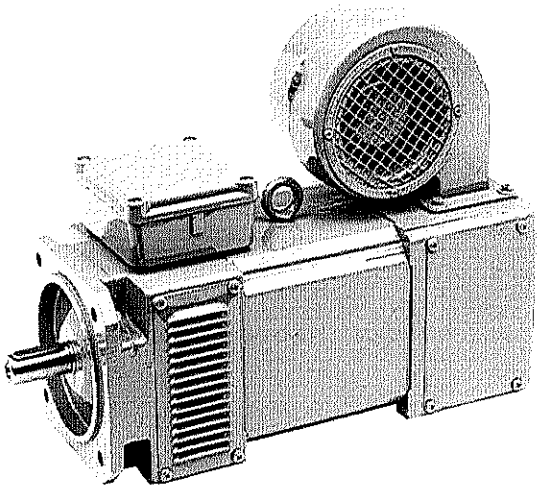
Lenze GFQU square frame d.c. motors

1.1 – 83kW

- Axially welded and laminated frame
- Commutating poles and "shaped" pole tips
- Skewed armature
- Large number of commutator segments
- Four-pole design
- Armature balanced with half key to DIN/ISO 8821 "N"
- Insulation class F (155°C), enclosure IP23
- Radial blower and normally closed over temperature switch
- IEC and DIN mounting dimensions
- Easy to fit options: tachogenerators, incremental encoders, electromagnetic brakes and filter kits
- Choice of blower mounting positions
- Can be connected to Lenze gearboxes
- Other voltages and speeds on request



Motors are painted with grey primer as standard

General description

By forced air ventilation through the motor frame and machining the internal air paths, high power for frame size is achieved. Rotor and stator are fully laminated, which ensures low eddy current losses.
The four-pole design with commutating poles, and special arrangements of the main poles for suppression of armature reaction, ensures spark-free commutation and long operating life of the carbon brushes, even for increased starting and braking torques. Smooth running, even at low speeds, is ensured by skewed armatures and low commutation voltage. The terminal box, normally mounted on top (except for size 160 when it is on the right viewed from front) allows access for all motor connections and is threaded to accept standard glands. The radial external blowers can be mounted on the sides, as well as axially via special plates and ducts.
The enamelled wire quality corresponds to insulation class "H", in order to increase life.
Higher enclosures up to IP44, filter air inlet and air flow surveillance can be fitted as options.

Tachogenerators

DC or AC tachogenerators can be selected depending on the application. For low speeds and four quadrant operation, the DC tachogenerator, type KTD3-2, is required. The AC tachogenerator, type TD3, only supplies an accurate speed signal at speeds above 50r/min. However, it is less costly, has no brushes and is therefore chosen for many applications. Tachogenerators are also available in different voltage. Please ask for details.

Brakes

For holding applications, the Lenze spring applied brake is ideal and can be mounted on the back of the GFQ motors. The standard brake voltage is 205V d.c. Other brake voltages are available on request. A full wave bridge rectifier (230V A.C./205V d.c.) is supplied loose with the motor. When d.c. switching is used, a spark suppressor should also be fitted. Ask for details.

Motor type	Brake size	Torque Nm
80	10	16
100	12	32
112	16	80
132	18	150
160	20	240

A higher torque brake can also be supplied. details on request

Terminal box

The standard terminal box position is on top, except for size 160 when it is on the right, viewed from the output shaft end. It can be turned through 4x90° to suit cable entry.

Oil seals

When an open gearbox is fitted to the GFQ motor, it is advisable to use an oil seal. This is also advisable with enclosed gearboxes when the motor is situated below the gearbox. It is advisable for this part to be fitted by us.

Lenze GFQU square d.c. motors

Performance data

Motor type	Power kW	Speed r/min	Armature voltage V	Max. field weaken. speed r/min	Max. mech speed r/min	Armature current A	Armature max current A	Armature inductance mH	Armature resistance Ω	Field voltage V	Field current A	Inertia kgm²	Weight kg
GFQU 80-22	2.1	1150	280	1400	4500	10.5	21.0	31.0	6.73	360	0.8	0.0087	36
	3.5	1900	420	2300									
	3.9	2100	460	2500									
	3.5	1900	280	2300	4500	16.1	32.2	13.8	2.88	360	0.8	0.0087	36
	5.7	3000	420	3600									
	6.2	3350	460	4000									
	3.3	1800	170	2700	4500	25.7	50.0	5.4	1.13	210	1.2	0.0087	36
	6.0	3250	280	3900									
GFQU 100-22	4.7	1200	280	1800	4500	21.2	42.5	13.4	2.15	360	1.4	0.0237	65
	7.6	1950	420	2350									
	8.4	2150	460	2600									
	6.4	1700	280	2550	4500	27.5	55.0	7.3	1.226	360	1.4	0.0237	65
	10.2	2700	420	3250									
	11.2	2950	460	3550									
	7.3	1950	280	2900	4500	30.9	62.0	5.9	0.954	360	1.4	0.0237	65
	11.4	3050	420	3650									
	12.5	3350	460	4000									
	12.1	3250	280	4500	4500	49.0	98.0	2.3	0.808	360	1.4	0.0237	65
GFQU 112-22	9.0	1150	280	1750	4000	40.0	80.0	7.6	1.2	360	2.2	0.0475	115
	14.5	1900	420	2300									
	16.0	2100	460	2500									
	15.9	2050	280	3050	4000	60.0	120.0	3.0	0.443	360	2.2	0.0475	115
	24.8	3200	420	3850									
	27.1	3500	460	4000									
GFQU 132-32	18.4	1150	280	1725	4000	78.8	160.0	4.7	0.470	360	2.2	0.1120	170
	29.1	1800	420	2150									
	32.1	2000	460	2400									
	24.4	1450	280	2150	4000	101.0	200.0	3.0	0.289	360	2.2	0.1120	170
	38.0	2300	420	2750									
	41.8	2550	460	3050									
	29.9	2050	280	3050	4000	120.0	240.0	1.7	0.171	360	2.2	0.1120	170
	46.0	3150	420	3800									
	50.4	3450	460	4000									
GFQU 160-22	82.0	2800	420	3350	3600	215.0	430.0	1.2	0.099	360	4	0.2452	250
	90.6	3100	460	3600									
GFQU 160-32	56.0	1600	420	1900	3600	149.0	300.0	2.9	0.206	360	4	0.32	285
	62.0	1800	460	2150									
	79.0	2200	420	2650	3600	207.0	410.0	1.6	0.115	360	4	0.32	285
	86.2	2400	460	2900									

N.B. Motors are supplied with nameplates showing the highest power, speed and voltage ratings. Should your name plate requirements be different to this, please specify when ordering.

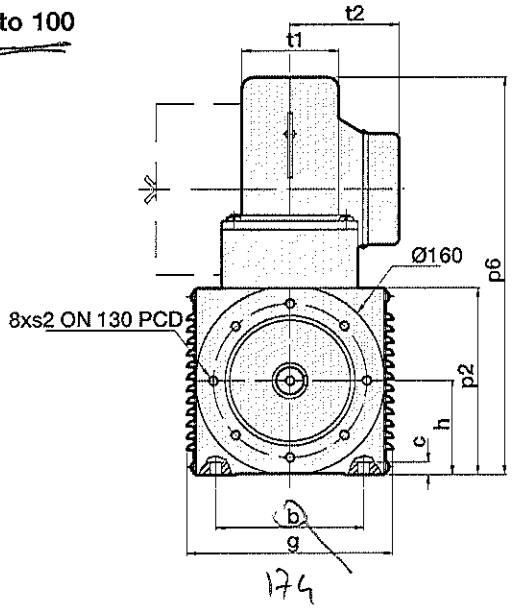
Ordering example

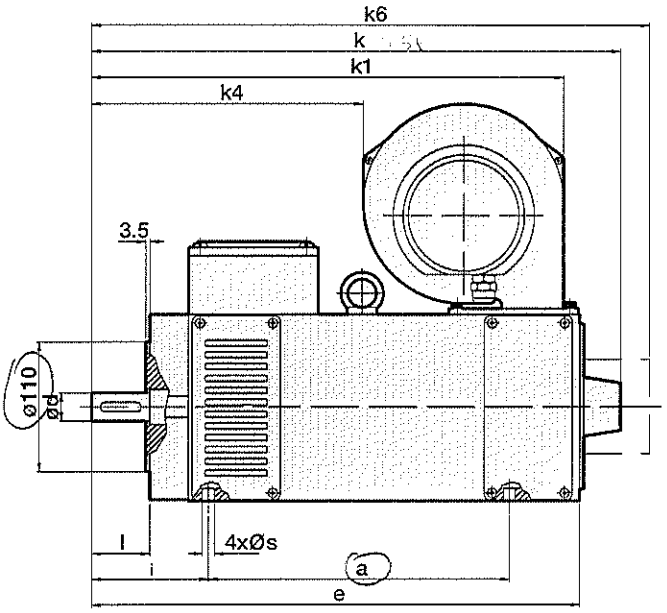
(3) off motor type GFQU 100-22, 12.5 kW, 3350 r/min, 460 VA, 360 VF, foot and flange mounted B34 fitted with D.C. tachogenerator

Stockline No. *L9-395 563*

Foot and face mounting (B34)

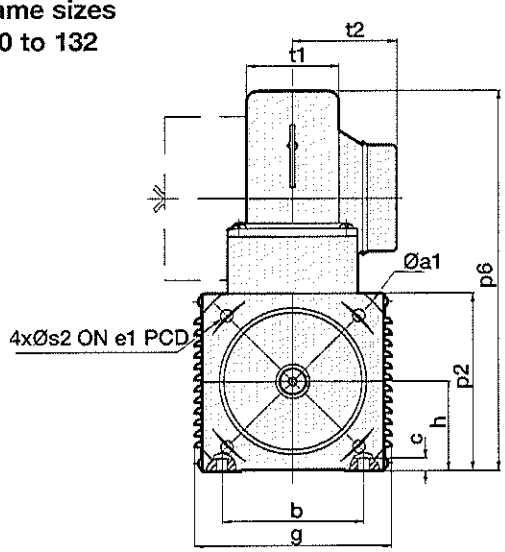
Frame sizes
80 to 100

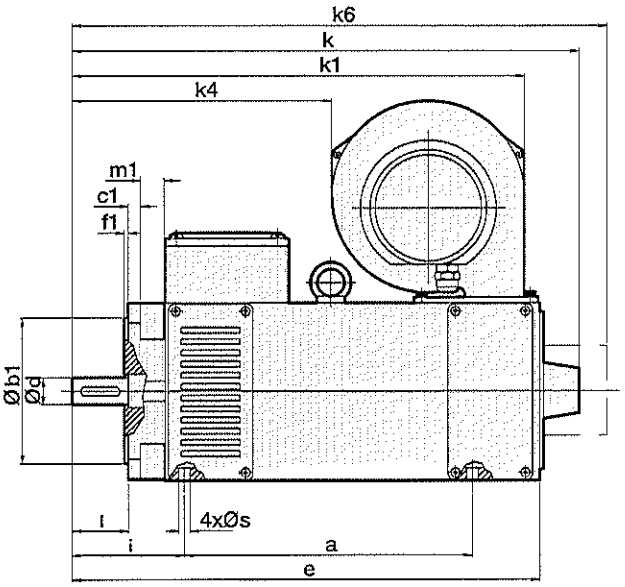




Foot and flange mounting (B35)

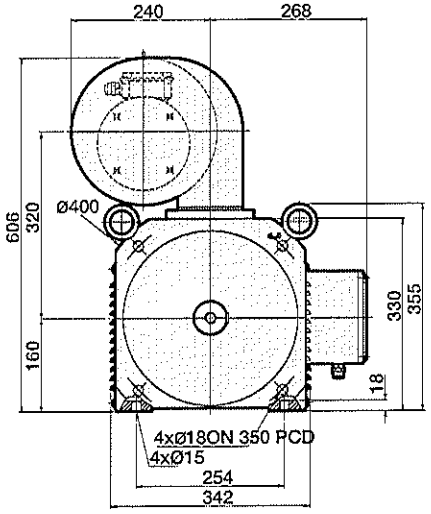
Frame sizes
80 to 132

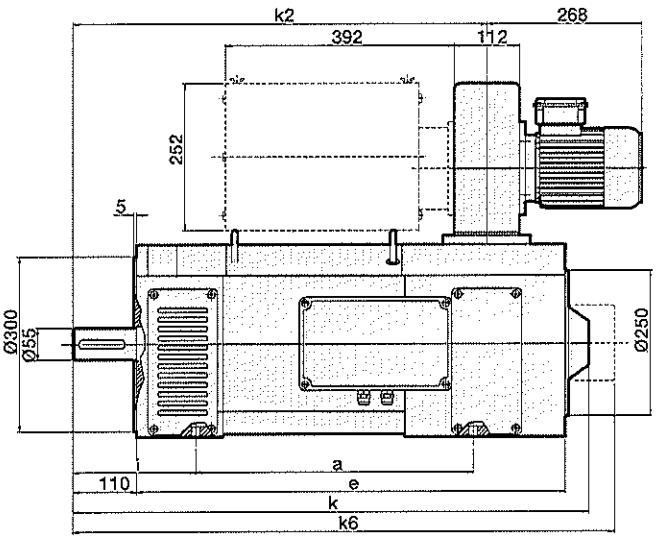




Foot and flange mounting (B35)

Frame size
160





Lenze GFQU d.c. motors

Frame sizes 80-132

Motor type	(a)	a_1	(b)	b_1	c	c_1	d k6	e_1	f_1	g	h	i	k	k_6^1	k_6^2	k_6^3	k_6^4	k_6^5	l	p_2	p_6	s	s_2
GFQU 80-22	255	200	125	130	11	11	24	165	3.5	174	80	100	467	459	475	555	547	633	50	158	335	9.5	11
GFQU/K 100-22	295	250	160	180	14	11	28	215	4	212	100	123	520	512	528	608	600	686	60	198	375	11.5	14
GFQU 112-22	385	300	190	230	16	12	38	265	4	235	112	150	660	652	668	786	778	864	80	222	451	11.5	14
GFQU 132-32	460	300	215	230	18	12	38	265	4	275	132	169	760	752	768	886	878	964	80	262	525	14	14

Additional dimensions 160 frame

Motor type	a	e	k	k_2	k_6^1	k_6^2	k_6^3	k_6^4	k_6^5
GFQU 160-22	476	737	864	712	889	905	993	1018	1104
GFQU/K 160-32	556	817	944	792	969	985	1073	1098	1184

Blowers

The wide voltage band blowers for 50/60 Hz should cover most applications, but other blower voltages are available on request. The standard mounting position for the blower on a GFQ motor is on top, 'Position A'. Alternatively, it may be mounted on either side of the motor, if required. If so, an additional sealing plate for the normal opening and an adaptor plate for the side opening are necessary. Please state the mounting position required.

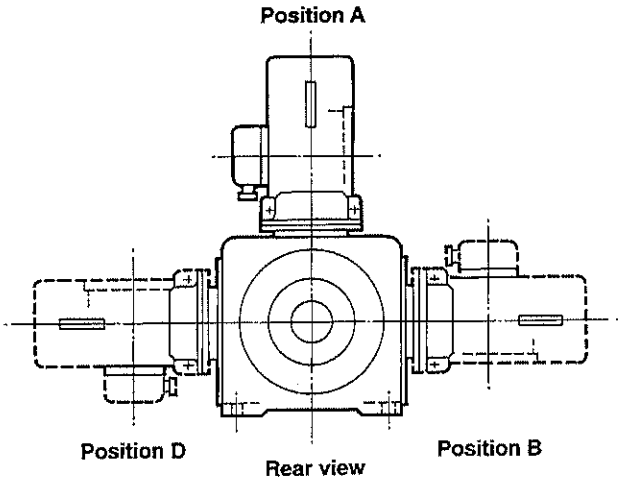
Airflow detector

Used to monitor the cooling air flow through the motor and can be supplied for different voltages.
We can fit it to the blower if it is ordered at the same time as the motor.

Voltage	Stockline No. (with fitting kit)
24V d.c.	***L1-158 836***
110V a.c.	***L1-160 49X***
240V a.c.	***L1-183 72X***

Motor length k6 varies according to options selected for tachos and brakes as described on the following pages.

Keyways to BS4235.
Tapped shaft ends to DIN 748 T3.



In addition, the blower can be turned through 180° so that the air intake faces the other way.

Filters

Specify filter cage and mat where the environment is dusty. This will be fitted to your motor.

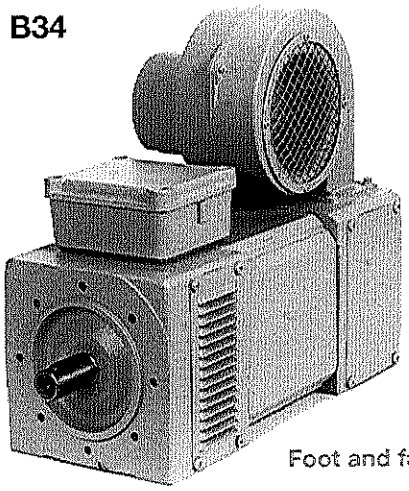
Stockline numbers in black – delivery time on request

GFQU motor size	Brush quantity per motor	Brush dimensions	Maximum current A	Carbon brushes	One pair of adaptor plates (for side mounting blowers)	Filter cage and mat	Mat only
80-22	4	8x16x25	16:1	***S8-370 210***	***L1-144 098***	***L1-213 357***	***L1-95 66X***
100-22	4/8	10x16x25	30.9	***S8-157 21X***	***L1-375 312***	***L1-213 357***	***L1-95 66X***
112-22	8	10x16x25	67	***S8-536 582***	***L1-112 302***	***L1-126 330***	***L1-169 767***
132-32	8	10x20x32	90	***S8-106 157***	***L1-143 981***	***L1-137 01X***	***L1-169 775***
	8	12.5x20x32*	90-120	***S8-203 230***			
	8	12.5x20x32	>120	***S8-223 859***			
160-32	12	12.5x25x32	66-207	***S8-411 024***	–	***L1-410 969***	***L1-410 985***
	12	12.5x25x32*	149	***S8-960 13***	–		

* Marked 'zw'

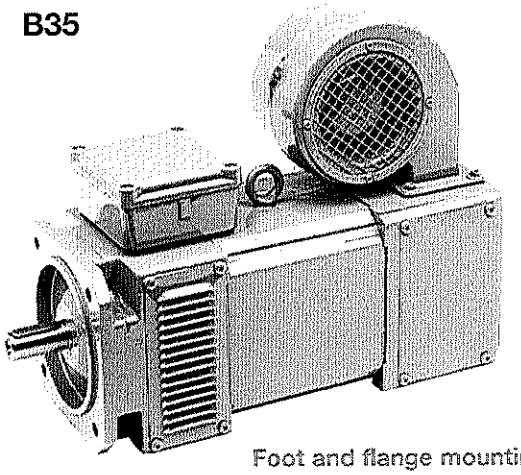
Lenze GFQU square d.c. motors

B34



Foot and face mounting

B35



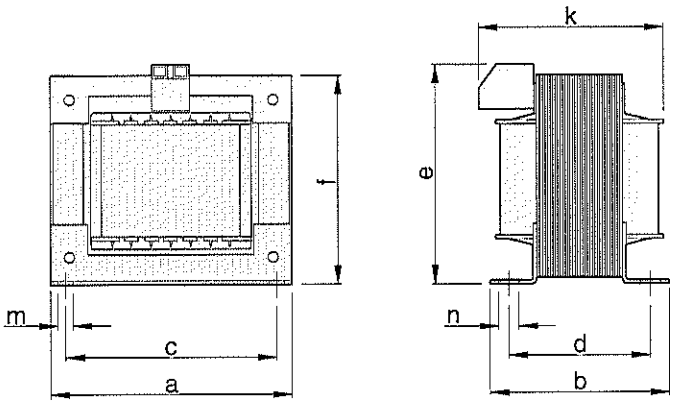
Foot and flange mounting

Motor overall length dimension				k	$k_6{}^1$	$k_6{}^2$	$k_6{}^3$	$k_6{}^4$	$k_6{}^5$
Motor type	Power kW	Speed r/min	Armature voltage V	Motor with blower only	with AC tacho 30V/1000 rpm & blower	with DC tacho 20V/1000 rpm & blower	with brake & blower	with AC tacho, brake & blower	with DC tacho, brake & blower
GFQU 80-22 B34	2.1 3.5 3.9	1150 1900 2100	280 420 460	*L9-201 646*	*L9-398 888*	*L9-382 287*	*L9-401 988*	*L9-402 106*	*L9-402 228*
	3.5 5.7 6.2	1900 3000 3350	280 420 460	*L9-383 067*	*L9-398 139*	*L9-395 161*	*L9-401 996*	*L9-402 114*	*L9-402 236*
	3.3 6.0	1800 3250	170 280	*L9-382 21X*	*L9-398 076*	*L9-395 129*	*L9-500 203*	*L9-500 211*	*L9-500 22X*
GFQU 100-22 B34	4.7 7.6 8.4	1200 1950 2150	280 420 460	*L9-155 09X*	*L9-398 549*	*L9-395 713*	*L9-402 019*	*L9-402 130*	*L9-402 252*
	6.4 10.2 11.2	1700 2700 2950	280 420 460	*L9-387 650*	*L9-398 435*	*L9-395 634*	*L9-402 027*	*L9-402 149*	*L9-402 260*
	7.3 11.4 12.5	1950 3050 3350	280 420 460	*L9-371 242*	*L9-398 380*	*L9-395 563*	*L9-402 035*	*L9-402 157*	*L9-402 279*
GFQU 112-22 B35	9.0 14.5 16.0	1150 1900 2100	280 420 460	*L9-381 902*	*L9-398 845*	*L9-396 587*	*L9-399 65X*	*L9-399 885*	*L9-401 594*
	15.9 24.8 27.1	2050 3200 3500	280 420 460	*L9-378 724*	*L9-398 837*	*L9-396 544*	*L9-399 668*	*L9-399 893*	*L9-401 606*
GFQU 132-32 B35	18.4 29.1 32.1	1150 1800 2000	280 420 460	*L9-339 234*	*L9-398 87X*	*L9-396 883*	*L9-399 676*	*L9-399 921*	*L9-401 614*
	24.4 38.0 41.8	1450 2300 2550	280 420 460	*L9-346 793*	*L9-398 861*	*L9-396 867*	*L9-399 684*	*L9-399 93X*	*L9-401 622*
	29.9 46.0 50.4	2050 3150 3450	280 420 460	*L9-387 468*	*L9-398 853*	*L9-396 840*	*L9-399 692*	*L9-399 956*	*L9-401 630*
GFQU 160-22 B35	82.0 90.6	2800 3100	420 460	*L9-252 508*	*L9-398 924*	*L9-398 916*	*L9-399 704*	*L9-399 964*	*L9-401 657*
GFQU 160-32 B35	56.0 62.0	1600 1800	420 460	*L9-251 728*	*L9-398 975*	*L9-398 967*	*L9-399 712*	*L9-399 972*	*L9-401 665*
	79.0 86.2	2200 2400	420 460	*L9-282 666*	*L9-399 022*	*L9-398 991*	*L9-399 720*	*L9-399 980*	*L9-401 673*

Stockline numbers in black – delivery times on request

d.c. motor chokes

This range of iron cored armature chokes for improving the form factor of any thyristor controller, thus reducing losses and increasing the effective output of the motor.
In order to obtain the rated capability from d.c. motors, they must be fed from d.c. In all cases where thyristor rectifier controllers fed from single phase supply are employed, the output is not pure d.c. The output in this situation contains a ripple component which reduces the effective value of current by a factor called the 'form factor'. In practical applications the range of values for form factor is between 1.6 and 1.1. For example if by calculation or measurement the FF of a particular arrangement is 1.35, and if the motor rating is 1.5kW the maximum available continuous power would be 1.5/1.35 = 1.1kW.
Insufficient armature inductance also causes an increase in brush sparking and increased brush wear.
Three-phase controllers do not usually need any additional armature chokes, due to the improved output of such a drive.

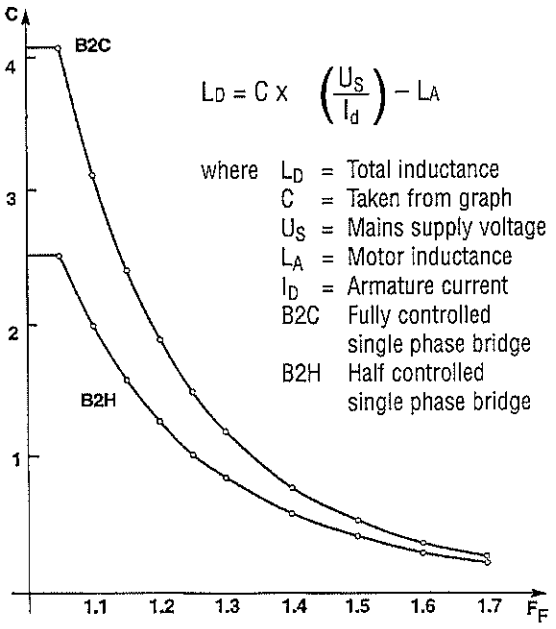


Current A	Inductance mH	a	b	c	d	e	f	k	m	n	Weight kg	Stockline No.
0.5/1.6	200/100	77	56	54	45	86	67	75	5	10	0.96	***K4-152 859***
4	25	77	97	54	53	80	50	105	5	10	1.2	***K4-116 214***
4.4	40	96	97	54	53	80	50	105	5	10	3	***K4-53 301***
6	24	96	97	84	60	95	90	105	5	8	3	***K4-30 10X***
6	40	116	112	100	75	115	110	120	5	8	4.5	***K4-229 879***
10	15	116	112	100	75	115	110	120	5	8	4.3	***K4-75 171***
10	40	164	135	140	90	150	150	150	6	12	10.0	***K4-30 118***
16	25	192	140	155	94	175	175	160	6	12	14	***K4-106 228***
18	12	136	140	105	110	125	110	160	6	12	9	***K4-322 890***
22	7	136	127	105	98	125	110	150	6	12	7.5	***K4-30 134***
22	15	192	140	155	94	175	175	160	6	12	15	***K4-109 577***
25	25	230	165	195	107	205	205	180	6	12	23	***K4-63 00X***
42	4	136	127	105	98	125	110	150	8	12	9	***K4-98 933***

Selection

The total armature inductance can be calculated from the formula.

1. Divide motor rated power by actual required power (motor selection should have chosen a motor having a larger than actual required power rating)
   e.g. $F_F = 2.2/1.8 = 1.22$ (1.8kW required, 2.2kW selected)
2. 'Look up' value of 'C' on graph above for the type of controller to be used i.e., B2H for 530, 470 series.
3. Insert values into formula
   i.e. $L_D = 1.1 \left(\frac{240}{17.4}\right) - 2.6 = 12.4$ mH @ 17.44A
4. Select a suitable choke (***K4-322 890*** 12mH @ 18A) or re-calculate selecting another motor. Do not 'overcurrent' a motor because the heat generated by the increase in current goes up by the square of current i.e. 20% over-current leads to 44% more power to be dissipated in the armature which may cause the armature temperature to rise above safe limits.



$$L_D = C \times \left(\frac{U_S}{I_d}\right) - L_A$$

where L_D = Total inductance
C = Taken from graph
U_S = Mains supply voltage
L_A = Motor inductance
I_D = Armature current
B2C Fully controlled single phase bridge
B2H Half controlled single phase bridge

Note: A much larger choke is not recommended because it will slow down the response of the drive system.