



Totally Focused. Totally Independent.

## Technical Specification

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# EC038 4 C



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



## 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).

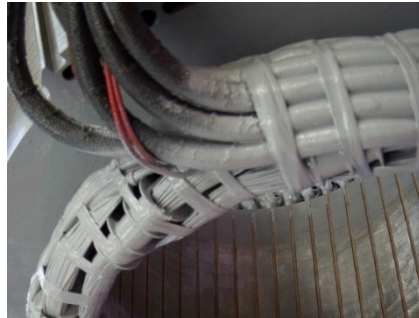
- ▶ 12 wire reconnectable:  
50Hz – 380V to 440V and 220/110V to 240/120V (de-rates may apply at certain voltages)  
60Hz – 380V to 480V and 220/110V to 240/120V (de-rates may apply at certain voltages)
- ▶ 6 wire reconnectable:  
50Hz – 380V to 440V and 220V to 240V (de-rates may apply at certain voltages)  
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
NPE32, ECP34 to ECO47	-	-	Std	Option	Option



Grey treatment (marinization) on the left, TOTAL+ treatment shown on the right. The EG43 grey varnish, is an 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.

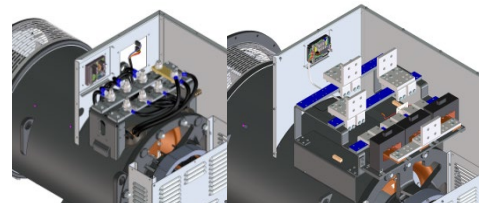
The TOTAL+ is a Mecc Alte protection system. It is the ultimate winding treatment that offers truly superior performances when the environment is really harsh, or the application very demanding. The TOTAL+ is also extremely resistant to the particle abrasion as it adsorbs the impacts.

## Design

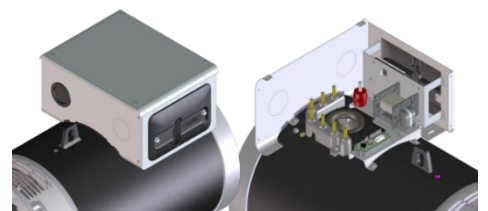
The robust mechanical structure withstands up to 5G in any direction and 9G vertically and its design permits easy access to the connections and components during routine maintenance check-ups. The mechanical design has used the most advanced FEM analysis. The materials used are: DD12 steel for the frame, 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.

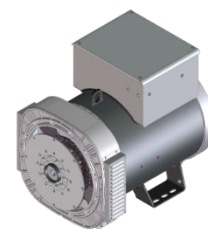


On C type family has been installed a new AVR panel. Terminal boards have been redesigned into a special L configuration, specifically to ease customer wiring; with this kind of terminal board it is possible to place a second terminal board in order to get 12 available terminals. Current transformers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

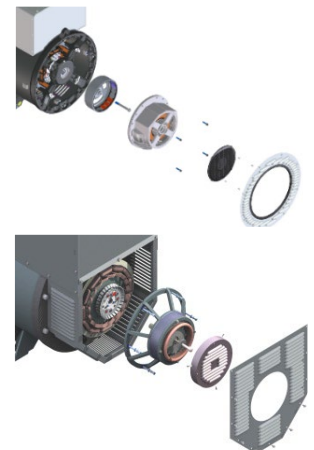
## Optional PMG

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.

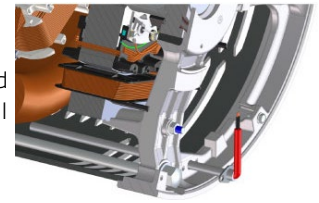
For ECO47 PMG is standard.

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	6314.2RS
Execution	Brushless	DE Bearing type	6318.2RS
Regulator type	DSR	Maximum Overspeed	2250
Winding pitch	2/3	Altitude	0-1000
Code voltage reference	T0405S3	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			
		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
Series Star Y		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
Parallel Star YY		190V	200V	208V	220V	190V	200V	208V	220V	190V	200V	208V	220V	190V	200V	208V	220V	190V	200V	208V	220V
Series Delta Δ		220V	230V	240V	254V	220V	230V	240V	254V	220V	230V	240V	254V	220V	230V	240V	254V	220V	230V	240V	254V
Parallel Delta ΔΔ		110V	115V	120V	127V	110V	115V	120V	127V	110V	115V	120V	127V	110V	115V	120V	127V	110V	115V	120V	127V
<b>ECO38 154 C</b>	<b>kVA</b>	196	<b>196</b>	196	180	188	<b>188</b>	188	173	180	<b>180</b>	180	165	170	<b>170</b>	170	155	144	<b>144</b>	144	132
	<b>kW</b>	157	<b>157</b>	157	144	150	<b>150</b>	150	138	144	<b>144</b>	144	132	136	<b>136</b>	136	124	115	<b>115</b>	115	106
<b>ECO38 254 C</b>	<b>kVA</b>	220	<b>220</b>	220	209	211	<b>211</b>	211	200	200	<b>200</b>	200	190	185	<b>185</b>	185	175	160	<b>160</b>	160	152
	<b>kW</b>	176	<b>176</b>	176	167	169	<b>169</b>	169	160	160	<b>160</b>	160	152	148	<b>148</b>	148	140	128	<b>128</b>	128	122
<b>ECO38 1M4 C</b>	<b>kVA</b>	250	<b>250</b>	250	234	237	<b>237</b>	237	221	225	<b>225</b>	225	210	207	<b>207</b>	207	190	180	<b>180</b>	180	168
	<b>kW</b>	200	<b>200</b>	200	187	190	<b>190</b>	190	177	180	<b>180</b>	180	168	166	<b>166</b>	166	152	144	<b>144</b>	144	134
<b>ECO38 2M4 C</b>	<b>kVA</b>	275	<b>275</b>	275	253	264	<b>264</b>	264	243	250	<b>250</b>	250	230	230	<b>230</b>	230	215	200	<b>200</b>	200	184
	<b>kW</b>	220	<b>220</b>	220	202	211	<b>211</b>	211	194	200	<b>200</b>	200	184	184	<b>184</b>	184	172	160	<b>160</b>	160	147
<b>ECO38 1L4 C</b>	<b>kVA</b>	330	<b>330</b>	330	319	315	<b>315</b>	315	305	300	<b>300</b>	300	290	275	<b>275</b>	275	265	240	<b>240</b>	240	232
	<b>kW</b>	264	<b>264</b>	264	255	252	<b>252</b>	252	244	240	<b>240</b>	240	232	220	<b>220</b>	220	212	192	<b>192</b>	192	186
<b>ECO38 2L4 C</b>	<b>kVA</b>	370	<b>370</b>	370	360	360	<b>360</b>	360	350	350	<b>350</b>	350	340	320	<b>320</b>	320	310	280	<b>280</b>	280	272
	<b>kW</b>	296	<b>296</b>	296	288	288	<b>288</b>	288	280	280	<b>280</b>	280	272	256	<b>256</b>	256	248	224	<b>224</b>	224	218
<b>ECO38 VL4 C</b>	<b>kVA</b>	380	<b>400</b>	400	370	370	<b>380</b>	380	360	360	<b>370</b>	370	350	329	<b>338</b>	338	319	288	<b>296</b>	296	280
	<b>kW</b>	304	<b>320</b>	320	296	296	<b>304</b>	304	288	288	<b>296</b>	296	280	263	<b>270</b>	270	255	230	<b>237</b>	237	224

## 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			
		415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V
Series Star Y		415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V	415V	440V	460V	480V
Parallel Star YY		208V	220V	230V	240V	208V	220V	230V	240V	208V	220V	230V	240V	208V	220V	230V	240V	208V	220V	230V	240V
Series Delta Δ		240V	254V	265V	277V	240V	254V	265V	277V	240V	254V	265V	277V	240V	254V	265V	277V	240V	254V	265V	277V
Parallel Delta ΔΔ		120V	127V	133V	138V	120V	127V	133V	138V	120V	127V	133V	138V	120V	127V	133V	138V	120V	127V	133V	138V
<b>ECO38 154 C</b>	<b>kVA</b>	225	236	236	<b>236</b>	220	230	230	<b>230</b>	210	220	220	<b>220</b>	195	205	205	<b>205</b>	168	176	176	<b>176</b>
	<b>kW</b>	180	189	189	<b>189</b>	176	184	184	<b>184</b>	168	176	176	<b>176</b>	156	164	164	<b>164</b>	134	141	141	<b>141</b>
<b>ECO38 254 C</b>	<b>kVA</b>	253	264	264	<b>264</b>	242	253	253	<b>253</b>	230	240	240	<b>240</b>	210	220	220	<b>220</b>	184	192	192	<b>192</b>
	<b>kW</b>	202	211	211	<b>211</b>	194	202	202	<b>202</b>	184	192	192	<b>192</b>	168	176	176	<b>176</b>	147	154	154	<b>154</b>
<b>ECO38 1M4 C</b>	<b>kVA</b>	289	300	300	<b>300</b>	274	284	284	<b>284</b>	260	270	270	<b>270</b>	240	250	250	<b>250</b>	208	216	216	<b>216</b>
	<b>kW</b>	231	240	240	<b>240</b>	219	227	227	<b>227</b>	208	216	216	<b>216</b>	192	200	200	<b>200</b>	166	173	173	<b>173</b>
<b>ECO38 2M4 C</b>	<b>kVA</b>	319	330	330	<b>330</b>	305	316	316	<b>316</b>	290	300	300	<b>300</b>	270	280	280	<b>280</b>	232	240	240	<b>240</b>
	<b>kW</b>	255	264	264	<b>264</b>	244	253	253	<b>253</b>	232	240	240	<b>240</b>	216	224	224	<b>224</b>	186	192	192	<b>192</b>
<b>ECO38 1L4 C</b>	<b>kVA</b>	358	374	396	<b>396</b>	341	357	378	<b>378</b>	325	340	360	<b>360</b>	300	310	330	<b>330</b>	260	272	288	<b>288</b>
	<b>kW</b>	286	299	317	<b>317</b>	273	286	302	<b>302</b>	260	272	288	<b>288</b>	240	248	264	<b>264</b>	208	218	230	<b>230</b>
<b>ECO38 2L4 C</b>	<b>kVA</b>	402	444	444	<b>444</b>	391	438	438	<b>438</b>	380	420	420	<b>420</b>	350	385	385	<b>385</b>	304	336	336	<b>336</b>
	<b>kW</b>	322	355	355	<b>355</b>	313	350	350	<b>350</b>	304	336	336	<b>336</b>	280	308	308	<b>308</b>	243	269	269	<b>269</b>
<b>ECO38 VL4 C</b>	<b>kVA</b>	413	455	455	<b>465</b>	401	442	442	<b>453</b>	390	430	430	<b>440</b>	359	394	394	<b>403</b>	312	344	344	<b>352</b>
	<b>kW</b>	330	364	364	<b>372</b>	321	354	354	<b>362</b>	312	344	344	<b>352</b>	287	315	315	<b>322</b>	250	275	275	<b>282</b>

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

Unsaturated (ref. EN60034-4)			ECO38 1S4 C	ECO38 2S4 C	ECO38 1M4 C	ECO38 2M4 C	ECO38 1L4 C	ECO38 2L4 C	ECO38 VL4 C
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	203,9	207	198,7	214,2	215,3	222,5	226,3
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	10	11,4	12,7	14,5	15,8	17,8	19,2
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	5,69	6,11	6,72	7,45	8,38	9,73	10,8
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	100,3	113,8	109,7	121,1	124,2	130,4	135,6
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	100,3	113,8	109,7	121,1	124,2	130,4	135,6
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	20,4	22,2	23	22,8	21,5	20,8	20,1
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	13,2	14,8	15,9	16,6	16,7	16,2	15,6
<b>X<sub>0</sub></b>	Zero sequence reactance	%	2,79	2,59	2,69	2,48	2,38	2,28	2,18
<b>Saturated</b>									
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	169,2	171,8	164,9	177,8	178,7	184,7	187,8
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	8,33	9,45	10,5	12	13,1	14,8	15,9
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	4,72	5,07	5,58	6,19	6,96	8,08	8,96
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	83,2	94,5	91	100,5	103,1	108,2	112,5
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	83,2	94,5	91	100,5	103,1	108,2	112,5
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	16,9	18,5	19,1	18,9	17,9	17,3	16,7
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	11	12,3	13,2	13,7	13,8	13,5	12,9
<b>X<sub>0</sub></b>	Zero sequence reactance	%	2,79	2,59	2,69	2,48	2,38	2,28	2,18
<b>K<sub>cc</sub></b>	Short circuit ratio		0,44	0,46	0,45	0,44	0,43	0,42	0,53
<b>T'<sub>d</sub></b>	Transient time constant	sec	0,073	0,078	0,083	0,085	0,091	0,099	0,102
<b>T''<sub>d</sub></b>	Subtransient time constant	sec	0,011	0,012	0,013	0,013	0,012	0,013	0,012
<b>T'<sub>do</sub></b>	Open circuit time constant	sec	0,7	0,9	1,1	1,3	1,4	1,5	1,6
<b>T<sub>a</sub></b>	Armature time constant	sec	0,015	0,016	0,018	0,017	0,016	0,013	0,015

## Additional information - Class H / 400V

<b>I<sub>o</sub></b>	Excitation current at no load	A	0,8	0,7	0,67	0,71	0,78	0,72	0,6
<b>I<sub>c</sub></b>	Excitation current at full load	A	3,2	3,0	3,0	2,8	3,9	3,9	3,1
<b>Overload</b>									
Overload per 10 sec.									
						300			
Heat dissipation		W	11844	12600	13548	14133	16137	19465	20239
Telephone Harmonic Factor - THF		%	<2	<2	<2	<2	<2	<2	<2
Waveform Distors.(THD) full load LL/LN		%	3,1 / 3	3 / 2,9	2,8 / 2,9	2,9 / 3,1	3 / 2,9	3,1 / 2,9	3,2 / 3
Waveform Distors.(THD) no load LL/LN		%	2,8 / 2,7	2,7 / 2,6	2,6 / 2,8	2 / 2,1	2,6 / 2,8	2,7 / 2,7	2,8 / 2,6



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

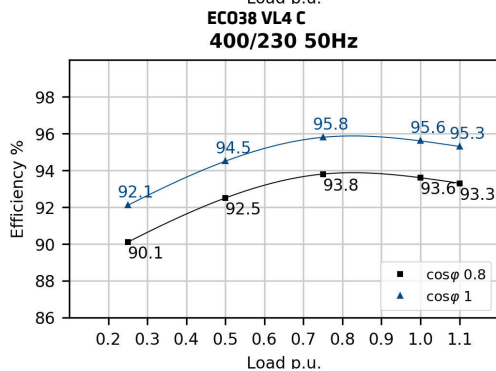
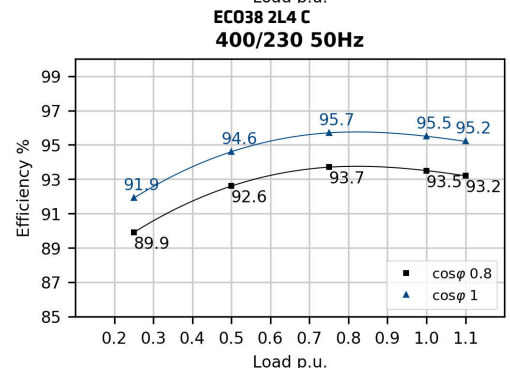
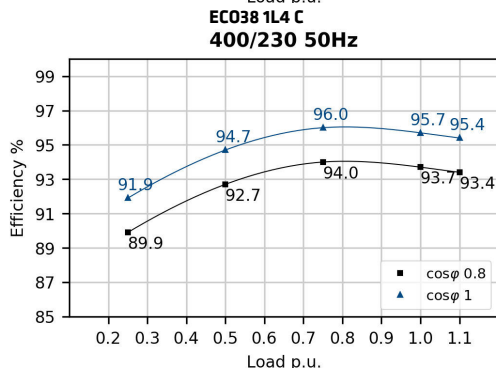
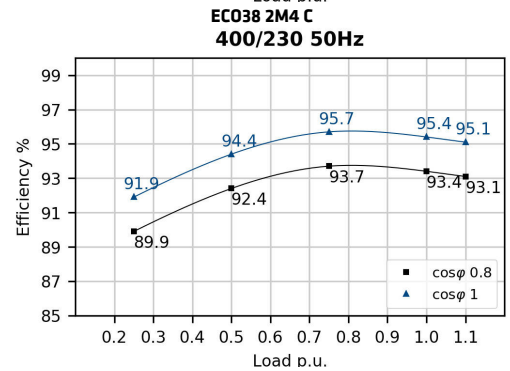
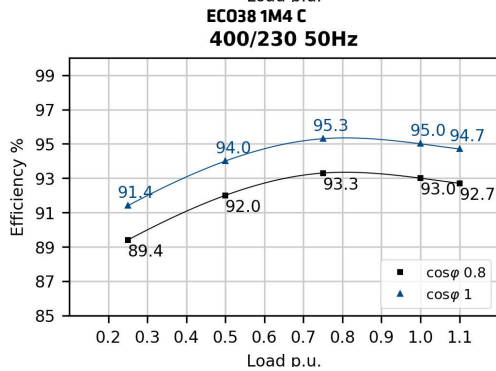
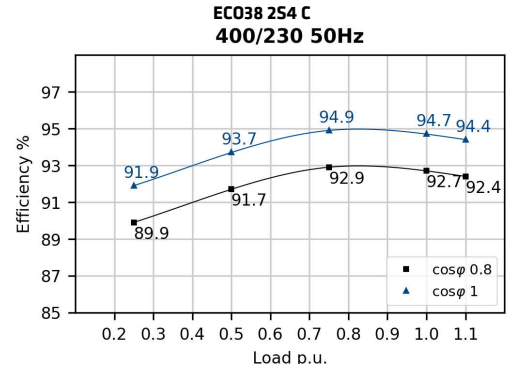
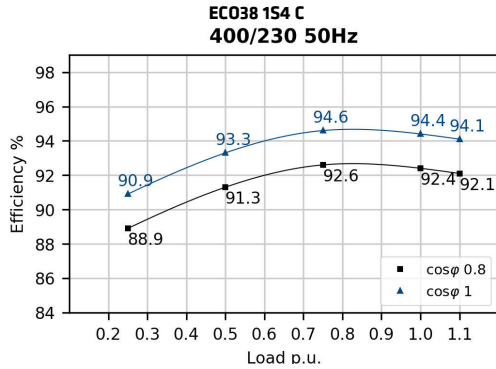
Unsaturated (ref. EN60034-4)			ECO38 1S4 C	ECO38 2S4 C	ECO38 1M4 C	ECO38 2M4 C	ECO38 1L4 C	ECO38 2L4 C	ECO38 VL4 C
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	207,7	207	198,7	214,2	215,3	222,5	224,3
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	10,2	11,4	12,7	14,5	15,8	17,8	19
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	5,8	6,11	6,72	7,45	8,38	9,73	10,7
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	102,1	113,8	109,7	121,1	124,2	130,4	134,4
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	102,1	113,8	109,7	121,1	124,2	130,4	134,4
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	20,8	22,2	23	22,8	21,5	20,8	19,9
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	13,5	14,8	15,9	16,6	16,7	16,2	15,5
<b>X<sub>0</sub></b>	Zero sequence reactance	%	2,85	2,59	2,69	2,48	2,38	2,28	2,16
<b>Saturated</b>									
<b>X<sub>d</sub></b>	Direct-axis synchronous reactance	%	172,4	171,8	164,9	177,8	178,7	184,7	186,2
<b>X'<sub>d</sub></b>	Direct-axis transient reactance	%	8,49	9,45	10,5	12	13,1	14,8	15,8
<b>X''<sub>d</sub></b>	Direct-axis subtransient reactance	%	4,81	5,07	5,58	6,19	6,96	8,08	8,88
<b>X<sub>q</sub></b>	Quadrature-axis synchronous reactance	%	84,8	94,5	91	100,5	103,1	108,2	111,6
<b>X'<sub>q</sub></b>	Quadrature-axis transient reactance	%	84,8	94,5	91	100,5	103,1	108,2	111,6
<b>X''<sub>q</sub></b>	Quadrature-axis subtransient reactance	%	17,2	18,5	19,1	18,9	17,9	17,3	16,5
<b>X<sub>2</sub></b>	Negative-sequence reactance	%	11,2	12,3	13,2	13,7	13,8	13,5	12,9
<b>X<sub>0</sub></b>	Zero sequence reactance	%	2,85	2,59	2,69	2,48	2,38	2,28	2,16
<b>K<sub>cc</sub></b>	Short circuit ratio		0,44	0,46	0,45	0,44	0,43	0,42	0,54
<b>T'<sub>d</sub></b>	Transient time constant	sec	0,073	0,078	0,083	0,085	0,091	0,099	0,102
<b>T''<sub>d</sub></b>	Subtransient time constant	sec	0,011	0,012	0,013	0,013	0,012	0,013	0,012
<b>T'<sub>do</sub></b>	Open circuit time constant	sec	0,7	0,9	1,1	1,3	1,4	1,5	1,6
<b>T<sub>a</sub></b>	Armature time constant	sec	0,015	0,016	0,018	0,017	0,016	0,013	0,015

## Additional information - Class H / 480V

<b>I<sub>o</sub></b>	Excitation current at no load	A	0,8	0,65	0,65	0,7	0,7	0,7	0,6
<b>I<sub>c</sub></b>	Excitation current at full load	A	3,2	2,9	2,9	2,8	3,8	3,9	3,1
<b>Overload</b>									
Overload per 10 sec.						300			
Heat dissipation		W	12437	12691	13299	13968	16118	20310	20881
Telephone Interference Factor - TIF			<40	<40	<40	<40	<40	<40	<40
Waveform Distors.(THD) full load LL/LN		%	3,1 / 3	3 / 2,9	2,8 / 2,9	2,9 / 3,1	3 / 2,9	3,1 / 2,9	3,2 / 3
Waveform Distors.(THD) no load LL/LN		%	2,8 / 2,7	2,7 / 2,6	2,6 / 2,8	2 / 2,1	2,6 / 2,8	2,7 / 2,7	2,8 / 2,6

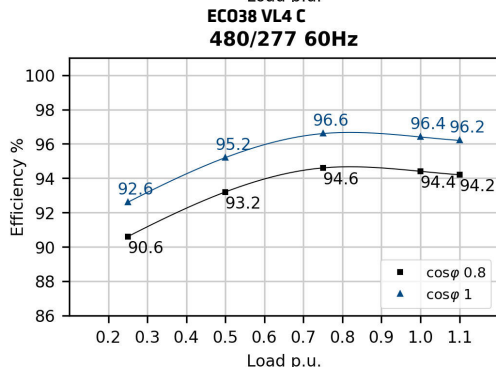
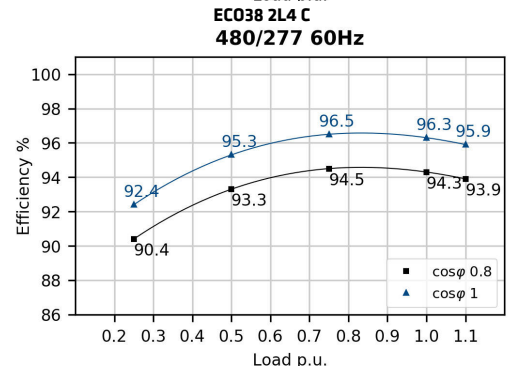
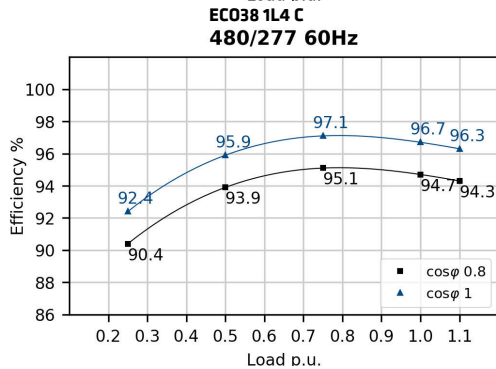
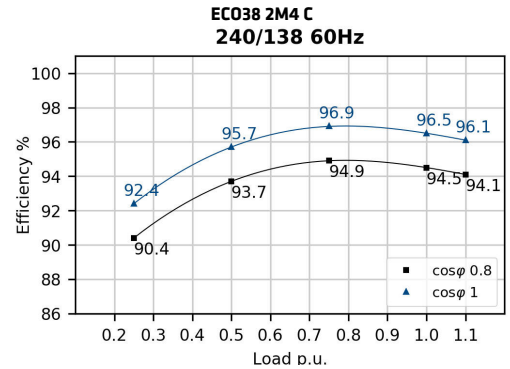
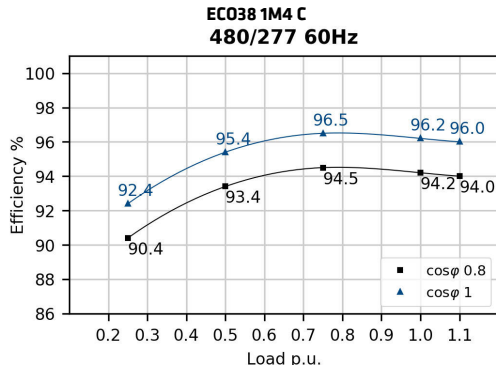
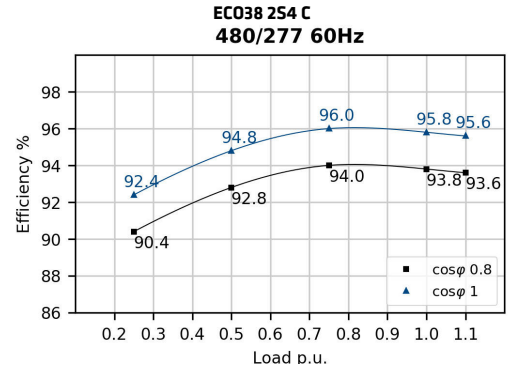
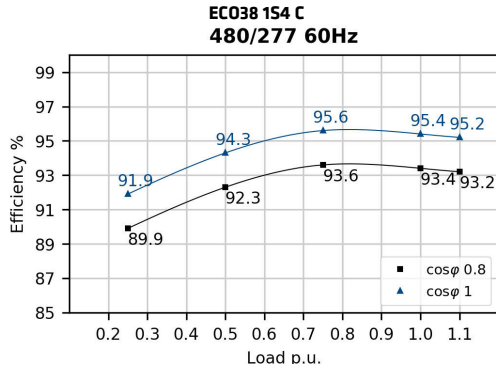
## Efficiencies @ 50Hz

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
ECO38 1S4 C	%	89,1	91,2	92,3	92,3	92,1	88,9	91,3	92,6	92,4	92,1	88,7	91,3	92,5	92,1	91,8	88,5	91,1	92,2	91,9	91,5
ECO38 2S4 C	%	90,1	91,6	92,6	92,6	92,4	89,9	91,7	92,9	92,7	92,4	89,7	91,7	92,8	92,4	92,1	89,5	91,5	92,5	92,2	91,8
ECO38 1M4 C	%	89,6	91,9	93,0	92,9	92,7	89,4	92,0	93,3	93,0	92,7	89,2	92,0	93,2	92,7	92,4	89,0	91,8	92,9	92,5	92,1
ECO38 2M4 C	%	90,1	92,3	93,4	93,3	93,1	89,9	92,4	93,7	93,4	93,1	89,7	92,4	93,6	93,1	92,8	89,5	92,2	93,3	92,9	92,5
ECO38 1L4 C	%	90,2	92,7	93,8	93,5	93,3	89,9	92,7	94,0	93,7	93,4	89,7	92,7	93,9	93,4	93,1	89,5	92,5	93,6	93,2	92,8
ECO38 2L4 C	%	90,1	92,5	93,4	93,4	93,2	89,9	92,6	93,7	93,5	93,2	89,7	92,6	93,6	93,2	92,9	89,5	92,4	93,3	93,0	92,6
ECO38 VL4 C	%	90,3	92,4	93,5	93,5	93,3	90,1	92,5	93,8	93,6	93,3	89,9	92,5	93,7	93,3	93,0	89,7	92,3	93,4	93,1	92,8

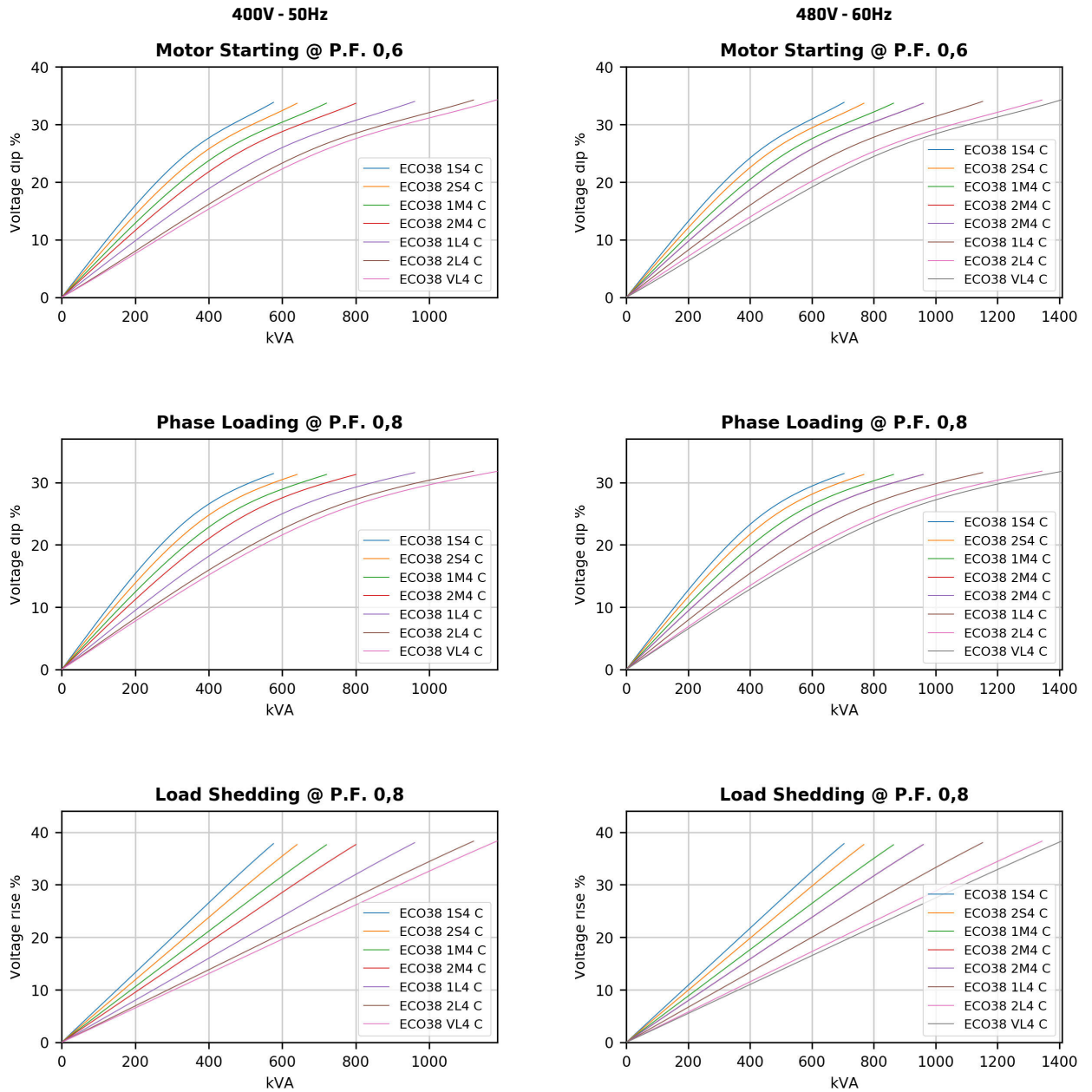


Efficiencies @ 60Hz

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
ECO38 1S4 C	90,1	92,0	93,0	92,7	92,4	90,1	92,1	93,2	93,2	93,0	90,1	92,2	93,4	93,3	93,2	89,9	92,3	93,6	93,4	93,2
ECO38 2S4 C	90,6	92,5	93,4	93,1	92,8	90,6	92,6	93,6	93,6	93,4	90,6	92,7	93,8	93,7	93,6	90,4	92,8	94,0	93,8	93,6
ECO38 1M4 C	90,6	93,1	93,9	93,5	93,2	90,6	93,2	94,1	94,0	93,8	90,6	93,3	94,3	94,1	94,0	90,4	93,4	94,5	94,2	94,0
ECO38 2M4 C	90,6	93,4	94,3	93,8	93,5	90,6	93,5	94,5	94,3	94,1	90,6	93,6	94,7	94,4	94,2	90,4	93,7	94,9	94,5	94,1
ECO38 1L4 C	90,6	93,6	94,5	94,0	93,7	90,6	93,7	94,7	94,5	94,3	90,6	93,8	94,9	94,6	94,4	90,4	93,9	95,1	94,7	94,3
ECO38 2L4 C	90,6	93,0	93,9	93,6	93,3	90,6	93,1	94,1	94,1	93,9	90,6	93,2	94,3	94,2	94,0	90,4	93,3	94,5	94,3	93,9
ECO38 VL4 C	90,8	92,9	94,0	93,7	93,4	90,8	93,0	94,2	94,2	94,0	90,8	93,1	94,4	94,3	94,1	90,6	93,2	94,6	94,4	94,2



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:

$$PFCC = \sin(\text{ARCCos}(\text{PF}_{\text{new}})) / 0.8$$

Example. The PFCC at power factor 0.3 is 1.192 [  $PFCC = \sin(\text{ARCCos}(0.3)) / 0.8$  ]. 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):

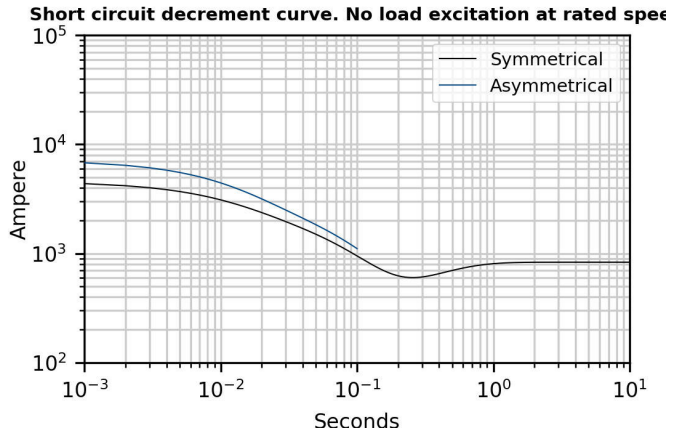
$$VCC = (400/V_{\text{new}})^2 \text{ if } 50 \text{ Hz}; VCC = (480/V_{\text{new}})^2 \text{ if } 60 \text{ Hz}$$

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. ).

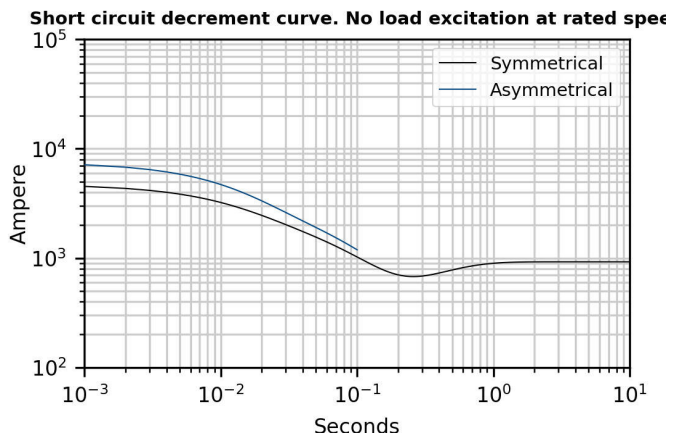
In this example, a 100 kVA load insertion at 415V is equivalent in voltage fall to a 133kVA load insertion at 480V.

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

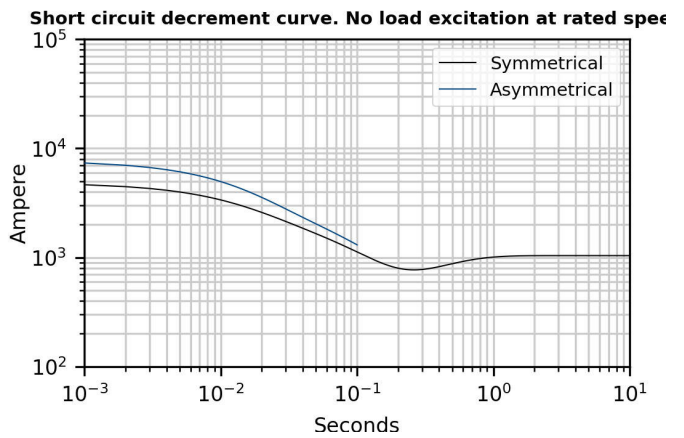
ECO38 1S4 C



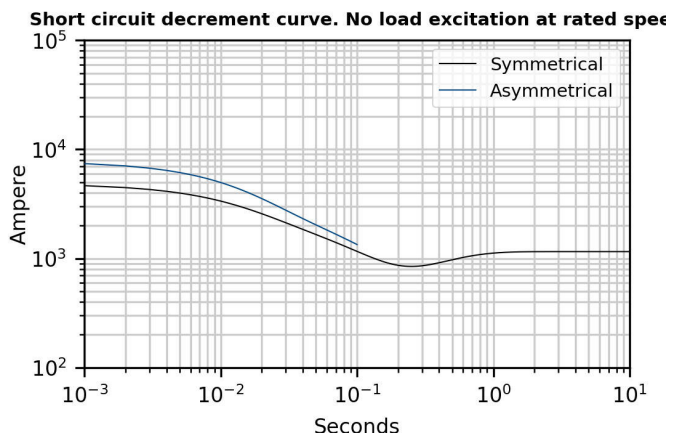
ECO38 2S4 C



ECO38 1M4 C



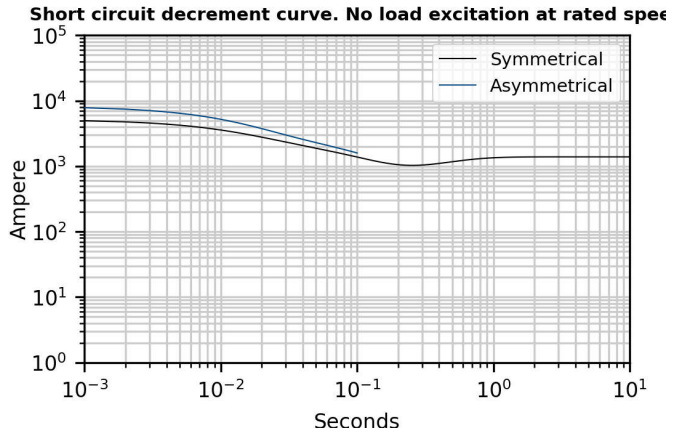
ECO38 2M4 C



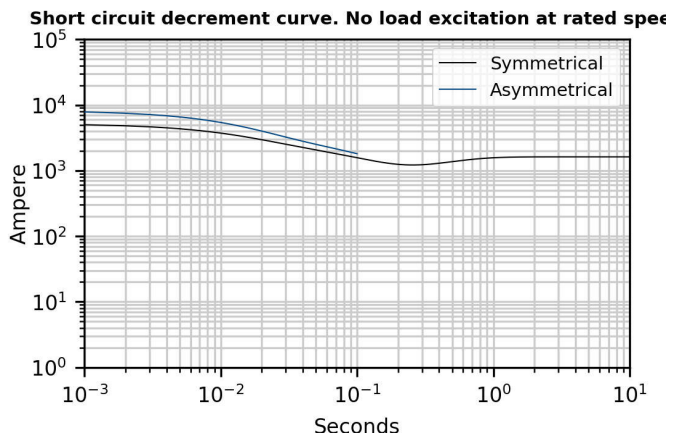
\*Please refer to tables at page 6

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

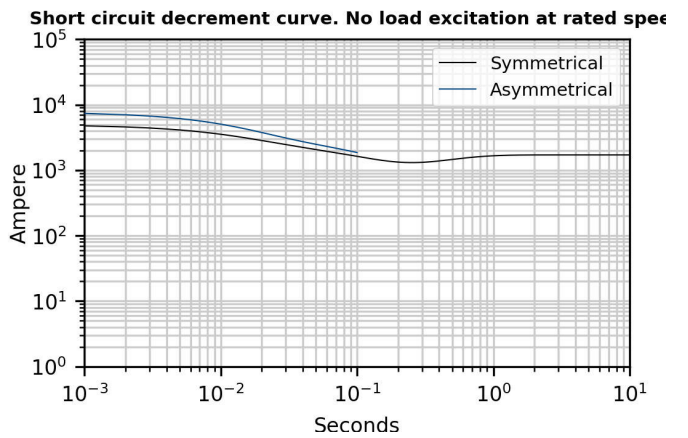
ECO38 1L4 C



ECO38 2L4 C



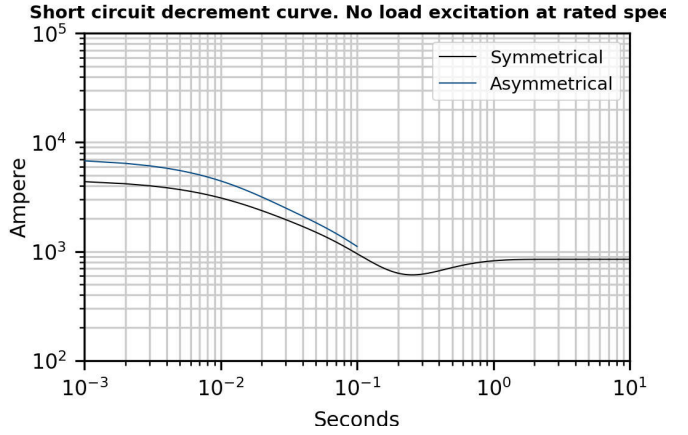
ECO38 VL4 C



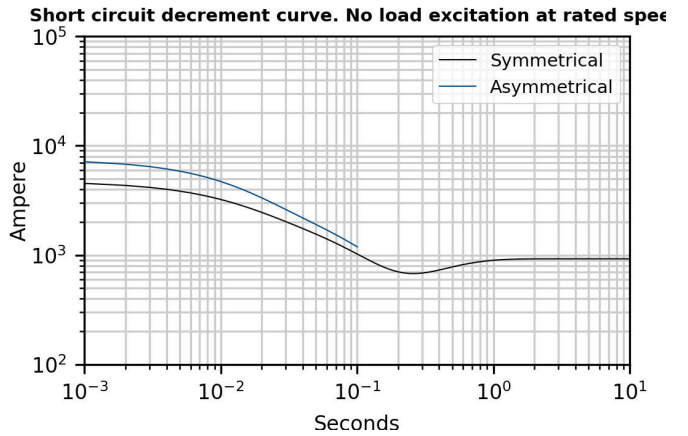
\*Please refer to tables at page 6

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

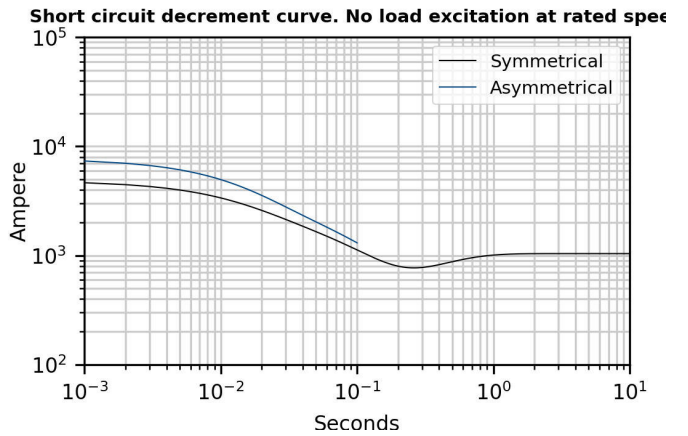
ECO38 1S4 C



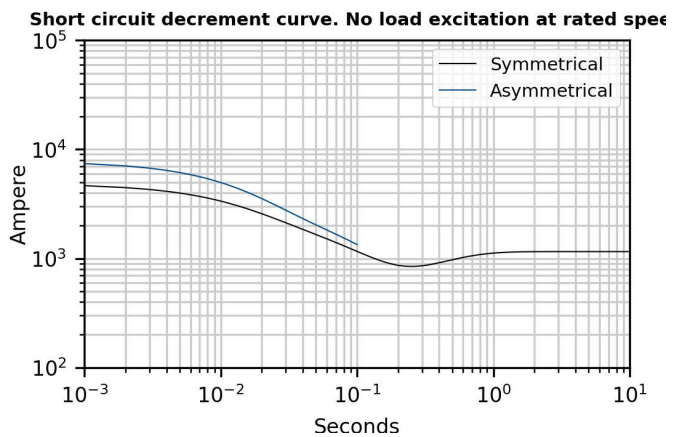
ECO38 2S4 C



ECO38 1M4 C



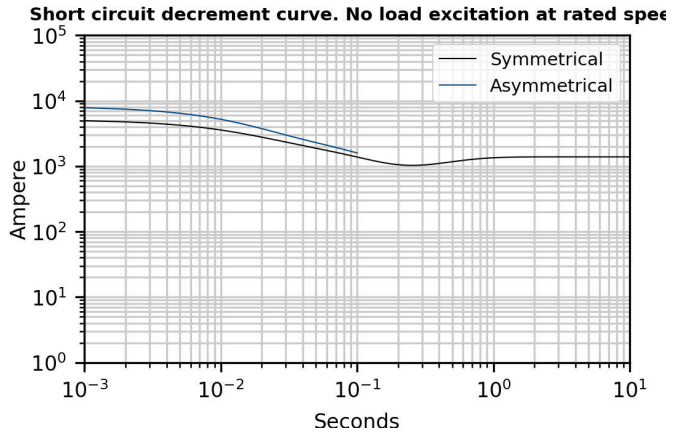
ECO38 2M4 C



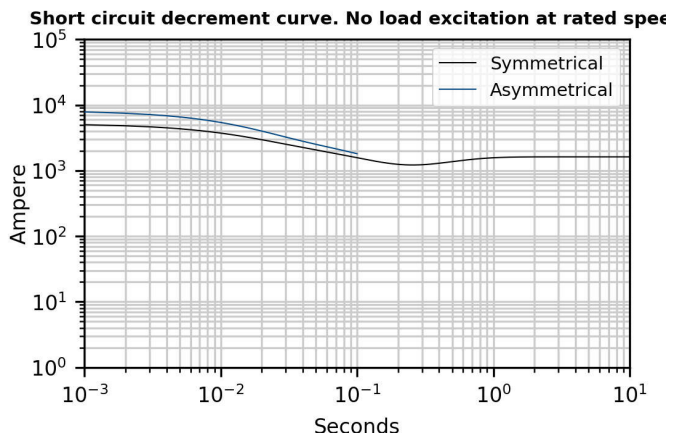
\*Please refer to tables at page 6

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

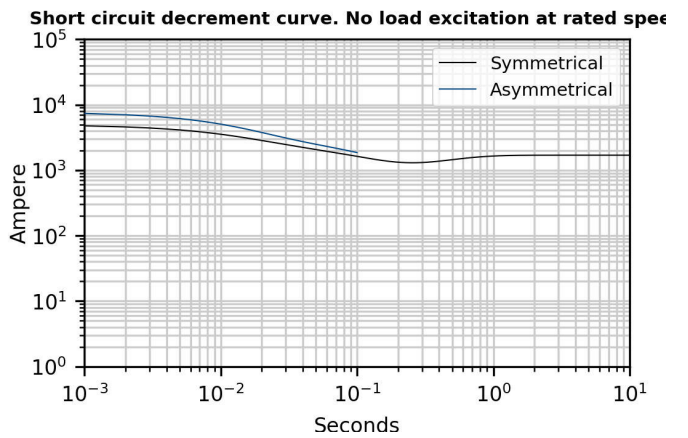
ECO38 1L4 C



ECO38 2L4 C



ECO38 VL4 C



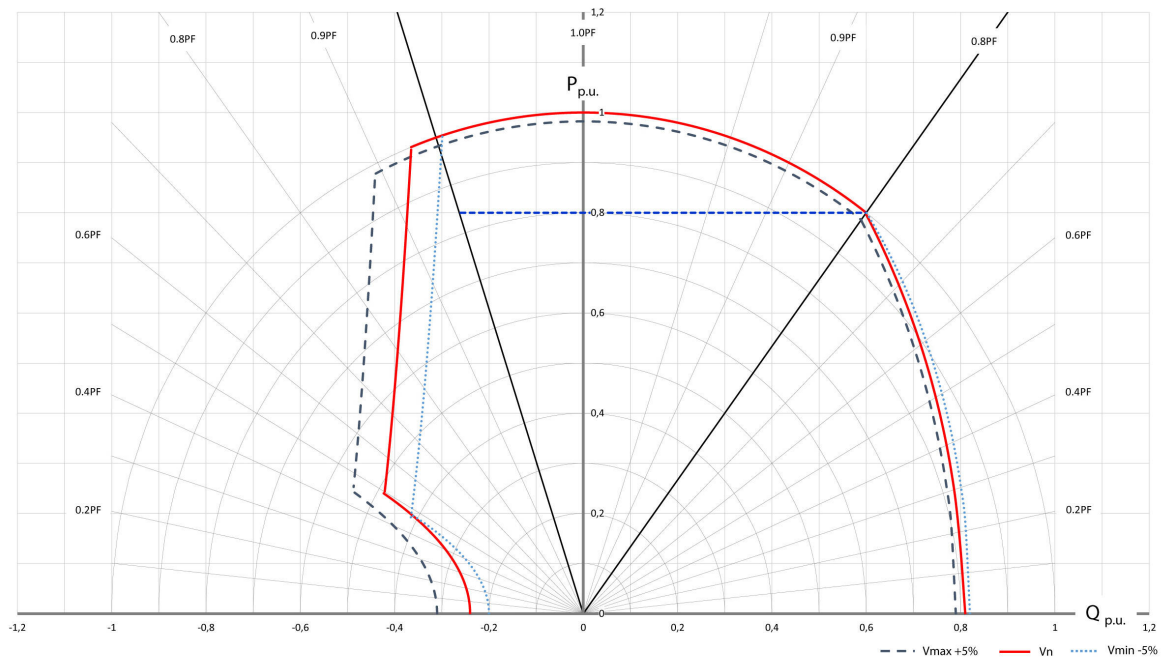
\*Please refer to tables at page 6



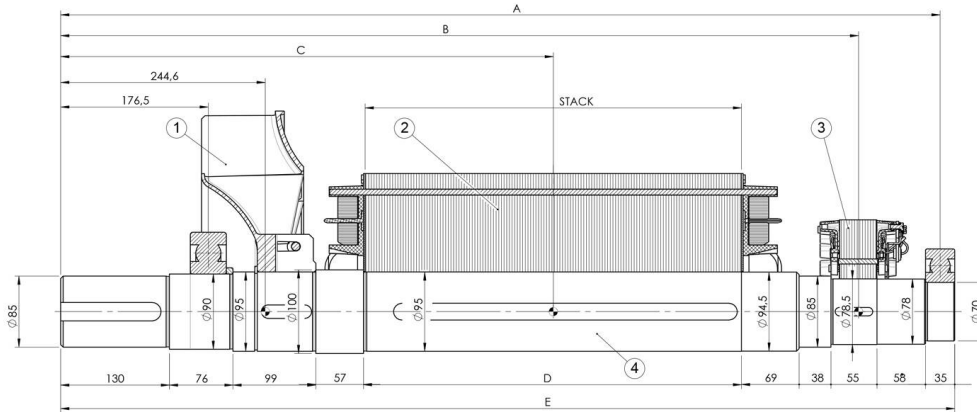
## Additional Characteristics

Data	ECO38 1S4 C		ECO38 2S4 C		ECO38 1M4 C		ECO38 2M4 C		ECO38 1L4 C		ECO38 2L4 C		ECO38 VL4 C		
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	
Damper cage	Copper														
Stator Winding Resistance (20°C)	Ω	0,013		0,0105		0,008		0,0065		0,006		0,004		0,004	
Rotor Winding Resistance (20°C)	Ω	3,905		4,133		4,449		4,887		5,604		6,78		7,383	
Stator Exciter Resistance (20°C)	Ω	13,47		13,47		13,47		15,28		13,47		13,47		13,47	
Rotor Exciter Resistance (20°C)	Ω	0,719		0,719		0,719		0,719		0,719		0,719		0,719	
Weight of complete generator	kg	525,0		550,0		600,0		653,0		771,0		895,0		957,0	
Unbalanced magnetic pull	kN/mm	4,4		5,2		5,7		5,1		5,9		6,2		6,5	
Air flow	m <sup>3</sup> /min	32,0	39,0	32,0	39,0	32,0	39,0	32,0	39,0	32,0	39,0	32,0	39,0	32,0	39,0
Noise level at 1m/7m	dB(A)	82/69	86/73	82/69	86/73	82/69	86/73	82/69	86/73	82/69	86/73	82/69	86/73	82/69	86/73

## PQ Diagram



MOMENTS OF INERTIA - DOUBLE BEARING



POS.	1		2		3		4		TOTAL	
	FAN		MAIN ROTOR		EXCITER ROTOR		SHAFT *			
TYPE	WEIGHT [kg]	J [kgm <sup>2</sup> ]	WEIGHT [kg]	J [kgm <sup>2</sup> ]	WEIGHT [kg]	J [kgm <sup>2</sup> ]	WEIGHT [kg]	J [kgm <sup>2</sup> ]	WEIGHT [kg]	J [kgm <sup>2</sup> ]
ECO38 1S / 4C	6,6	0,1633	106,2	1,4461	11,7	0,0806	40,8	0,0426	165,3	1,7326
ECO38 2S / 4C			115,9	1,5767			175,0	1,8632		
ECO38 1M / 4C			130,4	1,7724			193,4	2,0634		
ECO38 2M / 4C			150,0	2,0378			213,0	2,3287		
ECO38 1L / 4C			184,2	2,5007			256,8	2,8026		
ECO38 2L / 4C			232,9	3,1584			305,4	3,4602		
ECO38 VL / 4C			253,0	3,4336			327,8	3,7380		

TYPE	DIMENSION				
	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
ECO38 1S / 4C	811,5	714,2	479,0	212,0	829,0
ECO38 2S / 4C			469,0		
ECO38 1M / 4C	881,5	784,2	524,0	282,0	899,0
ECO38 2M / 4C			504,0		
ECO38 1L / 4C	1051,5	954,2	639,0	452,0	1069,0
ECO38 2L / 4C			589,0		
ECO38 VL / 4C	1091,5	994,2	609,0	492,0	1109,0

\* Shaft mass and inertia also include rotor keys

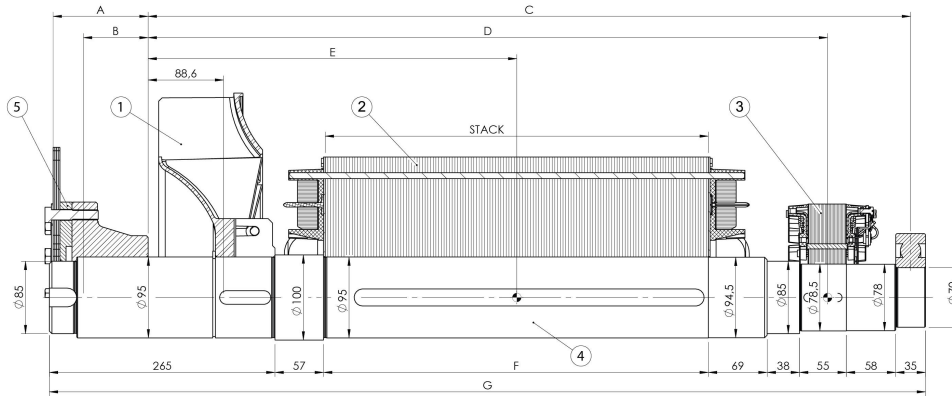
Tipo / Type	A	B	C	C.o.G. (mm)	
	[mm]	[mm]	[mm]	Standard	PMG
ECO38 1S / 4C	856	726	294	347.8	361.7
ECO38 2S / 4C				342.5	355.9
ECO38 1M / 4C	926	796	294	389.0	402.0
ECO38 2M / 4C				377.5	389.8
ECO38 1L / 4C	1096	966	454	495.6	507.2
ECO38 2L / 4C				463.7	474.3
ECO38 VL / 4C	1136	1006	494	483.9	494.3

1) REMOVABLE COVER FOR ACCESS TO MAIN TERMINALS

2) REMOVABLE PANEL FOR ACCESS TO AVR

3) SCREW M10 FOR GROUNDING

## MOMENTS OF INERTIA - SINGLE BEARING



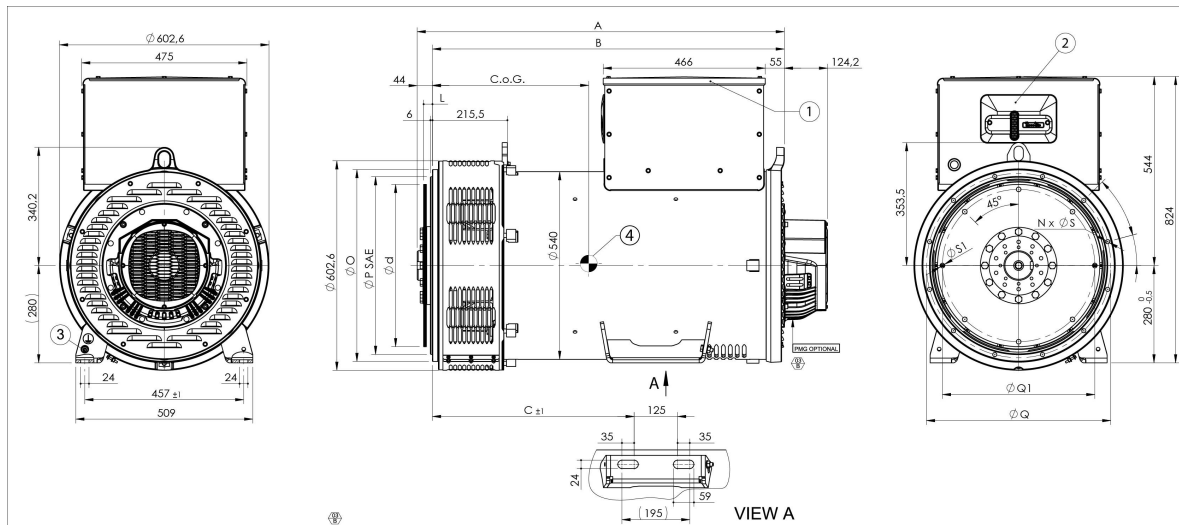
\* Shaft mass and inertia also include rotor keys

TYPE	COMPONENT						TOTAL			
	1 FAN		2 MAIN ROTOR		3 EXCITER ROTOR		4 SHAFT*			
	Weight [kg]	J [kg*m <sup>2</sup> ]	Weight [kg]	J [kg*m <sup>2</sup> ]	Weight [kg]	J [kg*m <sup>2</sup> ]	Weight [kg]	J [kg*m <sup>2</sup> ]		
ECO38 1S/4C	6.6	0.1633	106.4	1.4480	11.8	0.0808	40.2	0.0434	164.9	1.7355
ECO38 2S/4C			116.0	1.5782			174.6	1.8657		
ECO38 1M/4C			130.5	1.7733			193.0	2.0653		
ECO38 2M/4C			150.2	2.0407			212.7	2.3327		
ECO38 1L/4C			184.6	2.5051			256.6	2.8080		
ECO38 2L/4C			233.3	3.1636			305.3	3.4665		
ECO38 VL/4C	253.4	3.4348	55.9	0.0613	327.6	3.7402				

SAE N.	SHAFTS COUPLING FLEX PLATE			
	A	B	Weight [kg]	J [kg*m <sup>2</sup> ]
11.5	111.6	76.1	19.4	0.1802
14.0	97.4	74.6	22.6	0.3639

TYPE	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
ECO38 1S/4C	655.5	558.4	323.0	212.0	789.0
ECO38 2S/4C			313.0		
ECO38 1M/4C	725.5	628.4	368.0	282.0	859.0
ECO38 2M/4C			348.0		
ECO38 1L/4C	895.5	798.4	483.0	452.0	1029.0
ECO38 2L/4C			433.0		
ECO38 VL/4C	935.5	838.4	452.9	492.0	1069.0

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Tipo / Type	A [mm]	B [mm]	C [mm]	C.o.G. [mm]	
Type / Type	[mm]	[mm]	[mm]	Standard	PMG
ECO38 1S / 4C	816	772	420	388.8	402.8
ECO38 2S / 4C				383.6	397.2
ECO38 1M / 4C	886	842	420	430.5	443.6
ECO38 2M / 4C				419.4	431.8
ECO38 1L / 4C	1056	1012	580	538.1	549.8
ECO38 2L / 4C				506.7	517.4
ECO38 VL / 4C	1096	1052	620	527.1	537.5

SAE N.	Flangia / Flange					
	O	P	Q	S	N	
3	451	409.58	428.62	12	12	30
2	489	447.68	466.72	12	12	30
1	552	511.18	530.22	12	12	30
1/2	648	584.20	619.12	14	12	30
0	711	647.70	679.45	14	16	22.5

SAE N.	Giunti a dischi / Disc coupling			
	d	L	Q1	S1
11 1/2	352.42	39.6	333.37	11
14	466.72	25.4	438.15	13.5

- REMOVABLE COVER FOR ACCESS TO MAIN TERMINALS
- REMOVABLE PANEL FOR ACCESS TO AVR
- SCREW M10 FOR GROUNDING
- CENTER OF GRAVITY IN CONFIGURATION SAE 1 FLYWHEEL 14

Notes

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