ERIC PATON LIMITED

Electropower
Geared Reduction Units
.5 to 15 hp
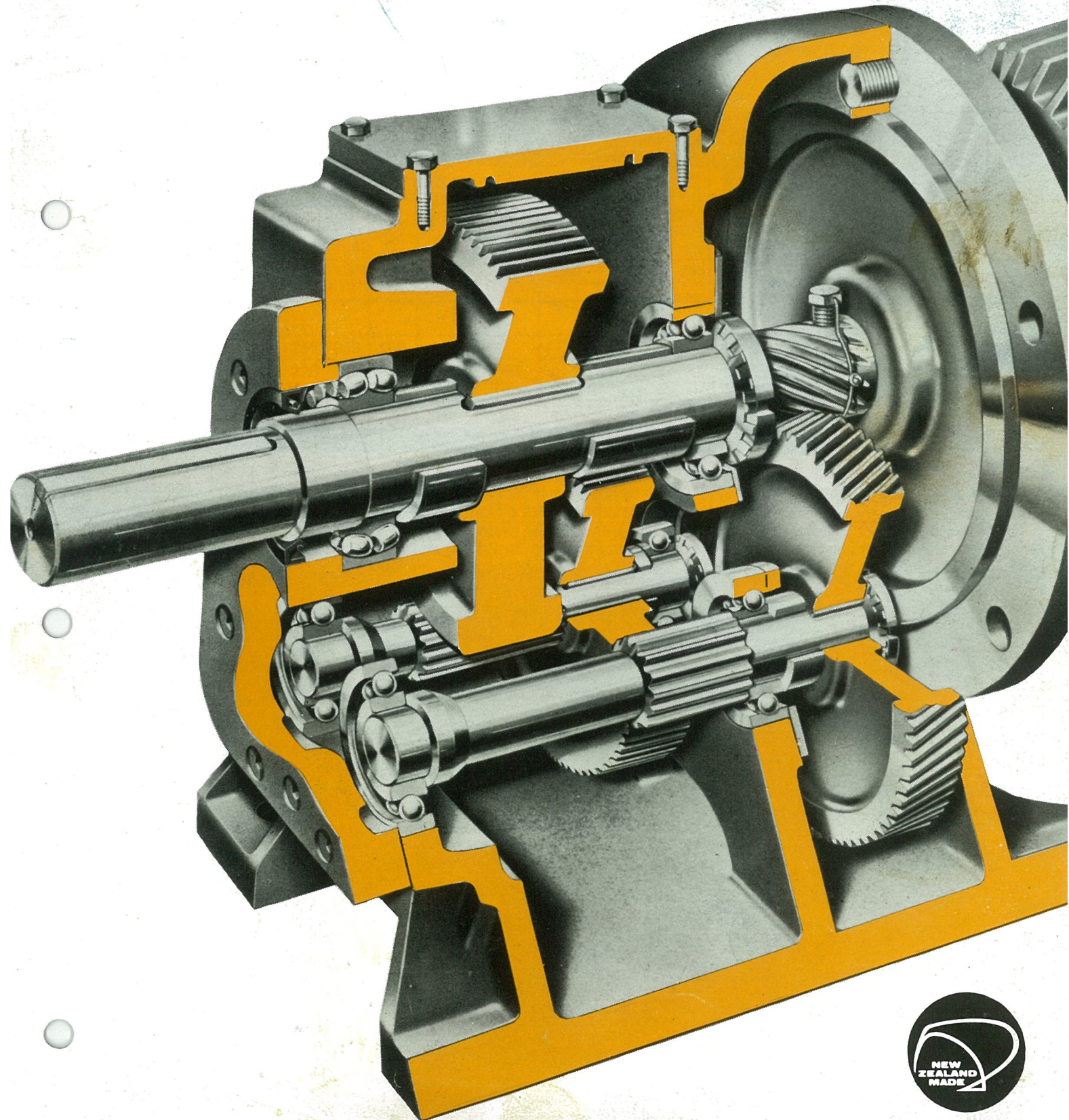
NEW ZEALAND MADE

Introduction

The Electropower spur geared reduction units are compact, well known and proven, co-axial metric speed reducers made under licence in New Zealand covering a range of ratios from 2.33:1 to 116.8:1.

DIMENSIONS AND SPECIFICATIONS
Our policy is one of continuous development and improvement and we reserve the right to alter dimensions and specifications without prior notice.

DIRECTION OF ROTATION
Double reduction units have the input and output shafts revolving in the same direction. Triple reduction have the input and output shafts revolving in opposite directions.

DOUBLE AND TRIPLE REDUCTION
Double reduction units cover the ratio 2.33:1 — 21.95:1.
''Triple reduction'' units cover the ratio 28.2:1 — 116.8:1.

EFFICIENCY
Maximum efficiency is 98% and the minimum 91%.

GEARS, SHAFTS AND PINION SHAFTS
All gear wheels are of high tensile steel, accurately machined on modern equipment. Output shafts are made of 50/60 ton tensile steel. First gear is helical and final drive gears are case hardened. Bearings are of ample dimensions to cater for the loads imposed.

INSPECTION AND ASSEMBLY
All component parts are subject to strict inspection and each unit has a full speed test run before despatch.

LUBRICATION
ESR1, 2 & 3M are all grease lubricated. ESR.35M is oil lubricated.

MOTORS
Metric T.E.F.C. motors to IEC 72-1 and BS 3979 dimensions. British Standard T.E.F.C. motors and single phase T.E.F.C. motors to BS 170 and BS 2048 dimensions are supplied ex stock.

SALES AND SERVICE
Eric Paton Ltd offer a complete sales and service for all Electropower Gears reduction units.

SPEED RANGE
The range of speeds shown on facing page are our stock sizes. Specials can be made at extra cost upon request. Larger sized units handling up to 300 HP, slow and high speed can be offered from our principals in England subject to import licence.

SUFFIX DEFINITION
  M Metric Dimensions.
  H Indicates double spherical roller bearing which is an extra in ESR1M, 2M & 3M units. Standard in ESR.35M units.
  S Indicates special unit.
IFS Indicates gearbox with input flange and shaft.

Specials are available on request, which include the following types, flange mounted to the gearbox. Brake and Flameproof motors, Flui Gear drive units. Variable speed drive incorporating the PYE TASC Eddy Current coupling.

Selection of Electropower Gears Speed Reducers

The following details are to be considered:—
(1) Driven machine, power source and shock load classification.
(2) Running hours per day.
(3) Input speed of driven machine.
(4) Horsepower required at driven machine.
(A) Determine the Running Time and Shock Load Factor, and take into consideration the type of power source, and the class of load on the driven machine.
(B) Starting and peak loads must be ascertained, and if the maximum load exceeds the normal load by 85% divide the maximum horsepower by 1.85 and use the resultant figure for selection purposes.
(C) Multiply the horsepower required at the driven machine by the Running Time and Shock Load Factor, and Power Source Factor where applicable, and use the resultant figure to select the gearbox size at the required R.P.M. by referring to the ESR Power Capacity Tables. It should be noted that in certain instances the motor quoted in the tables will transmit a greater horsepower than the gearbox, and under these circumstances the gearbox must not transmit more torque than that stated in the catalogue.

(D) If the power from the gearbox output shaft is transmitted by chain, gear or belt, determine the overhung load resulting from this final drive, and reference to the overhung load tables show how this is calculated. The overhung load resulting from a final drive can be reduced by INCREASING the P.C.D. of the sprocket, gear or pulley fitted to the gearbox output shaft, providing the speed of the gearbox is not altered. The smallest permissible P.C.D. can be determined from the formula:—

$$\text{P.C.D. (Inches)} = \frac{126000 \times \text{H.P.} \times \text{'f'}}{\text{'L'} \times \text{R.P.M.}}$$

'L' = Max. permitted overhung load in pounds.

$$\text{P.C.D. (mm)} = \frac{1,452,000 \times \text{'f'} \times \text{H.P.}}{\text{'L'} \times \text{R.P.M.}}$$

'L' = Max. permitted overhung load in kilogrammes.

'f'	Pinion or Sprocket	= 1
Final drive factor	'V' Belt	= 1.3
	Flat Belt	= 2

(E) If the gearbox output shaft is subjected to a thrust load, refer to the thrust load tables to check the gearbox thrust capacity.
(F) If an electro-magnetic brake is fitted whose torque rating exceeds that of the motor, the size of the unit selected should be decided by the rating of the brake.
(G) For applications where exceptionally high energy loads are to be absorbed or frequent reversals under full torque conditions, or where other severe loading is present, submit full details to Eric Paton Ltd.
(H) Gearboxes used for direct coupled drives should incorporate a flexible coupling between the gearbox and the driven shaft. A rigid flanged coupling should only be used with a vertically mounted shaft downwards gearbox, with the driven shaft having no bearings or only one pilot bearing at its extreme end.

ESR Power Capacity Tables

Note that these tables are for 8 hour uniform duty. For other duties refer facing page for selection of gearbox. Motor size will not be affected by gearbox selection procedure.

K.W. H.P.	MOTOR R.P.M.	OUTPUT SPEED R P M	GEAR RATIO: 1	OUTPUT TORQUE		GEARBOX SIZE ESR
				FT. LBS.	K.P.M.	
0.37 K.W. 0.5 H.P.	1425	12	116.8	170	23.5	1M
		14	102	165	22.8	1M
		20	71.25	119	16.5	1M
		25	58	96	13.3	1M
		36	40.1	62	8.6	1M
		57	25.15	43.3	6	1M
		65	21.95	38	5.2	1M
		93	15.35	26.5	3.7	1M
		114	12.48	21.6	3	1M
		166	8.61	14.9	2	1M
		195	7.33	12.6	1.7	1M
		282	5.06	8.7	1.2	1M
		340	4.19	7.2	1	1M
		421	3.38	5.8	.8	1M
		611	2.33	4	.55	1M
0.75 K.W. 1 H.P.	1425	12	116.8	372	51.4	2M
		14	102	341	47	2M
		20	71.25	238	33	2M
		25	58	147	20.3	1M
		36	40.1	128	17.7	1M
		57	25.15	87	12	1M
		65	21.95	76	10.5	1M
		93	15.35	53	7.3	1M
		114	12.48	43.4	6	1M
		166	8.61	29.8	4.1	1M
		195	7.33	25.3	3.5	1M
		282	5.06	17.5	2.4	1M
		340	4.19	14.5	2	1M
		421	3.38	12	1.7	1M
		611	2.33	8.1	1.1	1M
1.5 K.W. 2 H.P.	1425	12	116.8	795	110	3M
		14	102	680	94	3M
		20	71.25	476	66	3M
		25	58	317	43.8	2M
		27	52.7	305	42.2	2M
		36	40.1	265	36.7	2M
		46	31	208	28.5	2M
		57	25.15	173	24	2M
		65	21.95	152	21	2M
		93	15.35	92	12.7	1M
		114	12.48	84	11.6	1M
		166	8.61	59.5	8.2	1M
		195	7.33	50.5	7.0	1M
		282	5.06	35	4.8	1M
		340	4.19	29	4	1M
		421	3.38	23.4	3.2	1M
		611	2.33	16.1	2.2	1M
2.2 K.W. 3 H.P.	1425	12	116.8	1180	163	35M
		20	71.25	715	99	3M
		25	58	572	79	3M
		36	40.1	399	55	3M
		46	31	253	35	2M
		57	25.15	236	32.6	2M
		65	21.95	224	31	2M
		93	15.35	159	22	2M
		114	12.48	130	18	2M
		125	11.35	118	16.3	2M
		166	8.61	89	12.3	2M
		195	7.33	76	10.5	2M
		214	6.66	69	9.5	2M
		282	5.06	52.6	7.3	2M
		340	4.9	43.6	6	2M
		421	3.38	35.2	4.9	2M
		462	3.08	32	4.4	2M
		611	2.33	24.2	3.3	2M

K.W. H.P.	MOTOR R.P.M.	OUTPUT SPEED R P M	GEAR RATIO: 1	OUTPUT TORQUE		GEARBOX SIZE ESR
				FT. LBS.	K.P.M.	
4 K.W. 5.5 H.P.	1425	22	64.25	1000	138.3	35M
		25	58	996	137.7	35M
		36	40.1	710	98.2	3M
		57	25.15	475	66	3M
		65	21.95	418	57.9	3M
		93	15.35	295	40.7	3M
		114	12.48	237	33	3M
		166	8.61	163	22.5	3M
		195	7.33	115	15.9	2M
		214	6.66	107	14.8	2M
		282	5.06	87	12	2M
		340	4.19	53	7.33	2M
		421	3.38	51	7.06	2M
		462	3.08	49.5	6.85	2M
		611	2.33	43.5	6.02	2M
5.5 K.W. 7.5 H.P.	1425	30	47.9	990	137	35M
		36	40.1	968	134	35M
		42	34.1	852	118	35M
		57	25.15	560	77.5	3M
		65	21.95	515	71.2	3M
		93	15.35	399	55	3M
		114	12.48	324	44.5	3M
		166	8.61	223	31	3M
		195	7.33	190	26.3	3M
		282	5.06	131	18	3M
		340	4.19	109	15.1	3M
		421	3.38	88	12.2	3M
		611	2.33	60.5	8.4	3M
7.5 K.W. 10 H.P.	1425	46	31	886	122.5	35M
		51	28.2	870	120	35M
		57	25.15	845	117	35M
		65	21.95	760	105	35M
		93	15.35	530	73.5	35M
		114	12.48	378	52.2	3M
		166	8.61	291	40.2	3M
		195	7.33	253	35	3M
		282	5.06	173	24	3M
		340	4.19	145	20	3M
		421	3.38	117	16.2	3M
		611	2.33	81.5	11.3	3M
11 K.W. 15 H.P.	1425	93	15.35	692	96	35M
		103	13.82	666	92.2	35M
		114	12.48	622	86	35M
		125	11.35	578	80	35M
		138	10.32	536	74	35M
		166	8.61	445	61.5	35M
		176	8.12	420	58	35M
		195	7.33	380	52.5	35M
		214	6.66	346	48	35M
		236	6.06	314	43.5	35M
		282	5.06	263	36.5	35M

GEAR RATIOS 116.8 : 1 to 40.1 : 1 INCLUSIVE ARE TRIPLE REDUCTION. ALL OTHERS ARE DOUBLE.

Running Time Factor and Shock Load Factor. Electric Motor or Similar Smooth Drive.

Total Running Time	Class of Shock Load from Driven Machine		
	Uniform	Moderate Shock	Heavy Shock
3 hrs./day	.92	1.3	1.84
8 hrs./day	1.0	1.4	2.0
12 hrs./day	1.1	1.54	2.2
16 hrs./day	1.15	1.61	2.3
24 hrs./day	1.27	1.78	2.54

The above factors apply to a smooth uniform power source, but when the gearbox is fitted with an Input Flange and Shaft, and the power source is not shock free one of the following factors must be considered.

Power Source Factor	
Light Shock	1.25
Medium Shock	1.6

Multiply H.P. required at driven machine by Running Time and Shock Load Factor, and where necessary by Power Source Factor, to obtain the ESR H.P. capacity for gearbox selection purposes.

Overhung Loads - Kilograms

G/BOX ↓ SIZE	Up to 10 r.p.m.	11 — 20 r.p.m.	21 — 35 r.p.m.	36 — 70 r.p.m.	71 — 150 r.p.m.	151—300 r.p.m.	301—450 r.p.m.	451—700 r.p.m.
ESR 1M x V1M	390	326	254	197	188	150	132	118
ESR 1MH & V1MH	593	500	376	317	286	222	190	154
ESR 2M & V2M	475	408	350	250	227	190	168	145
ESR 2MH & V2MH	865	770	657	500	453	363	313	286
ESR 3M & V3M	735	663	500	408	359	286	236	195
ESR 3MH & V3MH	1475	1362	1090	861	748	635	545	453
ESR 35M & V35M	2270	2135	1725	1452	1182	952	815	680

Note: 'H' Bearing is standard on ESR35m units.

Pinion or Sprocket Load $= \dfrac{HP \times 1,452,000}{R.P.M. \times P.C.D. \text{ (mm)}}$

'V' Belt Load $= \dfrac{HP \times 1,452,000 \times 1.3}{R.P.M. \times P.C.D. \text{ (mm)}}$

Flat Belt Load $= \dfrac{HP \times 1,452,000 \times 2}{R.P.M. \times \text{Pulley Dia (mm)}}$

Thrust Loads - Kilograms

G/BOX SIZE		Up to 10 r.p.m.	11 — 20 r.p.m.	21 — 35 r.p.m.	36 — 70 r.p.m.	71 — 150 r.p.m.	151—300 r.p.m.	301—450 r.p.m.	451—700 r.p.m.
ESR 1M ESRV1M	Upwards	363	363	300	263	186	168	145	118
ESR 1MH ESRV1MH	Downwards	408	408	327	300	209	191	168	145
ESR 2M ESRV2M	Upwards	453	453	404	359	295	232	191	145
ESR 2MH ESRV2MH	Downwards	545	500	453	408	336	268	214	191
ESR 3M ESRV3M	Upwards	681	681	627	522	427	350	268	214
ESR 3MH ESRV3MH	Downwards	862	800	681	577	477	381	295	263
ESR 35M ESRV35M	Upwards	908	908	727	590	500	422	363	318
	Downwards	1272	1272	1182	955	862	681	500	408

Note: 'H' Bearing is standard on ESR35m units.

Above load tables are approximate, and on receipt of particulars of any proposed drive involving thrust load we shall be pleased to decide the most suitable gearbox depending on the load and conditions of drive.

The above loads are calculated as solely a thrust load dynamically balanced and acting through output shaft axis. Where an overhung load is also present the resultant load will be the sum of the journal and thrust loads of the drive.

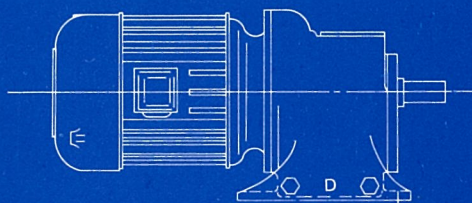# Dimensions of Foot Mounted Electropower Speed Reducers

All dimensions in millimetres
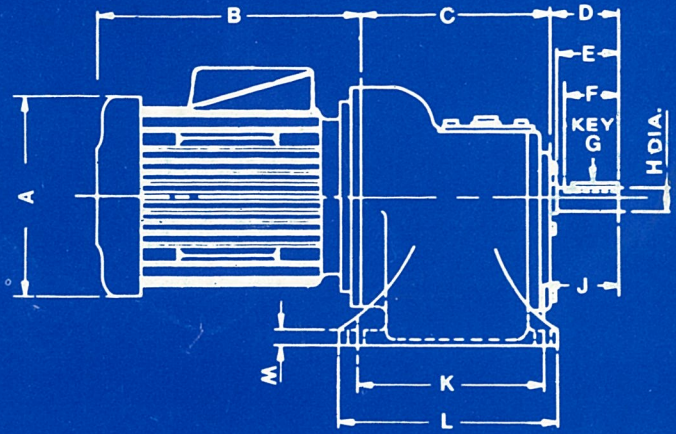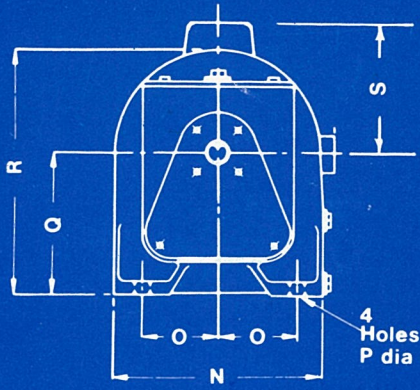
Motor dimensions Max.

kW	0.37-0.75	0.37	0.75	1.5	2.2	4	5.5	7.5	11
H.P.	0.5 -1.0	0.5	1	2	3	5.5	7.5	10	15
FRAME SIZE	BS56	D71	D80	D90L	D100L	D112M	D132S	D132M	D160M
A	178	140	168	205	240	275	320	320	333
S	117	110	152	174	185	205	232	235	261
B									
When fitted to									
ESR.1M	270	215	253	296					
ESR.2M		220	258	291	328	366			
ESR.3M			243	291	321	359	402	442	
ESR.35M					310	324	385	395	522
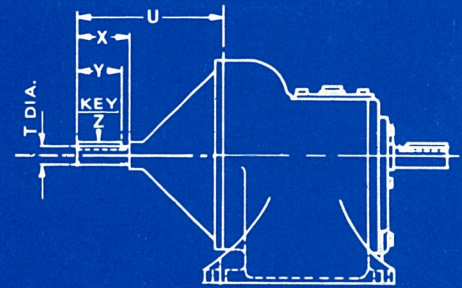
| G/BOX	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	T	U	X	Y	Z
ESR.1M	165.7	76.3	70	62	8x7	24j6	83.5	171.5	197	11	184	63.5	11	117.5	200	19j6	121	40	33	6x6
ESR.2M	184.7	88.3	80	72	8x7	28j6	96	206	238	12.5	228.5	82.5	15	146	254	24j6	142	50	38	8x7
ESR.3M	251	128	110	102	10x8	38k6	130	267	305	17	305	111	17	194	340	28j6	155	60	50	8x7
ESR.35M	306	139	130	115	16x10	55m6	182	311	349	19	368	140	18	229	406	38k6	221	80	70	10x8

Mounting Positions for E.S.R.M. Foot Mounted Types
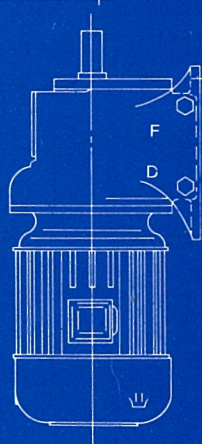

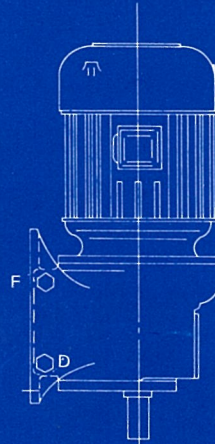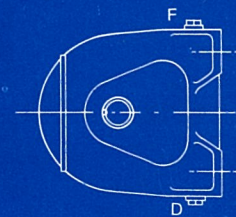STANDARD MOUNTING
B.3
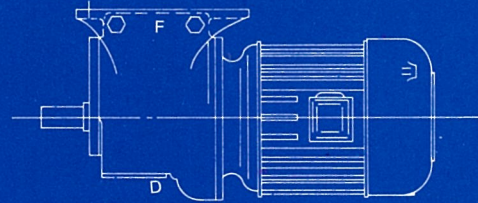
CEILING MOUNTING
B.8
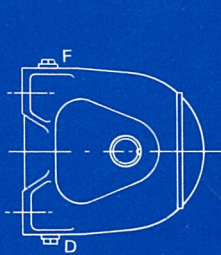
L.H. WALL MOUNTING
B.6

VERTICAL MOUNTING
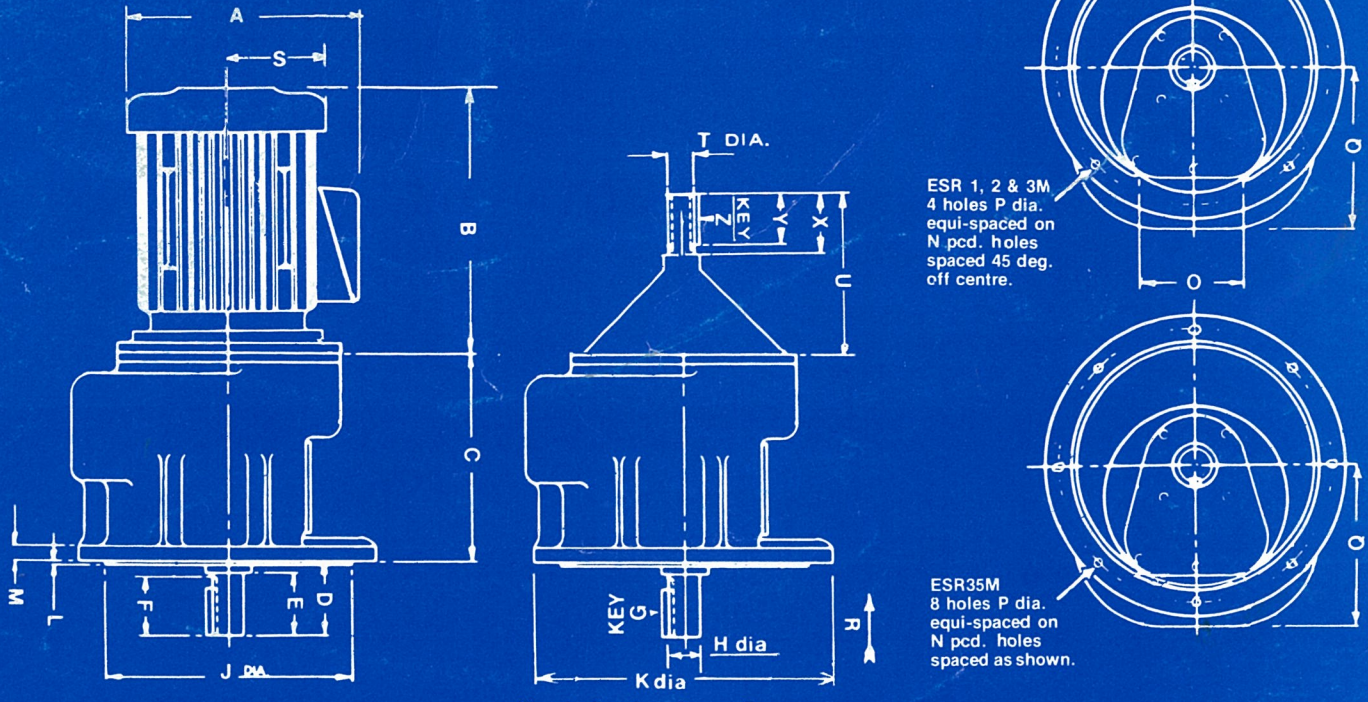O/PUT SHAFT UPWARD
V.6

VERTICAL MOUNTING
O/PUT SHAFT DOWNWARD
V.5

R.H. WALL MOUNTING
B.7

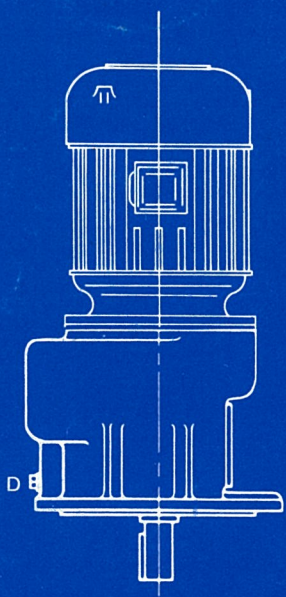# Dimensions of Flange Mounted Electropower Speed Reducers
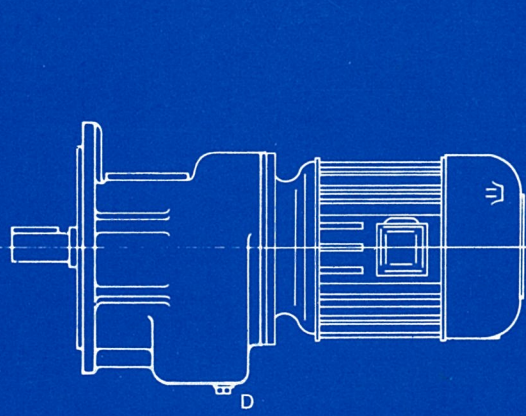
All dimensions in millimetres

ESR 1, 2 & 3M
4 holes P dia.
equi-spaced on
N pcd. holes
spaced 45 deg.
off centre.

ESR35M
8 holes P dia.
equi-spaced on
N pcd. holes
spaced as shown.

View in direction of arrow R
ESRV 1M, ESRV 2M, only have break in spigot.
Note: ESRV 3M & 35M have unbroken spigot.

G/BOX	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	T	U	X	Y	Z
ESR.1M	168	74	70	62	8x7	24j6	180h8	250	4	16	215	132	13	116	19j6	121	40	33	6x6
ESR.2M	189	84	80	72	8x7	28j6	230h8	300	4	20	265	140	15	143	24j6	142	50	38	8x7
ESR.3M	255	124	110	102	10x8	38k6	300h8	400	5	17.5	350		19	191	28j6	155	60	50	8x7
ESR.35M	305	140	130	115	16x10	55m6	350h8	450	5	18	400		19	224	38k6	221	80	70	10x8

Mounting Positions for ESRV.M. Flange Mounted Types

RH or LH WALL MOUNTING B5.

STANDARD MOUNTING V1.
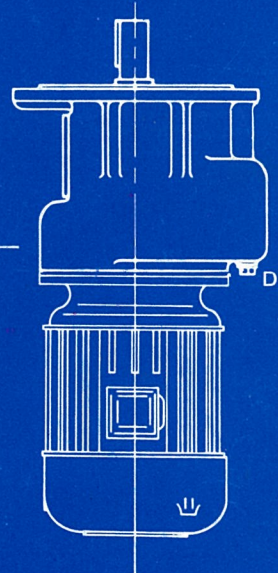
INVERTED MOUNTING V3.

ERIC PATON LIMITED

PRECISION AND GENERAL ENGINEERS
89 STATION RD., PENROSE, AUCKLAND. TEL: 591-139. P.O. BOX 12-047 TELEX 2966