BONFIGLIOLI
RIDUTTORI

CERTIFIED QUALITY SYSTEM UNI EN ISO 9001
SINCERT DNV

TÜV MANAGEMENT SERVICE ISO 9001

Worm Gear Series

VF

W

VF/VF - VF/W
W/VF

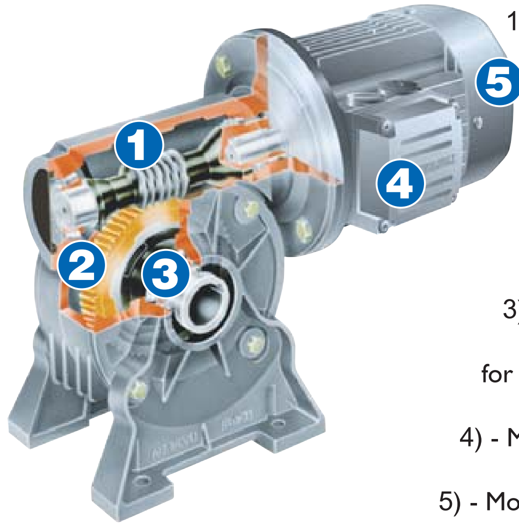
BONFIGLIOLI
Power & Control Solutions

Supplement
NEMA

Worm Gear Series

Product Features

COD. 1043 R4



1) - Wormshaft from case hardened alloy steel with ground finished tooth flank.

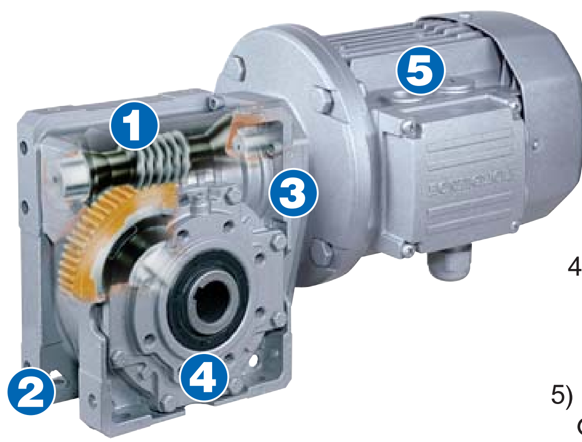
2) - Shell-casted phosphor bronze gearwheels.

3) - Output shaft bearings are suitably rated for substancial shaft loading.

4) - Motor larger conduit box

5) - Motor improved ventilation

COD. 1840 R4



1) - Wormshaft from hardened steel, ground finished on tooth profile.

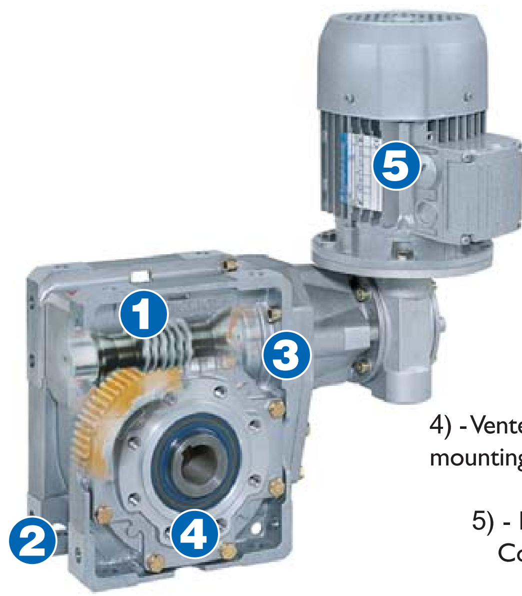
2) - Through holes facilitate discharge of water after wash-down

3) - Monolithic Aluminium gearcase..

4) - Vented side cover adjusts to any mounting position (patent pending).

5) - Numerous motor options. Compact style also available.

COD. 1407 R2



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This catalog is a supplement to the standard red Bonfiglioli metric catalogs. It provides for easy speed reducer/gearmotor selection using North American units (such as horsepower and lb•in.). When evaluating an application, it is recommended that final selections be reviewed by Bonfiglioli personnel. As this is a supplement, refer to the metric catalogs **(1847 R2)** for more detail in regards to each gearbox and gearmotor.

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Revisions

Refer to page 78 for the catalogue revision index.

Visit www.bonfiglioli.com to search for catalogues with latest revision index.

1.0 GENERAL INFORMATION

1.1 SYMBOLS AND UNITS

Symb.	U.m.	Description
A_c	[lbs]	Calculated thrust load
A_n	[lbs]	Rated thrust load
f_m	–	Adjusting power factor
S.F.	–	Service factor
f_t	–	Thermal correction factor
i	–	Transmission ratio
I	–	Intermittence
J_c	[lb·ft^2]	Load moment of inertia
J_m	[lb·ft^2]	Mass moment of inertia for motor
J_r	[lb·ft^2]	Mass moment of inertia for gearbox
K	–	Acceleration factor of masses
K_r	–	Radial load stress factor
T_b	[lb·in]	Brake torque
T	[lb·in]	Torque
T_c	[lb·in]	Calculated torque
T_n	[lb·in]	Speed reducer rated torque
T_r	[lb·in]	Torque required
n	[rpm]	Speed
P	[hp]	Power
P_c	[hp]	Calculated power
P_n	[hp]	Motor rated power

Symb.	U.m.	Description
P_n	[hp]	Rated horsepower
P_t	[hp]	Thermal capacity
P_r	[hp]	Power required
R_c	[lbs]	Calculated radial load
R_n	[lbs]	Rated OHL
R_x	[lbs]	Radial OHL for load shifted from shaft midpoint
S	–	Safety factor
t_a	[°C/ °F]	Ambient temperature
t_f	[min]	Operating time under constant load
t_r	[min]	Rest time
W	[ft·lb]	Brake dissipated energy between two successive air-gap adjustments
W_{max}	[ft·lb]	Maximum energy for each braking operation
x	[in]	Load application distance from shaft shoulder
Z	[1/h]	Number of permitted motor starts in loaded conditions
Z_r	[1/h]	Number of starts
η_d		Dynamic efficiency

Footnotes:

□1 *Applies to input shaft*

□2 *Applies to output shaft*

NOMENCLATURE

1.2 OUTPUT TORQUE

Nominal output torque T_{n2}

Torque transmitted at output shaft under uniform load, referred to input speed n_1 and corresponding output speed n_2.
It is calculated according to service factor S.F. = 1.

Application torque T_{r2}

This is torque corresponding to application requirements. It must be equal to or less than rated output torque T_{n2} for the gearmotor selected.

Calculated torque T_{c2}

Torque value to be used for selecting the gearbox, considering required torque T_{r2} and service factor S.F., and is obtained by:

$$T_{c2} = T_{r2} \times S.F. \leq T_{n2}$$

1.3 POWER

Rated input horsepower P_{n1}

In the speed reducer selection charts, this is power applicable at input shaft, referred to speed n_1, and considering a service factor S.F. = 1.

Output horsepower P_{n2}

Value represents rated HP as referred to speed reducer output shaft.

$$P_{n2} = P_{n1} \times \eta_d$$

$$P_{n2} = \frac{T_{n2} \times n_2}{63025}$$

P_{n2} in [hp]; M_{n2} in [lb·in]

1.4 THERMAL CAPACITY P_t

The value indicates the speed reducer thermal limit and corresponds to the power transmission capacity under continuous duty at an ambient temperature of 20°C[70°F] without using a supplementary cooling system.
For short operating periods with sufficiently long pauses to allow the unit to cool, thermal capacity does not need to be taken into consideration.
For ambient temperature different from 20°C[70°F] and intermittent duty, P_t value can be adjusted by means of to thermal factor f_t shown in table (A1), provided the following condition is satisfied.

$$P_{r1} \leq P_t \times f_t$$

(A1)

f_t					
ta max. °C [°F]	**Continuous duty**	**Intermittent duty**			
		Intermittence % (I)			
		80	60	40	20
40 [105]	0.8	1.1	1.3	1.5	1.6
30 [85]	0.85	1.3	1.5	1.6	1.8
20 [70]	1	1.5	1.6	1.8	2.0
50 [10]	1.15	1.6	1.8	2.0	2.3

Intermittence (I)% is obtained dividing operating time under load [t_f] by total time, expressed as a percentage:

$$I = \frac{t_f}{t_f + t_r} \times 100$$

1.5 EFFICIENCY η

Obtained from the relationship of output power P_2, to input power P_1, according to the following equation:

$$\eta = \frac{P_2}{P_1}$$

Torque value M_{n2} specified in this catalogue accounts for dynamic efficiency η_d.

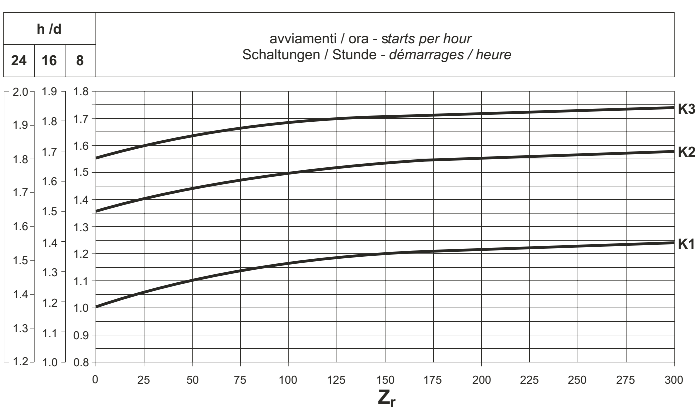
1.6 MASS MOMENT OF INERTIA J_r

Values for the moment of inertia specified in the catalogue refer to gear unit input shaft.
They are therefore related to motor speed, in the case of direct motor mounting.

1.7 SERVICE FACTOR S.F.

This factor is the numeric value describing reducer service duty. It takes into consideration, with unavoidable approximation, daily operating conditions, load variations and overloads connected with reducer application.
In the graph (A2) below, after selecting proper "daily working hours" column, the service factor is given by intersecting the number of starts per hour and one of the K1, K2 or K3 curves.
K_ curves are linked with the service nature (approximately: uniform, medium and heavy) through the acceleration factor of masses K, connected to the ratio between driven masses and motor inertia values.
Regardless of the value given for the service factor, we would like to remind that in some applications, which for example involve lifting of parts, failure of the reducer may expose the operators to the risk of injuries.
If in doubt, please contact our Technical Service Department.

(A2)



Acceleration factor of masses K

Used for establishing the service factor and obtained from the following equation:

$$K = \frac{J_c}{J_m}$$

Where:

Jc [lb·ft²]
dynamic moment of inertia of the driven masses in proportion to the speed of the applied motor

Jm [lb·ft²]
motor moment of inertia

K1 uniform load
$K \leq 0.25$

K2 moderate shock load
$K \leq 3$

K3 heavy shock load
$K \leq 10$

For K > 10 values, please contact our Technical Service.

1.8 SELECTION

AGMA Service Factor charting

(A3)

Application	S.F.
AGITATORS	
Pure Liquids	1.25
Liquids & Solids	1.50
Liquids - variable density	1.50
BLOWERS	
Centrifugal	1.25
Lobe	1.50
Vane	1.50
BREWING AND DISTILLING	
Bottling Machinery	1.25
Brew Kettles - Continuous Duty	1.25
Cookers - Continuous Duty	1.25
Mash Tubs - Continuous Duty	1.25
Scale Hopper - Frequent Starts	1.50
CAN FILLING MACHINES	1.25
CAR DUMPERS	2.00
CAR PULLERS	1.50
CLARIFIERS	1.25
CLASSIFIERS	1.50
CLAY WORKING MACHINERY	
Brick Press	2.00
Briquette Machine	2.00
Pug Mill	1.50
COMPACTORS	2.00
COMPRESSORS	
Centrifugal	1.25
Lobe	1.50

Application	S.F.
Reciprocating, Multi-Cylinder	1.75
Reciprocating, Single-Cylinder	2.00
CONVEYORS - GENERAL PURPOSE	
includes Apron, Assembly, Belt, Bucket, Chain, Flight, Oven and Screw	
Uniformly Loaded or Fed	1.25
Heavy Duty - Not Uniformly Fed	1.50
Severe Duty - Reciprocating or Shaker	2.00
CRANES	
Dry Dock	
Main Hoist	2.50
Auxiliary Hoist	3.00
Boom Hoist	3.00
Slewing Hoist	3.00
Traction Drive	3.00
Container	
Main Hoist	3.00
Boom Hoist	2.00
Trolley Drive	
Gantry Drive	3.00
Traction Drive	2.00
Mill Duty	
Main Hoist	3.50
Auxiliary	3.50
Bridge Travel	3.00
Trolley Travel	3.00
Industrial Duty	
Main	3.00
Auxiliary	3.00
Bridge Travel	3.00
Trolley Travel	3.00
CRUSHERS	
Stone or Ore	2.00
DREDGES	
Cable Reels	1.50
Conveyors	1.50
Cutter Head Drives	2.00
Pumps	2.00
Screen Drives	2.00
Stackers	1.50
Winches	1.50
ELEVATORS	
Bucket	1.50
Centrifugal Discharge	1.25
Escalators	1.25
Freight	1.50
Gravity Discharge	1.25
EXTRUDERS	
General	1.50
Plastics	
Variable Speed Drive	1.50
Fixed Speed Drive	1.75

Application	S.F.
Rubber	
Continuous Screw Operation	1.75
Intermittent Screw Operation	1.75
FANS	
Centrifugal	1.25
Cooling Towers	2.00
Forced Draft	1.25
Induced Draft	1.50
Industrial & Mine	1.50
FEEDERS	
Apron	1.50
Belt	1.50
Disc	1.25
Reciprocating	2.00
Screw	1.50
FOOD INDUSTRY	
Cereal Cooker	1.25
Dough Mixer	1.50
Meat Grinder	1.50
Slicers	1.50
GENERATORS AND EXITORS	1.25
HAMMER MILLS	2.00
HOISTS	
Heavy Duty	2.00
Medium Duty	1.50
Skip Hoist	1.50
LUMBER INDUSTRY	
Barkers	
Spindle Feed	1.50
Main Drive	1.75
Conveyors	
Burner	1.50
Main or Heavy Duty	1.50
Main Log	2.00
Re-saw, Merry-Go-Round	1.50
Slab	2.00
Transfer	1.50
Chains	
Floor	1.50
Green	1.75
Cut-Off Saws	
Chain	1.75
Drag	1.75
Debarking Drums	2.00
Feeds	
Edger	1.50
Gang	1.75
Trimmer	1.50
Log Deck	1.75
Log Hauls - Incline - Well Type	1.75
Log Turning Devices	1.75
Planer Feed	1.50

Application	S.F.
Planer Tilting Hoists	1.50
Rolls - Live-off brg. - Roll Cases	1.75
Sorting Table	1.50
Tipple Hoist	1.50
Transfer	
Chain	1.75
Craneway	1.75
Tray Drives	1.50
Veneer Lathe Drives	1.50
METAL MILLS	
Draw Bench Carriage and Main Drive	1.50
Runout Table	
Non-reversing	1.50
Group Drives	1.50
Individual Drives	2.00
Reversing	2.00
Slab Pushers	1.50
Shears	2.00
Wire Drawing	1.50
Wire Winding Machine	1.50
METAL STRIP PROCESSING MACHINERY	
Bridles	1.50
Coilers & Uncoilers	1.25
Edge Trimmers	1.50
Flatteners	1.50
Loopers (Accumulators)	1.25
Pinch Rolls	1.50
Scrap Choppers	1.50
Shears	2.00
Slitters	1.50
MILLS, ROTARY TYPE	
Ball & Rod	
Spur Ring Gear	2.00
Helical Ring Gear	1.50
Direct Connected	2.00
Cement Kilns	1.50
Dryers & Coolers	1.50
MIXERS, CEMENT	1.50
PAPER MILLS	
Agitator (Mixer)	1.50
Agitator for Pure Liquors	1.25
Barking Drums	2.00
Barkers - Mechanical	2.00
Beater	1.50
Breaker Stack	1.25
Calendar	1.25
Chipper	2.00
Chip Feeder	1.50
Coating Rolls	1.25
Conveyors	
Chip, Bark, Chemical	1.25
Log (including Slab)	2.00

Application	S.F.
Couch Rolls	1.25
Cutter	2.00
Cylinder Molds	1.25
Dryers	
Paper Machine	1.25
Conveyor Type	1.25
Embosser	1.25
Extruder	1.50
Fourdrinier Rolls (includes Lump breaker, dandy roll, wire turning, and return rolls)	1.25
Jordan	1.50
Kiln Drive	1.50
Mt. Hope Roll	1.25
Paper Rolls	1.25
Platter	1.50
Presses - Felt & Suction	1.25
Pulper	2.00
Pumps - Vacuum	1.50
Reel (Surface Type)	1.25
Screens	
Chip	1.50
Rotary	1.50
Vibrating	2.00
Size Press	1.25
Super Calender	1.25
Thickener (AC Motor)	1.50
Thickener (DC Motor)	1.25
Washer (AC Motor)	1.50
Washer (DC Motor)	1.25
Wind and Unwind Stand	1.25
Winders (Surface Type)	1.25
Yankee Dryers	1.25
PLASTICS INDUSTRY - PRIMARY PROCESSING	
Intensive Internal Mixers	
Batch Mixers	1.75
Continuous Mixers	1.50
Batch Drop Mill - 2 smooth rolls	1.25
Continuous Feed, Holding & Blend Mill	1.25
Calender	1.50
PLASTICS INDUSTRY - SECONDARY PROCESSING	
Blow Molder	1.50
Coating	1.25
Film	1.25
Pipe	1.25
Pre-Plasticizer	1.50
Rods	1.25
Sheet	1.25
Tubing	1.50
PULLER - BARGE HAUL	1.50
PUMPS	
Centrifugal	1.25
Proportioning	1.50

Application	S.F.
Reciprocating	
Single Acting, 3 or more cylinders	1.50
Double Acting, 2 or more cylinders	1.50
Rotary	
Gear Type	1.25
Lobe	1.25
Vane	1.25
RUBBER INDUSTRY	
Intensive Internal Mixers	
Batch Mixers	1.75
Continuous Mixers	1.50
Mixing Mill	
2 smooth rolls	1.50
1 or 2 corrugated rolls	
Batch Drop Mill - 2 smooth rolls	1.50
Cracker - 2 corrugated rolls	2.00
Holding, Feed & Blend Mill - 2 rolls	1.25
Refiner - 2 rolls	1.50
Calender	1.50
SAND MULLER SEWAGE DISPOSAL EQUIPMENT	1.50
Bar Screens	1.25
Chemical Feeders	1.25
Dewatering Screens	1.50
Scum Breakers	1.50
Slow or Rapid Mixers	1.50
Sludge Collectors	1.25
Thickener	1.50
Vacuum Filters	1.50
SCREENS	
Air Washing	1.25
Rotary - Stone or Gravel	1.50
Traveling Water Intake	1.25
SUGAR INDUSTRY	
Beet Slicer	2.00
Cane Knives	1.50
Crushers	1.50
Mills (low speed end)	1.75
TEXTILE INDUSTRY	
Batchers,	1.50
Calenders	1.50
Cards	1.50
Dry Cans	1.50
Dyeing Machinery	1.50
Looms	1.50
Mangles	1.50
Nappers	1.50
Pads	1.50
Slashers	1.50
Soapers	1.50
Spinners	1.50
Tenter Frames	1.50
Washers	1.50
Winders	1.50

Recommended procedure for correct selection of the drive unit:

Selecting a gearmotor

A) Determine service factor S.F. according to type of duty (factor K), number of starts per hour Z_r and duration of service.

B) Providing torque Tr_2, speed n_2 and efficiency η_d are known, input power can be calculated as follows:

$$P_{r1}(hp) = \frac{T_{r2}(lb \cdot in) \times n_2(rpm)}{63{,}025 \times \eta_d}$$

Values of η_d for the different sizes of speed reducer are given in the rating charts at pages 35 through 47.

C) Consult the gearmotor selection charts and locate the table corresponding to power

$$P_n \geq P_{r1}$$

Unless otherwise specified, power Pn of motors indicated in the catalogue refers to continuous duty S1.
For motors used in conditions other than S1, the type of duty required by reference to CEI 2-3/IEC 600 34-1 Standards must be mentioned.
For duties from S2 to S8 in particular, and for IEC motor frame 132 or smaller, extra power can be obtained with respect to continuous duty, and the following condition should be verified:

$$P_n \geq \frac{P_{r1}}{f_m}$$

The adjusting factor f_m can be obtained from chart (A4).

(A4)

	DUTY						
	S2			S3*			S4 - S8
	Cycle duration [min]			Intermittence (I)			Please consult factory
	10	30	60	25%	40%	60%	
f_m	1.35	1.15	1.05	1.25	1.15	1.1	

* Cycle duration, in any event, must be 10 minutes or less. If it is longer, please contact our Technical Service Department.

Intermittence: $I = \frac{t_f}{t_f + t_r} \times 100$

tf = operating time at constant load
tr = rest time

Next, according to output speed n_2, select a gearmotor having a calculated safety factor S higher than or equal to service factor S.F.
The gearmotor selection charts features combinations with 2, 4 and 6 pole motors.
If motors with different speed shall be used, refer to the selection procedure for speed reducers and choose the most suitable gear unit.
For applications such as hoisting and travelling, contact our Technical Service.

Selecting a speed reducer with a motor adapter

A) Determine service factor S.F.

B) Assuming the required output torque for the application Tr_2 is known, the calculated torque can be defined as:

$$T_{c2} = T_{r2} \times S.F.$$

C) The gear ratio is calculated according to requested output speed n_2 and available input speed n_1

$$i = \frac{n_1}{n_2}$$

Having calculated Tc_2 and (i), consult speed reducer selection charts referring to speed n_1 and find the speed reducer which, as a function of the ratio (i) closest to the calculated value, provides rated torque of

$$T_{n2} \geq T_{c2}$$

If the selected speed reducer has to be fitted to an electric motor with either an IEC or a NEMA flange, check feasibility by consulting the tables listing the available motor adapters.

1.9 VERIFICATIONS

After selecting the drive unit, the following checks must be conducted:

A) Maximum torque

The maximum torque (intended as momentary peak load) applicable to the speed reducer must not, in general, exceed 300% of rated torque T_{n2}. Therefore, check that this limit is not exceeded, using suitable torque limiting devices, if necessary.
For three-phase two speed motors, it is important to pay attention to switching torque generated (from high to low speed), because it could be significantly higher than maximum torque.

B) Radial loads

Check that radial forces applying on input and/or output shafts are within permitted catalogue values. If they are higher, select a larger speed reducer or change bearing arrangement.
Remember that all values listed in the catalogue refer to loads acting at mid-point of the shaft. The permissible radial load value should be adjusted if the radial load is not acting at mid point of shaft.

C) Thrust loads

Thrust loads, if applicable, must also be compared to the permitted values indicated in the catalogue.
In the event of extremely high thrust loads, or a combination of thrust and radial loads, contact our Technical Service Department.

D) Electric motors
For duties with considerable number of starts per hour, factor Z must be considered (it can be sorted from the motor rating chart). Factor Z defines the maximum number of starts for the application under consideration.

1.10 INSTALLATION

The following installation instructions must be followed:

A) Make sure that the speed reducer is adequately secured to avoid vibrations. If shocks, prolonged overloading, or the possibility of locking are expected, install hydraulic couplings, clutches, torque limiters, etc.).

B) Prior to paint coating, the outer face of the oil seals must be protected to prevent the solvent drying out the rubber, thus jeopardizing the oil-seal function.

C) Parts assembled on the speed reducer output shaft must be machined to ISO H7 tolerance to prevent interference fits that could damage the speed reducer itself. Further, to mount or remove such parts, use suitable pullers or extraction devices using the tapped hole located at the end of the shaft extension (solid shafts).

D) Contact surfaces must be cleaned and treated with suitable protective products before mounting to avoid oxidation and, as a result, seizure of parts.

E) Coupling to the speed reducer output hollow shaft (tolerance G7) is usually effected with shafts machined to h6 tolerance. If the type of application requires it, coupling with a slight interference (G7-j6) is possible.

F) Before starting up the machine, make sure that oil level is correct for the actual mounting position, and that viscosity is suitable for the specific duty.

1.11 STORAGE

Observe the following instructions to ensure correct storage of products:

A) Do not store outdoors, in areas exposed to weather or with excessive humidity.

B) Always place wooden pallets or other material between floor and products, to avoid direct contact with the floor.

C) For long term storage (over 60 days), all machined surfaces such as flanges, shafts and couplings must be protected with a suitable rust inhibiting product (Mobilarma 248 or equivalent).

D) The following measures must be taken when products are stored for a period exceeding 6 months:

- For life lubricated products, the machined areas must be greased to prevent oxidation.
- In addition to above, products originally supplied w/o oil must be positioned with the breather plug at the highest point, and filled with oil.
  Before operating the speed reducer, restore the correct quantity of oil.

1.12 MAINTENANCE

Life lubricated speed reducers do not require periodical oil change.
For larger speed reducers, the first oil change must take place after about 300 hours of operation, flushing the interior of the unit using suitable detergents.
Do not mix mineral oils with synthetic oils.
Check oil periodically, and restore the level, if necessary.

2.0 WORM GEAR SERIES VF, W, VF/W

ORDERING NUMBERS

Speed reducer designation - Series VF

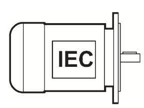
VF 49 L1 F1 — 28 P63 B5 B3 .....

OPTIONS

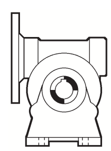
MOUNTING POSITION
B3 (Standard), **B6, B7, B8, V5, V6**

MOTOR MOUNTING
B5 (IEC Standard VF30 - VF250, VFR49 - VFR250)
B14 (on request VF30 - VF250)

INPUT STYLE

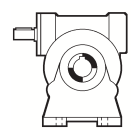


P27*	**S44****
P56	**P112**
P63	**P132**
P71	**P160**
P80	**P180**
P90	**P200**
P100	**P225**



***P27** = VF 27 only for combination with motor BN27.
****S44** = VFR 44 gearbox supplied with dedicated compact motor BN44 only.

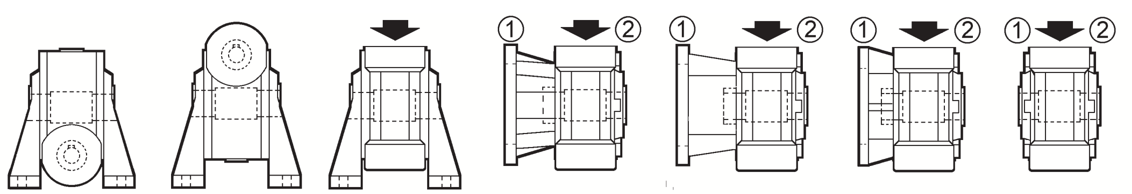
HS



GEAR RATIO

OUTPUT SHAFT BORE

VERSION



N	**A**	**V**	**F (1,2)**	**FA (1,2)**	**FC (1,2)**	**P (1)**
(VF27…250)	(VF27…250)	(VF27…250)	(VF27…185)	(VF44-49)	(VF63…185)	(VF30...86-210-250) P1 = P2
					FR (1,2) (VF86…185)	**P (1,2)** (VF110…185) P1 ≠ P2
					FCR (1,2) (VF72)	

①-② Flange mounting side

TORQUE LIMITER
L1, L2, LF

FRAME SIZE
27, 30, 44, 49, 63, 72, 86, 110, 130, 150, 185, 210, 250 (VF)
44, 49, 63, 72, 86, 110, 130, 150, 185, 210, 250 (VFR)
30/44, 30/49, 30/63, 44/72, 44/86, 49/110, 63/130, 86/150, 86/185, 130/210, 130/250 (W/VF)

SERIES
VF = double worm gear **VFR** = helical-worm gear unit **VF/VF** = combined gearbox

Speed reducer designation - Series W

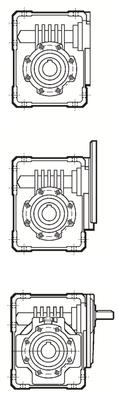
W 63 L1 UF1 — 24 S2 — B3 .....

OPTIONS

MOUNTING POSITION
B3 (Standard)**, B6, B7, B8, V5, V6**

MOTOR MOUNTING
B5 (W-WR63; W-WR75; W-WR86; W-WR110)
B14 (W63; W75; W86; W110)

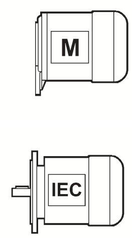
INPUT STYLE



S1
S2
S3

P63
P71
P80
P90
P100/11
2P132

HS

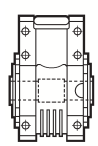


GEAR RATIO

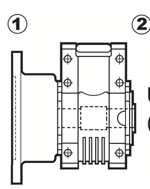
OUTPUT SHAFT BORE

Only for	W 75	**D30**	default
		D28	option

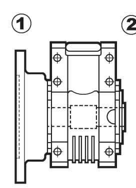
VERSION



U
(W63 … W110)



UF1 - UF2
(W63 … W110)



UFC1 - UFC2
(W63 … W110)
UFCR1 - UFCR2
(W75)

TORQUE LIMITER
L1, L2

FRAME SIZE
63, 75, 86, 110

SERIES
W = worm gearbox **WR** = helical-worm gear units

Speed reducer designation - Series VF/W, W/VF, VF/VF

VF/W 30/63 L1 U — 1520 P63 B5 B3 CW1 .....

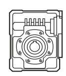
OPTIONS

ARRANGEMENT
CW (1,2,3,4)
CCW (1,2,3,4)

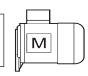
MOUNTING POSITION
B3, B6, B7, B8, V5, V6

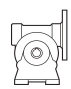
IEC MOTOR MOUNTING
B3, B6, B7, B8, V5, V6

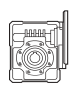
INPUT STYLE



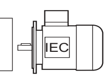
S1, S2, S3

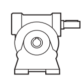


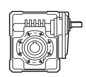




P63, P71, P80, P90, P100, P112, P132







HS

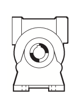
GEAR RATIO

OUTPUT SHAFT BORE

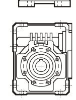
Only for VF/W 44/75	**D30**	default
	D28	option

VERSION

A, N, V, P (1,2), F (1,2), FA (1,2), FC (1,2), FR (1,2)



U, UF (1,2), UFC (1,2), UFCR (1,2)



TORQUE LIMITER
L1, L2, LF

FRAME SIZE
30/40, 30/49, 130/210, 130/250 (VF/VF)
30/63, 44/75, 44/86, 49/110 (VF/W)
63/130, 86/150, 86/185 (W/VF)

SERIES
VF/VF, VF/W, W/VF = double worm gear

Bonfiglioli motor

MOTOR | BRAKE

BN 63A 4 230/460-60 IP54 CLF ..... W **FD** 3.5 R SB 220 SA ....

OPTIONS

BRAKE SUPPLY

AC/DC RECTIFIER
NB, **NBR**, **SB**, **SBR**

BRAKE HAND RELEASE (optional)
R, **RM**

BRAKE TORQUE [specify Nm!]

[**1 ft • lb = 1.356 Nm**]

BRAKE TYPE
FD (DC brake)
FA (AC brake)

TERMINAL BOX
W (default), N, S, E

MOUNTING
blank for compact motor
B5 for IEC motor

INSULATION CLASS
CL F default

DEGREE OF PROTECTION
IP 55 standard (**IP 54** standard for brake motors)

VOLTAGE - FREQUENCY

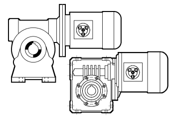
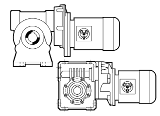
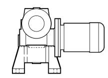
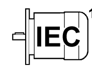
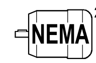
NUMBER OF POLES

MOTOR FRAME SIZE

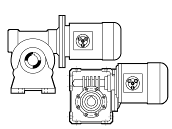
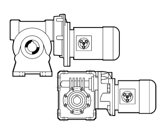
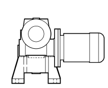
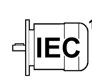
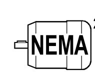
TYPE OF MOTOR
M = integral
BN = IEC flanged type
NEMA motors to be specified thru their ordering numbers

GEARMOTOR SELECTION CHARTS

0.125 hp

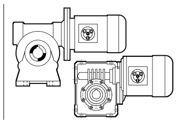
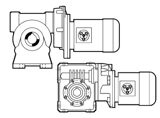
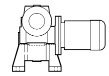
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				 [1]	 [2]
236	28	2.9	7	92	**VF 27 – 7**			**P27 BN27C4**	**n/a**
165	38	2.1	10	112	**VF 27 – 10**			**P27 BN27C4**	**n/a**
165	39	3.7	10	173	**VF 30 – 10**			**P56 BN56B4**	**N42CZ**
110	54	1.5	15	135	**VF 27 – 15**			**P27 BN27C4**	**n/a**
110	54	2.9	15	205	**VF 30 – 15**			**P56 BN56B4**	**N42CZ**
83	68	1.2	20	135	**VF 27– 20**			**P27 BN27C4**	**n/a**
83	70	2.3	20	232	**VF 30 – 20**			**P56 BN56B4**	**N42CZ**
55	93	1.9	30	270	**VF 30 – 30**			**P56 BN56B4**	**N42CZ**
41.3	115	1.5	40	306	**VF 30 – 40**			**P56 BN56B4**	**N42CZ**
27.5	146	1.2	60	357	**VF 30 – 60**			**P56 BN56B4**	**N42CZ**
23.5	250	1.4	70	597		**VFR 44 – 70**		**S44 BN44C4**	**n/a**
16.5	326	1.4	100	597		**VFR 44 – 100**		**S44 BN44C4**	**n/a**
13.0	363	2.3	84	710		**VFR 49 – 84**		**P63 BN63A6**	[3]
9.5	477	1.2	175	597		**VFR 44 – 175**		**S44 BN44C4**	**n/a**
8.1	492	1.6	135	710		**VFR 49 – 135**		**P63 BN63A6**	[3]
6.9	539	3.5	240	1124			**VF/W 30/63 – 240**	**P56 BN56B4**	**N42CZ**
5.2	628	1.1	210	710		**VFR 49 – 210**			[3]
5.2	632	2.9	315	1124			**VF/W 30/63 – 315**	**P56 BN56B4**	**N42CZ**
3.7	881	2.1	450	1124			**VF/W 30/63 – 450**	**P56 BN56B4**	**N42CZ**
2.9	1089	1.7	570	1124			**VF/W 30/63 – 570**	**P56 BN56B4**	**N42CZ**
2.3	1272	1.5	720	1124			**VF/W 30/63 – 720**	**P56 BN56B4**	**N42CZ**
1.8	1289	1.4	900	1124			**VF/W 30/63 – 900**	**P56 BN56B4**	**N42CZ**
1.4	1375	1.4	1200	1124			**VF/W 30/63 – 1200**	**P56 BN56B4**	**N42CZ**
1.1	1742	1.1	1520	1124			**VF/W 30/63 – 1520**	**P56 BN56B4**	**N42CZ**

0.16 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				 [1]	 [2]
236	36	3.9	7	142	**VF 30 – 7**			**P63 BN63A4**	**N42CZ**
165	50	2.9	10	173	**VF 30 – 10**			**P63 BN63A4**	**N42CZ**
118	69	3.7	14	378	**VF 44 – 14**			**P63 BN63A4**	**N56C**
110	70	2.3	15	205	**VF 30 – 15**			**P63 BN63A4**	**N42CZ**
92	86	6.1	18	425	**VF 49 – 18**			**P63 BN63A4**	**N56C**

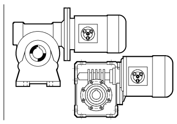
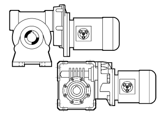
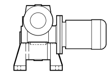
Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.16 hp

n2 [rpm]	T2 [lb·in]	S Safety factor	i (ratio)	Rn2 [lb]				IEC [1]	NEMA [2]
83	89	1.8	20	232	**VF 30 – 20**			**P63 BN63A4**	**N42CZ**
83	94	3.7	20	418	**VF 44 – 20**			**P63 BN63A4**	**N56C**
59	121	2.8	28	481	**VF 44 – 28**			**P63 BN63A4**	**N56C**
55	119	1.5	30	270	**VF 30 – 30**			**P63 BN63A4**	**N42CZ**
47.1	145	2.4	35	517	**VF 44 – 35**			**P63 BN63A4**	**N56C**
41.3	147	1.1	40	306	**VF 30 – 40**			**P63 BN63A4**	**N42CZ**
39.3	190	3.6	42	562		**VFR 49 – 42**		**P63 BN63A4**	[3]
36.7	173	3.3	45	613	**VF 49 – 45**			**P63 BN63A4**	**N56C**
35.9	177	1.9	46	517	**VF 44 – 46**			**P63 BN63A4**	**N56C**
30.6	234	2.8	54	636		**VFR 49 – 54**		**P63 BN63A4**	[3]
27.5	213	1.6	60	517	**VF 44 – 60**			**P63 BN63A4**	**N56C**
27.5	213	2.5	60	697	**VF 49 – 60**			**P63 BN63A4**	**N56C**
23.6	235	1.1	70	517	**VF 44 – 70**			**P63 BN63A4**	**N56C**
23.6	231	2.1	70	708	**VF 49 – 70**			**P63 BN63A4**	**N56C**
22.9	295	2.2	72	717		**VFR 49 – 72**		**P63 BN63A4**	[3]
20.6	254	1.9	80	708	**VF 49 – 80**			**P63 BN63A4**	**N56C**
19.6	318	2.4	84	740		**VFR 49 – 84**		**P63 BN63A4**	[3]
16.5	287	1.5	100	708	**VF 49 – 100**			**P63 BN63A4**	**N56C**
15.3	383	1.8	108	776		**VFR 49 – 108**		**P63 BN63A4**	[3]
12.2	446	1.7	135	776		**VFR 49 – 135**		**P63 BN63A4**	[3]
9.2	528	1.2	180	776		**VFR 49 – 180**		**P63 BN63A4**	[3]
7.9	578	1.1	210	776		**VFR 49 – 210**		**P63 BN63A4**	[3]
6.9	660	1.3	240	776			**VF/VF 30/49 – 240**	**P63 BN63A4**	**N42CZ**
5.5	935	3.5	300	1160			**VF/W 44/75 – 300**	**P63 BN63A4**	**N56C**
5.2	770	1.1	315	776			**VF/VF 30/49 – 315**	**P63 BN63A4**	**N42CZ**
4.1	1125	2.9	400	1394			**VF/W 44/75 – 400**	**P63 BN63A4**	**N56C**
3.7	1128	1.6	450	1124			**VF/W 30/63 – 450**	**P63 BN63A4**	**N42CZ**
3.1	1412	2.3	525	1394			**VF/W 44/75 – 525**	**P63 BN63A4**	**N56C**
2.9	1393	1.3	570	1124			**VF/W 30/63 – 570**	**P63 BN63A4**	**N42CZ**
2.4	1797	1.8	700	1394			**VF/W 44/75 – 700**	**P63 BN63A4**	**N56C**
2.3	1628	1.1	720	1124			**VF/W 30/63 – 720**	**P63 BN63A4**	**N42CZ**
1.8	1650	1.1	900	1124			**VF/W 30/63 – 900**	**P63 BN63A4**	**N42CZ**
1.4	1760	1.1	1200	1124			**VF/W 30/63 – 1200**	**P63 BN63A4**	**N42CZ**
1.2	2475	3.6	1350	1798			**VF/W 49/110 – 1350**	**P63 BN63A4**	**N56C**
1.2	2699	1.6	1380	1574			**VF/W 44/86 – 1380**	**P63 BN63A4**	**N56C**
1.1	3392	1.0	1500	1394			**VF/W 44/75 – 1500**	**P63 BN63A4**	**N56C**
1.0	3036	2.9	1656	1798			**VF/W 49/110 – 1656**	**P63 BN63A4**	**N56C**
0.90	3374	1.3	1840	1574			**VF/W 44/86 – 1840**	**P63 BN63A4**	**N56C**
0.80	3542	2.5	2070	1798			**VF/W 49/110 – 2070**	**P63 BN63A4**	**N56C**
0.78	3621	1.2	2116	1574			**VF/W 44/86 – 2116**	**P63 BN63A4**	**N56C**
0.60	4048	1.1	2760	1574			**VF/W 44/86 – 2760**	**P63 BN63A4**	**N56C**
0.59	4107	2.2	2800	1798			**VF/W 49/110 – 2800**	**P63 BN63A4**	**N56C**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.25 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
239	53	2.7	7	142	**VF 30 – 7**			**P63 BN63B4**	**N42CZ**
239	54	4.7	7	265	**VF 44 – 7**			**P63 BN63B4**	**N56C**
167	73	1.9	10	173	**VF 30 – 10**			**P63 BN63B4**	**N42CZ**
167	76	3.4	10	321	**VF 44 – 10**			**P63 BN63B4**	**N56C**
119	102	2.5	14	378	**VF 44 – 14**			**P63 BN63B4**	**N56C**
111	103	1.6	15	205	**VF 30 – 15**			**P63 BN63B4**	**N42CZ**
93	126	4.1	18	425	**VF 49 – 18**			**P63 BN63B4**	**N56C**
84	131	1.2	20	232	**VF 30 – 20**			**P63 BN63B4**	**N42CZ**
84	139	2.5	20	418	**VF 44 – 20**			**P63 BN63B4**	**N56C**
70	162	3.4	24	474	**VF 49 – 24**			**P63 BN63B4**	**N56C**
60	179	1.9	28	481	**VF 44 – 28**			**P63 BN63B4**	**N56C**
56	176	1.0	30	270	**VF 30 – 30**			**P63 BN63B4**	**N42CZ**
47.7	214	1.6	35	517	**VF 44 – 35**			**P63 BN63B4**	**N56C**
46.4	217	2.8	36	553	**VF 49 – 36**			**P63 BN63B4**	**N56C**
39.8	280	2.5	42	562		**VFR 49 – 42**		**P63 BN63B4**	[3]
37.1	255	2.3	45	613	**VF 49 – 45**			**P63 BN63B4**	**N56C**
36.3	261	1.3	46	517	**VF 44 – 46**			**P63 BN63B4**	**N56C**
30.9	345	1.9	54	636		**VFR 49 – 54**		**P63 BN63B4**	[3]
27.8	313	1.1	60	517	**VF 44 – 60**			**P63 BN63B4**	**N56C**
23.9	340	1.4	70	708	**VF 49 – 70**			**P63 BN63B4**	**N56C**
23.2	434	1.5	72	717		**VFR 49 – 72**		**P63 BN63B4**	[3]
23.2	454	3.6	72	991		**WR 63 – 72**		**P63 BN63B4**	[3]
20.9	375	1.3	80	708	**VF 49 – 80**			**P63 BN63B4**	**N56C**
19.9	469	1.7	84	740		**VFR 49 – 84**		**P63 BN63B4**	[3]
18.6	519	3.2	90	1086		**WR 63 – 90**		**P63 BN63B4**	[3]
16.7	423	1.0	100	708	**VF 49 – 100**			**P63 BN63B4**	**N56C**
15.5	564	1.3	108	776		**VFR 49 – 108**		**P63 BN63B4**	[3]
12.4	656	1.2	135	776		**VFR 49 – 135**		**P63 BN63B4**	[3]
8.7	882	1.5	192	1124		**WR 63 – 192**		**P63 BN63B4**	[3]
7.0	994	1.2	240	1124		**WR 63 – 240**		**P63 BN63B4**	[3]
7.0	1016	1.8	240	1124			**VF/W 30/63 – 240**	**P63 BN63B4**	**N42CZ**
6.7	1283	2.6	250	1048			**VF/W 44/75 – 250**	**P63 BN63B4**	**N56C**
5.6	1107	1.0	300	1124		**WR 63 – 300**		**P63 BN63B4**	[3]
5.6	1378	2.4	300	1160			**VF/W 44/75 – 300**	**P63 BN63B4**	**N56C**
5.3	1191	1.6	315	1124			**VF/W 30/63 – 315**	**P63 BN63B4**	**N42CZ**
4.2	1657	2.0	400	1394			**VF/W 44/75 – 400**	**P63 BN63B4**	**N56C**
3.7	1661	1.1	450	1124			**VF/W 30/63 – 450**	**P63 BN63B4**	**N42CZ**
3.2	2080	1.6	525	1394			**VF/W 44/75 – 525**	**P63 BN63B4**	**N56C**
3.1	1993	4.4	540	1798			**VF/W 49/110 – 540**	**P63 BN63B4**	**N56C**
2.4	2647	1.2	700	1394			**VF/W 44/75 – 700**	**P63 BN63B4**	**N56C**
2.3	2593	3.4	720	1798			**VF/W 49/110 – 720**	**P63 BN63B4**	**N56C**
1.8	3313	1.0	920	1394			**VF/W 44/75 – 920**	**P63 BN63B4**	**N56C**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.25 hp

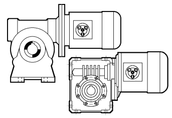
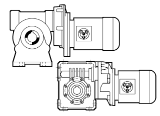
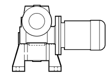
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]		NEMA [2]
1.8	3313	1.3	920	1574			**VF/W 44/86 – 920**	**P63**	**BN63B4**	**N56C**
1.5	3014	2.9	1080	1798			**VF/W 49/110 – 1080**	**P63**	**BN63B4**	**N56C**
1.2	3646	2.4	1350	1798			**VF/W 49/110 – 1350**	**P63**	**BN63B4**	**N56C**
1.2	3976	1.1	1380	1574			**VF/W 44/86 – 1380**	**P63**	**BN63B4**	**N56C**
1.0	4473	2.0	1656	1798			**VF/W 49/110 – 1656**	**P63**	**BN63B4**	**N56C**
0.93	4538	3.5	1800	3102			**W/VF 63/130 – 1800**	**P63**	**BN63B4**	**N56C**
0.81	5218	1.7	2070	1798			**VF/W 49/110 – 2070**	**P63**	**BN63B4**	**N56C**
0.65	5301	3.0	2560	3102			**W/VF 63/130 – 2560**	**P63**	**BN63B4**	**N56C**
0.60	6050	1.5	2800	1798			**VF/W 49/110 – 2800**	**P63**	**BN63B4**	**N56C**
0.57	7157	3.2	2944	3597			**W/VF 86/150 – 2944**	**P63**	**BN63B4**	**N56C**
0.52	4898	3.3	3200	3102			**W/VF 63/130 – 3200**	**P63**	**BN63B4**	**N56C**

0.33 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]		NEMA [2]
243	72	3.6	7	265	**VF 44 – 7**			**P71**	**BN71A4**	**N56C**
170	100	2.6	10	321	**VF 44 – 10**			**P71**	**BN71A4**	**N56C**
170	100	5.2	10	317	**VF 49 – 10**			**P71**	**BN71A4**	**N56C**
121	135	1.9	14	378	**VF 44 – 14**			**P71**	**BN71A4**	**N56C**
121	135	4.3	14	366	**VF 49 – 14**			**P71**	**BN71A4**	**N56C**
94	167	3.1	18	425	**VF 49 – 18**			**P71**	**BN71A4**	**N56C**
85	183	1.9	20	418	**VF 44 – 20**			**P71**	**BN71A4**	**N56C**
71	214	2.6	24	474	**VF 49 – 24**			**P71**	**BN71A4**	**N56C**
61	236	1.5	28	481	**VF 44 – 28**			**P71**	**BN71A4**	**N56C**
61	236	2.8	28	488	**VF 49 – 28**			**P71**	**BN71A4**	**N56C**
48.6	283	1.2	35	517	**VF 44 – 35**			**P71**	**BN71A4**	**N56C**
47.2	287	2.1	36	553	**VF 49 – 36**			**P71**	**BN71A4**	**N56C**
44.7	316	4.3	38	805	**W 63 – 38**			**P71**	**BN71A4**	**N56C**
40.5	369	1.9	42	562		**VFR 49 – 42**		**P71**	**BN71A4**	[3]
37.8	337	1.7	45	613	**VF 49 – 45**			**P71**	**BN71A4**	**N56C**
37.8	358	3.6	45	881	**W 63 – 45**			**P71**	**BN71A4**	**N56C**
37.0	344	1.0	46	517	**VF 44 – 46**			**P71**	**BN71A4**	**N56C**
34.0	404	4.8	50	1216	**W 75 – 50**			**P71**	**BN71A4**	**N56C**
28.3	414	1.3	60	697	**VF 49 – 60**			**P71**	**BN71A4**	**N56C**
28.3	464	3.8	60	1340	**W 75 – 60**			**P71**	**BN71A4**	**N56C**
26.6	464	2.4	64	1052	**W 63 – 64**			**P71**	**BN71A4**	**N56C**
24.3	449	1.1	70	708	**VF 49 – 70**			**P71**	**BN71A4**	**N56C**
23.6	573	1.1	72	717		**VFR 49 – 72**		**P71**	**BN71A4**	[3]
23.6	599	2.7	72	991		**WR 63 – 72**		**P71**	**BN71A4**	[3]

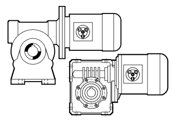
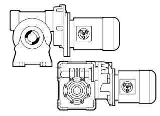
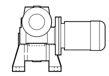
Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.33 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]		NEMA [2]
21.3	494	1.0	80	708	**VF 49 – 80**			**P71**	**BN71A4**	**N56C**
21.3	532	1.9	80	1124	**W 63 – 80**			**P71**	**BN71A4**	**N56C**
21.3	561	2.8	80	1394	**W 75 – 80**			**P71**	**BN71A4**	**N56C**
20.2	619	1.3	84	740		**VFR 49 – 84**		**P71**	**BN71A4**	[3]
18.9	685	2.5	90	1086		**WR 63 – 90**		**P71**	**BN71A4**	[3]
17.0	606	1.7	100	1124	**W 63 – 100**			**P71**	**BN71A4**	**N56C**
17.0	654	2.0	100	1394	**W 75 – 100**			**P71**	**BN71A4**	**N56C**
17.0	701	2.9	100	1574	**W 86 – 100**			**P71**	**BN71A4**	**N56C**
15.7	744	1.0	108	776		**VFR 49 – 108**		**P71**	**BN71A4**	[3]
14.9	826	2.0	114	1124		**WR 63 – 114**		**P71**	**BN71A4**	[3]
14.2	898	3.0	120	1394		**WR 75 – 120**		**P71**	**BN71A4**	[3]
12.6	931	1.6	135	1124		**WR 63 – 135**		**P71**	**BN71A4**	[3]
11.3	1034	2.2	150	1394		**WR 75 – 150**		**P71**	**BN71A4**	[3]
10.1	1198	2.6	168	1574		**WR 86 – 168**		**P71**	**BN71A4**	[3]
9.4	1177	1.8	180	1394		**WR 75 – 180**		**P71**	**BN71A4**	[3]
8.9	1164	1.1	192	1124		**WR 63 – 192**		**P71**	**BN71A4**	[3]
8.9	1323	2.2	192	1574		**WR 86 – 192**		**P71**	**BN71A4**	[3]
7.4	1476	3.0	230	1574			**VF/W 44/86 – 230**	**P71**	**BN71A4**	**N56C**
7.1	1398	1.4	240	1394		**WR 75 – 240**		**P71**	**BN71A4**	[3]
7.1	1341	1.4	240	1124			**VF/W 30/63 – 240**	**P71**	**BN71A4**	**N42CZ**
6.8	1694	1.9	250	1048			**VF/W 44/75 – 250**	**P71**	**BN71A4**	**N56C**
5.7	1569	1.0	300	1394		**WR 75 – 300**		**P71**	**BN71A4**	[3]
5.7	1747	1.4	300	1574		**WR 86 – 300**		**P71**	**BN71A4**	[3]
5.7	1818	1.8	300	1160			**VF/W 44/75 – 300**	**P71**	**BN71A4**	**N56C**
4.3	2187	1.5	400	1394			**VF/W 44/75 – 400**	**P71**	**BN71A4**	**N56C**
4.3	1949	2.3	400	1574			**VF/W 44/86 – 400**	**P71**	**BN71A4**	**N56C**
3.2	2745	1.2	525	1394			**VF/W 44/75 – 525**	**P71**	**BN71A4**	**N56C**
3.1	2631	3.4	540	1798			**VF/W 49/110 – 540**	**P71**	**BN71A4**	**N56C**
2.8	2852	5.6	600	3102			**W/VF 63/130 – 600**	**P71**	**BN71A4**	**N56C**
2.4	3245	1.4	700	1574			**VF/W 44/86 – 700**	**P71**	**BN71A4**	**N56C**
2.2	3523	4.5	760	3102			**W/VF 63/130 – 760**	**P71**	**BN71A4**	**N56C**
1.8	4374	1.0	920	1574			**VF/W 44/86 – 920**	**P71**	**BN71A4**	**N56C**
1.6	3979	2.2	1080	1798			**VF/W 49/110 – 1080**	**P71**	**BN71A4**	**N56C**
1.4	4849	3.3	1200	3102			**W/VF 63/130 – 1200**	**P71**	**BN71A4**	**N56C**
1.3	4813	1.8	1350	1798			**VF/W 49/110 – 1350**	**P71**	**BN71A4**	**N56C**
1.1	5781	2.8	1520	3102			**W/VF 63/130 – 1520**	**P71**	**BN71A4**	**N56C**
1.0	5904	1.5	1656	1798			**VF/W 49/110 – 1656**	**P71**	**BN71A4**	**N56C**
0.94	5990	2.7	1800	3102			**W/VF 63/130 – 1800**	**P71**	**BN71A4**	**N56C**
0.92	8310	2.8	1840	3597			**W/VF 86/150 – 1840**	**P71**	**BN71A4**	**N56C**
0.82	6888	1.3	2070	1798			**VF/W 49/110 – 2070**	**P71**	**BN71A4**	**N56C**
0.66	6998	2.3	2560	3102			**W/VF 63/130 – 2560**	**P71**	**BN71A4**	**N56C**
0.61	7987	1.1	2800	1798			**VF/W 49/110 – 2800**	**P71**	**BN71A4**	**N56C**
0.58	9447	2.4	2944	3597			**W/VF 86/150 – 2944**	**P71**	**BN71A4**	**N56C**
0.53	6465	2.5	3200	3102			**W/VF 63/130 – 3200**	**P71**	**BN71A4**	**N56C**

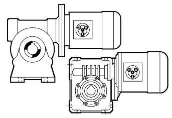
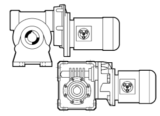
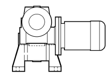
Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.5 hp

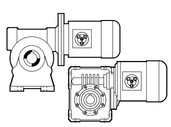
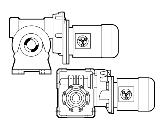
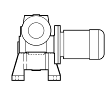
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
243	108	2.4	7	265	**VF 44 – 7**			**P71 BN71B4**	**N56C**
170	151	1.7	10	321	**VF 44 – 10**			**P71 BN71B4**	**N56C**
170	151	3.5	10	317	**VF 49 – 10**			**P71 BN71B4**	**N56C**
121	204	1.3	14	378	**VF 44 – 14**			**P71 BN71B4**	**N56C**
121	204	2.8	14	366	**VF 49 – 14**			**P71 BN71B4**	**N56C**
94	253	2.1	18	425	**VF 49 – 18**			**P71 BN71B4**	**N56C**
85	277	1.2	20	418	**VF 44 – 20**			**P71 BN71B4**	**N56C**
71	324	1.7	24	474	**VF 49 – 24**			**P71 BN71B4**	**N56C**
61	358	1.0	28	481	**VF 44 – 28**			**P71 BN71B4**	**N56C**
61	358	1.8	28	488	**VF 49 – 28**			**P71 BN71B4**	**N56C**
57	400	3.5	30	713	**W 63 – 30**			**P71 BN71B4**	**N56C**
47.2	434	1.4	36	553	**VF 49 – 36**			**P71 BN71B4**	**N56C**
44.7	479	2.9	38	805	**W 63 – 38**			**P71 BN71B4**	**N56C**
37.8	511	1.1	45	613	**VF 49 – 45**			**P71 BN71B4**	**N56C**
37.8	616	2.6	45	796		**WR 63 – 45**		**P71 BN71B4**	[3]
34.0	612	3.2	50	1216	**W 75 – 50**			**P71 BN71B4**	**N56C**
30.4	706	3.8	56	1574	**W 86 – 56**			**P71 BN71B4**	**N56C**
29.8	749	2.1	57	895		**WR 63 – 57**		**P71 BN71B4**	[3]
28.3	702	2.5	60	1340	**W 75 – 60**			**P71 BN71B4**	**N56C**
26.6	703	1.6	64	1052	**W 63 – 64**			**P71 BN71B4**	**N56C**
24.6	932	3.6	69	1574		**WR 86 – 69**		**P71 BN71B4**	[3]
23.6	908	1.8	72	991		**WR 63 – 72**		**P71 BN71B4**	[3]
22.7	986	2.6	75	1324		**WR 75 – 75**		**P71 BN71B4**	[3]
21.3	807	1.3	80	1124	**W 63 – 80**			**P71 BN71B4**	**N56C**
21.3	850	1.9	80	1394	**W 75 – 80**			**P71 BN71B4**	**N56C**
18.9	1037	1.6	90	1086		**WR 63 – 90**		**P71 BN71B4**	[3]
18.9	1118	2.5	90	1394		**WR 75 – 90**		**P71 BN71B4**	[3]
17.0	918	1.1	100	1124	**W 63 – 100**			**P71 BN71B4**	**N56C**
17.0	990	1.3	100	1394	**W 75 – 100**			**P71 BN71B4**	**N56C**
17.0	1062	1.9	100	1574	**W 86 – 100**			**P71 BN71B4**	**N56C**
14.9	1252	1.3	114	1124		**WR 63 – 114**		**P71 BN71B4**	[3]
14.2	1361	2.0	120	1394		**WR 75 – 120**		**P71 BN71B4**	[3]
12.6	1410	1.1	135	1124		**WR 63 – 135**		**P71 BN71B4**	[3]
12.3	1566	2.3	138	1574		**WR 86 – 138**		**P71 BN71B4**	[3]
11.3	1567	1.5	150	1394		**WR 75 – 150**		**P71 BN71B4**	[3]
10.1	1815	1.7	168	1574		**WR 86 – 168**		**P71 BN71B4**	[3]
9.4	1783	1.2	180	1394		**WR 75 – 180**		**P71 BN71B4**	[3]
8.9	2005	1.5	192	1574		**WR 86 – 192**		**P71 BN71B4**	[3]
7.4	2236	2.0	230	1574			**VF/W 44/86 – 230**	**P71 BN71B4**	**N56C**
7.1	2291	1.2	240	1574		**WR 86 – 240**		**P71 BN71B4**	[3]
6.8	2566	1.3	250	1048			**VF/W 44/75 – 250**	**P71 BN71B4**	**N56C**
5.7	2755	1.2	300	1160			**VF/W 44/75 – 300**	**P71 BN71B4**	**N56C**
5.7	2431	1.8	300	1574			**VF/W 44/86 – 300**	**P71 BN71B4**	**N56C**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.5 hp

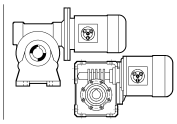
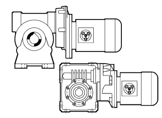
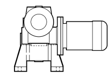
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
4.3	3313	1.0	400	1394			**VF/W 44/75 – 400**	**P71 BN71B4**	**N56C**
4.3	2953	1.5	400	1574			**VF/W 44/86 – 400**	**P71 BN71B4**	**N56C**
3.2	3971	1.1	525	1574			**VF/W 44/86 – 525**	**P71 BN71B4**	**N56C**
3.1	3987	2.2	540	1798			**VF/W 49/110 – 540**	**P71 BN71B4**	**N56C**
2.8	4322	3.7	600	3102			**W/VF 63/130 – 600**	**P71 BN71B4**	**N56C**
2.5	6212	3.7	690	3597			**W/VF 86/150 – 690**	**P71 BN71B4**	**N56C**
2.4	5186	1.7	720	1798			**VF/W 49/110 – 720**	**P71 BN71B4**	**N56C**
2.2	5337	3.0	760	3102			**W/VF 63/130 – 760**	**P71 BN71B4**	**N56C**
1.8	6396	2.5	960	3102			**W/VF 63/130 – 960**	**P71 BN71B4**	**N56C**
1.6	6029	1.5	1080	1798			**VF/W 49/110 – 1080**	**P71 BN71B4**	**N56C**
1.4	7347	2.2	1200	3102			**W/VF 63/130 – 1200**	**P71 BN71B4**	**N56C**
1.3	7293	1.2	1350	1798			**VF/W 49/110 – 1350**	**P71 BN71B4**	**N56C**
1.2	10437	2.2	1380	3597			**W/VF 86/150 – 1380**	**P71 BN71B4**	**N56C**
1.1	8759	1.8	1520	3102			**W/VF 63/130 – 1520**	**P71 BN71B4**	**N56C**
1.0	8946	1.0	1656	1798			**VF/W 49/110 – 1656**	**P71 BN71B4**	**N56C**
0.94	9076	1.8	1800	3102			**W/VF 63/130 – 1800**	**P71 BN71B4**	**N56C**
0.92	12591	1.8	1840	3597			**W/VF 86/150 – 1840**	**P71 BN71B4**	**N56C**
0.66	10603	1.5	2560	3102			**W/VF 63/130 – 2560**	**P71 BN71B4**	**N56C**
0.58	14314	1.6	2944	3597			**W/VF 86/150 – 2944**	**P71 BN71B4**	**N56C**
0.53	9796	1.6	3200	3102			**W/VF 63/130 – 3200**	**P71 BN71B4**	**N56C**

0.75 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
244	163	2.9	7	263	**VF 49 – 7**			**P80 BN80A4**	**N56C**
171	227	2.3	10	317	**VF 49 – 10**			**P80 BN80A4**	**N56C**
122	306	1.9	14	366	**VF 49 – 14**			**P80 BN80A4**	**N56C**
114	336	3.9	15	513	**W 63 – 15**			**P80 BN80A4**	**N56C**
95	379	1.4	18	425	**VF 49 – 18**			**P80 BN80A4**	**N56C**
90	416	3.2	19	584	**W 63 – 19**			**P80 BN80A4**	**N56C**
86	448	4.9	20	767	**W 75 – 20**			**P80 BN80A4**	**N56C**
81	476	2.6	21	564		**WR 63 – 21**		**P80 BN80A4**	[3]
71	486	1.1	24	474	**VF 49 – 24**			**P80 BN80A4**	**N56C**
71	506	2.7	24	650	**W 63 – 24**			**P80 BN80A4**	**N56C**
68	540	4.1	25	863	**W 75 – 25**			**P80 BN80A4**	**N56C**
61	537	1.2	28	488	**VF 49 – 28**			**P80 BN80A4**	**N56C**
57	600	2.4	30	713	**W 63 – 30**			**P80 BN80A4**	**N56C**
57	681	3.6	30	812		**WR 75 – 30**		**P80 BN80A4**	[3]

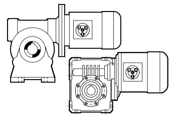
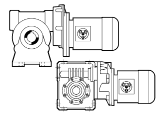
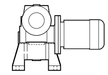
Dynamic efficiency included in output values 3 phase / 4 pole electric motor Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.75 hp

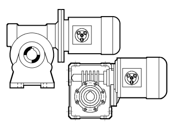
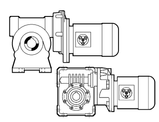
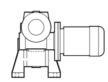
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
45.0	718	1.9	38	805	**W 63 – 38**			**P80 BN80A4**	**N56C**
42.8	778	2.9	40	1072	**W 75 – 40**			**P80 BN80A4**	**N56C**
38.0	814	1.6	45	881	**W 63 – 45**			**P80 BN80A4**	**N56C**
38.0	972	2.7	45	1018		**WR 75 – 45**		**P80 BN80A4**	[3]
37.2	907	3.3	46	1574	**W 86 – 46**			**P80 BN80A4**	**N56C**
34.2	918	2.1	50	1216	**W 75 – 50**			**P80 BN80A4**	**N56C**
30.5	1059	2.5	56	1574	**W 86 – 56**			**P80 BN80A4**	**N56C**
28.5	1053	1.7	60	1340	**W 75 – 60**			**P80 BN80A4**	**N56C**
28.5	1248	2.1	60	1187		**WR 75 – 60**		**P80 BN80A4**	[3]
28.5	1248	2.7	60	1574		**WR 86 – 60**		**P80 BN80A4**	[3]
26.7	1054	1.0	64	1052	**W 63 – 64**			**P80 BN80A4**	**N56C**
26.7	1176	2.1	64	1574	**W 86 – 64**			**P80 BN80A4**	**N56C**
24.8	1398	2.4	69	1574		**WR 86 – 69**		**P80 BN80A4**	[3]
22.8	1479	1.8	75	1324		**WR 75 – 75**		**P80 BN80A4**	[3]
21.4	1275	1.2	80	1394	**W 75 – 80**			**P80 BN80A4**	**N56C**
21.4	1383	1.6	80	1574	**W 86 – 80**			**P80 BN80A4**	**N56C**
19.0	1677	1.7	90	1394		**WR 75 – 90**		**P80 BN80A4**	[3]
17.1	1594	1.3	100	1574	**W 86 – 100**			**P80 BN80A4**	**N56C**
17.1	1675	2.4	100	1798	**W 110 – 100**			**P80 BN80A4**	**N56C**
14.3	2042	1.3	120	1394		**WR 75 – 120**		**P80 BN80A4**	[3]
14.3	2139	1.6	120	1574		**WR 86 – 120**		**P80 BN80A4**	[3]
12.4	2348	1.5	138	1574		**WR 86 – 138**		**P80 BN80A4**	[3]
11.4	2350	1.0	150	1394		**WR 75 – 150**		**P80 BN80A4**	[3]
10.2	2723	1.2	168	1574		**WR 86 – 168**		**P80 BN80A4**	[3]
10.2	2859	2.2	168	1798		**WR 110 – 168**		**P80 BN80A4**	[3]
8.9	3008	1.0	192	1574		**WR 86 – 192**		**P80 BN80A4**	[3]
8.9	3112	1.8	192	1798		**WR 110 – 192**		**P80 BN80A4**	[3]
7.4	3230	2.7	230	1798			**VF/W 49/110 – 230**	**P80 BN80A4**	**N56C**
7.1	3630	1.4	240	1798		**WR 110 – 240**		**P80 BN80A4**	[3]
7.1	3695	2.8	240	3102		**VFR 130 – 240**		**P80 BN80A4**	[3]
6.1	3782	4.2	280	3102			**W/VF 63/130 – 280**	**P80 BN80A4**	**N56C**
5.7	4133	1.2	300	1798		**WR 110 – 300**		**P80 BN80A4**	[3]
5.7	3890	2.3	300	1798			**VF/W 49/110 – 300**	**P80 BN80A4**	**N56C**
5.7	4295	1.9	300	3102		**VFR 130 – 300**		**P80 BN80A4**	[3]
5.0	5405	4.3	345	3597			**W/VF 86/150 – 345**	**P80 BN80A4**	**N56C**
4.3	4862	1.8	400	1798			**VF/W 49/110 – 400**	**P80 BN80A4**	**N56C**
3.7	6834	3.4	460	3597			**W/VF 86/150 – 460**	**P80 BN80A4**	**N56C**
3.2	7859	2.9	529	3597			**W/VF 86/150 – 529**	**P80 BN80A4**	**N56C**
3.2	5980	1.5	540	1798			**VF/W 49/110 – 540**	**P80 BN80A4**	**N56C**
2.9	6483	2.5	600	3102			**W/VF 63/130 – 600**	**P80 BN80A4**	**N56C**
2.5	9319	2.5	690	3597			**W/VF 86/150 – 690**	**P80 BN80A4**	**N56C**
2.4	7779	1.1	720	1798			**VF/W 49/110 – 720**	**P80 BN80A4**	**N56C**
2.3	8006	2.0	760	3102			**W/VF 63/130 – 760**	**P80 BN80A4**	**N56C**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

0.75 hp

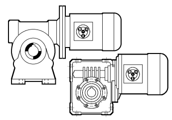
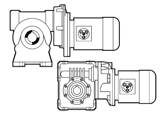
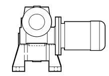
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
2.1	9292	4.0	800	4384			**W/VF 86/185 – 800**	**P80 BN80A4**	**N56C**
1.9	11182	2.1	920	3597			**W/VF 86/150 – 920**	**P80 BN80A4**	**N56C**
1.8	9594	1.7	960	3102			**W/VF 63/130 – 960**	**P80 BN80A4**	**N56C**
1.6	9043	1.0	1080	1798			**VF/W 49/110 – 1080**	**P80 BN80A4**	**N56C**
1.4	11020	1.4	1200	3102			**W/VF 63/130 – 1200**	**P80 BN80A4**	**N56C**
1.2	15655	1.5	1380	3597			**W/VF 86/150 – 1380**	**P80 BN80A4**	**N56C**
1.1	13138	1.2	1520	3102			**W/VF 63/130 – 1520**	**P80 BN80A4**	**N56C**
1.1	15126	2.5	1600	4384			**W/VF 86/185 – 1600**	**P80 BN80A4**	**N56C**
0.95	13613	1.2	1800	3102			**W/VF 63/130 – 1800**	**P80 BN80A4**	**N56C**
0.93	18886	1.2	1840	3597			**W/VF 86/150 – 1840**	**P80 BN80A4**	**N56C**
0.93	16898	2.2	1840	4384			**W/VF 86/185 – 1840**	**P80 BN80A4**	**N56C**
0.67	15904	1.0	2560	3102			**W/VF 63/130 – 2560**	**P80 BN80A4**	**N56C**
0.67	20053	1.9	2560	4384			**W/VF 86/185 – 2560**	**P80 BN80A4**	**N56C**
0.58	21470	1.1	2944	3597			**W/VF 86/150 – 2944**	**P80 BN80A4**	**N56C**
0.53	14694	1.1	3200	3102			**W/VF 63/130 – 3200**	**P80 BN80A4**	**N56C**
0.53	20744	1.8	3200	4384			**W/VF 86/185 – 3200**	**P80 BN80A4**	**N56C**

1 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
246	217	2.2	7	263	**VF 49 – 7**			**P80 BN80B4**	**N56C**
172	303	1.7	10	317	**VF 49 – 10**			**P80 BN80B4**	**N56C**
123	408	1.4	14	366	**VF 49 – 14**			**P80 BN80B4**	**N56C**
115	448	3.0	15	513	**W 63 – 15**			**P80 BN80B4**	**N56C**
96	506	1.0	18	425	**VF 49 – 18**			**P80 BN80B4**	**N56C**
91	554	2.4	19	584	**W 63 – 19**			**P80 BN80B4**	**N56C**
86	598	3.7	20	767	**W 75 – 20**			**P80 BN80B4**	**N56C**
82	650	3.1	21	688		**WR 75 – 21**		**P80 BN80B4**	[3]
72	674	2.0	24	650	**W 63 – 24**			**P80 BN80B4**	**N56C**
69	720	3.1	25	863	**W 75 – 25**			**P80 BN80B4**	**N56C**
57	800	1.8	30	713	**W 63 – 30**			**P80 BN80B4**	**N56C**
57	908	2.7	30	812		**WR 75 – 30**		**P80 BN80B4**	[3]
45.3	958	1.4	38	805	**W 63 – 38**			**P80 BN80B4**	**N56C**
43.0	1037	2.2	40	1072	**W 75 – 40**			**P80 BN80B4**	**N56C**
43.0	1080	2.7	40	1574	**W 86 – 40**			**P80 BN80B4**	**N56C**
38.2	1086	1.2	45	881	**W 63 – 45**			**P80 BN80B4**	**N56C**
38.2	1297	2.0	45	1018		**WR 75 – 45**		**P80 BN80B4**	[3]
37.4	1209	2.5	46	1574	**W 86 – 46**			**P80 BN80B4**	**N56C**
34.4	1224	1.6	50	1216	**W 75 – 50**			**P80 BN80B4**	**N56C**

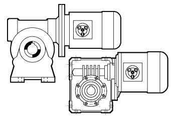
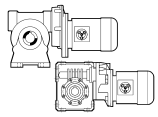
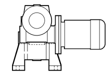
Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

1 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
30.7	1412	1.9	56	1574	**W 86 – 56**			**P80 BN80B4**	**N56C**
28.7	1405	1.3	60	1340	**W 75 – 60**			**P80 BN80B4**	**N56C**
28.7	1664	1.6	60	1187		**WR 75 – 60**		**P80 BN80B4**	[3]
26.9	1567	1.6	64	1574	**W 86 – 64**			**P80 BN80B4**	**N56C**
26.9	1613	2.9	64	1798	**W 110 – 64**			**P80 BN80B4**	**N56C**
24.9	1864	1.8	69	1574		**WR 86 – 69**		**P80 BN80B4**	[3]
22.9	1972	1.3	75	1324		**WR 75 – 75**		**P80 BN80B4**	[3]
21.5	1844	1.2	80	1574	**W 86 – 80**			**P80 BN80B4**	**N56C**
21.5	1902	2.2	80	1798	**W 110 – 80**			**P80 BN80B4**	**N56C**
19.1	2236	1.3	90	1394		**WR 75 – 90**		**P80 BN80B4**	[3]
17.2	2125	1.0	100	1574	**W 86 – 100**			**P80 BN80B4**	**N56C**
17.2	2233	1.8	100	1798	**W 110 – 100**			**P80 BN80B4**	**N56C**
14.3	2723	1.0	120	1394		**WR 75 – 120**		**P80 BN80B4**	[3]
14.3	2852	1.2	120	1574		**WR 86 – 120**		**P80 BN80B4**	[3]
12.5	3131	1.1	138	1574		**WR 86 – 138**		**P80 BN80B4**	[3]
12.5	3280	1.9	138	1798		**WR 110 – 138**		**P80 BN80B4**	[3]
10.2	3812	1.6	168	1798		**WR 110 – 168**		**P80 BN80B4**	[3]
10.2	3872	2.7	168	3102		**VFR 130 – 168**		**P80 BN80B4**	[3]
9.0	4149	1.3	192	1798		**WR 110 – 192**		**P80 BN80B4**	[3]
9.0	4218	2.5	192	3102		**VFR 130 – 192**		**P80 BN80B4**	[3]
7.5	4307	2.1	230	1798			**VF/W 49/110 – 230**	**P80 BN80B4**	**N56C**
7.2	4840	1.0	240	1798		**WR 110 – 240**		**P80 BN80B4**	[3]
7.2	4927	2.1	240	3102		**VFR 130 – 240**		**P80 BN80B4**	[3]
6.1	5042	3.2	280	3102			**W/VF 63/130 – 280**	**P80 BN80B4**	**N56C**
5.7	5186	1.7	300	1798			**VF/W 49/110 – 300**	**P80 BN80B4**	**N56C**
5.7	5726	1.4	300	3102		**VFR 130 – 300**		**P80 BN80B4**	[3]
5.0	7206	3.2	345	3597			**W/VF 86/150 – 345**	**P80 BN80B4**	**N56C**
4.3	6483	1.4	400	1798			**VF/W 49/110 – 400**	**P80 BN80B4**	**N56C**
4.3	6339	2.5	400	3102			**W/VF 63/130 – 400**	**P80 BN80B4**	**N56C**
3.7	9112	2.5	460	3597			**W/VF 86/150 – 460**	**P80 BN80B4**	**N56C**
3.3	10478	2.2	529	3597			**W/VF 86/150 – 529**	**P80 BN80B4**	**N56C**
3.2	7974	1.1	540	1798			**VF/W 49/110 – 540**	**P80 BN80B4**	**N56C**
2.9	8643	1.8	600	3102			**W/VF 63/130 – 600**	**P80 BN80B4**	**N56C**
2.5	12425	1.9	690	3597			**W/VF 86/150 – 690**	**P80 BN80B4**	**N56C**
2.3	10675	1.5	760	3102			**W/VF 63/130 – 760**	**P80 BN80B4**	**N56C**
1.9	14910	1.5	920	3597			**W/VF 86/150 – 920**	**P80 BN80B4**	**N56C**
1.8	12792	1.2	960	3102			**W/VF 63/130 – 960**	**P80 BN80B4**	**N56C**
1.4	14694	1.1	1200	3102			**W/VF 63/130 – 1200**	**P80 BN80B4**	**N56C**
1.2	20874	1.1	1380	3597			**W/VF 86/150 – 1380**	**P80 BN80B4**	**N56C**
1.1	20168	1.8	1600	4384			**W/VF 86/185 – 1600**	**P80 BN80B4**	**N56C**
0.93	22531	1.6	1840	4384			**W/VF 86/185 – 1840**	**P80 BN80B4**	**N56C**
0.67	26737	1.4	2560	4384			**W/VF 86/185 – 2560**	**P80 BN80B4**	**N56C**
0.54	27659	1.3	3200	4384			**W/VF 86/185 – 3200**	**P80 BN80B4**	**N56C**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

1.5 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
246	333	3.2	7	348	**W 63 – 7**			**P90 BN90S4**	**N143TC**
172	465	2.7	10	414	**W 63 – 10**			**P90 BN90S4**	**N143TC**
115	673	2.0	15	513	**W 63 – 15**			**P90 BN90S4**	**N143TC**
91	831	1.6	19	584	**W 63 – 19**			**P90 BN90S4**	**N143TC**
86	897	2.5	20	767	**W 75 – 20**			**P90 BN90S4**	**N143TC**
82	976	2.0	21	688		**WR 75 – 21**		**P90 BN90S4**	[3]
75	1019	2.8	23	1529	**W 86 – 23**			**P90 BN90S4**	**N143TC**
72	1011	1.4	24	650	**W 63 – 24**			**P90 BN90S4**	**N143TC**
69	1080	2.0	25	863	**W 75 – 25**			**P90 BN90S4**	**N143TC**
57	1199	1.2	30	713	**W 63 – 30**			**P90 BN90S4**	**N143TC**
57	1248	1.9	30	919	**W 75 – 30**			**P90 BN90S4**	**N143TC**
45.3	1437	1.0	38	805	**W 63 – 38**			**P90 BN90S4**	**N143TC**
43.0	1556	1.5	40	1072	**W 75 – 40**			**P90 BN90S4**	**N143TC**
43.0	1621	1.8	40	1574	**W 86 – 40**			**P90 BN90S4**	**N143TC**
38.2	1945	1.3	45	1018		**WR 75 – 45**		**P90 BN90S4**	[3]
37.4	1814	1.7	46	1574	**W 86 – 46**			**P90 BN90S4**	**N143TC**
34.4	1837	1.1	50	1216	**W 75 – 50**			**P90 BN90S4**	**N143TC**
30.7	2118	1.3	56	1574	**W 86 – 56**			**P90 BN90S4**	**N143TC**
30.7	2178	2.4	56	1798	**W 110 – 56**			**P90 BN90S4**	**N143TC**
28.7	2496	1.0	60	1187		**WR 75 – 60**		**P90 BN90S4**	[3]
26.9	2351	1.1	64	1574	**W 86 – 64**			**P90 BN90S4**	**N143TC**
26.9	2420	1.9	64	1798	**W 110 – 64**			**P90 BN90S4**	**N143TC**
24.9	2796	1.2	69	1574		**WR 86 – 69**		**P90 BN90S4**	[3]
21.5	2852	1.5	80	1798	**W 110 – 80**			**P90 BN90S4**	**N143TC**
19.1	3257	1.2	90	1574		**WR 86 – 90**		**P90 BN90S4**	[3]
17.2	3349	1.2	100	1798	**W 110 – 100**			**P90 BN90S4**	**N143TC**
14.3	4408	1.6	120	1798		**WR 110 – 120**		**P90 BN90S4**	[3]
14.3	4343	2.9	120	3102		**VFR 130 – 120**		**P90 BN90S4**	[3]
12.5	4920	1.3	138	1798		**WR 110 – 138**		**P90 BN90S4**	[3]
12.5	4995	2.4	138	3102		**VFR 130 – 138**		**P90 BN90S4**	[3]
10.2	5718	1.1	168	1798		**WR 110 – 168**		**P90 BN90S4**	[3]
10.2	5808	1.8	168	3102		**VFR 130 – 168**		**P90 BN90S4**	[3]
9.0	6327	1.7	192	3102		**VFR 130 – 192**		**P90 BN90S4**	[3]
7.6	7658	3.0	225	3597			**W/VF 86/150 – 225**	**P90 BN90S4**	**N143TC**
7.2	7390	1.4	240	3102		**VFR 130 – 240**		**P90 BN90S4**	[3]
7.2	7520	1.8	240	3597		**VFR 150 – 240**		**P90 BN90S4**	[3]
6.1	7563	2.1	280	3102			**W/VF 63/130 – 280**	**P90 BN90S4**	**N143TC**
5.7	9400	2.4	300	3597			**W/VF 86/150 – 300**	**P90 BN90S4**	**N143TC**
5.7	8751	1.3	300	3597		**VFR 150 – 300**		**P90 BN90S4**	[3]
5.0	10810	2.1	345	3597			**W/VF 86/150 – 345**	**P90 BN90S4**	**N143TC**
4.3	9508	1.7	400	3102			**W/VF 63/130 – 400**	**P90 BN90S4**	**N143TC**
3.7	13667	1.7	460	3597			**W/VF 86/150 – 460**	**P90 BN90S4**	**N143TC**
3.3	15718	1.5	529	3597			**W/VF 86/150 – 529**	**P90 BN90S4**	**N143TC**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

1.5 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
2.9	12965	1.2	600	3102			**W/VF 63/130 – 600**	**P90 BN90S4**	**N143TC**
2.9	14586	2.5	600	4384			**W/VF 86/185 – 600**	**P90 BN90S4**	**N143TC**
2.5	18637	1.2	690	3597			**W/VF 86/150 – 690**	**P90 BN90S4**	**N143TC**
2.3	16012	1.0	760	3102			**W/VF 63/130 – 760**	**P90 BN90S4**	**N143TC**
2.2	18583	2.0	800	4384			**W/VF 86/185 – 800**	**P90 BN90S4**	**N143TC**
1.9	22365	1.0	920	3597			**W/VF 86/150 – 920**	**P90 BN90S4**	**N143TC**
1.9	20874	1.8	920	4384			**W/VF 86/185 – 920**	**P90 BN90S4**	**N143TC**
1.4	22041	1.7	1200	4384			**W/VF 86/185 – 1200**	**P90 BN90S4**	**N143TC**
1.1	30252	1.2	1600	4384			**W/VF 86/185 – 1600**	**P90 BN90S4**	**N143TC**
0.93	33796	1.1	1840	4384			**W/VF 86/185 – 1840**	**P90 BN90S4**	**N143TC**
0.67	33191	1.7	2560	7756			**VF/VF 130/210 – 2560**	**P90 BN90S4**	**N143TC**
0.54	38031	1.5	3200	7756			**VF/VF 130/210 – 3200**	**P90 BN90S4**	**N143TC**

2 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
246	444	2.4	7	348	**W 63 – 7**			**P90 BN90LA4**	**N145TC**
172	619	2.0	10	414	**W 63 – 10**			**P90 BN90LA4**	**N145TC**
115	897	1.5	15	513	**W 63 – 15**			**P90 BN90LA4**	**N145TC**
115	918	2.4	15	645	**W 75 – 15**			**P90 BN90LA4**	**N145TC**
91	1109	1.2	19	584	**W 63 – 19**			**P90 BN90LA4**	**N145TC**
86	1196	1.9	20	767	**W 75 – 20**			**P90 BN90LA4**	**N145TC**
86	1210	2.3	20	1434	**W 86 – 20**			**P90 BN90LA4**	**N145TC**
82	1301	1.5	21	688		**WR 75 – 21**		**P90 BN90LA4**	[3]
72	1348	1.0	24	650	**W 63 – 24**			**P90 BN90LA4**	**N145TC**
69	1441	1.5	25	863	**W 75 – 25**			**P90 BN90LA4**	**N145TC**
57	1664	1.4	30	919	**W 75 – 30**			**P90 BN90LA4**	**N145TC**
57	1815	1.3	30	812		**WR 75 – 30**		**P90 BN90LA4**	[3]
43.0	2161	1.4	40	1574	**W 86 – 40**			**P90 BN90LA4**	**N145TC**
38.2	2593	1.0	45	1018		**WR 75 – 45**		**P90 BN90LA4**	[3]
38.2	2528	1.4	45	1574		**WR 86 – 45**		**P90 BN90LA4**	[3]
37.4	2419	1.2	46	1574	**W 86 – 46**			**P90 BN90LA4**	**N145TC**
37.4	2452	2.2	46	1798	**W 110 – 46**			**P90 BN90LA4**	**N145TC**
30.7	2904	1.8	56	1798	**W 110 – 56**			**P90 BN90LA4**	**N145TC**
28.7	3328	1.0	60	1574		**WR 86 – 60**		**P90 BN90LA4**	[3]
28.7	3414	1.7	60	1798		**WR 110 – 60**		**P90 BN90LA4**	[3]
26.9	3227	1.5	64	1798	**W 110 – 64**			**P90 BN90LA4**	**N145TC**
24.9	3827	1.5	69	1798		**WR 110 – 69**		**P90 BN90LA4**	[3]
21.5	3803	1.1	80	1798	**W 110 – 80**			**P90 BN90LA4**	**N145TC**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

2 hp

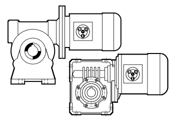
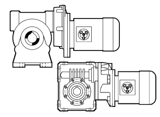
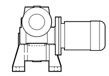
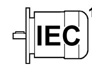
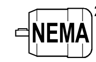
n2 [rpm]	T2 [lb·in]	S Safety factor	i (ratio)	Rn2 [lb]				IEC [1]	NEMA [2]
19.1	4538	1.6	90	1798		**WR 110 – 90**		**P90 BN90LA4**	[3]
19.1	4603	2.9	90	3102		**VFR 130 – 90**		**P90 BN90LA4**	[3]
17.2	4610	1.5	100	2832	**VF 130 – 100**			**P90 BN90LA4**	**N145TC**
14.3	5878	1.2	120	1798		**WR 110 – 120**		**P90 BN90LA4**	[3]
14.3	5791	2.1	120	3102		**VFR 130 – 120**		**P90 BN90LA4**	[3]
12.5	6560	1.0	138	1798		**WR 110 – 138**		**P90 BN90LA4**	[3]
12.5	6660	1.8	138	3102		**VFR 130 – 138**		**P90 BN90LA4**	[3]
10.2	7745	1.4	168	3102		**VFR 130 – 168**		**P90 BN90LA4**	[3]
10.2	7866	2.0	168	3597		**VFR 150 – 168**		**P90 BN90LA4**	[3]
9.0	8436	1.3	192	3102		**VFR 130 – 192**		**P90 BN90LA4**	[3]
9.0	8574	1.8	192	3597		**VFR 150 – 192**		**P90 BN90LA4**	[3]
8.6	9220	2.5	200	3597			**W/VF 86/150 – 200**	**P90 BN90LA4**	**N145TC**
7.6	10210	2.3	225	3597			**W/VF 86/150 – 225**	**P90 BN90LA4**	**N145TC**
7.2	9854	1.0	240	3102		**VFR 130 – 240**		**P90 BN90LA4**	[3]
7.2	10026	1.4	240	3597		**VFR 150 – 240**		**P90 BN90LA4**	[3]
6.1	10084	1.6	280	3102			**W/VF 63/130 – 280**	**P90 BN90LA4**	**N145TC**
5.7	12533	1.8	300	3597			**W/VF 86/150 – 300**	**P90 BN90LA4**	**N145TC**
5.7	11669	1.0	300	3597		**VFR 150 – 300**		**P90 BN90LA4**	[3]
5.0	14413	1.6	345	3597			**W/VF 86/150 – 345**	**P90 BN90LA4**	**N145TC**
4.3	12677	1.3	400	3102			**W/VF 63/130 – 400**	**P90 BN90LA4**	**N145TC**
3.7	18223	1.3	460	3597			**W/VF 86/150 – 460**	**P90 BN90LA4**	**N145TC**
3.3	20957	1.1	529	3597			**W/VF 86/150 – 529**	**P90 BN90LA4**	**N145TC**
2.9	19448	1.9	600	4384			**W/VF 86/185 – 600**	**P90 BN90LA4**	**N145TC**
2.2	24778	1.5	800	4384			**W/VF 86/185 – 800**	**P90 BN90LA4**	**N145TC**
1.9	27832	1.3	920	4384			**W/VF 86/185 – 920**	**P90 BN90LA4**	**N145TC**
1.1	36879	2.2	1600	11690			**VF/VF 130/250 – 1600**	**P90 BN90LA4**	**N145TC**
0.93	39760	1.4	1840	7756			**VF/VF 130/210 – 1840**	**P90 BN90LA4**	**N145TC**
0.93	41085	1.9	1840	11690			**VF/VF 130/250 – 1840**	**P90 BN90LA4**	**N145TC**
0.67	44254	1.3	2560	7756			**VF/VF 130/210 – 2560**	**P90 BN90LA4**	**N145TC**
0.67	46098	1.7	2560	11690			**VF/VF 130/250 – 2560**	**P90 BN90LA4**	**N145TC**

3 hp

n2 [rpm]	T2 [lb·in]	S Safety factor	i (ratio)	Rn2 [lb]				IEC [1]	NEMA [2]
246	681	2.5	7	344	**W 75 – 7**			**P100 BN100LA4**	**N182TC**
172	951	2.1	10	504	**W 75 – 10**			**P100 BN100LA4**	**N182TC**
115	1378	1.6	15	645	**W 75 – 15**			**P100 BN100LA4**	**N182TC**
86	1794	1.2	20	767	**W 75 – 20**			**P100 BN100LA4**	**N182TC**
86	1815	1.6	20	1434	**W 86 – 20**			**P100 BN100LA4**	**N182TC**

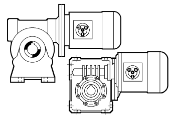
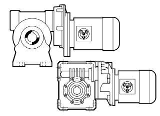
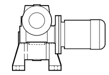
Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

3 hp

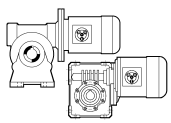
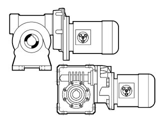
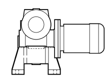
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				 [1]	 [2]
75	2038	1.4	23	1529	**W 86 – 23**			**P100 BN100LA4**	**N182TC**
75	2063	2.3	23	1798	**W 110 – 23**			**P100 BN100LA4**	**N182TC**
69	2161	1.0	25	863	**W 75 – 25**			**P100 BN100LA4**	**N182TC**
57	2496	1.0	30	919	**W 75 – 30**			**P100 BN100LA4**	**N182TC**
57	2463	1.3	30	1574	**W 86 – 30**			**P100 BN100LA4**	**N182TC**
57	2723	2.1	30	1798		**WR 110 – 30**		**P100 BN100LA4**	[3]
43.0	3285	1.8	40	1798	**W 110 – 40**			**P100 BN100LA4**	**N182TC**
38.2	3890	1.6	45	1798		**WR 110 – 45**		**P100 BN100LA4**	[3]
37.4	3678	1.4	46	1798	**W 110 – 46**			**P100 BN100LA4**	**N182TC**
37.4	3777	2.5	46	2832	**VF 130 – 46**			**P100 BN100LA4**	**-**
30.7	4356	1.2	56	1798	**W 110 – 56**			**P100 BN100LA4**	**N182TC**
30.7	4417	1.9	56	2832	**VF 130 – 56**			**P100 BN100LA4**	**N182TC**
28.7	4797	4.2	60	4046	**VF 185 – 60**			**P100 BN100LA4**	**N182TC**
28.7	5121	1.2	60	1798		**WR 110 – 60**		**P100 BN100LA4**	[3]
28.7	5056	2.4	60	3102		**VFR 130 – 60**		**P100 BN100LA4**	[3]
26.9	4840	1.0	64	1798	**W 110 – 64**			**P100 BN100LA4**	**N182TC**
26.9	4909	1.7	64	2832	**VF 130 – 64**			**P100 BN100LA4**	**N182TC**
24.9	5740	1.0	69	1798		**WR 110 – 69**		**P100 BN100LA4**	[3]
24.9	5666	2.0	69	3102		**VFR 130 – 69**		**P100 BN100LA4**	[3]
21.5	5878	1.3	80	2832	**VF 130 – 80**			**P100 BN100LA4**	**N182TC**
21.5	5964	1.9	80	3305	**VF 150 – 80**			**P100 BN100LA4**	**N182TC**
19.1	6807	1.1	90	1798		**WR 110 – 90**		**P100 BN100LA4**	[3]
19.1	6904	1.9	90	3102		**VFR 130 – 90**		**P100 BN100LA4**	[3]
17.2	6915	1.0	100	2832	**VF 130 – 100**			**P100 BN100LA4**	**N182TC**
17.2	7023	1.4	100	3305	**VF 150 – 100**			**P100 BN100LA4**	**N182TC**
14.3	8687	1.4	120	3102		**VFR 130 – 120**		**P100 BN100LA4**	[3]
14.3	8816	2.0	120	3597		**VFR 150 – 120**		**P100 BN100LA4**	[3]
12.5	9990	1.2	138	3102		**VFR 130 – 138**		**P100 BN100LA4**	[3]
12.5	10139	1.7	138	3597		**VFR 150 – 138**		**P100 BN100LA4**	[3]
11.5	10858	3.7	150	7756		**VFR 210 – 150**		**P100 BN100LA4**	[3]
10.2	11798	1.3	168	3597		**VFR 150 – 168**		**P100 BN100LA4**	[3]
9.6	12447	3.1	180	7756		**VFR 210 – 180**		**P100 BN100LA4**	[3]
9.0	12861	1.2	192	3597		**VFR 150 – 192**		**P100 BN100LA4**	[3]
8.6	13829	1.7	200	3597			**W/VF 86/150 – 200**	**P100 BN100LA4**	**N182TC**
7.6	15315	1.5	225	3597			**W/VF 86/150 – 225**	**P100 BN100LA4**	**N182TC**
7.2	15299	2.3	240	7756		**VFR 210 – 240**		**P100 BN100LA4**	[3]
6.1	15126	1.1	280	3102			**W/VF 63/130 – 280**	**P100 BN100LA4**	**N182TC**
6.1	15731	2.4	280	4384			**W/VF 86/185 – 280**	**P100 BN100LA4**	**N182TC**
5.7	18799	1.2	300	3597			**W/VF 86/150 – 300**	**P100 BN100LA4**	**N182TC**
5.7	17827	1.7	300	7756		**VFR 210 – 300**		**P100 BN100LA4**	[3]
4.3	20744	1.8	400	4384			**W/VF 86/185 – 400**	**P100 BN100LA4**	**N182TC**
2.9	29172	1.3	600	4384			**W/VF 86/185 – 600**	**P100 BN100LA4**	**N182TC**
2.2	37167	1.0	800	4384			**W/VF 86/185 – 800**	**P100 BN100LA4**	**N182TC**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

3 hp

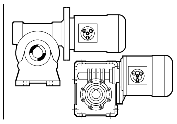
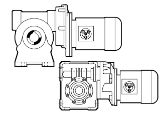
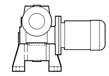
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
2.2	35438	1.6	800	7756			**VF/VF 130/210 – 800**	**P100 BN100LA4**	**N182TC**
1.9	36778	1.5	920	7756			**VF/VF 130/210 – 920**	**P100 BN100LA4**	**N182TC**
1.4	45378	1.2	1200	7756			**VF/VF 130/210 – 1200**	**P100 BN100LA4**	**N182TC**
1.1	55318	1.0	1600	7756			**VF/VF 130/210 – 1600**	**P100 BN100LA4**	**N182TC**
1.1	55318	1.4	1600	11690			**VF/VF 130/250 – 1600**	**P100 BN100LA4**	**N182TC**
0.93	61628	1.3	1840	11690			**VF/VF 130/250 – 1840**	**P100 BN100LA4**	**N182TC**

5 hp

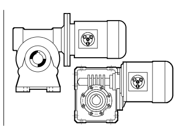
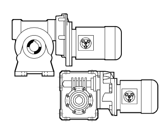
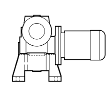
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
247	1134	1.5	7	344	**W 75 – 7**			**P112 BN112M4**	**N184TC**
173	1585	1.3	10	504	**W 75 – 10**			**P112 BN112M4**	**N184TC**
173	1585	1.6	10	1039	**W 86 – 10**			**P112 BN112M4**	**N184TC**
115	2296	1.0	15	645	**W 75 – 15**			**P112 BN112M4**	**N184TC**
115	2296	1.3	15	1239	**W 86 – 15**			**P112 BN112M4**	**N184TC**
87	3025	1.7	20	1798	**W 110 – 20**			**P112 BN112M4**	**N184TC**
82	3252	1.6	21	1787		**WR 110 – 21**		**P112 BN112M4**	[3]
75	3438	1.4	23	1798	**W 110 – 23**			**P112 BN112M4**	**N184TC**
75	3438	2.3	23	2594	**VF 130 – 23**			**P112 BN112M4**	**N184TC**
58	4160	1.5	30	1798	**W 110 – 30**			**P112 BN112M4**	**N184TC**
58	4538	1.3	30	1798		**WR 110 – 30**		**P112 BN112M4**	[3]
43.3	5474	1.1	40	1798	**W 110 – 40**			**P112 BN112M4**	**N184TC**
43.3	5474	1.8	40	2832	**VF 130 – 40**			**P112 BN112M4**	**N184TC**
38.4	6483	1.0	45	1798		**WR 110 – 45**		**P112 BN112M4**	[3]
38.4	6645	2.3	45	3278		**VFR 150 – 45**		**P112 BN112M4**	[3]
37.6	6295	1.5	46	2832	**VF 130 – 46**			**P112 BN112M4**	**N184TC**
37.6	6378	2.2	46	3305	**VF 150 – 46**			**P112 BN112M4**	**N184TC**
34.6	6843	3.2	50	4046	**VF 185 – 50**			**P112 BN112M4**	**N184TC**
30.9	7361	1.2	56	2832	**VF 130 – 56**			**P112 BN112M4**	**N184TC**
30.9	7462	1.6	56	3305	**VF 150 – 56**			**P112 BN112M4**	**N184TC**
28.8	7995	2.5	60	4046	**VF 185 – 60**			**P112 BN112M4**	**N184TC**
28.8	8427	1.4	60	3102		**VFR 130 – 60**		**P112 BN112M4**	[3]
27.0	8182	1.0	64	2832	**VF 130 – 64**			**P112 BN112M4**	**N184TC**
27.0	8298	1.4	64	3305	**VF 150 – 64**			**P112 BN112M4**	**N184TC**
25.1	9443	1.2	69	3102		**VFR 130 – 69**		**P112 BN112M4**	[3]
25.1	9567	1.7	69	3597		**VFR 150 – 69**		**P112 BN112M4**	[3]
21.6	9940	1.1	80	3305	**VF 150 – 80**			**P112 BN112M4**	**N184TC**

Dynamic efficiency included in output values 3 phase / 4 pole electric motor Refer to Notes after 20 hp section for [1, 2, 3, 4]

5 hp

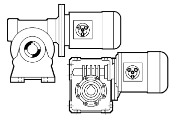
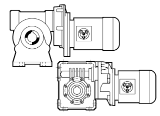
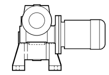
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
21.6	9940	1.9	80	4046	**VF 185 – 80**			**P112 BN112M4**	**N184TC**
19.2	11507	1.2	90	3102		**VFR 130 – 90**		**P112 BN112M4**	[3]
19.2	11669	1.5	90	3597		**VFR 150 – 90**		**P112 BN112M4**	[3]
17.3	11705	1.4	100	4046	**VF 185 – 100**			**P112 BN112M4**	**N184TC**
14.4	14694	1.2	120	3597		**VFR 150 – 120**		**P112 BN112M4**	[3]
12.5	16898	1.0	138	3597		**VFR 150 – 138**		**P112 BN112M4**	[3]
11.5	18097	2.2	150	7756		**VFR 210 – 150**		**P112 BN112M4**	[3]
9.6	20744	1.8	180	7756		**VFR 210 – 180**		**P112 BN112M4**	[3]
8.7	23049	1.0	200	3597			**W/VF 86/150 – 200**	**P112 BN112M4**	**N184TC**
7.2	25498	1.4	240	7756		**VFR 210 – 240**		**P112 BN112M4**	[3]
7.2	26362	1.8	240	11690		**VFR 250 – 240**		**P112 BN112M4**	[3]
6.2	26218	1.4	280	4384			**W/VF 86/185 – 280**	**P112 BN112M4**	**N184TC**
6.2	26218	2.1	280	7756			**VF/VF 130/210 – 280**	**P112 BN112M4**	**N184TC**
5.8	29712	1.0	300	7756		**VFR 210 – 300**		**P112 BN112M4**	[3]
5.8	30792	1.4	300	11690		**VFR 250 – 300**		**P112 BN112M4**	[3]
4.3	34574	1.1	400	4384			**W/VF 86/185 – 400**	**P112 BN112M4**	**N184TC**
2.9	46458	1.2	600	7756			**VF/VF 130/210 – 600**	**P112 BN112M4**	**N184TC**
2.2	60504	1.3	800	11690			**VF/VF 130/250 – 800**	**P112 BN112M4**	**N184TC**
1.9	61296	1.3	920	11690			**VF/VF 130/250 – 920**	**P112 BN112M4**	**N184TC**

7.5 hp

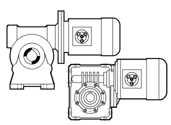
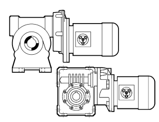
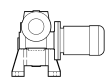
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
115	3484	2.3	15	2046	**VF 130 – 15**			**P132 BN132S4**	**N213TC**
87	4538	1.8	20	2412	**VF 130 – 20**			**P132 BN132S4**	**N213TC**
75	5156	1.5	23	2594	**VF 130 – 23**			**P132 BN132S4**	**N213TC**
75	5156	2.2	23	2763	**VF 150 – 23**			**P132 BN132S4**	**N213TC**
58	6402	1.5	30	2814	**VF 130 – 30**			**P132 BN132S4**	**N213TC**
43.3	8211	1.2	40	2832	**VF 130 – 40**			**P132 BN132S4**	**N213TC**
38.4	9967	1.5	45	3278		**VFR 150 – 45**		**P132 BN132S4**	[3]
37.6	9443	1.0	46	2832	**VF 130 – 46**			**P132 BN132S4**	**N213TC**
37.6	9567	1.4	46	3305	**VF 150 – 46**			**P132 BN132S4**	**N213TC**
34.6	10264	2.2	50	4046	**VF 185 – 50**			**P132 BN132S4**	**N213TC**
30.9	11193	1.1	56	3305	**VF 150 – 56**			**P132 BN132S4**	**N213TC**
28.8	11993	1.7	60	4046	**VF 185 – 60**			**P132 BN132S4**	**N213TC**
28.8	12803	1.3	60	3597		**VFR 150 – 60**		**P132 BN132S4**	[3]
25.1	14351	1.1	69	3597		**VFR 150 – 69**		**P132 BN132S4**	[3]
21.6	14910	1.3	80	4046	**VF 185 – 80**			**P132 BN132S4**	**N213TC**

Dynamic efficiency included in output values 3 phase / 4 pole electric motor Refer to Notes after 20 hp section for [1, 2, 3, 4]

7.5 hp

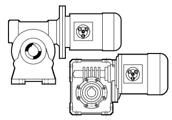
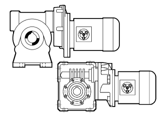
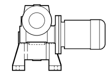
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
21.6	14910	1.7	80	7081	**VF 210 – 80**			**P132 BN132S4**	**N213TC**
19.2	17503	1.0	90	3597		**VFR 150 – 90**		**P132 BN132S4**	[3]
19.2	18475	1.9	90	7756		**VFR 210 – 90**		**P132 BN132S4**	[3]
17.3	17557	1.0	100	4046	**VF 185 – 100**			**P132 BN132S4**	**N213TC**
17.3	17557	1.4	100	7081	**VF 210 – 100**			**P132 BN132S4**	**N213TC**
14.4	22689	2.0	120	7756		**VFR 210 – 120**		**P132 BN132S4**	[3]
11.5	27146	1.5	150	7756		**VFR 210 – 150**		**P132 BN132S4**	[3]
9.6	31116	1.2	180	7756		**VFR 210 – 180**		**P132 BN132S4**	[3]
7.2	39544	1.2	240	11690		**VFR 250 – 240**		**P132 BN132S4**	[3]
6.2	39328	1.4	280	7756			**VF/VF 130/210 – 280**	**P132 BN132S4**	**N213TC**
6.2	40084	2.0	280	11690			**VF/VF 130/250 – 280**	**P132 BN132S4**	**N213TC**
5.8	46188	1.0	300	11690		**VFR 250 – 300**		**P132 BN132S4**	[3]
4.3	54021	1.0	400	7756			**VF/VF 130/210 – 400**	**P132 BN132S4**	**N213TC**
4.3	52941	1.5	400	11690			**VF/VF 130/250 – 400**	**P132 BN132S4**	**N213TC**

10 hp

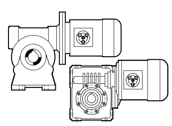
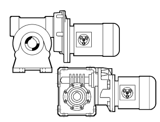
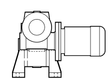
n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC [1]	NEMA [2]
174	3169	2.2	10	1713	**VF 130 – 10**			**P132 BN132MA4**	**N215TC**
116	4646	1.8	15	2046	**VF 130 – 15**			**P132 BN132MA4**	**N215TC**
87	6050	1.3	20	2412	**VF 130 – 20**			**P132 BN132MA4**	**N215TC**
87	6050	1.9	20	2542	**VF 150 – 20**			**P132 BN132MA4**	**N215TC**
76	6875	1.1	23	2594	**VF 130 – 23**			**P132 BN132MA4**	**N215TC**
76	6875	1.6	23	2763	**VF 150 – 23**			**P132 BN132MA4**	**N215TC**
58	8535	1.1	30	2814	**VF 130 – 30**	`		**P132 BN132MA4**	**N215TC**
43.5	11092	1.2	40	3305	**VF 150 – 40**			**P132 BN132MA4**	**N215TC**
38.7	13289	1.1	45	3278		**VFR 150 – 45**		**P132 BN132MA4**	[3]
37.8	12756	1.1	46	3305	**VF 150 – 46**			**P132 BN132MA4**	**N215TC**
34.8	13685	1.6	50	4046	**VF 185 – 50**			**P132 BN132MA4**	**N215TC**
34.8	13685	2.1	50	7081	**VF 210 – 50**			**P132 BN132MA4**	**N215TC**
29.0	15990	1.3	60	4046	**VF 185 – 60**			**P132 BN132MA4**	**N215TC**
29.0	17071	1.0	60	3597		**VFR 150 – 60**		**P132 BN132MA4**	[3]
21.8	19880	1.3	80	7081	**VF 210 – 80**			**P132 BN132MA4**	**N215TC**
21.8	20456	1.7	80	10566	**VF 250 – 80**			**P132 BN132MA4**	**N215TC**
19.3	24634	1.4	90	7756		**VFR 210 – 90**		**P132 BN132MA4**	[3]
17.4	23409	1.0	100	7081	**VF 210 – 100**			**P132 BN132MA4**	**N215TC**

Dynamic efficiency included in output values   3 phase / 4 pole electric motor   Refer to Notes after 20 hp section for [1, 2, 3, 4]

10 hp

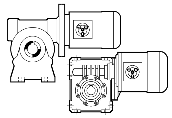
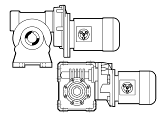
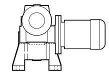
n2 [rpm]	T2 [lb·in]	S Safety factor	i (ratio)	Rn2 [lb]				IEC [1]	NEMA [2]
17.4	24490	1.3	100	10566	**VF 250 – 100**			**P132 BN132MA4**	**N215TC**
14.5	30252	1.5	120	7756		**VFR 210 – 120**		**P132 BN132MA4**	[3]
14.5	30684	2.0	120	11690		**VFR 250 – 120**		**P132 BN132MA4**	[3]
11.6	36194	1.1	150	7756		**VFR 210 – 150**		**P132 BN132MA4**	[3]
11.6	36194	1.6	150	11690		**VFR 250 – 150**		**P132 BN132MA4**	[3]
9.7	43433	1.3	180	11690		**VFR 250 – 180**		**P132 BN132MA4**	[3]
6.2	52437	1.1	280	7756			**VF/VF 130/210 – 280**	**P132 BN132MA4**	**N215TC**
6.2	53445	1.5	280	11690			**VF/VF 130/250 – 280**	**P132 BN132MA4**	**N215TC**
4.4	70588	1.1	400	11690			**VF/VF 130/250 – 400**	**P132 BN132MA4**	**N215TC**

15 hp

n2 [rpm]	T2 [lb·in]	S Safety factor	i (ratio)	Rn2 [lb]				IEC [1]	NEMA [2]
117	7050	1.4	15	2246	**VF 150 – 15**			**P160 BN160M4**	**n/a**
88	9076	1.3	20	2542	**VF 150 – 20**			**P160 BN160M4**	**n/a**
76	10313	1.1	23	2763	**VF 150 – 23**			**P160 BN160M4**	**n/a**
58	13451	1.3	30	3808	**VF 185 – 30**			**P160 BN160M4**	**n/a**
58	13451	2.0	30	7081	**VF 210 – 30**			**P160 BN160M4**	**n/a**
43.8	16855	1.4	40	4028	**VF 185 – 40**			**P160 BN160M4**	**n/a**
43.8	16855	1.8	40	7081	**VF 210 – 40**			**P160 BN160M4**	**n/a**
38.9	20177	1.8	45	7457		**VFR 210 – 45**		**P160 BN160M4**	**n/a**
35.0	20528	1.1	50	4046	**VF 185 – 50**			**P160 BN160M4**	**n/a**
35.0	20528	1.4	50	7081	**VF 210 – 50**			**P160 BN160M4**	**n/a**
29.2	23661	1.1	60	7081	**VF 210 – 60**			**P160 BN160M4**	**n/a**
29.2	24634	1.6	60	10566	**VF 250 – 60**			**P160 BN160M4**	**n/a**
29.2	25930	1.6	60	7756		**VFR 210 – 60**		**P160 BN160M4**	**n/a**
21.9	30684	1.1	80	10566	**VF 250 – 80**			**P160 BN160M4**	**n/a**
19.4	36951	1.0	90	7756		**VFR 210 – 90**		**P160 BN160M4**	**n/a**
19.4	37923	1.4	90	11690		**VFR 250 – 90**		**P160 BN160M4**	**n/a**
14.6	45378	1.0	120	7756		**VFR 210 – 120**		**P160 BN160M4**	**n/a**
14.6	46026	1.3	120	11690		**VFR 250 – 120**		**P160 BN160M4**	**n/a**
11.7	54292	1.1	150	11690		**VFR 250 – 150**		**P160 BN160M4**	**n/a**
6.3	80168	1.0	280	11690			**VF/VF 130/250 – 280**	**P160 BN160M4**	**n/a**

Dynamic efficiency included in output values — 3 phase / 4 pole electric motor — Refer to Notes after 20 hp section for [1, 2, 3, 4]

20 hp

n_2 [rpm]	T_2 [lb·in]	S Safety factor	i (ratio)	R_{n2} [lb]				IEC[1]	NEMA[2]
175	6339	1.5	10	1825	**VF 150 – 10**			**P160 BN160L4**	**n/a**
117	9400	1.1	15	2246	**VF 150 – 15**			**P160 BN160L4**	**n/a**
117	9508	1.7	15	2608	**VF 185 – 15**			**P160 BN160L4**	**n/a**
88	12101	1.0	20	2542	**VF 150 – 20**			**P160 BN160L4**	**n/a**
88	12245	1.6	20	2904	**VF 185 – 20**			**P160 BN160L4**	**n/a**
58	17935	1.0	30	3808	**VF 185 – 30**			**P160 BN160L4**	**n/a**
58	17935	1.5	30	7081	**VF 210 – 30**			**P160 BN160L4**	**n/a**
43.8	22473	1.0	40	4028	**VF 185 – 40**			**P160 BN160L4**	**n/a**
43.8	22473	1.4	40	7081	**VF 210 – 40**			**P160 BN160L4**	**n/a**
38.9	26903	1.3	45	7457		**VFR 210 – 45**		**P160 BN160L4**	**n/a**
35.0	27371	1.5	50	10566	**VF 250 – 50**			**P160 BN160L4**	**n/a**
29.2	32845	1.2	60	10566	**VF 250 – 60**			**P160 BN160L4**	**n/a**
29.2	34574	1.2	60	7756		**VFR 210 – 60**		**P160 BN160L4**	**n/a**
29.2	35006	1.8	60	10372		**VFR 250 – 60**		**P160 BN160L4**	**n/a**
19.4	50564	1.1	90	11690		**VFR 250 – 90**		**P160 BN160L4**	**n/a**
14.6	61368	1.0	120	11690		**VFR 250 – 120**		**P160 BN160L4**	**n/a**

NOTES: [1] for motors BN27, BN44 and BN 56 add IF option for extra insulation for inverter duty

[2] Nema Input Table:

VF30	N 42CZ	(all ratios)	W75, W86	N 56C	(all ratios)
VF44	N 56C	(all ratios)		N 143-145TC	(all ratios)
VF49	N 56C	(all ratios)		N 182-184TC	(all ratios)
W63	N 56C	(all ratios)	W110	N 143-145TC	(all ratios)
	N 143-145TC	(ratios 7:1 to 38:1)		N 182-184TC	(all ratios)
				N 213-215TC	(all ratios)

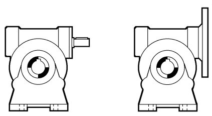
[3] for VFR & WR with Nema input see IEC adaptor for conversion to Nema “C”

[4] for Nema 213-215TC or VF 130-VF250, use P132 input plus ENTN213TC (see IEC adaptor for conversion to Nema “C”)

SPEED REDUCER RATING CHARTS

VF 27

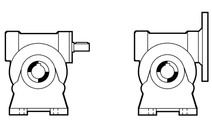
80 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 27 – 7	7	67	83	250	80	0.38	8	92
VF 27 – 10	10	62	80	175	80	0.28	7	112
VF 27 – 15	15	54	75	117	80	0.20	—	135
VF 27 – 20	20	49	71	88	80	0.16	—	135
VF 27 – 30	30	38	62	58	80	0.12	—	135
VF 27 – 40	40	33	57	44	80	0.10	—	135
VF 27 – 60	60	26	49	29	80	0.08	—	135
VF 27 – 70	70	24	45	25	80	0.07	—	135

VF 30

177 lb·in

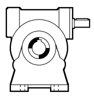
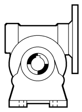


	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 30 – 7	7	69	84	250	142	0.67	31	142
VF 30 – 10	10	64	81	175	142	0.49	18	173
VF 30 – 15	15	56	76	117	159	0.39	—	205
VF 30 – 20	20	51	73	88	159	0.30	—	232
VF 30 – 30	30	41	65	58	177	0.25	—	270
VF 30 – 40	40	36	60	44	168	0.19	—	306
VF 30 – 60	60	29	51	29	168	0.15	—	357
VF 30 – 70	70	26	48	25	133	0.11	—	360

Dynamic efficiency included in output values

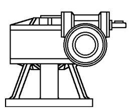
VF 44

345 lb·in

 	n_1 = **1750** rpm (4 pole motor)						
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 44 – 7	7	71	86	250	257	1.18	49	265
VF 44 – 10	10	66	84	175	257	0.85	49	321
VF 44 – 14	14	60	81	125	257	0.63	49	378
VF 44 – 20	20	55	77	88	345	0.62	49	418
VF 44 – 28	28	45	71	63	345	0.48	49	481
VF 44 – 35	35	42	68	50	345	0.40	49	517
VF 44 – 46	46	37	63	38	345	0.33	49	517
VF 44 – 60	60	32	58	29	345	0.28	—	517
VF 44 – 70	70	30	55	25	257	0.19	49	517
VF 44 – 100	100	24	47	18	248	0.15	49	517

VF/VF 30/44

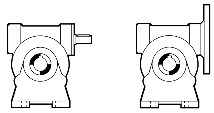
531 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF/VF 30/44 – 245	245	29	40	7.1	531	0.15	31	562
VF/VF 30/44 – 350	350	27	36	5.0	531	0.12	18	562
VF/VF 30/44 – 420	420	25	35	4.2	531	0.10	—	562
VF/VF 30/44 – 560	560	23	31	3.1	531	0.08	—	562
VF/VF 30/44 – 700	700	21	31	2.5	531	0.07	—	562
VF/VF 30/44 – 840	840	18	26	2.1	531	0.07	—	562
VF/VF 30/44 – 1120	1120	16	26	1.6	531	0.05	—	562
VF/VF 30/44 – 1680	1680	13	26	1.0	531	0.03	—	562
VF/VF 30/44 – 2100	2100	12	21	0.8	531	0.03	—	562

Dynamic efficiency included in output values

VF 49

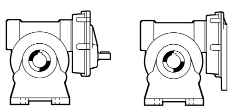
655 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 49 – 7	7	70	86	250	478	2.20	90	263
VF 49 – 10	10	65	84	175	522	1.73	90	317
VF 49 – 14	14	59	81	125	575	1.41	90	366
VF 49 – 18	18	55	78	97	522	1.03	90	425
VF 49 – 24	24	50	75	73	558	0.86	90	474
VF 49 – 28	28	43	71	63	655	0.91	49	488
VF 49 – 36	36	39	67	49	611	0.70	90	553
VF 49 – 45	45	35	63	39	575	0.56	90	613
VF 49 – 60	60	30	58	29	522	0.42	90	697
VF 49 – 70	70	28	54	25	487	0.36	90	708
VF 49 – 80	80	25	52	22	478	0.32	90	708
VF 49 – 100	100	22	47	18	434	0.26	90	708

VFR 49

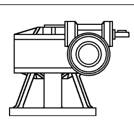
779 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VFR 49 – 42	42	58	74	41.7	690	0.62	52	562
VFR 49 – 54	54	54	71	32.4	655	0.47	52	636
VFR 49 – 72	72	49	67	24.3	655	0.38	—	717
VFR 49 – 84	84	42	62	20.8	779	0.42	—	740
VFR 49 – 108	108	38	58	16.2	708	0.31	—	776
VFR 49 – 135	135	34	54	13.0	779	0.30	—	776
VFR 49 – 180	180	29	48	9.7	611	0.20	—	776
VFR 49 – 210	210	27	45	8.3	611	0.18	—	776
VFR 49 – 240	240	25	42	7.3	522	0.14	52	776
VFR 49 – 300	300	22	37	5.8	522	0.13	52	776

VF/VF 30/49

841 lb·in

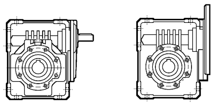


	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF/VF 30/49 – 240	240	32	45	7.3	841	0.22	18	776
VF/VF 30/49 – 315	315	24	40	5.6	841	0.19	31	776
VF/VF 30/49 – 420	420	24	41	4.2	841	0.14	—	776
VF/VF 30/49 – 540	540	22	37	3.2	841	0.12	—	776
VF/VF 30/49 – 720	720	20	39	2.4	841	0.08	—	776
VF/VF 30/49 – 900	900	18	31	1.9	841	0.08	—	776
VF/VF 30/49 – 1120	1120	15	31	1.6	841	0.07	—	776
VF/VF 30/49 – 1440	1440	14	24	1.2	841	0.07	—	776
VF/VF 30/49 – 2160	2160	11	21	0.8	841	0.05	—	776
VF/VF 30/49 – 2700	2700	10	17	0.6	841	0.05	—	776

Dynamic efficiency included in output values

W 63

1416 lb·in

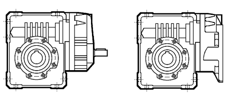


n₁ = **1750** rpm (4 pole motor)

	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
W 63 – 7	7	70	88	250	1062	4.79	108	348
W 63 – 10	10	66	86	175	1239	4.00	108	414
W 63 – 12	12	63	85	145	1239	3.85	108	466
W 63 – 15	15	59	83	117	1328	2.96	108	513
W 63 – 19	19	55	81	92	1328	2.40	108	584
W 63 – 24	24	52	78	73	1372	2.03	108	650
W 63 – 30	30	44	74	58	1416	1.77	108	713
W 63 – 38	38	40	70	46	1372	1.43	108	805
W 63 – 45	45	37	67	39	1283	1.18	108	881
W 63 – 64	64	31	61	27	1106	0.79	108	1052
W 63 – 80	80	27	56	22	1018	0.63	108	1124
W 63 – 100	100	23	51	18	1018	0.55	108	1124

WR 63

1682 lb·in

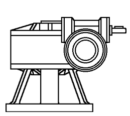


n₁ = **1750** rpm (4 pole motor)

	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
WR 63 – 21	21	69	84	83.3	1239	1.95	72	564
WR 63 – 30	30	65	81	58.3	1460	1.67	72	656
WR 63 – 36	36	62	79	48.6	1460	1.42	72	728
WR 63 – 45	45	58	76	38.9	1593	1.29	72	796
WR 63 – 57	57	54	73	30.7	1593	1.06	72	895
WR 63 – 72	72	51	70	24.3	1637	0.90	72	991
WR 63 – 90	90	44	64	19.4	1682	0.81	72	1086
WR 63 – 114	114	39	61	15.4	1637	0.65	72	1124
WR 63 – 135	135	36	58	13.0	1505	0.53	—	1124
WR 63 – 192	192	30	51	9.1	1328	0.38	72	1124
WR 63 – 240	240	26	46	7.3	1195	0.30	72	1124
WR 63 – 300	300	22	41	5.8	1151	0.26	72	1124

VF/W 30/63

1859 lb·in



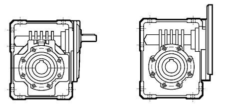
n₁ = **1750** rpm (4 pole motor)

	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VF/W 30/63 – 240	240	33	47	7.3	1859	0.46	18	1124
VF/W 30/63 – 315	315	26	42	5.6	1859	0.39	31	1124
VF/W 30/63 – 450	450	25	41	3.9	1859	0.28	—	1124
VF/W 30/63 – 570	570	22	40	3.1	1859	0.23	—	1124
VF/W 30/63 – 720	720	21	37	2.4	1859	0.19	—	1124
VF/W 30/63 – 900	900	18	30	1.9	1859	0.19	—	1124
VF/W 30/63 – 1200	1200	16	24	1.5	1859	0.18	—	1124
VF/W 30/63 – 1520	1520	14	24	1.2	1859	0.14	—	1124
VF/W 30/63 – 2280	2280	12	21	0.8	1859	0.11	—	1124
VF/W 30/63 – 2700	2700	11	22	0.6	1859	0.09	—	1124

Dynamic efficiency included in output values

W 75

2390 lb·in

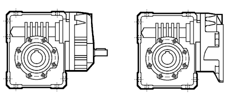


n₁ = **1750** rpm (4 pole motor)

	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
W 75 – 7	7	71	90	250	1682	7.41	169	344
W 75 – 10	10	67	88	175	2036	6.42	169	504
W 75 – 15	15	60	85	117	2213	4.82	169	645
W 75 – 20	20	56	83	88	2213	3.70	169	767
W 75 – 25	25	52	80	70	2213	3.07	169	863
W 75 – 30	30	45	77	58	2390	2.87	169	919
W 75 – 40	40	40	72	44	2257	2.18	169	1072
W 75 – 50	50	36	68	35	1947	1.59	169	1216
W 75 – 60	60	33	65	29	1770	1.26	169	1340
W 75 – 80	80	28	59	22	1593	0.94	169	1394
W 75 – 100	100	25	55	18	1328	0.67	169	1394

WR 75

2832 lb·in

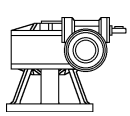


n₁ = **1750** rpm (4 pole motor)

	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
WR 75 – 21	21	70	86	83.3	1991	3.06	112	688
WR 75 – 30	30	66	84	58.3	2434	2.68	112	812
WR 75 – 45	45	59	80	38.9	2611	2.01	112	1018
WR 75 – 60	60	55	77	29.2	2611	1.57	112	1187
WR 75 – 75	75	51	73	23.3	2611	1.32	112	1324
WR 75 – 90	90	44	69	19.4	2832	1.27	112	1394
WR 75 – 120	120	39	63	14.6	2699	0.99	112	1394
WR 75 – 150	150	35	58	11.7	2301	0.73	112	1394
WR 75 – 180	180	32	55	9.7	2080	0.58	112	1394
WR 75 – 240	240	27	49	7.3	1903	0.45	112	1394
WR 75 – 300	300	24	44	5.8	1593	0.34	112	1394

VF/W 44/75

3275 lb·in



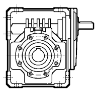
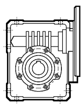
n₁ = **1750** rpm (4 pole motor)

	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VF/W 44/75 – 250	250	34	57	7.0	3275	0.64	49	1048
VF/W 44/75 – 300	300	30	51	5.8	3275	0.59	49	1160
VF/W 44/75 – 400	400	26	46	4.4	3275	0.49	49	1394
VF/W 44/75 – 525	525	25	44	3.3	3275	0.39	49	1394
VF/W 44/75 – 700	700	24	42	2.5	3275	0.31	49	1394
VF/W 44/75 – 920	920	21	40	1.9	3275	0.25	—	1394
VF/W 44/75 – 1200	1200	18	37	1.5	3275	0.20	—	1394
VF/W 44/75 – 1500	1500	17	37	1.2	3275	0.16	49	1394
VF/W 44/75 – 2100	2100	14	30	0.8	3275	0.14	49	1394
VF/W 44/75 – 2800	2800	12	26	0.6	3275	0.12	49	1394

Dynamic efficiency included in output values

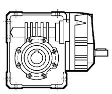
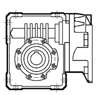
W 86

3275 lb·in

 	n1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
W 86 – 7	7	71	89	250	2213	9.86	191	881
W 86 – 10	10	67	88	175	2567	8.10	191	1039
W 86 – 15	15	60	85	117	2921	6.36	191	1239
W 86 – 20	20	60	84	88	2832	4.68	191	1434
W 86 – 23	23	58	82	76	2832	4.17	191	1529
W 86 – 30	30	45	76	58	3275	3.99	191	1574
W 86 – 40	40	45	75	44	2921	2.70	191	1574
W 86 – 46	46	43	73	38	3009	2.49	191	1574
W 86 – 56	56	39	70	31	2655	1.88	191	1574
W 86 – 64	64	37	68	27	2478	1.58	191	1574
W 86 – 80	80	33	64	22	2257	1.22	191	1574
W 86 – 100	100	29	59	18	2036	0.96	191	1574

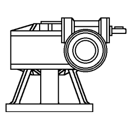
WR 86

3894 lb·in

 	n1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
WR 86 – 21	21	70	85	83.3	2611	4.06	112	1365
WR 86 – 30	30	66	82	58.3	3053	3.45	112	1574
WR 86 – 45	45	59	78	38.9	3452	2.73	112	1574
WR 86 – 60	60	59	77	29.2	3363	2.02	112	1574
WR 86 – 69	69	57	75	25.4	3363	1.80	112	1574
WR 86 – 90	90	44	67	19.4	3894	1.79	112	1574
WR 86 – 120	120	44	66	14.6	3452	1.21	112	1574
WR 86 – 138	138	42	63	12.7	3584	1.14	112	1574
WR 86 – 168	168	38	60	10.4	3142	0.87	112	1574
WR 86 – 192	192	36	58	9.1	2921	0.73	112	1574
WR 86 – 240	240	32	53	7.3	2699	0.59	112	1574
WR 86 – 300	300	28	49	5.8	2434	0.46	112	1574

VF/W 44/86

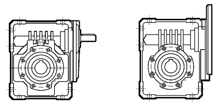
4425 lb·in

	n1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF/W 44/86 – 230	230	38	54	7.6	4425	0.99	49	1574
VF/W 44/86 – 300	300	30	45	5.8	4425	0.91	49	1574
VF/W 44/86 – 400	400	30	41	4.4	4425	0.75	49	1574
VF/W 44/86 – 525	525	25	42	3.3	4425	0.56	49	1574
VF/W 44/86 – 700	700	25	39	2.5	4425	0.45	49	1574
VF/W 44/86 – 920	920	22	40	1.9	4425	0.33	49	1574
VF/W 44/86 – 1380	1380	17	32	1.3	4425	0.28	49	1574
VF/W 44/86 – 1840	1840	17	30	1.0	4425	0.22	49	1574
VF/W 44/86 – 2116	2116	16	28	0.8	4425	0.21	49	1574
VF/W 44/86 – 2760	2760	14	24	0.6	4425	0.19	—	1574

Dynamic efficiency included in output values

W 110

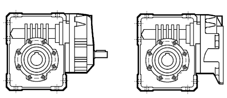
6195 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
W 110 – 7	7	71	89	250	4425	19.72	270	1128
W 110 – 10	10	67	87	175	4868	15.54	270	1392
W 110 – 15	15	60	84	117	5310	11.70	270	1706
W 110 – 20	20	61	84	88	5045	8.34	270	1798
W 110 – 23	23	59	83	76	4779	6.95	270	1798
W 110 – 30	30	45	77	58	6195	7.45	270	1798
W 110 – 40	40	46	76	44	5930	5.42	270	1798
W 110 – 46	46	44	74	38	5310	4.33	270	1798
W 110 – 56	56	41	72	31	5310	3.66	270	1798
W 110 – 64	64	38	70	27	4691	2.91	270	1798
W 110 – 80	80	34	66	22	4160	2.19	270	1798
W 110 – 100	100	30	62	18	4071	1.82	270	1798

WR 110

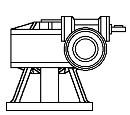
7346 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
WR 110 – 21	21	70	86	83.3	5266	8.10	157	1787
WR 110 – 30	30	66	84	58.3	5797	6.39	157	1798
WR 110 – 45	45	59	80	38.9	6284	4.85	157	1798
WR 110 – 60	60	60	79	29.2	5974	3.50	157	1798
WR 110 – 69	69	58	77	25.4	5664	2.96	157	1798
WR 110 – 90	90	44	70	19.4	7346	3.24	157	1798
WR 110 – 120	120	45	68	14.6	7036	2.39	157	1798
WR 110 – 138	138	43	66	12.7	6284	1.92	157	1798
WR 110 – 168	168	40	63	10.4	6284	1.65	157	1798
WR 110 – 192	192	37	60	9.1	5576	1.34	157	1798
WR 110 – 240	240	33	56	7.3	4956	1.02	157	1798
WR 110 – 300	300	29	51	5.8	4823	0.88	157	1798

VF/W 49/110

8850 lb·in

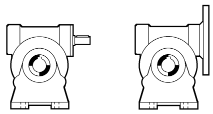


	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VF/W 49/110 – 230	230	38	52	7.6	8850	2.05	90	1798
VF/W 49/110 – 300	300	29	48	5.8	8850	1.71	90	1798
VF/W 49/110 – 400	400	30	45	4.4	8850	1.37	90	1798
VF/W 49/110 – 540	540	25	41	3.2	8850	1.11	90	1798
VF/W 49/110 – 720	720	24	40	2.4	8850	0.85	90	1798
VF/W 49/110 – 1080	1080	18	31	1.6	8850	0.73	90	1798
VF/W 49/110 – 1350	1350	16	30	1.3	8850	0.61	90	1798
VF/W 49/110 – 1656	1656	17	30	1.1	8850	0.49	90	1798
VF/W 49/110 – 2070	2070	15	28	0.8	8850	0.42	90	1798
VF/W 49/110 – 2800	2800	13	24	0.6	8850	0.37	90	1798

Dynamic efficiency included in output values

VF 130

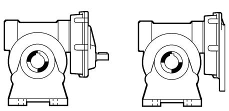
9793 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 130 – 7	7	71	89	250	6549	29.19	337	1347
VF 130 – 10	10	67	88	175	6992	22.06	337	1713
VF 130 – 15	15	63	86	117	8142	17.53	337	2046
VF 130 – 20	20	59	84	88	7965	13.16	337	2412
VF 130 – 23	23	57	83	76	7877	11.46	337	2594
VF 130 – 30	30	49	79	58	9293	10.89	—	2814
VF 130 – 40	40	44	76	44	9735	8.89	—	2832
VF 130 – 46	46	45	76	38	9293	7.38	—	2832
VF 130 – 56	56	42	73	31	8496	5.77	211	2832
VF 130 – 64	64	39	71	27	8231	5.03	274	2832
VF 130 – 80	80	35	68	22	7788	3.98	337	2832
VF 130 – 100	100	31	64	18	6903	2.99	337	2832

VFR 130

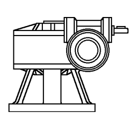
13275 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VFR 130 – 60	60	58	78	29.2	11948	7.09	225	3102
VFR 130 – 69	69	56	76	25.4	11505	6.09	225	3102
VFR 130 – 90	90	48	71	19.4	13275	5.77	225	3102
VFR 130 – 120	120	43	67	14.6	12390	4.28	225	3102
VFR 130 – 138	138	44	67	12.7	11948	3.59	225	3102
VFR 130 – 168	168	41	64	10.4	10620	2.74	225	3102
VFR 130 – 192	192	38	61	9.1	10620	2.52	225	3102
VFR 130 – 240	240	34	57	7.3	10178	2.07	225	3102
VFR 130 – 300	300	30	53	5.8	7965	1.39	225	3102

W/VF 63/130

15930 lb·in

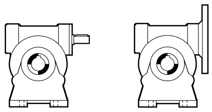


	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
W/VF 63/130 – 280	280	31	50	6.3	15930	3.16	108	3102
W/VF 63/130 – 400	400	29	44	4.4	15930	2.51	108	3102
W/VF 63/130 – 600	600	26	40	2.9	15930	1.84	108	3102
W/VF 63/130 – 760	760	24	39	2.3	15930	1.49	108	3102
W/VF 63/130 – 960	960	23	37	1.8	15930	1.25	108	3102
W/VF 63/130 – 1200	1200	19	34	1.5	15930	1.08	—	3102
W/VF 63/130 – 1520	1520	18	32	1.2	15930	0.91	—	3102
W/VF 63/130 – 1800	1800	16	28	1.0	15930	0.88	—	3102
W/VF 63/130 – 2560	2560	14	23	0.7	15930	0.75	—	3102
W/VF 63/130 – 3200	3200	12	17	0.5	15930	0.81	—	3102

Dynamic efficiency included in output values

VF 150

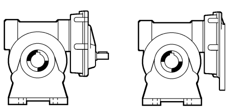
13718 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VF 150 – 7	7	72	90	250	8850	39.01	495	1358
VF 150 – 10	10	68	88	175	9293	29.32	495	1825
VF 150 – 15	15	64	87	117	10178	21.65	495	2246
VF 150 – 20	20	59	84	88	11505	19.02	495	2542
VF 150 – 23	23	57	83	76	11240	16.35	495	2763
VF 150 – 30	30	48	80	58	12125	14.03	495	3087
VF 150 – 40	40	44	77	44	13629	12.29	187	3305
VF 150 – 46	46	45	77	38	13718	10.75	315	3305
VF 150 – 56	56	42	74	31	12125	8.12	495	3305
VF 150 – 64	64	39	72	27	11771	7.09	495	3305
VF 150 – 80	80	35	69	22	11063	5.56	495	3305
VF 150 – 100	100	31	65	18	10178	4.35	495	3305

VFR 150

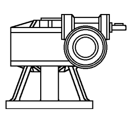
17258 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VFR 150 – 45	45	63	82	38.9	15045	11.32	337	3278
VFR 150 – 60	60	58	79	29.2	16815	9.85	337	3597
VFR 150 – 69	69	56	77	25.4	16373	8.56	337	3597
VFR 150 – 90	90	47	72	19.4	17258	7.39	337	3597
VFR 150 – 120	120	43	68	14.6	17700	6.02	337	3597
VFR 150 – 138	138	44	68	12.7	17700	5.24	337	3597
VFR 150 – 168	168	41	65	10.4	15488	3.94	337	3597
VFR 150 – 192	192	38	62	9.1	15045	3.51	337	3597
VFR 150 – 240	240	34	58	7.3	13718	2.74	337	3597
VFR 150 – 300	300	30	54	5.8	11505	1.97	337	3597

W/VF 86/150

23010 lb·in

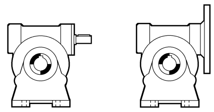


	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
W/VF 86/150 – 200	200	29	64	8.8	23010	4.99	191	3597
W/VF 86/150 – 225	225	26	63	7.8	23010	4.51	191	3597
W/VF 86/150 – 300	300	26	58	5.8	23010	3.67	191	3597
W/VF 86/150 – 345	345	26	58	5.1	23010	3.19	191	3597
W/VF 86/150 – 460	460	26	55	3.8	23010	2.53	191	3597
W/VF 86/150 – 529	529	26	55	3.3	23010	2.20	191	3597
W/VF 86/150 – 690	690	26	50	2.5	23010	1.85	191	3597
W/VF 86/150 – 920	920	26	45	1.9	23010	1.54	191	3597
W/VF 86/150 – 1380	1380	19	42	1.3	23010	1.10	191	3597
W/VF 86/150 – 1840	1840	19	38	1.0	23010	0.91	191	3597
W/VF 86/150 – 2944	2944	16	27	0.6	23010	0.80	191	3597

Dynamic efficiency included in output values

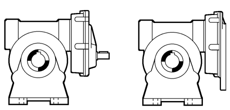
VF 185

23276 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 185 – 7	7	72	90	250	15488	68.26	629	1252
VF 185 – 10	10	68	89	175	16107	50.25	629	2014
VF 185 – 15	15	66	88	117	16373	34.44	629	2608
VF 185 – 20	20	59	85	88	20090	32.81	629	2904
VF 185 – 30	30	54	83	58	17523	19.54	629	3808
VF 185 – 40	40	44	78	44	23276	20.71	—	4028
VF 185 – 50	50	41	76	35	22125	16.17	—	4046
VF 185 – 60	60	39	74	29	20090	12.56	173	4046
VF 185 – 80	80	33	69	22	18762	9.44	256	4046
VF 185 – 100	100	30	65	18	16815	7.18	629	4046

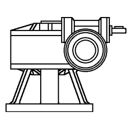
VFR 185

31860 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VFR 185 – 90	53	70	76	33.0	24780	17.08	382	4384
VFR 185 – 120	43	66	70	40.7	31860	29.39	382	4384
VFR 185 – 150	40	59	67	43.8	29205	30.26	382	4384
VFR 185 – 180	38	60	65	46.1	26550	29.85	382	4384
VFR 185 – 240	32	58	59	54.7	24780	36.44	382	4384
VFR 185 – 300	29	44	55	60.3	20355	35.44	382	4384

W/VF 86/185

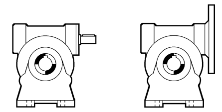
37170 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
W/VF 86/185 – 280	280	31	52	6.3	37170	7.09	191	4384
W/VF 86/185 – 400	400	29	48	4.4	37170	5.38	191	4384
W/VF 86/185 – 600	600	26	45	2.9	37170	3.82	191	4384
W/VF 86/185 – 800	800	26	43	2.2	37170	3.00	191	4384
W/VF 86/185 – 920	920	26	42	1.9	37170	2.67	191	4384
W/VF 86/185 – 1200	1200	20	34	1.5	37170	2.53	191	4384
W/VF 86/185 – 1600	1600	20	35	1.1	37170	1.84	191	4384
W/VF 86/185 – 1840	1840	19	34	1.0	37170	1.65	191	4384
W/VF 86/185 – 2560	2560	16	29	0.7	37170	1.39	191	4384
W/VF 86/185 – 3200	3200	15	24	0.5	37170	1.34	191	4384

Dynamic efficiency included in output values

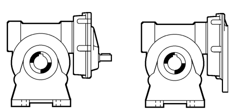
VF 210

30975 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF 210 – 7	7	71	90	250	20355	89.71	1191	3743
VF 210 – 10	10	69	89	175	23453	73.17	1191	4379
VF 210 – 15	15	63	88	117	25223	53.06	1191	5328
VF 210 – 20	20	57	85	88	27435	44.81	247	5989
VF 210 – 30	30	51	83	58	26993	30.10	396	7081
VF 210 – 40	40	42	78	44	30975	27.57	—	7081
VF 210 – 50	50	39	76	35	29205	21.34	—	7081
VF 210 – 60	60	36	73	29	26683	16.92	—	7081
VF 210 – 80	80	31	69	22	25665	12.91	—	7081
VF 210 – 100	100	27	65	18	23895	10.21	—	7081

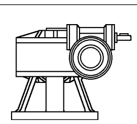
VFR 210

44250 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VFR 210 – 30	30	68	86	58.3	33630	36.19	495	6162
VFR 210 – 45	45	62	83	38.9	36285	26.98	495	7457
VFR 210 – 60	60	56	80	29.2	41595	24.06	495	7756
VFR 210 – 90	90	50	76	19.4	35400	14.37	495	7756
VFR 210 – 120	120	41	70	14.6	44250	14.63	495	7756
VFR 210 – 150	150	38	67	11.7	39825	11.00	495	7756
VFR 210 – 180	180	35	64	9.7	38055	9.17	495	7756
VFR 210 – 240	240	30	59	7.3	34515	6.77	495	7756
VFR 210 – 300	300	26	55	5.8	30090	5.06	495	7756

VF/VF 130/210

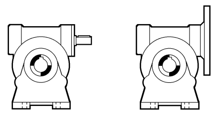
55755 lb·in

	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	**h_s** (%)	**h_d** (%)	**n_2** [rpm]	**T_{n2}** [lb·in]	**P_{n1}** [hp]	**R_{n1}** [lb]	**R_{n2}** [lb]
VF/VF 130/210 – 280	280	30	52	6.3	55755	10.63	337	7756
VF/VF 130/210 – 400	400	28	50	4.4	55755	7.74	337	7756
VF/VF 130/210 – 600	600	26	43	2.9	55755	6.00	337	7756
VF/VF 130/210 – 800	800	25	41	2.2	55755	4.72	337	7756
VF/VF 130/210 – 920	920	24	37	1.9	55755	4.55	337	7756
VF/VF 130/210 – 1200	1200	21	35	1.5	55755	3.69	—	7756
VF/VF 130/210 – 1600	1600	18	32	1.1	55755	3.02	—	7756
VF/VF 130/210 – 1840	1840	19	30	1.0	55755	2.80	—	7756
VF/VF 130/210 – 2560	2560	16	24	0.7	55755	2.52	274	7756
VF/VF 130/210 – 3200	3200	15	22	0.5	55755	2.20	337	7756

Dynamic efficiency included in output values

VF 250

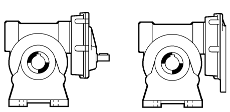
42480 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VF 250 – 7	7	71	91	250	28320	123.45	1574	4916
VF 250 – 10	10	69	90	175	32745	101.02	1574	5683
VF 250 – 15	15	64	88	117	35400	74.47	1574	6816
VF 250 – 20	20	59	86	88	39383	63.58	1574	7618
VF 250 – 30	30	53	84	58	35400	39.01	1574	9127
VF 250 – 40	40	41	79	44	42480	37.33	—	9900
VF 250 – 50	50	36	76	35	39825	29.10	—	10566
VF 250 – 60	60	38	76	29	39825	24.25	—	10566
VF 250 – 80	80	32	71	22	34515	16.87	—	10566
VF 250 – 100	100	29	68	18	32303	13.19	677	10566

VFR 250

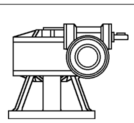
62835 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VFR 250 – 30	30	68	86	58.3	53100	57.15	787	7652
VFR 250 – 45	45	63	84	38.9	56640	41.61	787	9277
VFR 250 – 60	60	58	81	29.2	62835	35.90	787	10372
VFR 250 – 90	90	52	78	19.4	53100	21.00	787	11690
VFR 250 – 120	120	40	71	14.6	61950	20.19	787	11690
VFR 250 – 150	150	35	67	11.7	57525	15.89	787	11690
VFR 250 – 180	180	37	67	9.7	55755	12.84	787	11690
VFR 250 – 240	240	31	61	7.3	47790	9.06	787	11690
VFR 250 – 300	300	28	57	5.8	44250	7.19	787	11690

VF/VF 130/250

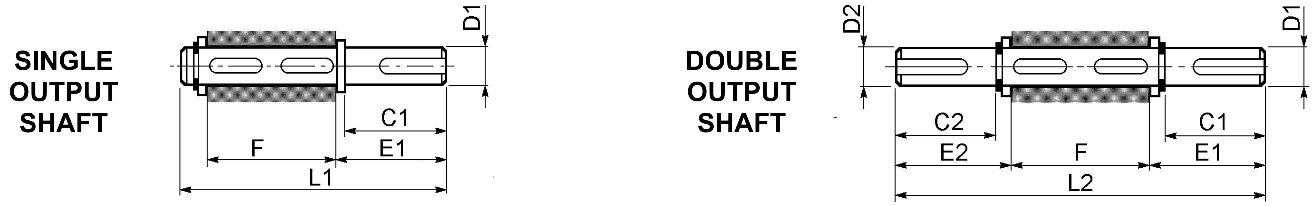
79650 lb·in



	n_1 = **1750** rpm (4 pole motor)							
	i (ratio)	h_s (%)	h_d (%)	n_2 [rpm]	T_{n2} [lb·in]	P_{n1} [hp]	R_{n1} [lb]	R_{n2} [lb]
VF/VF 130/250 – 280	280	29	53	6.3	79650	14.90	337	11690
VF/VF 130/250 – 400	400	27	49	4.4	79650	11.28	337	11690
VF/VF 130/250 – 600	600	26	44	2.9	79650	8.38	337	11690
VF/VF 130/250 – 800	800	24	42	2.2	79650	6.58	337	11690
VF/VF 130/250 – 920	920	23	37	1.9	79650	6.50	337	11690
VF/VF 130/250 – 1200	1200	20	35	1.5	79650	5.27	—	11690
VF/VF 130/250 – 1600	1600	18	32	1.1	79650	4.32	—	11690
VF/VF 130/250 – 1840	1840	18	31	1.0	79650	3.88	—	11690
VF/VF 130/250 – 2560	2560	16	25	0.7	79650	3.46	337	11690
VF/VF 130/250 – 3200	3200	14	21	0.5	79650	3.29	337	11690

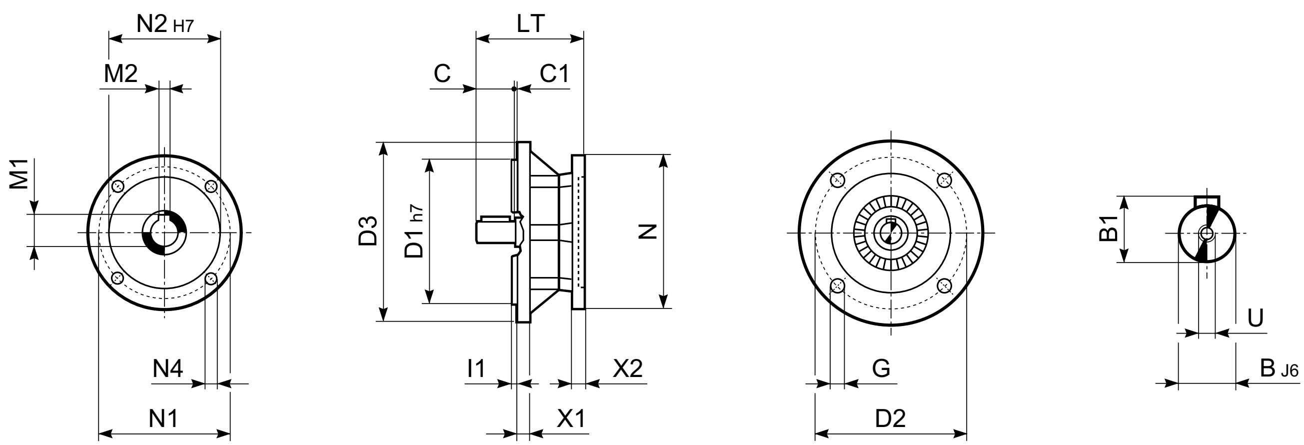
Dynamic efficiency included in output values

Imperial Dimensioned Output Shafts for Worm Gear Reducers



Model	C1	D1	E1	L1	C2	D2	E2	L2	F	KEY
VF 30	1.000 *25.40*	0.500 *12.70*	1.157 *29.40*	3.480 *88.40*	1.000 *25.40*	0.500 *12.70*	1.157 *29.40*	4.480 *113.80*	2.165 *55*	1/8 *3.175*
VF 44	1.563 *39.70*	0.750 *19.05*	1.760 *44.70*	4.516 *114.70*	1.563 *39.70*	0.687 *17.46*	1.759 *44.69*	6.039 *153.39*	2.520 *64*	3/16 *4.763*
VF 49	2.000 *50.80*	1.000 *25.40*	2.197 *55.80*	5.701 *144.80*	2.000 *50.80*	0.9375 *23.81*	2.235 *56.78*	7.779 *197.58*	3.228 *82*	1/4 *6.350*
W 63	2.000 *50.80*	1.125 *28.58*	2.197 *55.80*	7.197 *182.80*	2.000 *50.80*	0.9375 *23.81*	2.106 *53.48*	9.157 *232.58*	4.724 *120*	1/4 *6.350*
W 75	2.375 *60.33*	1.250 *31.75*	2.572 *65.32*	7.847 *199.32*	2.000 *50.80*	1.125 *28.58*	2.157 *54.80*	7.847 *199.32*	5.000 *127*	1/4 *6.350*
W 86	2.375 *60.33*	1.375 *34.93*	2.572 *65.32*	8.438 *214.32*	2.375 *60.32*	1.375 *34.93*	2.533 *64.35*	10.774 *273.67*	5.512 *140*	5/16 *7.938*
W 110	4.312 *109.53*	1.625 *41.28*	4.509 *114.53*	10.966 *278.53*	4.312 *109.53*	1.625 *41.28*	4.422 *112.32*	15.201 *386.10*	6.102 *155*	3/8 *9.525*

IEC Adaptor for Conversion to NEMA C



Motor	IEC	B	B1	B2	C	C1	D1	D2	D3	G	I1	LN	N	N2	M	M2	X1
ENTN56 P63	**63**	11	12.5	4	23	-	95	115	140	8.5	3	58.5	165	114.3	15,875	4.83	7.5
ENTN56 P71	**71**	14	16.0	5	30	3	110	130	160	9	3.5	55.5	165	114.3	15,875	4.83	7
ENTN56 P80	**80**	19	21.5	6	40	3	130	165	200	11	3.5	56.5	165	114.3	15,875	4.83	7
ENTN143T P80	**80**	19	21.5	6	40	2.5	130	165	200	11	3.5	57.1	165	114.3	22,225	4.83	7
ENTN145T P90	**90**	24	27.0	8	50	2.5	130	165	200	11	3.5	57.1	165	114.3	22,225	4.83	7
ENTN182T P100	**100**	28	31.0	8	60	2.5	180	215	250	14	4	78	226	215.9	28,575	6.40	7
ENTN184T P112	**112**	28	31.0	8	60	2.5	180	215	250	14	4	78	226	215.9	28,575	6.40	7
ENTN213T P132	**132**	38	41.0	10	80	-1	230	265	300	13	4	96.5	226	215.9	34,925	7.98	14

Dimension are $\frac{\text{inch}}{\textit{mm}}$

3.0 BONFIGLIOLI ELECTRIC MOTORS

3.1 GENERAL INFORMATION

BONFIGLIOLI RIDUTTORI three-phase AC induction motors and brake motors are designed for continuous operation, IEC dimensional standard and comply electrically with all relevant standards including NEMA MG1.

They are supplied either integral (M type) to a BONFIGLIOLI gear unit or flanged design (BN type).

The motors also comply with national standards adapted to IEC 60034-1 as charted along side.

(C1)

Canada	CSA C22.2 N° 100
Great Britain	BS5000 / BS 4999
Germany	DIN VDE 0530
Australia	AS 1359
Belgium	NBNC 51 - 101
Norway	NEK – IEC 34
France	NF C 51
Austria	OEVE M 10
Switzerland	SEV 3009
Netherlands	NEN 3173
Sweden	SS 426 01 01

Abbreviations and units

Symb.	U.m.	Description
cos φ	–	Power factor
η	–	Efficiency
f_m	–	Intermittence adjustment factor
f_t	–	Ambient temperature factor
I	–	Cyclic duration factor
I_n	[A]	Rated current
I_s	[A]	Locked rotor current
J_c	[lb·ft^2]	Load inertia
J_m	[lb·ft^2]	Motor inertia
n	[rpm]	Speed
K_c	–	Torque factor
K_d	–	Load factor
K_i	–	Inertia factor
T_b	[lb·in]	Brake torque
T_n	[lb·in]	Motor rated torque
T_a	[lb·in]	Mean starting torque
T_k	[lb·in]	Breakdown torque
T_L	[lb·in]	Load torque
T_s	[lb·in]	Locked rotor torque
P_b	[W]	Power absorbed by brake coil
P_n	[W]	Rated power output
t_1	[ms]	Brake release time
t_{1s}	[ms]	Shorter brake release time
t_2	[ms]	Brake reaction time
t_{2c}	[ms]	Faster reaction time
t_a	[°C/ °F]	Ambient temperature
t_f	[min]	Operating time at constant load
t_r	[min]	Rest time
W	[lb•ft]	Brake work between two successive adjustments
W_{max}	[lb•ft]	Max permissible brake work
Z	[1/h]	Permissible starts per hour
Z_0	[1/h]	Permissible starts per hour (unloaded, I=50%)

Conversion table for commonly used metric – imperial units

Length

1 in	=	25.40 mm	= 0.0254 m
1 ft	=	304.8 mm	= 0.3048 m
1 yd	=	914.4 mm	= 0.9144 m

Area

1 in^2	=	645.16 mm^2	= 0.645×10^{-3} m^2
1 ft^2	=	92.9×10^3 mm^2	= 92.9×10^3 m^2
1 yd^2	=	836×10^3 mm^2	= 0.8361 m^2

Volume

1 in^3	=	16.4×10^{-3} dm^3	= 16.4×10^{-6} m^3
1 ft^3	=	28.32 dm^3	= 28.3×10^{-3} m^3

Force – Weight

1 lbm	=	2.2046 Kg
1 lbf	=	4.4482 N

Torque

1 lb in	=	0.1129 Nm
1 lb ft	=	1.3558 Nm

Power

1 hp	=	0.7457 kW

Moment of inertia

1 lb ft^2	=	4.214×10^{-2}	Kg m^2
1 lb in s^2	=	1.12985×10^{-1}	Kg m^2
1 lb ft s^2	=	1.35582	Kg m^2

Pressure – stress

1 lb/in^2	=	6.89×10^{-3}	N/mm^2
1 lb/ft^2	=	47.88	N/m^2

Temperature

t [°F]	=	$\frac{5}{9}\times[t-32]$	[°C]
T [°C]	=	$\left(\frac{9}{5}\times T+32\right)$	[°F]

3.2 ORDERING NUMBERS FOR BONFIGLIOLI MOTORS

MOTOR | BRAKE

M 2SA 4 230/460-60 IP54 CLF ..... W FD 15 R SB 220 SA ....

OPTIONS

BRAKE SUPPLY

AC/DC RECTIFIER
NB, **NBR**, **SB**, **SBR**

BRAKE HAND RELEASE (optional)
R, **RM**

BRAKE TORQUE [specify Nm!]

[1 ft · lb = 1.356 Nm]

BRAKE TYPE
FD (DC brake)
FA (AC brake)

TERMINAL BOX
W (default), N, S, E

MOUNTING
blank for compact motor
B5 for IEC motor

INSULATION CLASS
CL F default

DEGREE OF PROTECTION
IP 55 standard (**IP 54** standard for brake motors)

VOLTAGE - FREQUENCY

NUMBER OF POLES

MOTOR FRAME SIZE

TYPE OF MOTOR

US power mains voltages and the corresponding rated voltages to be specified for the motor are indicated in the following table:

(C2)

Frequency	Mains voltage	V_{mot}
60 Hz	208 V	**200 V**
	240 V	**230 V**
	480 V	**460 V**
	600 V	**575 V**

Motors with YY/Y connection (e.g. 230/460-60; 220/440-60) feature, as standard, a 9-stud terminal board.
For DC brake motors type BN_FD, the rectifieris fed with 1-phase 230V a.c., factory pre-wired in the motor terminal box as standard.

Brake power supply for brake motors is as follows:

(C3)

BN_FD **M_FD**	
Wired to terminal box 1~230V a.c.	
BN_FA **M_FA**	
	Specify
Separate power supply 230V Δ - 60Hz	**230SA**
Separate power supply 460V Y - 60Hz	**460SA**

Tolerances

As per the IEC standards applicable the tolerances here after apply to the following quantities.

(C4)

-0.15 (1 - η) P ≤ 75 hp	Efficiency
-(1 - cosφ)/6 min 0.02 max 0.07	Power factor
±20% *	Slip
+20%	Locked rotor current
-15% +25%	Locked rotor torque
-10%	Max. torque

* ± 30% for motors with Pn < 0.75 hp

CUS

Motors for USA and Canada

BN and M motors are available in NEMA Design C configuration (concerning electrical characteristics), certified to CSA (Canadian standard) C22.2 No. 100 and UL (Underwriters Laboratory) UL 1004. Name plate includes the cCSAus mark (voltage ≤ 600V), in this case, please specify option CUS.

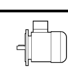
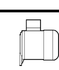
3.3 MECHANICAL CHARACTERISTICS

IP..

Enclosures

Motors are provided as totally enclosed fan-cooled (TEFC) according to NEMA MG1 1-26-2 1998 and they are designed for IP 55 (IP 54 for brake motors) degree of protection in accordance with NEMA MG1- 5 / IEC 60034-5 Standards.
Higher degree of protection (IP 56, or IP 55 for brake motors) is available on request.
The following table provides an overview of the available degree of protection.
Regardless of the protection class specified on order, motors to be installed outdoors require protection against direct sunlight and in addition – when they are to be installed with the shaft downwards – a drip cover to keep out water and solid matter (option **RC**).

(C5)

		IP 54	IP 55	IP 56
		n.a.	standard	at request
BN_FD **BN_FA**	**M_FD** **M_FD**	standard	at request	n.a.

Cooling

The motors are self ventilated (IEC 411 / NEMA MG1-6) and are equipped with a plastic fan working in both directions.
The motors must be installed allowing sufficient space between fan cowl and the nearest wall to ensure free air intake and allow access for maintenance purposes on motor and brake, if supplied.
Independent, forced air ventilation (IEC 416 / NEMA MG1-6) can be supplied on request (option U1).
This solution enables to increase the motor duty factor when driven by an inverter and operating at reduced speed.

Direction of rotation

Rotation is possible in both directions. If terminals U1, V1, and W1 are connected to line phases L1,L2 and L3, clockwise rotation (looking from drive end) is obtained. For counterclockwise rotation, switch two phases.

Noise

Noise levels, measured using the method prescribed by ISO 1680 Standards, are within the maximum levels specified by Standards CEI EN 60034-9.

Vibrations and balancing

Rotor shafts are balanced with half key fitted and fall within the vibration class N, as per Standard CEI EN 60034-14.
If a further reduced noise level is required improved balancing can be optionally requested (class N).
Table below shows the value for the vibration velocity for standard (N) and improved (R) balancing.

(C6)

Vibration class	Angular velocity n [rpm]	Limits of the vibration velocity [mm/s]	
		BN 56…BN 132 M05…M4	**BN 160MR…BN 200 M5**
N	600 ≤ n ≤ 3600	1.8	2.8
R	600 ≤ n ≤ 1800	0.71	1.12
	1800 < n ≤ 3600	1.12	1.8

Values refer to measures with freely suspended motor in unloaded conditions.

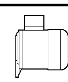
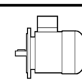
Winding connection and motor terminal box

Standard terminal board has 9 studs for YY-Y dual-voltage winding and 6 studs for star/delta winding configuration (single-speed motors).
An earth terminal located in the terminal box is provided as standard on all motors.

For DC brake motors, the AC/DC rectifier is supplied in the terminal box and it is provided with adequately connected terminals.
All connections must be carried out according to the diagrams inside the terminal box or in the instruction manual.

Cable entry

(C7)

		Cable entry (metric thread)	Max cable diam. [mm]
BN 63	**M 05**	2 x M20	13
BN 71	**M 1**	2 x M25	17
BN 80 - BN 90	**M 2**	2 x M25	17
BN 100	**M 3**	2 x M32	21
		2 x M25	17
BN 112	**-**	2 x M32 2 x M25	17
BN 132...BN 160MR	**M 4**	4 x M32	21
BN 160M...BN 200L	**M 5**	2 x M40	29

Bearings

Life lubricated preloaded radial ball bearings are used, types are shown in the chart here under.
Calculated endurance lifetime L_{10}, as per ISO 281, in unloaded condition, exceeds 40000 hrs.

DE = drive end
NDE = non drive end

(C8)

	DE	NDE	
	M, M_FD, M_FA	M	M_FD, M_FA
M05	6004 2Z C3	6201 2Z C3	6201 2RS C3
M1	6004 2Z C3	6202 2Z C3	6202 2RS C3
M2	6007 2Z C3	6204 2Z C3	6204 2RS C3
M3	6207 2Z C3	6206 2Z C3	6206 2RS C3
M4	6309 2Z C3	6208 2Z C3	6208 2RS C3
M5	6309 2Z C3	6209 2Z C3	6209 2RS C3

(C9)

	DE	NDE	
	BN, BN_FD, BN_FA	BN	BN_FD, BN_FA
BN 56	6201 2Z C3	6201 2Z C3	-
BN 63	6201 2Z C3	6201 2Z C3	6201 2Z C3
BN 71	6202 2Z C3	6202 2Z C3	6202 2Z C3
BN 80	6204 2Z C3	6204 2Z C3	6204 2Z C3
BN 90	6205 2Z C3	6205 2Z C3	6205 2Z C3
BN 100	6206 2Z C3	6206 2Z C3	6206 2Z C3
BN 112	6306 2Z C3	6306 2Z C3	6306 2Z C3
BN 132	6308 2Z C3	6308 2Z C3	6308 2Z C3
BN 160MR	6309 2Z C3	6308 2Z C3	6308 2Z C3
BN 160M/L	6309 2Z C3	6309 2Z C3	6309 2Z C3
BN 180M	6210 2Z C3	6309 2Z C3	6309 2Z C3
BN 180L	6310 2Z C3	6310 2Z C3	6310 2Z C3
BN 200L	6312 2Z C3	6310 2Z C3	6310 2Z C3

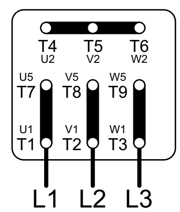
3.4 ELECTRICAL CHARACTERISTICS

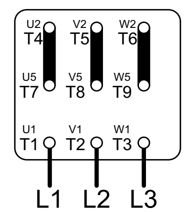
Voltage

Motors can operate on any voltage within the range of 200 – 690 Volts. Voltage to be <600 V for CSA/UL motors. Voltage values available as standard are 230/460V-60 Hz and 575V-60Hz.
Other voltage values may be available on request.

(C10)

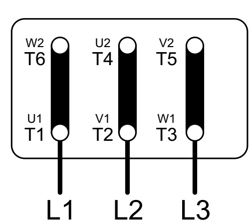
Low Voltage	**High Voltage**
230V - 60Hz	460V - 60Hz
200V - 50Hz	400V - 50Hz
Single-Speed / Dual-Voltage	
Low Voltage YY	High Voltage Y

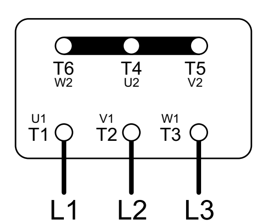




(C11)

Low Voltage	**High Voltage**
200V - 50Hz	346V - 50Hz
208V - 60Hz	360V - 60Hz
220V - 50Hz	380V - 50Hz
230V - 50Hz	400V - 50Hz
240V - 50Hz	415V - 50Hz
330V - 60Hz	575V - 60Hz
Single-Speed / Dual-Voltage	
Low Voltage Δ	High Voltage Y





Rated horsepower

Motor outputs shown in this catalogue are based on continuous operation at 40 °C [104 °F] ambient temperature and maximum elevation not exceeding 3300 feet (1000 m) above the sea level.
Motors can operate at higher ambient temperatures with output adjusted in accordance with tables here below.

(C12)

Ambient temperature [°F]	**100**	**115**	**120**	**130**	**140**
Power output as a % of rated power	100%	95%	90%	85%	80%

Should a derating factor higher than 15% apply, contact our Technical Service.

Insulation class

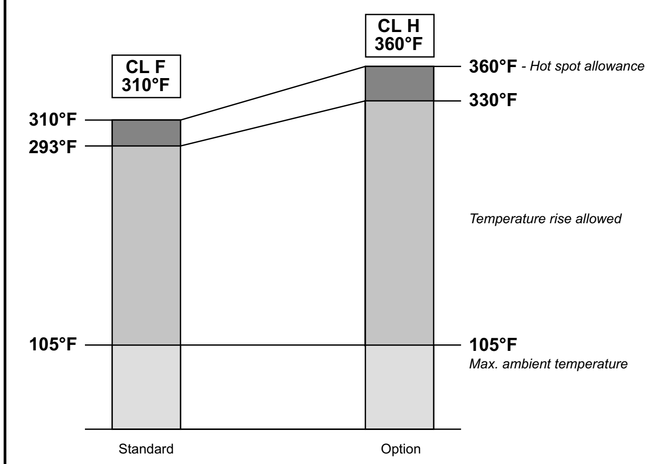
CL F

Bonfiglioli motors use class **F** insulating materials (enamelled wire, insulators, impregnation resins) as compared to the standard motor.

CL H

Motors manufactured in insulation class **H** are available at request.
In standard motors, the stator windings temperature rise normally stays below the 80 K limit corresponding to class B over temperature.
A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration.
For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.

(C13)



Types of duty

Unless otherwise indicated, the power of motors specified in the catalogue refers to continuous duty S1.
For motors used under conditions other than S1, the type of duty required is definied with reference to CEI EN 60034-1 Standards.
In particular, for duties S2 and S3, power can be adjusted with respect to continuous duty according to data in table (C14) applicable to single speed motors.

(C14)

	Duty						
	S2			**S3 ***			**S4 - S9**
	Cycle duration (min)			Cyclic duration factor (I)			Consult factory
	10	**30**	**60**	**25%**	**40%**	**60%**	
f_m	1.35	1.15	1.05	1.25	1.15	1.1	

* Cycle duration must, in any event, be equal to or less than 10 minutes; if this time is exceeded, please contact our Technical Service.

Cycle duration factor:

$$I = \frac{t_f}{t_f + t_r} \times 100$$

t_f = operating time at constant load
t_r = rest time

Limited duration duty S2

This type of duty is characterized by operation at constant load for a limited time, which is shorter than the time required to reach thermal equilibrium, followed by a rest period of sufficient duration to restore ambient temperature in the motor.

Periodical intermittent duty S3

This type of duty is characterized by a sequence of identical operation cycles, each including a constant load operation period and a rest period.
For this type of duty, the starting current does not significantly influence overtemperature.

Inverter-controlled motors

The electric motors of series BN and M may be used in combination with PWM inverters with rated voltage at transformer input up to 500 V.Standard motors use a phase insulating system with separators, class 2 enamelled wire and class H impregnation resins (1600V peak-to-peak voltage pulse capacity and rise edge t_s > 0.1µs at motor terminals). Table (C22) shows the typical torque/speed curves referred to S1 duty for motors with base frequency f_b = 60 Hz.
Because ventilation is somewhat impaired in operation at lower frequencies (approx. 30 Hz), standard motors with incorporated fan (IC411) require adequate torque derating or - alternately - the addition of a separate supply fan cooling.
Above base frequency, upon reaching the maximum output voltage of the inverter, the motor enters a steady-power field of operation, and shaft torque drops with ratio (f/f_b).
As motor maximum torque decreases with $(f/f_b)^2$, the allowed overloading must be reduced progressively.

(C15)

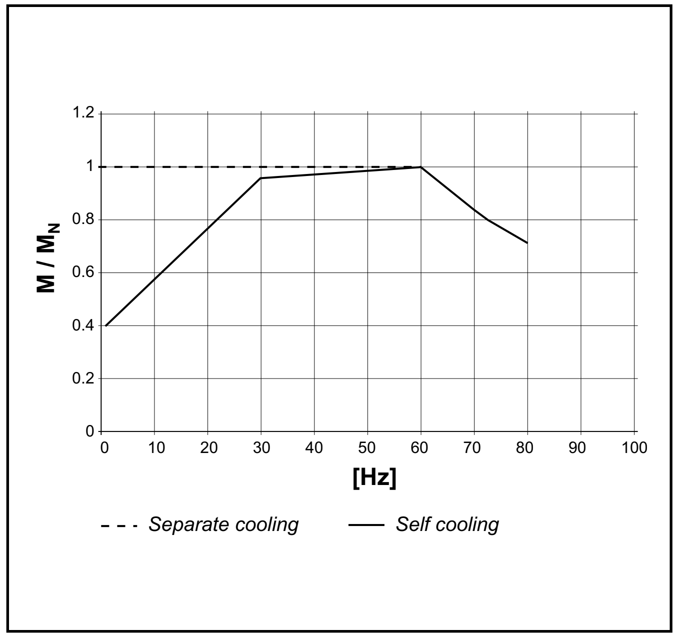
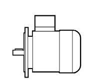
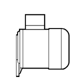


Table (C16) reports the mechanical limit speed for motor operation above rated frequency:

(C16)

		n [rpm]		
		2p	4p	6p
≤ **BN 112**	M05…M3	5200	4000	3000
BN 132...BN 200L	M4, M5	4500	4000	3000

Above rated speed, motors generate increased mechanical vibration and fan noise. Class R rotor balancing is highly recommended in these applications. Installing a separate supply fan cooling may also be advisable.

Indipendent fan cooling and brake (if fitted) must always be connected direct to mains power supply.

Permissible starts per hour Z

The rating charts of brakemotors lend the permitted number of starts Z_0, based on 50% intermittence and for unloaded operation.
The catalogue value represents the maximum number of starts per hour for the motor without exceeding the rated temperature for the insulation class F.
To give a practical example for an application characterized by inertia J_c, drawing power P_r and requiring mean torque at start-up T_L the actual number of starts per hour

for the motor can be calculated approximately through the following equation:

$$Z = \frac{Z_0 \times K_c \times K_d}{K_J}$$

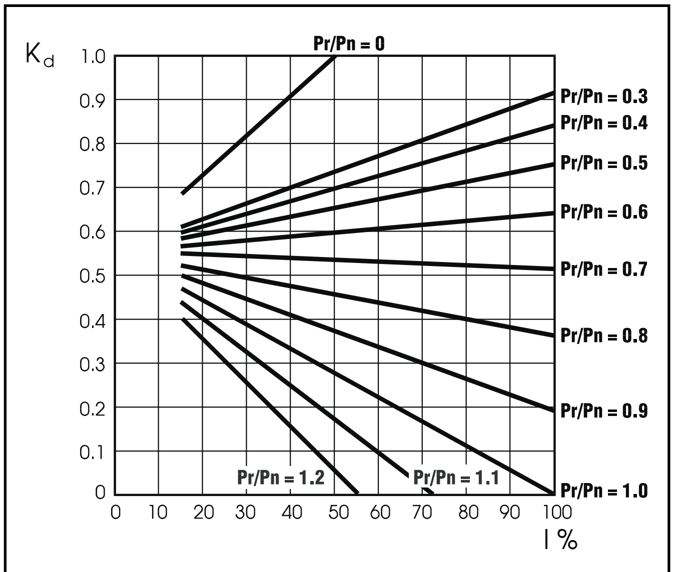
where:

$$K_J = \frac{J_m + J_c}{J_m} = \text{inertia factor}$$

$$K_c = \frac{T_a - T_L}{T_a} = \text{torque factor}$$

K_d = load factor (see table C17)

(C17)



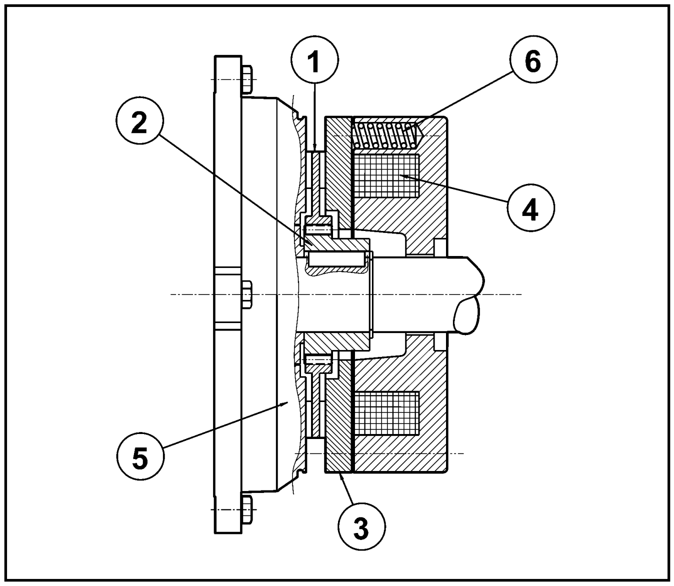
If actual starts per hour is within permitted value (Z) it may be worth checking that braking work is compatible with brake (thermal) capacity W_{max} also given in table (C22) and dependent on the number of switches (s/h).

3.5 BRAKE MOTORS

Operation

Versions with incorporated brake use spring-applied DC (FD option) or AC (FA option) brakes.
All brakes are designed to provide fail-safe operation, meaning that they are applied by spring-action in the event of a power failure.

(C18)



Key:
① brake disc
② disc carrier
③ pressure plate
④ brake coil
⑤ motor rear shield
⑥ brake springs

When power is disconnected, the springs push the armature plate against the brake disc. The disc becomes trapped between the armature plate and motor shield and stops the shaft from rotating.
When the coil is energized, a magnetic field attracts the armature plate, so that the brake disc – which is integral with the motor shaft – is released.

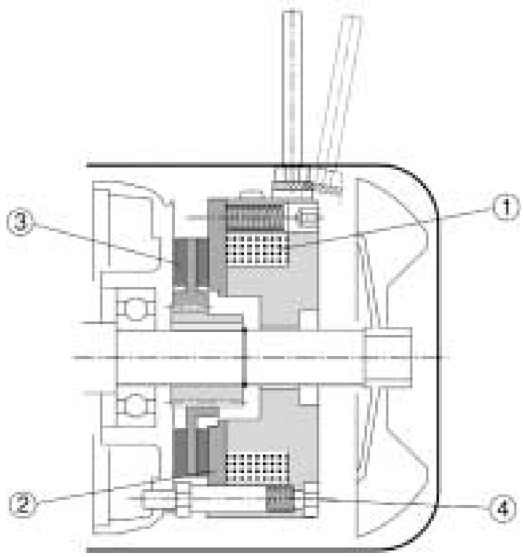
Most significant features

- High braking torques (normally $T_b \approx 2\ T_n$), braking torque adjustment.
- Steel brake disc with double friction lining (low-wear, asbestos-free lining).
- Hexagonal socket head on motor shaft end (N.D.E.) for manual rotation (not compatible with options PS, RC, TC, U1, U2, EN1, EN2, EN3).
- Manual release lever.
- Corrosion-proof treatment on all brake surfaces.
- Class F insulation

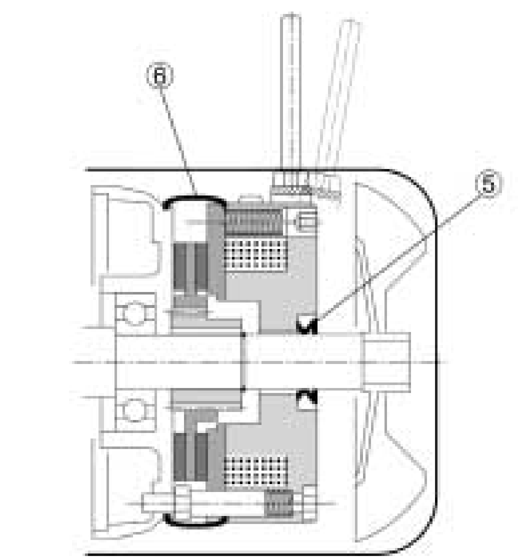
3.6 DC BRAKE MOTORS TYPE BN_FD

Frame sizes: BN 63 … BN 200L

(C19)



IP 54 (DEFAULT FOR BRAKE MOTORS)



IP 55 (OPTIONAL ON BRAKE MOTORS)

Direct current electromagnetic brake bolted onto motor shield. Preloading springs provide axial positioning of magnet body.
Brake disc slides axially on steel hub fitted onto motor shaft with anti-vibration spring.
Brake torque factory setting is indicated in the corresponding motor rating charts.
Braking torque may be modified by changing the type and/or number of springs.
At request, motors may be equipped with manual release lever with automatic return (**R**) or system for holding brake in the released position (**RM**).

See variant at page 61 for available release lever locations.

FD brakes ensure excellent dynamic performance with low noise. DC brake operating characteristics may be optimized to meet application requirements by choosing from the various rectifier/power supply and wiring connection options available.

Degree of protection

Standard degree of protection is IP54.
Brake motor FD is also available in **IP 55**, which incorporates the following variants:

① V-ring at N.D.E. of motor shaft

② dust and water-proof rubber boot

③ stainless steel shim placed between motor shield and brake disc

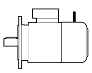
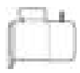
④ stainless steel hub

⑤ stainless steel brake disc

FD brake power supply

A rectifier housed into the terminal box feeds the DC brake coil. Wiring connection across rectifier and brake coil is performed at the factory.
On single-speed motors, rectifier is pre-wired to the motor terminal board.
Rectifier standard power supply voltage V_B is as indicated in the following table (C20), regardless of mains frequency:

(C20)

2, 4, 6 P					1 speed
		BN_FD / M_FD V_{mot} ± 10% 3 ~	V_B ± 10% 1 ~	brake connected to terminal board power supply	separate power supply
BN 63…BN 200	**M05...M5**	230/460 V – 60 Hz	230 V	standard	specify **V_B SA** or **V_B SD**

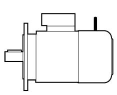
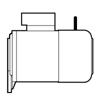
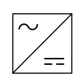
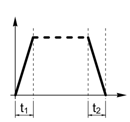
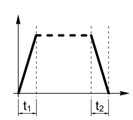
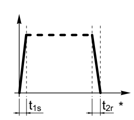
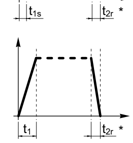
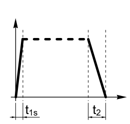
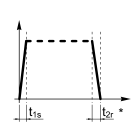
The diode half-wave rectifier ($V_{dc} \approx 0{,}45 \times V_{ac}$) is available in versions **NB**, **SB**, **NBR** e **SBR**, as detailed in the table (C21). Rectifier **SB** with electronic energizing control over-energizes the electromagnet upon power-up to cut brake release response time and then switches to normal half-wave operation once the brake has been released.

Use of the **SB** rectifier is mandatory in the event of:

- high number of operations per hour
- reduced brake release response time
- brake is exposed to extreme thermal stress

Rectifiers **NBR** or **SBR** are available for applications requiring quick brake release response.
These rectifiers complement the **NB** and **SB** types as their electronic circuit incorporates a static switch that de-energizes the brake quickly in the event voltage is missing.
This arrangement ensures short brake release response time with no need for additional external wiring and contacts.
Optimum performance of rectifiers **NBR** and **SBR** is achieved with separate brake power supply.
Available voltages: 230V ± 10%.

(C21)

		Brake	 Standard		At request	
BN 63	**M05**	**FD 02**	**NB**		**SB,**	
BN 71	**M1**	**FD 03**				
		FD 53				
BN 80	**M2**	**FD 04**			**SBR,**	
BN 90S	**—**	**FD 14**				
BN 90L	**—**	**FD 05**			**NBR**	
BN 100	**M3**	**FD 15**				
—		**FD 55**	**SB**		**SBR**	
BN 112	**—**	**FD 06S**				
BN 132...160MR	**M4**	**FD 56**				
BN 160L - BN 180M	**M5**	**FD 06**				
BN 180L - NM 200L	**—**	**FD 07**				

(*) $t_{2c} < t_{2r} < t_2$

FD brake technical specifications

The table (C22) shows the technical specifications of DC brakes type FD.

(C22)

Brake	Motor		Brake torque T_b [lb·in] Springs			Release		Braking		Wmax per each brake operation [lb·ft]			W	P
						t_1	t_{1s}	t_2	t_{2c}					
			6	4	2	[ms]	[ms]	[ms]	[ms]	10 c/h	100 c/h	1000 c/h	[lb·ftx10^6]	[W]
FD02	**BN 63**	**M05**	—	31	15	30	15	80	9	3300	1050	130	11	17
FD03	**BN 71**	**M1**	44	31	15	50	20	100	12	5200	1400	170	18	24
FD53			66	44	22	60	30	100	12					
FD04	**BN 80**	**M2**	133	88	44	80	35	140	15	7400	2300	260	27	33
FD14	**BN90S**	**—**												
FD05	**BN 90L**	**—**	354	230	115	130	65	170	20	13300	3300	370	37	45
FD15	**BN 100**	**M3**	354	230	115	130	65	170	20					
FD55			487	327	159	—	65	170	20					
FD06S	**BN 112**	**—**	831	354	177	—	80	220	25	15000	3500	400	52	55
FD56	**BN 132… BN 160MR**	**M4**	—	664	327	—	90	150	20	21500	5500	600	59	65
FD06				885	443		100	150	20					
FD07			1328	885	443	—	120	200	25	29500	6900	750	96	65
FD08*	**BN 160L BN 180M**	**M5**	2200	1770	1500	—	140	350	30	44500	10300	1100	170	100
FD09**	**BN 180L BN 200L**	**—**	3540	2650	1770	—	200	450	40	51500	7600	1250	170	120

∗ brake torque values obtained with 9, 7 and 6 springs, respectively

∗∗ brake torque values obtained with 12, 9 and 6 springs, respectively

Key:

t_1 = brake release time with half-wave rectifier

t_{1s} = brake release time with over-energizing rectifier

t_2 = brake engagement time with AC line disconnect and separate power supply

t_{2c} = brake engagement time with AC and DC line disconnect.
Values for t_1, t_{1s}, t_2, t_{2c} indicated in the tab. (C23) are referred to brake set at maximum torque, medium air gap and rated voltage

W_{max} = max energy per each brake operation

W = braking energy between two successive air gap adjustments

P_b = brake power absorption at normal ambient temperature

T_b = static braking torque (±15%)

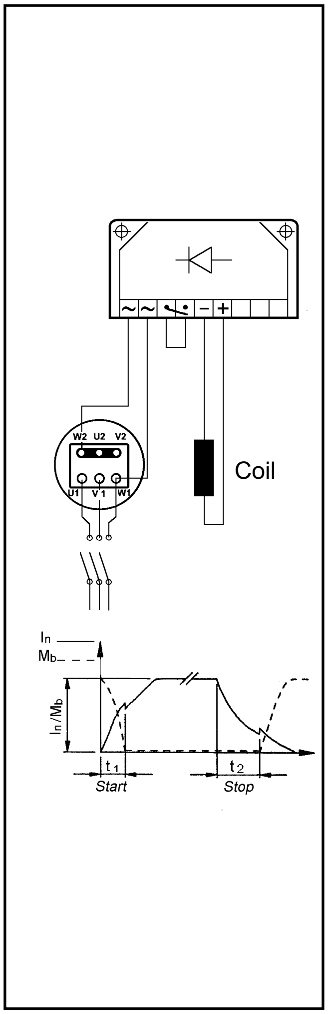
[s/h] = starts per hour

FD brake connections

On standard single-speed motors, the rectifier is connected to the motor terminal board at the factory.

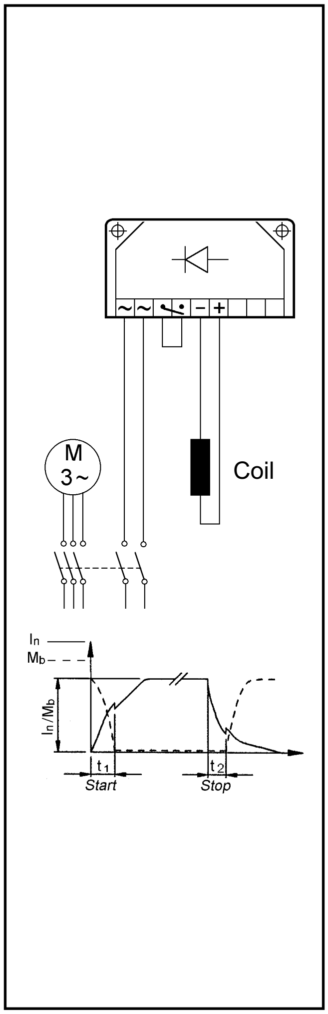
Because the load is of the inductive type, brake control and DC line switch must use contacts from the usage class AC-3 to IEC 60947-4-1.

(C23)



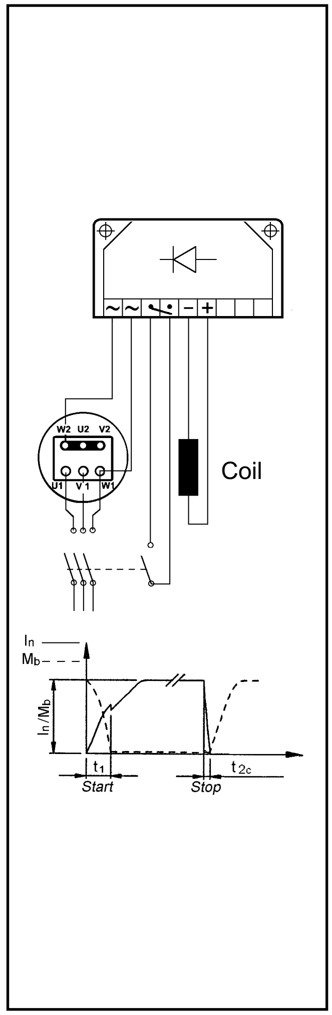
Brake supply from motor terminals and A.C. line disconnect. Longer stop time t_2, dependent on motor time constants. Use when no particular braking performance is required.

(C24)



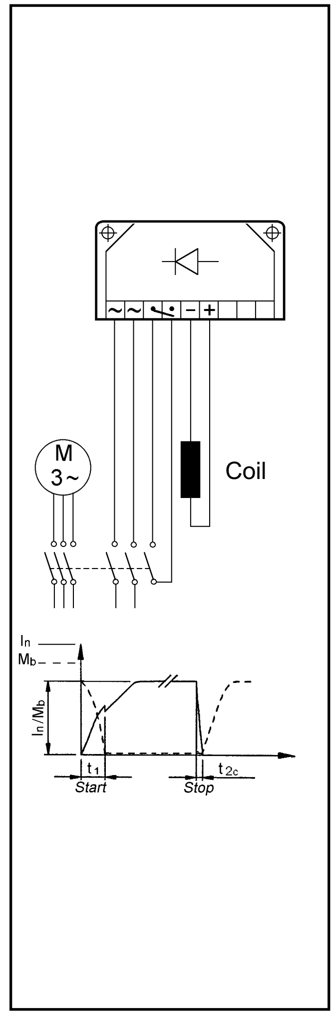
Separate power supply to brake coil and A.C. line disconnect.
Stopping time is independent on motor. See table C22

(C25)



Brake coil energized from motor terminals, both A.C. and D.C. line switch off.
Rapid stopping time, t_{2c}. See table C22

(C26)

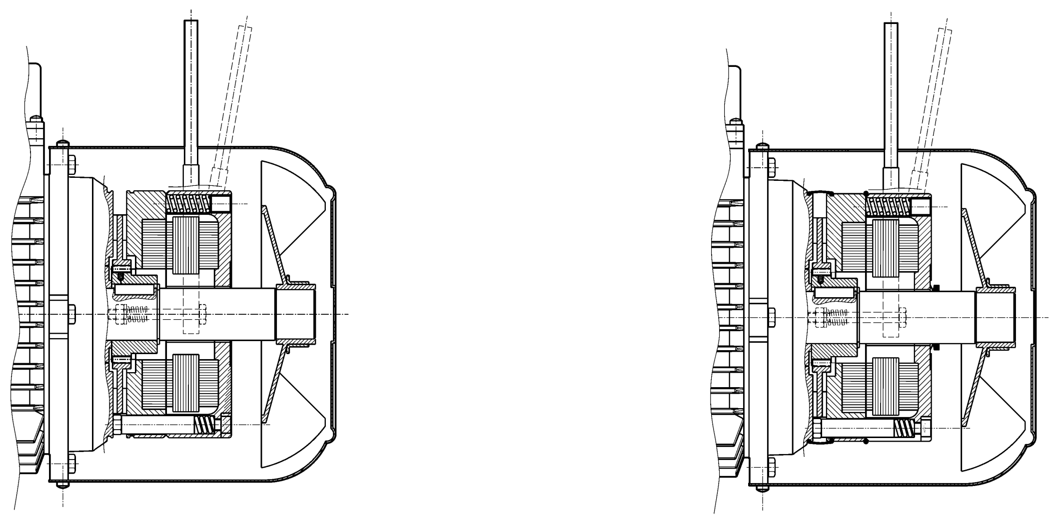


Separate power supply to brake coil. Both A.C. and D.C. line disconnect.
Rapid stopping time to t_{2c} value, see table C22

3.7 AC BRAKE MOTORS TYPE BN_FA

Frame sizes: BN 63 … BN 180M

(C27)



IP 54 IP 55

Electromagnetic brake operates from three-phase **alternated current** power supply and is bolted onto motor rear shield. Preloaded springs provide axial positioning of the magnet body.
Steel brake disc slides axially on steel hub fitted onto motor shaft with anti-vibration spring.
Brake torque factory setting is indicated in the corresponding motor rating charts.
Spring preloading screws provide stepless braking torque adjustment.
Torque adjustment range is 30% $T_{bMAX} < T_b < T_{bMAX}$ (where T_{bMAX} is maximum braking torque as shown in tab. (C29).
Thanks to their high dynamic characteristics, FA brakes are ideal for heavy-duty applications as well as applications requiring frequent stop/starts and fast response time.

Motors may be equipped with manual release lever with automatic return (**R**) at request. See variants at page 61 for available lever locations.

Degree of protection

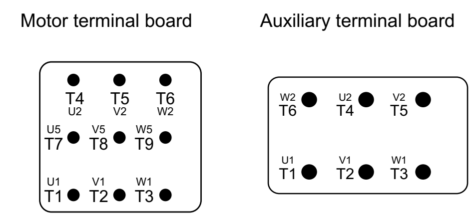
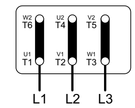
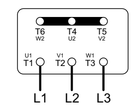
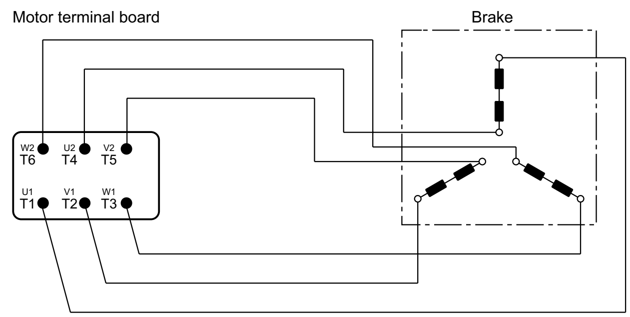
Standard degree of protection is IP54.
Brake motor BN_FA is also available in degree of protection **IP 55**, which incorporates the following variants:

- V-ring at N.D.E. of motor shaft
- water-proof rubber grommet
- O-ring

FA brake power supply

Depending on motor voltage the brake may require the supply voltage to be specified, or not, as detailed in the chart below. Special voltages in the 24...690 V range may be available on request.

(C28)

Motor voltage - V_{mot}	Brake voltage - V_B	Specify	Brake wiring scherme	
230/460 V YY/Y 60 Hz	230 Δ - 60 Hz	**230SA**		Δ Connected 
	460 Y - 60 Hz	**460SA**		**Y** Connected 
330/575 V Δ/Y 60 Hz	330/575 V Δ/Y 60 Hz	not required		

Technical specifications of FA brakes

(C29)

Brake	Motor		Brake torque T_b [lb·in]	Release t_1 [ms]	Braking t_2 [ms]	Wmax [lb·ft] 10 s/h	100 s/h	1000 s/h	W [lb·ftx10^6]	P_b [VA]
FA 02	**BN 63**	**M05**	31	4	20	4500	1400	180	15	60
FA 03	**BN 71**	**M1**	66	4	40	7000	1900	230	25	80
FA 04	**BN 80**	**M2**	133	6	60	10000	3100	350	30	110
FA 14	**BN 90S**	**—**								
FA 05	**BN 90L**	**—**	354	8	90	18000	4500	500	50	250
FA 15	**BN 100**	**M3**								
FA 06S	**BN 112**	**—**	530	16	120	20000	4800	550	70	470
FA 06	**BN 132S**	**M4S**	663	16	140	29000	7400	800	80	550
FA 07	**BN 132M** **BN 160MR**	**M4L**	1328	16	180	40000	9300	1000	130	600
FA 08	**BN 160L** **BN 180M**	**M5**	2200	20	200	60000	14000	1500	230	1200

Key:
T_b = max static braking torque (±15%)
t_1 = brake release time
t_2 = brake engagement time
W_{max} = max energy per brake operation (brake thermal capacity)
W = braking energy between two successive air gap adjustments
P_b = power drawn by brake at 20° (50 Hz)
[s/h] = starts per hour

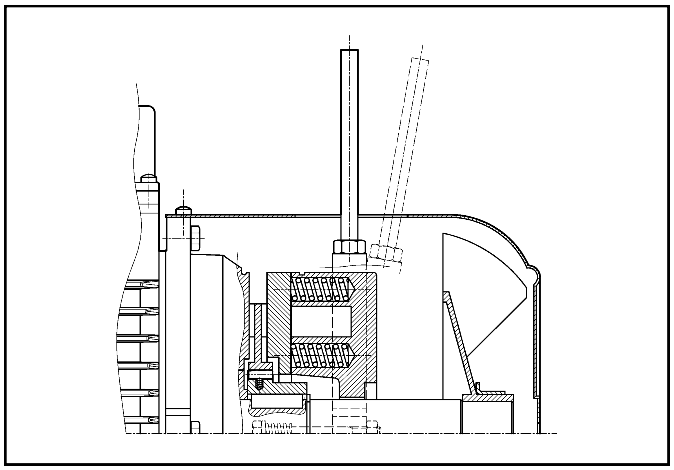
NOTE
Values t_1 and t_2 in the table refer to a brake set at rated torque, medium air gap and rated voltage.

3.8 - BRAKE RELEASE SYSTEMS

Spring-applied brakes type **FD** and **FA** may be equipped with optional manual release devices. These are typically used for manually releasing the brake before servicing any machine or plant parts operated by the motor.

R

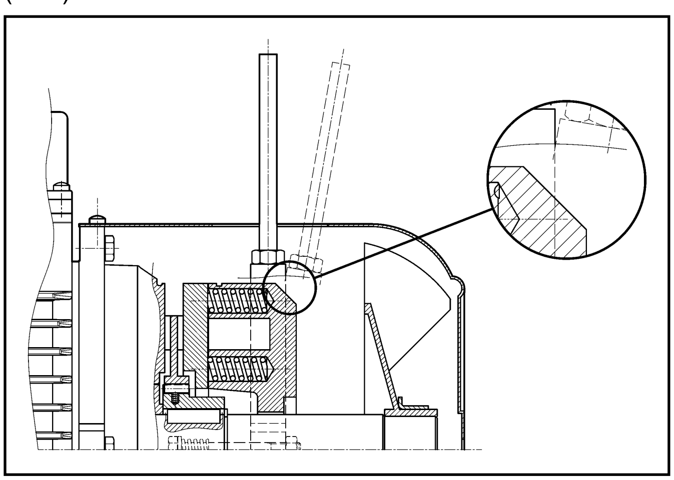
(C30)



A return spring brings the release lever back in the original position.

RM

(C31)



On motors type BN_FD, it the option RM is specified, the release lever may be locked in the "release" position by tightening the lever until lever end becomes engaged with a brake housing projection.

The availability for the two lever options is charted here below:

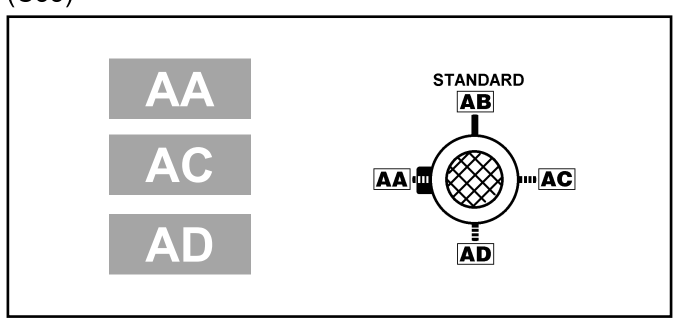
(C32)

	R	RM
BN_FD	BN 63...BN 200	BN 63...BN 160MR
M_FD	M 05...M 5	M 05...M 4LC
BN_FA	BN 63...BN 180M	n.a.
M_FA	M 05...M 5	

Release lever arrangement

Unless otherwise specified, the release lever is located 90° away from the terminal box – identified by letters [**AB**] in the diagram below – in a clockwise direction on both options **R** and **RM**.
Alternative lever positions [**AA**], [**AC**] and [**AD**] are also possible when the corresponding option is specified:

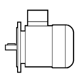
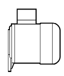
(C33)



Fly-wheel data (F1)

The table below shows values of weight and inertia of flywheel (option F1). Overall dimensions of motors remain unchanged. The option is available for DC brake-motors only.

(C34)

Main data for flywheel			
		Fly-wheel weight [lbs]	Fly-wheel inertia [lb • ft^2] x 10^{-5}
BN 63	**M05**	0.31	2.7
BN 71	**M1**	0.51	5.7
BN 80	**M2**	0.76	11.4
BN 90 **BN 90 L**	–	1.14	22.3
BN 100	**M3**	1.58	35.4
BN 112	–	2.19	62.4
BN 132 S **BN 132 M**	**M4**	2.81	108.6

3.9 - SPECIAL EXECUTIONS

Thermal protective devices

In addition to the standard protection provided by the magneto-thermal device, motors can be supplied with built-in thermal probes to protect the winding against overheating caused, by insufficient ventilation or by an intermittent duty.
This additional protection should always be specified for servoventilated motors (IC416).

E3

Thermistors

These are semi-conductors having rapid resistance variation when they are close to the rated switch off temperature.
Variations of the R = f(T) characteristic are specified under DIN 44081, IEC 34-11 Standards.
These elements feature several advantages: compact dimensions, rapid response time and, being contact-free, absolutely no wear.
Positive temperature coefficient thermistors are normally used (also known as PTC "cold conductor resistors").
Unlike bimetallic thermostates, they cannot directly intervene on currents of energizing coils, and must therefore be connected to a special control unit (triggering apparatus) to be interfaced with the external connections.
Thus protected, three PTCs connected in series are installed in the winding, the terminals of which are located on the auxiliary terminal-board.

Bimetallic thermostates

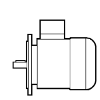
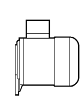
These types of protective devices house a bimetal disk. When the rated switch off temperature is reached, the disk switches the contacts from their initial rest position.
As temperature falls, the disk and the contacts automatically return to rest position.
Three bimetallic thermostates connected in series are usually employed, with normally closed contacts. The terminals are located in an auxiliary terminal-board.

H1

Anti-condensation heaters

Where an application involves high humidity or extreme temperature fluctuation, motors may be equipped with an anti-condensate heater.
A single-phase power supply is available in the auxiliary terminal board inside the main terminal box. Values for the absorbed power are listed here below:

(C35)

		H1 1~ 230V ± 10% P [W]
BN 56...BN 80	**M0...M2**	10
BN 90...BN 160MR	**M3 - M4**	25
BN 160M...BN 180M	**M5**	50
BN 180L...BN 200L	**–**	65

Warning!
Always disconnect power supply to the anti-condensate heater before operating the motor.

AL **AR**

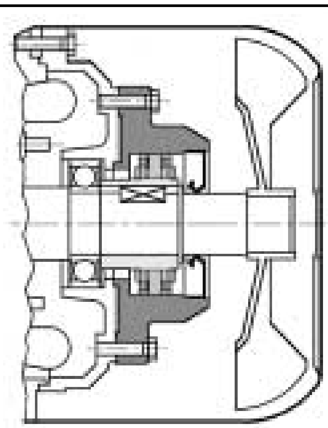
Backstop device

For applications where backdriving must be avoided, motors equipped with an anti run-back device can be used (available for the M series only).
While allowing rotation in the direction required, this device operates instantaneously in case of a power failure, preventing the shaft from running back.
The anti run-back device is life lubricated with special grease for this specific application.
When ordering, customers should indicate the required rotation direction, AL or AR.
Never use the anti run-back device to prevent reverse rotation caused by faulty electrical connection.
Table (C36) shows rated and maximum locking torques for the anti run-back devices.
A diagram of the device can be seen in Table (C37).
Overall dimensions are same as the corresponding brake motor.

(C36)

	Rated locking torque [lb·in]	Max. locking torque [lb·in]	Release speed [rpm]
M1	53	90	750
M2	140	240	650
M3	480	815	520
M4	970	1815	430

(C37)



Ventilation

Motors are cooled through outer air blow (IC 411 according to CEI EN 60034-6) and are equipped with a plastic radial fan, which operates in both directions.
Ensure that fan cover is installed at a suitable distance from the closest wall so to allow air circulation and servicing of motor and brake, if fitted.
On request, motors can be supplied with independently power-supplied forced ventilation system starting from BN 71 or M1 size.
Motor is cooled by an axial fan with independent power supply and fitted on the fan cover (IC 416 cooling system).
This version is used in case of motor driven by inverter so that constant torque operation is possible even at low speed or when high starting frequencies are needed.
Motors with rear shaft projection (PS option) are excluded.

(C38)

Power supply					
		V a.c. ± 10%	**Hz**	**P** [W]	**I** [A]
BN 71	**M1**	1~ 230	50 / 60	22	0.14
BN 80	**M2**			22	0.14
BN 90	–			40	0.25
BN 100 (*)	**M3**			50	0.25
BN 112	–	3~ 230 Δ / 400Y		50	0.26 / 0.15
BN 132S	**M4S**			110	0.38 / 0.22
BN 132M... BN160MR	**M4L**				
BN 160... BN 180M	**M5**	3~460	60	210	1.25 / 0.72

This variant features two options, designated **U1** and **U2**, having the same lenght overall.
Longer side of fan cover (ΔL) is specified for both models in the table below. Overall dimension can be reckoned from motor size table.

(C39)

Extra length for servoventilated motors			[in]
		Δ L_1 add for standard motor	Δ L_2 add for brakemotor
BN 71	**M1**	3.66	1.26
BN 80	**M2**	5.00	2.17
BN 90	**–**	5.16	1.89
BN 100	**M3**	4.69	1.10
BN 112	**–**	5.12	1.22
BN 132S	**M4S**	6.34	2.01
BN 132M	**M4L**	6.34	2.01

U1

Fan wiring terminals are housed in a separate terminal box.
In brake motors of size BN 71...BN 160MR, with **U1** model, the release lever cannot be positioned to AA.

U2

Fan terminals are wired in the motor terminal box.
The option does not apply to BN160M...BN200L motors.

(C40)

(*)			**V a.c.** ± 10%	**Hz**	**P** [W]	**I** [A]
	BN 100_U2	**M3**	3~ 230 Δ / 400Y	50 / 60	40	0.24 / 0.14

RC

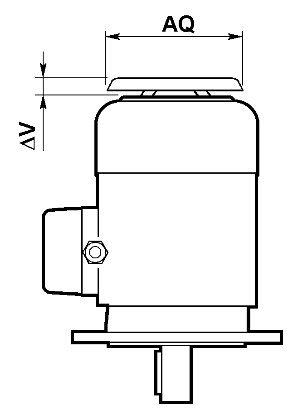
Drip cover

The drip cover protects the motor from dripping and avoids the ingress of solid bodies. It is recommended when motor is installed in a vertical position with the shaft downwards.
Relevant dimensions are indicated in the table (C41).
The drip cover is not compatible with variants PS, EN1, EN2, EN3 and will not fit motors equipped with a BA brake.

(C41)

		AQ [in]	**ΔV** [in]
BN 63	**M05**	118	24
BN 71	**M1**	134	27
BN 80	**M2**	134	25
BN 90	**–**	168	30
BN 100	**M3**	168	28
BN 112	**–**	211	32
BN 132...BN 160MR	**M4**	211	32
BN 160M...BN 180M	**M5**	270	36
BN 180L...BN 200L	**–**	310	36

(C42)



TC

Textile canopy

Option TC is a cover variant for textile industry environments, where lint may obstruct the fan grid and prevent a regular flow of cooling air.
This option is not compatible with variants EN1, EN2, EN3. Overall dimensions are the same as drip cover type RC.

Feedback units

Motors may be combined with three different types of encoders to achieve feedback circuits.
Configurations with double-extended shaft (PS) and rain canopy (RC, TC) are not compatible with encoder installation.

EN1

Incremental encoder, V_{IN}= 5 V, line-driver output RS 422.

EN2

Incremental encoder, V_{IN}=10-30 V, line-driver output RS 422.

EN3

Incremental encoder, V_{IN}=12-30 V, push-pull output 12-30 V.

(C43)

		EN1	EN2	EN3
Interface		RS 422	RS 422	push-pull
Power supply voltage	[V]	4...6	10...30	12...30
Output voltage	[V]	5	5	12...30
No-load operating current	[mA]	120	100	100
No. of pulses per revolution		1024		
No. of signals		6 (A, B, C + inverted signals)		
Max. output frequency	[kHz]	300	300	200
Max. speed	[rpm]	600 (900 rpm x 10s)		
Temperature range	[°C]	-20...+70		
Protection class		IP 65		

3.10 COMPACT MOTOR RATING CHARTS

2 POLE - 3600 rpm - S1

60 Hz

P_n			n	T_n	η	cosφ	I_n at 460V	I_s / I_n	T_s / T_n	T_k / T_n	J_m lb·ft²		Brake type	T_b	Z_o 1/h		Weight IM B9 lbs	
HP	kW		rpm	lb·in	%		A	%	%	%	1)	2)		lb·in	3)	4)	1)	2)
0.25	0.18	**M 05A 2**	3380	4.7	60	0.74	0.53	410	300	320	0.0048	0.0062	FD 02	15	2700	3300	7.1	10.8
0.33	0.25	**M 05B 2**	3400	6.1	65	0.75	0.63	490	320	330	0.0055	0.0071	FD 02	15	2700	3300	7.9	11.7
0.5	0.37	**M 05C 2**	3420	9.2	69	0.76	0.89	550	330	350	0.0062	0.0078	FD 02	30	2500	3000	10.6	14.3
0.75	0.55	**M 1SD 2**	3450	13.7	76	0.75	1.23	620	340	390	0.0097	0.0126	FD 03	44	2200	2700	12.8	18.7
1	0.75	**M 1LA 2**	3440	18.3	77	0.75	1.62	620	380	410	0.0119	0.0145	FD 03	44	1500	2100	15.2	21
1.5	1.1	**M 2SA 2**	3430	27.6	77	0.76	2.40	620	380	390	0.0214	0.0252	FD 04	88	1200	1600	19.4	28
2	1.5	**M 2SB 2**	3420	36.8	80	0.81	2.89	600	330	350	0.0271	0.0309	FD 04	133	1000	1300	23	32
3	2.2	**M 3SA 2**	3430	55	81	0.83	4.2	600	240	250	0.0570	0.0665	FD 15	230	800	1000	34	49
5	3.7	**M 3LB 2**	3490	92	84	0.83	6.7	670	290	320	0.0926	0.102	FD 15	354	360	500	49	62
7.5	5.5	**M 4SA 2**	3490	135	83	0.86	9.8	640	270	300	0.240	0.266	FD 06	440		400	72	101
10	7.5	**M 4SB 2**	3490	181	82	0.88	13.0	620	280	320	0.318	0.344	FD 06	440		350	88	117
15	11	**M 4LC 2**	3510	271	87	0.88	18.3	690	270	300	0.499						132	
20	15	**M 5SB 2**	3510	359	86	0.90	24.2	600	250	270	0.808						154	
25	18.5	**M 5SC 2**	3520	449	88	0.91	29.2	690	280	300	0.998						183	
30	22	**M 5LA 2**	3520	537	88	0.91	35.1	690	280	310	1.164						209	

4 POLE - 1800 rpm - S1

60 Hz

P_n			n	T_n	η	cosφ	I_n at 460V	I_s / I_n	T_s / T_n	T_k / T_n	J_m lb·ft²		Brake type	T_b	Z_o 1/h		Weight IM B9 lbs	
HP	kW		rpm	lb·in	%		A	%	%	%	1)	2)		lb·in	3)	4)	1)	2)
0.12	0.09	**M 0B 4**	1670	4.5	59	0.52	0.37	280	290	290	0.0356						6.4	
0.16	0.12	**M 05A 4**	1690	6.0	60	0.57	0.44	330	240	250	0.0048	0.0062	FD 02	15	7000	9000	7.1	10.8
0.25	0.18	**M 05B 4**	1670	9.4	58	0.60	0.65	320	280	290	0.0055	0.0071	FD 02	30	7000	9000	7.9	11.7
0.33	0.25	**M 05C 4**	1670	12.4	64	0.64	0.77	330	250	260	0.0078	0.0093	FD 02	30	6000	8000	10.6	14.3
0.50	0.37	**M 1SD 4**	1700	18.5	66	0.73	0.96	450	260	280	0.0164	0.0190	FD 03	44	4800	7500	12.1	18.1
0.75	0.55	**M 1LA 4**	1710	27.6	72	0.70	1.37	490	300	310	0.0216	0.0242	FD 53	66	3400	7000	15.2	21
1	0.75	**M 2SA 4**	1720	36.6	78	0.75	1.61	620	340	350	0.0482	0.0523	FD 04	133	3000	6000	20	29
1.5	1.1	**M 2SB 4**	1720	55	78	0.76	2.33	630	340	350	0.0594	0.0641	FD 04	133	2000	4200	23	32
2	1.5	**M 3SA 4**	1720	73	82	0.73	3.15	570	290	330	0.0808	0.0903	FD 15	230	1500	3000	34	49
3	2.2	**M 3LA 4**	1720	110	81	0.73	4.67	550	270	290	0.0960	0.105	FD 15	354	1000	2700	37	53
5	3.7	**M 3LC 4**	1730	182	84	0.74	7.5	560	280	310	0.145	0.154	FD 55	480		1200	51	64
7.5	5.5	**M 4SA 4**	1730	273	84	0.84	9.8	630	290	310	0.506	0.530	FD 56	664		850	93	121
10	7.5	**M 4LA 4**	1740	362	85	0.84	13.2	610	290	300	0.641	0.665	FD 06	885		700	112	141
15	11	**M 4LC 4**	1740	543	88	0.81	19.4	650	310	320	0.855	0.907	FD 07	1328		600	143	179
20	15	**M 5SB 4**	1750	720	90	0.84	24.9	580	230	270	1.544	1.781	FD 08	1770		400	187	254
25	18.5	**M 5LA 4**	1760	895	90	0.83	31.1	580	250	310	1.876	2.054	FD 08	2210		300	223	289

1) without brake
2) with brake
3) value with NB rectifier (AC/DC)
4) value with SB rectifier (AC/DC)

60 Hz

6 POLE - 1200 rpm - S1

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	$\frac{I_s}{I_n}$ %	$\frac{T_s}{T_n}$ %	$\frac{T_k}{T_n}$ %	J_m lb·ft² 1)	J_m lb·ft² 2)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight IM B9 lbs 1)	Weight IM B9 lbs 2)
0.12	0.09	**M 05A 6**	1100	6.9	47	0.46	0.52	240	290	290	0.0081	0.0095	FD 02	30	7000	10000	9.5	13.2
0.16	0.12	**M 05B 6**	1100	9.2	49	0.54	0.57	230	240	240	0.0088	0.0102	FD 02	30	7000	10000	10.1	13.9
0.25	0.18	**M 1SC 6**	1100	14.3	61	0.65	0.57	330	260	280	0.0200	0.0226	FD 03	44	6500	10000	11.2	17.2
0.33	0.25	**M 1SD 6**	1100	18.9	64	0.65	0.75	320	260	270	0.0259	0.0290	FD 03	44	6200	8000	13.9	19.8
0.50	0.37	**M 1LA 6**	1100	28.6	66	0.65	1.08	330	260	270	0.0306	0.0330	FD 53	66	4000	7000	16.1	22
0.75	0.55	**M 2SA 6**	1140	41.4	76	0.66	1.38	490	320	340	0.0594	0.0641	FD 04	133	3800	5000	23	32
1	0.75	**M 2SB 6**	1140	55	76	0.61	2.03	440	280	300	0.0665	0.0713	FD 04	133	2700	5000	25	34
1.5	1.1	**M 3SA 6**	1140	83	74	0.68	2.74	440	240	280	0.147	0.157	FD 15	230	2300	4500	37	51
2	1.5	**M 3LA 6**	1140	111	76	0.66	3.75	450	240	280	0.195	0.204	FD 15	354	1500	3000	46	60
3	2.2	**M 3LC 6**	1140	166	77	0.68	5.3	510	260	290	0.226	0.235	FD 55	480		1500	51	64
5	3.7	**M 4LA 6**	1150	274	80	0.79	7.3	610	250	310	0.701	0.724	FD 06	885		900	95	123
7.5	5.5	**M 4LB 6**	1140	414	82	0.75	11.2	540	270	290	0.910	0.964	FD 07	1328		800	119	154
10	7.5	**M 5SA 6**	1160	543	85	0.82	13.5	580	230	280	1.758	1.936	FD 08	1500		550	152	216
15	11	**M 5SB 6**	1160	815	84	0.83	19.8	580	250	290	2.304	2.482	FD 08	1770		400	196	262

1) without brake
2) with brake
3) value with NB rectifier (AC/DC)
4) value with SB rectifier (AC/DC)

3.11 IEC MOTOR RATING CHARTS

2 POLE - 3600 rpm - S1

60 Hz

P_n				n	T_n	η	$\cos\varphi$	I_n at 460V	I_s/I_n	T_s/T_n	T_k/T_n	J_m lb·ft²		Brake type	T_b	Z_o 1/h		Weight IM B9 lbs	
HP	kW			rpm	lb·in	%		A	%	%	%	1)	2)		lb·in	3)	4)	1)	2)
0.25	0.18	**BN 63A**	**2**	3360	4.7	58	0.74	0.55	370	290	300	0.0048	0.0062	FD 02	15	2700	3300	7.7	10.7
0.33	0.25	**BN 63B**	**2**	3370	6.2	61	0.73	0.69	420	290	300	0.0055	0.0071	FD 02	15	2700	3300	8.6	11.5
0.5	0.37	**BN 71A**	**2**	3420	9.2	71	0.77	0.86	580	330	380	0.0082	0.0109	FD 03	30	2400	3200	11.9	16.6
0.75	0.55	**BN 71B**	**2**	3450	13.7	76	0.75	1.23	620	340	390	0.0097	0.0126	FD 03	44	2200	2700	13.7	18.2
1	0.75	**BN 80A**	**2**	3440	18.3	76	0.76	1.62	590	310	370	0.0185	0.0223	FD 04	44	1400	1700	19.0	26
1.5	1.1	**BN 80B**	**2**	3430	27.6	77	0.76	2.40	620	380	390	0.0214	0.0252	FD 04	88	1200	1600	21	27
2	1.5	**BN 90SA**	**2**	3480	36.2	79	0.78	3.04	730	360	380	0.0297	0.0335	FD 14	133	750	1000	27	34
3	2.2	**BN 90L**	**2**	3490	54	81	0.79	4.4	730	380	390	0.0397	0.0435	FD 05	230	750	1000	31	41
5	3.7	**BN 100LB**	**2**	3490	90	84	0.83	6.7	670	290	320	0.0926	0.102	FD 15	354	360	500	51	59
7.5	5.5	**BN 132SA**	**2**	3490	135	83	0.86	9.8	640	270	300	0.240	0.266	FD 06	440		400	77	98
10	7.5	**BN 132SB**	**2**	3490	181	82	0.88	13.0	620	280	320	0.318	0.344	FD 06	440		350	93	113
15	11	**BN 160MR**	**2**	3510	271	87	0.88	18.3	690	270	300	0.499						143	
20	15	**BN 160MB**	**2**	3510	359	86	0.90	24.2	600	250	270	0.808						185	
25	18.5	**BN 160L**	**2**	3520	449	88	0.91	29.2	690	280	300	0.998						214	
30	22	**BN 180M**	**2**	3520	537	88	0.91	35.1	690	280	310	1.164						240	
40	30	**BN 200L**	**2**	3530	716	89	0.91	46.2	690	260	300	1.829						309	

4 POLE - 1800 rpm - S1

60 Hz

P_n				n	T_n	η	$\cos\varphi$	I_n at 460V	I_s/I_n	T_s/T_n	T_k/T_n	J_m lb·ft²		Brake type	T_b	Z_o 1/h		Weight IM B9 lbs	
HP	kW			rpm	lb·in	%		A	%	%	%	1)	2)		lb·in	3)	4)	1)	2)
0.08	0.06	**BN 56A**	**4**	1670	3.0	53	0.55	0.26	290	310	310	0.0036						6.8	
0.12	0.09	**BN 56B**	**4**	1670	4.5	59	0.52	0.37	280	290	290	0.0036						6.8	
0.16	0.12	**BN 63A**	**4**	1650	6.1	55	0.64	0.43	310	240	250	0.0048	0.0062	FD 02	15	7000	9000	7.7	11.5
0.25	0.18	**BN 63B**	**4**	1670	9.4	58	0.59	0.68	310	280	290	0.0055	0.0071	FD 02	30	7000	9000	8.6	12.3
0.33	0.25	**BN 71A**	**4**	1700	12.2	64	0.74	0.65	430	260	270	0.0138	0.0164	FD 03	30	6000	8500	11.2	17.2
0.50	0.37	**BN 71B**	**4**	1700	18.5	66	0.73	0.97	450	260	280	0.0164	0.0190	FD 03	44	4800	7500	13.0	19.0
0.75	0.55	**BN 80A**	**4**	1710	27.6	73	0.75	1.28	490	300	300	0.0356	0.0394	FD 04	89	3400	7000	18.1	27
1	0.75	**BN 80B**	**4**	1720	36.6	78	0.75	1.60	620	340	350	0.0482	0.0523	FD 04	133	3000	6000	22	30
1.5	1.1	**BN 90S**	**4**	1720	55	78	0.74	2.43	570	310	340	0.0499	0.0546	FD 14	133	3000	7000	27	36
2	1.5	**BN 90LA**	**4**	1720	73	81	0.74	3.12	660	330	360	0.0665	0.0760	FD 05	230	2200	4700	30	43
3	2.2	**BN 100LA**	**4**	1720	110	81	0.73	4.8	550	270	290	0.0960	0.105	FD 15	354	1000	2700	40	55
5	3.7	**BN 100LC**	**4**	1730	182	84	0.74	7.5	560	280	310	0.145	0.154	FD 55	480		1200	55	66
7.5	5.5	**BN 132S**	**4**	1730	273	84	0.84	10.0	630	290	310	0.506	0.530	FD 56	664		850	97	126
10	7.5	**BN 132MA**	**4**	1740	362	85	0.84	13.1	610	290	300	0.641	0.665	FD 06	885		700	117	146
15	11	**BN 160MR**	**4**	1740	543	88	0.81	19.4	650	310	320	0.855	0.907	FD 07	1328		600	154	190
20	15	**BN 160L**	**4**	1750	720	90	0.84	24.8	580	230	270	1.544	1.722	FD 08	1770		400	218	284
25	18.5	**BN 180M**	**4**	1760	895	90	0.83	31.3	580	250	310	1.876	2.054	FD 08	2210		300	254	320

1) without brake
2) with brake
3) value with NB rectifier (AC/DC)
4) value with SB rectifier (AC/DC)

60 Hz

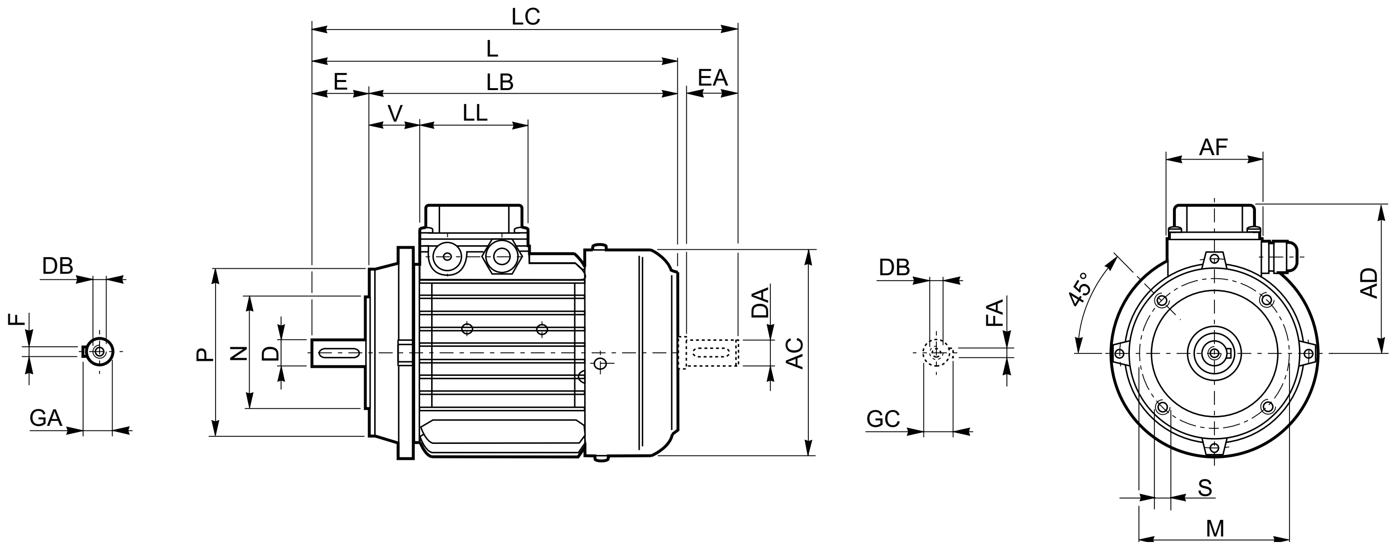
6 POLE - 1200 rpm - S1

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	I_s/I_n %	T_s/T_n %	T_k/T_n %	J_m lb·ft² 1)	J_m lb·ft² 2)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight IM B9 lbs 1)	Weight IM B9 lbs 2)
0.12	0.09	**BN 63A 6**	1100	6.9	47	0.50	0.48	280	290	290	0.0081	0.0095	FD 02	30	7000	10000	10.1	13.9
0.16	0.12	**BN 63B 6**	1100	9.2	50	0.55	0.55	240	240	270	0.0088	0.0102	FD 02	30	7000	10000	10.8	14.6
0.25	0.18	**BN 71A 6**	1100	14.3	61	0.65	0.57	330	260	280	0.0200	0.0226	FD 03	44	6500	10000	12.1	18.1
0.33	0.25	**BN 71B 6**	1100	18.9	64	0.65	0.75	320	260	270	0.0259	0.0285	FD 03	44	6200	8000	14.8	21
0.50	0.37	**BN 80A 6**	1130	27.9	67	0.65	1.07	390	260	280	0.0499	0.0546	FD 04	88	4100	5500	22	30
0.75	0.55	**BN 80B 6**	1140	41.4	76	0.66	1.38	490	320	340	0.0594	0.0641	FD 04	133	3800	5000	25	34
1	0.75	**BN 90S 6**	1140	55.3	73	0.63	2.05	450	290	310	0.0618	0.0665	FD 14	133	2700	4000	29	37
1.5	1.1	**BN 90L 6**	1140	83	75	0.65	2.83	430	280	290	0.0784	0.0879	FD 05	230	2000	3500	33	46
2	1.5	**BN 100LA 6**	1140	111	76	0.66	3.75	450	240	280	0.195	0.204	FD 15	354	1500	3000	49	62
3	2.2	**BN 112M 6**	1150	164	81	0.69	4.9	550	280	290	0.400	0.420	FD 06S	530		1250	71	93
5.0	3.7	**BN 132MA 6**	1150	274	80	0.79	7.3	610	250	3.1	0.701	0.724	FD 06	885		900	97	128
7.5	5.5	**BN 132MB 6**	1140	414	82	0.75	11.2	540	270	290	0.910	0.964	FD 07	1328		800	123	159
10	7.5	**BN 160M 6**	1160	543	85	0.82	13.5	580	230	280	1.758	1.936	FD 08	1500		550	183	247
15	11	**BN 160L 6**	1160	815	84	0.83	19.8	580	250	290	2.304	2.482	FD 08	1770		400	227	293

1) without brake
2) with brake

3) value with NB rectifier (AC/DC)
4) value with SB rectifier (AC/DC)

3.12 DIMENSIONS

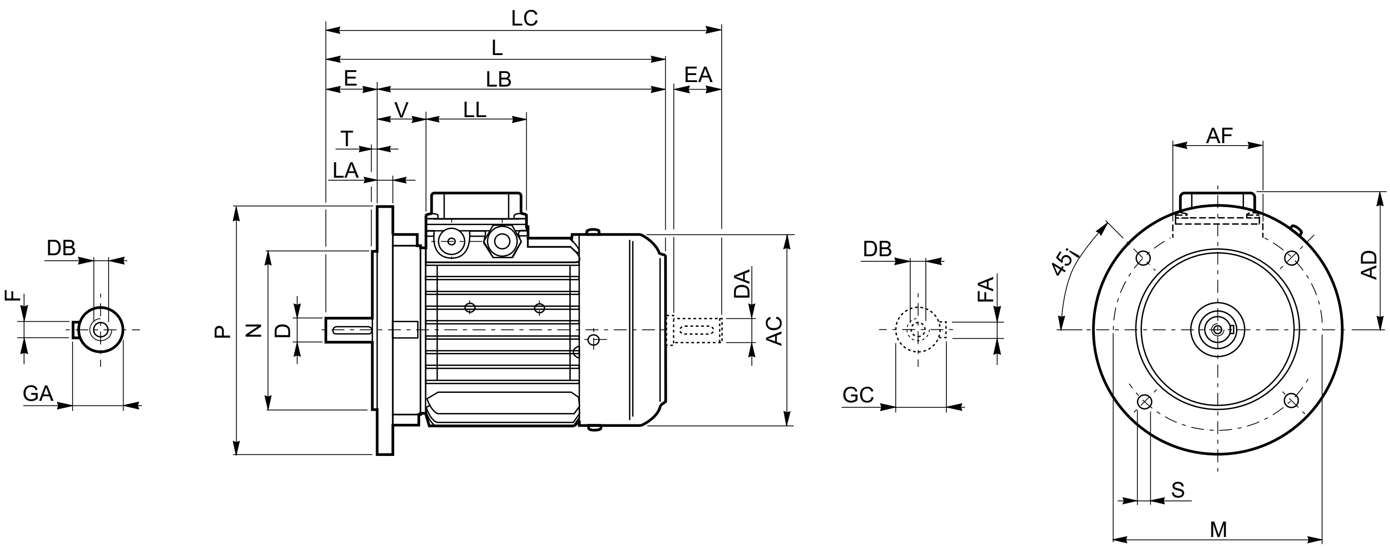


	Shaft					Flange					Motor							
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 56	0.35	0.79	*M3*	0.40	0.12	2.56	1.97	3.15	*M5*	0.10	4.33	7.28	6.50	8.15	3.58	2.91	3.15	1.34
	9	*20*		*10.2*	*3*	*65*	*50*	*80*		*2.5*	*110*	*185*	*165*	*207*	*91*	*74*	*80*	*34*
BN 63	0.43	0.91	*M4*	0.49	0.16	2.95	2.36	3.54	*M5*	0.10	4.76	8.15	7.24	9.13	3.74	2.91	3.15	1.02
	11	*23*		*12.5*	*4*	*75*	*60*	*90*		*2.5*	*121*	*207*	*184*	*232*	*95*	*74*	*80*	*26*
BN 71	0.55	1.18	*M5*	0.63	0.20	3.35	2.76	4.13	*M6*	0.10	5.43	9.80	8.62	11.06	4.25	2.91	3.15	1.46
	14	*30*		*16*	*5*	*85*	*70*	*105*		*2.5*	*138*	*249*	*219*	*281*	*108*	*74*	*80*	*37*
BN 80	0.75	1.57	*M6*	0.85	0.24	3.94	3.15	4.72	*M6*	0.12	6.14	10.79	9.21	12.40	4.69	2.91	3.15	1.50
	19	*40*		*21.5*	*6*	*100*	*80*	*120*		*3*	*156*	*274*	*234*	*315*	*119*	*74*	*80*	*38*
BN 90 S	0.94	1.97	*M8*	1.06	0.31	4.53	3.74	5.51	*M8*	0.12	6.93	12.83	10.87	14.88	5.24	3.86	3.86	1.73
	24	*50*		*27*	*8*	*115*	*95*	*140*		*3*	*176*	*326*	*276*	*378*	*133*	*98*	*98*	*44*
BN 90 L	0.94	1.97	*M8*	1.06	0.31	4.53	3.74	5.51	*M8*	0.12	6.93	12.83	10.87	14.88	5.24	3.86	3.86	1.73
	24	*50*		*27*	*8*	*115*	*95*	*140*		*3*	*176*	*326*	*276*	*378*	*133*	*98*	*98*	*44*
BN 100	1.10	2.36	*M10*	1.22	0.31	5.12	4.33	6.30	*M8*	0.14	7.68	14.41	12.05	16.89	5.59	3.86	3.86	1.97
	28	*60*		*31*	*8*	*130*	*110*	*160*		*3.5*	*195*	*366*	*306*	*429*	*142*	*98*	*98*	*50*
BN 112	1.10	2.36	*M10*	1.22	0.31	5.12	4.33	6.30	*M8*	0.14	8.62	15.16	12.80	17.64	6.18	3.86	3.86	2.05
	28	*60*		*31*	*8*	*130*	*110*	*160*		*3.5*	*219*	*385*	*325*	*448*	*157*	*98*	*98*	*52*
BN 132 S	1.50	3.15	*M12*	1.61	0.39	6.50	5.12	7.87	*M10*	0.16	10.16	17.91	14.76	21.18	7.60	4.65	4.65	2.28
	38	*80*		*41*	*10*	*165*	*130*	*200*		*4*	*258*	*455*	*375*	*538*	*193*	*118*	*118*	*58*
BN 132 M	1.50	3.15	*M12*	1.61	0.39	6.50	5.12	7.87	*M10*	0.16	10.16	19.41	16.26	22.68	7.60	4.65	4.65	2.28
	38	*80*		*41*	*10*	*165*	*130*	*200*		*4*	*258*	*493*	*413*	*576*	*193*	*118*	*118*	*58*

1) These values refer to the rear shaft end.

Dimension are inch / *mm*

BONFIGLIOLI RIDUTTORI



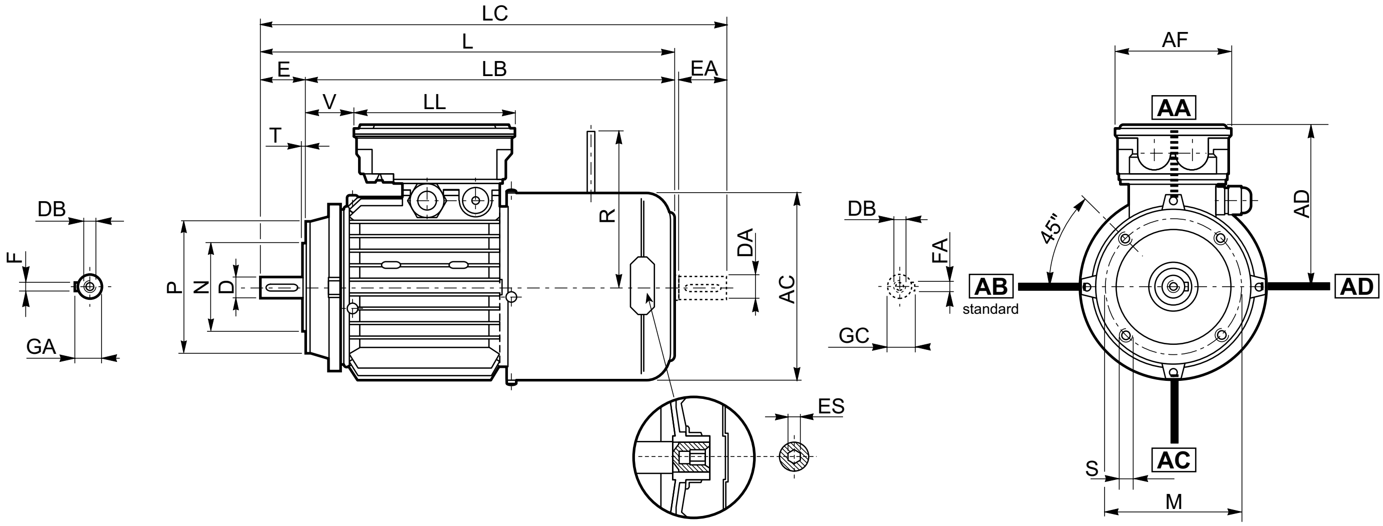
	Shaft					Flange						Motor							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	4.53 *115*	3.74 *95*	5.51 *140*	0.37 *9.5*	0.12 *3*	0.39 *10*	4.76 *121*	8.15 *207*	7.24 *184*	9.13 *232*	3.74 *95*	2.91 *74*	3.15 *80*	1.02 *26*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	5.12 *130*	4.33 *110*	6.30 *160*	0.37 *9.5*	0.12 *3*	0.39 *10*	5.43 *138*	9.80 *249*	8.62 *219*	11.06 *281*	4.25 *108*	2.91 *74*	3.15 *80*	1.46 *37*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.14 *156*	10.79 *274*	9.21 *234*	12.40 *315*	4.69 *119*	2.91 *74*	3.15 *80*	1.50 *38*
BN 90 S **BN 90 L**	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	12.83 *326*	10.87 *276*	14.88 *378*	5.24 *133*	3.86 *98*	3.86 *98*	1.73 *44*
BN 100	1.10 28	2.36 60	*M10*	1.22 31	0.31 8	8.46 215	7.09 180	9.84 250	0.55 14	0.16 4	0.55 14	7.68 195	14.45 367	12.09 307	16.89 429	5.59 142	3.86 98	3.86 98	1.97 50
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.59 *15*	8.62 *219*	15.16 *385*	12.80 *325*	17.64 *448*	6.18 *157*	3.86 *98*	3.86 *98*	2.05 *52*
BN 132 S	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	17.91 *455*	14.76 *375*	21.18 *538*	7.59 *193*	4.64 *118*	4.64 *118*	2.28 *58*
BN 132 M	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	19.40 *493*	16.25 *413*	22.67 *576*	7.59 *193*	4.64 *118*	4.64 *118*	2.28 *58*
BN 160 MR	*1.65* *42*	*4.33* *110*	*M16*	*1.77* *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	10.15 *258*	22.12 *562*	17.79 *452*	25.39 *645*	7.59 *193*	4.64 *118*	4.64 *118*	8.58 *218*
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*														
BN 160 M **BN 160 L**	1.65 *42*	4.33 *110*	*M16*	1.77 *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	23.46 *596*	19.13 *486*	26.77 *680*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*
	1.49 *38(1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*														
BN 180 M	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	25.19 *640*	20.86 *530*	28.50 *724*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*
	1.49 *38 (1)*	4.33 *110 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*														
BN 180 L	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	27.87 *708*	23.54 *598*	32.40 *823*	10.27 *261*	7.36 *187*	7.36 *187*	2.04 *52*
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*														
BN 200 L	2.16 *55*	4.33 *110*	*M20*	2.32 *59*	0.62 *16*	13.77 *350*	11.81 *300*	15.74 *400*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	28.42 *722*	24.09 *612*	32.95 *837*	10.27 *261*	7.36 *187*	7.36 *187*	2.59 *66*
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*														

1) These values refer to the rear shaft end.

2) For FD07 brake value R=226

For motors type BN..FA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

Dimension are inch / *mm*



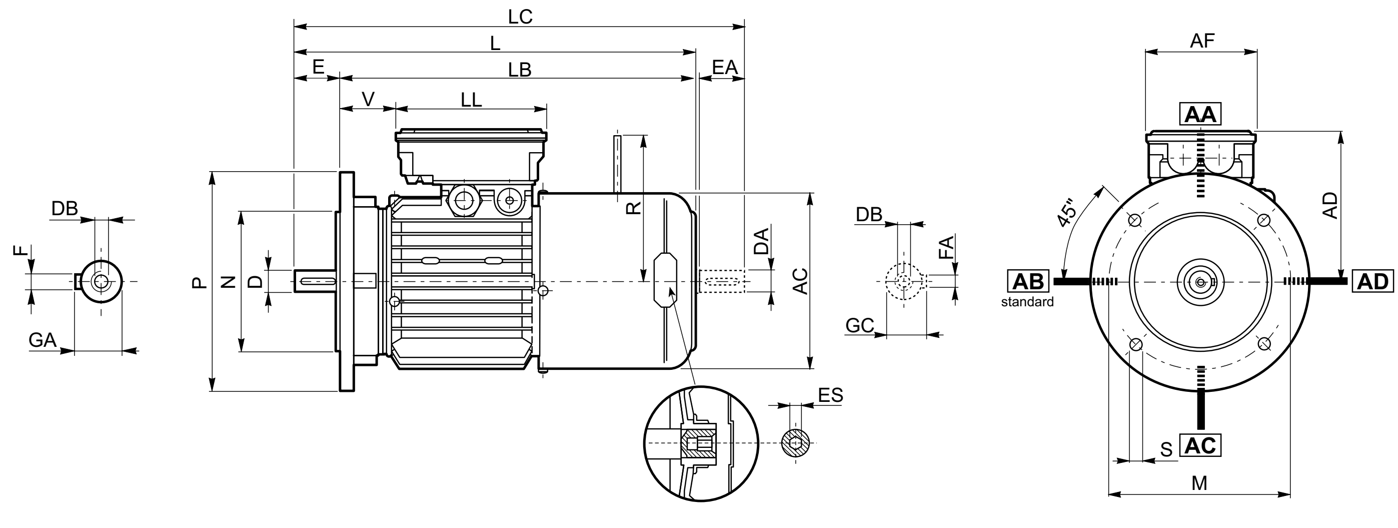
	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43	0.91	*M4*	0.49	0.16	2.95	2.36	3.54	*M5*	0.10	4.76	10.71	9.80	11.69	4.69	3.86	5.24	0.55	3.78	0.20
	11	*23*		*12.5*	*4*	*75*	*60*	*90*		*2.5*	*121*	*272*	*249*	*297*	*119*	*98*	*133*	*14*	*96*	*5*
BN 71	0.55	1.18	*M5*	0.63	0.20	3.35	2.76	4.13	*M6*	0.10	5.43	12.20	11.02	13.46	5.20	3.86	5.24	1.18	4.06	0.20
	14	*30*		*16*	*5*	*85*	*70*	*105*		*2.5*	*138*	*310*	*280*	*342*	*132*	*98*	*133*	*30*	*103*	*5*
BN 80	0.75	1.57	*M6*	0.85	0.24	3.94	3.15	4.72	*M6*	0.12	6.14	13.62	12.05	15.28	5.63	3.86	5.24	1.61	5.08	0.20
	19	*40*		*21.5*	*6*	*100*	*80*	*120*		*3*	*156*	*346*	*306*	*388*	*143*	*98*	*133*	*41*	*129*	*5*
BN 90 S	0.94	1.97	*M8*	1.06	0.31	4.53	3.74	5.51	*M8*	0.12	6.93	16.10	14.13	18.15	5.75	4.33	6.50	1.54	5.08	0.24
	24	*50*		*27*	*8*	*115*	*95*	*140*		*3*	*176*	*409*	*359*	*461*	*146*	*110*	*165*	*39*	*129*	*6*
BN 90 L	0.94	1.97	*M8*	1.06	0.31	4.53	3.74	5.51	*M8*	0.12	6.93	16.10	14.13	18.15	5.75	4.33	6.50	1.54	6.30	0.24
	24	*50*		*27*	*8*	*115*	*95*	*140*		*3*	*176*	*409*	*359*	*461*	*146*	*110*	*165*	*39*	*160*	*6*
BN 100	1.10	2.36	*M10*	1.22	0.31	5.12	4.33	6.30	*M8*	0.14	7.68	18.03	15.67	20.51	6.10	4.33	6.50	2.44	6.30	0.24
	28	*60*		*31*	*8*	*130*	*110*	*160*		*3.5*	*195*	*458*	*398*	*521*	*155*	*110*	*165*	*62*	*160*	*6*
BN 112	1.10	2.36	*M10*	1.22	0.31	5.12	4.33	6.30	*M8*	0.14	8.62	19.06	16.69	21.54	6.69	4.33	6.50	2.87	7.83	0.24
	28	*60*		*31*	*8*	*130*	*110*	*160*		*3.5*	*219*	*484*	*424*	*547*	*170*	*110*	*165*	*73*	*199*	*6*
BN 132 S	1.50	3.15	*M12*	1.61	0.39	6.50	5.12	7.87	*M10*	0.16	10.16	22.24	19.09	25.51	7.60	4.65	4.65	5.59	8.03	0.24
	38	*80*		*41*	*10*	*165*	*130*	*200*		*4*	*258*	*565*	*485*	*648*	*193*	*118*	*118*	*142*	*204 (2)*	*6*
BN 132 M	1.50	3.15	*M12*	1.61	0.39	6.50	5.12	7.87	*M10*	0.16	10.16	23.74	20.59	27.01	7.60	4.65	4.65	7.09	8.03	0.24
	38	*80*		*41*	*10*	*165*	*130*	*200*		*4*	*258*	*603*	*523*	*686*	*193*	*118*	*118*	*180*	*204 (2)*	*6*

1) These values refer to the rear shaft end.

2) For FD07 brake value R=226

ES hexagon is not supplied with PS option

Dimension are inch / *mm*

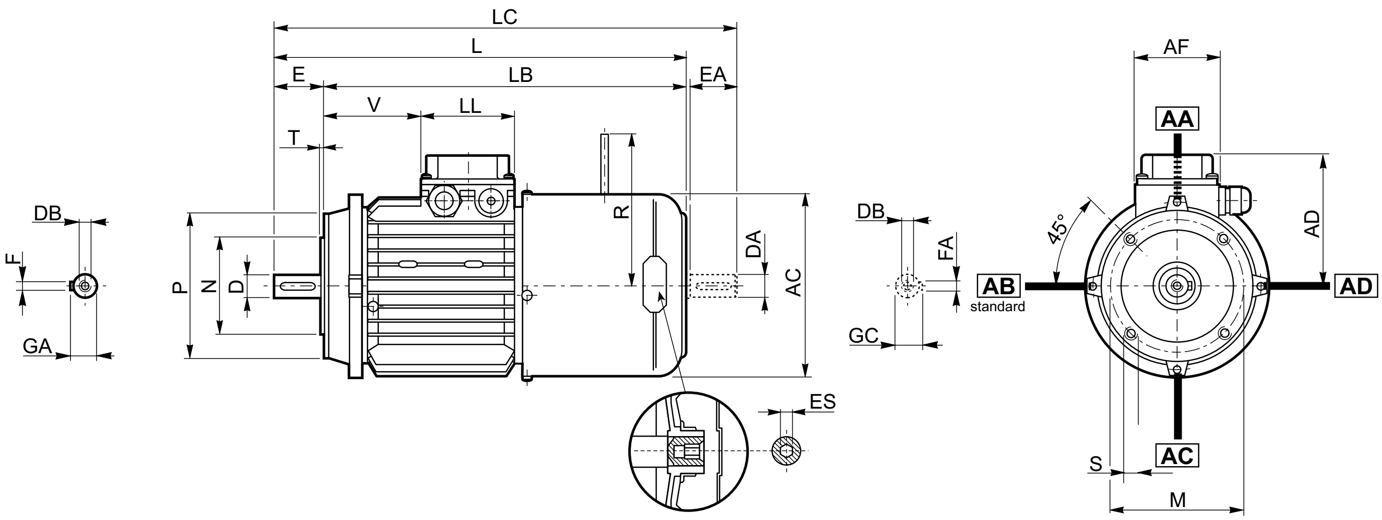


	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	4.53 *115*	3.74 *95*	5.51 *140*	0.37 *9.5*	0.12 *3*	0.39 *10*	4.76 *121*	10.71 *272*	9.80 *249*	11.69 *297*	4.69 *119*	3.86 *98*	5.24 *133*	0.55 *14*	3.78 *96*	0.20 *5*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	5.12 *130*	4.33 *110*	6.30 *160*	0.37 *9.5*	0.14 *3.5*	0.39 *10*	5.43 *138*	12.20 *310*	11.02 *280*	13.46 *342*	5.20 *132*	3.86 *98*	5.24 *133*	1.18 *30*	4.06 *103*	0.20 *5*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.14 *156*	13.62 *346*	12.05 *306*	15.28 *388*	5.63 *143*	3.86 *98*	5.24 *133*	1.61 *41*	5.08 *129*	0.20 *5*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.75 *146*	4.33 *110*	6.50 *165*	1.54 *39*	5.08 *129*	0.24 *6*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.75 *146*	4.33 *110*	6.50 *165*	1.54 *39*	6.30 *160*	0.24 *6*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.55 *14*	7.68 *195*	18.03 *458*	15.67 *398*	20.51 *521*	6.10 *155*	4.33 *110*	6.50 *165*	2.44 *62*	6.30 *160*	0.24 *6*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.59 *15*	8.62 *219*	19.06 *484*	16.69 *424*	21.54 *547*	6.69 *170*	4.33 *110*	6.50 *165*	2.87 *73*	7.83 *199*	0.24 *6*
BN 132 S	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	22.24 *565*	19.09 *485*	25.51 *648*	7.59 *193*	4.64 *118*	4.64 *118*	5.59 *142*	8.03 *204 (2)*	0.23 *6*
BN 132 M	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	23.74 *603*	20.59 *523*	27.00 *686*	7.59 *193*	4.64 *118*	4.64 *118*	7.08 *180*	8.03 *204 (1)*	0.23 *6*
BN 160 MR	*1.65* *42*	*4.33* *110*	*M16*	*1.77* *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	10.15 *258*	26.45 *672*	22.12 *562*	29.72 *755*	7.59 *193*	4.64 *118*	4.64 *118*	8.58 *218*	8.89 *226*	0.23 *6*
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 160 M **BN 160 L**	1.65 *42*	4.33 *110*	*M16*	1.77 *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	28.97 *736*	24.64 *626*	32.28 *820*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*	8.89 *226*	
	1.49 *38 (1)*	3.14 *80 (1)*	M12 (1)	1.61 *41 (1)*	0.39 *10 (1)*																
BN 180 M	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	30.70 *780*	26.37 *670*	34.01 *864*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*	8.89 *226*	
	1.49 *38 (1)*	4.33 *110 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 180 L	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	34.09 *866*	29.76 *756*	38.62 *981*	10.27 *261*	7.36 *187*	7.36 *187*	2.04 *52*	12.00 *305*	
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*																
BN 200 L	2.16 *55*	4.33 *110*	*M20*	2.32 *59*	0.62 *16*	13.77 *350*	11.81 *300*	15.74 *400*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	34.56 *878*	30.23 *768*	39.09 *993*	10.27 *261*	7.36 *187*	7.36 *187*	2.51 *64*	*12.00* *305*	
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*																

1) These values refer to the rear shaft end.
2) For FD07 brake value R=226

For motors type BN..FA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.
ES hexagon is not supplied with PS option.

Dimension are inch / *mm*



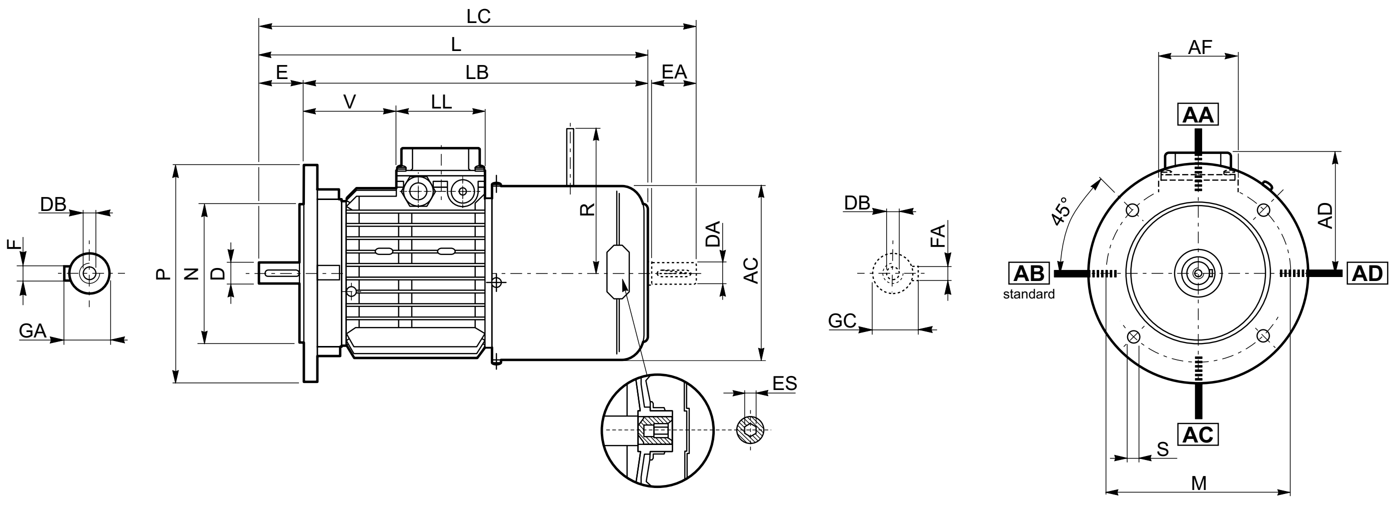
	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	2.95 *75*	2.36 *60*	3.54 *90*	*M5*	0.10 *2.5*	4.76 *121*	10.71 *272*	9.80 *249*	4.69 *119*	3.74 *95*	2.91 *74*	3.15 *80*	1.02 *26*	4.57 *116*	0.20 *5*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	3.35 *85*	2.76 *70*	4.13 *105*	*M6*	0.10 *2.5*	5.43 *138*	12.20 *310*	11.02 *280*	13.46 *342*	4.25 *108*	2.91 *74*	3.15 *80*	2.68 *68*	4.88 *124*	0.20 *5*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	3.94 *100*	3.15 *80*	4.72 *120*	*M6*	0.12 *3*	6.14 *156*	13.62 *346*	12.05 *306*	15.28 *388*	4.69 *119*	2.91 *74*	3.15 *80*	3.27 *83*	5.28 *134*	0.20 *5*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*	5.28 *134*	0.24 *6*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*	6.30 *160*	0.24 *6*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	7.68 *195*	18.03 *458*	15.67 *398*	20.51 *521*	5.59 *142*	3.86 *98*	3.86 *98*	4.69 *119*	6.30 *160*	0.24 *6*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	8.62 *219*	19.06 *484*	16.69 *424*	21.54 *547*	6.18 *157*	3.86 *98*	3.86 *98*	5.04 *128*	7.80 *198*	0.24 *6*
BN 132 S	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	22.24 *565*	19.09 *485*	25.51 *648*	7.60 *193*	4.65 *118*	4.65 *118*	5.59 *142*	7.87 *200 (2)*	0.24 *6*
BN 132 M	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	23.74 *603*	20.59 *523*	27.01 *686*	7.60 *193*	4.65 *118*	4.65 *118*	7.09 *180*	7.87 *200 (2)*	0.24 *6*

1) These values refer to the rear shaft end.

2) For FD07 brake value R=226

For motors type BN..FA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

Dimension are inch / *mm*

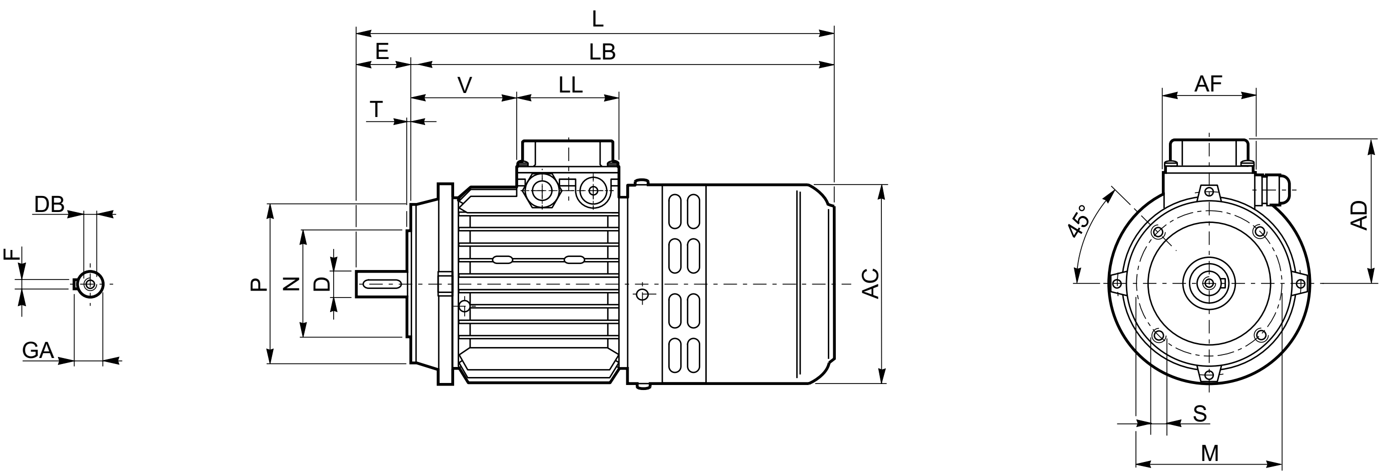


	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43	0.91	M4	0.49	0.16	4.53	3.74	5.51	0.37	0.12	0.39	4.76	10.71	9.80	11.69	3.74	2.91	3.15	1.02	4.57	0.20
	11	*23*		*12.5*	*4*	*115*	*95*	*140*	*9.5*	*3*	*10*	*121*	*272*	*249*	*297*	*95*	*74*	*80*	*26*	*116*	*5*
BN 71	0.55	1.18	M5	0.63	0.20	5.12	4.33	6.30	0.37	0.14	0.39	5.43	12.20	11.02	13.46	4.25	2.91	3.15	2.68	4.88	0.20
	14	*30*		*16*	*5*	*130*	*110*	*160*	*9.5*	*3.5*	*10*	*138*	*310*	*280*	*342*	*108*	*74*	*80*	*68*	*124*	*5*
BN 80	0.75	1.57	M6	0.85	0.24	6.50	5.12	7.87	0.45	0.14	0.45	6.14	13.62	12.05	15.28	4.69	2.91	3.15	3.27	5.28	0.20
	19	*40*		*21.5*	*6*	*165*	*130*	*200*	*11.5*	*3.5*	*11.5*	*156*	*346*	*306*	*388*	*119*	*74*	*80*	*83*	*134*	*5*
BN 90 S	0.94	1.97	M8	1.06	0.31	6.50	5.12	7.87	0.45	0.14	0.45	6.93	16.10	14.13	18.15	5.24	3.86	3.86	3.74	5.28	0.24
	24	*50*		*27*	*8*	*165*	*130*	*200*	*11.5*	*3.5*	*11.5*	*176*	*409*	*359*	*461*	*133*	*98*	*98*	*95*	*134*	*6*
BN 90 L	0.94	1.97	M8	1.06	0.31	6.50	5.12	7.87	0.45	0.14	0.45	6.93	16.10	14.13	18.15	5.24	3.86	3.86	3.74	6.30	0.24
	24	*50*		*27*	*8*	*165*	*130*	*200*	*11.5*	*3.5*	*11.5*	*176*	*409*	*359*	*461*	*133*	*98*	*98*	*95*	*160*	*6*
BN 100	1.10	2.36	M10	1.22	0.31	8.46	7.09	9.84	0.55	0.16	0.55	7.68	18.03	15.67	20.51	5.59	3.86	3.86	4.69	6.30	0.24
	28	*60*		*31*	*8*	*215*	*180*	*250*	*14*	*4*	*14*	*195*	*458*	*398*	*521*	*142*	*98*	*98*	*119*	*160*	*6*
BN 112	1.10	2.36	M10	1.22	0.31	8.46	7.09	9.84	0.55	0.16	0.59	8.62	19.06	16.69	21.54	6.18	3.86	3.86	5.04	7.80	0.24
	28	*60*		*31*	*8*	*215*	*180*	*250*	*14*	*4*	*15*	*219*	*484*	*424*	*547*	*157*	*98*	*98*	*128*	*198*	*6*
BN 132 S	1.49	3.14	M12	1.61	0.39	10.43	9.05	11.81	0.55	0.15	0.62	10.15	22.24	19.09	25.51	7.59	4.64	4.64	5.59	7.87	0.23
	38	*80*		*41*	*10*	*265*	*230*	*300*	*14*	*4*	*16*	*258*	*565*	*485*	*648*	*193*	*118*	*118*	*142*	*200 (2)*	*6*
BN 132 M	1.49	3.14	M12	1.61	0.39	10.43	9.05	11.81	0.55	0.15	0.62	10.15	23.74	20.59	27.00	7.59	4.64	4.64	7.08	7.87	0.23
	38	*80*		*41*	*10*	*265*	*230*	*300*	*14*	*4*	*16*	*258*	*603*	*523*	*686*	*193*	*118*	*118*	*180*	*200 (1)*	*6*
BN 160 MR	*1.65*	*4.33*	M16	*1.77*	0.47																
	42	*110*		*45*	*12*	11.81	9.84	13.77	0.72	0.19	0.59	10.15	26.45	22.12	29.72	7.59	4.64	4.64	8.58	8.54	0.23
	1.49	3.14	M12 (1)	1.61	0.39	*300*	*250*	*350*	*18.5*	*5*	*15*	*258*	*672*	*562*	*755*	*193*	*118*	*118*	*218*	*217*	*6*
	38 (1)	*80 (1)*		*41 (1)*	*10 (1)*																
BN 160 M	1.65	4.33	M16	1.77	0.47																
BN 160 L	*42*	*110*		*45*	*12*	11.81	9.84	13.77	0.72	0.19	0.59	1.22	28.97	24.64	32.28	9.64	7.36	7.36	2.00	9.72	
	1.49	3.14	M12 (1)	1.61	0.39	*300*	*250*	*350*	*18.5*	*5*	*15*	*310*	*736*	*626*	*820*	*245*	*187*	*187*	*51*	*247*	
	38 (1)	*80 (1)*		*41 (1)*	*10 (1)*																
BN 180 M	1.88	4.33	M16	2.02	0.55																
	48	*110*		*51.5*	*14*	11.81	9.84	13.77	0.72	0.19	0.59	1.22	30.70	26.37	34.01	9.64	7.36	7.36	2.00	9.72	
	1.49	3.14	M12 (1)	1.61	0.39	*300*	*250*	*350*	*18.5*	*5*	*15*	*310*	*780*	*670*	*864*	*245*	*187*	*187*	*51*	*247*	
	38 (1)	*80 (1)*		*41 (1)*	*10 (1)*																

1) These values refer to the rear shaft end.
2) For FD07 brake value R=226

For motors type BN..FA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

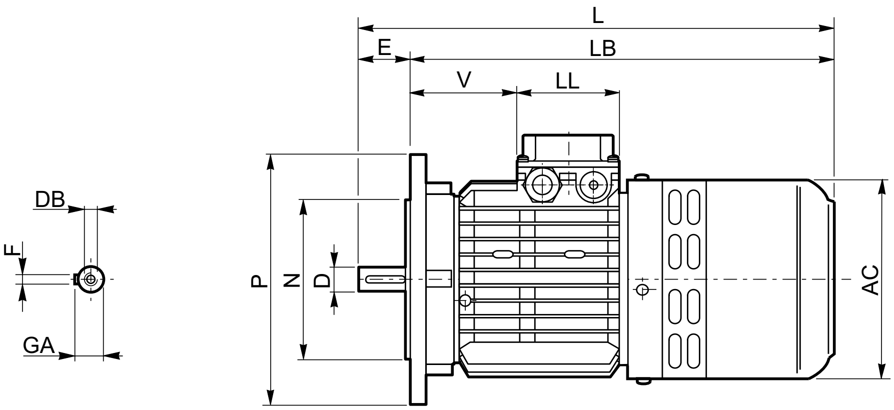
Dimension are inch / *mm*

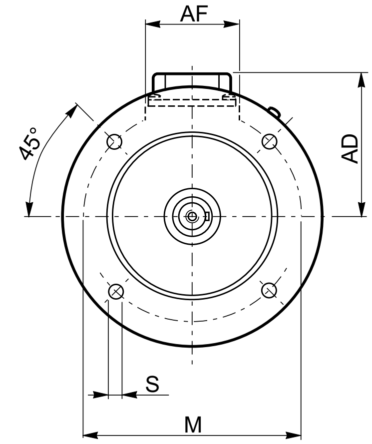


	Shaft					Flange					Motor						
	D **DA**	**E** **EA**	**DB**	**GA** **GC**	**F** **FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**AD**	**AF**	**LL**	**V**
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	2.95 *75*	2.36 *60*	3.54 *90*	*M5*	0.10 *2.5*	4.88 *124*	11.61 *295*	10.71 *272*	3.94 *100*	2.76 *70*	2.76 *70*	2.48 *63*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	3.35 *85*	2.76 *70*	4.13 *105*	*M6*	0.10 *2.5*	5.43 *138*	12.87 *327*	11.69 *297*	4.25 *108*	2.91 *74*	3.15 *80*	2.68 *68*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	3.94 *100*	3.15 *80*	4.72 *120*	*M6*	0.12 *3*	6.14 *156*	14.65 *372*	13.07 *332*	4.69 *119*	2.91 *74*	3.15 *80*	3.27 *83*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.73 *425*	14.76 *375*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.73 *425*	14.76 *375*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	7.68 *195*	18.78 *477*	16.42 *417*	5.59 *142*	3.86 *98*	3.86 *98*	4.69 *119*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	8.62 *219*	19.69 *500*	17.32 *440*	6.18 *157*	3.86 *98*	3.86 *98*	5.04 *128*
BN 132 S	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	23.62 *600*	20.47 *520*	7.60 *193*	4.65 *118*	4.65 *118*	5.59 *142*
BN 132 M	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	25.12 *638*	21.97 *558*	7.60 *193*	4.65 *118*	4.65 *118*	7.09 *180*

For motors type BN..BA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

Dimension are inch / *mm*





	Shaft					Flange						Motor						
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**LA**	**AC**	**L**	**LB**	**AD**	**AF**	**LL**	**V**
BN63	0.43	0.91	*M4*	0.49	0.16	4.53	3.74	5.51	0.37	0.12	0.39	4.88	11.61	10.71	3.94	2.76	2.76	2.48
	11	*23*		*12.5*	*4*	*115*	*95*	*140*	*9.5*	*3*	*10*	*124*	*295*	*272*	*100*	*70*	*70*	*63*
BN 71	0.55	1.18	*M5*	0.63	0.20	5.12	4.33	6.30	0.37	0.14	0.39	5.43	12.87	11.69	4.25	2.91	3.15	2.68
	14	*30*		*16*	*5*	*130*	*110*	*160*	*9.5*	*3.5*	*10*	*138*	*327*	*297*	*108*	*74*	*80*	*68*
BN 80	0.75	1.57	*M6*	0.85	0.24	6.50	5.12	7.87	0.45	0.14	0.45	6.14	14.65	13.07	4.69	2.91	3.15	3.27
	19	*40*		*21.5*	*6*	*165*	*130*	*200*	*11.5*	*3.5*	*11.5*	*156*	*372*	*332*	*119*	*74*	*80*	*83*
BN 90 S	0.94	1.97	*M8*	1.06	0.31	6.50	5.12	7.87	0.45	0.14	0.45	6.93	16.73	14.76	5.24	3.86	3.86	3.74
	24	*50*		*27*	*8*	*165*	*130*	*200*	*11.5*	*3.5*	*11.5*	*176*	*425*	*375*	*133*	*98*	*98*	*95*
BN 90 L	0.94	1.97	*M8*	1.06	0.31	6.50	5.12	7.87	0.45	0.14	0.45	6.93	16.73	14.76	5.24	3.86	3.86	3.74
	24	*50*		*27*	*8*	*165*	*130*	*200*	*11.5*	*3.5*	*11.5*	*176*	*425*	*375*	*133*	*98*	*98*	*95*
BN 100	1.10	2.36	*M10*	1.22	0.31	8.46	7.09	9.84	0.55	0.16	0.55	7.68	18.78	16.42	5.59	3.86	3.86	4.69
	28	*60*		*31*	*8*	*215*	*180*	*250*	*14*	*4*	*14*	*195*	*477*	*417*	*142*	*98*	*98*	*119*
BN 112	1.10	2.36	*M10*	1.22	0.31	8.46	7.09	9.84	0.55	0.16	0.59	8.62	19.69	17.32	6.18	3.86	3.86	5.04
	28	*60*		*31*	*8*	*215*	*180*	*250*	*14*	*4*	*15*	*219*	*500*	*440*	*157*	*98*	*98*	*128*
BN 132 S	1.50	3.15	*M12*	1.61	0.39	10.43	9.06	11.81	0.55	0.16	0.63	10.16	23.62	20.47	7.60	4.65	4.65	5.59
	38	*80*		*41*	*10*	*265*	*230*	*300*	*14*	*4*	*16*	*258*	*600*	*520*	*193*	*118*	*118*	*142*
BN 132 M	1.50	3.15	*M12*	1.61	0.39	10.43	9.06	11.81	0.55	0.16	0.63	10.16	25.12	21.97	7.60	4.65	4.65	7.09
	38	*80*		*41*	*10*	*265*	*230*	*300*	*14*	*4*	*16*	*258*	*638*	*558*	*193*	*118*	*118*	*180*

For motors type BN..BA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

Dimension are $\frac{\text{inch}}{\textit{mm}}$

R1

Torque

$M_2 = M_1 \times i \times \eta$

$$T_2 \text{ (lb·in)} = \frac{Hp \times 63025 \times \eta}{n \text{ (rpm)}}$$

$$T_2 \text{ (lb·ft)} = \frac{Hp \times 5252 \times \eta}{n \text{ (rpm)}}$$

$$M_2 \text{ (Nm)} = \frac{Kw \times 9550 \times \eta}{n \text{ (rpm)}}$$

$$M_2 \text{ (Nm)} = \frac{Hp \times 7121 \times \eta}{n \text{ (rpm)}}$$

Power

$$P_1 \text{ (Hp)} = \frac{\text{Torque (lb·in)} \times n_2 \text{ (rpm)}}{63025 \times \eta}$$

$$P_1 \text{ (Hp)} = \frac{\text{Torque (lb·ft)} \times n_2 \text{ (rpm)}}{5252 \times \eta}$$

$$P_1 \text{ (Hp)} = \frac{\text{Torque (Nm)} \times n_2 \text{ (rpm)}}{7121 \times \eta}$$

$$P_1 \text{ (Kw)} = \frac{\text{Torque (Nm)} \times n_2 \text{ (rpm)}}{9550 \times \eta}$$

Products

W, VF – worm gear

VFR – helical / worm

C, S – in-line helical

A, RAO – right angle bevel helical

RAP – parallel shaft

RAN – single stage right angle

F, TA – shaft mount helical

V – mechanical variator

300 Series – planetary drives

BN – Bonfiglioli IEC motor

Note: Speed Reducers available as a gearbox or gearmotor.