INSTALLATION

EVA-HF325/525
# TABLE OF CONTENTS

1. Introduction ................................................. 2  
2. Composition .................................................. 3  
3. Electric Environment........................................ 4  
4. Packing ....................................................... 6  
5. Dimension .................................................... 7  
6. Installation .................................................. 8  
7. Installation Trouble Shooting---------------------- 19
1. INTRODUCTION

Installation person, operator and patient always be careful their head at the tube or assembling collimator

Installation person, operator and patient always be careful their leg and foot under the table when moved or used machine.

Installation person, operator and patient always be careful their hand at the sharp part or need the electronic safety

Installation person, operator and patient always be careful of electrical shock or damage
2. COMPOSITION

1. TUBE
2. COLLIMATOR
3. STAND
4. TOP TABLE
5. X-RAY GENERATOR
6. TABLE MOVEMENT S/W
7. RAIL
8. RAIL SUPPORT
9. CABLE DUCT
10. STAND GUIDE
11. HANDLE BAR
12. TABLE
3. ELECTRIC ENVIRONMENT

Table. Line Power requirement

<table>
<thead>
<tr>
<th>GENERATOR MODEL</th>
<th>EVA-HF325</th>
<th>EVA-HF525</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max.Power kW</td>
<td>37.5kW</td>
<td>40kW</td>
</tr>
<tr>
<td>Maximum mA</td>
<td>300mA</td>
<td>500mA</td>
</tr>
<tr>
<td>Maximum kVp</td>
<td>125kVp</td>
<td>125kVp</td>
</tr>
<tr>
<td>Power Line</td>
<td>210-230VAC, Single-Phase, 50/60Hz</td>
<td></td>
</tr>
</tbody>
</table>

Table. Line impedance requirement

<table>
<thead>
<tr>
<th>LINE VOLTAGE</th>
<th>GENERATOR POWER( 37.5 kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>208 VAC</td>
<td>0.053Ω</td>
</tr>
<tr>
<td>230 VAC</td>
<td>0.065Ω</td>
</tr>
<tr>
<td>240 VAC</td>
<td>0.070Ω</td>
</tr>
</tbody>
</table>

The installation should comply with all the electrical requirements indicated in this document. These requirements should be upgraded if Local Standards are more stringent.

RMS Line current during a X-ray exposure, generator stand-by consumption(W), the differential sensitivity(mA) and the thermomagnetic breaker should be:

Maximum power line impedance:
### Magnetic Breaker Requirement

<table>
<thead>
<tr>
<th>LINE VOLTAGE</th>
<th>SINGLE-PHASE (37.5kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>208VAC</td>
<td>273 A</td>
</tr>
<tr>
<td>230VAC</td>
<td>245 A</td>
</tr>
<tr>
<td>240VAC</td>
<td>232 A</td>
</tr>
</tbody>
</table>

- **Minimum kVA required**: Maximum kW $\times 1.2$
- **Stand-bye Consumption**: 500 W
- **Differential Sensitivity**: 30 mA
- **Thermomagnetic Breaker**: 50% of the RMS line current
  
  $(RMS = momentary line current based on 100ms X-ray exposures)$

**Below 210VAC requires an auxiliary boost transformer to adequate the line voltage to the generator input**

### Wire Size Requirement

**SINGLE-PHASE 1Ø**

<table>
<thead>
<tr>
<th>Line Voltage</th>
<th>Wire Size at 15m</th>
<th>Wire Size at 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td>208 VAC</td>
<td>50 mm$^2$</td>
<td>105 mm$^2$</td>
</tr>
<tr>
<td>230 VAC</td>
<td>50 mm$^2$</td>
<td>105 mm$^2$</td>
</tr>
<tr>
<td>240 VAC</td>
<td>50 mm$^2$</td>
<td>95 mm$^2$</td>
</tr>
</tbody>
</table>
The generator is shipped in Table to facilitate transport and installation. 
Upon receipt of the X-ray unit and associated equipment, inspect all shipping containers for signs of damage. If damage is found, notify the carrier or his agent immediately.
5. DIMENSION

1. Tube forward and backward movement range: 185mm
2. X-axis center rotation angle range: over ± 90°
3. Z-axis center rotation angle range: over ± 90°
4. Tube max upward movement: above ground 1720 mm
5. Tube max downward movement: above ground 650 mm
6. Tube up and down movement range: 1170 mm
7. Tube left and right movement range: 1940 mm
8. Table forward and backward movement range: 200mm
9. Table left and right range: 600mm

Total weight: 430kg
6. INSTALLATION

1. **Put in top table to table.** *(first, remove rubber stopper and insert rubber stopper after insert top table)*
2. **connect braker into table.**

- **Breaker**
- **interval: 4 - 6mm**
When heavy person be on the bed, consider interval of locker and bed (about 5 mm) And fix with volts and wind tightly.

3. Connect rail to table.
4. Put in stand support to rail.
5. Lift up rail with rail support.

6. Connect stand into stand support.

COMED Medical Systems Co., Ltd.
Tube support and stand ware fixed with tape (or wire). This fixing tape should be remove the last. Because, wire inside stand would be not tangle. Tube support must be face below direction (direction of weight balance).

Pic. Stand assembly and inside drawing

7. fixing stand with six bolts.

Using the six bolts contrast A angle and B angle equaled. And then remove fixing bolt in weight balance.
8. fixing the tube assembly into tube support and cable connection.

Connect cable duct into rail support
9. fixing all cover.

Insert rail-cover into rail and sticking.
(Release the dish-head-bolt and tighten with the rail-cover by the bolt.)
10. connection HV cable and terminal connection

**HV cable Connection**
When you are connecting high voltage cable, be careful of its polarity.
*CAUTION: Cable must be connected deep into the hole.*
<table>
<thead>
<tr>
<th>No.</th>
<th>Symbol</th>
<th>Description</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mA TP+</td>
<td>mA Test Point (+)</td>
<td>mA &amp; mAs Meter Connection</td>
</tr>
<tr>
<td>2</td>
<td>mA TP-</td>
<td>mA Test Point (-)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>F-L</td>
<td>Large Focus of Filament</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>F-COM</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>F-S</td>
<td>Small Focus of Filament</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>mA +F/B</td>
<td>mA Feedback (+)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>mA -F/B</td>
<td>mA Feedback (-)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>kV +F/B</td>
<td>kV Feedback (+)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>INT</td>
<td>Tank Interlock</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground(Earth)</td>
<td></td>
</tr>
</tbody>
</table>
11. Board and terminal connection

11.1 I/F Board and terminal connection
Terminal connection

1. +24VB : Handel Bar Board Relay Power (+) AND (LAMP Power)  
   Stand Bulky Driving Magnetic Conductor Power (+) AND (LAMP Power)

2. +24VB GND : Handel Bar Board Relay Power (-)  
   Stand Bulky Driving Magnetic Conductor Power (-)

3. 0VAC : Collimator Power Cable

4. 25VAC : Collimator Power Cable

5. 0VAC : Table Bulky Power Cable (Table Board Power 0VAC com)

6. BKY1 EXP2 : Table Bulky Power Cable

7. 0VAC : Table Bulky Power Cable

8. BKY2 EXP2 : Stand Bulky Power Cable

9. 0VAC : Stand Bulky Power Cable

10. THERM : TUBE Over-Heat Protection Cable

11. THERM : TUBE Over-Heat Protection Cable

12. ROTOR1(W/COM) : Tube Rotor Connection Cable

13. ROTOR2(B/MAIN) : Tube Rotor Connection Cable

14. ROTOR3(G/AUX) : Tube Rotor Connection Cable

15. 110VAC : Table Board Power Cable

16. 0VAC : Table Board Power Cable

17. CASE GND : Ground

18. WARNING 2-1 : PSU Charge ON Signal(OPTION)

19. WARNING 2-3 : PSU Charge ON Signal(OPTION)

20. SMPS +24V : Table Stand Driving Magnetic Conductor Power (+)

21. SMPS -24V : Table Stand Driving Magnetic Conductor Power (-)
I/F Board connection

TB502
CN503
CN502
TB503
TB501
TB504
CN501
CN504
## TB 504 (BR-944C) and TB 503 (BR-944C)

<table>
<thead>
<tr>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O</td>
<td>BUCKY1 SPLY</td>
<td>1</td>
<td>I</td>
<td>DOOR</td>
</tr>
<tr>
<td>2</td>
<td>O</td>
<td>BUCKY1 DR</td>
<td>2</td>
<td>I</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>O</td>
<td>BUCKY1 EXP1</td>
<td>3</td>
<td>I</td>
<td>OTHER DEVICE 1</td>
</tr>
<tr>
<td>4</td>
<td>O</td>
<td>BUCKY1 EXP2</td>
<td>4</td>
<td>I</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>O</td>
<td>SPARE OUT1-1</td>
<td>5</td>
<td>I</td>
<td>OTHER DEVICE 2</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
<td>SPARE OUT1-2</td>
<td>6</td>
<td>I</td>
<td>GND</td>
</tr>
<tr>
<td>7</td>
<td>I</td>
<td>SPARE OUT2-1</td>
<td>7</td>
<td>I</td>
<td>SPARE IN 1</td>
</tr>
<tr>
<td>8</td>
<td>O</td>
<td>SPARE OUT2-2</td>
<td>8</td>
<td>I</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>O</td>
<td>BUCKY2 SPLY</td>
<td>9</td>
<td>I</td>
<td>SPARE IN 2</td>
</tr>
<tr>
<td>10</td>
<td>O</td>
<td>BUCKY2 DR</td>
<td>10</td>
<td>I</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>O</td>
<td>BUCKY2 EXP1</td>
<td>11</td>
<td>O</td>
<td>LIGHT IN USE-1</td>
</tr>
<tr>
<td>12</td>
<td>O</td>
<td>BUCKY2 EXP2</td>
<td>12</td>
<td>O</td>
<td>LIGHT IN USE-2</td>
</tr>
<tr>
<td>13</td>
<td>I</td>
<td>BUCYK2 OK</td>
<td>13</td>
<td>O</td>
<td>WARNING 1-1</td>
</tr>
<tr>
<td>14</td>
<td>I</td>
<td>BUCYK2 OK (GND)</td>
<td>14</td>
<td>O</td>
<td>WARNING 1-2</td>
</tr>
<tr>
<td>15</td>
<td>O</td>
<td>BUCYK1 OK</td>
<td>15</td>
<td>O</td>
<td>WARNING 1-3</td>
</tr>
<tr>
<td>16</td>
<td>O</td>
<td>BUCYK1 OK (GND)</td>
<td>16</td>
<td>O</td>
<td>WARNING 2-1</td>
</tr>
<tr>
<td>17</td>
<td>O</td>
<td>+24V</td>
<td>17</td>
<td>O</td>
<td>WARNING 2-2</td>
</tr>
<tr>
<td>18</td>
<td>O</td>
<td>24V GND</td>
<td>18</td>
<td>O</td>
<td>WARNING 2-3</td>
</tr>
</tbody>
</table>

## TB 502 (BR-944C) and TB 501 (BR-944C)

<table>
<thead>
<tr>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O</td>
<td>ROTOR 1 (COM)</td>
<td>1</td>
<td></td>
<td>25 VAC</td>
</tr>
<tr>
<td>2</td>
<td>O</td>
<td>ROTOR 2 (MAIN)</td>
<td>2</td>
<td></td>
<td>16 VAC</td>
</tr>
<tr>
<td>3</td>
<td>O</td>
<td>ROTOR 3 (SHIFT)</td>
<td>3</td>
<td></td>
<td>0 VAC</td>
</tr>
<tr>
<td>4</td>
<td>O</td>
<td>GND</td>
<td>4</td>
<td></td>
<td>220 VAC</td>
</tr>
<tr>
<td>5</td>
<td>I</td>
<td>TUBE THERMAL</td>
<td>5</td>
<td></td>
<td>110 VAC</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
<td>TUBE THERMAL</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>O</td>
<td>25 VAC (10A)</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>O</td>
<td>16 VAC (10A)</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.2 Handle Bar Board and Table Board terminal connection
<table>
<thead>
<tr>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O</td>
<td>24 VDC</td>
<td>1</td>
<td>O</td>
<td>F/B–</td>
</tr>
<tr>
<td>2</td>
<td>O</td>
<td>0 VDC</td>
<td>2</td>
<td>O</td>
<td>F/B+</td>
</tr>
<tr>
<td>3</td>
<td>I</td>
<td>RY1</td>
<td>3</td>
<td>O</td>
<td>U/D–</td>
</tr>
<tr>
<td>4</td>
<td>I</td>
<td>RY2</td>
<td>4</td>
<td>O</td>
<td>U/D+</td>
</tr>
<tr>
<td>5</td>
<td>I</td>
<td>RY3</td>
<td>5</td>
<td>O</td>
<td>90–</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
<td>RY4</td>
<td>6</td>
<td>O</td>
<td>90+</td>
</tr>
<tr>
<td>7</td>
<td>I</td>
<td>RY5</td>
<td>7</td>
<td>O</td>
<td>ROT–</td>
</tr>
<tr>
<td>8</td>
<td>I</td>
<td>RY6</td>
<td>8</td>
<td>O</td>
<td>ROT+</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>9</td>
<td>O</td>
<td>R/L–</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>10</td>
<td>O</td>
<td>R/L+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>LOCK–</td>
<td>1</td>
<td>I</td>
<td>110 VAC</td>
</tr>
<tr>
<td>2</td>
<td>I</td>
<td>LOCK+</td>
<td>2</td>
<td>I</td>
<td>0 VAC</td>
</tr>
<tr>
<td>3</td>
<td>I</td>
<td>0 VDC</td>
<td>3</td>
<td>I</td>
<td>BUCKY 2</td>
</tr>
<tr>
<td>4</td>
<td>I</td>
<td>24 VDC</td>
<td>4</td>
<td>I</td>
<td>BUCKY 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
<th>PIN</th>
<th>I/O</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O</td>
<td>MG 1+</td>
<td>1</td>
<td>I</td>
<td>POS(RTN)</td>
</tr>
<tr>
<td>2</td>
<td>O</td>
<td>MG 1–</td>
<td>2</td>
<td>O</td>
<td>POS</td>
</tr>
<tr>
<td>3</td>
<td>O</td>
<td>MG 2+</td>
<td>3</td>
<td>I</td>
<td>TRAY(RTN)</td>
</tr>
<tr>
<td>4</td>
<td>O</td>
<td>MG 2–</td>
<td>4</td>
<td>O</td>
<td>TRAY</td>
</tr>
<tr>
<td>5</td>
<td>O</td>
<td>MG 3+</td>
<td>5</td>
<td>I</td>
<td>T/C(RTN)</td>
</tr>
<tr>
<td>6</td>
<td>O</td>
<td>MG 3–</td>
<td>6</td>
<td>O</td>
<td>T/C</td>
</tr>
<tr>
<td>7</td>
<td>O</td>
<td>MG 4+</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>O</td>
<td>MG 4–</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>O</td>
<td>MG 5+</td>
<td>9</td>
<td>I</td>
<td>BUCKY OUT(RTN)</td>
</tr>
<tr>
<td>10</td>
<td>O</td>
<td>MG 5–</td>
<td>10</td>
<td>O</td>
<td>BUCKY OUT</td>
</tr>
</tbody>
</table>

COMED Medical Systems Co., Ltd. 20
7. Installation trouble shooting

7.1 bucky stand trouble shooting

1) locker interval(top cover off)

2) If x-ray film image moved, you should fix bucky to wall
3) Bucky stand input signal

1. DC+ (locker power)
2. DC- (locker power)
3. START (BKY2 EXP2—moving motor power 110VAC)
4. START (0VAC—moving motor power 110VAC)
5. CASE GND (Ground)

Pic1. Bucky stand wire
1) side bolts off and side cover off
2) front bolts off and front wood cover off
7.2 Table bucky trouble shooting

1. remove rubber stopper.

2. remove locker.

2. move top table a little.

3. check bucky assembly.
4. check hitter

ready s/w push → hitter hitting spring
(check 24VDC in hitter when ready s/w is pushed)

5. check bucky signal

from bucky signal(AC110V when ready s/w pushed)
7.3 change broken bearing in table

first, remove rubber stopper on top-table and remove breaker and move top-table to right-side little.(consider room size).
① rubber stopper on top-table ② breaker

Second, take out bearing assembly(refer picture)

picture: bearing assembly
first, remove M5 bolts and take out bearing assembly

second, change broken bearing with same bearing and put together reverse method

7.4 Locker interval change

fix with volts and wind tightly.

interval : 4-5mm

when pushed foot s/w, check interval of locker
push foot s/w → release locker
not push foot s/w → attached locker

Locker fixing method
Calibration Manual

EVA-HF325/525
# TABLE OF CONTENTS

## INPUT POWER SECTION

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Input Power Selection</td>
<td>3</td>
</tr>
</tbody>
</table>

## BOARD kV & mA CALIBRATION

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. HT Control Calibration</td>
<td>5</td>
</tr>
<tr>
<td>2. HT Control SILK Circuit</td>
<td>6</td>
</tr>
<tr>
<td>3. Filament Calibration</td>
<td>7</td>
</tr>
<tr>
<td>4. Filament Drive Silk Circuit</td>
<td>7</td>
</tr>
<tr>
<td>5. Aging</td>
<td>8</td>
</tr>
<tr>
<td>6. kV Calibration</td>
<td>9</td>
</tr>
<tr>
<td>7. kV Calibration</td>
<td>10</td>
</tr>
<tr>
<td>8. mA Oscilloscope Wave Form</td>
<td>11</td>
</tr>
<tr>
<td>9. Bucky Type Selection</td>
<td>13</td>
</tr>
</tbody>
</table>

## OPERATION PANEL CALIBRATION

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DIP Switch Function</td>
<td>15</td>
</tr>
<tr>
<td>2. Calibration ode</td>
<td>16</td>
</tr>
<tr>
<td>3. Setting Manual Radiography</td>
<td>18</td>
</tr>
<tr>
<td>4. Setting APR Radiography</td>
<td>20</td>
</tr>
<tr>
<td>5. Radiography</td>
<td>21</td>
</tr>
<tr>
<td>6. Bucky Time Chart</td>
<td>22</td>
</tr>
<tr>
<td>7. Error Code</td>
<td>23</td>
</tr>
<tr>
<td>8. Trouble Shooting Guide</td>
<td>26</td>
</tr>
<tr>
<td>9. HT-Controller A/S Reference</td>
<td>28</td>
</tr>
</tbody>
</table>
INPUT POWER SELECTION
1. INPUT POWER SELECTION

![Diagram of input power selection](image)

<table>
<thead>
<tr>
<th>Input</th>
<th>Connection</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 200V</td>
<td>①(AC 0V) + ②(AC 200V)</td>
<td></td>
</tr>
<tr>
<td>AC 220V</td>
<td>①(AC 0V) + ③(AC 220V)</td>
<td></td>
</tr>
<tr>
<td>AC 240V</td>
<td>①(AC 0V) + ④(AC 240V)</td>
<td></td>
</tr>
</tbody>
</table>

[Fig. 1]

[Fig. 2]
BOARD kV & mA SELECTION
1. HT CONTROL CALIBRATION

VR1 Oscillator frequency calibration for filament drive
- Measuring Point : U18-3 PIN
- Adjust Frequency : 36 kHz ± 0.5kHz (55.6±1.6μsec).
- Caution : Measure as 2-PULSE since it is alternating current.

VR2 Filament LAMP DEAD TIME calibration
- Caution: Do not calibrate but just turn to the left (counter clock-wise).

VR3 Small Scale (10mA ~ 80mA) mA FEEDBACK to mAs adjustment with VF converter
- Measuring Point : TP5
- Adjust the VR3 until the TP5 set to 25kHz ± 0.5kHz.
- Simple Adjustment : Connect mAs tester to the connector 8,9 (mA TEST) of HV tank and shoot x-ray and adjust mAs.
- Conditions: 40kV 50mA / 10mAs
- Measuring: 10 ± 0.2mAs

VR4 Oscillator Frequency Adjustment for kV DRIVE
- Measuring Point : TP7
- Adjust Frequency : 40kHz ± 0.5kHz (50±1.2μsec)
- Caution : Measure as 2-PULSE since it is alternating current.

VR6 Floroscopy Scale Calibration
- Measuring Point : U19-9 Pin
- Adjust Frequency : 10.35kΩ
- Caution : Calibrate only when Floroscopy Calibration.
2. HT CONTROL SILK CIRCUIT
3. FILAMENT DRIVE CALIBRATION

VR1 FILAMENT TRANS DIRVE Power Voltage Calibration
- Measuring Point: TP8, TP9
- Adjusting Point: DC130V±1V

4. FILAMENT DRIVE SILK CURCUIIT
5. AGING

How to Calibrate: Execute on Operation Panel  
Measuring Point: (Actual Current: less than 40mA)

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>SHOOTING TIME</th>
<th>SHOOTING INTERVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>40kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>50kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>60kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>80kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>40kV/50mA 0.1sec</td>
<td>Two</td>
<td>50~60 Sec.</td>
</tr>
<tr>
<td>50kV/50mA 0.1sec</td>
<td>Two</td>
<td>50~60 Sec.</td>
</tr>
<tr>
<td>60kV/50mA 0.1sec</td>
<td>Two</td>
<td>50~60 Sec.</td>
</tr>
<tr>
<td>80kV/50mA 0.1sec</td>
<td>Two</td>
<td>50~60 Sec.</td>
</tr>
<tr>
<td>90kV/50mA 0.1sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>100kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>110kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
<tr>
<td>120kV/50mA 0.01sec</td>
<td>Two</td>
<td>20~30 Sec.</td>
</tr>
</tbody>
</table>
6. kV CALIBRATION

Calibration Method: Act in the panel calibration Mode (From C1–00 to 20)

- Setting range:

<table>
<thead>
<tr>
<th>mA</th>
<th>Sec</th>
<th>kV</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>10mA</td>
<td>0.1sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
<tr>
<td>100mA</td>
<td>0.1sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
<tr>
<td>200mA</td>
<td>0.05sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
<tr>
<td>320mA</td>
<td>0.05sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
</tbody>
</table>

- Measuring Point: HT–CONT TP8 : kV FEEDBACK
- Converted Value: 1V = 33.3 kV
- Adjusting Value: ±10% for the setting kV
- Caution: Execute the final test with correct mA value. kV could be changed by the mA.
7. mA CALIBRATION

Calibration Method: Execute in panel calibration mode. (from C1–21 39 : mA, from C2–21 39 : Pre_mA)

- Setting Range:

<table>
<thead>
<tr>
<th>mA</th>
<th>Sec</th>
<th>kV</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>10mA</td>
<td>0.1sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
<tr>
<td>100mA</td>
<td>0.1sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
<tr>
<td>200mA</td>
<td>0.05sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
<tr>
<td>320mA</td>
<td>0.05sec</td>
<td>40kV, 80kV, 125kV</td>
<td></td>
</tr>
</tbody>
</table>

- Measuring point: HT-CONT TP4
- mA FEEDBACK conversion
  
  \[(10~99mA : 1V = 10mA, 100~999mA : 1V = 100mA)\]

- Adjusting value: ±10% for the setting kV
- Caution: Execute the mA variation from C1–21 to 39.
  In case of overshoot and undershoot, act from C2–21 to 39 for the stable mA levels.
8. mA OSCILLOSCOPE WAVE FORM

1) NORMAL CONDITIONS

2) UNDERSHOOT WAVE FORM

Operate in panel calibration mode (From C2-21 to 39). Decrease DATA.
3) OVERSHOOT WAVE FORM

Act in Panel calibration mode (From C2-21 to 39). Decrease DATA.
9. BUCKY TYPE SELECTION

1) DIP SW MODE (HT_CONT DIP SW 1)

<table>
<thead>
<tr>
<th>DIP SW 1~4</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mode</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>2 Mode</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>3 Mode</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>4 Mode</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

2) Bucky Type

<table>
<thead>
<tr>
<th></th>
<th>Bucky 1</th>
<th>Bucky 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mode</td>
<td>Motor Type</td>
<td>Motor Type</td>
</tr>
<tr>
<td>2 Mode</td>
<td>Solenoid Type</td>
<td>Solenoid Type</td>
</tr>
<tr>
<td>3 Mode</td>
<td>Motor Type</td>
<td>Solenoid Type</td>
</tr>
<tr>
<td>4 Mode</td>
<td>Solenoid Type</td>
<td>Motor Type</td>
</tr>
</tbody>
</table>
OPERATION PANEL CALIBRATION
1. DIP SW FUNCTION

Adjust DIP Switch SW1 (8P) located on the back front of control panel and operate the each calibration.

**DIP SW (SW 1: 8P) Function Display**

<table>
<thead>
<tr>
<th>Switch Configuration</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIPSW-1 OFF, DIPSW-2,3,4,5,6,7,8 ON</td>
<td>Calibration Mode</td>
</tr>
<tr>
<td>DIPSW-1 OFF, DIPSW-2,3,4,5,6,7,8 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-3 OFF, DIPSW-1,2,4,5,6,7,8 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-4 OFF, DIPSW-1,2,3,5,6,7,8 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-5 OFF, DIPSW-1,2,3,4,6,7,8 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-6 OFF, DIPSW-1,2,3,4,5,7,8 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-7 OFF, DIPSW-1,2,3,4,5,6,8 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-8 OFF, DIPSW-1,2,3,4,5,6,7 ON</td>
<td>Not in use</td>
</tr>
<tr>
<td>DIPSW-1,2,3,4,5,6,7,8, ON</td>
<td>Anatomical Mode</td>
</tr>
</tbody>
</table>

1) **DIPSW-1 OFF, DIPSW-2,3,4,5,6,7,8 ON**: Calibration Mode
Execute the initializing of KVREF, mAREF, setting of each calibration and data.

2) **DIPSW-1,2,3,4,5,6,7,8, ON**: Anatomical Mode
Execute X-ray Exposure after setting up radiographic conditions with selection of target regions, directions and patient size. You can save each exposure conditions and levels.

3) **AEC Exposure Mode (Option)**
Execute the X-ray exposure with Ion Chamber control.
You can calibrate the range (-3 ~+0~ +3) with density setting switch.
2. CALIBRATION MODE

1) Initial LCD screen

<table>
<thead>
<tr>
<th>KVP</th>
<th>MA</th>
<th>SEC</th>
<th>TUBE1 RAD CAL MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>10</td>
<td>0.100</td>
<td>KVP-SET</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>95 +00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mA-SET</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>57 -03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mA-COMP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-02</td>
</tr>
</tbody>
</table>

95 & 57: reference data fixed in the memory
+00, −03, −02: Actual data to be calibrated

2) DISPLAY OF PANEL IN CALIBRATION MODE

- Power OFF switch
- Power ON switch
- KV control switch
  40KV ~ 125KV (86 levels by 1KV)
- mA control switch
  10mA ~ 160mA: Small Focus (13 levels)
  200mA ~ 500mA: Large Focus (5 levels)
- TIME control switch
  0.001 SEC ~ 5.0 SEC (35 levels)
<table>
<thead>
<tr>
<th>Modality</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKULL</td>
<td>Switch to raise KV condition up (max. +20)</td>
</tr>
<tr>
<td>PNS</td>
<td>Switch to lower KV condition (min. −20)</td>
</tr>
<tr>
<td>CHEST</td>
<td>Switch to raise mA condition up (max. +20)</td>
</tr>
<tr>
<td>SPINE</td>
<td>Switch to lower mA condition (min. −20)</td>
</tr>
<tr>
<td>ABDOMEN</td>
<td>Switch to raise mA COMP condition up (max. +00)</td>
</tr>
<tr>
<td>HAND</td>
<td>Switch to lower mA COMP condition (min. −10)</td>
</tr>
</tbody>
</table>
3. SETTING MANUAL RADIOGRAPHY

1) Select the Anatomical Mode
Anatomical Mode will be ready as a default mode when power turned on.
A user can choose on Manual Mode.

2) Select “BUCKY1” or “BUCKY 2”
Appropriate bucky table or stand is matched for each Anatomical Mode as a default. A user can select another bucky table / stand or select none for his/her specific purpose using the switch.

3) A setup of tube voltage “kV”
Set up the tube voltage with “kV” setting switch.
Setting range: 40kV ~ 125kV (1kV step)

4) A set up of tube current “mA”
Set up the tube current with “mA” setting switch.
Setting range: 10, 12.5, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160mA (Small Focus)
200, 250, 320, 400, 500mA (Large Focus)

5) Setup of Exposure mode (Time/mAs radiography)
6) Execute Exposure Mode with Time/mAs selection switch

mAs setting of Exposure accumulation time.
Select the exposure accumulation time with Time/mAs setting switch

- **Setting range**: 0.1mAs ~ 630mAs

- **Step**: 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0, 1.3, 1.6, 2.0, 2.5, 3.2, 4.0, 5.0, 6.3, 8.0, 10.0, 12.5, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 320, 400, 500, 630mAs

7) Exposure time «sec» setting

Select the exposure time with Time/mAs setting switch.

- **Setting range**: 0.001sec ~ 10sec

- **Step**: 0.001, 0.002, 0.003, 0.004, 0.005, 0.006, 0.008, 0.010, 0.013, 0.016, 0.020, 0.025, 0.032, 0.040, 0.050, 0.064, 0.080, 0.100, 0.125, 0.160, 0.200, 0.250, 0.320, 0.400, 0.500, 0.640, 0.800, 1.00, 1.25, 1.60, 2.00, 2.50, 3.20, 4.00, 5.00, 6.300, 8.00, 10.00sec

If a user set a shooting condition over the maximum lode of the machine, “Over Lode” lamp will be on and X-ray will be not projected.
4. SETTING APR RADIOGRAPHY

1) Choose Subject Size
There are four preset subject size as Child, Small, Medium, and Large. A user can choose a subject size depends on actual size of person.

2) Choose Body Part for Shooting
A user can choose specific part for shooting from 42 preset body part of subject.

3) Changing Shooting Condition
   (1) Choose subject Size
   (2) Choose body part for shooting
   (3) Changing shooting conditions to be saved in the memory including bucky selection.
   (4) Press “SET” switch and changed shooting condition will be memorized after beep.
5. RADIOGRAPHY

1) X-ray Radiography using Radiography switch on the Control Panel
   (1) Press "Ready" switch. Please make sure "Ready" switch lamp is on.
   (2) When “Ready” switch is on, press “Exposure” switch. "Exposure” switch lamp will be on and alarm will sound.

2) X-ray radiography with hand–switch
   (1) Press Hand switch slightly. Make sure “Ready” switch lamp is on.
   (2) When “Ready” switch is on, press “Hand” switch again with more pressure. "Exposure" switch lamp will be on and alarm will sound.
6. Bucky Time Chart

1) Solenoid Type

- Ready Switch
- Ready Signal
- Bucky Out Signal
- Exposure Switch
- Exposure Signal

2) Motor Type

- Ready Switch
- Ready Signal
- Bucky Out Signal
- Exposure Switch
- Exposure Signal
7. ERROR CODE

1) Error Code Display

Error Code 1
Charge Monitor Error

2) Error Code
The error code is displayed when problems, such as abnormalities, occur to equipment. While the error code is displayed, radiography operation is forbidden for safety. A power supply is re-switched off and on, then an error code is cleared. If the problem of equipment is not solved at the time of a power-supply re-switched on, the display is lighted on again.

Caution

Please wait for 1~2 minutes before you turn on the machine again right after powering off.

3) Check code
Check codes are warning displays when an error is on operation of equipment unlike an error code. While the check code is displayed, radiography operation is forbidden for safety. Check code is cleared when the backup release switch is switched on. Please refer to the check code list for the case the clearance method is different.

Check code List

<table>
<thead>
<tr>
<th>Ch_01</th>
<th>TUBE THERMOSTAT OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◦ The temperature of the slim and long shaped light bulb is higher than 80°C.</td>
</tr>
<tr>
<td></td>
<td>◦ Thermo switch is in open position.</td>
</tr>
<tr>
<td></td>
<td>◦ Release the check code at Thermo switch off condition.</td>
</tr>
<tr>
<td>Ch_07</td>
<td>Shortage of power-supply capacity for exposure</td>
</tr>
<tr>
<td></td>
<td>◦ The power voltage drop is below AC160V and DC 150V.</td>
</tr>
<tr>
<td></td>
<td>◦ Release the check code with input of power.</td>
</tr>
</tbody>
</table>
**ERROR CODE LIST**

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description</th>
</tr>
</thead>
</table>
| Err 01     | CHARGE MONITOR ERROR  
  ◆ When the power voltage drops below AC160V and DC150V. |
| Err 02     | TIME OVER ERROR AT STANDBY (Serial Communication Fail Error)  
  ◆ Standby position is not cleared after the 10 sec. at the operation panel power on (No reply from HT–CONT) |
| Err 03     | READY OUT SIGNAL ERROR AT STANDBY  
  ◆ Defects of Operation panel or HT control board |
| Err 04     | X-RAY OUT SIGNAL ERROR AT STANDBY  
  ◆ Defects of Operation panel or HT control board |
| Err 05     | PANEL READY SWITCH INPUT ERROR AT STANDBY  
  ◆ When the operation panel ready switch input is 'on' position. |
| Err 06     | PANEL X-RAY SWITCH INPUT ERROR AT STANDBY  
  ◆ When the operation panel ready switch input is 'on' position. |
| Err 07     | Not Defined |
| Err 08     | Not Defined |
| Err 09     | ROTOR CURRENT ERROR AT NON–EXPOSURE POSITION  
  ◆ TP18 (RTR_I_FB) of HT Control Board is higher than 1V at non–exposure action |
| Err 10     | FILAMENT CURRENT ERROR AT NON–EXPOSURE POSITION  
  ◆ TP2 (FIL_I_FB) of HT Control Board is higher than 1.5V at non–exposure action |
| Err 11     | kV FEEDBACK CURRENT ERROR AT NON–EXPOSURE POSITION  
  ◆ TP8 (kV_FB) of HT Control Board is higher than 1V TP8 (33.3kV) at non–exposure action |
| Err 12     | mA FEEDBACK CURRENT ERROR AT NON–EXPOSURE POSITION  
  ◆ TP4 (mA_FB) 10–80mA setting of HT Control Board is higher than 0.5V (5mA), In case of 100–500mA setting of HT Control Board is higher than 0.1V (11mA) TP8 (33.3kV) at non–exposure action |
| Err 13     | ROTOR CURRENT ERROR AT EXPOSURE POSITION  
  ◆ TP18 (RTR_I_FB) of HT Control Board is lower than 3.0V at exposure ready action after the 0.8 sec. With ready switch input. |
| Err 14     | FILAMENT CURRENT ERROR AT EXPOSURE POSITION  
  ◆ TP2 (FIL_I_FB) of HT Control Board is lower than 1.5V at exposure ready action after the 1.5 sec. With ready switch input. |
### Calibration

<table>
<thead>
<tr>
<th>Err 15</th>
<th>KV FEEDBACK CURRENT ERROR AT EXPOSURE POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ After Exposure is ready, X-ray switch input and turn on HV–ENABLE signal and within 3msec HT8 (kV_FB) setting is under %70 During exposure TP8 (kV_FB) setting is under 70% *KV Feedback monitoring data (70%) can be set on calibration mode [C–2_43]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 16</th>
<th>mA FEEDBACK CURRENT ERROR AT EXPOSURE POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ Exposure Ready Condition TP4 (mA_FB) 10–80mA setting of HT Control Board is lower than 0.5V (5mA), In case of 100–630mA setting of HT Control Board is lower than 0.1V (11mA) after the 3 msec. with kV Feedback signal. ◆ During Exposure TP4 (mA_FB) 10–80mA setting of HT Control Board is lower than 0.5V (5mA), In case of 100–630mA setting of HT Control Board is lower than 0.1V (11mA).</td>
</tr>
</tbody>
</table>

| Err 17 | Not Defined |

<table>
<thead>
<tr>
<th>Err 18</th>
<th>X-RAY TIME OVER ERROR AT SEC MODE EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ X-ray end signal is not reached to the panel from HT exceeding the setting time at the sec mode exposure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 19</th>
<th>X-RAY TIME OVER ERROR AT mAs MODE EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ X-ray end signal is not reached to the panel from HT exceeding the setting time calculated by the mA × (1/2) formula at the mAs mode exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 20</th>
<th>X-RAY TIME OVER ERROR AT AEC MODE EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ X-ray end signal is not reached to the panel from HT exceeding the setting time calculated by backup–timer at the AEC mode exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 21</th>
<th>HV INTERLOCK ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ Unlink the HV trans connection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 22</th>
<th>IGBT FAULT ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ HV Tans is under overloading condition about mA (350A).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 23</th>
<th>KV FEEDBACK OVER CURRENT ERROR AT EXPOSURE POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ TP8 (kV_FB) of HT Control Board is higher than 20kV during the exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 24</th>
<th>mA FEEDBACK OVER CURRENT ERROR AT EXPOSURE POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ TP8 (mA_FB) of HT Control Board is higher than [mA setting value plus 50%] during the exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 25</th>
<th>NO ZERO CROSS ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ Impossible to detect the frequency signal.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Err 26</th>
<th>ZERO CROSS OVER ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>◆ Frequency signal detection over.</td>
</tr>
</tbody>
</table>
## 8. TROUBLE SHOOTING GUIDE

<table>
<thead>
<tr>
<th>Error No.</th>
<th>Parts</th>
<th>Check Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error 01</td>
<td>IGBT</td>
<td>PC1(PC817)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED LD1, LD2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN404 Connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U2(MIC4584)</td>
</tr>
<tr>
<td></td>
<td>POWER</td>
<td>Q2, Q3(MTD3055EL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN208 Connection</td>
</tr>
<tr>
<td></td>
<td>MAIN</td>
<td>R101(60W20Ω)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BR1(VUO150-16NO7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SW1(Toggle Switch Position)</td>
</tr>
<tr>
<td>Error 02</td>
<td>POWER</td>
<td>+12V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN210 Connection</td>
</tr>
<tr>
<td></td>
<td>HT–Cont.</td>
<td>CN103 Connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN104 Connection</td>
</tr>
<tr>
<td></td>
<td>MAIN</td>
<td>J1 Connection</td>
</tr>
<tr>
<td>Error 03</td>
<td>OP</td>
<td>Ready S/W</td>
</tr>
<tr>
<td>Error 04</td>
<td>OP</td>
<td>X–Ray S/W</td>
</tr>
<tr>
<td>Error 05</td>
<td>MAIN</td>
<td>J1 Connection</td>
</tr>
<tr>
<td></td>
<td>HT–Cont.</td>
<td>U14(TLP521-4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U10(74HC14)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN103 Connection</td>
</tr>
<tr>
<td>Error 06</td>
<td>MAIN</td>
<td>J1 Connection</td>
</tr>
<tr>
<td></td>
<td>HT–Cont.</td>
<td>U14(TLP521-4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U10(74HC14)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN103 Connection</td>
</tr>
<tr>
<td>Error 07</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Error</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Error 08</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Error 09</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Error 10</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Error 11</td>
<td>HT-Cont. Check U24</td>
<td></td>
</tr>
<tr>
<td>Error 12</td>
<td>HT-Cont. Check U24</td>
<td></td>
</tr>
<tr>
<td>Error 13</td>
<td>HT-Cont. U29(VM48) I/F Rotor Signal Connection POWER F2(5A) Fuse</td>
<td></td>
</tr>
<tr>
<td>Error 14</td>
<td>FILAMENT RY1(CH2-MD12) R11(5W2Ω) Q2, Q5(IRFP40B)</td>
<td></td>
</tr>
<tr>
<td>Error 15</td>
<td>HT-Cont. Check TP8 (1V=33.3KV) CON 107 Connection</td>
<td></td>
</tr>
<tr>
<td>Error 16</td>
<td>HT-Cont. Check TP4 1V=10mA (10mA ~99mA) 1V=100mA (100mA ~999mA)</td>
<td></td>
</tr>
<tr>
<td>Error 17</td>
<td>Not In Use</td>
<td></td>
</tr>
<tr>
<td>Error 18</td>
<td>HT-Cont. HT-Cont. PCB</td>
<td></td>
</tr>
<tr>
<td>Error 19</td>
<td>HT-Cont. U22(VFC32)</td>
<td></td>
</tr>
<tr>
<td>Error 20</td>
<td>HT-Cont. U22(VFC32)</td>
<td></td>
</tr>
<tr>
<td>Error 21</td>
<td>HT-Cont. CN107 Connection</td>
<td></td>
</tr>
<tr>
<td>Error 22</td>
<td>HT-Cont. -12V Check</td>
<td></td>
</tr>
<tr>
<td>Error 23</td>
<td>HT-Cont. Check TP8 (1V=33.3KV)</td>
<td></td>
</tr>
<tr>
<td>Error 24</td>
<td>HT-Cont. Check TP4 1V=10mA (10mA ~99mA) 1V=100mA (100mA ~999mA)</td>
<td></td>
</tr>
<tr>
<td>Error 25</td>
<td>HT-Cont. HT-Cont. PCB</td>
<td></td>
</tr>
<tr>
<td>Error 26</td>
<td>HT-Cont. HT-Cont. PCB</td>
<td></td>
</tr>
</tbody>
</table>
9. HT–CONTROLLER A/S REFERENCE

1) HT–Controller CPU Analog-to–Digital Input Value (1/5)

<table>
<thead>
<tr>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.02</td>
<td>0.039</td>
<td>31</td>
<td>0.608</td>
<td>1.216</td>
</tr>
<tr>
<td>2</td>
<td>0.039</td>
<td>0.078</td>
<td>32</td>
<td>0.627</td>
<td>1.255</td>
</tr>
<tr>
<td>3</td>
<td>0.059</td>
<td>0.118</td>
<td>33</td>
<td>0.647</td>
<td>1.294</td>
</tr>
<tr>
<td>4</td>
<td>0.078</td>
<td>0.157</td>
<td>34</td>
<td>0.667</td>
<td>1.333</td>
</tr>
<tr>
<td>5</td>
<td>0.098</td>
<td>0.196</td>
<td>35</td>
<td>0.686</td>
<td>1.373</td>
</tr>
<tr>
<td>6</td>
<td>0.118</td>
<td>0.235</td>
<td>36</td>
<td>0.706</td>
<td>1.412</td>
</tr>
<tr>
<td>7</td>
<td>0.137</td>
<td>0.275</td>
<td>37</td>
<td>0.725</td>
<td>1.451</td>
</tr>
<tr>
<td>8</td>
<td>0.157</td>
<td>0.314</td>
<td>38</td>
<td>0.745</td>
<td>1.49</td>
</tr>
<tr>
<td>9</td>
<td>0.176</td>
<td>0.353</td>
<td>39</td>
<td>0.765</td>
<td>1.529</td>
</tr>
<tr>
<td>10</td>
<td>0.196</td>
<td>0.392</td>
<td>40</td>
<td>0.784</td>
<td>1.569</td>
</tr>
<tr>
<td>11</td>
<td>0.216</td>
<td>0.431</td>
<td>41</td>
<td>0.804</td>
<td>1.608</td>
</tr>
<tr>
<td>12</td>
<td>0.235</td>
<td>0.471</td>
<td>42</td>
<td>0.824</td>
<td>1.647</td>
</tr>
<tr>
<td>13</td>
<td>0.255</td>
<td>0.51</td>
<td>43</td>
<td>0.843</td>
<td>1.686</td>
</tr>
<tr>
<td>14</td>
<td>0.275</td>
<td>0.549</td>
<td>44</td>
<td>0.863</td>
<td>1.725</td>
</tr>
<tr>
<td>15</td>
<td>0.294</td>
<td>0.588</td>
<td>45</td>
<td>0.882</td>
<td>1.765</td>
</tr>
<tr>
<td>16</td>
<td>0.314</td>
<td>0.627</td>
<td>46</td>
<td>0.902</td>
<td>1.804</td>
</tr>
<tr>
<td>17</td>
<td>0.333</td>
<td>0.667</td>
<td>47</td>
<td>0.922</td>
<td>1.843</td>
</tr>
<tr>
<td>18</td>
<td>0.353</td>
<td>0.706</td>
<td>48</td>
<td>0.941</td>
<td>1.882</td>
</tr>
<tr>
<td>19</td>
<td>0.373</td>
<td>0.745</td>
<td>49</td>
<td>0.961</td>
<td>1.922</td>
</tr>
<tr>
<td>20</td>
<td>0.392</td>
<td>0.784</td>
<td>50</td>
<td>0.98</td>
<td>1.961</td>
</tr>
<tr>
<td>21</td>
<td>0.412</td>
<td>0.824</td>
<td>51</td>
<td>1.02</td>
<td>2.039</td>
</tr>
<tr>
<td>22</td>
<td>0.431</td>
<td>0.863</td>
<td>52</td>
<td>1.02</td>
<td>2.039</td>
</tr>
<tr>
<td>23</td>
<td>0.451</td>
<td>0.902</td>
<td>53</td>
<td>1.039</td>
<td>2.078</td>
</tr>
<tr>
<td>24</td>
<td>0.471</td>
<td>0.941</td>
<td>54</td>
<td>1.059</td>
<td>2.118</td>
</tr>
<tr>
<td>25</td>
<td>0.49</td>
<td>0.98</td>
<td>55</td>
<td>1.078</td>
<td>2.157</td>
</tr>
<tr>
<td>26</td>
<td>0.51</td>
<td>1.02</td>
<td>56</td>
<td>1.098</td>
<td>2.196</td>
</tr>
<tr>
<td>27</td>
<td>0.529</td>
<td>1.059</td>
<td>57</td>
<td>1.118</td>
<td>2.235</td>
</tr>
<tr>
<td>28</td>
<td>0.549</td>
<td>1.098</td>
<td>58</td>
<td>1.137</td>
<td>2.275</td>
</tr>
<tr>
<td>29</td>
<td>0.569</td>
<td>1.137</td>
<td>59</td>
<td>1.157</td>
<td>2.314</td>
</tr>
<tr>
<td>30</td>
<td>0.588</td>
<td>1.176</td>
<td>60</td>
<td>1.176</td>
<td>2.353</td>
</tr>
</tbody>
</table>
## Calibration

### 2) HT-Controller CPU Analog-to-Digital Input Value (2/5)

<table>
<thead>
<tr>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td>1.196</td>
<td>2.392</td>
<td>91</td>
<td>1.784</td>
<td>3.569</td>
</tr>
<tr>
<td>62</td>
<td>1.216</td>
<td>2.431</td>
<td>92</td>
<td>1.804</td>
<td>3.608</td>
</tr>
<tr>
<td>63</td>
<td>1.235</td>
<td>2.471</td>
<td>93</td>
<td>1.824</td>
<td>3.647</td>
</tr>
<tr>
<td>64</td>
<td>1.255</td>
<td>2.51</td>
<td>94</td>
<td>1.843</td>
<td>3.686</td>
</tr>
<tr>
<td>65</td>
<td>1.275</td>
<td>2.549</td>
<td>95</td>
<td>1.863</td>
<td>3.725</td>
</tr>
<tr>
<td>66</td>
<td>1.294</td>
<td>2.588</td>
<td>96</td>
<td>1.882</td>
<td>3.765</td>
</tr>
<tr>
<td>67</td>
<td>1.314</td>
<td>2.627</td>
<td>97</td>
<td>1.902</td>
<td>3.804</td>
</tr>
<tr>
<td>68</td>
<td>1.333</td>
<td>2.667</td>
<td>98</td>
<td>1.922</td>
<td>3.843</td>
</tr>
<tr>
<td>69</td>
<td>1.353</td>
<td>2.706</td>
<td>99</td>
<td>1.941</td>
<td>3.882</td>
</tr>
<tr>
<td>70</td>
<td>1.373</td>
<td>2.745</td>
<td>100</td>
<td>1.961</td>
<td>3.922</td>
</tr>
<tr>
<td>71</td>
<td>1.392</td>
<td>2.784</td>
<td>101</td>
<td>1.98</td>
<td>3.961</td>
</tr>
<tr>
<td>72</td>
<td>1.412</td>
<td>2.824</td>
<td>102</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>73</td>
<td>1.431</td>
<td>2.863</td>
<td>103</td>
<td>2.02</td>
<td>4.039</td>
</tr>
<tr>
<td>74</td>
<td>1.451</td>
<td>2.902</td>
<td>104</td>
<td>2.039</td>
<td>0.078</td>
</tr>
<tr>
<td>75</td>
<td>1.471</td>
<td>2.941</td>
<td>105</td>
<td>2.059</td>
<td>4.118</td>
</tr>
<tr>
<td>76</td>
<td>1.49</td>
<td>2.98</td>
<td>106</td>
<td>2.078</td>
<td>4.157</td>
</tr>
<tr>
<td>77</td>
<td>1.51</td>
<td>3.02</td>
<td>107</td>
<td>2.098</td>
<td>4.196</td>
</tr>
<tr>
<td>78</td>
<td>1.529</td>
<td>3.059</td>
<td>108</td>
<td>2.118</td>
<td>4.235</td>
</tr>
<tr>
<td>79</td>
<td>1.549</td>
<td>3.098</td>
<td>109</td>
<td>2.137</td>
<td>4.275</td>
</tr>
<tr>
<td>80</td>
<td>1.569</td>
<td>3.137</td>
<td>110</td>
<td>2.157</td>
<td>4.314</td>
</tr>
<tr>
<td>81</td>
<td>1.588</td>
<td>3.176</td>
<td>111</td>
<td>2.176</td>
<td>4.353</td>
</tr>
<tr>
<td>82</td>
<td>1.608</td>
<td>3.216</td>
<td>112</td>
<td>2.196</td>
<td>4.392</td>
</tr>
<tr>
<td>83</td>
<td>1.627</td>
<td>3.255</td>
<td>113</td>
<td>2.216</td>
<td>4.431</td>
</tr>
<tr>
<td>84</td>
<td>1.647</td>
<td>3.294</td>
<td>114</td>
<td>2.235</td>
<td>4.471</td>
</tr>
<tr>
<td>85</td>
<td>1.667</td>
<td>3.333</td>
<td>115</td>
<td>2.255</td>
<td>4.51</td>
</tr>
<tr>
<td>86</td>
<td>1.686</td>
<td>3.373</td>
<td>116</td>
<td>2.275</td>
<td>4.549</td>
</tr>
<tr>
<td>87</td>
<td>1.706</td>
<td>3.412</td>
<td>117</td>
<td>2.294</td>
<td>4.588</td>
</tr>
<tr>
<td>88</td>
<td>1.725</td>
<td>3.451</td>
<td>118</td>
<td>2.314</td>
<td>4.627</td>
</tr>
<tr>
<td>89</td>
<td>1.745</td>
<td>3.49</td>
<td>119</td>
<td>2.333</td>
<td>4.667</td>
</tr>
<tr>
<td>90</td>
<td>1.765</td>
<td>3.529</td>
<td>120</td>
<td>2.353</td>
<td>4.706</td>
</tr>
</tbody>
</table>
### 3) HT-Controller CPU Analog-to-Digital Input Value (3/5)

<table>
<thead>
<tr>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
<td>2.373</td>
<td>4.745</td>
<td>151</td>
<td>2.961</td>
<td>5.922</td>
</tr>
<tr>
<td>122</td>
<td>2.392</td>
<td>4.784</td>
<td>152</td>
<td>2.98</td>
<td>5.961</td>
</tr>
<tr>
<td>123</td>
<td>2.412</td>
<td>4.824</td>
<td>153</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>124</td>
<td>2.431</td>
<td>4.863</td>
<td>154</td>
<td>3.02</td>
<td>6.039</td>
</tr>
<tr>
<td>125</td>
<td>2.451</td>
<td>4.902</td>
<td>155</td>
<td>3.039</td>
<td>6.078</td>
</tr>
<tr>
<td>126</td>
<td>2.471</td>
<td>4.941</td>
<td>156</td>
<td>3.059</td>
<td>6.118</td>
</tr>
<tr>
<td>127</td>
<td>2.49</td>
<td>4.98</td>
<td>157</td>
<td>3.078</td>
<td>6.157</td>
</tr>
<tr>
<td>128</td>
<td>2.51</td>
<td>5.02</td>
<td>158</td>
<td>3.098</td>
<td>6.196</td>
</tr>
<tr>
<td>129</td>
<td>2.529</td>
<td>5.059</td>
<td>159</td>
<td>3.118</td>
<td>6.235</td>
</tr>
<tr>
<td>130</td>
<td>2.549</td>
<td>5.098</td>
<td>160</td>
<td>3.137</td>
<td>6.275</td>
</tr>
<tr>
<td>131</td>
<td>2.569</td>
<td>5.137</td>
<td>161</td>
<td>3.157</td>
<td>6.314</td>
</tr>
<tr>
<td>132</td>
<td>2.588</td>
<td>5.176</td>
<td>162</td>
<td>3.176</td>
<td>6.353</td>
</tr>
<tr>
<td>133</td>
<td>2.608</td>
<td>5.216</td>
<td>163</td>
<td>3.196</td>
<td>6.392</td>
</tr>
<tr>
<td>134</td>
<td>2.627</td>
<td>5.255</td>
<td>164</td>
<td>3.216</td>
<td>6.431</td>
</tr>
<tr>
<td>135</td>
<td>2.647</td>
<td>5.294</td>
<td>165</td>
<td>3.235</td>
<td>6.471</td>
</tr>
<tr>
<td>136</td>
<td>2.667</td>
<td>5.333</td>
<td>166</td>
<td>3.255</td>
<td>6.515</td>
</tr>
<tr>
<td>137</td>
<td>2.686</td>
<td>5.373</td>
<td>167</td>
<td>3.275</td>
<td>6.549</td>
</tr>
<tr>
<td>138</td>
<td>2.706</td>
<td>5.412</td>
<td>168</td>
<td>3.294</td>
<td>6.588</td>
</tr>
<tr>
<td>139</td>
<td>2.725</td>
<td>5.451</td>
<td>169</td>
<td>3.314</td>
<td>6.627</td>
</tr>
<tr>
<td>140</td>
<td>2.745</td>
<td>5.49</td>
<td>170</td>
<td>3.333</td>
<td>6.667</td>
</tr>
<tr>
<td>141</td>
<td>2.765</td>
<td>5.529</td>
<td>171</td>
<td>3.353</td>
<td>6.706</td>
</tr>
<tr>
<td>142</td>
<td>2.784</td>
<td>5.569</td>
<td>172</td>
<td>3.373</td>
<td>6.745</td>
</tr>
<tr>
<td>143</td>
<td>2.804</td>
<td>5.608</td>
<td>173</td>
<td>3.392</td>
<td>6.784</td>
</tr>
<tr>
<td>144</td>
<td>2.824</td>
<td>5.647</td>
<td>174</td>
<td>3.412</td>
<td>6.824</td>
</tr>
<tr>
<td>145</td>
<td>2.843</td>
<td>5.686</td>
<td>175</td>
<td>3.431</td>
<td>6.863</td>
</tr>
<tr>
<td>146</td>
<td>2.863</td>
<td>5.725</td>
<td>176</td>
<td>3.451</td>
<td>6.902</td>
</tr>
<tr>
<td>147</td>
<td>2.882</td>
<td>5.765</td>
<td>177</td>
<td>3.471</td>
<td>6.941</td>
</tr>
<tr>
<td>148</td>
<td>2.902</td>
<td>5.804</td>
<td>178</td>
<td>3.49</td>
<td>6.98</td>
</tr>
<tr>
<td>149</td>
<td>2.922</td>
<td>5.843</td>
<td>179</td>
<td>3.51</td>
<td>7.02</td>
</tr>
<tr>
<td>150</td>
<td>2.941</td>
<td>5.882</td>
<td>180</td>
<td>3.529</td>
<td>7.059</td>
</tr>
</tbody>
</table>
4) **HT-Controller CPU Analog-to-Digital Input Value (4/5)**

<table>
<thead>
<tr>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>181</td>
<td>3.549</td>
<td>7.098</td>
<td>211</td>
<td>4.137</td>
<td>8.275</td>
</tr>
<tr>
<td>182</td>
<td>3.569</td>
<td>7.137</td>
<td>212</td>
<td>4.157</td>
<td>8.314</td>
</tr>
<tr>
<td>183</td>
<td>3.588</td>
<td>7.176</td>
<td>213</td>
<td>4.176</td>
<td>8.353</td>
</tr>
<tr>
<td>184</td>
<td>3.608</td>
<td>7.216</td>
<td>214</td>
<td>4.196</td>
<td>8.392</td>
</tr>
<tr>
<td>185</td>
<td>3.627</td>
<td>7.255</td>
<td>215</td>
<td>4.216</td>
<td>8.431</td>
</tr>
<tr>
<td>186</td>
<td>3.647</td>
<td>7.294</td>
<td>216</td>
<td>4.235</td>
<td>8.471</td>
</tr>
<tr>
<td>187</td>
<td>3.667</td>
<td>7.333</td>
<td>217</td>
<td>4.255</td>
<td>8.51</td>
</tr>
<tr>
<td>188</td>
<td>3.686</td>
<td>7.373</td>
<td>218</td>
<td>4.275</td>
<td>8.549</td>
</tr>
<tr>
<td>189</td>
<td>3.706</td>
<td>7.412</td>
<td>219</td>
<td>4.294</td>
<td>8.588</td>
</tr>
<tr>
<td>190</td>
<td>3.725</td>
<td>7.451</td>
<td>220</td>
<td>4.314</td>
<td>8.627</td>
</tr>
<tr>
<td>191</td>
<td>3.745</td>
<td>7.49</td>
<td>221</td>
<td>4.333</td>
<td>8.667</td>
</tr>
<tr>
<td>192</td>
<td>3.765</td>
<td>7.529</td>
<td>222</td>
<td>4.353</td>
<td>8.706</td>
</tr>
<tr>
<td>193</td>
<td>3.784</td>
<td>7.569</td>
<td>223</td>
<td>4.373</td>
<td>8.745</td>
</tr>
<tr>
<td>194</td>
<td>3.804</td>
<td>7.608</td>
<td>224</td>
<td>4.392</td>
<td>8.784</td>
</tr>
<tr>
<td>195</td>
<td>3.824</td>
<td>7.647</td>
<td>225</td>
<td>4.412</td>
<td>8.824</td>
</tr>
<tr>
<td>197</td>
<td>3.863</td>
<td>7.725</td>
<td>227</td>
<td>4.451</td>
<td>8.902</td>
</tr>
<tr>
<td>198</td>
<td>3.882</td>
<td>7.765</td>
<td>228</td>
<td>4.471</td>
<td>8.941</td>
</tr>
<tr>
<td>199</td>
<td>3.902</td>
<td>7.804</td>
<td>229</td>
<td>4.49</td>
<td>8.98</td>
</tr>
<tr>
<td>200</td>
<td>3.922</td>
<td>7.843</td>
<td>230</td>
<td>4.51</td>
<td>9.02</td>
</tr>
<tr>
<td>201</td>
<td>3.941</td>
<td>7.882</td>
<td>231</td>
<td>4.529</td>
<td>9.059</td>
</tr>
<tr>
<td>203</td>
<td>3.98</td>
<td>7.961</td>
<td>233</td>
<td>4.569</td>
<td>9.137</td>
</tr>
<tr>
<td>204</td>
<td>4</td>
<td>8</td>
<td>234</td>
<td>4.588</td>
<td>9.176</td>
</tr>
<tr>
<td>205</td>
<td>4.02</td>
<td>8.039</td>
<td>235</td>
<td>4.608</td>
<td>9.216</td>
</tr>
<tr>
<td>206</td>
<td>4.039</td>
<td>8.078</td>
<td>236</td>
<td>4.627</td>
<td>9.255</td>
</tr>
<tr>
<td>207</td>
<td>4.059</td>
<td>8.118</td>
<td>237</td>
<td>4.647</td>
<td>9.294</td>
</tr>
<tr>
<td>208</td>
<td>4.078</td>
<td>8.157</td>
<td>238</td>
<td>4.667</td>
<td>9.333</td>
</tr>
<tr>
<td>209</td>
<td>4.098</td>
<td>8.196</td>
<td>239</td>
<td>4.686</td>
<td>9.373</td>
</tr>
<tr>
<td>210</td>
<td>4.118</td>
<td>8.235</td>
<td>240</td>
<td>4.706</td>
<td>9.412</td>
</tr>
</tbody>
</table>
5) HT-Controller CPU Analog-to-Digital Input Value (5/5)

<table>
<thead>
<tr>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
<th>DEC</th>
<th>A/D Input</th>
<th>(A/D) X 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>242</td>
<td>4.745</td>
<td>9.49</td>
<td>250</td>
<td>4.902</td>
<td>9.804</td>
</tr>
<tr>
<td>244</td>
<td>4.784</td>
<td>9.569</td>
<td>252</td>
<td>4.941</td>
<td>9.882</td>
</tr>
<tr>
<td>246</td>
<td>4.824</td>
<td>9.647</td>
<td>254</td>
<td>4.98</td>
<td>9.961</td>
</tr>
<tr>
<td>247</td>
<td>4.843</td>
<td>9.686</td>
<td>255</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>248</td>
<td>4.863</td>
<td>9.725</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Schemetics

EVA-HF325/525 generator
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Board 1–4</td>
<td>3</td>
</tr>
<tr>
<td>CPU Board 2–4</td>
<td>4</td>
</tr>
<tr>
<td>CPU Board 3–4 Interface</td>
<td>5</td>
</tr>
<tr>
<td>CPU Board 4–4 LCD Display Control</td>
<td>6</td>
</tr>
<tr>
<td>MAIN</td>
<td>7</td>
</tr>
<tr>
<td>Wire Connection</td>
<td>8</td>
</tr>
<tr>
<td>HT Controller 1–4</td>
<td>9</td>
</tr>
<tr>
<td>HT Controller 2–4</td>
<td>10</td>
</tr>
<tr>
<td>HT Controller 3–4</td>
<td>11</td>
</tr>
<tr>
<td>HT Controller 4–4</td>
<td>12</td>
</tr>
<tr>
<td>Power Board</td>
<td>13</td>
</tr>
<tr>
<td>Filament Drive Board</td>
<td>14</td>
</tr>
<tr>
<td>I/F Board</td>
<td>15</td>
</tr>
<tr>
<td>IGBT Drive Board 1–2</td>
<td>16</td>
</tr>
<tr>
<td>IGBT Drive Board 2–2</td>
<td>17</td>
</tr>
<tr>
<td>Table Board</td>
<td>18</td>
</tr>
<tr>
<td>Hand Bar Board</td>
<td>19</td>
</tr>
</tbody>
</table>