

Asynchronous motors for inverter vector control **VA Series**

Italian technology since 1953



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2. General

2.1 Informations

Brusatori offers the VA series of asynchronous motors with square frames, developed to be connected to frequency converters.

VA motors are 4-pole three-phase asynchronous motors (6 poles for size 355) with squirrel cage windings and are available with **IP23, IP54 or IP55** protection ratings with direct and indirect cooling systems.

Five mechanical sizes are available (160 - 180 - 225 - 280 - 355) to cover a power range from 15 kW to 1115 kW.

VA series motors are also available with liquid cooling in 4 mechanical sizes (160 - 180 - 225 - 280) that can satisfy a power range from 21 kW to 456 kW.

VA series motors are designed exclusively for connection to inverters.

ATTENTION!

All operations relating to transport, connection, commissioning and regular maintenance must be carried out by qualified responsible personnel, familiar with the appropriate safety regulations, and wearing the necessary protective equipment.

Read the entire manual carefully before carrying out any operation.



This manual is available to the user and is valid for all Brusatori electric motors belonging to the VA series.

Non-compliant behavior can cause serious damage to people or things.

In case of uncertainty, misunderstanding or doubts, stop operations immediately and contact our technical service.

Follow national, local, and plant-specific requirements and standards.

ATTENTION!

The special executions and constructive variants may deviate in some technical details from the motors described in the manual.

In case of difficulty, please contact the manufacturer indicating its code and serial number.



Brusatori Srl reserves the right to make changes to this document without notice.

The constructive variations agreed with the customer take precedence over the contents of the manual.

The manufacturer of the machine in which the motor will be incorporated must include the necessary safety guidelines in the instructions intended for the end user.

2.2 Symbols used



DANGER

ATTENTION

WARNING



ELECTRIC DANGER



DANGER SUSPENDED LOADS



DANGER HOT SURFACE

2.3 Intended use

The electric motors in this manual comply with the LOW VOLTAGE DIRECTIVE 2014/35/EU, and are intended for use in a standard industrial environments.

They also comply with Directive 2011/65/EU (RoHS Directive) and EMC Directive 2014/30/EU.

Each motor is built to be incorporated into a machine or to be assembled with other machinery to form a machine covered by the MACHINERY DIRECTIVE 2006/42/EC.

If used for other purposes, it is necessary to take the necessary precautions to make the motor safe in the environment in which they are intended.

ATTENTION!

The motor cannot be put into service before the machinery in which it is incorporated is declared compliant with the MACHINERY DIRECTIVE 2006/42/CE.

The manufacturer of the machinery must also verify that the machine complies with the EMC DIRECTIVE 2014/30/EU.



This document is intended for the machine manufacturer, not for the end user.

The manufacturer of the machine in which the motor will be incorporated is responsible for providing the installation, use and maintenance manual to the end user.

2.4 European directives

LOW VOLTAGE DIRECTIVE (LVD) 2014/35/EU	Compliant
HAZARDOUS SUBSTANCES DIRECTIVE 2011/65/EU (RoHS) and subsequent Delegated Directives	Compliant
MACHINERY DIRECTIVE 2006/42/CE	Responsibility of the machine manufacturer
EMC DIRECTIVE 2014/30/UE	Compliant (if electronic components are present) Responsibility of the machine manufacturer

2.5 Harmonized standards

CEI EN 60034-1: 2011	Part 1: Nominal and operating characteristics
CEI EN 60034-2:	Part 2: Methods for losses determining
CEI EN 60034-5: 2021	Part 5: Degrees of protection of rotating machinery enclosures (integral design) (IP Code)
CEI EN 60034-6: 1997	Part 6: Cooling Methods (IC Code)
CEI EN 60034-7: 1997 / A1:2001	Part 7: Classification of construction forms and types of installation as well as location of terminal boxes (IM code)
CEI EN 60034-8: 2008 / A1:2015	Part 8: Marking of terminals and direction of rotation
CEI EN 60034-9	Part 9: Noise limits
CEI EN 60034-14	Part 14: Mechanical vibrations of rotating machines
CEI EN 60034-18 41	Part 18: Electrical insulation systems
CEI EN 60034-25	Part 25: Inverter power supply
CEI EN 60034-30-1/2	Part 30: Energy efficiency classes
UNI 9321	Drive shaft ends
ISO 22081	General tolerances
UNI ISO 8015	Technical drawings and tolerances
CEI EN 60204-1: 2018	Machinery safety - Electrical equipment of machines Part 1: General rules

2.6 UL Certification

On request	PRHJ2/8*	Certification UL/CSA	File E549407
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*Available for size 160 S/M/L/P, 180 S/M/L/P, 225 S/M/L/P/X IP23 and IP54. Available for size 160 M/L/P/X, 180 M/L/X liquid cooling

2.7 Available sizes

Mechanical size		Motor length				
VA	160	S	M	L	P	-
	180	S	M	L	P	-
	225	S	M	L	P	X
	280	S	M	L	P	-
	355	S	M	L	-	-

2.8 Identification plate

Each motor is equipped with its own unique identification plate.

The plate is affixed to the motor in the form of an adhesive label, and indicates the nominal values and operating conditions. Before commissioning, check that the data corresponds to the expected values.

The plate must always be visible on the motor and must NOT be removed.



S/N 12345/001 - yyyy/ww 2025/42

Made in Italy
Brusatori srl
I-20012-Cuggiono
www.brusatori.eu

Mat. No.: ABCDEF

Type: ABCDEF



www.keb-automation.com

BCode VA116S1200N1300O001

P_N 44	[kW]	f [Hz]	V_N [Vrms]	I_N [Arms]	I_0 [Arms]
----------	------	----------	--------------	--------------	--------------

$T_N: 350$	$[Nm]$		41.2	400	80.4	30.6
------------	--------	---	------	-----	------	------

n_N: 1200 [rpm] $\triangle$

n_p: 1920 [rpm] Resist. (ph/ph) Y: 0.173 [Ohm]

Slip: 36 [rpm] **Induct. (ph/ph)** **Y:** 19 [mH]

Feedback:

Brake:

Fan: 3Ph 400/460 Vac - 50/60Hz - 2.31A - 1100W

DE 6312ZZC3 **NDE 6311ZZC3**

3ph AC Servomotor

IEC 60034-1, *Duty* S1

Ins. Class F

IC B35 - IP 23

Cosfi 0.87 Eff. 90.9 [%]

T. sensor: NC 150 °C

Jm 255 [kqcm2]

Poles 4

Weight 208 [kg]

Note:

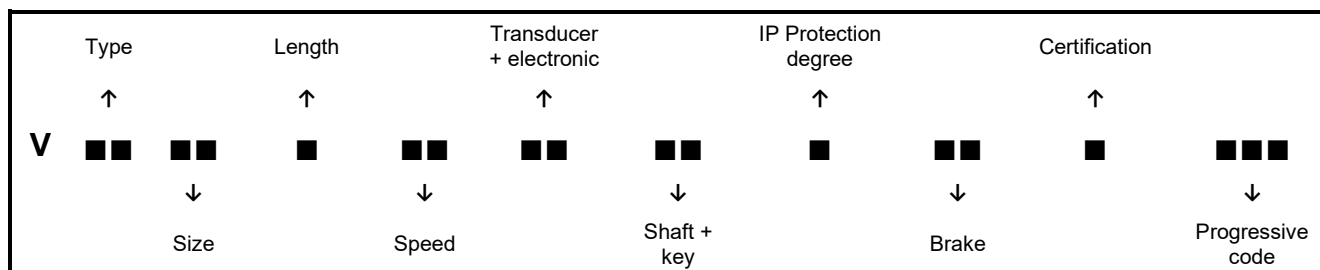
The appearance of the plates shown in this manual may differ from the real one.

Plate legend

Mat. No	Customer article code
Type	Secondary customer article code
BCode	Brusatori motor code
S/N	Motor serial number
yyyy/ww	Year / week of production
P_N	Nominal power
f	Nominal frequency
V_N	Nominal voltage
I_N	Current at nominal speed
I₀	Stall current
T_N	Coppia alla velocità nominale
nn	Nominal speed
np	Speed at constant power
Slip	Scroll
Resist	Phase-to-phase resistance
Induct.	Phase-to-phase inductance
IEC	Reference standard
Duty	Type of service
Ins. class	Winding insulation class
IC	Cooling index
IM	Construction form
IP	Protection degree
Cosφ	Power factor
Eff. %	Efficiency
T. sensor	Temperature sensor
Jm	Rotor moment of inertia
Poles	Number of poles
Feedback	Transducer type + transducer data
Brake	Type of brake (only if present)
Fan	Fan features
DE	Drive end side bearing
NDE	Non Drive End side bearing
Weight	Motor weight

2.9 Order key

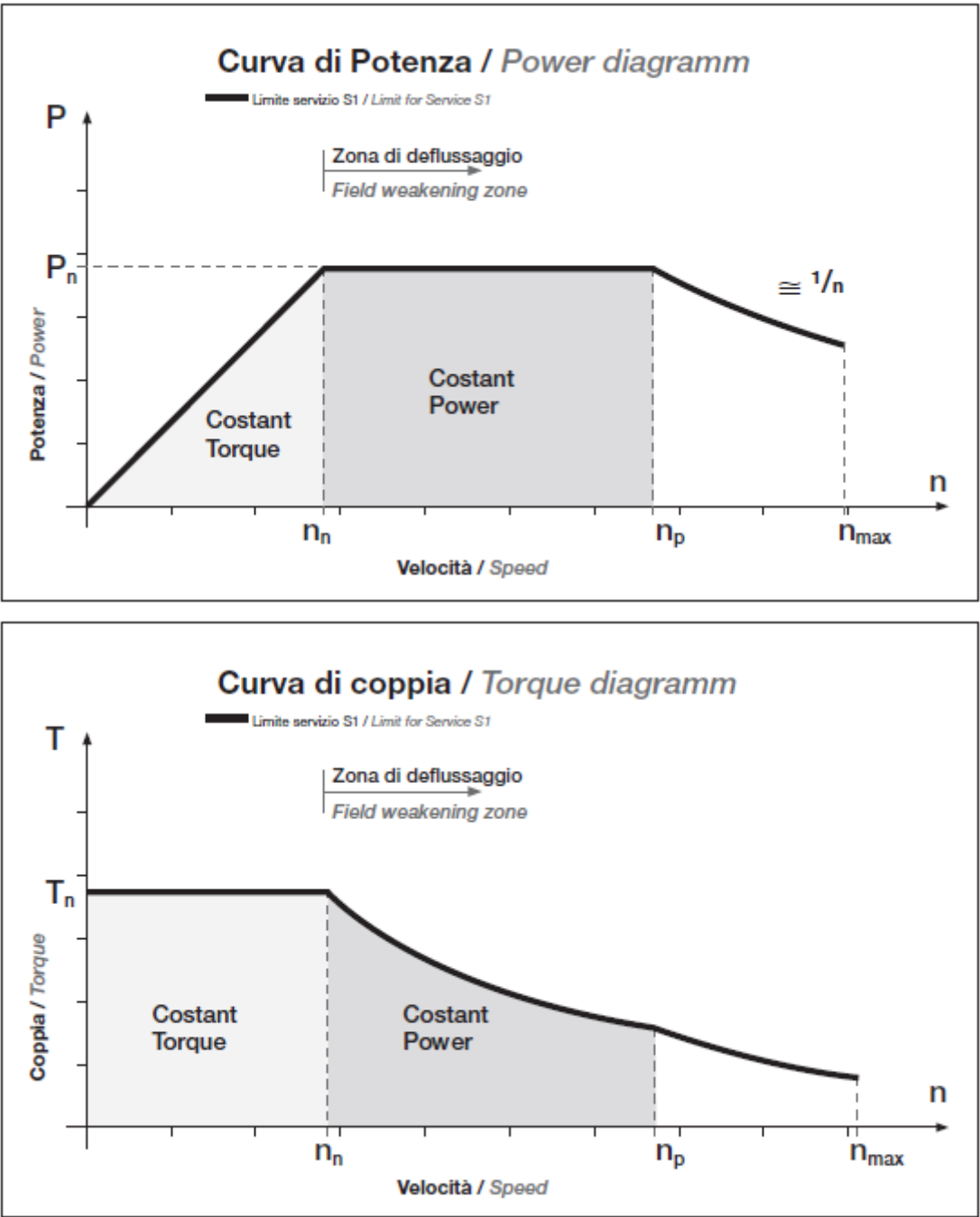
The configuration of a VA series motor is described using the following coding system:



Type		V■□□□□□□□□□□□□□□□□
	A1 A2 A3	Motor VA direct cooling (open) Motor VA indirect cooling (close) Motor VA liquid cooling
Size		V□□■□□□□□□□□□□□□□
	16 18 22 28 35	Size 160 Size 180 Size 225 Size 280 Size 355
Length		V□□□□■□□□□□□□□□□□
	A S M L P X	Length A Length S Length M Length L Length P Length X
Speed		V□□□□□■□□□□□□□□□□
	5X 10 12 15 18 22 26	580 rpm 1000 rpm 1200 rpm 1500 rpm 1800 rpm 2200 rpm 2600 rpm
Transducer + electronic		V□□□□□□□■□□□□□□□□
	00 01 2W U1 V1 V2 V3 V4 V5 V6	No transducer, no predisposition No transducer, predisposition encoder Sick VFS60 Resolver TS2640N1901E64 Encoder Sick VFS60 SinCos Encoder Sick VFS60 1024 TTL Encoder Sick VFS60 1024 HTL Encoder Sick VFS60 2048 TTL Encoder Sick VFS60 2048 HTL Encoder Sick VFS60 4096 TTL Encoder Sick VFS60 4096 HTL

Shaft + Key		V□□□□□□□□■□□□□□□□			
	N1	48x110	with key	Optional	VA 160 S-M
	N2	48x110	without key	Optional	VA 160 S-M
	O1	55x110	with key	Standard	VA 160
	O2	55x110	without key	Optional	VA 160
	P1	60x140	with key	Standard	VA 180 S
	P2	60x140	without key	Optional	VA 180 S
	Q1	65x140	with key	Standard	VA 180 M-L-P
	Q2	65x140	without key	Optional	VA 180 M-L-P
	R1	75x140	with key	Standard	VA 225 S-M-L
	R2	75x140	without key	Optional	VA 225 S-M-L
	S1	85x170	with key	Standard	VA 225 P-X
	S2	85x170	without key	Optional	VA 225 P-X
	T1	100x210	with key	Standard	VA 280
	T2	100x210	without key	Optional	VA 280
	U1	120x210	with key	Standard	VA 355
	U2	120x210	without key	Optional	VA 355
	V1	70x140	with key		
	V2	70x140	without key		
IP proection degree		V□□□□□□□□□□■□□□□□□□			
	0	IP 00			
	3	IP 23			
	4	IP 54			
	5	IP 55			
	6	IP 65			
Brake		V□□□□□□□□□□□□■□□□□□			
	00	No brake			
	xx	Brake type Ref. chapter 3.9 Brake Type			
Certification		V□□□□□□□□□□□□□□■□□□□			
	C	CE		Standard	
	I	CE + Insulation system		UL/CSA (OBJY2/8)	
	O	CE + UL/CSA certification		UL/CSA (PRHJ2/8)	
Progressive code		V□□□□□□□□□□□□□□■□■□■			
Last 3 digits represent a progressive code, that defines other variants of the motor, such as:					
- Connections					
- Flange dimensions					
- Connection box position					
- Cable outlet direction					
- Thermal protection					
- Ventilation					
- Bearings type					
- Inertia					
- Painting					
- Other customizations...					

2.10 Torque / Power Curve



3. Technical data

3.1 Standard features

Winding	Reinforced three-phase for inverter application
Insulation	Class F according to CEI EN 60034-1
Overtemperature	Class F according to CEI EN 60034-1
Sizing	Class F according to CEI EN 60034-1
Type of service	S1 - Continuous
Protection degree (CEI EN 60034-5)	IP23 according to CEI EN 60034-5 IP54 according to CEI EN 60034-5
Room temperature	From -20 to +40 °C
Environmental conditions	Maximum altitude: 1000m above sea level Humidity: ≤90% (non-condensing) Transport / storage temperature: -20 to +70 °C
Color	Black RAL 9005
Cooling (CEI EN 60034-6)	VA160 IC 416 Single-phase axial fan for IP54 VA180-355 IC 416 Three-phase fan radial mounting for IP54 IC 06 Three-phase fan radial mounting with filter per IP23 IC 9W7 Liquid cooling
Ventilation	Direct starting of the fan when the power is switched on
Vibration degree (CEI EN 60034-14)	Grade A Half key balancing
Thermal protection	Thermal protector with normally closed contact 150°C (Tensione max 250 Vac, corrente max 6 Aac)
Construction form (CEI EN 60034-7)	B35 IM 2001 VA 160 - 280** B3 IM 1001 VA 355**
Bearings	Ball bearings lubricated for life
Position sensor	Encoder predisposition (Shaft D.12 mm i isolier peek 12 - 14mm)
Service position	See paragraph 3.6
Power connection	Three-phase terminal block in terminal box
Signal connection	M23 Connector
Terminal box position	Up

* Operations at higher temperatures or altitudes are possible with derating (see paragraph 3.10).

** See paragraph 3.6 for the recommended mounting positions

ATTENTION!

The motor may only be used in the applications for which it was designed.
The rated values and operating conditions are indicated on the motor plate, check before putting into service that the data correspond to those foreseen.



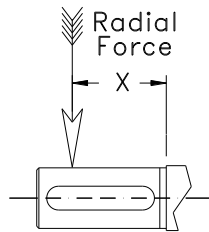
Motor size		VA160	VA180	VA225	VA280	VA355
Stator	Material	Magnetic lamination				
	Stator winding	Copper winding with special insulation for use with inverters				
Rear shield	Material	Alluminium + steel compass	Cast iron			
Ball bearings (standard)	D-End (spheres)	6312 ZZ C3	6314 ZZ C3	6318 C3	6222 C3	-
	ND-End (spheres)	6311 ZZ C3	6214 ZZ C3	6315 C3	6222 C3	-
	Lubrication	Lubricated for life				
	Axial locking	-	D-End side			
Rollers bearings (optional) - standard for size 355	D-End (rollers)	NU 312 EC	NU 314 C3	NU 318	NU 222 EC	6226 C3 + NU 226 EC
	ND-End (rollers)	-	-	-	-	NU 226 EC
	Lubrication	Periodically lubricated by grease nipple				
	Axial locking	ND-End side				
High speed bearings (optional)	D-End (high speed)	6312 ZZ C3 TBH	6314 ZZ C3 TBH	6318 C3 TBH	7222 TBH	2 x 7226 TBH
	ND-End (high speed)	6311 ZZ C3 TBH	6214 ZZ C3 TBH	6315 C3 TBH	7222 TBH	NN 3026 TBH
	Lubrication	Lubricated for life				
	Axial locking	-	D-End side			
Terminal box		Alluminium	Steel			
Flange		Alluminium + steel compass	Cast iron			
Ventilation carter		Galvanized steel				
Rotor		Magnetic lamination + Aluminium				

3.2 Standard transducer (encoder)

Sizes it is available on	160 - 180 - 225 - 280 - 355
Supply voltage	5 - 32 V
Output circuit	HTL / TTL
Resolution	65.536 pul./rot.
Maximum current with load	Max 30 mA
Maximum frequency of use	820 kHz
Maximum rotation speed	9000 rpm
Protection	IP65 acc. IEC 60529
Working temperature	-30 to +100 °C
Maximum relative humidity	90%
Connector	M23

3.3 Permissible radial loads

The tables give the allowable radial loads in Newtons, assuming zero axial force.
 Radial force is applied to the center of the shaft for a bearing life of **20000** hours.
 The motors are mounted in IM B3 construction in a horizontal position.
 Warning: avoid axial shocks on the shaft during assembly.



3.3.1 Ball bearings VA160

Motor	VA160	Maximum radial load on the shaft:					9800 N
Quote X (mm)	Velocità rotore						
	580 rpm	1000 rpm	1500 rpm	2200 rpm	3750 rpm	5300 rpm	
0	6700	5600	4700	3800	3100	2400	
20	6600	5400	4600	3700	3050	2350	
30	6500	5300	4500	3600	3000	2300	
40	6300	5200	4400	3500	2950	2275	
50	6200	5100	4300	3400	2900	2225	
60	6100	5000	4200	3350	2850	2200	
70	6000	4900	4100	3300	2800	2175	
80	5800	4800	4050	3200	2700	2150	
90	5700	4700	4000	3100	2600	2125	
100	5500	4600	3900	3000	2500	2000	
110	5400	4400	3800	2950	2400	1950	

3.3.2 Rollers bearings VA160

Motor	VA160	Maximum radial load on the shaft:					9800 N
Quote X (mm)	Velocità rotore						
	580 rpm	1000 rpm	1500 rpm	2200 rpm	3500 rpm	4800 rpm	
0	11000	9200	7600	6000	5000	4000	
20	10800	9000	7500	5800	4900	3950	
30	10600	8800	7400	5700	4800	3900	
40	10400	8600	7300	5600	4700	3850	
50	10200	8400	7200	5500	4600	3800	
60	10000	8200	7000	5400	4500	3750	
70	9800	8000	6900	5300	4400	3700	
80	8800	7800	6600	5200	4300	3600	
90	7600	7600	6400	5100	4200	3500	
100	6700	6700	6200	5000	4100	3400	
110	5800	5800	5800	4900	4000	3300	

3.3.3 High speed bearings VA160

Motor	VA160	Maximum radial load on the shaft:					9800 N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	2200 rpm	4850 rpm	7500 rpm	
0	3150	2600	2400	1750	1450	1150	
20	3100	2550	2350	1700	1400	1125	
30	3050	2500	2300	1650	1375	1100	
40	2950	2450	2250	1600	1350	1075	
50	2900	2400	2200	1575	1325	1050	
60	2850	2350	2150	1550	1300	1025	
70	2800	2300	2100	1525	1275	1000	
80	2750	2250	2000	1500	1250	975	
90	2700	2200	1900	1450	1200	950	
100	2600	2150	1800	1400	1175	925	
110	2500	2100	1700	1350	1150	900	

3.3.4 Ball bearings VA180

Motor	VA180	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	3050 rpm	4300 rpm	
0	10200	8300	7400	6200	4600	4000	
20	10100	8200	7200	6100	4500	3900	
30	10000	8100	7000	6000	4400	3800	
50	9800	8000	6800	5900	4300	3750	
60	9600	7900	6600	5800	4200	3700	
70	9400	7800	6500	5700	4100	3650	
90	9200	7600	6400	5600	4050	3600	
100	9000	7400	6300	5400	4000	3500	
120	8600	7200	6100	5200	3950	3400	
130	8400	7000	5900	5000	3850	3300	
140	8200	6800	5800	4800	3700	3200	

3.3.5 Rollers bearings VA180

Motor	VA180	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	2800 rpm	3800 rpm	
0	15600	12600	10800	9300	6800	5900	
20	15400	12300	10600	9100	6650	5800	
30	15200	12000	10400	8800	6500	5700	
50	14800	11800	10200	8600	6400	5550	
60	14400	11600	10000	8450	6300	5400	
70	14000	11400	9800	8350	6200	5250	
90	13600	11200	9600	8200	6100	5100	
100	12200	10800	9400	8000	6000	5000	
120	11000	10500	9200	7750	5850	4900	
130	9400	9400	8800	7500	5700	4800	
140	8000	8000	8000	7300	5600	4700	

3.3.6 High speed bearings VA180

Motor	VA180	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	2200 rpm	4050 rpm	6300 rpm	
0	5000	4100	3500	3000	2300	1900	
20	4900	4000	3400	2950	2250	1850	
30	4800	3900	3350	2900	2200	1800	
50	4700	3850	3300	2850	2150	1750	
60	4600	3800	3250	2800	2100	1700	
70	4500	3750	3200	2700	2050	1650	
90	4400	3700	3150	2600	2000	1600	
100	4300	3500	3100	2550	1950	1575	
120	4200	3400	3000	2500	1900	1550	
130	4100	3300	2900	2450	1850	1525	
140	4000	3200	2800	2400	1800	1500	

3.3.7 Ball bearings VA225

Motor	VA225	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	2600 rpm	3400 rpm	
0	11000	8800	7600	6600	5000	4200	
20	10800	8600	7400	6500	4900	4150	
40	10600	8400	7300	6400	4800	4100	
60	10400	8300	7200	6250	4700	4075	
70	10200	8200	7100	6100	4600	4050	
90	10000	8100	7000	5900	4500	4000	
110	9750	7950	6800	5700	4400	3950	
120	9500	7800	6600	5500	4300	3875	
140	9250	7600	6400	5400	4200	3800	
160	9000	7400	6200	5300	4100	3750	
170	8600	7200	6050	5200	4000	3700	

3.3.8 Rollers bearings VA225

Motor	VA225	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	2300 rpm	2800 rpm	
0	18800	15300	13300	11500	8200	7750	
20	18600	15000	13000	11200	8100	7600	
40	18300	14800	12750	10800	8050	7400	
60	17700	14500	12500	10600	8000	7200	
70	17400	14300	12250	10400	7900	7000	
90	17000	13800	12000	10200	7800	6900	
110	16600	13600	11700	10000	7600	6800	
120	15200	13300	11500	9750	7350	6600	
140	13200	13000	11200	9500	7200	6400	
160	11500	11500	10800	9250	7000	6200	
170	9800	9800	9800	9000	6800	6000	

3.3.9 High speed bearings VA225

Motor	VA225	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	3300 rpm	4800 rpm	
0	5600	4600	3950	3400	2500	2250	
20	5500	4550	3900	3350	2450	2200	
40	5400	4500	3800	3300	2400	2150	
60	5300	4400	3700	3250	2350	2125	
70	5200	4300	3650	3200	2300	2100	
90	5100	4200	3600	3150	2250	2050	
110	5000	4100	3500	3000	2200	2000	
120	4900	4000	3400	2950	2150	1950	
140	4800	3800	3300	2900	2100	1900	
160	4700	3700	3200	2800	2050	1850	
170	4500	3600	3100	2700	2000	1750	

3.3.10 Ball bearings VA280

Motor	VA280	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	2400 rpm	3000 rpm	
0	12000	9700	8200	6700	5500	4800	
30	11750	9500	8100	6600	5400	4750	
50	11500	9400	8000	6500	5300	4700	
70	11250	9200	7800	6300	5200	4600	
90	11000	9000	7600	6200	5000	4500	
110	10750	8800	7400	6000	4850	4400	
130	10500	8600	7250	5950	4750	4300	
150	10250	8400	7150	5800	4600	4200	
170	10100	8200	7000	5600	4500	4100	
190	9800	8000	6750	5500	4400	4000	
210	9500	7800	6500	5350	4300	3950	

3.3.11 Rollers bearings VA280

Motor	VA280	Maximum radial load on the shaft:					N
Quote X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	2300 rpm	2800 rpm	
0	23500	18750	16500	13500	10500	9500	
30	23150	18500	16100	13150	10350	9350	
50	22850	18250	15800	12850	10200	9200	
70	22500	18000	15500	12500	10000	9000	
90	22250	17750	15250	12200	9850	8850	
110	22000	17500	15000	11900	9700	8700	
130	21500	17150	14500	11600	9500	8500	
150	19000	16850	14200	11350	9350	8350	
170	16500	16500	13850	11100	9100	8100	
190	14500	14500	13500	10800	8800	7800	
210	12500	12500	12500	10500	8500	7500	

3.3.12 High speed bearings VA280

Motor	VA280	Maximum radial load on the shaft:					N
Quota X (mm)	Rotor speed						
	580 rpm	1000 rpm	1500 rpm	1800 rpm	3150 rpm	4500 rpm	
0	7800	6400	5500	4400	3500	3200	
30	7650	6300	5400	4300	3400	3150	
50	7550	6200	5300	4200	3300	3050	
70	7400	6000	5200	4100	3250	3000	
90	7250	5850	5100	4050	3200	2900	
110	7150	5750	5000	4000	3150	2800	
130	7000	5600	4900	3900	3100	2750	
150	6800	5400	4750	3800	3000	2700	
170	6600	5250	4600	3700	2950	2600	
190	6400	5150	4500	3600	2850	2550	
210	6200	5000	4400	3500	2800	2500	

3.3.13 Ball + rollers bearings VA355

Motor	VA355	Maximum radial load on the shaft:					N
Quota X (mm)	Rotor speed						
	500 rpm	750 rpm	1000 rpm	1500 rpm	1850 rpm	2200 rpm	
0	35500	32700	30700	28000	24500	21500	
30	34750	32000	30100	27300	24150	21150	
50	34000	31500	29500	26600	23800	20750	
70	33500	31000	29000	26000	23500	20375	
90	33000	30500	28500	25500	23000	20000	
110	32500	30000	28000	25000	22500	19500	
130	32000	29000	27500	24500	22000	19000	
150	28000	28000	26000	24000	21500	18500	
170	25000	25000	25000	23500	21000	18000	
190	22000	22000	22000	22000	20000	17500	
210	18000	18000	18000	18000	18000	17300	

3.3.14 High speed bearings VA355

Motor	VA355	Maximum radial load on the shaft:					N
Quota X (mm)	Rotor speed						
	500 rpm	750 rpm	1000 rpm	1500 rpm	2350 rpm	3200 rpm	
0	16500	15200	14200	12800	10800	8500	
30	16200	15000	14000	12600	10600	8300	
50	15800	14800	13800	12400	10400	8200	
70	15600	14500	13500	12200	10200	8100	
90	15300	14200	13200	11800	10000	8000	
110	15000	14000	13000	11600	3750	7800	
130	14750	13600	12600	11400	9500	7600	
150	14500	13300	12300	11200	3250	7400	
170	14000	13000	12000	10800	9000	7200	
190	13500	12500	11500	10500	8750	7000	
210	13000	12000	11000	10200	8500	6800	

3.4 Optional Features

Size	160	180	225	280	355
Cooling mode					
Single-phase axial fan for IP54 motors	S	x***	x***	-	-
Variants and accessories					
Air filter (for motors with radial fan)	S	S	S	S	S
Temperature probes PT1000, PT100, PTC, KTY84/130	x	x	x	x	x
Others temperature probes	R	R	R	R	R
Special shaft (diameter, without keyway)	x	x	x	x	x
Drive shaft side oil seal	x	x	x	x	x
Vibration class B	x	x	x	x	x
Drive shaft side roller bearing (for belt pull)	x	x	x	x	x
Insulated bearing opposite drive shaft side	x	x	x	x	x
Motor Brake	x	x	x	x	x
Special paint (RAL colours)	R	R	R	R	R
Reinforced insulation	S	S	S	S	S
Special anti-corrosion protection	x	x	x	x	x
Terminal box position on the right	x	x	x	x	x
Terminal box position on the left	x	x	x	x	x
Motors with UL insulation system (File E549407)	x	x	x	-	-
Special realizations on customer specifications	R	R	R	R	R
Encoder					
Sinusoidal encoder 1Vpp – 1024 pul./turn	x	x	x	x	x
Absolute single-turn encoder	x	x	x	x	x
Multiturn absolute encoder	x	x	x	x	x
Resolver 2 poles-7Vrms - rapp. Transformation 0.5	x*	x*	x*	x*	x*

S: standard x: possible R: on request

* Not available for motors with brake

** Recommended for motors with power higher than 75 kW

*** Available with performance derating -15%

3.5 Construction forms

Motor size	160	180	225	280	355
Standard	IM B35	IM B35	IM B35	IM B35	IM B3
Optional on request	-	-	-	-	IM B35

3.6 Recommended mounting positions

		VA160	VA180	VA225	VA280	VA355
Mounting position	Coupling (shaft coupling / pulley + belt)*	S - M - L - P - X				
B35	SHAFT COUPLING	ALL	ALL	ALL	ALL	ALL
	PULLEY + BELT	ALL	ALL	ALL	ALL	ALL
B3	SHAFT COUPLING	ALL	ALL	ALL	ALL	ALL
	PULLEY + BELT	ALL	ALL	ALL	ALL	ALL
B5	SHAFT COUPLING	S - M	NONE	NONE	NONE	NONE
	PULLEY + BELT	S - M	NONE	NONE	NONE	NONE
B5 + SUPPORT	SHAFT COUPLING	ALL	ALL	ALL	ALL	ALL
	PULLEY + BELT	ALL	ALL	ALL	ALL	ALL
V36	SHAFT COUPLING	ALL*	ALL*	ALL*	ALL*	ALL*
	PULLEY + BELT	ALL*	ALL*	ALL*	ALL*	ALL*
V15	SHAFT COUPLING	ALL	ALL	ALL	ALL	ALL
	PULLEY + BELT	ALL	ALL	ALL	ALL	ALL
V6	SHAFT COUPLING	ALL*	ALL*	ALL*	ALL*	ALL*
	PULLEY + BELT	ALL*	ALL*	ALL*	ALL*	ALL*
V5	SHAFT COUPLING	ALL	ALL	ALL	ALL	ALL
	PULLEY + BELT	ALL	ALL	ALL	ALL	ALL
V3	SHAFT COUPLING	S - M*	S - M*	S - M*	S - M*	S - M*
	PULLEY + BELT	S - M*	S - M*	S - M*	S - M*	S - M*
V1	SHAFT COUPLING	ALL	ALL	ALL	ALL	ALL
	PULLEY + BELT	ALL	ALL	ALL	ALL	ALL

* vertical mounting must be indicated in the order

3.7 Ventilation

VA160 motors with IP54 protection are equipped with an electric fan axial mounted on the back of the motor.

The axial fan for VA180 and 225 motors IP54 protection is available as an option with a -15% derating in performance.

The VA280 and 355 motors with IP54 protection and the VA160, 180, 225, 280 and 355 with IP23 protection motors are equipped with a centrifugal electric fan radial mounted on the back of the motor.

3.7.1 Single phase axial fan data standard for the size 160 (optional for size 180* and 225* IP54):

Motor size	VA160	VA180*	VA225*	Unit
Certification	CE / UL	CE / UL	CE / UL	-
Motor protection	IP54	IP54	IP54	IP
Number of phase	1	1	1	N
Supply voltage	220 ÷ 230	220 ÷ 230	220 ÷ 230	V
Frequency	50 ÷ 60**	50 ÷ 60**	50 ÷ 60**	Hz
Power	350	660	750	W
Current consumption	1,55	2,9	3,3	A
Minimum distance from the back for air inlet / outlet	80	120	120	mm
Minimum distance from the side for air inlet / outlet	60	80	100	mm
Flow	3420	3420	5160	m ³ /h
Prevalence	160	850	700	Pa
Thermal overload protection	Thermal	Thermal	Thermal	-
Fan protection degree	IP44	IP55	IP55	IP
Capacitor	8	-	-	µF

* motor performance derating -15%

** for 60Hz power supply, a reduction bushing for the section inlet is required.

3.7.2 Three phase axial fan data (optional) for the size 160, 180* and 225* IP54:

Motor size	VA160	VA180*	VA225*	Unit
Certification	CE / UL	CE / UL	CE / UL	-
Motor protection	IP54	IP54	IP54	IP
Number of phase	3	3	3	N
Supply voltage	400	400	400	V
Frequency	50 ÷ 60**	50 ÷ 60**	50 ÷ 60**	Hz
Power	715	1180	1100	W
Current consumption	1,1	1,8	1,7	A
Minimum distance from the back for air inlet / outlet	80	120	120	mm
Minimum distance from the side for air inlet / outlet	60	80	100	mm
Flow	1395	2405	3600	m ³ /h
Prevalence	950	1042	663	Pa
Thermal overload protection	Thermal	Thermal	Thermal	-
Fan protection degree	IP55	IP55	IP55	IP
Capacitor	-	-	-	µF

* motor performance derating -15%

** for 60Hz power supply, a reduction bushing for the section inlet is required.

3.7.3 Radial fan data standard for all IP23 motors and for sizes 180, 225, 280 and 355 IP54:

Motor size	VA180	VA225	VA280	VA355	Unit
Certification	CE / UL	CE / UL	CE / UL	CE / UL	-
Motor protection	IP23 / IP54	IP23 / IP54	IP23 / IP54	IP23 / IP54	IP
Number of phase	3	3	3	3	N
Supply voltage	400 ÷ 460	400 ÷ 460	400 ÷ 460	400 ÷ 460	V
Frequency	50 ÷ 60**	50 ÷ 60**	50 ÷ 60**	50 ÷ 60**	Hz
Power	1500	2200	4000	7500	W
Current consumption	3,15	4,5	7,9	14	A
Minimum distance from the back for air inlet / outlet	140	140	170	200	mm
Minimum distance from the side for air inlet / outlet	80	100	120	150	mm
Flow	2100	2880	4500	7800	m ³ /h
Prevalence	1600	1800	2200	2300	Pa
Thermal overload protection	Impedence	Thermal	Thermal	Thermal	-
Fan protection degree	IP23	IP23	IP23	IP23	IP
Capacitor	-	-	-	-	µF

** for 60Hz power supply, a reduction bushing for the section inlet is required.

3.8 Liquid cooling

Liquid cooling is available for motor size 160, 180, 225 and 280 of the VA series; this technology allows for increased performance while reducing the overall size of the motor.

Liquid-cooled motors are provided with a steel cooling circuit placed inside the housing of the motor.

The motor coolant pass through the circuit.

Always observe the coolant flow rate and pressure values given in section 7 and on the motor nameplate.

The recommended coolant temperature depends on the ambient temperature and relative humidity; refer to Chapter 3.8.4 to identify the correct one.

Excessively high coolant temperatures will cause a drop in performance (refer to section 3.8.3 regarding power derating as a function of coolant temperature).

Too low coolant temperatures can cause condensation inside the motor, the correct coolant temperature should be identified as can be seen in the graph in section 3.8.4.

3.8.1 Type of coolant

The type of coolant is very important for the life of the motor; a liquid rich of impurities can impair the operation of the entire system. The application of a filter at the inlet of the circuit is recommended to keep the cooling channels clean.

Plain water with the addition of anti-rust, anti-corrosion and anti-algae additives should be used.

The coolant should have the following characteristics:

Conditions	Unit	Value
Maximum allowable pressure (non-continuous)	Bar	5
Coolant temperature	°C	18 – 22
Ph Value (at 20°C)	Ph	6 – 9
Water hardness	Mmol/l	1.43 – 2.5
Chloridium – Cl	mg/l	< 200
Sulfate – SO ₄ ²⁻	mg/l	< 200
Oil	mg/l	< 10
Size of particles allowed for foreign bodies*	mm	< 0.1*

* value to be taken into consideration when choosing the filter to be applied on the circuit

When installing the motor in environments where the temperature may drop below 5°C, an antifreeze liquid must be added to prevent freezing of the coolant and consequently damage to the circuit.

3.8.2 Cooling system

The cooling system should be closed-loop equipped with a pump for recirculation and temperature and pressure control, an industrial chiller should be used.

WARNING!

Do not use an open-loop cooling system!

This is in order to protect the environment and avoid obstruction and/or serious damage to the cooling circuit and consequently to the motor.



WARNING!

Coolant should be circulated before starting the motor and should continue to circulate as long as the motor is running. If problems occur related to the operation of the cooling system, stop motor operation immediately.



WARNING!

After the motor is turned off, it is a good idea to leave the cooling system switched on for a few minutes so that motors temperatures can drop and to prevent high-pressure vapors from forming in the circuit.



It is recommended to use an automatic system that stops motor operation in the absence of coolant to avoid motor damage.

WARNING!

Never exceed the maximum coolant pressure indicated on the nameplate or in Section 5.4.9, provide a system to monitor it to avoid damage to the motor or people in the area around the motor.



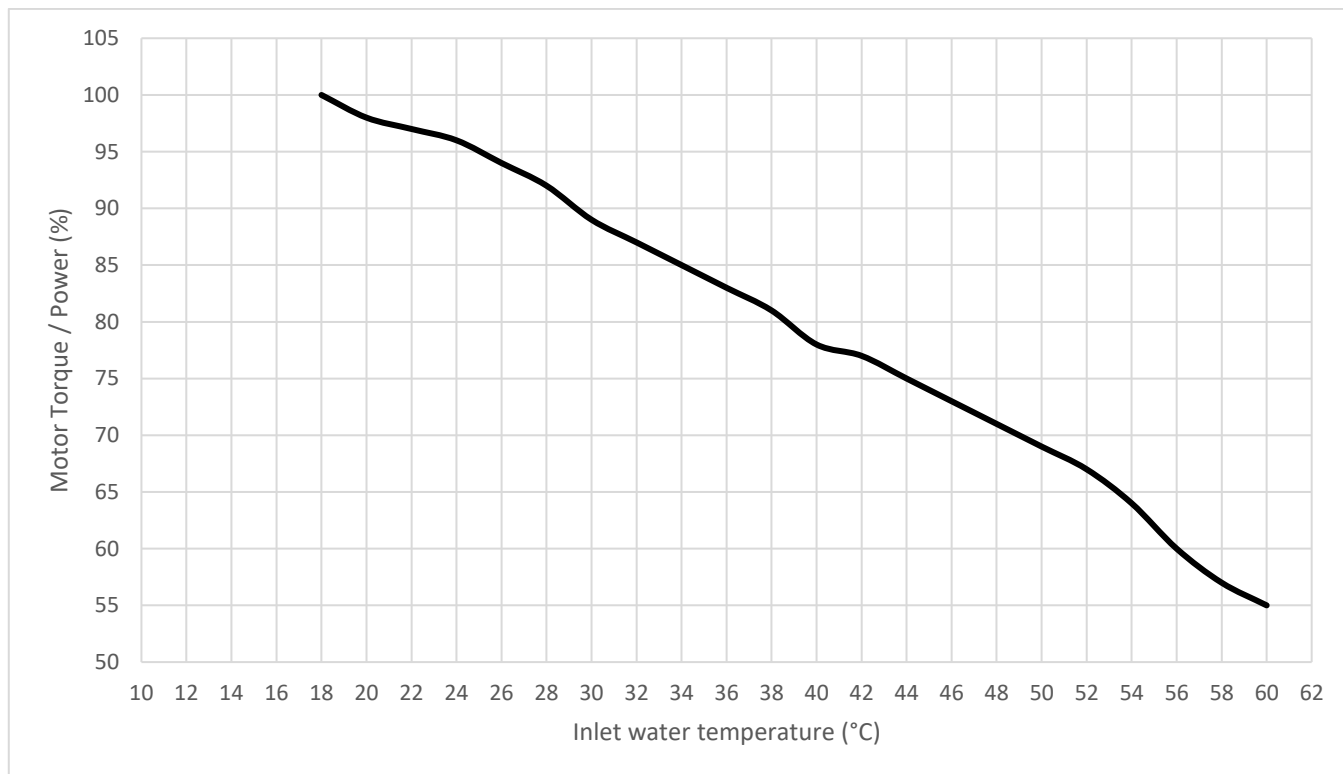
WARNING!

It is recommended to apply a temperature sensor that monitors the coolant temperature and intervenes when it exceeds the maximum temperature.



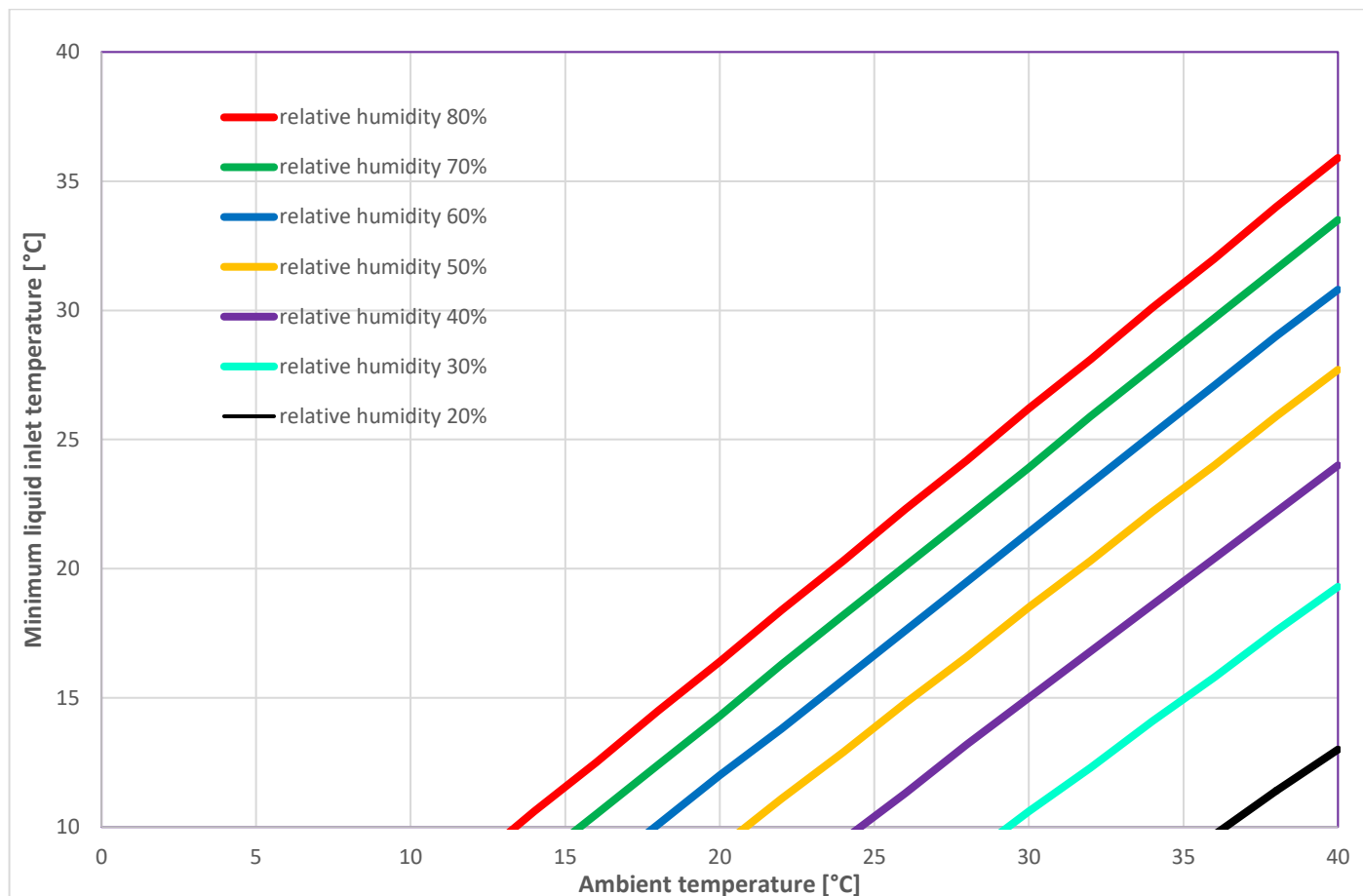
3.8.3 Derating of torques as a function of liquid temperature

Motors performance drops if the coolant inlet temperature increases, this after 20° C, proportionally as shown in the graph below:



3.8.4 Coolant temperature as a function of ambient temperature and relative humidity

To select the coolant temperature in relation to the ambient temperature and humidity, the following graph should be observed:



First we need to identify the value of the ambient temperature (X-axis), then we need to move vertically upward and trace the colored sloping line that identifies the relative humidity, consequently we will find on the Y-axis the minimum coolant temperature to be used (follow the example shown with the yellow line).

3.9 Motor holding brake

Upon request, it is possible to mount a holding brake on the rear shield of the motor.

The brake is of the electromechanical type with springs with braking action without voltage.

The brake must be switched on and switched off with the rotor stopped.

Brake data:

Motor size	VA160	VA180	VA225	VA280	VA355	Unit
Order key code						-
Brake manufacturer	KEB	KEB	KEB	KEB	-	-
Brake series	Combistop 38 093811N	Combistop 38 103811N	Combistop 38 113811N	Combistop 38 113811N	-	-
Brake type	Spring brake	Spring brake	Spring brake	Spring brake	-	-
Static braking torque	330	665	1335	1335	-	Nm
Supply voltage +/- 5%	24	24	24	24	-	Vdc
Frequency	-	-	-	-	-	Hz
Absorbed power	80	130	180	180	-	W
Maximum intervention speed	1500	1500	1500	1500	-	rpm
Max. work with 1 intervention/hour					-	kJ
Brake inertia	73,8	205,4	1807	1807	-	Kgcm ²
Additional mass	26	39	80	80	-	Kg

- 1) When the brake has not been run in, the value of the braking torque can deviate by +/- 20% from the nominal value
- 2) Others supply voltages are available upon request

3.10 Vibration and balance class

VA motors are built to meet vibration class A and are half key balanced.

The vibration level according to class B is available on request.

The vibration level is expressed in displacement and speed, using the suspension method and with no load applied.

Vibration degree	Shaft height (mm)	
	160 < H ≤ 355	
	Shift	Speed
	µm	mm/s
A	45	2,8
B	18	1,1

3.11 Motor derating in function of temperature / altitude

The motors are designed to operate at temperatures between -20°C and 40°C and at an altitude of 1000m above sea level.

If use takes place at altitudes or at higher temperatures, the motor must have a derating according to the indications given in the table below:

Altitude (m)	Temperature (°C)			
	30	40	50	60
1000	1	1	0,90	0,80
2000	1	0,95	0,86	0,75
3000		0,84	0,76	0,64
4000		0,73	0,65	0,50

3.12 Holes for cable entry in the terminal box

VA motors are supplied with the following holes on the terminal box (power / auxiliary)

Motor	Holes dimension
VA 160	1 x Ø51 + 1 x Ø41 + 1 x Ø21
VA 180	6 x Ø65 + 1 x Ø22
VA 225	6 x Ø65 + 1 x Ø22
VA 280	6 x Ø65
VA 355	6 x Ø65

4. Electrical data IP54 version

4.1 Motor features VA 160 (S-M-L-P) IP54 / IP55 with axial fan

Protection degree	IP 54 / IP55***		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 0,255 - M 0,290 - L 0,341 - P 0,387				
Maximum mechanical speed nmax (rpm)****	VA 160 S	5300 4800* 7500**	Motor weight (kg)	VA 160 S	201
	VA 160 M			VA 160 M	220
	VA 160 L			VA 160 L	247
	VA 160 P			VA 160 P	276
D-End side bearing	6312 ZZ C3		ND-End side bearing	6311 ZZ C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing

**With high speed special bearing

***Available on request

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	1,55
Number of phases	1	Mounting	Axial
Voltage (V)	220 / 230	Type of ventilation	Forced air intake
Power (W)	350	Protection degree (IP)	IP44
Maximum flow (m³/min)	57	Maximum pressure (Pa)	160
Minimum distance for air inlet / outlet (mm)			90

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 160 S

n _N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P _N Nominal power	15,3	25,2	36	43,2	50,1	56,1	kW
T _N Torque at nominal speed	252	240	229	229	218	206	Nm
I _N Current at nominal power	29,5	47,8	66,1	79,1	91,8	103	A
n _p Max speed at costant power	1400	2400	3600	4300	5200	6200	rpm
T _{max} Max torque	450						Nm
Efficiency	88	91,8	92,7	93	93,2	93,4	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 M

n _N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P _N Nominal power	17,9	29,4	42	50,4	58,5	65,5	kW
T _N Torque at nominal speed	294	281	268	268	254	241	Nm
I _N Current at nominal power	34,5	55,8	77,3	92,5	107	120	A
n _p Max speed at costant power	1400	2400	3600	4300	5200	6200	rpm
T _{max} Max torque	520						Nm
Efficiency	81	91,8	93,1	93,4	93,6	93,8	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 L

n_N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P_N Nominal power	20,8	34,3	49	58,8	68,3	76,4	kW
T_N Torque at nominal speed	343	328	312	312	296	281	Nm
I_N Current at nominal power	40,2	62,7	86,9	104	120	135	A
n_p Max speed at costant power	1400	2400	3600	4300	5200	6200	rpm
T_{max} Max torque	600						Nm
Efficiency	88	92	93,1	93,4	93,6	93,8	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 P

n_N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P_N Nominal power	23,4	38,5	55	66	76,6	85,8	kW
T_N Torque at nominal speed	385	368	350	350	333	315	Nm
I_N Current at nominal power	45,1	71,1	98,6	118	137	153	A
n_p Max speed at costant power	1400	2400	3600	4300	5200	6200	rpm
T_{max} Max torque	700						Nm
Efficiency	88	92	93,5	93,8	94	94,2	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

4.2 Motor features VA 180 (S-M-L-P) IP54 / IP55 with radial fan

Protection degree	IP 54 / IP55***		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 0,490 - M 0,690 - L 0,810 - P 0,920				
Maximum mechanical speed nmax (rpm)****	VA 180 S	4300 3800* 6300**	Motor weight (kg)	VA 180 S	390
	VA 180 M			VA 180 M	480
	VA 180 L			VA 180 L	535
	VA 180 P			VA 180 P	580
D-End side bearing	6314 ZZ C3		ND-End side bearing	6214 ZZ C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing

**With high speed special bearing

***Available on request

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	3,15
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	1500	Protection degree (IP)	IP54 / IP55
Maximum flow (m ³ /min)	35	Maximum pressure (Pa)	1600
Minimum distance for air inlet / outlet (mm)			140

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 180 S

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	25,2	42	60	72	77,4	kW
T _N Torque at nominal speed	420	401	382	382	336	Nm
I _N Current at nominal power	48,7	77,7	108	129	138	A
n _p Max speed at constant power	1400	2400	3600	4300	5200	rpm
T _{max} Max torque	730					Nm
Efficiency	89	92	93,5	93,8	94	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 M

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	34	56	80	96	103	kW
T _N Torque at nominal speed	560	535	510	510	448	Nm
I _N Current at nominal power	64,9	103	143	172	185	A
n _p Max speed at constant power	1400	2400	3600	4300	5200	rpm
T _{max} Max torque	1000					Nm
Efficiency	89	92,1	94,2	94,5	94,7	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 L

n_N Nominal speed	580	1000	1500	1800	2200	rpm
P_N Nominal power	38,3	63	90	108	116	kW
T_N Torque at nominal speed	630	602	573	573	504	Nm
I_N Current at nominal power	73	116	161	193	207	A
n_p Max speed at costant power	1400	2400	3600	4300	5200	rpm
T_{max} Max torque	1200					Nm
Efficiency	89	92,2	94,2	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 P

n_N Nominal speed	580	1000	1500	1800	2200	rpm
P_N Nominal power	41,9	69,1	100	120	127	kW
T_N Torque at nominal speed	690	660	636	636	550	Nm
I_N Current at nominal power	79	127	179	214	226	A
n_p Max speed at costant power	1400	2400	3600	4300	5200	rpm
T_{max} Max torque	1400					Nm
Efficiency	89	92,2	94,2	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	Hz

4.3 Motor features VA 225 (S-M-L-P-X) IP54 / IP55 with radial fan

Protection degree	IP 54 / IP55***		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 1,48 - M 1,74 - L 1,99 - P 2,55 - X 3,25				
Maximum mechanical speed nmax (rpm)****	VA 225 S	3400 2800* 4800**	Motor weight (kg)	VA 225 S	730
	VA 225 M			VA 225 M	810
	VA 225 L			VA 225 L	890
	VA 225 P	VA 225 P		1020	
	VA 225 X	3400 2800*		VA 225 X	1175
D-End side bearing	6318 C3		ND-End side bearing	6315 C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing

**With high speed special bearing

***Available on request

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	4,5
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	2200	Protection degree (IP)	IP54 / IP55
Maximum flow (m³/min)	48	Maximum pressure (Pa)	1800
Minimum distance for air inlet / outlet (mm)			140

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 225 S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	44,8	73,7	105	126	kW
T _N Torque at nominal speed	737	704	670	670	Nm
I _N Current at nominal power	85,4	136	189	226	A
n _p Max speed at constant power	1400	2400	3600	4300	rpm
T _{max} Max torque	1200				Nm
Efficiency	89	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 M

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	53,4	88	126	151	kW
T _N Torque at nominal speed	880	840	800	800	Nm
I _N Current at nominal power	102	162	225	269	A
n _p Max speed at constant power	1400	2400	3600	4300	rpm
T _{max} Max torque	1500				Nm
Efficiency	89	92,1	94,9	95,2	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 L

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	58,8	96,8	138	166	kW
T_N Torque at nominal speed	968	924	880	880	Nm
I_N Current at nominal power	112	179	248	296	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	1800				Nm
Efficiency	89	92,1	94,9	95,2	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 P

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	68,8	113	162	194	kW
T_N Torque at nominal speed	1133	1082	1030	1030	Nm
I_N Current at nominal power	131	209	290	346	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	2300				Nm
Efficiency	89	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 X

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	85,2	140	200	240	kW
T_N Torque at nominal speed	1403	1339	1275	1275	Nm
I_N Current at nominal power	163	259	358	429	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	2600				Nm
Efficiency	89	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

4.4 Motor features VA 280 (S-M-L-P) IP54 / IP55 with radial fan

Protection degree	IP 54 / IP55***		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 3,68 - M 4,34 - L 5,25 - P 5,75				
Maximum mechanical speed nmax (rpm)****	VA 280 S	3000 2800* 4500**	Motor weight (kg)	VA 280 S	1230
	VA 280 M			VA 280 M	1420
	VA 280 L			VA 280 L	1680
	VA 280 P			VA 280 P	1830
D-End side bearing	6222 C3		ND-End side bearing	6222 C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing

**With high speed special bearing

***Available on request

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	7,9
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	4000	Protection degree (IP)	IP54 / IP55
Maximum flow (m³/min)	75	Maximum pressure (Pa)	2200
Minimum distance for air inlet / outlet (mm)			170

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 280 S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	97,9	161	230	276	kW
T _N Torque at nominal speed	1612	1538	1465	1465	Nm
I _N Current at nominal power	185	298	413	494	A
n _p Max speed at constant power	1400	2400	3600	4300	rpm
T _{max} Max torque	2700				Nm
Efficiency	90	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 M

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	119	196	280	336	kW
T _N Torque at nominal speed	1964	1874	1785	1785	Nm
I _N Current at nominal power	225	362	502	601	A
n _p Max speed at constant power	1400	2400	3600	4300	rpm
T _{max} Max torque	3200				Nm
Efficiency	90	92,1	94,9	95,2	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 L

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	140	231	330	396	kW
T_N Torque at nominal speed	2310	2205	2100	2100	Nm
I_N Current at nominal power	265	426	591	707	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	4200				Nm
Efficiency	90	92,1	94,9	95,2	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 P

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	153	252	360	432	kW
T_N Torque at nominal speed	2519	2405	2290	2290	Nm
I_N Current at nominal power	289	465	644	770	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	4500				Nm
Efficiency	90	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

4.5 Motor features VA 355 (S-M-L) IP54 / IP55 with radial fan

Protection degree	IP 54 / IP55***		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 28 - M 33 - L 38				
Maximum mechanical speed nmax (rpm)****	VA 355 S	2200 3200**	Motor weight (kg)	VA 355 S	2300
	VA 355 M			VA 355 M	2700
	VA 355 L			VA 355 L	3100
D-End side bearing	6226 C3 + NU 226 EC		ND-End side bearing	NU 226 EC	
Vibration class	A		Construction form	IM 1001 (B3)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing

**With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	14
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	7500	Protection degree (IP)	IP54 / IP55
Maximum flow (m³/min)	130	Maximum pressure (Pa)	2300
Minimum distance for air inlet / outlet (mm)			200

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 355 S

n _N Nominal speed	500	750	1000	1250	1500	1800	rpm
P _N Nominal power	163	239	316	387	450	517	kW
T _N Torque at nominal speed	3105	3045	3015	2955	2864	2744	Nm
I _N Current at nominal power	300	434	556	681	791	909	A
n _p Max speed at constant power	1200	1800	2400	2900	3199	3199	rpm
T _{max} Max torque	6500						Nm
Efficiency	92	93,7	96,6	96,6	96,7	96,7	%
f _N Nominal frequency	25	37,5	50	62,5	75	90	Hz

VA 355 M

n _N Nominal speed	500	750	1000	1250	1500	1800	rpm
P _N Nominal power	191	282	372	455	530	609	kW
T _N Torque at nominal speed	3657	3586	3550	3479	3373	3231	Nm
I _N Current at nominal power	354	511	654	801	931	1071	A
n _p Max speed at constant power	1200	1800	2400	2900	3199	3199	rpm
T _{max} Max torque	7500						
Efficiency	92	93,7	96,6	96,6	96,7	96,7	%
f _N Nominal frequency	25	37,5	50	62,5	75	90	Hz

VA 355 L

n _N Nominal speed	500	750	1000	1250	1500	1800	rpm
P _N Nominal power	217	319	421	516	600	690	kW
T _N Torque at nominal speed	4141	4060	4020	3940	3819	3658	Nm
I _N Current at nominal power	401	577	739	906	1055	1212	A
n _p Max speed at constant power	1200	1800	2400	2900	3199	3199	rpm
T _{max} Max torque	8500						
Efficiency	92	93,9	96,8	96,8	96,7	96,7	%
f _N Nominal frequency	25	37,5	50	62,5	75	90	Hz

5. Electrical data IP54 version with axial fan

5.1 Motor features VA 180 (S-M-L-P) IP54 / IP55 with axial fan (derating -15%)

Protection degree	IP 54 / IP55		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 0,490 - M 0,690 - L 0,810 - P 0,920				
Maximum mechanical speed nmax (rpm)****	VA 180 S	4300 3800* 6300**	Motor weight (kg)	VA 180 S	390
	VA 180 M			VA 180 M	480
	VA 180 L			VA 180 L	535
	VA 180 P			VA 180 P	580
D-End side bearing	6314 ZZ C3		ND-End side bearing	6214 ZZ C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	2,9
Number of phases	1	Mounting	Axial
Voltage (V)	200 / 277	Type of ventilation	Forced air intake
Power (W)	660	Protection degree (IP)	IP 55
Maximum flow (m ³ /min)		Maximum pressure (Pa)	682
Minimum distance for air inlet / outlet (mm)			120

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 180 S

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	21,4	35,7	51	61,2	65,8	kW
T _N Torque at nominal speed	357	341	325	325	286	Nm
I _N Current at nominal power	41,3	66	91,8	110	117	A
n _p Max speed at costant power	1400	2400	3600	4300	5200	rpm
T _{max} Max torque	620					Nm
Efficiency	89	92	93,5	93,8	94	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 M

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	29	47,6	68	81,6	87,5	kW
T _N Torque at nominal speed	476	455	433	433	381	Nm
I _N Current at nominal power	55,1	87,5	122	146	157	A
n _p Max speed at costant power	1400	2400	3600	4300	5200	rpm
T _{max} Max torque	850					Nm
Efficiency	89	92,1	94,2	94,5	94,7	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 L

n_N Nominal speed	580	1000	1500	1800	2200	rpm
P_N Nominal power	32,5	53,5	76,5	92	98,6	kW
T_N Torque at nominal speed	535	512	487	487	428	Nm
I_N Current at nominal power	62	98,6	137	178	176	A
n_p Max speed at costant power	1400	2400	3600	4300	5200	rpm
T_{max} Max torque	1020					Nm
Efficiency	89	92,2	94,2	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 P

n_N Nominal speed	580	1000	1500	1800	2200	rpm
P_N Nominal power	36,6	58,7	85	102	108	kW
T_N Torque at nominal speed	586	561	540	540	467	Nm
I_N Current at nominal power	67,1	108	152	182	192	A
n_p Max speed at costant power	1400	2400	3600	4300	5200	rpm
T_{max} Max torque	1190					Nm
Efficiency	89	92,2	94,2	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	Hz

5.2 Motor features VA 225 (S-M-L-P-X) IP54 / IP55 with axial fan (derating -15%)

Protection degree	IP 54 / IP55		Ventilation	IC 416	
Rotor inerzia J (kgm²)	S 1,48 - M 1,74 - L 1,99 - P 2,55 - X 3,25				
Maximum mechanical speed nmax (rpm)****	VA 225 S	3400 2800* 4800**	Motor weight (kg)	VA 225 S	730
	VA 225 M			VA 225 M	810
	VA 225 L			VA 225 L	890
	VA 225 P	VA 225 P		1020	
	VA 225 X	3400 2800*		VA 225 X	1175
D-End side bearing	6318 C3		ND-End side bearing	6315 C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	3,3
Number of phases	1	Mounting	Axial
Voltage (V)	200 / 277	Type of ventilation	Forced air intake
Power (W)	750	Protection degree (IP)	IP 55
Maximum flow (m³/min)		Maximum pressure (Pa)	511
Minimum distance for air inlet / outlet (mm)			120

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 225 S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	38	62,6	89,2	107	kW
T _N Torque at nominal speed	626	598	569	569	Nm
I _N Current at nominal power	72,5	116	161	192	A
n _p Max speed at constant power	1400	2400	3600	4300	rpm
T _{max} Max torque	1020				Nm
Efficiency	89	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 M

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	45,4	74,8	107	128	kW
T _N Torque at nominal speed	748	714	680	680	Nm
I _N Current at nominal power	87	138	191	229	A
n _p Max speed at constant power	1400	2400	3600	4300	rpm
T _{max} Max torque	1275				Nm
Efficiency	89	92,1	94,9	95,2	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 L

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	50	82,3	117	141	kW
T_N Torque at nominal speed	823	785	748	748	Nm
I_N Current at nominal power	95	152	211	252	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	1530				Nm
Efficiency	89	92,1	94,9	95,2	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 P

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	58,5	96	138	165	kW
T_N Torque at nominal speed	963	920	875	875	Nm
I_N Current at nominal power	111	178	247	294	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	1955				Nm
Efficiency	89	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 X

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	72,5	119	170	204	kW
T_N Torque at nominal speed	1193	1138	1084	1084	Nm
I_N Current at nominal power	139	220	304	365	A
n_p Max speed at costant power	1400	2400	3600	4300	rpm
T_{max} Max torque	2210				Nm
Efficiency	89	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

6. Electrical data IP23 S version

6.1 Motor features VA 160 (S-M-L-P) IP23 S

Protection degree	IP 23		Ventilation	IC 06	
Rotor inerzia J (kgm²)	S 0,255 - M 0,290 - L 0,341 - P 0,387				
Maximum mechanical speed nmax (rpm)****	VA 160 S	5300 4800* 7500**	Motor weight (kg)	VA 160 S	208
	VA 160 M			VA 160 M	229
	VA 160 L			VA 160 L	260
	VA 160 P			VA 160 P	285
D-End side bearing	6312 ZZ C3		ND-End side bearing	6311 ZZ C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	2,31
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	1100	Protection degree (IP)	IP 54
Maximum flow (m ³ /min)	30	Maximum pressure (Pa)	1100
Minimum distance for air inlet / outlet (mm)			90

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 160 S IP23S

n _N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P _N Nominal power	25,5	42	60	72	83,6	93,6	kW
T _N Torque at nominal speed	420	401	382	382	363	344	Nm
I _N Current at nominal power	49,8	79,7	110	132	153	171	A
n _p Max speed at costant power	950	1600	2400	2900	3600	4200	rpm
T _{max} Max torque	700						Nm
Efficiency	87	91,8	93,5	93,8	94	94,2	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 M IP23S

n _N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P _N Nominal power	27,7	45,5	65	78	90,6	101	kW
T _N Torque at nominal speed	455	435	414	414	393	373	Nm
I _N Current at nominal power	54	86,4	120	143	166	186	A
n _p Max speed at costant power	950	1600	2400	2900	3600	4200	rpm
T _{max} Max torque	800						Nm
Efficiency	87	91,8	93,5	93,8	94	94,2	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 L IP23S

n_N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P_N Nominal power	31,1	51,1	73	87,6	102	114	kW
T_N Torque at nominal speed	512	488	465	465	442	419	Nm
I_N Current at nominal power	60,6	96,6	134	160	186	207	A
n_p Max speed at costant power	950	1600	2400	2900	3600	4200	rpm
T_{max} Max torque	900						Nm
Efficiency	87	92,2	94	94,3	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 P IP23S

n_N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P_N Nominal power	34,5	56,7	81	97,3	113	126	kW
T_N Torque at nominal speed	568	542	516	516	490	464	Nm
I_N Current at nominal power	67,3	108	150	179	208	233	A
n_p Max speed at costant power	950	1600	2400	2900	3600	4200	rpm
T_{max} Max torque	1000						Nm
Efficiency	87	92,3	94	94,3	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

6.2 Motor features VA 180 (S-M-L-P) IP23 S

Protection degree	IP 23		Ventilation	IC 06	
Rotor inerzia J (kgm²)	S 0,490 - M 0,690 - L 0,810 - P 0,920				
Maximum mechanical speed nmax (rpm)****	VA 180 S	4300 3800* 6300**	Motor weight (kg)	VA 180 S	385
	VA 180 M			VA 180 M	475
	VA 180 L			VA 180 L	530
	VA 180 P			VA 180 P	580
D-End side bearing	6314 ZZ C3		ND-End side bearing	6214 ZZ C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	3,15
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	1500	Protection degree (IP)	IP 54
Maximum flow (m ³ /min)	35	Maximum pressure (Pa)	1600
Minimum distance for air inlet / outlet (mm)			140

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 180 S IP23S

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	34,9	57,4	82	98,4	106	kW
T _N Torque at nominal speed	574	548	522	522	459	Nm
I _N Current at nominal power	67,3	109	151	180	193	A
n _p Max speed at constant power	950	1600	2400	2900	3600	rpm
T _{max} Max torque	1000					Nm
Efficiency	88	92	94	94,3	94,5	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 M IP23S

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	50,8	83,7	120	143	154	kW
T _N Torque at nominal speed	837	799	761	761	670	Nm
I _N Current at nominal power	98,1	158	218	263	281	A
n _p Max speed at constant power	950	1600	2400	2900	3600	rpm
T _{max} Max torque	1500					Nm
Efficiency	88	92,1	94,5	94,8	95	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 L IP23S

n_N Nominal speed	580	1000	1500	1800	2200	rpm
P_N Nominal power	58,8	96,8	138	166	178	kW
T_N Torque at nominal speed	968	924	880	880	774	Nm
I_N Current at nominal power	113	183	253	303	326	A
n_p Max speed at costant power	950	1600	2400	2900	3600	rpm
T_{max} Max torque	1700					Nm
Efficiency	88	92,2	94,7	95	95,2	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 P IP23S

n_N Nominal speed	580	1000	1500	1800	2200	rpm
P_N Nominal power	66	108	155	175	195	kW
T_N Torque at nominal speed	1086	1031	987	928	846	Nm
I_N Current at nominal power	127	204	284	319	356	A
n_p Max speed at costant power	950	1600	2400	2900	3600	rpm
T_{max} Max torque	1900					Nm
Efficiency	88	92,2	94,9	95,2	95,4	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	Hz

6.3 Motor features VA 225 (S-M-L-P-X) IP23 S

Protection degree	IP 23		Ventilation	IC 06	
Rotor inerzia J (kgm²)	S 1,48 - M 1,74 - L 1,99 - P 2,55 - X 3,25				
Maximum mechanical speed nmax (rpm)****	VA 225 S	3400 2800* 4800**	Motor weight (kg)	VA 225 S	740
	VA 225 M			VA 225 M	820
	VA 225 L			VA 225 L	900
	VA 225 P	VA 225 P		1030	
	VA 225 X	3400 2800*		VA 225 X	1185
D-End side bearing	6318 C3		ND-End side bearing	6315 C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	4,5
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	2200	Protection degree (IP)	IP 54
Maximum flow (m³/min)	48	Maximum pressure (Pa)	1800
Minimum distance for air inlet / outlet (mm)			140

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 225 S IP23S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	70,1	115	165	198	kW
T _N Torque at nominal speed	1155	1103	1050	1050	Nm
I _N Current at nominal power	135	216	299	358	A
n _p Max speed at constant power	950	1600	2400	2900	rpm
T _{max} Max torque	1700				Nm
Efficiency	88	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 M IP23S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	80,8	133	190	228	kW
T _N Torque at nominal speed	1331	1271	1210	1210	Nm
I _N Current at nominal power	156	249	345	412	A
n _p Max speed at constant power	950	1600	2400	2900	rpm
T _{max} Max torque	2000				Nm
Efficiency	88	92,1	94,9	95,2	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 L IP23S

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	87,2	143	205	246	kW
T_N Torque at nominal speed	1436	1370	1305	1305	Nm
I_N Current at nominal power	168	268	372	445	A
n_p Max speed at costant power	950	1600	2400	2900	rpm
T_{max} Max torque	2400				Nm
Efficiency	88	92,1	94,9	95,2	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 P IP23S

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	102	168	240	288	kW
T_N Torque at nominal speed	1683	1607	1530	1530	Nm
I_N Current at nominal power	197	314	435	521	A
n_p Max speed at costant power	950	1600	2400	2900	rpm
T_{max} Max torque	2800				Nm
Efficiency	88	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 X IP23S

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	119	196	280	335	kW
T_N Torque at nominal speed	1958	1869	1780	1780	Nm
I_N Current at nominal power	229	365	506	606	A
n_p Max speed at costant power	950	1600	2400	2900	rpm
T_{max} Max torque	3500				Nm
Efficiency	88	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

6.4 Motor features VA 280 (S-M-L-P) IP23 S

Protection degree	IP 23		Ventilation	IC 06	
Rotor inerzia J (kgm²)	S 3,68 - M 4,34 - L 5,25 - P 5,75				
Maximum mechanical speed nmax (rpm)****	VA 280 S	3000 2800* 4500**	Motor weight (kg)	VA 280 S	1180
	VA 280 M			VA 280 M	1370
	VA 280 L			VA 280 L	1630
	VA 280 P			VA 280 P	1780
D-End side bearing	6222 C3		ND-End side bearing	6222 C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	7,9
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	4000	Protection degree (IP)	IP 54
Maximum flow (m ³ /min)	75	Maximum pressure (Pa)	2200
Minimum distance for air inlet / outlet (mm)			170

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 280 S IP23S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	157	259	370	444	kW
T _N Torque at nominal speed	2591	2473	2355	2355	Nm
I _N Current at nominal power	297	479	663	794	A
n _p Max speed at constant power	950	1600	2400	2900	rpm
T _{max} Max torque	3500				Nm
Efficiency	90	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 M IP23S

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	187	308	440	528	kW
T _N Torque at nominal speed	3080	2940	2800	2800	Nm
I _N Current at nominal power	353	569	788	943	A
n _p Max speed at constant power	950	1600	2400	2900	rpm
T _{max} Max torque	4400				Nm
Efficiency	90	92,1	94,9	95,2	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 L IP23S

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	213	350	500	600	kW
T_N Torque at nominal speed	3504	3344	3185	3185	Nm
I_N Current at nominal power	401	647	896	1072	A
n_p Max speed at costant power	950	1600	2400	2900	rpm
T_{max} Max torque	5600				Nm
Efficiency	90	92,1	94,9	95,2	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 P IP23S

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	234	385	550	660	kW
T_N Torque at nominal speed	3850	3675	3500	3500	Nm
I_N Current at nominal power	441	710	984	1177	A
n_p Max speed at costant power	950	1600	2400	2900	rpm
T_{max} Max torque	6300				Nm
Efficiency	90	92,2	95	95,3	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

6.5 Motor features VA 355 (S-M-L) IP23 S

Protection degree	IP 23		Ventilation	IC 06	
Rotor inerzia J (kgm²)	S 28 - M 33 - L 38				
Maximum mechanical speed nmax (rpm)****	VA 355 S	2200 3200**	Motor weight (kg)	VA 355 S	2300
	VA 355 M			VA 355 M	2700
	VA 355 L			VA 355 L	3100
D-End side bearing	6226 C3 + NU 226 EC		ND-End side bearing	NU 226 EC	
Vibration class	A		Construction form	IM 1001 (B3)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

****With high speed special bearing

FAN FEATURES

Frequency (Hz)	50 / 60	Current (A)	14
Number of phases	3	Mounting	Radial
Voltage (V)	400 / 460	Type of ventilation	Forced air intake
Power (W)	7500	Protection degree (IP)	IP 54
Maximum flow (m³/min)	130	Maximum pressure (Pa)	2300
Minimum distance for air inlet / outlet (mm)			200

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 355 S IP23S

n _N Nominal speed	500	750	1000	1250	1500	1800	rpm
P _N Nominal power	263	386	510	625	727	835	kW
T _N Torque at nominal speed	5016	4919	4870	4773	4627	4432	Nm
I _N Current at nominal power	491	701	897	1099	1278	1469	A
n _p Max speed at constant power	800	1200	1600	2000	2400	2900	rpm
T _{max} Max torque	10000						Nm
Efficiency	91	93,7	96,6	96,6	96,7	96,7	%
f _N Nominal frequency	25	37,5	50	62,5	75	90	Hz

VA 355 M IP23S

n _N Nominal speed	500	750	1000	1250	1500	1800	rpm
P _N Nominal power	305	448	592	725	843	869	kW
T _N Torque at nominal speed	5820	5707	5650	5537	5368	5142	Nm
I _N Current at nominal power	569	813	1041	1275	1482	1704	A
n _p Max speed at constant power	800	1200	1600	2000	2400	2900	rpm
T _{max} Max torque	11500						
Efficiency	91	93,7	96,6	96,6	96,7	96,7	%
f _N Nominal frequency	25	37,5	50	62,5	75	90	Hz

VA 355 L IP23S

n _N Nominal speed	500	750	1000	1250	1500	1800	rpm
P _N Nominal power	351	516	681	834	970	1115	kW
T _N Torque at nominal speed	6695	6565	6500	6370	6175	5915	Nm
I _N Current at nominal power	655	934	1195	1464	1705	1960	A
n _p Max speed at constant power	800	1200	1600	2000	2400	2900	rpm
T _{max} Max torque	13000						
Efficiency	91	93,9	96,8	96,8	96,7	96,7	%
f _N Nominal frequency	25	37,5	50	62,5	75	90	Hz

7. Electrical data liquid cooling version

7.1 Motor features VA 160 (M-L-P-X) IP54 / IP55 liquid cooling

Protection degree	IP 54		Cooling	IC 9W7	
Rotor inerzia J (kgm²)	M 0,290 - L 0,341 - P 0,387 - X 0,510				
Maximum mechanical speed nmax (rpm)****	VA 160 M	5300 4800* 7500**	Motor weight (kg)	VA 160 M	215
	VA 160 L			VA 160 L	240
	VA 160 P			VA 160 P	265
	VA 160 X			VA 160 X	325
D-End side bearing	6312 ZZ C3		ND-End side bearing	6311 ZZ C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

LIQUID COOLING CIRCUIT FEATURES

Liquid flow rate (l/min)	12	Liquid type	Water + anti-corrosive liquid / antifreeze max 20%
Max circuit pressure (Bar)	3	Cooling circuit type	Closed circuit with external chiller
Maximum pressure drop (Bar)	0,8	Liquid temperature	Recommended +18° C / Max +60° C with derating (se section 3.8.1)

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 160 M LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P _N Nominal power	21,3	35	50	60	67,6	73,8	kW
T _N Torque at nominal speed	351	335	319	319	293	271	Nm
I _N Current at nominal power	42,6	66,5	92,3	110	124	134	A
n _p Max speed at costant power	1400	2400	3800	4300	5200	6200	rpm
T _{max} Max torque	640						Nm
Efficiency	87	91,8	93,5	93,8	94	94,2	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 L LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P _N Nominal power	25,5	42	60	72	81	88,4	kW
T _N Torque at nominal speed	420	401	382	382	351	325	Nm
I _N Current at nominal power	49,3	76,7	106	127	143	155	A
n _p Max speed at costant power	1400	2400	3800	4300	5200	6200	rpm
T _{max} Max torque	760						Nm
Efficiency	87	92	93,5	93,8	94	94,2	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 P LIQUID COOLING

n_N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P_N Nominal power	29,8	49	70	84	94,5	103	kW
T_N Torque at nominal speed	491	468	446	446	410	379	Nm
I_N Current at nominal power	58,2	90,7	126	150	168	183	A
n_p Max speed at costant power	1400	2400	3800	4300	5200	6200	rpm
T_{max} Max torque	860						Nm
Efficiency	87	92	94	94,3	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

VA 160 X LIQUID COOLING

n_N Nominal speed	580	1000	1500	1800	2200	2600	rpm
P_N Nominal power	36,1	59,5	85	102	115	125	kW
T_N Torque at nominal speed	595	568	541	541	498	460	Nm
I_N Current at nominal power	70,6	110	152	182	203	222	A
n_p Max speed at costant power	1400	2400	3800	4300	5200	6200	rpm
T_{max} Max torque	1100						Nm
Efficiency	87	92	94	94,3	94,5	94,7	%
f_N Nominal frequency	19,3	33,3	50	60	73,3	86,6	Hz

7.2 Motor features VA 180 (M-L-X) IP54 / IP55 liquid cooling

Protection degree	IP 54		Cooling	IC 9W7	
Rotor inerzia J (kgm²)	M 0,690 - L 0,810 - X 0,990				
Maximum mechanical speed nmax (rpm)****	VA 180 M	4300 3800* 6300**	Motor weight (kg)	VA 180 M	390
	VA 180 L			VA 180 L	440
	VA 180 X			VA 180 X	470
D-End side bearing	6314 C3		ND-End side bearing	6312 C3	
Vibration class	A		Construction form	IM 2001 (B35)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

LIQUID COOLING CIRCUIT FEATURES

Liquid flow rate (l/min)	15	Liquid type	Water + anti-corrosive liquid / antifreeze max 20%
Max circuit pressure (Bar)	3	Cooling circuit type	Closed circuit with external chiller
Maximum pressure drop (Bar)	0,9	Liquid temperature	Recommended +18° C / Max +60° C with derating (se section 3.8.1)

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 180 M LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	46,8	77	110	132	148	kW
T _N Torque at nominal speed	770	735	700	700	644	Nm
I _N Current at nominal power	90,3	142	197	236	264	A
n _p Max speed at costant power	1400	2400	3800	4300	5200	rpm
T _{max} Max torque	1400					Nm
Efficiency	88	92	94,8	95,1	95,5	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 L LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	56,1	92,4	132	158	178	kW
T _N Torque at nominal speed	924	882	840	840	773	Nm
I _N Current at nominal power	108	171	237	283	317	A
n _p Max speed at costant power	1400	2400	3800	4300	5200	rpm
T _{max} Max torque	1700					Nm
Efficiency	88	92	94,8	95,1	95,5	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

VA 180 X LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	2200	rpm
P _N Nominal power	61,7	101	145	174	196	kW
T _N Torque at nominal speed	1015	969	923	923	849	Nm
I _N Current at nominal power	119	188	260	311	347	A
n _p Max speed at costant power	1400	2400	3800	4300	5200	rpm
T _{max} Max torque	1850					Nm
Efficiency	88	92	94,8	95,1	95,5	%
f _N Nominal frequency	19,3	33,3	50	60	73,3	Hz

7.3 Motor features VA 225 (L-P-X) IP54 / IP55 liquid cooling

Protection degree	IP 54		Cooling	IC 9W7	
Rotor inerzia J (kgm²)	L 1,990 - P 2,320 - X 2,800				
Maximum mechanical speed nmax (rpm)****	VA 225 L	3400 2800* 4800**	Motor weight (kg)	VA 225 L	680
	VA 225 P			VA 225 P	860
	VA 225 X			VA 225 X	960
D-End side bearing	6318 C3		ND-End side bearing	6315 C3	
Vibration class	A		Construction form	IM 1001 (B3)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

LIQUID COOLING CIRCUIT FEATURES

Liquid flow rate (l/min)	18	Liquid type	Water + anti-corrosive liquid / antifreeze max 20%
Max circuit pressure (Bar)	3	Cooling circuit type	Closed circuit with external chiller
Maximum pressure drop (Bar)	0,9	Liquid temperature	Recommended +18° C / Max +60° C with derating (se section 3.8.1)

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 225 L LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	68,1	112	160	192	kW
T _N Torque at nominal speed	1122	1071	1020	1020	Nm
I _N Current at nominal power	132	207	287	344	A
n _p Max speed at costant power	1400	2400	3800	4300	rpm
T _{max} Max torque	1900				Nm
Efficiency	88	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 P LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	78,8	130	185	222	kW
T _N Torque at nominal speed	1298	1239	1180	1180	Nm
I _N Current at nominal power	152	240	332	398	A
n _p Max speed at costant power	1400	2400	3800	4300	rpm
T _{max} Max torque	2200				Nm
Efficiency	88	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 225 X LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	97,9	161	230	276	kW
T _N Torque at nominal speed	1612	1538	1465	1465	Nm
I _N Current at nominal power	189	298	413	494	A
n _p Max speed at costant power	1400	2400	3800	4300	rpm
T _{max} Max torque	2700				Nm
Efficiency	88	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

7.4 Motor features VA 280 (S-M-L-P) IP54 / IP55 liquid cooling

Protection degree	IP 54		Cooling	IC 9W7	
Rotor inerzia J (kgm²)	S 3,680 - M 4,340 - L 5,250 - P 5,750				
Maximum mechanical speed nmax (rpm)****	VA 280 S	2800 2800* 4500**	Motor weight (kg)	VA 280 S	1020
	VA 280 M			VA 280 M	1130
	VA 280 L			VA 280 L	1290
	VA 280 P			VA 280 P	1400
D-End side bearing	6222 C3		ND-End side bearing	NU 222 EC	
Vibration class	A		Construction form	IM 1001 (B3)	
Insulation class	H		Overtemperature Class	F	
Rated supply voltage (V)	400		Thermal protection	NC 150° C	

*With roller bearing **With high speed special bearing

LIQUID COOLING CIRCUIT FEATURES

Liquid flow rate (l/min)	18	Liquid type	Water + anti-corrosive liquid / antifreeze max 20%
Max circuit pressure (Bar)	3	Cooling circuit type	Closed circuit with external chiller
Maximum pressure drop (Bar)	0,9	Liquid temperature	Recommended +18° C / Max +60° C with derating (se section 3.8.1)

**** The maximum continuous mechanical speed is limited to 70% of that indicated

VA 280 S LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	102	168	240	287	kW
T _N Torque at nominal speed	1678	1601	1525	1525	Nm
I _N Current at nominal power	195	310	430	514	A
n _p Max speed at costant power	1400	2400	3800	4300	rpm
T _{max} Max torque	3500				Nm
Efficiency	89	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 M LIQUID COOLING

n _N Nominal speed	580	1000	1500	1800	rpm
P _N Nominal power	123	203	290	348	kW
T _N Torque at nominal speed	2030	1937	1845	1845	Nm
I _N Current at nominal power	235	375	520	622	A
n _p Max speed at costant power	1400	2400	3800	4300	rpm
T _{max} Max torque	4100				Nm
Efficiency	89	92	94,8	95,1	%
f _N Nominal frequency	19,3	33,3	50	60	Hz

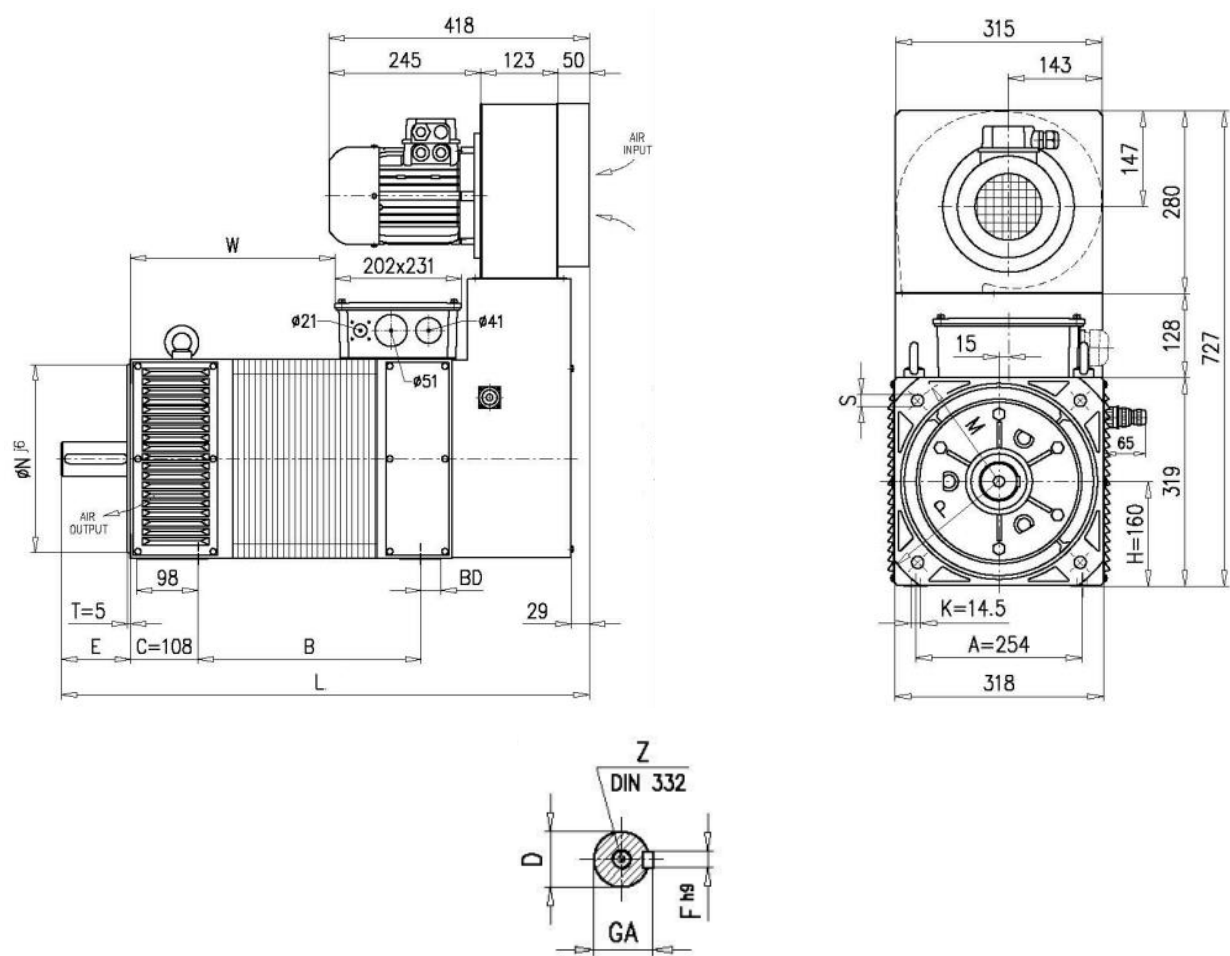
VA 280 L LIQUID COOLING

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	145	238	340	408	kW
T_N Torque at nominal speed	2382	2273	2165	2165	Nm
I_N Current at nominal power	276	440	610	730	A
n_p Max speed at costant power	1400	2400	3800	4300	rpm
T_{max} Max torque	5400				Nm
Efficiency	89	92	94,8	95,1	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

VA 280 P LIQUID COOLING

n_N Nominal speed	580	1000	1500	1800	rpm
P_N Nominal power	162	266	380	456	kW
T_N Torque at nominal speed	2662	2541	2420	2420	Nm
I_N Current at nominal power	309	492	682	816	A
n_p Max speed at costant power	1400	2400	3800	4300	rpm
T_{max} Max torque	6000				Nm
Efficiency	89	92	94,8	95,1	%
f_N Nominal frequency	19,3	33,3	50	60	Hz

8.2 Overall dimensions – VA 160 IP23



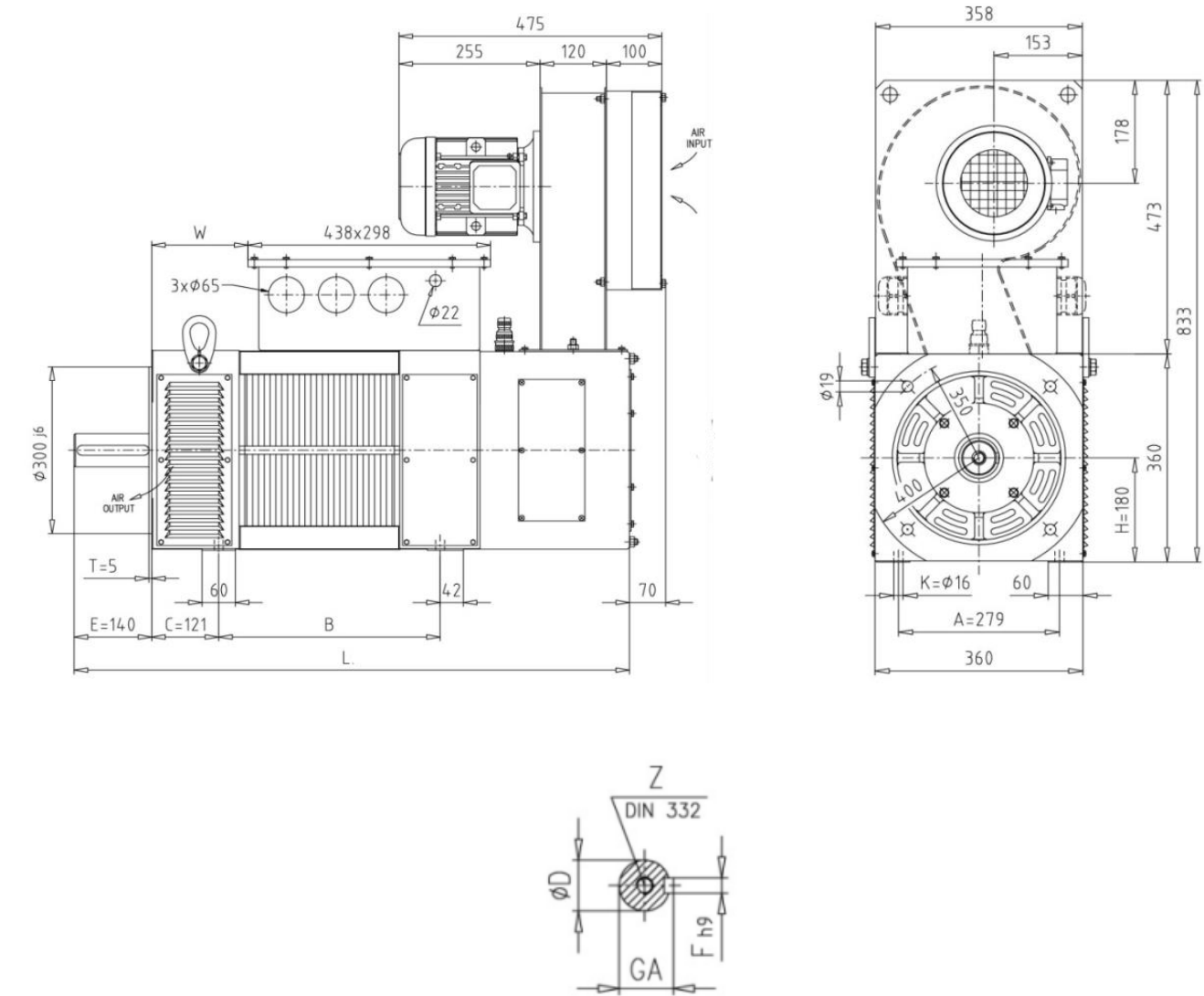
Type		Length					Shaft											
		B	BD	L	Lb*	W	D (1)	D (2)	E (1)	E (2)	GA (1)	GA (2)	F (1)	F (2)	Z (1)	Z (2)		
VA 160	S	355	33	845	895	326	55 m6	48 k6	110	110	59	51,5	16	14	M20	M20		
	M	400	23	880	930	361		/				/		/		/	/	/
	L	450	23	930	980	411												
	P	500	18	975	1025	456												

*Lb = motor length with brake

Type	Flange						
	P (1)	P (2)	N (1)	N (2)	M (1)	M (2)	S (1)
VR 160	S	400	350	300	250	350	300
	M						
	L						
	P						

(1) Standard (2) On request

8.3 Overall dimensions – VA 180 IP54 / IP55 WITH RADIAL FAN and VA 180 IP23



Type		Length				Shaft				
		B	L	Lb*	W	D	E	GA	F	Z
VA 180	S	400	1005	1135	174	60 m6	140	64	18	M20
	M	520	1125	1255	294	65 m6		69		
	L	590	1195	1325	364					
	P	640	1245	1375	414					

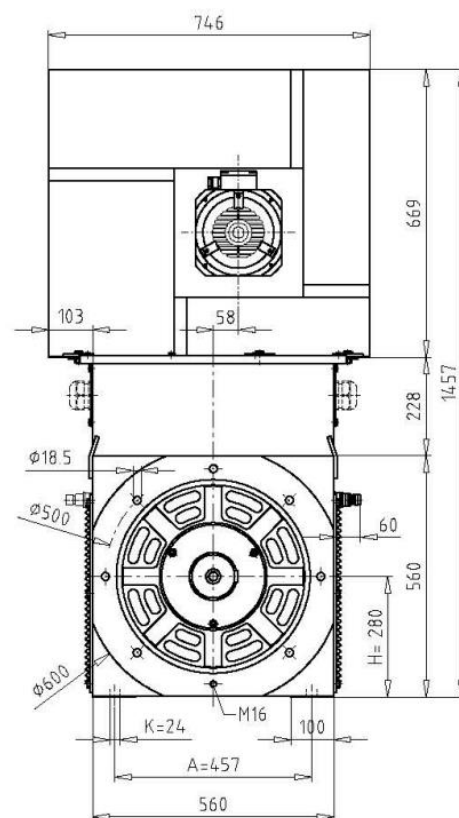
*Lb = motor length with brake

[illegible]

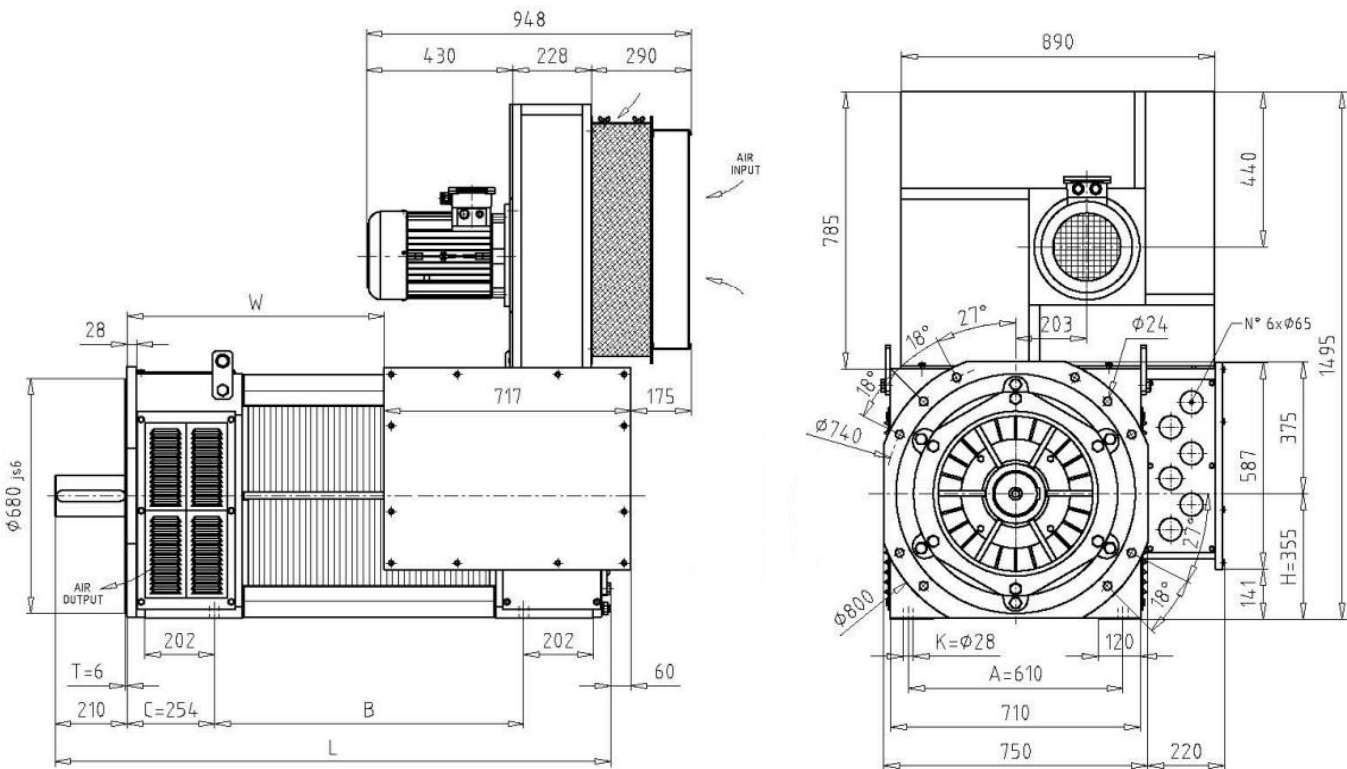
Type		Length						Shaft								
		B	L (1)	L (2)	Lb* (1)	Lb* (2)	W	D (1)	D (2)	E (1)	E (2)	GA (1)	GA (2)	F (1)	F (2)	Z
VA 225	S	555	1235	1265	1385	1415	270	75 m6	85 m6	140	170	79,5	90	20	22	M20
	M	615	1295	1325	1445	1475	330									
	L	675	1355	1385	1505	1535	390									
	P	803	1515	/	1665	/	518	85 m6	/	170	/	90	/	22	/	
	X	923	1635	/	1785	/	638									

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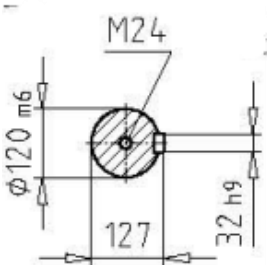
and VA 280 IP23



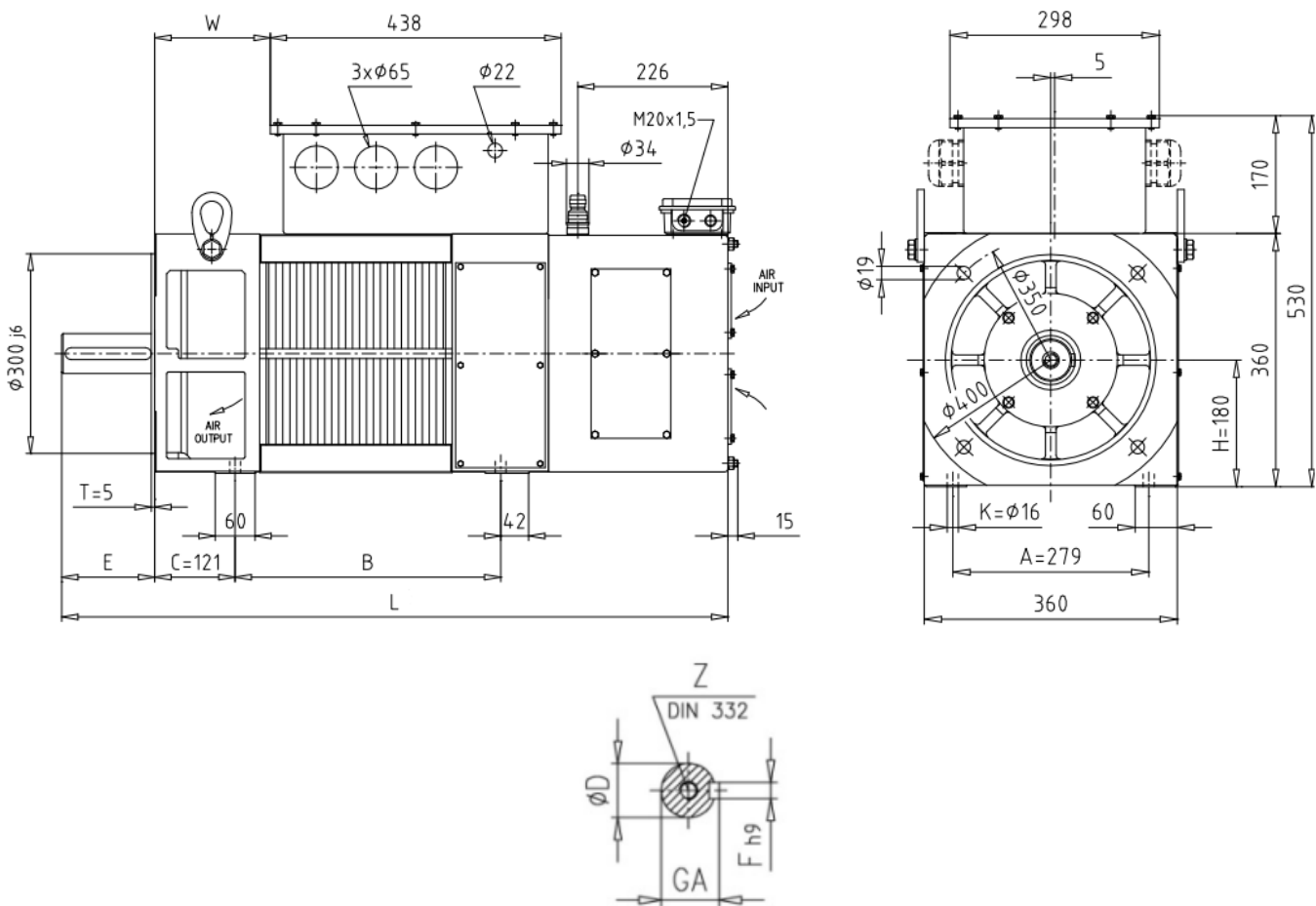
8.6 Overall dimensions – VA 355 IP54 / IP55 WITH RADIAL FAN and VA 355 IP23



Type		Length		
		B	L	W
VA 355	S	800	1520	648
	M	900	1620	748
	L	1000	1720	848



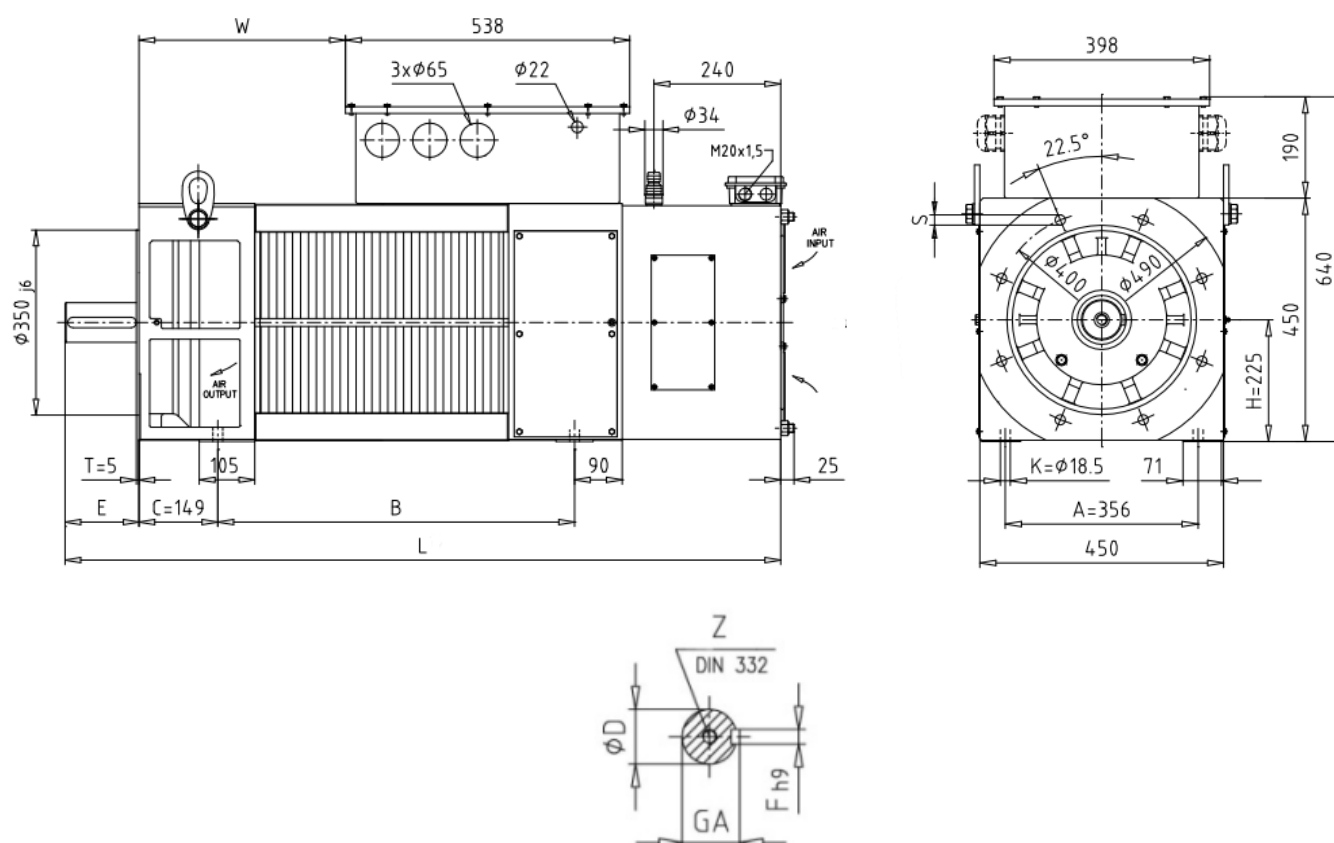
8.7 Overall dimensions – VA 180 IP54 / IP55 WITH AXIAL FAN



Type		Length				Shaft				
		B	L	Lb*	W	D	E	GA	F	Z
VA 180	S	400	1070	1200	174	60 m6	140	64	18	M20
	M	520	1190	1320	294	65 m6		69		
	L	590	1260	1390	364					
	P	640	1310	1440	414					

*Lb = motor length with brake

8.8 Overall dimensions – VA 225 IP54 / IP55 WITH AXIAL FAN



Type		Length						Shaft								
		B	L (1)	L (2)	Lb* (1)	Lb* (2)	W	D (1)	D (2)	E (1)	E (2)	GA (1)	GA (2)	F (1)	F (2)	Z
VA 225	S	555	1335	1365	1485	1515	270	75 m6	85 m6	140	170	79,5	90	20	22	M20
	M	615	1395	1425	1545	1575	330									
	L	675	1455	1485	1605	1635	390									
	P	803	1615	/	1765	/	518	85 m6	/	170	/	90	/	22	/	
	X	923	1735	/	1885	/	638									

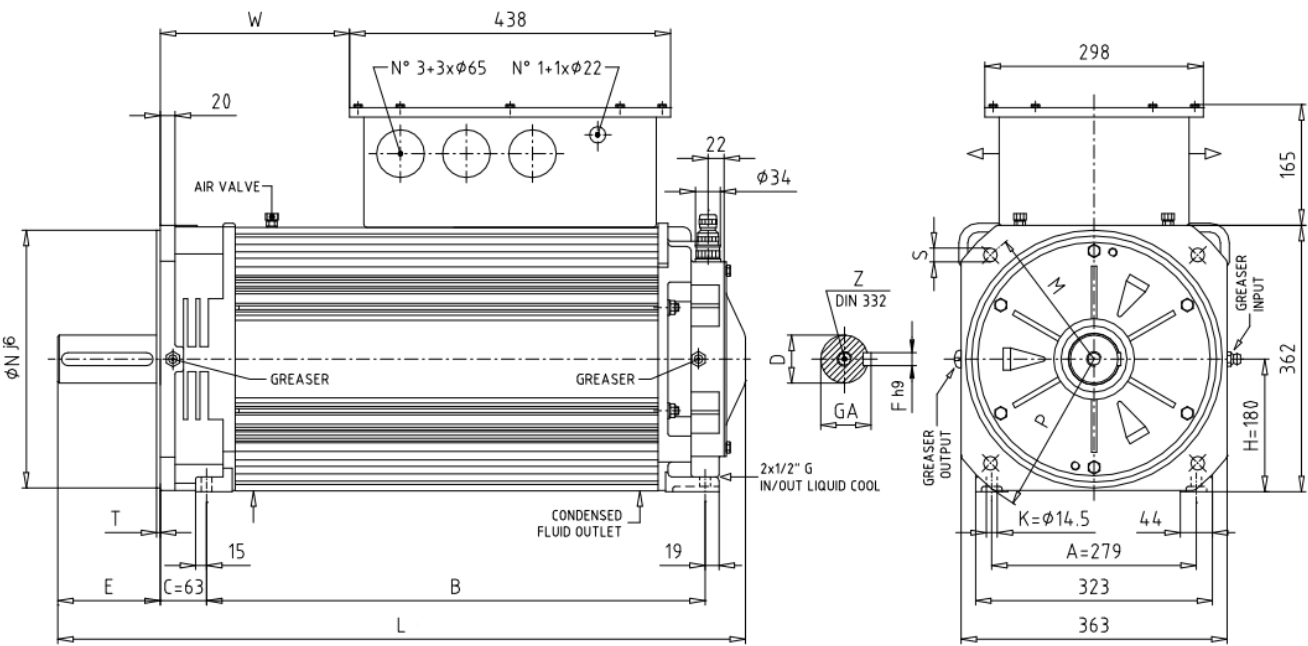
(1) Standard (2) On request *Lb = motor length with brake

[illegible]

Type		Length				Shaft					Flange			
		B	L	Lb*	W	D	E	GA	F	Z	P	N	M	S
VA 160	M	513	725	925	204	55 m6	110	59	16	M20	400	300	350	18,5
	L	563	775	975	254									
	P	608	820	1020	299									
	X	735	947	1147	426									

User's manual - VA Series - vers. VA01.00.EN (07-2025)

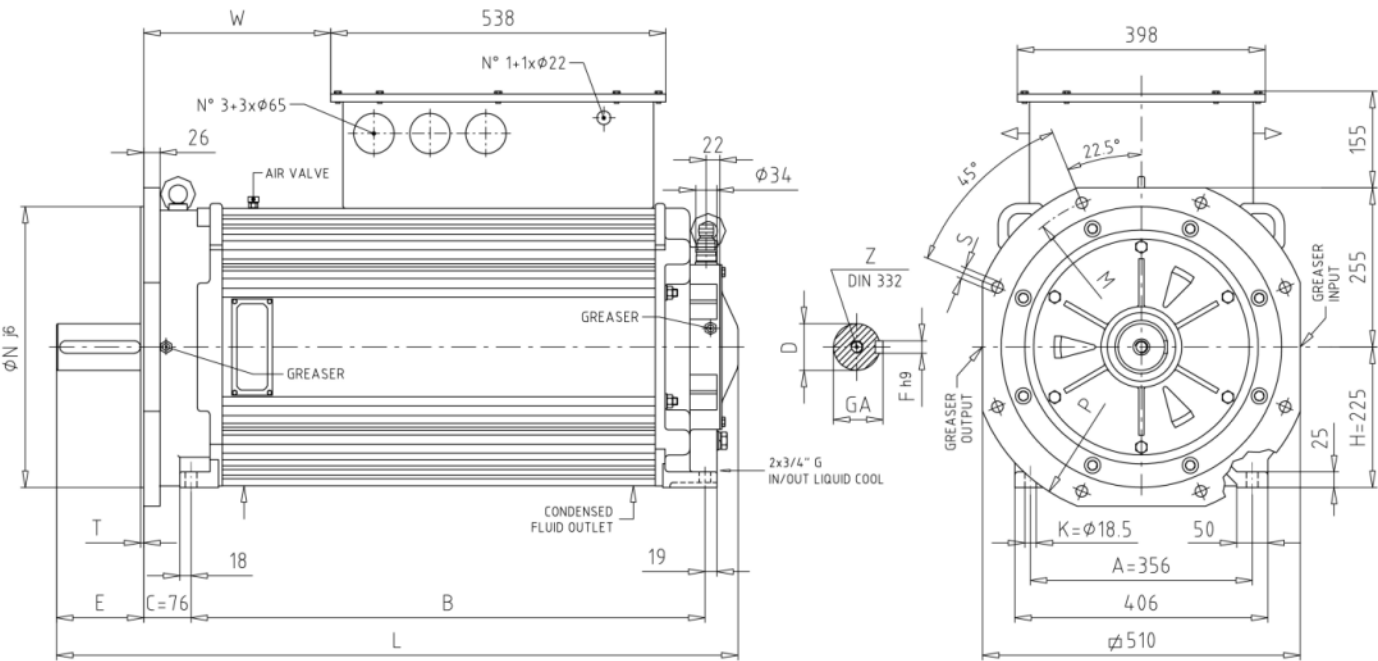
8.10 Overall dimensions – VA 180 IP54 / IP55 Liquid cooling



Type		Length				Shaft					Flange			
		B	L	Lb*	W	D	E	GA	F	Z	P	N	M	S
VA 180	M	680	940	1140	258	65 m6	140	69	18	M20	450	350	400	18,5
	L	750	1010	1210	328									
	X	870	1130	1330	448									

*Lb = motor length with brake

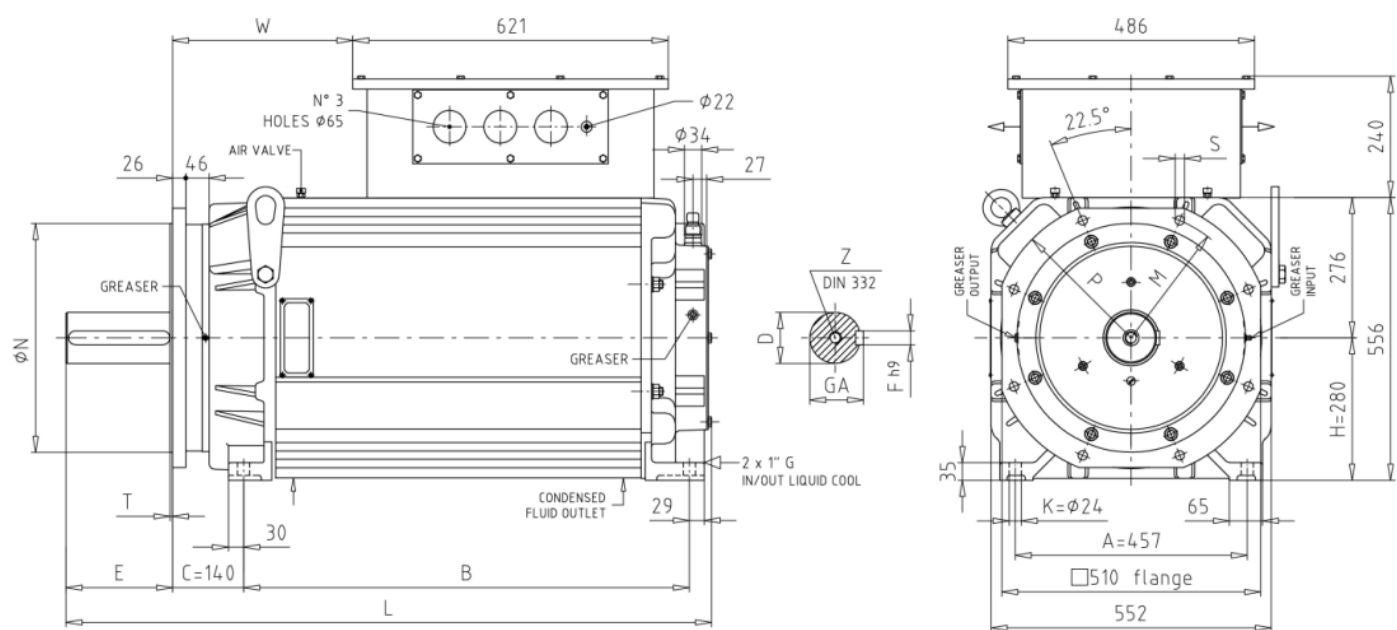
8.11 Overall dimensions – VA 225 IP54 / IP55 Liquid cooling



Type		Length				Shaft					Flange			
		B	L	Lb*	W	D	E	GA	F	Z	P	N	M	S
VA 225	L	825	1095	1295	300	75 m6	140	79,5	20	M20	550	450	500	18,5
	P	905	1205	1405	380	85 m6	170	90	22					
	X	1025	1325	1525	500									

*Lb = motor length with brake

8.12 Overall dimensions – VA 280 IP54 / IP55 Liquid cooling



Type		Length			Shaft					Flange			
		B	L	W	D	E	GA	F	Z	P	N	M	S
VA 280	S	798	1195	275	100	210	106	28	M24	550	450	500	18,5
	M	878	1275	355									
	L	988	1385	465									
	P	1048	1445	525									

9. Electrical connections

9.1 Safety Instructions

WARNING!

Do not perform work on the motor, connecting cables, frequency converters or accessories such as brakes, fans or thermal protection cables when voltage is present.

**WARNING!**

For cable entries, use cable glands and seals that conform to the type of protection and cable diameter.

**WARNING!**

The system manufacturer is responsible for proper installation.
Signal and power connectors must be shielded.



The motor must be connected as shown in the diagrams provided.
Observe the EMC instructions and the converter manufacturer's instructions.

When making the connection make sure that:

- The connecting conductors are suitable for the intended use, voltages and currents present.
- Properly sized connecting conductors, anti-twist, anti-kink and anti-thrust terminals as well as anti-kink protectors for the conductors themselves are provided.
- The protective conductor is grounded.
- Grounding is carried out in accordance with local regulations before connecting the motor to the power supply.

With connection by connectors make sure that:

- The signal and power connector ferrules are tightened securely in order to ensure good contact and tightness, and clicks the connector locking protection if provided.

With connection by terminal board make sure that:

- Conductor ends should be stripped only to the lug or terminal block.
- The size of the lugs must be suitable for the terminals used on the terminal block.
- Comply with terminal tightening torque values.
- The protective conductor or grounding conductor must be connected.
- For large cross sections, the grounding conductor can be divided into three protective conductors, placed symmetrically around the power conductors.
- The inside of the terminal block should be clean and free of residual conductors.
- Avoid accidental dropping of nuts, washers, conductor residues inside the motor through the cable passage hole.
- Pay attention to wires protruding from conductors and observe minimum air gaps between live parts.
- Unused inlets must be closed and sealing elements must be screwed tight to ensure a dust- and water-tight seal.
- Terminal box seals must be properly inserted into their respective housings in order to ensure the correct IP class.

The required tightening torque according to the pin type is given below:

Pin size	Tightening torque [Nm]
M4	1.6
M5	2.5
M6	4
M8	8
M10	13
M12	20
M14	30
M16	40

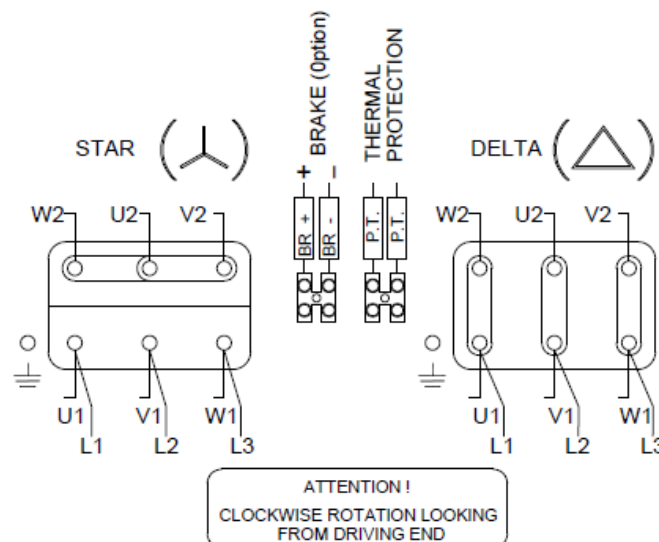
WARNING!

Tighten the cables on the headstocks observing the tightening torques corresponding to the pin type. Tolerance +0% / -10%



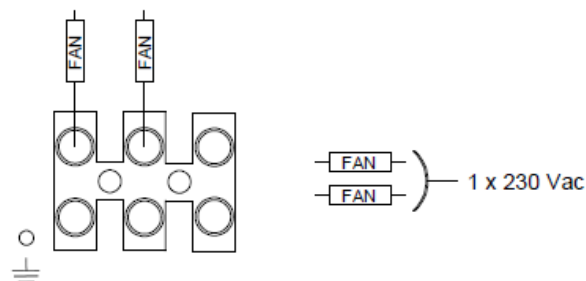
POWER

VA - VR



ELECTROFAN

VA - VR



OPTIONAL TREE PHASE SUPPLY VOLTAGE SCHEME:
SAME POWER CONNECTION (SEE ABOVE)

SEE ARROW ON ELECTROFAN CASE FOR ROTATION DIRECTION

9.2 Transducer (Encoder)

Normally, a hollow-shaft transducer is used on VA motors series.

The transducer body is attached to the rear cover of the motor and is made free to oscillate by means of a torque arm, which is responsible for absorbing any axial/radial misalignment. A 12-pin M23 male (panel or bulkhead feed-through) connector is used for the electrical connection. The female (flying) part with solder contacts is supplied with the transducer as standard.

Always ensure that the electrical data of the transducer is compatible with that of the inverter powering the motor, that the supply voltage is correct, and that the connections are respected.

WARNING!
Do not supply power to the transducer output channels and never run the motor if the transducer has output cables shorted to each other or to ground.



WARNING!
Do not perform the high voltage test on the transducer terminals.



Wiring instructions for the signal flying connector are shown on a sheet located inside the motor terminal box.
Always use a shielded cable for connection to the inverter.
When soldering the flying connector, do not overheat the contacts. Avoid short circuits between the connector contacts.

WARNING!
Failure to comply with any of the above warnings may result in immediate failure of the encoder.



The encoder connection diagram is either attached to the flying connector or placed inside the motor terminal box.
Normally the maximum mechanical rotation speed of the encoder is 9000rpm. Do not exceed this limit to avoid damage to the transducer.

Encoder SICK VFS60 connection:



MALE CONNECTOR:
INTERCONTEC
AKUA020MS06620203.000
(MOUNTED)



PLUG-IN FACE VIEW

FEMALE CONNECTOR:
SIZE M23 12 PINS (FREE)
INTERCONTEC
A ST A 013 FS 13 10 0035 000

PIN	SIGNAL TTL/HTL	EXPLANATION
1	B ₋	Signal line
2	N.C.	Not connected
3	Z	Signal line
4	Z ₋	Signal line
5	A	Signal line
6	A ₋	Signal line
7	N.C.	Not connected
8	B	Signal line
9	N.C.	Not connected
10	GND	Encoder ground connection
11	N.C.	Not connected
12	U _s	Supply voltage (volt-free to housing)
Screen	Screen	Connected to housing on encoder side Connected to ground on control side

9.3 Thermal protector

Thermal motor protection by means of a 150°C bimetallic thermal protector (maximum voltage 250Vac, maximum current 5Aac) built into the windings is provided as standard. The normally closed contact opens when the thermal protector reaches the trip temperature. The connection terminal is normally located inside the terminal box.

Do not perform the high voltage test on the terminals of the thermal protectors.

ATTENZIONE!

Il mancato collegamento delle sonde termiche fa decadere immediatamente la garanzia sul prodotto.



Other thermal protector (PT1000, PT100, PTC, KTY84/130) are available on request and located inside the terminal box.

10. Transportation and storage

10.1 Transport conditions

If present, use only the specially provided lifting hooks for transport.

WARNING!

Check before lifting that the hooks are tightly screwed in and the load is balanced.
The hooks are sized for the weight of the motor; do not add other weights.
Do not use the hooks if the temperature is below -20°C.



WARNING!

Do not lift the motor by grasping the shaft-the plastic shaft cover could slip off, causing the motor to fall, resulting in injury or damage.



All the motors manufactured by Brusatori leave the factory in optimal conditions after being inspected and tested. Upon arrival, check the motor carefully to ensure that it has not been damaged during transport. If you notice any abnormalities or damage, contact the manufacturer as soon as possible, and do not put the motor into service.

10.2 Storage conditions

For proper storage, the ambient temperature must be between -20°C and +50°C.

If the machines are stored, place them horizontally and pay attention that the environment is dry, dust-free and vibration-free.

Manually rotate the motor shaft every 2-3 months.

Measure the insulation resistance at a temperature between 20 and 30°C (maximum voltage 1000Vdc) before starting the motor for the first time, ensuring that it is at least 10 MΩ.

If not, dry the winding.

To dry the winding, the oven temperature must be 80°C for 10-15 hours.

11. Installation

11.1 Mounting

WARNING!

The motors are designed exclusively for installation in industrial environments. Different installations are permitted only if all necessary precautions are taken by the machine/plant manufacturer to ensure safe operation.

Read the entire manual carefully before performing any operation.

Any installation operation must be carried out by qualified personnel, with tools appropriate to the type of operation.



Provide good fastening of feet and flanges.

For mounting IM B5 (IM 3001) flange motors, the motor support frame must be sized to prevent the transfer of vibration to the motor and the occurrence of vibration due to resonance.

For mounting IM B3 (IM 1001) and IM B35 (IM 2001) motors, the motor support frame must be sized to prevent the transfer of vibration to the motor and the occurrence of vibration due to resonance.

WARNING!

The motor should be mounted in such a way as to ensure adequate heat dissipation without impeding ventilation.

The opposite side of the flange should NOT be thermally insulated, as it is necessary for heat dissipation.



For all the motors, excluded VA160 S - M is mandatory IM B35 (IM 2001) or IM B3 (IM 1001) mounting form to avoid bending and/or deformation of the flange/drive shaft. For mounting motors with IM B3 and IMB35 feet, the crankcase must be flat, rigid, and solid. When mounting some motors, it is necessary to remove the protective doors, which must then be positioned as originally. During the mounting stages be careful not to damage the windings. If IM B35 mounting for long motors is not possible, it would be strongly recommended to use a support placed at the back shield, which should not be rigid but provided with cup springs or compressible rubber supports. The thrust to be exerted by the support can be quantified at 50 percent of the total weight of the motor.

WARNING!

In the case of upright installations with the shaft facing upward make sure that no liquid of any kind can seep into the upper bearing.

In the case of direct coupling in oil bath make sure that the oil seal complete with spring is fitted.



WARNING!

In the case of direct coupling (shaft engaged), with gears and with a gearbox, it is absolutely essential to carry out exact alignment between the motor shaft and driven shaft and between the coupling flanges. Otherwise, severe vibrations, irregularities in motion, unwanted axial thrusts and breakage of the drive shaft may occur.



When coupling with belts, install the motor with the shaft perfectly parallel and aligned with that of the pulley to avoid axial thrusts on the supports. The belt pull must not exceed the maximum applicable load under any circumstances. The axial load must not exceed 20 percent of the maximum radial load indicated at the rated speed of the motor.

WARNING!

Excessive belt tension can cause rapid bearing wear and shaft failure.



Attach or remove drive elements (pulley, coupling, gear wheel, etc.) only with appropriate devices (for example, heating the drive element or using the threaded hole on the shaft end).

WARNING!

Never fit half couplings or pulleys using a hammer, or remove them using a lever infulcated against the motor body.

Before keying the transmission part, remove the anti-rust paint from the drive shaft and keyway using alcohol or appropriate solvents.

It is important that the solvent does not get inside the bearings.



Grease the shaft end and keyway before keying the transmission organ.

Observe the general safety measures for protecting the transmission organ against contact.

WARNING!

Absolutely avoid striking or exerting pressure on the shaft end.

**WARNING!**

The use of damaged or unsuitable components may result in personal injury or property damage.



The motor flange should be fastened directly to the machine using appropriate screws.

Observe the correct tightening torques, using the correct equipment.

11.2 Ventilation

The motors are equipped with a single-phase electric fan powered by 230Vac 50/60Hz or a three-phase electric fan powered by 400/460 Vac 50/60Hz.

Air flow can be supply or suction depending on the type of motor and fan chosen. The minimum distance between the machine structure and the motor hot air outlet should be at least 80 mm.

For installations in harsh environmental conditions due to the presence of a lot of dust, water, high humidity, mist, water-oil vapors, etc., it is necessary to use motors with IP54 protection rating. Under these operating conditions, periodic maintenance of the fan and motor is required to remove dirt deposits from the impeller/fan blades and fan channels.

For motors with IP23 protection, it is essential to ascertain the quality of the cooling air. Make sure that the air drawn in by the fan is always cool, clean and dry. An air filter is available for this type of motor and can be installed on the fan.

Shut-off doors should always be installed before starting the motor. Air sucked in/blown out by the fan should always pass completely through the stator in the longitudinal direction and out the other side.

11.3 Commissioning

The following points should be checked before commissioning:

- The rotor must be able to rotate freely (supply the brake if necessary).
- The correct installation of the drive elements must be checked.
- All electrical connections and connecting elements must be carefully made and tightened.
- The protective and grounding conductor must be properly connected.
- Any auxiliary devices must be working (brake, fan, etc.).
- It is opportune to take appropriate safety measures against contact with moving and live parts.

WARNING!

Make sure the brake (if provided) is working properly.
The brake is only suitable for a limited number of emergency braking.
Use as a working brake is not permitted.



WARNING!

Always use safety devices, even during testing operations.



WARNING!

Drives can cause high voltage stresses on the motor winding, so it is necessary to check with appropriate oscilloscope and trained personnel that the voltage values at the terminal box terminals are not too high due to long wiring and/or from the voltage and frequency of the inverter supply.



It should be noted that the cause of this phenomenon is external to the motor.

In such cases, it is recommended that suitable filters be inserted between the inverter and motor to reduce $\frac{dV}{dt}$ surges, and the use of symmetrical shielded cables.

WARNING!

This list of verifications may be incomplete, so additional verifications may be necessary.



12. Maintenance

12.1 Instructions on maintenance

WARNING!

Before starting any work on the motors and before opening any cover of active parts, be sure to:

- Cut the power to the motor.
- Blocking re-insertion.
- Verify that there is no voltage.
- Check for proper grounding.
- Cover or separate adjacent live parts.

In addition to the main circuits, any auxiliary or supplementary circuits must also be disconnected.

These safety measures can be abandoned only after maintenance work is completed and the motor has been completely reassembled.

All work should be carried out with the motor disconnected.



All standard motors mount pre-lubricated ball bearings for life, which require no maintenance.

Every 2000 hours of operation, it is good to check their temperature and vibration. However, it is recommended to replace the bearings after about 20000 operating hours, at the latest after three years.

The bearings and their greases should be suitable for a temperature range of -30° to +140°C.

For motors equipped with a grease nipple, it is necessary to comply with the re-lubrication intervals recommended by the manufacturer:

VA160 ROLLER BEARING LUBRICATION INTERVAL

Bearing Type	RPM	Operation time (h)	Grease quantity (g)
NU 312 EC	580	6000	35
	1000	4500	
	1500	3500	
	2000	2700	
	2500	2000	
	3000	1500	

VA180 ROLLER BEARING LUBRICATION INTERVAL

Bearing Type	RPM	Operation time (h)	Grease quantity (g)
NU 314 C3	580	6000	40
	1000	4500	
	1500	3500	
	2000	2700	
	2500	2000	
	3000	1500	

VA225 ROLLER BEARING LUBRICATION INTERVAL

Bearing Type	RPM	Operation time (h)	Grease quantity (g)
NU 318	580	4000	75
	1000	2500	
	1500	2000	
	2000	1500	
	2500	1000	
	3000	1000	

VA280 ROLLER BEARING LUBRICATION INTERVAL			
Bearing Type	RPM	Operation time (h)	Grease quantity (g)
NU 222 EC	580	4000	100
	1000	2500	
	1500	2000	
	2000	1500	
	2500	1000	
	3000	1000	

VA355 ROLLER + SPHERES BEARING LUBRICATION INTERVAL			
Bearing Type	RPM	Operation time (h)	Grease quantity (g)
6226 C3 + NU 226 EC	580	4000	250
	1000	2500	
	1500	2000	
	2000	1500	
	2500	1000	
	3000	1000	

In the case of ball bearings and high speed ball bearings with grease nipples (option available on request), the quantities of grease for re-lubrication are the same as for roller bearings.

TYPES OF GREASE TO USE FOR ROLLER AND BALL BEARINGS			
Manufacturer	Grease type	Composition	Color
Petro-Canada	Peerless LLG	Mineral calcium sulfanato	Red
Petro-Canada	Precision XL EMB	Mineral lithium complex	Blue
Brugarolas	G.Beslux Komplex M-2	Mineral with polyurea	Cream
Lubcon	Turmogrease N 502	Mineral with polyurea	Yellow
Shell	Alvania R3	Mineral with lithium	Brown

TYPES OF GREASE TO USE FOR HIGH SPEED BEARINGS			
Manufacturer	Grease type	Composition	Color
SKF	LGHP2	Mineral di-urea	Blue
Lubcon	Thermoplex 2 TML	Mineral with lithium	Cream
Kluber	Isoflex	Mineral with lithium	Yellow

The quantity of grease indicated in the table is valid only for re-lubricating bearings.

If the grease is compatible but not identical to the existing grease, double the quantity in order to replace all the grease in the bearing.

Ambient temperature, operating speed and the type of lubricant used can significantly affect the frequency of intervention. For further information, please contact our technical department.

For spare parts, specify in detail all nameplate data of the motor or accessory to which they relate, with any options requested in the order.

WARNING!

This manual, along with any additional safety information, must be kept!

Unless expressly authorized by the manufacturer, any repairs performed by the end user will void the manufacturer's responsibility for the conformity of the motor supplied.

We recommend that maintenance work be performed in our service center.



Unprotected machined surfaces (flanges and shaft ends) should be treated with anticorrosive products.
 Cleaning the motor can damage it if done incorrectly.
 Use only appropriate products.
 Avoid contact of products with oil seals and gaskets to prevent damage.

12.2 Troubleshooting



Note:

This list cannot be considered complete. If you have any doubts consult our technical office.

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
Motor does not start	No power supply	Check power supply, Check drive connections
	No brake release	Check brake connection or if there are any faults
	Encoder/resolver malfunction	Check wirings and connections, look for any encoder/resolver faults
Motor runs slowly or not as intended	Inverter malfunctioning, wrong connection or wiring	Confront that displayed and nominal values corresponds, check the inverter settings and connection
	Encoder/resolver malfunction	Check wirings and connections, look for any encoder/resolver faults
Motor overheats	Abnormal operating values, cooling problems	Verify that the fan works correctly
	Thermal protection malfunctioning	Check that thermal protection works correctly
	Overload, abnormal power supplied, inverter fault	Confront nominal values and values displayed
	No brake release	Check that the brake works correctly
Brake does not work	Brake fault, wrong brake connection/wiring	Check connections, check if the brake is damaged
Vibrations	Abnormal balance, worn out bearings, fixing screws loose	Balance the motor correctly, tighten loosen screws, replace worn out bearings
High noise level	Foreign bodies inside the motor, wrong inverter settings	Verify the presence of any foreign bodies inside the motor, check inverter settings
Other problems not listed here	Instructions not followed or accidental fault	Immediately contact our technical office

13. Disposal

Refer to the nature of the material and current regulations regarding the dismantling and disposal of electrical equipment, so as to limit the impact on the environment and avoid ecological damage.

14. Certifications

14.1 RoHS directive

All motors in the present manual comply with Directive 2011/65/EU (RoHS Directive) and following Delegated Directives, on limitation of hazardous substances.

14.2 EMC directive

Electrical motors are not covered by Directive 2014/30/EU (EMC Directive) on Electromagnetic Compatibility. All motors in the present manual comply with EMC Directive if said motors are equipped with electronic components, because the installed devices have been verified compliant to said Directive.

14.3 EU Declaration of Conformity

Most recent version of the Declaration of Conformity can be found on Brusatori website.

14.4 Quality management system ISO 9001: 2015

Most recent version of the document can be found on Brusatori website.

14.5 UL/CSA Certificate of compliance (optional)

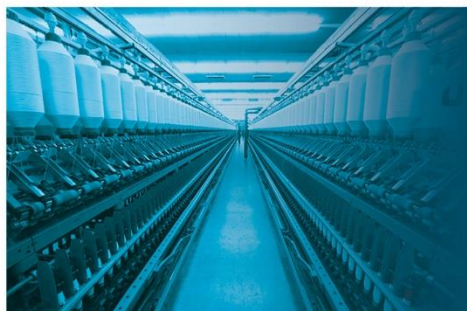
Most recent version of UL and CSA certificates of compliance can be found on Brusatori website.

15. Contact

Name	Brusatori Srl
Address	Via Antonio Meucci 5/7, 20012 Cuggiono (MI) – Italy
Phone	+39 0225068401
Fax	+39 0225060140
Website	www.brusatori.eu
E-mail	info@brusatori.eu

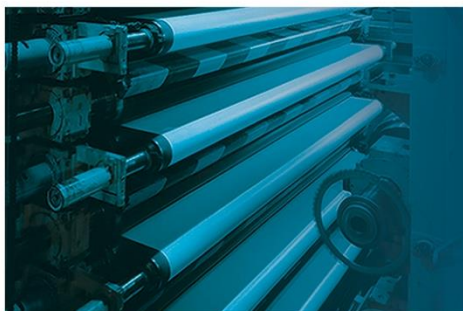
Note

Applications



TEXTILE

Ironers, dryers, vaporizers, calenders



PRINTING

Rotogravure printing machines, flexographic printing machines, converting lines, laminators, coating lines



PLASTICS

Extrusion lines, pipe machines, profile machines, stretch lines, tape lines, recycling



MACHINE TOOLS

Grinders, milling machines, machining centers, sawing machines



METALS

Winders-unwinders, loaders and stackers, tube lines, drawing lines, cable production lines, longitudinal and transverse cutting lines



PAPER

Winders-unwinders, cutters, rewinders, wrappers



Member of Keb Group

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