



Totally Focused. Totally Independent.

## Technical Specification

---

# EC046 4 A



The world's largest  
independent producer of  
alternators 1 – 5,000kVA

**All electrical / mechanical data are to be considered as a reference and they can be modified without any notice.**

**This document is a propriety of Mecc Alte S.p.A.. All rights reserved.**



## Standards

Alternators are designed and produced within an ISO 9001 environment. The entire series is manufactured according to, and complies with, the most common specifications such as CEI 2-3, IEC 34-1, EN 60034-1, VDE 0530, BS 4999-5000, NF 51.111, NEMA MG 1-2011, ISO 8528-3. They also comply with other specific standards such as UL1446, UL 1004/4 and /B and CAN/CSA-C22.2 No14-95-No100-95.

## Windings and Performances

All windings are 2/3rds pitch to eliminate triplen harmonics within the voltage waveform and to avoid excessive neutral currents in certain parallel operating conditions. A fully interconnected aluminium or copper damper cage is supplied on the rotor of all models (excluding the ECP3 series).

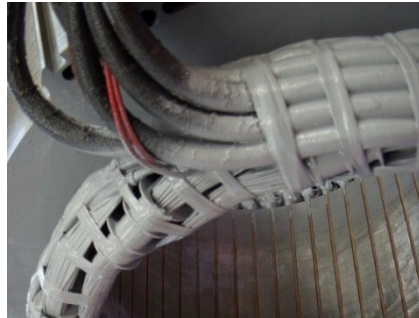
- ▶ 12 wire reconnectable:  
50Hz – 380V to 440V and 220/110V to 240/120V (de-rates may apply at certain voltages)  
60Hz – 380V to 480V and 220/110V to 240/120V (de-rates may apply at certain voltages)
- ▶ 6 wire reconnectable:  
50Hz – 380V to 440V and 220V to 240V (de-rates may apply at certain voltages)  
60Hz – 380V to 480V and 220V to 240V (de-rates may apply at certain voltages)

Winding Configurations	Standard		Special (dedicated)			
	12 wire Reconnectable	6 wire Reconnectable	380V and 600V 60Hz	690V 50/60Hz	220-240V 1ph 50Hz	220-240V 1ph 60Hz
ECP3 to ECO38	Std	Option	Option	Option	Option	Option
ECO40 to ECO46	Std	Option	Option	Option	Option (to ECO40)	
ECO47	Std 4 wires		Option	Option		
Insulation materials	Class H	Class H	Class H	Class H	Class H	Class H
High efficiency	Std	Std	Std	Std	Std	Std
High motor starting	>300%	>300%	>300%	>300%	>300%	>300%
THD (Total Harmonic Distortion)	Typically <3.5% full load L-L	Typically <3.0% full load L-L	Typically <3.5% full load L-L	Typically <3.5% full load L-L	Typically <4.5% full load L-N	Typically <4.5% full load L-N
Interference suppression	VDE 0875 G/N/K, EN61000-6-3, EN61000-6-2, others available on request					

## Winding Protection

There are various degrees of protection for the windings following the standard impregnation process, as can be seen here. The TOTAL+ butadienic black flexible coating is recommended for arduous applications.

Winding Protection:	STANDARD	STANDARD+	GREY	GREY+	TOTAL+
ECP3	Std	Option	Option	Option	Option
ECP28 and ECP32	-	Std	Option	Option	Option
NPE, ECP34 to ECO47	-	-	Std	Option	Option



Grey treatment (marinization) on the left, TOTAL+ treatment shown on the right. The EG43 grey varnish, is a high temperature insulating enamel that forms a tough and flexible film, with excellent moisture and chemical protection. It is water and oil proof, and also protects windings from abrasion. It is applied spraying an over coating layer over the impregnated winding, or dipping the stator in a varnish barrel for superior treatments.

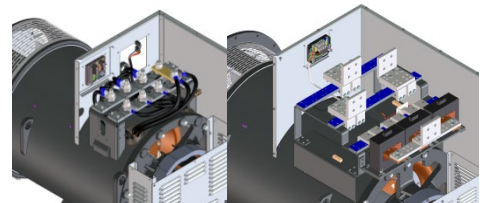
The TOTAL+ is a Mecc Alte protection system. It is the ultimate winding treatment that offers truly superior performances when the environment is really harsh, or the application very demanding. The TOTAL+ is also extremely resistant to the particle abrasion as it adsorbs the impacts.

## Design

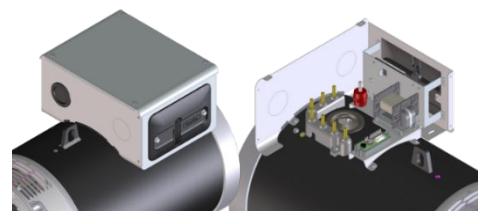
The robust mechanical structure withstands up to 5G in any direction and 9G vertically and its design permits easy access to the connections and components during routine maintenance check-ups. The mechanical design has used the most advanced FEM analysis. The materials used are: DD12 steel for the frame, C45 steel for the shaft and cast iron or aluminum pressure die cast for the end-brackets: fans are either aluminum die casted or nylon fiber glass loaded, UL compliant materials. Rotors are dynamically balanced according grades 6.3 (up to series 32) or 2.5 (from series 34 onwards) of ISO 1940-1.

## Terminals and Terminal Box

Easy access to regulators is assured through a pull out drawer or a drop down panel to allow safer adjustment. Large terminal boxes allow easy access of power cables, in the ECO43 and ECO46 higher power ranges the terminal allow the convenient choice of power cable or busbar connection with versatility of entry and connection. Current transformers are available as an option on series ECO 40, 43, 46 and 47 with single or dual output.



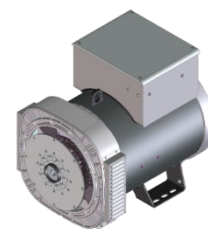
On C type family has been installed a new AVR panel. Terminal boards have been redesigned into a special L configuration, specifically to ease customer wiring; with this kind of terminal board it is possible to place a second terminal board in order to get 12 available terminals. Current transformers are available as an option on series ECO38 with single or dual output.



## Ingress Protection

In addition to the protection on the windings themselves, alternators can increase the protection on the inlet side. Standard level is IP23 but the following solutions are also available: IP23 DP with inlet filters, IP23 with only terminal box in IP45, IP43 and IP45. Derates may be applied.

Info: [https://www.meccalte.com/downloads/MA0605\\_Bulletin\\_IP.pdf](https://www.meccalte.com/downloads/MA0605_Bulletin_IP.pdf)





## Excitation and Regulation Systems

All ECP/ECO series have MAUX auxiliary winding to power the digital regulator. Both DSR and the DER1 are available to connect to PC through the DxR2 USB interface and DxR TERMINAL software to interrogate/download alarms & settings for analysis or for cloning other regulators. DER2 has got an integrated USB connection and can be connected to the PC without any optional connection boards. More settings such as LAMS, digital RAM based synchronous external control and soft start are obtainable through the DxR connection. Simple analogue potentiometers are available for the more usual adjustments.

Excitation Systems	DSR	DER1	DER2
ECP3 to ECO38	Std	Option	Option
ECO40 to ECO46	-	Std	Option
ECO47	-	-	Std
Parallel Operation	√	√	√
Mains Parallel	√	√	√
3 Phase Sensing (rms)	-	√	√
Accuracy	+/-1%	+/-0.5%	+/-0.5%
Remote Voltage Control	√	√	√
Alarm Log	√	√	√
Analogue and Digital Configurable	√	√	√
LAMS (Load Acceptance V/f)	√	√	√
APO (Active Protection Output)	√	√	√
Soft Start	√	√	√
High dynamic response	-	-	√
USB connection without external boards	-	-	√

For a given motor start duty a smaller generator may be selected – as it has lower subtransient reactance values for non-linear loads. The whole range from 6.5 to 3400kVA is capable of >300% sustained short circuit current for up to 20 seconds.

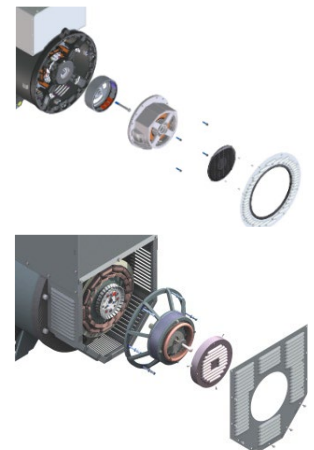
## Optional PMG

The Mecc Alte PMG is available on ECP28, ECP30, ECP32, ECP34 and ECO38 as factory-fitted option; alternatively, only the predisposition for the retrofit, for subsequent assembly, is available on option.

On ECO 40, 43 and 46 series it is available as a factory-fitted or retro-fitted options.

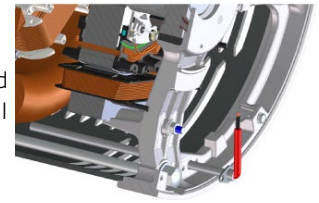
For ECO47 PMG is standard.

The complete AVR range is fully compatible with both MAUX and PMG systems, this minimises spare part management and flexibility of stock as one AVR suits all applications. The PMG is delivering the same amount of kVA available with the MAUX.



## Dew Heater

Our entire range can be equipped with anti-condensation resistors of adequate power and sized for the alternator. Voltage for heaters must be specified when ordering. New cylindrical cartridge style heaters are available on request and it can be retrofitted.



## Accessories

Additional optionals can be fit on our alternator series, such as PTC thermistors or PT100 both on windings and bearings, dew heaters, high and low profile of terminal boxes (on most series), parallel devices, current and voltage transformers, air filters, IP43 and IP45 protections and many others.

For more info visit: <https://www.meccalte.com/en/products/alternators/accessories/c-type-accessories>

## Deration coefficients

Altitude (meters)	Ambient temperature (Celsius)							
	25	40	45	50	55	60	65	70
$\leq 1000$	1.07	1	0.96	0.93	0.91	0.89	0.85	0.82
$> 1000 \leq 1500$	1.01	0.96	0.92	0.89	0.87	0.84	0.81	0.77
$> 1500 \leq 2000$	0.96	0.91	0.87	0.84	0.83	0.79	0.77	0.73
$> 2000 \leq 3000$	0.90	0.85	0.81	0.78	0.76	0.73	0.71	0.68
$> 3000 \leq 4000$	0.84	0.78	0.75	0.73	0.70	0.68	0.66	0.62
$> 4000 \leq 5000$	0.78	0.72	0.69	0.67	0.65	0.62	0.59	0.56
$> 5000 \leq 6000$	0.70	0.65	0.63	0.61	0.58	0.55	0.53	0.50

## Notes on short circuit curves

The indicated coefficients have to be used to correct the three phase short circuit curves values as a function of the rated voltage.

The indicated coefficient have to be used to correct the three phase short circuit curves values as a function of the type of short circuit voltage.

50 Hz		60 Hz			3 phase	2 phase L-L	1 phase L-N
Voltage	Factor	Voltage	Factor				
380	0.93X	415	0.85X	<i>Istantaneous</i>	1X	0.87X	1.30X
400	1X	440	0.90X	<i>Minimum</i>	1X	1.80X	3.20X
415	1.04X	460	0.95X	<i>Sustained</i>	1X	1.50X	2.50X
440	1.10X	480	1X	<i>Max Duration</i>	20 sec.	10 sec.	4 sec.

All the curves are shown for series or parallel star connection at 400V 50 Hz or 480V 60 Hz. If the unit is reconnected from series to parallel star, the additional coefficient is 2X. From series star to series delta, it is 1.72X. From series star to parallel delta, it is 3.44X.



## General characteristics

Pole number	4	Insulation class	H
Phase number	3	Protection class	IP23
Number of wires	12	NDE Bearing type	6324.2RS
Execution	Brushless	DE Bearing type	6330
Regulator type	DER-1/A	Maximum Overspeed	2250
Winding pitch	2/3	Altitude	0-1000
Code voltage reference	T0405P3	Balancing	ISO1940-1

## Ratings 50Hz

kVA / kW @ Temp. Rise / Ambient °C - 0.8 PF		STANDBY-163/27				STANDBY-150/40				H-125/40				F-105/40				B-80/40			
Series		760V	800V	830V	880V	760V	800V	830V	880V	760V	800V	830V	880V	760V	800V	830V	880V	760V	800V	830V	880V
Parallel Star YY		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
Series Delta Δ		440V	460V	480V	508V	440V	460V	480V	508V	440V	460V	480V	508V	440V	460V	480V	508V	440V	460V	480V	508V
Parallel Delta ΔΔ		220V	230V	240V	254V	220V	230V	240V	254V	220V	230V	240V	254V	220V	230V	240V	254V	220V	230V	240V	254V
<b>ECO46 154 A</b>	<b>kVA</b>	1650	<b>1650</b>	1650	1400	1552	<b>1552</b>	1552	1340	1500	<b>1500</b>	1500	1300	1350	<b>1350</b>	1350	1170	1200	<b>1200</b>	1200	1040
	<b>kW</b>	1320	<b>1320</b>	1320	1120	1242	<b>1242</b>	1242	1072	1200	<b>1200</b>	1200	1040	1080	<b>1080</b>	1080	936	960	<b>960</b>	960	832
<b>ECO46 1.554 A</b>	<b>kVA</b>	1800	<b>1800</b>	1800	1620	1700	<b>1700</b>	1700	1545	1650	<b>1650</b>	1650	1500	1480	<b>1480</b>	1480	1360	1320	<b>1320</b>	1320	1200
	<b>kW</b>	1440	<b>1440</b>	1440	1296	1360	<b>1360</b>	1360	1236	1320	<b>1320</b>	1320	1200	1184	<b>1184</b>	1184	1088	1056	<b>1056</b>	1056	960
<b>ECO46 254 A</b>	<b>kVA</b>	1944	<b>1944</b>	1944	1720	1863	<b>1863</b>	1863	1650	1800	<b>1800</b>	1800	1600	1600	<b>1600</b>	1600	1440	1440	<b>1440</b>	1440	1280
	<b>kW</b>	1555	<b>1555</b>	1555	1376	1490	<b>1490</b>	1490	1320	1440	<b>1440</b>	1440	1280	1280	<b>1280</b>	1280	1152	1152	<b>1152</b>	1152	1024
<b>ECO46 1L4 A</b>	<b>kVA</b>	2268	<b>2268</b>	2268	1990	2173	<b>2173</b>	2173	1900	2100	<b>2100</b>	2100	1850	1900	<b>1900</b>	1900	1660	1680	<b>1680</b>	1680	1480
	<b>kW</b>	1814	<b>1814</b>	1814	1592	1738	<b>1738</b>	1738	1520	1680	<b>1680</b>	1680	1480	1520	<b>1520</b>	1520	1328	1344	<b>1344</b>	1344	1184
<b>ECO46 1.5L4 A</b>	<b>kVA</b>	2500	<b>2500</b>	2500	2375	2380	<b>2380</b>	2380	2275	2300	<b>2300</b>	2300	2200	2050	<b>2050</b>	2050	1950	1840	<b>1840</b>	1840	1760
	<b>kW</b>	2000	<b>2000</b>	2000	1900	1904	<b>1904</b>	1904	1820	1840	<b>1840</b>	1840	1760	1640	<b>1640</b>	1640	1560	1472	<b>1472</b>	1472	1408
<b>ECO46 2L4 A</b>	<b>kVA</b>	2700	<b>2700</b>	2700	2450	2588	<b>2588</b>	2588	2350	2500	<b>2500</b>	2500	2280	2250	<b>2250</b>	2250	2050	2000	<b>2000</b>	2000	1824
	<b>kW</b>	2160	<b>2160</b>	2160	1960	2070	<b>2070</b>	2070	1880	2000	<b>2000</b>	2000	1824	1800	<b>1800</b>	1800	1640	1600	<b>1600</b>	1600	1459
<b>ECO46 VL4 A</b>	<b>kVA</b>	2916	<b>3024</b>	2916	2150	2795	<b>2899</b>	2795	2060	2700	<b>2800</b>	2700	2000	2400	<b>2500</b>	2400	1780	2160	<b>2240</b>	2160	1600
	<b>kW</b>	2333	<b>2419</b>	2333	1720	2236	<b>2319</b>	2236	1648	2160	<b>2240</b>	2160	1600	1920	<b>2000</b>	1920	1424	1728	<b>1792</b>	1728	1280

## Ratings 60Hz

kVA / kW @ Temp. Rise / Ambient °C - 0.8 PF		STANDBY-163/27				STANDBY-150/40				H-125/40				F-105/40				B-80/40			
Series		830V	880V	920V	960V	830V	880V	920V	960V	830V	880V	920V	960V	830V	880V	920V	960V	830V	880V	920V	960V
Parallel Star YY		415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V
Series Delta Δ		480V	504V	530V	554V	480V	504V	530V	554V	480V	504V	530V	554V	480V	504V	530V	554V	480V	504V	530V	554V
Parallel Delta ΔΔ		240V	254V	265V	277V	240V	254V	265V	277V	240V	254V	265V	277V	240V	254V	265V	277V	240V	254V	265V	277V
<b>ECO46 154 A</b>	<b>kVA</b>	1728	1847	1944	<b>1944</b>	1656	1770	1875	<b>1875</b>	1600	1710	1800	<b>1800</b>	1440	1530	1620	<b>1620</b>	1280	1368	1440	<b>1440</b>
	<b>kW</b>	1382	1478	1555	<b>1555</b>	1325	1416	1500	<b>1500</b>	1280	1368	1440	<b>1440</b>	1152	1224	1296	<b>1296</b>	1024	1094	1152	<b>1152</b>
<b>ECO46 1.554 A</b>	<b>kVA</b>	1870	2030	2140	<b>2140</b>	1782	1936	2040	<b>2040</b>	1730	1880	1980	<b>1980</b>	1570	1690	1780	<b>1780</b>	1384	1504	1584	<b>1584</b>
	<b>kW</b>	1496	1624	1712	<b>1712</b>	1426	1549	1632	<b>1632</b>	1384	1504	1584	<b>1584</b>	1256	1352	1424	<b>1424</b>	1107	1203	1267	<b>1267</b>
<b>ECO46 254 A</b>	<b>kVA</b>	2116	2213	2332	<b>2332</b>	2028	2122	2236	<b>2236</b>	1950	2050	2160	<b>2160</b>	1750	1820	1920	<b>1920</b>	1560	1640	1728	<b>1728</b>
	<b>kW</b>	1693	1770	1866	<b>1866</b>	1622	1698	1789	<b>1789</b>	1560	1640	1728	<b>1728</b>	1400	1456	1536	<b>1536</b>	1248	1312	1382	<b>1382</b>
<b>ECO46 1L4 A</b>	<b>kVA</b>	2480	2582	2722	<b>2722</b>	2370	2473	2608	<b>2608</b>	2300	2390	2520	<b>2520</b>	2070	2150	2280	<b>2280</b>	1840	1912	2016	<b>2016</b>
	<b>kW</b>	1984	2066	2178	<b>2178</b>	1896	1978	2086	<b>2086</b>	1840	1912	2016	<b>2016</b>	1656	1720	1824	<b>1824</b>	1472	1530	1613	<b>1613</b>
<b>ECO46 1.5L4 A</b>	<b>kVA</b>	2613	2829	2980	<b>2980</b>	2508	2715	2860	<b>2860</b>	2420	2620	2760	<b>2760</b>	2150	2330	2460	<b>2460</b>	1936	2096	2208	<b>2208</b>
	<b>kW</b>	2090	2263	2384	<b>2384</b>	2006	2172	2288	<b>2288</b>	1936	2096	2208	<b>2208</b>	1720	1864	1968	<b>1968</b>	1549	1677	1766	<b>1766</b>
<b>ECO46 2L4 A</b>	<b>kVA</b>	2920	3067	3240	<b>3240</b>	2800	2939	3105	<b>3105</b>	2700	2840	3000	<b>3000</b>	2430	2550	2700	<b>2700</b>	2160	2272	2400	<b>2400</b>
	<b>kW</b>	2336	2454	2592	<b>2592</b>	2240	2351	2484	<b>2484</b>	2160	2272	2400	<b>2400</b>	1944	2040	2160	<b>2160</b>	1728	1818	1920	<b>1920</b>
<b>ECO46 VL4 A</b>	<b>kVA</b>	3136	3375	3575	<b>3683</b>	3007	3234	3426	<b>3529</b>	2900	3125	3310	<b>3410</b>	2600	2800	2980	<b>3050</b>	2320	2500	2648	<b>2728</b>
	<b>kW</b>	2509	2700	2860	<b>2946</b>	2406	2587	2741	<b>2823</b>	2320	2500	2648	<b>2728</b>	2080	2240	2384	<b>2440</b>	1856	2000	2118	<b>2182</b>

## Reactance & Time constants- Class H / 400V

Unsaturated (ref. EN60034-4)			ECO46 154 A	ECO46 1.554 A	ECO46 254 A	ECO46 1L4 A	ECO46 1.5L4 A	ECO46 2L4 A	ECO46 VL4 A
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	273,5	296,4	273,7	253,8	289,1	270,4	247,5
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	26,5	29,3	25,9	25,3	27,9	25,6	25,5
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	13,4	14,3	12,7	12,3	13,6	12,4	12,1
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	177,8
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	177,8
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	29,3	32,6	28,9	27,6	29,3	27	22,3
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	19,2	20,5	18,1	17,5	19,4	17,5	14,9
<b>X<sub>0</sub></b>	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,74
<b>Saturated</b>									
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	227	246	227,2	210,7	240	224,4	205,4
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	22	24,3	21,5	21	23,2	21,2	21,2
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	11,1	11,9	10,5	10,2	11,3	10,3	10
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	145	157,5	141,6	147,6	170,9	158,9	147,6
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	145	157,5	141,6	147,6	170,9	158,9	147,6
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	24,3	27,1	24	22,9	24,3	22,4	18,5
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	15,9	17	15	14,5	16,1	14,5	12,4
<b>X<sub>0</sub></b>	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,74
<b>K<sub>cc</sub></b>	Short circuit ratio		0,44	0,41	0,44	0,47	0,42	0,45	0,49
<b>T'<sub>d</sub></b>	Transient time constant	sec	0,25	0,264	0,258	0,265	0,27	0,275	0,291
<b>T''<sub>d</sub></b>	Subtransient time constant	sec	0,021	0,024	0,023	0,022	0,022	0,024	0,035
<b>T'<sub>do</sub></b>	Open circuit time constant	sec	9,5	10,8	10,4	11	10,4	12,5	13,1
<b>T<sub>a</sub></b>	Armature time constant	sec	0,027	0,03	0,029	0,031	0,031	0,034	0,04

## Additional information - Class H / 400V

<b>I<sub>o</sub></b>	Excitation current at no load	A	0,7	1,2	0,8	0,9	1,3	1,0	1,4
<b>I<sub>c</sub></b>	Excitation current at full load	A	3,2	3,6	3,2	3,1	3,7	3,1	3,2
<b>Overload</b>									
Overload per 20 sec. PRP or 10 sec. COP						%			
						300			
Heat dissipation		W	47401	50716	53776	59130	62792	66116	71662
Telephone Harmonic Factor - THF		%	<2	<2	<2	<2	<2	<2	<2
Waveform Distors.(THD) full load LL/LN		%	3 / 2,9	3,3 / 3,2	3,4 / 3,3	3,3 / 2,9	2,8 / 2,8	2,7 / 2,8	2,6 / 2,5
Waveform Distors.(THD) no load LL/LN		%	2,5 / 2,4	2,9 / 3	2,9 / 2,8	2,7 / 2,6	2,9 / 2,9	2,8 / 2,6	2,7 / 2,5



## Reactance & Time constants- Class H / 480V

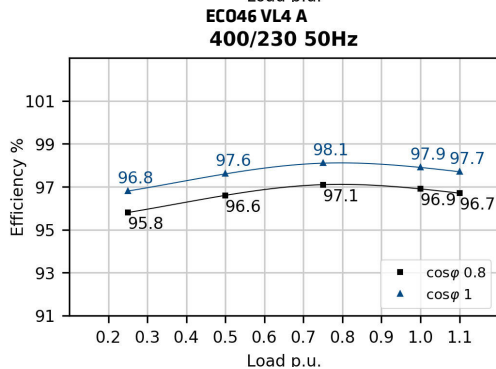
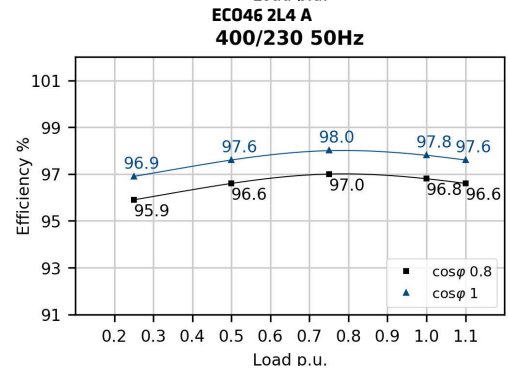
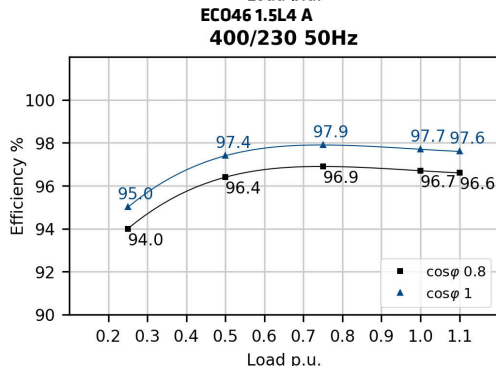
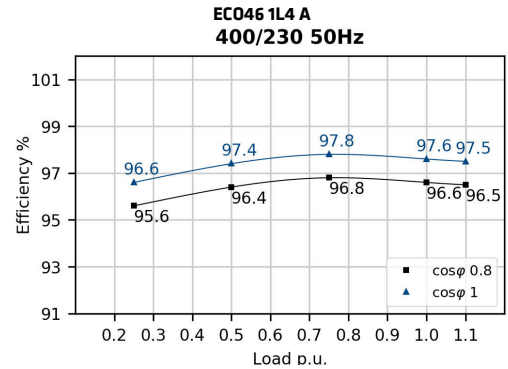
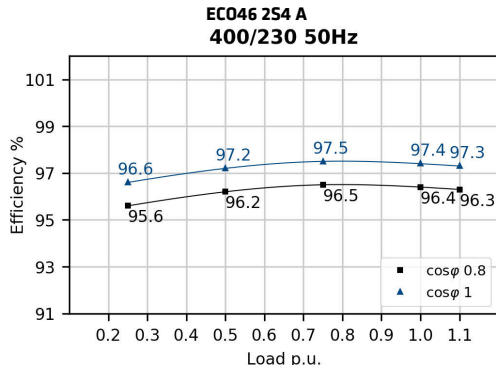
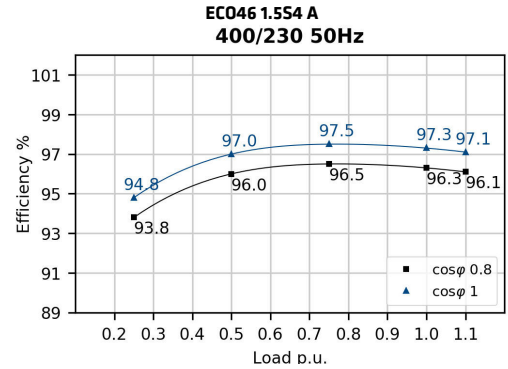
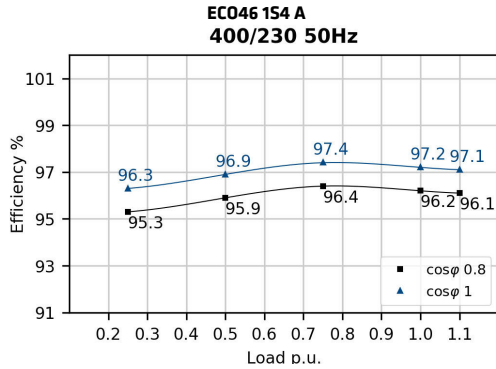
Unsaturated (ref. EN60034-4)			ECO46 1S4 A	ECO46 1.5S4 A	ECO46 2S4 A	ECO46 1L4 A	ECO46 1.5L4 A	ECO46 2L4 A	ECO46 VL4 A
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	273,5	296,4	273,7	253,8	289,1	270,4	251,2
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	26,5	29,3	25,9	25,3	27,9	25,6	25,9
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	13,4	14,3	12,7	12,3	13,6	12,4	12,3
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	180,4
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	180,4
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	29,3	32,6	28,9	27,6	29,3	27	22,6
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	19,2	20,5	18,1	17,5	19,4	17,5	15,1
<b>X<sub>0</sub></b>	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,8
<b>Saturated</b>									
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	227	246	227,2	210,7	240	224,4	208,5
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	22	24,3	21,5	21	23,2	21,2	21,5
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	11,1	11,9	10,5	10,2	11,3	10,3	10,2
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	145	157,5	141,6	147,6	170,9	158,9	149,7
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	145	157,5	141,6	147,6	170,9	158,9	149,7
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	24,3	27,1	24	22,9	24,3	22,4	18,8
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	15,9	17	15	14,5	16,1	14,5	12,5
<b>X<sub>0</sub></b>	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,8
<b>K<sub>cc</sub></b>	Short circuit ratio		0,44	0,41	0,44	0,47	0,42	0,45	0,48
<b>T'<sub>d</sub></b>	Transient time constant	sec	0,25	0,264	0,258	0,265	0,27	0,275	0,291
<b>T''<sub>d</sub></b>	Subtransient time constant	sec	0,021	0,024	0,023	0,022	0,022	0,024	0,035
<b>T'<sub>do</sub></b>	Open circuit time constant	sec	9,5	10,8	10,4	11	10,4	12,5	13,1
<b>T<sub>a</sub></b>	Armature time constant	sec	0,027	0,03	0,029	0,031	0,031	0,034	0,04

## Additional information - Class H / 480V

<b>I<sub>o</sub></b>	Excitation current at no load	A	0,7	1,2	0,8	0,9	1,3	1,0	1,4
<b>I<sub>c</sub></b>	Excitation current at full load	A	3,2	3,6	3,2	3,1	3,7	3,1	3,2
<b>Overload</b>									
Overload per 20 sec. PRP or 10 sec. COP						%			
						300			
Heat dissipation		W	53776	57451	60820	66645	70638	71679	78584
Telephone Interference Factor - TIF			<40	<40	<40	<40	<40	<40	<40
Waveform Distors.(THD) full load LL/LN		%	3 / 2,9	3,3 / 3,2	3,4 / 3,3	3,3 / 2,9	2,8 / 2,8	2,7 / 2,8	2,6 / 2,5
Waveform Distors.(THD) no load LL/LN		%	2,5 / 2,4	2,9 / 3	2,9 / 2,8	2,7 / 2,6	2,9 / 2,9	2,8 / 2,6	2,7 / 2,5

## Efficiencies @ 50Hz

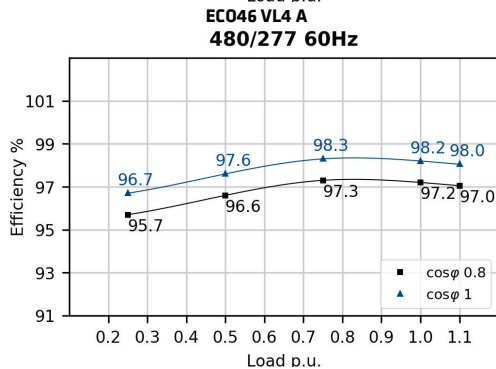
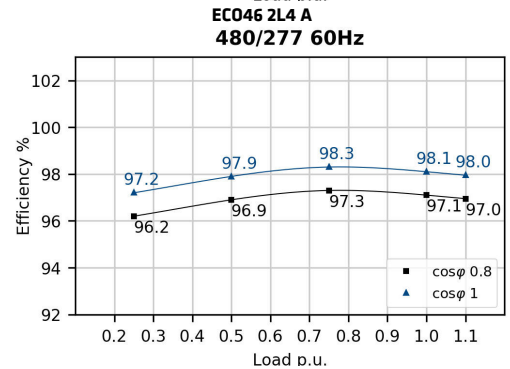
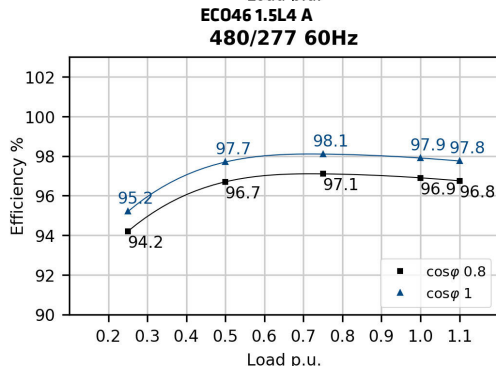
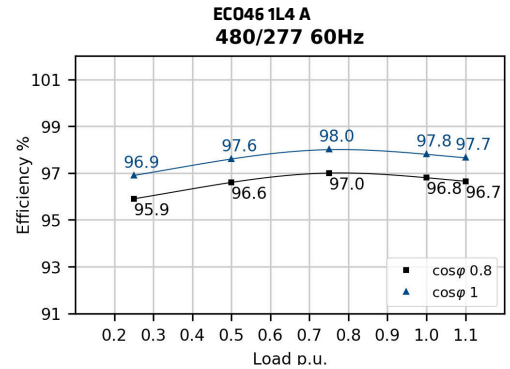
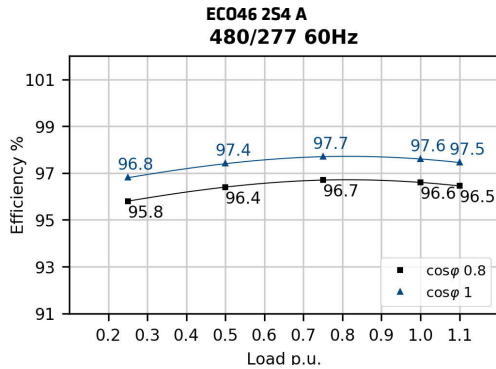
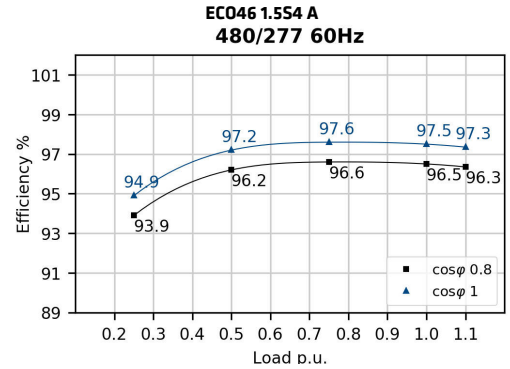
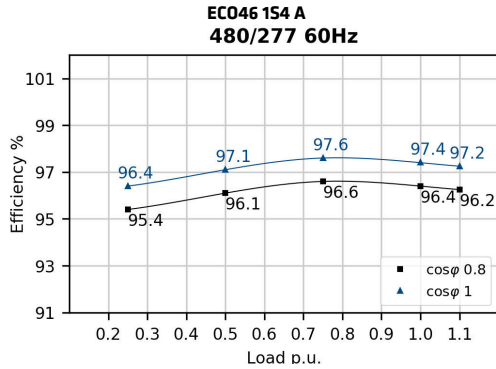
Models		380V 50Hz					400V 50Hz					415V 50Hz					440V 50Hz				
		0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1
ECO46 1S4 A	%	95,3	96,0	96,7	96,3	96,1	95,3	95,9	96,4	96,2	96,1	95,1	95,9	96,5	96,0	95,6	94,6	95,5	96,0	95,8	95,6
ECO46 1.5S4 A	%	93,8	96,1	96,8	96,4	96,2	93,8	96,0	96,5	96,3	96,1	93,6	96,1	96,6	96,1	95,7	93,1	95,7	96,4	95,9	95,6
ECO46 2S4 A	%	95,6	96,3	96,8	96,5	96,3	95,6	96,2	96,5	96,4	96,3	95,4	96,2	96,6	96,2	95,8	94,9	95,7	96,1	96,0	95,9
ECO46 1L4 A	%	95,6	96,5	97,1	96,7	96,5	95,6	96,4	96,8	96,6	96,5	95,4	96,4	96,9	96,4	96,0	94,9	95,8	96,4	96,2	96,1
ECO46 1.5L4 A	%	94,0	96,5	97,2	96,8	96,6	94,0	96,4	96,9	96,7	96,6	93,8	96,5	97,0	96,5	96,1	93,3	96,1	96,8	96,3	96,1
ECO46 2L4 A	%	95,6	96,7	97,3	96,9	96,7	95,9	96,6	97,0	96,8	96,6	95,7	96,6	97,1	96,6	96,2	95,1	96,0	96,5	96,4	96,3
ECO46 VL4 A	%	95,9	96,7	97,2	97,0	96,8	95,8	96,6	97,1	96,9	96,7	95,6	96,4	96,9	96,7	96,5	93,6	94,9	95,8	96,0	95,9



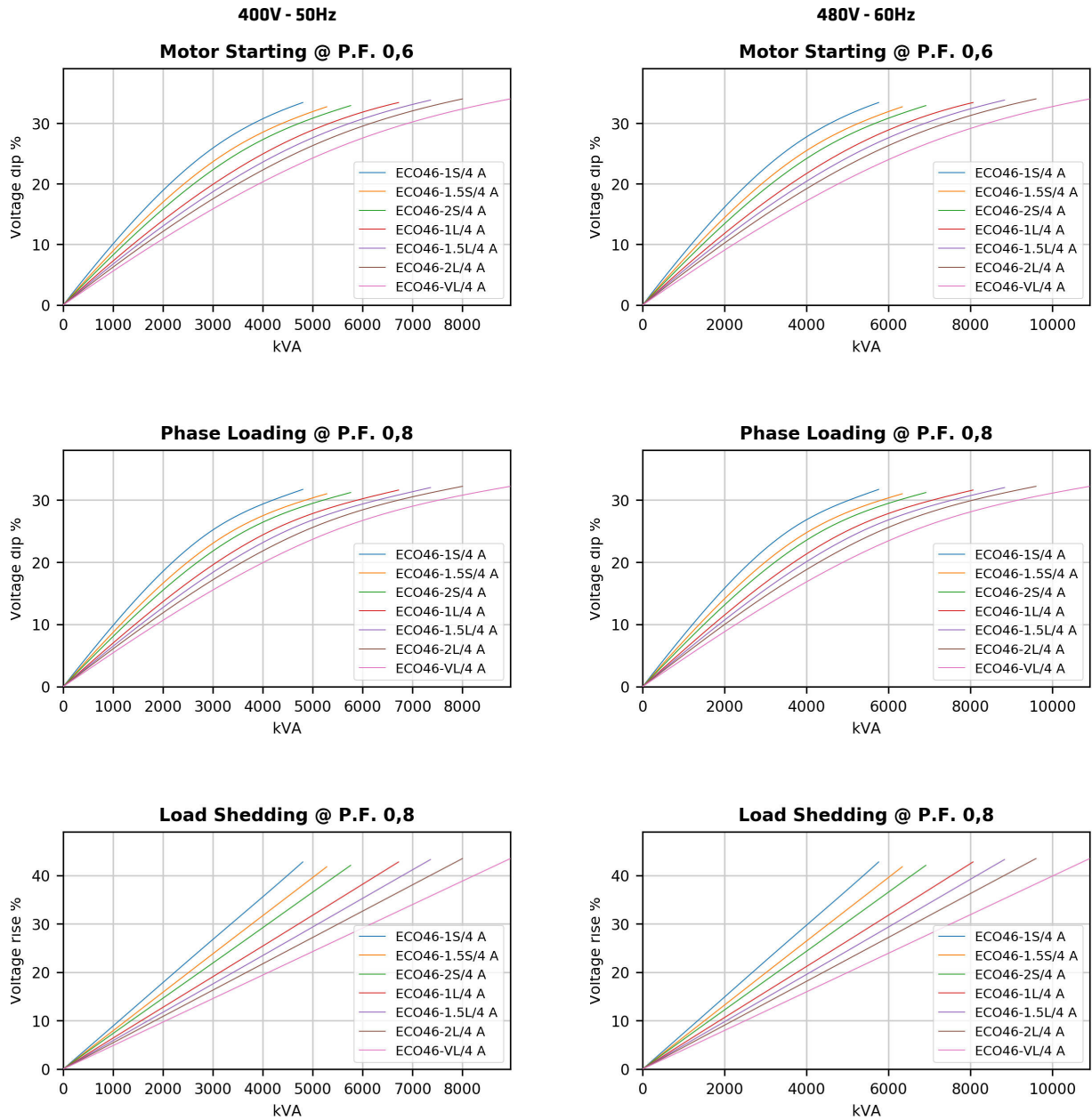


## Efficiencies @ 60Hz

Models	415V 60Hz					440V 60Hz					460V 60Hz					480V 60Hz					
	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	
ECO46 1S4 A	%	94,8	95,6	96,2	96,1	95,9	95,2	96,0	96,5	96,3	96,2	95,3	96,2	96,9	96,5	96,3	95,4	96,1	96,6	96,4	96,3
ECO46 1.5S4 A	%	93,9	96,0	96,3	96,1	95,9	93,9	96,1	96,6	96,6	96,5	93,9	96,3	96,8	96,8	96,7	93,9	96,2	96,6	96,5	96,4
ECO46 2S4 A	%	95,0	95,8	96,3	96,2	96,1	95,6	96,3	96,6	96,5	96,4	95,8	96,5	97,0	96,7	96,5	95,8	96,4	96,7	96,6	96,5
ECO46 1L4 A	%	95,3	96,1	96,6	96,5	96,4	95,9	96,5	96,9	96,7	96,6	95,8	96,7	97,3	96,9	96,7	95,9	96,6	97,0	96,8	96,7
ECO46 1.5L4 A	%	94,2	96,5	96,8	96,5	96,3	94,2	96,6	97,1	97,0	96,9	94,2	96,8	97,3	97,2	97,1	94,2	96,7	97,1	96,9	96,8
ECO46 2L4 A	%	95,6	96,4	96,9	96,8	96,7	96,2	96,8	97,2	97,0	96,9	96,2	97,0	97,6	97,2	97,0	96,2	96,9	97,3	97,1	97,0
ECO46 VL4 A	%	94,8	95,7	96,6	96,5	96,4	95,6	96,5	97,3	97,2	97,1	95,8	96,8	97,5	97,4	97,3	95,7	96,6	97,3	97,2	97,1



Transients voltage



In order to scale transient curves as a function of a power factor or voltage if not indicated, please proceed as follows:

Power Factor coefficient corrector (PFCC), to be used on power factor 0.6 curves:

$$PFCC = \frac{\sin(\text{ARCCos}(PF_{\text{new}}))}{0.8}$$

Example. The PFCC at power factor 0.3 is 1.192 [  $PFCC = \frac{\sin(\text{ARCCos}(0.3))}{0.8}$  ]. This means that the voltage fall at a given power at pf 0.3 is equivalent to the one that can be read on the pf 0.6 curve if the load is considered 1.192 times bigger (19% higher value. ).

In this example, a 100 kVA load insertion at pf 0.3 is equivalent in voltage fall to a 119kVA load insertion at pf 0.6.

Voltage coefficient corrector (VCC):

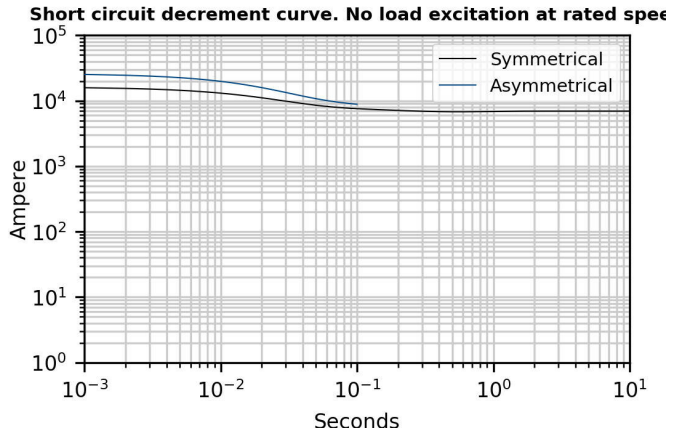
$$VCC = \left(\frac{400}{V_{\text{new}}}\right)^2 \text{ if } 50 \text{ Hz}; VCC = \left(\frac{480}{V_{\text{new}}}\right)^2 \text{ if } 60 \text{ Hz}$$

Example. VCC at 415V 60 Hz is 1.338 [  $VCC = \left(\frac{480}{415}\right)^2$  ]. This means that the voltage fall at a given power at 415V is equivalent to the one that can be read on the power factor 0.6 curve if the load is considered 1.338 times bigger (33% higher value. ).

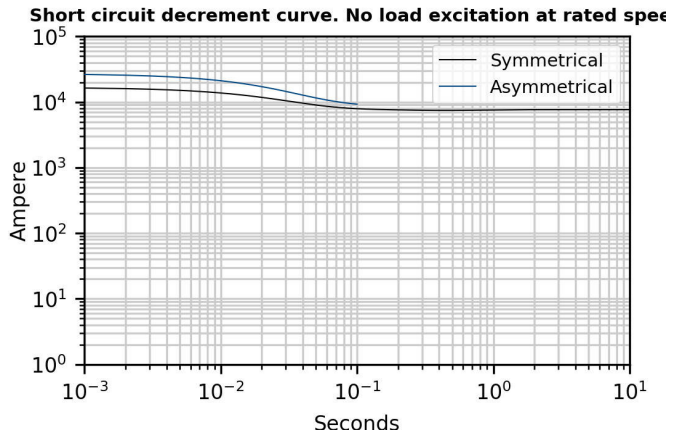
In this example, a 100 kVA load insertion at 415V is equivalent in voltage fall to a 133kVA load insertion at 480V.

50Hz Short circuit decrement curves - No load excitation at rated speed

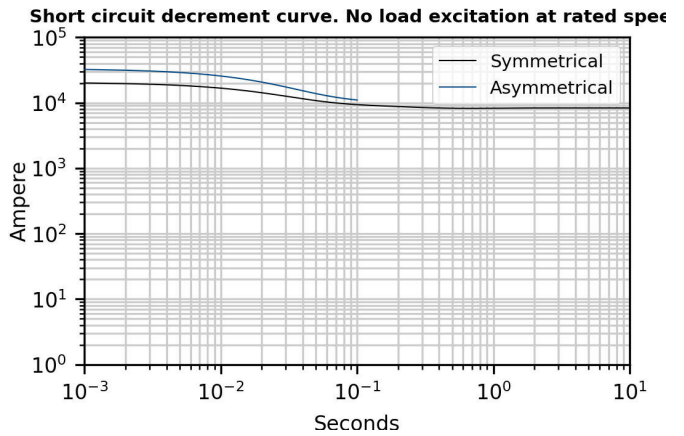
ECO46 1S4 A



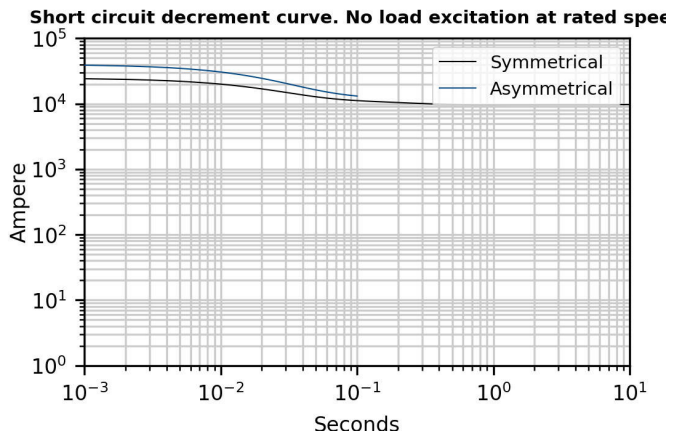
ECO46 1.5S4 A



ECO46 2S4 A



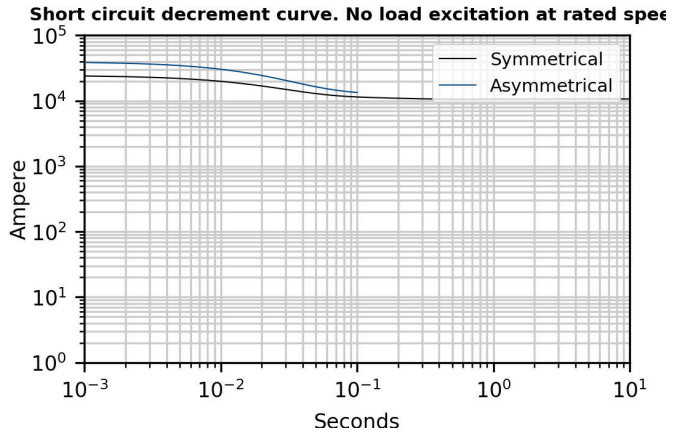
ECO46 1L4 A



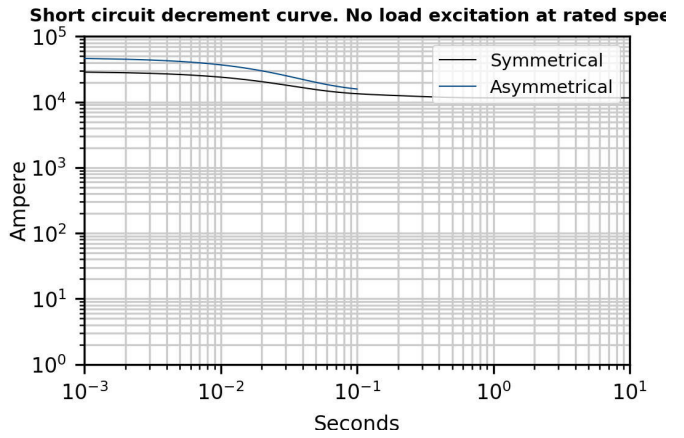
\*Please refer to tables at page 6

50Hz Short circuit decrement curves - No load excitation at rated speed

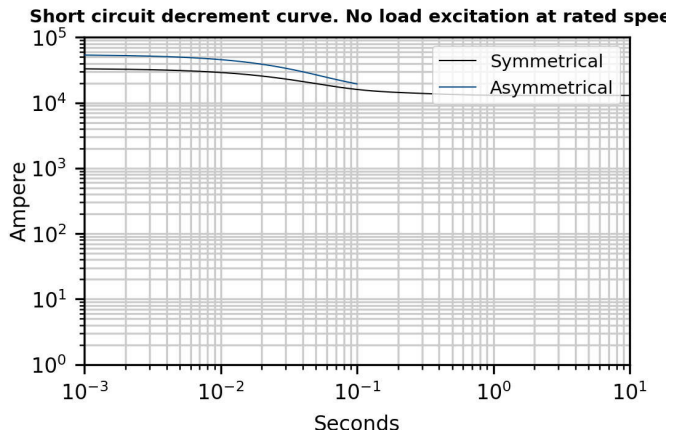
ECO46 1.5L4 A



ECO46 2L4 A



ECO46 VL4 A

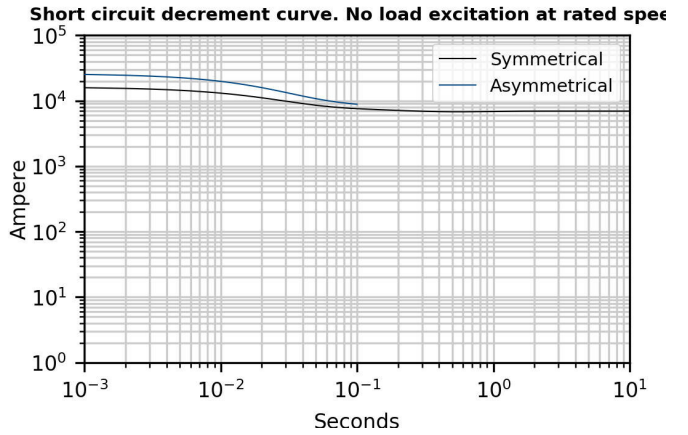


\*Please refer to tables at page 6

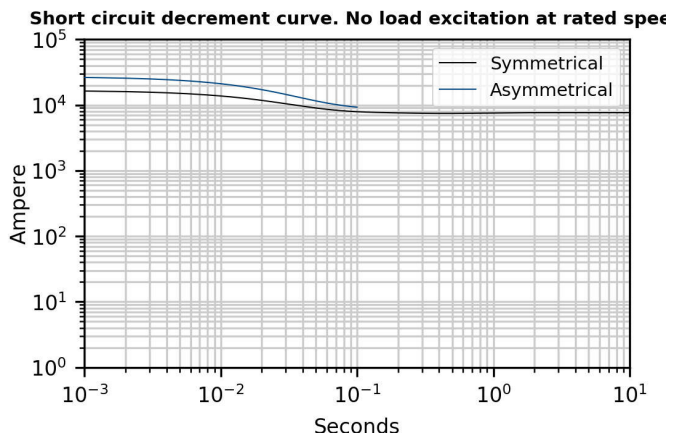


60Hz Short circuit decrement curves - No load excitation at rated speed

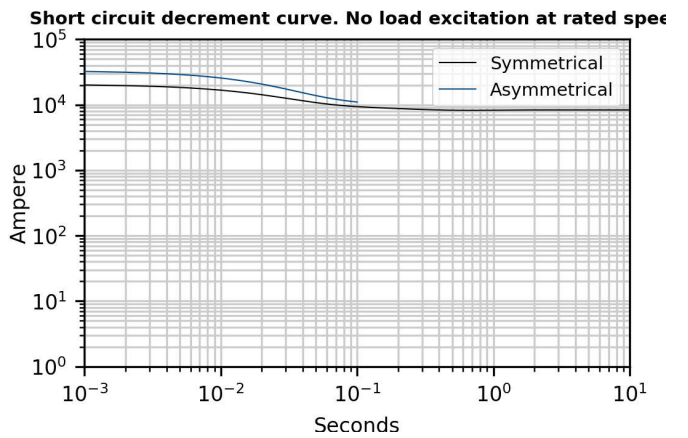
ECO46 1S4 A



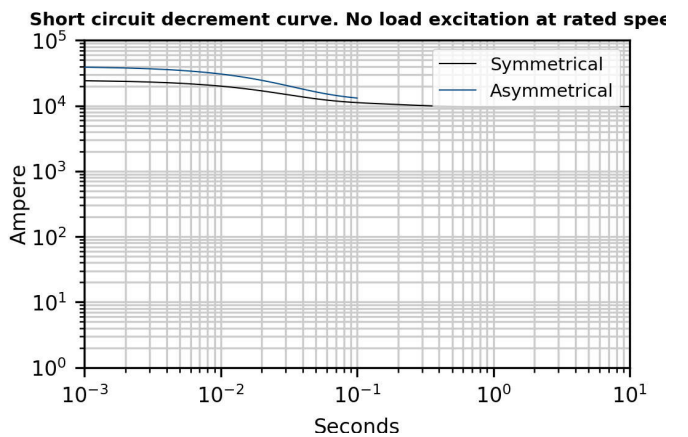
ECO46 1.5S4 A



ECO46 2S4 A



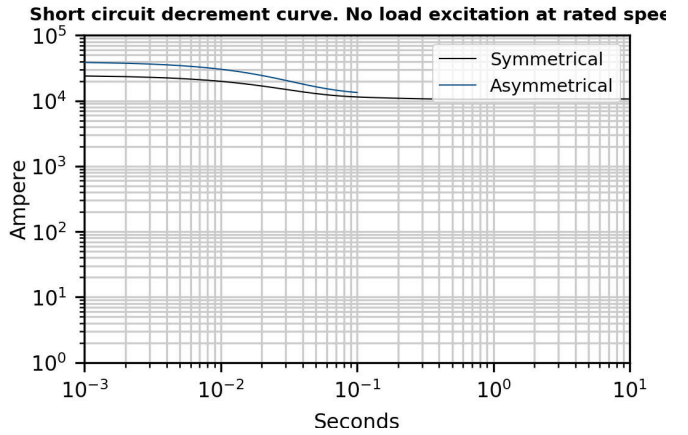
ECO46 1L4 A



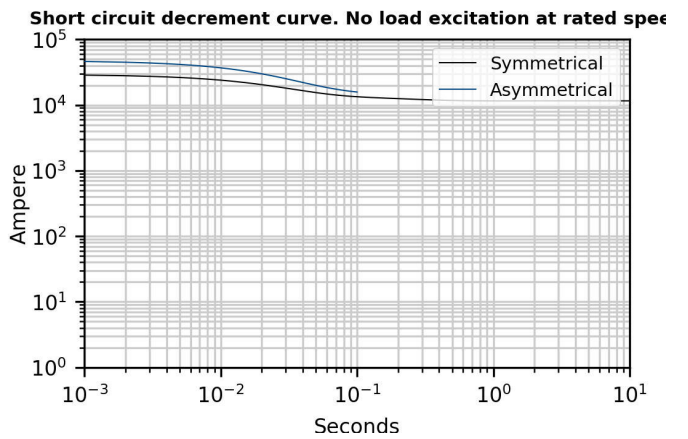
\*Please refer to tables at page 6

60Hz Short circuit decrement curves - No load excitation at rated speed

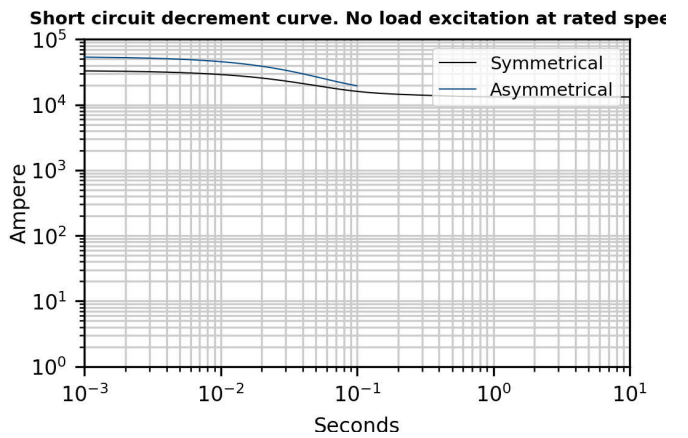
ECO46 1.5L4 A



ECO46 2L4 A



ECO46 VL4 A

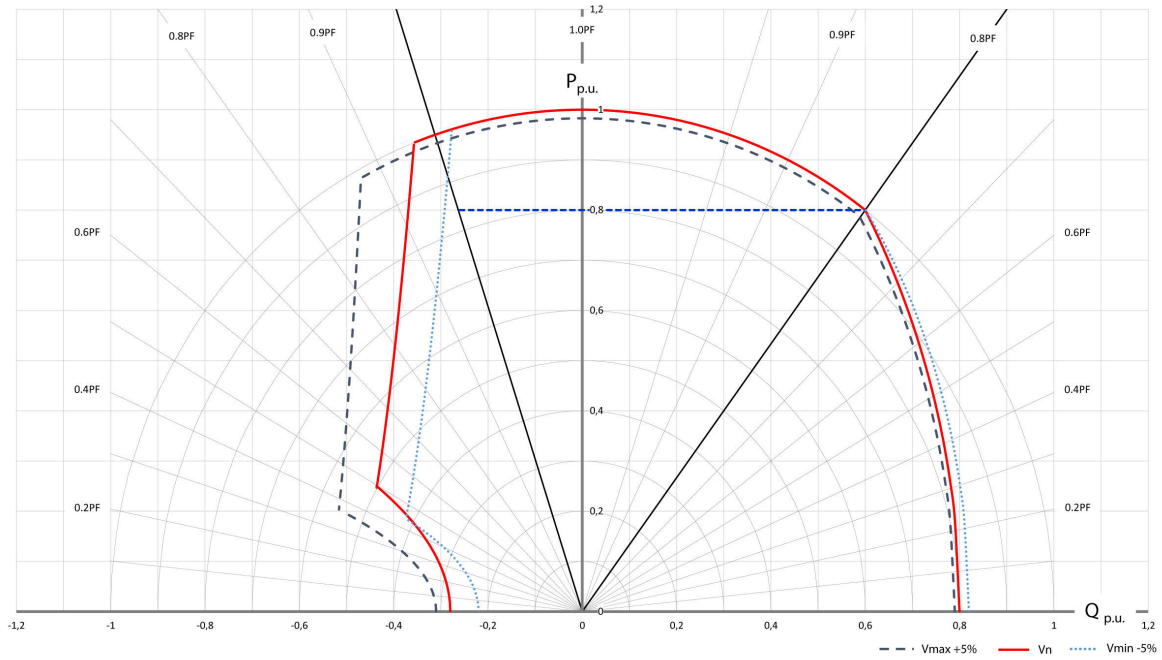


\*Please refer to tables at page 6

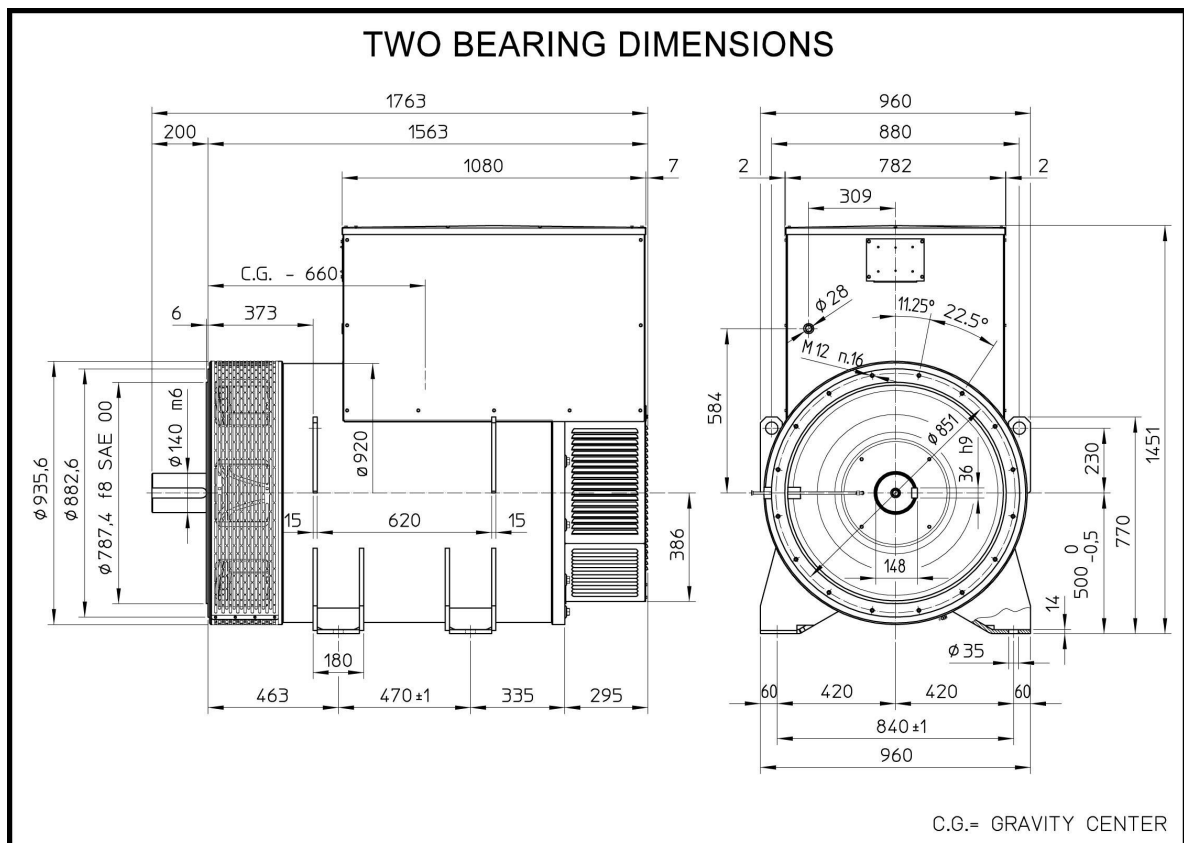
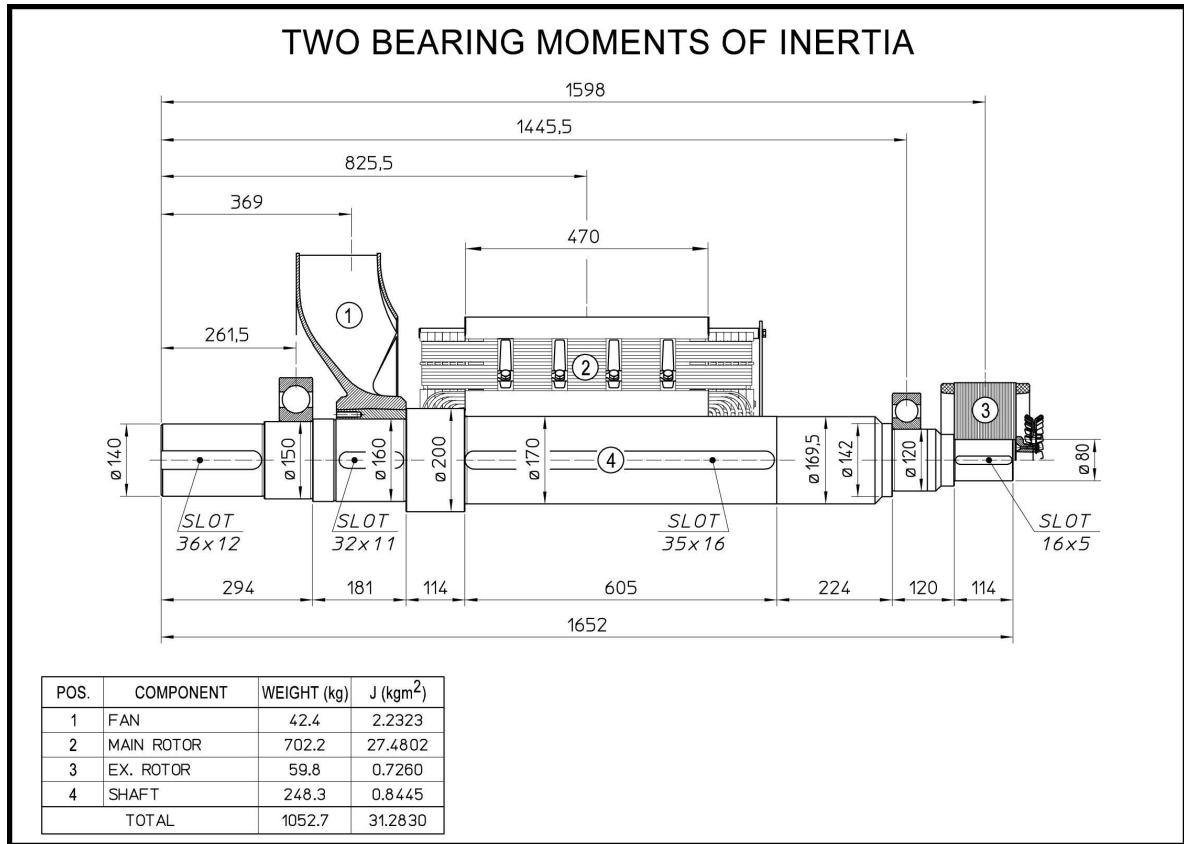
### Additional Characteristics

Data	ECO46 1S4 A		ECO46 1.5S4 A		ECO46 2S4 A		ECO46 1L4 A		ECO46 1.5L4 A		ECO46 2L4 A		ECO46 VL4 A		
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	
Damper cage	Copper														
Stator Winding Resistance (20°C)	Ω	0,00584		0,00405		0,00304		0,0024		0,00381		0,00234		0,00189	
Rotor Winding Resistance (20°C)	Ω	3,05		3,319		3,5		3,977		4,27		4,5		5,18	
Stator Exciter Resistance (20°C)	Ω	12,9		12,9		12,9		12,9		12,9		12,9		12,9	
Rotor Exciter Resistance (20°C)	Ω	0,12		0,12		0,12		0,12		0,12		0,12		0,12	
Auxiliary Winding Resistance (20°C)	Ω	0,414		0,35		0,33		0,36		0,4		0,39		0,41	
Weight of complete generator	kg	3005,0		3375,0		3560,0		3805,0		4255,0		4375,0		5120,0	
Unbalanced magnetic pull	kN/mm	6,4		6,4		6,5		6,8		6,9		7,0		8,0	
Air flow	m <sup>3</sup> /min	135,0	162,0	135,0	162,0	135,0	162,0	135,0	162,0	135,0	162,0	135,0	162,0	135,0	162,0
Noise level at 1m/7m	dB(A)	97/86	100/91	97/86	100/91	97/86	100/91	97/86	100/91	97/86	100/91	97/86	100/91	97/86	100/91

### PQ Diagram



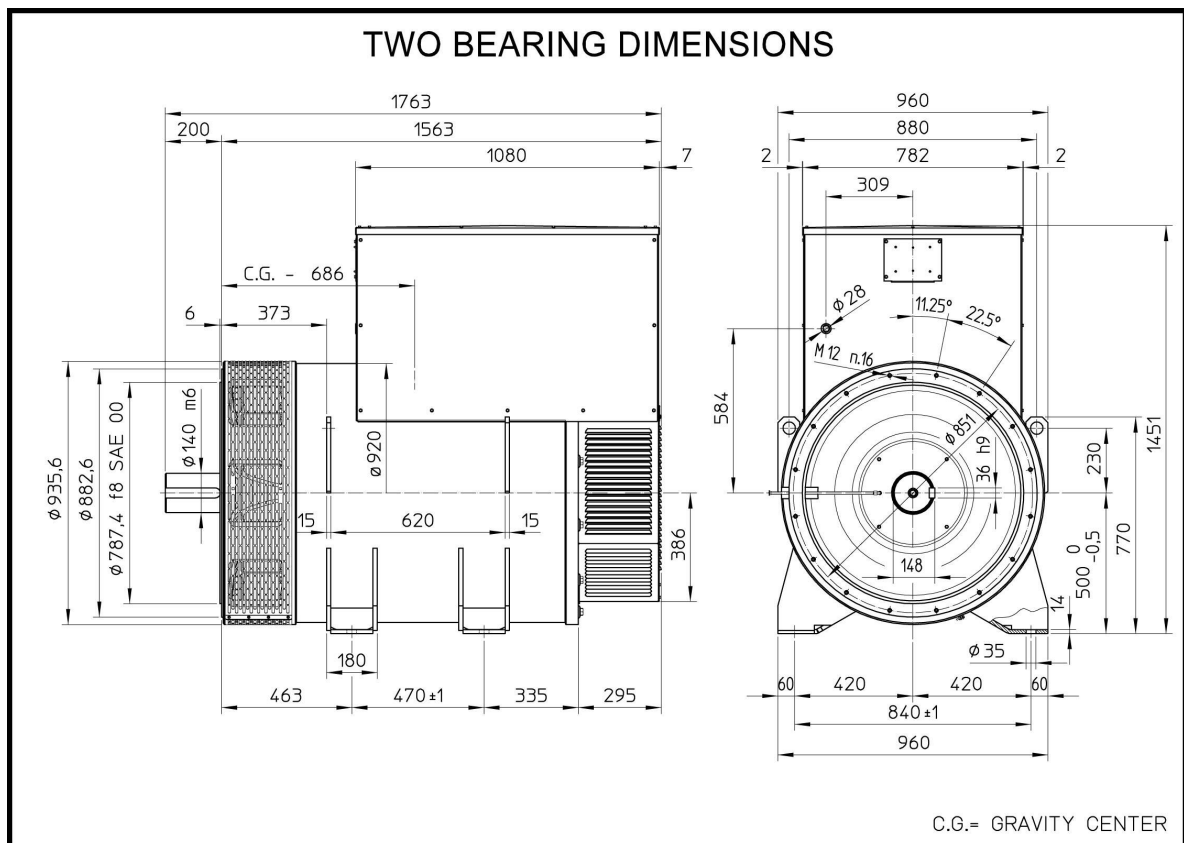
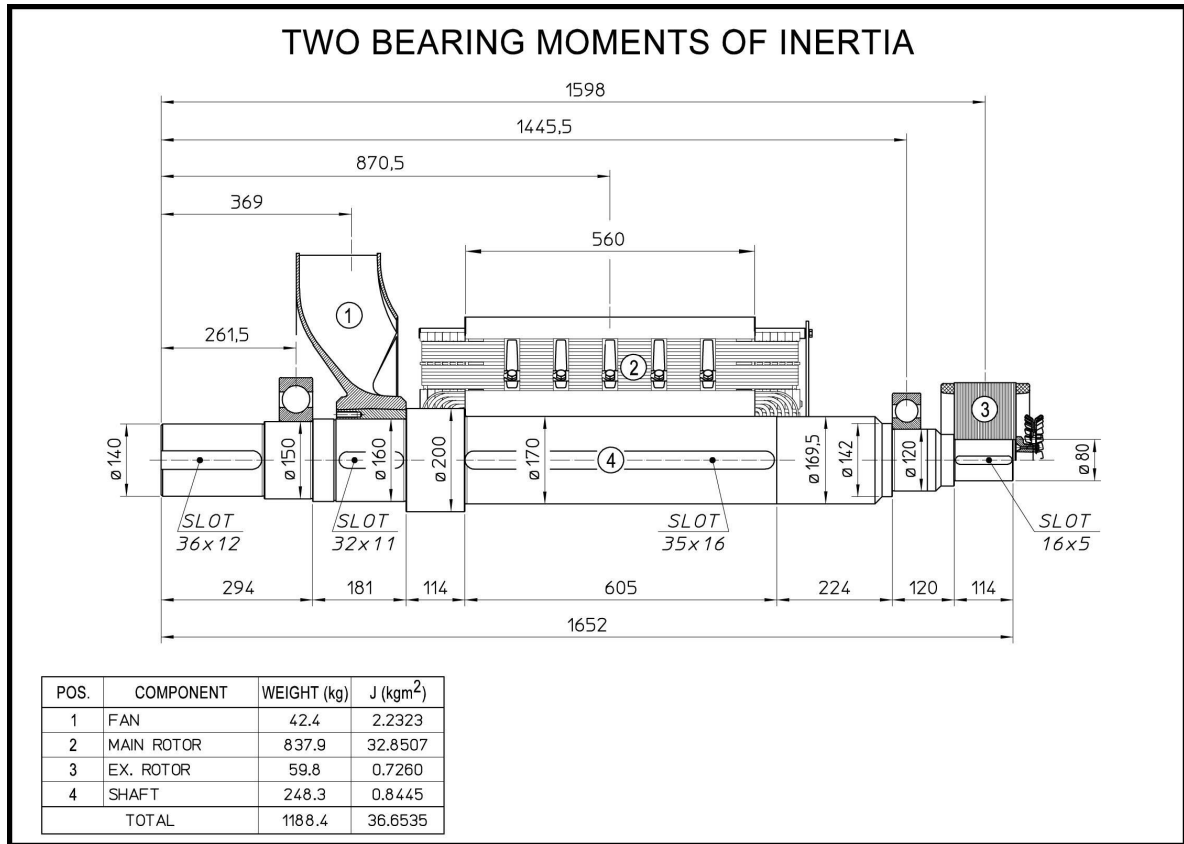
ECO46 1S4 A

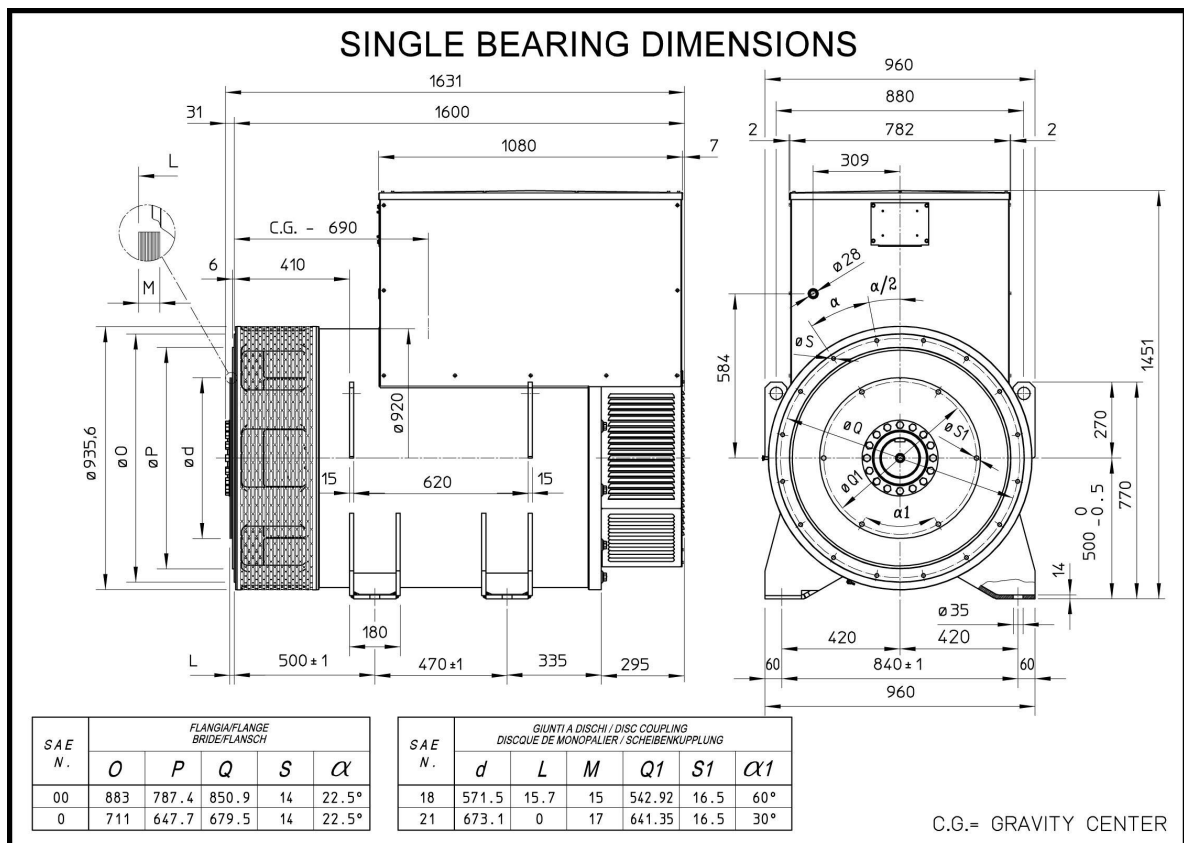
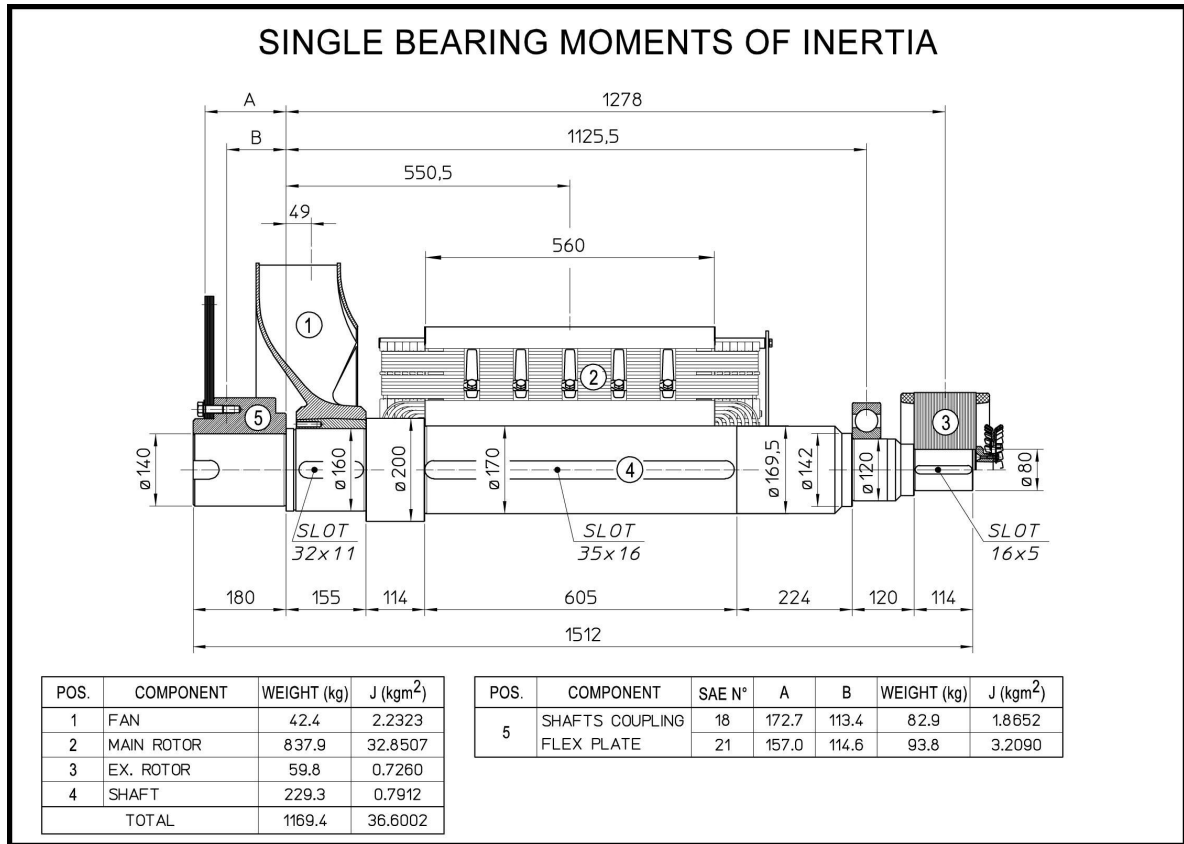




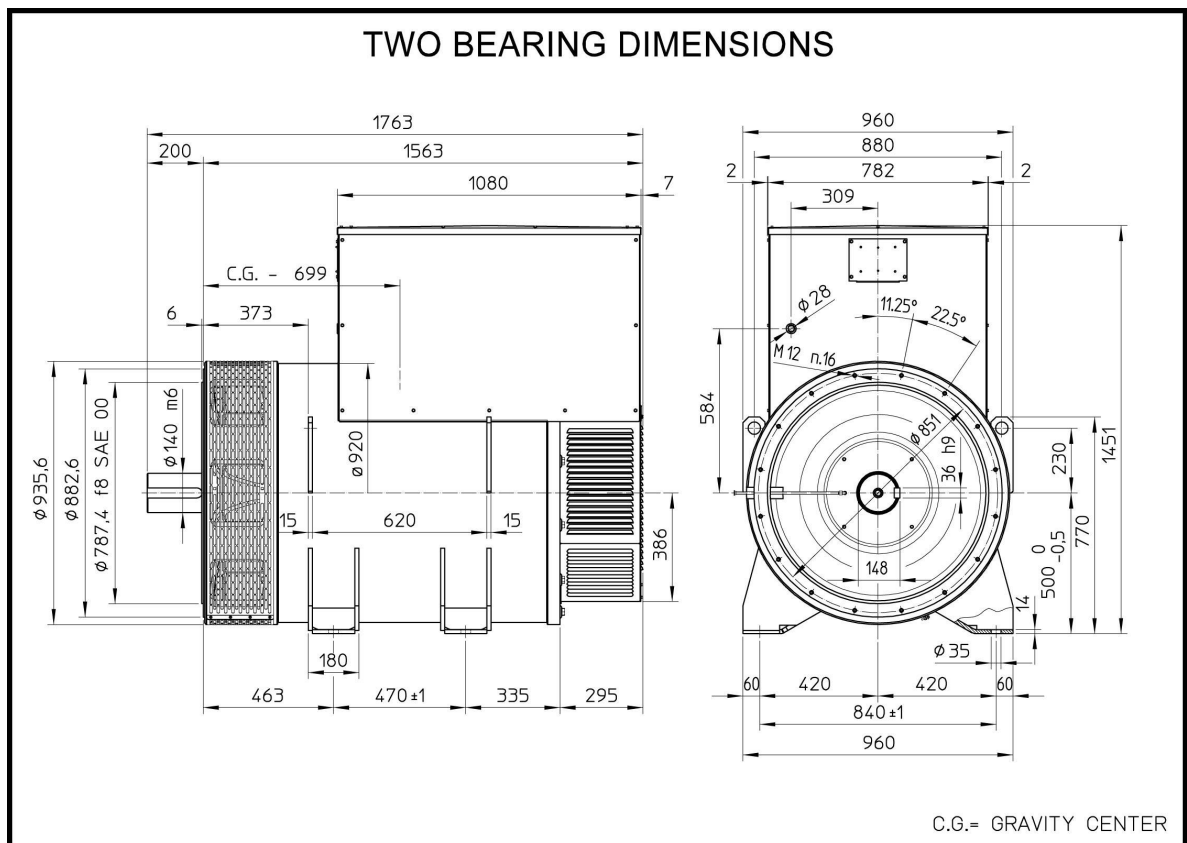
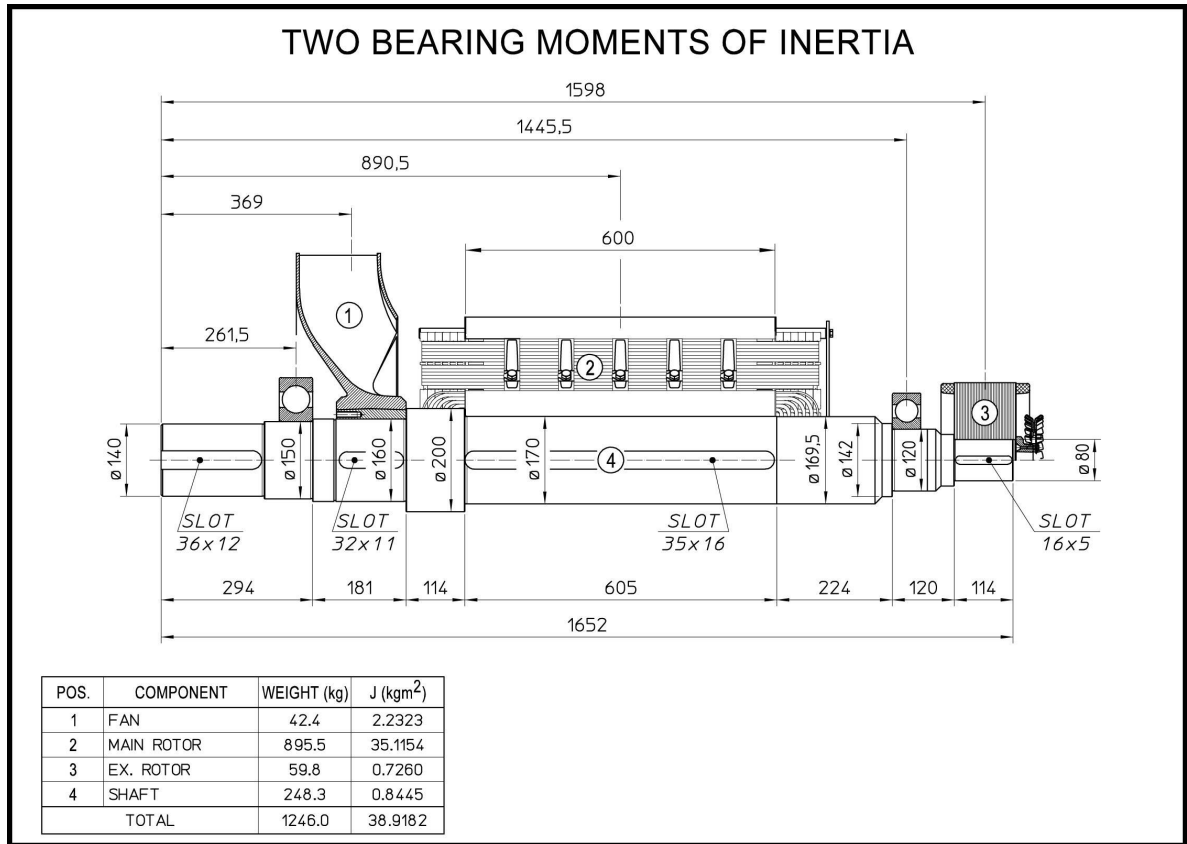


ECO46 1.5S4 A



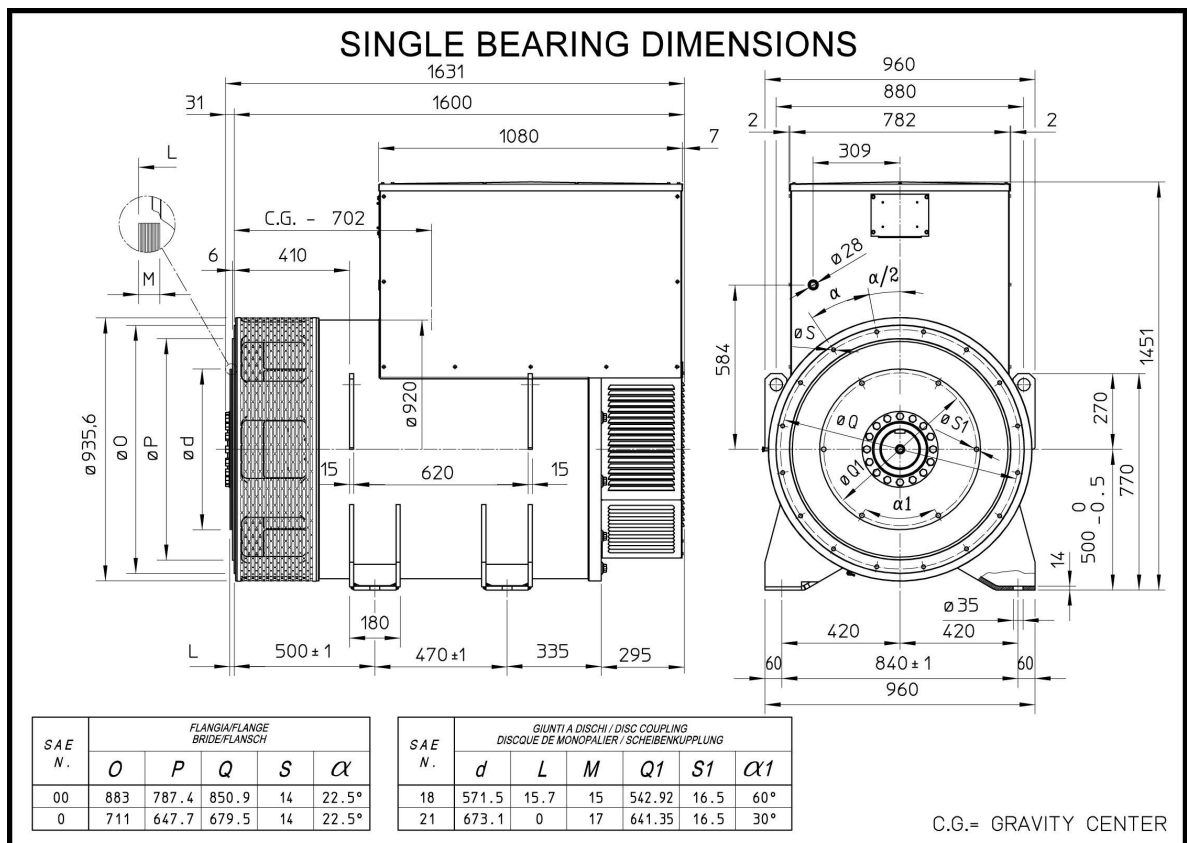
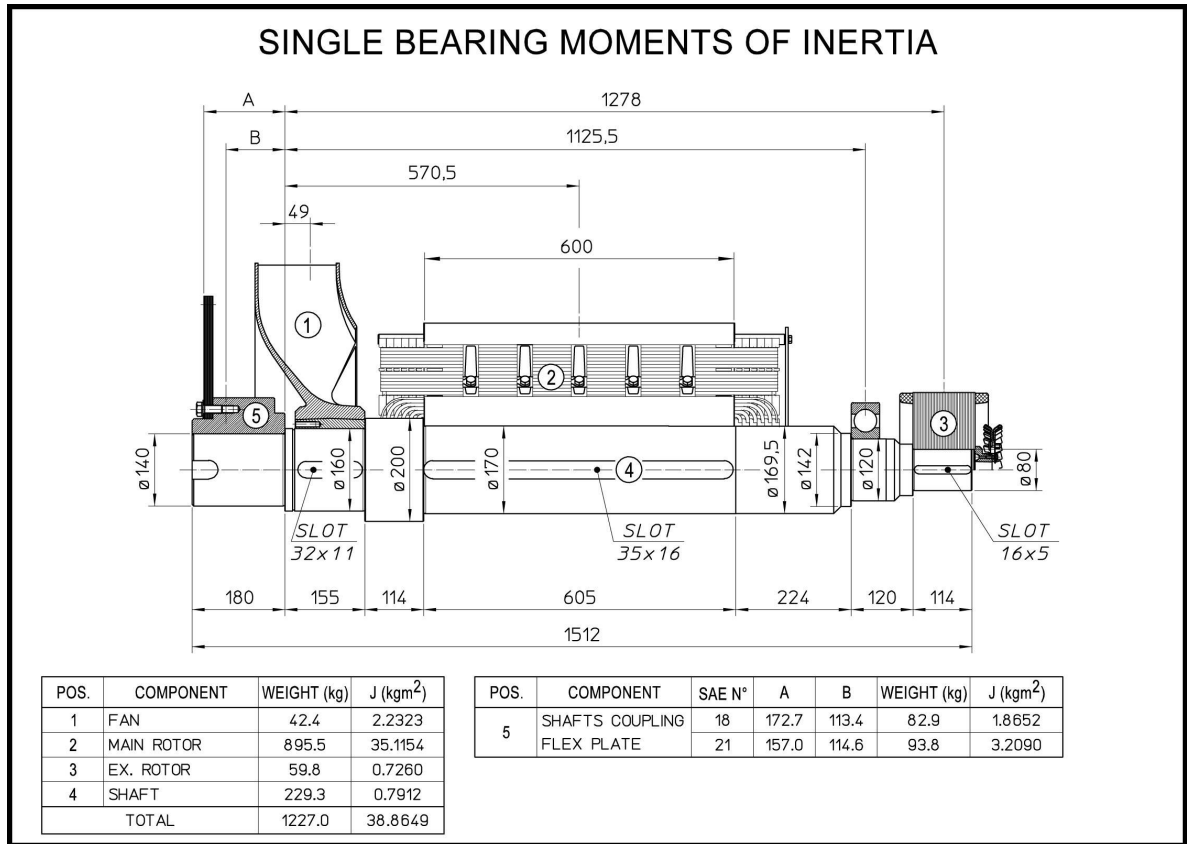


ECO46 2S4 A

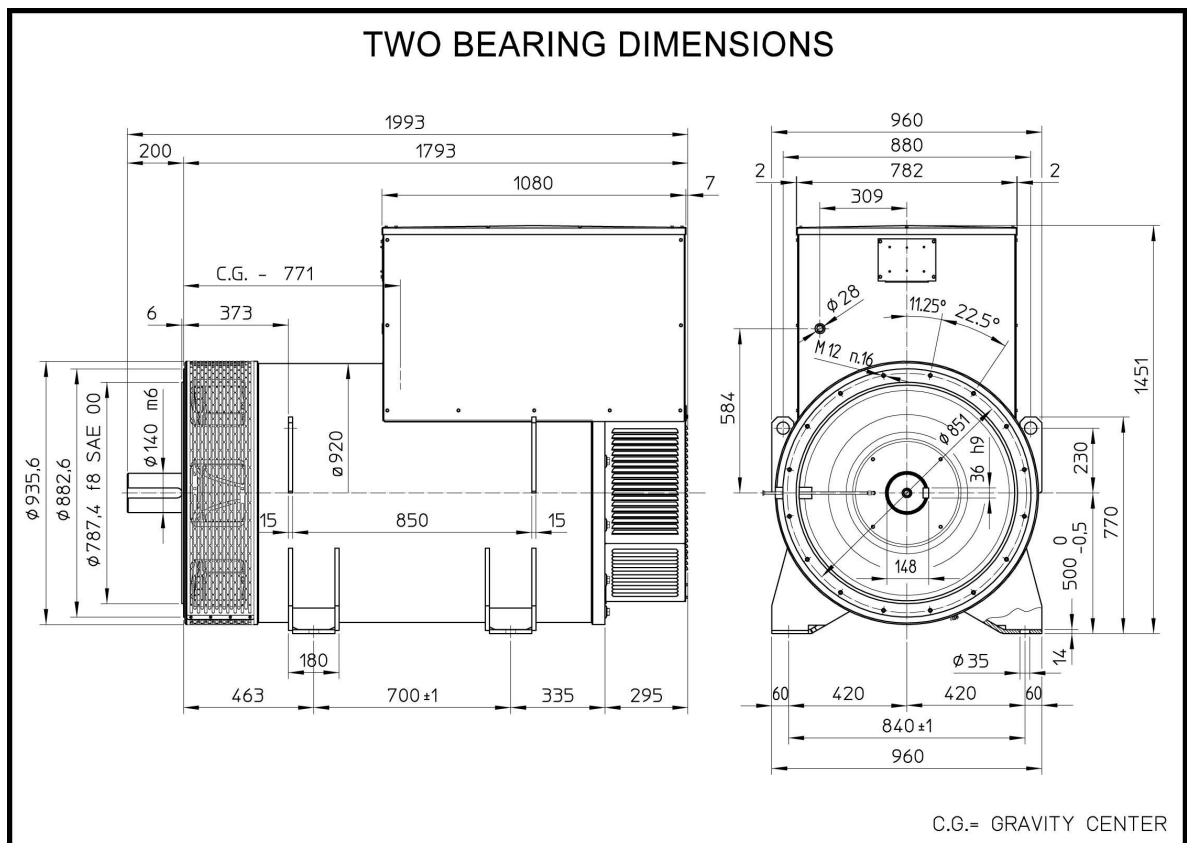
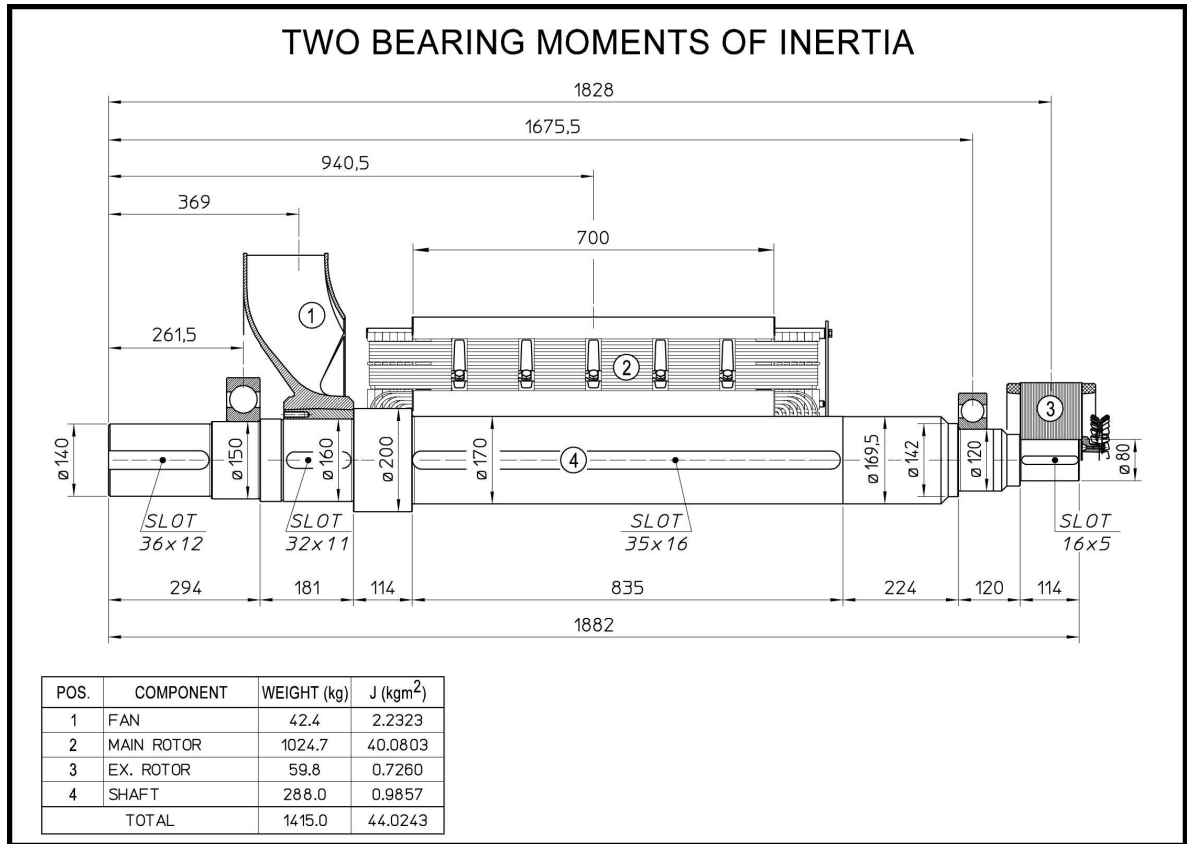


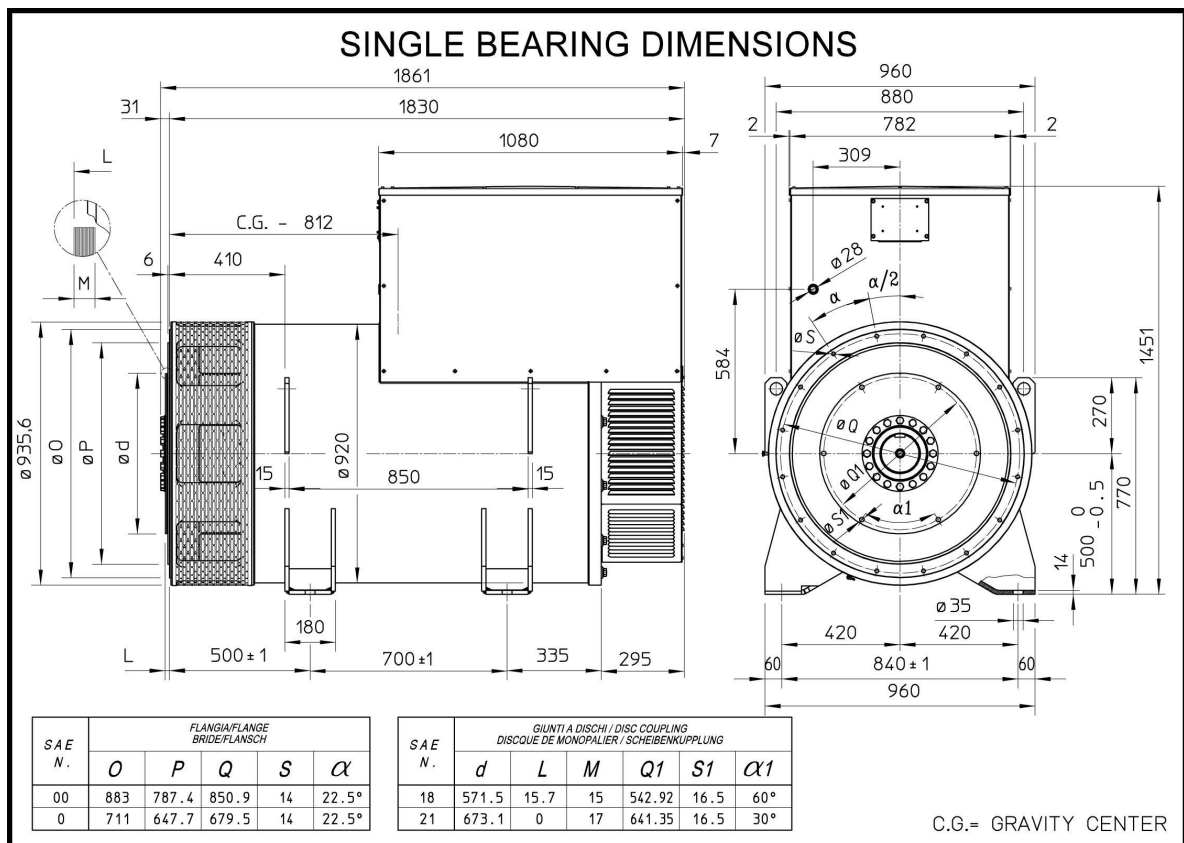
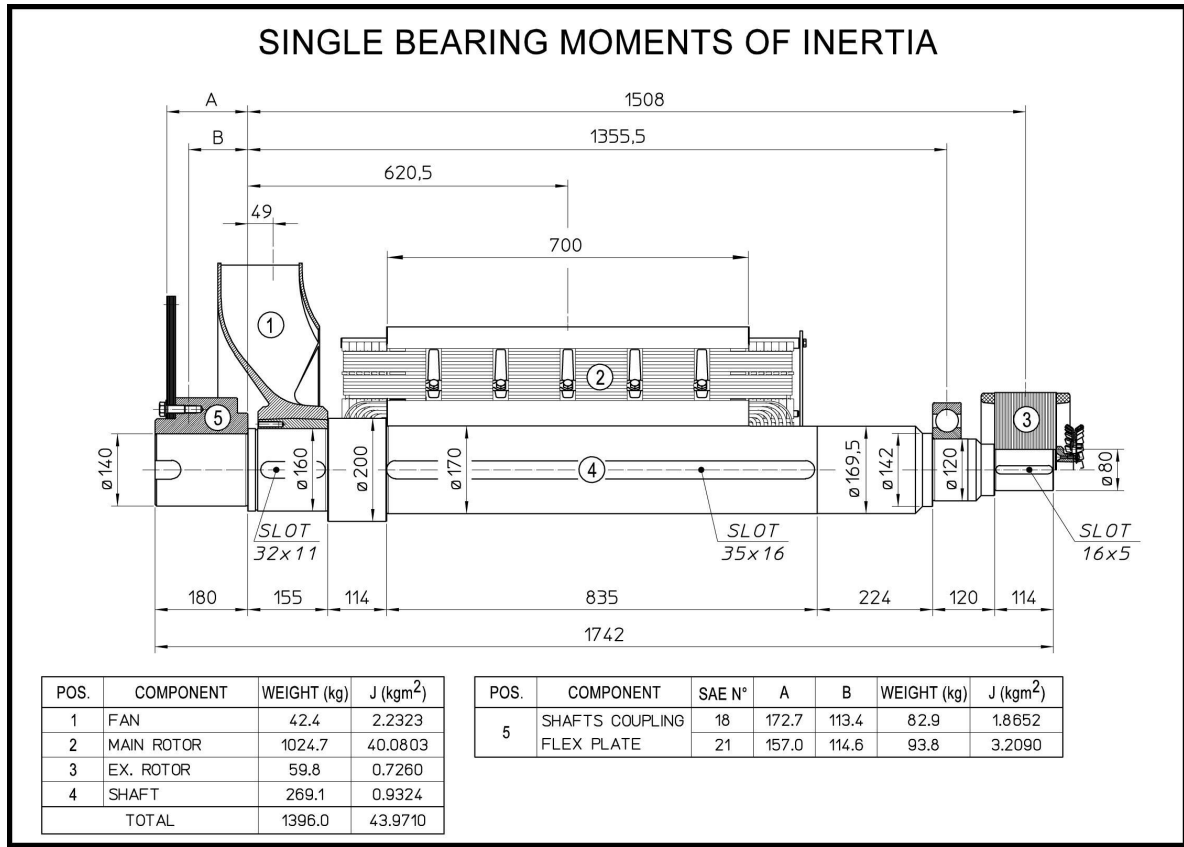


ECO46 2S4 A

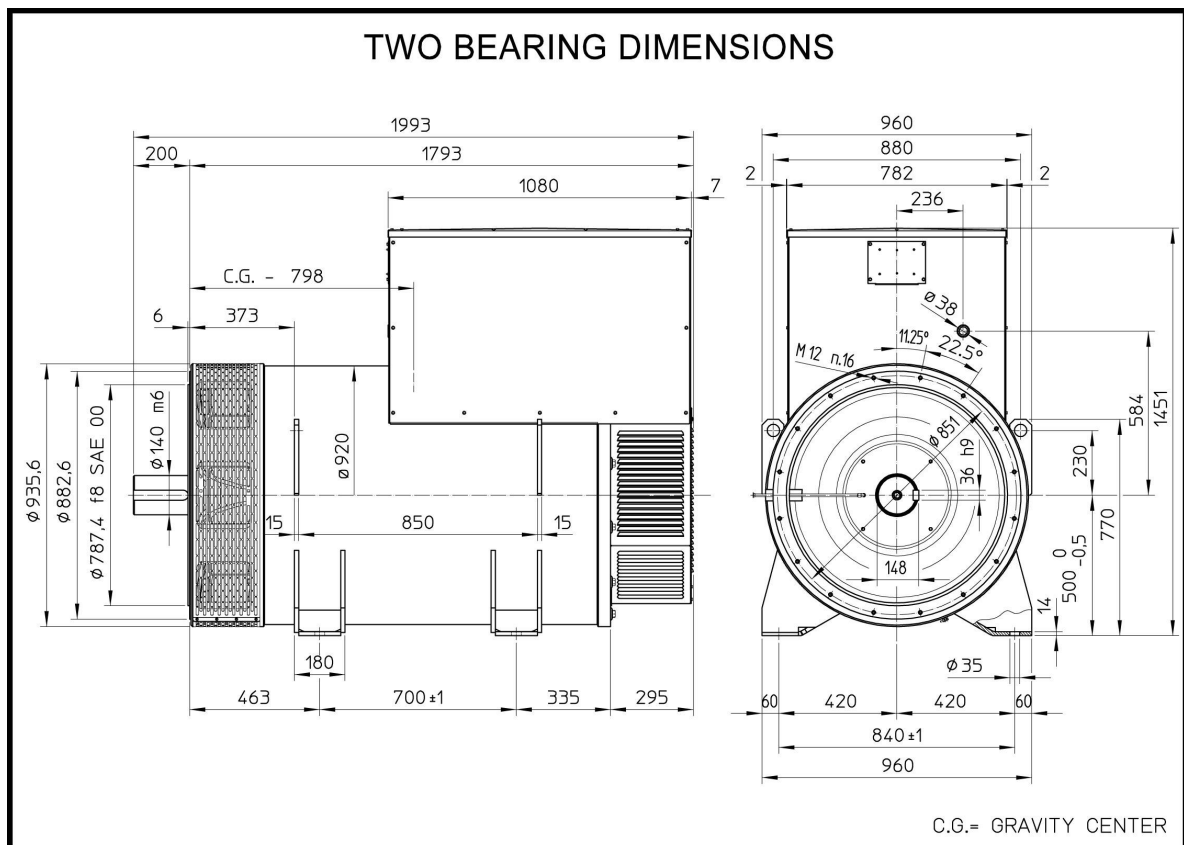
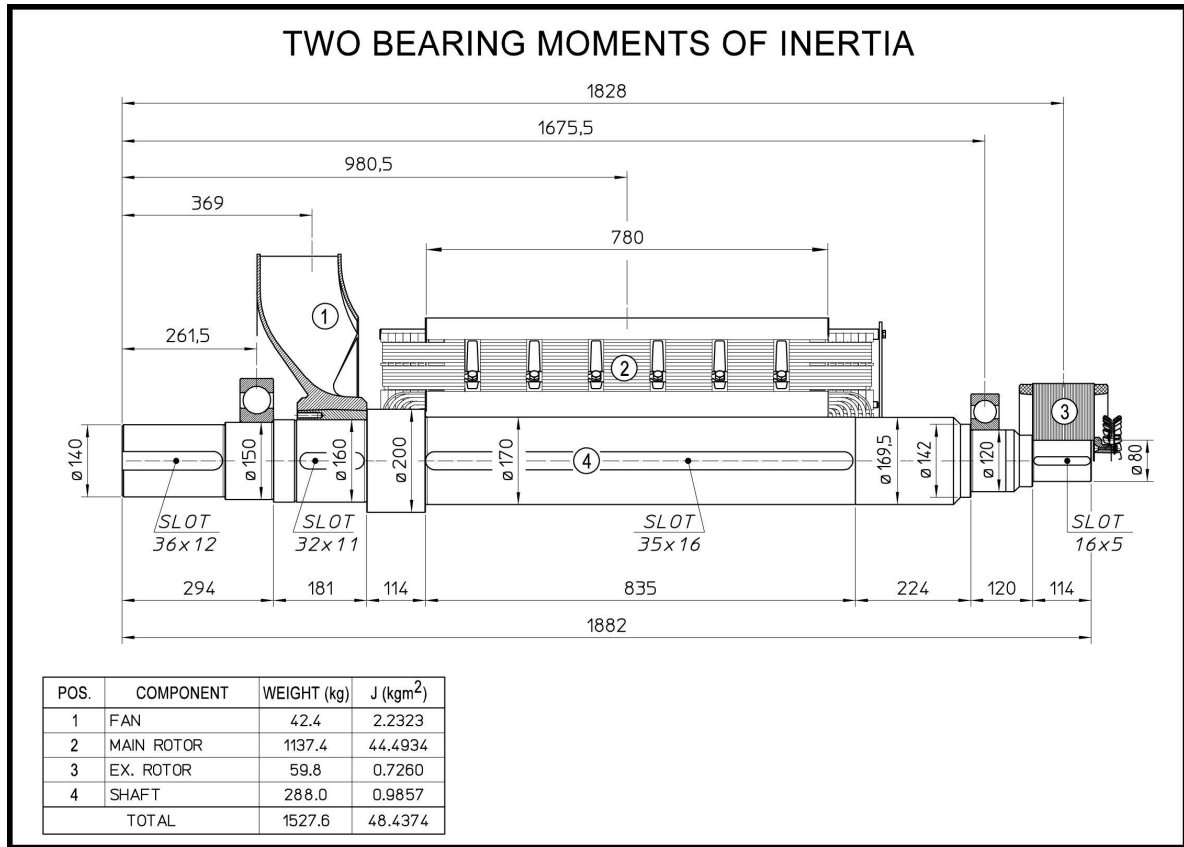


ECO46 1L4 A



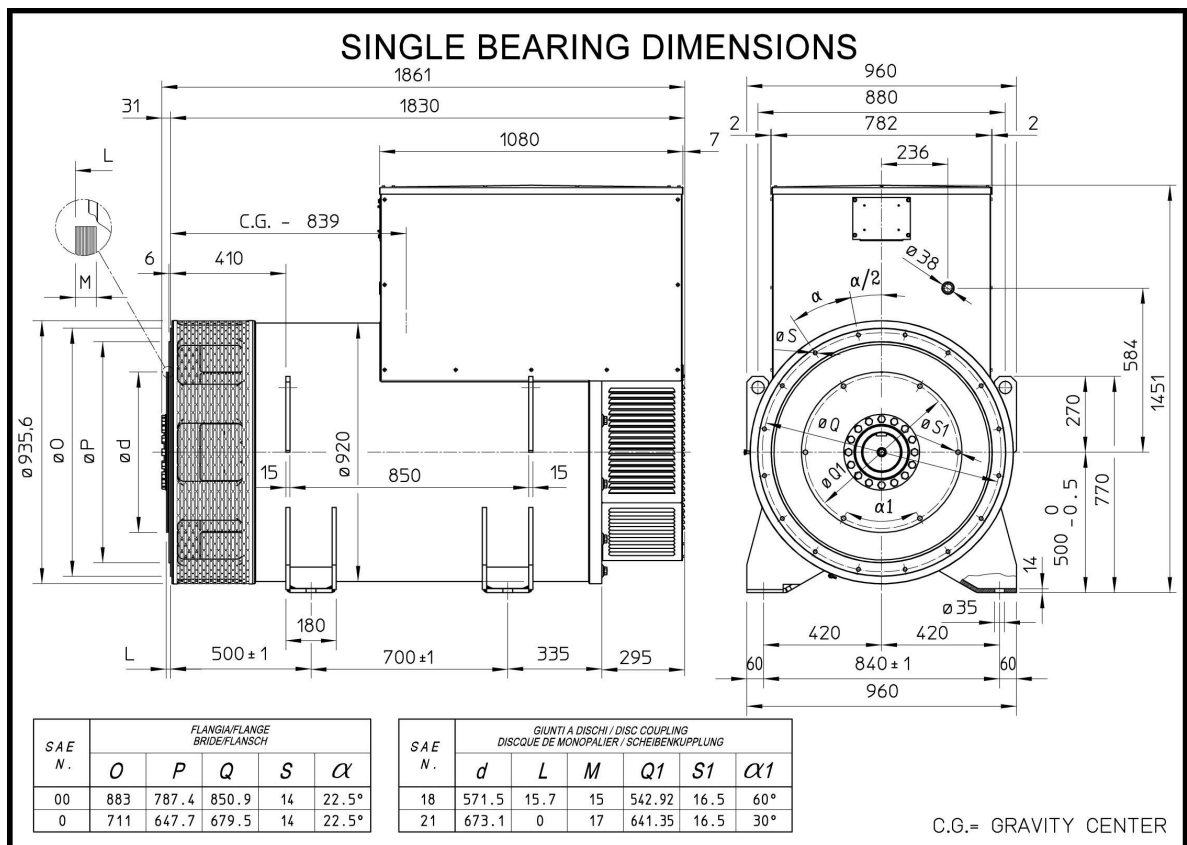
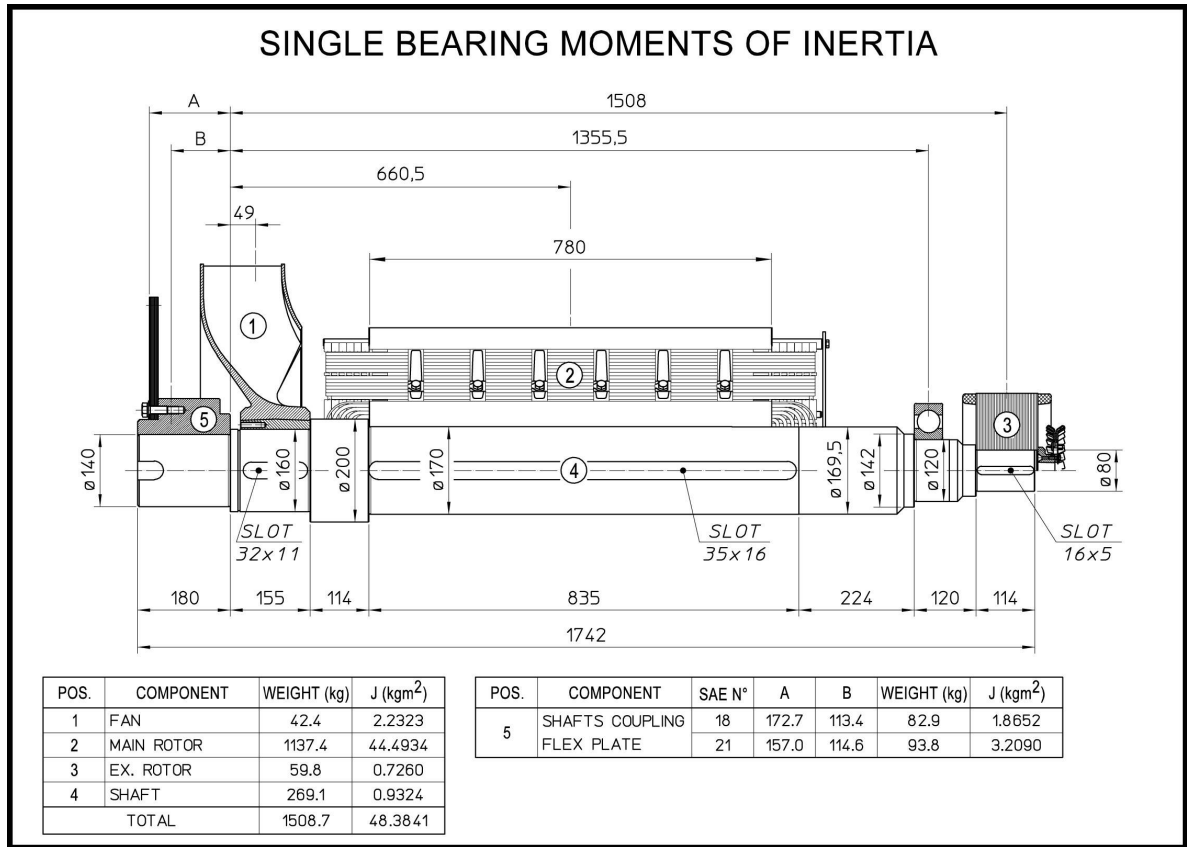


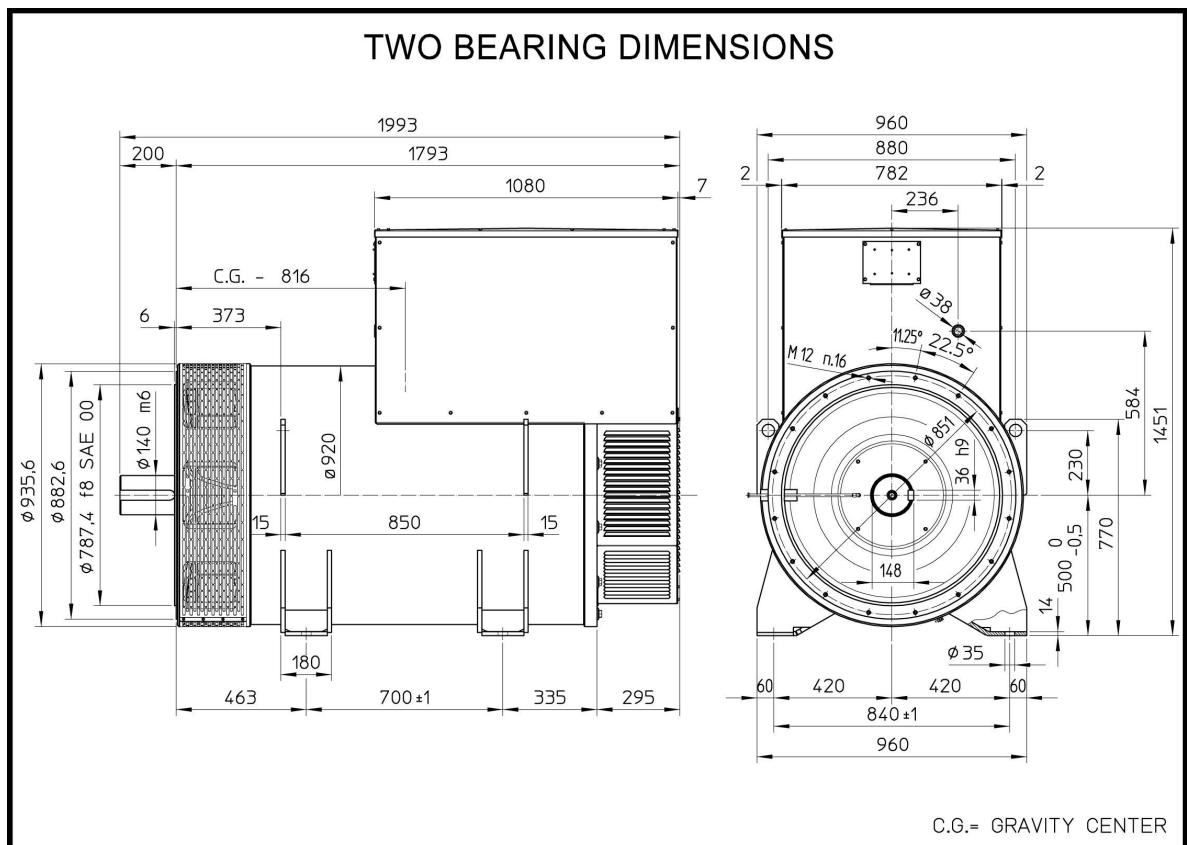
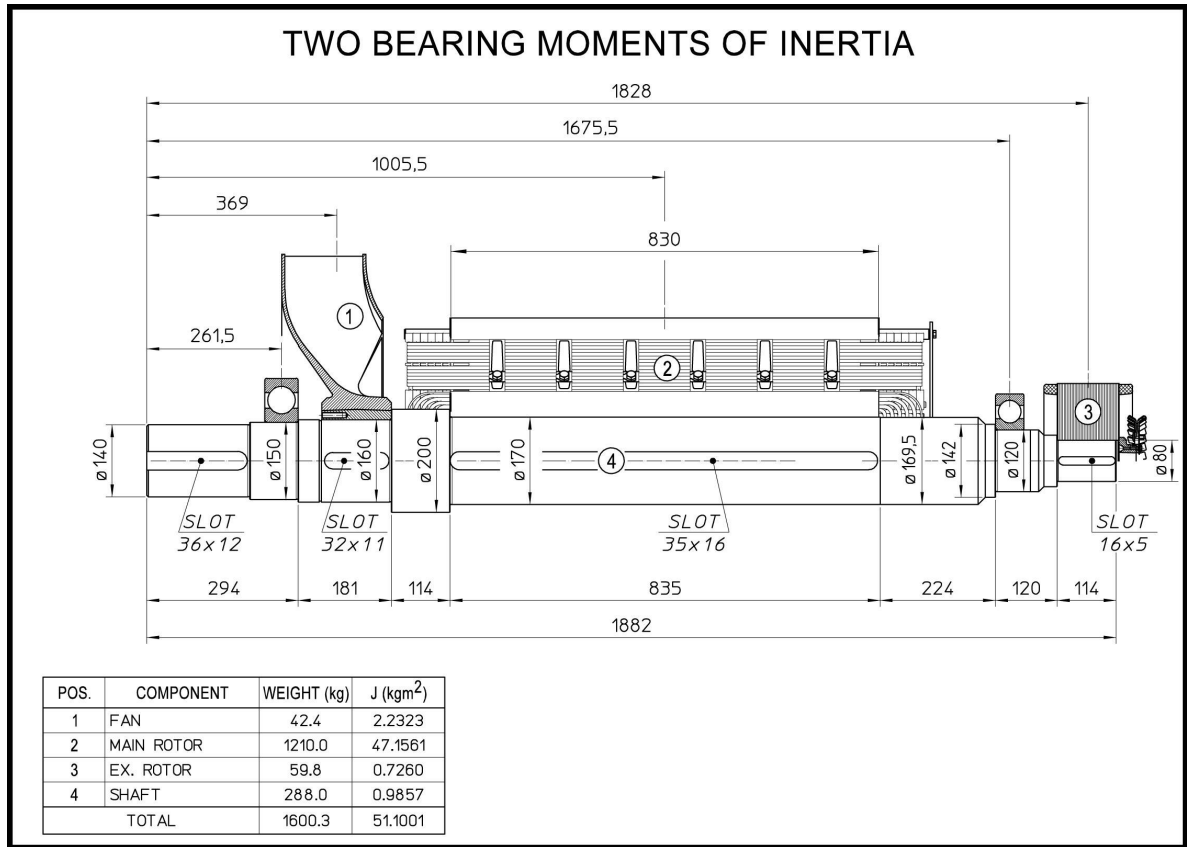
ECO46 1.5L4 A

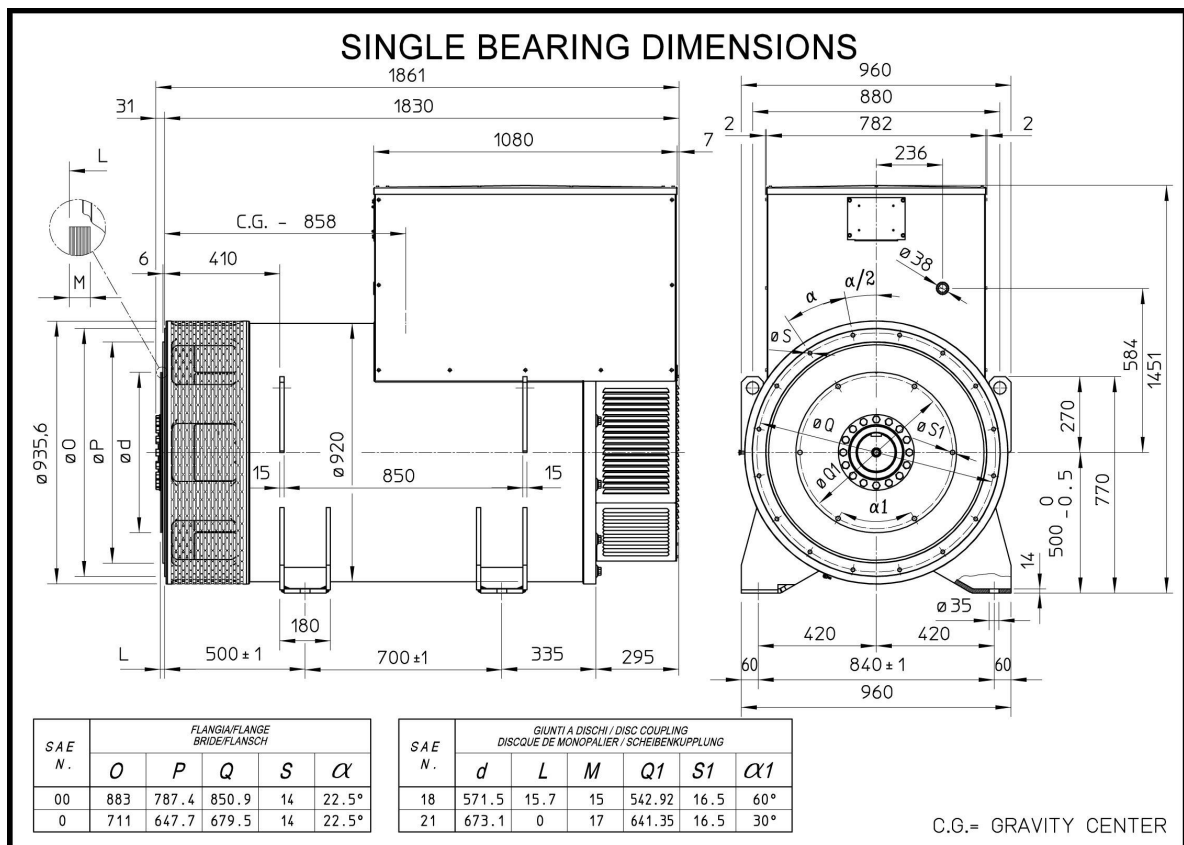
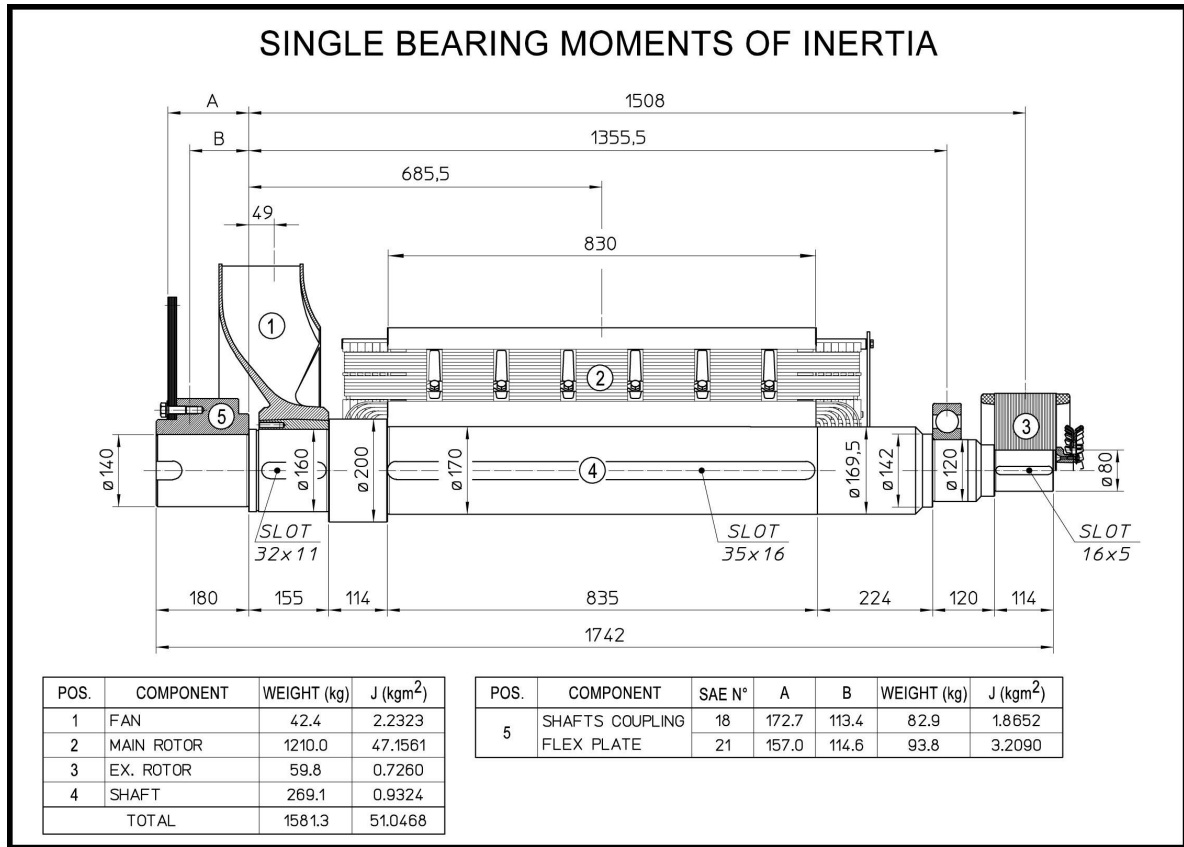


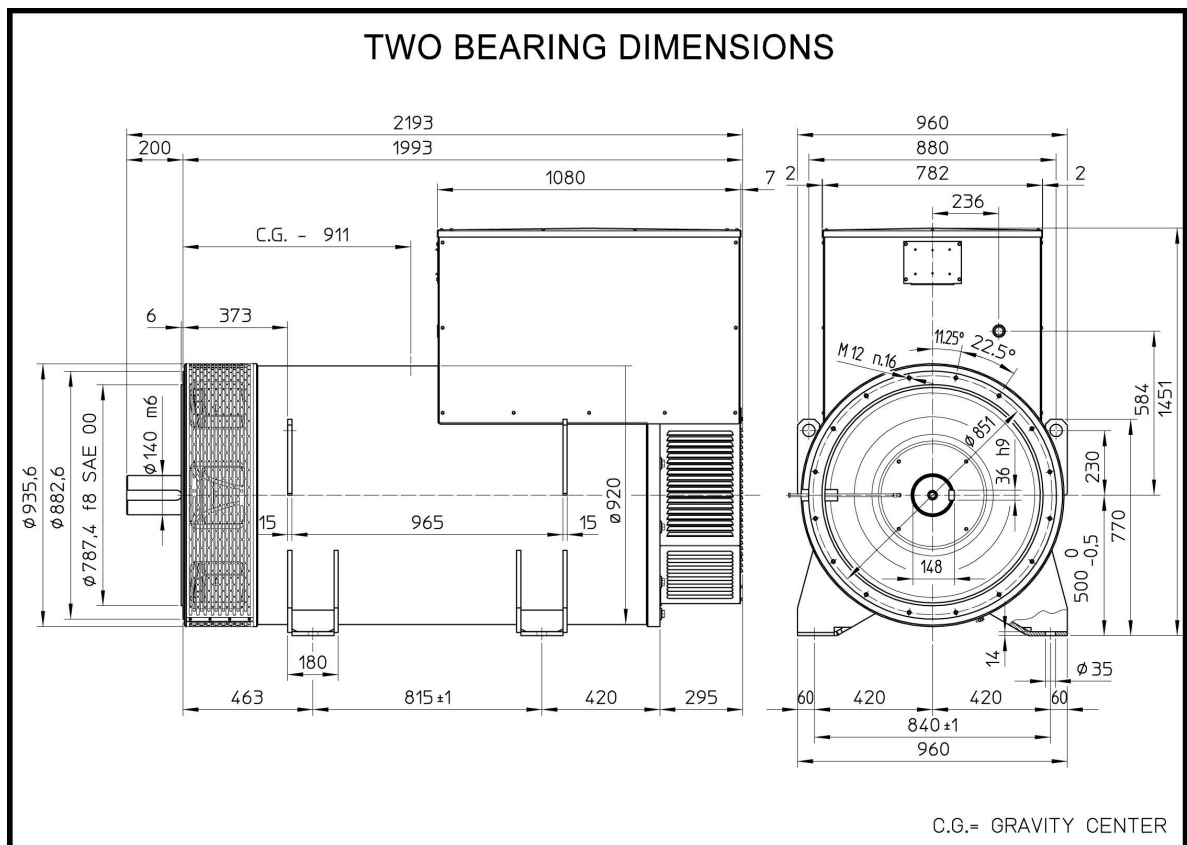
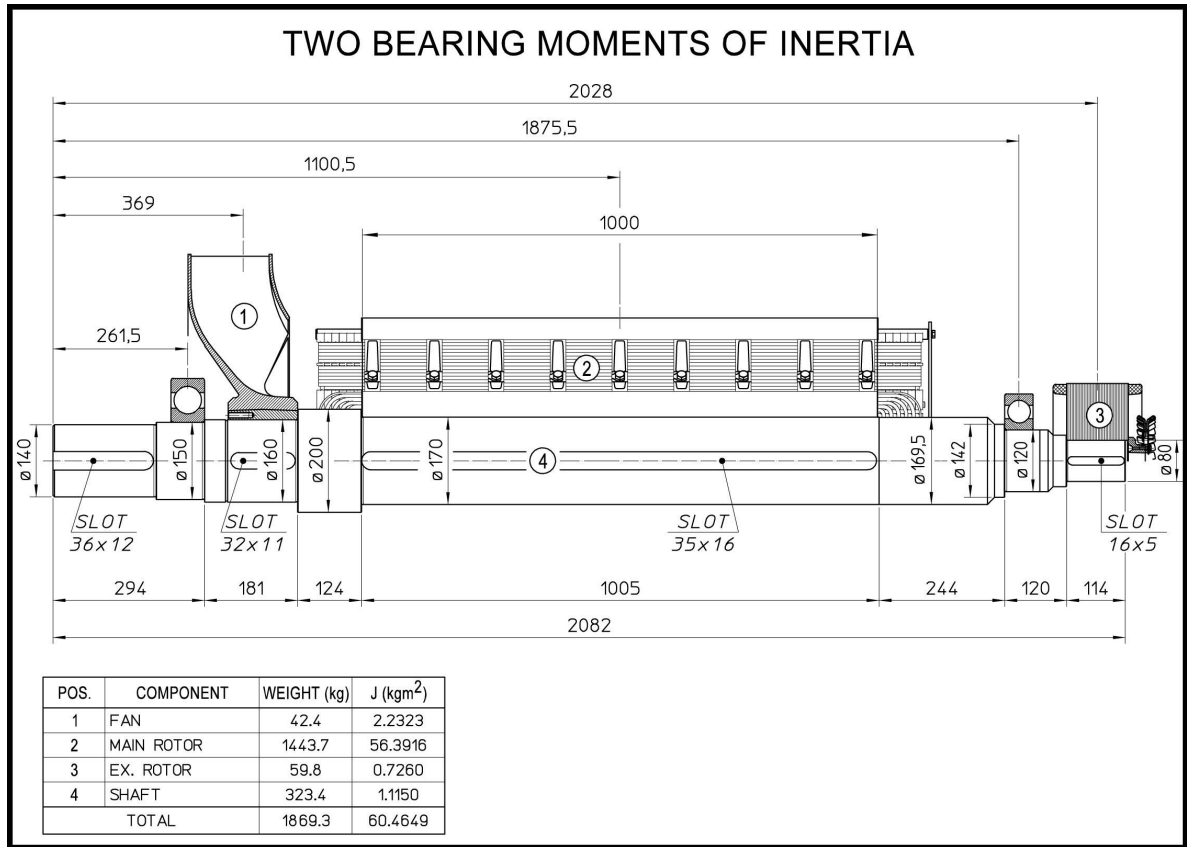


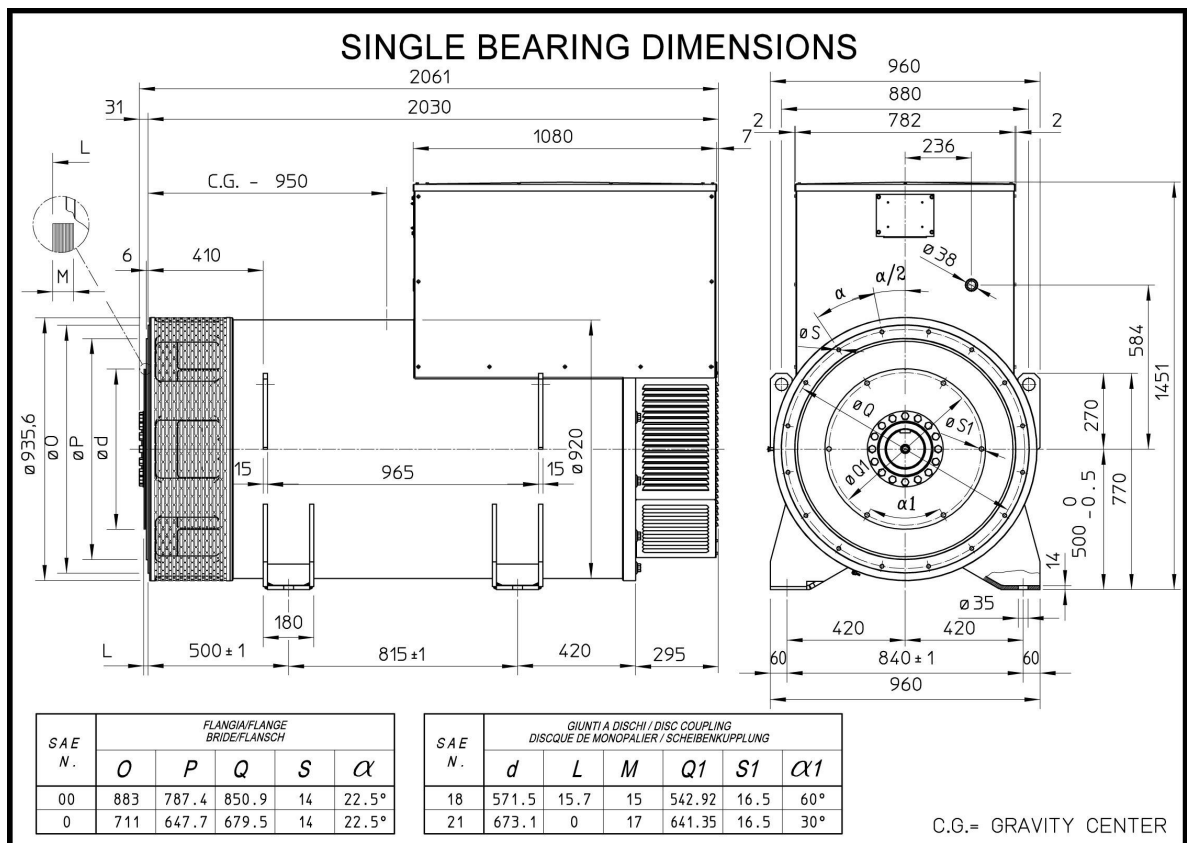
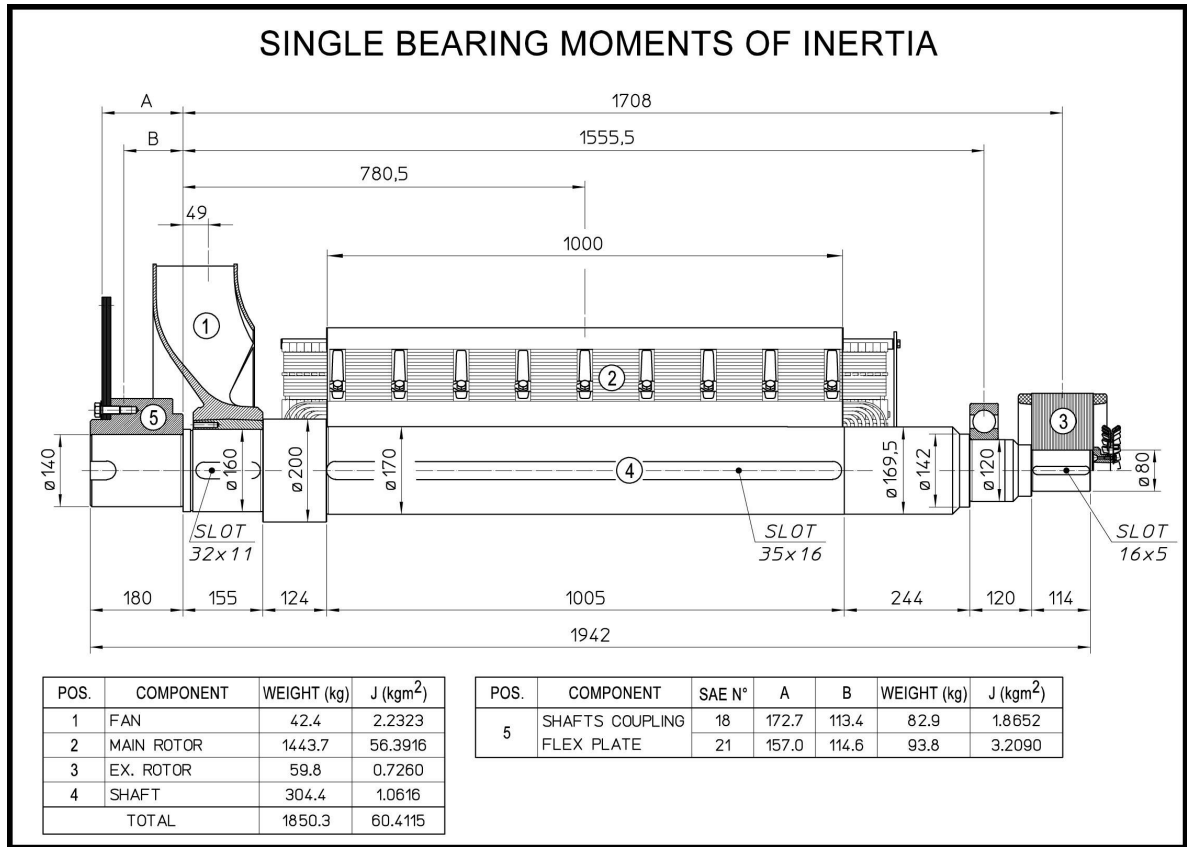
ECO46 1.5L4 A

















---

**Mecc Alte SpA (HQ)**

Via Roma  
20 - 36051 Creazzo  
Vicenza - ITALY  
T: +39 0444 396111  
E: info@meccalte.it  
aftersales@meccalte.it

---

**Mecc Alte Portable**

Via Roma  
20 - 36051 Creazzo  
Vicenza - ITALY  
T: +39 0444 396111  
E: info@meccalte.it

---

**Mecc Alte Power Products srl**

Via Melaro  
2 - 36075 Montecchio  
Maggiore (VI) - ITALY  
T: +39 0444 1831295  
E: info@meccalte.it

---

**Zanardi Alternatori srl**

Via Dei Laghi  
48/B - 36077 Altavilla  
Vicenza - ITALY  
T: +39 0444 370799  
E: info@zanardialternatori.it

---

**United Kingdom**

Mecc Alte U.K. LTD  
6 Lands' End Way  
Oakham  
Rutland LE15 6RF  
T: +44 (0) 1572 771160  
E: info@meccalte.co.uk

---

**Spain**

Mecc Alte España S.A.  
C/ Rio Taibilla, 2  
Polig. Ind. Los Valeros  
03178 Benijofar (Alicante)  
T: +34 (0) 96 6702152  
E: info@meccalte.es

---

**China**

Mecc Alte Alternator Haimen LTD  
755 Nanghai East Rd  
Jiangsu HEDZ 226100 PRC  
T: +86 (0) 513 82325758  
E: info@meccalte.cn

---

**India**

Mecc Alte India PVT LTD  
Plot NO: 1, Sanaswadi  
Talegaon  
Dhamdhare Road Taluka:  
Shirur, District:  
Pune - 412208  
Maharashtra, India  
T: +91 2137 619600  
E: info@meccalte.in

---

**U.S.A. and Canada**

Mecc Alte Inc.  
1229 Adams Drive  
McHenry, IL, 60051  
T: +1 815 344 0530  
E: info@meccalte.us

---

**Germany**

Mecc Alte Generatoren GmbH  
Bucher Hang 2  
D-87448 Waltenhofen  
T: +49 (0)831 540755 0  
E: info@meccalte.de

---

**Australia**

Mecc Alte Alternators PTY LTD  
10 Duncan Road, PO Box 1046  
Dry Creek, 5094, South  
Australia  
T: +61 (0) 8 8349 8422  
E: info@meccalte.com.au

---

**France**

Mecc Alte International S.A.  
Z.E.La Gagnerie  
16330 ST.Amant de Boixe  
T: +33 (0) 545 397562  
E: info@meccalte.fr

---

**Far East**

Mecc Alte (F.E.) PTE LTD  
19 Kian Teck Drive  
Singapore 628836  
T: +65 62 657122  
E: info@meccalte.com.sg



[www.meccalte.com](http://www.meccalte.com)