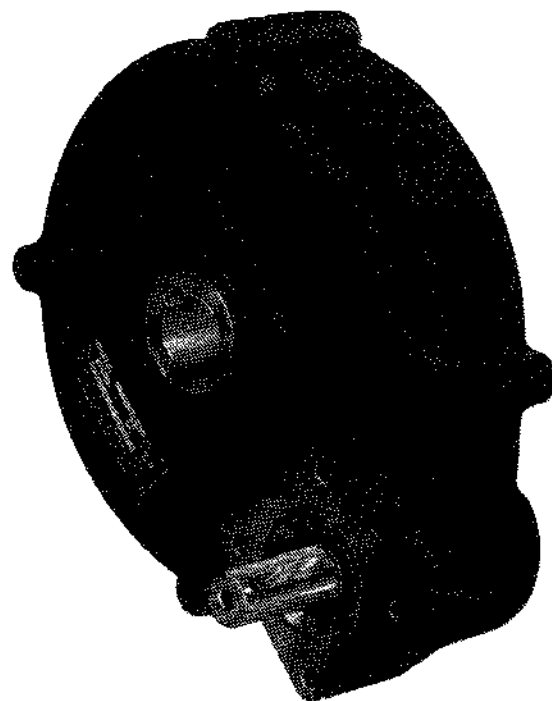
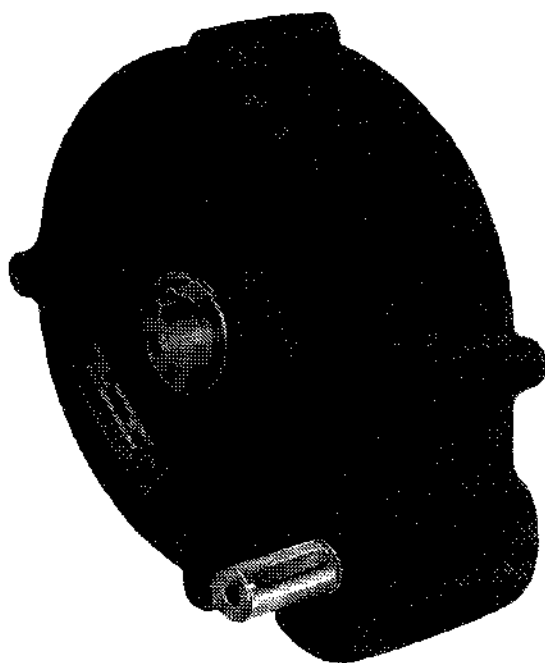


Van der Graaf B.V.

## „G.V.” SHAFT MOUNTED GEAR BOXES



- \* DELIVERY EX STOCK
- \* SPECIAL MOUNTING FLANGE
- \* LUBRICATED FOR LIFE
- \* BACKSTOPS AVAILABLE

5 SIZES

RATIOS 5,82:1 – 7,92:1 – 10,6:1

MAX. OUTPUT TORQUE 2100 Nm

P.O. Box 3  
8325 ZG Vollenhove  
Holland

**NEW NUMBER**

Tel : +31(0)527 - 241441

Fax: +31(0)527 - 241488

## VAN DER GRAAF POWER TRANSMISSION EQUIPMENT

The Gear Boxes as described in this leaflet are only one item of our range based on more than 35 year's experience and „know-how“.

### **„G.V.“ Start-up Couplings – Granulock –**

- soft and load free start
- 100% efficient, saving energy
- simple to install

### **„G.V.“ Friction Clutches**

- with ball bearing clutch collar
- 5 sizes from 80 – 640 Nm
- no torque remains after disengaging

### **„G.V.“ Variable Pulleys**

- for V-belts A/SPA and B/SPB
- ratio 1 : 1,9
- up to 3 kW x 1500 r.p.m. nominal

### **„G.V.“ Drum-Motors**

- oilbath cooling
- 0,1 – 11kW
- Ø 127, 160, 215, 315, 400 and 500 mm

**ASK FOR DETAILED INFORMATION!!**

## **FEATURES OF THE „G.V.“ SHAFT MOUNTED GEAR BOXES**

The „G.V.“ single stage gear box with hollow output shaft, offers a convenient solution to many transmission problems. This is attributed to the great variety in ratios, powers, and especially to the method of mounting which is an important advantage in itself. The gear box should be fitted to the shaft, and secured to the machine. The hollow output shaft is fitted in bearings on both sides of the gear box casting, and therefore can be utilized as a bearing support for the driven shaft, a cost saving which should not be overlooked.

The hub of the gear protrudes from both sides of the casing, on which the oilseals achieve a perfect closure being of the double lip type.

The small dimensions of these gear boxes make them suitable for many applications. Both covers have machined spigots to facilitate exact concentric mounting. With type TVF, adapter rings can be fitted for direct mounting of air- and hydraulic motors.

The „G.V.“ gear unit owes its popularity to the advantage stated, its superb quality, high efficiency and silent operation.

„G.V.“ gear boxes are suitable for both speed reduction and speed increase, and when used with V-belts the ratios are infinite.

## SUMMARY OF IMPORTANT FEATURES

- \* The gears are of one piece forged steel
- \* The pinion is case hardened and ground
- \* Input shaft to IEC standard with thread to DIN 332
- \* External teeth are helical in form
- \* Heavy bearing on input shaft allows high belt load
- \* All shaft seals with dust locks (double lip type)
- \* All sizes available with three different reduction ratios
- \* Vertical reducers can be made to order
- \* Both covers have machined spigots
- \* Silent in operation
- \* All types suitable for speed reduction or increase
- \* Torque arms can be utilized
- \* Backstops can be fitted, in this case „TB“ is added to the type number
- \* All types are pre-filled for full life operation without additional lubricant („LD“)
- \* Type TVF is designed to accept an adaptor flange for air- or hydraulic motors

## GENERAL DATA SHEET

TYPE TV or TVF	Standard		Reduction ratio	Max. torque Nm	Selection chart pages	Weight in kg ± **	Lubricant kg		
	Bore mm	Shaft diam. mm							
* 1582– 8– * 1792– 8– * 1106– 8–	20-25	14	5,82 7,92 10,60	118	10 12 14	5,7 5,9 6	0,15		
* 1582– 15– * 1792– 15– * 1106– 15–			25-30		19	5,82 7,92 10,60		10 12 14	8,7 8,9 9
1582– 50– 1792– 50– 1106– 50–						30-35-40		24	5,82 7,92 10,60
1582– 70– 1792– 70– 1106– 70–	35-40-45-50	24		5,82 7,92 10,60			11 13 15		26,7 28 28,7
1582–150– 1792–150– 1106–150–			40-45 50-55-60	28	5,82 7,92 10,60		11 13 15		43,5 45,5 46,5

\* These cannot be fitted with backstop

\*\* Without backstops

When gear box is fitted with backstop, the type ref. TV or TVF should be followed by „TB”

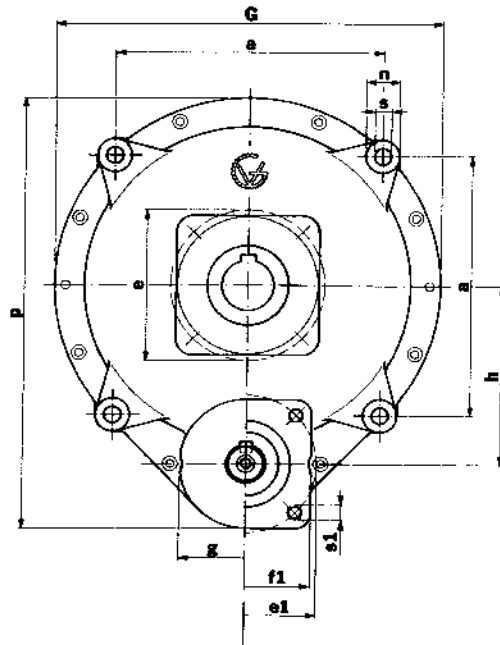
## LUBRICATION

Reference: LD

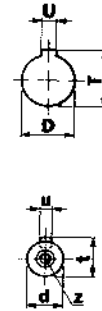
All types pre-filled with lubricant for life

STANDARD Grease filled up to 1800 RPM	HIGH SPEED Oil filled over 1800 RPM
BLACK POINT – SP 3 MOBIL – RR 103B SHELL – TIVELA Compound A	BLACK POINT – Synthetic Lubricant 90 MOBIL – GLYGOILE 22 SHELL – TIVELA-WA

**TV**



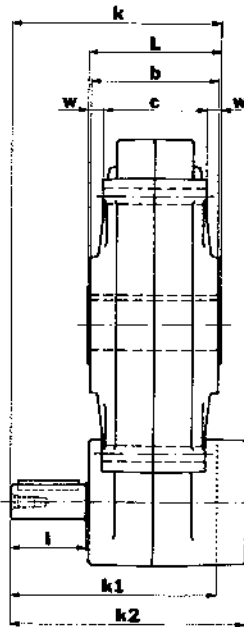
**TVF**



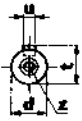
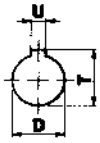
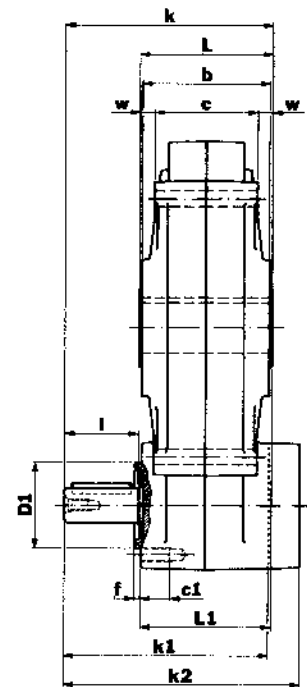
TYPE TV/TVF	a	d k6	D H7	e	e1	f1	g	G	h	n	p	s	s1	t	T	u	U	z
* 1582- 8 * 1792- 8 * 1106- 8	115	14	20	80	60	56	60	168	78	16	192	7	M6	16	22,8	5	6	M4
25			28,3												8			
28,3			8															
* 1582- 15 * 1792- 15 * 1106- 15	135	19	25	85	80	73	80	200	93	20	233	9	M8	21,5	28,3	6	8	M5
30			33,3												8			
33,3			8															
** 1582- 50 ** 1792- 50 ** 1106- 50	180	24	30	105	95	90	90	260	124	23	299	11	M10	27	33,3	8	8	M8
35			38,3												10			
40			43,3												12			
1582- 70 1792- 70 1106- 70	180	24	35	130	120	108	110	260	124	26	310	13	M10	27	38,3	8	10	M8
40			43,3												12			
45			48,8												14			
50			53,8												14			
1582- 150 1792- 150 1106- 150	230	28	40	155	148	134	130	332	156	30	390	17	M12	31	43,3	8	12	M8
45			48,8												14			
50			53,8												14			
55			59,3												16			
60			64,4												18			

\* Not available with backstop (TB)  
 \*\* If fitted with backstop, replace dimension k1 by k2

TV



TVF



TYPE TV/TVF	b	c	c <sup>1</sup>	d	D	D <sup>1</sup>	f	k	k <sup>1</sup>	k <sup>2</sup>	l	L	L <sup>1</sup>	t	T	u	U	w	z
				k <sup>6</sup>	H <sup>7</sup>	h <sup>7</sup>													
* 1582- 8					20										22,8		6		
* 1792- 8	68	50	13	14	40	40	2,5	100	99	-	30	70	69	16	5	8	10	M4	
* 1106- 8					25										28,3				
* 1582- 15					25										28,3		8		
* 1792- 15	72	60	16	19	50	50	3	115	114	-	40	75	76	21,5	6	8	7	M5	
* 1106- 15					30										33,3				
** 1582- 50					30										33,3		8		
** 1792- 50	88	70	20	24	35	60	3,5	140	139	180	50	90	89	27	38,3	8	10	10	M8
** 1106- 50					40										43,3		12		
1582- 70					35										38,3		10		
1792- 70	115	100	20	24	40	80	3,5	165	-	194	50	120	199	27	43,3	8	12	14	M8
1106- 70					45										48,8		14		
					50										53,8		14		
1582- 150					40										43,3		12		
1792- 150	130	110	24	28	45	90	3,5	203	-	235	60	135	141	31	48,8	8	14	12,5	M8
1106- 150					50										53,8		14		
					55										59,3		16		
					60										64,4		18		

\* Not available with backstop (TB)

\*\* If fitted with backstop, replace dimension k1 by k2

## SAFETY FACTORS

TABLE 1

SERVICE FACTORS					
POWER SOURCE	Service hours per day	TYPE OF LOAD			
		uniform load	light impact	average impact	heavy impact
Electric motor Turbine	0,5 hour	0,5	0,75	1	1,25
	3 hour	0,75	1	1,25	1,5
	10 hour	1	1,25	1,5	1,75
	24 hour	1,25	1,5	1,75	2
I.C. Engines with Multicylinders	0,5 hour	0,75	1	1,25	1,5
	3 hour	1	1,25	1,5	1,75
	10 hour	1,25	1,5	1,75	2
	24 hour	1,5	1,75	2	2,25
I.C. Engines with less than 4 cylinders	0,5 hour	1	1,25	1,5	1,75
	3 hour	1,25	1,5	1,75	2
	10 hour	1,5	1,75	2	2,25
	24 hour	1,75	2	2,25	2,5

TABLE 2

EXTRA FACTORS						
Number of starts per hour	11 to 20	21 to 35	36 to 50	51 to 75	76 to 100	101 to 125
Extra factor	0,1	0,2	0,3	0,4	0,5	0,6

## SELECTION PROCEDURE

The capacities in the tables on pages 10 to 15 apply to safety factor 1.

The maximum permitted torque of every „G.V.” gearbox is 2.7 times the obtained torques of the tables (max. loadfactor).

The minimum selected power follows by comparing two calculations and the highest value must be used.

Select a unit from the tables by using the output speed and the selected power.

- a. the chosen service factor from table 1 x running power  
or
- b.  $\frac{\text{starting factor of the power source}}{\text{max. loadfactor of a gearbox}} \times \text{installed power}$

An extra factor must be added from table 2 for more than 10 starts per hour.



Calculations of the minimum table power to be selected.

### Example 1

- a. The chosen service factor from table 1 is 0.75  
The running power is 3.5 kW
- b. Starting factor of the power source is 2.6 (starting torque is 260% of the nominal torque)  
Maximum loadfactor of a gearbox is 2.7  
Installed power is 4 kW  
Number of starts less than 10 per hour (no extra factor)

a. the chosen service factor x running power =  $0.75 \times 3.5 \text{ kW} = 2.63 \text{ kW}$

b.  $\frac{\text{starting factor of the power source}}{\text{max. loadfactor of a gearbox}} \times \text{installed power} = \frac{2.6}{2.7} \times 4 \text{ kW} = 3.85 \text{ kW}$

The minimum selected power of the tables is 3.85 kW

### Example 2

- a. The chosen service factor from table 1 is 1.5  
The running power is 4 kW
- b. Starting factor of the power source is 2.4 (240%)  
Maximum loadfactor of a gearbox is 2.7  
Installed power is 4 kW  
Number of starts 15 per hour, extra factor from table 2 is 0.1

a. (the chosen service factor + extra factor) x running power =  $(1.5 + 0.1) \times 4 \text{ kW} = 6.4 \text{ kW}$

b.  $\left( \frac{\text{starting factor of the power source}}{\text{max. loadfactor of a gearbox}} + \text{extra factor} \right) \times \text{installed power} =$   
 $\left( \frac{2.4}{2.7} + 0.1 \right) \times 4 \text{ kW} = 3.96 \text{ kW}$

The minimum selected power of the tables is 6.4 kW

### Example 3

- a. The chosen service factor from table 1 is 0.5  
The running power is 7.0 kW
- b. Starting factor of the power source is 1 (e.g. hydraulic motor)  
Maximum loadfactor of a gearbox is 2.7  
Installed power is 8.75 kW  
Number of starts 60 per hour, extra factor from table 2 is 0.4

a. (the chosen service factor + extra factor) x running power =  $(0.5 + 0.4) \times 7 \text{ kW} = 6.3 \text{ kW}$

b.  $\left( \frac{\text{starting factor of the power source}}{\text{max. loadfactor of a gearbox}} + \text{extra factor} \right) \times \text{installed power} =$   
 $\left( \frac{1}{2.7} + 0.4 \right) \times 8.75 \text{ kW} = 6.74 \text{ kW}$

The minimum selected power of the tables is 6.74 kW

## SELECTION TABLE

I = 5,82

TYPE TV 1582		-8	-15	-50	-70
Bore mm :		20-25	25-30	30-35-40	35-40-45-50
R.P.M.		HP - kW	HP - kW	HP - kW	HP - kW
output	input				
20	116	0,30-0,22	0,60-0,44	1,90- 1,40	2,62- 1,93
22	128	0,34-0,25	0,66-0,48	2,09- 1,54	2,88- 2,12
24	140	0,38-0,28	0,72-0,52	2,28- 1,68	3,14- 2,31
26	151	0,42-0,31	0,78-0,57	2,47- 1,82	3,40- 2,50
28	163	0,46-0,34	0,84-0,61	2,66- 1,95	3,66- 2,70
30	175	0,50-0,37	0,90-0,66	2,85- 2,09	3,93- 2,89
35	204	0,58-0,43	1,05-0,77	3,32- 2,44	4,58- 3,37
40	233	0,67-0,50	1,20-0,88	3,80- 2,79	5,23- 3,85
45	262	0,76-0,56	1,35-0,99	4,27- 3,14	5,89- 4,33
50	291	0,84-0,62	1,50-1,10	4,75- 3,49	6,54- 4,81
55	320	0,95-0,70	1,65-1,21	5,22- 3,84	7,20- 5,29
60	349	1,03-0,76	1,80-1,32	5,70- 4,19	7,85- 5,78
65	379	1,12-0,82	1,95-1,43	6,17- 4,54	8,51- 6,26
70	408	1,20-0,88	2,10-1,54	6,64- 4,89	9,16- 6,74
75	437	1,28-0,94	2,24-1,65	7,12- 5,24	9,81- 7,22
80	466	1,36-1,00	2,40-1,76	7,59- 5,59	10,47- 7,70
85	495	1,44-1,06	2,54-1,87	8,07- 5,93	11,12- 8,18
90	524	1,52-1,12	2,69-1,98	8,54- 6,28	11,78- 8,67
95	553	1,60-1,18	2,84-2,09	9,02- 6,63	12,43- 9,14
100	582	1,69-1,24	3,00-2,20	9,49- 6,98	13,09- 9,62
110	641	1,85-1,36	3,21-2,36	10,44- 7,68	14,40-10,60
120	699	2,01-1,48	3,37-2,48	11,39- 8,38	15,70-11,55
130	757	2,18-1,60	3,47-2,55	12,30- 9,05	17,00-12,51
140	815	2,33-1,71	3,54-2,60	12,98- 9,55	17,88-13,15
150	874	2,42-1,78	3,58-2,63	13,46- 9,90	18,38-13,52
160	932	2,50-1,84	3,60-2,65	13,76-10,12	18,97-13,95
170	990	2,57-1,89	3,62-2,66	14,00-10,30	19,25-14,16
180	1048	2,62-1,93	3,63-2,67	14,14-10,40	19,44-14,30
190	1106	2,66-1,96	3,64-2,68	14,22-10,46	19,58-14,40
200	1165	2,69-1,98	3,66-2,69	14,28-10,50	19,71-14,50
210	1223	2,72-2,00	3,67-2,70	14,37-10,57	19,82-14,58
220	1281	2,75-2,02	3,84-2,83	14,41-10,60	19,90-14,64
230	1339	2,76-2,03	4,02-2,96	14,51-10,67	20,00-14,71
240	1398	2,77-2,04	4,19-3,09	14,58-10,72	20,12-14,80
250	1456	2,79-2,05	4,37-3,21	14,68-10,80	20,26-14,90
260	1514	2,80-2,06	4,54-3,34	14,82-10,90	20,39-15,00
270	1572	2,82-2,07	4,71-3,47	15,00-11,03	20,53-15,10
280	1631	2,85-2,10	4,90-3,60	15,23-11,20	20,72-15,24
300	1747	3,05-2,24	5,24-3,85	16,32-12,00	22,16-16,30

I = 5,82		
TYPE TV 1582		—150
Bore mm :		40—45—50—55—60
R.P.M.		HP — kW
output	input	
20	116	5,86— 4,31
22	128	6,45— 4,74
24	140	7,04— 5,18
26	151	7,62— 5,61
28	163	8,21— 6,04
30	175	8,80— 6,47
35	204	10,26— 7,55
40	233	11,73— 8,63
45	262	13,19— 9,70
50	291	14,66—10,78
55	320	16,13—11,86
60	349	17,60—12,94
65	379	19,06—14,02
70	408	20,52—15,10
75	437	22,00—16,17
80	466	23,46—17,25
85	495	24,92—18,33
90	524	26,40—19,40
95	553	27,85—20,50
100	582	29,10—21,40
110	641	31,00—22,80
120	699	32,22—23,70
130	757	33,04—24,30
140	815	33,65—24,75
150	874	34,00—25,00
160	932	34,26—25,20
170	990	34,40—25,30
180	1048	34,53—25,40
190	1106	34,67—25,50
200	1165	34,80—25,60
210	1223	34,94—25,70
220	1281	35,08—25,80
230	1339	35,35—26,00
240	1398	36,90—27,13
250	1456	38,42—28,26
260	1514	39,96—29,40
270	1572	41,50—30,52
280	1631	43,00—31,65
300	1747	

(see page 8 and 9)

## SELECTION TABLE

I = 7,92					
TYPE TV 1792		-8	-15	-50	-70
Bore mm :		20-25	25-30	30-35-40	35-40-45-50
R.P.M.					
output	input	HP - kW	HP - kW	HP - kW	HP - kW
6	48	0,10-0,07	0,18-0,13	0,58-0,42	0,80- 0,59
8	63	0,13-0,10	0,24-0,18	0,77-0,57	1,06- 0,78
10	79	0,17-0,12	0,30-0,22	0,96-0,71	1,33- 0,98
12	95	0,20-0,15	0,36-0,27	1,15-0,85	1,59- 1,17
14	111	0,23-0,17	0,43-0,31	1,35-0,99	1,86- 1,37
16	127	0,27-0,20	0,49-0,36	1,54-1,13	2,12- 1,56
18	143	0,30-0,22	0,55-0,40	1,73-1,27	2,39- 1,76
20	158	0,34-0,25	0,61-0,45	1,92-1,41	2,65- 1,95
22	174	0,37-0,27	0,67-0,49	2,11-1,55	2,92- 2,15
24	190	0,40-0,30	0,73-0,54	2,30-1,70	3,18- 2,34
26	206	0,44-0,32	0,79-0,58	2,50-1,84	3,45- 2,54
28	222	0,47-0,35	0,85-0,63	2,69-1,98	3,71- 2,73
30	238	0,50-0,37	0,91-0,67	2,88-2,12	3,98- 2,93
35	277	0,59-0,43	1,06-0,78	3,36-2,47	4,64- 3,41
40	317	0,67-0,49	1,22-0,89	3,84-2,83	5,30- 3,90
45	357	0,75-0,56	1,37-1,00	4,32-3,18	5,97- 4,39
50	396	0,84-0,62	1,52-1,12	4,80-3,53	6,63- 4,88
55	436	0,92-0,68	1,67-1,23	5,28-3,89	7,29- 5,36
60	475	1,01-0,74	1,82-1,34	5,76-4,24	7,95- 5,85
65	515	1,09-0,80	1,97-1,45	6,25-4,59	8,62- 6,34
70	555	1,17-0,86	2,09-1,54	6,73-4,95	9,28- 6,83
75	594	1,26-0,93	2,20-1,62	7,20-5,30	9,94- 7,31
80	634	1,34-0,99	2,28-1,68	7,69-5,65	10,61- 7,80
85	673	1,43-1,05	2,37-1,74	8,17-6,00	11,27- 8,29
90	713	1,51-1,11	2,42-1,78	8,65-6,36	11,93- 8,78
95	753	1,59-1,17	2,47-1,82	9,11-6,70	12,51- 9,20
100	792	1,68-1,24	2,52-1,85	9,38-6,90	12,98- 9,55
110	872	1,84-1,36	2,58-1,90	9,95-7,32	13,76-10,12
120	951	1,98-1,46	2,64-1,94	10,33-7,60	14,28-10,50
130	1030	2,07-1,52	2,66-1,96	10,61-7,80	14,66-10,78
140	1109	2,13-1,57	2,69-1,98	10,81-7,95	14,93-10,98
150	1188	2,18-1,60	2,72-2,00	10,96-8,06	15,09-11,10
160	1268	2,20-1,62	2,75-2,02	11,07-8,14	15,23-11,20
170	1347	2,23-1,64	2,77-2,04	11,15-8,20	15,36-11,30
180	1426	2,26-1,66	2,80-2,06	11,28-8,30	15,50-11,40
190	1505	2,28-1,68	2,83-2,08	11,32-8,33	15,64-11,50
200	1585	2,30-1,70	2,98-2,19	11,37-8,36	15,78-11,60
210	1664	2,33-1,72	3,12-2,30	11,42-8,40	15,90-11,70
220	1743	2,37-1,74	3,27-2,41	11,74-8,64	16,90-12,44

I = 7,92		
TYPE TV 1792		-150
Bore mm :		40-45-50-55-60
R.P.M.		HP - kW
output	input	
6	48	1,80- 1,32
8	63	2,40- 1,76
10	79	3,00- 2,20
12	95	3,60- 2,65
14	111	4,20- 3,09
16	127	4,80- 3,52
18	143	5,38- 3,96
20	158	5,98- 4,40
22	174	6,58- 4,84
24	190	7,18- 5,28
26	206	7,78- 5,72
28	222	8,38- 6,16
30	238	8,97- 6,60
35	277	10,47- 7,70
40	317	11,96- 8,80
45	357	13,46- 9,90
50	396	14,96-11,00
55	436	16,45-12,10
60	475	17,95-13,20
65	515	19,44-14,30
70	555	20,94-15,40
75	594	22,43-16,50
80	634	23,93-17,60
85	673	25,42-18,70
90	713	26,65-19,60
95	753	27,53-20,25
100	792	28,33-20,84
110	872	29,67-21,82
120	951	30,46-22,40
130	1030	31,00-22,80
140	1109	31,41-23,10
150	1188	31,68-23,30
160	1268	31,95-23,50
170	1347	32,09-23,60
180	1426	32,36-23,80
190	1505	32,63-24,00
200	1585	33,56-24,68
210	1664	35,24-25,92
220	1743	36,92-27,15

(see page 8 and 9)

## SELECTION TABLE

I = 10,6		TYPE TV 1106			
		-8	-15	-50	-70
Bore mm :		20-25	25-30	30-35-40	35-40-45-50
R.P.M.		HP - kW		HP - kW	
output	input	HP - kW		HP - kW	
3	32	0,05-0,04	0,09-0,07	0,29-0,21	0,39-0,29
4	42	0,07-0,05	0,12-0,09	0,39-0,28	0,52-0,39
5	53	0,08-0,06	0,15-0,11	0,48-0,35	0,66-0,48
6	64	0,10-0,07	0,18-0,14	0,57-0,42	0,79-0,58
7	74	0,12-0,09	0,21-0,16	0,66-0,49	0,92-0,68
8	85	0,13-0,10	0,24-0,18	0,76-0,56	1,05-0,77
10	106	0,17-0,12	0,31-0,23	0,95-0,70	1,30-0,96
12	127	0,20-0,15	0,37-0,27	1,14-0,84	1,57-1,16
14	148	0,23-0,17	0,43-0,32	1,33-0,98	1,84-1,35
16	170	0,27-0,20	0,49-0,36	1,52-1,11	2,10-1,54
18	191	0,30-0,22	0,55-0,41	1,71-1,26	2,36-1,74
20	212	0,33-0,24	0,61-0,45	1,90-1,40	2,62-1,93
22	233	0,36-0,27	0,67-0,50	2,09-1,54	2,88-2,12
24	254	0,40-0,29	0,73-0,54	2,28-1,68	3,15-2,31
26	276	0,43-0,32	0,80-0,59	2,47-1,82	3,40-2,50
28	297	0,46-0,34	0,86-0,63	2,66-1,96	3,67-2,70
30	318	0,50-0,37	0,92-0,68	2,85-2,10	3,93-2,89
35	371	0,58-0,43	1,07-0,79	3,33-2,45	4,59-3,38
40	424	0,66-0,49	1,22-0,90	3,80-2,80	5,24-3,86
45	477	0,74-0,55	1,36-1,00	4,27-3,14	5,90-4,34
50	530	0,83-0,61	1,47-1,08	4,75-3,50	6,56-4,82
55	583	0,91-0,67	1,55-1,14	5,22-3,84	7,20-5,30
60	636	0,99-0,73	1,63-1,20	5,70-4,20	7,87-5,79
65	689	1,08-0,79	1,68-1,24	6,17-4,54	8,52-6,27
70	742	1,16-0,85	1,73-1,27	6,53-4,80	9,04-6,65
75	795	1,21-0,89	1,77-1,30	6,80-5,00	9,41-6,92
80	848	1,25-0,92	1,81-1,33	7,00-5,15	9,68-7,12
85	901	1,29-0,95	1,84-1,35	7,17-5,27	9,93-7,30
90	954	1,32-0,97	1,86-1,37	7,34-5,40	10,09-7,42
95	1007	1,35-0,99	1,88-1,38	7,48-5,50	10,27-7,55
100	1060	1,37-1,01	1,90-1,40	7,56-5,56	10,40-7,65
110	1166	1,40-1,03	1,93-1,42	7,70-5,66	10,60-7,80
120	1272	1,43-1,05	1,96-1,44	7,82-5,75	10,77-7,92
130	1378	1,44-1,06	1,97-1,45	7,90-5,80	10,88-8,00
140	1484	1,45-1,07	2,00-1,47	7,94-5,84	10,94-8,05
150	1590	1,47-1,08	2,01-1,48	7,98-5,87	11,00-8,10
160	1696	1,48-1,09	2,15-1,58	8,00-5,88	11,04-8,12
170	1802	1,50-1,10	2,28-1,67	8,02-5,90	11,07-8,14
180	1908	1,51-1,11	2,40-1,78	8,05-5,92	11,10-8,16