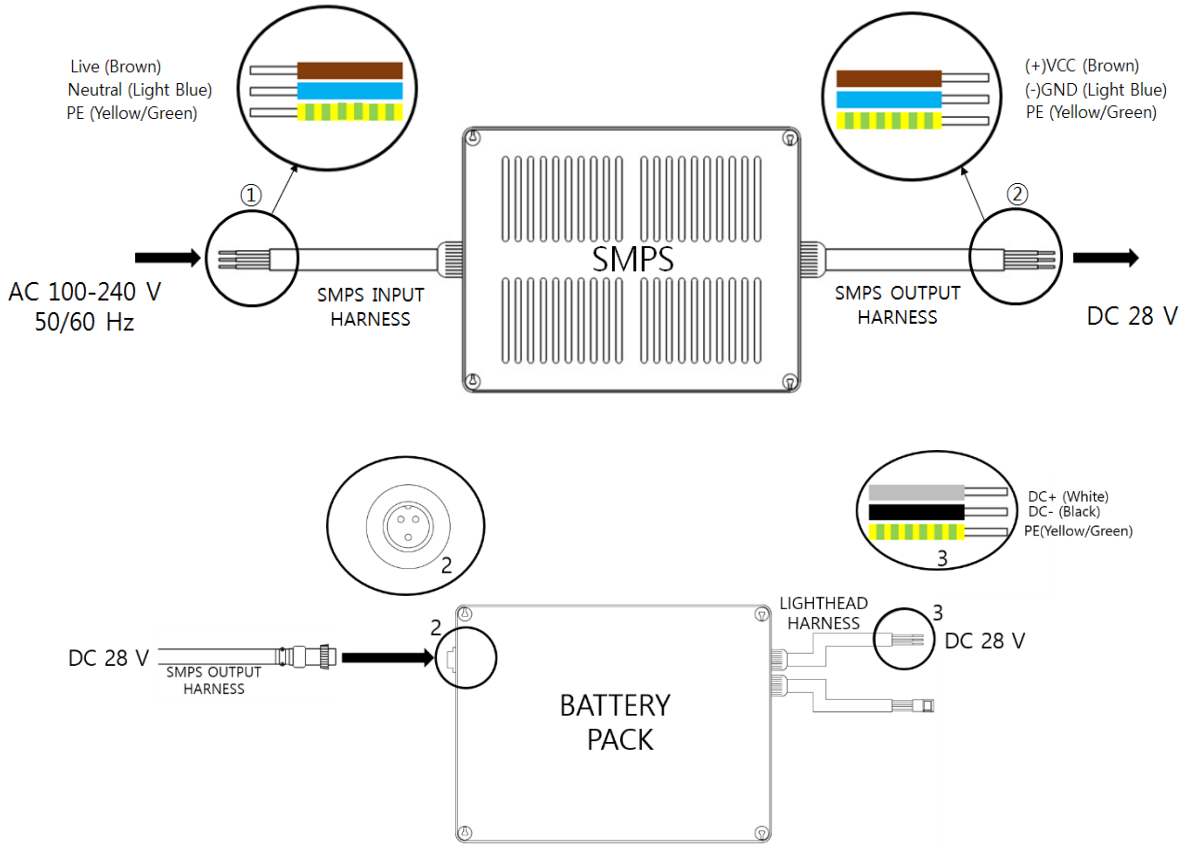
<table>
<tr><th>Step</th><th>Description</th></tr>
<tr><td>1</td><td> 

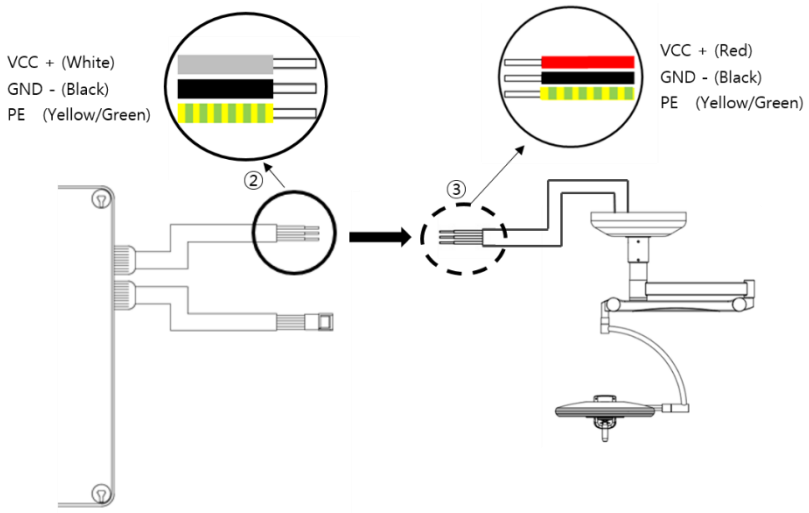
Check the SMPS's cable name</td></tr>
<tr><td>2</td><td>□ Cable③ Colour : (+)VCC(Red or Brown), (-)GND(Black or Blue), PE(Yellow/Green)
<table>
<tr><td>SMPS OUTPUT HARNESS
 
</td><td>CENTRAL AXIS Type1
 
</td></tr>
<tr><td>SMPS OUTPUT HARNESS
 
</td><td>CENTRAL AXIS Type2
 
</td></tr>
</table>
Connect the SMPS OUTPUT HARNESS② to CENTRAL AXIS Type1 or Type2 cable③.
(+)VCC (Brown) → (+)VCC (Red or Brown)
(-)GND (Light Blue) → (-)GND (Black or Blue)
PE(Yellow/Green) → PE(Yellow/Green)</td></tr>
<tr><td>3</td><td> 

Cable connection of Dual Ceiling Type</td></tr>
</table>

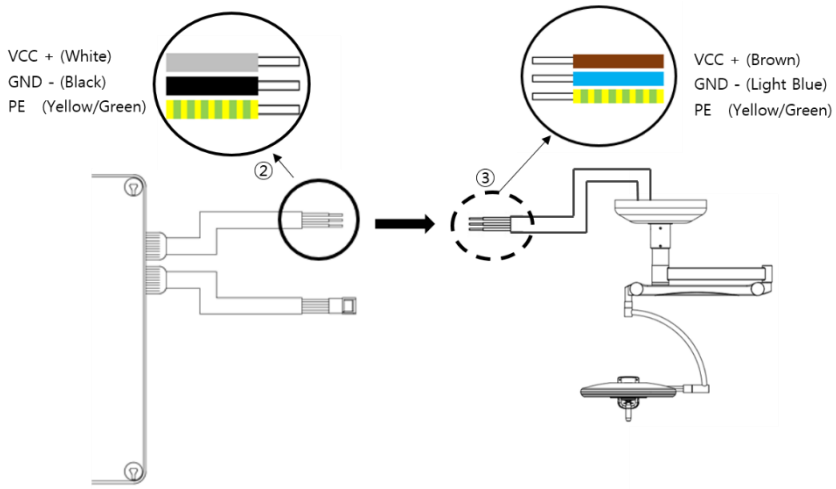
4	 Cable connection of Single Ceiling Type

- SMPS and BATTERY PACK Type





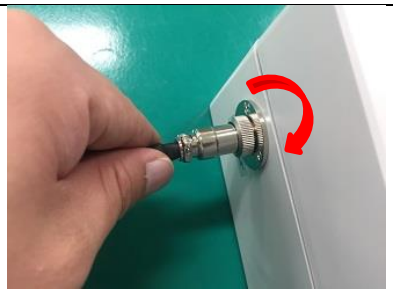
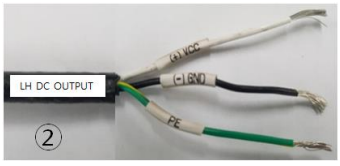
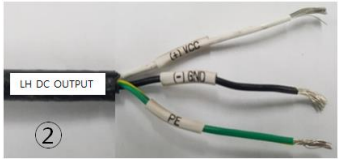
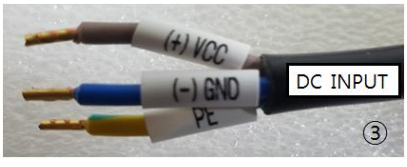
Central Axis Type1

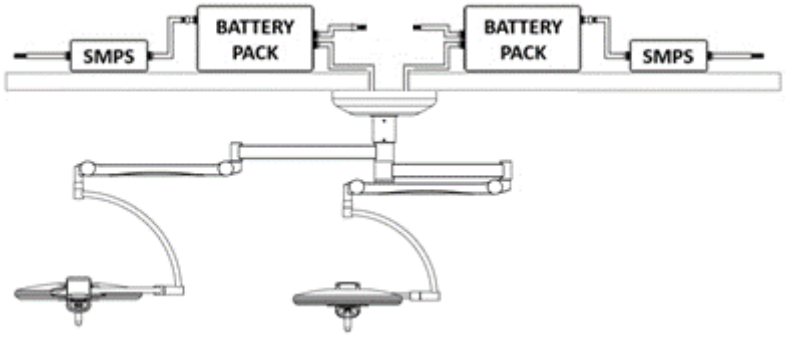
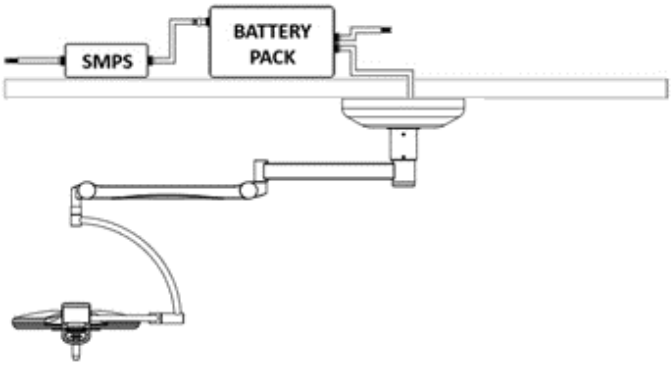


Central Axis Type2

※ Cable③'s Colour can be changed : (+)VCC(Red or Brown), (-)GND(Black or Blue), PE(Yellow/Green)

Step	Description
1	 Check the packing condition of the BATTERY PACK.

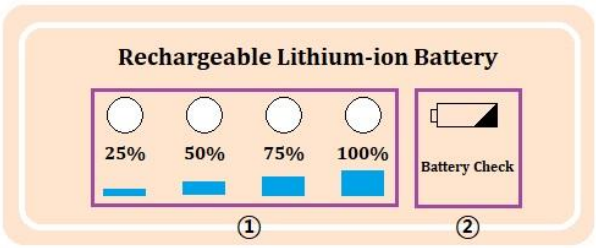
<table>
<tr><td>2</td><td> 
Check the circular connector on the SMPS output.</td></tr>
<tr><td>3</td><td> 
Connect the circular connector to the BATTERY PACK input.</td></tr>
<tr><td>4</td><td> 
Turn the nut to the right. (clockwise)</td></tr>
<tr><td>5</td><td>□ Cable③ Colour : (+)VCC(Red or Brown), (-)GND(Black or Blue), PE(Yellow/Green)
<table><tr><td>LIGHTHEAD HARNESS
  </td><td>CENTRAL AXIS Type1
  </td></tr><tr><td>LIGHTHEAD HARNESS
  </td><td>CENTRAL AXIS Type2
  </td></tr></table></td></tr>
</table>

	Connect the LIGHTHEAD HARNESS② to CENTRAL AXIS Type1 or Type2 cable③. (+)VCC (Brown) → (+)VCC (Red or Brown) (-)GND (Light Blue) → (-)GND (Black or Blue) PE(Yellow/Green) → PE(Yellow/Green)
6	 Cable connection of Dual Ceiling Type with BATTERY PACK
7	 Cable connection of Single Ceiling Type with BATTERY PACK

WARNING

Connect the output harness of the BATTERY PACK to the seiling pendant as short as possible. Failure to do so may result in performance degradation due to voltage drop.

18.2 The control panel of the BATTERY PACK CONTROLLER



No.	Function	Description
①	Battery charging level indicator	• The charging level can be indicated 25%, 50%, 75%, 100%
②	BATTERY CHECK BUTTON	• Press to check the charging level of the BATTERY PACK

- The BATTERY PACK can be used for a minimum period of 3h with fully charged.(100%)

WARNING

The lithium–ion BATTERY PACK is a consumable item and should be replaced every 12 months by service personnel.(It can vary depending on the number of use.)
Check the BATTERY PACK capacity level by pushing the BATTERY CHECK BUTTON.

WARNING

The mains plug should not be difficult to remove, place it in position
(Means for isolation is disconnect mains plug)

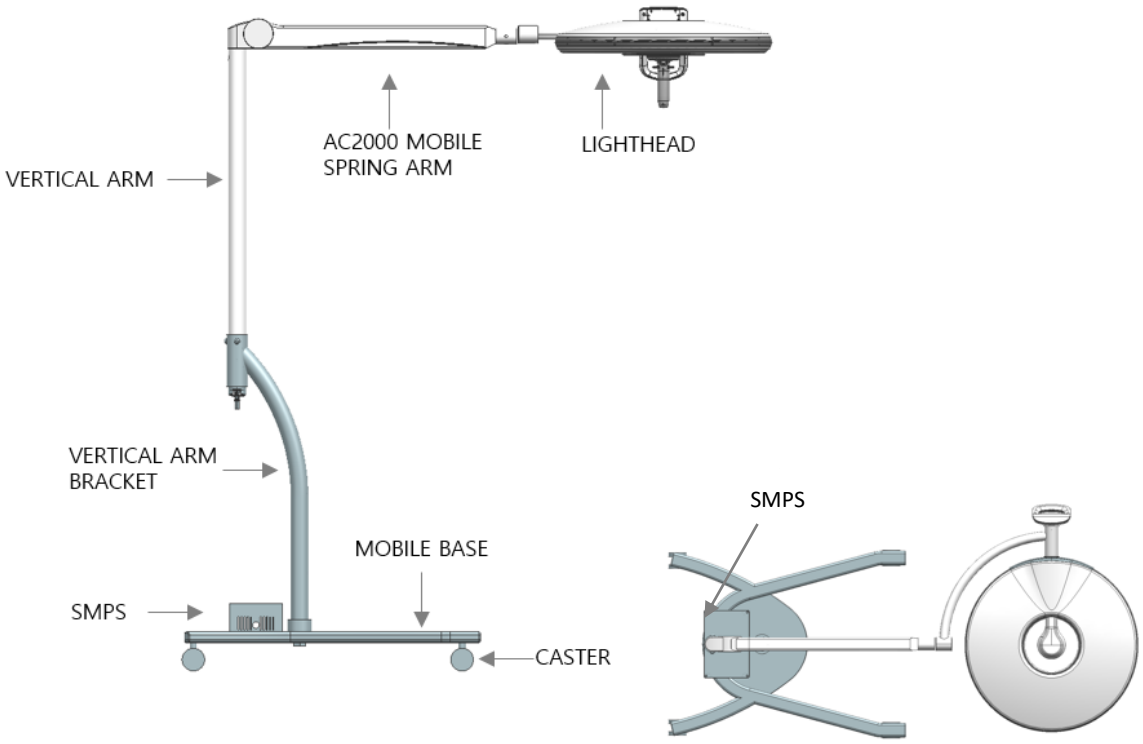
WARNING

After the first installation, you must fully charge the BATTERY PACK.

18.3 Install Contents of Mobile Type

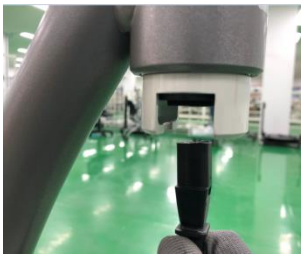
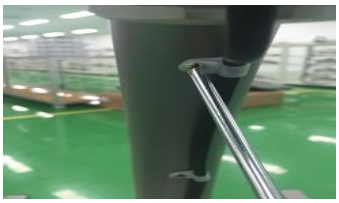
SMPS

2 axis

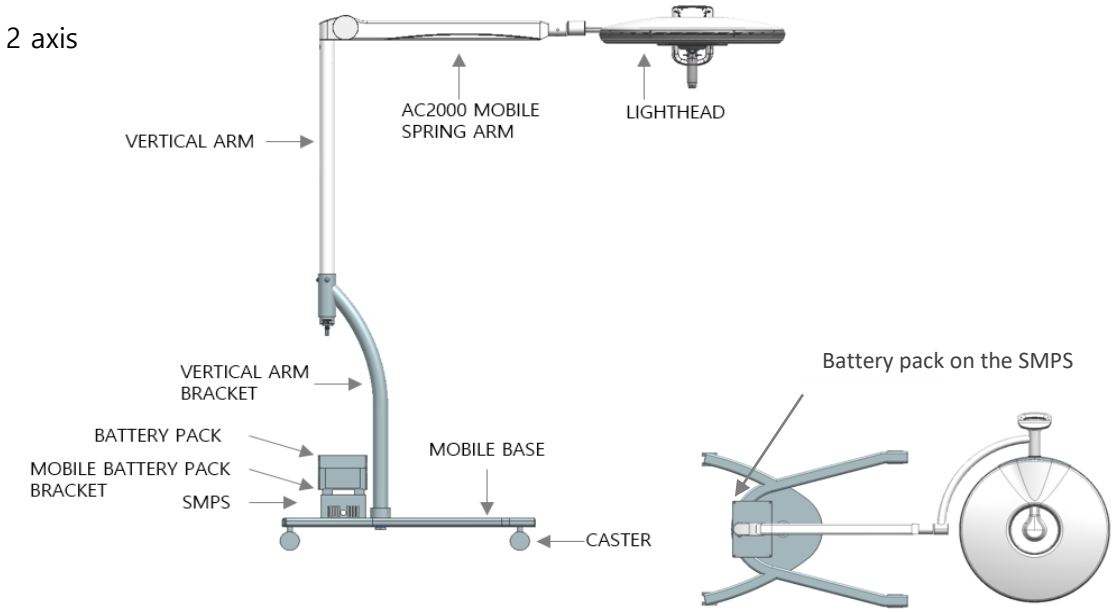


- Make sure all parts.
- Fix the SMPS to the MOBILE BASE.
- Check that the cables have been inserted correctly.

	ITEM	Description	Quantity
1		WIRE HOLDER, FIXING BOLT	1 SET

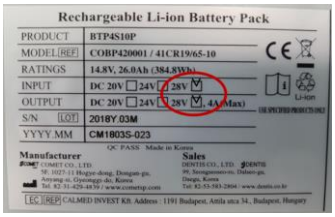
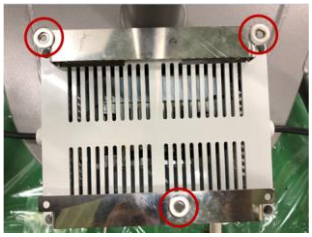
Step	Description	
1	Connect the SMPS OUTPUT HARNESS to INLET SOCKET	
2	Tighten a bolt to secure the wire using a (+)Screwdriver (WIRE HOLDER, FIXING BOLT)	
3	Complete assembly	

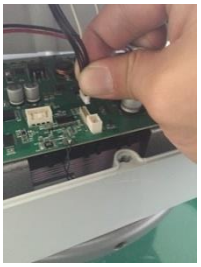
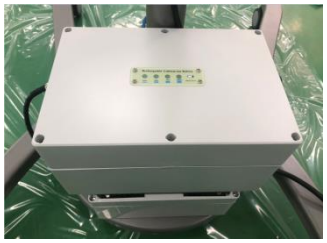
SMPS and BATTERY PACK

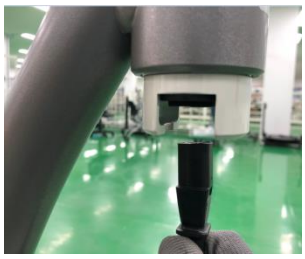
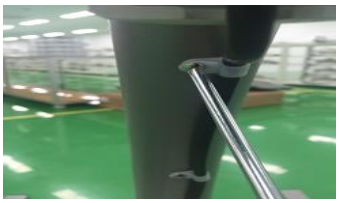


- Make sure all parts.
- Fix the BATTERY PACK on the MOBILE BATTERY PACK BRACKET.
- Check that the cables have been inserted correctly.
- Please charge the BATTERY PACK before use.

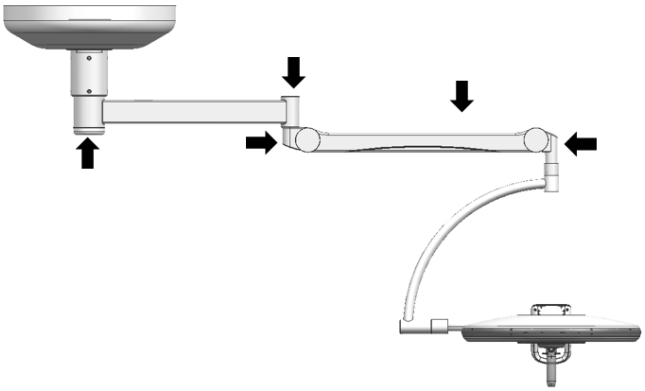
	ITEM	Description	Quantity
1		BATTERY PACK	1
2		FIXING BOLT, NUT, WASHER	1 SET
3		WIRE HOLDER, FIXING BOLT	1 SET

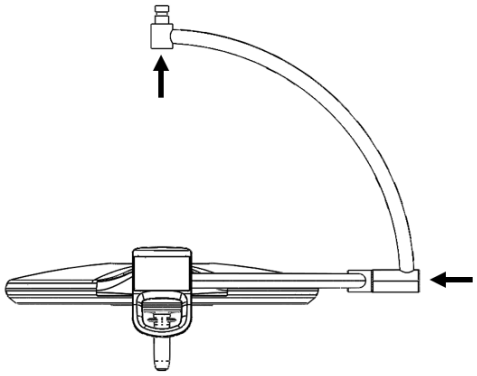
Step	Description	
1	Check the BATTERY PACK box	
2	Open the BATTERY PACK box	
3	Take out the BATTERY PACK	
4	Must check the voltage of the BATTERY PACK label The voltage is DC 28V	
5	Place the three wahsers on the MOBILE BATTERY PACK BRACKET (FIXING BOLT, NUT, WASHER)	
6	Open the BATTERY PACK top cover (Use a (+)Screwdriver) ⚠ Connected Harness caution when opening the BATTERY PACK top cover	
7	Detach the Black harness. Detach the white harness.	

8	Place and align the BATTERY PACK on the MOBILE BATTERY PACK BRACKET. Insert three bolts to secure the BATTERY PACK on the MOBILE BATTERY PACK BRACKET using allen wrench and long nose plier. (FIXING BOLT, NUT, WASHER)	
9	Connect the BATTERY PACK Check PCB harness (Black harness first)	
10	Connect the BATTERY PACK Check PCB harness (White harness Next)	
11	Completed harness connection	
12	Close the BATTERY PACK top cover (Use a (+)Screwdriver)	
13	Connect the SMPS OUT HARNESS to BATTERY PACT INPUT	

14	Connect the BATTERY PACK OUTPUT HARNESS to INLET SOCKET	
15	Tighten a bolt to secure the wire using a (+)Screwdriver (WIRE HOLDER, FIXING BOLT)	
16	Complete assembly	

19. Checking cover and cap





- Check that all covers and bolt caps are in place

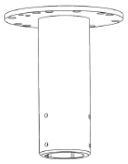
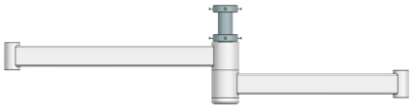
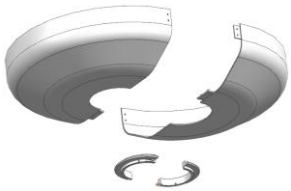
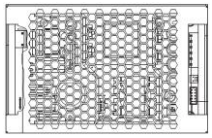
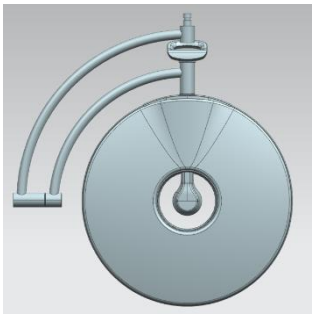
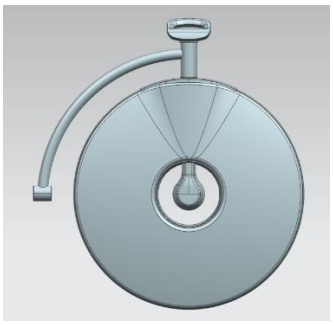
20. Recycling of packaging

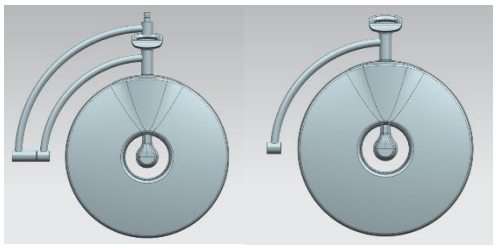
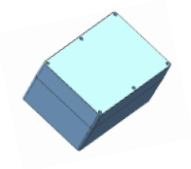
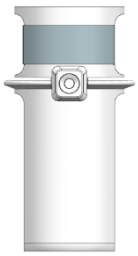
- For environment and safety of human, wastes must be recycled or separated.
  - The materials should be carefully separated.
  - The electrical boards should be submitted to an appropriate recycling proceeding
  - The cardboard box may be recycled with other paper products.
- Please contact the closest DENTIS branch or your supplier, if you have any questions about recycling of the device.

21. Model designation

MAIN HEAD		HEAD_2	Head Arm Axis	Mount type	Spring Arm	Camera	Wall Controller	Battery
L400 M400		N=None A=L400 B=M400	2=2Axis 3=3Axis	S=Single Ceiling D=Dual ceiling T=Triple Ceiling (with Monitor Arm) M=Mobile H=Head Only	0=None S= SA300 V=VALIA A=ACROBAT	0=Without CAM 1=With Internal 2=With External 3=Ready 4=Wireless CAM	0=Without WC 1=With WC	0=Without BAT 1=With BAT 2=with BAT_2

22. List of component

 CEILING TUBE	 CENTRAL AXIS
 AC2000 SPRING ARM(STD)	 Valia(LCH)
 CEILING COVER & CEILING COVER BRACKET	 SMPS
 L400 LIGHTHEAD(3Axis)	 L400 LIGHTHEAD(2Axis)

 L400 LIGHTHEAD(3Axis or 2Axis) (INTERNAL CAMERA Optional)	 BATTERY PACK(Optional)
 AC2000 SPRING ARM(Mobile)	 MOBILE ARM
 CAMERA(Optional)	 TABLET PC(Optional)

23. Installation Check List(ML-Series)

Product info.			
Supplier :		Date of installation :	
Model :		Serial number :	
TYPE :		Installer :	
Quantity :		Installation place :	

Outline
This installation checklist is only valid when used in conjunction with the DENTIS Installation guide.
The list must be checked by the authorized person by DENTIS or DENTIS itself.

Appearance	OK	NOK	N/A
Ceiling type			
● The DROP TUBE and the ceiling are remaining level, and the screws such as GUIDE BRACKET, FIX BRACKET, hexagonal nuts, and bolts are well fixed.			
● The gap between the CEILING COVER BRACKET and the CEILING COVER is firmly fixed and is not damaged.			
● The connection (Headless wrench bolt) between the CEILING COVER BRACKET and the DROP TUBE is securely fastened and there is no damage.			
● The CEILING COVER is firmly installed in the correct place without shaking.			
● CENTRAL AXIS is properly and well seated in the DROP TUBE.			
● The SPRING ARM is properly mounted with the CENTRAL AXIS.			
● CENTRAL AXIS is smooth to rotate horizontally without interference.			
Mobile type			
● MOBILE VERTICAL ARM is correctly and well fitted with MOBILE BASE.			
● SPRING ARM is correctly fitted with the MOBILE VERTICAL ARM.			
● Make sure WHEELs are operating normally.			
Common			
● The Sleeve is properly fitted and covering the securing segment well			
● No damage such as deformation, scratch, or crack on the surface of the product is checked			
● No nicking or peeling on the product's painted area or connection welding area is checked			
● Product labels are well identified without damage.			

Function	OK	NOK	N/A
● SPRING ARM operates up and down smoothly and maintains equilibrium according to the installed end product.			
● SPRING ARM does not collide with the ceiling during upward limit operation.			
● (WS type only) The WS function works well. (operating limit 320 degrees).			
● The power supply section works well without interruption when supplying power.			
● Check the pattern size of ARM CONTROLLER to see if LEDs on the LIGHTHEAD operating properly.			
● Check the ENDO mode of LIGHTHEAD is operating properly.			
● Check the LIGHTHEAD operates properly when adjusting the pattern.			
● Check the LIGHTHEAD operates properly when adjusting the brightness.			
● Check the Depth button of the LIGHTHEAD operates properly.			
● Check the HANDLE function is operating properly when operating the HANDLE mode of LIGHTHEAD.			
● Make sure that the HANDLE on LIGHTHEAD is correctly installed.			
● Check for any crack of the HANDLE of LIGHTHEAD			
Options	**OK**	**NOK**	**N/A**
● Check the SYNC function is operating properly when used as a compound light.			
● Check the camera HANDLE button is operating properly.			
● Check the ARM CONTROLLER on LIGHTHEAD for proper operation of the camera function.			
● Make sure the LIGHTHEAD is operating normally with the WALL CONTROLLER.			
● When installing the battery type, verify that the LIGHTHEAD is operating properly even after removing the SMPS power.			
● When controlled by TABLET, the LIGHTHEAD must be checked for proper operation.			

■ Action in case of abnormality

No.	Problem	Contents of action	Date
1			
2			

EL2LLP-PM070
(V2.3) May/02/2024
SER-L4-02

www.luvis.co.kr

DENTIS Co., LTD. http://eng.luvis.co.kr
KOREA +82-2-869-6020 / USA +1-323-677-4363