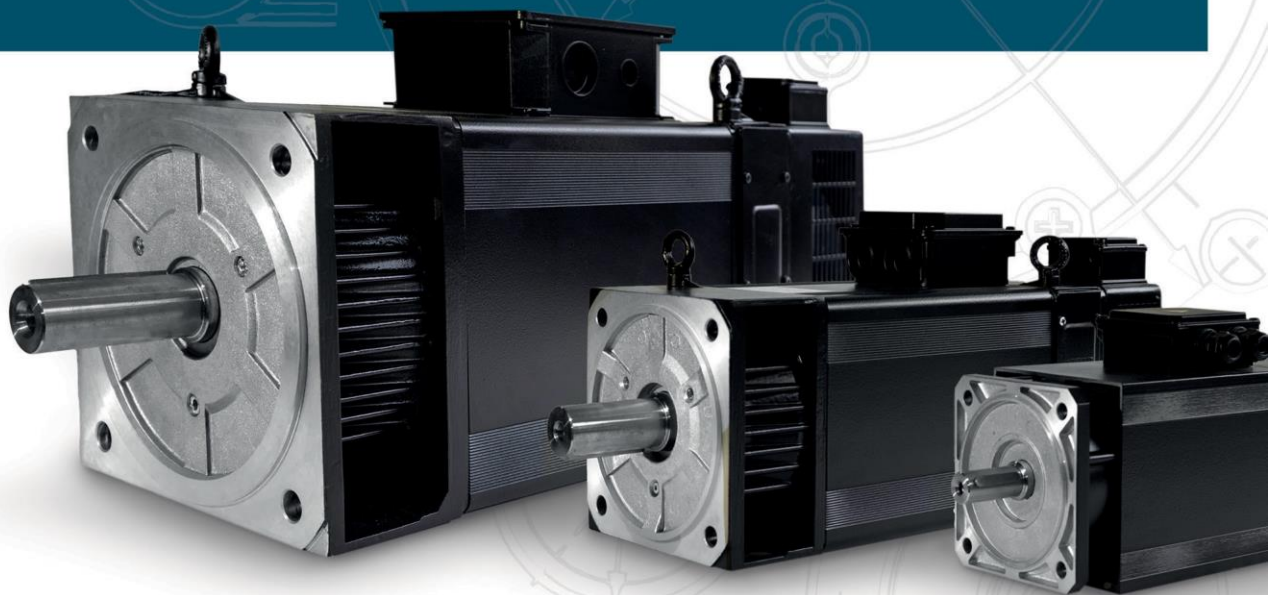


Asynchronous motors for inverter vector control **VF Series**

Italian technology since 1953



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2. General

2.1 Information

Brusatori proposes a series of square frame ac motors for variable speed drives applications. This asynchronous motor has been developed and designed to achieve the same dynamic performance as for DC motors series.

The AC square motor complies with IEC60034 standards and responds to the requirements for most industrial applications. Its flexible square frame design facilitates its integration into all types of machinery.

VF motors are 3 phase asynchronous squirrel cage 4 pole motors manufactured in degree of protection IP23 and IP54/55. 7 sizes (160-180-225-250-280-315-355) are proposed covering a power range from 12 kW to 1600 kW.

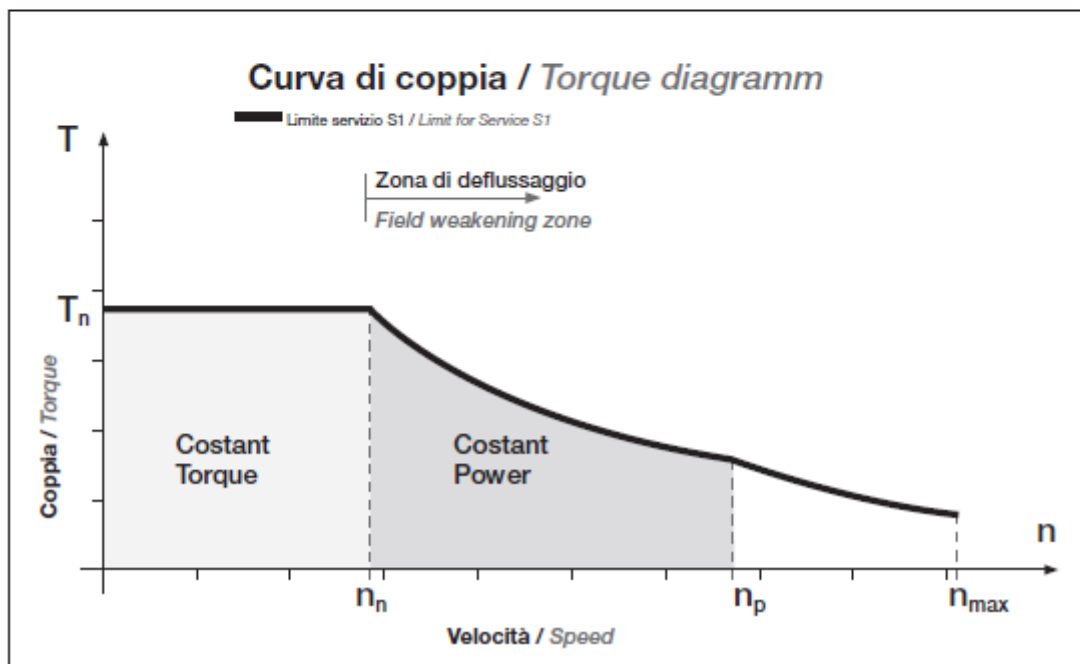
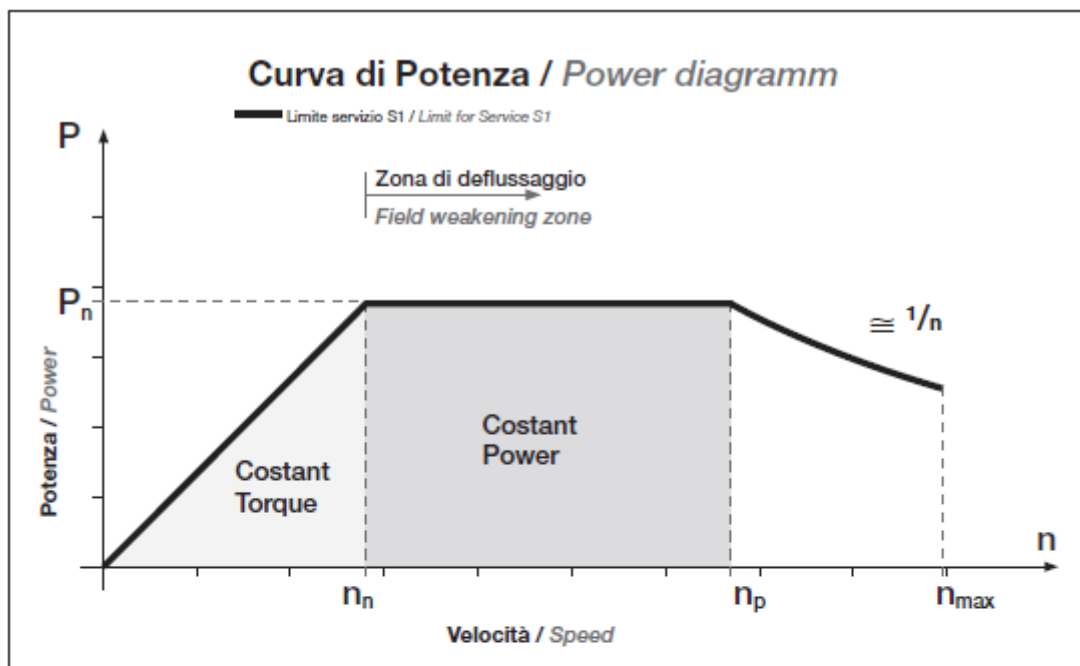
2.2 Type of designation

Frame size		Core length				
VF	160	S	M	L	-	-
	180	S	M	L	-	-
	225	S	M	L	-	-
	250	S	M	L	-	-
	280	S	M	L	P	-
	315	S	M	L	P	-
	355	S	M	L	P	X

2.3 Nameplate

		 Brusatori Member of KEB Group			
3 Phase AC Motor 4 poles			IEC 60034-1		Date:
Type: VF			N°		
Pn: kW	Tn: Nm	Nn: rpm	Vn: V		
 In: A	Cos phi	Eff.:	Weight	kg	
Fn: Hz	N1: rpm	Nmech: rpm	Duty		
IP	IC	IM	Res.1ph: Ω		
Amb: °C	Alt: m	Ins. Cl:	Temp. rise Cl:		
Fan: Ph	Hz	A	V		
Encoder:		ppr	Vdc	channels	
Made in E.U.			www.brusatori.eu		

2.4 Operating torque/power curves



3. Technical data

3.1 Main features

Insulation	Class H
Temperature rise	Class F
Thermal protection	PTC 150 °C triplex
Vibration and balancing	Class A Class B (optional)
Protection degree	IP 23 IP 54/55
Cooling	3-phase fan blower: Radial mounting for IP 23 Axial mounting for IP 54 Axial or radial mounting for IP 55
Mounting	B3 (IM 1001) B35 (IM 2001)
Bearings	Grease lubricated ball bearings Roller bearings (optional) Insulated bearings (optional)
Space heaters	1 per end shield, connected in parallel (optional)
Painting	RAL 9005 (black) Thickness ≥ 60 microns
Transport	Rotor locking device
Environmental conditions*	Ambient temperature: -5 to +40 °C Maximum altitude: 1000 m above sea level
Standards	IEC 60034-1

*Higher ambient temperature and altitude are possible with derating (see table 3.4)

Motor size		160	180	225	250	280	315	355
Stator	Material	Magnetic lamination						
	Stator winding	Copper wire with special insulation for inverter supply						
End shield	Material	Cast iron						
Bearings	D-End/ND-End	6312	6215	6220	6222	6224	6228	6230
		2RSC3		C3				
	Lubrication	Greased for life		Regreasable				
	Protection ring	Strongly recommended > 100kw						
	Axially locked	ND-End side						
Terminal box		Steel		Cast iron	Steel			
Flange		Steel or cast iron						
Cooling system		Aluminium motor + Steel fan housing						
Rotor		Magnetic lamination						
		and pressure die-cast aluminium					and copper bars	
Balancing method		Half key balancing						

3.2 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. Values are based on normal conditions at 50Hz and 100Hz for a bearing life of 20000 hours.

The motors are mounted on IM B3 foot in horizontal position.

Ball bearings:

Type	Distance from shaft shoulder (mm)	Speed 1500 rpm (N)	Speed 3000 rpm (N)
VF160	55	3500	2500
VF180	70	4000	3000
VF225	85	7000	5200
VF250	105	7500	5700
VF280	105	8000	6000
VF315	105	8500	6500
VF355	125	9000	6700 (2800 rpm)

Roller bearings:

Type	Distance from shaft shoulder (mm)	Speed 1500 rpm (N)	Speed 3000 rpm (N)
VF160	55	9500	7500
VF180	70	11500	9000
VF225	85	21000	17000
VF250	105	28000	22000
VF280	105	32000	26500
VF315	105	38000	32000
VF355	125	42000	35000 (2500 rpm)

Bearing protection ring:

Modern variable speed drives with their fast-rising voltage pulses and high switching frequencies can cause current pulses through the bearings whose repeated discharging can gradually erode the bearing races.

To prevent these damages specific rules need to be respected (symmetrical multicolor motor cable, shielded, high frequency bonding connections between the installation and knows earth reference points).

Is recommend the use of a bearing protection ring for motors above 100Kw. This ring is fixed on the Dend end shield and the conductive microfibers in contact all around the rotor shaft channel harmful shaft voltages away from the bearings to around.

The best solution is a bearing protection ring Dend side and an insulated bearing Ned side which cut the path to the leakage current.

3.3 Optional features

Size	160	180	225	250	280	315	355
Cooling forms							
IC06 (IP23) Force ventilated	S	S	S	S	S	S	S
IC17 (IP23) Single pipe ventilated	x	x	x	x	x	X	x
IC37 (IP54) Double pipe ventilated	x	x	x	x	x	x	X
IC416 (IP54) Totally enclosed, fan cooled	S	S	S	S	S	S	S
<i>Other cooling forms available on request</i>							
Mounting Forms							
IM1001 Horizontal foot (radial ventilation)	S	S	S	S	S	S	S
IM1001 Horizontal foot (axial ventilation)		S	S	S	S	S	S
IM1002 Horizontal foot, double shaft extension	x	x	x	x	x	x	X
IM2001 Horizontal foot and flange (radial ventilation)	x	x	x	x	x	x	x
IM2001 Horizontal foot and flange (axial ventilation)	S	S	x	x	x	x	x
IM2011/2031 Vertical foot and flange	x	x	x	x	x	x	x
IM 3001/3011/3031 Horizontal/ Vertical flange	R	R	R	R	R	R	R
Modifications and accessories							
Air filter (in IP23)	S	S	S	S	S	S	S
Air sound absorber	x	x	x	x	x	x	x
Air pressure switch	x	x	x	x	x	x	x
PTC 150°C - 3 in series	S	S	S	S	S	S	S
Other temperature sensor	x	x	x	x	x	x	x
Bearing monitoring nipple	x	x	x	x	x	x	x
Special shaft	x	x	x	x	x	x	x
Shaft seal, D-End	x	x	x	x	x	x	x
Vibration class B	x	x	x	x	x	x	x
Roller bearing D-End	x	x	x	x	x	x	x
AEGIS bearing protection ring	x	x	x	x	x	x	x
Insulated bearing, ND-End	x	x	x	x	x	x	x
Disk Brake	x	x	x	x	x	x	x
Heating element	x	x	x	x	x	x	x
Special paint (RAL colour)	x	x	x	x	x	x	x
Reinforced impregnation	x	x	x	x	x	x	x
Special corrosion protection	x	x	x	x	x	x	x
Special winding for 690V nominal voltage	x	x	x	x	S	S	S
Nema	R	R	R	R	R	R	R
Encoder							
Programmable	x	x	x	x	x	x	x
Not reprogrammable	x	x	x	x	x	x	x

S: standard x: possible R: on request

3.4 Vibration class and balancing

VF motors are manufactured as standard to meet vibration class A and balanced with half key.

Class B is available on request.

Vibrations are expressed in mm/s, rms, using free suspension method and measured under no load.

Vibration grade	Center height (mm)					
	160 < H ≤ 280			H > 280		
	Displ	Vel	Acc	Displ	Vel	Acc
	μm	mm/s	m/s ²	μm	mm/s	m/s ²
A	35	2,2	3,5	45	2,8	4,4
B	18	1,1	1,7	29	1,8	2,8

3.5 Derating of the motor in function of temperature / altitude

Motors are designed to operate between -5°C to maximum 40°C ambient temperature and at a maximum altitude of 1000 m above sea level.

If ambient temperature or altitude is higher the motor torque/power is derated according to the table below:

Altitude (m)	Temperature (°C)			
	30	40	50	60
1000	1	1	0,9	0,8
2000	1	0,93	0,85	0,75
3000	0,93	0,85	0,77	0,64
4000	0,85	0,73	0,65	0,5

3.6 Terminal box input cables

Provided with plugged holes: 2 for main supply and 1 for accessories.

Dimensions according to table below.

Motor type	Size and disposition
VF 160	2 x φ 63.5 + 1 x φ 20.5
VF 180	1 blank removable face
VF 225	1 blank removable face
VF 250	1 blank removable face
VF 280	1 blank removable face
VF 315	1 blank removable face
VF 355	1 blank removable face

3.7 Duty type correction factors

Motor power output can be increased depending on duty types defined by IEC 60034-1. Correction factors are given in the table below:

Duty	Operating time
S1	Continuous - Reference duty for nominal values

Duty	Operating time		
	10 min	30 min	60 min
S2	1.6	1.3	1.1

Duty	Cyclic duration factor		
	25%	40%	60%
S3	1.4	1.2	1.1
S6	1.4	1.3	1.2

The maximum constant power speed will be reduced based on the type of duty and the required overload.

Overload capacity:

IEC standard 60034-1: 160% FLT/FLC for 1 minute every 10 minutes.

3.8 Electrical and mechanical tolerances

	Efficiency by summation losses	Efficiency by input-output test	Power factor	Slip	Max torque	Inertia	Noise level
Pn kW < 150	-15% (1- η)	-15% (1- η)	-1/6 (1-cos ϕ)	+/-20%	-10%	±10%	+3dB(A)
Pn kW > 150	-10% (1- η)	-15% (1- η)	-1/6 (1-cos ϕ)	+/-20%	-10%	±10%	+3dB(A)

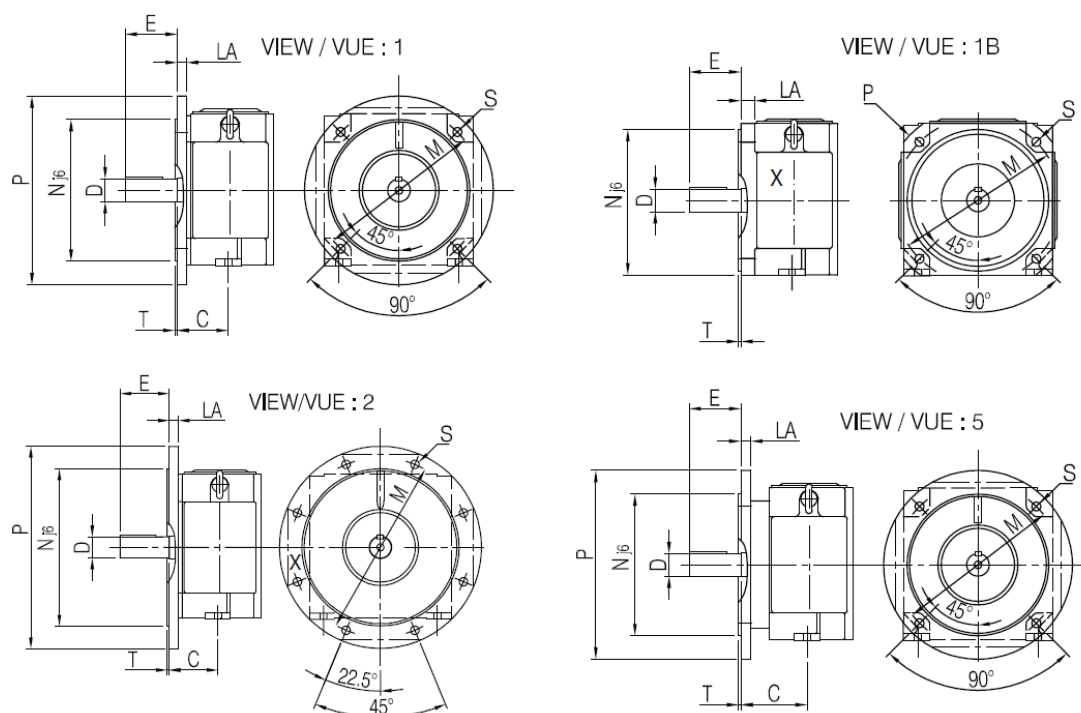
Tolerances are in accordance with IEC 60034-1 and based on test procedure in accordance with IEC 60034-2.

3.9 Space heaters (optional)

Motor type	IP 23	IP 54
VF 160	2*50W	2*50W
VF 180	2*50W	2*50W
VF 225	2*80W	2*65W
VF 250	2*80W	2*65W
VF 280	2*100W	2*65W
VF 315	2*100W	2*100W
VF 355	2*150W	2*100W

3.10 Flange dimensions

On request VF motors can be equipped with integrated or bolted flange



VF	Flange size	LA	M	N	P	S	T	C	View For AV	View For RV
160	F300*	19	300	250	350	19	5	130*	1B	5
	F350**	19	350	300	400	19	5	108	1B	1B
	F400	19	400	350	450	19	5	108	2	2
180	F300	19	300	250	350	19	5	121	1B	1
	F350**	19	350	300	400	19	5	21	1B	1B
	F400	19	400	350	450	19	5	121	2	2
225	F400	19	400	350	450	19	5	149	2	2
	F500	19	500	450	550	19	5	149	2	2
	F600	19	600	550	660	24	6	149	2	2
250	F400	23	400	350	450	19	5	168	N.A.	2
280	F500	23	500	450	550	19	5	190		2
	F600	23	600	550	660	24	6	190		2
	F740	23	740	680	800	24	6	190		2
315	F500	30	500	450	550	24	6	216		2
	F600	30	600	550	660	24	6	216		2
	F740	30	740	680	800	24	6	216		2
355	F600	42	600	550	660	24	6	254		2
	F740	42	740	680	800	24	6	254		2

* Special shaft required - C dimension change from 108 to 130
Technical and economical analysis is requested

** Recommended standard flanges

AV : Axial ventilation
RV : Radial ventilation

N.A. : Not assigned

4. Datasheet IP23 version

4.1 Electrical data VF 160 (S-M-L) IP23 motors

Degree of Protection	IP 23		Cooling	IC 06	
Rotor Inertia J (kgm ²)	S 0,24 - M 0,29 - L 0,33		Sound Pressure level (db(A)) at 50 Hz	76	
Maximum mechanical speed n _{max} (rpm)	VF 160 S	3400 (9500)*	Motor weight (kg)	VF 160 S	290
	VF 160 M	3400 (7700)*		VF 160 M	335
	VF 160 L	3400 (6500)*		VF 160 L	370
D-End Bearing**	6312 2RSC3		ND-End bearing	6312 2RSC3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2865/3438	Type of cooling fan	Force draught
Power (kW)	0,75/1,1	Internal Static Air Pres. Drop (Pa)	850
Current (A)	1,64/1,49	Required cooling Air flow (m ³ /h)	900

VF 160 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	26	51	60	74	87	91	97	103	kW
T _N Torque at rated speed	497	487	478	471	462	435	386	328	Nm
I _N Current at rated power	56	103	119	144	169	175	184	194	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4800*	rpm
cos φ	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8	
Efficiency	0,84	0,89	0,91	0,93	0,93	0,94	0,95	0,96	
f _N Nominal frequency	18	34,6	41	51,3	61,5	68	82	101,5	Hz

VF 160 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	31	58	69	85	101	104	112	118	kW
T _N Torque at rated speed	592	554	549	541	536	497	446	376	Nm
I _N Current at rated power	65	116	133	161	189	193	205	214	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4800*	rpm
cos φ	0,82	0,81	0,82	0,82	0,82	0,82	0,83	0,83	
Efficiency	0,84	0,89	0,91	0,93	0,94	0,95	0,95	0,96	
f _N Nominal frequency	18	34,7	41	51,4	61,5	68,3	82,2	101,5	Hz

VF 160 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	35	70	81	100	117	122	133	139	kW
T _N Torque at rated speed	669	669	645	637	621	583	529	442	Nm
I _N Current at rated power	77	144	163	196	227	232	253	261	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4800*	rpm
cos φ	0,78	0,79	0,79	0,79	0,79	0,8	0,8	0,8	
Efficiency	0,84	0,89	0,91	0,93	0,94	0,95	0,95	0,96	
f _N Nominal frequency	18,9	35,8	41,6	52,1	62,5	68,9	83	101,9	Hz

4.2 Electrical data VF 180 (S-M-L) IP23 motors

Degree of Protection	IP 23		Cooling	IC 06	
Rotor Inertia J (kgm ²)	S 0,54 - M 0,74 - L 0,94		Sound Pressure level (db(A)) at 50 Hz	78	
Maximum mechanical speed n _{max} (rpm)	VF 180 S	3200 (8500)*	Motor weight (kg)	VF 180 S	365
	VF 180 M	3200 (7000)*		VF 180 M	450
	VF 180 L	3200 (5200)*		VF 180 L	545
D-End Bearing**	6215 2RSC3		ND-End bearing	6215 2RSC3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2865/3462	Type of cooling fan	Force draught
Power (kW)	0,75/1,1	Internal Static Air Pres. Drop (Pa)	900
Current (A)	1,64/1,98	Required cooling Air flow (m ³ /h)	1300

VF 180 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	40	80	94	118	136	142	154	159	kW
T _N Torque at rated speed	764	764	748	739	722	678	613	506	Nm
I _N Current at rated power	82	156	180	214	249	257	279	284	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200*	3840*	4800*	rpm
cos φ	0,84	0,83	0,83	0,84	0,84	0,84	0,84	0,85	
Efficiency	0,84	0,89	0,91	0,93	0,94	0,95	0,95	0,95	
f _N Nominal frequency	17,5	34,3	40,6	50,8	60,8	67,7	81,2	101	Hz

VF 180 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	50	98	115	140	165	172	187	196	kW
T _N Torque at rated speed	955	936	915	891	875	821	744	624	Nm
I _N Current at rated power	101	187	215	253	298	307	334	347	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200*	3840*	4800*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,85	
Efficiency	0,85	0,9	0,92	0,94	0,94	0,95	0,95	0,96	
f _N Nominal frequency	17,3	34	40,6	50,7	60,8	67,4	81,1	101	Hz

VF 180 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	56	110	129	159	187	195	211	223	kW
T _N Torque at rated speed	1073	1053	1029	1012	992	931	840	710	Nm
I _N Current at rated power	115	210	242	287	338	349	337	390	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200*	3840*	4800*	rpm
cos φ	0,83	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,85	0,9	0,92	0,94	0,94	0,95	0,95	0,96	
f _N Nominal frequency	17,5	34,2	40,7	50,9	61,1	67,6	81,3	100,9	Hz

4.3 Electrical data VF 225 (S-M-L) IP23 motors

Degree of Protection	IP 23		Cooling	IC 06	
Rotor Inertia J (kgm ²)	S 1,72 - M 2,29 - L 2,55		Sound Pressure level (db(A)) at 50 Hz	80	
Maximum mechanical speed n _{max} (rpm)	VF 225 S	3800 (6500)*	Motor weight (kg)	VF 225 S	705
	VF 225 M	3800 (5300)*		VF 225 M	860
	VF 225 L	3800 (4600)*		VF 225 L	920
D-End Bearing**	6220 C3		ND-End bearing	6220 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2895/3474	Type of cooling fan	Force draught
Power (kW)	2,2/2,2	Internal Static Air Pres. Drop (Pa)	1200
Current (A)	4,35/3,76	Required cooling Air flow (m ³ /h)	2200

VF 225 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	84	164	192	235	276	288	314	330	kW
T _N Torque at rated speed	1604	1566	1528	1496	1464	1375	1249	1051	Nm
I _N Current at rated power	168	310	355	420	493	509	555	577	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4800*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	17,2	34	40,5	50,6	60,7	67,3	81	100,8	Hz

VF 225 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	103	201	237	292	342	358	387	408	kW
T _N Torque at rated speed	1927	1920	1886	1859	1815	1709	1540	1299	Nm
I _N Current at rated power	206	375	433	522	611	633	685	713	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4800*	rpm
cos φ	0,84	0,85	0,85	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	17,1	33,9	40,4	50,5	60,6	67,2	80,8	100,8	Hz

VF 225 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	118	232	273	335	394	412	444	469	kW
T _N Torque at rated speed	2254	2216	2173	2133	2090	1967	1767	1493	Nm
I _N Current at rated power	236	443	511	606	713	745	803	830	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4400*	rpm
cos φ	0,84	0,83	0,83	0,84	0,84	0,84	0,84	0,85	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	0,95	0,96	
f _N Nominal frequency	17,3	34	40,6	50,7	60,7	67,3	81	101	Hz

4.4 Electrical data VF 250 (S-M-L) IP23 motors

Degree of Protection	IP 23		Cooling	IC 06	
Rotor Inertia J (kgm2)	S 2,8 - M 3,4 - L 3,8		Sound Pressure level (db(A)) at 50 Hz	82	
Maximum mechanical speed n _{max} (rpm)	VF 250 S	3400 (5700)*	Motor weight (kg)	VF 250 S	1090
	VF 250 M	3400 (4600)*		VF 250 M	1260
	VF 250 L	3400 (4100)*		VF 250 L	1390
D-End Bearing**	6222 C3		ND-End bearing	6222 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2895/3498	Type of cooling fan	Force draught
Power (kW)	4/3	Internal Static Air Pres. Drop (Pa)	2100
Current (A)	7,54/4,89	Required cooling Air flow (m3/h)	2700

VF 250 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	2600	Rpm
P _N Rated power	121	239	280	344	405	422	456	458	kW
T _N Torque at rated speed	2311	2283	2228	2190	2149	2015	1815	1682	Nm
I _N Current at rated power	242	451	517	615	724	747	807	801	A
n1 Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4160*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	16,8	33,6	40,4	50,5	60,6	67,3	80,8	87,5	Hz

VF 250 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	2600	Rpm
P _N Rated power	142	278	327	401	472	491	533	535	kW
T _N Torque at rated speed	2712	2655	2602	2553	2504	2345	2121	1965	Nm
I _N Current at rated power	284	525	604	717	844	869	943	935	A
n1 Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	4160*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	16,8	33,6	40,4	50,5	60,6	67,3	80,8	87,5	Hz

VF 250 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	164	322	380	465	547	570	617	620	kW
T _N Torque at rated speed	3132	3075	3024	2961	2902	2722	2455	2277	Nm
I _N Current at rated power	328	608	702	831	978	1008	1091	1084	A
n1 Maximum speed at constant power	800	1600	1920	2400	2880	3200	3840*	3900*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	16,8	33,6	40,4	50,5	60,6	67,3	80,8	87,5	Hz

4.5 Electrical data VF 280 (S-M-L-P) IP23 motors

Degree of Protection	IP 23 S		Cooling	IC 06	
Rotor Inertia J (kgm2)	S 4,17 - M 5,5 - L 6,2 - P 6,7		Sound Pressure level (db(A)) at 50 Hz	84	
Maximum mechanical speed n _{max} (rpm)	VF 280 S	3200 (5400)*	Motor weight (kg)	VF 280 S	1160
	VF 280 M	3200 (4600)*		VF 280 M	1510
	VF 280 L	3200 (4000)*		VF 280 L	1800
	VF 280 P	3200 (4000)*		VF 280 P	1900
D-End Bearing**	6224 C3		ND-End bearing	6224 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400***		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

*** 690V voltage supply possible on request

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2925/3510	Type of cooling fan	Force draught
Power (kW)	5,5/7,5	Internal Static Air Pres. Drop (Pa)	2600
Current (A)	10,1/11,86	Required cooling Air flow (m3/h)	3600

VF 280 S

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	138	270	317	389	458	477	kW
T _N Torque at rated speed	2636	2579	2523	2477	2430	2278	Nm
I _N Current at rated power	273	498	572	679	800	833	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 280 M

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	185	362	425	522	612	640	kW
T _N Torque at rated speed	3534	3457	3382	3323	3247	3056	Nm
I _N Current at rated power	353	645	742	892	1046	1093	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	rpm
cos φ	0,87	0,88	0,88	0,88	0,88	0,88	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 280 L

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	194	382	449	551	648	676	kW
T_N Torque at rated speed	3705	3648	3573	3508	3438	3228	Nm
I_N Current at rated power	383	705	811	975	1146	1196	A
n₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	rpm
cos φ	0,84	0,85	0,85	0,85	0,85	0,85	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 280 P

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	217	426	502	615	723	754	kW
T_N Torque at rated speed	4145	4068	3995	3916	3836	3600	Nm
I_N Current at rated power	429	786	906	1074	1263	1317	A
n₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	
f_N Nominal frequency	17	33,7	40,3	50,4	60,5	67,1	Hz

4.6 Electrical data VF 315 (S-M-L-P) IP23 motors

Degree of Protection	IP 23 S		Cooling	IC 06	
Rotor Inertia J (kgm2)	S 12,9 - M 16,1 - L 18,65 - P 16,5		Sound Pressure level (db(A)) at 50 Hz	85	
Maximum mechanical speed n _{max} (rpm)	VF 315 S	3000 (4300)*	Motor weight (kg)	VF 315 S	2140
	VF 315 M	3000 (3600)*		VF 315 M	2540
	VF 315 L	3000		VF 315 L	2930
	VF 315 P	2600		VF 315 P	3100
D-End Bearing**	6228 C3		ND-End bearing	6228 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400***		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

*** 690V voltage supply possible on request

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2925/3510	Type of cooling fan	Force draught
Power (kW)	5,5/7,5	Internal Static Air Pres. Drop (Pa)	3500
Current (A)	10,1/11,86	Required cooling Air flow (m3/h)	4400

VF 315 S

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	212	416	490	600	705	736	kW
T _N Torque at rated speed	4049	3973	3900	3820	3740	3514	Nm
I _N Current at rated power	419	767	884	1048	1231	1285	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,6	67,1	Hz

VF 315 M

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	272	534	628	770	906	945	kW
T _N Torque at rated speed	5195	5100	4998	4902	4807	4512	Nm
I _N Current at rated power	519	963	1108	1331	1566	1633	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880	3200*	rpm
cos φ	0,87	0,87	0,87	0,87	0,87	0,87	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 315 L

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	318	624	734	900	1058	1104	kW
T_N Torque at rated speed	6074	5959	5841	5730	5613	5272	Nm
I_N Current at rated power	628	1152	1326	1573	1850	1930	A
n₁ Maximum speed at constant power	800	1600	1920	2400	2600	2600	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,86	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17	33,7	40,3	50,4	60,5	67,1	Hz

VF 315 P

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	382	750	881	1080	1270	1325	kW
T_N Torque at rated speed	7296	7163	7011	6876	6738	6327	Nm
I_N Current at rated power	755	1384	1592	1888	2220	2317	A
n₁ Maximum speed at constant power	800	1600	1920	2400	2600	2600	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,86	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17	33,7	40,3	50,4	60,5	67,1	Hz

4.7 Electrical data VF 355 (S-M-L) IP23 motors

Degree of Protection	IP 23		Cooling	IC 06	
Rotor Inertia J (kgm ²)	S 17,26 - M 22,32 - L 25,7 - P 33,45 - X 41,2		Sound Pressure level (db(A)) at 50 Hz	86	
Maximum mechanical speed n _{max} (rpm)	VF 355 S	2800 (4200)*	Motor weight (kg)	VF 355 S	2100
	VF 355 M	2800 (4200)*		VF 355 M	2800
	VF 355 L	2800 (3600)*		VF 355 L	3400
	VF 355 P	2700		VF 355 P	4000
	VF 355 X	2000		VF 355 X	4000
D-End Bearing**	6230 C3		ND-End bearing	6230 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400***		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

*** 690V voltage supply possible on request

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2925/1752	Type of cooling fan	Force draught
Power (kW)	5,5/7,5	Internal Static Air Pres. Drop (Pa)	3300
Current (A)	10,1/12,22	Required cooling Air flow (m ³ /h)	4700

VF 355 S

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	233	457	538	659	774	808	kW
T _N Torque at rated speed	4450	4364	4282	4196	4107	3858	Nm
I _N Current at rated power	471	824	950	1126	1322	1381	A
n ₁ Maximum speed at constant power	800	1600	1920	2400	2880*	3200*	rpm
cos φ	0,86	0,87	0,87	0,88	0,88	0,88	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17	33,6	40,2	50,3	60,4	66,9	Hz

VF 355 M

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	297	582	685	840	1008	1030	kW
T _N Torque at rated speed	5669	5662	5451	5348	5348	4920	Nm
I _N Current at rated power	607	1062	1209	1452	1742	1781	A
n ₁ Maximum speed at constant power	840	1600	1920	2400	2880*	3200*	rpm
cos φ	0,85	0,86	0,87	0,87	0,87	0,87	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17	33,6	40,2	50,3	60,4	66,9	Hz

VF 355 L

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	353	693	816	1000	1176	1227	kW
T_N Torque at rated speed	6749	6618	6494	6367	6239	5857	Nm
I_N Current at rated power	723	1265	1457	1728	2032	2120	A
n₁ Maximum speed at constant power	800	1600	1920	2400	2880*	3200*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17	33,6	40,2	50,3	60,4	66,9	Hz

VF 355 P

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	459	901	1061	1300	1529	1595	kW
T_N Torque at rated speed	8773	8608	8442	8277	8111	7615	Nm
I_N Current at rated power	940	1644	1894	2247	2642	2756	A
n₁ Maximum speed at constant power	800	1600	1920	2400	2700	2700	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17	33,6	40,2	50,3	60,4	66,9	Hz

VF 355 X

n_N Rated speed	500	1000	1200	1500	Rpm
P_N Rated power	565	1109	1306	1600	kW
T_N Torque at rated speed	10798	10594	10390	10187	Nm
I_N Current at rated power	1157	2024	2331	2765	A
n₁ Maximum speed at constant power	800	1600	1800	1800	rpm
cos φ	0,85	0,86	0,86	0,87	
Efficiency	0,83	0,92	0,94	0,96	
f_N Nominal frequency	17	33,6	40,2	50,3	Hz

5. Dati elettrici versione IP54/IP55

5.1 Electrical data VF 160 (S-M-L) IP54/IP55 motors

Degree of Protection	IP 55		Cooling	IC 416	
Rotor Inertia J (kgm ²)	S 0,24 - M 0,29 - L 0,33		Sound Pressure level (db(A)) at 50 Hz	76	
Maximum mechanical speed n _{max} (rpm)	VF 160 S	3400 (5600)*	Motor weight (kg)	VF 160 S	295
	VF 160 M	3400 (5600)*		VF 160 M	340
	VF 160 L	3400 (5600)*		VF 160 L	375
D-End Bearing**	6312 2RSC3		ND-End bearing	6312 2RSC3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**IM 2001 for axial ventilation

FAN CHARACTERISTICS

IP54 (ASSIALE)

IP55 (ASSIALE O RADIALE)

Frequency (Hz)	50/60	Number of phases	3	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Assiale	400/460	Mounting	Radial
Speed (rpm)	2480/3050	Type of cooling fan	Force draught	2885/3462	Type of cooling fan	Force draught
Power (kW)	0,79/0,9			0,75/0,75	Internal Static Air Pres. Drop (Pa)	850
Current (A)	1,3/1,3			1,64/1,49	Required cooling Air flow (m ³ /h)	900

VF 160 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	12	24	29	35	41	43	46	49	kW
T _N Torque at rated speed	236	232	231	223	218	205	183	156	Nm
I _N Current at rated power	26	49	58	69	81	82	87	90	A
n ₁ Maximum speed at constant power	1000	2000	2400	3000	3600*	4000*	4300*	4800*	rpm
cos φ	0,77	0,78	0,78	0,79	0,79	0,8	0,81	0,83	
Efficiency	0,88	0,91	0,92	0,93	0,93	0,94	0,94	0,95	
f _N Nominal frequency	18	34,7	41,1	51,4	61,6	68	82,2	101,4	Hz

VF 160 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	15	29	34	42	49	52	56	59	kW
T _N Torque at rated speed	283	278	271	267	260	246	223	187	Nm
I _N Current at rated power	30	57	66	80	93	95	103	104	A
n ₁ Maximum speed at constant power	1000	2000	2400	3000	3600*	4000*	4300*	4800*	rpm
cos φ	0,79	0,8	0,8	0,81	0,81	0,82	0,83	0,85	
Efficiency	0,89	0,92	0,93	0,94	0,94	0,95	0,95	0,96	
f _N Nominal frequency	17,7	34,4	40,8	51,1	61,3	67,7	81,7	101,1	Hz

VF 160 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	18	35	41	50	59	61	66	70	kW
T _N Torque at rated speed	337	331	326	318	313	293	263	223	Nm
I _N Current at rated power	41	77	90	107	126	128	136	138	A
n ₁ Maximum speed at constant power	1000	2000	2400	3000	3600*	4000*	4300*	4800*	rpm
cos φ	0,7	0,71	0,71	0,72	0,72	0,73	0,74	0,76	
Efficiency	0,89	0,92	0,93	0,94	0,94	0,95	0,95	0,96	
f _N Nominal frequency	17,6	34,3	40,8	51	61,2	67,6	81,5	101	Hz

5.2 Electrical data VF 180 (S-M-L) IP54/IP55 motors

Degree of Protection	IP54/IP 55		Cooling	IC 416	
Rotor Inertia J (kgm2)	S 0,54 - M 0,74- L 0,94		Sound Pressure level (db(A)) at 50 Hz	78	
Maximum mechanical speed n _{max} (rpm)	VF 180 S	3200 (5300)*	Motor weight (kg)	VF 180 S	370
	VF 180 M	3200 (5300)*		VF 180 M	460
	VF 180 L	3200 (5200)*		VF 180 L	550
D-End Bearing**	6215 2RSC3		ND-End bearing	6215 2RSC3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**IM 2001 for axial ventilation

FAN CHARACTERISTICS

IP54 (ASSIALE)

IP55 (ASSIALE O RADIALE)

Frequency (Hz)	50/60	Number of phases	3	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Assiale	400/460	Mounting	Radial
Speed (rpm)	2480/3050	Type of cooling fan	Force draught	2865/3462	Type of cooling fan	Force draught
Power (kW)	0,79/0,9			0,75/1,1	Internal Static Air Pres. Drop (Pa)	900
Current (A)	1,3/1,3			1,64/1,98	Required cooling Air flow (m3/h)	1300

VF 180 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	19	37	44	54	64	66	72	76	kW
T _N Torque at rated speed	363	353	350	344	340	316	287	241	Nm
I _N Current at rated power	37	69	81	98	116	117	126	128	A
n1 Maximum speed at constant power	1000	2000	2400	2800	3200*	3400*	3600*	4200*	rpm
cos φ	0,83	0,84	0,84	0,85	0,85	0,86	0,87	0,89	
Efficiency	0,89	0,92	0,93	0,94	0,94	0,95	0,95	0,96	
f _N Nominal frequency	17,3	34	40,6	50,7	60,8	67,3	81,1	100,7	Hz

VF 180 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	25	50	59	72	85	88	95	101	kW
T _N Torque at rated speed	478	478	470	458	451	422	378	321	Nm
I _N Current at rated power	49	93	109	130	154	156	166	170	A
n1 Maximum speed at constant power	1000	2000	2400	2800	3200*	3400*	3600*	4200*	rpm
cos φ	0,83	0,84	0,84	0,85	0,85	0,86	0,87	0,89	
Efficiency	0,89	0,92	0,93	0,94	0,94	0,95	0,95	0,96	
f _N Nominal frequency	17,2	33,9	40,5	50,6	60,7	67,2	81	100,6	Hz

VF 180 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	32	62	73	90	106	110	119	126	kW
T _N Torque at rated speed	611	592	581	573	562	527	474	401	Nm
I _N Current at rated power	62	114	133	161	189	193	205	210	A
n1 Maximum speed at constant power	1000	2000	2400	2800	3200*	3400*	3600*	4200*	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,87	0,88	0,9	
Efficiency	0,89	0,92	0,93	0,94	0,94	0,95	0,95	0,95	
f _N Nominal frequency	17,2	33,9	40,5	50,6	60,7	67,2	80,9	100,6	Hz

NOTE: size 180 motors with speeds higher than 1500rpm are only available in the IP55 version

5.3 Electrical data VF 225 (S-M-L) IP55 motors

Degree of Protection	IP 55		Cooling	IC 416	
Rotor Inertia J (kgm ²)	S 1,72 - M 2,29 - L 2,55		Sound Pressure level (db(A)) at 50 Hzv	80	
Maximum mechanical speed n _{max} (rpm)	VF 225 S	3800	Motor weight (kg)	VF 225 S	715
	VF 225 M	3800		VF 225 M	870
	VF 225 L	3800		VF 225 L	930
D-End Bearing**	6220 2ZC3		ND-End bearing	6220 2ZC3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Axial / Radial
Speed (rpm)	2895/3474	Type of cooling fan	Force draught
Power (kW)	2,2/2,2	Internal Static Air Pres. Drop (Pa)	1200
Current (A)	4,35/3,76	Required cooling Air flow (m ³ /h)	2200

VF 225 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	42	83	98	120	141	147	159	168	kW
T _N Torque at rated speed	802	793	780	764	748	702	633	535	Nm
I _N Current at rated power	81	153	179	214	252	257	275	281	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400	3600	3800	rpm
cos φ	0,83	0,84	0,84	0,85	0,85	0,86	0,87	0,89	
Efficiency	0,9	0,93	0,94	0,95	0,95	0,96	0,96	0,97	
f _N Nominal frequency	17,1	33,8	40,4	50,5	60,6	67,	80,8	100,5	Hz

VF 225 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	53	104	122	150	176	184	199	210	kW
T _N Torque at rated speed	1012	993	971	955	934	879	792	669	Nm
I _N Current at rated power	101	190	220	265	311	318	340	347	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400	3600	3800	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,87	0,88	0,9	
Efficiency	0,89	0,93	0,94	0,95	0,95	0,96	0,96	0,97	
f _N Nominal frequency	17,1	33,8	40,4	50,5	60,6	67,1	80,8	100,5	Hz

VF 225 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	3000	Rpm
P _N Rated power	57	111	130	160	188	196	212	224	kW
T _N Torque at rated speed	1089	1060	1035	1019	997	936	844	713	Nm
I _N Current at rated power	109	203	235	283	332	339	362	370	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400	3600	3800	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,87	0,88	0,9	
Efficiency	0,9	0,93	0,94	0,95	0,95	0,96	0,96	0,97	
f _N Nominal frequency	17,1	33,8	40,4	50,5	60,6	67,1	80,8	100,5	Hz

5.4 Electrical data VF 250 (S-M-L) IP55 motors

Degree of Protection	IP 55		Cooling	IC 416	
Rotor Inertia J (kgm ²)	S 2,8 - M 3,4 - L 3,8		Sound Pressure level (db(A)) at 50 Hz	82	
Maximum mechanical speed n _{max} (rpm)	VF 250 S	3400 (4200)*	Motor weight (kg)	VF 250 S	1110
	VF 250 M	3400 (4200)*		VF 250 M	1280
	VF 250 L	3400 (4100)*		VF 250 L	1410
D-End Bearing**	6222 C3		ND-End bearing	6222 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2895/3498	Type of cooling fan	Force draught
Power (kW)	4/3	Internal Static Air Pres. Drop (Pa)	2100
Current (A)	7,54/4,89	Required cooling Air flow (m ³ /h)	2700

VF 250 S

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	2600	Rpm
P _N Rated power	58	114	135	165	194	202	219	220	kW
T _N Torque at rated speed	1114	1093	1072	1051	1029	966	872	809	Nm
I _N Current at rated power	116	216	249	295	347	358	388	385	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400	3600*	4200*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	16,8	33,6	40,4	50,5	60,6	67,3	80,8	87,5	Hz

VF 250 M

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	2600	Rpm
P _N Rated power	68	134	157	193	227	237	256	258	kW
T _N Torque at rated speed	1302	1278	1253	1229	1204	1130	1020	946	Nm
I _N Current at rated power	136	253	291	345	406	419	453	450	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400	3600*	4200*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	16,8	33,6	40,4	50,5	60,6	67,3	80,8	87,5	Hz

VF 250 L

n _N Rated speed	500	1000	1200	1500	1800	2000	2400	2600	Rpm
P _N Rated power	80	156	184	225	265	276	299	300	kW
T _N Torque at rated speed	1518	1490	1461	1433	1404	1318	1189	1103	Nm
I _N Current at rated power	159	295	339	402	473	488	529	525	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400	3600*	3900*	rpm
cos φ	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,96	0,96	0,96	
f _N Nominal frequency	16,8	33,6	40,4	50,5	60,6	67,3	80,8	87,5	Hz

5.5 Electrical data VF 280 (S-M-L-P) IP55 motors

Degree of Protection	IP 55		Cooling	IC 416	
Rotor Inertia J (kgm2)	S 4,17 - M 5,5 - L 6,2 - P 6,7		Sound Pressure level (db(A)) at 50 Hz	84	
Maximum mechanical speed n _{max} (rpm)	VF 280 S	3200 (4000)*	Motor weight (kg)	VF 280 S	1180
	VF 280 M	3200 (4000)*		VF 280 M	1530
	VF 280 L	3200 (4000)*		VF 280 L	1820
	VF 280 P	3200 (3700)*		VF 280 P	1900
D-End Bearing**	6224 C3		ND-End bearing	6224 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400***		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

*** 690V voltage supply possible on request

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2925/3510	Type of cooling fan	Force draught
Power (kW)	5,5/7,5	Internal Static Air Pres. Drop (Pa)	2600
Current (A)	10,1/11,86	Required cooling Air flow (m3/h)	3600

VF 280 S

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	66	130	152	187	220	229	kW
T _N Torque at rated speed	1261	1242	1210	1191	1167	1093	Nm
I _N Current at rated power	130	240	274	327	384	400	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 280 M

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	89	176	206	253	298	310	kW
T _N Torque at rated speed	1700	1671	1639	1611	1581	1480	Nm
I _N Current at rated power	170	312	359	432	509	530	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400*	rpm
cos φ	0,87	0,88	0,88	0,88	0,88	0,88	
Efficiency	0,87	0,92	0,93	0,96	0,96	0,96	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 280 L

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	103	202	238	292	343	358	kW
T_N Torque at rated speed	1967	1929	1894	1859	1820	1709	Nm
I_N Current at rated power	203	373	430	517	607	633	A
n₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400*	rpm
cos φ	0,84	0,85	0,85	0,85	0,85	0,85	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 280 P

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	109	214	251	308	362	378	kW
T_N Torque at rated speed	2082	2044	1998	1961	1921	1805	Nm
I_N Current at rated power	215	395	453	538	632	660	A
n₁ Maximum speed at constant power	1000	2000	2400	2600	3100	3400*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	
f_N Nominal frequency	17	33,7	40,3	50,4	60,5	67,1	Hz

5.6 Electrical data VF 315 (S-M-L-P) IP55 motors

Degree of Protection	IP 55		Cooling	IC 416	
Rotor Inertia J (kgm2)	S 12,9 - M 16,1 - L 18,65 - P 16,5		Sound Pressure level (db(A)) at 50 Hz	85	
Maximum mechanical speed n _{max} (rpm)	VF 315 S	3000 (3400)*	Motor weight (kg)	VF 315 S	2140
	VF 315 M	3000 (3400)*		VF 315 M	2560
	VF 315 L	3000		VF 315 L	2910
	VF 315 P	2600		VF 315 P	3100
D-End Bearing**	6228 C3		ND-End bearing	6228 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400***		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

*** 690V voltage supply possible on request

FAN CHARACTERISTICS

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2925/3510	Type of cooling fan	Force draught
Power (kW)	5,5/7,5	Internal Static Air Pres. Drop (Pa)	2600
Current (A)	10,1/11,86	Required cooling Air flow (m3/h)	3600

VF 315 S

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	117	229	270	330	388	405	kW
T _N Torque at rated speed	2235	2187	2149	2101	2059	1934	Nm
I _N Current at rated power	231	422	487	576	678	707	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100*	3400*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,86	0,91	0,93	0,95	0,95	0,95	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,6	67,1	Hz

VF 315 M

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	150	294	345	424	498	520	kW
T _N Torque at rated speed	2865	2808	2746	2699	2642	2483	Nm
I _N Current at rated power	286	530	609	733	861	899	A
n ₁ Maximum speed at constant power	1000	2000	2400	2600	3100*	3200*	rpm
cos φ	0,87	0,87	0,87	0,87	0,87	0,87	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 315 L

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	175	343	404	495	582	607	kW
T_N Torque at rated speed	3343	3276	3215	3152	3088	2898	Nm
I_N Current at rated power	346	633	730	865	1017	1061	A
n₁ Maximum speed at constant power	1000	2000	2400	2600	2600	2600	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,86	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17,1	33,7	40,3	50,4	60,5	67,1	Hz

VF 315 P

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	210	412	485	594	699	729	kW
T_N Torque at rated speed	4011	3935	3860	3782	3709	3481	Nm
I_N Current at rated power	415	761	876	1039	1222	1275	A
n₁ Maximum speed at constant power	1000	2000	2400	2600	2600	2600	rpm
cos φ	0,84	0,85	0,85	0,86	0,86	0,86	
Efficiency	0,87	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	17	33,7	40,3	50,4	60,5	67,1	Hz

5.7 Electrical data VF 355 (S-M-L-P) IP55 motors

Degree of Protection	IP 55		Cooling	IC 416	
Rotor Inertia J (kgm ²)	S 17,26 -M 22,32 - L 25,7 - P 33,45		Sound Pressure level (db(A)) at 50 Hz	86	
Maximum mechanical speed n _{max} (rpm)	VF 355 S	2800 (3000)*	Motor weight (kg)	VF 355 S	2130
	VF 355 M	2800 (3000)*		VF 355 M	2830
	VF 355 L	2800 (3000)*		VF 355 L	3430
	VF 355 P	2700		VF 355 P	4030
D-End Bearing**	6230 C3		ND-End bearing	6230 C3	
Vibration Class	A		Mounting	IM1001	
Insulation class	H		Temperature rise Class	F	
Motor Nominal voltage (V)	400***		Thermal Protection	PTC 150°C	

*on request (high speed option to be evaluated with our R&D department)

**insulated bearing or bearing protection ring recommended on motor with power higher than 100kW

*** 690V voltage supply possible on request

FAN CHARACTERISTICS IP55 (RADIAL FAN OR AXIAL FAN)

Frequency (Hz)	50/60	Number of phases	3
Voltage (V)	400/460	Mounting	Radial
Speed (rpm)	2925/3510	Type of cooling fan	Force draught
Power (kW)	5,5/7,5	Internal Static Air Pres. Drop (Pa)	2600
Current (A)	10,1/11,86	Required cooling Air flow (m ³ /h)	3600

VF 355 S

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	119	233	274	336	395	412	kW
T _N Torque at rated speed	2273	2225	2181	2139	2096	1967	Nm
I _N Current at rated power	241	420	478	574	675	704	A
n1 Maximum speed at constant power	1000	2000	2400	2600	3000*	3000*	rpm
cos φ	0,86	0,87	0,88	0,88	0,88	0,88	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17	33,6	40,2	50,3	60,3	66,9	Hz

VF 355 M

n _N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P _N Rated power	163	320	377	462	453	567	kW
T _N Torque at rated speed	3113	3056	3000	2941	2881	2707	Nm
I _N Current at rated power	333	584	673	798	938	980	A
n1 Maximum speed at constant power	1000	2000	2400	2600	3000*	3000*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f _N Nominal frequency	17	33,6	40,2	50,3	60,3	66,9	Hz

VF 355 L

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	194	381	448	550	646	675	kW
T_N Torque at rated speed	3705	3639	3565	3502	3427	3223	Nm
I_N Current at rated power	397	695	800	950	1116	1167	A
n₁ Maximum speed at constant power	1000	2000	2400	2600	3000*	3000*	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	16,9	33,6	40,2	50,3	60,3	66,9	Hz

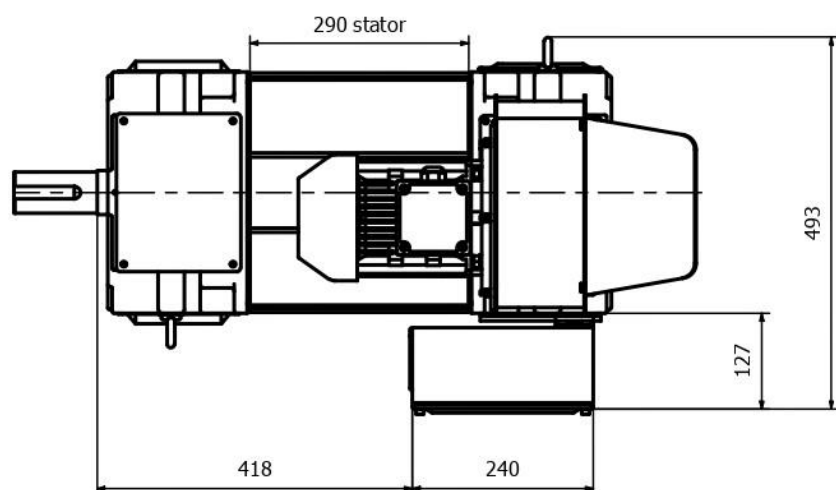
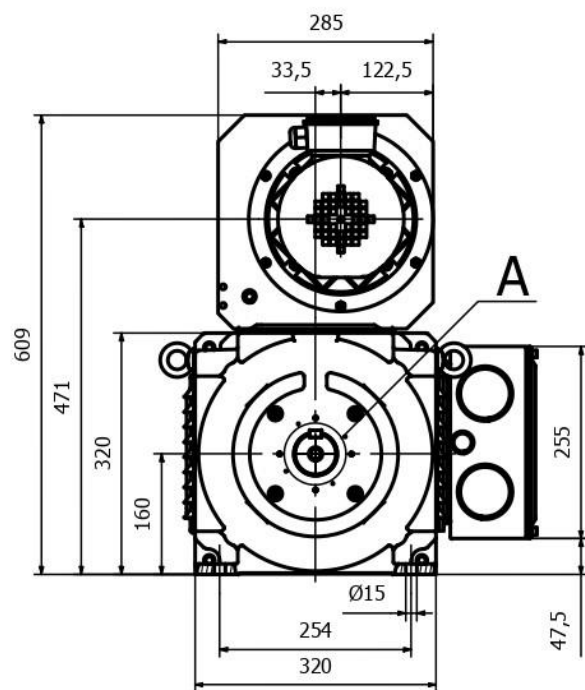
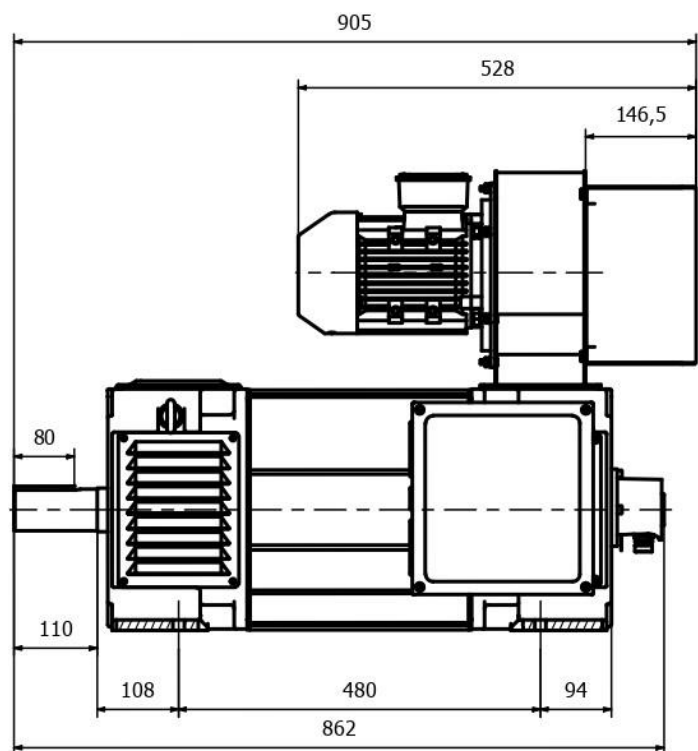
VF 355 P

n_N Rated speed	500	1000	1200	1500	1800	2000	Rpm
P_N Rated power	253	496	583	715	841	877	kW
T_N Torque at rated speed	4825	4734	4643	4552	4461	4188	Nm
I_N Current at rated power	517	904	1042	1236	1453	1516	A
n₁ Maximum speed at constant power	1000	2000	2400	2600	2700	2700	rpm
cos φ	0,85	0,86	0,86	0,87	0,87	0,87	
Efficiency	0,83	0,92	0,94	0,96	0,96	0,96	
f_N Nominal frequency	16,9	33,6	40,2	50,3	60,3	66,9	Hz

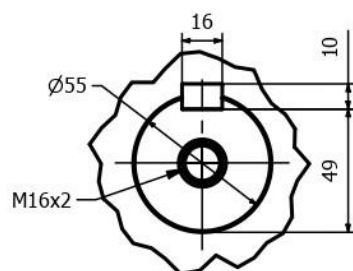
6. Mechanical dimensions

6.1 Mechanical dimensions IP23

6.1.1 Motor dimensions VF 160 S IP23



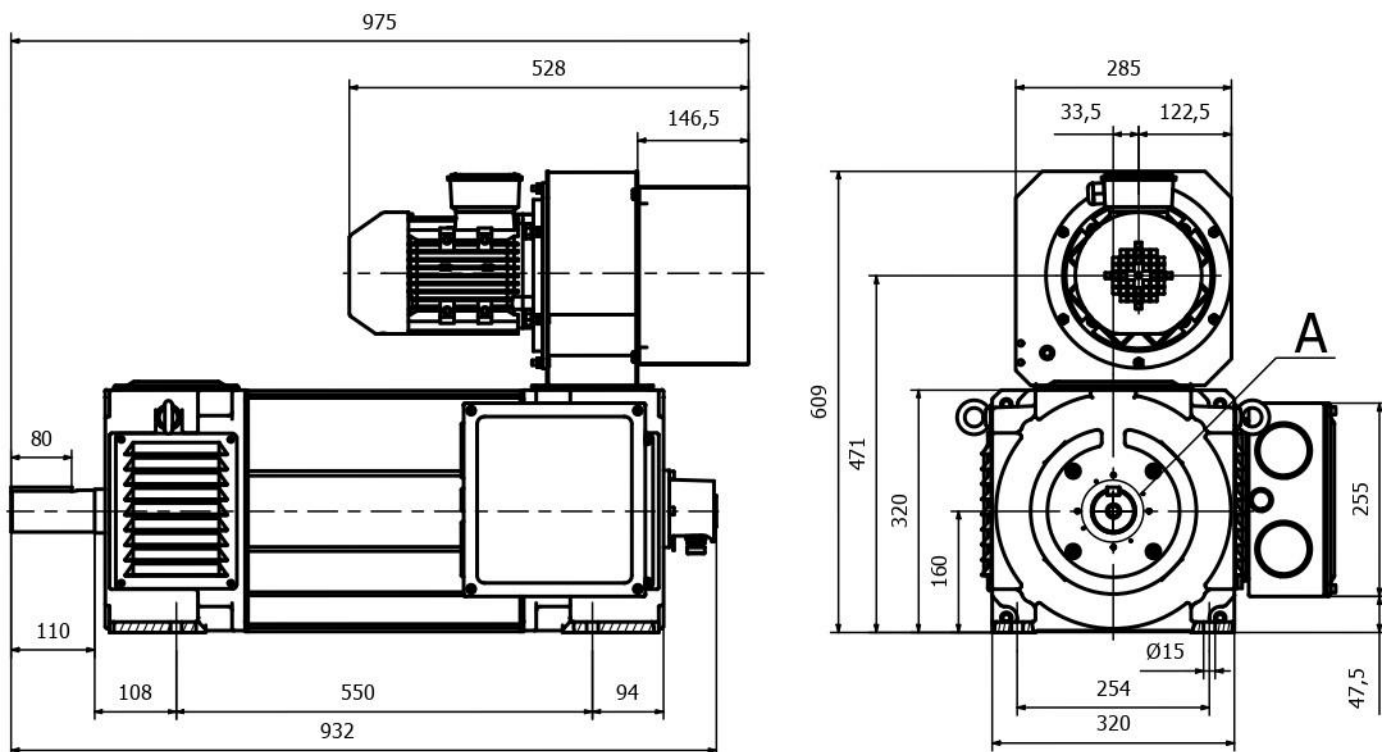
DETAIL A



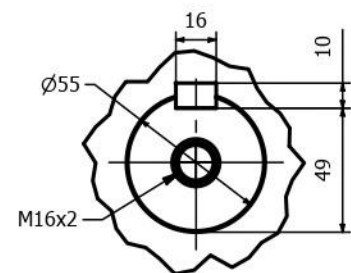
IC: 06
IP: 23
IM: 1001
Dwg: CDH/257



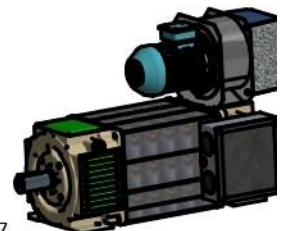
6.1.2 Motor dimensions VF 160 M IP23



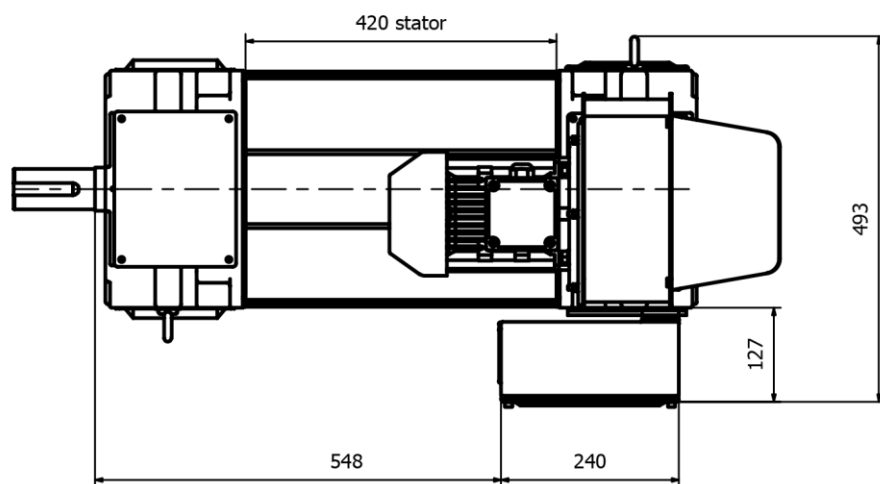
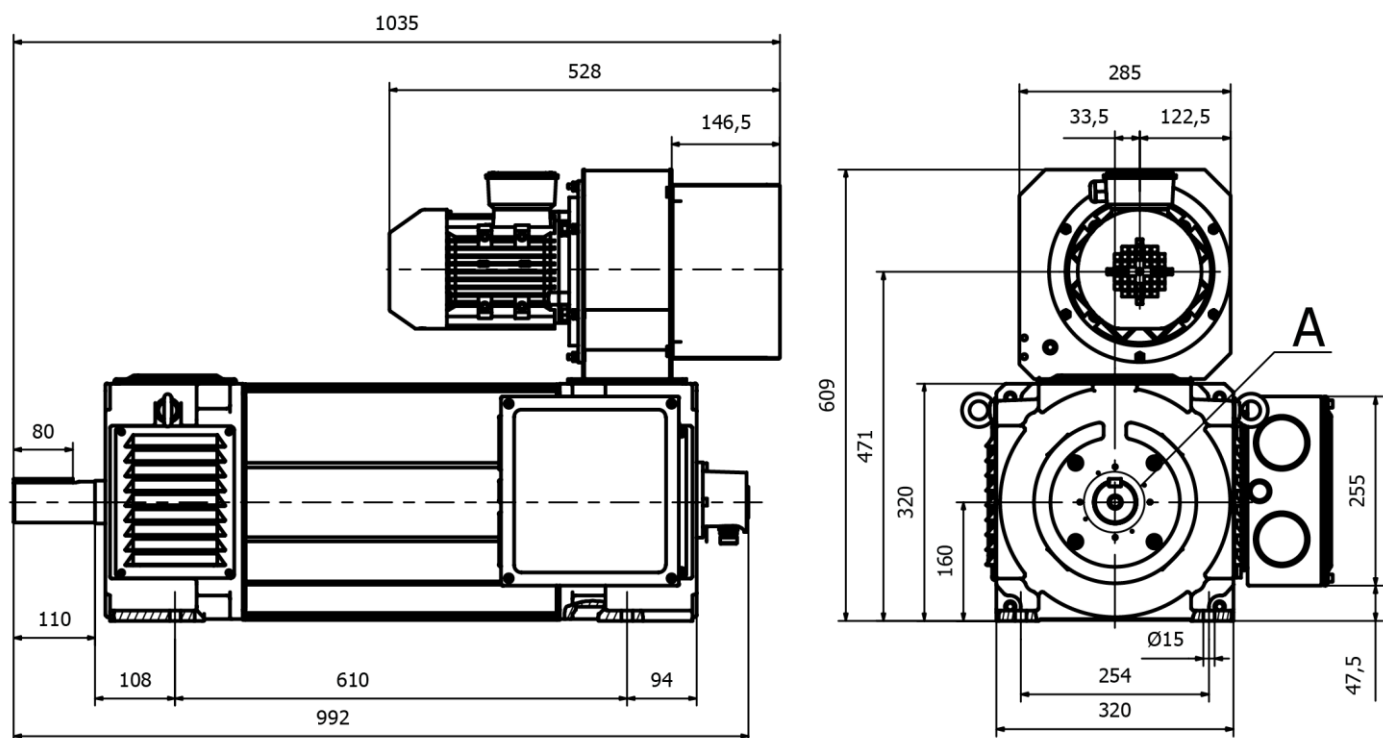
DETAIL A



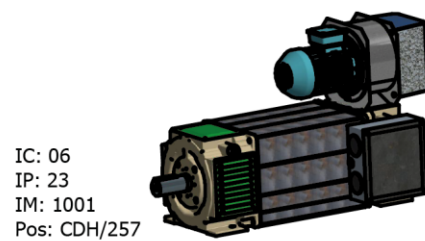
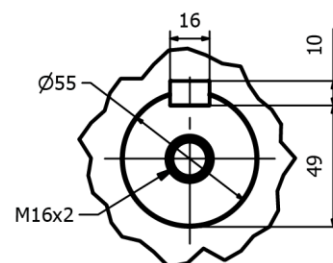
IC: 06
IP: 23
IM: 1001
Pos: CDH/257



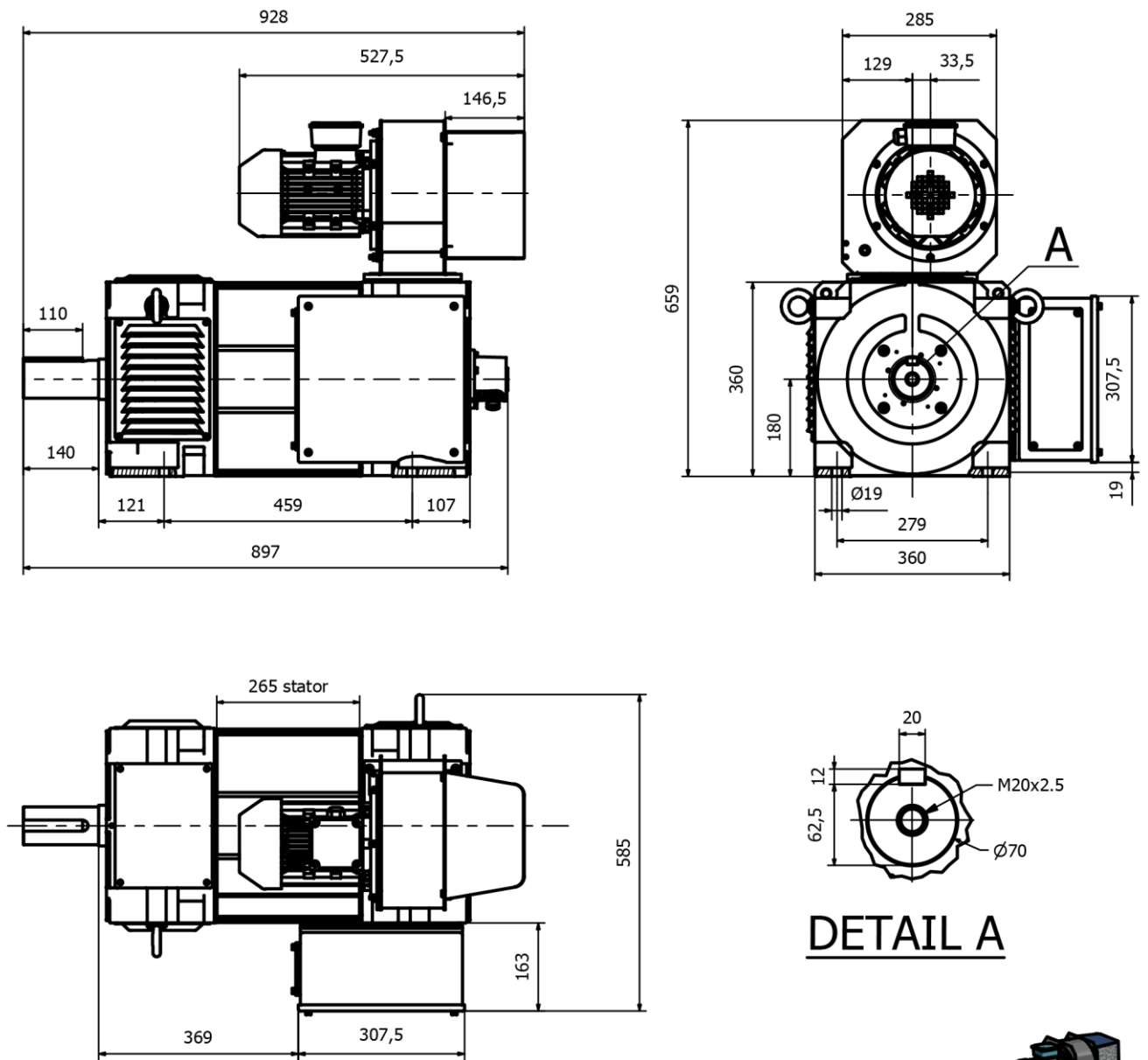
6.1.3 Motor dimensions VF 160 L IP23



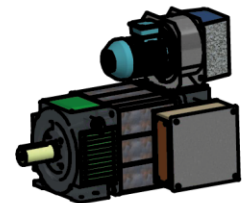
DETAIL A



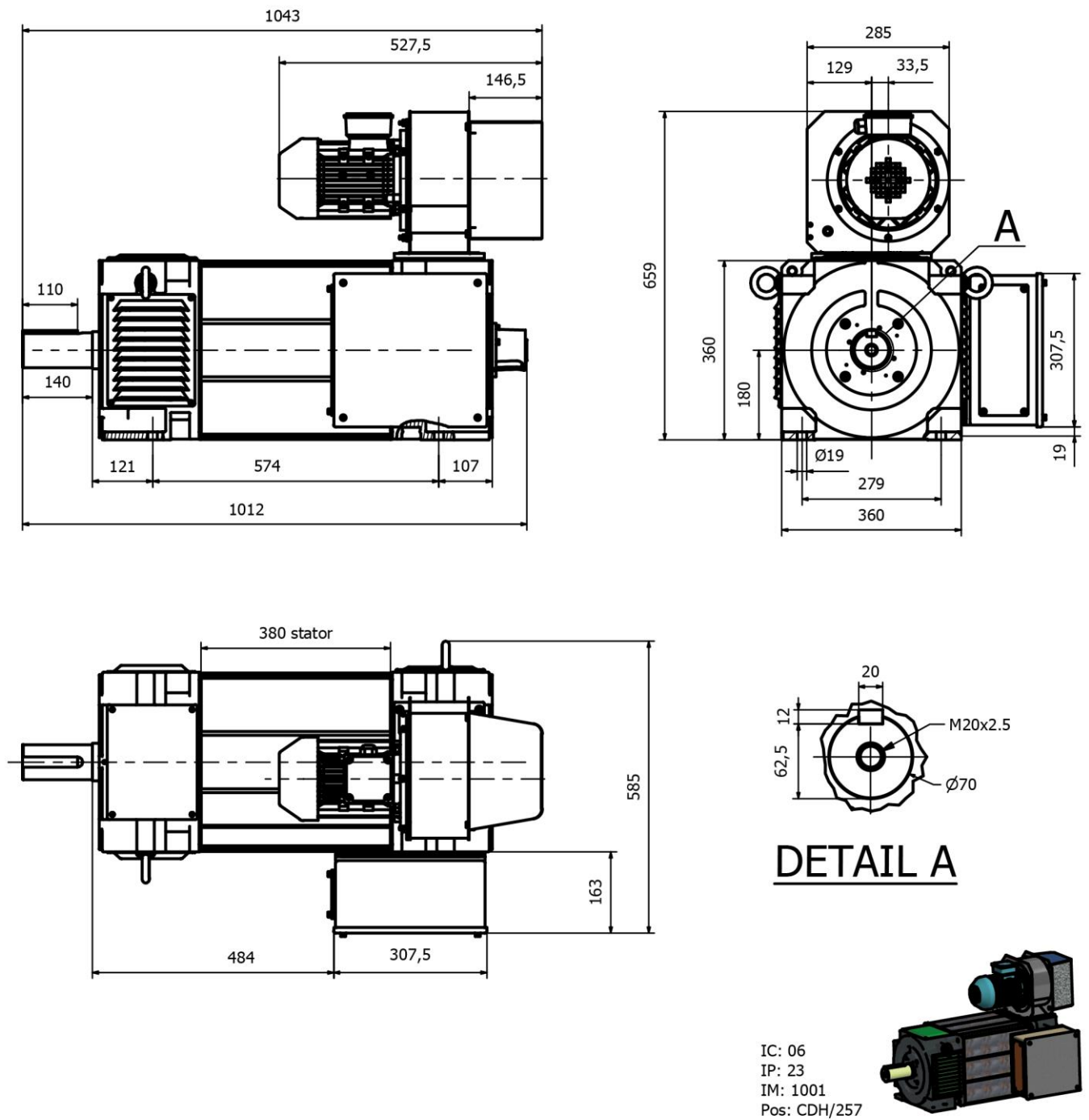
6.1.4 Motor dimensions VF 180 S IP23



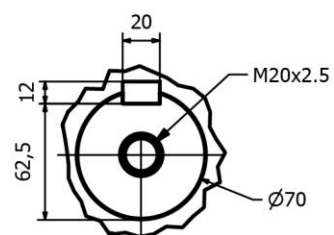
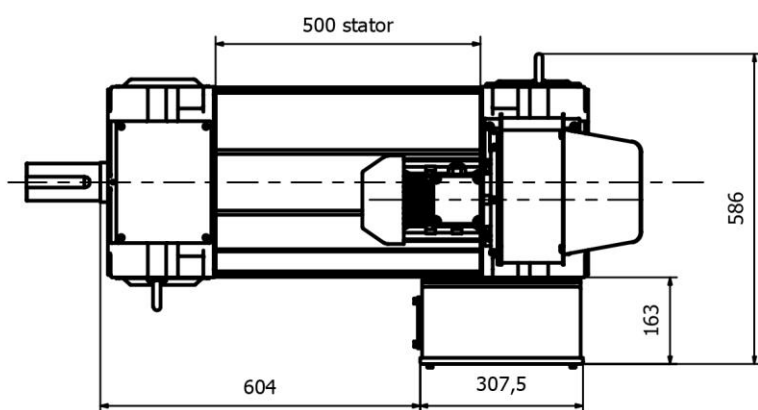
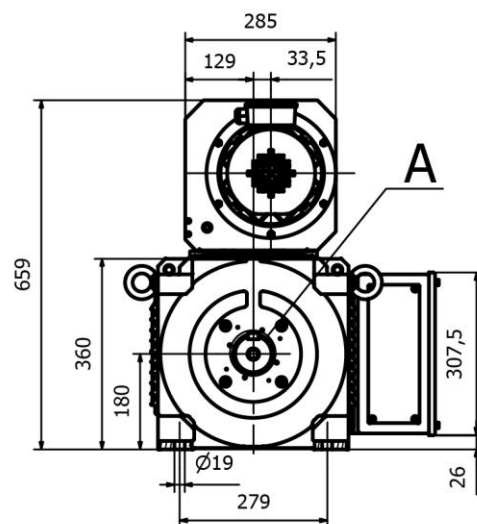
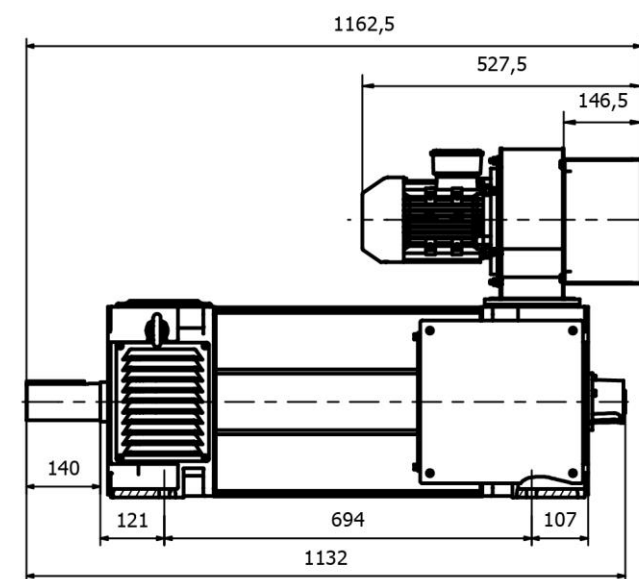
IC: 06
IP: 23
IM: 1001
Pos: CDH/257



6.1.5 Motor dimensions VF 180 M IP23



6.1.6 Motor dimensions VF 180 L IP23

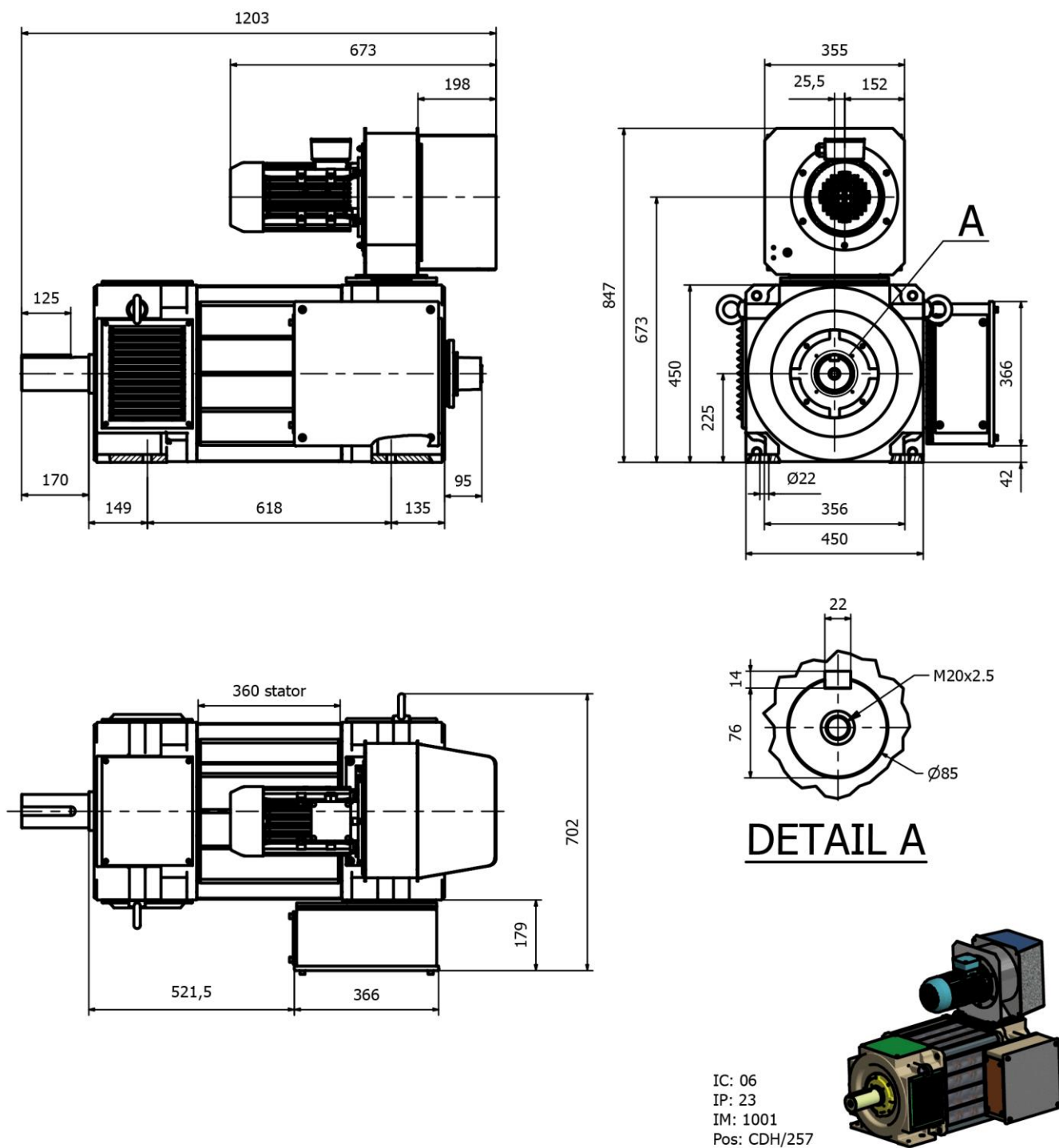


DETAIL A

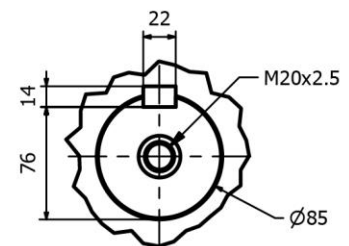
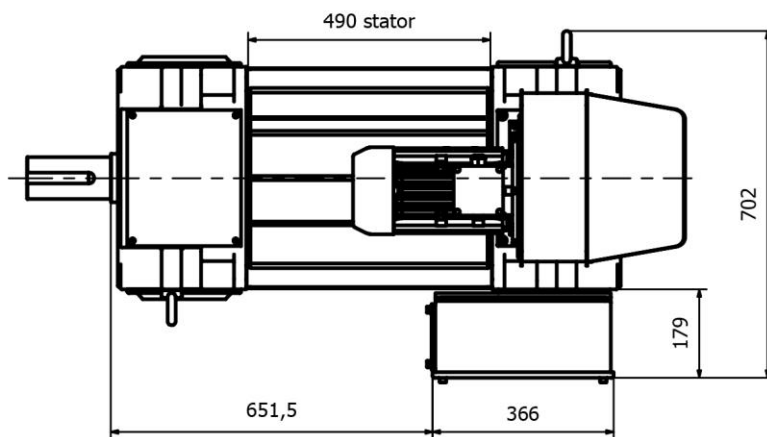
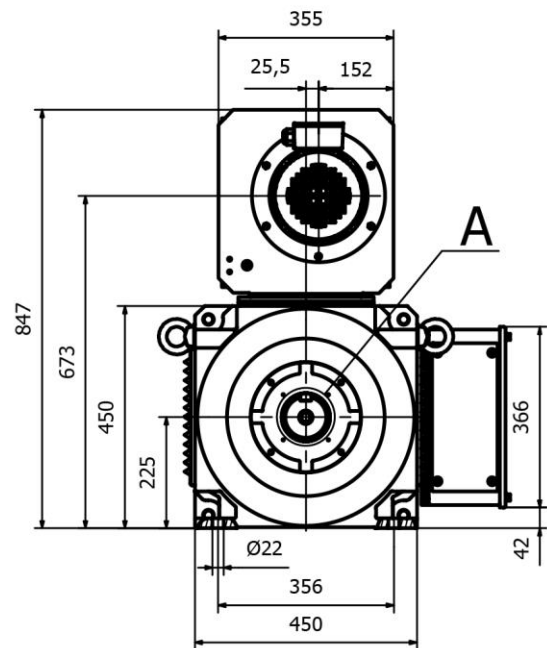
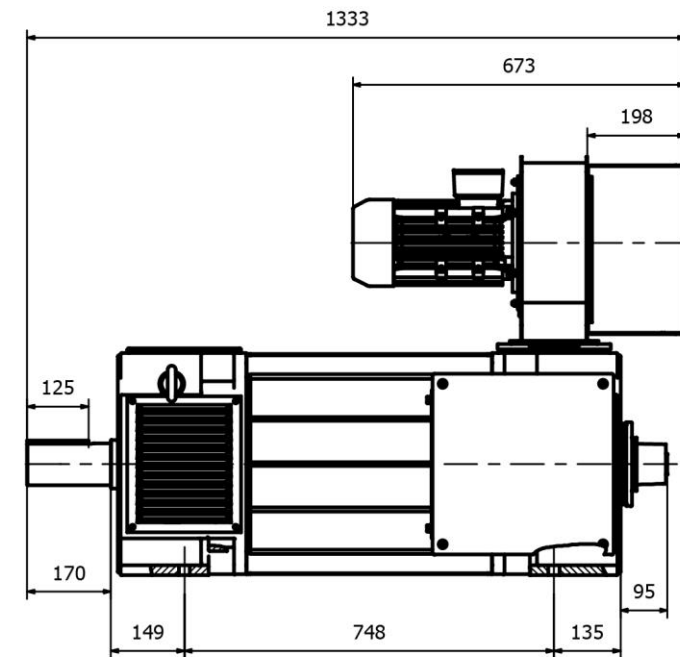


IC: 06
IP: 23
IM: 1001
Pos: CDH/257

6.1.7 Motor dimensions VF 225 S IP23

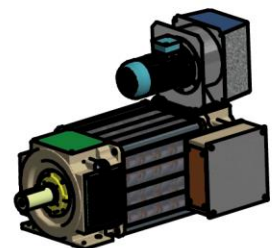


6.1.8 Motor dimensions VF 225 M IP23

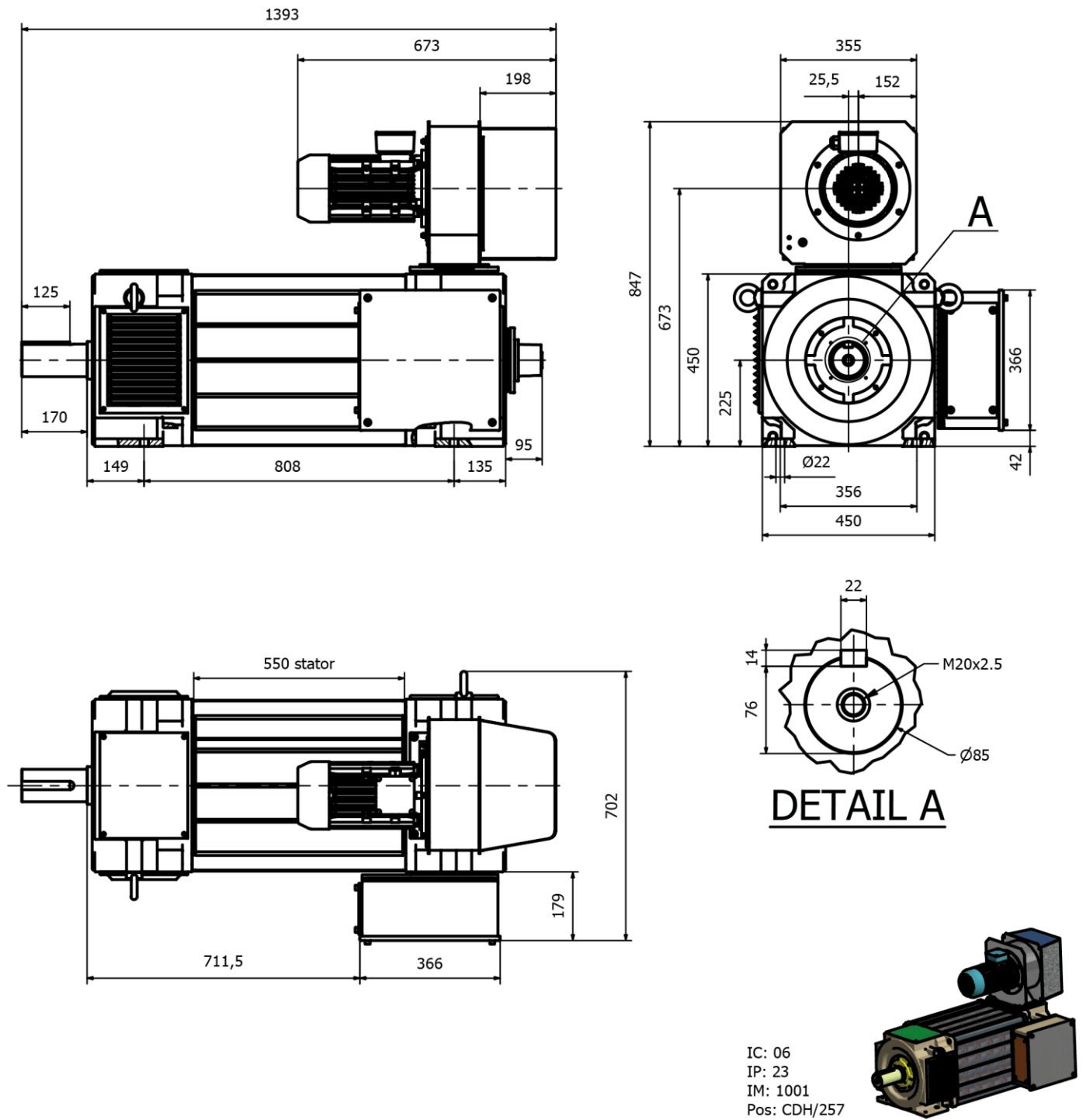


DETAIL A

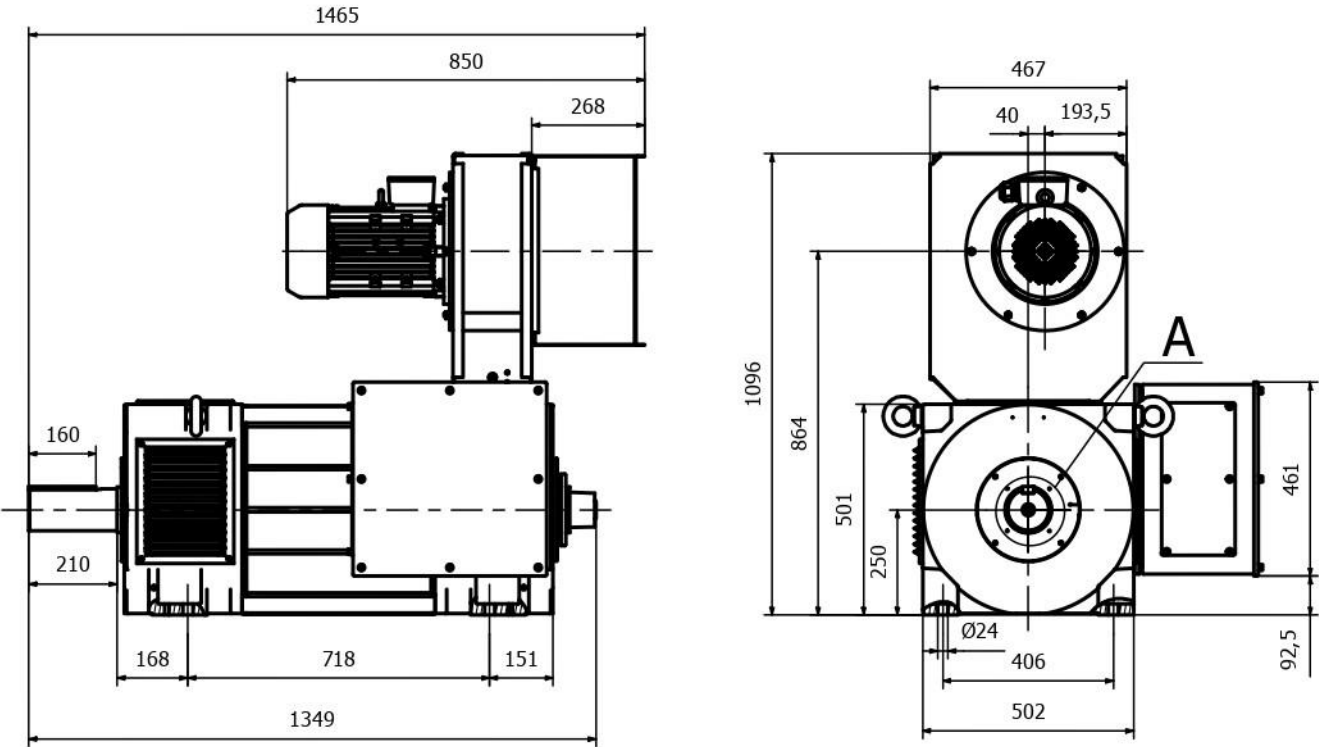
IC: 06
IP: 23
IM: 1001
Pos: CDH/257



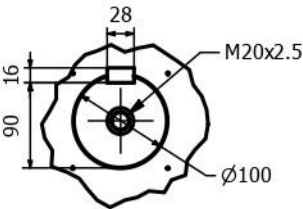
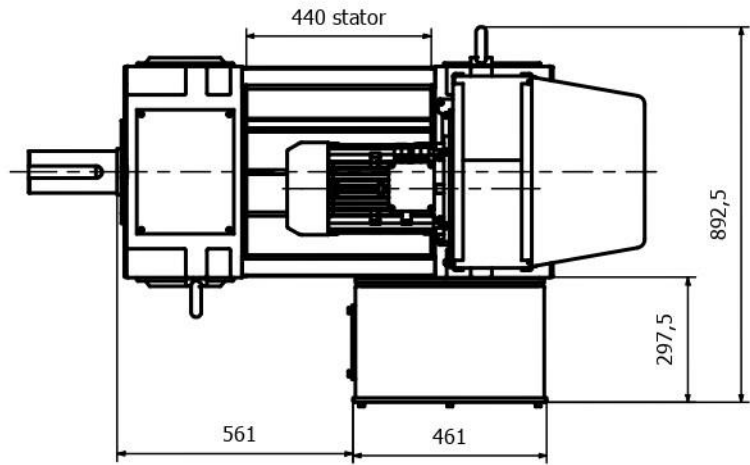
6.1.9 Motor dimensions VF 225 L IP23



6.1.10 Motor dimensions VF 250 S IP23



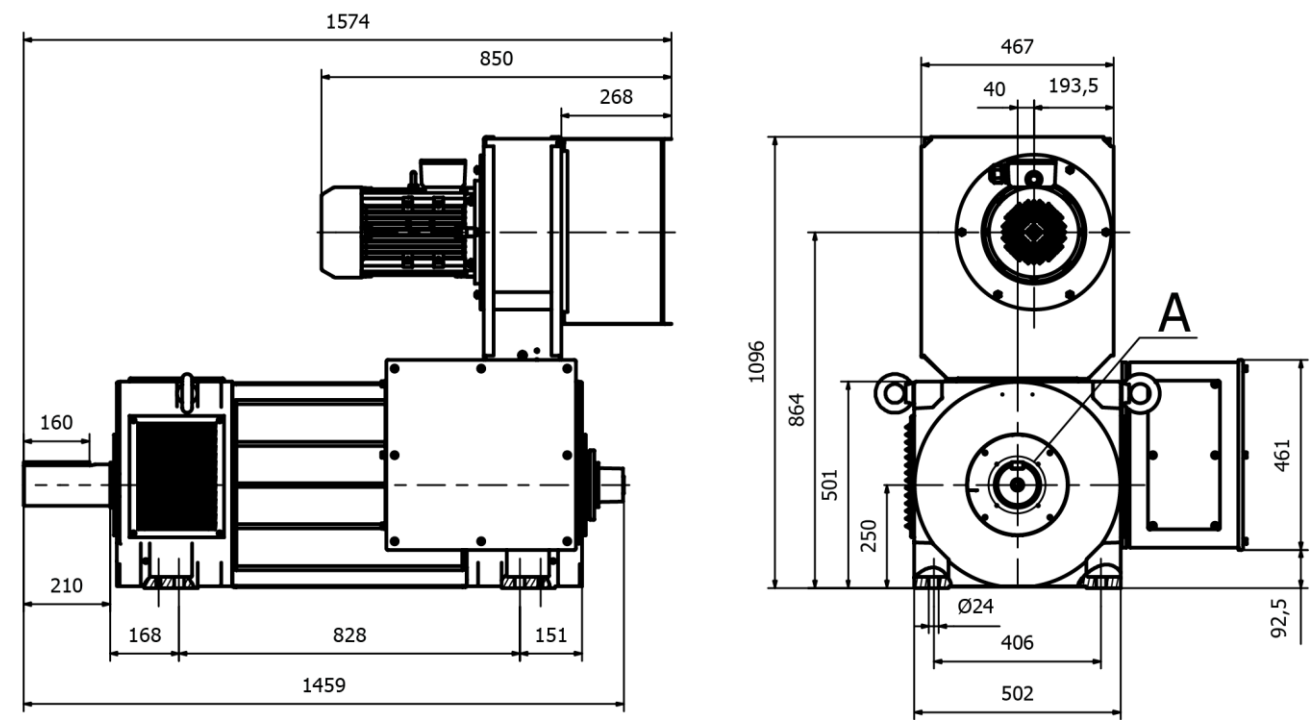
DETAIL A



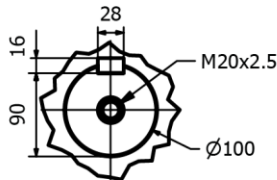
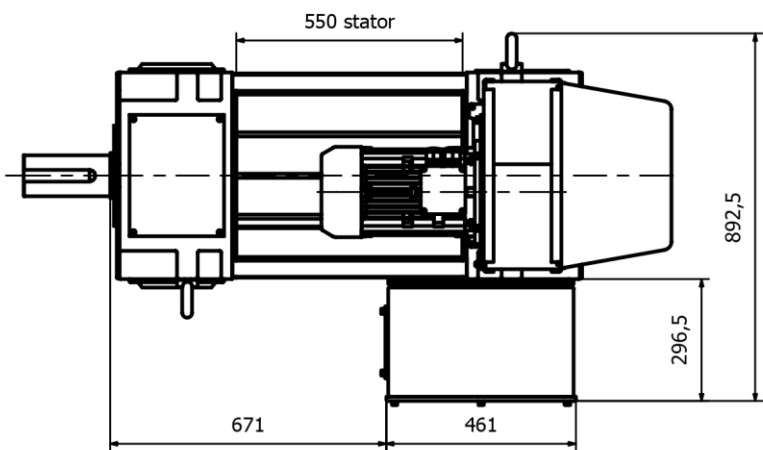
IC: 06
IP: 23
IM: 1001
Pos: CDH/257



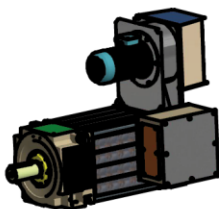
6.1.11 Motor dimensions VF 250 M IP23



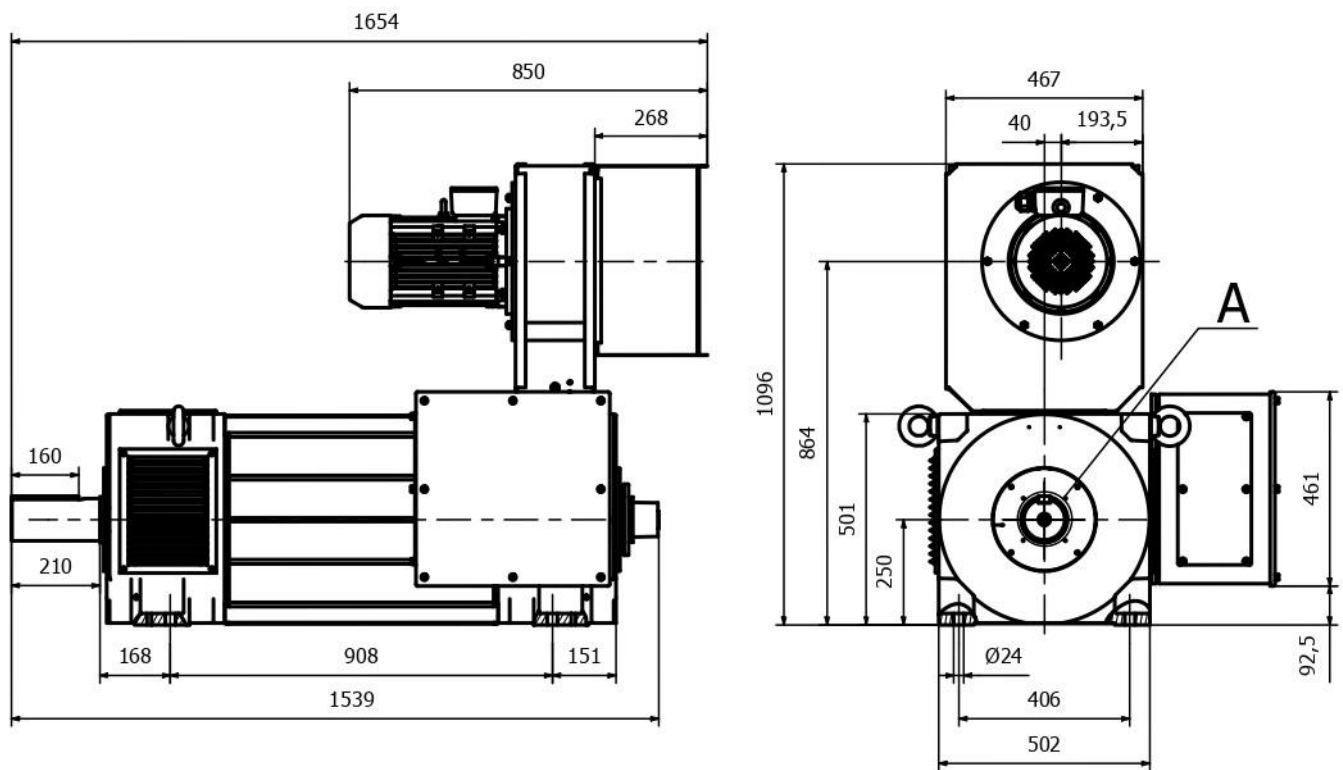
DETAIL A



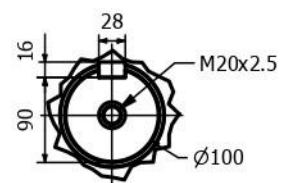
IC: 06
IP: 23
IM: 1001
Pos: CDH/257



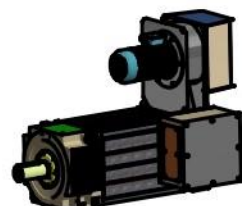
6.1.12 Motor dimensions VF 250 L IP23



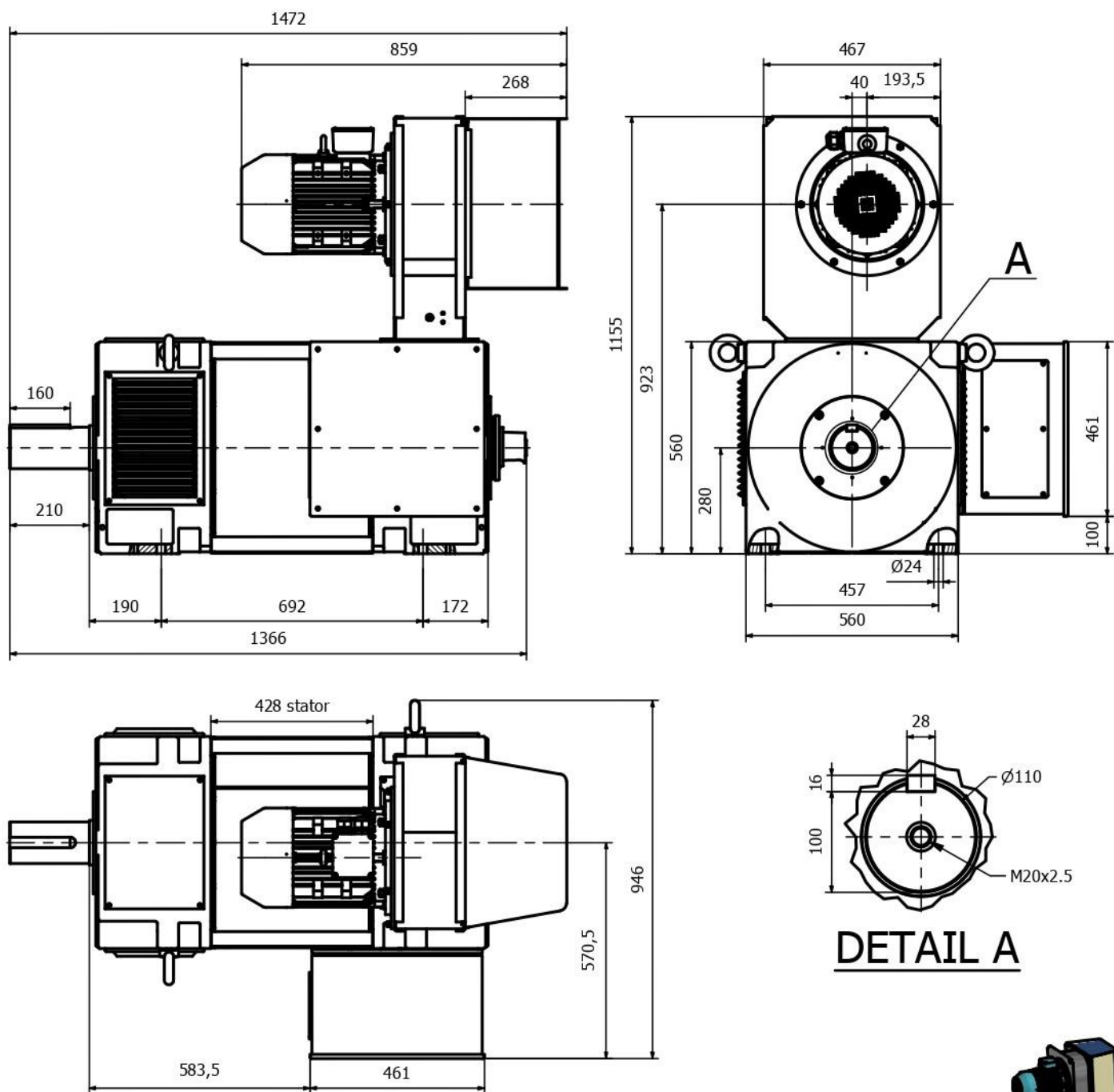
DETAIL A



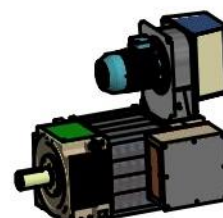
IC: 06
IP: 23
IM: 1001
Pos: CDH/257



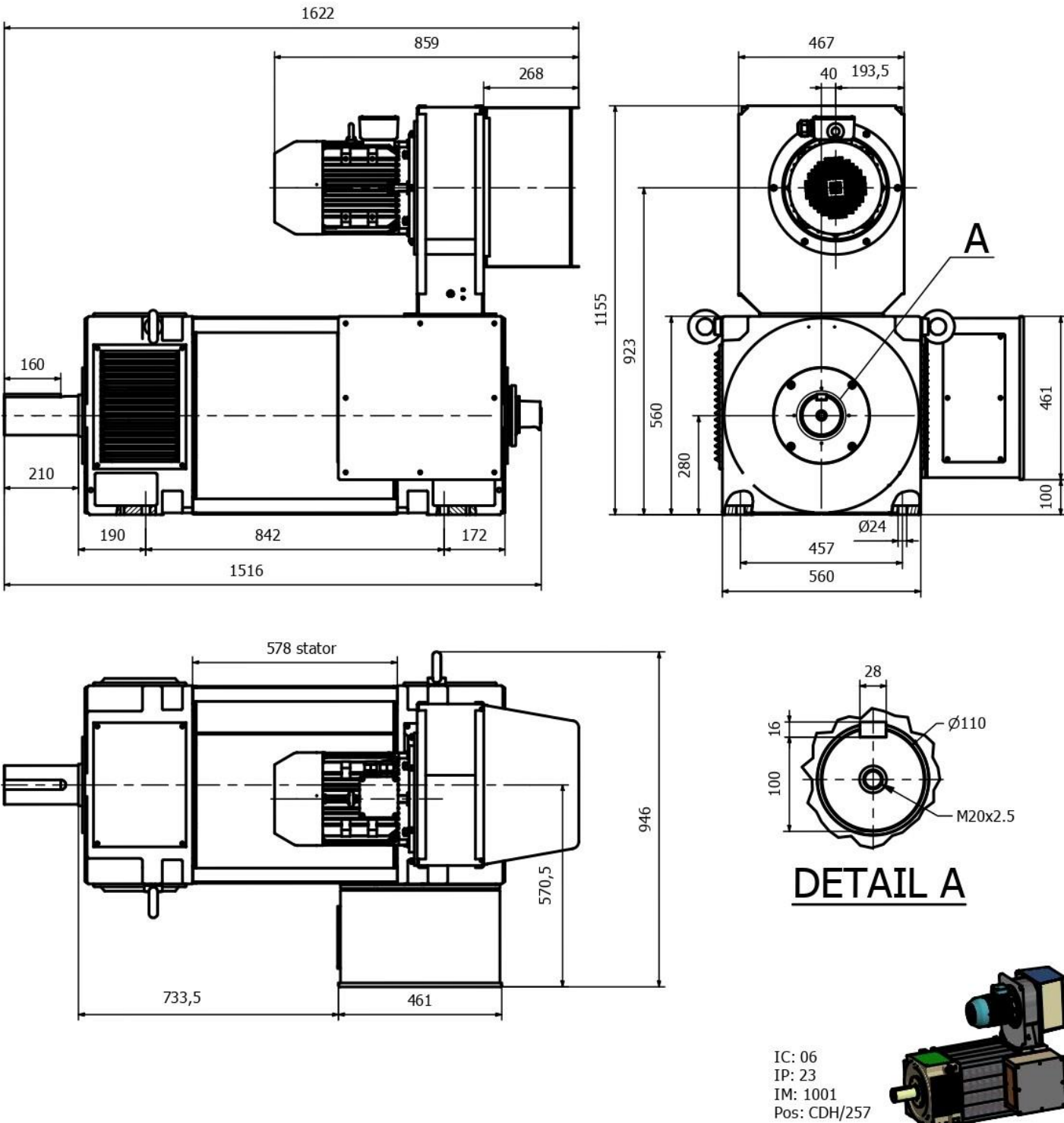
6.1.13 Motor dimensions VF 280 S IP23



IC: 06
IP: 23
IM: 1001
Pos: CDH/257

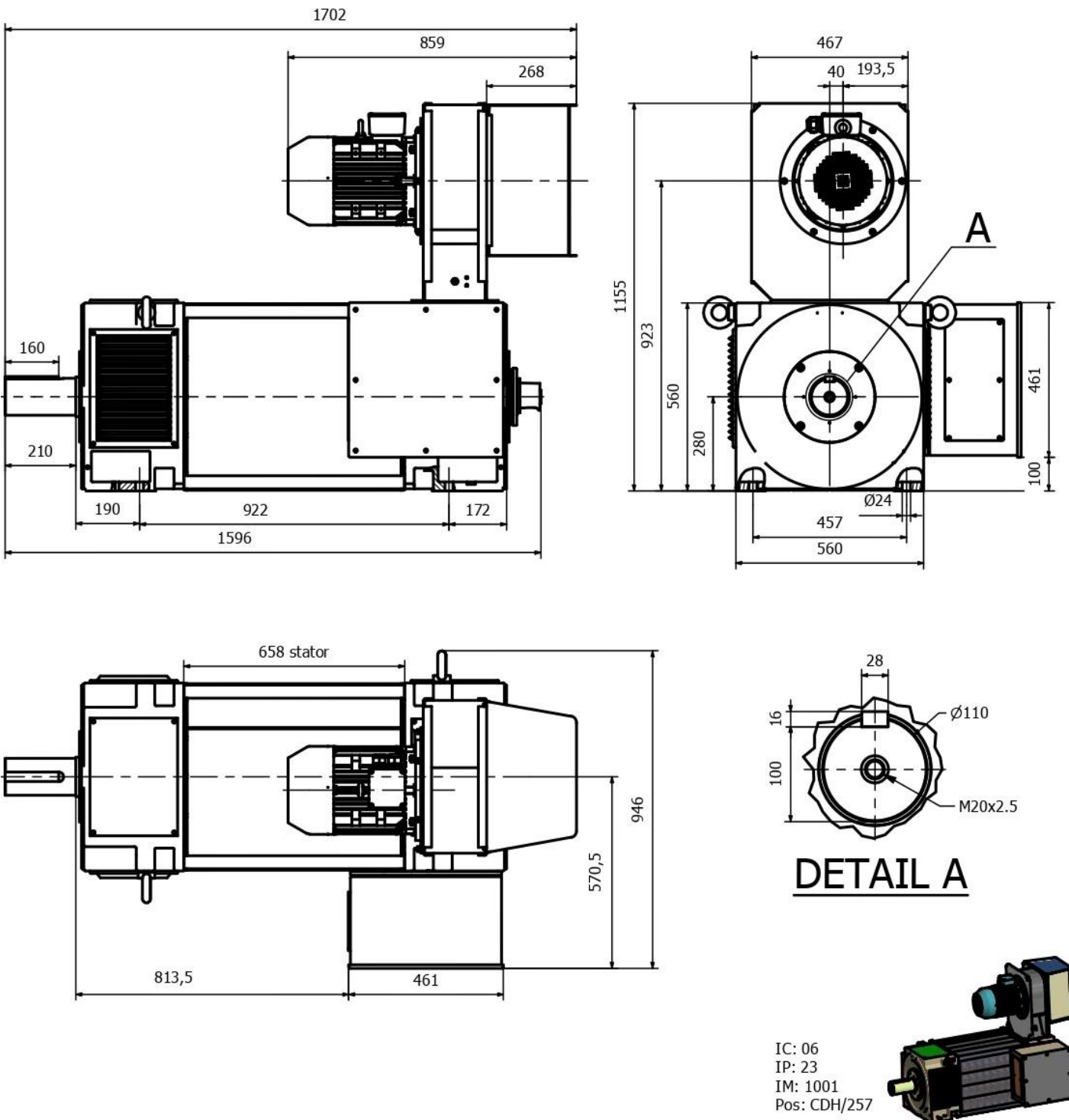


6.1.14 Motor dimensions VF 280 M IP23

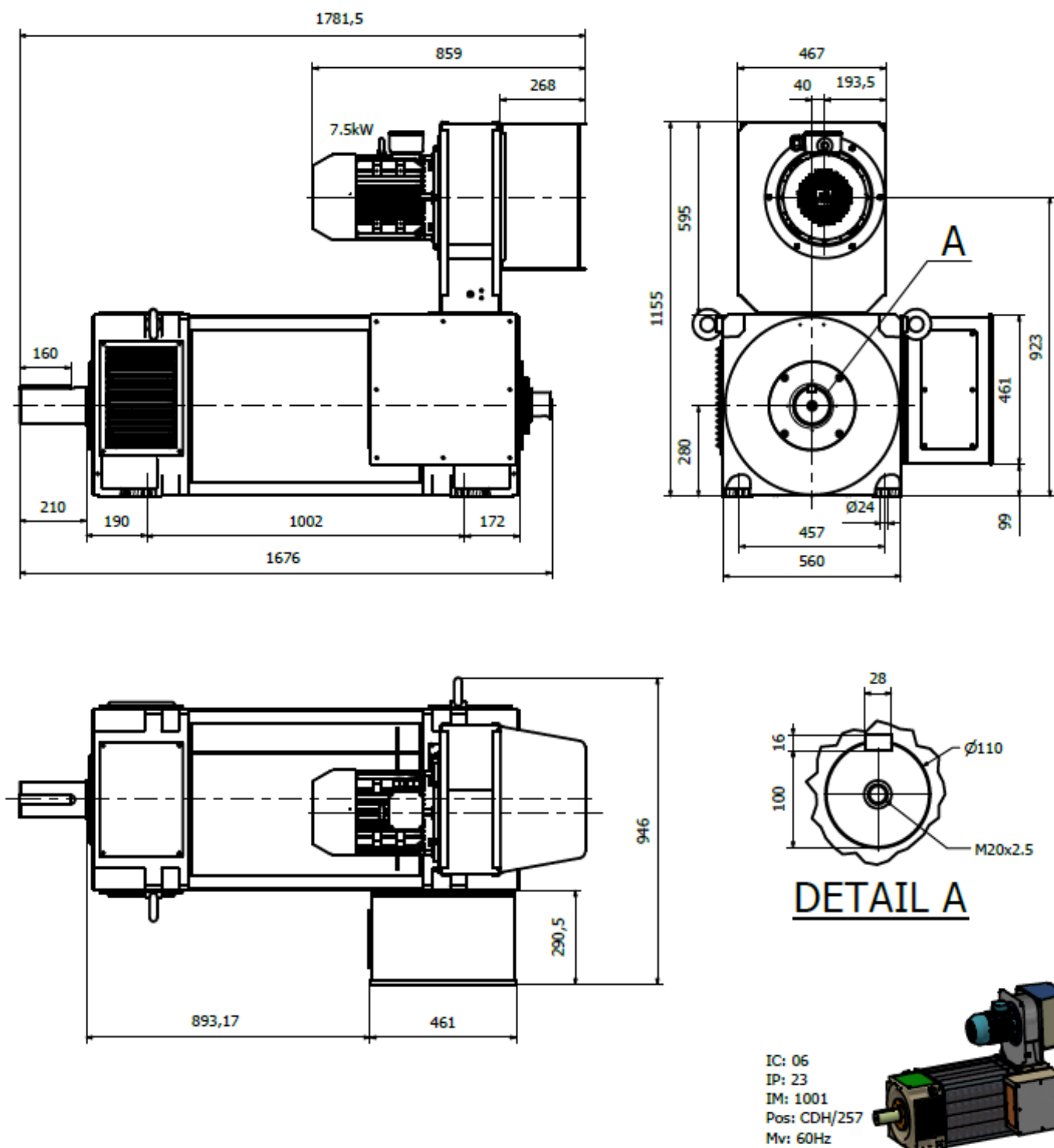


DETAIL A

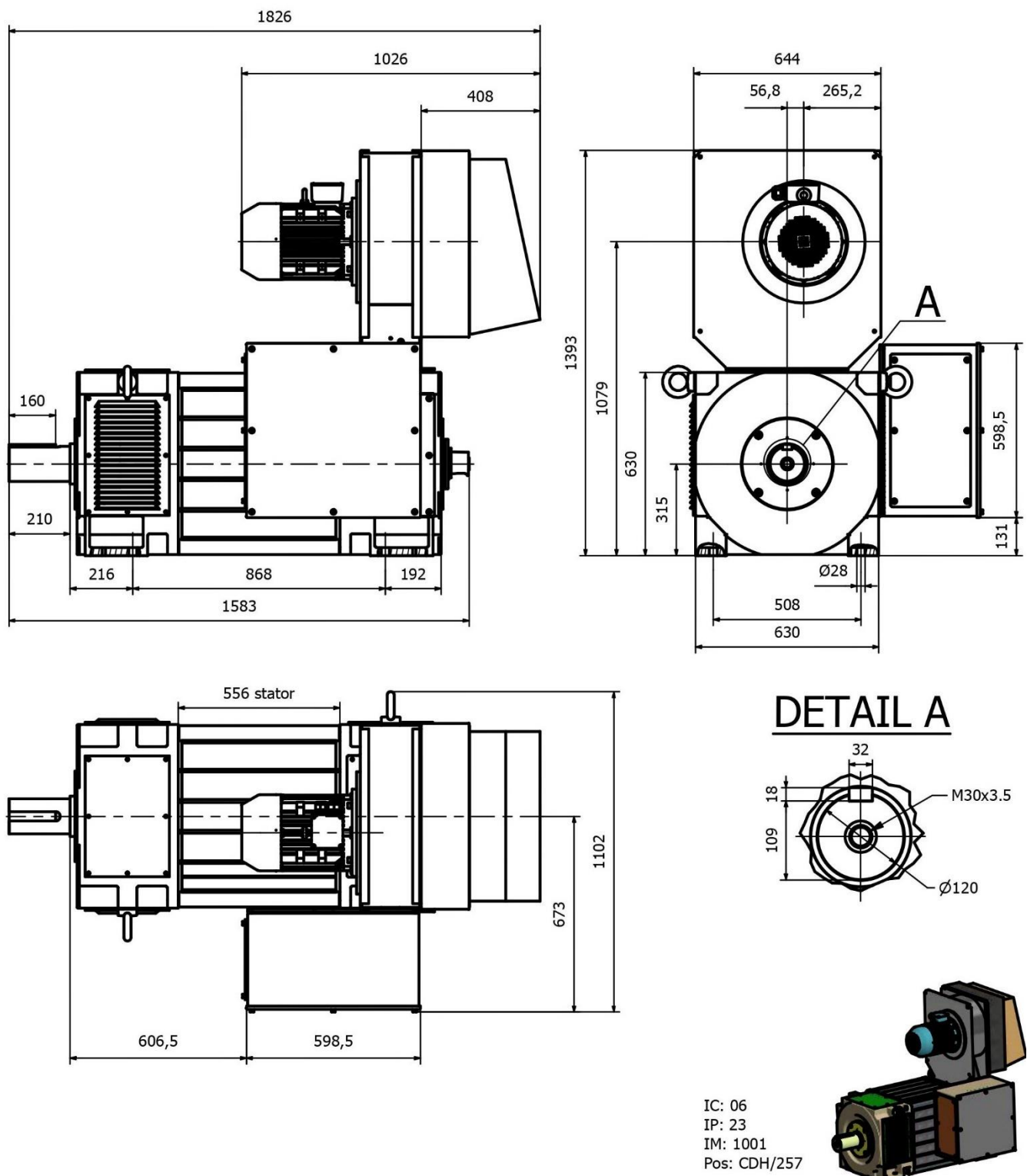
6.1.15 Motor dimensions VF 280 L IP23



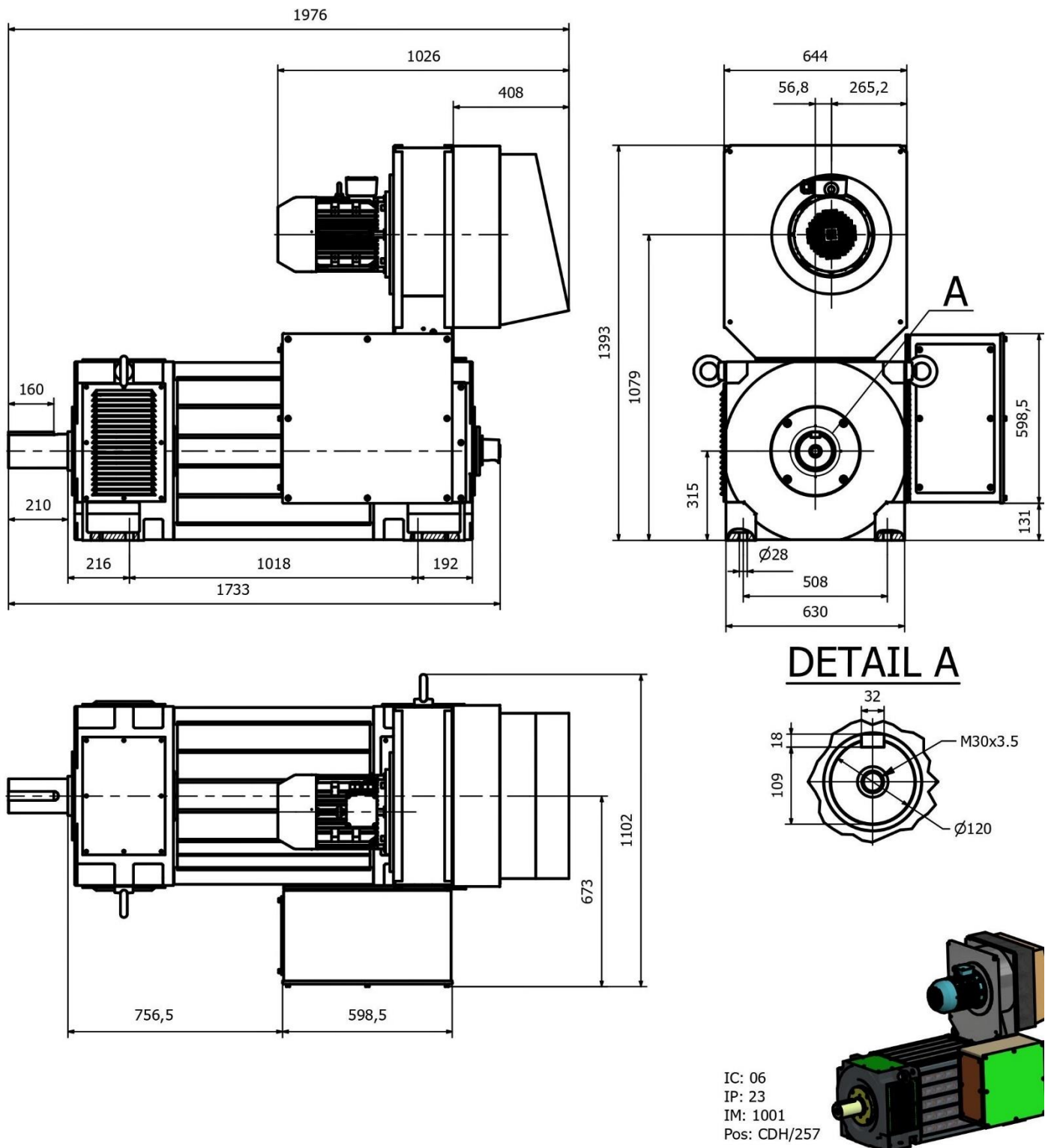
6.1.16 Motor dimensions VF 280 P IP23



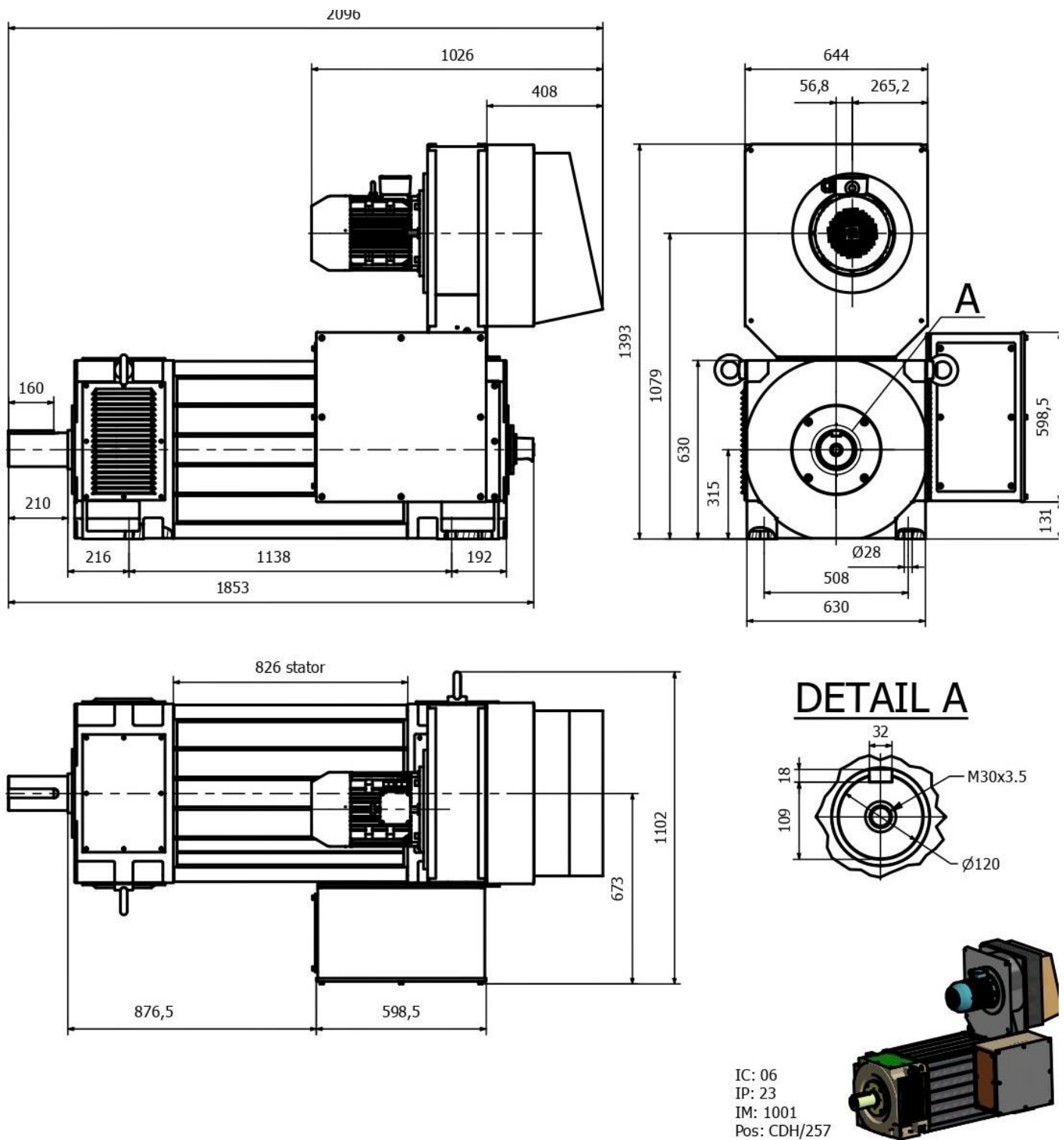
6.1.17 Motor dimensions VF 315 S IP23



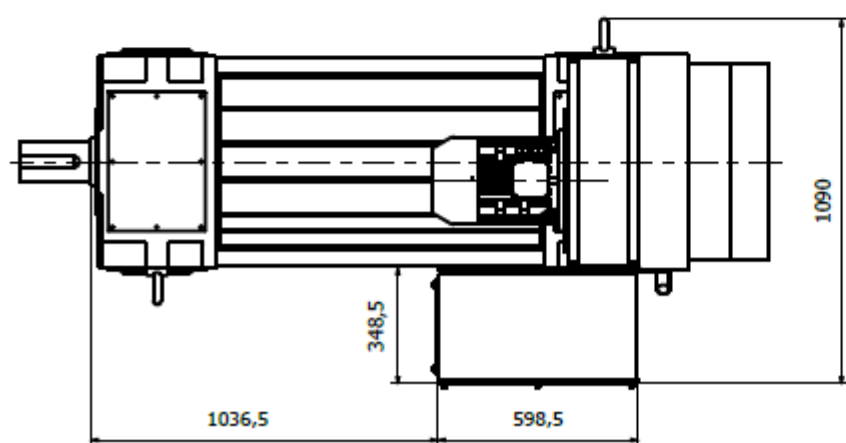
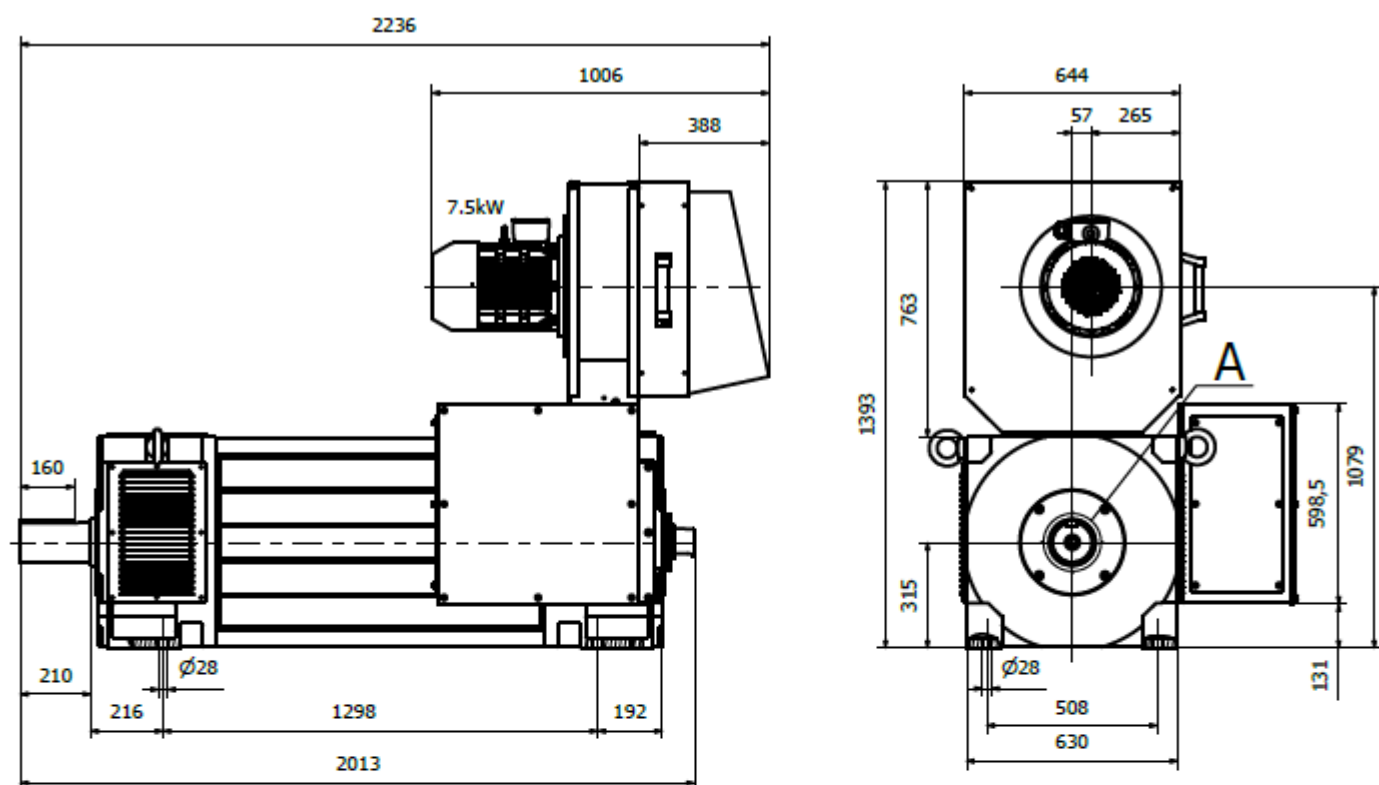
6.1.18 Motor dimensions VF 315 M IP23



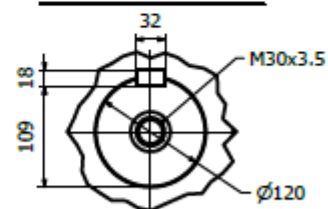
6.1.19 Motor dimensions VF 315 L IP23



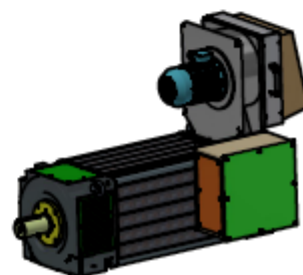
6.1.20 Motor dimensions VF 315 P IP23



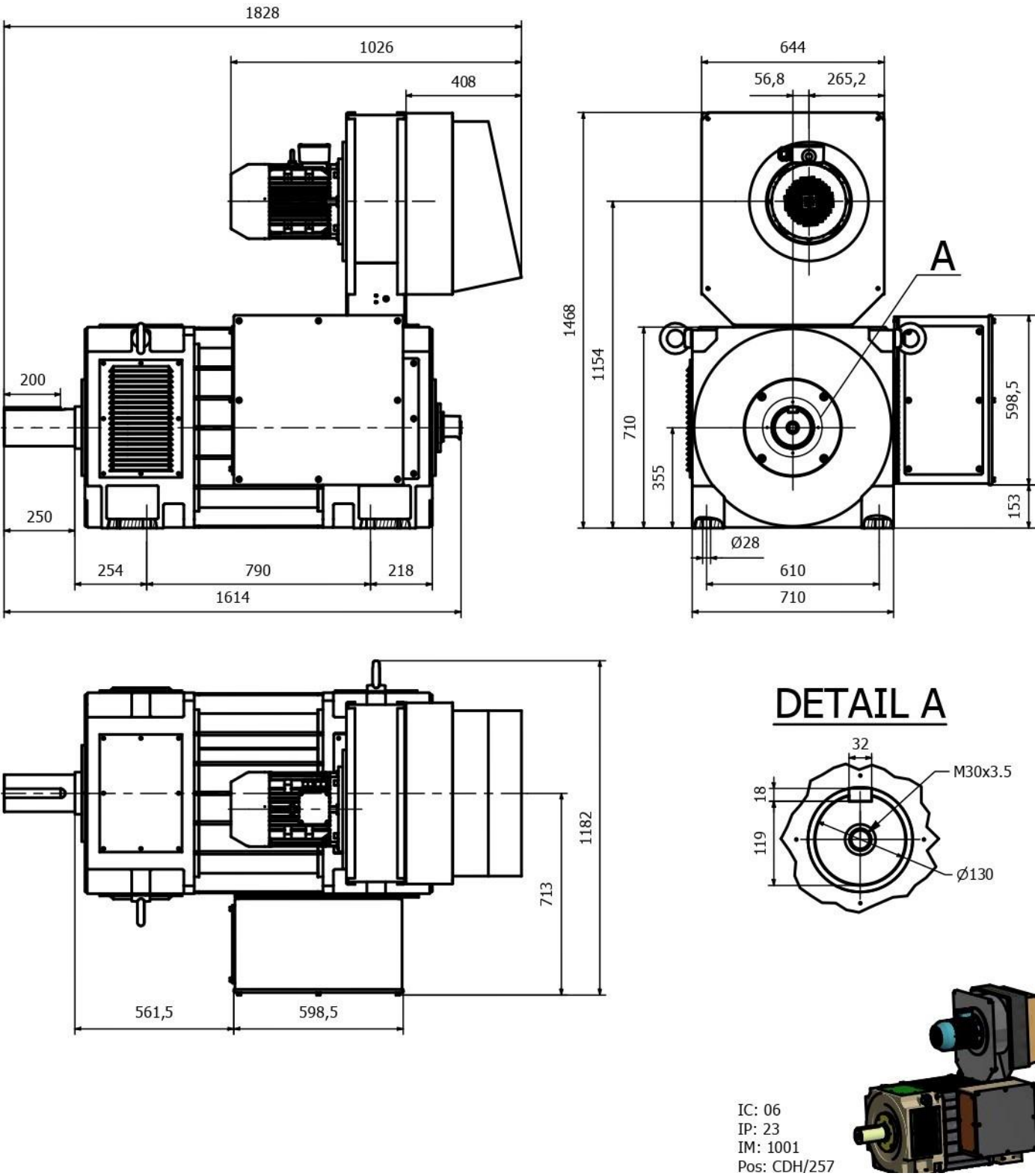
DETAIL A



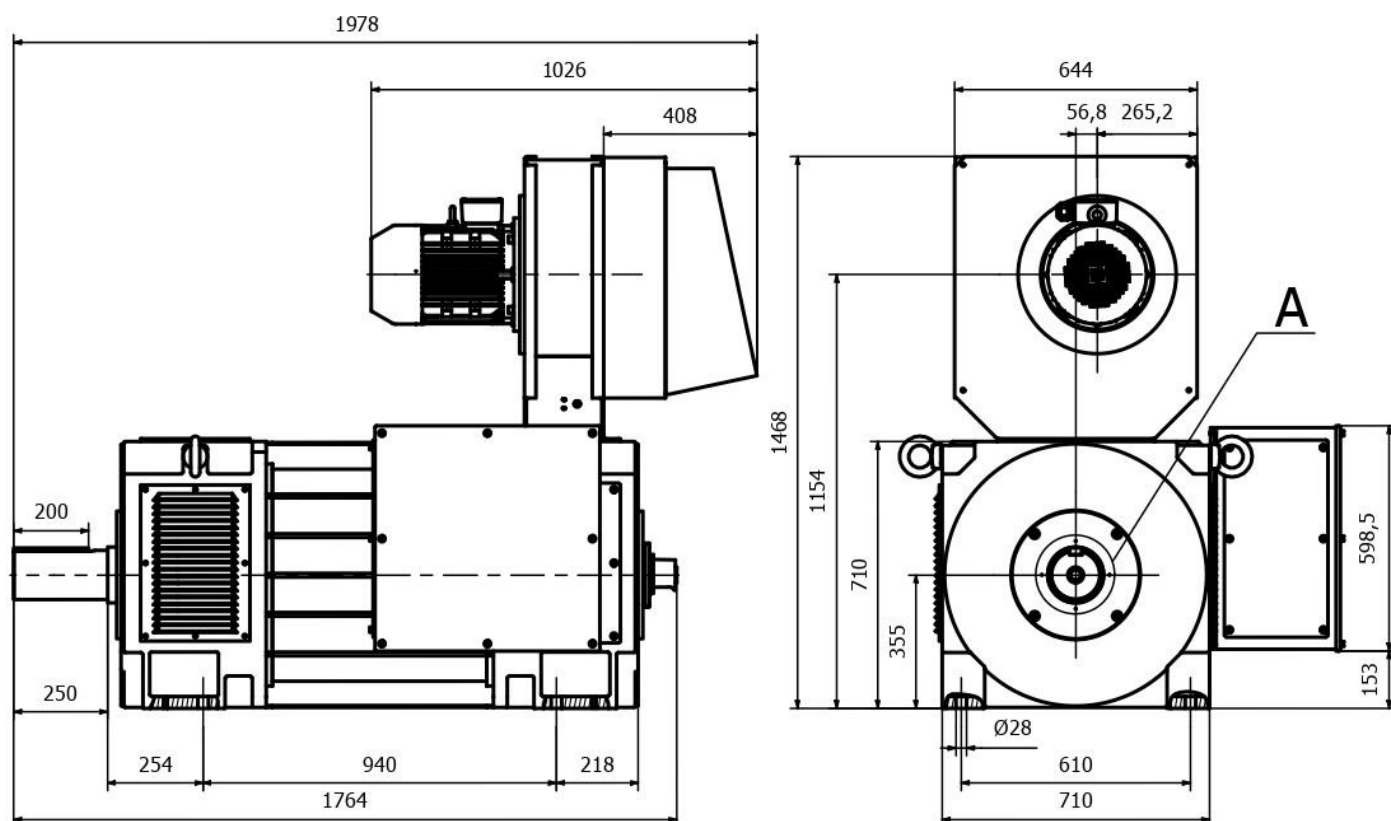
IC: 06
IP: 23
IM: 1001
Pos: CDH/257
MV: 60Hz



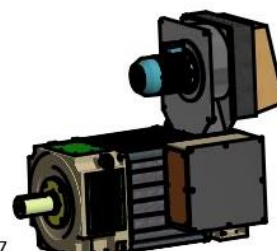
6.1.21 Motor dimensions VF 355 S IP23



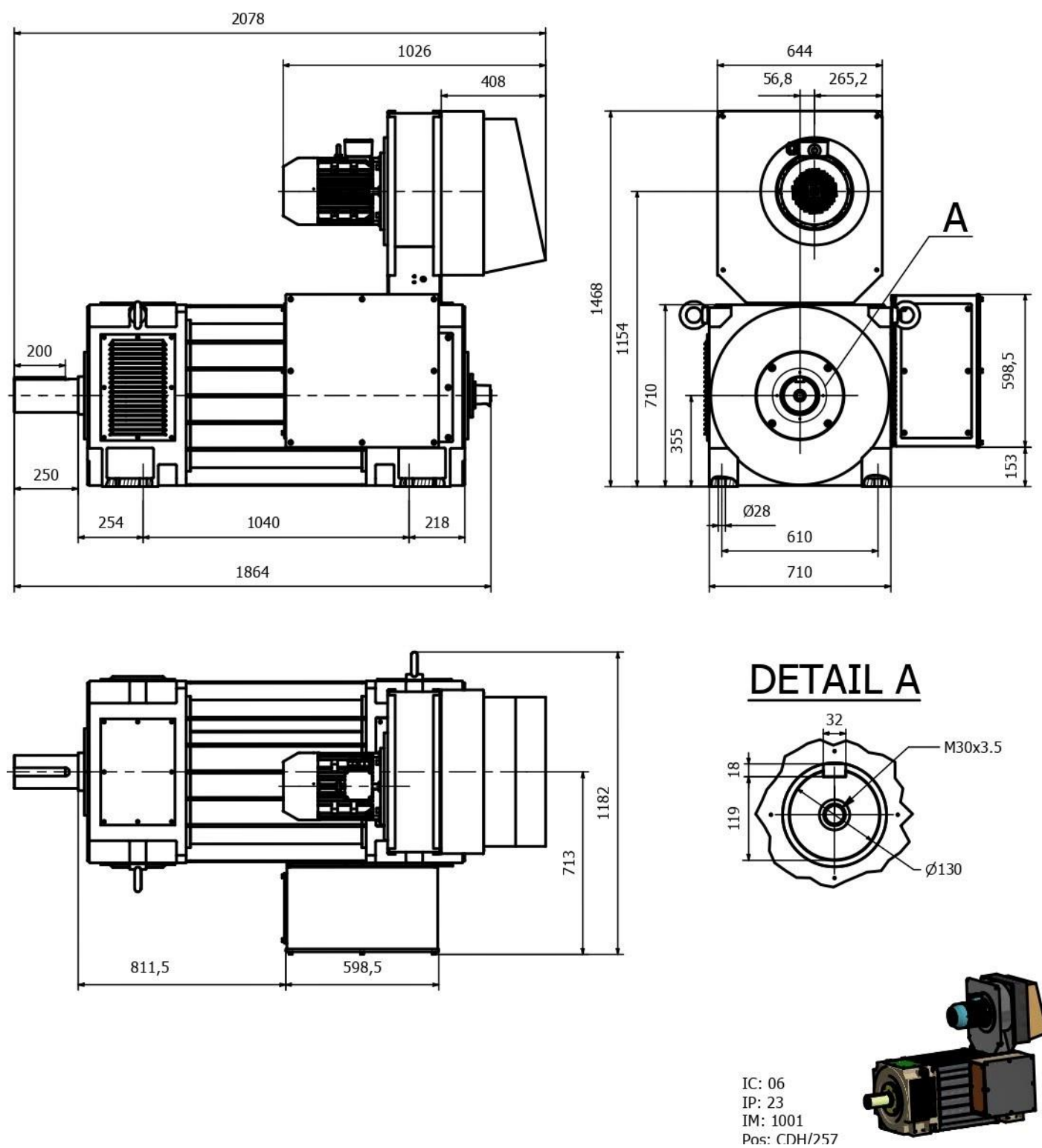
6.1.22 Motor dimensions VF 355 M IP23



IC: 06
IP: 23
IM: 1001
Pos: CDH/257



6.1.23 Motor dimensions VF 355 L IP23



Technical drawing of the DH 1001 motor, showing three views and a detail view.

Front View Dimensions:

- Total width: 2308
- Total height: 2094
- Motor body width: 1270
- Motor body height: 254
- Motor body depth: 218
- Motor body width (excluding mounting flange): 1026
- Motor body height (excluding mounting flange): 408

Top View Dimensions:

- Total width: 2094
- Total height: 1182
- Motor body width: 1270
- Motor body height: 254
- Motor body depth: 218
- Motor body width (excluding mounting flange): 1026
- Motor body height (excluding mounting flange): 408

Side View Dimensions:

- Total width: 1041,5
- Total height: 598,5
- Motor body width: 1270
- Motor body height: 254
- Motor body depth: 218
- Motor body width (excluding mounting flange): 1026
- Motor body height (excluding mounting flange): 408

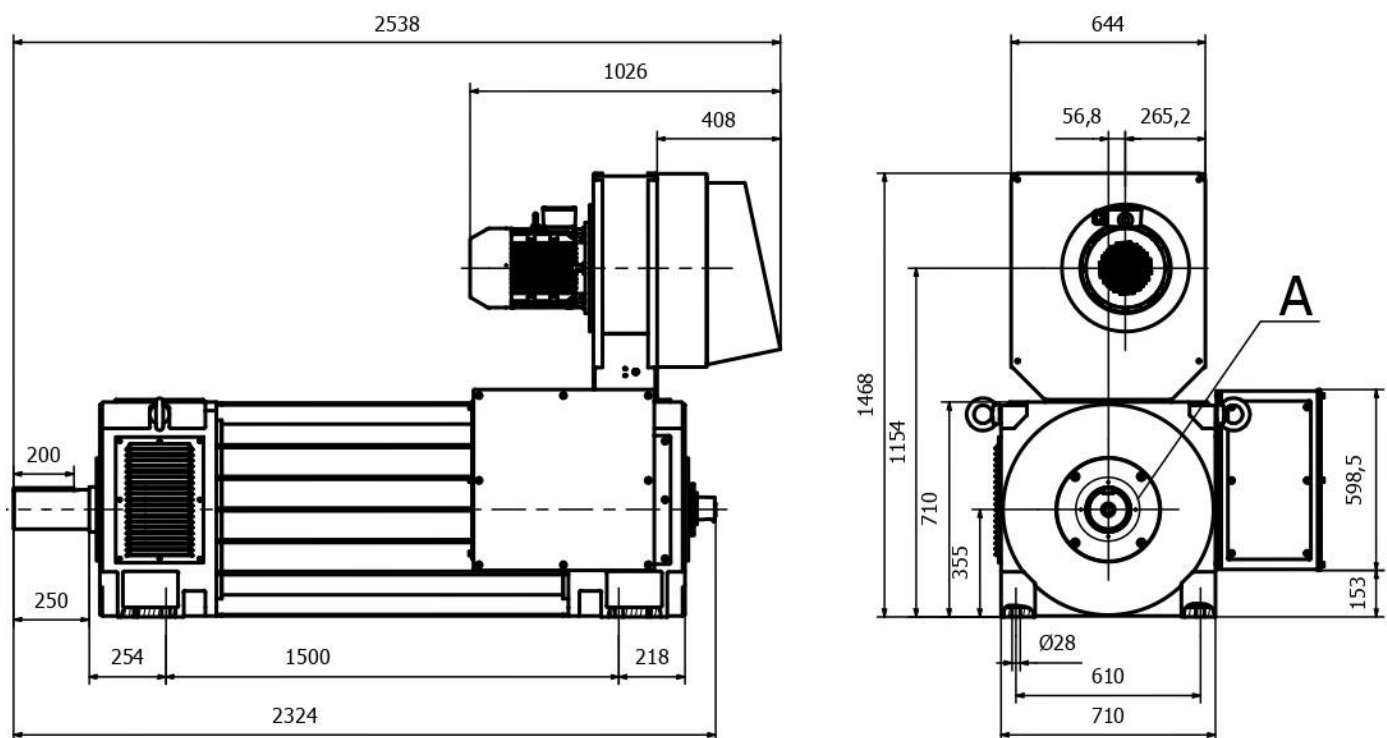
Detail View A Dimensions:

- Outer diameter: $\varnothing 130$
- Inner diameter: $\varnothing 119$
- Central hole diameter: 32
- Mounting holes: M30x3.5

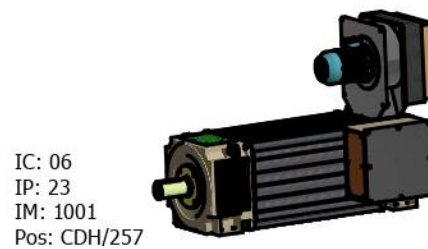
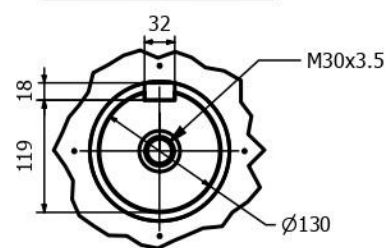
Motor Specifications:

- IC: 06
- IP: 23
- IM: 1001
- Pos: CDH/257

6.1.25 Motor dimensions VF 355 X IP23



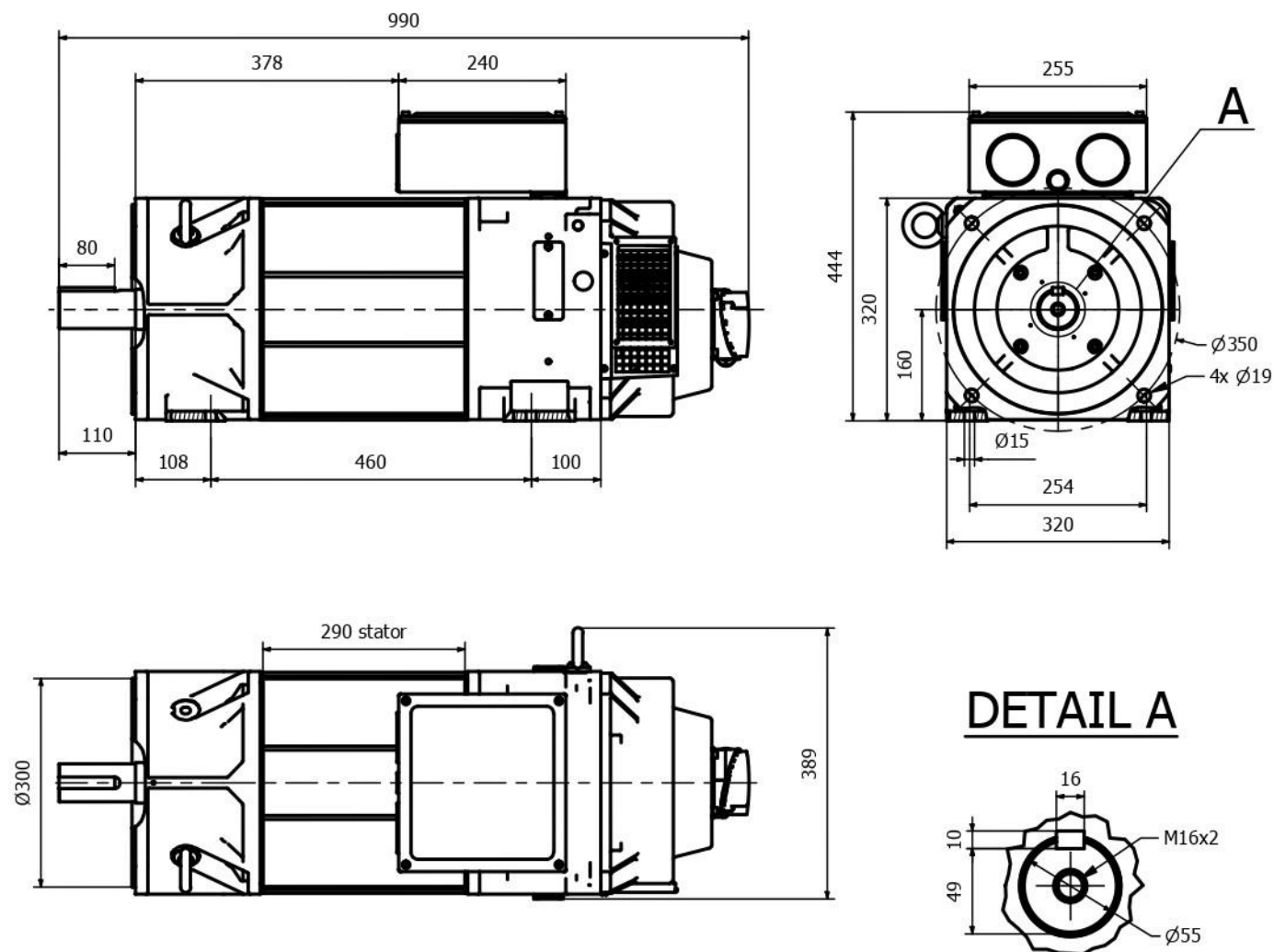
DETAIL A



IC: 06
IP: 23
IM: 1001
Pos: CDH/257

6.2 Mechanical dimensions IP54

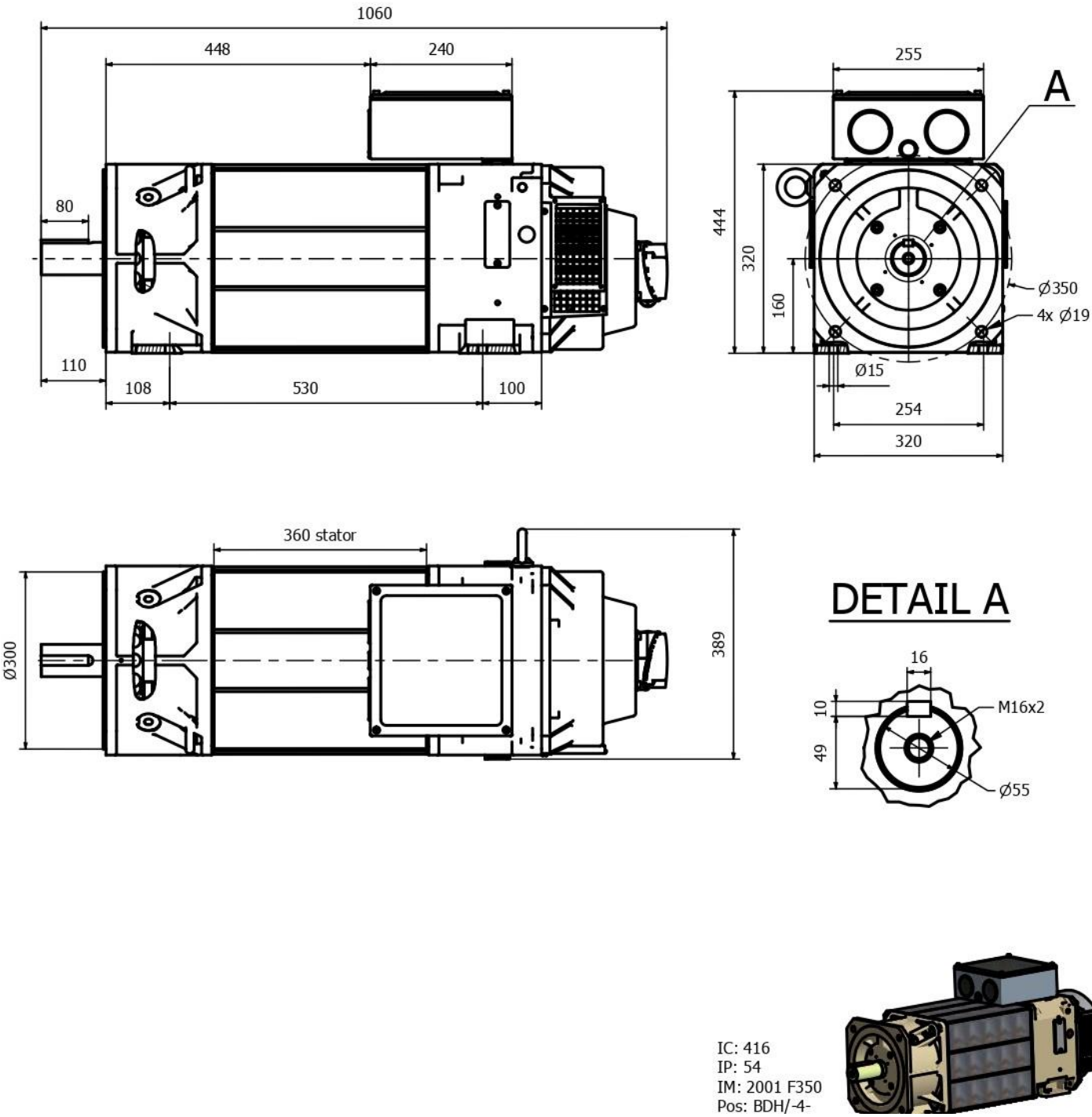
6.2.1 Motor dimensions VF 160 S IP54



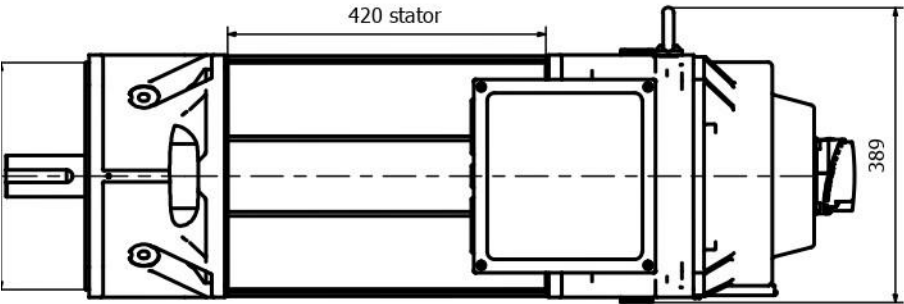
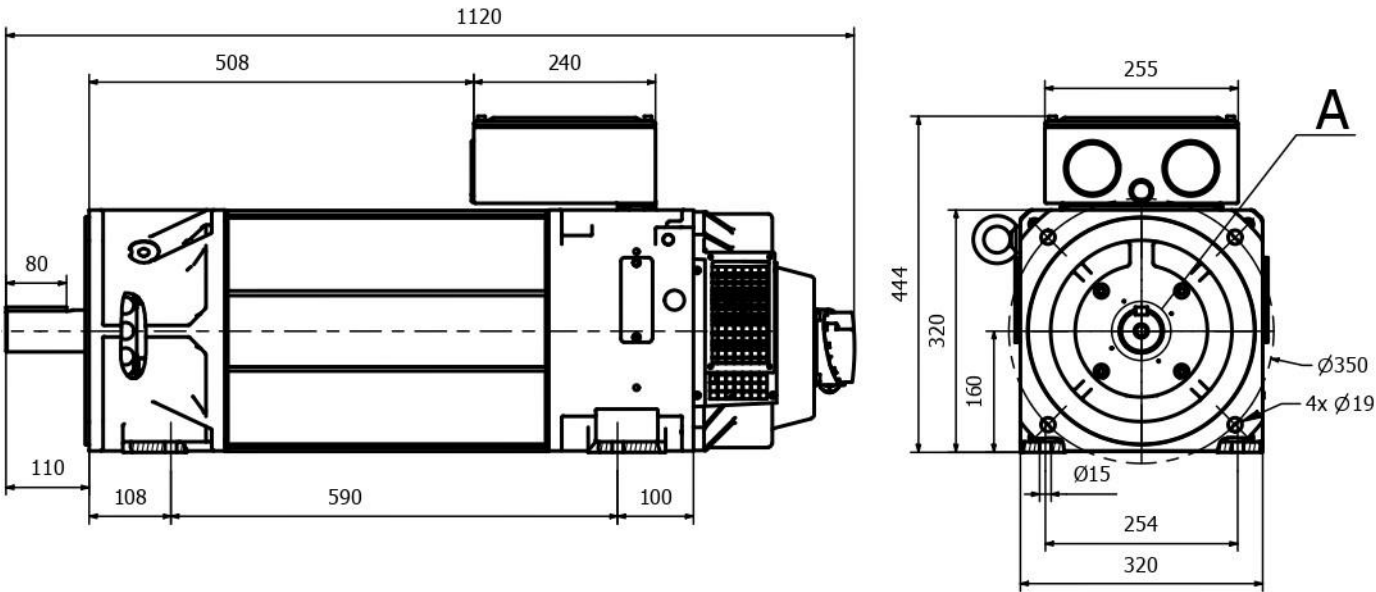
IC: 416
IP: 54
IM: 2001 F350
Pos: BDH/-4-



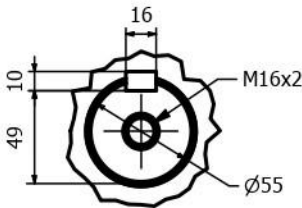
6.2.2 Motor dimensions VF 160 M IP54



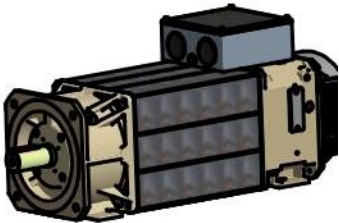
6.2.3 Motor dimensions VF 160 L IP54



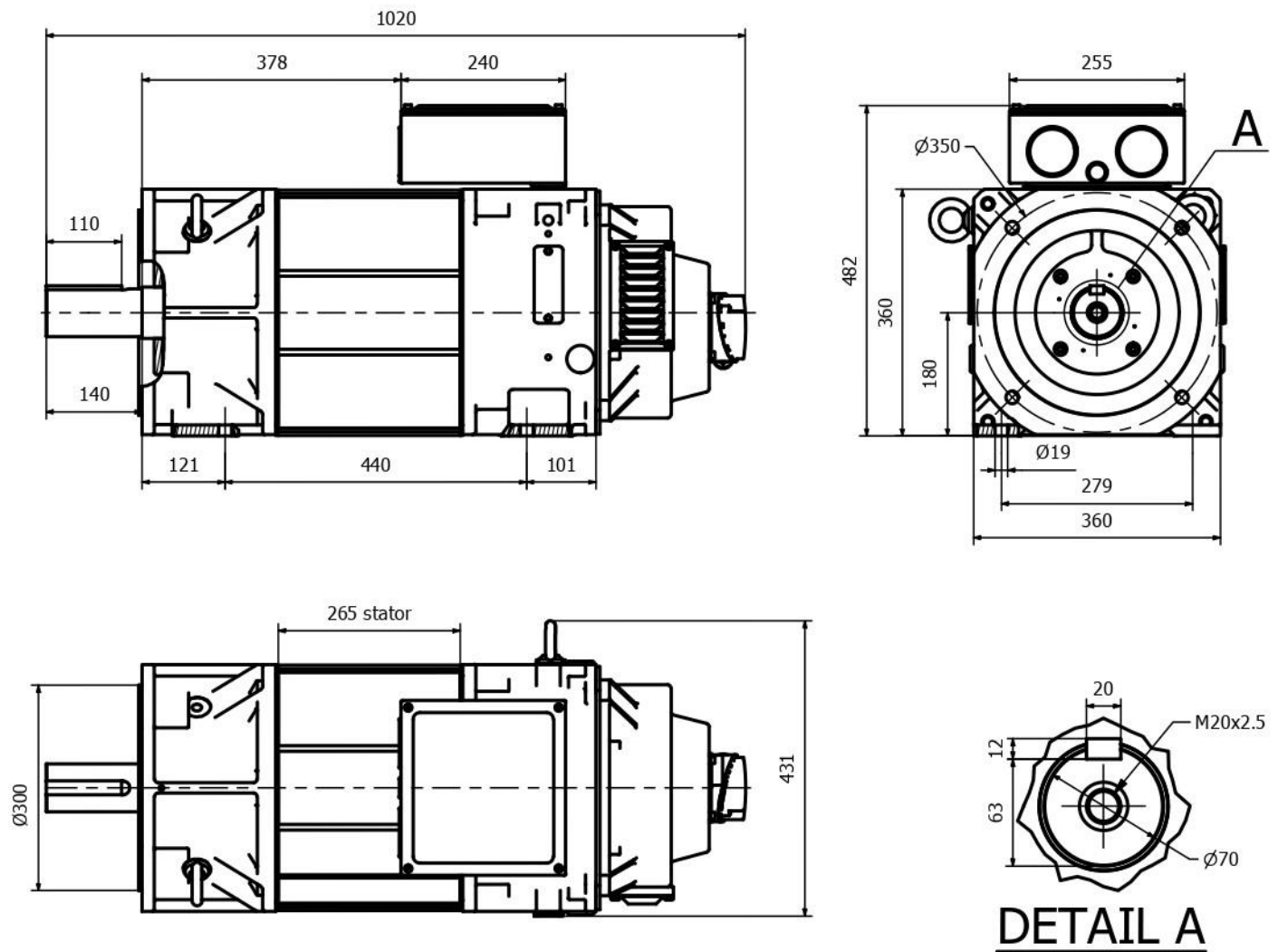
DETAIL A



IC: 416
IP: 54
IM: 2001 F350
Pos: BDH/-4-



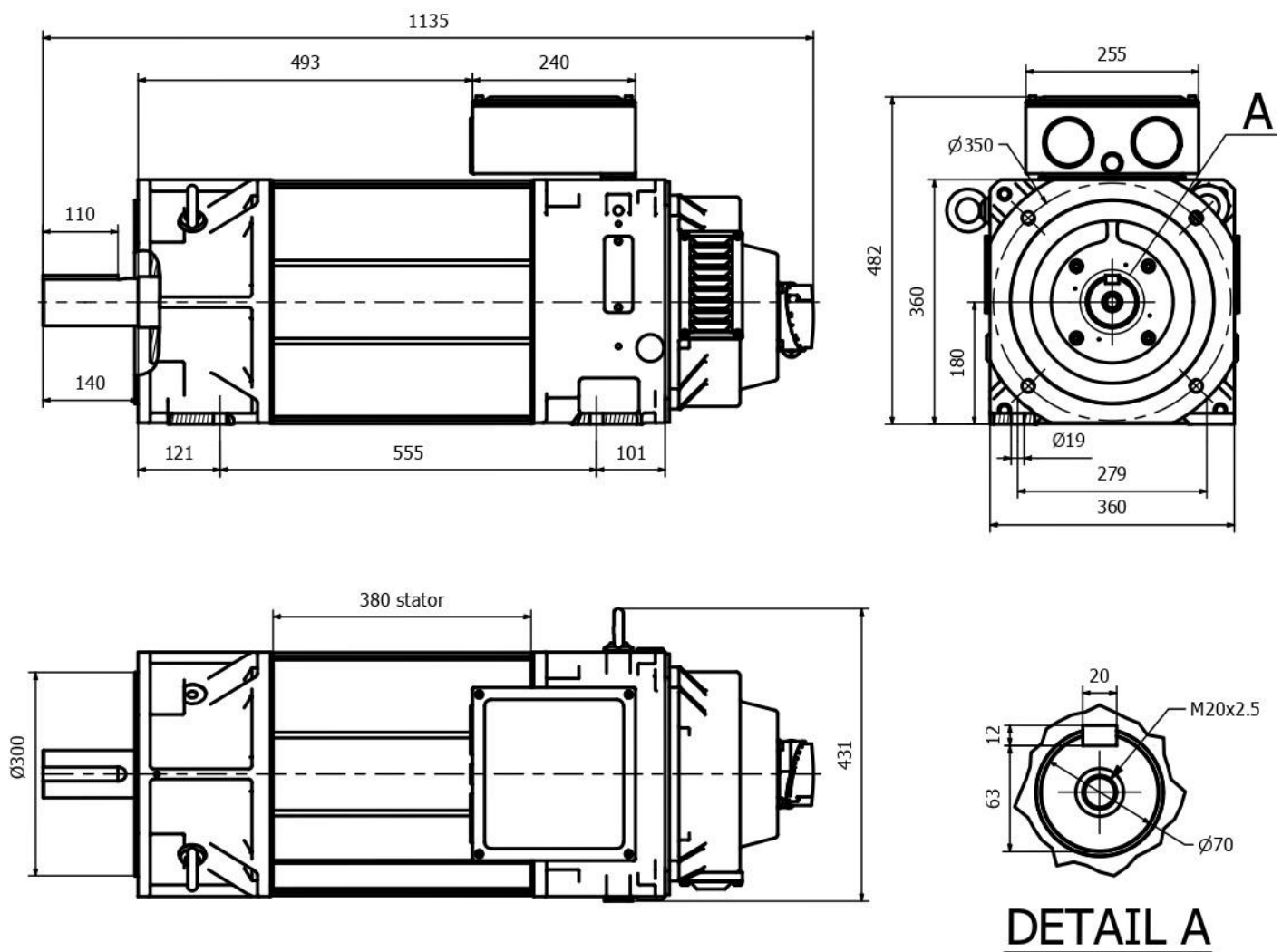
6.2.4 Motor dimensions VF 180 S IP54



IC: 416
IP: 54
IM: 2001 F350
Pos: BDH/-4-



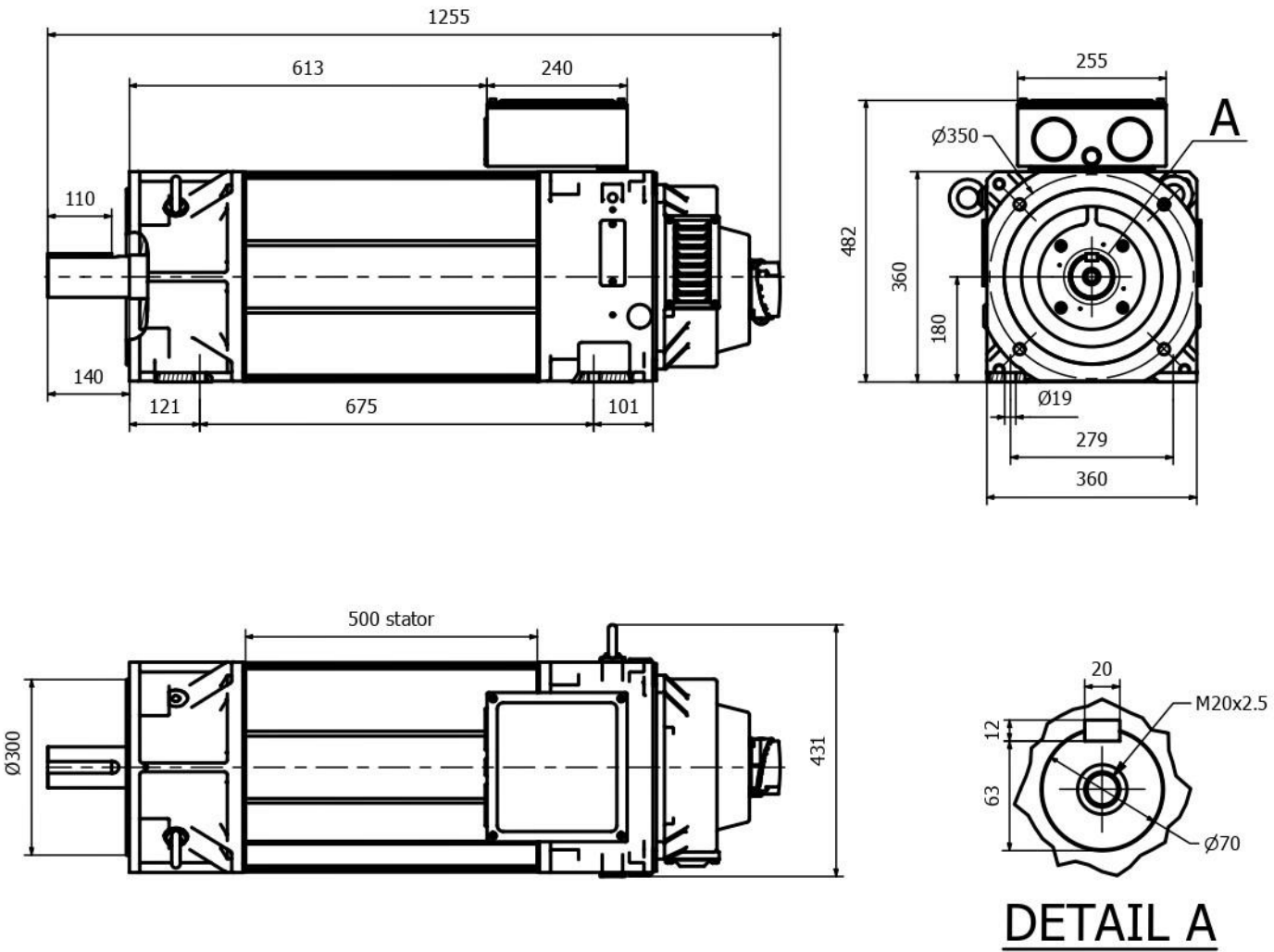
6.2.5 Motor dimensions VF 180 M IP54



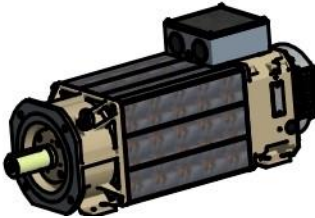
IC: 416
IP: 54
IM: 2001 F350
Pos: BDH/-4-



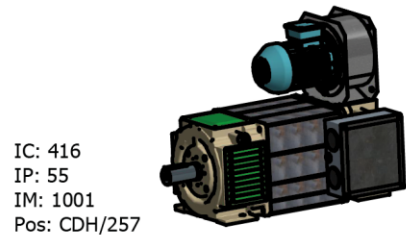
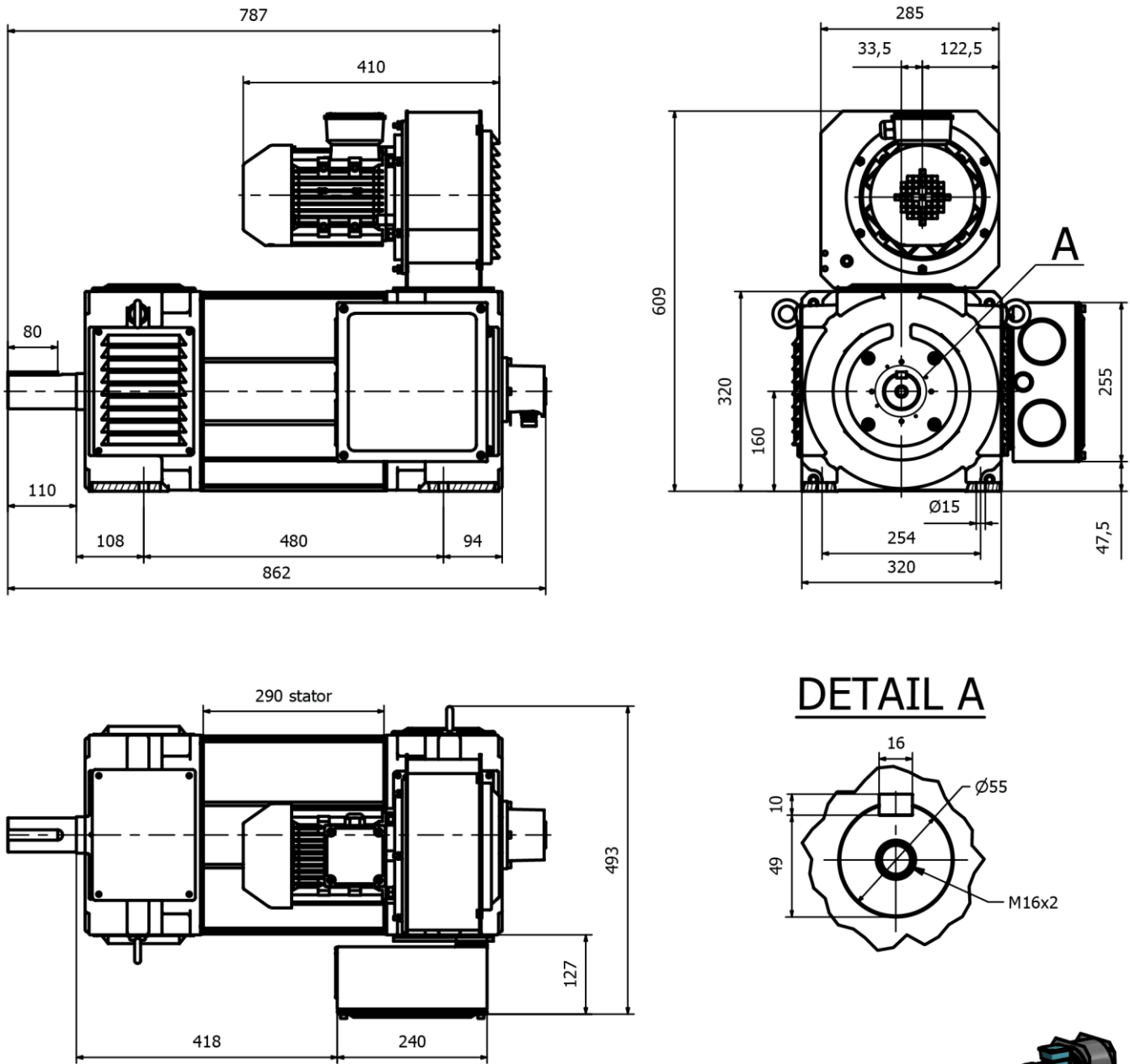
6.2.6 Motor dimensions VF 180 L IP54



IC: 416
IP: 54
IM: 2001 F350
Pos: BDH/-4-

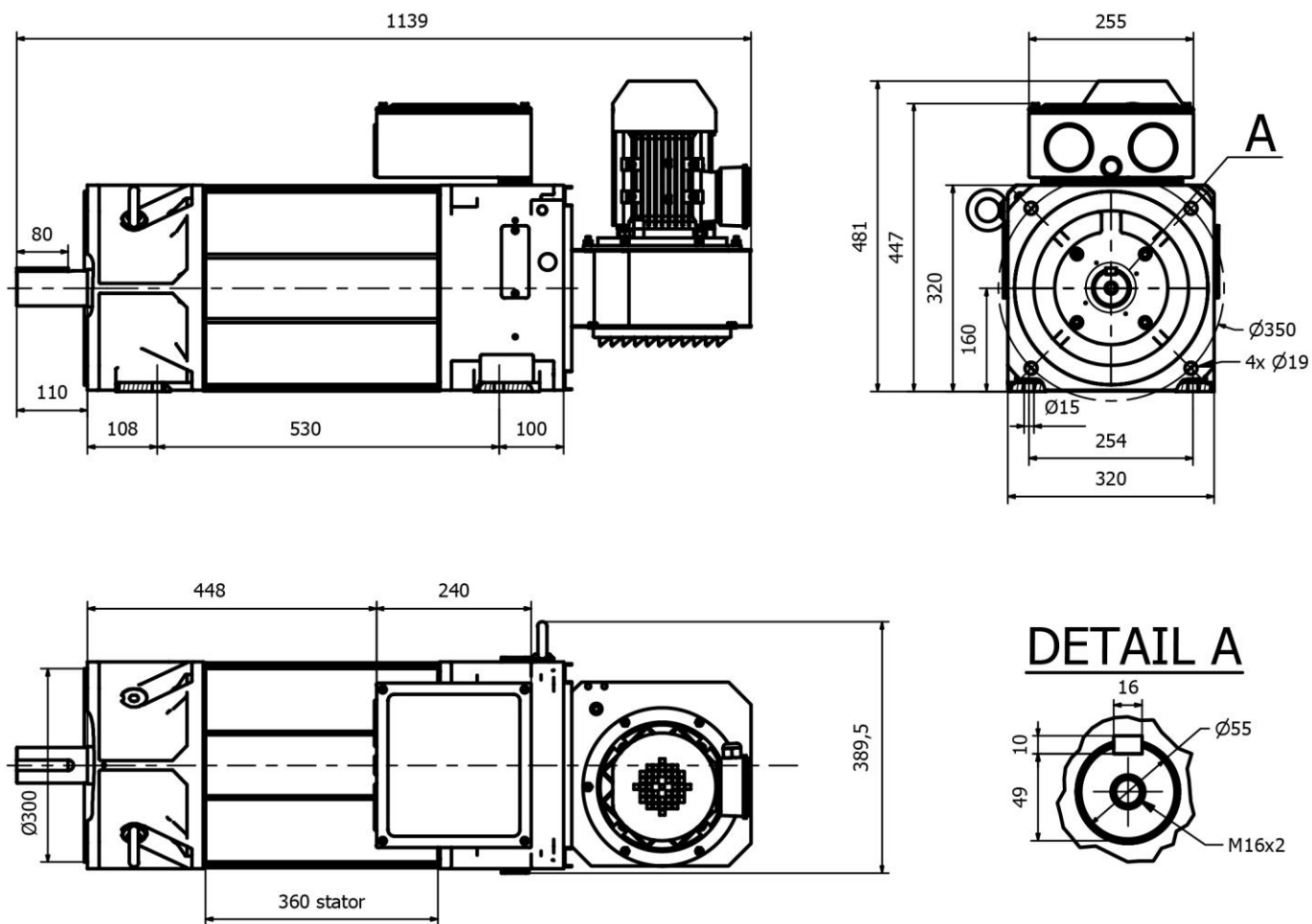


6.3.2 Motor dimensions VF 160 S IP55 radial version

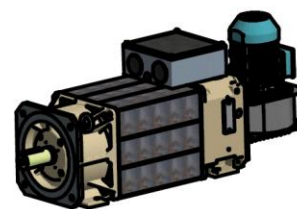


IC: 416
IP: 55
IM: 1001
Pos: CDH/257

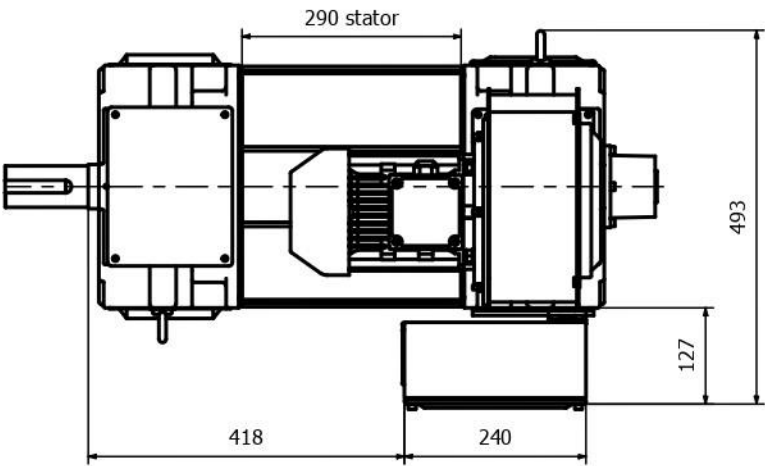
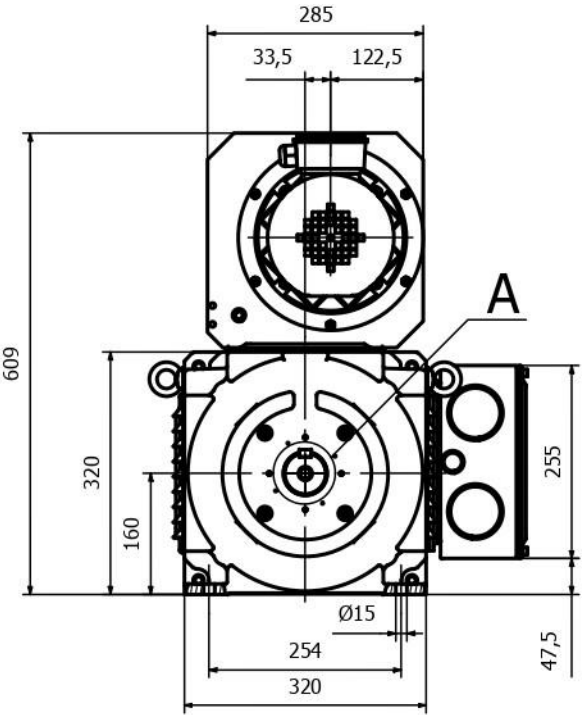
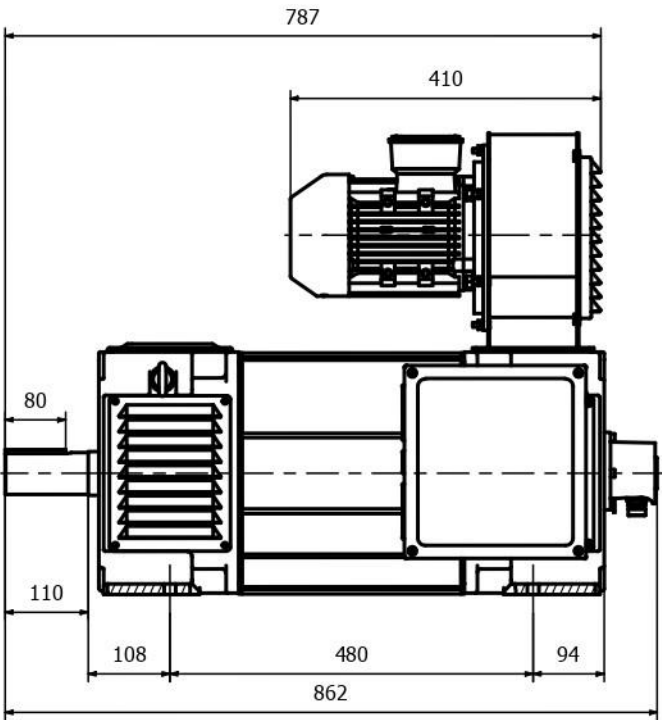
6.3.3 Motor dimensions VF 160 M IP55 axial version



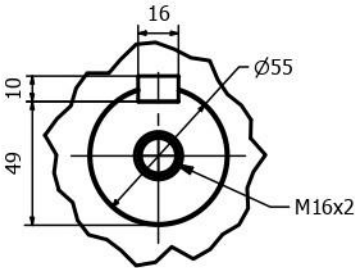
IC: 416
IP: 55
IM: 2001 F350
Pos: BDH/-4-



6.3.4 Motor dimensions VF 160 M IP55 radial version

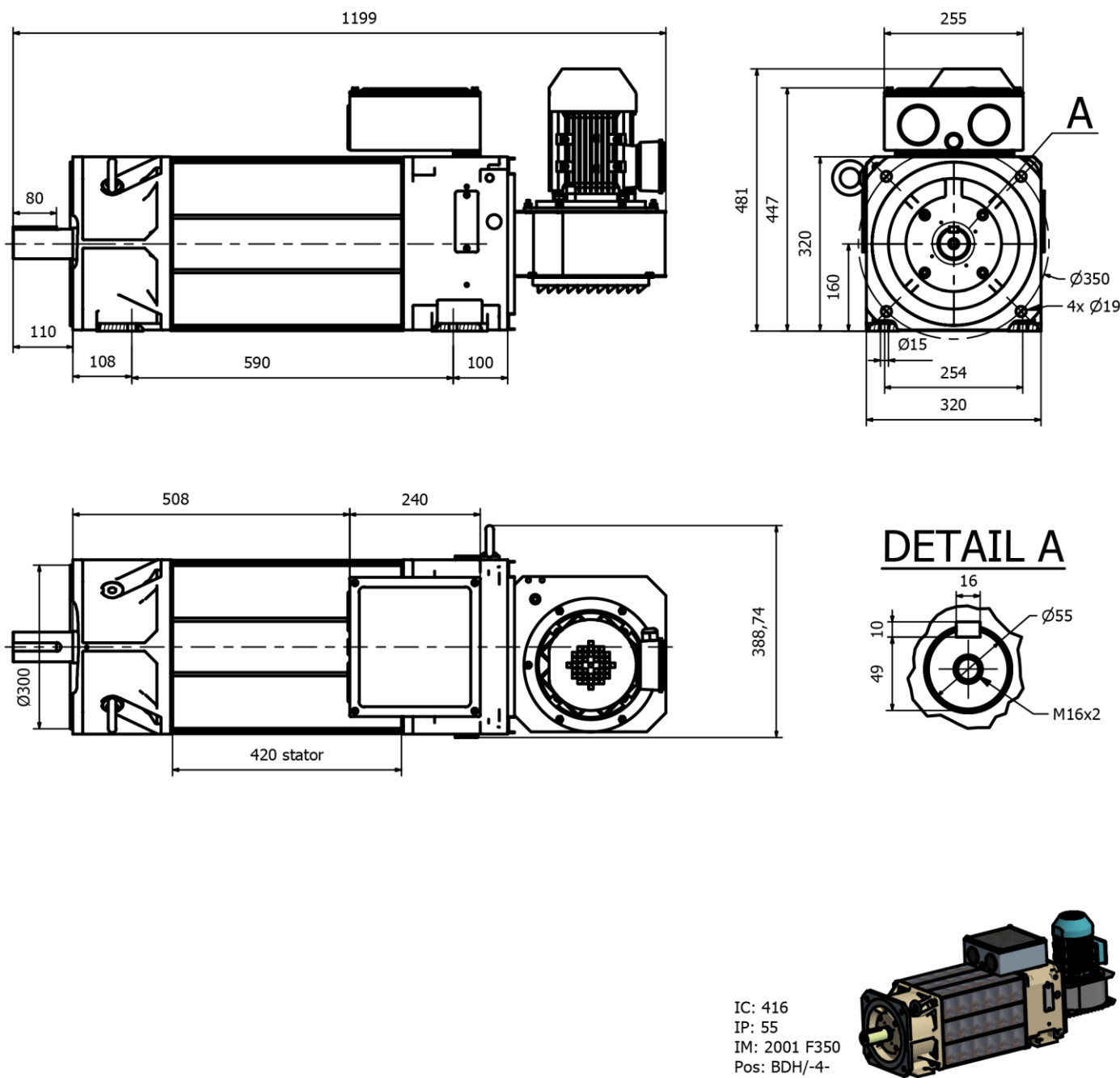


DETAIL A

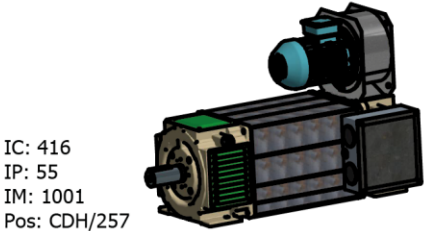
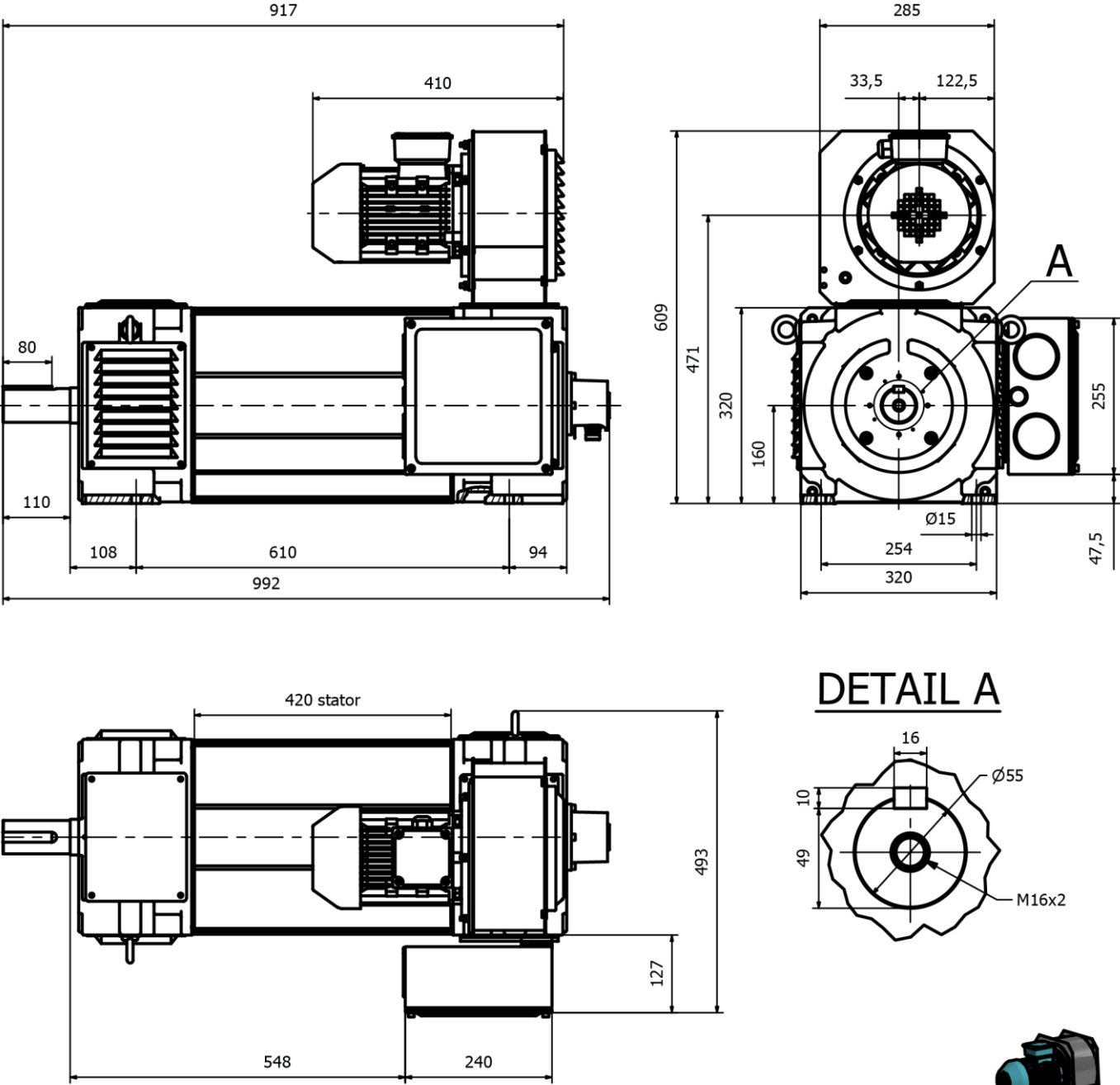


IC: 416
IP: 55
IM: 1001
Pos: CDH/257

6.3.5 Motor dimensions VF 160 L IP55 axial version

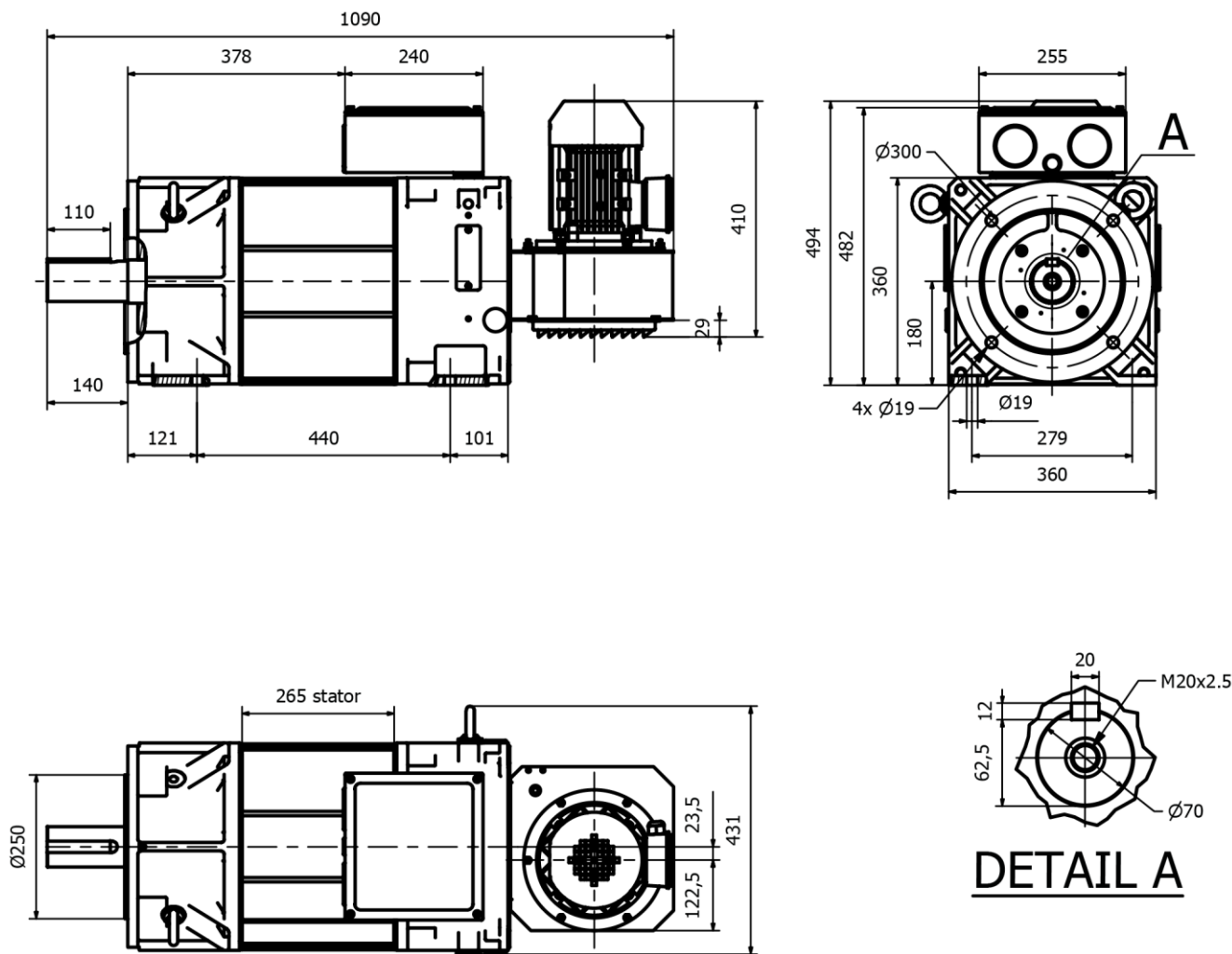


6.3.6 Motor dimensions VF 160 L IP55 radial version

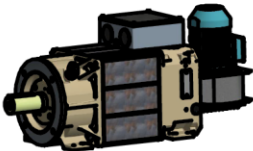


IC: 416
IP: 55
IM: 1001
Pos: CDH/257

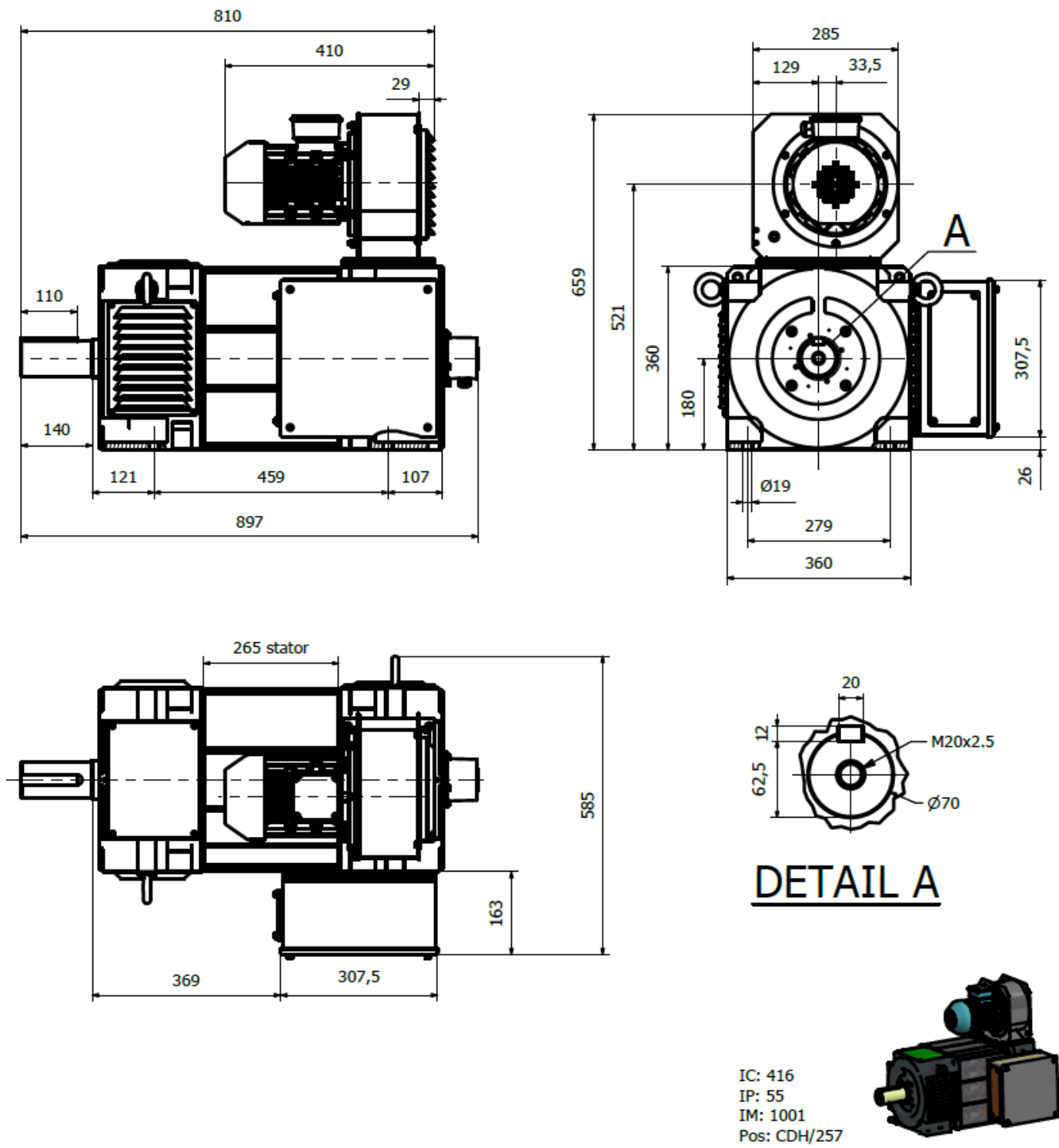
6.3.7 Motor dimensions VF 180 S IP55 axial version



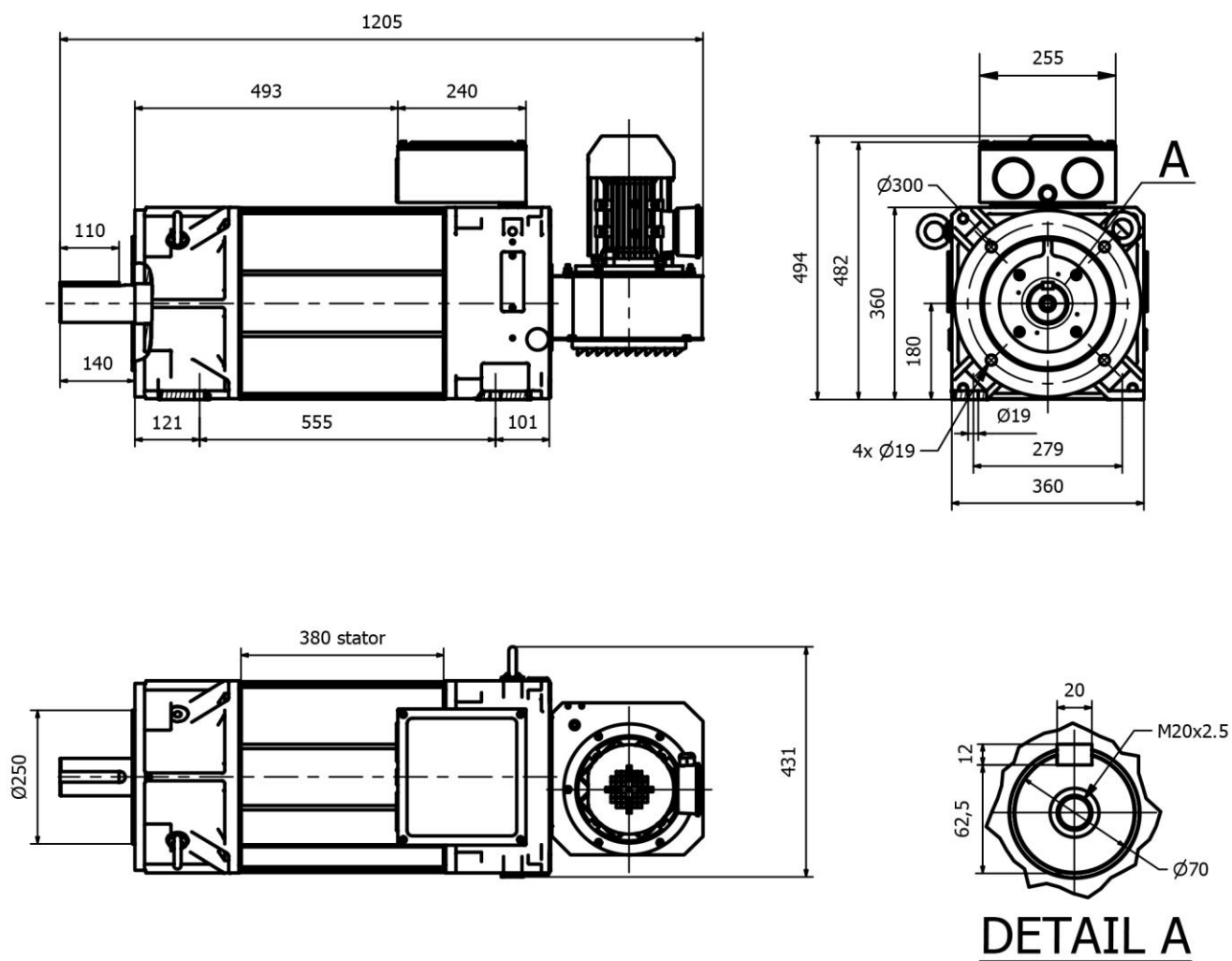
IC: 416
IP: 55
IM: 2001 F300
Pos: BDH/-4-



6.3.8 Motor dimensions VF 180 S IP55 radial version



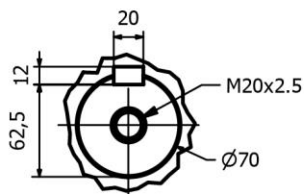
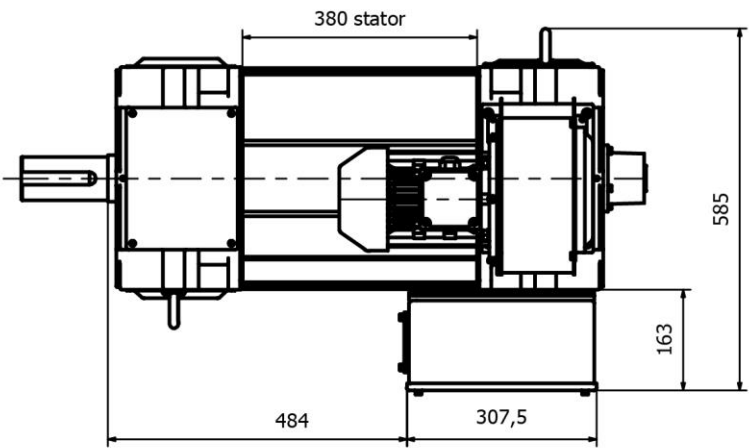
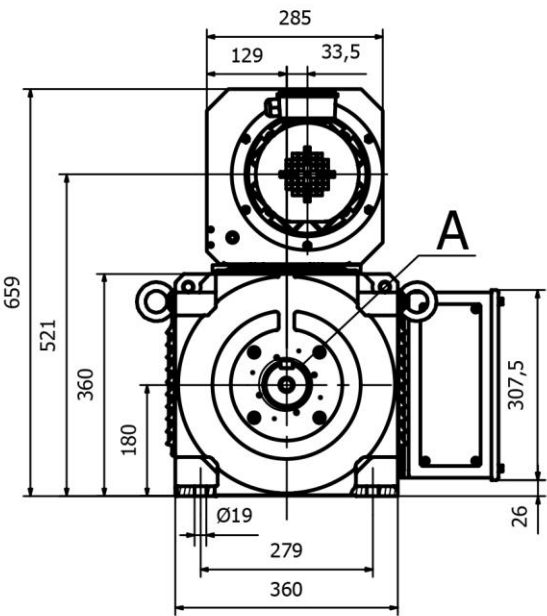
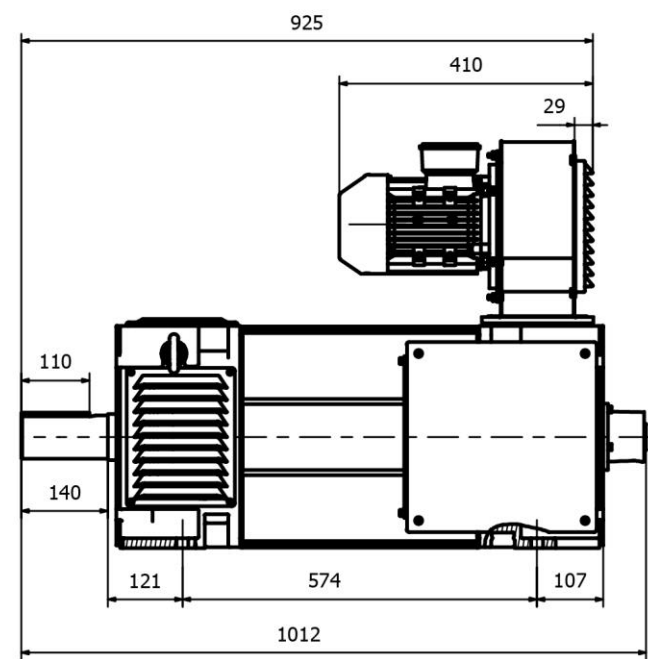
6.3.9 Motor dimensions VF 180 M IP55 axial version



IC: 416
IP: 55
IM: 2001 F300
Pos: BDH/-4-



6.3.10 Motor dimensions VF 180 M IP55 radial version

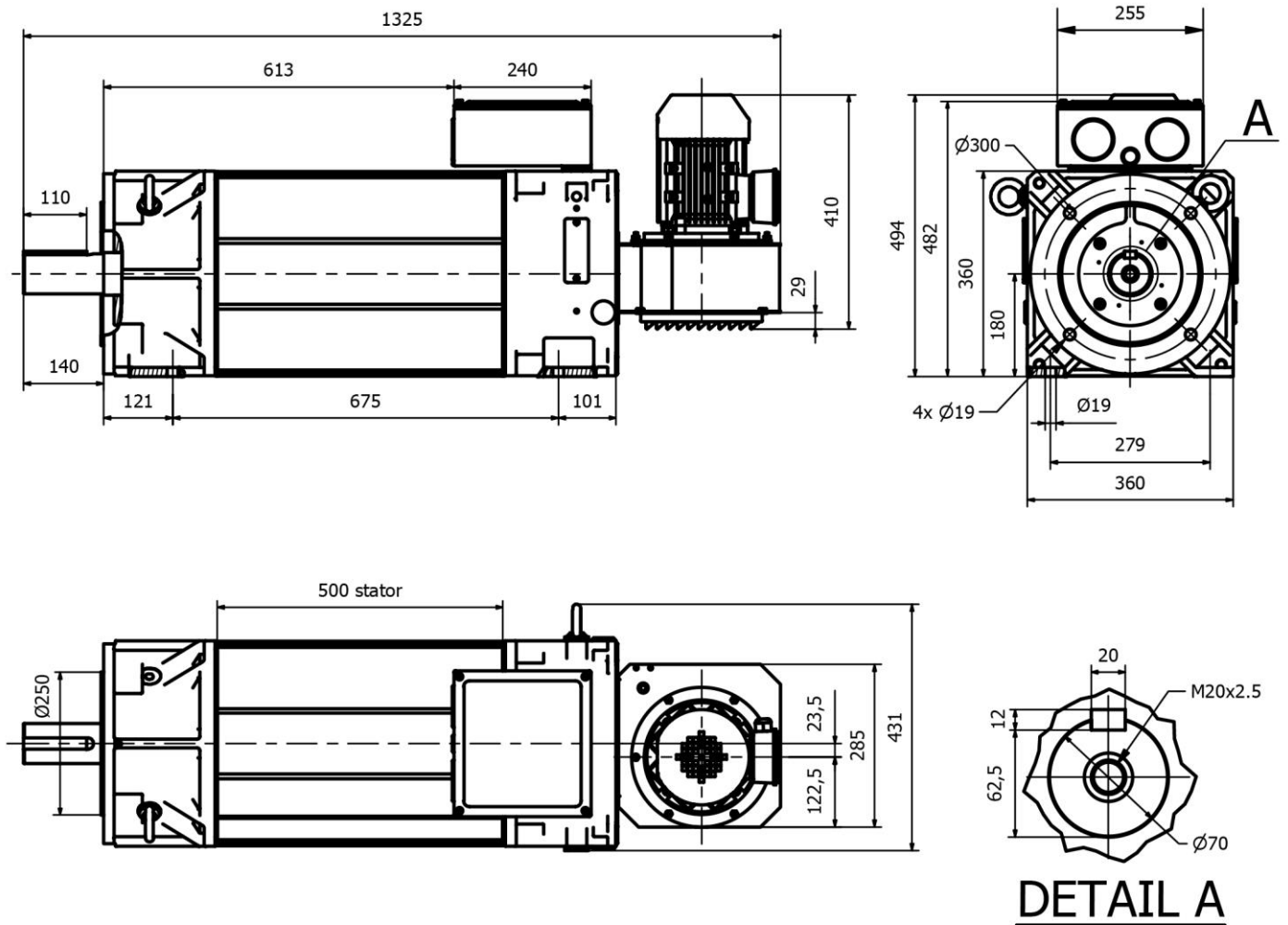


DETAIL A

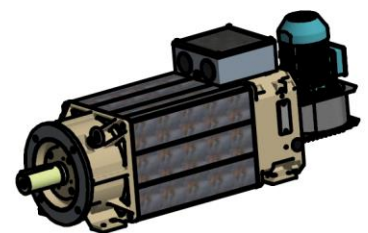
IC: 415
IP: 55
IM: 1001
Pos: CDH/257



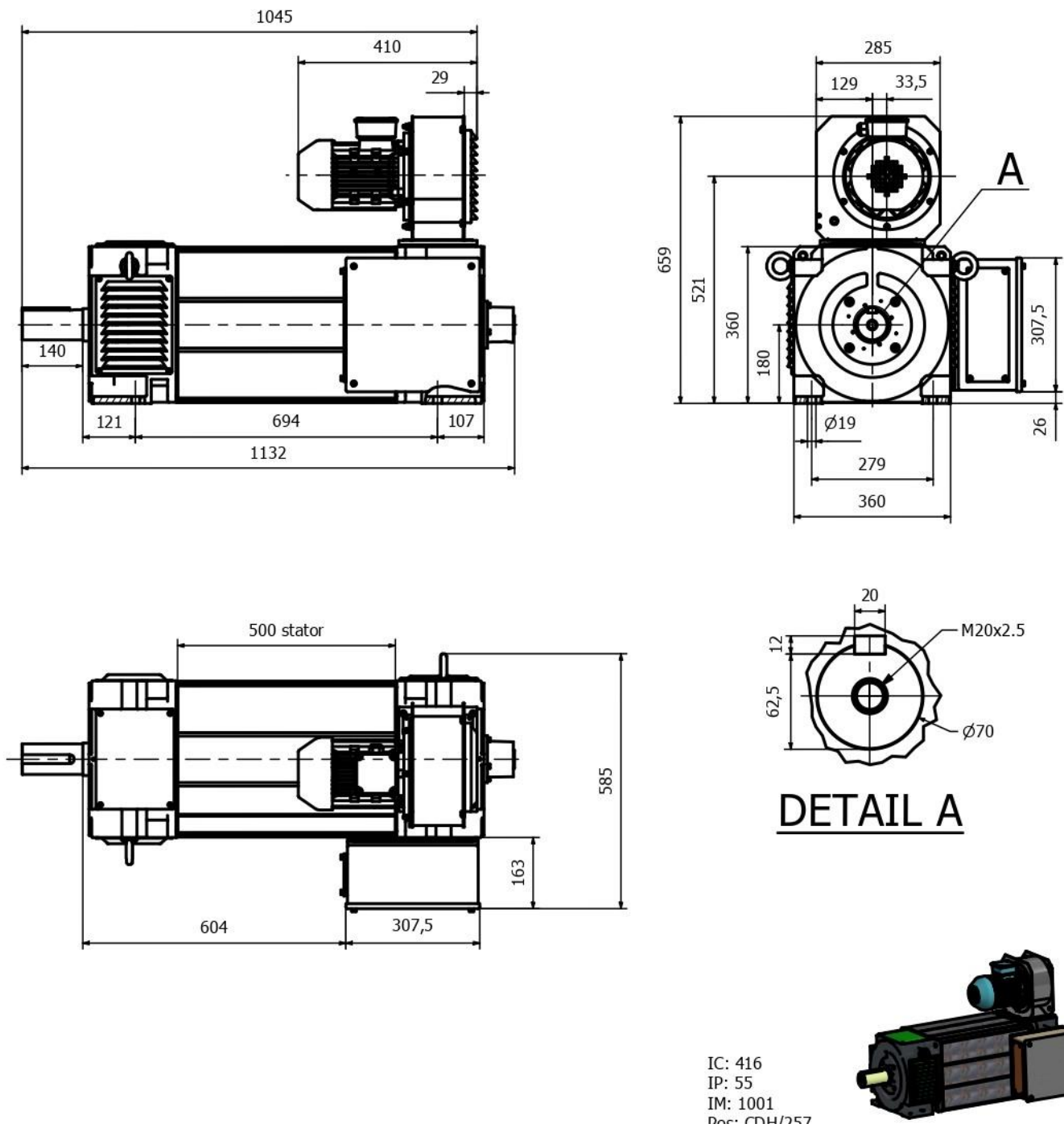
6.3.11 Motor dimensions VF 180 L IP55 axial version



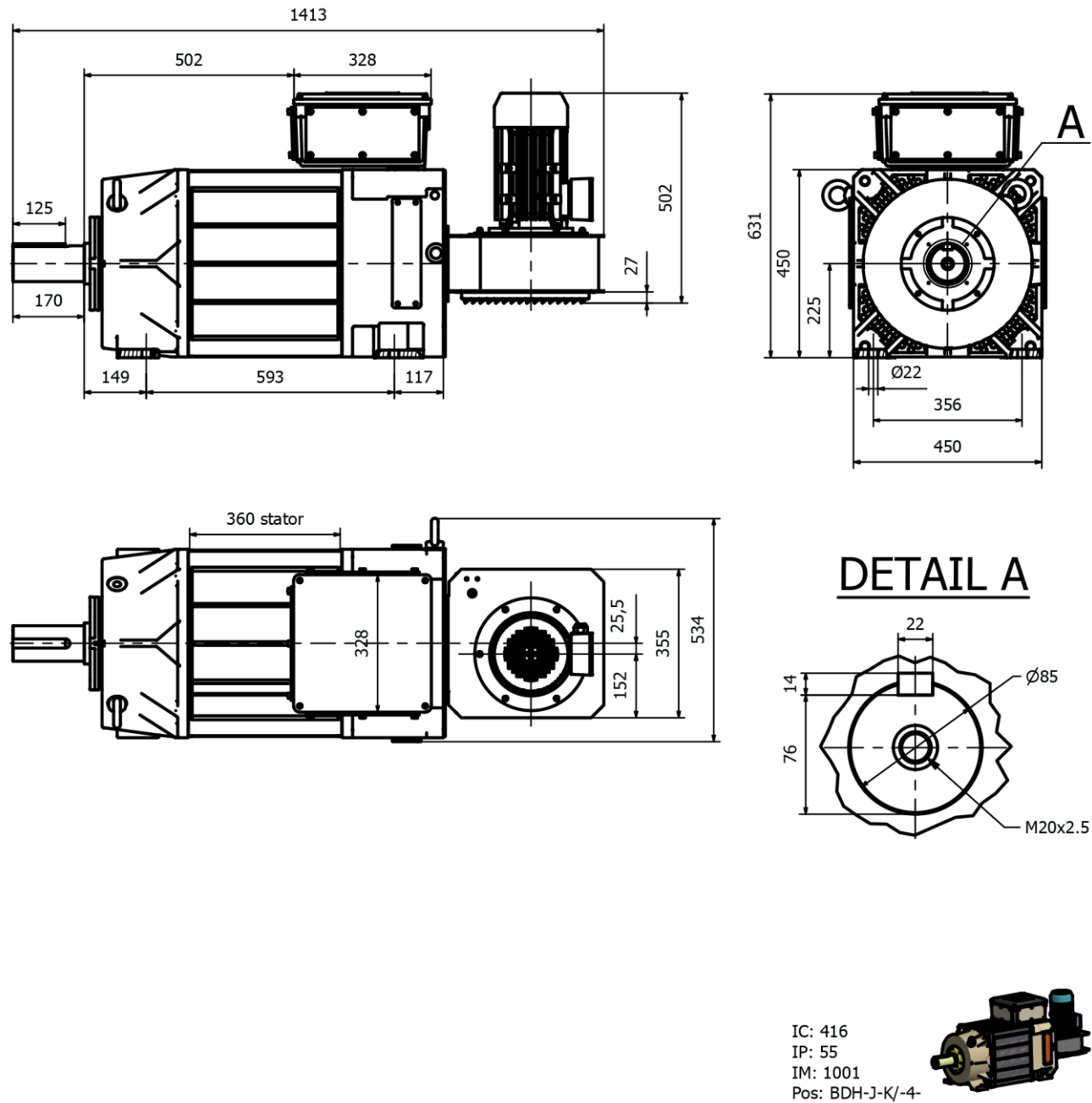
IC: 416
IP: 55
IM: 2001 F300
Pos: BDH/-4-



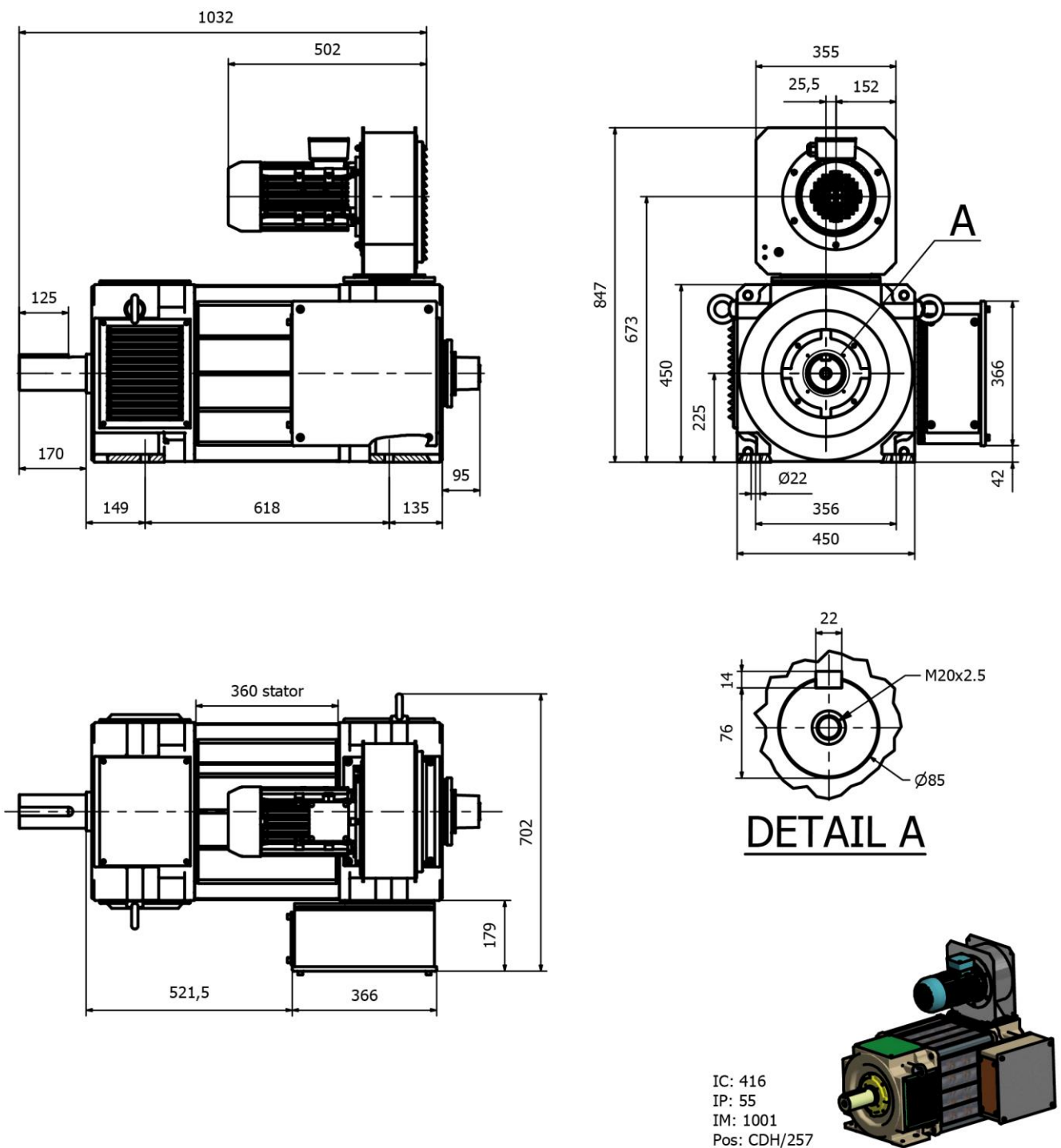
6.3.12 Motor dimensions VF 180 L IP55 radial version



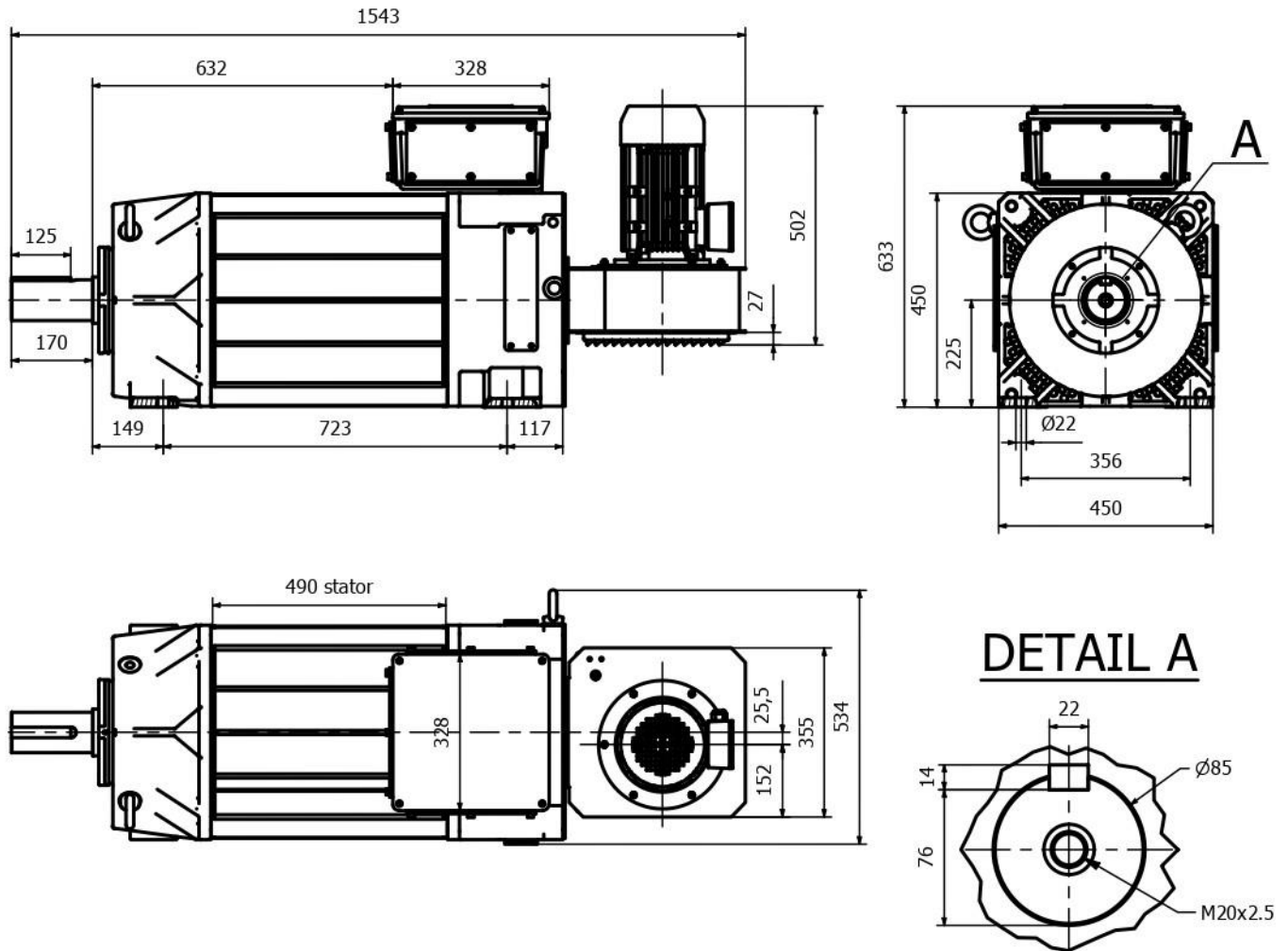
6.3.13 Motor dimensions VF 225 S IP55 axial version



6.3.14 Motor dimensions VF 225 S IP55 radial version



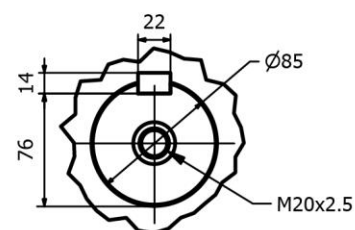
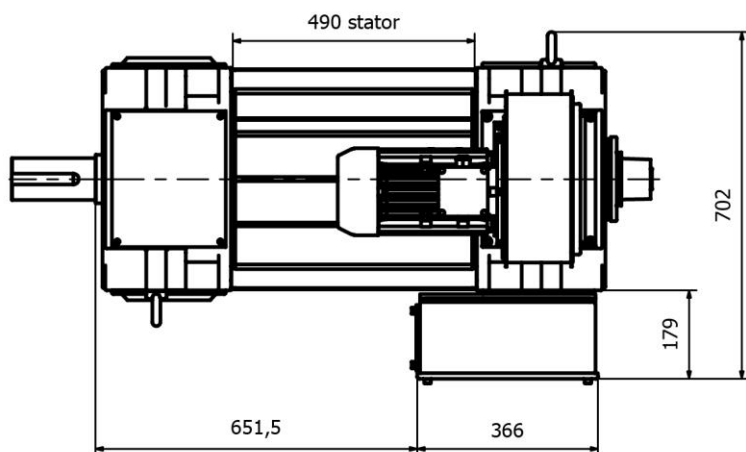
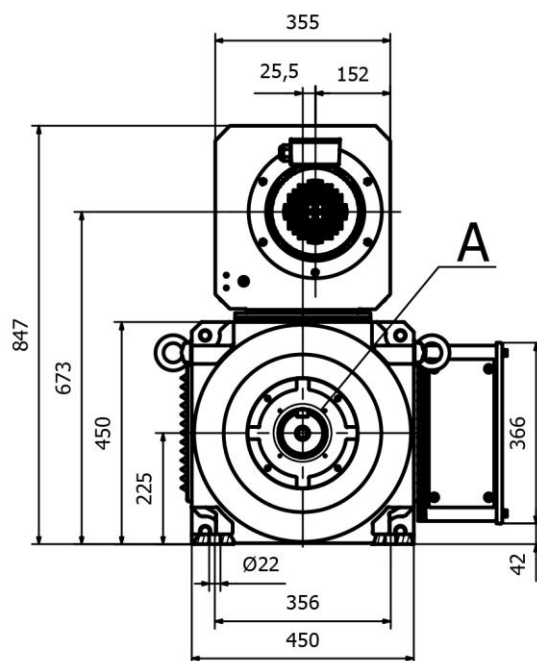
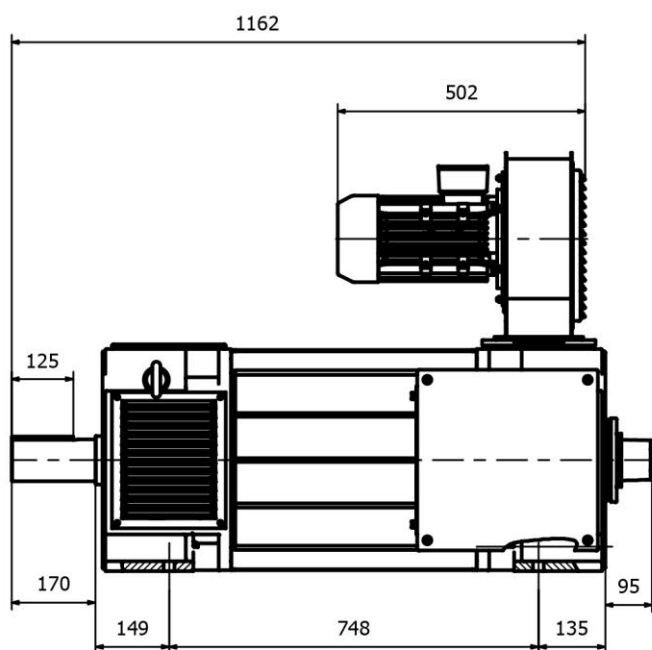
6.3.15 Motor dimensions VF 225 M IP55 axial version



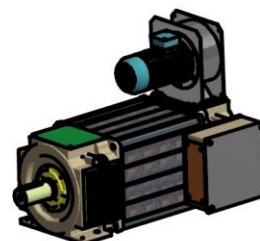
IC: 416
IP: 55
IM: 1001
Pos: BDH-J-K/-4-



6.3.16 Motor dimensions VF 225 M IP55 radial version

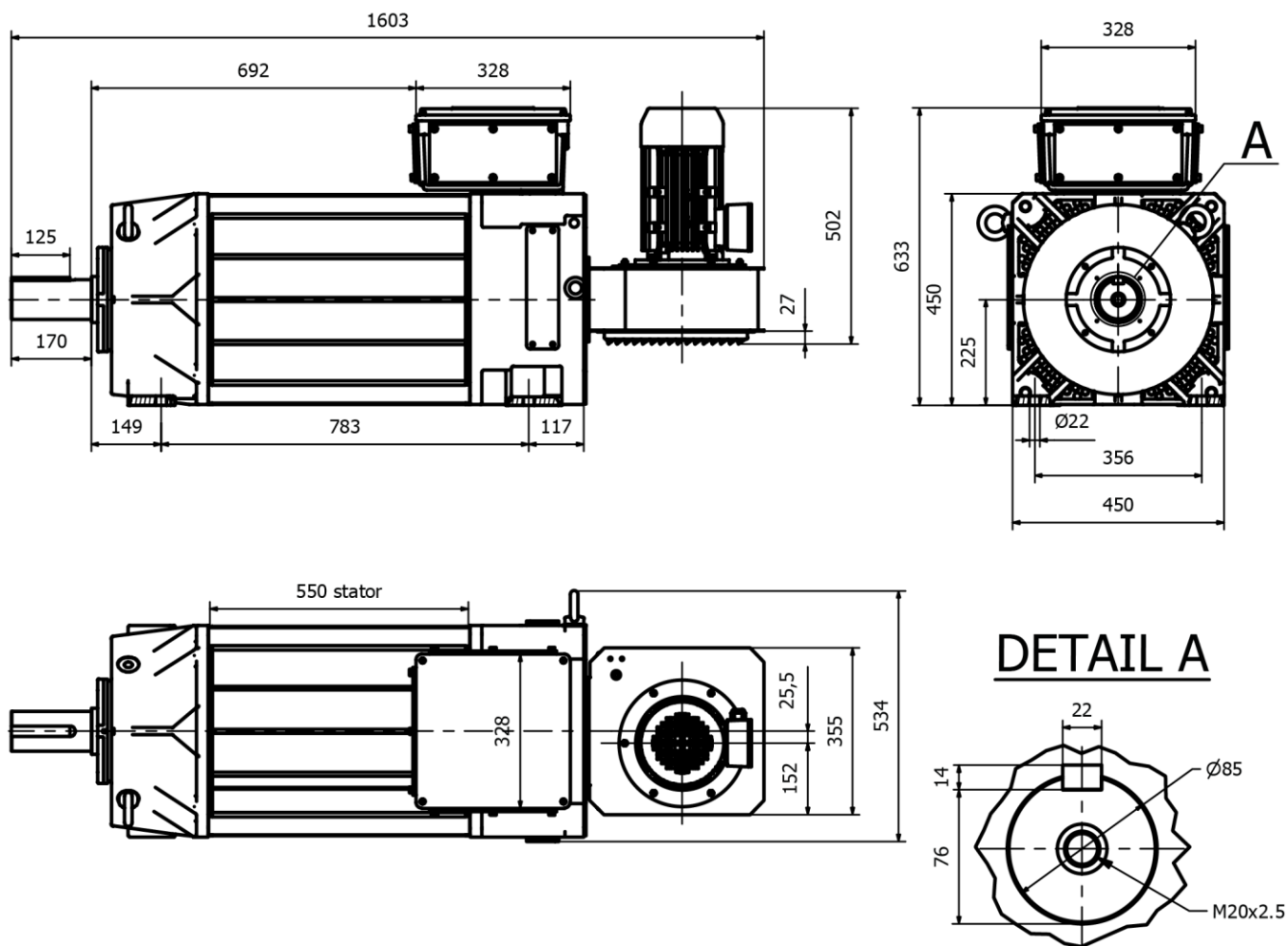


DETAIL A



IC: 416
IP: 55
IM: 1001
Pos: CDH/257

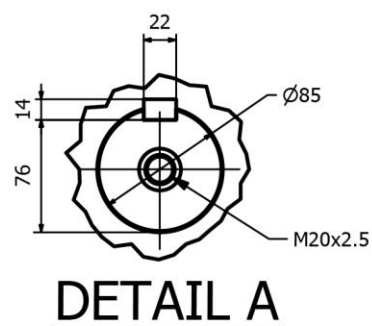
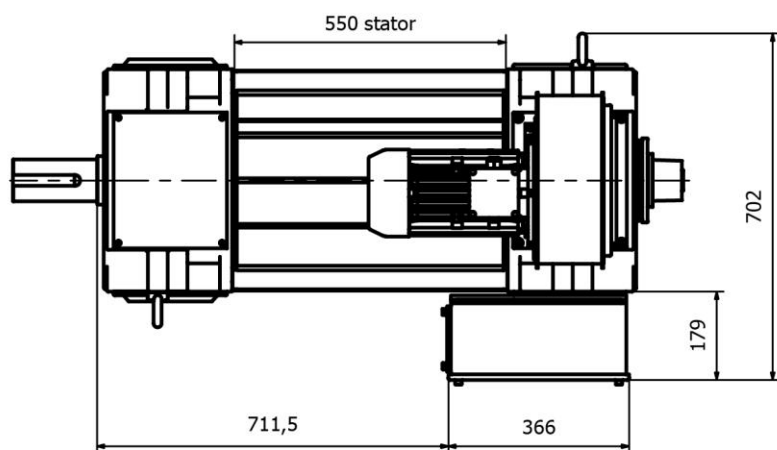
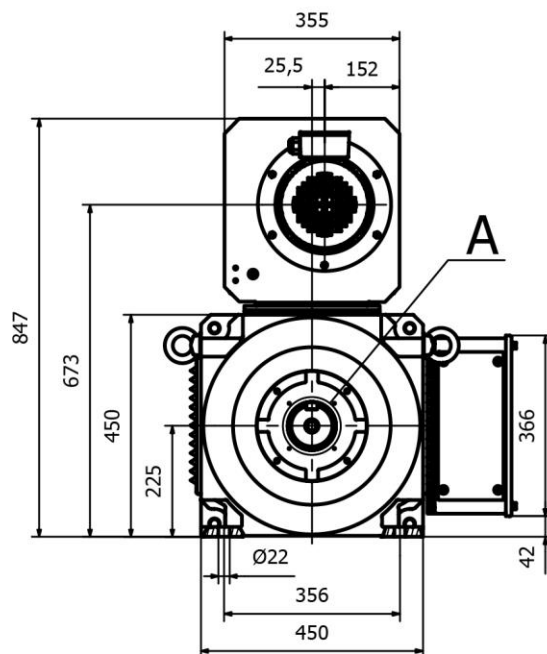
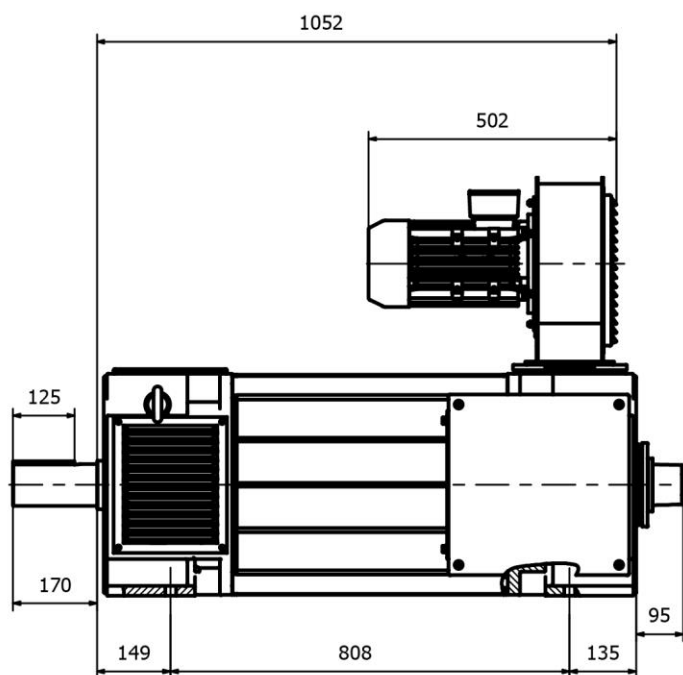
6.3.17 Motor dimensions VF 225 L IP55 axial version



IC: 416
IP: 55
IM: 1001
Pos: BDH-J-K/-4-



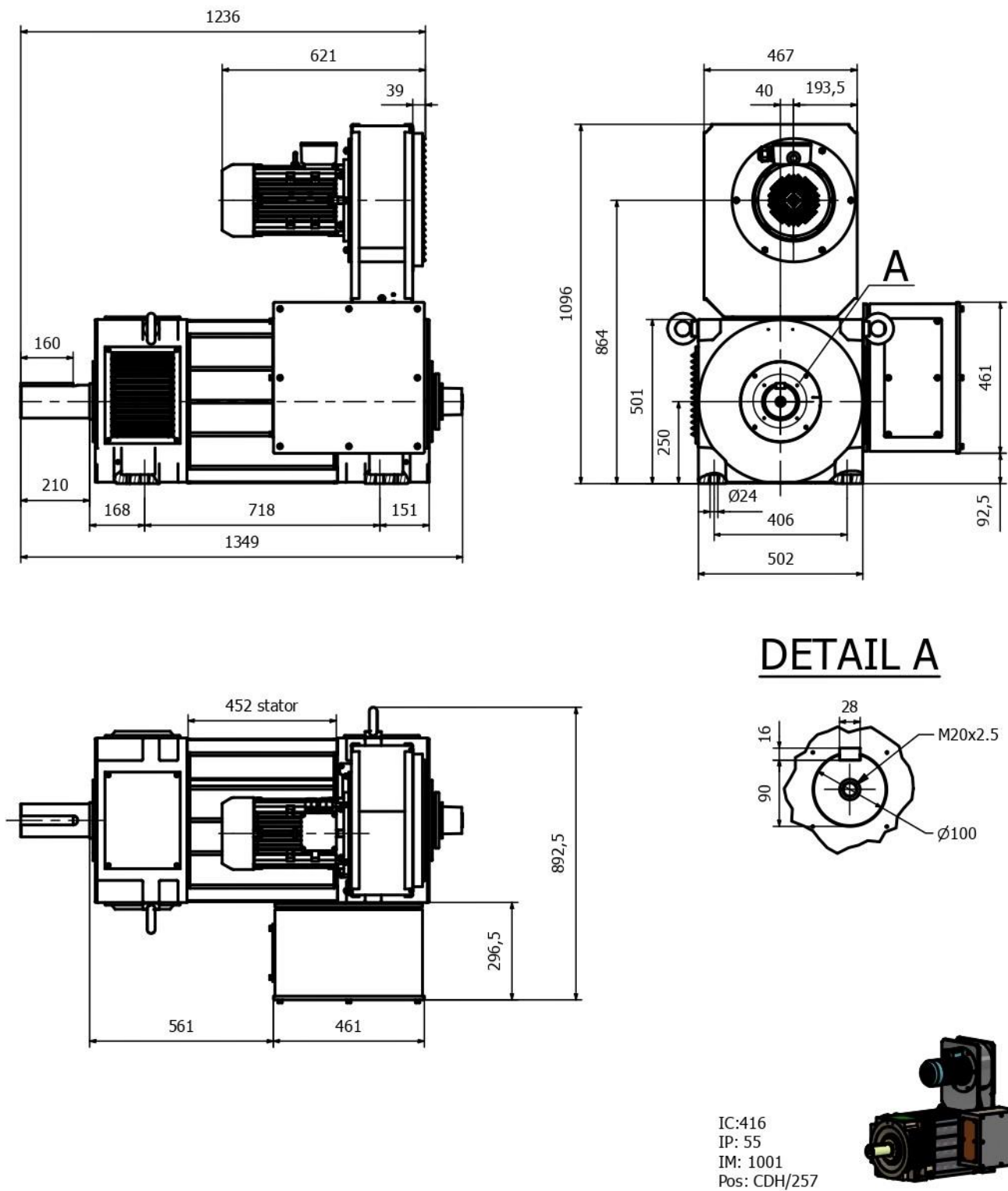
6.3.18 Motor dimensions VF 225 L IP55 radial version



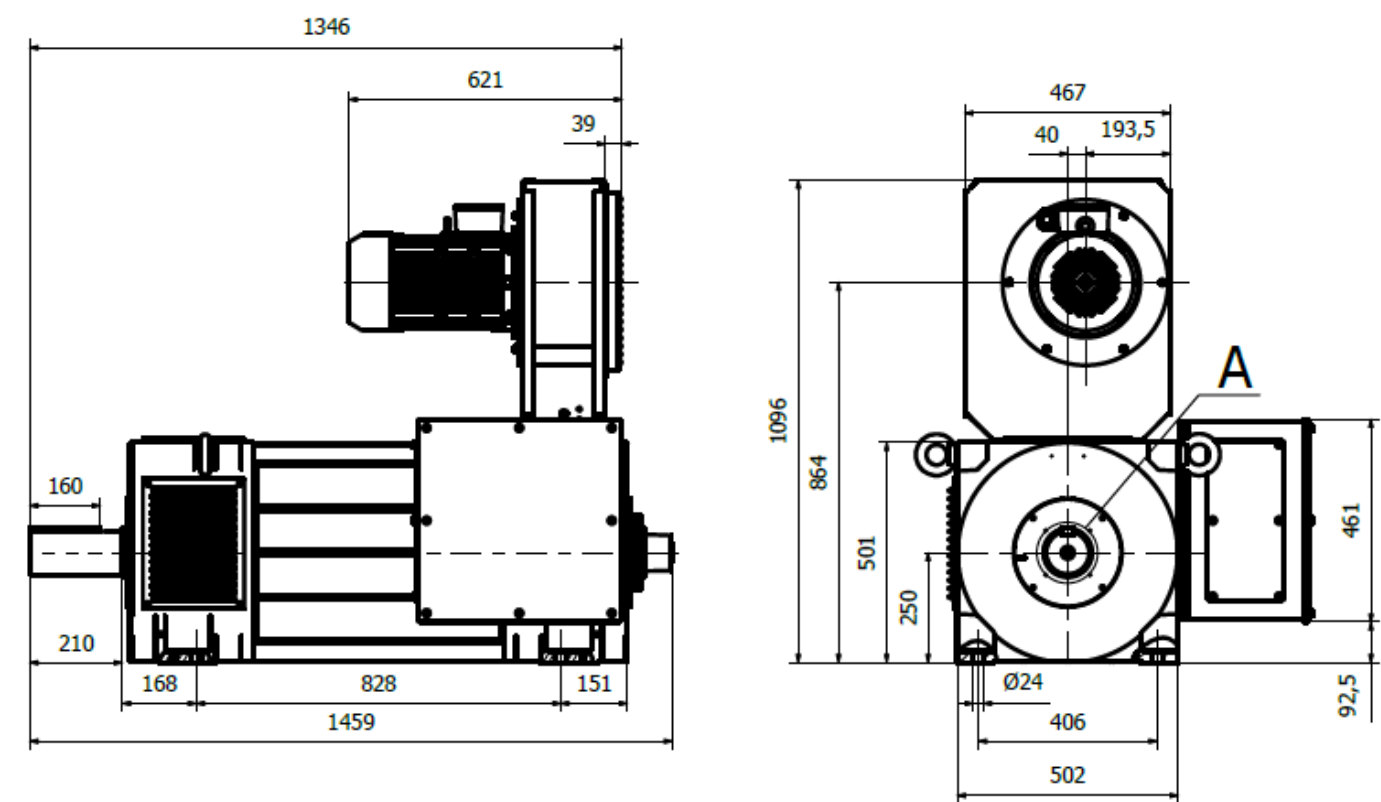
IC: 416
IP: 55
IM: 1001
Pos: CDH/257



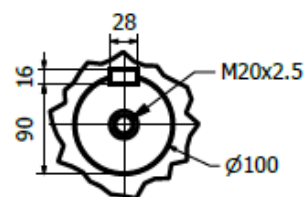
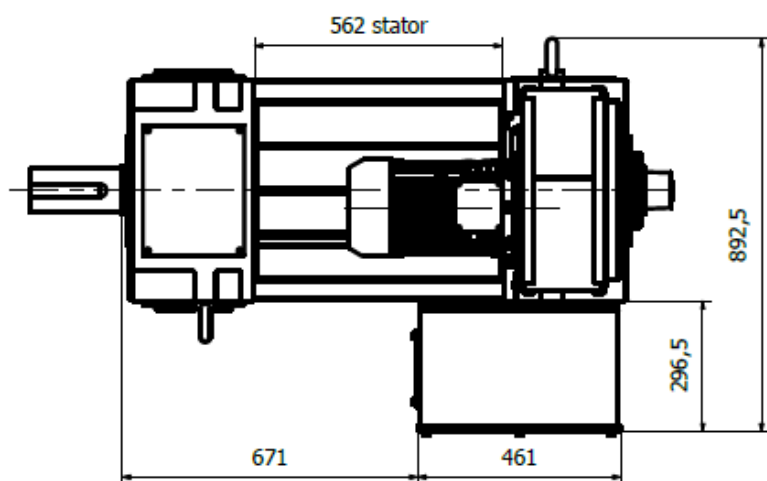
6.3.19 Motor dimensions VF 250 S IP55 radial version



6.3.20 Motor dimensions VF 250 M IP55 radial version



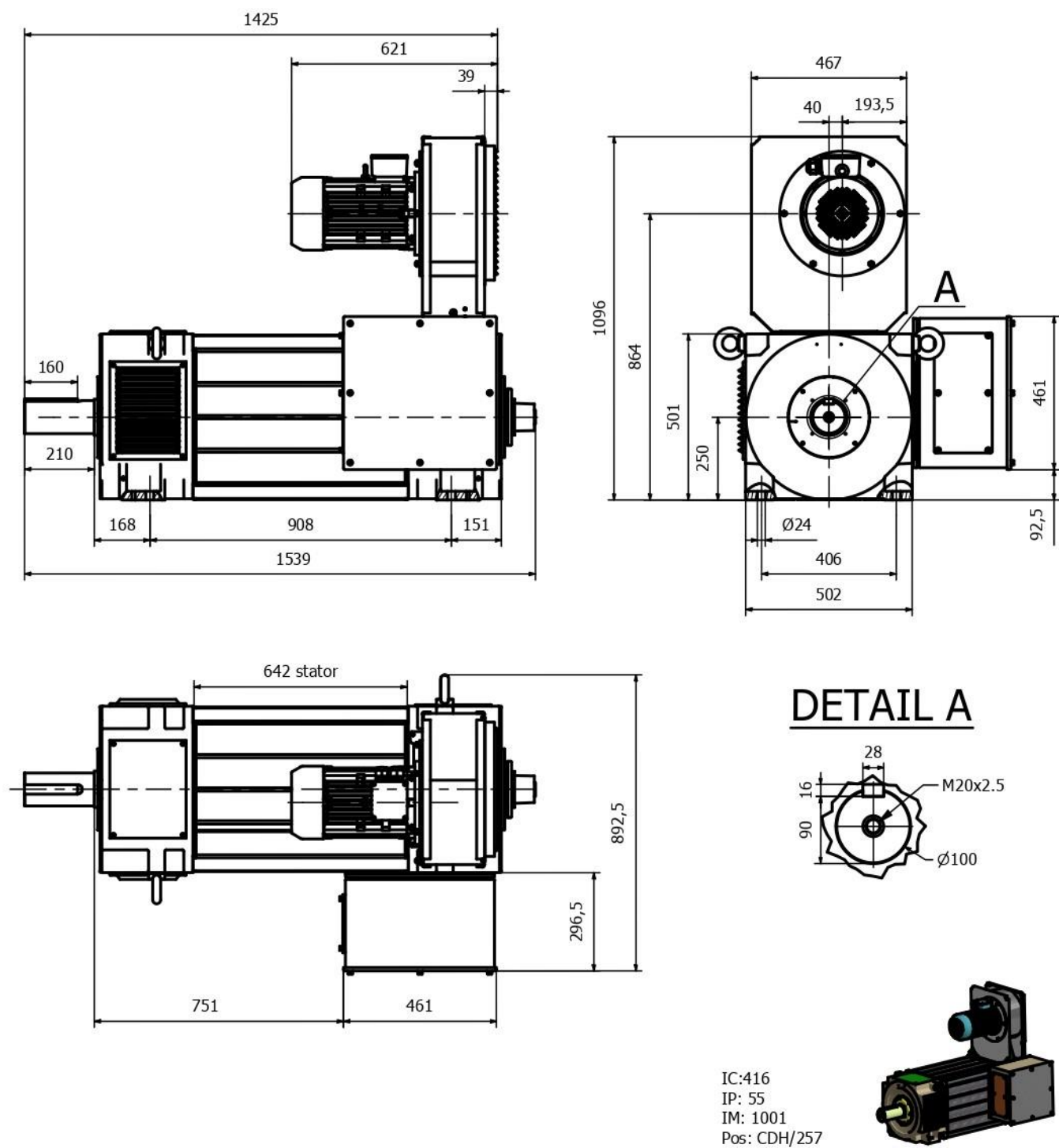
DETAIL A



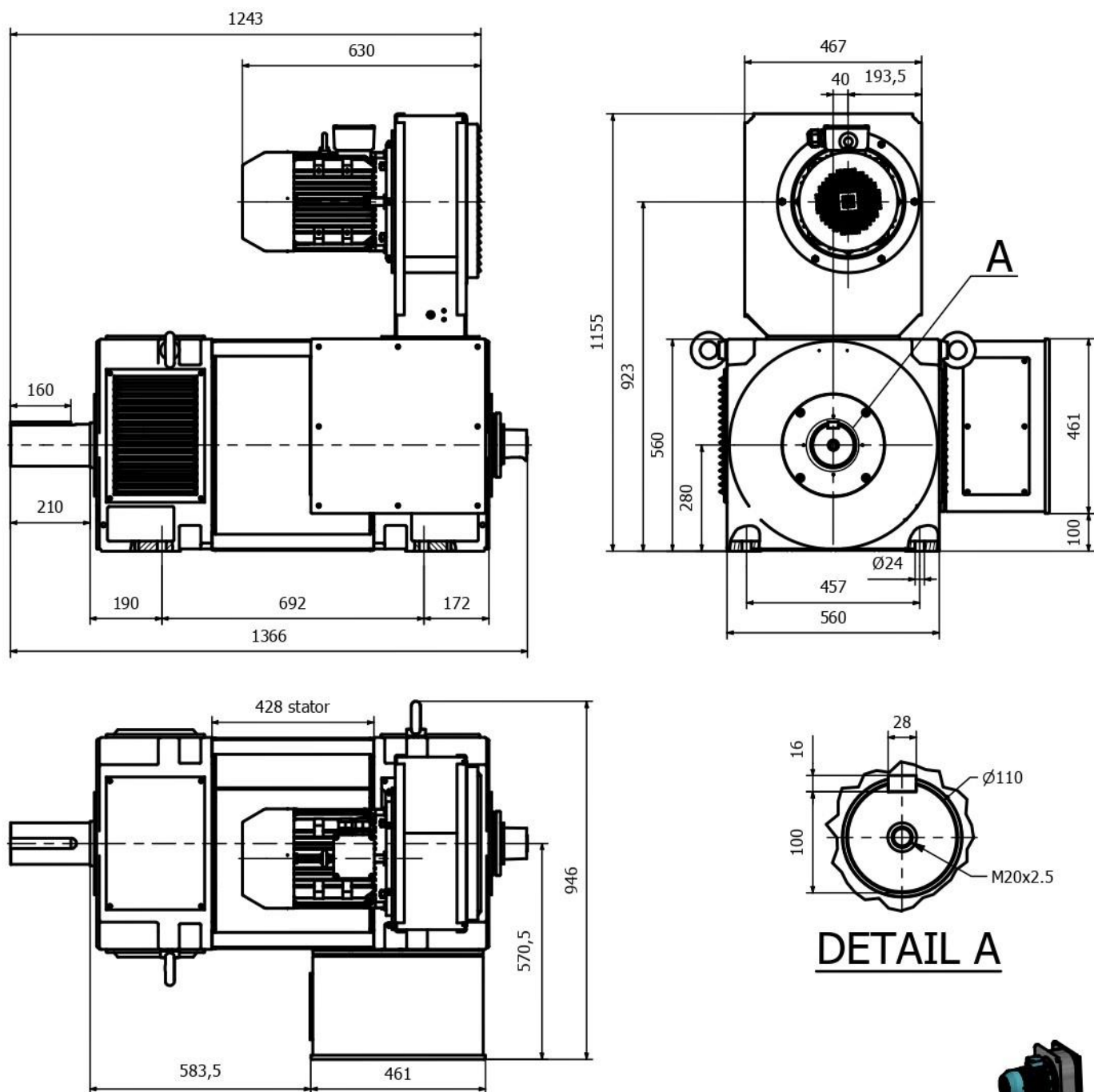
IC:416
IP: 55
IM: 1001
Pos: CDH/257



6.3.21 Motor dimensions VF 250 L IP55 radial version



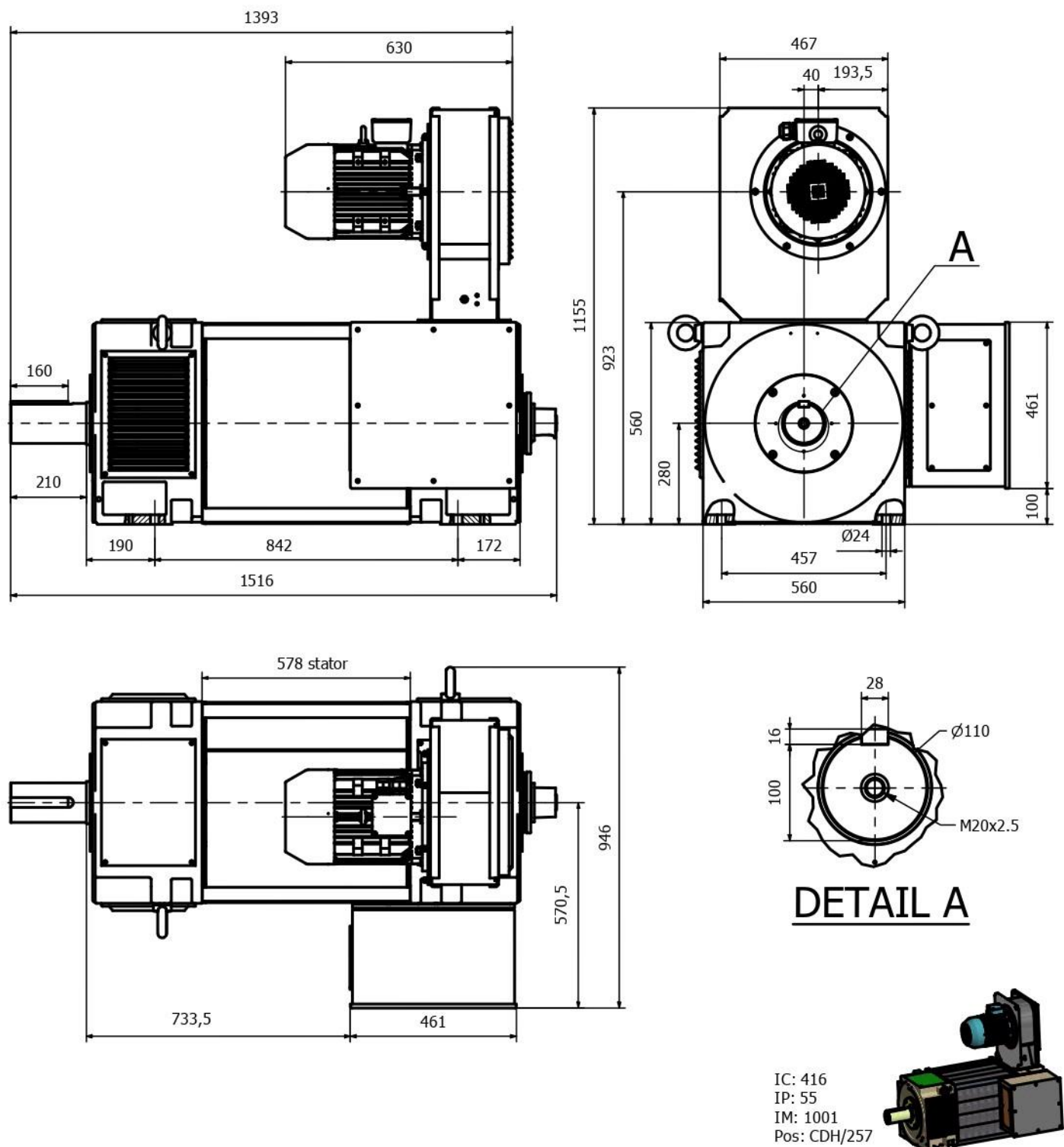
6.3.22 Motor dimensions VF 280 S IP55 radial version



IC: 416
IP: 55
IM: 1001
Pos: CDH/257

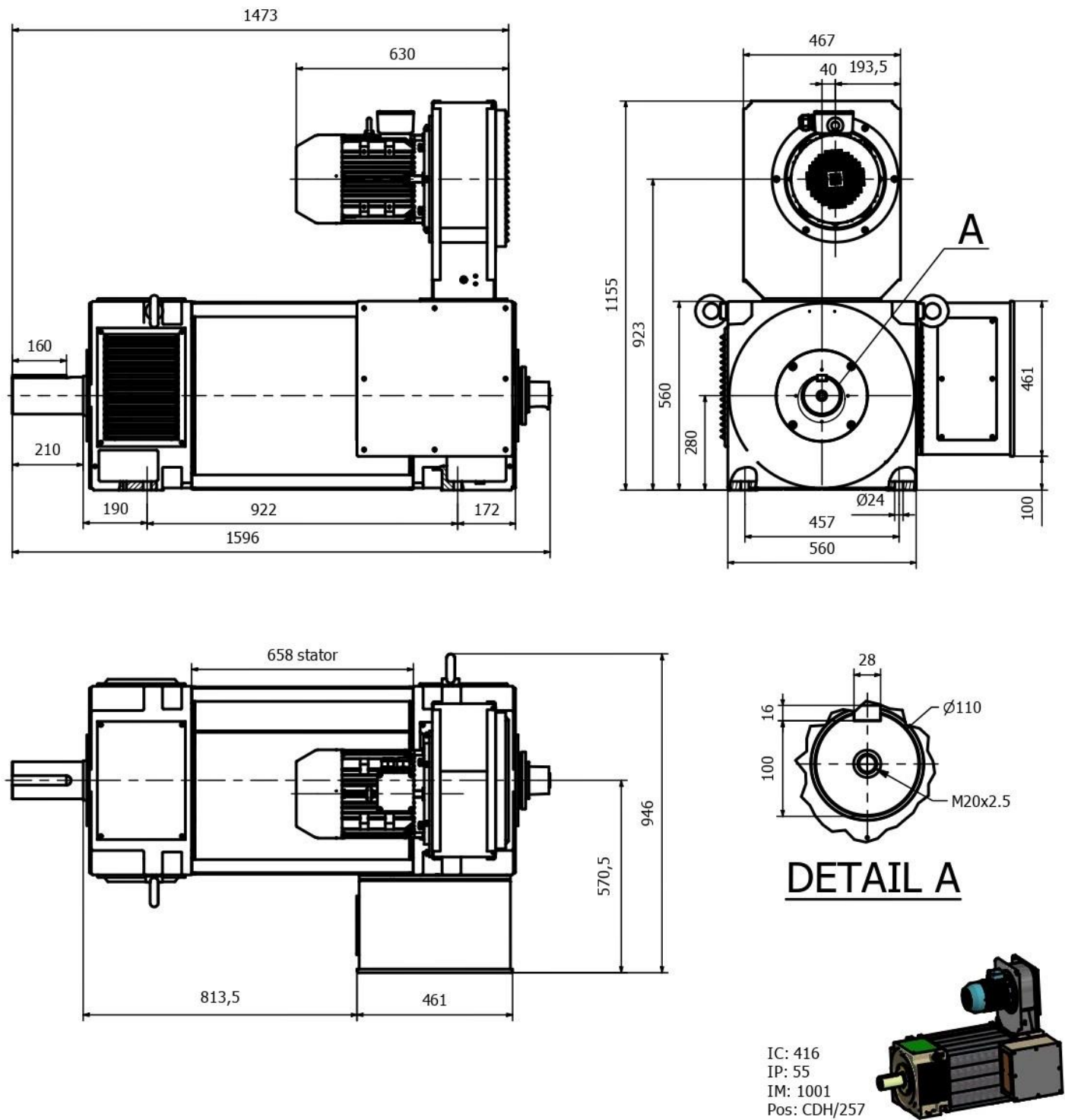


6.3.23 Motor dimensions VF 280 M IP55 radial version

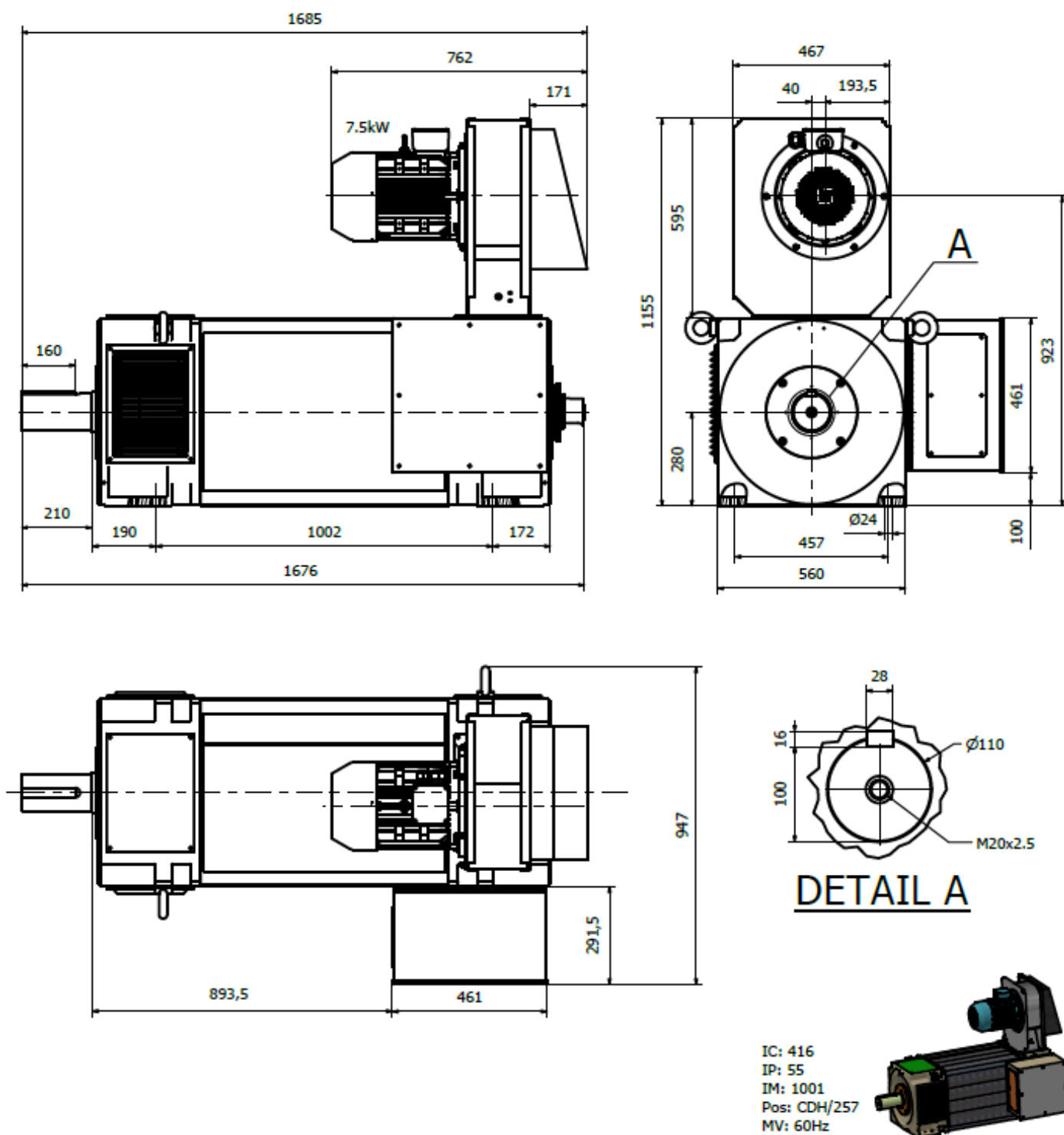


DETAIL A

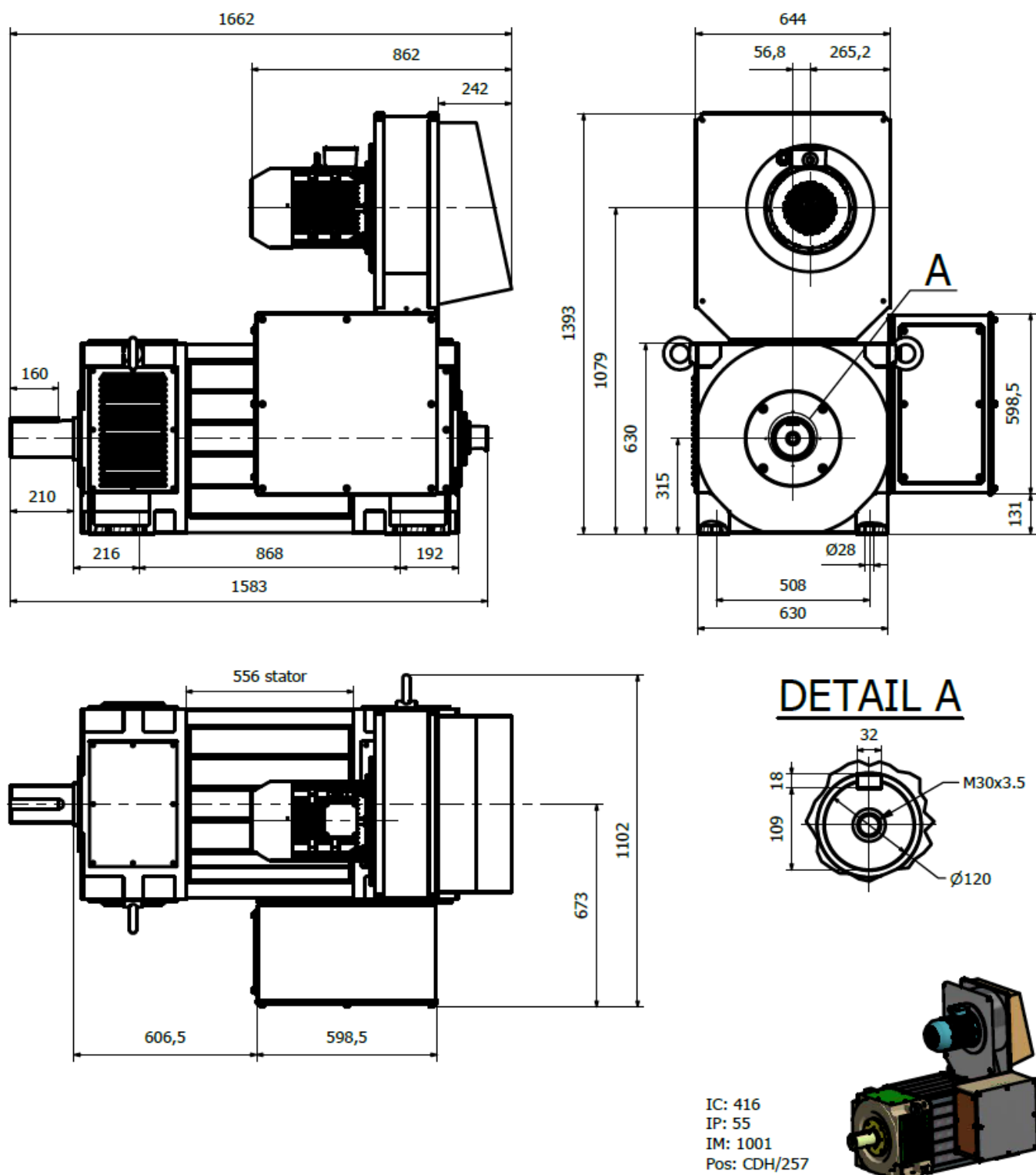
6.3.24 Motor dimensions VF 280 L IP55 radial version



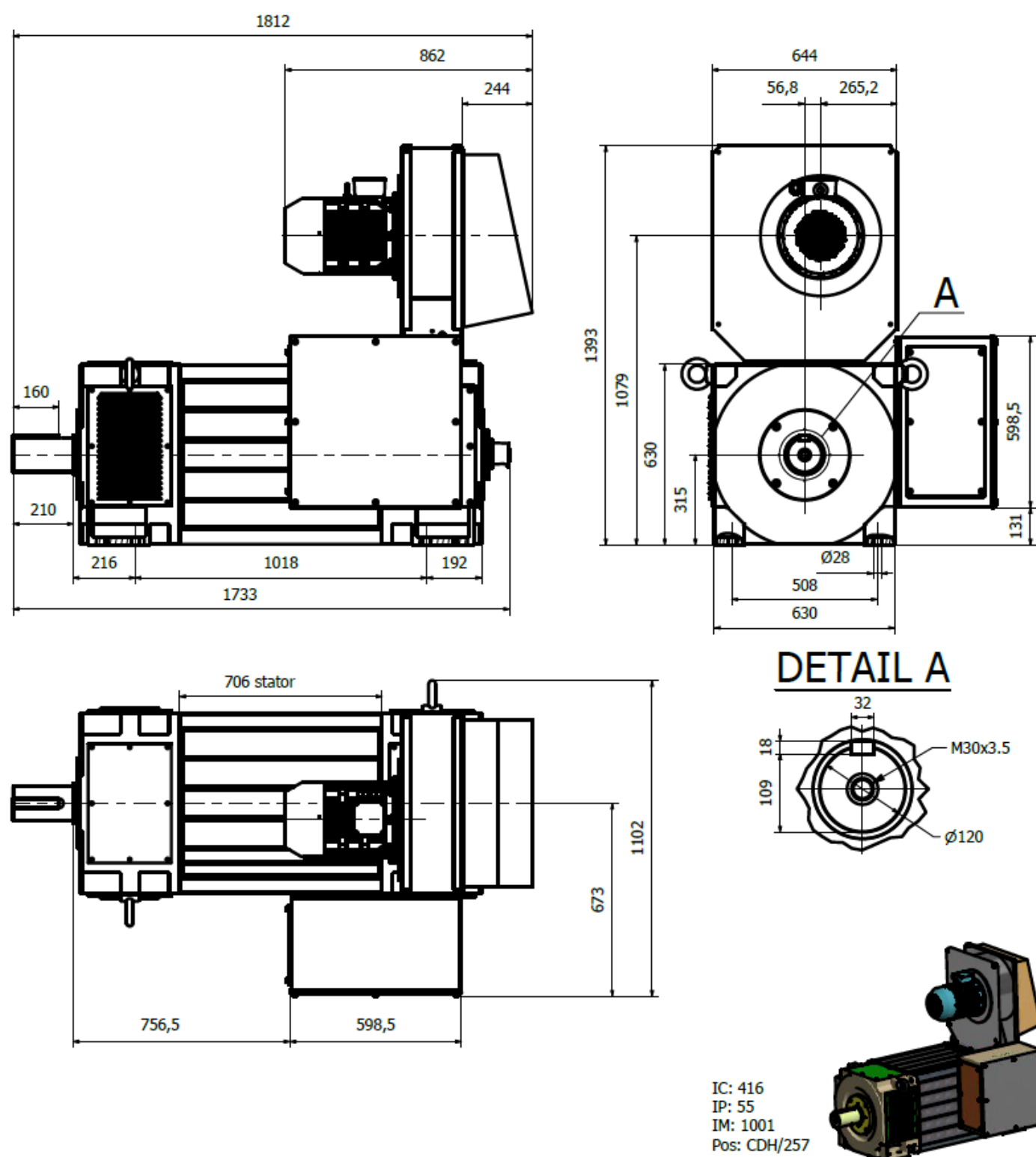
6.3.25 Motor dimensions VF 280 P IP55 radial version



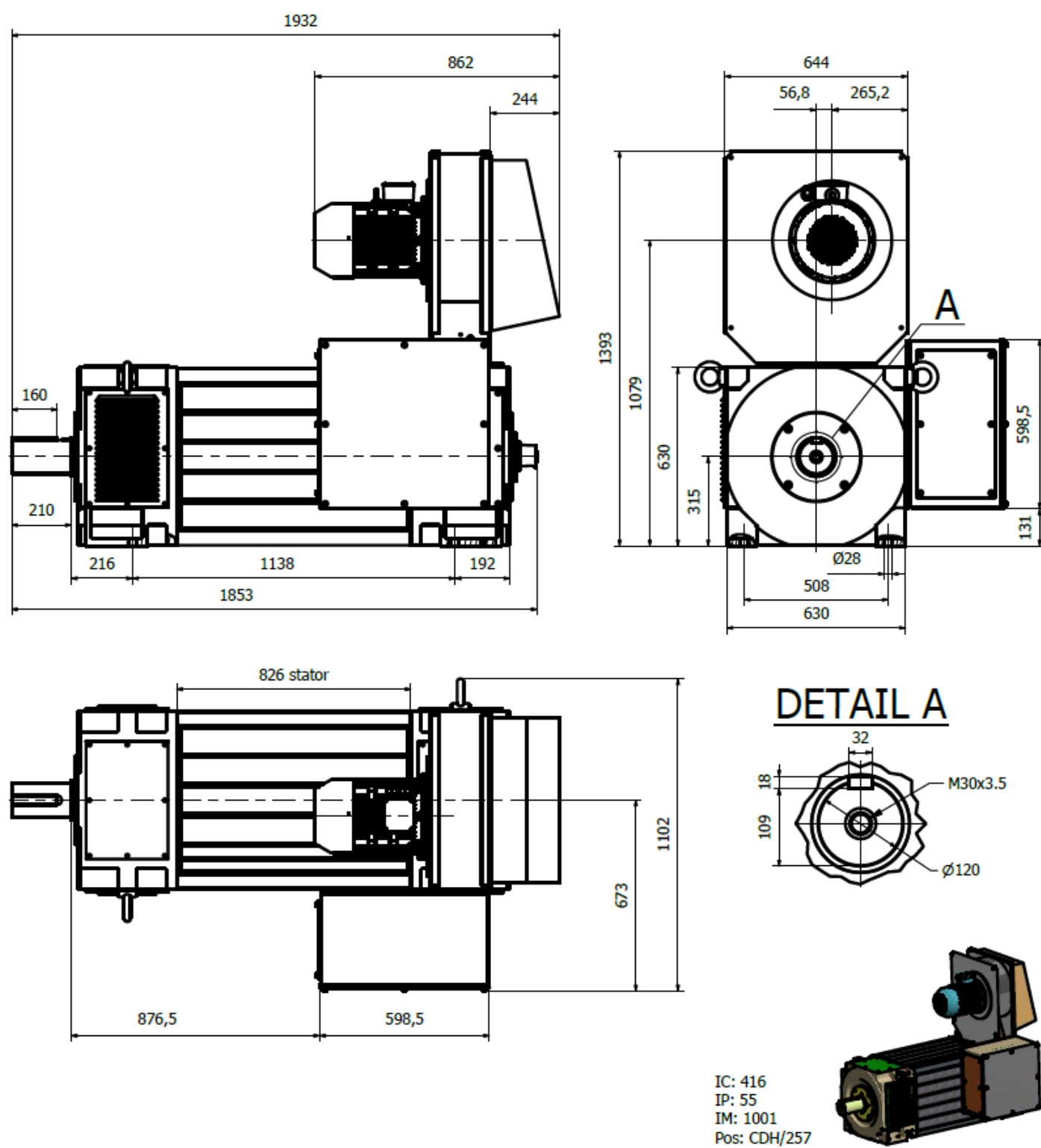
6.3.26 Motor dimensions VF 315 S IP55 radial version



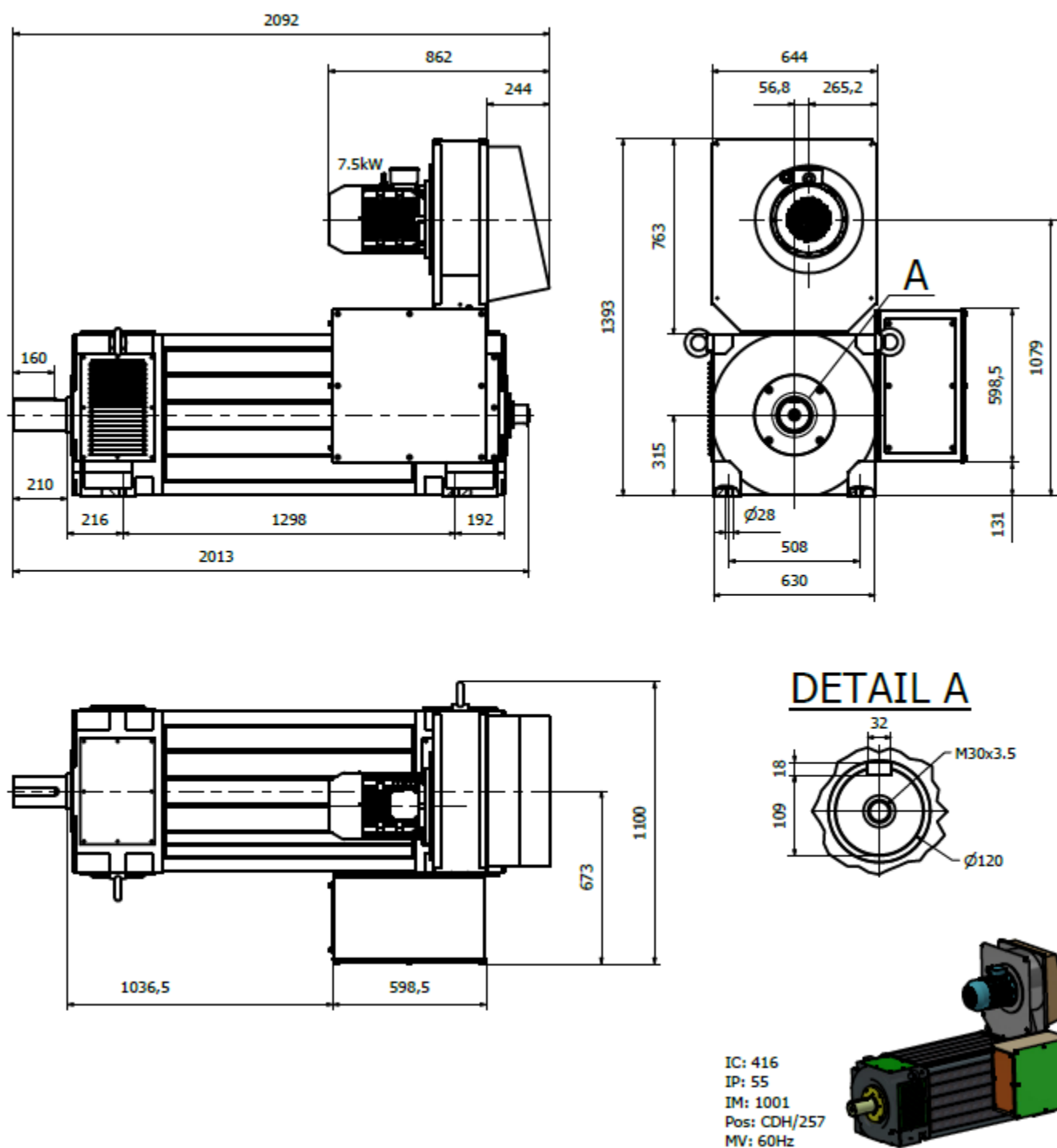
6.3.27 Motor dimensions VF 315 M IP55 radial version



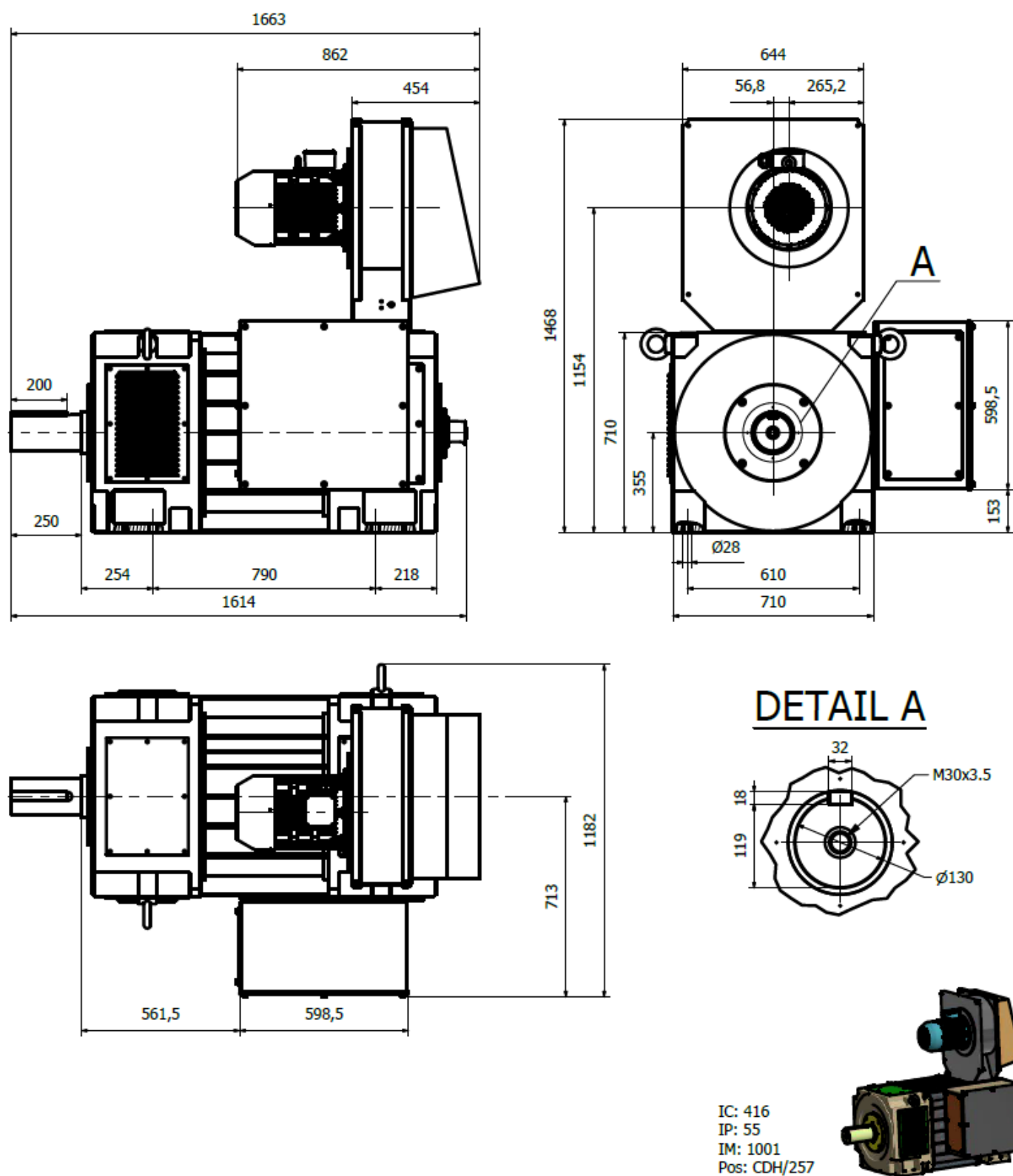
6.3.28 Motor dimensions VF 315 L IP55 radial version



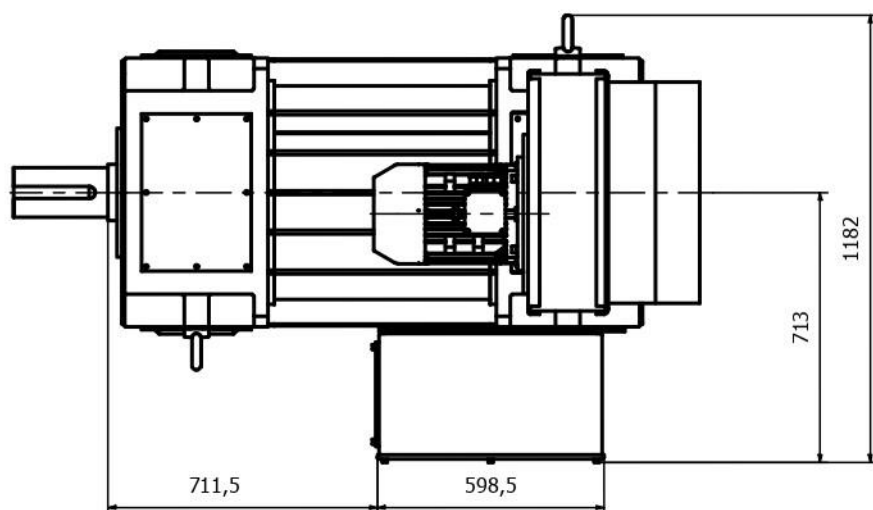
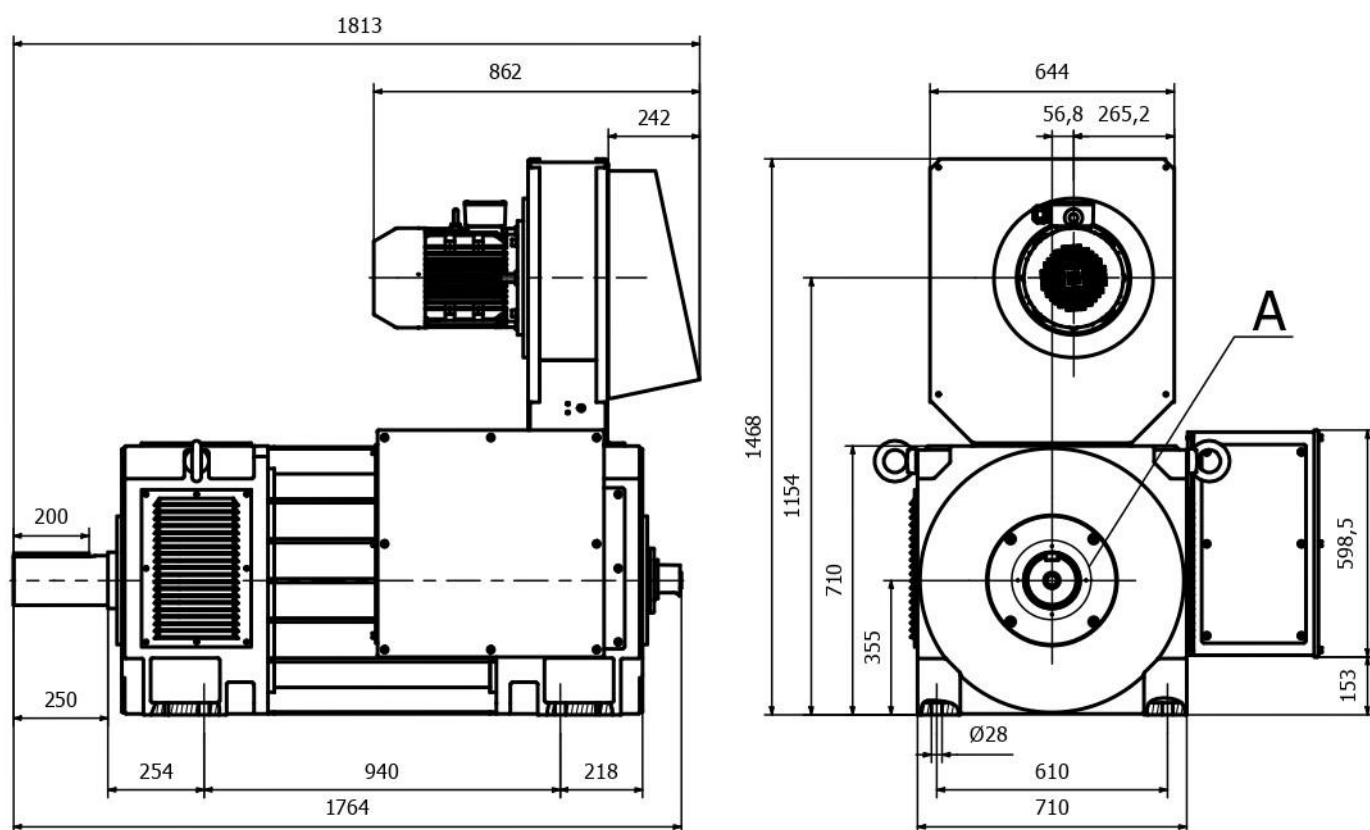
6.3.29 Motor dimensions VF 315 P IP55 radial version



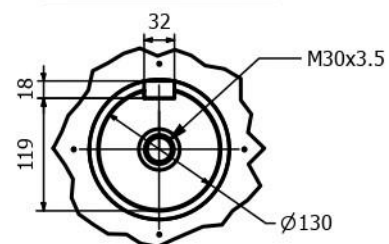
6.3.30 Motor dimensions VF 355 S IP55 radial version



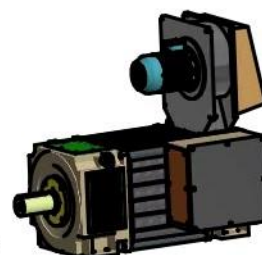
6.3.31 Motor dimensions VF 355 M IP55 radial version



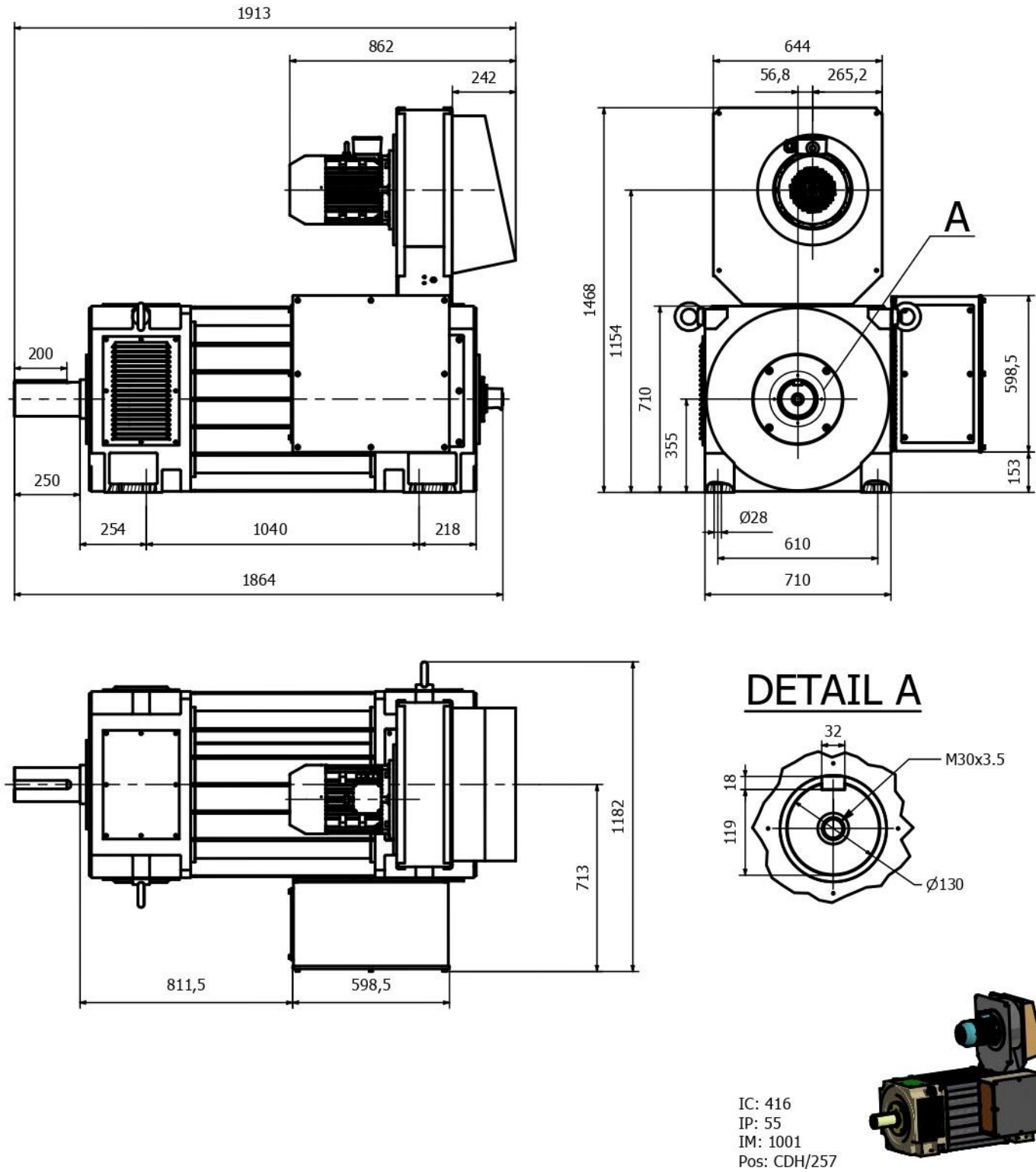
DETAIL A



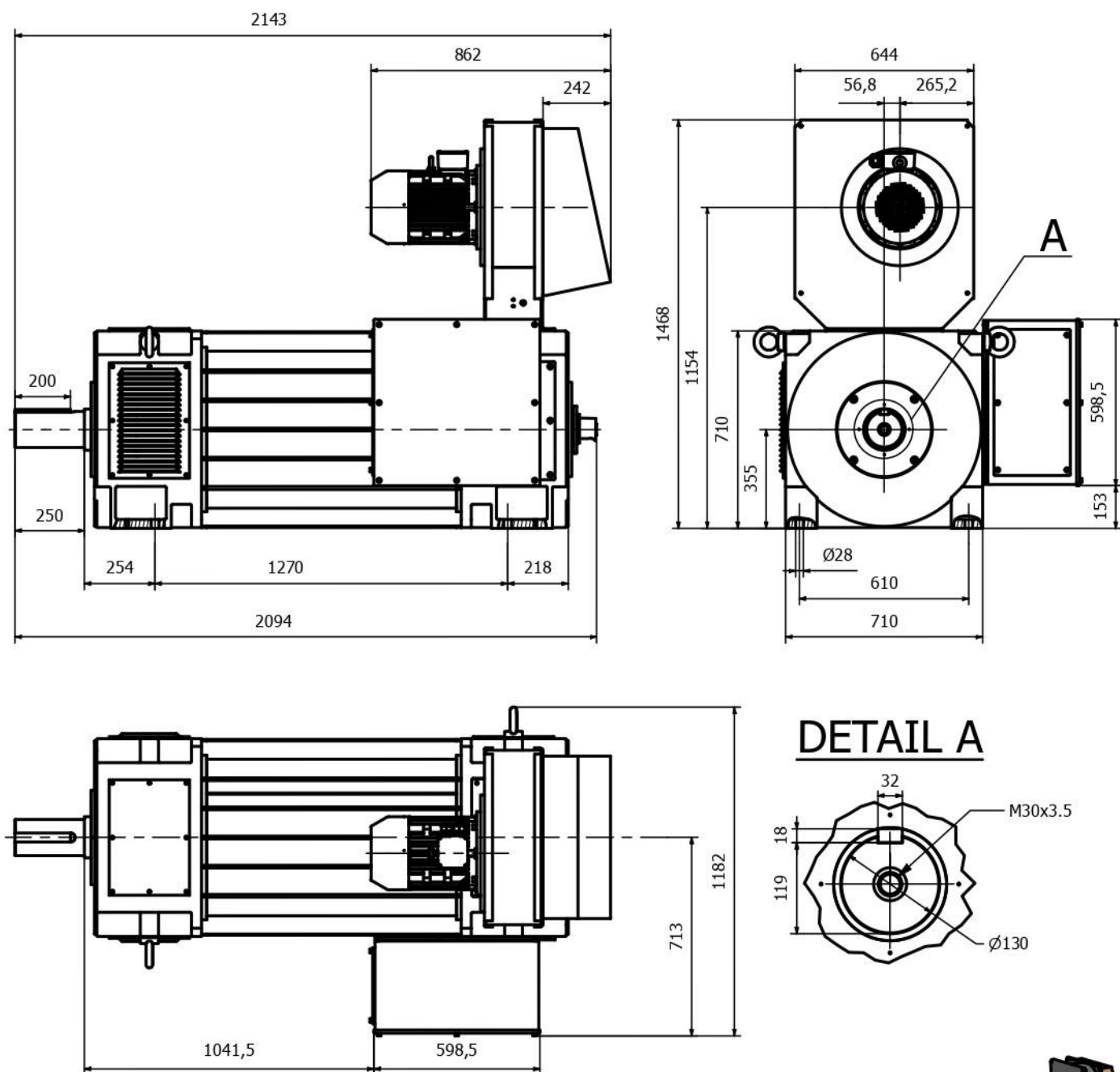
IC: 416
IP: 55
IM: 1001
Pos: CDH/257



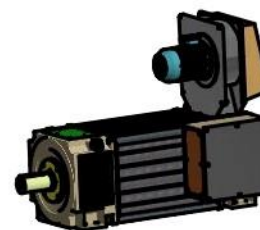
6.3.32 Motor dimensions VF 355 L IP55 radial version



6.3.33 Motor dimensions VF 355 P IP55 radial version



IC: 416
IP: 55
IM: 1001
Pos: CDH/257



7. Electrical connections

7.1 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:

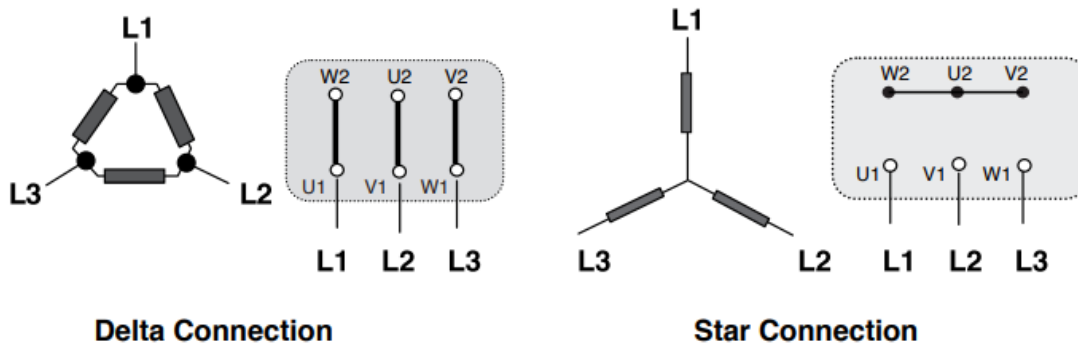
- Conductor ends should be stripped only to the lug or terminal block.
- The size of the lugs must be suitable for the terminals used on the terminal block.
- Comply with terminal tightening torque values.
- The protective conductor or grounding conductor must be connected.
- For large cross sections, 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%



7.2 Transducer (Encoder)

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

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 illustrated 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 connection SICK VFS60 / DFS60:



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

7.3 Thermal protector

Thermal protection of the motor by three PTC 150°C thermal protectors in series embedded in the windings is provided as standard. The connection terminal is normally located inside the terminal box.

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

WARNING!

Failure to connect the thermal probes will immediately void the product warranty.



8. Transportation and storage

8.1 Transport conditions

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.



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.

8.2 Storage conditions

For proper storage, the ambient temperature must be between -20°C and +70°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 before starting the motor for the first time, make sure it is at least 2 MΩ.

If not, dry the winding.

For drying the winding, the minimum temperature of the oven should be 80°C increasing by 5°C every hour until it reaches 105°C, then wait 1 hour at 105°C before removing the motor from the oven.

9. Installation

9.1 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.

When 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 long and large motors, an IM B35 (IM 2001) mounting is recommended to avoid bending and/or deformation of the flange/motor shaft. For mounting motors with IM B3 and IMB35 feet, the foundation must be flat, rigid and solid. Take care not to damage the windings during the mounting stages. Should IM B35 mounting not be possible for long motors, 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.

9.2 Ventilation

The motors are equipped with three-phase electric fan powered at 400Vac 50/60Hz.

Air flow can be supply or suction depending on the type of motor and ventilation chosen. La distanza minima tra la struttura della macchina e lo scarico dell'aria calda del motore deve essere almeno di 100mm.

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 engine. The air sucked in/blown out by the fan should always pass completely through the stator in the longitudinal direction and out the other side.

9.3 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!

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 appropriate filters be placed between the inverter and motor to reduce surges $\frac{dV}{dt}$, and the use of symmetrical shielded cables.

WARNING!

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



10. Maintenance

10.1 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.



Standard VF 160 and VF 180 motors mount pre-lubricated, maintenance-free ball bearings for life. Every 2000 hours of operation, it is a good idea 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 (VF 160 and VF 180 with roller bearings and all VF 225 - 355), the re-lubrication intervals suggested by the manufacturer must be observed:

Motor size	Motor speed (rpm)	Intervallo for regreasing (h)	Grease quantity (g)
VF 225	1500	5000	31
	3000	1500	
VF 250	1500	4500	38
	3000	1275	
VF 280	1500	4000	43
	3000	1050	
VF 315	1500	3500	52
	2700	900	
VF 355	1500	3000	61
	2700	700	

Please consult our technical department for more information.

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.

10.1 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

11. 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.

12. Certifications

12.1 Direttiva RoHS

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

12.2 Direttiva EMC

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.

12.3 Dichiarazione UE di Conformità

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

12.4 Sistema di gestione per la qualità ISO 9001:2015

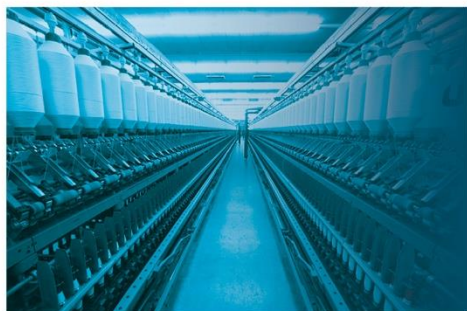
Most recent version of the document can be found on Brusatori website.

13. Contact

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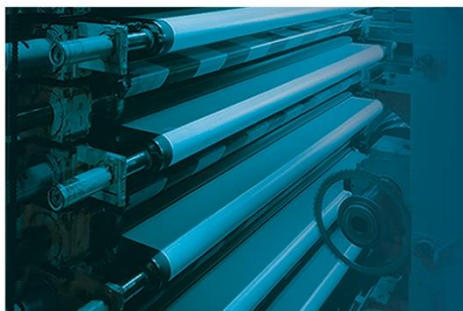
Notes

Applications



TEXTIL

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



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