



Site Pre-Planning Guidelines Xstrahl 200

Pre-Installation Checklist

Site:

Proposed Install Date:

This checklist must be completed and returned to Xstrahl Ltd. at least 14 days prior to the agreed upon installation start date. Any work not completed prior to the commencement of installation may prolong the installation and incur additional costs.

No.	Item	Specification	Page Reference	Signature
1	Primary supports ^a	Floor Stand: Floor is to support 160 kg and wall is to support 50 kg Ceiling Stand: Ceiling to support static load of 400 kg.	Section 3 Page 4	
2	Cooling water and drainage	Water-Water Cooler requires water supply, drain or chilled water supply and return to be available; hose tails to accept 3/8" reinforced hose. Water-Air Cooler requires air conditioning/heat removal for 3 kW of heat output. Closed-Circuit chiller requires water supply and return to be available; hose tails to accept 3/8" reinforced hose	Section 5 Page 14	
3	Power supply requirements	220V 1 Phase—neutral 47—63 Hz; 32A; 8 kVA	Section 8 Page 23	
4	Main isolator	Switched and fused 40A isolator	Section 8.1 Page 23	
5	Earth reference terminal	< 0.5Ω to main earth; minimum 8 off M8 studs.	Section 8.3 Page 23	
6	Cable containment	Minimum 100 mm x 100 mm; 2 x compartments	Section 8.4.1 Page 24	
7	Emergency stops ^a	Emergency Beam OFF: Volt free contact wired to TP2 CCU location Emergency Power OFF: Linked via a contactor to mains isolator	Section 8.2 Page 23	
8	Door interlocks/ switches	Volt-free contact and two core cable wired back to TP2 CCU location to accept 24V DC (supplied by TP2 CCU)	Section 9 Page 26	
9	Warning lights ^a	230V AC Min 4 x 1.5 mm ² Core Cable; 1 live; 1 x switched live; 1 x neutral; 1 x earth; wired back to TP2 CCU location.	Section 10 Page 27	
10	Radiation shielding	In accordance with UK or local regulatory standards	Section 12 Page 29	

a. Where applicable

Above pre-installation preparations are now considered complete:			
Signed:		Date:	
	(Customer Representative)		
Name:			

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1. Xstrahl 200 Overview

The Xstrahl 200 is an X-Ray therapy system producing X-Rays from 20 kV to 220 kV. It can also be supplied with the output capped to 150kV.

It is available as either a floor mounted or ceiling mounted support system offering an infinite range of treatment options for superficial, orthovoltage and palliative oncology and dermatology treatment.

Figure 1-1: Xstrahl 200 Illustration



2. Xstrahl 200 Room Layout

Customers may (in cooperation with an Xstrahl engineer) design their own room layout.

2.1. Treatment and Control Room Equipment

The Xstrahl 200 can be supplied as either a floor stand or ceiling stand unit.

Treatment rooms and control rooms will have the following respectively:

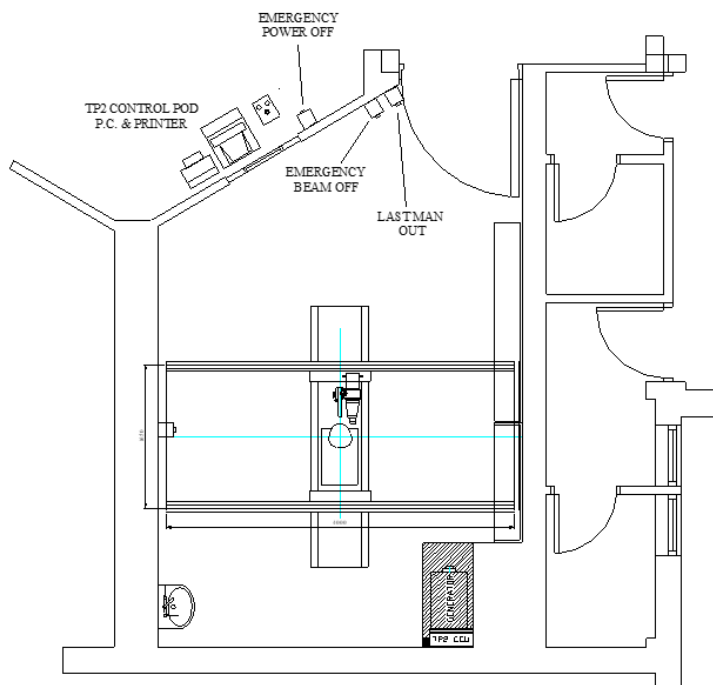
Treatment Room	Control Room
Tube stand and X-Ray tube	Operator control pod
Generator	Desktop PC
Cooling equipment (may be in adjacent plant room)	
Filter storage unit	
Applicators	
TP2 central control unit (CCU)	

2.1.1. Ceiling Room Layout

Typical Xstrahl 200 ceiling stand installation:

Refer to [Appendix M](#) for a Stand Cable Chart Diagram.

Figure 2-1: Typical Ceiling Stand Layout

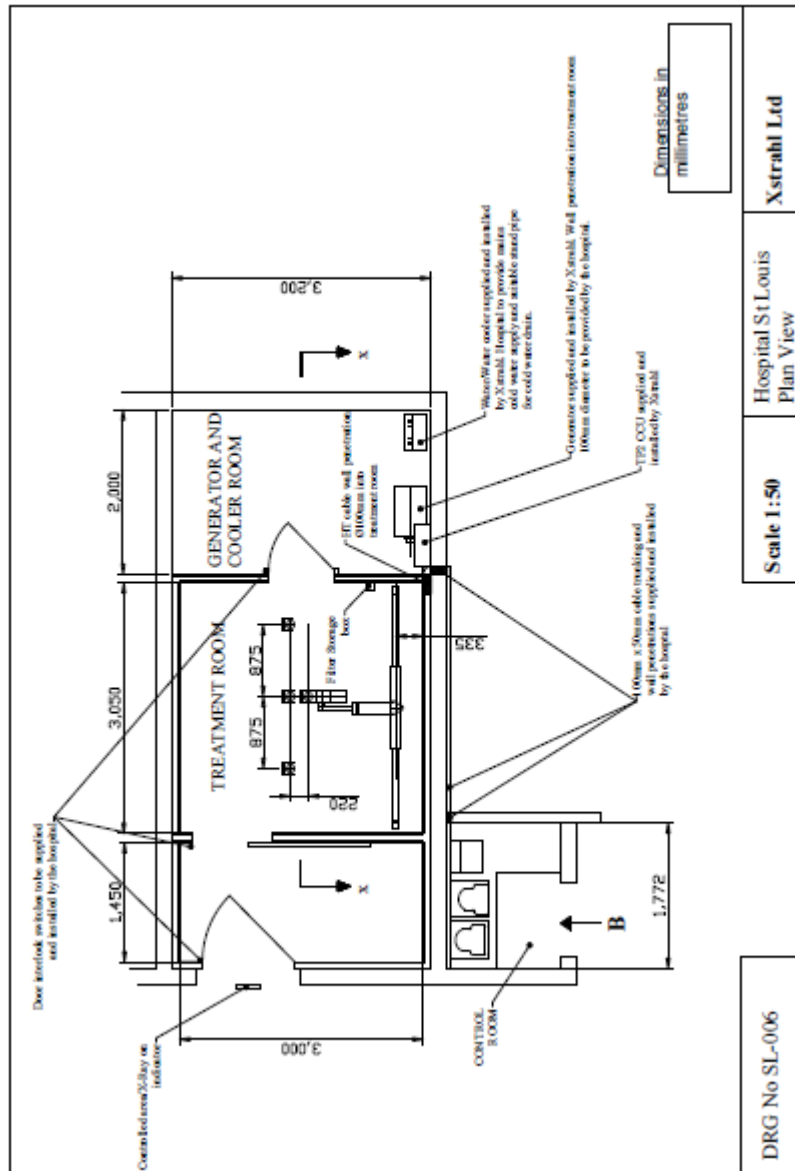


2.1.2. Floor Stand Room Layout

Typical Xstrahl 200 floor stand installation:

Refer to [Appendix N](#) for a for a Floor Stand Cable Chart Diagram.

Figure 2-2: Typical Floor Stand Layout



3. X-Ray Tube Support

The Xstrahl 200 can be supplied as either a floor stand (3.1) or ceiling stand (3.2) unit. See [Appendix E](#) and [Appendix F](#) for fixing details.

NOTE:

It is the customer's responsibility to design and install any primary supports to the wall/ceiling and floor slab and qualify its structural integrity. The primary support onto which the floor rail will be secured must be able to support a load of 160 kg. The top rail primary support must be able to support a vertical pulling force of 50 kg. See [Appendix L](#) for a structural steel drill drawing.

3.1. Floor Stand



CAUTION: The stand ropes in both the floor/wall and ceiling stands must be changed regularly—every 5 years for ceiling stand systems and every 10 years for floor/wall stand systems as per the manufacturer's instructions and should only be carried out by trained personnel. A record of the rope change should be retained for future reference.

The floor stand consists of a track secured to the floor onto which the X-Ray tube stand is mounted. The top of the X-Ray tube stand is secured to the wall or ceiling by a top rail.

Refer to drawings in [Appendix E](#) and [Appendix F](#).

Figure 3-1: Xstrahl 200 Floor Stand



3.1.1. Support Rails and Bridge Recommendations for Floor Stand

The customer must:

- Confirm the height from the finished floor to the underside of the false ceiling is 2550 mm minimum.
- Ensure the floor is flat, level and free from peaks/troughs over the range of the floor stand track.
- Make allowances for lighting units, smoke detectors and CCTV equipment.
- Make allowances for air conditioning work.
- Make allowances for the depth of a false ceiling.
- Confirm access is available to transport the stand to the treatment room.

3.2. Ceiling Stand



CAUTION: The stand ropes in both the floor/wall and ceiling stands must be changed regularly—every 5 years for ceiling stand systems and every 10 years for floor/wall stand systems as per the manufacturer's instructions and should only be carried out by trained personnel. A record of the rope change should be retained for future reference.

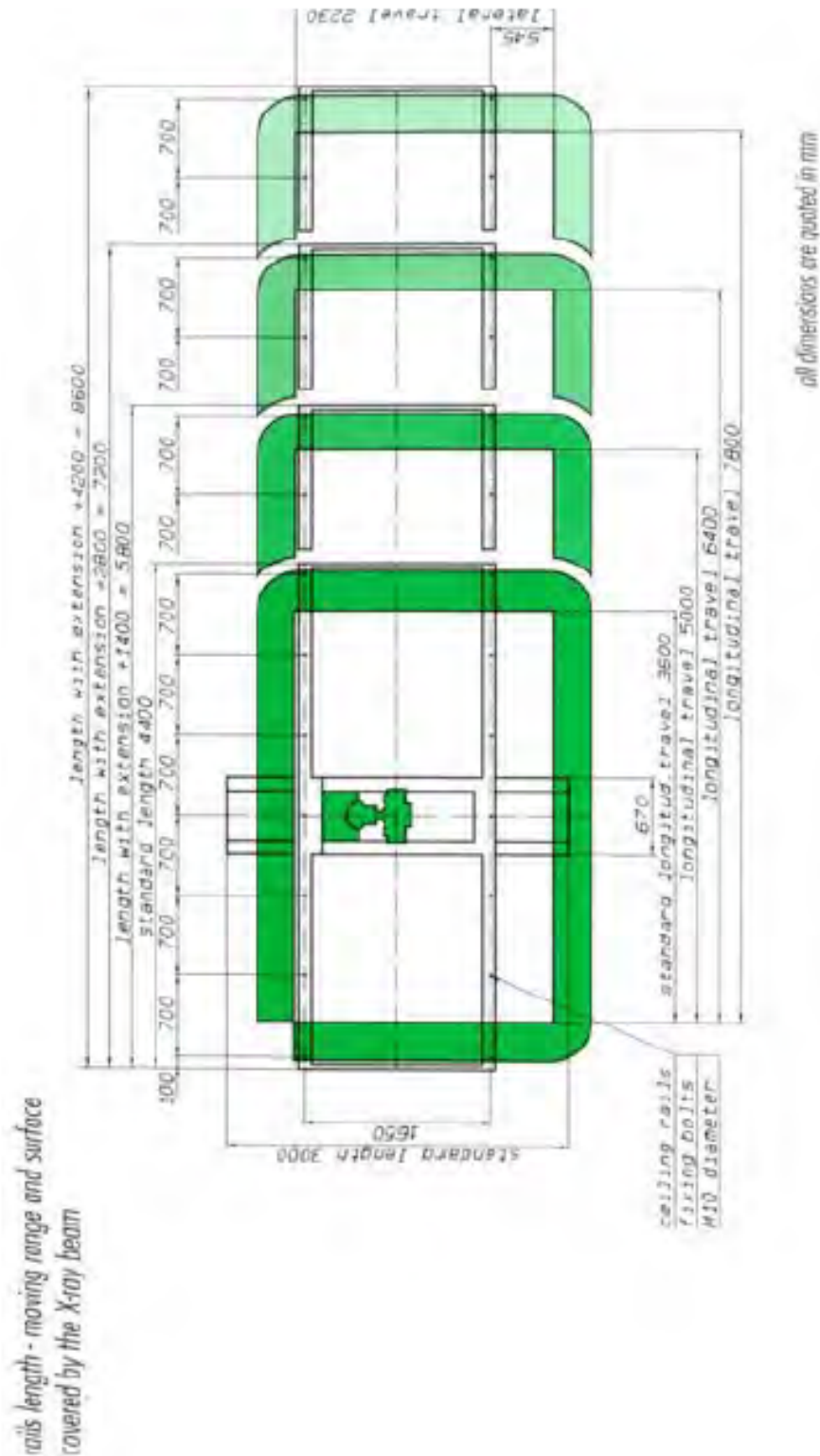
Figure 3-2: Xstrahl 200 Ceiling Stand



The ceiling stand consists of two parallel rails (4400 mm long). The rails are secured to customer supplied supports installed at 1650 mm (centre to centre).

A 3000 mm wide bridge assembly is fitted onto the rails enabling the tube stand to travel freely along the length of the rails. The tube stand carriage is suspended from the bridge assembly. Xstrahl will attach the ceiling rails to the primary support.

Figure 3-3: Ceiling Stand Range of Motion Illustration



3.2.1. Primary Support Arrangements

NOTE:

It is the customer's responsibility to design, supply and install any primary supports to the ceiling slab and qualify its structural integrity.

Measurements will determine which Xstrahl ceiling mounted tube stand option will provide the optimum working position.

The following must be considered:

- Accessibility; the ceiling rails are 4400 mm long.
- Overall room size; the minimum room size is 4400 mm x 4000 mm. If the room is smaller than specified, Xstrahl must be advised prior to delivery in order to shorten the rails.

See [Appendix L](#) for the primary support drilling template.

3.2.2. Support Rails and Bridge Recommendations for Ceiling Stand

The customer must:

- Confirm the height from the finished floor to the underside of the false ceiling and primary support frame is within limits for the stand to be installed.
- The total static load of the complete rail system and tube stand is approximately 400 kg. The aluminum rails have 14 No. M10 fixing points to spread the load evenly.
- Make allowance for lighting units, smoke detectors and CCTV equipment.
- Make allowances for air conditioning work.
- Make allowances for the depth of a false ceiling.
- Ensure access is available to transport the stand to the treatment room.

3.2.3. Vertical Travel

The recommended maximum floor to finished ceiling height is 3000 mm (minimum is 2700 mm). Xstrahl must be advised if the ceiling height is less than 2700 mm because modifications must be made to the tube stand prior to delivery.

To enable Xstrahl to make suitable recommendations regarding maximum vertical travel (1500mm), the following must be provided prior to manufacture:

- Vertical distance between the ceiling slab and finished ceiling.
- Vertical distance between the underside of the finished ceiling and treatment room floor.
- The chosen method for fixing the ceiling rails to the ceiling supports.

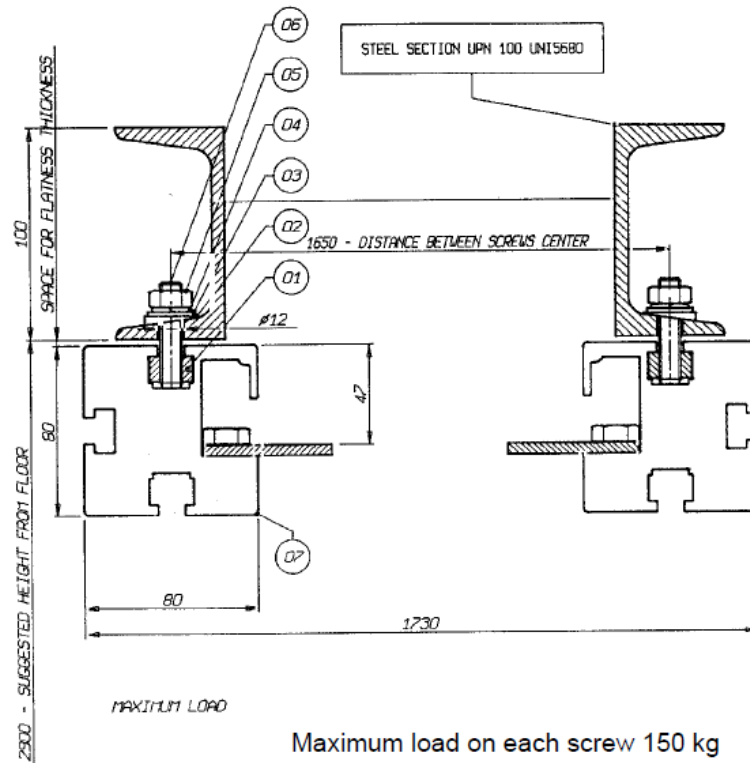
3.3. Ceiling Rails

3.3.1. Fixing Ceiling Rails to Ceiling Supports

Refer to the following three options for fixing the ceiling rails to the ceiling supports:

- Drawing TSC1: Bottom Fixing Method (Longitudinal Ceiling Rail) ([Figure 3-4](#)).
- Drawing TSC2: Unistrut® Method (Longitudinal Ceiling Rail) ([Figure 3-4](#)). See [Appendix K](#) for Unistrut® detail drawing.
- Drawing TSC3: Lateral Side Fixing Method (Longitudinal Ceiling Rail) ([Figure 3-6](#))

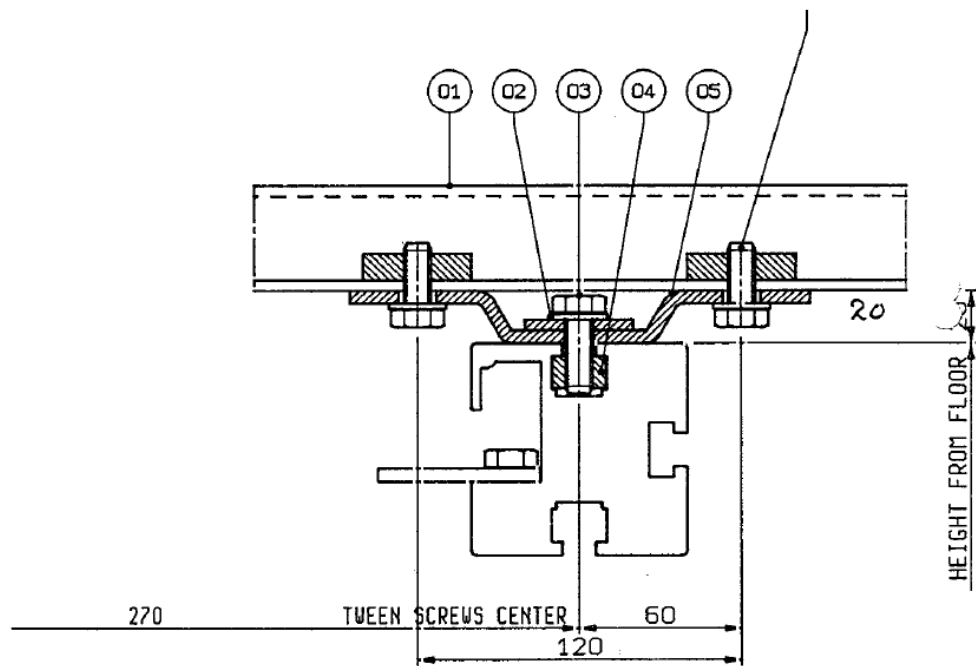
Figure 3-4: Drawing TSC1: Bottom Method



Part Number	Description	Quantity
01	Square nut 30 x 20 x 12 M10	14
02	Square washer M10	14
03	Plain washer M10	14
04	Spring washer M10	14
05	Hexagon nut M10	14
06	Hexagon socket head screw M10	14

Figure 3-5: Drawing TSC2: Unistrut® Method

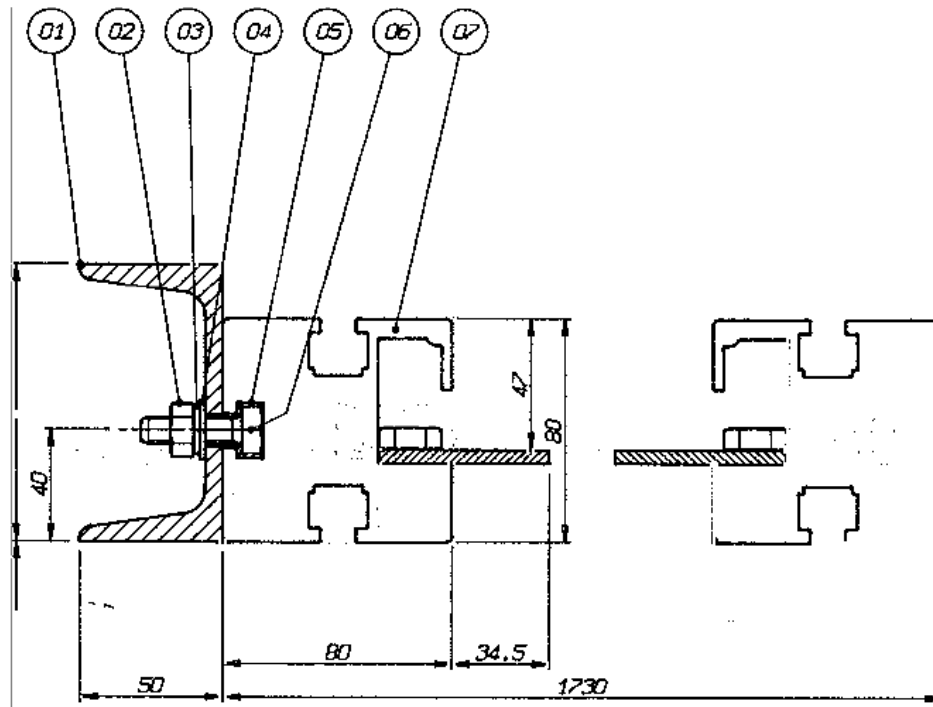
Screw, washer and bolt for Unistrut® (28x)



Maximum load on each screw 150 kg

Part Number	Description	Quantity
01	Flush "Unistrut" runner	-
02	Plain washer M10	14
03	Hexagon socket head cap screw M10	14
04	Square nut 30 x 20 x 12 M10	14
05	"Unistrut" bracket	14

Figure 3-6: Drawing TSC3: Lateral Method



Part Number	Description	Quantity
01	STEEL SECTION UPN 100 UNI5680	2
02	HEXAGON NUT M10x35	14
03	SPRING WASHER	14
04	PLAIN WASHER M10	14
05	SQUARE NUT FOR LATERAL FASTENING M10	14
06	HEXAGON SCREW M10	14
07	LONGITUDINAL CEILING RAILS	2

3.3.2. Ceiling Rail Specifications

Stationary Rails, Extruded Aluminum, Physical Description	
Standard length of rails	4400 mm ^a
Longitudinal travel	3600 mm ^b

a. Can be cut down.

b. Can be restricted with end stops.

Bridge, Extruded Aluminium, Physical Description	
Standard length of rails	3000 mm ^a
Transverse travel	2280 mm ^b
Covered area	4260 mm x 2940 mm (Adjustable)

a. Can be cut down

b. Can be restricted with end stops

Carriage/Telescope, Extruded Aluminum, Physical Description	
Vertical travel	1.5 metres

Net Weights ^a	
Stationary rails and bridge	157 kgs
Carriage/telescope	125 kgs
Tube/cables	73 kgs
All in weight	400 kgs

a. Weights are approximate

3.4. Tube Stand Specifications

Specifications of the Xstrahl 200 tube stands:

X-Ray Tube Support Specifications	
Rotation	Degrees
Tube assembly around vertical column	180° ± 90°
Tube assembly tilt	100° (+40° to -60°)
Rotational positioning detents every	90°
Degree of rotation of tube assembly (axial)	270° ± 135°

Floor/Wall Stand Technical Specifications	
Length of longitudinal aluminium rails	4000 mm max
Longitudinal travel	± 110 mm
Transverse travel	2800 mm max
Vertical travel	1500 mm max
Minimum distance tube axis to floor	500 mm
Counter-balancing system	Adjustable counterweights
Maximum weight supported	36 kgs
Movement brakes	Electromagnetic
Maximum vertical movement with power loss	1 mm
Brake control	Select and movement enable buttons located on tube front cover
Electrical power requirements	220 VAC ± 10% single phase; 50/60 Hz, 200 VA
Paint finish	RAL 9002
Net weight	160 kg
Ceiling height for ceiling fixing of support rail	2.55 to 3 metres

Ceiling Mounted Technical Specifications	
Degree of rotation of tube assembly around the horizontal arm	270° (± 135°)
Rotational positioning detents	every 90°
Degree of rotation of tube assembly (axial rotation)	90° (+60° to -30°)
Ceiling Rails:	
Standard length of longitudinal aluminium rails	4400 mm
Longitudinal travel	3600 mm
Standard length of transverse aluminum rails	3000 mm
Transverse travel	2280 mm
Covered area	4260 x 4290 mm
Distance from X-Ray beam centre to vertical column axis	380 mm
Number of extruded aluminium telescopic sections	4
Vertical travel	1500 mm
Counter-balancing system	Tensator® spring and counterweights
Maximum weight supported	75 kgs
Movement brakes	Electromagnetic
Brake control	Select and movement enable buttons

4. Generator

Figure 4-1: CP225-RS232 Generator (Right)



The Xstrahl 200 is supplied with a CP225-RS232 generator and the X200 Capped (150kV) is supplied with a CP160-RS232 generator ([Figure 4-1](#)). The location of the generator is optional, but must be as close as possible to the earth (star) terminal, X-Ray tube and TP2 CCU.

The generator is supplied with casters for easy maneuverability and can be freestanding in the treatment room or placed in a ventilated enclosure ([4.1](#)).

Generator power and control signals are supplied from the CCU.

4.1. Generator Enclosure

The minimum enclosure size is 1350 mm (length) x 850 mm (height) x 600 mm (width). This is to ensure adequate cooling/ventilation for the generator.

Refer to [Appendix A](#) for a generator enclosure drawing.

NOTE:

Xstrahl recommends louvered cupboard doors or ventilation grills on the work surface if the generator is housed in an enclosure.

4.2. Generator Specifications

	CP225 Dimensions	CP160 Dimension
Length	760 mm	660 mm
Width	420 mm	412 mm
Height	800 mm	710 mm
Weight	240 kgs	220 kgs

RS232 Operating Limits	
Ambient temperature of operation	10 - 30°C
Ambient humidity limit (non-condensing)	< 85%
Storage temperature limits	0 - 40°C

5. Cooling Equipment

The Xstrahl 200 X-Ray therapy system can be supplied with either a water-to-air cooler (5.1), water-to-water cooler (5.2) or a closed circuit chiller (5.2.3).

If the cooler is located outside of the treatment room, 2 off 15 mm copper pipes with 3/8" hose barbs and isolation valves on each side of pipework (supply and return) should be installed between the cooler location and the treatment room. The maximum distance allowable from the cooler to the X-Ray tube is 25 metres.

5.1. Water-to-Air Cooler

Figure 5-1: Water-to-Air Cooler



The water-to-air cooler can be freestanding or shelf-mounted. The cooler needs to be sited in a well ventilated area. The heat exchanger consists of a reservoir of water that is circulated around the X-Ray tube whilst the system is powered up.

A thermostatically controlled fan maintains the reservoir temperature.

Refer to [Appendix G](#) for a Water-to-Air cooler drawing.

5.1.1. Water-to-Air Cooler

Physical Description	
Depth	479 mm
Width	398 mm
Height	481 mm
Weight	40 kgs (approximate dry weight)

Performance Data	
Cooling medium	Distilled water or 70% water and 30% glycol mix
Cooling capacity	3000 W
Water flow	> 4 Litres per minute at 4.0 bar
Noise level	55 dB(A) at 1 metre

Operating Limits	
Maximum working temperature	35°C
Design ambient temperature	25°C

Settings	
Maximum pressure	7 Bar
Flow switch opens at	4 Litres per minute
Rated coolant temperature	25°C
Temperature switch set at	40°C

5.2. Water-to-Water Cooler

Figure 5-2: Water-to-Water Cooler



NOTE:

Where chilled water is used in the external cooling source, consideration must be given to the potential back pressure caused when the solenoid opens and closes.

The water-to-water cooler can be freestanding or shelf-mounted. It is a heat exchanger consisting of a reservoir of water which circulates around the X-Ray tube when the system is powered up. When the temperature of this water exceeds a preset limit (20°C) a solenoid opens allowing the external water (from either mains water or a chilled water supply) to flow through a cooling jacket to cool the reservoir.

When the reservoir temperature is below the preset limit, the solenoid will close.

Consideration must also be given to the location of the water supply and drain or chilled water supply and return, which must be in the vicinity of the cooler unit.

Refer to [Appendix H](#) for a Water-to-Water cooler drawing.

5.2.1. Connecting the Cooler

A 3/8" hose barb and isolation valves on each side of pipework is used to connect the cooler to the external cooling source, so the supply should be terminated with barbed hose-tail connectors (*Figure 5-3*).

Figure 5-3: Barbed Hose-Tail Connectors



5.2.2. Water-to-Water Cooler Specifications

Physical Description	
Depth	297 mm
Width	464mm
Height	404 mm
Weight	24 kgs (approximate dry weight)

Performance Data	
Cooling medium	Distilled water or 70% water and 30% glycol mix
Cooling capacity	3000 W
Water flow	> 4 Litres per minute at 4.0 bar
Noise level	47 dB(A) at 1 metre

Operating Limits	
Nominal water temperature into cooler tank	8-15°C
Nominal water flow rate required	3-4 Litres per minute
Storage temperature limits	-20° C to +70°C
Pressure drop across heat exchanger	0.2 Bar
Maximum inlet pressure	7 Bar

Settings	
Maximum pressure	7 Bar
Flow switch opens at	4 Litres per minute
Rated coolant temperature	25°C
Temperature switch set at	30°C

5.2.3. Closed-Circuit Chiller

Figure 5-4: Closed-Circuit Chiller



The closed-circuit chiller can be freestanding or shelf-mounted. The heat exchanger consists of a reservoir of water which circulates around the X-Ray tube when the system is powered up.

The temperature is maintained at approximately 25°C by a refrigerant system.

Refer to [Appendix I](#) for a closed-circuit chiller drawing.

5.2.4. Closed-Circuit Chiller Specifications

Physical Description	
Depth	570 mm
Width	550 mm
Height	735 mm
Weight	82 kgs (approximate dry weight)

Performance Data	
Cooling capacity	3.2kW
Tank capacity	15 Litres
Ambient temperature range	5°C to 40°C
Refrigerant type/amount	R134a/0.8 kg
Noise level	63 dB(A) at 1 metre

Electrical Requirements	
Main supply voltage	220 VAC \pm 10% 50-60 Hz, single phase
Current consumption	13.A

Settings	
Maximum pressure	6 Bar
Rated coolant temperature	25°C
Temperature switch set at	30°C

6. Filters and Applicators

6.1. Filter Storage Unit

Figure 6-1: Filter Storage Unit and Applicators



The filter storage unit ([Figure 6-1](#)) is secured to the treatment room wall and has no electrical connections. The storage unit is used for storage purposes only; filters are recognised by the sub-tube assembly.

Refer to [Appendix C](#) for a filter storage unit drawing.

Filter Storage Specifications	
Length	280 mm
Width	100 mm
Height	170 mm
Weight	2.5 kgs ^a (approximate)

a. Weight is with ten filter carriers.

6.2. Applicators

Figure 6-2: Applicators



NOTE:

Custom applicators for the Xstrahl 200 system are available upon request. Contact Xstrahl for any additional applicator requirements.

The number and type of applicators will vary according to the customer's order—individual weights vary from 0.75 kg to 6.5 kgs, so consideration should be given to suitable applicator storage. If applicators are stored on a shelf, they should stand on the end disk as shown in [Figure 6-1](#): and not on the Perspex® tip.

The Xstrahl 200 is supplied with a standard set of applicators:

Xstrahl 200 Standard Applicators	
20 cm FSD Open Applicators (Circular)	50 cm FSD Closed Applicators (Square)
3 cm diameter	4 x 4 cm
4 cm diameter	6 x 6 cm
5 cm diameter	8 x 8 cm
10 cm diameter	10 x 10 cm
	15 x 15 cm
	20 x 20 cm
Xstrahl 200 Capped (150kV) Standard Applicators	
20 cm FSD Open Applicators (Circular)	30 cm FSD Open Applicators (Circular)
1.5 cm diameter	10 cm diameter
2 cm diameter	15 cm diameter
2.5 cm diameter	
3 cm diameter	
4 cm diameter	
5 cm diameter	

7. X-Ray Controller and Control Room

The Xstrahl TP2 X-Ray medical controller has:

- a central control unit (CCU) (7.1) and
- an operator control pod (7.2) connected to a desktop PC in the control area (7.3).

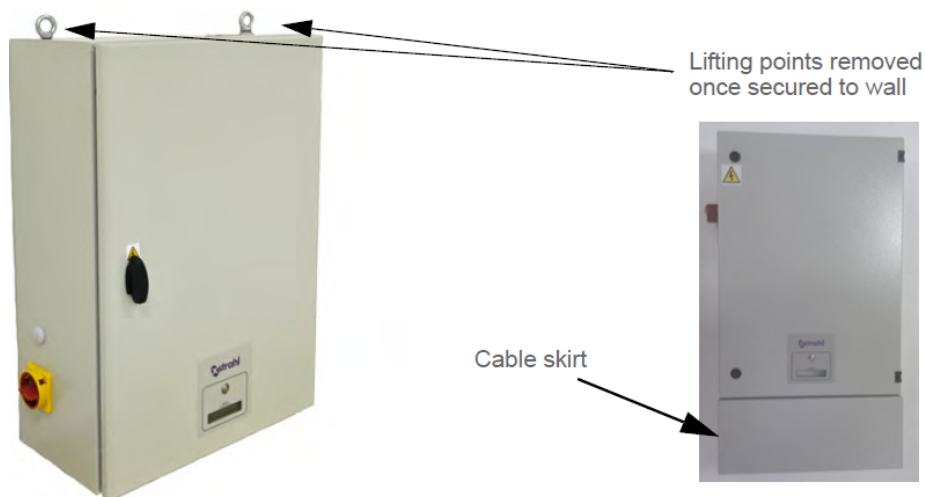
7.1. Central Control Unit (CCU)

The TP2 CCU controller enclosure (*Figure 7-1*) is a wall-mounted room interface box.

The CCU enclosure should be sited at a height that is convenient for routine servicing with good lighting and access. It's mounted to the wall with 4 fixing points (2 x top and 2 x bottom).

A 200 mm gap should be left below the intended location of the CCU and cable trunking to allow for a cable skirt to be attached below the CCU (*Figure 7-1*). Refer to *Appendix J* for a CCU and cable skirt drawing.

Figure 7-1: TP2 CCU



CCU Specifications	
Dimensions	Specification
CCU	700 mm x 500 mm x 270 mm
CCU Cable skirt dimensions	200 mm x 500 mm x 200 mm
Weight	45 kg (approximate)

7.2. Operator Control Pod and PC

The operator control pod (*Figure 7-2*) is connected to the CCU by a 23 core cable connection (supplied by Xstrahl) and the pod is connected to a PC via an RS232 serial cable.

The pod is located adjacent to the PC for ergonomic operation and control of the Xstrahl 200 system (*7.3*).

The PC should have a minimum specification of 40GB hard drive, 4GB RAM, a CD/ DVD drive, an RS232 serial connection (or serial—USB converter), four USB ports and a Windows® operating system.

Figure 7-2: Operator Control Pod



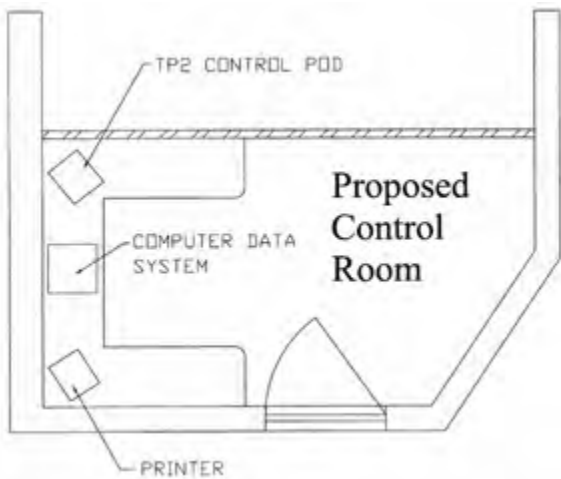
Operator Control Pod Specifications	
Dimensions	Specification
Pod	260 mm x 180 mm x 120 mm
Weight	1.5 kg

7.3. The Control Room Layout

The control room layout is the responsibility of the customer.

Adequate space must be made available for the operator and a suitable containment should be allocated for the connection to the CCU.

Figure 7-3: Proposed Control Room Layout



8. Electrical Supply Requirements

The Xstrahl 200 X-Ray therapy system requires a stable mains power supply. This is specified at 220V \pm 10%, but it must be emphasised that this is the acceptable supply range.

Once the Xstrahl 200 is installed and the system setup complete, the mains input must remain within 7V of the nominal voltage at installation.

Recommended electrical supply requirements:

Electrical Supply Requirements	
Power requirement	8 kVA single phase
Mains supply	220V \pm 10%
Nominal frequency	47 – 63 Hz

NOTE:

When recommended power requirements cannot be guaranteed, consideration should be given to installation of suitable power conditioning, for example, a constant voltage transformer.

8.1. Mains Isolator

A suitable mains isolator switch will be required adjacent to the TP2 CCU. The mains supply must be wired through a switched and fused, single or double pole 40A isolator.

The mains isolator switch should be a previously approved and correctly rated one in accordance with local standards and electrical regulations.

The switch must remove all power from the TP2 CCU distribution board and should be suitable for switching the system on/off.

Note: The mains isolator switch should be accessible at all times.

The associated mains wiring also needs to be correctly rated in accordance with local standards and electrical regulations. Typically, for example a UK based 40A supply, the minimum mains conductors are required to be 10mm² cross sectional area (this can be SWA, steel wire armoured cable).

8.2. Emergency Power OFF

Local rules may stipulate the need for an emergency power OFF button.

If required, it must be installed so that it interrupts the supply to the mains isolator through a contactor. This must be supplied and installed by the customer.

8.3. Earth Specification

A sound, clean earth is essential to the stable operation of the X-Ray equipment. The earth reference terminal needs to be located close to the generator and TP2 CCU distribution board. The main earth connection must have a maximum earth loop impedance of 0.5 Ω .

The earth rail will provide a minimum of 8 off M8 studs dedicated to the connection of the earth leads from the system installation. This terminal should be housed so that it is only available using a tool.

8.4. HT Cables

The floor mounted Xstrahl 200, and Xstrahl 200 Capped 150, are supplied with a 10 metre high-tension cable (standard); the maximum high-tension length is 15 metres and the minimum is 10 metres.

The ceiling mounted Xstrahl 200, and Xstrahl 200 Capped 150, are supplied with a 15 metre high-tension cable (standard); the maximum high-tension length is 20 metres.

High-tension cables can be supplied to specific customer dimensions.

8.4.1. Cable Containment Requirements

NOTE: Cable containment is to be supplied by the customer. Work must be completed prior to Xstrahl commencing installation of the system:

Containment is required for interconnecting cables to and from the following:

- TP2 Pod to TP2 CCU
- Generator to TP2 CCU
- Cooler to TP2 CCU
- Door switches to TP2 CCU
- Warning light location to TP2 CCU
- Emergency stop to TP2 CCU

The main trunking should have two compartments to allow for segregation of mains and control signals. The main trunking must be a minimum of 100 mm x 100 mm.

The X-Ray warning light, door switch and filter storage unit trunking should have a minimum dimension of 20 mm x 10 mm or be a 20 mm diameter conduit. This trunking should be installed as a spur from the main trunking.

Careful consideration should be given to cable routing in order to preserve the integrity of radiation shielding.

Refer to [Appendix M](#) for a ceiling stand cable chart and [Appendix N](#) for a floor stand cable chart.

8.4.2. Cable Specifications

The cables used for warning lights, door interlocks and emergency stops should have a maximum outer diameter of 3 mm to fit into the TP2 CCU connectors.

8.5. Interface Cables

NOTE:

The customer is responsible for supplying all interface cables and cooling hose lengths prior to shipping.

The following table lists the relevant Xstrahl 200 cables/hoses and specifies maximum lengths, where applicable. Please use this table to report cable lengths to Xstrahl Ltd:

Xstrahl 200 Interface Cables and Hoses				
Description	From	To	Remarks	Length
Mains feed	Customer isolator	TP2 CCU	220V/40A single phase	
Generator I/F	Generator	TP2 CCU	25 metres max	
TP2 pod I/F	TP2 pod	TP2 CCU	25 metres max	
Generator mains cable	Generator	TP2 CCU	25 metres max	
Filter/applicator cable coded	Tube stand	TP2 CCU	25 metres max	
Tube stand power cable	Tube stand	TP2 CCU	24 Vac floor stand 240 Vac ceiling stand	
Emergency off cable(s)	preference-Stops	TP2 CCU	+24 VDC	
Door interlock cable(s)	Door Switch	TP2 CCU	+24 VDC	
Cooler mains	Cooler	TP2 CCU	25 metres max	
Cooler interlocks	Cooler	TP2 CCU	25 metres max	
X-Ray warning light	Warning Light	TP2 CCU	230 Vac 4-wire	
EHT cable	Tube stand	Generator	20 metres max	
Cooler hose; 2 Off	Cooler	Tube stand	25 metres max	
RS232/RS422 cable	Pod	PC	5 metres max	
Printer cable	Printer	PC	5 metres max	

Add for Dose Based Control Systems				
Description	From	To	Remarks	Length
Temp/Dose cable	Tube Stand	TP2 CCU	25 metres max	

Add for Water-to-Water Coolers				
Description	From	To	Remarks	Length
Heat exchanger inlet hose	Mains water supply	Cooler inlet	25 metres max	
Heat exchanger outlet hose	Water drain	Cooler outlet	25 metres max	

9. Interlocks and Emergency Stops

NOTE: Door interlocks and emergency beam OFF switches are to be supplied by the customer.

The TP2 CCU supplies a 24V DC signal (interlock +24V) for interlocking purposes. When interrupted, initiation of X-Rays is prevented without first removing power from the system.

The signal is used to feed door interlocks and emergency beam OFF switches.

The customer must confirm which interlocks will be used and where they are to be positioned prior to installation.

An emergency OFF switch is also located on the operator control pod. When pressed, it removes power from the generator and base unit. Cooler mains power is maintained to provide X-Ray tube cooling so as to preserve the life of the X-Ray tube.

The emergency beam off switch has a twist and release function to restore power.

10. Warning Lights

Warning lights are powered by a 230V AC supply from the TP2 CCU.

Warning lights are connected by a 4 x 1.5 mm core cable:

- 1 x live (Controlled Area)
- 1 x switched live (X-Ray ON/Do Not Enter)
- 1 x neutral
- 1 x earth

Cable containment should be provided (min 10 mm x 10 mm trunking) from the warning lights location to the TP2 CCU location. If existing warning lights are used, they should be wired back to the TP2 CCU location.

11. Environmental Conditions

The Xstrahl 200 system operates within the following environmental conditions:

Environmental Conditions	
Ambient humidity limit (non-condensing)	< 85%
Ambient temperature of operation	10 - 30°C
Storage temperature limits	0 - 40°C

11.1. Heat Dissipation

The maximum heat dissipation from the individual units into the surroundings, assuming an ambient air temperature of 20°C, is as follows:

Heat Dissipation	
Generator	500W
Tube stand	<100W
PC and monitor	<100W
TP2 controller	<100W
X-Ray tube	1000W
TP2 CCU	<100W
Cooler system	3000W
System standby mode	1500W (continuous)
Total maximum system output	4900W

12. Radiation Protection

The treatment room design must have approval of the Radiation Protection Advisor in accordance with UK or local regulatory standards prior to the installation work commencing by Xstrahl Ltd.

Typical primary and secondary barrier thickness for superficial and orthovoltage radiation qualities:

Barrier Thickness for Radiation Qualities			
Radiation Source	Attenuation Factor	Thickness (mm)	
		Lead	Concrete (2350 kg m³)
Primary			
100 kVp	10 ⁻³	2.4	165
300 kVp		17.0	460
Secondary			
100 kVp	10 ⁻¹	1.0	60
300 kVp		7.0	260

NOTE: All lead work and specifications are the responsibility of the customer.

13. Delivery and Installation Access Dimensions

13.1. Considerations for Installation

NOTE:

Ensure provision for delivery of the crate by supplying a forklift or pallet truck to receive the delivery. Contact Xstrahl in advance if you have specific issues with delivery and storage of the crate.

The following must be considered when installing an Xstrahl system:

- When installing a system on ground level, the size and angle of the entrance openings must be considered, for example, the ceiling mounted tube stand rails can be up to 4.4 metres long.
- When installing above ground level the physical size and weight of the system must also be considered. The safe weight loading of lifts, manhole covers, etc., must be considered because some system components weigh over 220 kgs.

13.2. Crate Dimensions

The Xstrahl 200 is delivered in a crate with the following approximate measurements:

Xstrahl 200 Ceiling Stand Crate Specifications					
Crate No.	Main Item	Length (cm)	Height (cm)	Width (cm)	Approximate weight (kg)
1	Ceiling rails	455	70	81	300
2	Ceiling stand	101	135	71	280
3	Generator	108	99	65	320
4	Cooler ^a	73	67	43	60
5	Couch (optional)	210	58	76	80

^a Cooler crate dimensions and weight vary depending on cooler ordered.

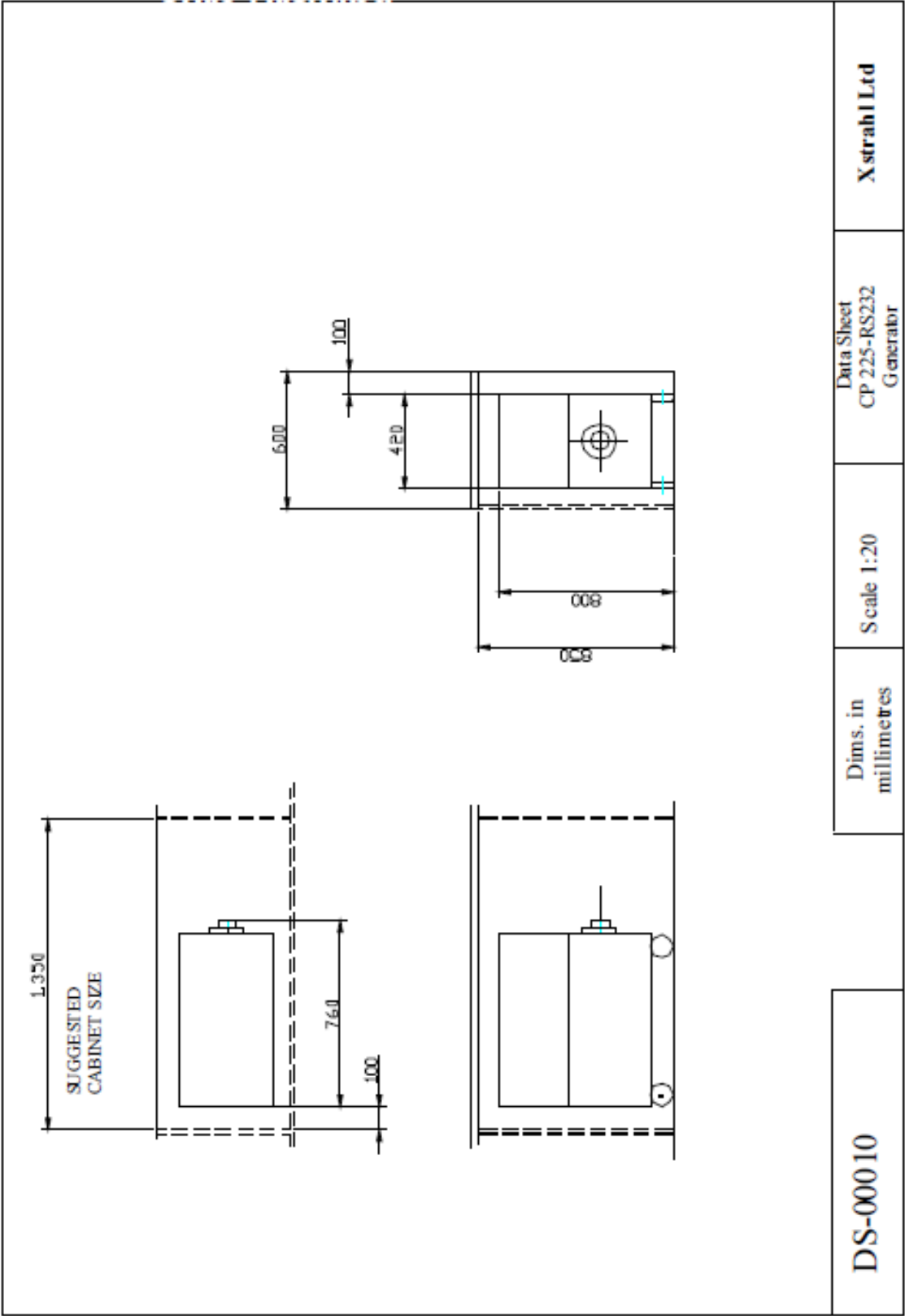
Xstrahl 200 Capped (150kV) Ceiling Stand Crate Specifications					
Crate No.	Main Item	Length (cm)	Height (cm)	Width (cm)	Approximate weight (kg)
1	Ceiling rails	455	70	81	300
2	Ceiling stand	101	135	71	280
3	Generator	97	87	65	245
4	Cooler ^a	73	67	43	60
5	Couch (optional)	210	58	76	80

Xstrahl 200 Wall/FloorStand Crate Specifications					
Crate No.	Main Item	Length (cm)	Height (cm)	Width (cm)	Approximate weight (kg)
1	Floor Stand	311	56	76	280
2	Generator	108	99	65	320
3	Cooler ^a	81	76	60	60
4	Couch (optional)	210	58	76	80

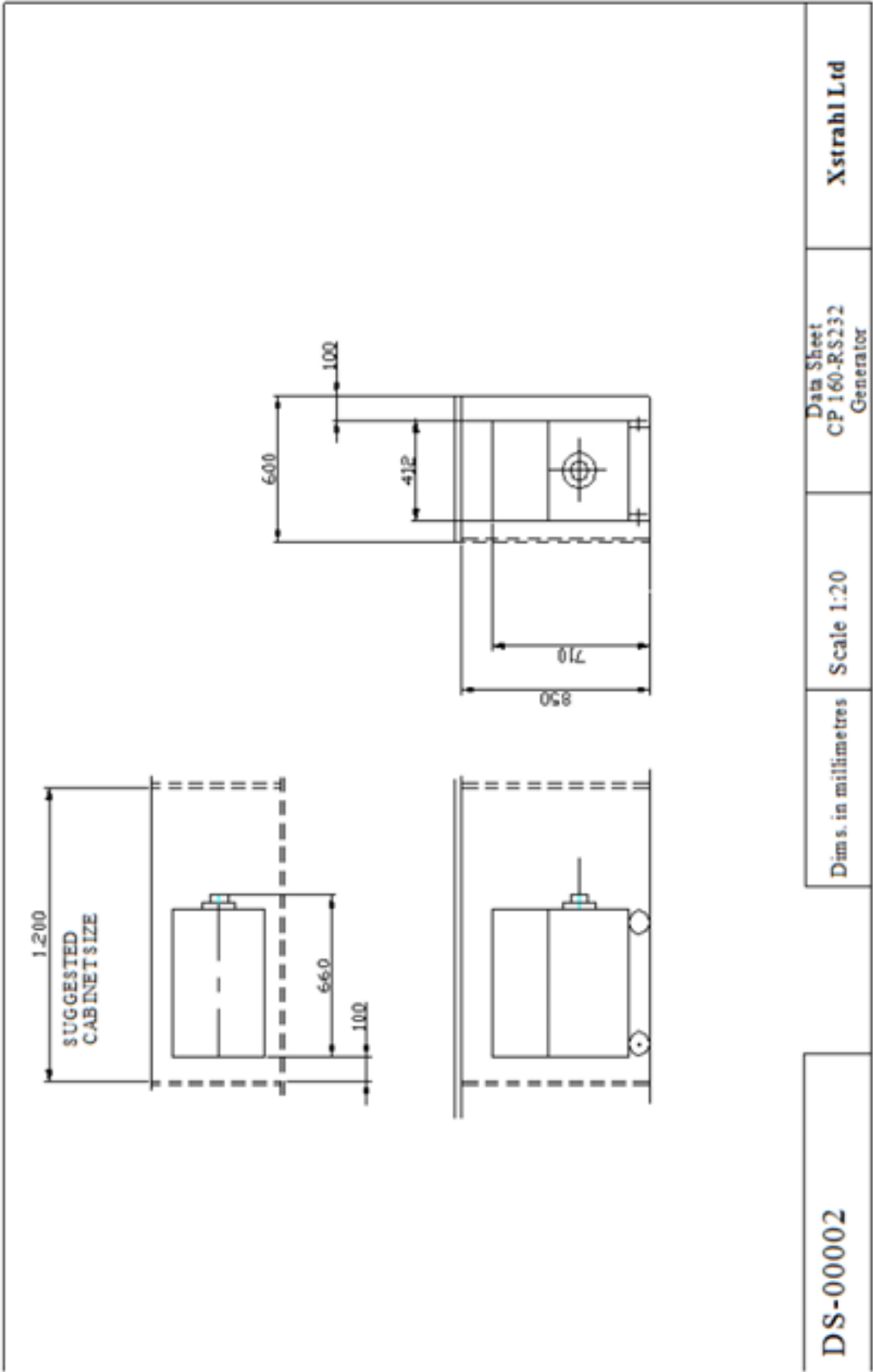
^a Cooler crate dimensions and weight vary depending on cooler ordered.

Xstrahl 200 Capped (150kV) Wall/Floor Stand Crate Specifications					
Crate No.	Main Item	Length (cm)	Height (cm)	Width (cm)	Approximate weight (kg)
1	Floor Stand	311	56	76	280
2	Generator	97	87	65	245
3	Cooler ^a	81	76	60	60
4	Couch (optional)	210	58	76	80

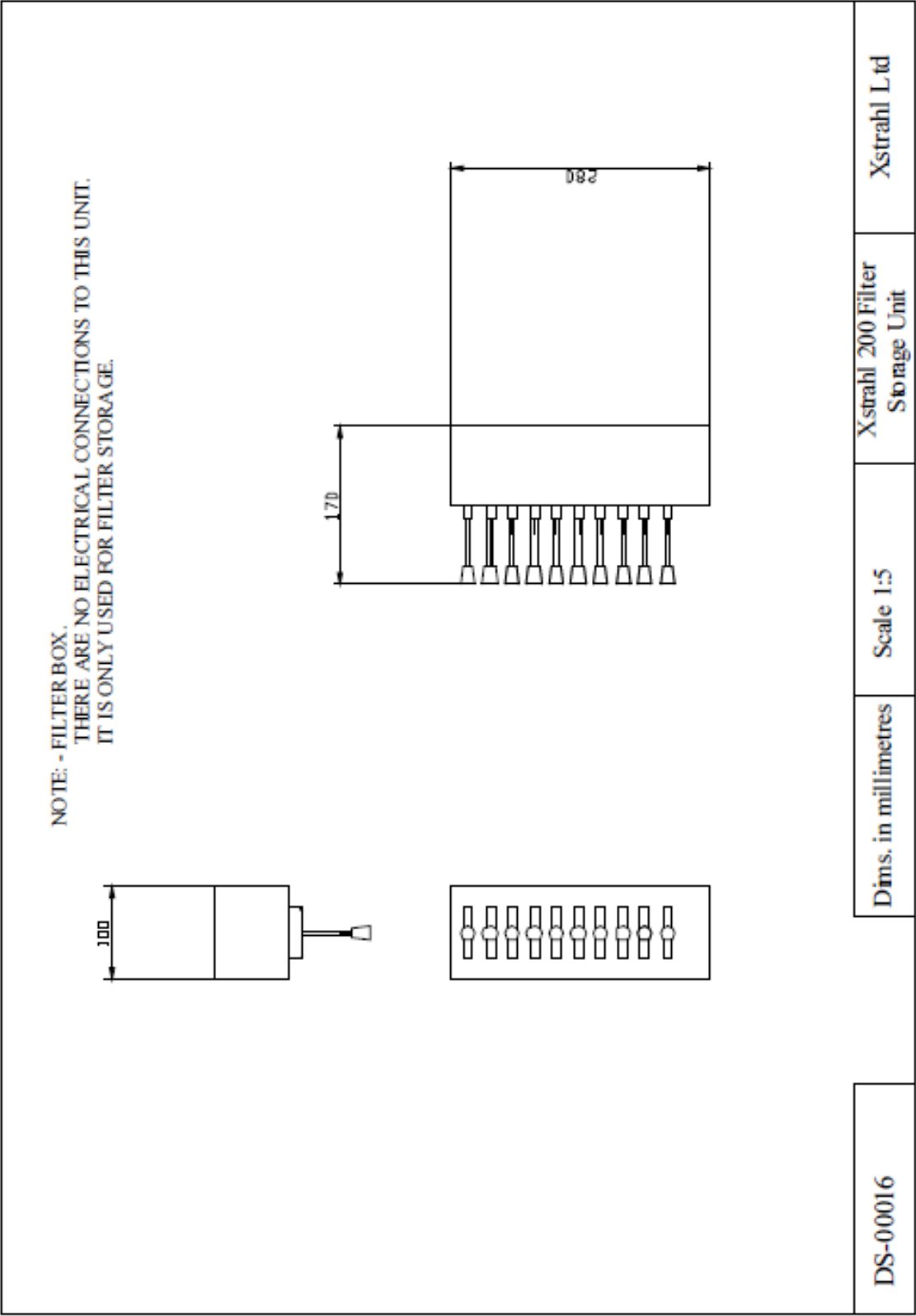
Appendix A: CP225-RS232 Generator Enclosure Drawing



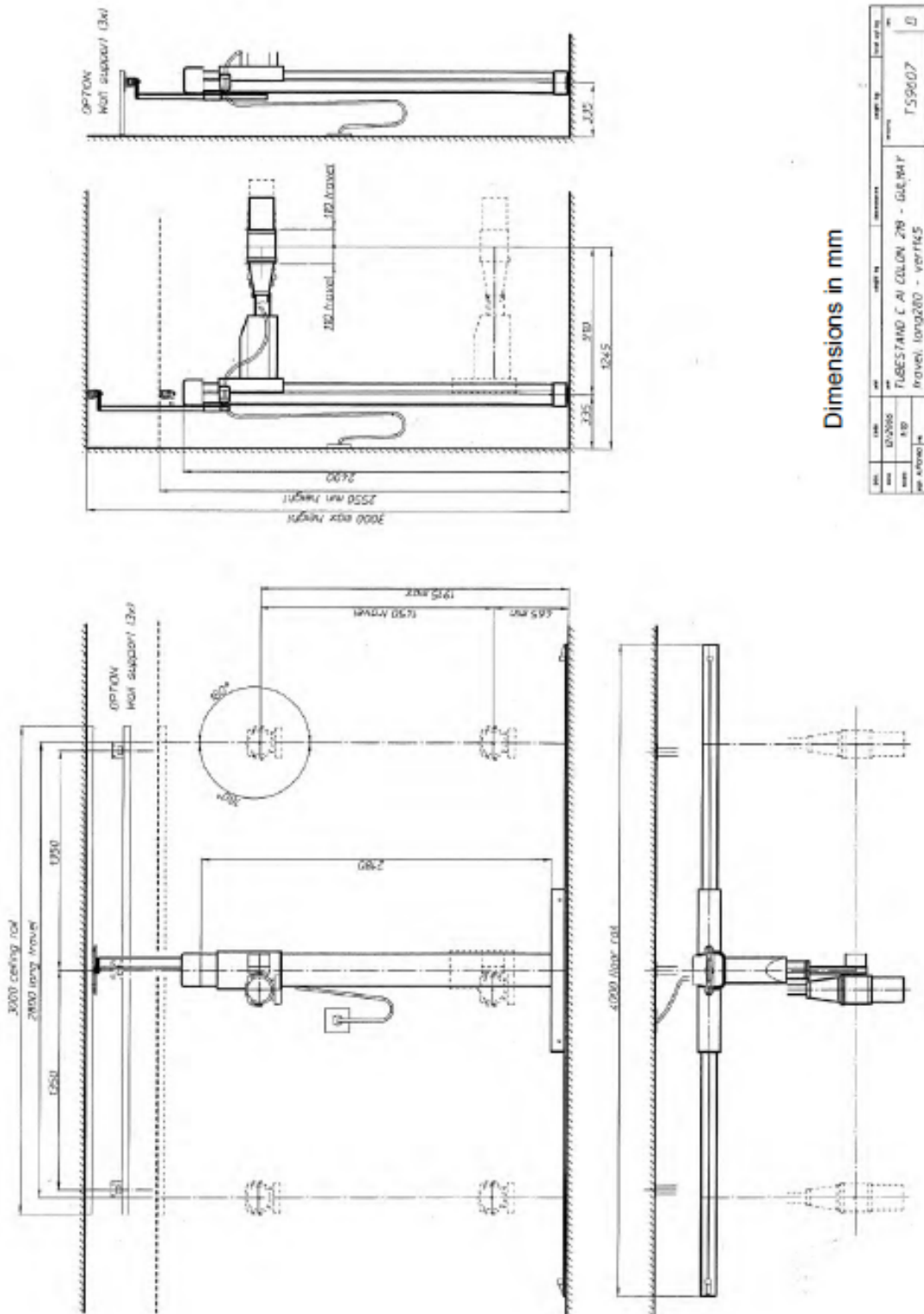
Appendix B: CP160-RS232 Generator Enclosure Drawing



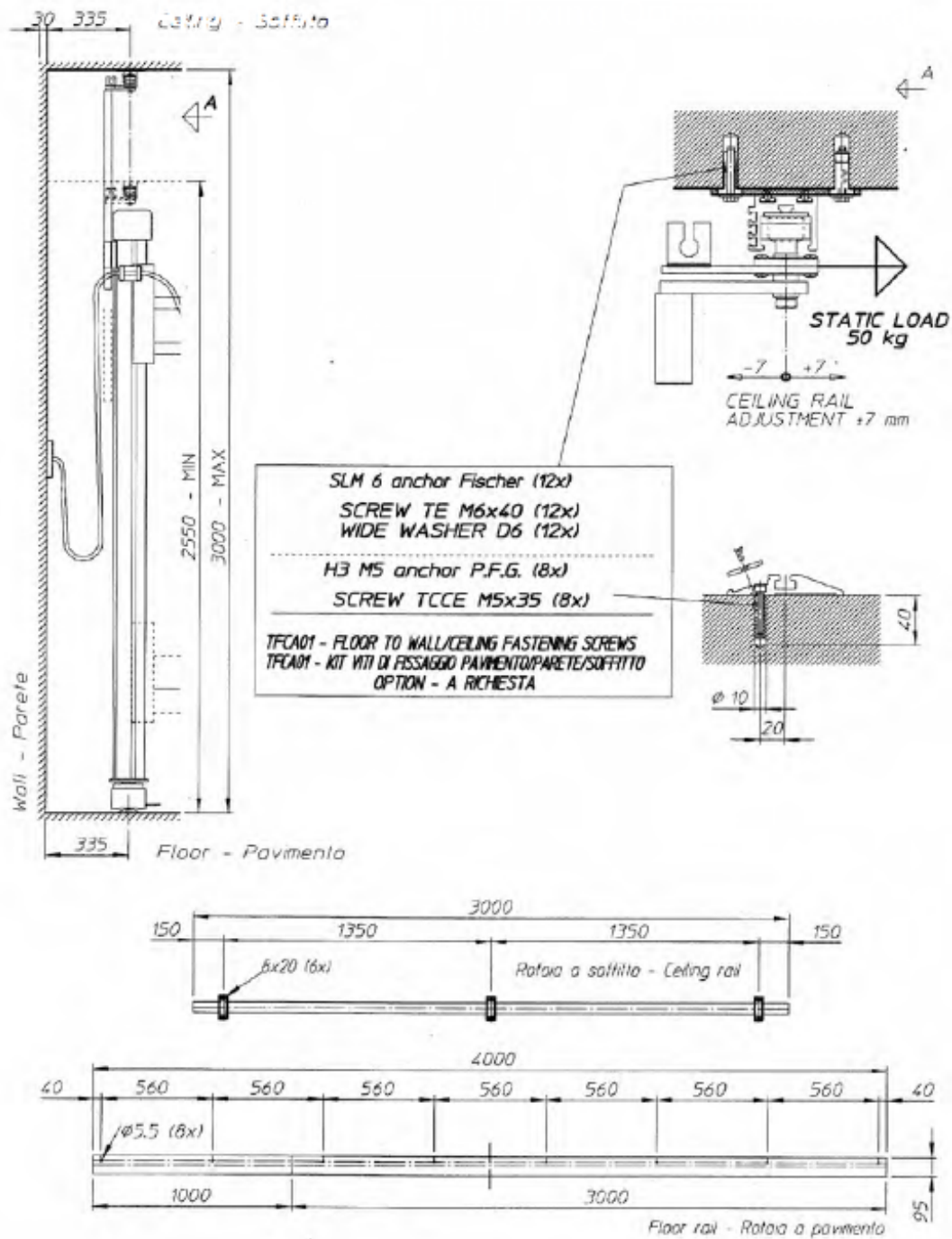
Appendix C: Filter Storage Unit Enclosure Drawing



Appendix D: Floor Stand Detail Drawing



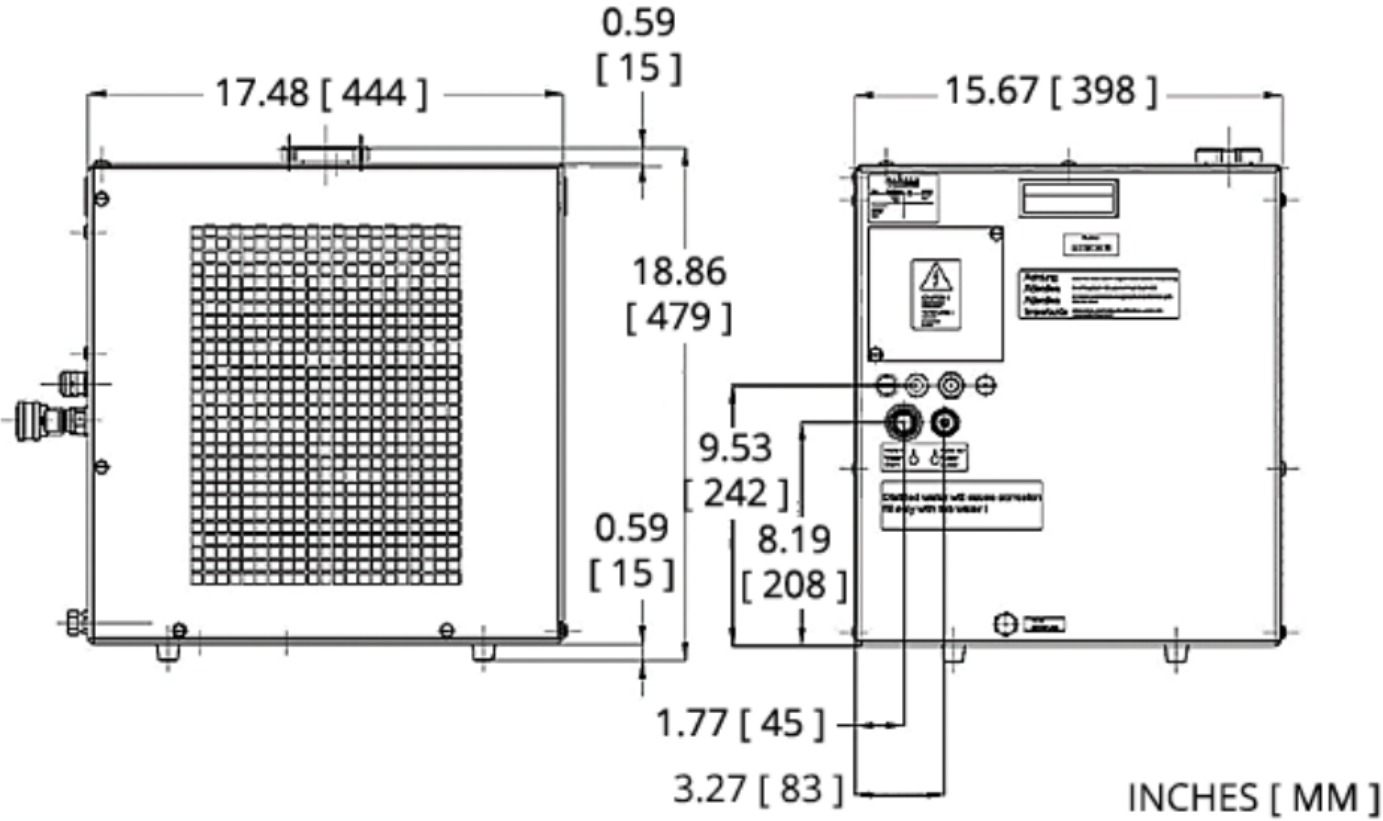
Appendix F: Ceiling Fixing Option (Floor Stand)



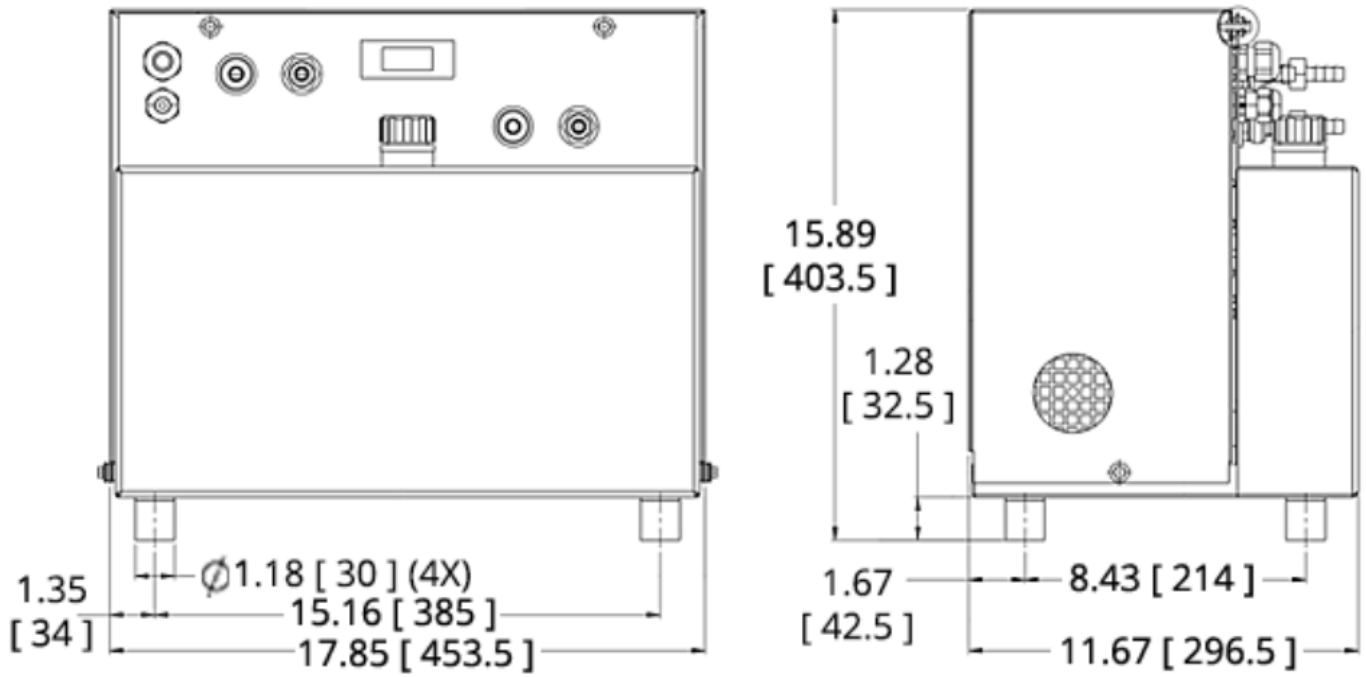
Dimensions in mm

pos.	code	unit	weight kg	accessories	weight kg	total wgt kg
date	12/2006	unit	TUBESTAND C A1 FLOOR TO CEILING FASTENING SCREW		drawing	rev.
scale	1				mi250003	-
sign. R. Casoli	vs.					

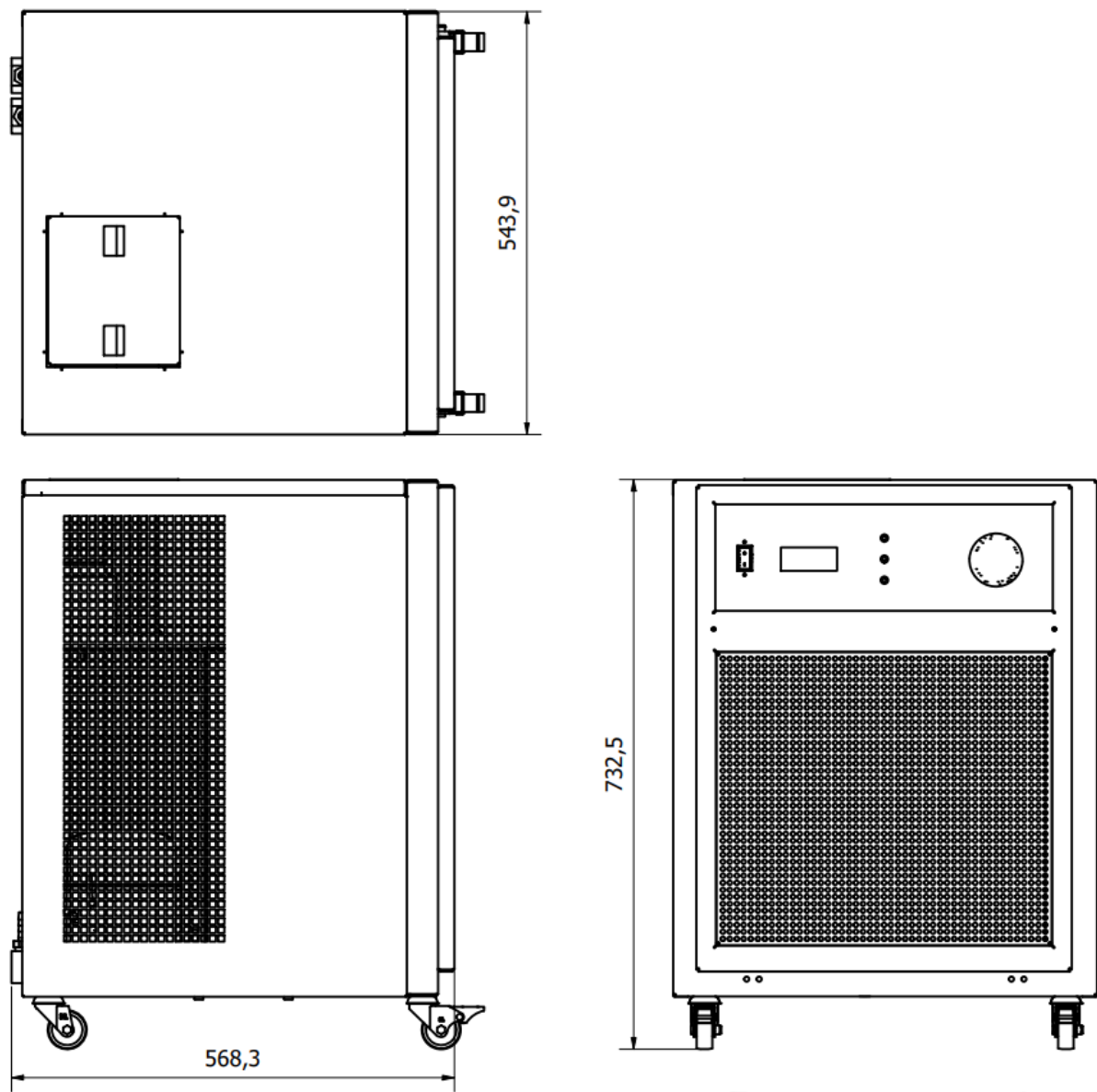
Appendix G: Water-to-Air Cooler Drawing



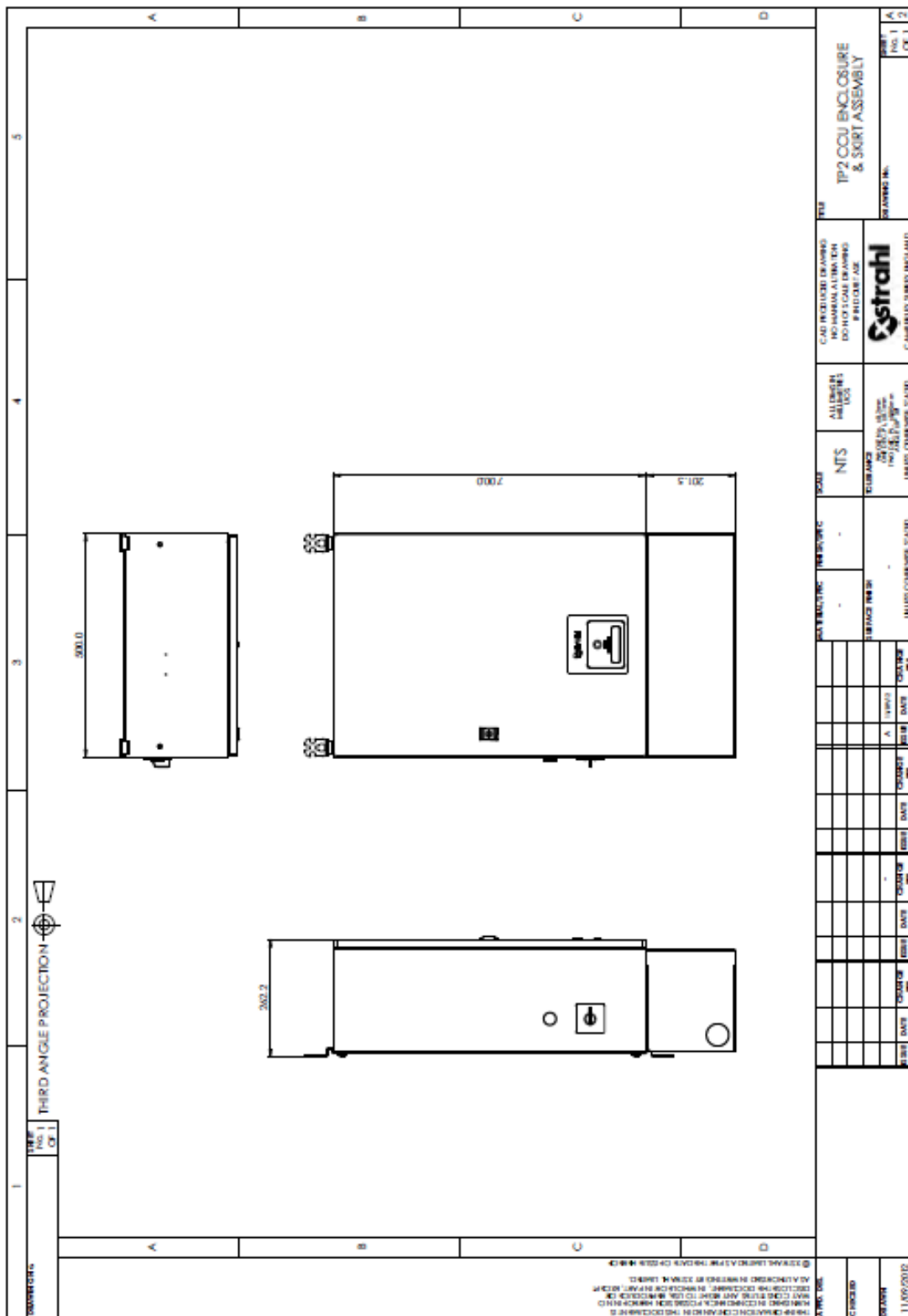
Appendix H: Water-to-Water Cooler Drawing



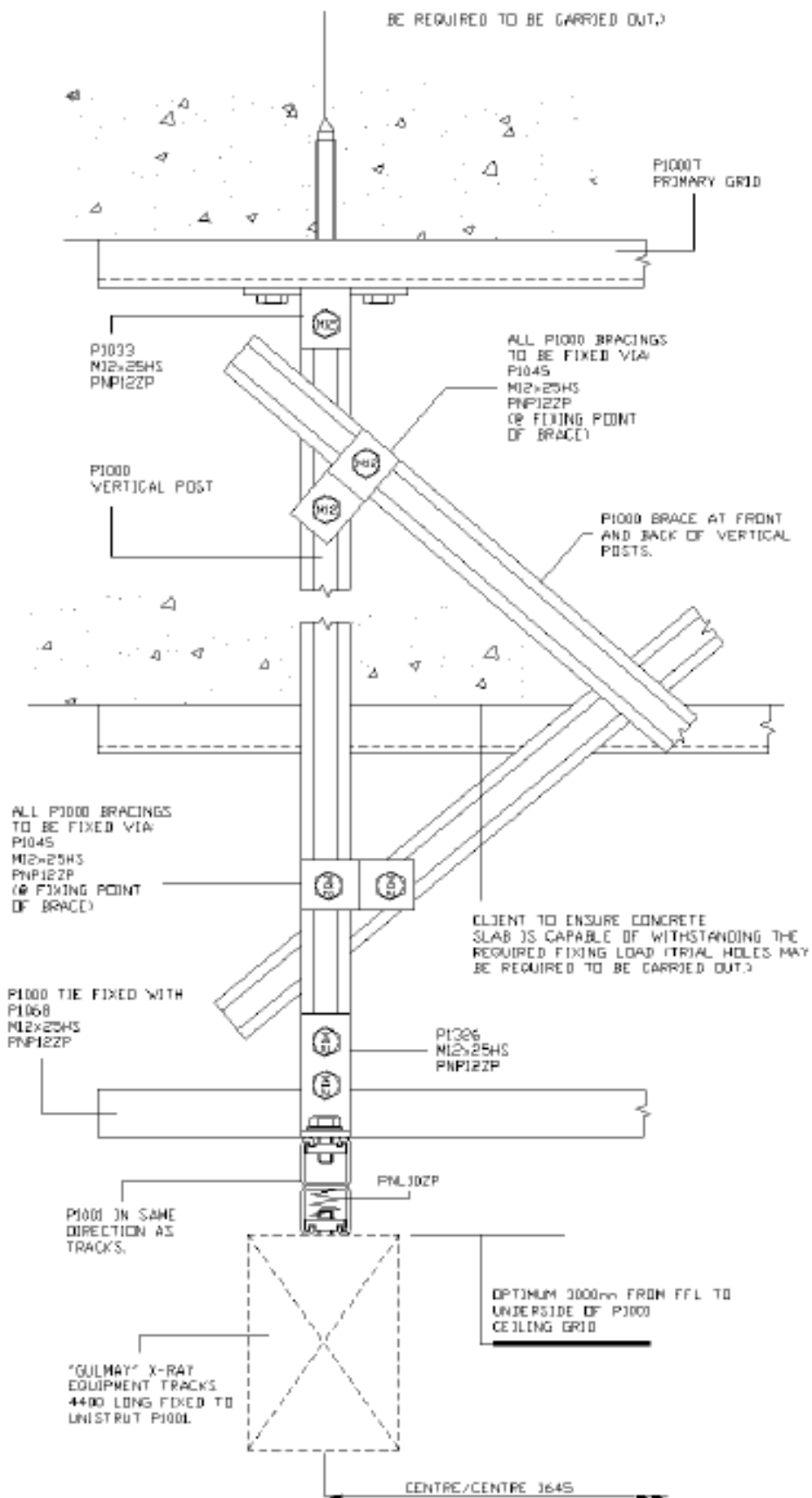
Appendix I: Closed-Circuit Chiller Drawing



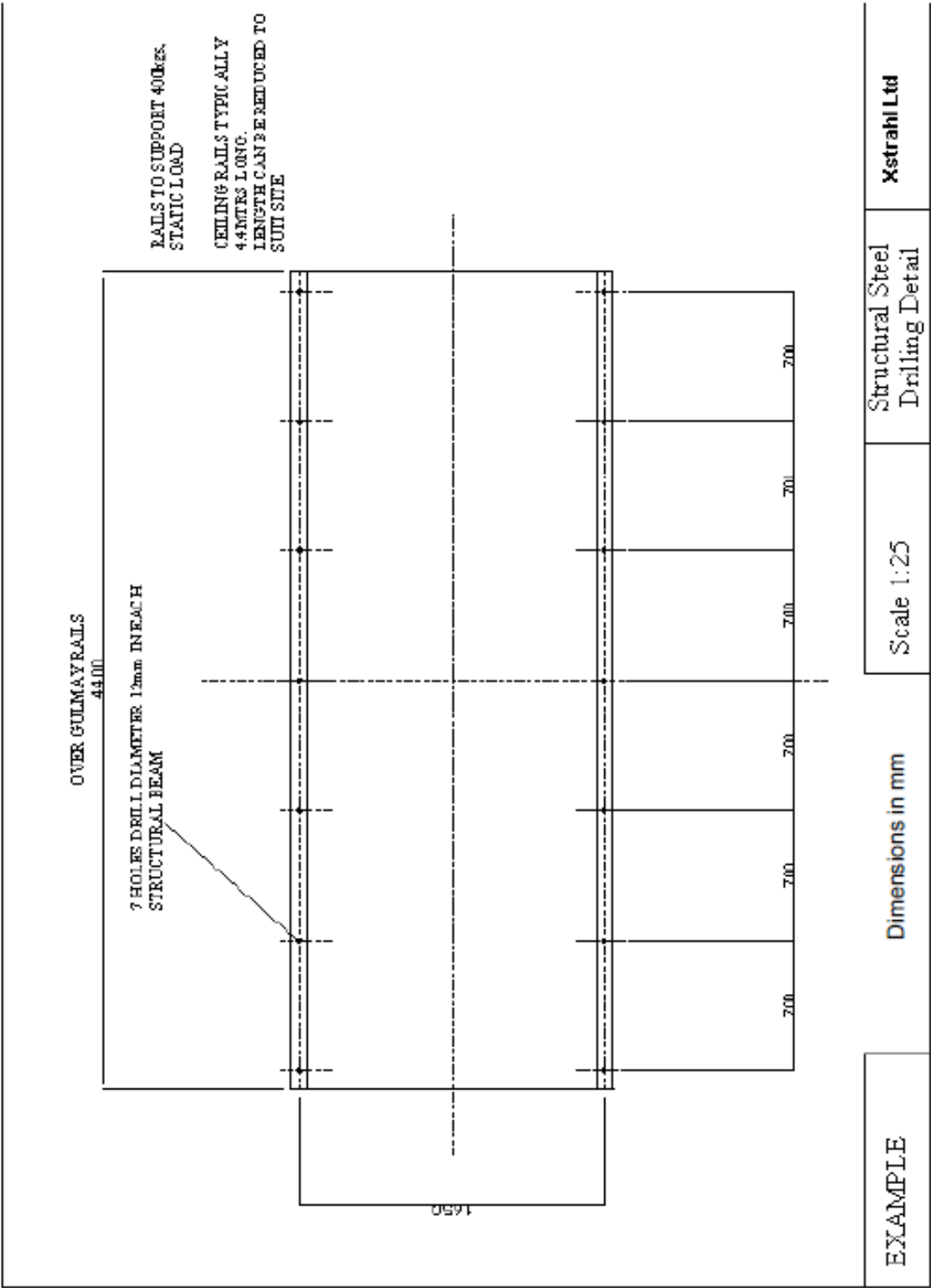
Appendix J: CCU and Cable Skirt Enclosure Drawing



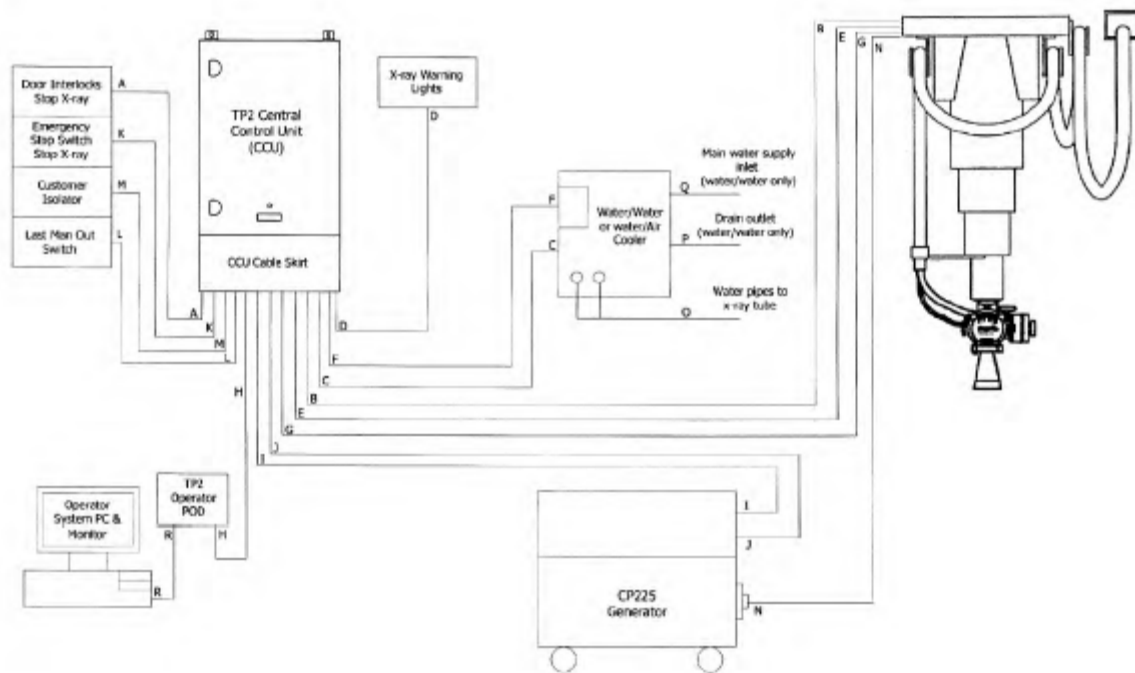
Appendix K: Typical Unistrut® Detail Drawing



Appendix L: Structural Steel Drill Drawing



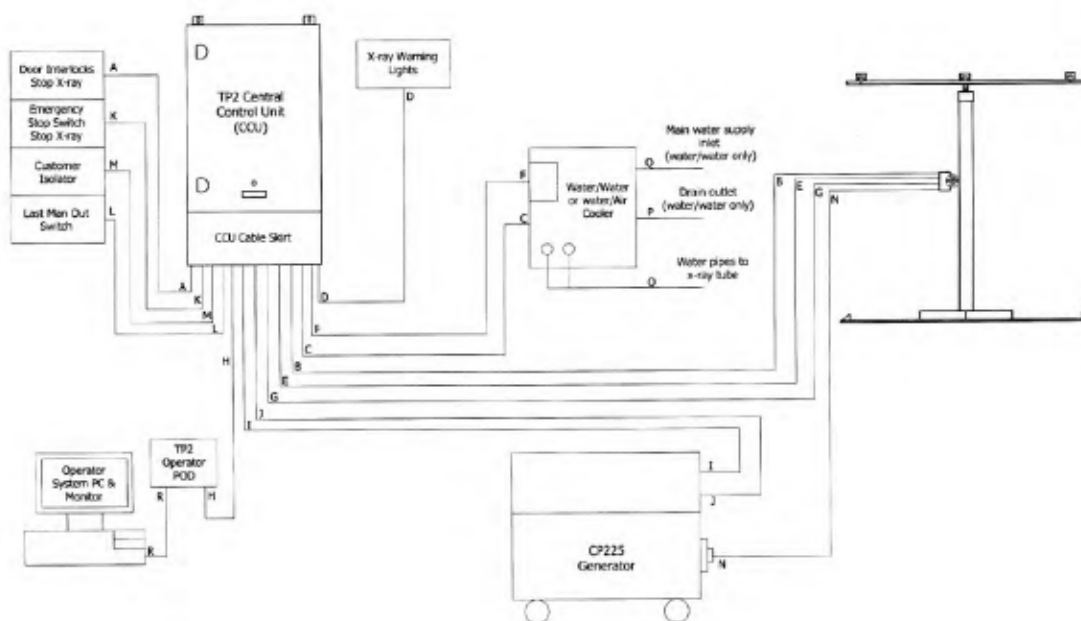
Appendix M: Ceiling Stand Cable Chart



Last man out optional.

Cable Connection for Xstrahl 200 Ceiling Stand			
No	Description	From	To
A	Emergency Off Cable	TP2 CCU	Emergency Stop Switch
B	Tube Stand 230 V AC Cable	TP2 CCU	Ceiling Stand Carriage
C	Cooler Mains Cable	TP2 CCU	Cooler
D	X-Ray Warning Lights Cable	TP2 CCU	Warning Lights
E	Thermocouple & Dose Cable (Dose Based Systems Only)	TP2 CCU	Ceiling Stand Carriage
F	Cooler Interlocks Cable	TP2 CCU	Cooler
G	Filters & Applicators Coded Cable	TP2 CCU	Ceiling Stand Carriage
H	Pod Interface Cable	TP2 CCU	Operator Pod
I	Generator Interface Cable	TP2 CCU	Generator
J	Generator Mains Cable	TP2 CCU	Generator
K	AC Mains In Cable	TP2 CCU	Supply Isolator
L	Door Interlocks	TP2 CCU	Door Switches
M	Last Man Out Switch Cable (System Option)	TP2 CCU	Last Man Out Switch*
N	EHT Cable	Generator	X-Ray Tube
O	Cooler Hoses x 2 (AL 40)	Cooler	X-Ray Tube
P	Heat Exchanger Inlet (AL45) (Water to Water Cooler Only)	Water Supply	Cooler Inlet
Q	Heat Exchanger Outlet (AL45) (Water to Water Coolers Only)	Cooler Outlet	Drain
R	RS-232	Operator Pod	PC

Appendix N: Floor Stand Cable Chart



Cable Connection for Xstrahl 200 Floor Stand

No	Description	From	To
A	Emergency Off Cable	TP2 CCU	Emergency Stop Switch
B	Tube Stand 24 V AC Cable	TP2 CCU	Ceiling Stand Carriage
C	Cooler Mains Cable	TP2 CCU	Cooler
D	X-Ray Warning Lights Cable	TP2 CCU	Warning Lights
E	Thermocouple & Dose Cable (Dose Based Systems Only)	TP2 CCU	Ceiling Stand Carriage
F	Cooler Interlocks Cable	TP2 CCU	Cooler
G	Filters & Applicators Coded Cable	TP2 CCU	Ceiling Stand Carriage
H	Pod Interface Cable	TP2 CCU	Operator Pod
I	Generator Interface Cable	TP2 CCU	Generator
J	Generator Mains Cable	TP2 CCU	Generator
K	AC Mains In Cable	TP2 CCU	Supply Isolator
L	Door Interlocks	TP2 CCU	Door Switches
M	Last Man Out Switch Cable (System Optional)*	TP2 CCU	Last Man Out Switch*
N	EHT Cable	Generator	X-Ray Tube
O	Cooler Hoses x 2 (AL 40)	Cooler	X-Ray Tube
P	Heat Exchanger Inlet (AL45) (Water to Water Cooler Only)	Water Supply	Cooler Inlet
Q	Heat Exchanger Outlet (AL45) (Water to Water Coolers Only)	Cooler Outlet	Drain
R	RS-232	Operator Pod	PC

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