TC400 Mk I

WALL MOUNTED RADIANT WARMER

July 1995

THERMACOT

TC400/W Mk I

DESIGNED AND MANUFACTURED IN ENGLAND

BY

APPLEYARD AND SONS
29 BATTER LANE, RAWDON
LEEDS, LS19 6EU
(01132 502917)

Sole Agents for Sales and Service

VIAMED
15 Station Road, Crosshills
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England
(01535 634542)

APPLEYARD AND SONS will only accept responsibility for the safety, reliability and performance of the equipment if:-

Assembly, operations, repairs and modifications are carried out by authorised engineers.

The electrical installation of the relevant room complies with the 'Regulations For Electrical Equipment Of Buildings' PUBLISHED BY THE INSTITUTE OF ELECTRICAL ENGINEERS.

The mechanical installation complies fully with the instructions supplied The equipment is used in accordance with the instructions for use

THERMACOT TC400/W Mk I

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ILLUSTRATIONS

The THERMACOT
Front and rear panels
Circuit diagram
Radiant warmer (exploded diagram)

1.0 WARNINGS

The TC400 THERMACOT must be earthed at all times during operation.

Lethal voltages exist within the radiant warmer, always switch off the mains power before removing the access cover of the radiant warmer.

During periods of prolonged usage of the radiant warmer, some areas of the outer cover may become warm, therefore, caution should be exercised when handling the heater housing.

The ventilation louvres of the radiant warmer must never be obstructed and under no circumstances should any blankets, sheets, etc., be draped over the radiant warmer

2 .0 SAFETY PRECAUTIONS

Ensure that the electrical installation of the room complies with the 'Regulations For Electrical Equipment Of Buildings' PUBLISHED BY THE INSTITUTION OF ELECTRICAL ENGINEERS.

It is recommended that the patients temperature is monitored during operation.

Before connecting the unit to the mains ensure that the radiant warmer power cable and mains plug are undamaged

Should the THERMACOT TC400 malfunction, immediately disconnect from the mains supply and contact an authorised engineer.

The THERMACOT TC400 must never be operated with any of the covers removed, except by an authorised engineer. All maintenance, modifications and adjustments are only to be carried out by an authorised engineer.

The Thermacot lower face and grill will become hot when in use. Care should be exercised when attending the patient that excessive heat does not effect the users head. Care should be taken to ensure neither hair nor hats/caps etc. come into contact with the heater grill.

The Grill must be at least 72cm above the mattress at all times whilst heater is switched on.

3.0 TECHNICAL DATA

3.1 Overall dimensions (nominal)

Length	900mm
Width	100mm
Height	100mm
Weight	7.6 Kg
Wall Plate	3.5 Kg

Minimum Heater operating height above baby 720mm

3.2 Specification

Power supply (input) 240v, 50Hz (mains)
Protection against electric shock :-
Type Class I
Degree Type B

Mode of operation Continuous
Heater rating 240v - 400 watts nominal
Heater element Tubalox element Incalox sheathed
Fuse type 20mm cartridge (20x5mm)
Fuse rating 2 amp antisurge Time delay (T)

Temperature rise within mattress area Approx. 10 degrees above ambient (nominal) with heat control set to maximum

3.3 Electrical safety

Designed to comply with BS5724;Part 1 regarding the safety of electrical medical equipment.

4.0 GENERAL DESCRIPTION

The THERMACOT TC400 is a mobile cot and integral radiant warmer, designed to provide a simple, effective method of reducing radiant heat loss from infants nursed on the paediatric ward, special care baby units and maternity units.

The 400 watt radiant warmer is wall mounted at a fixed height above the cot mattress. It is operated by a mains power switch and a variable heat control, which facilitates the reduction of heater output when required and enables standby operation.

The combination of a 400 watt heating element and an effective reflector, ensures a safe and uniform warmth within the cot area, raising the surface temperature by about 10 c above the ambient temperature at maximum output.

The THERMACOT TC400/W may be supplied with resuscitation cabinet and resuscitation equipment

5.0 INSTRUCTIONS FOR USE

Prior to operating the THERMACOT TC400 the warnings and safety precautions printed on page 4 MUST be observed.

5.1 Operation of the radiant warmer

The THERMACOT TC400 has been designed for continuous operation. Connection to a suitable 240v 50Hz mains supply is required, and the equipment MUST be earthed to a suitable safety earth via the non-detachable mains cable.

Mains cable colour code:-
Brown.....Live
Blue.....Neutral
Green/Yellow....Earth

Two controls are situated on the front panel of the radiant warmer, these are:-

1. Illuminated On/Off switch
2. Variable temperature control

Before switching the radiant warmer on, turn the temperature control knob anti-clockwise to the MIN position.

To switch the radiant warmer on, depress the green rocker towards the T symbol. The switch will now be illuminated, indicating that power is available to the heating element.

Rotate the temperature control knob clockwise to the desired temperature setting. (NB. The type of heating element fitted to the radiant warmer does not respond instantaneously to changes of the temperature control.) It is recommended that the patients temperature is monitored during operation.

To switch the radiant warmer off, depress the green rocker switch towards the 'O' symbol. The switch will not be illuminated.

Whenever the THERMACOT TC400 is switched off disconnect the mains input from the supply.

6.0 User Maintenance

Regularly monitor the THERMACOT TC400 during its operation to ensure satisfactory functioning.

Check the power switch is illuminated
Check that the louvres of the radiant warmer are not obstructed and there are no indications of unit overheating
Check the mains supply cable is not trapped or damaged
Report all faults immediately to an authorised engineer.

It is recommended that the THERMACOT TC400 should be inspected by an authorised engineer at intervals not exceeding six weeks.

6.1 Recommended cleaning

The Radiant warmer housing must only be wiped clean with a DAMP cloth, and dried thoroughly. Never allow the ingress of water into this unit.

7.0 TECHNICAL DESCRIPTION

The THERMACOT TC400/W radiant warmer is mounted at a fixed distance of 72cm above the mattress top. Housed within the radiant warmer is a 400 watt Incalox sheathed Tubalox element, the
output of the element is sufficient to raise the temperature of the mattress area by approximately 10c above the ambient air temperature.

The heater element is controlled by a double pole illuminated rocker On/Off switch and a temperature controller mounted on the front panel of the radiant warmer.

The temperature controller, is a 15 Amp encapsulated pulse firing controller, which maintains the output of the heating element at any set level to a maximum of 400 watts.

The radiant warmer is protected by two 2 Amp anti-surge time delay (T) 20 x 5mm cartridge fuses housed in low profile fuseholders located on the rear panel.

8.0 CIRCUIT DIAGRAM

The 240v 50Hz mains input voltage is fed via the rewireable non-detachable mains cable to barrier terminal block TB1.
The protective earth of the mains cable is attached to the cot frame, a protective earth conductor links the cot frame to TB1. From TB1 protective earth conductors bond the power controller, heater hosing radiant warmer chassis and the Incalox sheath of the heating element.

Tri-rated live and neutral conductors feed the mains voltage from TB1 via 2 Amp anti-surge time delay fuses F1/F2 and a double pole illuminated switch to the live and neutral input terminals of the pulse firing power controller.

The duty cycle of the output triac of the power controller is controlled by an internally generated square wave with an adjustable mark-space ratio which is varied using the potentiometer RV1 to achieve a range of duty cycle from 0% - 100%. Triac switching takes place ar the zero voltage on each cycle virtually eliminating any ratio frequency interference.

The live and neutral outputs of the power controller are fed to the resistive 400 watt Tubalox heating element via high temperature appliance conductors.

9.0 MAINTENANCE INSTRUCTIONS

ROUTINE MAINTENANCE, ASSEMBLY, REPAIRS, ADJUSTMENTS AND MODIFICATIONS ARE ONLY TO BE CARRIED OUT BY AUTHORISED ENGINEERS.

It is recommended that the following maintenance routine should be carried out at intervals not exceeding six weeks.

a. Thoroughly clean the exterior and interior of the radiant warmer.
b. Inspect the mains plug, mains cable, and radiant warmer for damage.
c. Inspect all connectors and conductors within the radiant warmer for security and damage.
d. Carry out earth leakage tests in accordance with BS5724:PART 1. (IEC601)
e. Carry out insulation tests in accordance with BS5724:PART1. (IEC601)
f Functionally test the radiant warmer to ensure satisfactory operation.

9.1 Replacement of Fuses

a. Disconnect the THERMACOT TC400/W from the mains supply.
b. Fuse holders F1 and F2 are situated on the rear panel of the radiant heater.
c. Using a suitable screwdriver unscrew the slotted fuse cap from the low profile fuseholder.
d. After ascertaining the cause of a fuse failure, replace defective fuses with B.S.I. approved 2 Amp anti-surge time delay(T) 20 x 5mm cartridge fuses.

9.3 Removal of the Radiant Warmer Heater

1. Disconnect the THERMACOT TC400 from the mains supply.
2. Remove screw pins on wall bracket

9.4 Replacement of the Heater Element

REPLACEMENT HEATING ELEMENT KITS ARE ONLY AVAILABLE FROM:- VIAMED, 15 STATION ROAD, CROSSHILLS, KEIGHLEY, W. YORKSHIRE. ENGLAND TEL 01535 634542 AND SHOULD ONLY BE REPLACED BY A COMPANY SERVICE ENGINEER OR OTHER AUTHORISED ENGINEER.

a. Carry out the procedure 9.3 "Removal of the Radiant Warmer".
b. Cut away the heat shrink tubing from the spade terminals at each end of the heater element.
c. Disconnect the high temperature conductors from the element by pulling off the spade terminals.
d.. Unscrew the four screws holding the heater housing to the radiant warmer inner mounting plate then pull the heater housing clear.
e. Using a spanner unscrew the heater element clamp nut and withdraw the element from the heater housing, remove the 'olive' from the element.
f.. Pass the replacement element into the heater housing, refit the 'olive', replace and tighten the element clamp nut. Ensuring that there is a minimum of 4mm between each end of the element and the element holder/clamp.
g.. Re-attach the heater housing to the radiant warmer mounting plate
h.. Pass the replacement heat shrink tubing over the high temperature conductors and push the spade connectors onto the element terminals. Using a suitable heat gun, shrink the heat shrink tubing over the exposed metal terminals.

10.0 SERVICING AND SPARES

All servicing of the THERMACOT TC400 is only to be carried out by suitably qualified personnel, instructed in the operation and maintenance of the THERMACOT TC400 and approved by a representative of the manufacturer or his agent. Servicing information, assistance and spares may be obtained by contacting:- VIAMED Ltd

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Parts List

Drg. No	Item	Part No
	Radiant Heater unit	2000
1	Cover	2001
2	Screw	2002
3	Mounting Plate	2003
4	Screw	2004
5	Washer	2005
6	Nut	2006
7	Insulating spacer	2007
8	Power controller	2008
9	Knob	2009
10	Switch	2010
13	Nut	2013
14	Fuse Holder	2014
15	Terminal Block	2015
16	Radiant cover	2016
17	Reflector	2017
18	400watt element	2018
19	Element holder	2019
20	Grille	2020
		File =TC400WM

Installation Instructions for TC400/w
&
Resuscitation Cabinet

Both the Cabinet and heater head are heavy and care must be taken to ensure the units are safely fixed to the wall with adequate load bearing components (not supplied by Viamed.). The wall surface should be flat and even.

There are several suggested methods available the most suitable depending on the wall composition and techniques used in its construction.

Wood screws into wood or wood composite materials

Wall bolts into stone or concrete walls

Through-the-wall bolts with a backing plate for composite block walls which will not accept screws or bolts.

The method to be used must be governed solely by the type of wall to which the units are to be fixed and must be determined by the local installer with knowledge of the wall construction. The suggested methods above are not the only methods available but are methods successfully used in the past.

Viamed accepts no responsibility for inadequate wall mounting techniques.

Cabinet.

The weight of the cabinet is approximately 20 Kg.

The shelf may be subject to users resting upon it whilst examining the infants.

Four re-inforced holes are pre-drilled in the rear cabinet wall. Diagram TC002

Height from Floor
The most important height is the distance from the floor to the top of the Bed with mattress. It is vital that this height be specified by the user as it dictates the usability of the resuscitation unit.

As an indication the top of the mattress bed should be at waist height.
This normally places the bottom face of the cabinet at 1.0 - 1.10 metres from the floor. Diagram TC001.

Inputs for Oxygen and suction are located in the centre of the cabinet base allowing access from either side of the cabinet.

Heater unit

The heater unit should be mounted above the cabinet. Diagrams TC001 & TC004

Ideally directly above the bed unit but for aesthetic purposes many users prefer to have the heater central.

The heater unit weighs 7.6Kg and is 90cm long applying forces to the wall with a cantilever action.

For this reason seven mounting holes are provided.

The ideal height above the mattress is 74 cm.

WARNING

THE ABSOLUTE MINIMUM HEIGHT FROM MATTRESS TO HEATER UNIT LOWER FACE MUST NEVER BE LESS THAN 72CM.

In practice most users prefer the heater to be higher allowing more access to the patient.

The aim of the heater unit is to create a curtain of warmth around the patient approximately 10 degrees Celsius above ambient. If the distance between Heater lower face and the mattress top exceeds 84 cm this level of warming may not be achievable depending on ambient conditions.

The wall plate is reversible and offers a height variation of 9 cms. Diagram TC004.

The heater arm rotates through an angle of almost 180 degrees allowing it to be parked against the wall. In order to gain the maximum benefit the centre screw in the heater wall plate should be at least 90 cms from the nearest obstruction. Diagram TC004.

Resuscitation components

Diagram TC005

A. This is the bed area. The bed is fastened to the door with six self tapping screws. It is manufactured in white acrylic with rounded corners to simplify cleaning.

G. the door opens into a horizontal position to act as a work surface.

B. Is the base of the cabinet and is pre-drilled to accept Oxygen and suction hoses. The grommets are deliberately split .

C. The medical rail is adjustable by being mounted on a ladder system. It is possible to remove the spacers and mount the rail closer to the cabinet rear wall This may be necessary if rear mounted components interfere with the mattress when the door is closed.

E. This is a shelf designed to hold a sealed emergency procedure pack

F. A louvred panel to hold Linbins. The system is fairly universal to accept different sizes.

Suction

apparatus because of its size is usually mounted either direct into a suction outlet or onto a medical rail external to the cabinet. By removing the top medical rail spacers in the cabinet the suction unit could be mounted internally.
To do this the yellow hose needs to be removed from the suction unit ,passed through a grommet and re-fitted.. The mattress may have to be removed when the cupboard is closed.

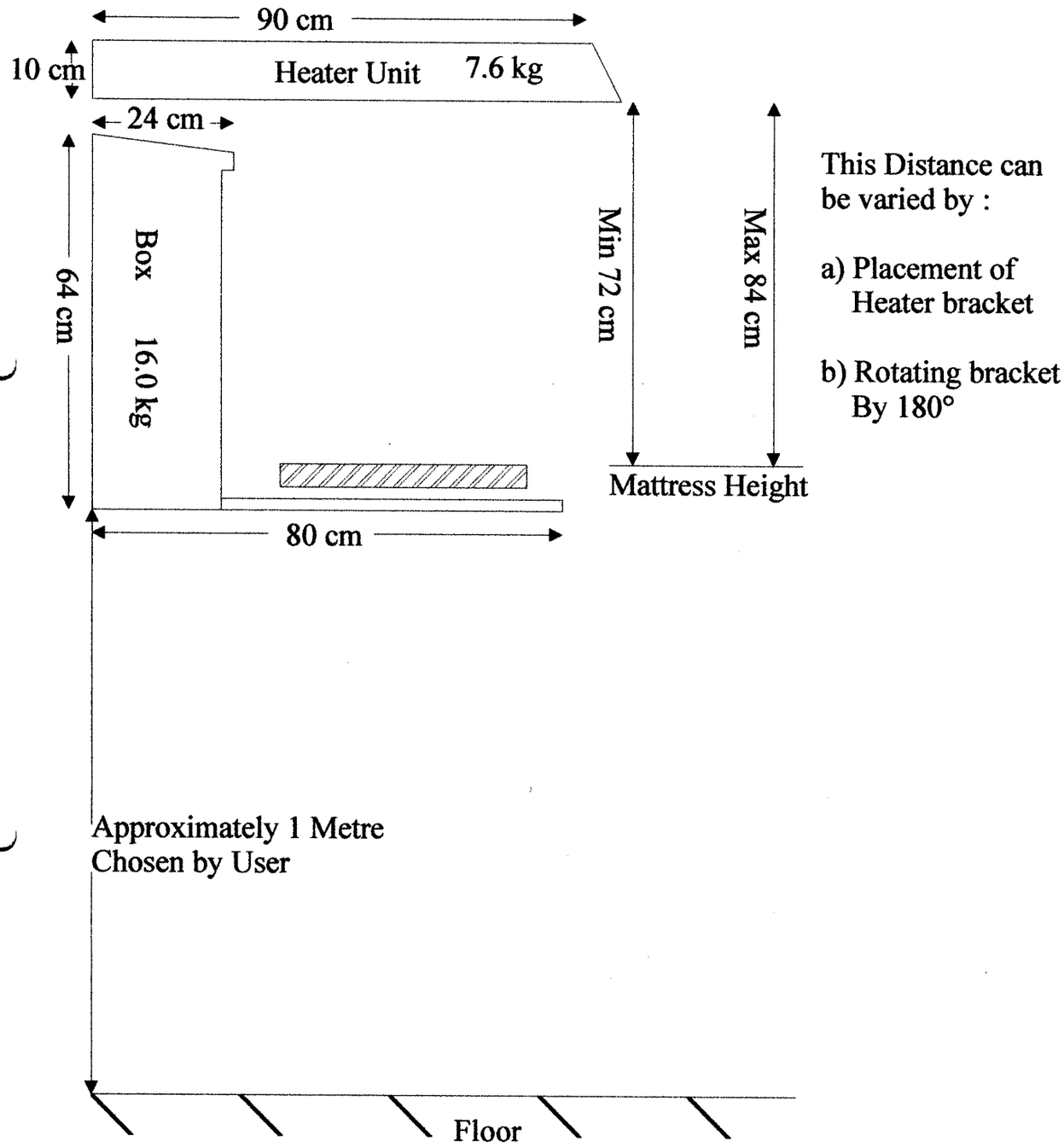
Tom Thumb Resuscitation Unit.

Separate instructions are enclosed for the use and service of this unit.

The mattress has straps with Velcro fastening to hold it to the bed. As an alternative self adhesive strips of Velcro have been supplied to enable the mattress to be removed quickly.
NB. self adhesive Velcro may require renewing at intervals.

TC400WI.
July 1995

TC400R Mounting Position

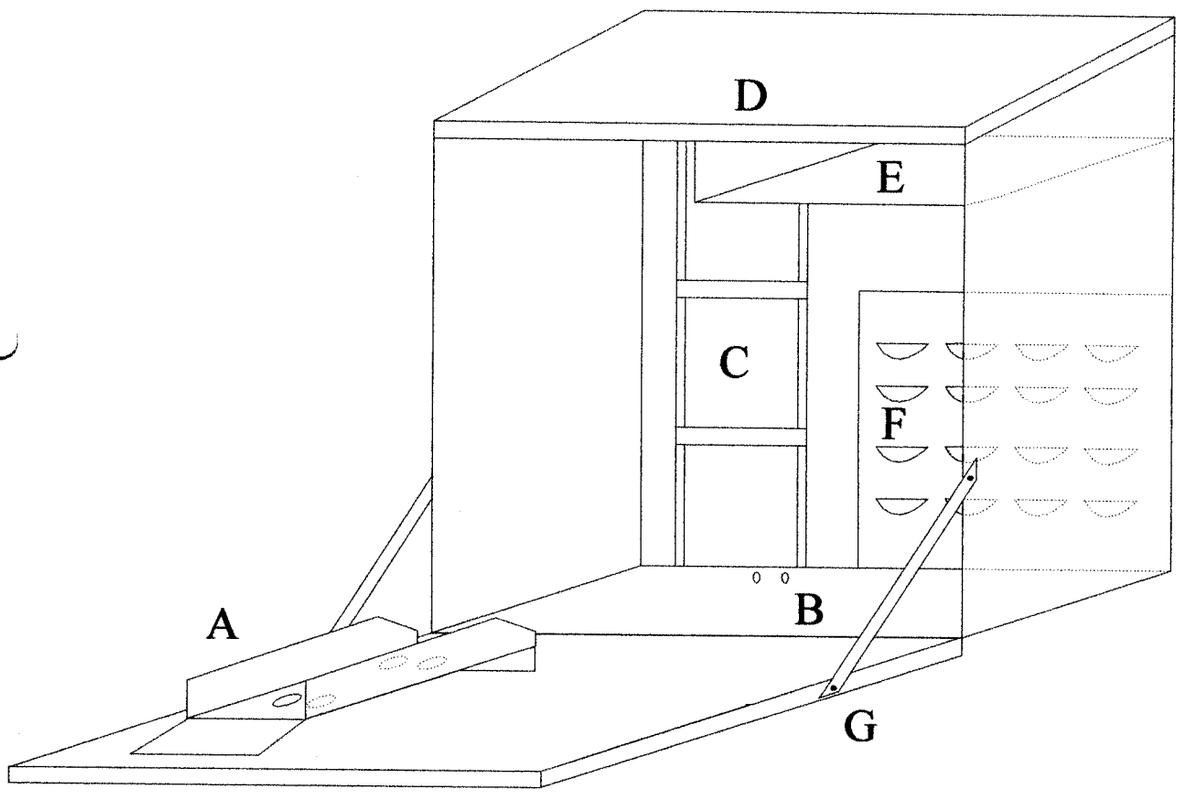


This Distance can be varied by :

a) Placement of Heater bracket

b) Rotating bracket By 180°

Contact	
Date	12-7-95
Hospital	
Engineer	
Diagram	TC001
Scale	1 : 10



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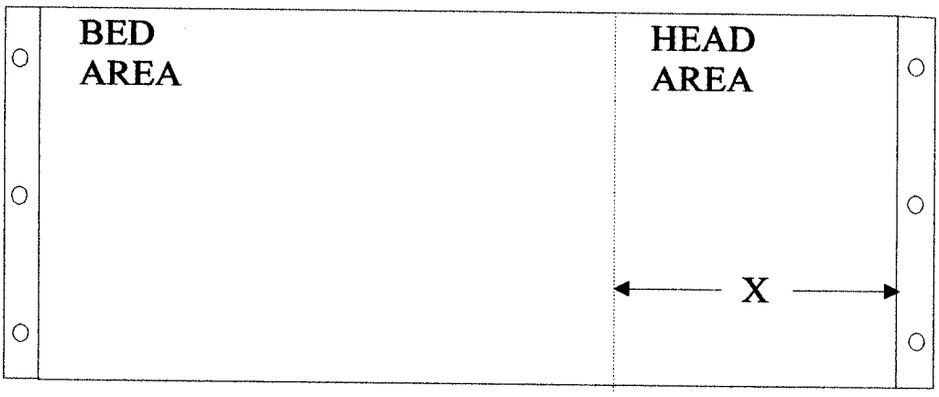
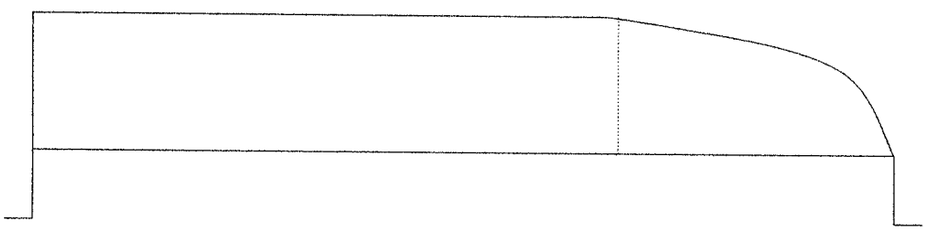
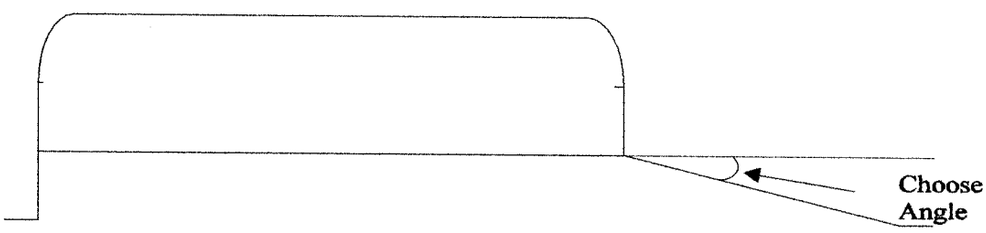
Hospital	
Engineer	
Diagram	TC005
Scale	

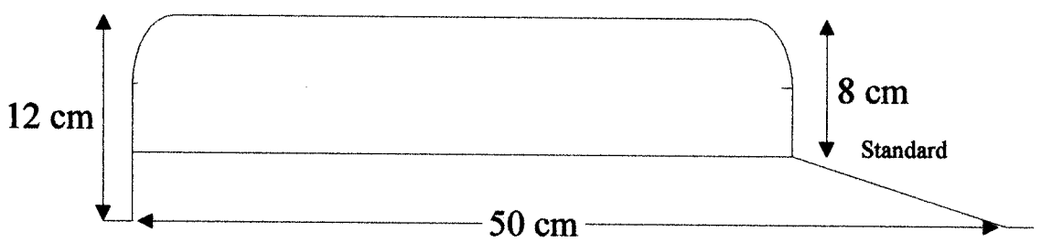
BED STYLE



Choose the length of the head rest X



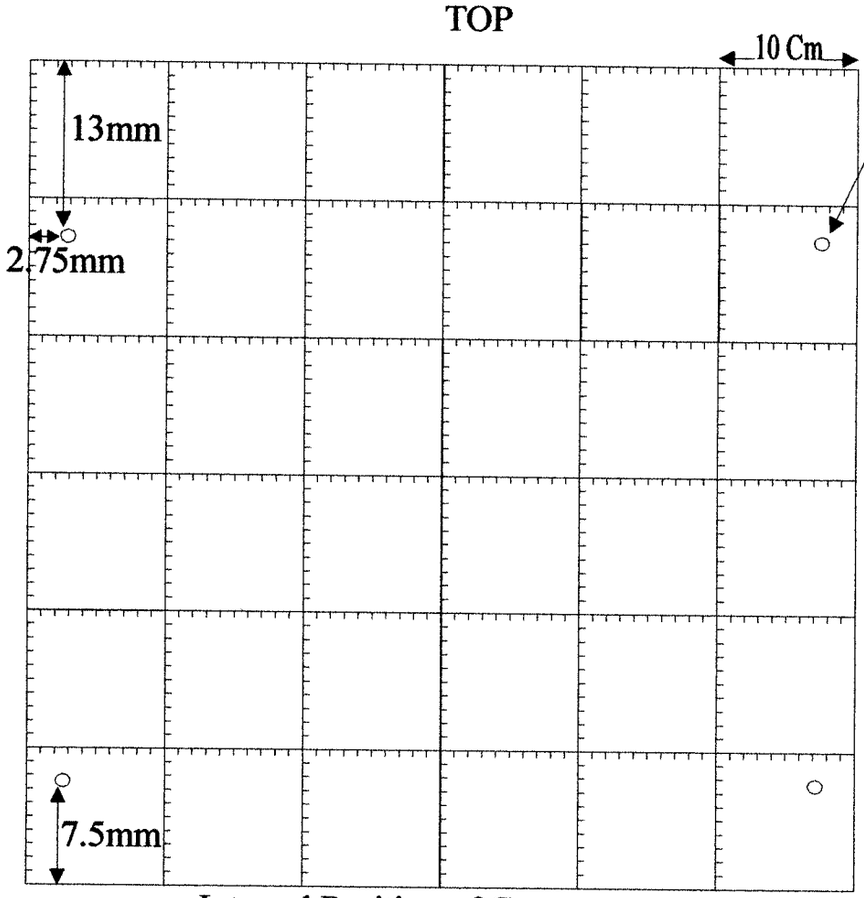




Contact	
Date	12-7-95
Hospital	
Engineer	
Diagram	TC003
Scale	1 : 4

THERMACOT TC400R
CABINET

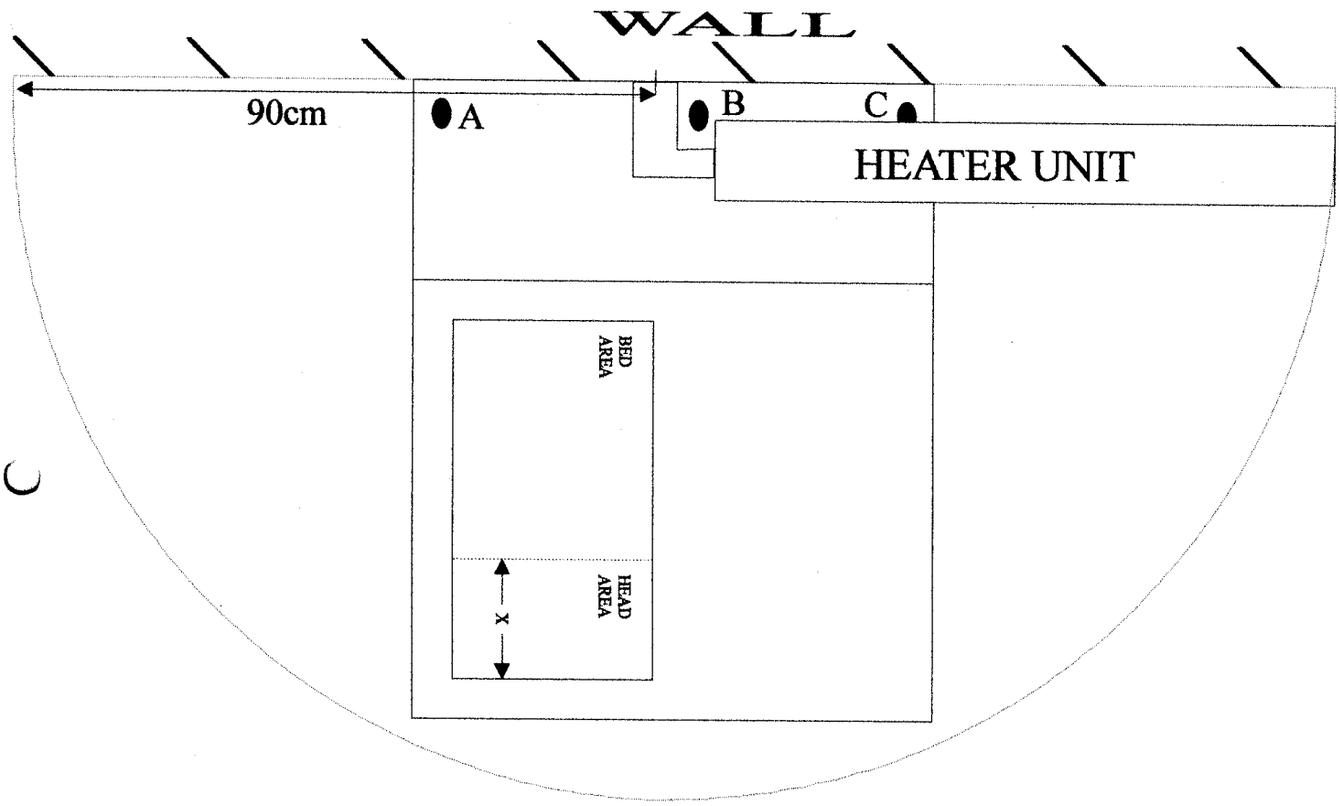
TOP



Internal Position of Components

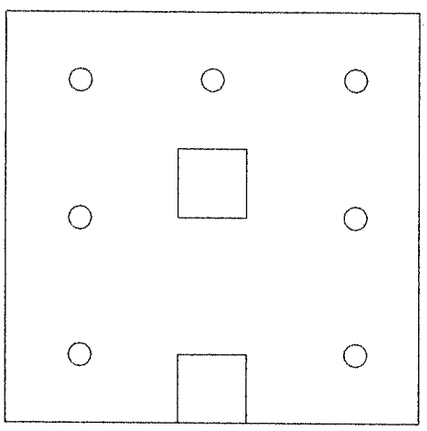
	Tick if required
Mark entry of air hose A	
Mark entry of vacuum hose B	
Mark rear plate cut-outs	
Mark position of medirail LHS	
Mark position of containers RHS	
Mark Position of shelf.	

Contact	
Date	12·7·95
Hospital	
Engineer	
Diagram	TC002
Scale	1 : 5



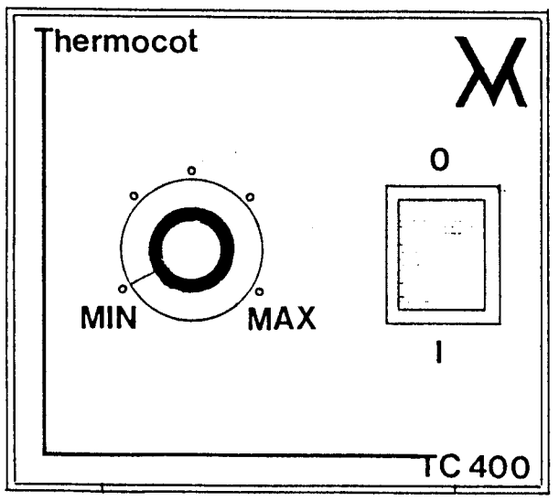
Position of insert Holes
For Oxygen and Suction Hoses

A	B	C
Yes / No	Yes / No	Yes / No



Wall plate for heater
Can be mounted in position shown
i.e. 84cm above the bed
or turned 180° 72cm above the bed

Contact	
Date	12·7·95
Hospital	
Engineer	
Diagram	TC004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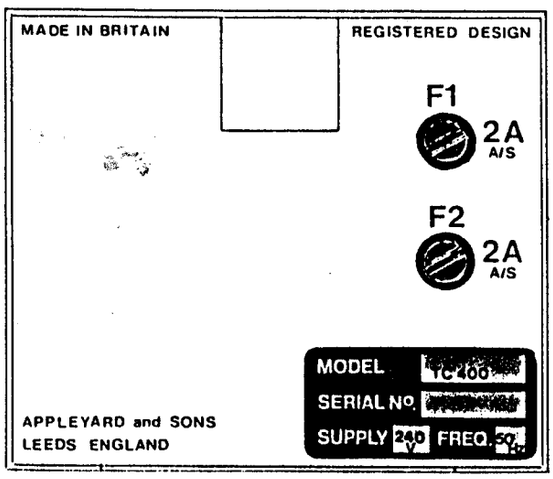
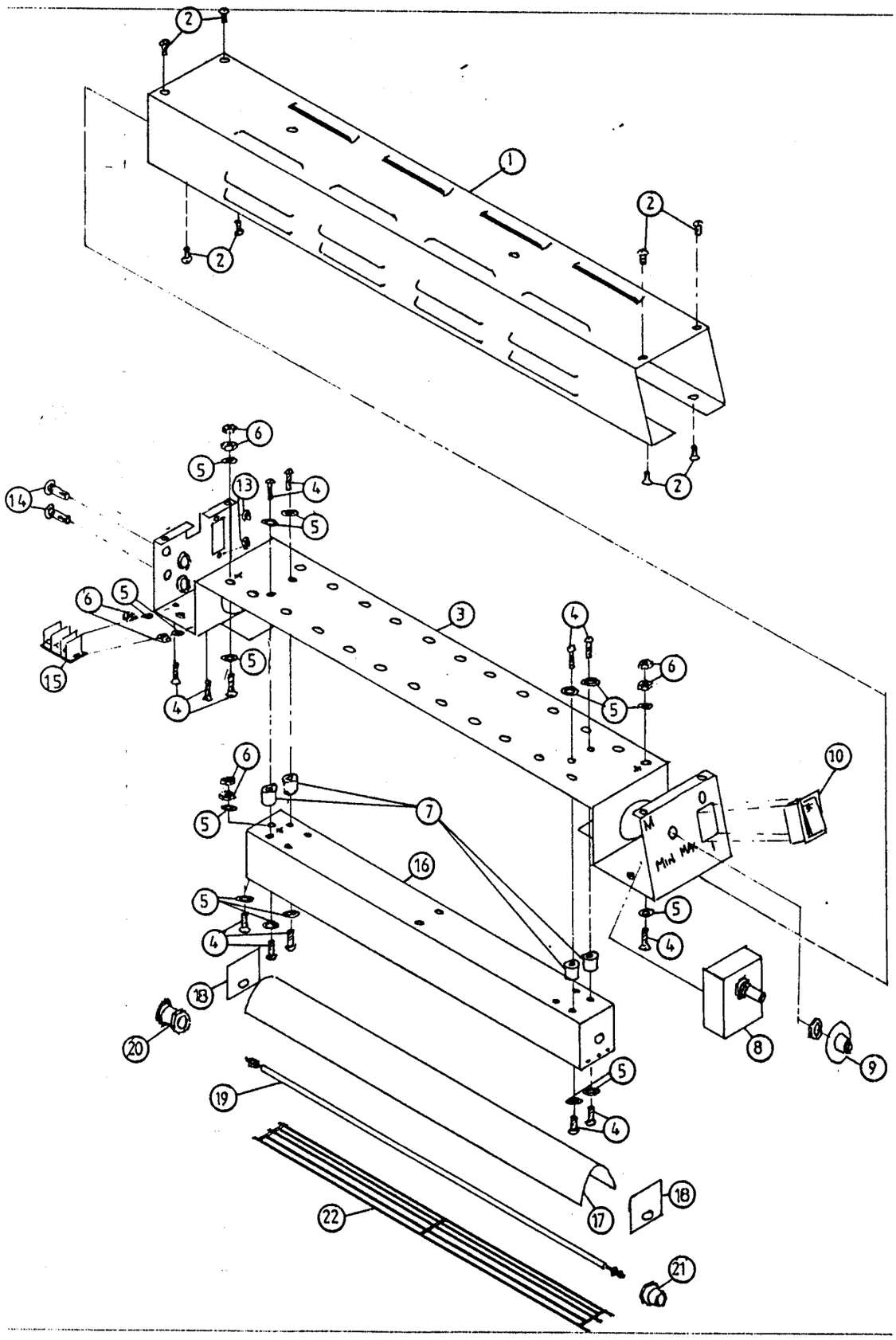

MADE IN BRITAIN
REGISTERED DESIGN
F1
2A
A/S
F2
2A
A/S
MODEL
TC 400
SERIAL No.
SUPPLY 240 V FREQ. 50 Hz
APPLEYARD and SONS
LEEDS ENGLAND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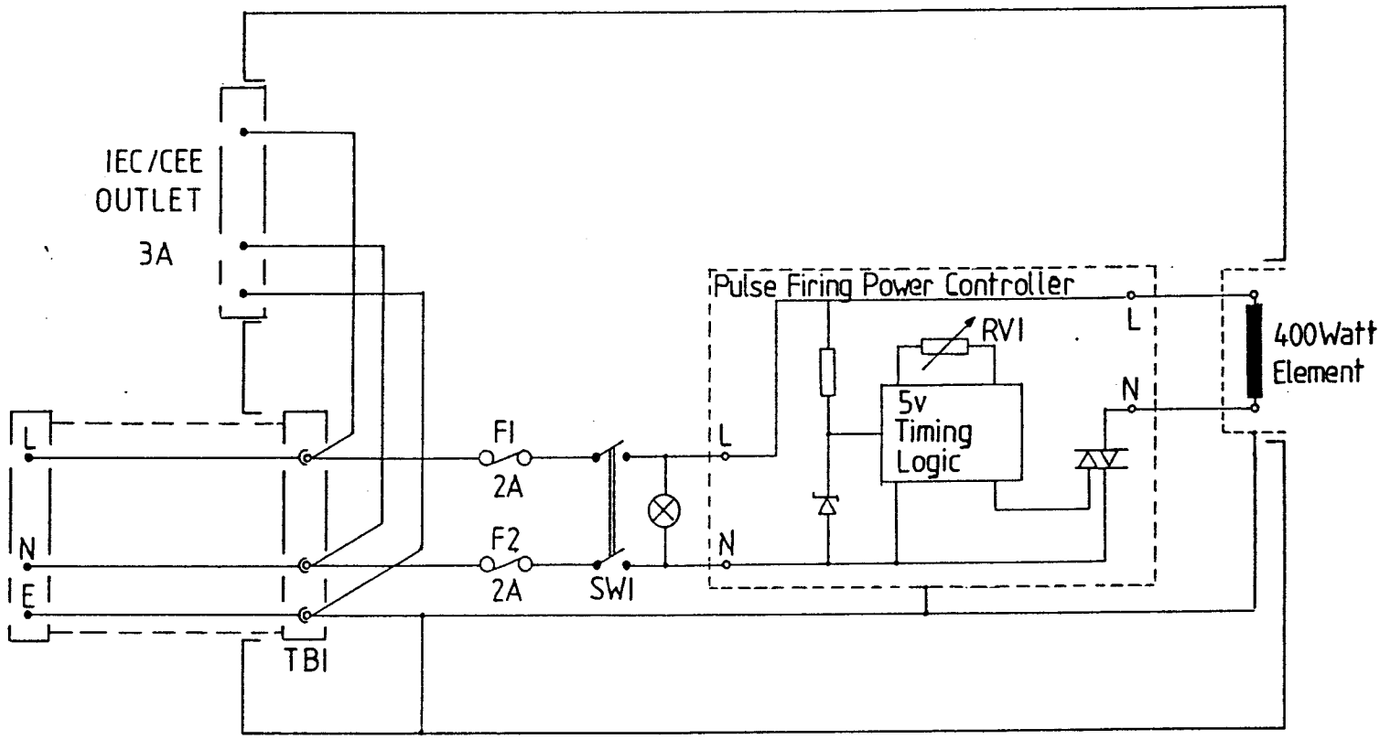
IEC/CEE
OUTLET
3A
L
N
E
TBI
F1
2A
F2
2A
SW1
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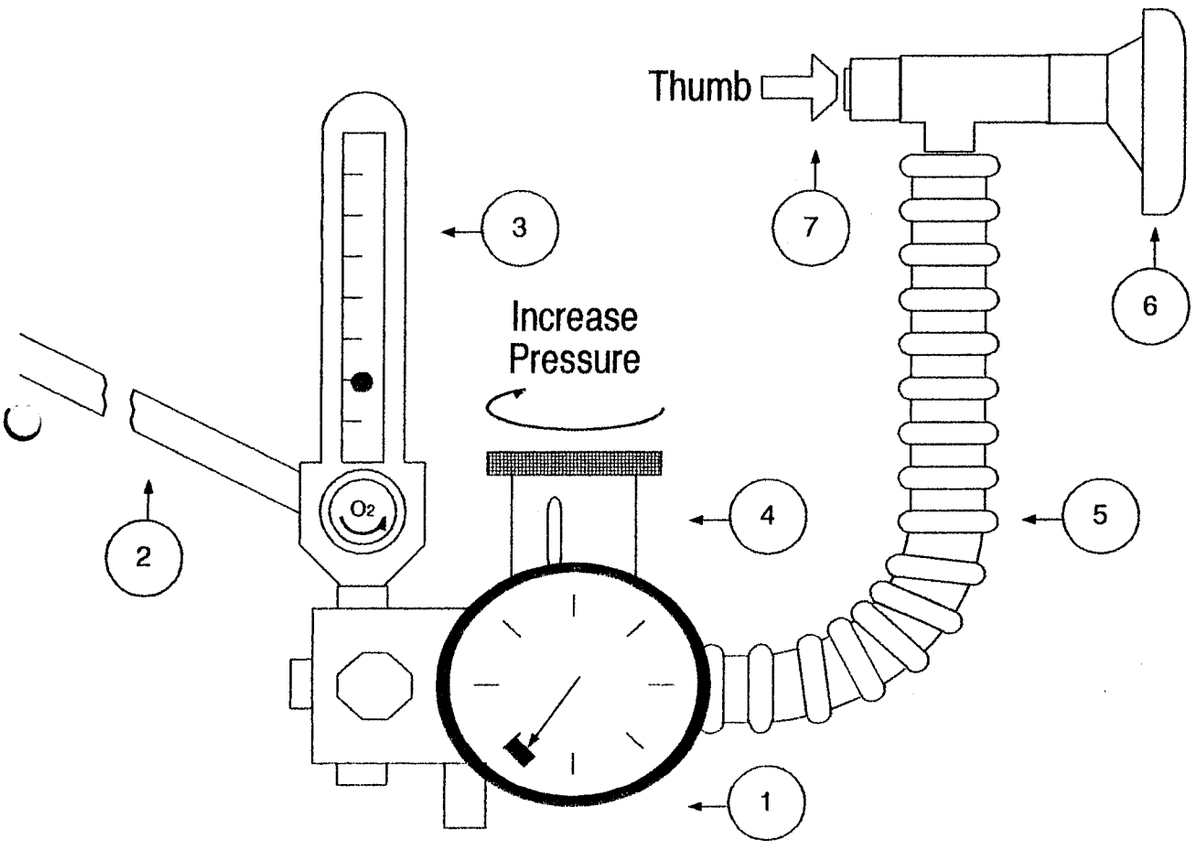
Pulse Firing Power Controller
RV1
5v
Timing
Logic
L
N
400Watt
Element

VIAMED

Tom Thumb TC490



Instructions for use.

(1) Check zero reading correctly on pressure guage. If not correct get guage calibrated.
(2) Attach flowmeter inlet to oxygen supply.
(3) Set flow to 4-6 l/min.
(4) Set blow off pressure on variable control after occluding outlet.
(5) Connect disposable tubing.
(6) Connect silicone mask.
(7) Occlude ect.

Outlets for use with normal Oxygen tubing are available but not advisable. The narrow bore causes falsely high PEEP readings.

In emergency situations the mask could be inadvertently connected directly to a high output flowmeter.

Viamed Limited, 15 Station Road, Cross Hills, Keighley, West Yorkshire BD20 7DT
Tel: 01535 634542 / 636757 Fax: 01535 635582
Registration No. 1291765 in England

Thermacot TC400 Mk1 was designed to comply with BS 5724:Part 1 but, on the warmer examined at BSI, the following points of non-compliance were found against BS 5724: Part 1.

6.1 External symbols missing.	Clause 6.1 All required external symbols are now present and have been checked by BSI.
6.3 Mains switch and heater control not identified with their function.	Clause 6.3 The mains switch and heater controls are now identified with their function and have been checked by BSI.
7.1 Power consumption of unit exceeded rated value when auxillary mains socket in use. 57.1 Mains isolating switch did not isolate appliance outlet. 57.6 The appliance outlet was not fused.	Clauses 7.1,57.1 & 57.6 The auxiliary mains outlet socket has been removed and the energy regulator now has flying leads as opposed to a terminal block so these points are not now relevant.
42.5 Radiant heater guard exceeded 85°C under normal conditions.	Clause 42.5 With refernce to BS5724: Part 1:(1979) clause 42.1 and 42.5, the radiant heater guard did exceed the maximum permitted temperature of 85°C at an ambient temperature of 40°C.The purpose of the Thermacot, however, is to provide radiant heat and this is not correctly taken into account with the present standards. it is assumed that when the BS 5724: Part 2: protocol for non-servo controlled infant radiant warmers is published, that the function of the unit will be taken into account and the appropriate standards will supercede BS 5724: Part 1:(1979) clauses 42.1 and 42.5. The design of the heater enclosure has also been modified and it is hoped that with the improved ventilation and heat conduction away from the element guard that the temperature of the element guard will be reduced
57.4 Replacement of the mains cable required a crimping tool 58.1 Special preparation of mains cable required for correct connection.	Clauses 57.4 & 58.1Replacement of the mains cable does not now require a crimping tool or any special preparation.
59 The mains appliance outlet and energy regulator terminal block failed the ball pressure test.	Clause 59 The energy regulator terminal block has been replaced and now conforms.

USER MAINTENANCE

Regularly monitor the THERMACOT TC400 TM during its operation to ensure satisfactory functioning.

- Check the power switch is illuminated
- Check that the louvres of the radiant warmer are not obstructed and there are no indications of unit overheating
- Check the mains supply cable is not trapped or damaged

Periodically check the functioning of the castors, brakes and tilt mechanism.

Report all faults immediately to an authorised engineer.

It is recommended that the THERMACOT TC400 TM should be inspected by an authprised engineer at intervals not exceeding six weeks.

Recommended cleaning

The radiant warmer housing must only be wiped clean with a DAMP cloth, and dried thoroughly. Never allow the ingress of water into this unit.

The cot stand and basinette may be washed with warm soapy water the thoroughly dried.

Routine Maintenance

It is recommended that the following maintenance routine should be carried out at intervals not exceeding six weeks.

1. Thoroughly clean the stand unit, cot units and the exterior and interior of the radiant warmer.
2. Inspect the mains plug, mains cable, stand unit, cot unit and radiant warmer for damage.
3. Functionally test the castors, brakes and tilt mechanism for correct operation.
4. Inspect all connectors and conductors within the radiant warmer for security and damage.
5. Carry out earth leakage tests in accordance with BS5724:PART 1.
6. Carry out insulation tests in accordance with BS5724:PART1.
7. Functionally test the radiant warmer to ensure satisfactory operation.