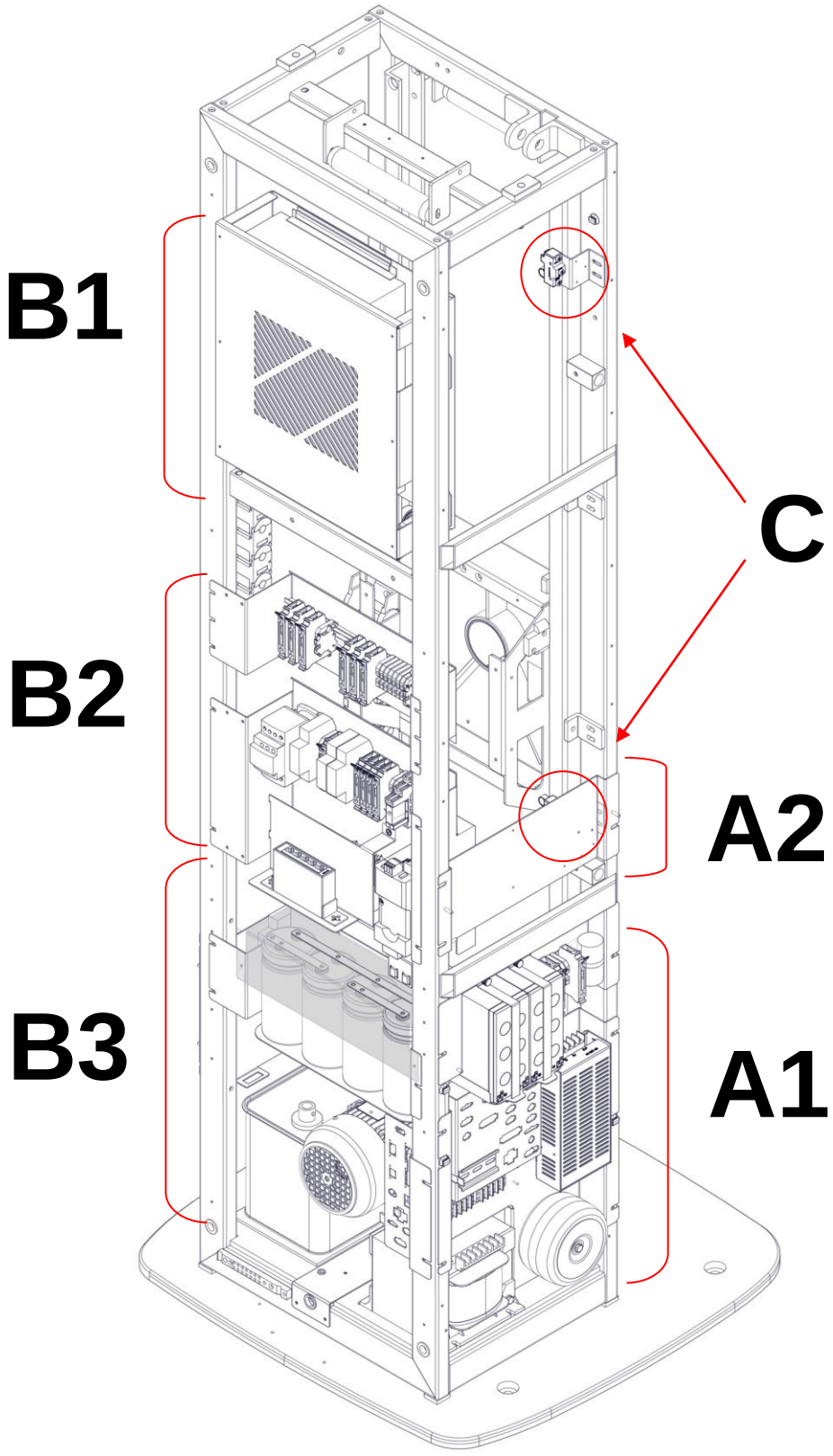
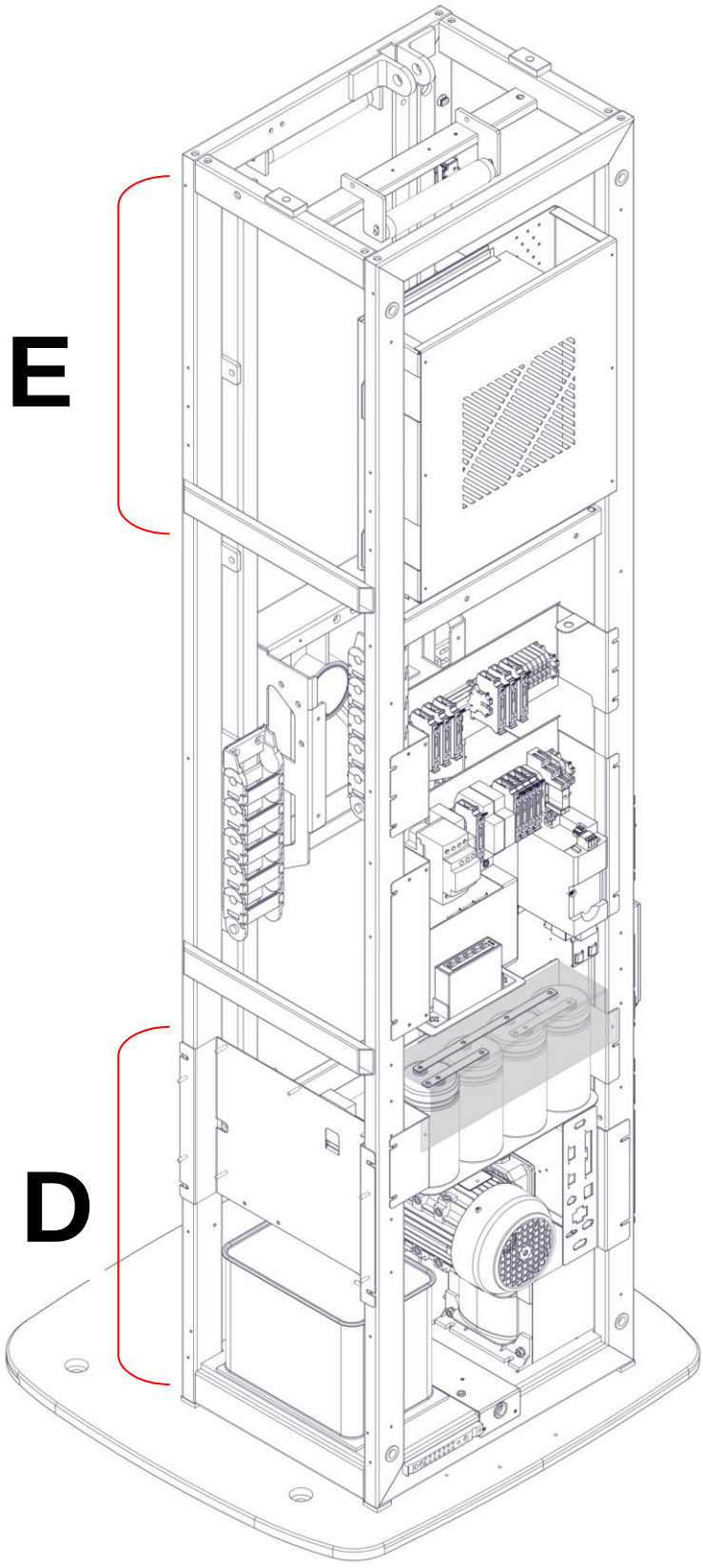
Chapter III:
INSTALLATION

1. INSIDE VIEW MAIN INTERNAL COMPONENTS LOCATION

1.1 INTERNAL MAIN COMPONENTS

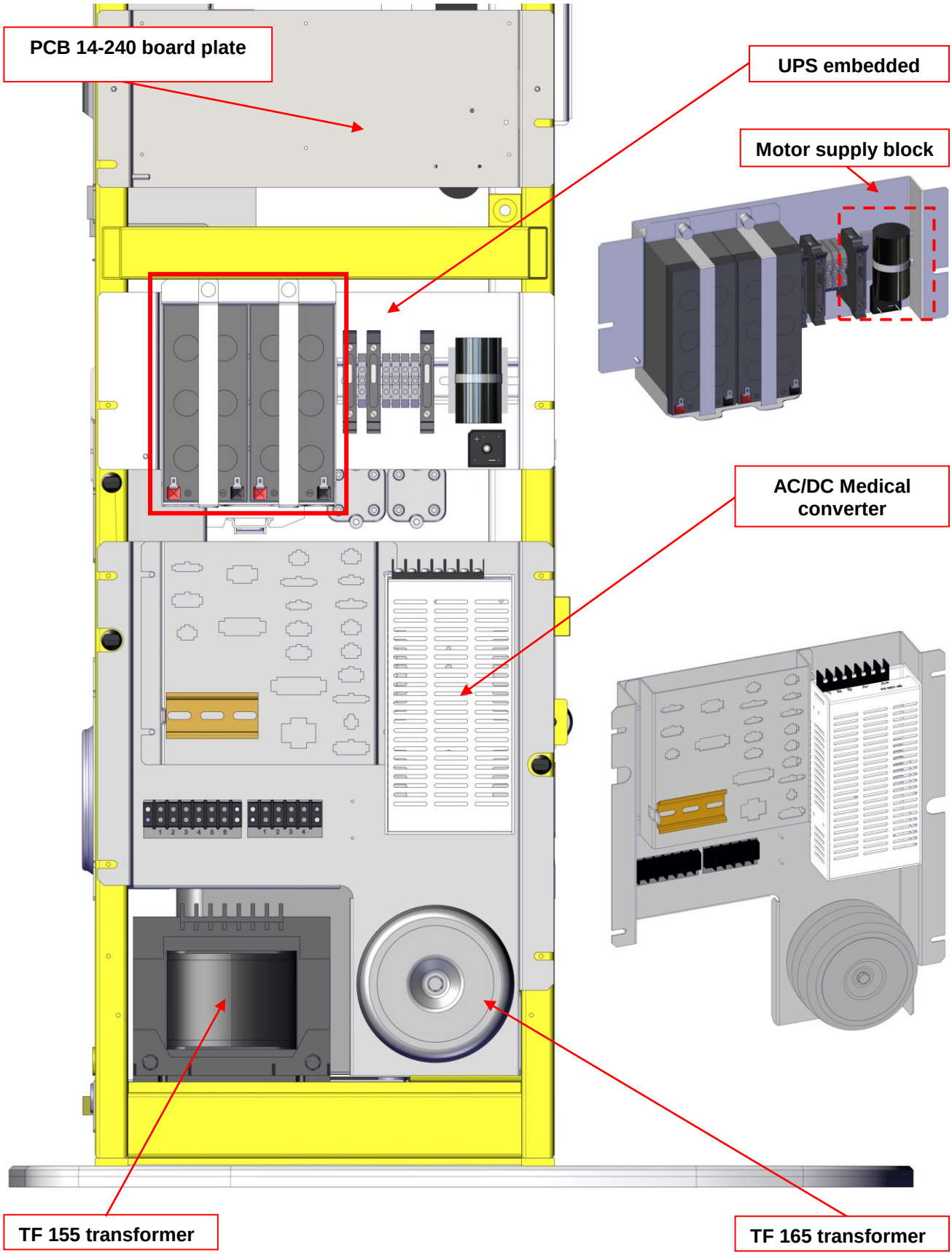


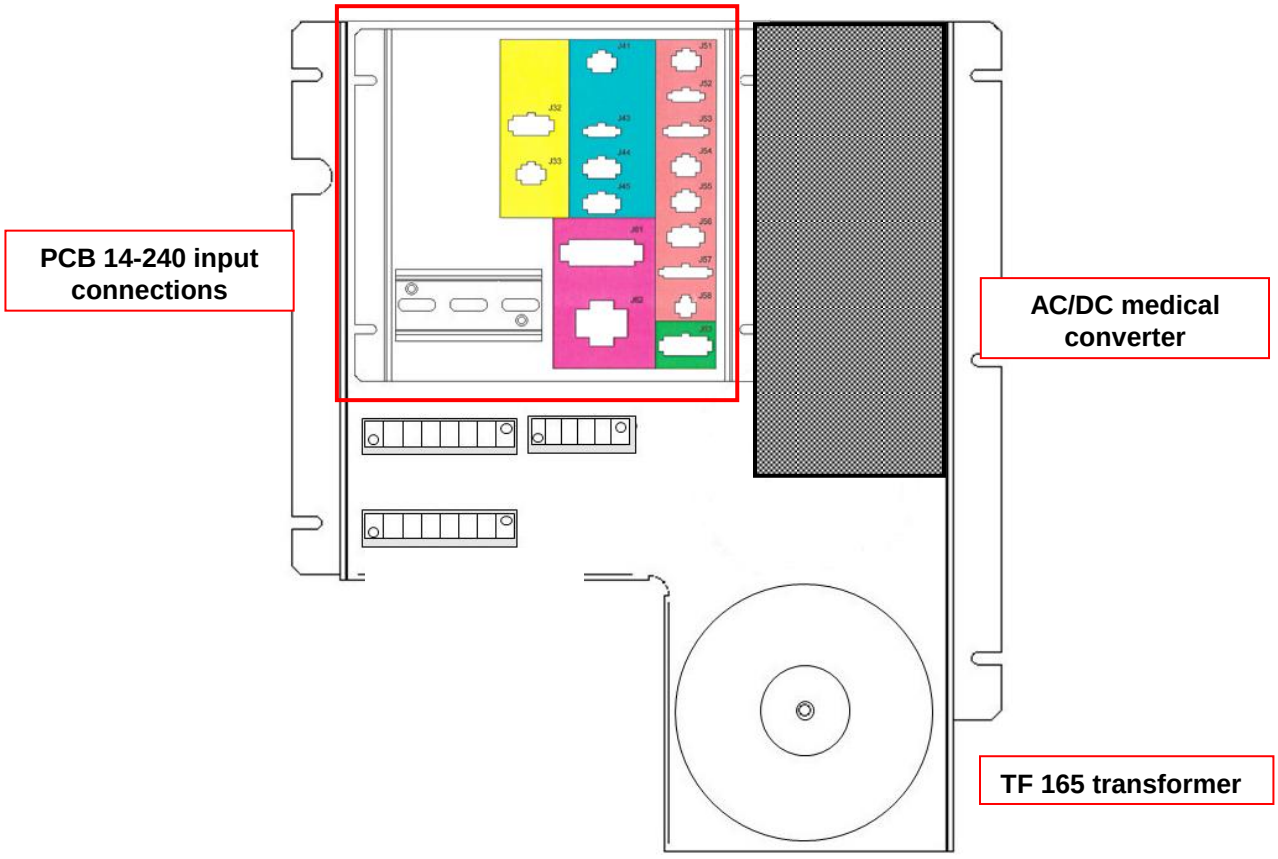
LEFT SIDE



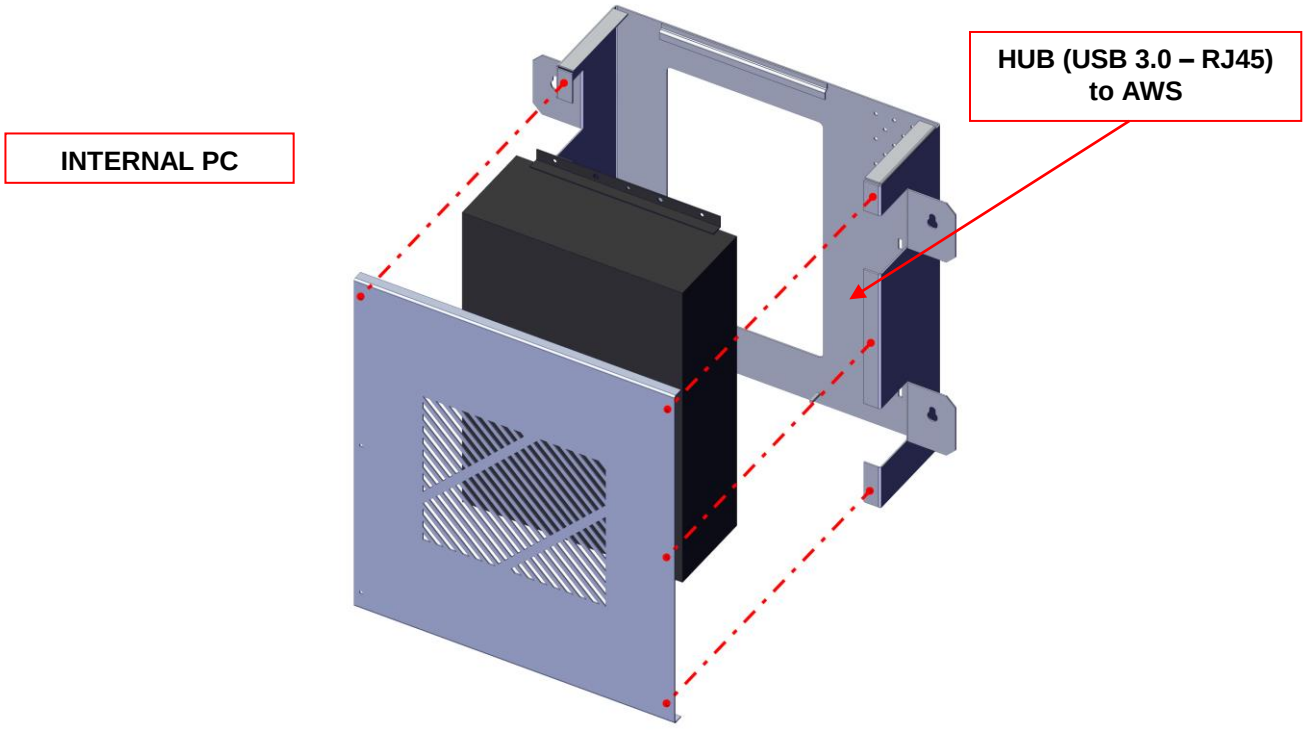
RIGHT SIDE

A1 – A2

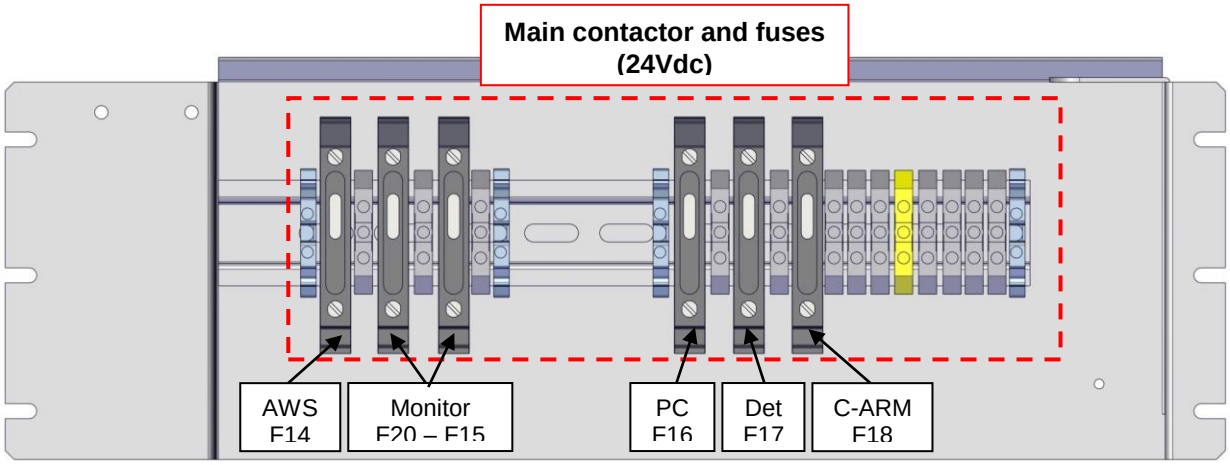

PCB 14-240 board plate
UPS embedded
Motor supply block
AC/DC Medical converter
TF 155 transformer
TF 165 transformer

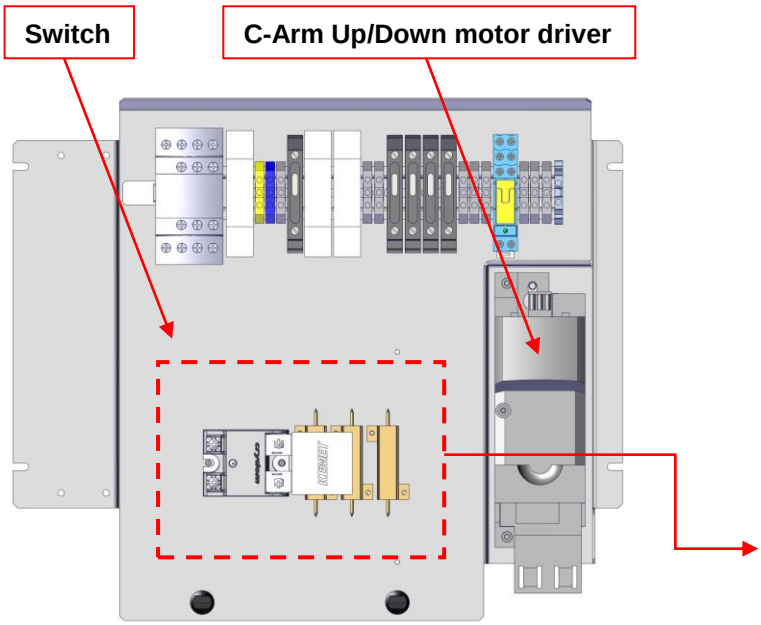

PCB 14-240 input connections
AC/DC medical converter
TF 165 transformer

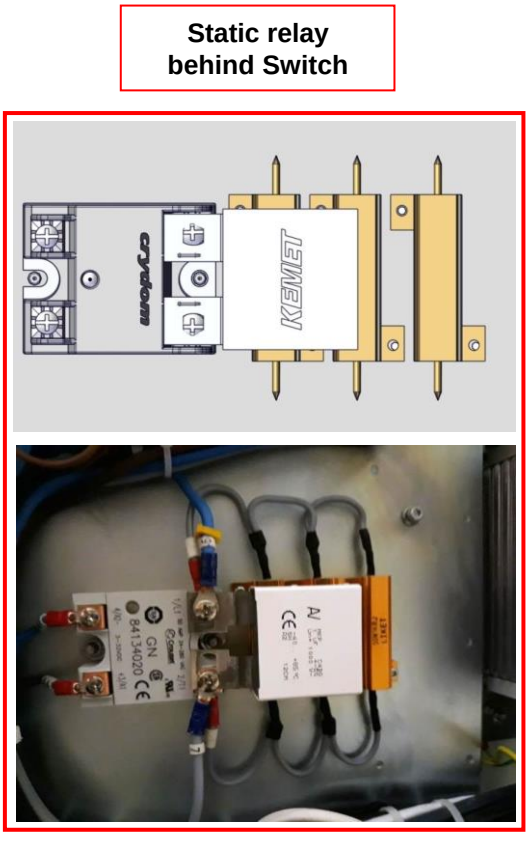
B1

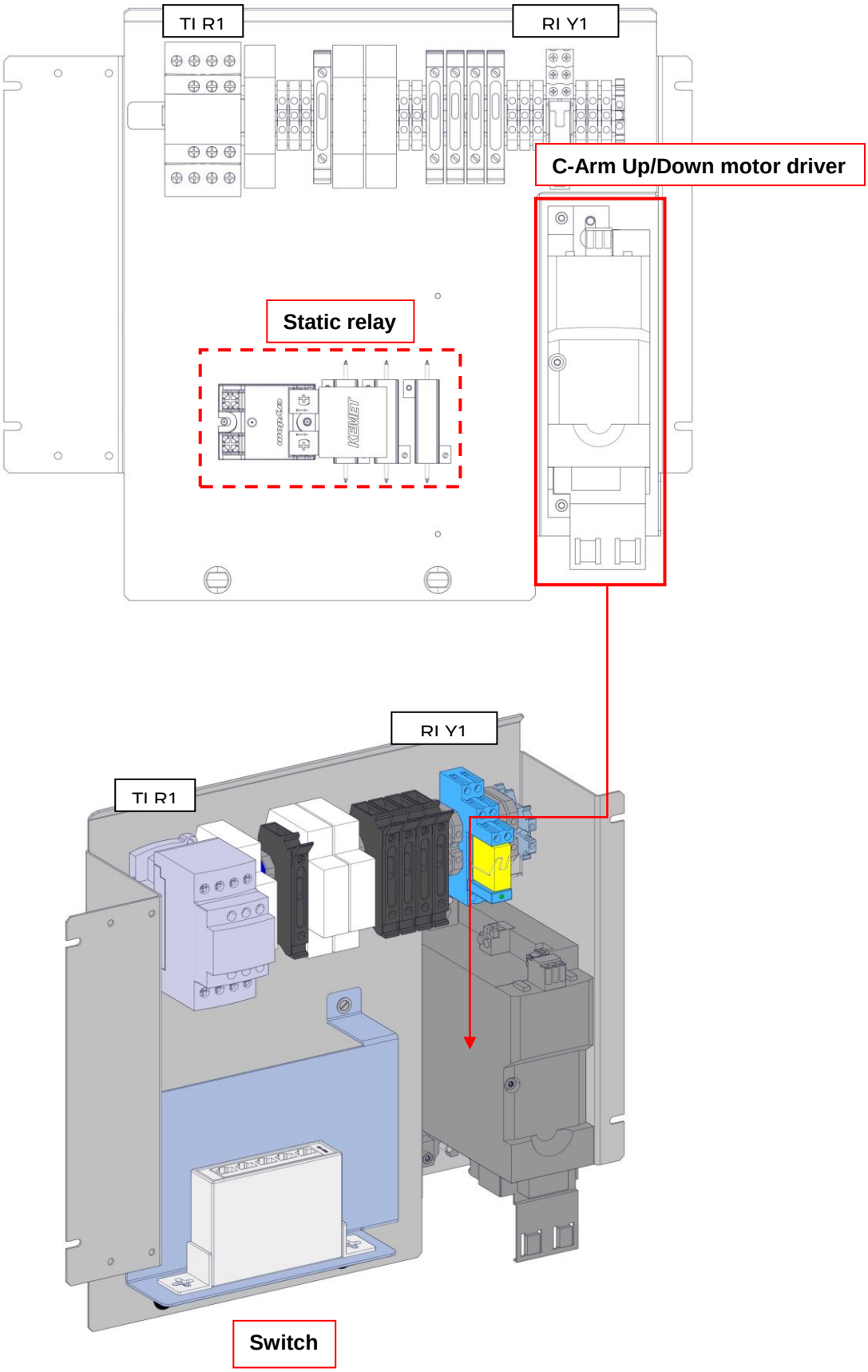

INTERNAL PC
HUB (USB 3.0 – RJ45) to AWS

B2

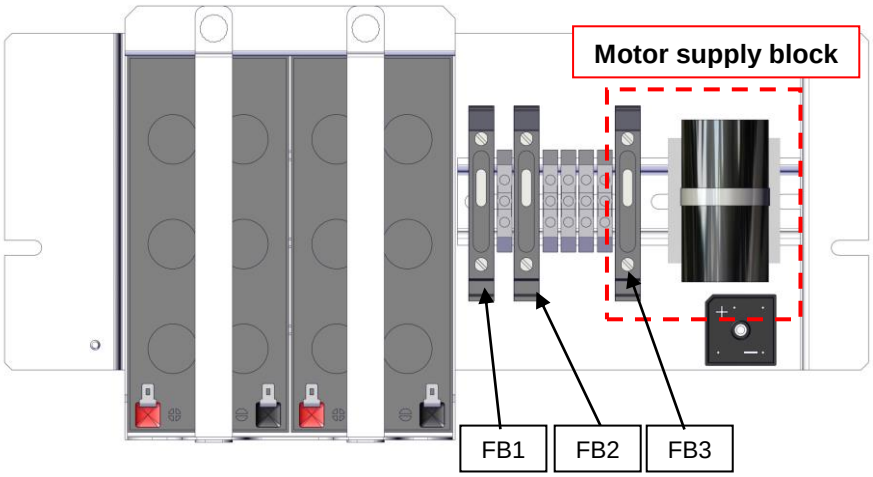

Main contactor and fuses
(24Vdc)
AWS
F14
Monitor
F20 – F15
PC
F16
Det
F17
C-ARM
F18


Switch
C-Arm Up/Down motor driver

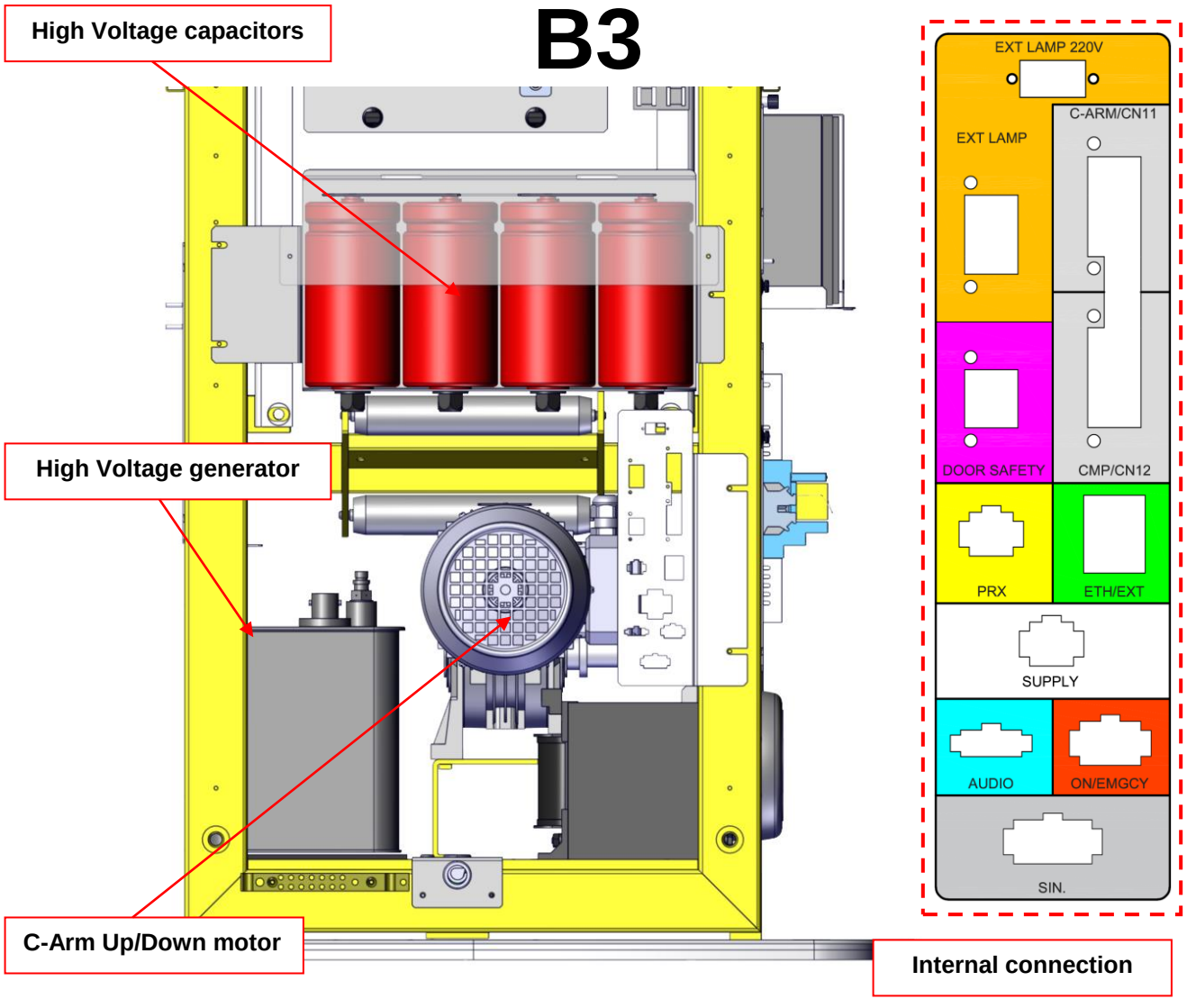

Static relay
behind Switch
crydom
KEMET


TI R1
RI Y1
C-Arm Up/Down motor driver
Static relay
RI Y1
TI R1
Switch

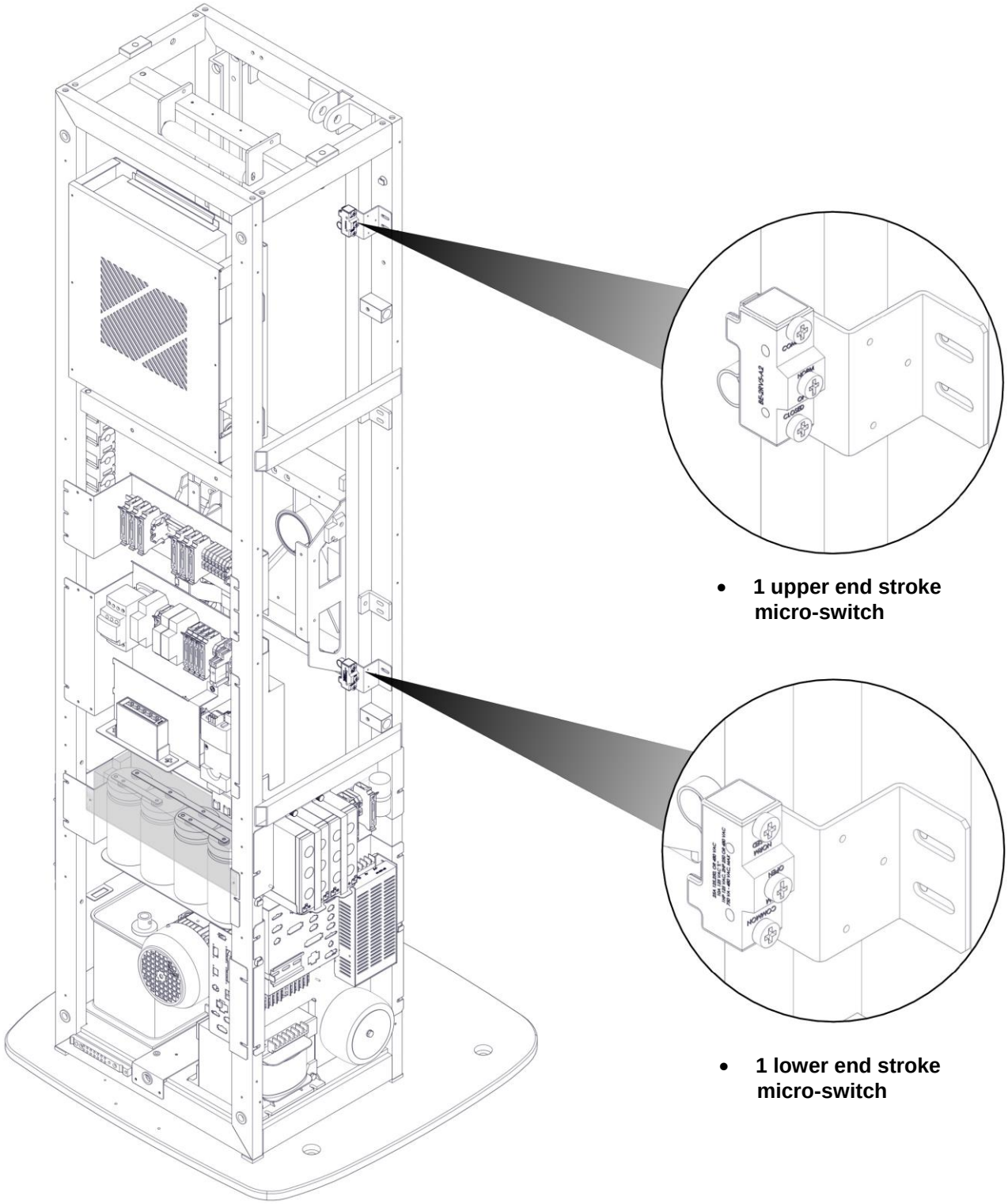
A1


Motor supply block
FB1
FB2
FB3

B3


High Voltage capacitors
High Voltage generator
C-Arm Up/Down motor
EXT LAMP 220V
EXT LAMP
C-ARM/CN11
DOOR SAFETY
CMP/CN12
PRX
ETH/EXT
SUPPLY
AUDIO
ON/EMGCY
SIN.
Internal connection

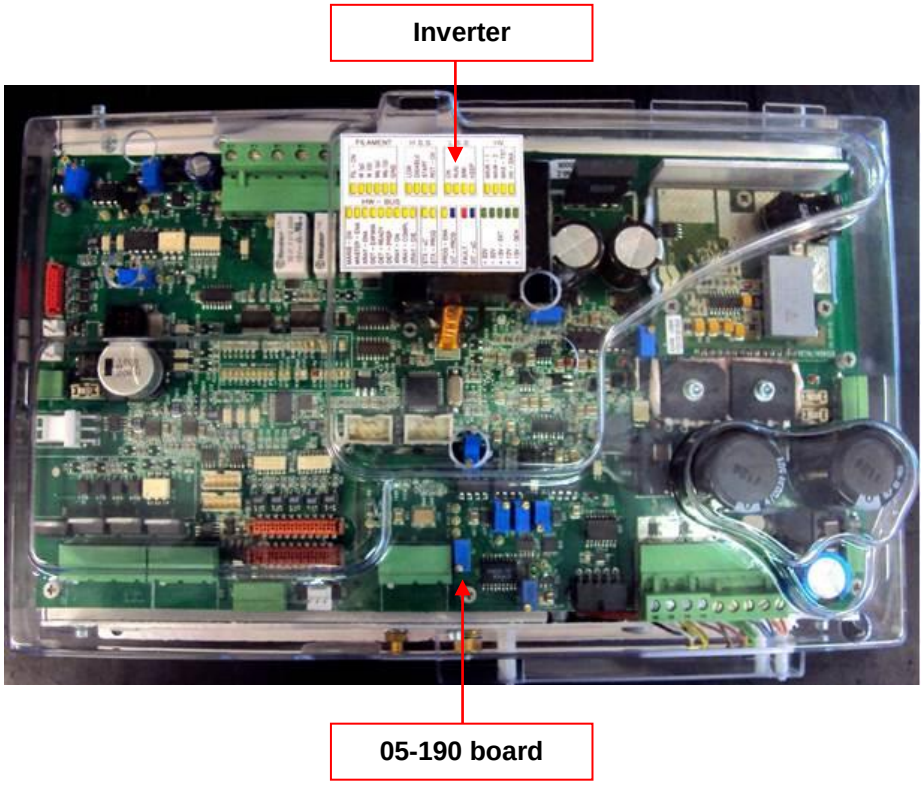
C

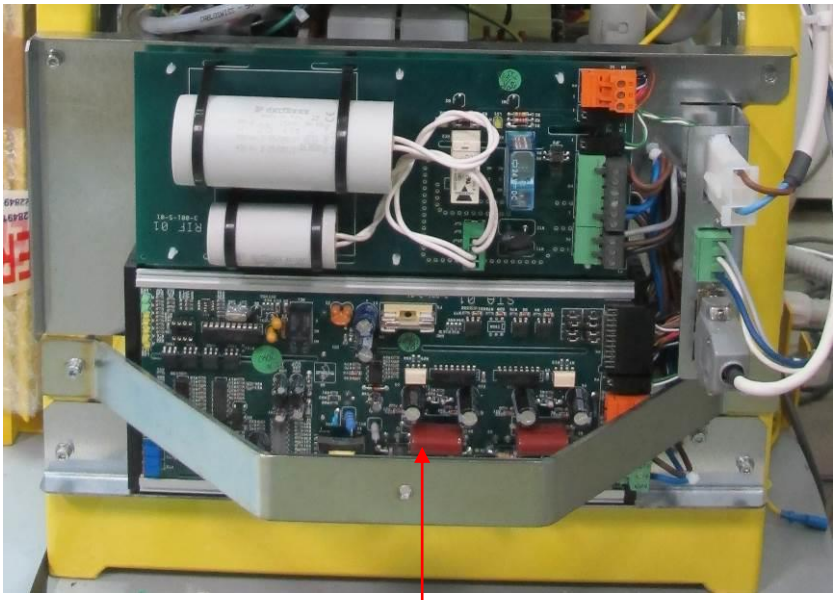


- **1 upper end stroke micro-switch**

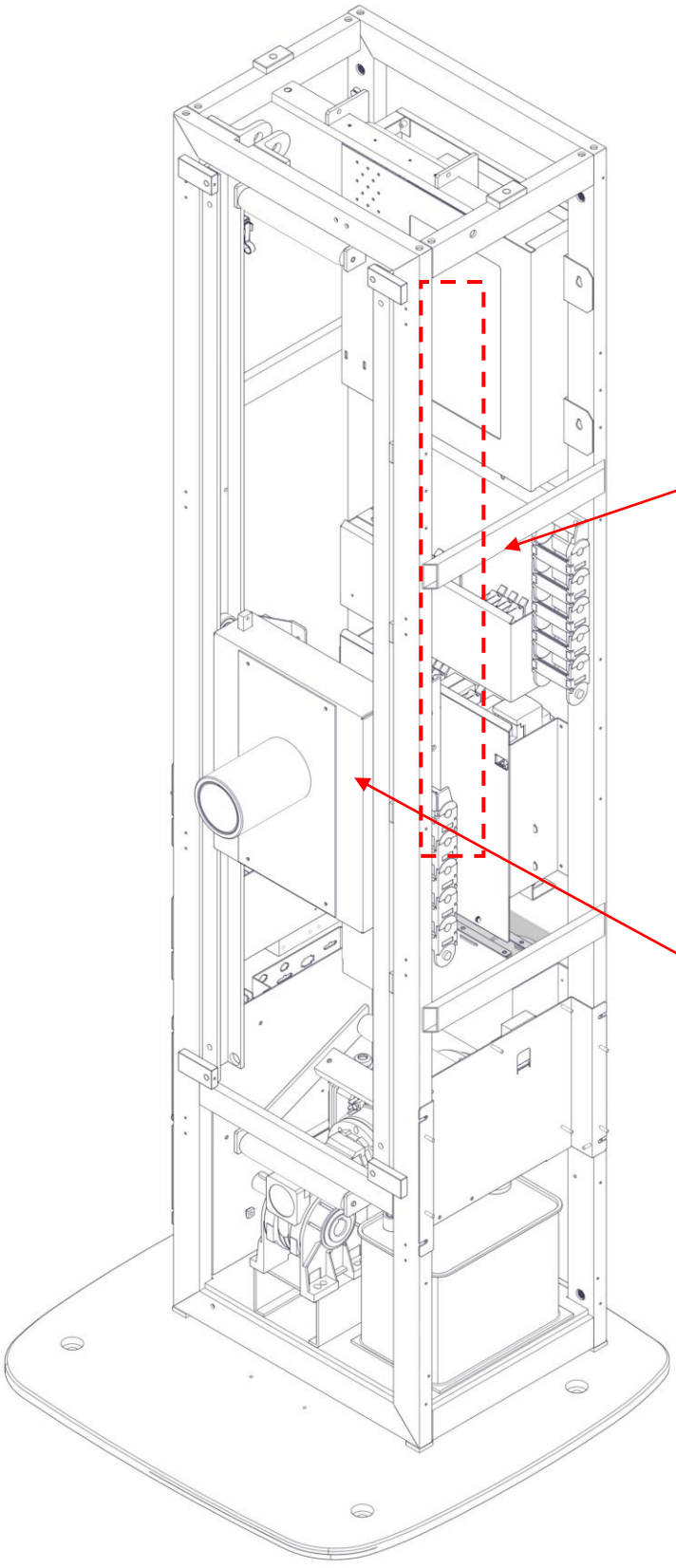
- **1 lower end stroke micro-switch**

D

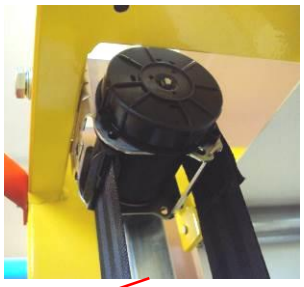




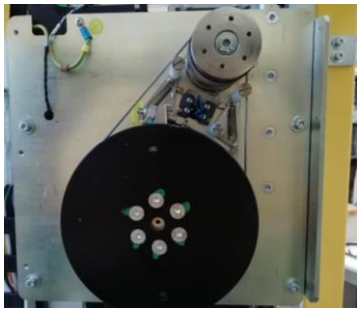
E



SAFETY BELT system

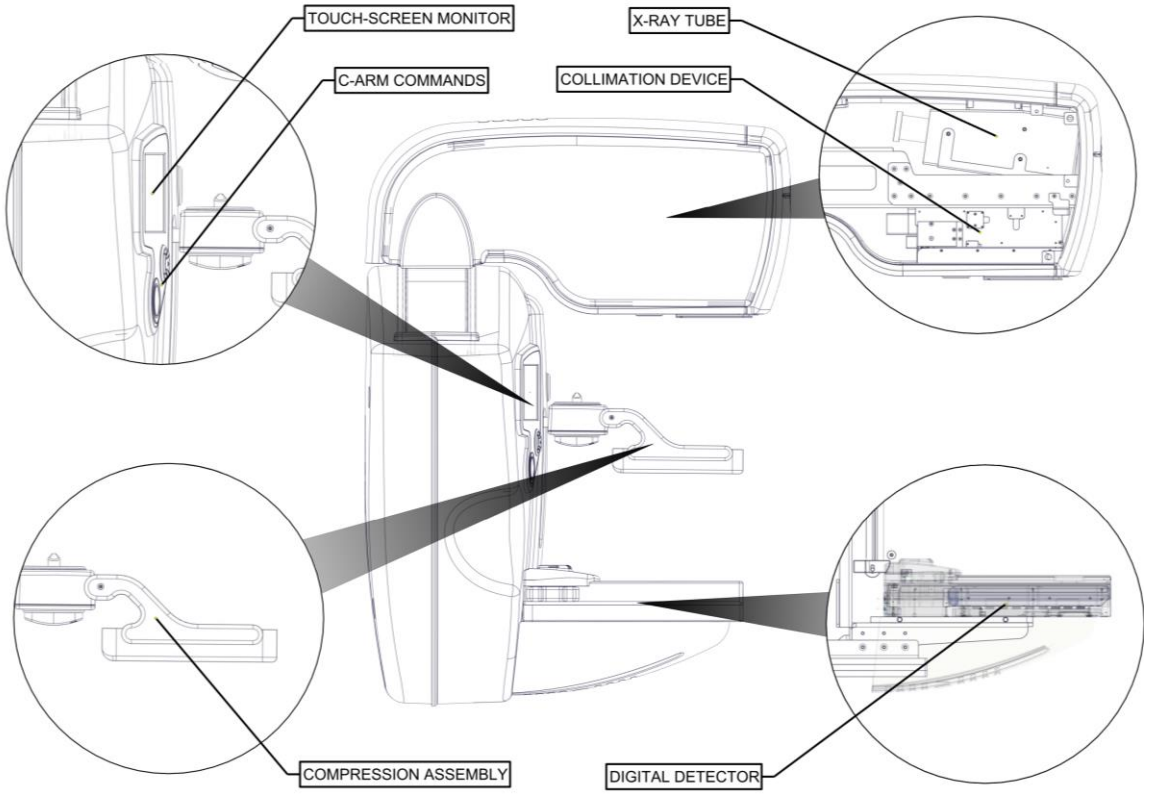


Motorized rotation

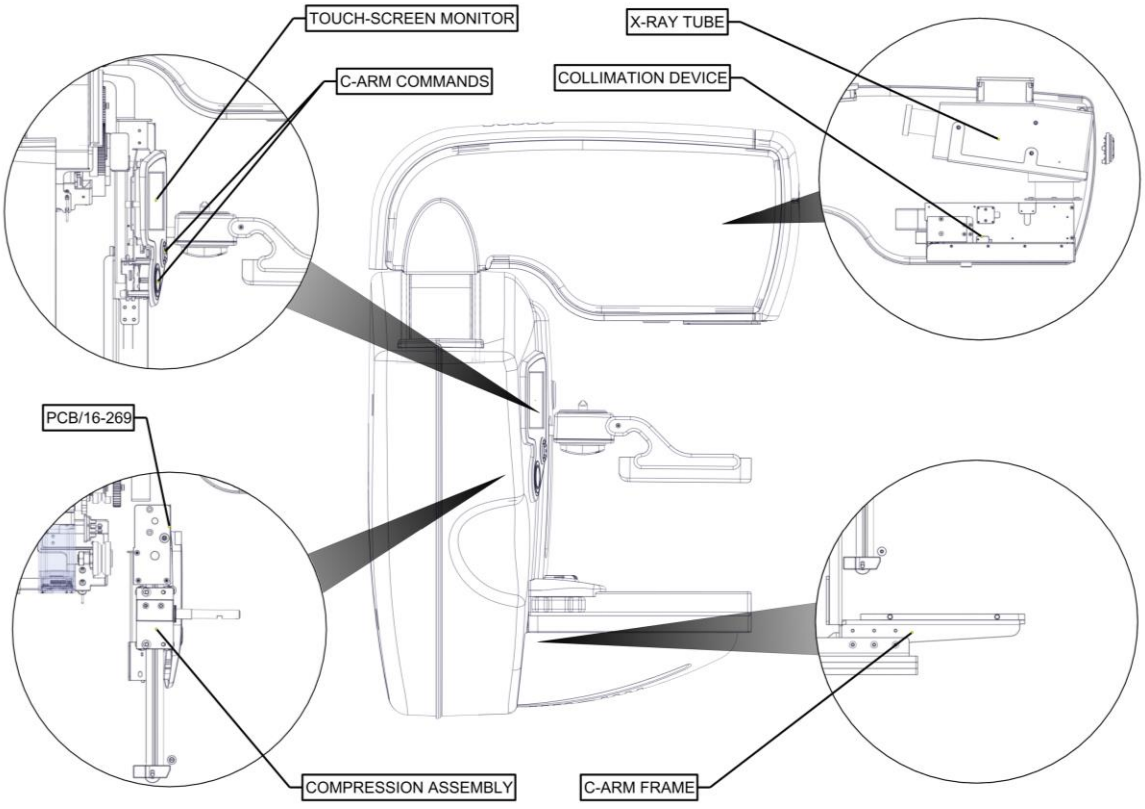


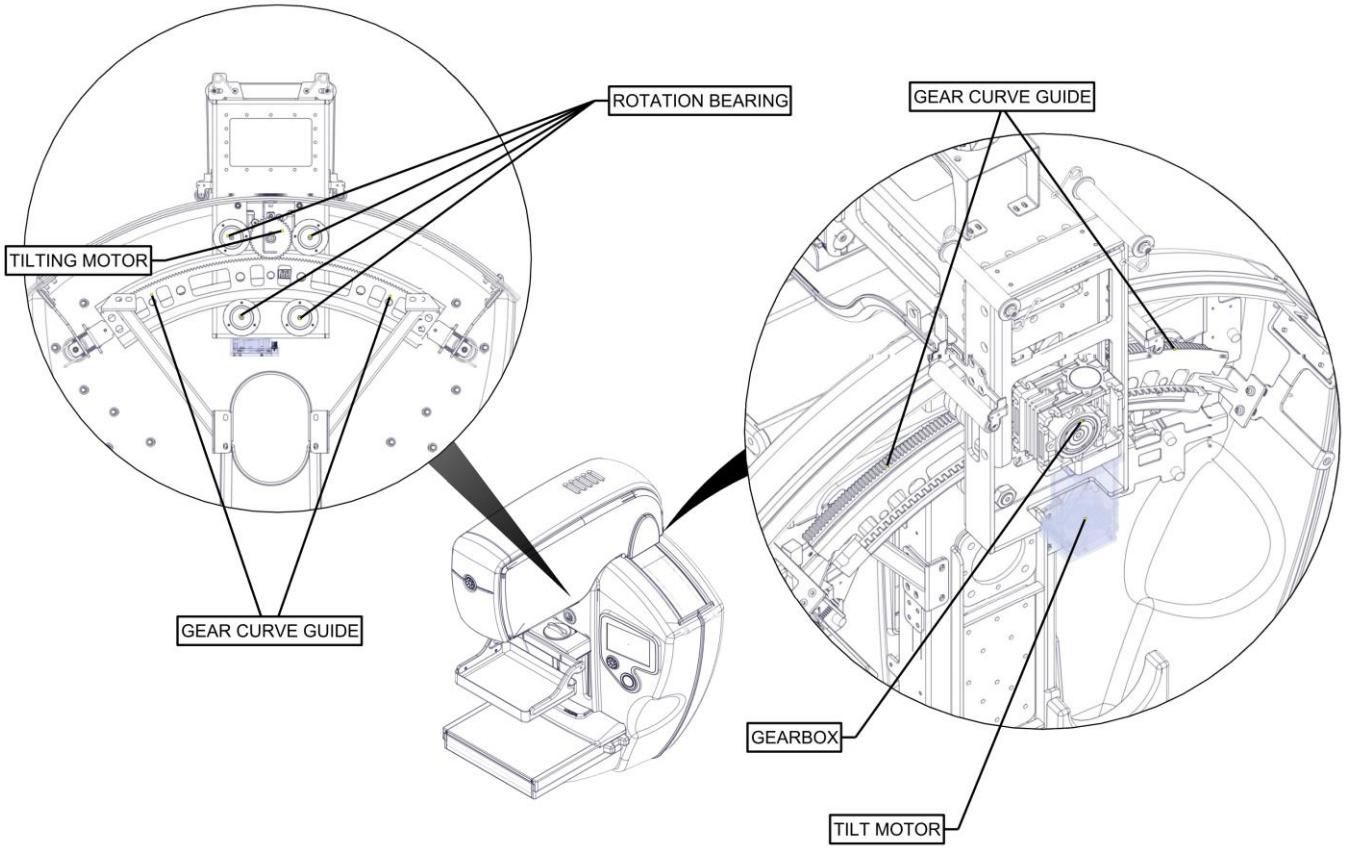
1.2 C-ARM COMPONENTS

EXTERNAL COMPONENTS

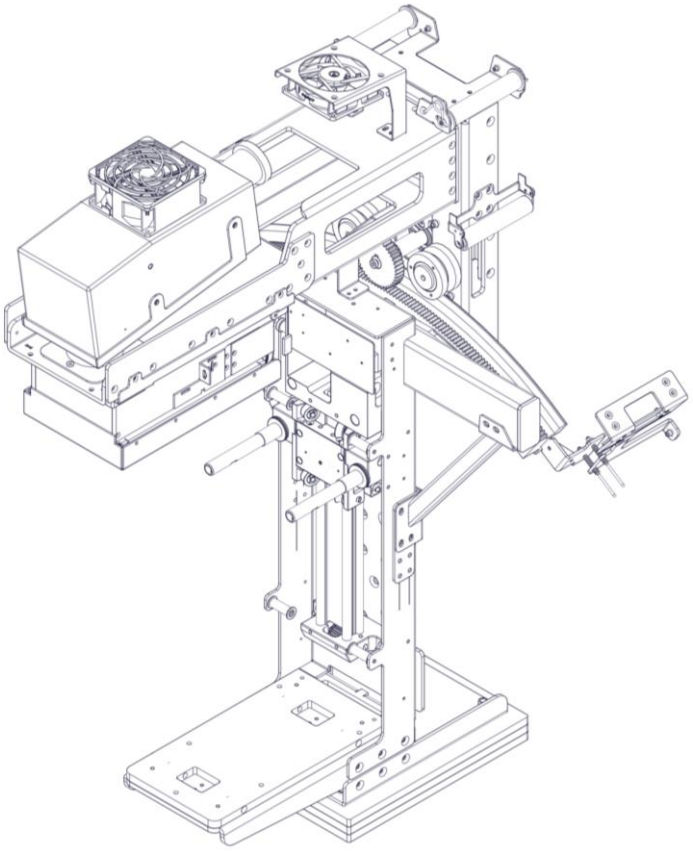


INTERNAL COMPONENTS

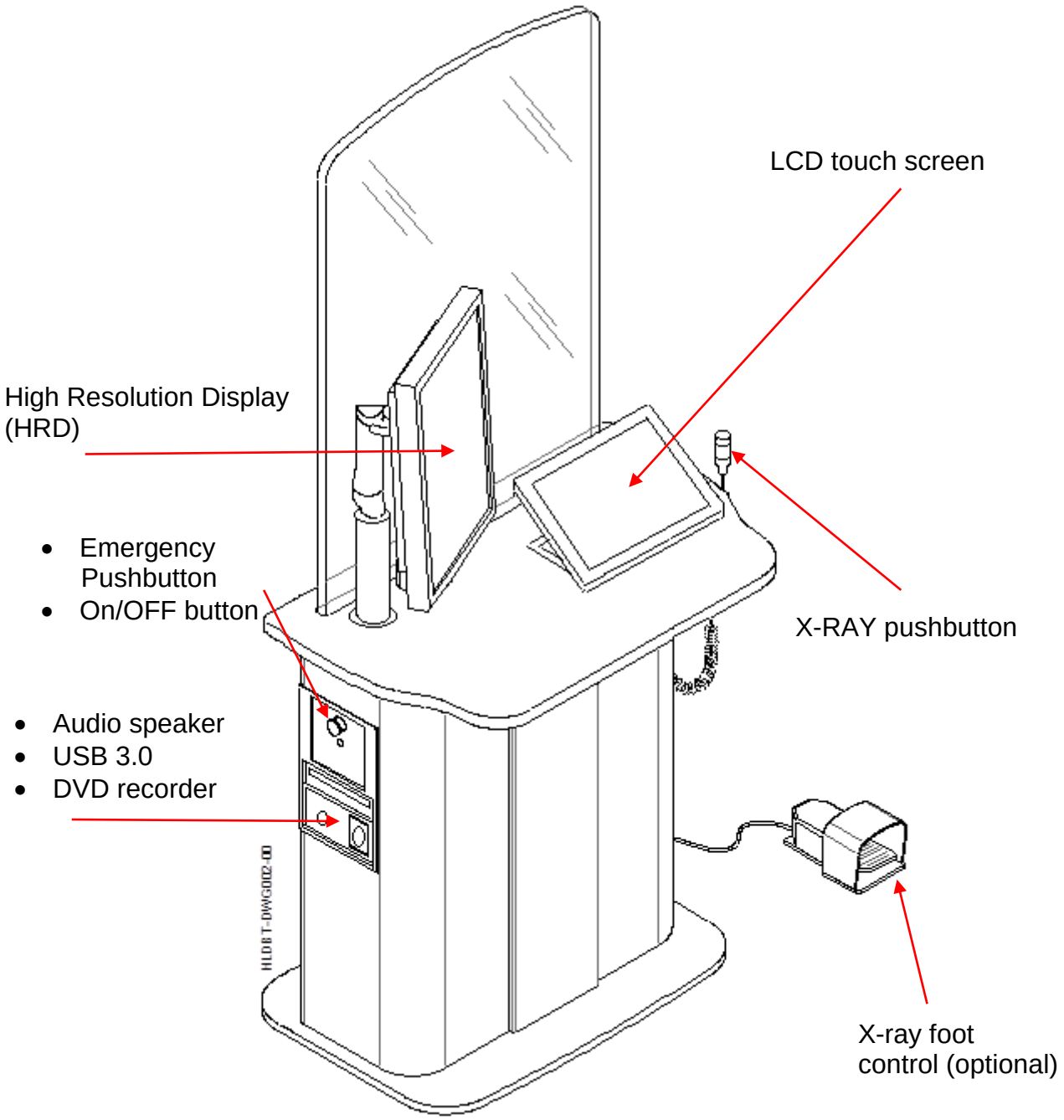



ROTATION BEARING
TILTING MOTOR
GEAR CURVE GUIDE
GEAR CURVE GUIDE
GEARBOX
TILT MOTOR

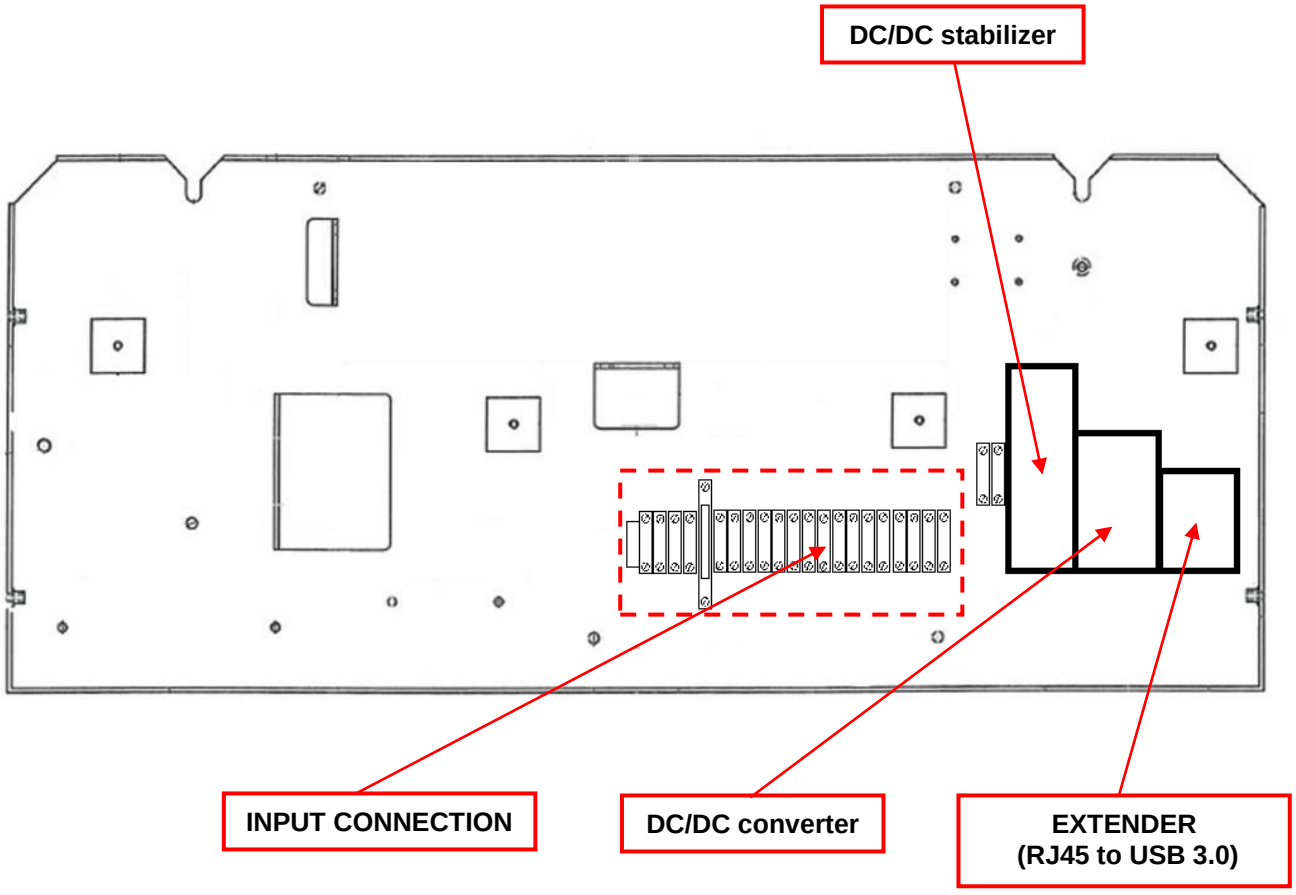
C-ARM FRAME



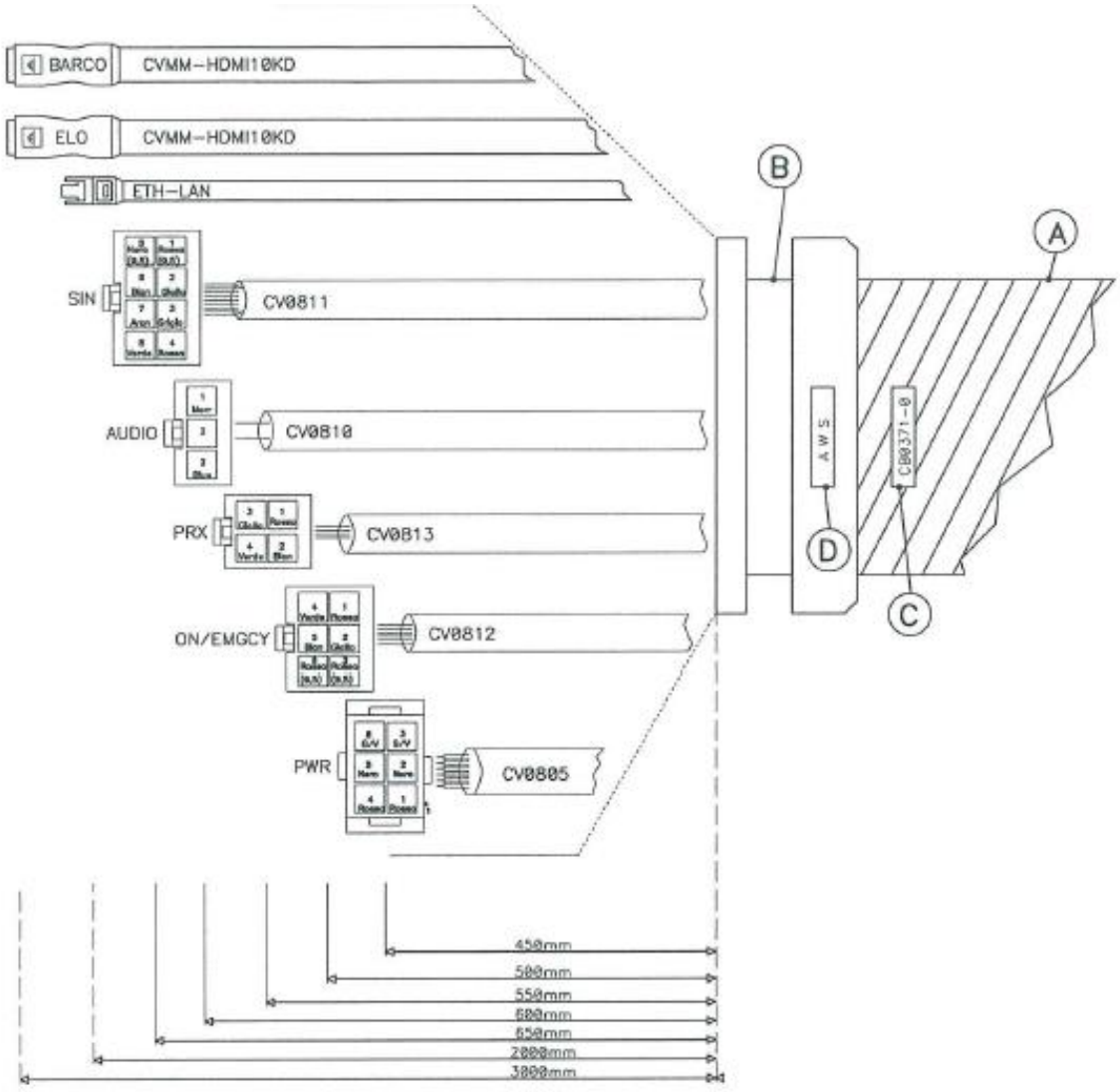
1.3 ACQUISITION WORK STATION COMPONENTS (Optional)



For Acquisition workstation assembly see paragraph n° 1.4 of Chapter 4 of Technical manual.


DC/DC stabilizer
INPUT CONNECTION
DC/DC converter
EXTENDER
(RJ45 to USB 3.0)

1.4 MAMMO UNIT/ACQUISITION WORKSTATION CONNECTION



Cable connections legend:

1. ETH-LAN cable (AWS extender);
2. CV0812 – Cable for EMERGENCY / ON-OFF pushbuttons and power on light;
3. CVMM-HDMI10KD – HDMI cable for HDR monitor;
4. CV0810 – Audio cable;
5. CVMM-HDMI10KD - HDMI cable for touchscreen monitor on AWS (if available);
6. CV0813 – cable for X-ray push button;
7. CV0805 – Cable 24 Vdc for AWS supply or “PWR” cable;
8. CV0811 – SIN Cable

2. MAMMO UNIT CONNECTIONS

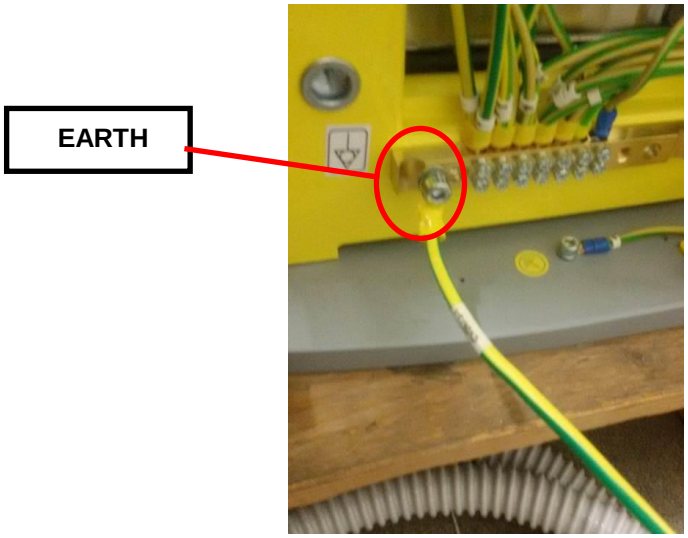
2.1 MAMMO UNIT CONNECTION TO WALL OUTLET

Mammo unit must be connected to wall outlet by means CV0400 cable that is provided with free terminal ends (wall outlet side) and it is connected to Mammo Unit by manufacturer. Cable must be connected to wall outlet by referring to national regulations (see also 3.5 Power line connection).

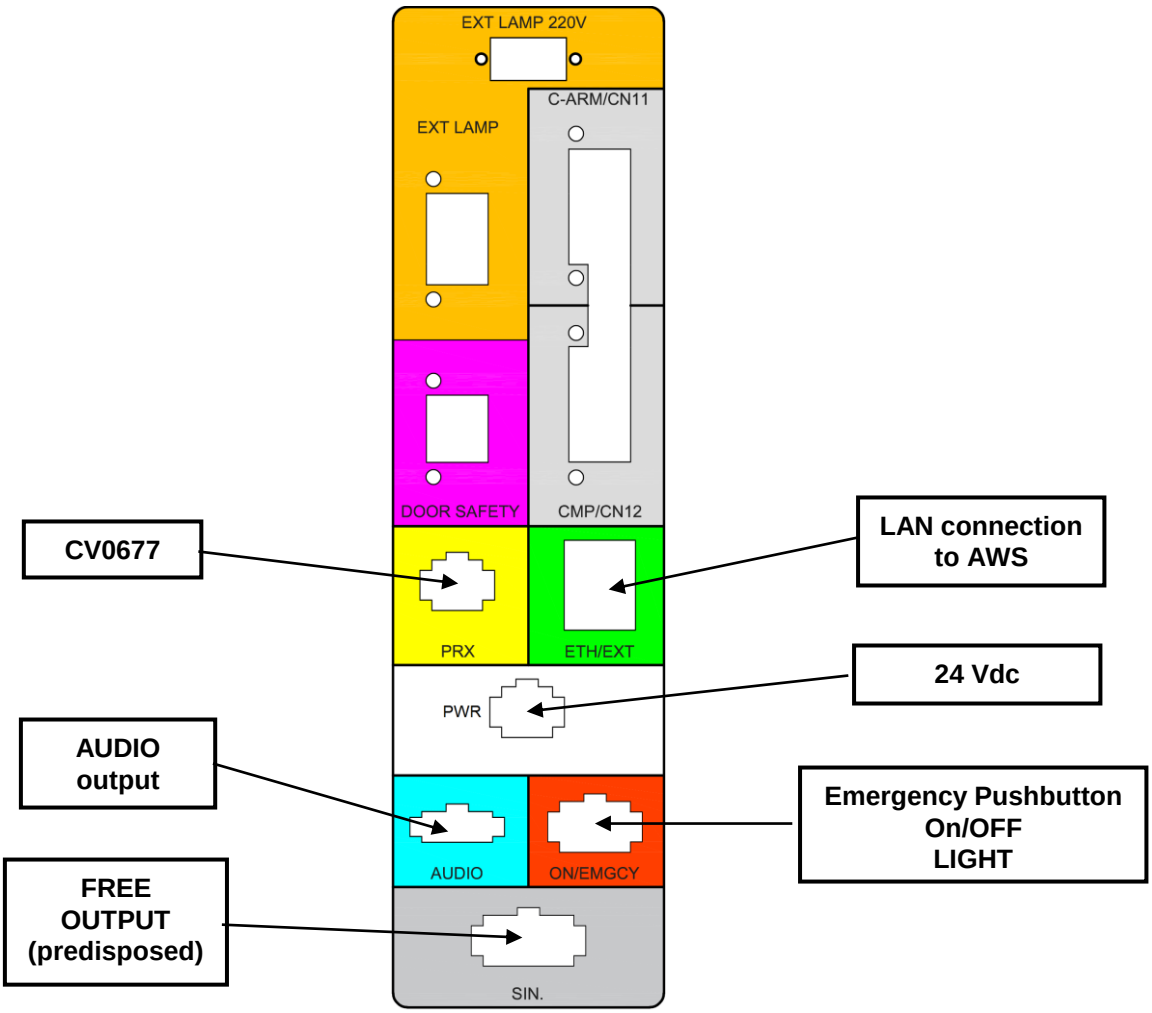
2.2 CABLE CONNECTIONS

1. Remove the rear cover and insert the end of the corrugated cable coming (coming from the AWS) in the lower bracket on the rear base: fasten it using the plastic nut provided

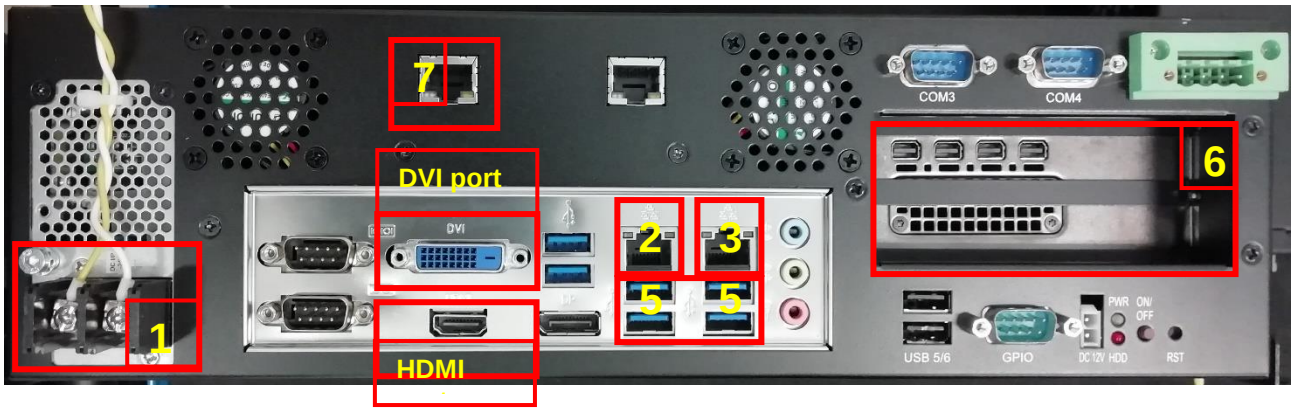
2. Connect the earth cable on the frame (equipotential bar) of the Mammo unit as shown below:



3. Connect other cables coming from corrugated cable as shown below:



2.3 CALCULATOR CONNECTIONS



Connections legend:

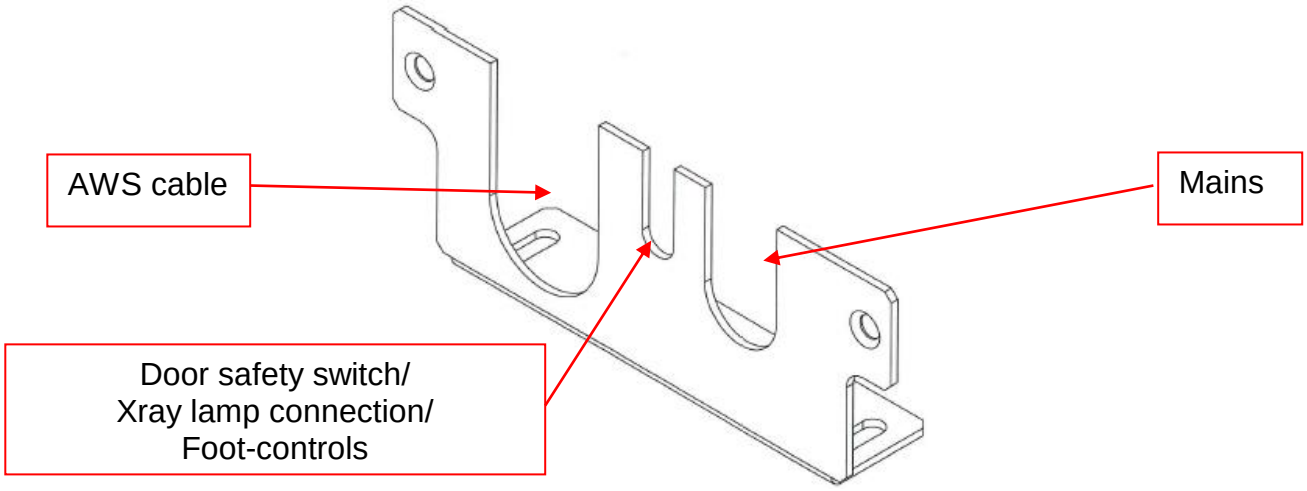
1. CV0819-XX (PRW connection);
2. DICOM connection (backside panel);
3. CV0499-x (detector interface DB9);
4. SPK Out;
5. 4 USB 3.0 ports (1 USB 3.0 on backside panel;1 USB for AWS extender);
6. Graphic card (Display outputs for AWS Touch screen display and HRD monitors):
    a. P1: Display output for AWS Touch screen display (if provided);
    b. P2: Display output for HRD monitor on AWS (If provided);
    c. P3: Display output for HRD monitor on Stand (if device is not provided with AWS);
7. CV0573-x (DB9 – RJ45) for data logger interface;

Technical details:

CMI202-991*	
CPU type	6th Generation Intel® Core™ i5 Pentium® DT Processors
RAM	8 GB SO-DIMM DDR4 or 16 GB (2 x 8 GB) SO-DIMM DDR4
Chipset	Intel® C236/Q170/H110 PCH, Package =23 mm x 23 mm, TDP=6W
Graphics	CoreTM DT processor integrated HD Gfx or Graphics card NVIDIA RTX A2000
Storage	1 or 2 x SATAIII port for 2.5'' (1 TB) or 1 SATAIII port for 2.5'' (2 TB) 1 x SATAIII port for 2.5'' (128 GB or 256 GB)
I/O Interface	
Rear panel I/O	1x 2-pin DC input for 24V (±10%) 1x 2-pin DC output for 12V (±10%) 1x Power on/off button 1x reset button 1x Power LED, 1x HDD LED 1x DB9 (for GPIO 4-in & 4-out) 3x RS232 for COM#2~4 (2-ports thru pin header) 1x RS232/422/485 for COM#1 6x USB 3.0 ,2x USB2.0 2x system fans 4x RJ45, 1x Audio port for Line-in/Line-out/Mic-in 1x SPK Out (6W output) thru ID107 (Optional) 1x DVI-D, 1x HDMI, 1x Display Port
Power supply	
Supply	Input Voltage: Direct 24V(±10%) DC, 18A
Dimension	
External dimension	345mm(W) x 240mm(D) x 100mm(H)

*Technical features are subject to different according to configuration of device

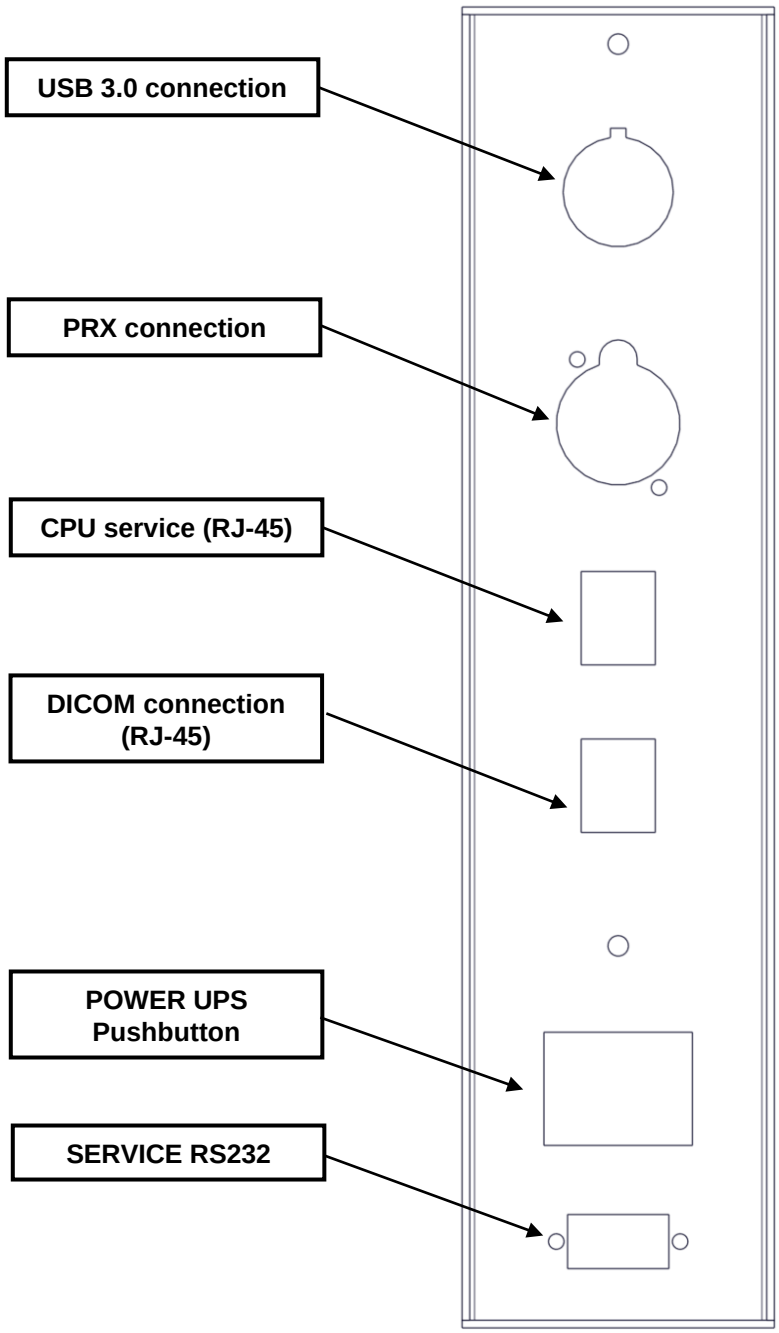
2.4 REAR CONNECTIONS



To connect Acquisition Work Station, foot controls, door safety switch and Mains cable please see the following procedures.

2.5 BACKSIDE EXTERNAL CONNECTIONS

On the back-bottom side of the mammography unit, there is a specific panel which allows following connections and functions:



3. INSTALLATION CHECK LIST FOR MAMMOGRAPHY UNIT

Fill this form and send it back to to validate warranty.

HELIANTHUS series Model _____S/n_____

INSTALLATION PLACE _____

INSTALLATION DATE _____

INSTALLATOR SIGNATURE _____

RESPONSIBLE PERSON _____

Measuring device Type _____ S /N _____ Date __ /__/____

3.1	External damage check	[ ]
3.2	Internal visual check	[ ]
3.3	Line voltage configuration Vac_____	[ ]
3.4	Power line connection	[ ]
3.5	Line resistance (< 0.50 Ω)*	Y [ ] N [ ] N/A [ ]
3.6	Protective measures	[ ]
3.7	H.V. generator vent valve opening	[ ]
3.8	Foot controls connection	[ ]
3.9	Door safety switch connection	[ ]
3.10	External lamp connection	[ ]

DATE_____SIGNATURE_____

* Please, attach electrical cabling certificate release by qualified electrician.
Manufacturer is not responsible for this value.

3.1 EXTERNAL DAMAGE CHECK

In presence of evident external damage (including covers, bases and Components), please contact the installation responsible as soon as such damage is found.
Any claims must be completed within 15 days of receiving the shipment.

3.2 INTERNAL VISUAL CHECK

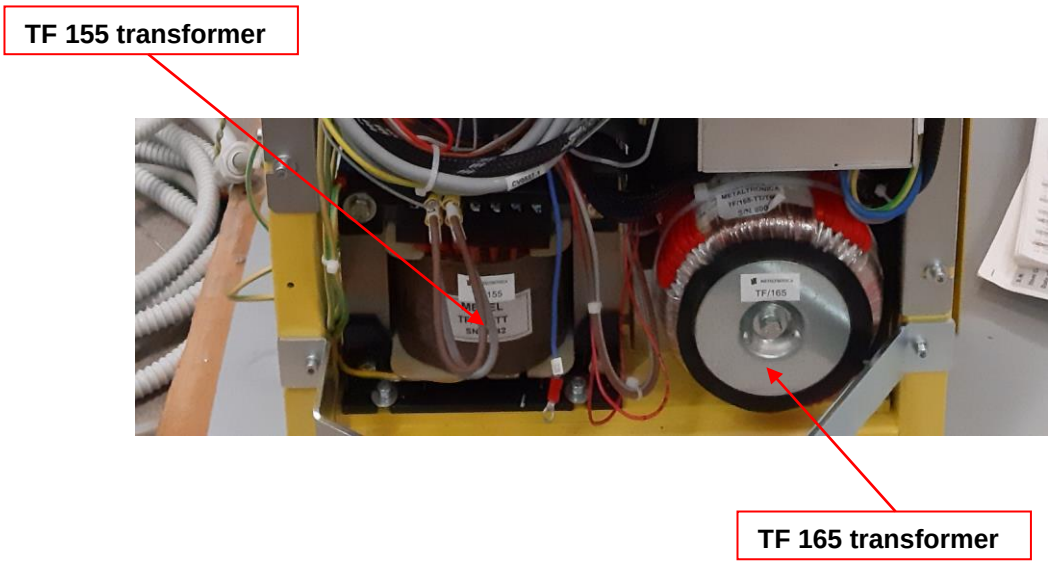
Internal visual check includes particularly:

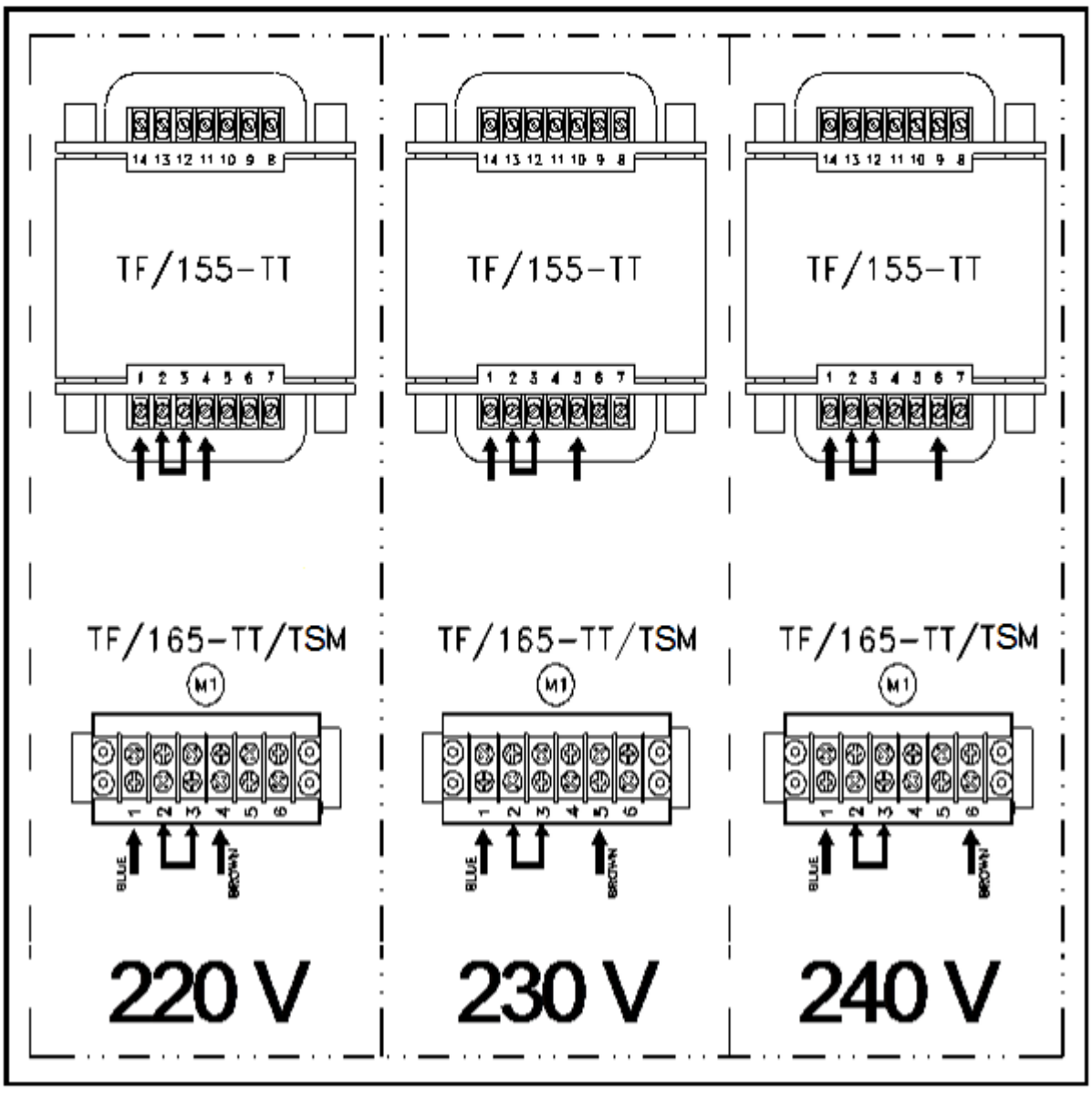
- connectors properly inserted,
- Wirings damage
- Mechanical parts damage

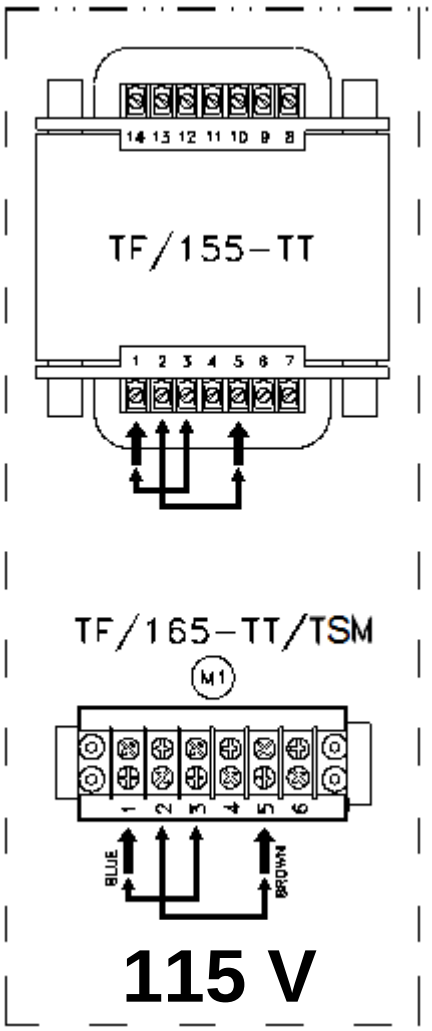
3.3 LINE VOLTAGE CONFIGURATION

Units are normally delivered for line voltage of 230 Vac or 115 Vac on request.
This is a Factory configuration that cannot be changed in the field because of unit labeling and specific components rating as Main Contactor solenoid and fuses.

In case of 220 and 240 Vac configurations, Voltage selection is necessary for TF/155-TT and TF/165-TT/TSM , both located into the mammographic unit as follows:




14 13 12 11 10 9 8
TF/155-TT
1 2 3 4 5 6 7
14 13 12 11 10 9 8
TF/155-TT
1 2 3 4 5 6 7
14 13 12 11 10 9 8
TF/155-TT
1 2 3 4 5 6 7
TF/165-TT/TSM
M1
1 2 3 4 5 6
BLUE
BROWN
220 V
TF/165-TT/TSM
M1
1 2 3 4 5 6
BLUE
BROWN
230 V
TF/165-TT/TSM
M1
1 2 3 4 5 6
BLUE
BROWN
240 V



Check line voltage and only if necessary reconfigure correctly the device according to the above wiring diagrams.

In case of 115 Vac configuration, follow scheme above, remove jumpers between pin n° 2-3 from TF/155-TT and M1 for TF/165-TT/TSM and connect cables shown in schematic voltage configuration.

Acquisition WorkStation (optional)

Acquisition workstation (AWS) is factory configured for 24 Vdc, no high voltage or hazardous voltage are present inside the AWS. Factory configuration cannot be changed in the field.

3.4 POWER LINE CONNECTION

The mammography unit is classified as permanently installed according to IEC 60601-1 international standard. This means that it must be electrically connected by means of permanent connections.

In conformity with the local Regulations and national laws. The switch board (to which the mammography unit is connected) has to be provided with a thermal magnetic circuit breaker able to interrupt both the power-carrying conductors with the exception of the protective earth ones.

In particular, for the maximum electrical safety, the protective earth conductor must be fixed and permanently installed. This is a prescription of Metaltronica S.p.A, and must be observed. Do not let the mains wirings unfixed. Do not use any plug.

CAUTION

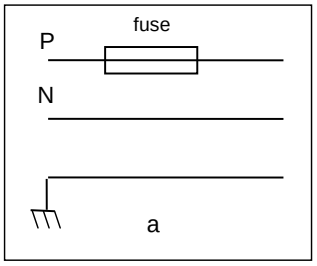
WARNING

To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

ESD

Handling the Equipment using ESD precautions

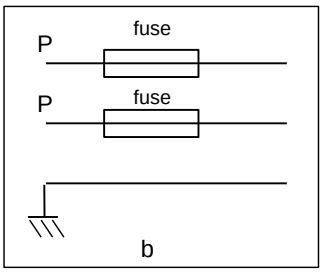
The unit is supplied with single phase Mains input with: **phase/neutral/protective earth.**

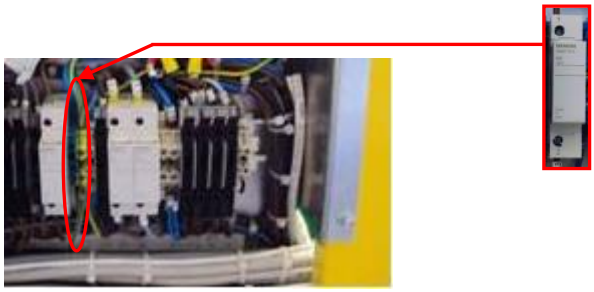


For single-phase mains with Phase / Neutral connection, make sure that the neutral conductor of the mains is connected to terminal N.

WARNING

If available Mains is: **phase/phase/protective earth** the blue terminal block for neutral conductor connection must be replaced with a same fuse holder and fuse rating of the preexisting one for phase conductor connection.





Protective earth connection must be checked by qualified electrician with appropriate instrument and procedure according to local applicable laws regulations.
A FFT kit is provided by manufacturer on request in order to guarantee the correct replacement. For detail on FNT and FFT distribution panel configurations please refer to chap.07 for drawings.

3.5 LINE RESISTANCE

To achieve full output, line resistance must not exceed the value of 0.50 Ω at 230 V. If the above value is exceeded, general malfunction can occur, refer to qualified electrician to improve line characteristics.

3.6 PROTECTIVE MEASURES

WARNING

It is very important that any intervention in the equipment will start with disconnecting it from the mains by means of wall mounted circuit breaker. Before removing or inserting any internal part, switch OFF the equipment and its **UPS** using the rear panel

WARNING

Read carefully the following list before touching any internal part.

If the system is only switched at the UPS SERVICE push button, line voltage is still present at the followings:

MAMMO UNIT

- Mains input terminal blocks,
- Fuse F1 (in case FFT configuration also F2 fuse),
- Main contactor TLR1,
- Emergency pushbuttons and related cables/connectors (J61, J62)
- Line filter

AWS

AWS is supplied only by 24 Vdc. There is no High voltage inside.

WARNING

After shut down of the system, there may still be dangerous voltage up to 550 Vdc on inverter power supply. Voltage decreases to zero by means of bleeder resistors (on PCB/12-228, see chap.08) in not less than 5 minutes due to capacitor size, energy stored is still dangerous if short to ground occurs when it's less than 60 Vdc and till when capacitors are not fully discharged:

- Rectifier bridges PD1, PD2
- Capacitors block C1, 2, 3, 4
- Inverter block and electrical connection to High Voltage generator

WARNING

High voltage (20-49 kV) is present (but not accessible) on:

- High Voltage generator
- High voltage cable
- X-ray Tube

Dangerous voltage points after system's shut down are highlighted by specific labels as reported in the following pictures as example

CAUTION

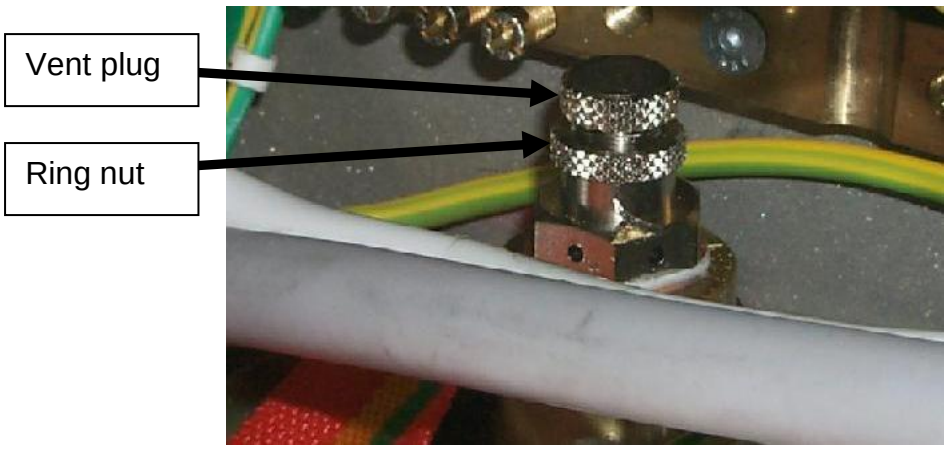
CAUTION

Printed Circuit Boards contain electrostatic highly sensitive components requiring particular care in their handling (ground before making contact and place only a conductive surface).

3.7 H.V. GENERATOR TANK VENT VALVE OPENING

Before unit operation, open H.V. generator tank vent valve for ventilation. This valve must be closed only during unit displacements to avoid oil leakage.

- Unscrew vent plug of about one or two turns, and secure it with ring nut. If the vent plug is hard to unscrew, it is already secured by the ring nut.
- you have first to unscrew ring nut, then unscrew vent plug and finally screw ring nut.



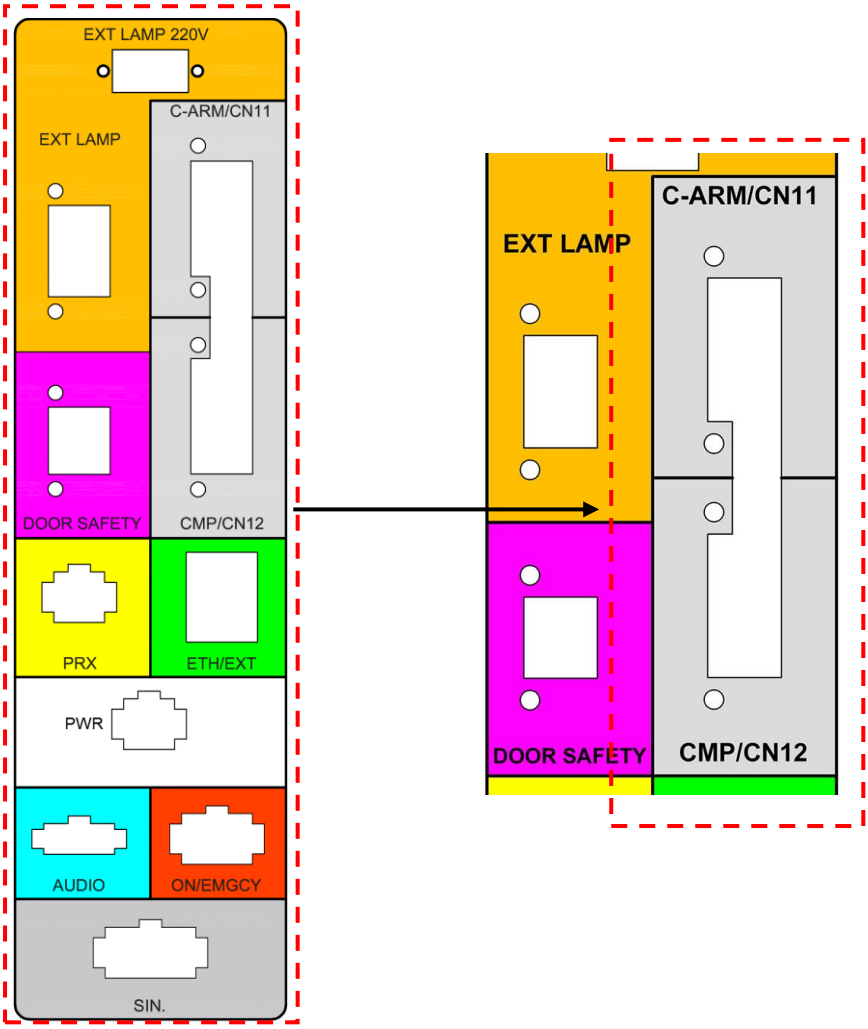
3.8 FOOT CONTROLS CONNECTION

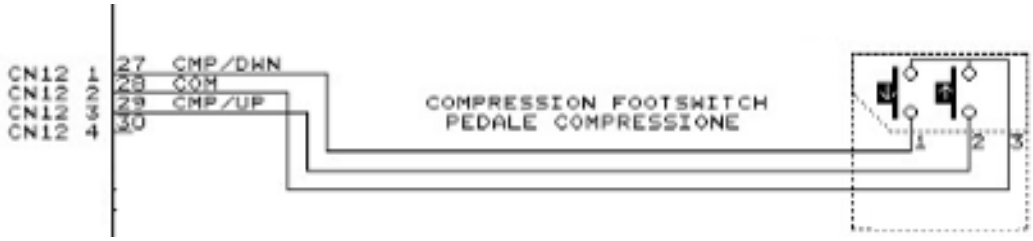
To connect the foot controls, use the connections in the picture. If you have two pairs of pedals, they can be connected in parallel mode (CN12).

The multi-functions pedals have five wires,

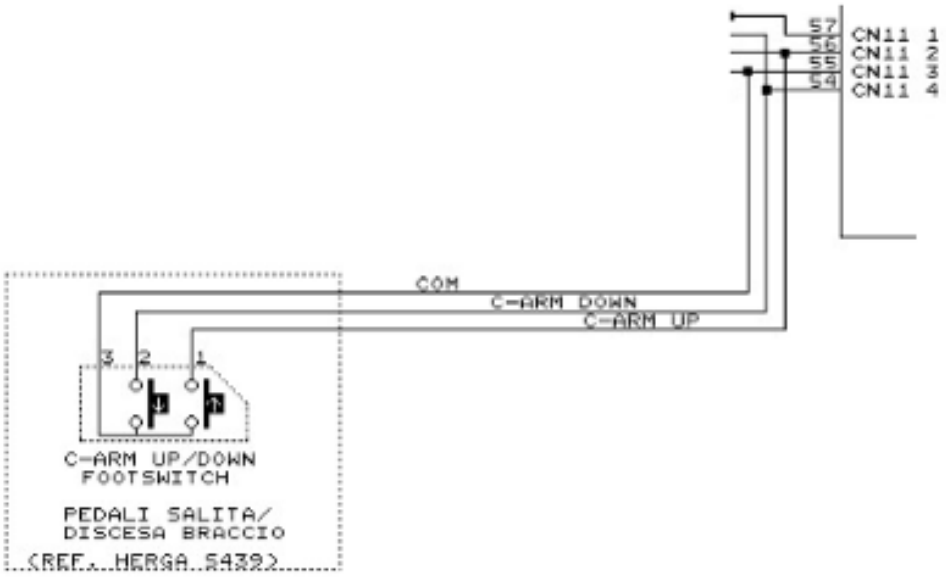
1. Compression UP to be connected to Pin 3 (CN12).
2. Compression DOWN to be connected to Pin 1 (CN12).
3. Common to be connected to Pin 3 of CN11
4. C-arm UP to be connected to Pin 2 of CN11
5. C-arm DOWN to be connected to Pin 4 of CN11

By means of an ohmmeter (voltmeter) you can check which of the wires of the pedals corresponds to different movements.





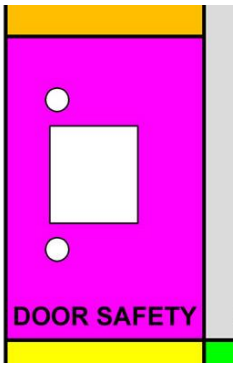
Connection to CN12



Connection to CN11

Verify that pushing the compression up foot pedal, the compressor moves up, and that pushing the compression down the light of the compression system switches on and the compressor moves down. The same for C-arm UP/DOWN.

3.9 DOOR SAFETY SWITCH CONNECTION



Input for Door Safety Switch is provided at specific connector.

According to the IEC 60601-2-45, any attempt to:

1. start exposure sequence while the door is open or otherwise
2. open the door when the exposure sequence is just started

will cause the following error message on the AWS TSD and MAMMO TSD:

OPEN DOOR OPEN! Unable to proceed with the XRAY sequence

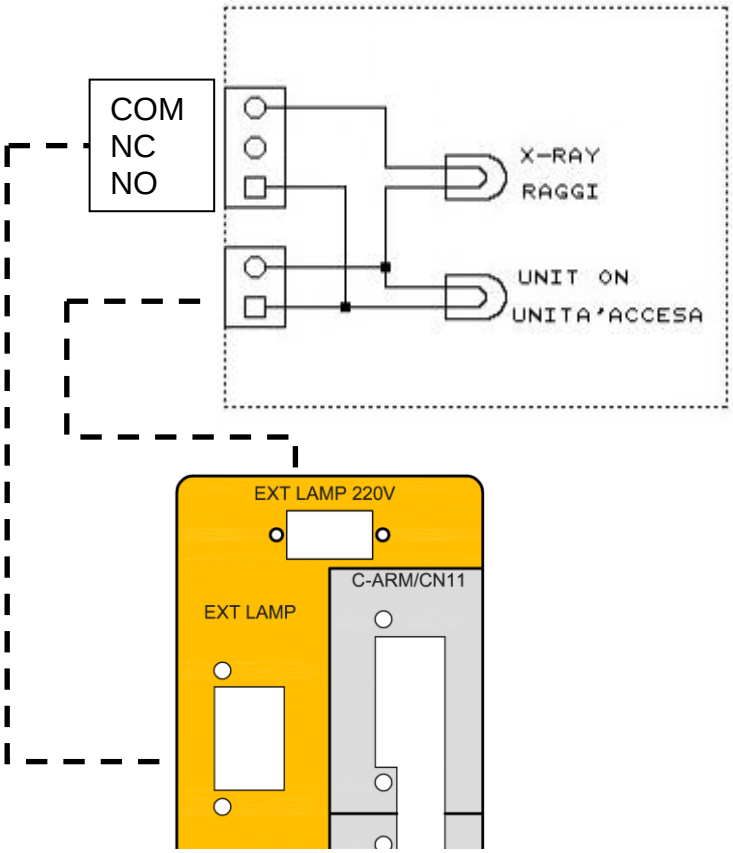
In particular:

1. in the first case, exposure will not start;
2. in the second case, the exposure will be interrupted.

NOTE Low voltage, low current contactors are recommended.

3.10 EXTERNAL LAMP CONNECTION

On mammography unit are available two connectors for external indicator lamps (CV0839 and CV0654).



NOTE

Circuit is protected by fuse F5, DO NOT USE LAMPS EXCEEDING 25 W.