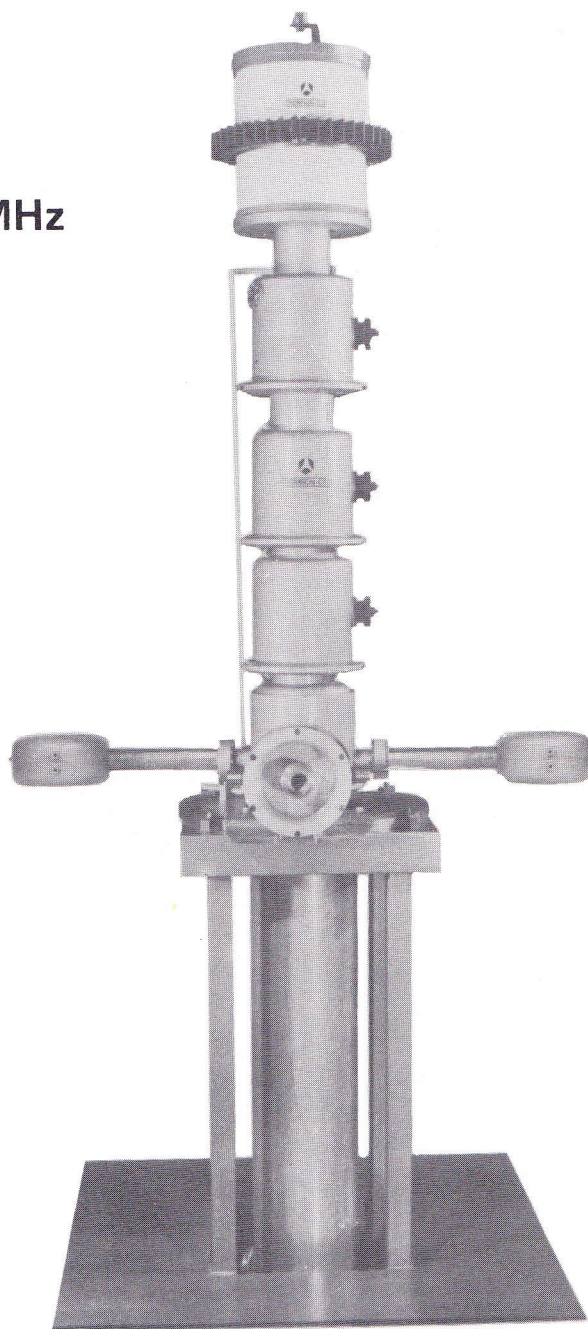


High-Power Klystron

500 kW peak / 250 kW ave. / 500 MHz

- Extremely high output power in both pulsed and CW operation
- Suitable for long-pulse and high-duty-cycle applications
- Hypervapotron[®] collector cooling, for high overload safety
- Extreme reliability and long operating life



This data sheet cannot be considered to be a contractual specification. The information given herein may be modified without notice due to product improvement or further development. Consult THOMSON-CSF (Electron Tube Division) before making use of this information for equipment design.

The F2055 is a high-power, multicavity klystron amplifier suitable for pulsed or continuous-wave (CW) use. In pulsed operation at a fixed frequency of 500 MHz, the F2055 can deliver a peak output power at saturation of 500 kW, minimum, with an average output power that can exceed 250 kW (50 % duty). The beam current in this operating mode is controlled by a modulating anode. In CW operation, this tube can deliver an output power at saturation of at least 250 kW.

At such power levels, electromagnetic confinement of the electron beam is necessary. For this, the F2055 is operated with a THOMSON-CSF electromagnet, the FOC 1295.

For excellent overload safety and added tube reliability, the collector is cooled by THOMSON-CSF's patented Hypervapotron circulating-water method. The tube body is cooled by ordinary water circulation and the modulating anode and RF output window by forced air.

The F2055 has been designed and thoroughly proven to give extremely reliable, long-term operation in circular accelerators, colliding and storage rings and other applications.

GENERAL CHARACTERISTICS

Electrical

Frequency	500	MHz
Peak output power at saturation, min.	500	kW
Average or CW output power at saturation, min.	250	kW
Peak RF drive power, typ.	70	W
Bandwidth (– 3 dB), min.	5	MHz
Gain at saturation, min.	37	dB
Efficiency, typ.	40	%
Perveance.	2.25	$\mu\text{A.V}^{-3/2}$
Heater voltage (ac or dc) (1)	24	V
Heater current	24	A

Mechanical

Dimensions	See the Outline Drawing	
Weight approx. :		
– klystron	300	kg
– electromagnet	500	kg
– shielding	50	kg
Operating position	Vertical, cathode up	
Envelope	Metal-glass-ceramic	
Cathode.	Oxide-coated, unipotential, indirectly heated	

(1) The exact heater voltage to use for each tube is given on its Test Report Sheet. This voltage is to be observed to within $\pm 4\%$.

TYPICAL OPERATION

Frequency	500 MHz
Heater voltage	24 V
Heater current	24 A
Ion-pump voltage (2)	5.0 kV

Typical CW Operation

Output power at saturation	250	kW
Gain at saturation	37	dB
Bandwidth (- 3 dB)	5	MHz
Efficiency	40	%
Beam voltage	40	kV
Beam current	15.5	A
Modulating-anode voltage	36	kV
Modulating-anode current	15	mA
RF drive power	50	W
Pressure drop :		
- modulating-anode cooling circuit	40	mm H ₂ O
- window cooling circuit	400	mm H ₂ O

Typical Pulsed Operation

Peak output power at saturation	500	kW
Ave. output power at saturation	250	kW
RF drive power, CW	50	W
RF pulse duration	10	ms
Pulse repetition rate	50	Hz
Duty cycle	0.5	
Gain at saturation	40	dB
Bandwidth (- 3 dB)	6	MHz
Efficiency	40	%
Peak beam voltage	50	kV
Peak beam current	25	A
Peak modulating-anode voltage	49	kV
Load SWR	1.2:1	
Pressure drop :		
- modulating-anode cooling circuit	40	mm H ₂ O
- window cooling circuit	400	mm H ₂ O

(2) A safety device should be provided to cut off the high-voltage supply if the ion-pump current exceeds the value specified on the individual Test Report Sheet (between 20 and 200 μ A).

ABSOLUTE RATINGS (3)
(non-simultaneous values)

	Min.	Max.	Units
Peak output power (4)	—	600	kW
Ave. output power.	—	275	kW
Output SWR	—	1.5:1	
Beam current	—	30	A
Beam voltage	—	55	kV
Modulating-anode voltage	See the beam voltage limit		
Modulating-anode power, average.	—	750	W
Peak beam power	—	1500	kW
Ave. beam power.	—	650	kW
Collector dissipation	—	650	kW
Peak RF drive power	—	1.0	kW
Ave. RF drive power	—	0.15	kW
Applied modulating-anode voltage (for a max. peak output power of 500 kW) :			
— pulse duration (measured at 76 %)	—	15	ms
— duty cycle (4)	—	0.5	
Warm-up time.	15	—	mn
Heater surge current.	—	30	A
Heater voltage.	—	30	V
Ion-pump voltage	—	5.5	kV
Ion-pump current (2)	—	1.0	mA

Cooling

	Body	Collector	Units
Water flow, min.	1.5	60	m ³ /h
Inlet pressure, max.	7	7	bar
Pressure drop, max.	4	4	bar
Cooling-water inlet temperature, max.	—	40	°C

	Modulating Anode	Window	Units
Air flow, min.	120	30	m ³ /h

(3) No one value ever to be exceeded, even under transient conditions ; operation at more than one absolute rating at the same time may cause tube damage. Equipment must be designed so that these limits are never exceeded.
(4) Depends upon the pulse duration.

ACCESSORIES

Connections

RF input coaxial connector	"SPINNER" 60 Ω plug or HN type UG-496/U
RF output waveguide	WR 1800
Heater-cathode connector	Socapex EF 33 G
Ion-pump connector	HN type UG-496/U

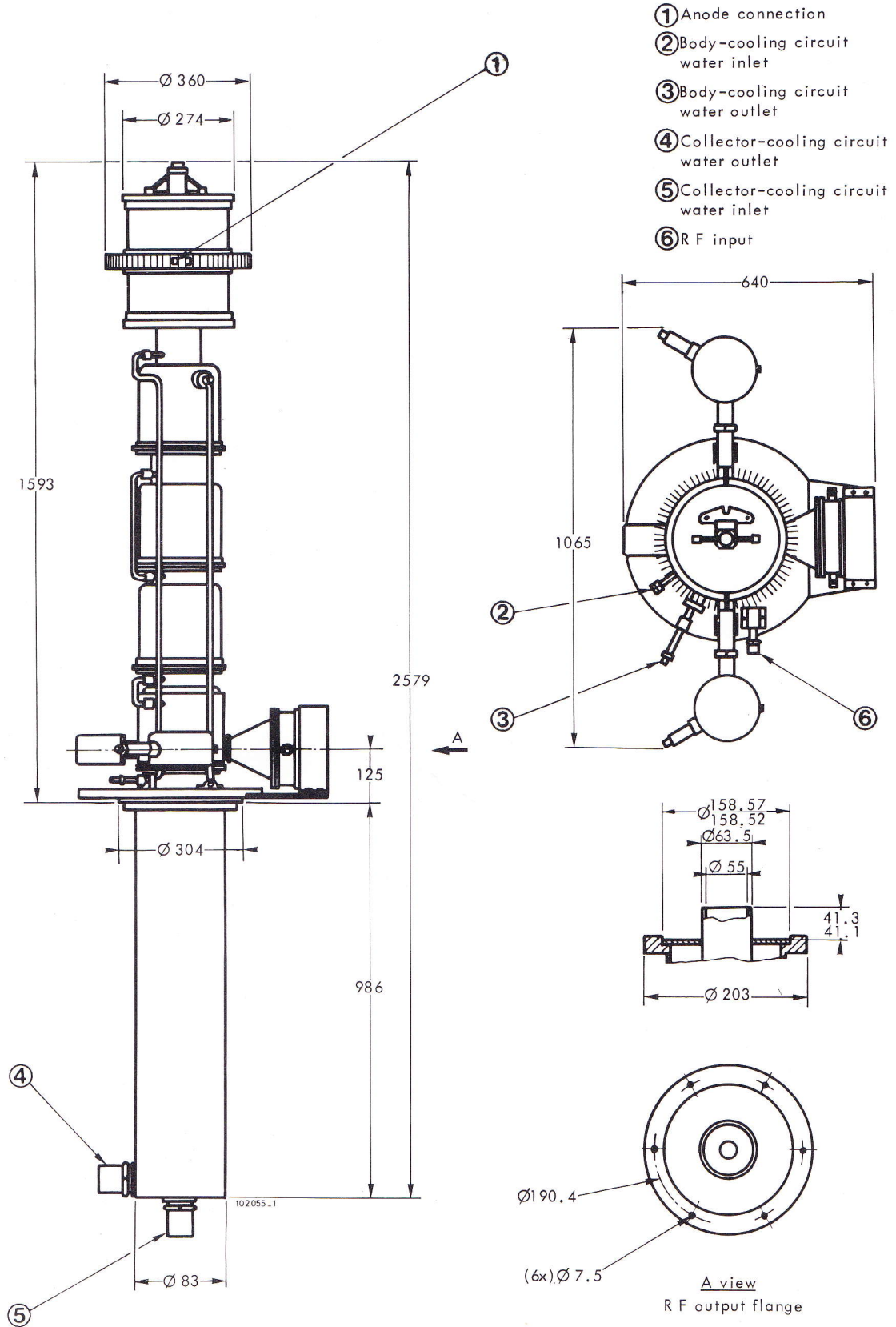
Electromagnet

Reference number	FOC 1295
Maximum current	11 A
Maximum resistance	22 Ω

Power Supply and Protection Unit

Contains :	1 Electromagnet power supply (2 racks)
	2 Ion-pump power supplies
	1 Body-power monitoring rack
	1 Interlock rack

OUTLINE DRAWING



Dimensions in mm.

