mecc alte

Totally Focused. Totally Independent.

Technical Specification

ECO46 4 A

DDS
Dynamic Data Support

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

Rev. 2

All electrical and mechanical data contained in this document is provided for reference only and represents typical values under optimal operating conditions.
Actual performances may be subjected to cumulative tolerances or variances due to materials, construction or other specific operating and loading conditions, in accordance with IEC 60034.

Mecc Alte S.p.A. reserves the right to change specifications without notice.
The information contained in this document does not constitute a guarantee of performance for any specific application. For specific technical information, please contact your local Mecc Alte office.

Regulations and Certifications

The alternators are designed, built and tested in accordance with **ISO 9001**, within a certified quality management system. The entire range meets the most common international specifications, including:

- **CEI 2-3, IEC 34-1, EN 60034-1, VDE 0530**
- **BS 4999-5000, NF 51.111, NEMA MG 1-2011**
- **ISO 8528-3**

In addition, they comply with specific regulations for particular markets, such as:

- **UL 1446, UL 1004-4, UL 1004-B**
- **CAN/CSA-C22.2 No14-95 / No100-95**

The ECP and ECO series comply with EEC directives **2006/42/EC (Machinery Directive), 2014/35/EC (Low Voltage Directive), 2014/30/EC (Electromagnetic Compatibility Directive), 2011/65/EC (RoHS 2) and 2015/863 (RoHS 3).**

Windings and performance

All alternators are equipped with **reduced pitch windings (2/3).** This configuration allows:

- The elimination of triple harmonics in the voltage waveform
- Reduction of neutral currents in parallel operation

All models, except the **ECP3 series**, are equipped with an aluminum or copper **cushioning cage** to ensure greater stability during load transients.

- 12 reconnectable wires:
  50 Hz - from 380 V to 440 V and from 220/110 V to 240/120 V (with possible derating)
  60 Hz - from 380 V to 480 V and from 220/110 V to 240/120 V (with possible derating)
- 6 reconnectable wires:
  50 Hz - from 380 V to 440 V and from 220 V to 240 V (with possible derating)
  60 Hz - from 380 V to 480 V and from 220 V to 240 V (with possible derating)

Winding configurations	Standard		Special (dedicated)			
	12 reconnectable wires	6 reconnectable wires	380 V and 600 V 60 Hz	690V 50/60Hz	220-240V 1ph 50Hz	220-240V 1ph 60Hz
ECP3 to ECO38 & (NPE)	●	○	○	○	○	○
ECO40 to ECO46	○	●	○	○	○ *	○ *
ECO47	● 4 wires		○	○	–	-
THD (Total Harmonic Distortion)	Typically <3.5% at full load L-L	Typically <3.0% at full load L-L	Typically <3.5% at full load L-L	Typically <3.5% at full load L-L	Typically <4.5% at full load L-N	Typically <4.5% at full load L-N
Interference suppression	VDE 0875 G/N/K, EN61000-6-3, EN61000-6-2, others available on request					

* Only up to ECO40 series ● Standard ○ Optional

Insulating Materials and Electrical Performance

- **Insulation Class:** H on the entire range
- **Efficiency:** High efficiency as standard
- **Motor Start:** Inrush current >300% for 20 seconds
- **THD (Total Harmonic Distortion):**
    - <3.5% L-L typical (three-phase windings)
    - <4.5% L-N typical (single-phase windings)

Winding protection

Winding protection is crucial to ensure the longevity of the generator based on environmental conditions and electrical stress.

Protection Level	Standard	Standard+	Grey	Grey+	Total+	V-Type
Treated Components	Active parts	Exciter stator	Main stator + exciter	Stator + Exciter	Stator + Exciter + Rotor	Complete system
Type of Treatment	Impregnation resin only	Resin + Grey paint EG43	Grey paint EG43	Stator (EG43) + Exciter (Black severe ep.)	Black protection (stators) + EG43 (rotating parts)	Double VPI, Anti-Corona Wire, Double Layer Black
Series/Typical Application	ECP3, ECP4 (Standard Use)	ECP28, 30, 32	Marine Applications / NPE, ECO, HCP	Harsh industrial environments	Extreme/abusive conditions	Harsh Environments (Extended Warranty)

Detail of specific treatments

- **Grey paint EG43:** Standard protection against moisture and contaminants.
- **Black Protection:** Advanced physical barrier against chemicals and high humidity.
- **V-Type Treatment:** Includes vacuum impregnation (VPI), internal stator insulation, and corona-resistant materials for maximum reliability.

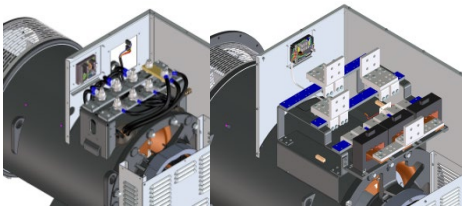
For more information visit: Insulation_System_Guide

Construction

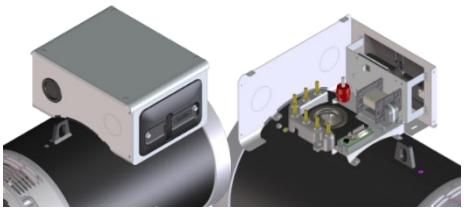
The robust mechanical structure withstands up to 5G in any direction and 9G vertically, and its design allows easy access to connections and components during routine maintenance checks. The mechanical design used the most advanced FEM techniques. The materials used are: DD12 steel for the frame, C45 steel for the shaft and cast iron or die-cast aluminum for the end brackets: the fans are made of die-cast aluminum and nylon reinforced with fiberglass, UL compliant materials. The rotors are dynamically balanced according to ISO 1940-1 grades 6.3 (up to series 32) or 2.5 (series 34 onwards).

Terminals and terminal blocks

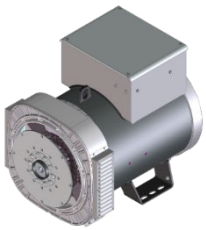
Easy access to the regulators is ensured by a pull-out drawer or drop-down panel to allow for safer adjustment. Large terminal blocks allow easy access of power cables, in the higher power ranges ECO43 and ECO46 terminals allow convenient choice of power cable or busbar connection with input and connection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



A new AVR panel has been installed on the Type-C family. The terminal blocks have been redesigned in a special "L" configuration, specifically to facilitate connections with customers; With this type of terminal block, a second terminal block can be positioned in order to obtain 12 terminals available. Current transformers are available as an option on the ECO38 series with single or dual output.



Protection for the environment



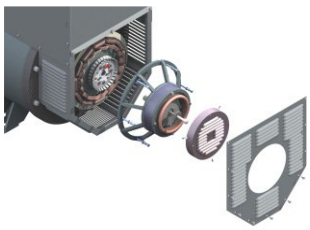
In addition to the protection on the windings themselves, alternators can have a higher degree of protection. The standard level is IP23 but the following solutions are also available: IP23 DP with ingress filters, IP23 with terminal box only in IP45, IP43 and IP45. Downgrades may apply.
For more information visit: Bulletin_IP

Optional PMG

The MeccAlte PMG is optionally available factory-fitted on ECP28, ECP30, ECP32, ECP34 and ECO38; Alternatively, only the preparation for future mounting is optional.

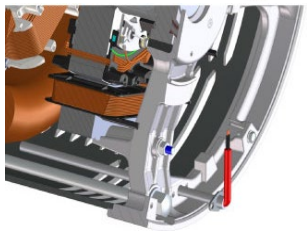
On the ECO 40, 43 and 46 series it is optionally available factory-fitted or retrofitted. On the ECO47 the PMG is standard.

The entire AVR range is fully compatible with MAUX and PMG systems, minimizing spare parts management and inventory flexibility, as one AVR adapts to all applications. The PMG delivers the same amount of kVA as the MAUX.



Anti-condensation heater

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



Accessories

Additional optional can be mounted on our alternator series, such as PTC or PT100 thermistors on both windings and bearings, anti-condensation heaters, high and low profile terminal blocks (on most series), parallel devices, current and voltage transformers, air filters, IP43 and IP45 protections and many more. For more information visit: C-type-accessories

Excitation and regulation systems

All ECP/ECO series are equipped with MAUX auxiliary winding to power the digital controller.

DxR

Both the DSR and DER1 are available for PC connection via the DxR2 USB interface and DxR TERMINAL software to query/download alarms and settings for analysis or for cloning other controllers. DER2 has a built-in USB connection and can be connected to your PC without any optional connection card. Through the DxR connection, other settings such as LAMS, synchronous external control based on digital RAM, and soft start can be achieved. Simple analog potentiometers are available for the most common adjustments.

MxK

The digital controllers of the MxK series (M2K, M2KS, M3K, M3KS, M3KSHD) are configurable via the MeccAlte App for PC or mobile devices, using the USB2MxK (USB) or MxKonnect (Wi-Fi) accessories. The M3KSHD model integrates a USB port for direct connection to the PC, without the need for optional cards. The M2KS, M3KS and M3KSHD models also support CAN Bus communication (SAE J-1939) for integration with MeccAlte GC controllers. Software-accessible features include LAMS, external voltage control (±10V), soft start, and PID autotuning. The controller records up to 64 alarms in E2PROM memory and provides the current status via A ALARMS address. There are analog potentiometers for VOLT, STAB, AMP, and DROOP (the latter on M3K, M3KS, and M3KSHD models only). The M3KSHD includes High Dynamic Response (HDR) for a quick rush of excitement. All MxK regulators are equipped with protections against over/under excitation, overcurrent, V/f, short circuit and power overvoltage.

Regulator	M2K	M2Ks	M3K	M3Ks	M3KsHD	DSR	DER1	DER2
ECP3 to ECO38 & (NPE)	●	○	○	○	○	○	○	○
ECO40 to ECO46	○	○	●	○	○	○	○	○
ECO47	○	○	○	○	●	○	○	○
Parallel operation	-	-	√	√	√	√	√	√
Network Parallel	-	-	√	√	√	√	√	√
Reference 3 phase (rms)	-	-	√	√	√	-	√	√
Accuracy	+/-0.5%	+/-0.5%	+/-0.5%	+/-0.5%	+/-0.5%	+/-1%	+/-0.5%	+/-0.5%
Remote voltage control	√	√	√	√	√	√	√	√
Alarm log	√	√	√	√	√	√	√	√
Analog and digital configurable	√	√	√	√	√	√	√	√
LAMS (Load Acceptance V/f)	√	√	√	√	√	√	√	√
APO (Active Protection Output)	-	-	-	-	√	√	√	√
Soft start	√	√	√	√	√	√	√	√
High Dynamic Response	-	-	-	-	√	-	-	√
USB connection without external cards	-	-	-	-	√	-	-	√

● Standard ○ Optional √ Available

Derating coefficients

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

Notes on short-circuit curves

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

50 Hz		*60 Hz*	
Voltage	*Factor*	*Voltage*	*Factor*
380	0.93x	415	0.85x
400	1x	440	0.90x
415	1.04x	460	0.95x
440	1.10x	480	1x

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

	3 Steps	*2 L-L phases*	*1 L-N phase*
Instant	1x	0.87x	1.30x
Minimum	1x	1.80x	3.20x
Supported	1x	1.50x	2.50x
Maximum duration	20 s	10 s	4 s

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

A smaller generator can be selected for a given engine starting service, as it has lower subtransient reactance values for nonlinear loads. The entire range from 6.5 to 3400 kVA is capable of delivering a sustained short-circuit current of >300% for up to 20 seconds.

MeccAlte Tools

This section provides direct access to professional tools developed to support alternator selection, sizing and configuration. These tools ensure solutions that are aligned with the electrical and mechanical requirements of each project.

Key features

With a data-driven approach, you can optimize performance and reduce scaling risks:

- **Targeted Selection:** Identify the ideal alternator based on load profiles and operating conditions.
- **Power Calculations**: performs the sizing of the engine and alternator respecting the electrical constraints.
- **Parameter Verification**: Controls engine starting capability and handling of unbalanced and distorted loads.
- **PMG Configuration**: Configure permanent magnet alternators for AC/DC outputs or battery chargers.

For more information visit: MeccAlte Tools

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	M3K	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 Star Y		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
ECO46 1S4 A	**kVA**	1650	**1650**	1650	1400	1552	**1552**	1552	1340	1500	**1500**	1500	1300	1350	**1350**	1350	1170	1200	**1200**	1200	1040
	kW	1320	**1320**	1320	1120	1242	**1242**	1242	1072	1200	**1200**	1200	1040	1080	**1080**	1080	936	960	**960**	960	832
ECO46 1.5S4 A	**kVA**	1800	**1800**	1800	1620	1700	**1700**	1700	1545	1650	**1650**	1650	1500	1480	**1480**	1480	1360	1320	**1320**	1320	1200
	kW	1440	**1440**	1440	1296	1360	**1360**	1360	1236	1320	**1320**	1320	1200	1184	**1184**	1184	1088	1056	**1056**	1056	960
ECO46 2S4 A	**kVA**	1944	**1944**	1944	1720	1863	**1863**	1863	1650	1800	**1800**	1800	1600	1600	**1600**	1600	1440	1440	**1440**	1440	1280
	kW	1555	**1555**	1555	1376	1490	**1490**	1490	1320	1440	**1440**	1440	1280	1280	**1280**	1280	1152	1152	**1152**	1152	1024
ECO46 1L4 A	**kVA**	2268	**2268**	2268	1990	2173	**2173**	2173	1900	2100	**2100**	2100	1850	1900	**1900**	1900	1660	1680	**1680**	1680	1480
	kW	1814	**1814**	1814	1592	1738	**1738**	1738	1520	1680	**1680**	1680	1480	1520	**1520**	1520	1328	1344	**1344**	1344	1184
ECO46 1.5L4 A	**kVA**	2500	**2500**	2500	2375	2380	**2380**	2380	2275	2300	**2300**	2300	2200	2050	**2050**	2050	1950	1840	**1840**	1840	1760
	kW	2000	**2000**	2000	1900	1904	**1904**	1904	1820	1840	**1840**	1840	1760	1640	**1640**	1640	1560	1472	**1472**	1472	1408
ECO46 2L4 A	**kVA**	2700	**2700**	2700	2450	2588	**2588**	2588	2350	2500	**2500**	2500	2280	2250	**2250**	2250	2050	2000	**2000**	2000	1824
	kW	2160	**2160**	2160	1960	2070	**2070**	2070	1880	2000	**2000**	2000	1824	1800	**1800**	1800	1640	1600	**1600**	1600	1459
ECO46 VL4 A	**kVA**	2916	**3024**	2916	2150	2795	**2899**	2795	2060	2700	**2800**	2700	2000	2400	**2500**	2400	1780	2160	**2240**	2160	1600
	kW	2333	**2419**	2333	1720	2236	**2319**	2236	1648	2160	**2240**	2160	1600	1920	**2000**	1920	1424	1728	**1792**	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 Star Y		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
ECO46 1S4 A	**kVA**	1728	1847	1944	**1944**	1656	1770	1875	**1875**	1600	1710	1800	**1800**	1440	1530	1620	**1620**	1280	1368	1440	**1440**
	kW	1382	1478	1555	**1555**	1325	1416	1500	**1500**	1280	1368	1440	**1440**	1152	1224	1296	**1296**	1024	1094	1152	**1152**
ECO46 1.5S4 A	**kVA**	1870	2030	2140	**2140**	1782	1936	2040	**2040**	1730	1880	1980	**1980**	1570	1690	1780	**1780**	1384	1504	1584	**1584**
	kW	1496	1624	1712	**1712**	1426	1549	1632	**1632**	1384	1504	1584	**1584**	1256	1352	1424	**1424**	1107	1203	1267	**1267**
ECO46 2S4 A	**kVA**	2116	2213	2332	**2332**	2028	2122	2236	**2236**	1950	2050	2160	**2160**	1750	1820	1920	**1920**	1560	1640	1728	**1728**
	kW	1693	1770	1866	**1866**	1622	1698	1789	**1789**	1560	1640	1728	**1728**	1400	1456	1536	**1536**	1248	1312	1382	**1382**
ECO46 1L4 A	**kVA**	2480	2582	2722	**2722**	2370	2473	2608	**2608**	2300	2390	2520	**2520**	2070	2150	2280	**2280**	1840	1912	2016	**2016**
	kW	1984	2066	2178	**2178**	1896	1978	2086	**2086**	1840	1912	2016	**2016**	1656	1720	1824	**1824**	1472	1530	1613	**1613**
ECO46 1.5L4 A	**kVA**	2613	2829	2980	**2980**	2508	2715	2860	**2860**	2420	2620	2760	**2760**	2150	2330	2460	**2460**	1936	2096	2208	**2208**
	kW	2090	2263	2384	**2384**	2006	2172	2288	**2288**	1936	2096	2208	**2208**	1720	1864	1968	**1968**	1549	1677	1766	**1766**
ECO46 2L4 A	**kVA**	2920	3067	3240	**3240**	2800	2939	3105	**3105**	2700	2840	3000	**3000**	2430	2550	2700	**2700**	2160	2272	2400	**2400**
	kW	2336	2454	2592	**2592**	2240	2351	2484	**2484**	2160	2272	2400	**2400**	1944	2040	2160	**2160**	1728	1818	1920	**1920**
ECO46 VL4 A	**kVA**	3136	3375	3575	**3683**	3007	3234	3426	**3529**	2900	3125	3310	**3410**	2600	2800	2980	**3050**	2320	2500	2648	**2728**
	kW	2509	2700	2860	**2946**	2406	2587	2741	**2823**	2320	2500	2648	**2728**	2080	2240	2384	**2440**	1856	2000	2118	**2182**

Reactance & Time constants- Class H / 400V

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
Xd	Direct-axis synchronous reactance	%	273,5	296,4	273,7	253,8	289,1	270,4	282,9
X'd	Direct-axis transient reactance	%	26,5	29,3	25,9	25,3	27,9	25,6	21
X"d	Direct-axis subtransient reactance	%	13,4	14,3	12,7	12,3	13,6	12,4	11,6
Xq	Quadrature-axis synchronous reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	177,8
X'q	Quadrature-axis transient reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	177,8
X"q	Quadrature-axis subtransient reactance	%	29,3	32,6	28,9	27,6	29,3	27	22,3
X_2	Negative-sequence reactance	%	19,2	20,5	18,1	17,5	19,4	17,5	14,2
X_0	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,1
Saturated									
Xd	Direct-axis synchronous reactance	%	227	246	227,2	210,7	240	224,4	234,8
X'd	Direct-axis transient reactance	%	22	24,3	21,5	21	23,2	21,2	17,4
X"d	Direct-axis subtransient reactance	%	11,1	11,9	10,5	10,2	11,3	10,3	9,63
Xq	Quadrature-axis synchronous reactance	%	145	157,5	141,6	147,6	170,9	158,9	147,6
X'q	Quadrature-axis transient reactance	%	145	157,5	141,6	147,6	170,9	158,9	147,6
X"q	Quadrature-axis subtransient reactance	%	24,3	27,1	24	22,9	24,3	22,4	18,5
X_2	Negative-sequence reactance	%	15,9	17	15	14,5	16,1	14,5	11,8
X_0	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,1
Kcc	Short circuit ratio		0,44	0,41	0,44	0,47	0,42	0,45	0,43
T'd	Transient time constant	sec	0,25	0,264	0,258	0,265	0,27	0,275	0,4
T"d	Subtransient time constant	sec	0,021	0,024	0,023	0,022	0,022	0,024	0,023
T'do	Open circuit time constant	sec	9,5	10,8	10,4	11	10,4	12,5	7,8
Ta	Armature time constant	sec	0,027	0,03	0,029	0,031	0,031	0,034	0,04

Additional information - Class H / 400V

Io	Excitation current at no load	A	0,7	1,2	0,8	0,9	1,3	1,0	1,4
Ic	Excitation current at full load	A	3,2	3,6	3,2	3,1	3,7	3,1	3,2
Overload						-			
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
Xd	Direct-axis synchronous reactance	%	273,5	296,4	273,7	253,8	289,1	270,4	287,1
X'd	Direct-axis transient reactance	%	26,5	29,3	25,9	25,3	27,9	25,6	21,3
X"d	Direct-axis subtransient reactance	%	13,4	14,3	12,7	12,3	13,6	12,4	11,8
Xq	Quadrature-axis synchronous reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	180,4
X'q	Quadrature-axis transient reactance	%	174,7	189,8	170,6	177,8	205,9	191,4	180,4
X"q	Quadrature-axis subtransient reactance	%	29,3	32,6	28,9	27,6	29,3	27	22,6
X_2	Negative-sequence reactance	%	19,2	20,5	18,1	17,5	19,4	17,5	14,4
X_0	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,15
Saturated									
Xd	Direct-axis synchronous reactance	%	227	246	227,2	210,7	240	224,4	238,3
X'd	Direct-axis transient reactance	%	22	24,3	21,5	21	23,2	21,2	17,7
X"d	Direct-axis subtransient reactance	%	11,1	11,9	10,5	10,2	11,3	10,3	9,79
Xq	Quadrature-axis synchronous reactance	%	145	157,5	141,6	147,6	170,9	158,9	149,7
X'q	Quadrature-axis transient reactance	%	145	157,5	141,6	147,6	170,9	158,9	149,7
X"q	Quadrature-axis subtransient reactance	%	24,3	27,1	24	22,9	24,3	22,4	18,8
X_2	Negative-sequence reactance	%	15,9	17	15	14,5	16,1	14,5	12
X_0	Zero sequence reactance	%	4,26	4,78	4,06	3,85	4,58	3,89	3,15
Kcc	Short circuit ratio		0,44	0,41	0,44	0,47	0,42	0,45	0,42
T'd	Transient time constant	sec	0,25	0,264	0,258	0,265	0,27	0,275	0,4
T"d	Subtransient time constant	sec	0,021	0,024	0,023	0,022	0,022	0,024	0,023
T'do	Open circuit time constant	sec	9,5	10,8	10,4	11	10,4	12,5	7,8
Ta	Armature time constant	sec	0,027	0,03	0,029	0,031	0,031	0,034	0,04

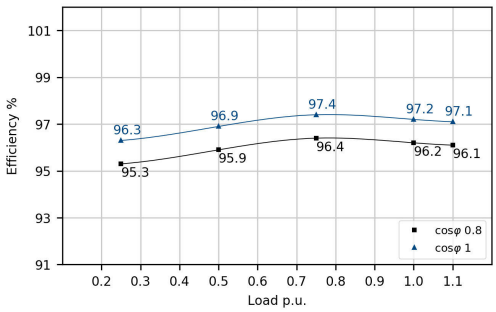
Additional information - Class H / 480V

Io	Excitation current at no load	A	0,7	1,2	0,8	0,9	1,3	1,0	1,4
Ic	Excitation current at full load	A	3,2	3,6	3,2	3,1	3,7	3,1	3,2
Overload						-			
Overload per 20 sec. PRP or 10 sec. COP		%				300			
Heat dissipation		W	53776	57451	60820	66645	70638	71679	78584
Telephone Interferance 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

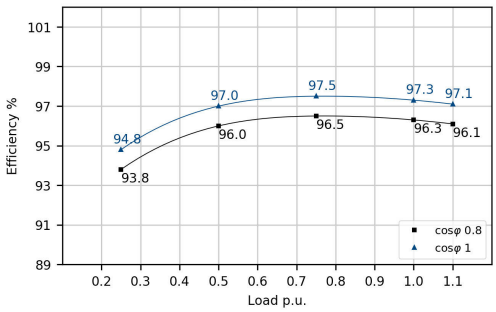
Efficiencies @ 50Hz

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

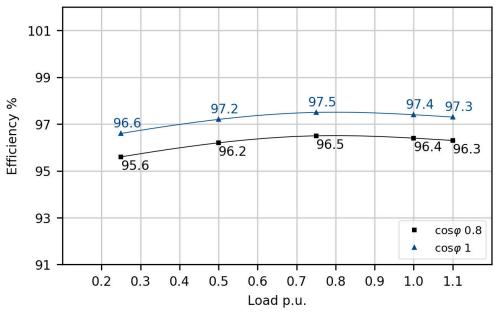
ECO46 1S4 A
400/230 50Hz



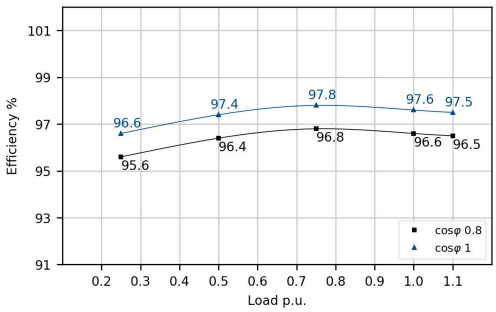
ECO46 1.5S4 A
400/230 50Hz



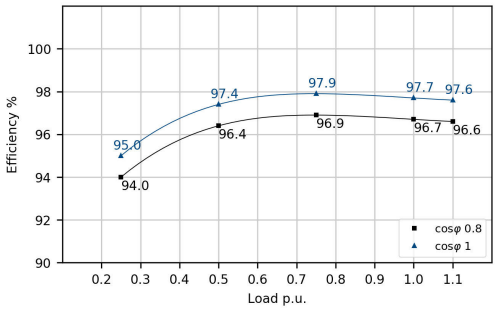
ECO46 2S4 A
400/230 50Hz



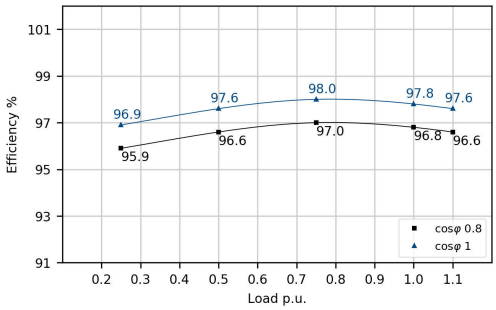
ECO46 1L4 A
400/230 50Hz



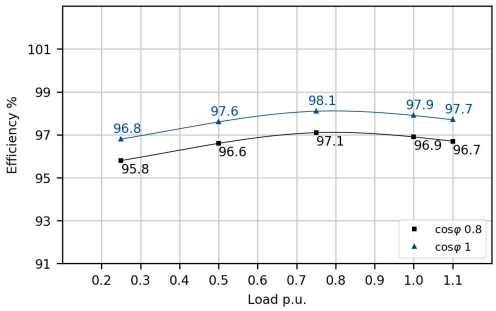
ECO46 1.5L4 A
400/230 50Hz



ECO46 2L4 A
400/230 50Hz



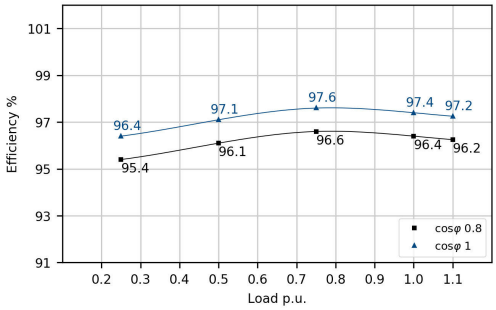
ECO46 VL4 A
400/230 50Hz



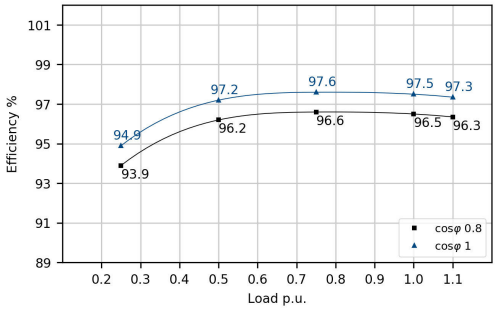
Efficiencies @ 60Hz

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

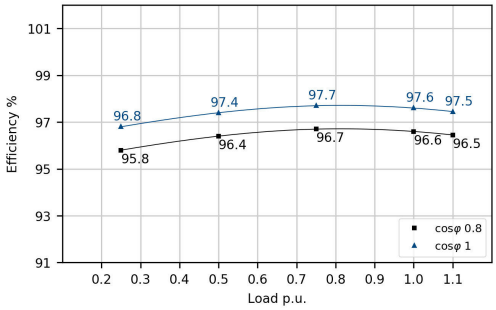
ECO46 1S4 A
480/277 60Hz



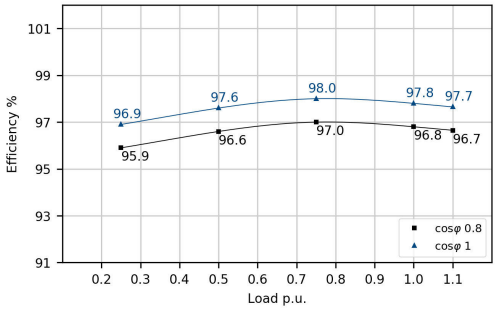
ECO46 1.5S4 A
480/277 60Hz



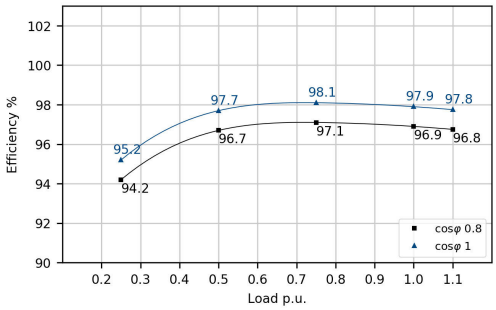
ECO46 2S4 A
480/277 60Hz



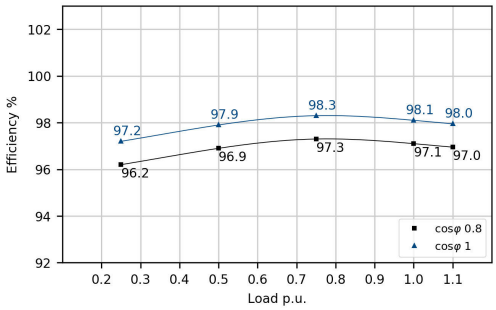
ECO46 1L4 A
480/277 60Hz



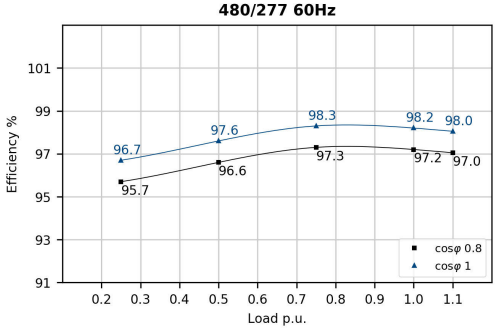
ECO46 1.5L4 A
480/277 60Hz



ECO46 2L4 A
480/277 60Hz



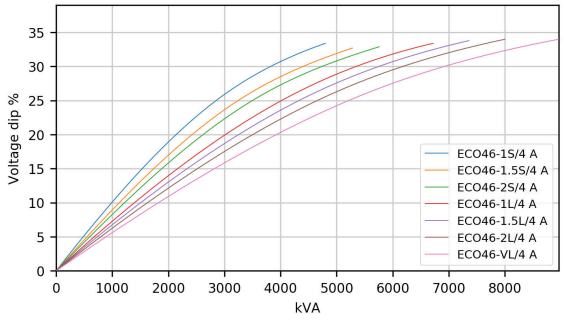
ECO46 VL4 A
480/277 60Hz



Transients voltage

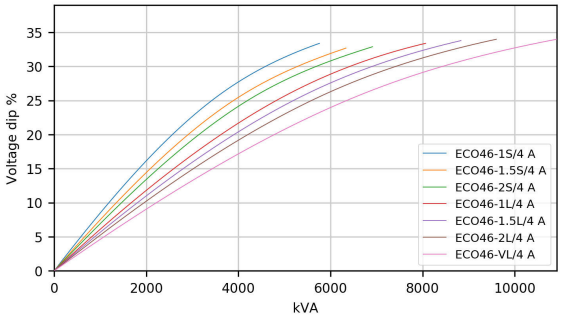
400V - 50Hz

Motor Starting @ P.F. 0,6

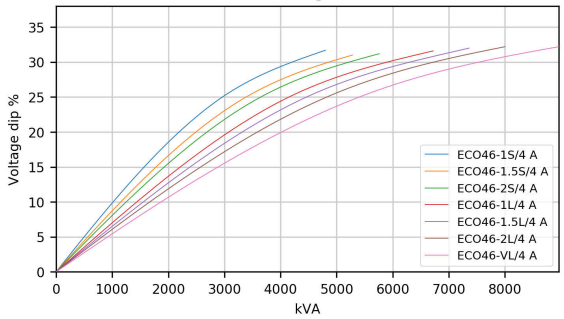


480V - 60Hz

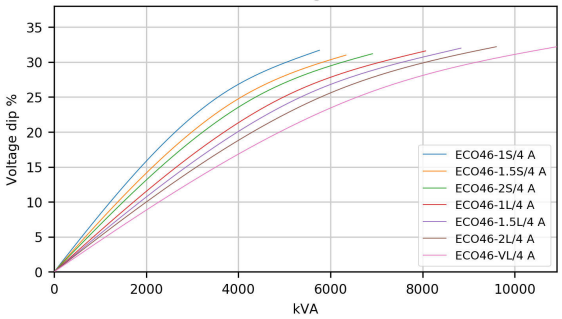
Motor Starting @ P.F. 0,6



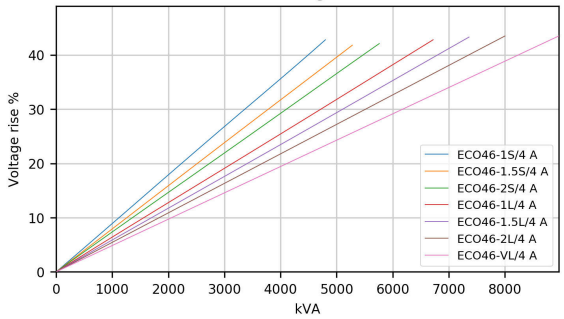
Phase Loading @ P.F. 0,8



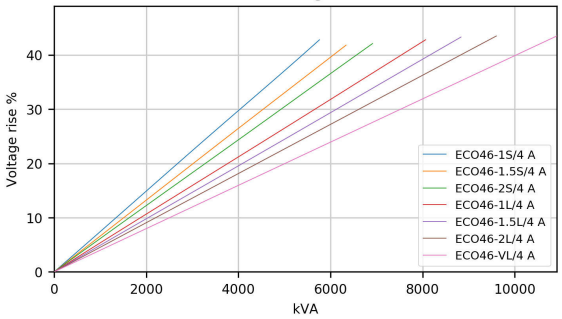
Phase Loading @ P.F. 0,8



Load Shedding @ P.F. 0,8



Load Shedding @ P.F. 0,8



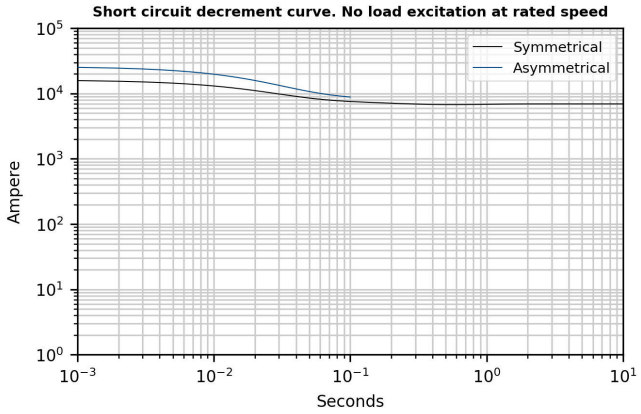
In order to scale transient curves as a function of a power factor or voltage if not indicated, please proceed as follows:

Power Factor coefficient corrector (PFCC), to be used on power factor 0.6 curves:
PFCC=sin(ARCcos (PFnew))/0.8
Example. The PFCC at power factor 0.3 is 1.192 [PFCC= sin(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.

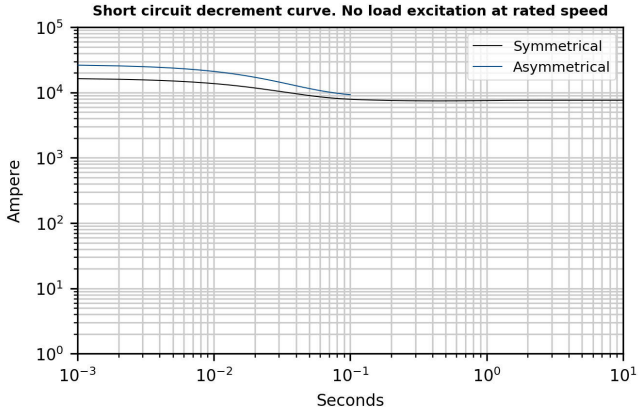
Voltage coefficient corrector (VCC):
VCC=(400/Vnew)2 if 50 Hz; VCC=(480/Vnew)2 if 60 Hz
Example. VCC at 415V 60 Hz is 1.338 [VCC=(480/415)^2]. This means that the voltage fall at a given power at 415V is equivalent to the one that can be read on the power factor 0.6 curve if the load is considered 1.338 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

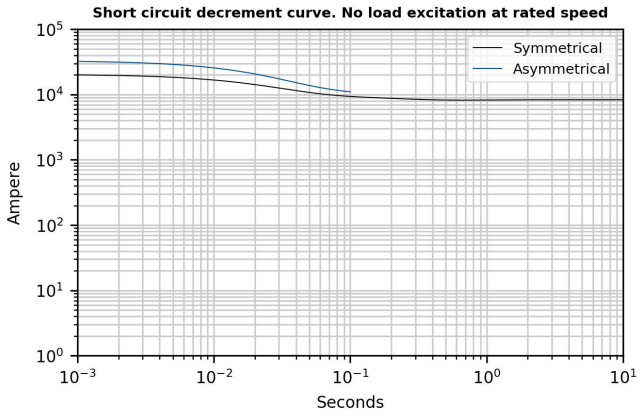
ECO46 1S4 A



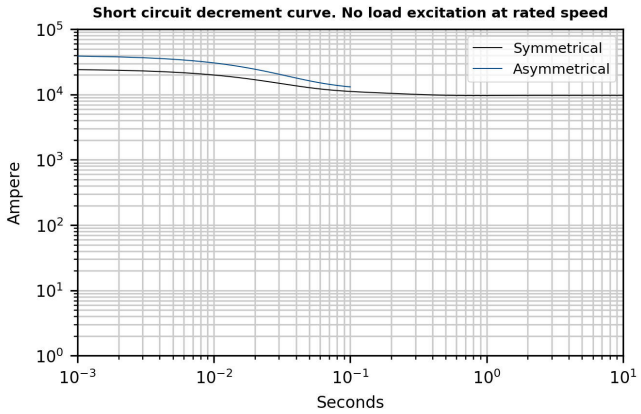
ECO46 1.5S4 A



ECO46 2S4 A



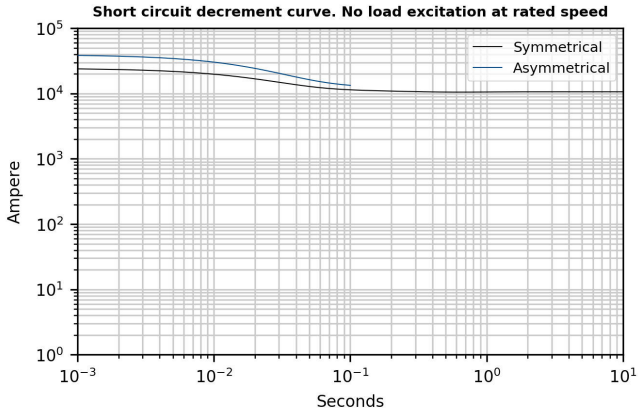
ECO46 1L4 A



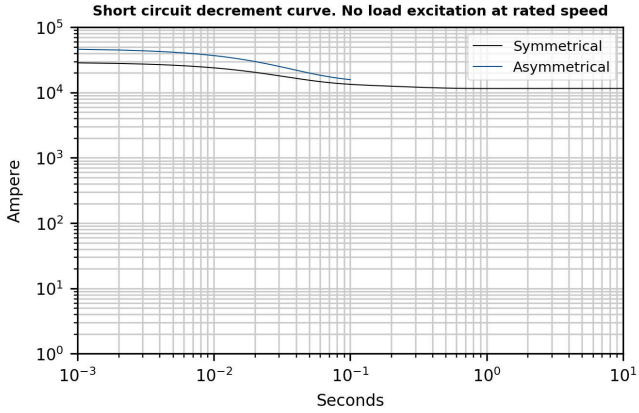
*Please refer to tables at page 6

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

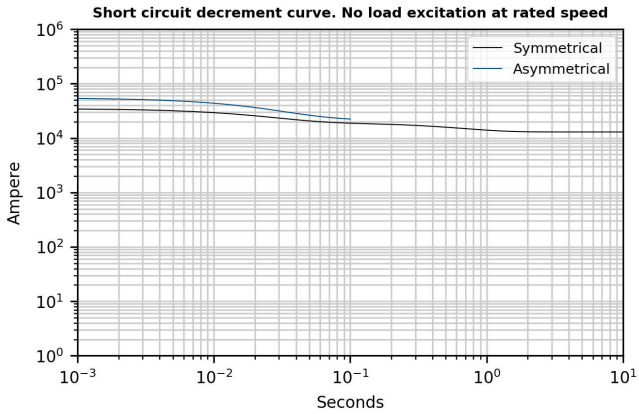
ECO46 1.5L4 A



ECO46 2L4 A



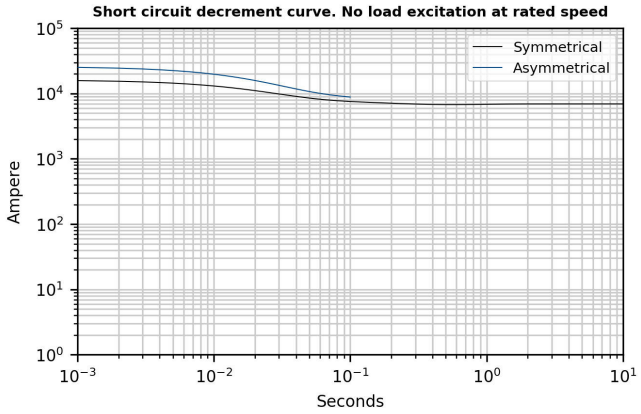
ECO46 VL4 A



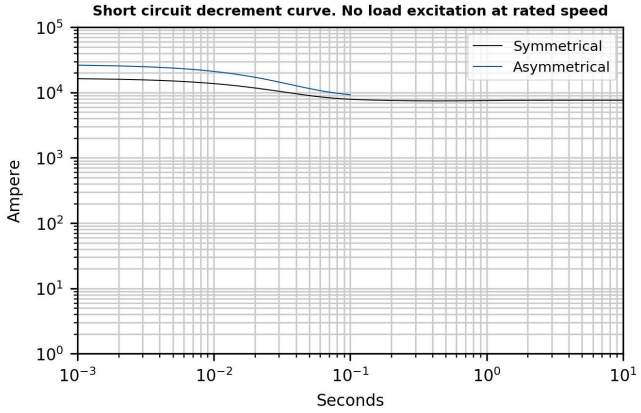
*Please refer to tables at page 6

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

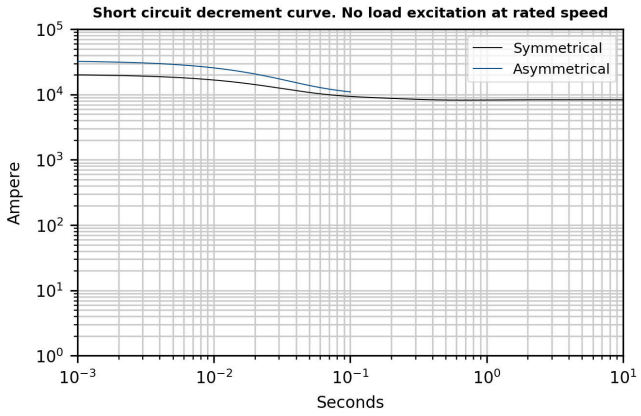
ECO46 1S4 A



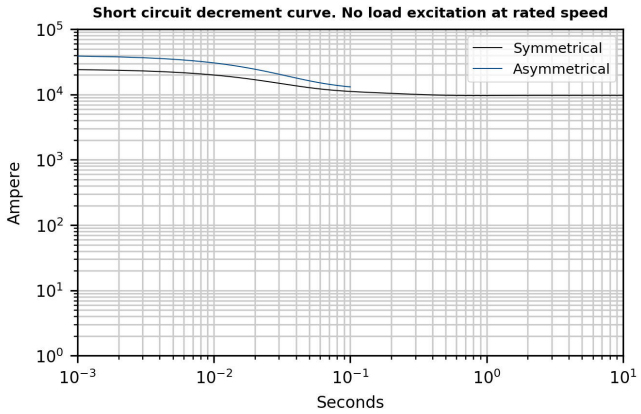
ECO46 1.5S4 A



ECO46 2S4 A



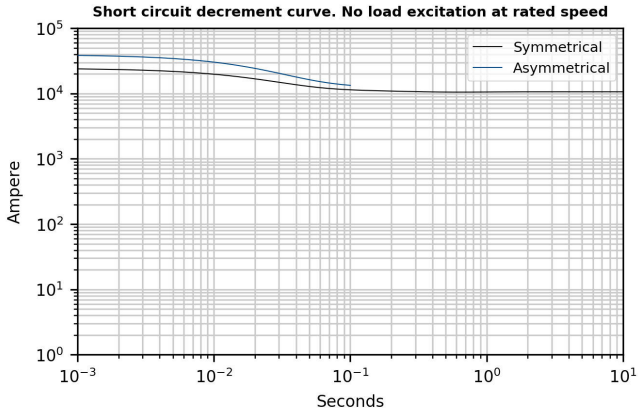
ECO46 1L4 A



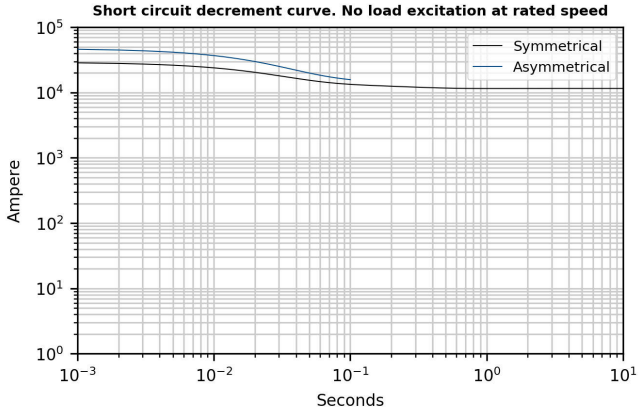
*Please refer to tables at page 6

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

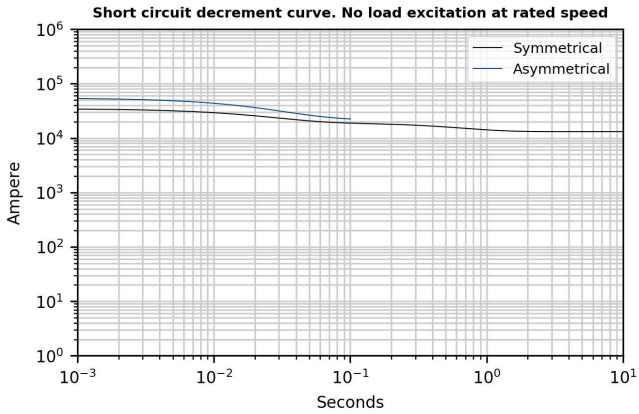
ECO46 1.5L4 A



ECO46 2L4 A



ECO46 VL4 A

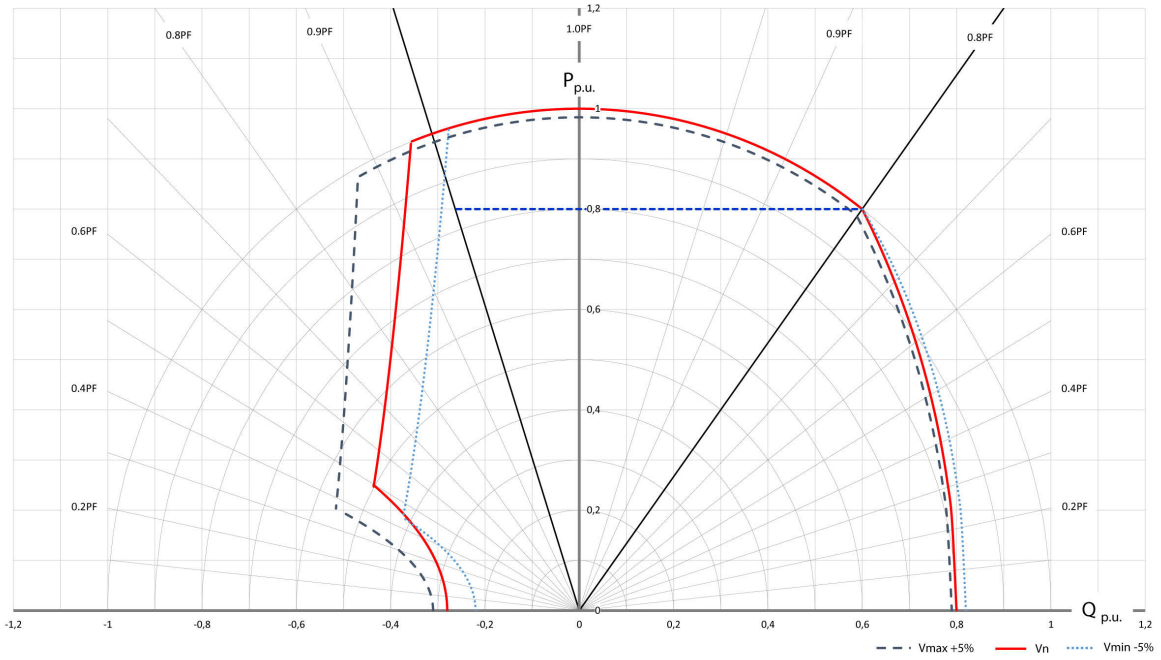


*Please refer to tables at page 6

Additional Characteristics

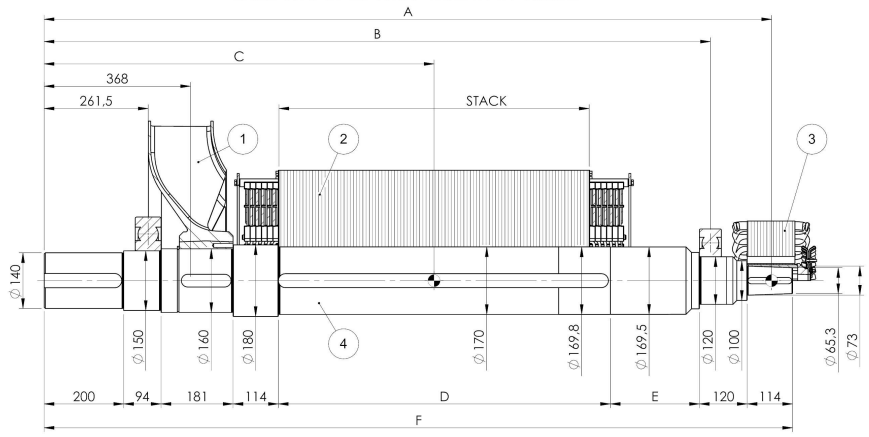
Data		ECO46 1S4 A		ECO46 1.5S4 A		ECO46 2S4 A		ECO46 1L4 A		ECO46 1.5L4 A		ECO46 2L4 A		ECO46 VL4 A	
		50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Damper cage		Copper													
Single stator coil resistance (20°C)	Ω	0,00584		0,00405		0,00304		0,0024		0,00381		0,00234		0,00189	
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^3/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



* The PQ diagram above refers to three-phase application only.

MOMENTS OF INERTIA - DOUBLE BEARING



TYPE	COMPONENT 1 FAN Weight [kg]	1 FAN J [kgm²]	2 MAIN ROTOR Weight [kg]	2 MAIN ROTOR J [kgm²]	3 EXCITER ROTOR Weight [kg]	3 EXCITER ROTOR J [kgm²]	4 SHAFT* Weight [kg]	4 SHAFT* J [kgm²]	TOTAL Weight [kg]	TOTAL J [kgm²]
ECO46 1S/4A			709,2	27,7645			245,7	0,8200	1059,1	31,7831
ECO46 1.5S/4A			845,8	33,1547			246,4	0,8242	1196,4	37,1775
ECO46 2S/4A			903,9	35,4299			246,6	0,8261	1254,7	39,4546
ECO46 1L/4A	43.3	2.4801	1034,1	40,4352	60.9	0.7185	287,1	0,9720	1425,3	44,6058
ECO46 1.5L/4A			1147,6	44,8739			287,6	0,9758	1539,5	49,0483
ECO46 2L/4A			1220,8	47,7453			288,0	0,9781	1612,9	51,9219
ECO46 VL/4A			1455,7	56,8930			324,0	1,1111	1883,9	61,2027

TYPE	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
ECO46 1S/4A			825.5			
ECO46 1.5S/4A	1599.4	1445.5	870.5	605.0	224.0	1552.0
ECO46 2S/4A			890.5			
ECO46 1L/4A			940.5			
ECO46 1.5L/4A	1829.4	1675.5	980.5	835.0	224.0	1882.0
ECO46 2L/4A			1005.5			
ECO46 VL/4A	2029.4	1875.5	1100.5	1005.0	244.0	2082.0

* Shaft mass and inertia also include rotor keys

REV.	DATE	REVIEWS	DESIGN BY	APPROVED BY
00	19/02/2026	FIRST ISSUE	Berdin G.	Luise F.

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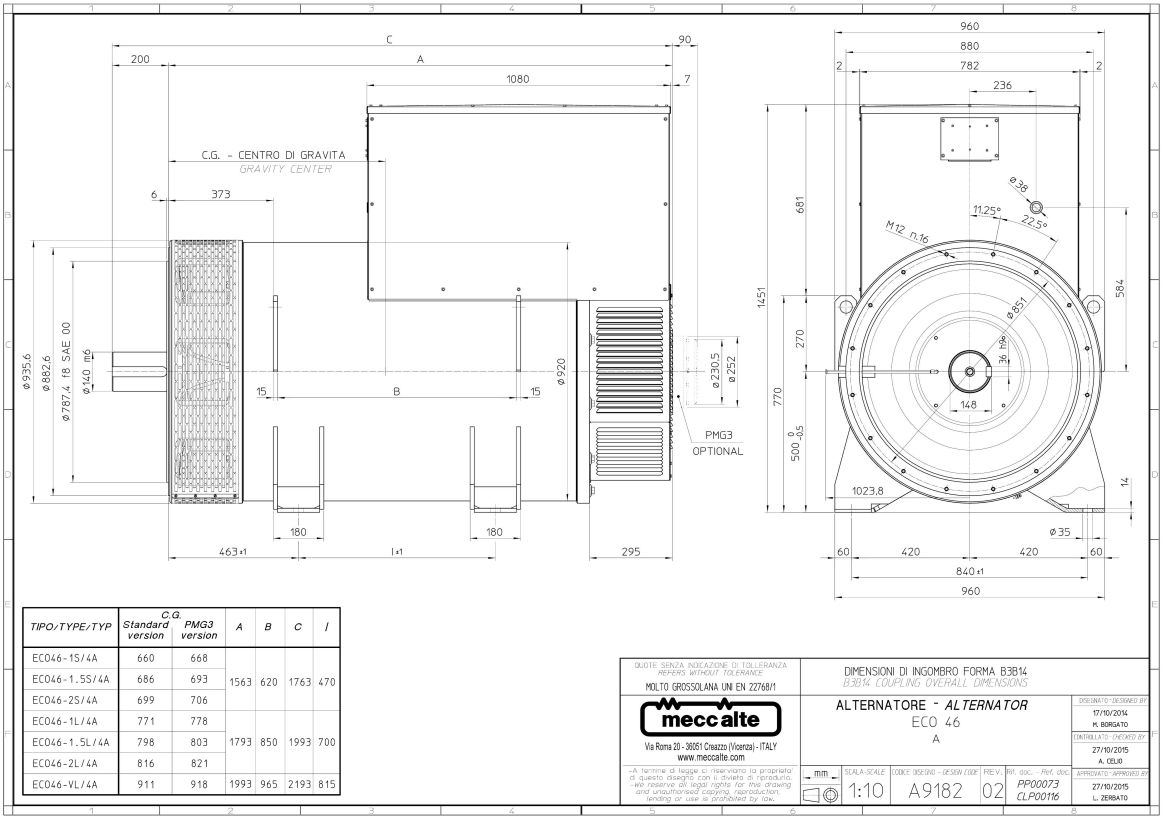
DESCRIPTION: MOMENTS OF INERTIA - DOUBLE BEARING ECO46A

FORMAT	SCALE	REF.DOC.	PART N.	MODEL REV.	DRW REV.
A4	1:10	-	D00467	00	00



TIPO/TYPE/TYP	C.G. Standard version	C.G. PMG3 version	A	B	C	I
ECO46-1S/4A	660	668	1563	620	1763	470
ECO46-1.5S/4A	686	693				
ECO46-2S/4A	699	706				
ECO46-1L/4A	771	778	1793	850	1993	700
ECO46-1.5L/4A	798	803				
ECO46-2L/4A	816	821				
ECO46-VL/4A	911	918	1993	965	2193	815

QUOTE SENZA INDICAZIONE DI TOLLERANZA RISPETTARE WITHOUT TOLERANCE: MOLTO GROSSOLANA UNI EN 22768/1

DIMENSIONI DI INGOMBRO FORMA B3B14
B3B14 COUPLING OVERALL DIMENSIONS

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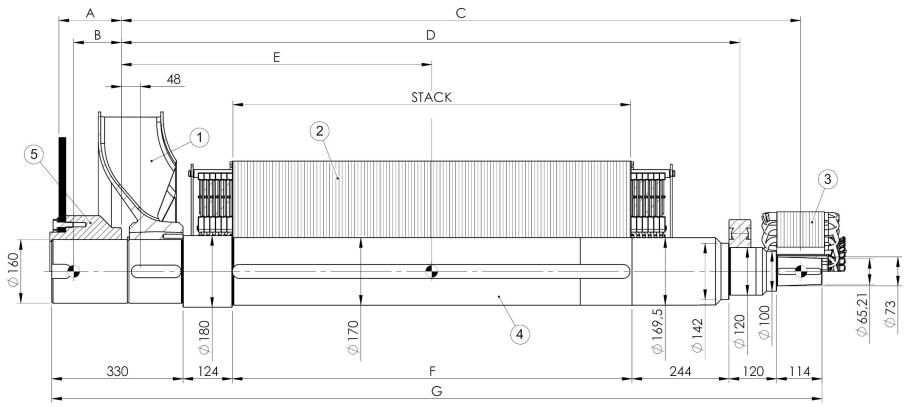
ALTERNATORE - ALTERNATOR
ECO 46
A

mm	SCALA-SCALE	CODICE DISEGNO - DESIGN CODE	REV.	Rif. doc. - Ref. doc.
	1:10	A9182	02	PP00073 CLP00116

DESIGNATO - DESIGNED BY: 17/10/2014 M. BORGATO
CONTROLLATO - CHECKED BY: 27/10/2015 A. CELIO
APPROVATO - APPROVED BY: 27/10/2015 L. ZERBATO

MOMENTS OF INERTIA - SINGLE BEARING



* Shaft mass and inertia also include rotor keys

TYPE	COMPONENT 1 FAN Weight [kg]	1 FAN J [kgm²]	2 MAIN ROTOR Weight [kg]	2 MAIN ROTOR J [kgm²]	3 EXCITER ROTOR Weight [kg]	3 EXCITER ROTOR J [kgm²]	4 SHAFT* Weight [kg]	4 SHAFT* J [kgm²]	TOTAL Weight [kg]	TOTAL J [kgm²]
ECO46 1S/4A	43.2	2.4801	709.2	27.7645	60.9	0.7185	232.6	0.8012	1046.0	31.7643
ECO46 1.5S/4A			845.8	33.1547			233.2	0.8054	1183.2	37.1587
ECO46 2S/4A			903.9	35.4299			233.5	0.8073	1241.6	39.4358
ECO46 1L/4A			1034.1	40.4352			273.9	0.9532	1412.2	44.5870
ECO46 1.5L/4A			1147.6	44.8739			274.5	0.9570	1526.3	49.0295
ECO46 2L/4A			1220.8	47.7453			274.8	0.9593	1599.8	51.9031
ECO46 VL/4A			1455.7	56.8930			310.9	1.0923	1870.8	61.1839

SAE N.	5 | SHAFTS COUPLING FLEX PLATE A	B	Weight [kg]	J [kgm²]
18	172.7	121.3	69.4	1.7300
21	157	120	82	3.0976

TYPE	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
ECO46 1S/4A			505.5		
ECO46 1.5S/4A	1279.4	1125.5	550.5	605	1507
ECO46 2S/4A			570.5		
ECO46 1L/4A			620.5		
ECO46 1.5L/4A	1509.4	1355.5	660.5	835	1737
ECO46 2L/4A			685.5		
ECO46 VL/4A	1709.4	1555.5	780.5	1005	1937

REV.	DATE	REVIEWS	DESIGN BY	APPROVED BY
01	02/02/2026	UPDATED DATA	Berdin G.	Luise F.
00	14/03/2025	FIRST ISSUE	Masiero M.	Luise F.

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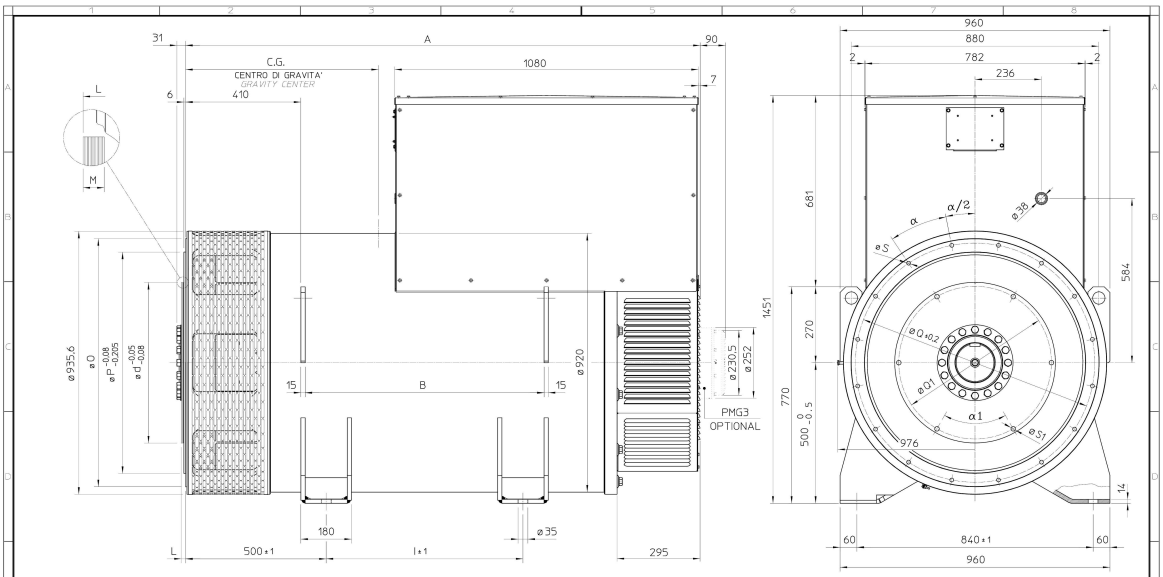
DESCRIPTION: MOMENTS OF INERTIA - SINGLE BEARING ECO46A

FORMAT	SCALE	REF.DOC	PART N.	MODEL REV.	DRW REV.
A4	1:10	ECR00089	D00388	00	01



SAE N.	FLANGIA / LANGE BRIDE / FLANSCH O	P	Q	S	α
00	883	787.4	850.9	14	22.5°
0	711	647.7	679.5	14	22.5°

SAE N.	GIUNTI A DISCHI / DISC COUPLING DISCQUE DE MONOPALIER / SCHEIBENKUPPLUNG d	L	M	Q1	S1	α1
18	571.5	15.7	15	542.92	16.5	60°
21	673.1	0	17	641.35	16.5	30°

TIPO/TYPE/TYP	C.G. Standard version	C.G. PMG3 version	A	B	I
ECO46-1S/4A	664	672	1600	620	470
ECO46-1.5S/4A	690	697			
ECO46-2S/4A	702	709			
ECO46-1L/4A	812	819	1830	850	700
ECO46-1.5L/4A	839	845			
ECO46-2L/4A	858	863			
ECO46-VL/4A	950	956	2030	965	815

QUOTE SENZA INDICAZIONE DI TOLLERANZA RIFERIRSI WITHOUT TOLERANCE MOLTO GROSSOLANA UNI EN 22768/1

DIMENSIONI DI INGOMBRO FORMA MD35
OVERALL DIMENSIONS COUPLING MD35

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ALTERNATORE - ALTERNATOR
ECO 46
A

DESIGNATO - DESIGNED BY 24/09/2014 S. SAORIN
CONTROLLATO - CHECKED BY 27/10/2015 A. CELIO
APPROVATO - APPROVED BY 27/10/2015 L. ZERBATO

mm | SCALA-SCALE 1:10 | CODICE DISEGNO - DESIGN CODE A9153 | REV. 03 | Rif. doc. - Ref. doc. PP00073 CLP00116

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