INDUSTRIAL R.F. TRIODE

Triodes in metal-ceramic construction intended for use as industrial oscillators.
The YD1160 is forced-air cooled, with integral cooler.
The YD1161 is water cooled by means of a separate jacket.
The YD1162 has an integral helical water cooler.

QUICK REFERENCE DATA

Oscillator output power ($W_o - W_{feedback}$), typical	W_{osc}		8,8 kW
Frequency for full ratings	f	max.	85 MHz

To be read in conjunction with "General Operational Recommendations Transmitting Tubes for Communication, Tubes for R.F. Heating"

R.F. CLASS C OSCILLATOR FOR INDUSTRIAL USE

OPERATING CONDITIONS

Frequency	f	150	27,12	27,12	MHz
Filament voltage	V_f	5,8	6,3	6,3	V
Oscillator output power (W_o-W_{feedb})	W_{osc}	7,15	8,8	7,5	kW
Anode voltage	V_a	5,0	6,5	6,0	kV
Anode current	I_a	2,0	1,8	1,6	A
Anode input power	W_{ia}	10,0	11,7	9,6	kW
Anode dissipation	W_a	2,45	2,5	1,7	kW*
Anode output power	W_o	7,55	9,2	7,9	kW
Anode efficiency	η_a	75,5	78,6	82,3	%
Oscillator efficiency	η_{osc}	71,5	75,2	78,1	%
Feedback ratio	V_{gp}/V_{ap}	15	16	15	%
Grid resistor	R_g	1,0	1,6	1,3	kΩ
Grid current, on load	I_g	480	430	480	mA
Grid voltage, negative	$-V_g$	480	688	624	V
Grid dissipation	W_g	100	110	120	W
Grid resistor dissipation	W_{Rg}	230	296	300	W

LIMITING VALUES (Absolute maximum rating system)

Frequency	f	up to	85	150 MHz
Anode voltage	V_a	max.	7,2	6,0 kV
Anode current	I_a	max.	2,2	2,2 A
Anode input power	W_{ia}	max.	12,5	11 kW
Anode dissipation	W_a	max.	5	5 kW
Grid voltage	$-V_g$	max.	1	1 kV
Grid current				
on load	I_g	max.	550	550 mA
off load	I_g	max.	750	750 mA
Grid dissipation	W_g	max.	250	250 W
Grid circuit resistance	R_g	max.	20	20 kΩ
Cathode current				
mean	I_k	max.	2,8	2,8 A
peak	I_{kp}	max.	15	15 A
Envelope temperature	T_{env}	max.	240	240 °C

HEATING: direct; filament thoriated tungsten

Filament voltage		
(f = 150 MHz)	V_f	5,8 V
(f < 150 MHz)	V_f	6,3 V
Filament current at V_f = 6,3 V	I_f	66 A

The filament is designed to accept temporary fluctuations of +5% and −10%.

It is extremely important that the filament be properly decoupled. This should be so done that the resonance of the circuit formed by the filament and decoupling elements remains below the fundamental oscillator frequency. In grounded-grid circuits this resonance should be below the grid-cathode resonance. For further information please see Application Book "Tubes for R.F. heating" or contact the manufacturer.

CAPACITANCES

Anode to filament	C_{af}	0,5 pF
Grid to filament	C_{gf}	19 pF
Anode to grid	C_{ag}	14,5 pF

CHARACTERISTICS measured at V_a = 2 kV, I_a = 1 A.

Transconductance	S	22 mA/V
Amplification factor	μ	20

COOLING

To obtain optimum life, the seal/envelope temperature under normal operating conditions should be kept below 200 °C. See also cooling curves.

YD1160

anode + grid dissipation $W_a + W_g$ kW	inlet temperature T_i °C	rate of flow q_{min} m^3/min	pressure drop p_i Pa	outlet temperature t_o °C
3	35	3,6	90	82
3	45	4,2	110	87

YD1161

With jacket K726

anode + grid dissipation $W_a + W_g$ kW	inlet temperature T_i °C	rate of flow q_{min} ℓ/min	pressure drop p_i kPa
3	20	3	16
	50	7	52
5	20	5	34
	50	11,5	140

Absolute max. water inlet temperature T_i max. 50 °C

A low-velocity air flow may be required for cooling of the seals.

YD1162

anode + grid dissipation $W_a + W_g$ kW	inlet temperature T_i °C	rate of flow q_{min} ℓ/min	pressure drop p_i kPa
3	20	2,2	18
	50	4,3	38
5	20	4,0	40
	50	8,0	140

Absolute max. water inlet temperature T_i max. 50 °C

Absolute max. water pressure P max. 600 kPa(abs)

A low-velocity air flow may be required for cooling of the seals.

ACCESSORIES

Filament connector	type	40688
Filament/cathode connector	type	40689
Grid connector	type	40686
Insulating pedestal (YD1160 only)	type	40630
Water jacket (YD1161 only)	type	K726
Gasket (YD1161 only)	code	3322 026 82801

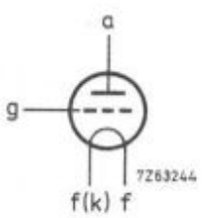
MECHANICAL DATA

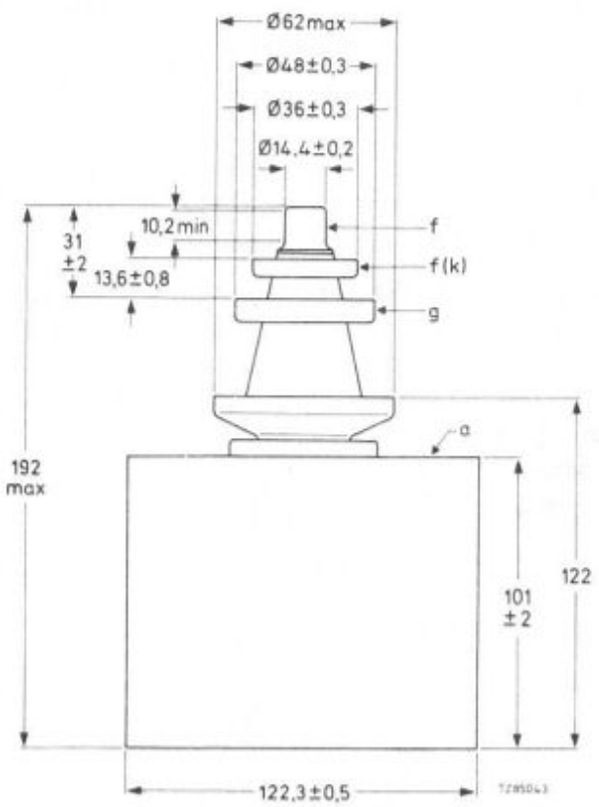
Dimensions in mm

YD1160

Mounting position: vertical, with anode up or down

Net mass: approx. 3,9 kg

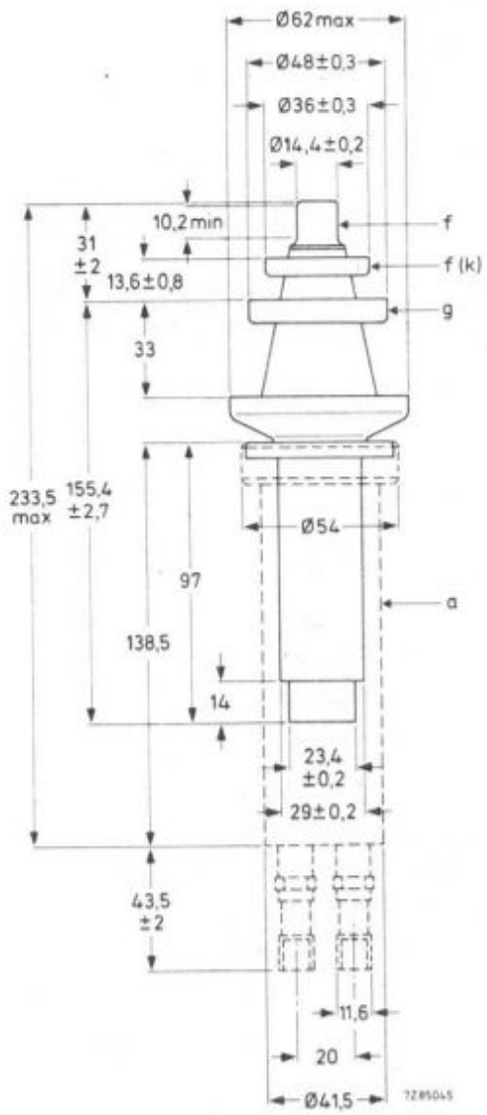




YD1161

Mounting position: vertical with anode down

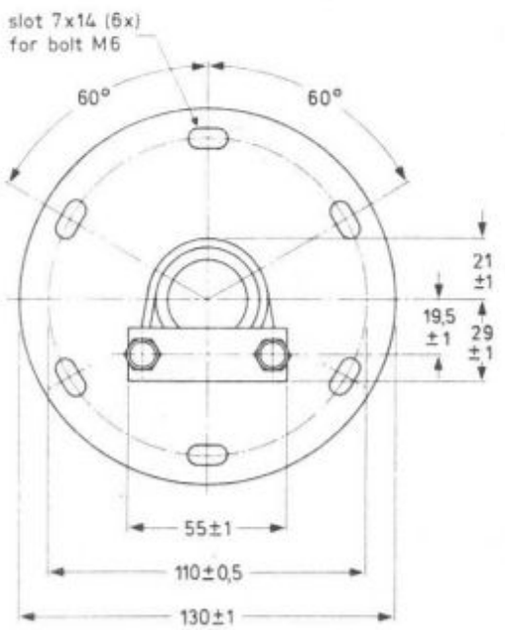
Net mass: approx. 0,66 kg

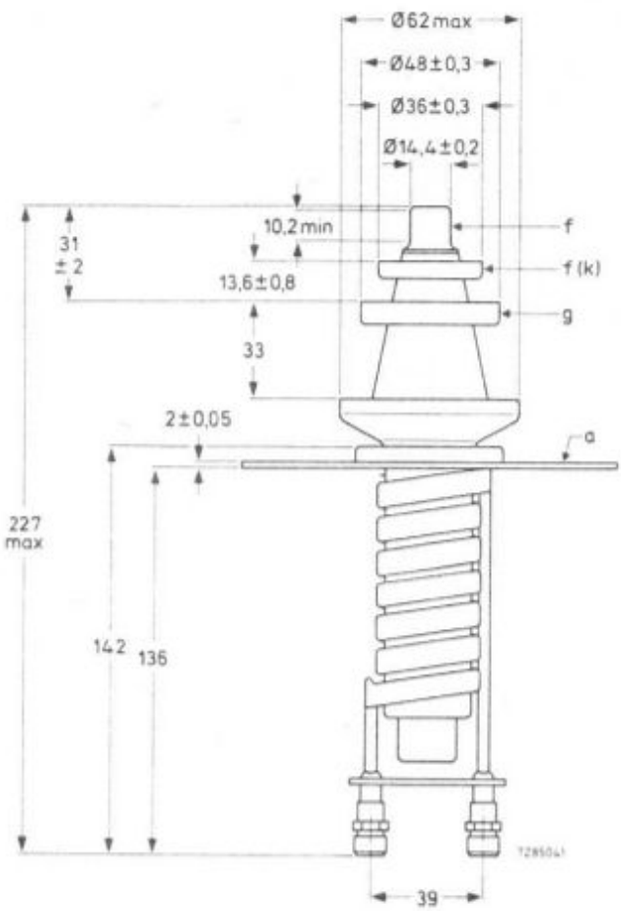


YD1162

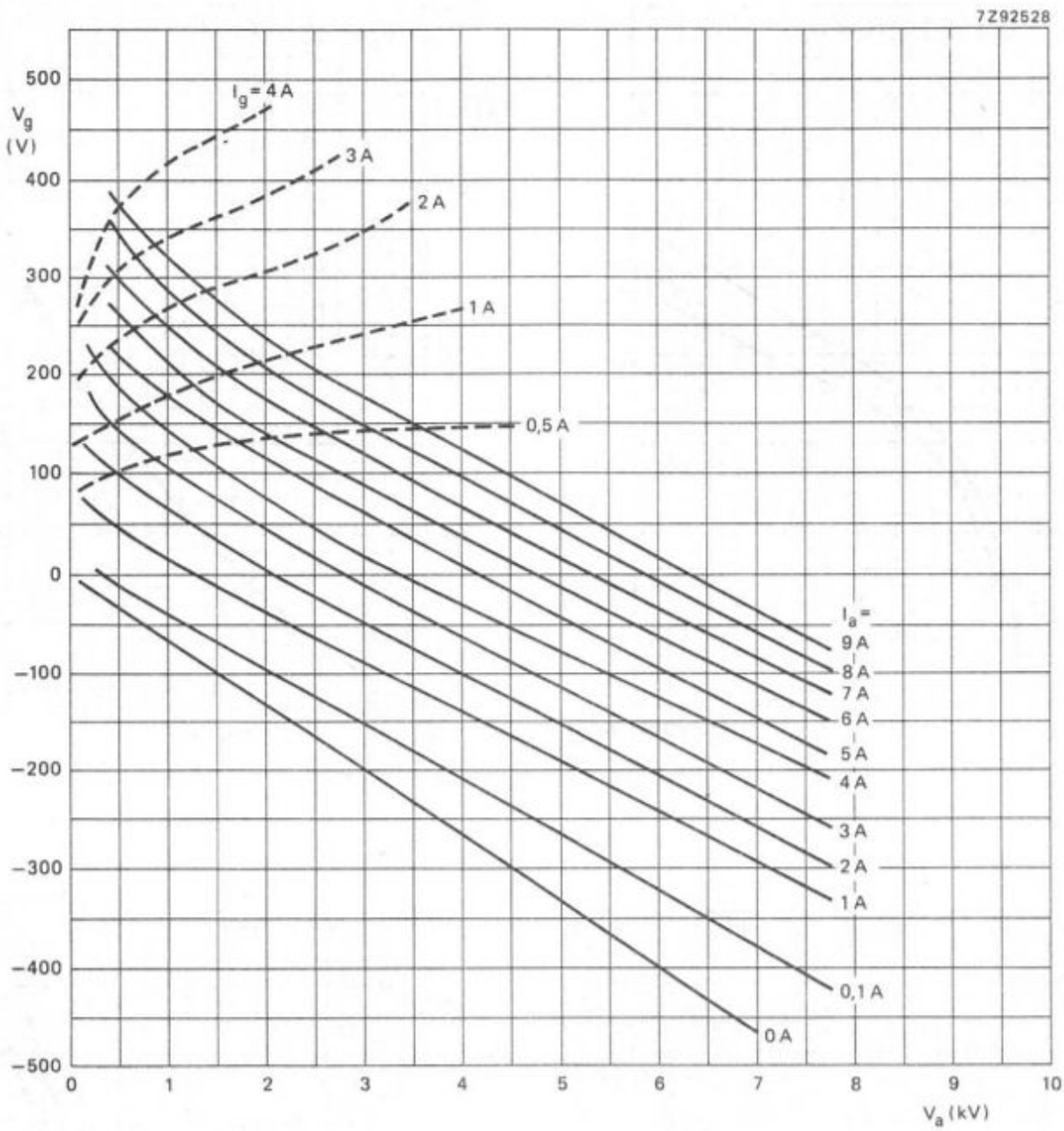
Mounting position: vertical with anode up or down

Net mass: approx. 1 kg

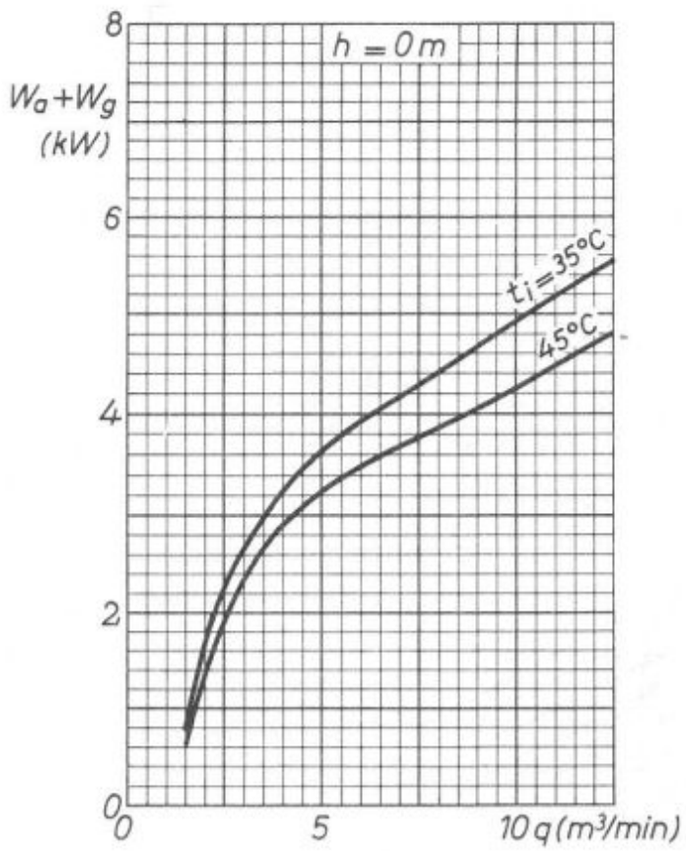


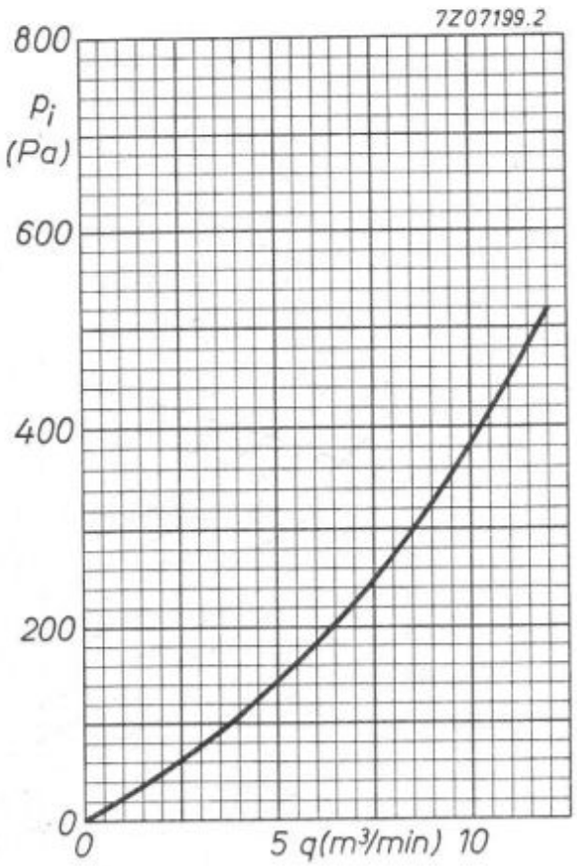


Thread of water connections BSP $^{3}/_{8}$ in.


7Z92528
V_g (V)
500
400
300
200
100
0
−100
−200
−300
−400
−500
I_g = 4 A
3 A
2 A
1 A
0,5 A
I_a =
9 A
8 A
7 A
6 A
5 A
4 A
3 A
2 A
1 A
0,1 A
0 A
0
1
2
3
4
5
6
7
8
9
10
V_a (kV)

YD1160





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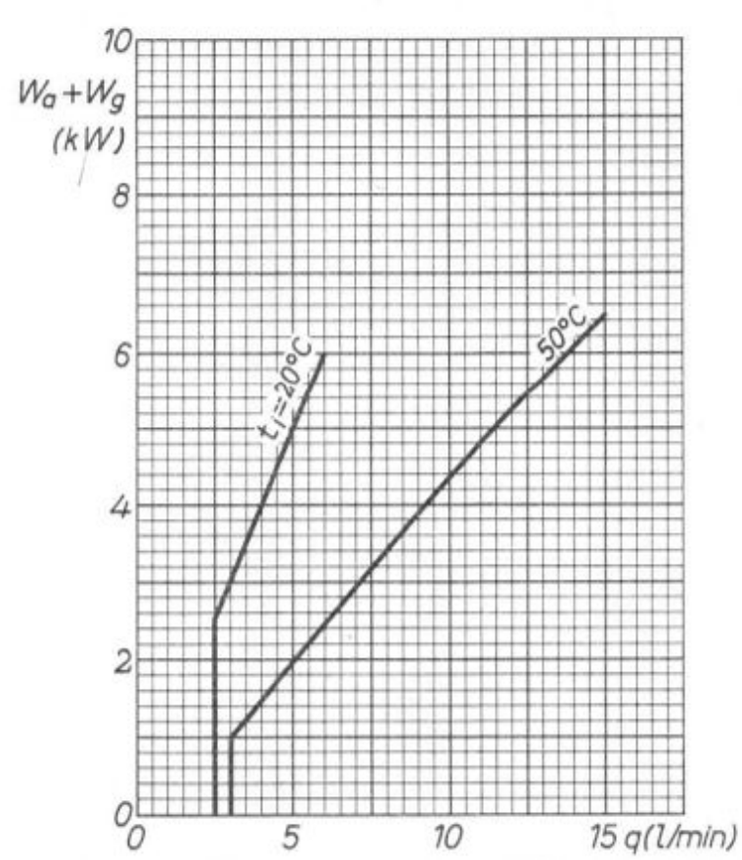

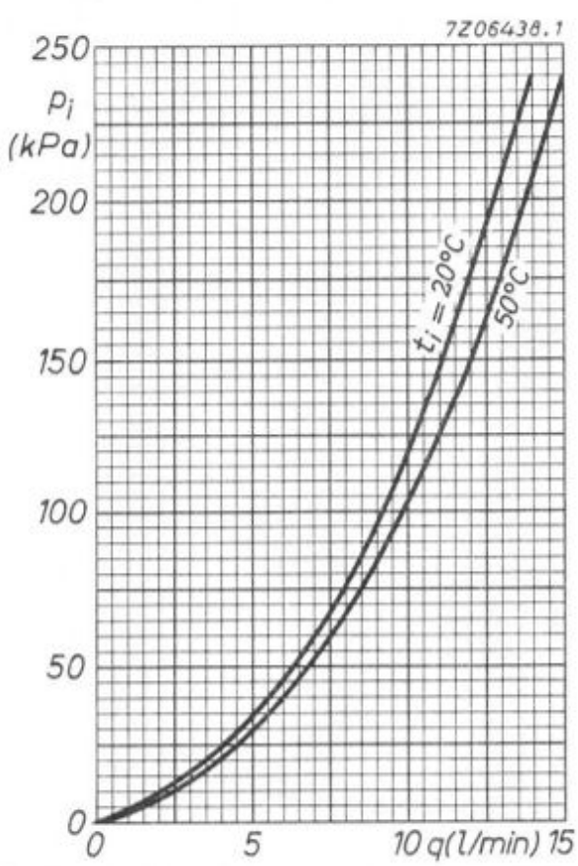

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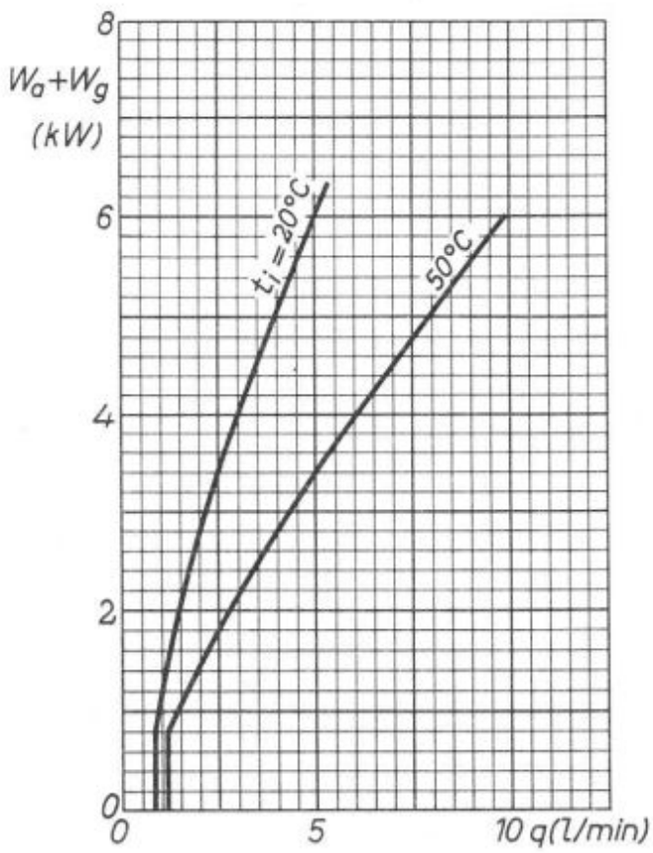
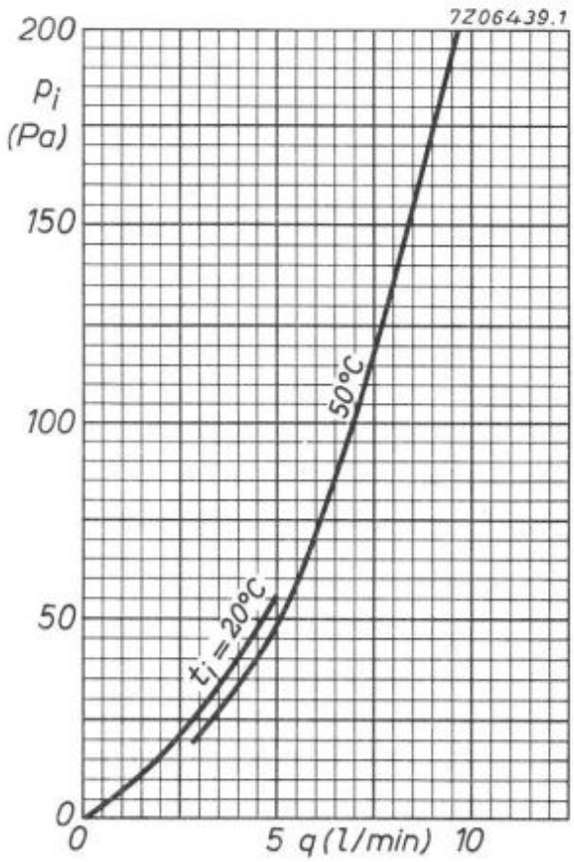

8
W_a+W_g
(kW)
6
4
2
0
0
5
10 q(l/min)
t_i = 20°C
50°C


7Z06439.1
200
p_i
(Pa)
150
100
50
0
0
5 q (l/min) 10
50°C
t_i = 20°C