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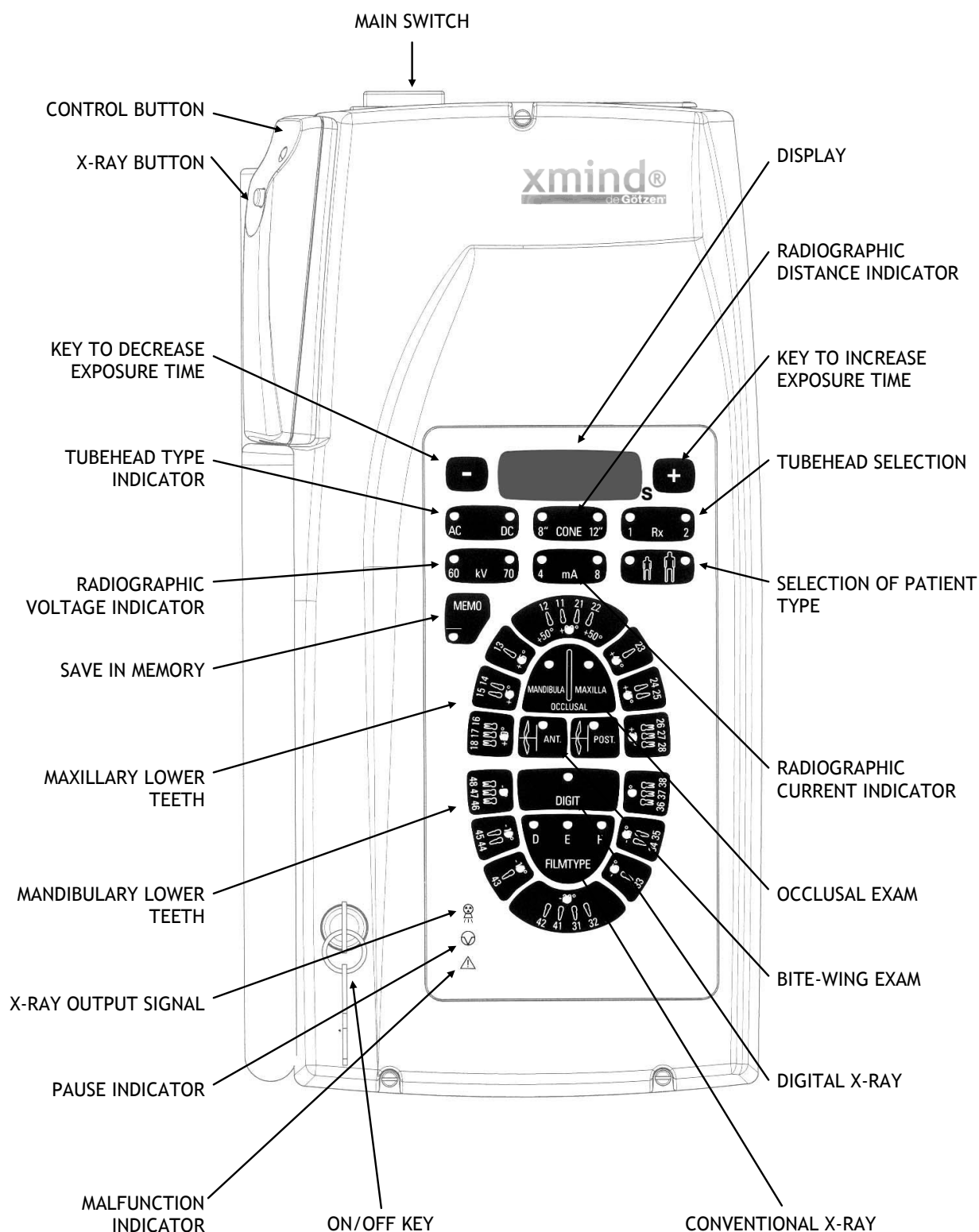


xmind[®]dc

intraoral x-ray system at constant potential

INSTALLATION & MAINTENANCE MANUAL

Control panel



THE RADIOGRAPHIC SYSTEM DESCRIBED IN THIS MANUAL REFERS TO A WALL INSTALLATION.

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CHAPTER 1

PRELIMINARY INFORMATION

PRELIMINARY INFORMATION

Before you start to use the “**xmind®dc**” radiographic system, it is recommended to carefully read and follow the instructions contained herein, in order to obtain the best possible performance.

Always pay close attention to the

**CAUTION
WARNING
PLEASE NOTE**

messages when operating the system.

LEGEND



CAUTION

The word **CAUTION** identifies those occurrences which might jeopardize the operator's personal safety or cause physical injuries.



WARNING

The word **WARNING** identifies those occurrences which might compromise the radiographic system's performance.



PLEASE NOTE

PLEASE NOTE gives special indications to facilitate maintenance or to make important information clearer.

INFORMATION FOR THE INSTALLER



CAUTION

The installer is responsible for installation, with regard to the system safety and operation.

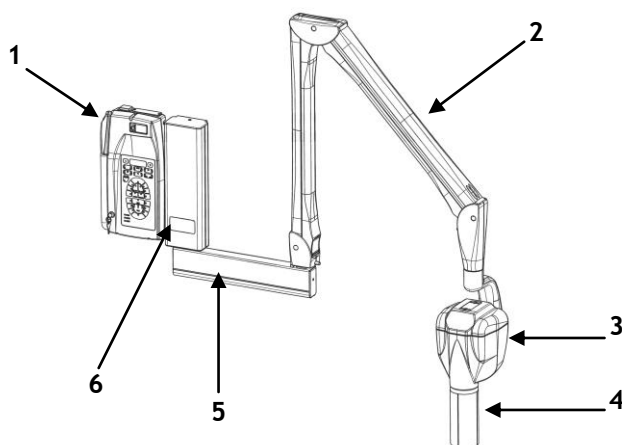
For safe and reliable installation of the “**xmind®dc**” radiographic system it is advisable to:

- Check that the voltage mentioned in the rating plate matches the line voltage
- Install the radiographic system according to the procedures described in this manual
- Provide the user with any information regarding the use of the radiographic system according to that stated in the manual
- Certify the work done by a “Declaration of Conformity”
- Return the warranty certificate duly filled in to “de Götzen® S.r.l.”: if this is not done, the warranty is not valid.

RADIOGRAPHIC SYSTEM

The “xmind®dc” radiographic system (Figure 1) consist of:

SYSTEM COMPONENTS



1. xmind® TIMER
2. PANTOGRAPH
3. xmind®dc TUBEHEAD
4. CONE
5. BRACKET
6. WALL PLATE

Figure 1

OPTIONAL

- SECOND CONTROL BUTTON
- xmind® LIGHT (Rx signalling lamp for external use)
- xmind® ECB (remote control button)

OVERALL DIMENSIONS

Figures 2A, 2B, 2C give the overall dimensions of the configurations available:

- BRACKET 400: length 41 cm - 16.2”
- BRACKET 800: length 82.5 cm - 32.5”
- BRACKET 1100: length 110 cm - 43.5”

CHAPTER 2

OVERALL DIMENSIONS

BRACKET 400

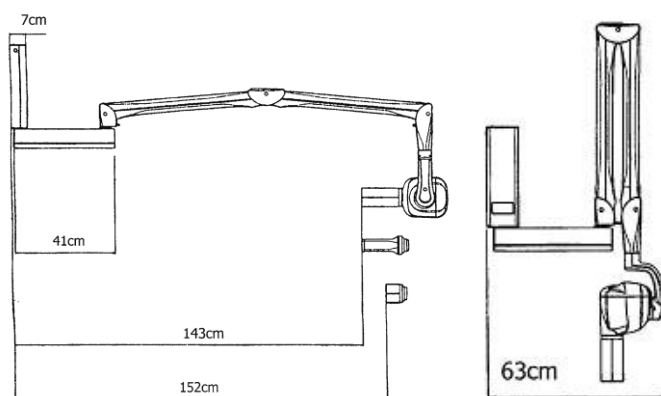


Figure 2A

BRACKET 800

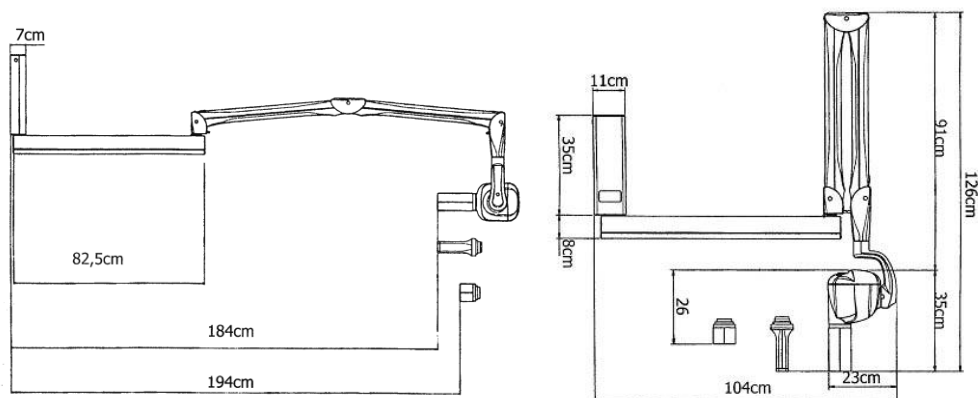


Figure 2B

BRACKET 1100

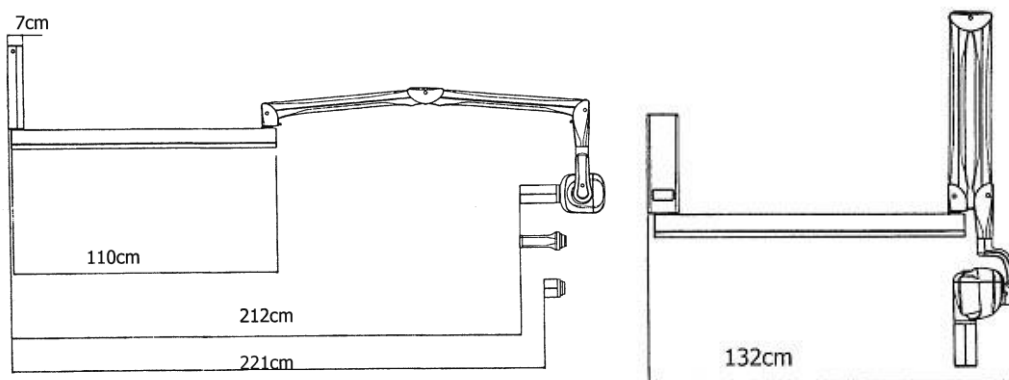


Figure 2C

Figures 3 and 4 show the typical dimensions of the radiographic system:

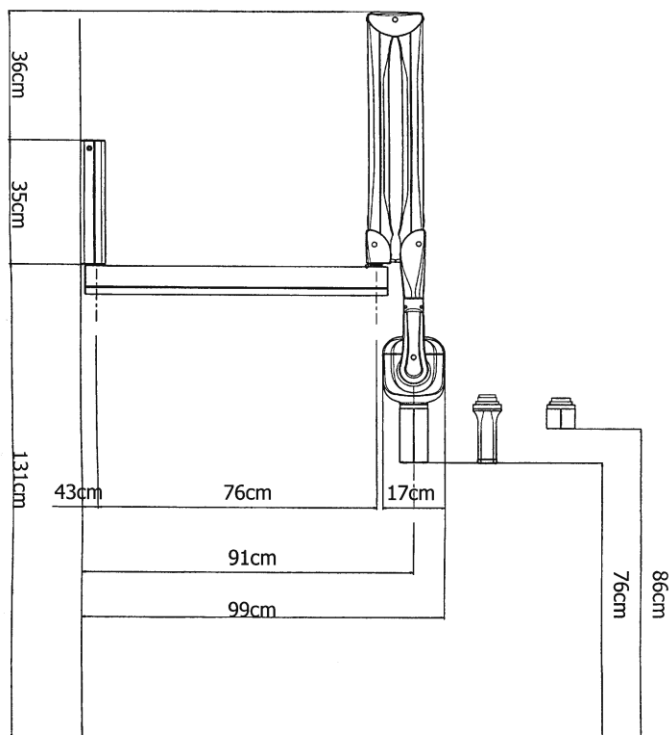


Figure 3

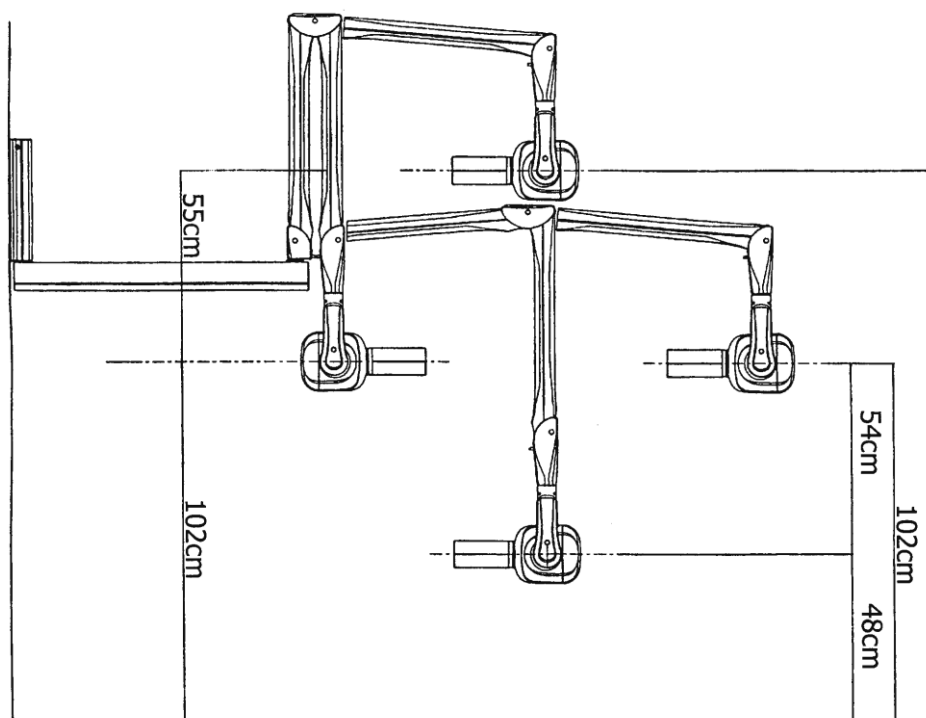


Figure 4

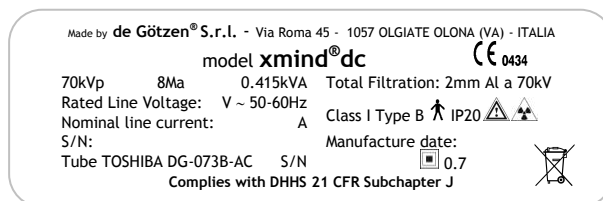
CHAPTER 2

IDENTIFICATION TAGS

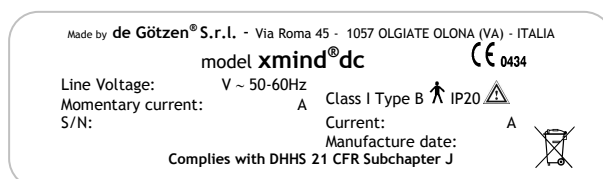
IDENTIFICATION TAGS

The identification tags on the tubehead, on the timer and on the cone indicate the model number, the serial number, the manufacturing date and the symbols of the main technical characteristics.

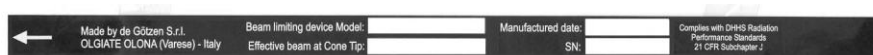
TUBEHEAD



TIMER



CONE



GRADUATED SCALE



PICTOGRAMS USED



THIS SYMBOL GUARANTEES THAT THE RADIOGRAPHIC SYSTEM COMPLIES WITH THE REGULATIONS CONTAINED IN THE EUROPEAN DIRECTIVE EEC 93/42 RELEVANT TO MEDICAL DEVICES



THE DEGREE OF PROTECTION AGAINST DIRECT AND INDIRECT ELECTRIC CONTACTS IS B TYPE



REFER TO MANUAL'S INSTRUCTIONS



SYMBOL INDICATING DANGER DUE TO IONISING RADIATIONS



SIZE OF THE FOCAL SPOT



WEEE (Waste Electrical and Electronic Equipment) SYMBOL, IN CONFORMITY WITH 2002/96/CE DIRECTIVE AND EN 50419 STANDARD.

INSTALLATION SPECIFICATIONS



WARNING

Prior to installing the radiographic system the Office Manager must ascertain that: the environment, the electric system and the power supply comply with the necessary requirements, otherwise he/she must make the necessary adjustment.

ENVIRONMENTAL REQUIREMENTS

- The installation environment must be of suitable width: check that the size and overall dimensions available are sufficient and that there no obstacles positioning the radiographic system.
- The environment must not be exposed to explosion hazards and must not be pressurized.
- During operation, the ambient temperature must range between +5°C and +40°C.
- The storage temperature must range between -15°C and +50°C.
- The relative humidity must range between 25% and 75%.

REQUIREMENTS OF THE SUPPORTING WALL

- The wall supporting the radiographic system must be able to bear 200 kg at every fixing point.



PLEASE NOTE

The strength and nature of the wall must be checked and if required, ask the advice of a masonry expert.

Walls of which the solidity is uncertain must be fitted with a buried counter plate or with a sandwich type system.

REQUIREMENTS OF THE ELECTRIC SYSTEM

- The electric system must comply with the regulations in force.
- The electric system must be able to supply the power and voltage stipulated in the manufacturer's rating plate of the radiographic system (Chart A).

Chart A - Electric system

MANUFACTURER'S RATING PLATE	230 V \pm 15%	115 V \pm 15%
NOMINAL VOLTAGE	230 V	115 V
MINIMUM LINE VOLTAGE	196 V	98 V
MAXIMUM LINE VOLTAGE	264 V	132 V
FREQUENCY	50/60 Hz	50/60 Hz
ABSORBED POWER	1.4 kVa	1.4 kVa

CHAPTER 3

INSTALLATION SPECIFICATIONS

REQUIREMENTS OF THE ELECTRIC LINE

- The electric line must be of the “single phase alternating” type.
- It is essential to fit a 16 A - 250 V, magnetothermal differential switch upstream to the radiographic system, with differential protection $I_n \leq 30$ mA (*refer to Chapter 15*).
- The power conductors of the timer and the connection conductors with the tubehead must be two-pole + ground, and must be of suitable section for the length of the power supply line (Chart B).

Chart B - Power supply voltage

MANUFACTURER'S RATING PLATE	230 V $\pm 15\%$	115 V $\pm 15\%$
POWER SUPPLY VOLTAGE	$196 \leq V \leq 264$	$98 \leq V \leq 132$
MINIMUM CONDUCTOR SECTION	1.5 mm ²	1.5 mm ²
MINIMUM LINE LENGTH	10 m	10 m
MAXIMUM CONDUCTOR SECTION	2.5 mm ²	2.5 mm ²
MAXIMUM LINE LENGTH	20 m	20 m



PLEASE NOTE

For longer lines, the conductor section must be increased in proportion.

- The communication cables (C11, C12 - C21, C22) between the timer and the tubehead must be two-pole, twisted and shielded with ≥ 0.25 mm² (es. tipo Belden 9501).
- The cables (S11, S12 - S21, S22) connecting the timer and the Rx signalling lamp for external use must be two-pole type, of section ≥ 0.5 mm².
- The electric line characteristics must be as follows (Chart C).

Chart C - Electric line

MANUFACTURER'S RATING PLATE	230 V $\pm 15\%$	115 V $\pm 15\%$
MAXIMUM VOLTAGE DROP	3%	3%
APPARENT LINE RESISTANCE	0.5 Ω	0.2 Ω

ELECTRIC CONNECTIONS



WARNING

Prior to installing the radiographic system, it is advisable that all the electric connections be arranged.

TIMER

On the timer installation wall, suitable runs for the following electric cables must be provided, according to the installation electric diagram (*refer to Chapter 15*):

- Timer electric cables
- Cables connecting the timer and the tubehead
- Cables connecting the timer and the Rx signalling lamp for external use **xmind® LIGHT (OPTIONAL)**
- Cables connecting the timer and the remote control button **xmind® ECB (OPTIONAL)**.



CAUTION

According to the relevant standard, the timer must be installed in a position allowing the operator to permanently control the radiographic exposure.

TUBEHEAD

Suitable run for the cable connecting the timer and tubehead must be provided on the wall on which the wall plate is installed.

INSTALLATION



CAUTION

The “xmind®dc” radiographic system must be installed by professionally trained technicians, who must be able to certify their work by “Declaration of Conformity”.

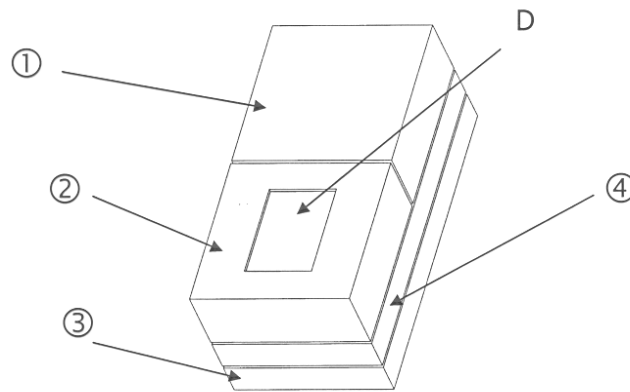


WARNING

Prior to installing the radiographic system, it is advisable to check that all necessary requirements have been met (*refer to Chapter 3*).

UNPACKING

The components of the “xmind®dc” radiographic system are duly packed within a carton box, as shown in the Figure 5.



- ① TUBEHEAD PACKAGING
- ② TIMER + OPTIONAL PACKAGING
- ③ PANTOGRAPH PACKAGING
- ④ WALL PLATE and BRACKET PACKAGING
- D MANUALS and WARRANTY CARD

Figure 5



PLEASE NOTE

Prior to installation, duly check all components.



PLEASE NOTE

The cardboard and the polystyrene foam packaging can be completely recycled and disposed of by authorized recycling companies.



PLEASE NOTE

It is advisable to retain the original packaging in case it is needed to return the goods for repairs.

ASSEMBLING THE WALL PLATE

**WARNING**

When the timer is installed aside the wall plate, please do as follows:

- The timer must be mounted on the left side of the wall plate
- The distance between timer and wall plate must be 2.5 mm.

**WARNING**

To fix the wall plate **DO NOT** use plastic or rubber anchor screws.

For cement walls, or those built with solid or hollow bricks, use metal anchor screws Ø12 (NOT included in the supply).

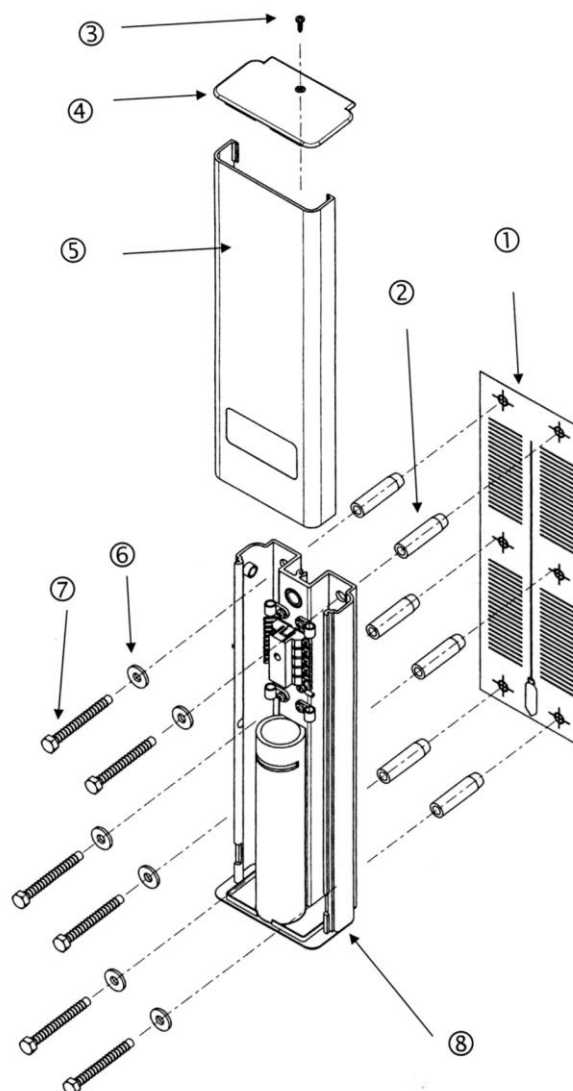


Figure 6

CHAPTER 4

ASSEMBLING THE WALL PLATE

ASSEMBLY INSTRUCTIONS (REFER TO FIGURE 6)

1. Remove the wall plate from the packaging and take out the drilling template ①.
2. Position the drilling template ① on the radiographic system installation wall, at the required height (130 cm from the base in the suggested height).
3. Fix the template ① with adhesive tape.
4. Check the holes for verticalness and alignment with the floor, using a plumb line.
5. Mark the wall plate ⑧ fixing holes.
6. If required, mark the holes for the electric cables connecting the timer to the tubehead.



PLEASE NOTE

To prevent any flaking in the plaster and to control the distances between the holes, it is advisable to start drilling with a Ø7 tip, increasing this measure gradually.

7. Drill the fixing holes.
8. Remove the template ① and insert the suitable anchor screws ②, according to the wall characteristics.
9. Unscrew the screw ③ and remove the plug ④ from the wall plate ⑧.
10. Withdraw the sliding cover ⑤.
11. Place the wall plate ⑧ against the wall and insert the screws ⑦ with the relevant washers ⑥, then tighten alternately.
12. Check that the wall plate ⑧ is steadily fixed to the wall.



PLEASE NOTE

If the wall is not perfectly level, put a suitable wedge between the wall and the wall plate, so as to prevent any possible deformations.

ASSEMBLING THE BRACKET

**PLEASE NOTE**

The 82.5 cm and 110 cm brackets are provided with a stop key ① (Figures 7A and 7B) to prevent the electric cable from twisting.

**PLEASE NOTE**

Generally, the stop key is installed so that the equipment position at rest is on the right side of a possible watcher standing in front of the wall plate (Figure 7A).

Should the position at rest be on the left side, the stop key must be rotated by 180° (Figure 7B).

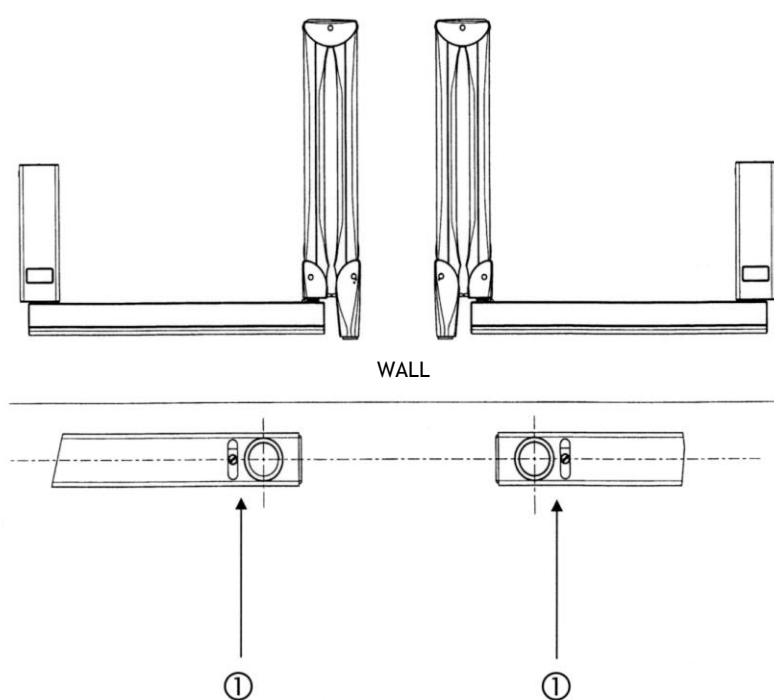


Figure 7A

Figure 7B

CHAPTER 4

ASSEMBLING THE PANTOGRAPH

ASSEMBLY INSTRUCTIONS (REFER TO FIGURE 8)

1. Take out the bracket from the packaging.
2. Insert the bracket pin ③ into the wall plate ① (upwards).
3. Insert the supporting rest ②.

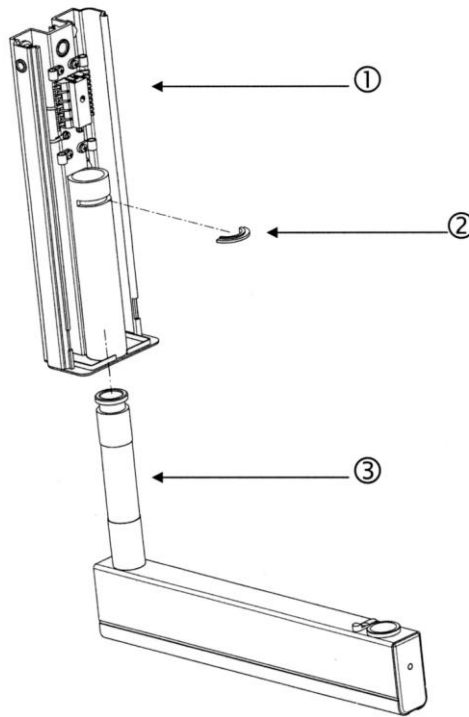


Figure 8



PLEASE NOTE

Prevent all foreign matters (ground, dust, cement, etc.) from settling on the pin seat.

The pin must slide freely in its seat. If required, thoroughly clean and lubricate with Molikote D grease.



PLEASE NOTE

Check accurately with a split level, the exact distance between the racket and the ground floor.

ASSEMBLING THE PANTOGRAPH

ASSEMBLY INSTRUCTIONS (REFER TO FIGURE 9)

1. Remove the pantograph from the packaging.
2. Remove the bracket plug ① by unscrewing the fixing screw ②.
3. Slide the bracket guard slat ③.
4. Insert the pantograph group cable ⑤ into the bushing ④ and then the pantograph pin ⑥.
5. If required, clean the pin and the bushing and lubricate with Molikote D grease.
6. Insert the electric cable into the bracket housing ⑦.
7. Assemble the guard slat.
8. Insert the cable into the bracket and push it until it reaches the pin outlet near the supply terminal board.

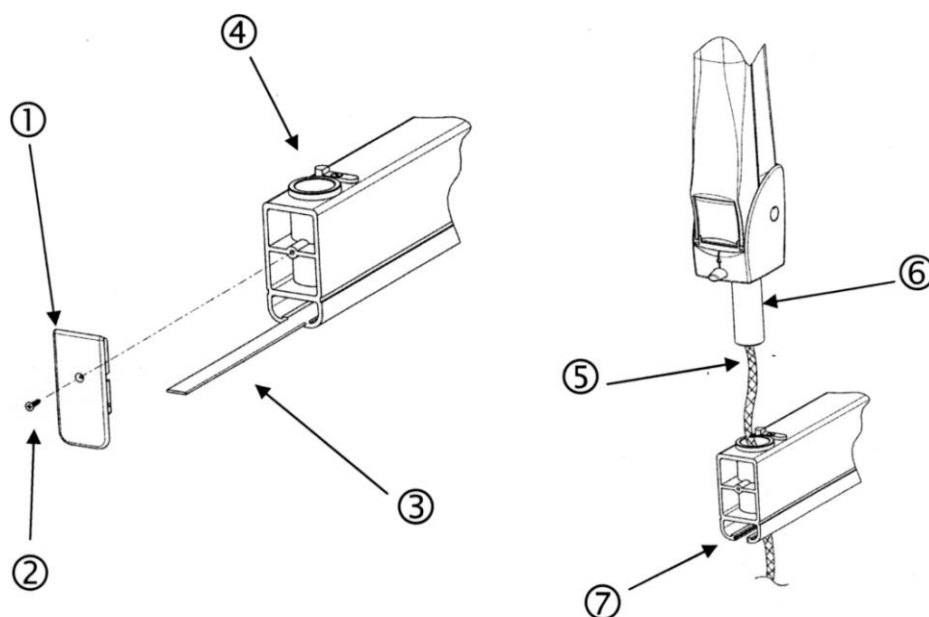


Figure 9



CAUTION

Check that the cable runs are arranged in the timer installation wall; check the compliance of the power supply with the installation specifications (*refer to Chapter 3*).



WARNING

Check that the rating data match the power supply voltage.



WARNING

When the timer is installed aside the wall plate, please do as follows:

- The timer must be mounted on the left side of the wall plate
- The distance between timer and wall plate must be 2.5 mm.

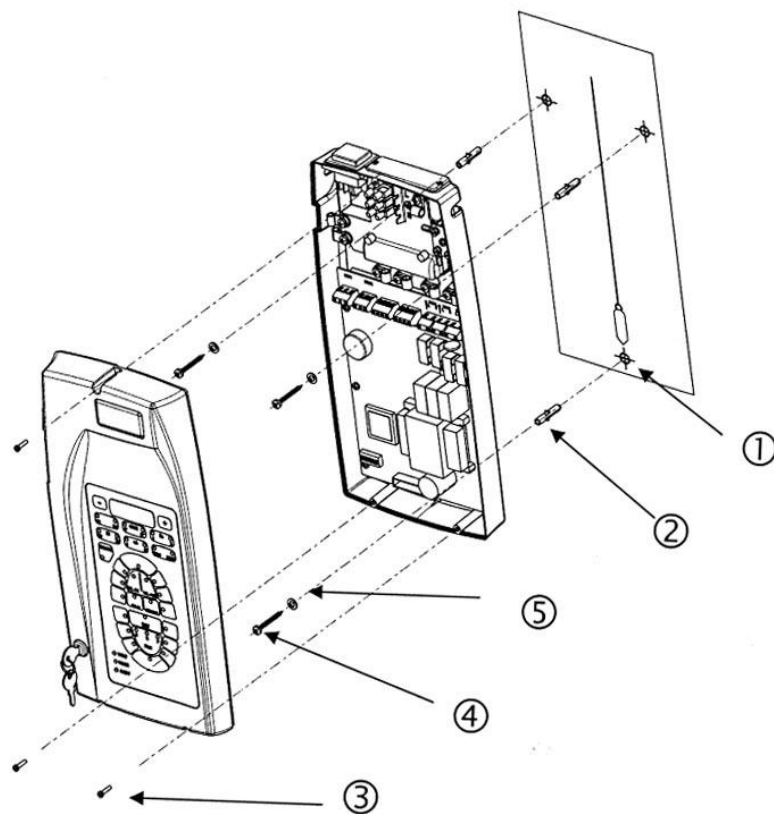


Figure 10

ASSEMBLY INSTRUCTIONS (REFER TO FIGURES 10-11)

1. Remove the timer from the packaging and take out the drilling template ①.
2. Position the drilling template ① on the radiographic system installation wall, at the required height.
3. Fix the template ① with adhesive tape.
4. Check the vertical positioning of the holes and alignment with the floor, using a plumb line.
5. Mark the timer fixing holes on the wall using the drilling template.
6. If required, mark the holes for the electric cables connecting the timer to tubehead.
7. Drill using a Ø3 tip, then drill again with a Ø6 tip to prevent any flaking of the plaster.
8. Remove the template ① and insert the suitable anchor screws provided ②.
9. Open the timer by unscrewing the three screws ③.
10. Withdraw the 26-pole connector from its seat to release both timer guards.
11. Approach the timer ⑧ to the wall and insert the electric feeding cables into the hole.
12. Insert the connection cables coming from the tubeheads into the slot A: when the timer is installed aside the wall plate insert in between the rubber cover for the electrical cable.
13. Insert the cables of the RX signalling lamp for external use (OPTIONAL) and the cables of the remote control button (OPTIONAL) into the slot B.
14. Place the timer base ⑧ against the wall, matching the three anchor screws with the holes and tighten the screws with the relevant washers.

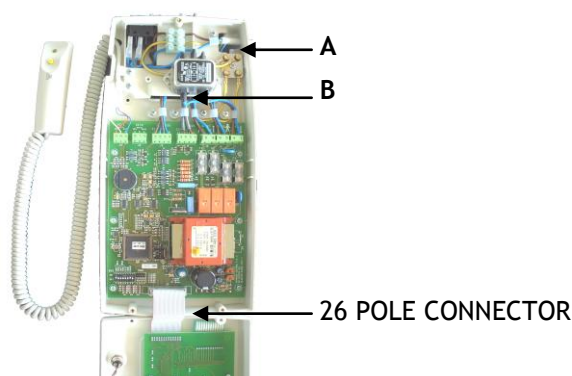


Figure 11

CHAPTER 4

ASSEMBLING THE TUBEHEAD

ASSEMBLING THE TUBEHEAD

ASSEMBLY INSTRUCTIONS

1. Take out the tubehead from the packaging.
2. Check that all the rating data matches the power supply voltage.



3. Remove both guards from the pantograph by loosening the relevant screws.



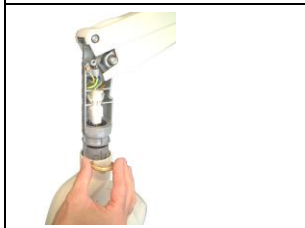
4. Using a tip, act on the front coupling device.



5. Remove both guards.



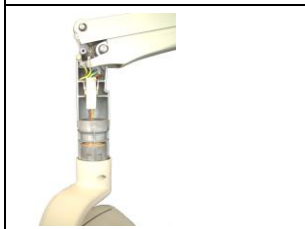
6. Insert the tubehead pin into the pantograph head.



7. Insert the support rest.



8. Check that during insertion the pin of the anti-turning device correctly fits the seat located on the pantograph head.



9. Couple the pantograph and tubehead connections and fit them into their seats.

BALANCING THE PANTOGRAPH**CAUTION**

The pantograph must only be adjusted when the tubehead is assembled.

**WARNING**

To prevent damage to the internal mechanism while performing adjustment and the balancing tests, the adjustment key must not be left in place.

**WARNING**

The adjustment key provided must be retained carefully.

**PLEASE NOTE**

To reach the adjustment screw X the arm A must be put in vertical position.

To reach the adjustment screw Y the arm B must be put in horizontal position.

The adjustment key provided can be inserted only under the above conditions.

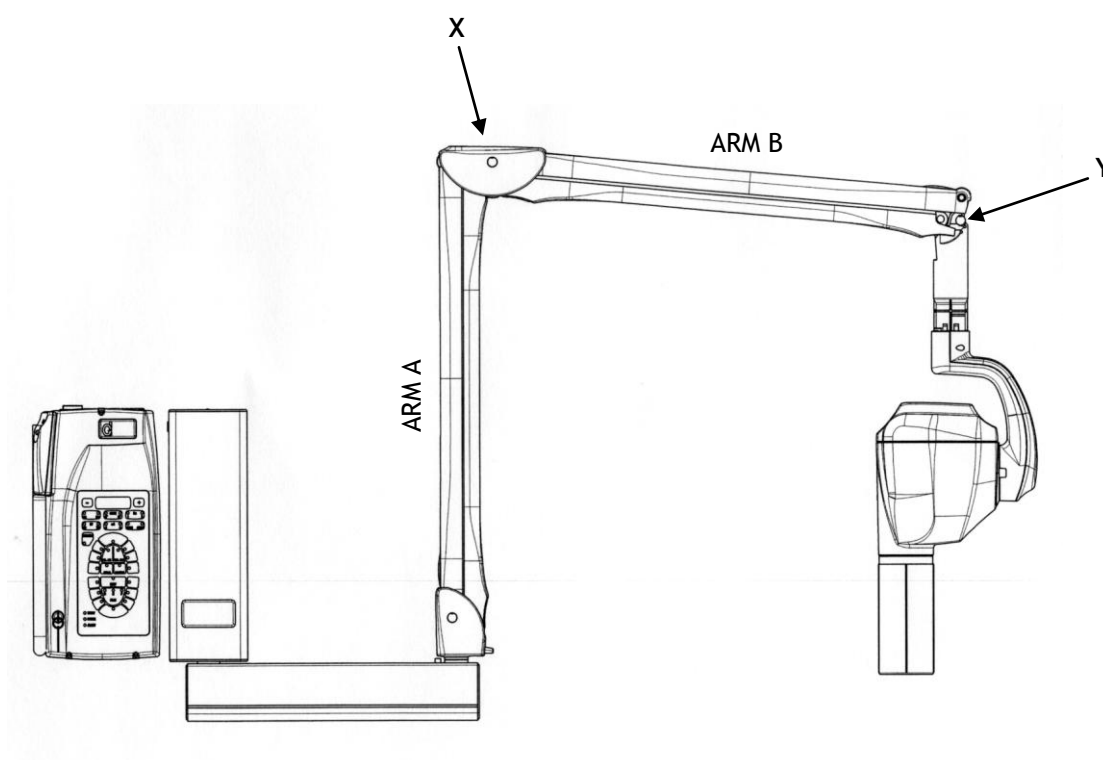


Figure 12

CHAPTER 4

BALANCING THE PANTOGRAPH

INSTRUCTIONS (REFER TO FIGURE 12)

1. BALANCING THE ARM A



PLEASE NOTE

The pantograph is supplied with arm A already preloaded.
The arm B is supplied unloaded for safety reasons.

2. BALANCING THE ARM B

- Arm A vertical
- Arm B horizontal
- Insert the adjustment key in Y
- Load the spring by n° 22 turns
- Withdraw the key.

3. CHECKING THE BALANCING

Bring the arm B in the different positions

IF IT DOES NOT KEEP THE POSITION



- Bring the arm B to the horizontal position
- Insert the adjustment key in Y
- Rotate the adjustment key by half turn: clockwise if it tends to come down; counter clockwise if it tends to go up
- Withdraw the key.



PLEASE NOTE

Repeat the test and adjustment until the arm B is steady and stable in all positions, even when the arm A is completely extended.

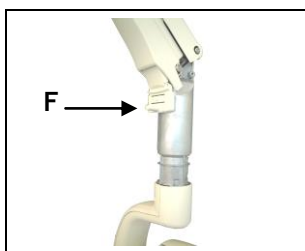
4. READJUSTMENT OF ARM A

- Bring the arm A to the vertical position
- Insert the adjustment key in X
- Rotate the adjustment key by half turn: clockwise if it tends to come down; counter clockwise if it tends to go up
- Withdraw the key.



PLEASE NOTE

Repeat the test and adjustment until the arm A is steady and stable in all positions, even when the arm B is completely extended.



5. Insert the movable finish F between the pantograph guard and metal frame.



6. Insert the pins of the guards into the relevant seats; then position them and check that the movable finish is coupled to the guards.

ELECTRIC CONNECTIONS

**CAUTION**

Before proceeding to connections, the power supply must be cut off.

**CAUTION**

For electric safety, it is essential that the ground conductors be correctly connected.

**WARNING**

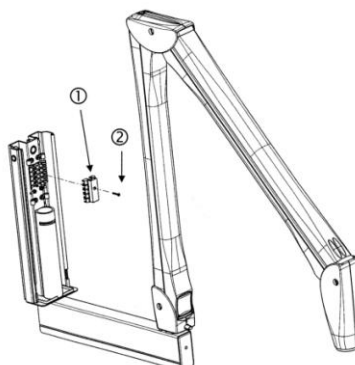
While making connections, always respect the polarity **PHASE/NEUTRAL**.

**WARNING**

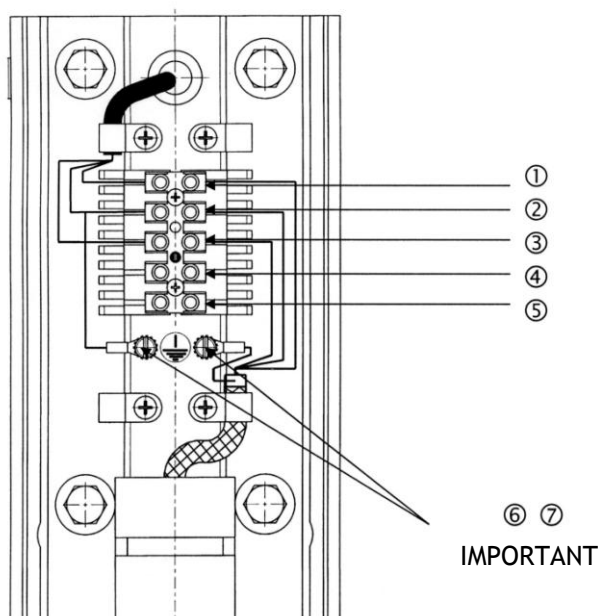
While stripping the cables, pay attention to the small copper wires that may fall on the printed circuit and cause short circuits or malfunctions.

INSTRUCTIONS FOR CONNECTION TO THE FEEDING TERMINAL BOARD

1. Remove the terminal board cover ① by unscrewing the fixing screw ②.



2. Proceed to the electric connection as shown:



TERMINAL BOARD CONNECTION DIAGRAM

①	BROWN	L = PHASE
②	YELLOW GREEN	T = GROUND
③	BLUE	N = NEUTRAL
④	BLACK	COMMUNICATION
⑤	RED	COMMUNICATION
⑥	YELLOW GREEN	T = GROUND
⑦	YELLOW GREEN	T = GROUND

THE COMMUNICATION CABLES ARE NOT POLARIZED.

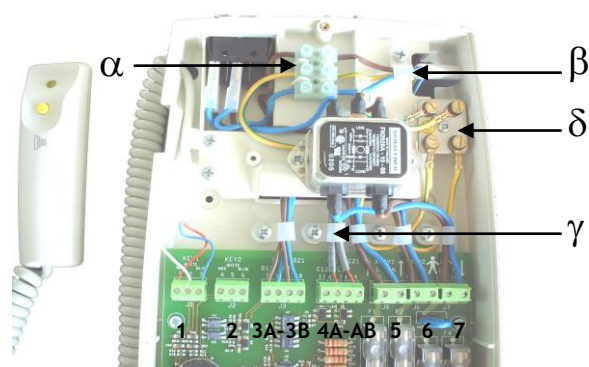
CHAPTER 5

ELECTRIC CONNECTIONS

3. Connect the pantograph cable shield to the grounding potential ⑥.
4. Connect the wall plate to the grounding potential ⑦.
5. Clamp the cables with the cable clamps provided.
6. Reassemble the terminal board cover.

INSTRUCTION FOR CONNECTION TO THE TIMER

1. Connect the power supply cable to the terminal board α .
2. Insert the three mains cables into the rack.
3. Fix them with the cable clamp β .
4. Connect the cables coming from the tubehead 1 to the terminals XRAY1.
5. Connect the communications cables from the tubehead 1 to the C11 and C12 terminals.
6. Connect the yellow-green grounding cable to the equipotential metal plate δ .
7. Connect the cables coming from the tubehead 2 to the terminals XRAY2.
8. Connect the communications cables from the tubehead 2 to the terminals C21 and C22.
9. Connect the yellow-green grounding cable to the equipotential metal plate δ .
10. Clamp the cables in the cable clamp γ .
11. Connect the Rx signalling lamps for external use (OPTIONAL).
12. Connect the remote control buttons (OPTIONAL).
13. Check the configuration on the dip-switches.
14. Reconnect the 26-pole connector.
15. Close the timer with the three screws.
16. Mount the sliding cover and the plug of the wall plate.
17. Reconnect the power supply.










- | | | |
|----|------------------------------------|----------|
| 1 | TUBEHEAD 1 CONTROL BUTTON | |
| 2 | TUBEHEAD 2 CONTROL BUTTON | OPTIONAL |
| 3A | TUBEHEAD 1 RX SIGNALLING LAMP | OPTIONAL |
| 3B | TUBEHEAD 2 RX SIGNALLING LAMP | OPTIONAL |
| 4A | RS232 COMMUNICATION FOR TUBEHEAD 1 | |
| 4B | RS232 COMMUNICATION FOR TUBEHEAD 2 | |
| 5 | TUBEHEAD 1 POWER SUPPLY | |
| 6 | TUBEHEAD 2 POWER SUPPLY | |
| 7 | TIMER POWER SUPPLY | |

CONFIGURATION

The “xmind®dc” radiographic system is factory configured in “standard mode”.

On the control panel the LED relevant to the following exposure parameters will light up:

	No. of the selected tubehead LED 1
	Supplied cone LED 8” = SHORT CONE LED 12” = LONG CONE
	Tubehead type LED AC = ALTERNATING CURRENT LED DC = DIRECT CURRENT
	Radiographic voltage LED 70 kV
	Radiographic current LED 8 mA
	Type of patient LED ADULT
	Radiographic technique CONVENTIONAL LED D

The above configuration depends on the dip switch position on the timer electronics:

KEY

ON = INSTALLED

OFF = NOT INSTALLED



IF THE LONG CONE IS USED

31 cm = 12"

	ON	OFF	
1	■		TUBEHEAD 1
2	■		TUBEHEAD DC
3	■		TUBEHEAD 2
4	■		TUBEHEAD DC
5		■	II° CONTROL BUTTON
6	■		LONG CONE 12" (31 cm)
7		■	NOT AVAILABLE
8		■	NOT AVAILABLE



IF THE SHORT CONE IS USED

20 cm = 8"

	ON	OFF	
1	■		TUBEHEAD 1
2	■		TUBEHEAD DC
3	■		TUBEHEAD 2
4	■		TUBEHEAD DC
5		■	II° CONTROL BUTTON
6		■	LONG CONE 8" (20 cm)
7		■	NOT AVAILABLE
8		■	NOT AVAILABLE

CHAPTER 6

CHANGING THE CONFIGURATION

POSSIBLE MODIFICATIONS OF THE EXPOSURE VALUES

- Radiographic voltage (60 kV/70 kV)
- Radiographic current (4 mA/8 mA)
- Type of patient (ADULT/CHILD)
- Radiographic technique



(refer to “User’s Manual” Chapter 4).

POSSIBLE MODIFICATIONS OF THE EXPOSURE VALUES

- Cone (8”/12”)
- Type tubehead
- Control button no.



Inside the timer, by changing the dip-switch position.

THIS OPERATION MUST BE CARRIED OUT BY THE INSTALLER ONLY

DIP SWITCH	ON	OFF	PARAMETER
1	INSTALLED	NOT INSTALLED	TUBEHEAD 1
2	dc	ac	TUBEHEAD TYPE 1
3	INSTALLED	NOT INSTALLED	TUBEHEAD 2
4	dc	ac	TUBEHEAD TYPE 2
5	INSTALLED	NOT INSTALLED	II° CONTROL BUTTON
6	LONG 12” = 30 cm	SHORT 8” = 20 cm	CONE
7			NOT AVAILABLE
8			NOT AVAILABLE

INSTRUCTIONS

DIP SWITCH	1	3
	ON	ON
	OFF	OFF

To change the selection of tubehead , activate the dip-switch no. 1 or the dip-switch no. 3:

- If the tubehead is connected to the XRAY1 terminal board, put the dip-switch no. 1 in the ON position; otherwise in OFF position
- If the tubehead is connected to the XRAY2 terminal board, put the dip-switch no. 3 in the ON position; otherwise in OFF position.

DIP SWITCH	2	4
	ON	ON
	OFF	OFF

To change the type of tubehead installed, move the dip-switch no. 2 or the dip-switch no. 4:

- If the tubehead connected to the XRAY1 is of **ac**, put the dip-switch no. 2 in the OFF position; otherwise put it in the ON position
- If the tubehead connected to the XRAY2 is of **ac**, put the dip-switch no. 4 in the OFF position; otherwise put it in the ON position.

**PLEASE NOTE**

It is possible to connect to the timer:

- no. 2 **xmind[®]ac**
- no. 2 **xmind[®]dc**
- no. 1 **xmind[®]ac** + no. 1 **xmind[®]dc**

DIP SWITCH	5
	ON
	OFF

To change the number of control buttons installed, move the dip-switch no. 5:

- With the second control button move the dip-switch no. 5 to the ON position.

**PLEASE NOTE**

After modification, each tubehead is controlled by the relevant button.

DIP SWITCH	6
	ON
	OFF

To change the cone installed, move the dip-switch no. 6:

- With the short cone move the dip-switch no. 6 to the OFF position
- With long cone move the dip-switch no. 6 to the ON position.

**PLEASE NOTE**

After modification, the set exposure times are changed automatically.

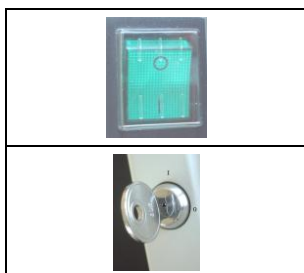
START UP



CAUTION

When all connections are completed, the installer must check the electric safety and functions of the system.

INSTRUCTIONS



Put the main switch located on the upper part of the timer in the “I” position (ON).


Turn the key switch to the “I” position (ON).

1. The green light turns on indicating that the system is powered.
2. The LEDs of the set parameters automatically light up.
3. The exposure time is shown on the display.



CAUTION

If an error is detected when the system is turned on, the anomaly is indicated as follows:

- An intermittent beep sounds
- If the  LED, MALFUNCTION INDICATOR flashes
- The error code (E) appears on the display (*refer to Chapter 8*)
- All control panel functions are inhibited.

In this case turn off the timer and then turn it back on.

If the error should repeat itself, call the “Assistance Service”.



PLEASE NOTE

The exposure time and parameters which appear on the display are the last that were set before the timer was turned off.

If the timer remains inactive for a few minutes, it switches to the stand-by mode. Press any key on the control panel to restore it to the operative mode.

CHECKING THE INSTALLATION



STEP 1 CHECKING THE CONFIGURATION

Check on the control panel that all LEDs corresponding to the required configuration are lit; otherwise, change them.

STEP 2 CHECKING THE TIMER OPERATION

1. Check the correct operation of the control panel by selecting different exposure times.
2. Check the time on the display.
3. Check that, when changing the selected tubehead, the corresponding Rx signalling lamp for external use turns on (OPTIONAL).


STEP 3 CHECKING THE EXPOSURE

1. Set an exposure time of 1 sec.
2. Take the control button on the timer and keep a safety distance (of at least 2 meters) from the tubehead.
3. On the control button press the  X-RAY key and keep it pressed until the acoustic signal (beep) stops and the yellow  LED turns off.



PLEASE NOTE

If the “X-RAY” key is released early, the exposure is immediately interrupted and the E12 error message appears on the display.

4. At the end of the exposure the green LED flashes  PAUSE.
5. The display indicates the actual exposure time.
6. All the timer functions are inhibited.

STEP 4 CHECKING THE OPERATION OF THE TUBEHEAD

Carry out several exposures and check that:

- There are no errors
- The LED of the selected tubehead is lit
- The control button led is lit for the whole duration of the acoustic signal (beep).

CHAPTER 8

CHECKING THE EXPOSURE FACTORS

STEP 5 CHECKING THE POWER ABSORBED BY THE RADIOGRAPHIC SYSTEM

To check the power absorbed by the radiographic system a tester must be used, in the mode ammeter in AC:

1. Connect the instrument to the power supply line.
2. Set an exposure time of approx 3 sec on the timer.
3. Carry out an exposure and read the current value on the instrument.



PLEASE NOTE

The “xmind®dc” radiographic system complies with the requirements when:

the absorbed current is ≤ 8 A with 230 V

the absorbed current is ≤ 12.5 A with 115 V

Otherwise, check the electrical system or call the “Assistance Service”.

STEP 6 CHECKING THE ELECTRIC SYSTEM

To check the electric system, a tester must be used, in the AC voltmeter mode:

1. Connect the instrument to the terminals L and N on the timer.
2. Measure the line voltage.
3. Connect the instrument to the terminals L and N off the wall plate terminal board.
4. Set an exposure time of approx 3 sec on the timer.
5. Take the exposure and measure the line voltage during exposure.



PLEASE NOTE

The electric system complies with the requirements when:

$$(V_0 - V_1) / V_0 \leq 0.03 \text{ (3\%)}$$

Otherwise, the electric system must be adjusted.

CHECKING THE EXPOSURE FACTORS

STEP 1 CHECKING THE RADIOGRAPHIC VOLTAGE (kVp)

The radiographic voltage is measured using calibrated “non invasive” instrument.

SET TECHNICAL FACTORS

NOMINAL VOLTAGE	$V_n \pm 15\%$
MAXIMUM VOLTAGE DROP	3%
NOMINAL HIGH VOLTAGE	60-70 kV
NOMINAL CURRENT	4-8 mA
SET EXPOSURE TIME	3.2 sec

The radiographic voltage is 60 kVp - 70 kVp $\pm 10\%$.

STEP 2 CHECKING THE RADIOGRAPHIC CURRENT (mA)

The radiographic current is measured by connecting a milliammeter inside tubehead.

SET TECHNICAL FACTORS

NOMINAL VOLTAGE	$V_n \pm 15\%$
MAXIMUM VOLTAGE DROP	3%
NOMINAL HIGH VOLTAGE	60-70 kV
NOMINAL CURRENT	4-8 mA
SET EXPOSURE TIME	3.2 sec

The radiographic current is 4 mA - 8 mA $\pm 10\%$.

STEP 3 CHECKING THE DOSE (mGy)

The dose in air is measured with a “non invasive” instrument, by positioning the detector at a source-skin distance of 31 cm (12”) or 20 cm (8”).

SET TECHNICAL FACTORS

NOMINAL VOLTAGE	$V_n \pm 15\%$
MAXIMUM VOLTAGE DROP	3%
NOMINAL HIGH VOLTAGE	60-70 kV
NOMINAL CURRENT	4-8 mA
SET EXPOSURE TIME	1 sec

CHAPTER 8

CHECKING THE EXPOSURE FACTORS

Dose in air is:

SOURCE-SKIN DISTANCE

31 cm - 12"	20 cm = 8"
60 kVp - 4 mA = 2.2 mGy/s \pm 30%	60 kVp - 4 mA = 4.5 mGy/s \pm 30%
70 kVp - 4 mA = 3 mGy/s \pm 30%	70 kVp - 4 mA = 6 mGy/s \pm 30%
60 kVp - 8 mA = 4.5 mGy/s \pm 30%	60 kVp - 8 mA = 9 mGy/s \pm 30%
70 kVp - 8 mA = 5.5 mGy/s \pm 30%	70 kVp - 8 mA = 12 mGy/s \pm 30%

STEP 4 CHECKING THE EXPOSURE TIME (SEC)

The exposure time is measured with a “non invasive” instruments.

SET TECHNICAL FACTORS

NOMINAL VOLTAGE	$V_n \pm 15\%$
MAXIMUM VOLTAGE DROP	3%
NOMINAL HIGH VOLTAGE	60-70 kV
NOMINAL CURRENT	4-8 mA
SET EXPOSURE TIME	3.2 sec





The exposure time measured is 3.2 sec \pm 10%.

★ ★ ★

DIAGNOSIS




With the “xmind®dc” radiographic system it is possible to set and visualise certain functional parameters.

To set the parameters, the installer must:

- Select the tubehead
- Turn off the timer
- Turn on the timer, by keeping the  key pressed
- The message SEC is displayed for approx 1 sec
- The present value of the lower set limit is displayed
- To change the value, press the keys  
- To confirm press the  key
- To exit this mode, turn the timer off and then on again.

To visualize them proceed as follows:

1. Press simultaneously and keep pressed the keys
(17) MAXILLA MOLAR
(47) MANDIBULARY MOLAR
2. Press the key associated to the parameter one wishes to:

KEY	DISPLAYED PARAMETER
	RADIOGRAPHIC SYSTEM NOMINAL VOLTAGE
	LINE VOLTAGE
	SOFTWARE VERSION

CALIBRATION OF THE TUBEHEAD







CAUTION

During this operation there is x-ray output.

It is mandatory to adopt all the safety measures relevant to radioprotection.

INSTRUCTION

1. Turn off the timer.
2. Turn on the timer by keeping pressed the  key.
3. The message TUBE is displayed.
4. Select with the  key the tubehead to calibrate.
5. Take the exposure: on the control button press the  X-RAY key and keep it pressed until the acoustic signal (beep) stops and the yellow  led turn off.
6. Once the exposure has been taken, if the display does not show errors, the calibration has been successfully done.

ERROR MESSAGES

The following chart gives a list of error messages that may appear while the “xmind®dc” radiographic system is working.

The chart also includes the causes of the error messages and what to do to solve them.

CHAPTER 11

ERROR MESSAGES

ERROR MESSAGES	CAUSE	SOLUTION
E00	RX1 TUBEHEAD IS NOT CONNECTED OR IS OUT OF ORDER	CALL THE “AFTER SALES SERVICE”
E01	RX2 TUBEHEAD IS NOT CONNECTED OR IS OUT OF ORDER	CALL THE “AFTER SALES SERVICE”
E02	CORRUPTED EEPROM DATA	CALL THE “AFTER SALES SERVICE”
E03	EEPROM DATA NOT SAVED PROPERLY	CALL THE “AFTER SALES SERVICE”
E05	LINE VOLTAGE VALUE NOT INCLUDED WITHIN THE SET LIMITS	CALL THE “AFTER SALES SERVICE”
E07	LINE VOLTAGE VALUE NOT INCLUDED WITHIN THE $\pm 15\%$ NOMINAL VALUE	CALL THE “AFTER SALES SERVICE”
E08	THE X-RAY KEY ALWAYS SEEMS TO BE PRESSED	MAKE SURE IT IS NOT JAMMED
E09	ANOMALY IN THE CONTROL PANEL	CALL THE “AFTER SALES SERVICE”
E12	THE EXPOSURE HAS BEEN PREMATURELY INTERRUPTED	KEEP THE X-RAY KEY PRESSED TILL THE END OF THE EXPOSURE
E20	ANOMALY IN THE TRIAC/RELAY	CALL THE “AFTER SALES SERVICE”
E21	ANOMALY IN THE ELECTRONIC CIRCUIT	CALL THE “AFTER SALES SERVICE”
E22	ANOMALY IN THE CONTROL CIRCUIT	CALL THE “AFTER SALES SERVICE”
E23	INCORRECT DIP-SWITCH CONFIGURATION	CALL THE “AFTER SALES SERVICE”
E24	THE CONTROL BUTTON DOES NOT CORRESPOND TO THE SELECTED TUBEHEAD	CALL THE “AFTER SALES SERVICE”
E30	THE TUBEHEAD DOES NOT WORK PROPERLY	CALL THE “AFTER SALES SERVICE”
E32	THE TUBEHEAD IS NOT IN THE CORRECT MODE	CALL THE “AFTER SALES SERVICE”
E33	THE TUBEHEAD HAS NOT COMPLETED THE EXPOSURE	REPEAT THE EXPOSURE CALL THE “AFTER SALES SERVICE”
E40	PROBLEM IN THE FREQUENCY OR REGULATION	CALL THE “AFTER SALES SERVICE”
E41	THE TUBEHEAD IS NOT CALIBRATED	CARRY OUT WITH THE CALIBRATION CALL THE “AFTER SALES SERVICE”
E42	EEPROM DATA NOT SAVED PROPERLY	CALL THE “AFTER SALES SERVICE”
E43	CORRUPTED EEPROM DATA	CALL THE “AFTER SALES SERVICE”
E44	OVERVOLTAGE ERROR	CALL THE “AFTER SALES SERVICE”
E45	ANODE VOLTAGE OUT OF TOLERANCE	CALL THE “AFTER SALES SERVICE”
E46	ANODE CURRENT OUT OF TOLERANCE	CALL THE “AFTER SALES SERVICE”
E47	CONTROL CONNECTOR	CALL THE “AFTER SALES SERVICE”
E48	PROBLEM IN THE REFERENCE VOLTAGE	CALL THE “AFTER SALES SERVICE”
ERR	MAJOR ERROR	CALL THE “AFTER SALES SERVICE”

RECOMMENDED MAINTENANCE

In order to guarantee safety of the radiographic system, it is necessary to set up a maintenance schedule.

The owner is responsible for organising and observing a maintenance schedule which must be executed by qualified technicians who must be able to certify their work with a “Conformity Declaration”.



CAUTION

Run an inspection on the radiographic system and on its operation when it is installed and every twelve months.

Once a year, lubricate the pins and bushes of the wall plate and the positioning arm, as specified.



WARNING

Do not lose the adjustment key that comes with the system, since, in time, it could become necessary to make readjustments.



WARNING

If the parts should become hard to move or should squeak, call the “AFTER SALES SERVICE”.

CLEANING THE OUTER SURFACE

Use a soft cloth dampened with water and soap to clean the outer surfaces.

The spacer cone may be cleaned with cotton wool soaked with surgical alcohol.

CHAPTER 12

CLEANING THE OUTER SURFACE

INSTRUCTIONS

1. Cut off the power.
2. Release the spring of the arm B of the pantograph using the key provided.
3. Remove the tubehead.
4. Withdraw the wall plate guard.
5. Remove the terminal board cover and disconnect the pantograph cable.
6. Remove the bracket plug and withdraw the guard slab.
7. Remove the pantograph and the relevant cable from the bracket.
8. Remove the bracket from the wall plate.
9. Check the vertical alignment of the wall plate: adjust if required.
10. Check the six fixing screws of the wall plate: tighten if required.
11. Clean the old lubricating grease from the bracket shaft: should the bracket shaft be damaged, install a new bracket.
12. Clean the old lubricating grease of the bracket bush: should the bracket bush be damaged, install a new bracket.
13. Grease the bracket shaft (use Molikote D grease).
14. Lubricate the bracket bush with lubrication grease (use grease Molikote D).
15. Install the bracket in the wall plate.
16. Check the pantograph cable: should it be damaged, send the pantograph to the manufacturer for repairs.
17. Check the pantograph guards.
18. Replace the damaged guards.
19. Clean the old grease of the shaft: should the shaft be damaged, send the pantograph to the manufacturer for repairs.
20. Lubricate the pantograph shaft with lubricating grease (use Molikote D grease) and reposition it in the bracket.
21. Put again the pantograph cable in the bracket and the wall plate, connect it to the terminal board and put in place the terminal board cover.
22. Position the guard slab in the bracket.
23. Position the bracket plug.
24. Position the plate guard.
25. Check the electric contact of the tubehead: if damaged, send the tubehead to the manufacturer for repairs.
26. Clean the old grease from the tubehead assembly shaft.
27. Grease the assembly shaft of the tubehead with a thin layer of lubricating grease (use Molikote D grease).
28. Position the tubehead again.
29. Load the spring of the pantograph B using the key provided.
30. Give power and check the correct operation of the radiographic system.

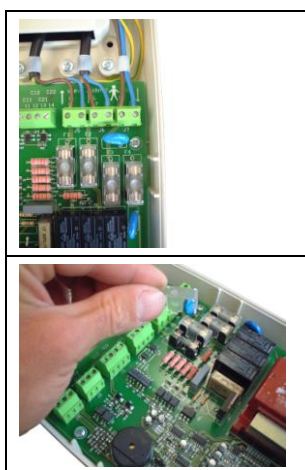
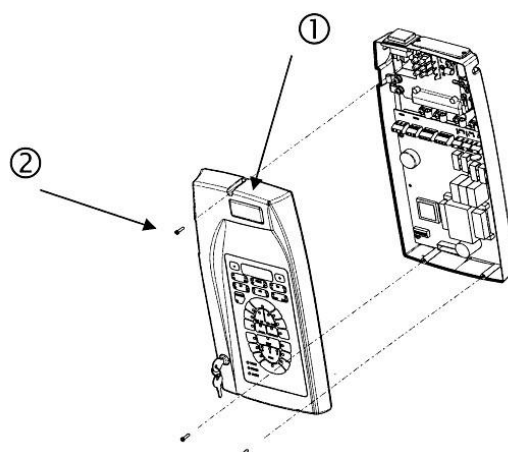
REPLACEMENT OF FUSES

The timer electronic equipment is protected by no. 4 fuses located on the electronic circuit.

To replace them proceed as follows:

INSTRUCTIONS

1. Cut off the power supply.
2. Temporarily remove the guard of the timer ① by unscrewing the fixing screws ②.



3. Spot the fuse to be replaced.
4. Remove the plastic protection.
5. Withdraw the fuse.
6. Replace it with one of same type.

NOMINAL VOLTAGE	230 V $\pm 15\%$	115 V $\pm 15\%$
PROTECTION FUSES	8AF - 250V	12AF - 250V

7. Put in place the protection.
8. Close the timer guard.
9. Give power.

REPAIRS

In case of a malfunction, send the defective part using the original packaging to:

de Götzen® S.r.l.
Via Roma 45
21057 OLGiate OLONA VA ITALY
Tel. +39 0331 376760 r.a.
Fax +39 0331 376763
E-mail: degotzen@degotzen.com

DISPOSAL



The use of the WEEE symbol indicates that this product may not be treated as household waste, but must be treated separately, in conformity to the Directive 2002/96/CE.

By ensuring this product is disposed of correctly, you will help to protect the environment.

For more detailed information about the recycling of this product, please contact your local authority, your house waste disposal service provider or where you purchased the product.

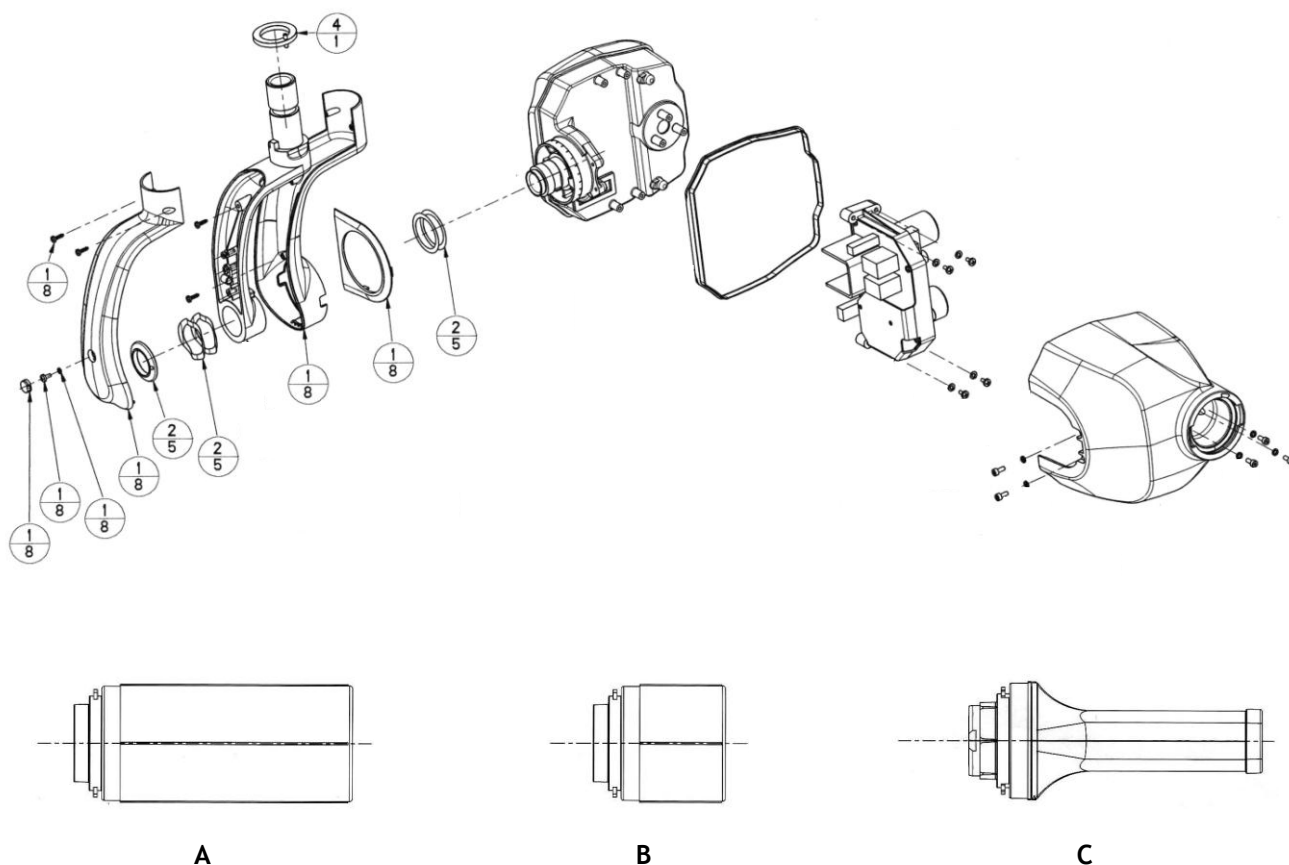


CAUTION

To avoid any risk of environmental contamination, do not dispose of the device and its accessories with household waste materials.

ATTACHMENTS

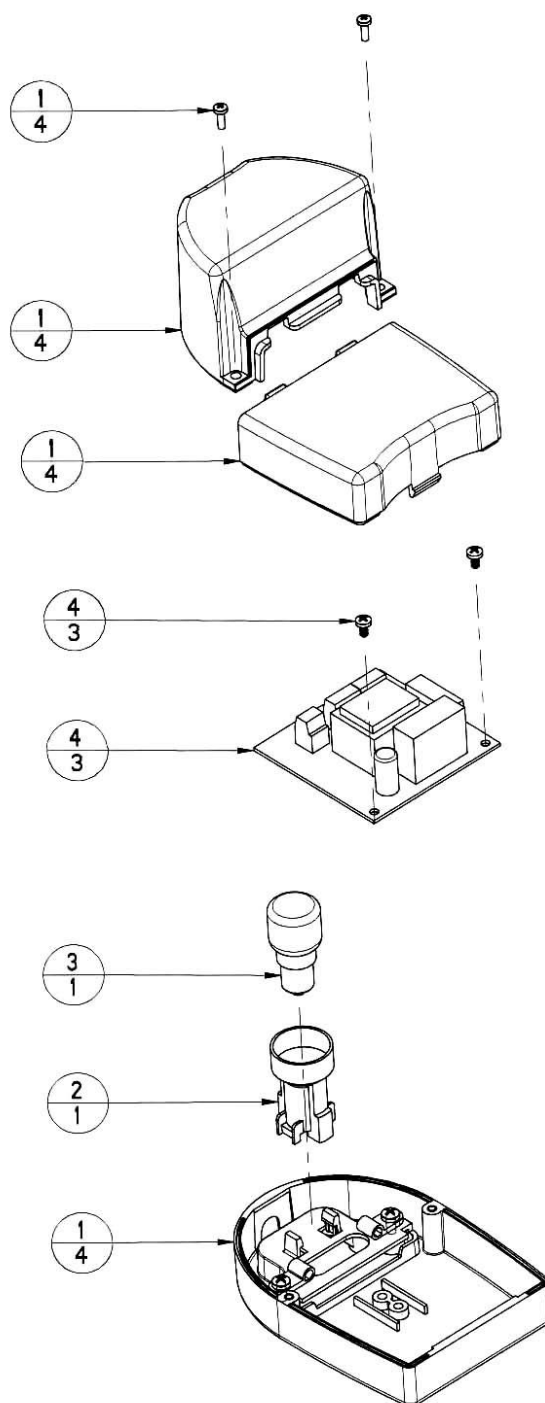
The manufacturer undertakes to supply, upon request, drawings, circuit diagrams, component parts lists, instructions or other information needed by qualified technical personnel to perform repairs on those parts of the “xmind®dc” radiographic system which may be repaired.



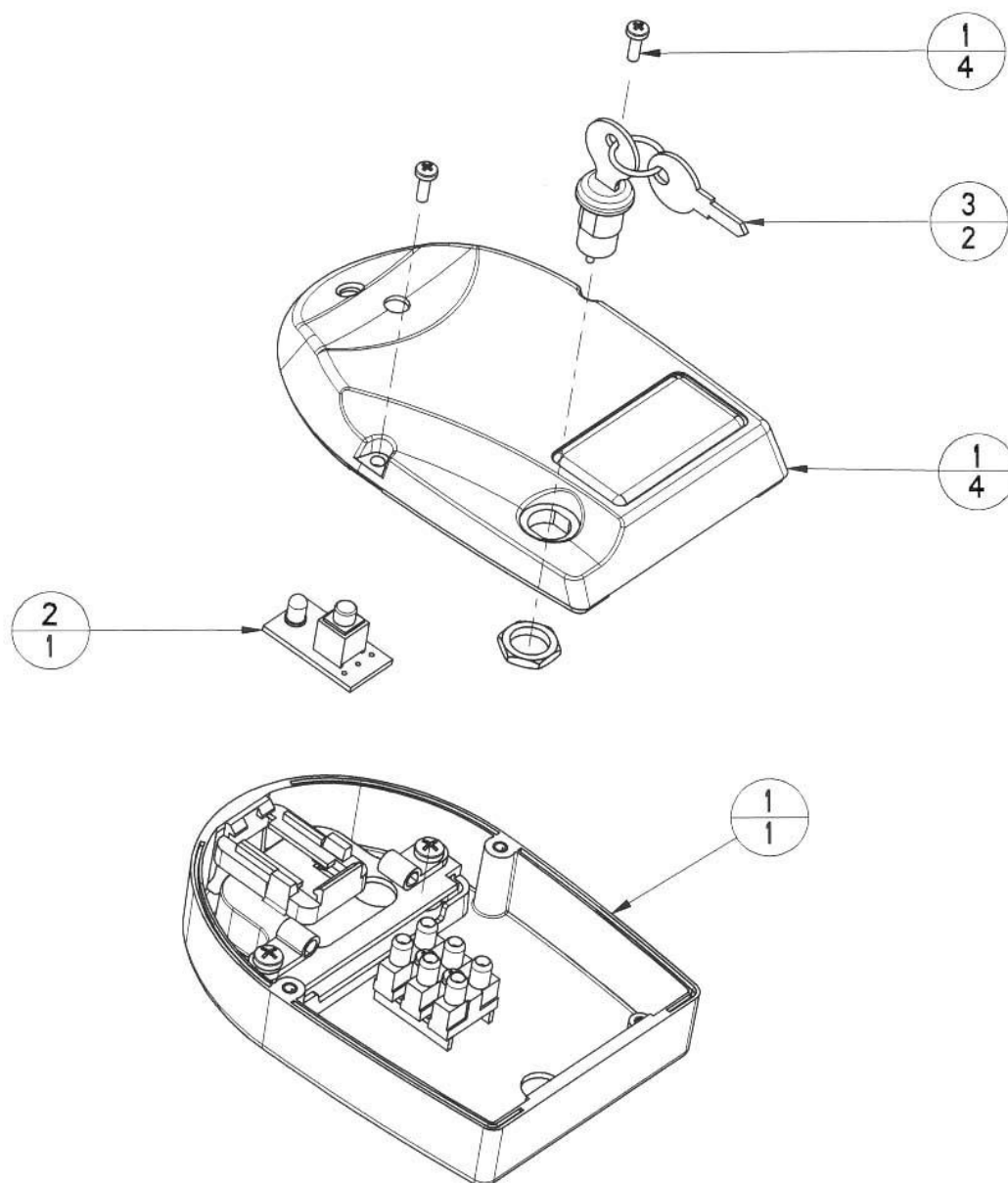
REF	SPARE PARTS TUBEHEAD xmind®dc	CODE	RAL 9010 VERSION	Q.TY PCS
1	AC XG (1) FORK COVER	29700979	29700979.C	8
2	AC/DC XG (2) FORK RING NUT SET	29700980	29700980	5
4	AC/DC XG LIMIT ROTATION r.B	29701298	29701298	1
A	LONG CONE 31cm (12'') Ø60 DEG	29700397	29700397	1
A	LONG CONE 31cm (12'') Ø60 SAT	29701197	29701197	1
B	SHORT CONE 20cm (8'') Ø60 DEG	29700396	29700396	1
B	SHORT CONE 20cm (8'') Ø60 SAT	29701195	29701195	1
C	RECTANGULAR CONE 31cm (12'') 44x35 DEG	29700615	29700615.C	1
C	RECTANGULAR CONE 31cm (12'') 44x35 SAT	29701199	29701199.C	1
A	LONG CONE 31cm (12'') Ø60	29700397	29700397	1
B	SHORT CONE 20cm (8'') Ø60 DEG	29700396	29700396	1
C	RECTANGULAR CONE 31cm (12'') 44x35	29700615	29700615.C	1

CHAPTER 15

ATTACHMENTS



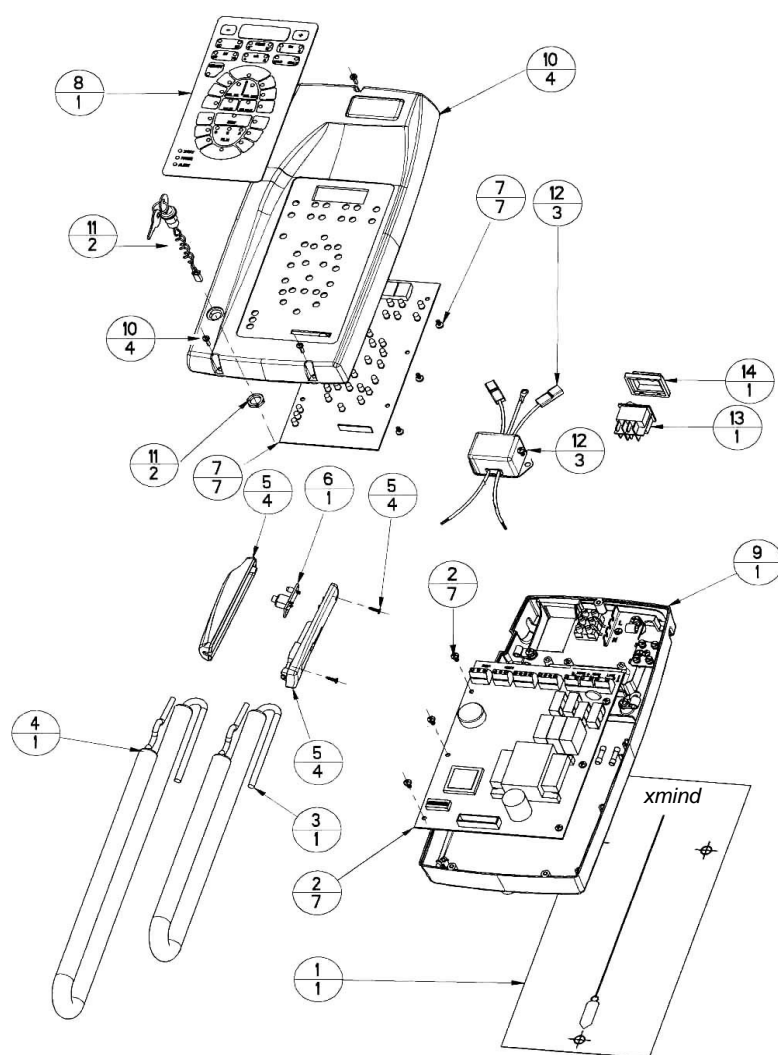
REF	SPARE PARTS xmind® LIGHT (OPTIONAL)	CODE	RAL 9010 VERSION	Q.TY PCS
1	XG LIGHT (1) LOWER & UPPER SHELL	29700977	29700977.C	4
2	XG LIGHT (2) LAMPSOCKET	33400372	33400372	1
3	XG LIGHT (3) LIGHT BULB 230V 15W	33300352	33300352	1
3	XG LIGHT (3) LIGHT BULB 115V 15W	33300390	33300390	1
4	XG LIGHT (4) BOARD 230V	39200354	39200354	3
4	XG LIGHT (4) BOARD 115V	39200353	39200353	3



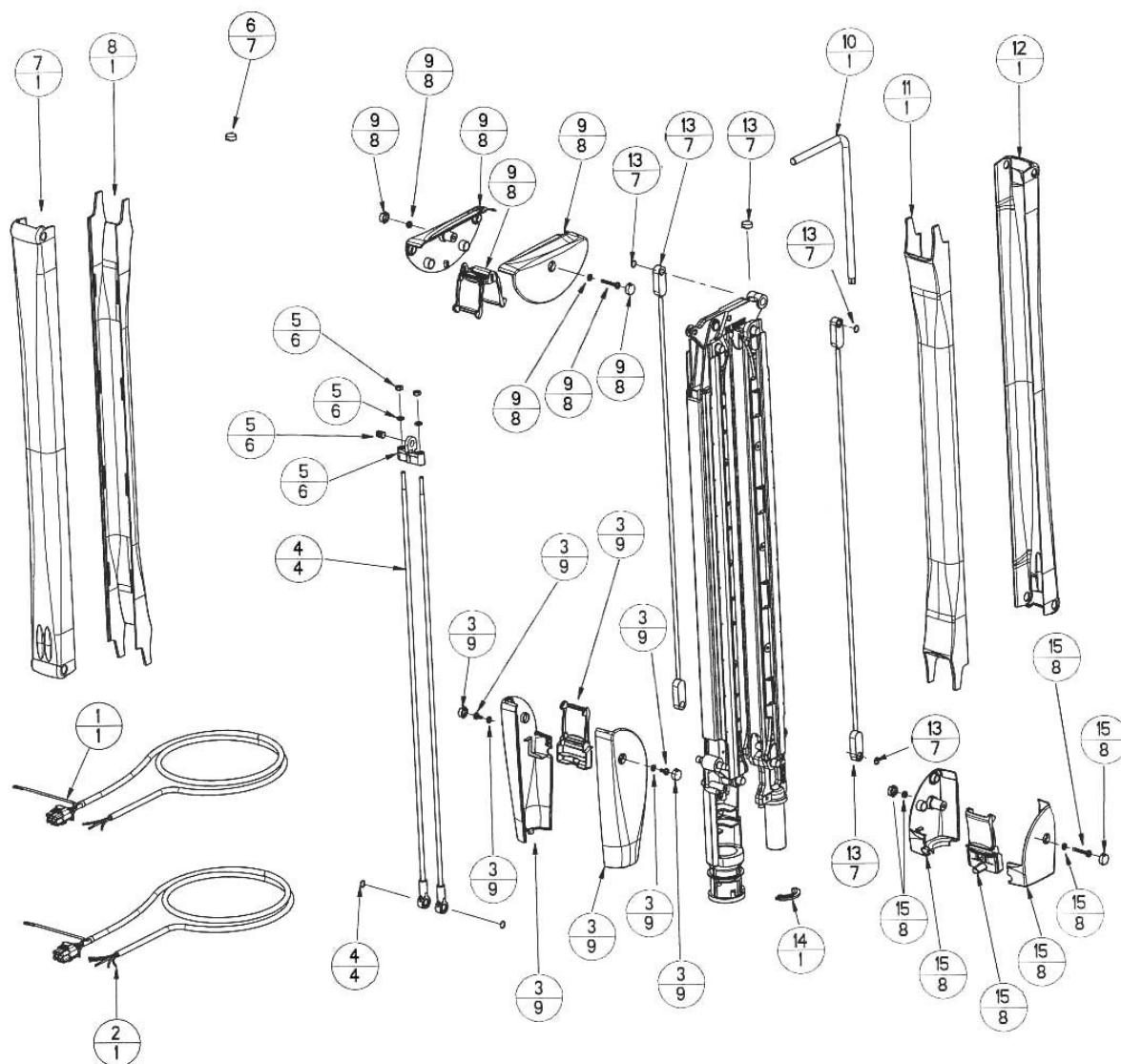
REF	SPARE PARTS xmind® ECB (OPTIONAL)	CODE	RAL 9010 VERSION	Q.TY PCS
1	XG ECB (1) LOWER & UPPER SHELL	29700978	29700978.C	4
2	CONTROL BOARD WITH BUTTON AND LED	39700303	39700303	1
3	XG ECB (3) SWITCH WITH KEY	35100298	35100298	1

CHAPTER 15

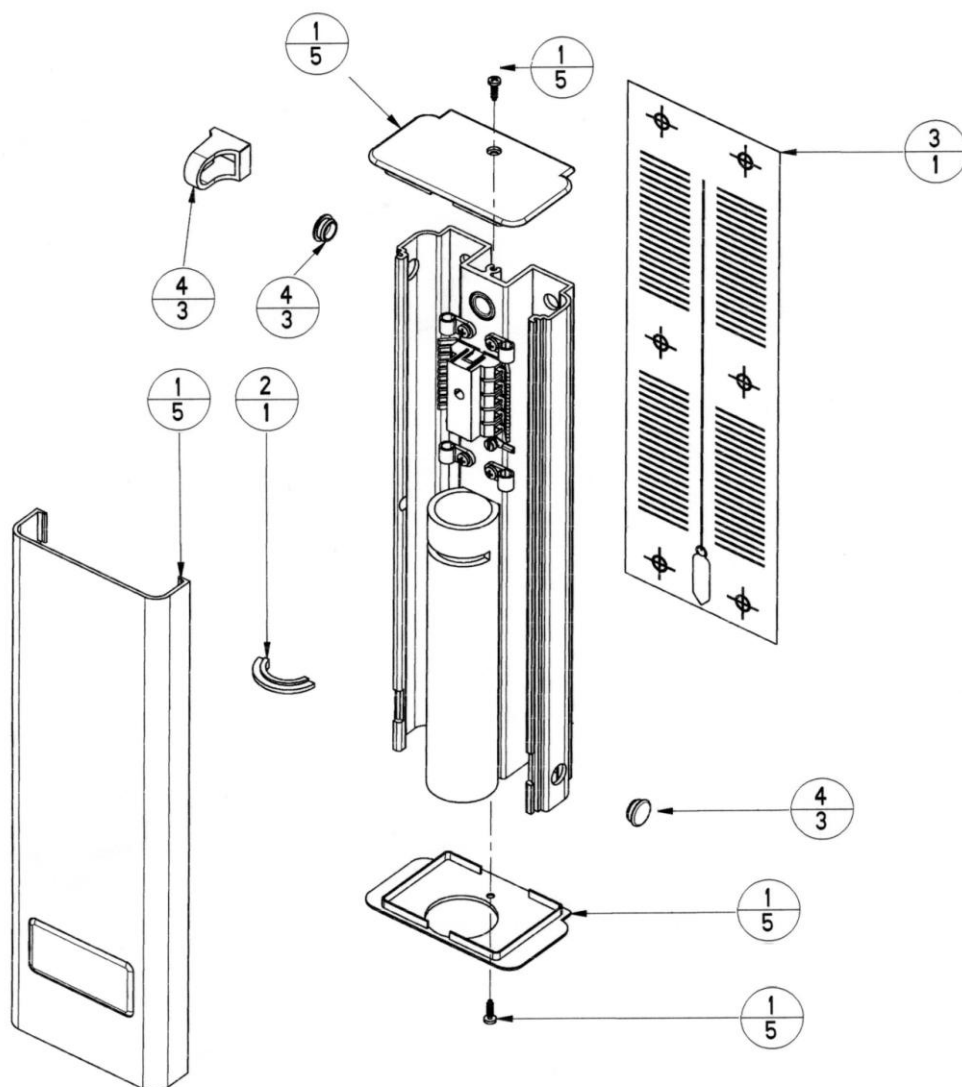
ATTACHMENTS



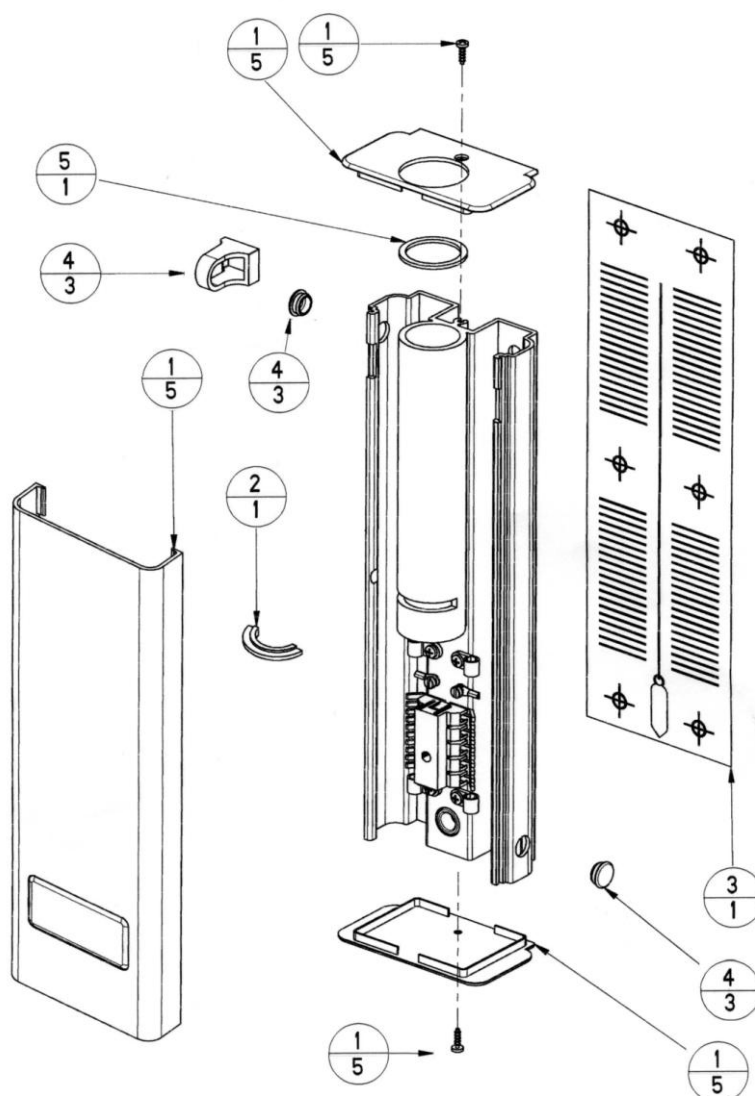
REF	SPARE PARTS TIMER xmind®	CODE	RAL 9010 VERSION	Q.TY PCS
1	AC/DC XG TIMER (1) TEMPLATE	24200883	24200883	1
2	AC/DC XG TIMER (2) CONTROL BOARD	39200306	39200306	7
2	AC/DC XG TIMER (2) US CONTROL BOARD	39200307	39200307	7
3	AC/DC XG TIMER (3) XM COILED CORD	32000325	32000325.C	1
4	AC/DC XG TIMER (4) XM DOUBLE COILED CORD	32000359	N.D.	1
5	AC/DC XG TIMER (5) ACTIVATING CASE	29700974	29700974.C	4
6	AC/DC XG TIMER (6) ACTIVATING BOARD	39700303	39700303	1
7	AC/DC XG TIMER (7) EXPOSURE INDICATOR LED	39200313	39200313	7
8	AC/DC XG TIMER (8) KEYBOARD DEG	39200308	39200510	1
8	AC/DC XG TIMER (8) KEYBOARD SAT	39200309	39200309	1
9	AC/DC XG TIMER (9) CASE	29700975	29700975.C	1
10	AC/DC XG TIMER (10) COVER DEG	29700304	29700304.C	4
10	AC/DC XG TIMER (10) COVER SAT	29700976	29700976.C	4
11	KEY BLOCK	39700305	39700305	2
12	DC XG TIMER (12) FILTER	36200382	36200382	3
13	BIPOlar SWITCH WITH GREEN LIGHT	35000044	35000044	1
14	BIPOlar SWITCH PROTECTION	33500228	33500228	1



REF	SPARE PARTS PANTOGRAPH TYPE ARM xmind®	CODE	RAL 9010 VERSION	Q.TY PCS
1	AC XG B (1) CABLE + CONNECTOR 3 POLES	39700384	39700384	1
2	DC XG B (2) CABLE + CONNECTOR 5 POLES	39700381	39700381	1
3	AC/DC XG B (3) TUBEHEAD SIDE SHELLS	29700990	29700990.C	9
4	FRONT PANTOGRAPH TYPE ARM ROD	29700460	29700460	4
5	PANTOGRAPH TYPE ARM TIE ROD HOLDER	29700458	29700458	6
6	AC/DC XG B (6) PLUGS (SET)	29700991	29700991.C	7
7	AC/DC XG B (7) EXTERNAL COVER	27500757	27500757.C	1
8	AC/DC XG B (8) INTERNAL COVER	27500758	27500758.C	1
9	AC/DC XG B (9) CENTRAL SHELLS	29700993	29700993.C	8
10	PANTOGRAPH TYPE ARM LOADING KEY	22000543	22000543	1
11	AC/DC XG B (11) INTERNAL COVER	27500758	27500758.C	1
12	AC/DC B (12) EXTERNAL COVER	27500757	27500757.C	1
13	BACK PANTOGRAPH TYPE ARM ROD	29700992	29700992	7
14	AC/DC XG B & HALF-MOON PLATE	22000176	22000176	1
15	AC/DC B (15) BRACKET SIDE SHELLS	29700994	29700994.C	8



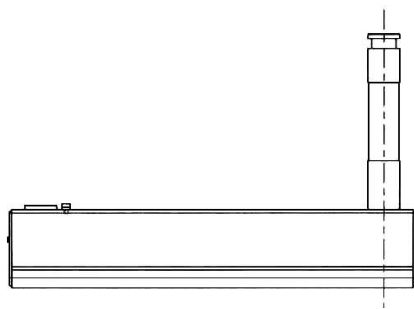
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1	COVER (1) PLATE DEG	29700985	29700985.C	5
1	COVER (1) PLATE SAT	29700986	29700986.C	5
2	AC/DC XG B & HALF-MOON PLATE	22000176	22000176	1
3	PLATE (3) TEMPLATE	24200984	24200984	1
4	PLATE (4) INSERT + PLUGS	29701036	29701036.C	3
	WALL PLATE 350 DEG	29700383	29700383.C	COMPLETE
	WALL PLATE 350 SAT	29700384	29700384.C	COMPLETE



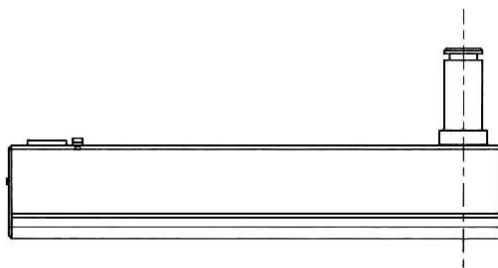
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1	COVER (1) PLATE DEG	29700985	29700985.C	5
1	COVER (1) PLATE DEG	29700986	29700986.C	5
2	AC/DC XG B & HALF-MOON PLATE	22000176	22000176	1
3	PLATE (3) TEMPLATE TOP MOUNT	24201002	24201002	1
4	PLATE (4) INSERT + PLUGS	29701036	29701036.C	3
5	PLATE (5) COLLAR TOP MOUNT	22000597	22000597	1
	WALL PLATE 350 TOP DEG	29700988	29700988.C	COMPLETE
	WALL PLATE 350 TOP SAT	29700385	29700385.C	COMPLETE

CHAPTER 15

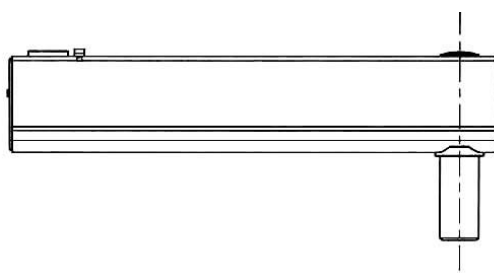
ATTACHMENTS



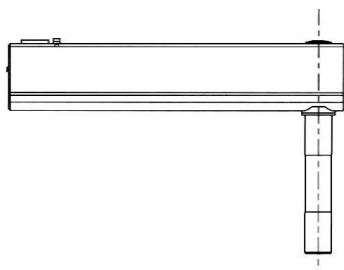
REF	SPARE PARTS BRACKET	CODE	RAL 9010 VERSION	Q.TY PCS
	BRACKET 400	29700380	29700380.C	COMPLETE
	BRACKET 800	29700378	29700378.C	COMPLETE
	BRACKET 1100	29700379	29700379.C	COMPLETE



REF	SPARE PARTS BRACKET	CODE	RAL 9010 VERSION	Q.TY PCS
	CEILING BRACKET	29700382	29700382.C	COMPLETE



REF	SPARE PARTS BRACKET	CODE	RAL 9010 VERSION	Q.TY PCS
	UNIT BRACKET	29700381	29700381.C	COMPLETE



REF	SPARE PARTS BRACKET	CODE	RAL 9010 VERSION	Q.TY PCS
	TOP MOUNT BRACKET 400	29700620	29700620.C	COMPLETE
	TOP MOUNT BRACKET 800	29700621	29700621.C	COMPLETE
	TOP MOUNT BRACKET 1100	29700622	29700622.C	COMPLETE

