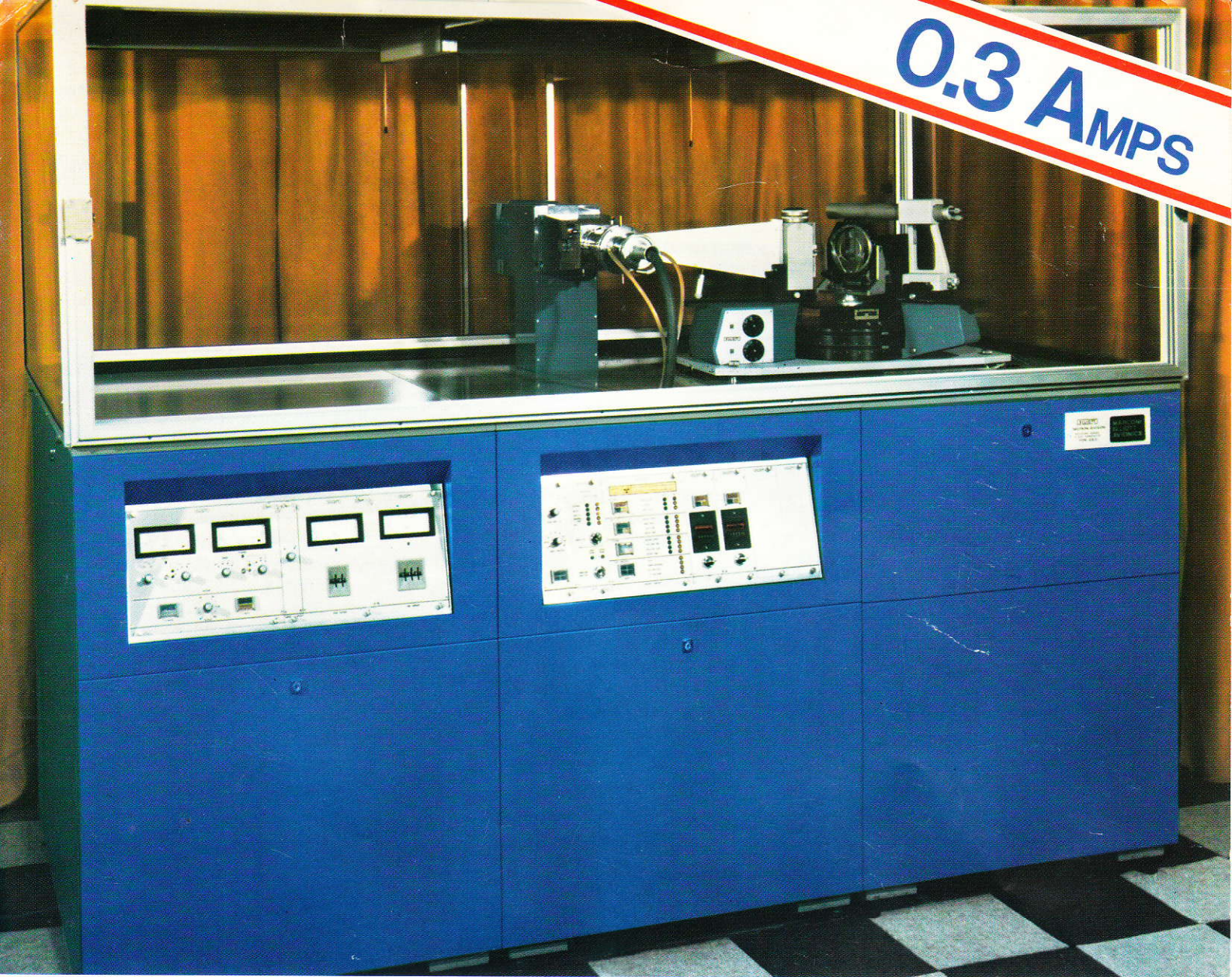


**0.3 AMPS**



- \* HIGH POWER COMBINED WITH HIGH BRILLIANCE
- \* COMPLETE PROTECTION FROM RADIATION HAZARDS
- \* TURBOMOLECULAR PUMPING
- \* PROGRAMMABLE OPERATION

# **GX 21 ROTATING ANODE X-RAY DIFFRACTION GENERATOR**



# GX 21 ROTATING ANODE X-RAY DIFFRACTION GENERATOR

X-ray sources of very high intensity are required for X-ray diffraction experiments in which the time duration would be intolerably long using conventional stationary anode generators. By spinning a cylindrical anode at high velocity, the conduction of heat from the focus is accelerated so that a high power dissipation can be sustained, with enhanced X-ray output and focal brilliance.

## DESIGN FEATURES

### High Power Rating

The maximum anode current of 0.3 Amps permits a power dissipation of up to 15 kW, obtainable with a 0.5 by 10 mm focus on copper at 50 kV.

### High Brilliance

The maximum focal brilliance is 12 kW/mm<sup>2</sup>, obtainable with a 0.1 by 1.0 mm focus on a copper target.

### High Stability

Stabilisation of the cathode voltage and tube current to within 0.1% is provided using advanced solid state servo techniques. The spatial stability of the X-ray focus is better than 5 microns.

### Choice of Focal Dimensions

The GX21 generator is designed to produce X-rays within a wide range of focal areas on the anode, between a micro-focus of 0.1 by 1.0 mm and a "normal" focus of 0.5 by 10 mm, with a corresponding range of maximum power ratings. The focal cups are easily interchanged.

### Choice of Focal Configurations

Two versions of the equipment are offered, with the RA5 head as illustrated in which the X-ray source is viewed through two beryllium windows and can be arranged to give either two point sources or two vertical lines. An alternative configuration uses the RA6 head in which two point and two horizontal line sources can be viewed simultaneously, utilising four shutter assemblies.

### Choice of Target Material

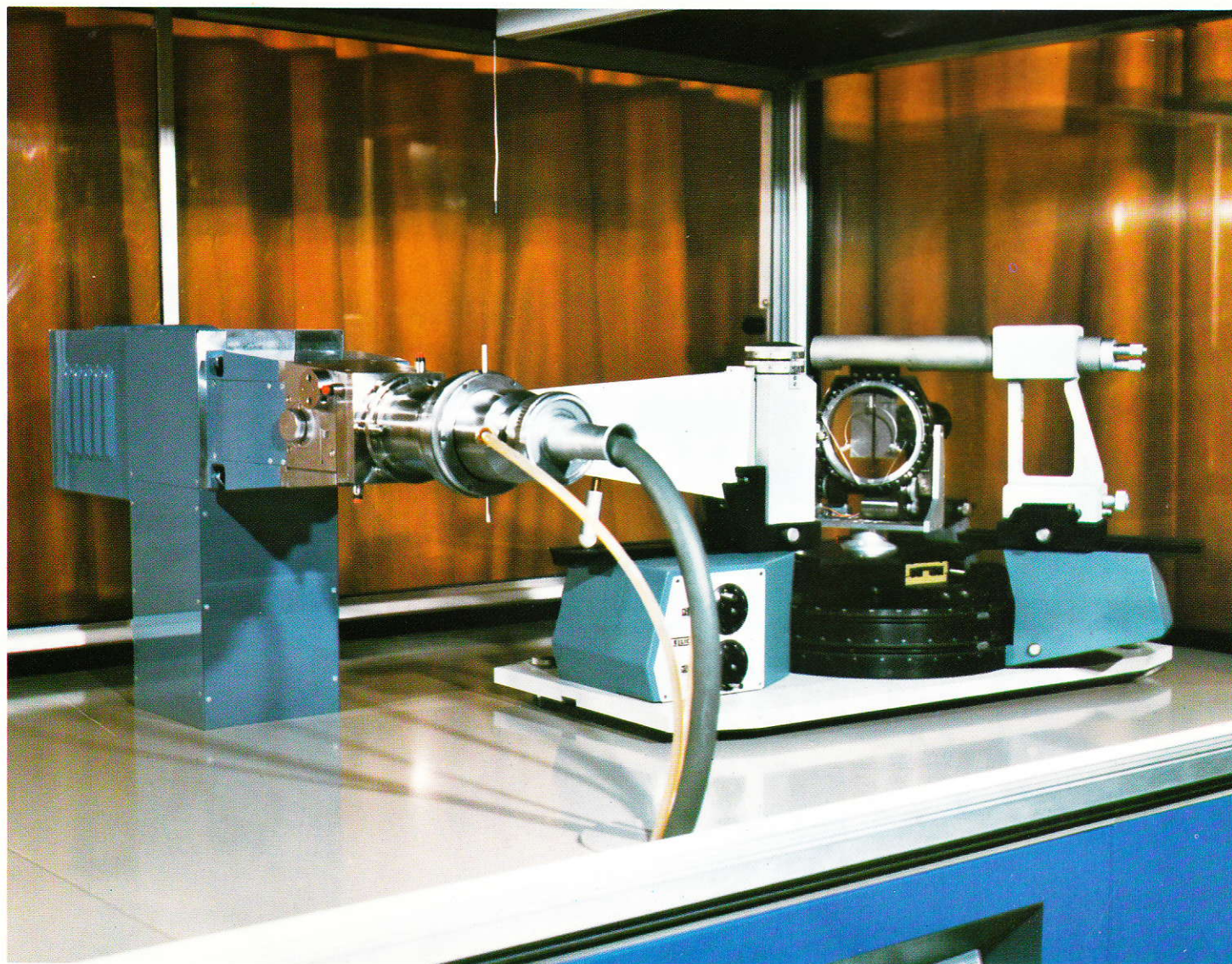
Interchangeable anodes are provided. The standard target materials are copper, molybdenum, chromium, silver. Other anodes available on request.

### Voltage and Current Range

Voltage and current are digitally selected. The voltage range is 0 to 60 kV by 1 kV; the current range is 0 to 300 mA by 1 mA.

### Safety

The safety shutter is designed to comply fully with the requirements of the U.K. Health and Safety Executive and X-rays can only be emitted from the tube port when a diffraction instrument is properly interlocked in position. Energisation of



the X-ray tube and opening of the shutter are constantly indicated, and are preceded by warning signals.

### Control System

The control system is of advanced solid state design. The entire system is self-maintaining. The generator protects itself against variations in mains supply, coolant water flow, vacuum conditions, current surges, anode rotation speed, etc., and automatically seeks to restore normal operating conditions. When normal operation cannot be restored, the subsystem in need of attention is visibly indicated.

### Ease of Maintenance

Replacement of consumable components and exchange of focal cups and anodes in the fully demountable X-ray tube is facilitated by an automatically controlled sequence for switching off and switching on the X-ray tube. The modular control system is designed for easy replacement of components.

### Working Surface

The GX21 generator is housed in three cubicles of identical size which are bolted together on site to provide a working

surface 1136 by 2316 mm.

### Low Attenuation

The X-ray windows are 0.25 mm beryllium discs.

### Vacuum System

The X-ray tube is rapidly evacuated to a very low pressure by means of turbo-molecular pump backed by a rotary pump. This results in highly stable operating conditions and prolonged filament life.

### Cooling System

The anode is cooled by internal closed circuit water circulation.

### Anode Rotor

The anode rotation speed can be either 3000 or 6000 r.p.m. according to the power loading desired.

### Power Limiter

There is a device for preventing accidental overloading of the anode for any combination of target material and focal dimension.

## ACCESSORIES

### Adjustable Cathode

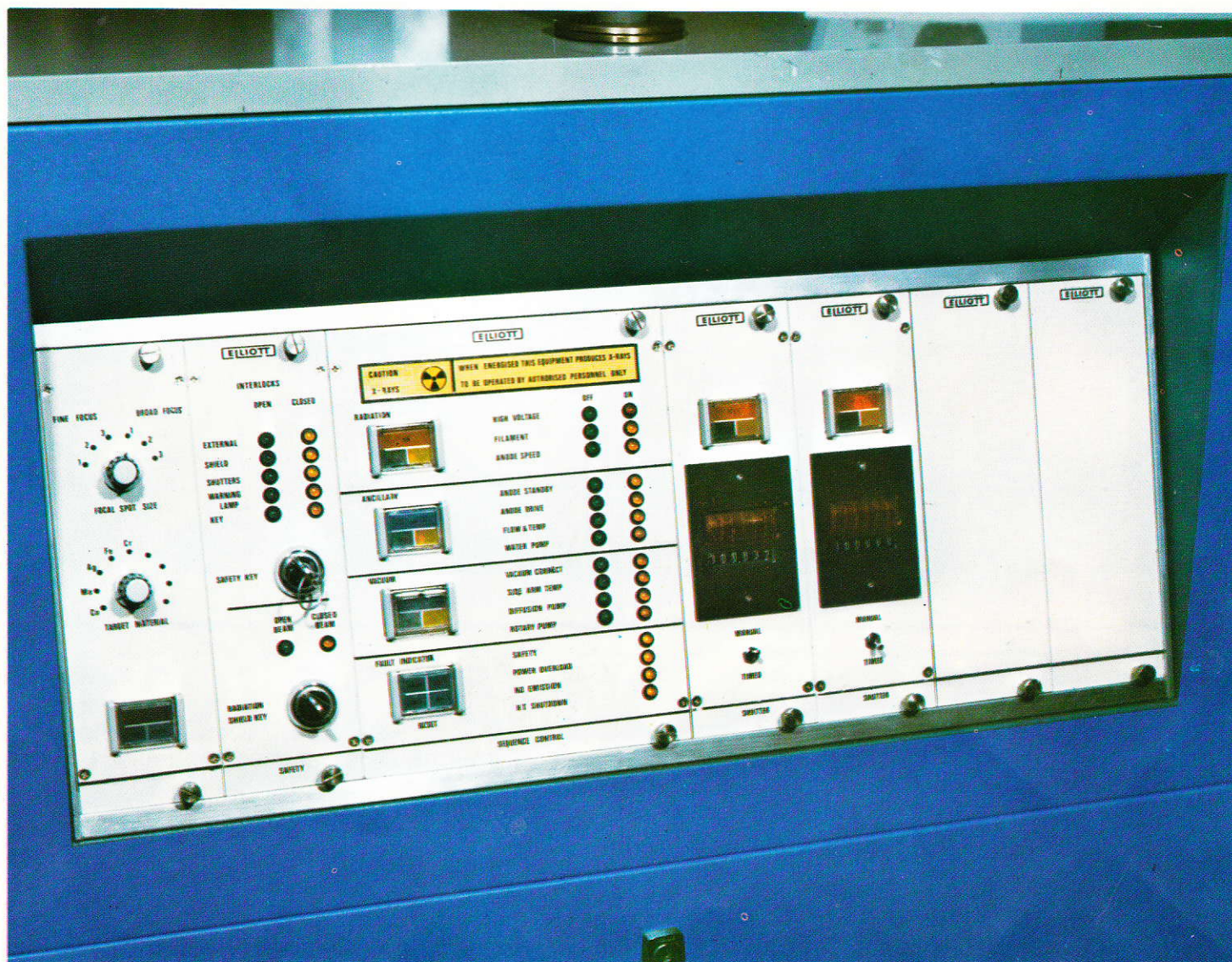
An adjustable cathode can be supplied as an optional accessory in order to facilitate the refinement and maintenance of focal dimensions of 0.1 mm and less.

### Radiation Safety Enclosure

An enclosure covering the entire working surface to a height of 770 mm can be provided as an optional accessory to shield personnel using diffraction instruments in which the X-ray beams are not enclosed. Permanent beam stops are fixed opposite each X-ray port, and sliding side panels of transparent but X-ray absorbent plastic are interlocked with the X-ray supply. The enclosure is fitted with lamps and cooling fan.

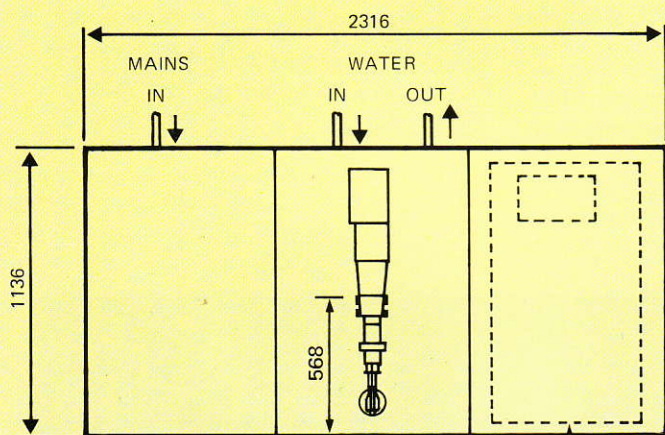
### Supplementary Cubicles

Additional cubicles may be provided to extend the working surface, size 772 by 1136 mm.

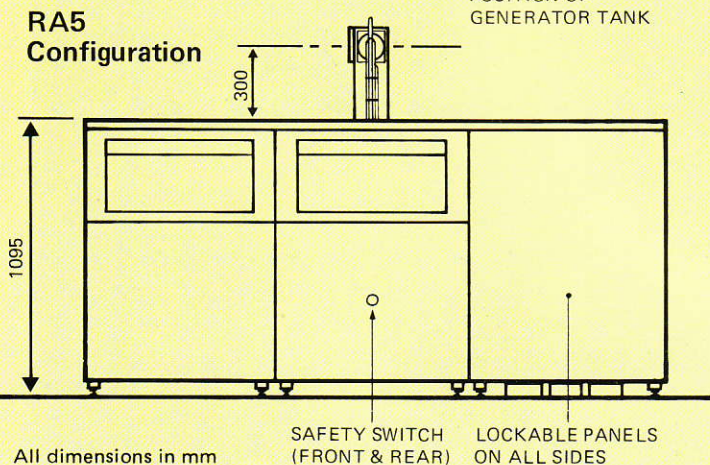


## SPECIFICATIONS

|                                      |                                       |
|--------------------------------------|---------------------------------------|
| Voltage range                        | 10 to 60 kV by 1 kV steps             |
| Current range                        | 0 to 300 mA by 1 mA steps             |
| Maximum power loading                | 15 kW                                 |
| Voltage and current stability        | Better than 0.1%                      |
| Standard target materials            | Cu, Mo, Cr, Ag.                       |
| Standard focal dimensions            | 0.1 by 1.0 mm 1.2 kW                  |
| with maximum power ratings           | 0.2 by 2.0 mm 3.0 kW                  |
| for copper anode                     | 0.3 by 3.0 mm 5.0 kW                  |
|                                      | 0.5 by 5.0 mm 10.0 kW                 |
|                                      | 0.5 by 10 mm 15.0 kW                  |
| Range of take-off angles             | 0 to 12°                              |
| Inherent filtration                  | 0.25 mm beryllium                     |
| Physical dimensions                  |                                       |
| Height of cubicles                   | 1095 mm                               |
| Width of cubicles                    | 1136 mm                               |
| Length of cubicles                   | 2316 mm                               |
| Height of focus from working surface | RA5 300 mm                            |
|                                      | RA6 382 mm                            |
| Total weight                         | 2150 kg                               |
| Maximum power supply requirement     | 400 V 80A single phase                |
| Maximum water supply requirement     | 35 l/min. at < 15°C                   |
|                                      | at a pressure of 4 kg/cm <sup>2</sup> |



### RA5 Configuration

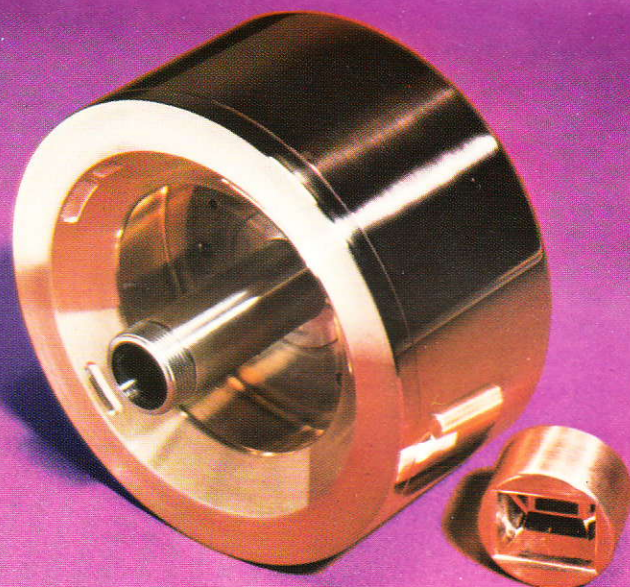


All dimensions in mm

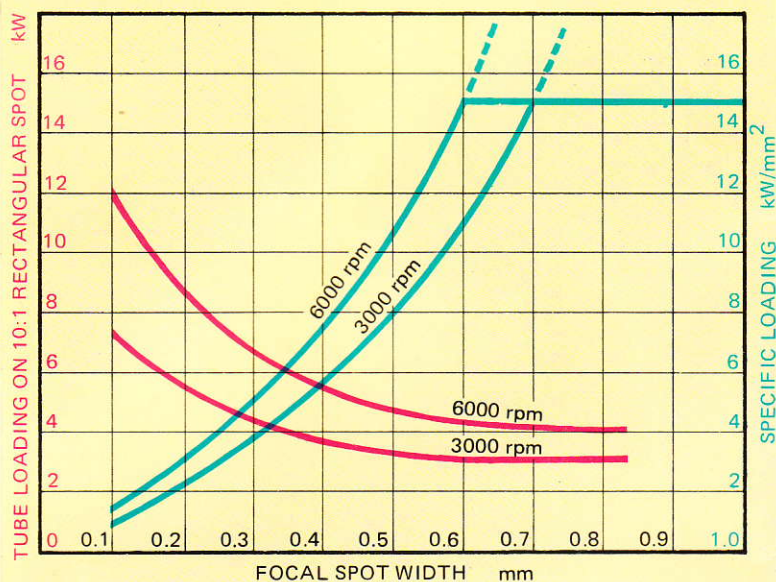
SAFETY SWITCH (FRONT & REAR)

LOCKABLE PANELS ON ALL SIDES

### Copper Anode and Focus Cup



### Adjustable Cathode



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