mecc alte

Totally Focused. Totally Independent.

Technical Specification

ECO40 4 C

DDS
Dynamic Data Support

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

Rev. 0

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.

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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 feature **reduced-pitch** (2/3) windings, which:
  - Eliminate triple harmonics in the voltage waveform
  - Reduce neutral currents during parallel operation
- **Parallel operation** Use alternators of the same model and winding configuration. For different models, contact Mecc Alte Application Engineering to verify compatibility.
- **Damping cage** All models except the ECP3 series include an aluminum or copper damping cage for greater stability during load transients.
- **Reconnectable windings**
  - 12 leads: 50 Hz 380–440 V and 220/110–240/120 V (derating may apply); 60 Hz 380–480 V and 220/110–240/120 V (derating may apply)
  - 6 leads: 50 Hz 380–440 V and 220–240 V (derating may apply); 60 Hz 380–480 V and 220–240 V (derating may apply)

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)	<3.5% at full load L-L	<3.0% at full load L-L	<3.5% at full load L-L	<3.5% at full load L-L	<4.5% at full load L-N	<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.

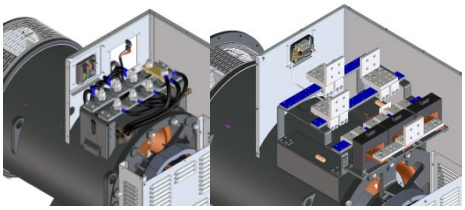
For more information visit: Insulation_System_Guide

Construction

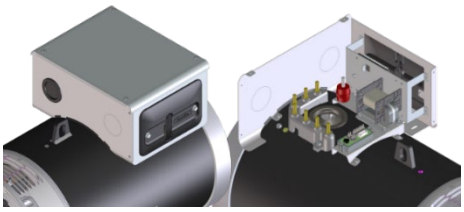
The robust mechanical structure withstands up to 5G in any direction and 9G vertically, and its design allows easy access to connections and components during routine maintenance checks. The mechanical design used the most advanced FEM techniques. The materials used are: DD12 steel for the frame, C45 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

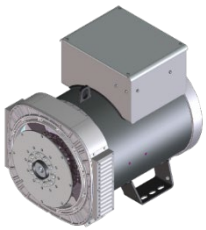
Easy access to the regulators is ensured by a pull-out drawer or drop-down panel to allow for safer adjustment. Large terminal blocks allow easy access of power cables, in the higher power ranges ECO43 and ECO46 terminals allow convenient choice of power cable or busbar connection with input and connection 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

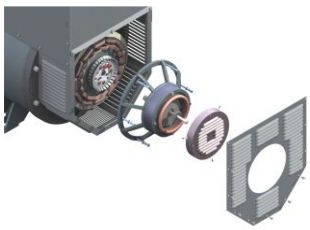
Optional PMG

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



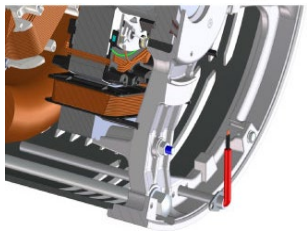
On the ECO 40, 43 and 46 series it is optionally available factory-fitted or retrofitted. On the ECO47 the PMG is standard.

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.

Selection & Sizing Tools

Online tools available at select.meccalte.com support alternator selection, sizing and configuration:

- **Sizing Tool** – power sizing, motor starting and electrical verification for industrial alternators.
- **Ratings Book** – complete kVA ratings reference, 50/60 Hz, all standard voltages and temperature classes.
- **PMG Configurator** – model selection and output configuration for permanent magnet generators.
- **3D/2D CAD Library** – STEP models and 2D drawings for alternators and AVR regulators.
- **Winding Resistance** – reference resistance data for all alternator families.

For more information visit: select.meccalte.com

General characteristics

Pole number	4	Insulation class	H
Phase number	3	Protection class	IP23
Number of wires	12	NDE Bearing type	6318.2RS
Execution	Brushless	DE Bearing type	6322.2RS
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
ECO40 1S4 C	**kVA**	440	**440**	440	404	417	**417**	417	386	400	**400**	400	370	370	**370**	370	342	320	**320**	320	296
	kW	352	**352**	352	323	334	**334**	334	309	320	**320**	320	296	296	**296**	296	273	256	**256**	256	237
ECO40 2S4 C	**kVA**	491	**491**	491	393	468	**468**	468	375	450	**450**	450	360	410	**410**	410	330	360	**360**	360	288
	kW	393	**393**	393	314	374	**374**	374	300	360	**360**	360	288	328	**328**	328	264	288	**288**	288	230
ECO40 3S4 C	**kVA**	550	**550**	550	503	521	**521**	521	479	500	**500**	500	460	450	**450**	450	414	400	**400**	400	368
	kW	440	**440**	440	402	417	**417**	417	383	400	**400**	400	368	360	**360**	360	331	320	**320**	320	294
ECO40 1L4 C	**kVA**	601	**601**	590	546	567	**567**	557	515	550	**550**	540	500	500	**500**	490	454	440	**440**	432	400
	kW	481	**481**	472	437	454	**454**	446	412	440	**440**	432	400	400	**400**	392	363	352	**352**	346	320
ECO40 2L4 C	**kVA**	675	**675**	675	616	645	**645**	645	588	625	**625**	625	570	564	**564**	564	515	500	**500**	500	456
	kW	540	**540**	540	493	516	**516**	516	470	500	**500**	500	456	451	**451**	451	412	400	**400**	400	365
ECO40 3L4 C	**kVA**	735	**735**	735	560	700	**700**	700	535	680	**680**	680	520	630	**630**	630	483	544	**544**	544	416
	kW	588	**588**	588	448	560	**580**	580	428	544	**544**	544	416	504	**504**	504	386	435	**435**	435	333
ECO40 VL4 C	**kVA**	825	**825**	825	740	777	**777**	777	700	750	**750**	750	680	690	**690**	690	630	600	**600**	600	544
	kW	660	**660**	660	592	622	**622**	622	560	600	**600**	600	544	552	**552**	552	504	480	**480**	480	435

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
ECO40 1S4 C	**kVA**	459	492	525	**525**	438	469	500	**500**	420	450	480	**480**	383	410	440	**440**	336	360	384	**384**
	kW	367	394	420	**420**	350	375	400	**400**	336	360	384	**384**	306	328	352	**352**	269	288	307	**307**
ECO40 2S4 C	**kVA**	524	557	590	**590**	500	532	563	**563**	480	510	540	**540**	435	460	490	**490**	384	408	432	**432**
	kW	419	446	472	**472**	400	426	450	**450**	384	408	432	**432**	348	368	392	**392**	307	326	346	**346**
ECO40 3S4 C	**kVA**	590	634	660	**660**	563	604	625	**625**	540	580	600	**600**	484	520	540	**540**	432	464	480	**480**
	kW	472	507	528	**528**	450	483	500	**500**	432	464	480	**480**	387	416	432	**432**	346	371	384	**384**
ECO40 1L4 C	**kVA**	623	669	722	**722**	587	649	680	**680**	570	630	660	**660**	515	570	600	**600**	456	504	528	**528**
	kW	498	535	578	**578**	470	519	544	**544**	456	504	528	**528**	412	456	480	**480**	365	403	422	**422**
ECO40 2L4 C	**kVA**	720	762	810	**810**	688	730	775	**775**	665	705	750	**750**	605	636	677	**677**	532	564	600	**600**
	kW	576	610	648	**648**	550	584	620	**620**	532	564	600	**600**	484	509	542	**542**	426	451	480	**480**
ECO40 3L4 C	**kVA**	778	843	882	**882**	741	803	840	**840**	720	780	816	**816**	665	720	756	**756**	576	624	653	**653**
	kW	622	674	706	**706**	593	642	672	**672**	576	624	653	**653**	532	576	604	**604**	461	499	522	**522**
ECO40 VL4 C	**kVA**	930	970	970	**970**	885	925	925	**925**	860	900	900	**900**	790	830	830	**830**	688	720	720	**720**
	kW	744	776	776	**776**	708	740	740	**740**	688	720	720	**720**	632	664	664	**664**	550	576	576	**576**

Reactance & Time constants- Class H / 400V

Unsaturated (ref. EN60034-4)			ECO40 1S4 C	ECO40 2S4 C	ECO40 3S4 C	ECO40 1L4 C	ECO40 2L4 C	ECO40 3L4 C	ECO40 VL4 C
Xd	Direct-axis synchronous reactance	%	286,7	240,1	258,7	246,3	270	234,9	175,9
X'd	Direct-axis transient reactance	%	23,3	22,1	21,7	20,1	19,8	18,7	16,7
X"d	Direct-axis subtransient reactance	%	14,7	12,5	11,8	10,6	10,5	9,52	9
Xq	Quadrature-axis synchronous reactance	%	115,9	110,7	111,8	115,9	157,1	145,9	122,1
X'q	Quadrature-axis transient reactance	%	115,9	110,7	111,8	115,9	157,1	145,9	122,1
X"q	Quadrature-axis subtransient reactance	%	29,2	28,4	27,3	24,9	24	16,8	14,8
X_2	Negative-sequence reactance	%	19,1	18,2	17,3	13	12,4	14,6	12,5
X_0	Zero sequence reactance	%	3,62	3,21	3,1	2,9	2,9	2,48	2,28
Saturated									
Xd	Direct-axis synchronous reactance	%	238	199,3	214,7	204,4	224,1	195	146
X'd	Direct-axis transient reactance	%	19,3	18,4	18	16,7	16,4	15,5	13,8
X"d	Direct-axis subtransient reactance	%	12,2	10,4	9,79	8,76	8,72	7,9	7,47
Xq	Quadrature-axis synchronous reactance	%	96,2	91,9	92,8	96,2	130,4	121,1	101,4
X'q	Quadrature-axis transient reactance	%	96,2	91,9	92,8	96,2	130,4	121,1	101,4
X"q	Quadrature-axis subtransient reactance	%	24,2	23,5	22,7	20,7	19,9	13,9	12,3
X_2	Negative-sequence reactance	%	15,8	15,1	14,4	10,8	10,3	12,1	10,4
X_0	Zero sequence reactance	%	3,62	3,21	3,1	2,9	2,9	2,48	2,28
Kcc	Short circuit ratio		0,36	0,5	0,4	0,49	0,45	0,44	0,59
T'd	Transient time constant	sec	0,16	0,13	0,14	0,14	0,15	0,18	0,18
T"d	Subtransient time constant	sec	0,019	0,019	0,021	0,021	0,019	0,019	0,015
T'do	Open circuit time constant	sec	2,55	2,7	2,8	2,9	3,1	3,1	3,7
Ta	Armature time constant	sec	0,017	0,03	0,031	0,04	0,04	0,052	0,071

Additional information - Class H / 400V

Io	Excitation current at no load	A	0,9	0,9	0,5	0,8	0,9	0,7	0,7
Ic	Excitation current at full load	A	4,1	3,7	3,4	3,7	4,3	4,2	4,3
Overload						-			
Overload per 20 sec. PRP or 10 sec. COP		%				300			
Heat dissipation		W	19703	21356	22833	24135	26316	28632	30915
Telephone Harmonic Factor - THF		%	<2	<2	<2	<2	<2	<2	<2
Waveform Distors.(THD) full load LL/LN		%	2,6 / 2,6	2,7 / 2,8	2,4 / 2,5	2,5 / 2,5	2,2 / 2,4	2,1 / 2,1	2,2 / 2,2
Waveform Distors.(THD) no load LL/LN		%	2,9 / 2,9	2,5 / 2,6	2,6 / 2,5	2,3 / 2,4	2,4 / 2,5	2,4 / 2,4	2,5 / 2,5

Reactance & Time constants- Class H / 480V

Unsaturated (ref. EN60034-4)			ECO40 1S4 C	ECO40 2S4 C	ECO40 3S4 C	ECO40 1L4 C	ECO40 2L4 C	ECO40 3L4 C	ECO40 VL4 C
Xd	Direct-axis synchronous reactance	%	286,7	240,1	258,7	246,3	270	234,9	175,9
X'd	Direct-axis transient reactance	%	23,3	22,1	21,7	20,1	19,8	18,7	16,7
X"d	Direct-axis subtransient reactance	%	14,7	12,5	11,8	10,6	10,5	9,52	9
Xq	Quadrature-axis synchronous reactance	%	115,9	110,7	111,8	115,9	157,1	145,9	122,1
X'q	Quadrature-axis transient reactance	%	115,9	110,7	111,8	115,9	157,1	145,9	122,1
X"q	Quadrature-axis subtransient reactance	%	29,2	28,4	27,3	24,9	24	16,8	14,8
X_2	Negative-sequence reactance	%	19,1	18,2	17,3	13	12,4	14,6	12,5
X_0	Zero sequence reactance	%	3,62	3,21	3,1	2,9	2,9	2,48	2,28
Saturated									
Xd	Direct-axis synchronous reactance	%	238	199,3	214,7	204,4	224,1	195	146
X'd	Direct-axis transient reactance	%	19,3	18,4	18	16,7	16,4	15,5	13,9
X"d	Direct-axis subtransient reactance	%	12,2	10,4	9,79	8,76	8,72	7,9	7,47
Xq	Quadrature-axis synchronous reactance	%	96,2	91,9	92,8	96,2	130,4	121,1	101,3
X'q	Quadrature-axis transient reactance	%	96,2	91,9	92,8	96,2	130,4	121,1	101,3
X"q	Quadrature-axis subtransient reactance	%	24,2	23,5	22,7	20,7	19,9	13,9	12,3
X_2	Negative-sequence reactance	%	15,8	15,1	14,4	10,8	10,3	12,1	10,4
X_0	Zero sequence reactance	%	3,62	3,21	3,1	2,9	2,9	2,48	2,28
Kcc	Short circuit ratio		0,36	0,5	0,4	0,49	0,45	0,44	0,59
T'd	Transient time constant	sec	0,16	0,13	0,14	0,14	0,15	0,18	0,18
T"d	Subtransient time constant	sec	0,019	0,019	0,021	0,021	0,019	0,019	0,015
T'do	Open circuit time constant	sec	2,55	2,7	2,8	2,9	3,1	3,1	3,7
Ta	Armature time constant	sec	0,017	0,03	0,031	0,04	0,04	0,052	0,071

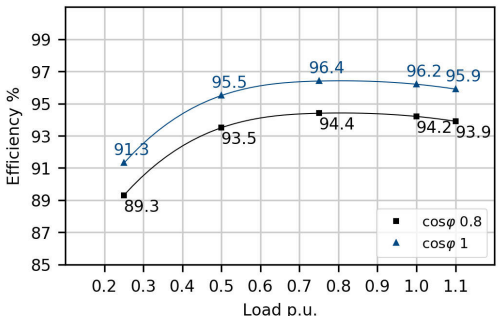
Additional information - Class H / 480V

Io	Excitation current at no load	A	0,9	0,9	0,5	0,8	0,9	0,7	0,7
Ic	Excitation current at full load	A	4,1	3,7	3,4	3,7	4,3	4,2	4,3
Overload						-			
Overload per 20 sec. PRP or 10 sec. COP		%				300			
Heat dissipation		W	19361	21305	22092	23148	23701	24386	25342
Telephone Interferance Factor - TIF			<40	<40	<40	<40	<40	<40	<40
Waveform Distors.(THD) full load LL/LN		%	2,6 / 2,6	2,7 / 2,8	2,4 / 2,5	2,5 / 2,5	2,2 / 2,4	2,1 / 2,1	2,2 / 2,2
Waveform Distors.(THD) no load LL/LN		%	2,9 / 2,9	2,5 / 2,6	2,6 / 2,5	2,3 / 2,4	2,4 / 2,5	2,4 / 2,4	2,5 / 2,5

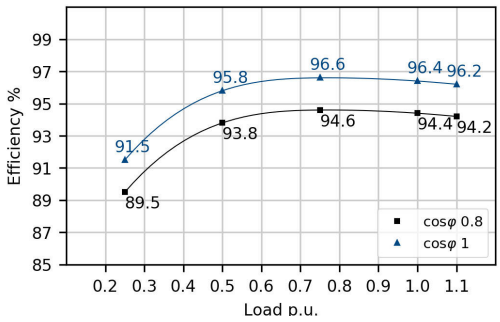
Efficiencies @ 50Hz

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
ECO40 1S4 C	%	89,1	93,3	94,2	94,1	93,9	89,3	93,5	94,4	94,2	93,9	89,2	93,3	94,1	94,0	93,7	89,0	93,1	93,9	93,8	93,5
ECO40 2S4 C	%	89,4	93,5	94,3	94,1	93,9	89,5	93,8	94,6	94,4	94,2	89,4	93,7	94,5	94,2	93,9	89,2	93,5	94,1	93,9	93,7
ECO40 3S4 C	%	90,2	93,7	94,6	94,4	94,3	90,3	93,9	94,8	94,6	94,4	90,1	93,7	94,7	94,5	94,3	89,8	93,4	94,4	94,2	94,0
ECO40 1L4 C	%	90,5	94,0	94,9	94,7	94,5	90,5	94,1	95,0	94,8	94,5	90,3	94,0	94,9	94,6	94,2	90,0	93,8	94,5	94,4	94,2
ECO40 2L4 C	%	91,0	94,1	94,9	94,8	94,6	91,1	94,2	95,1	95,0	94,8	91,1	94,1	94,9	94,7	94,4	90,5	94,0	94,6	94,4	94,2
ECO40 3L4 C	%	91,4	94,1	95,0	94,8	94,6	91,5	94,3	95,2	95,0	94,8	91,3	94,2	95,0	94,7	94,4	90,8	93,8	94,4	94,5	94,4
ECO40 VL4 C	%	91,5	94,2	95,1	94,8	94,5	91,6	94,4	95,3	95,1	94,8	91,4	94,2	95,1	94,9	94,6	90,8	93,7	94,6	94,4	94,2

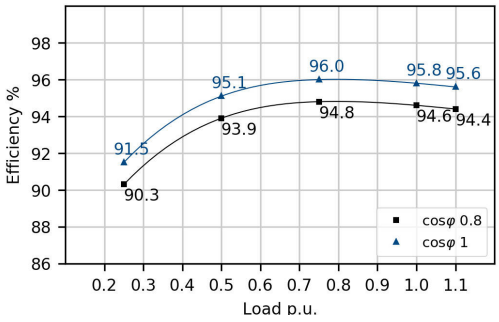
ECO40 1S4 C
400/230 50Hz



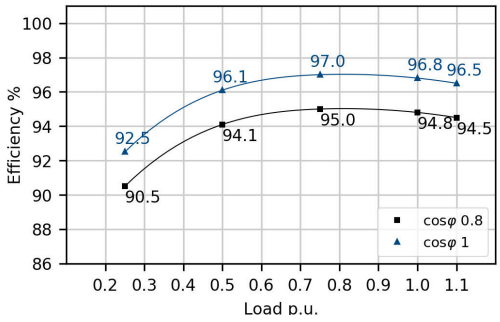
ECO40 2S4 C
400/230 50Hz



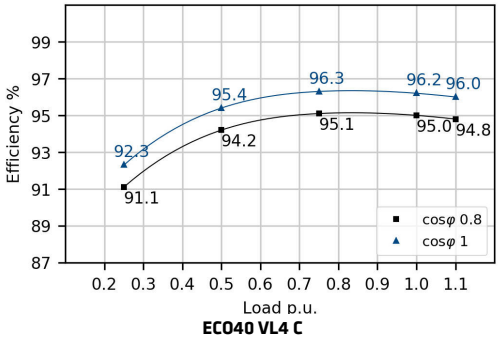
ECO40 3S4 C
400/230 50Hz



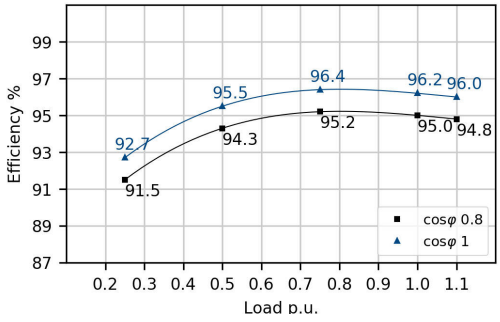
ECO40 1L4 C
400/230 50Hz



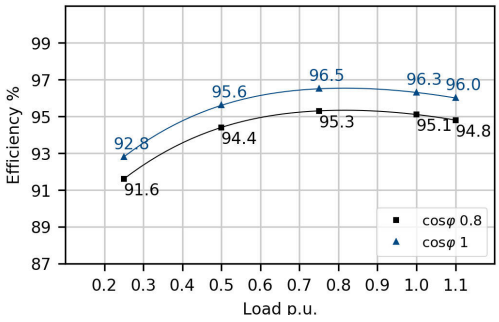
ECO40 2L4 C
400/230 50Hz



ECO40 3L4 C
400/230 50Hz

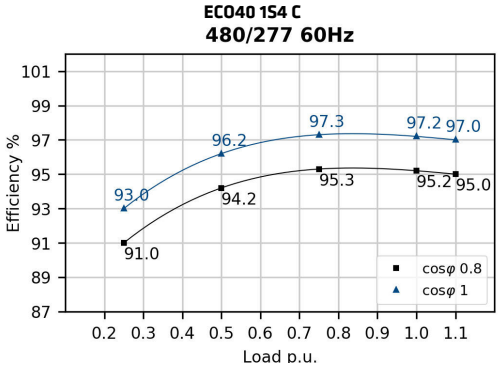


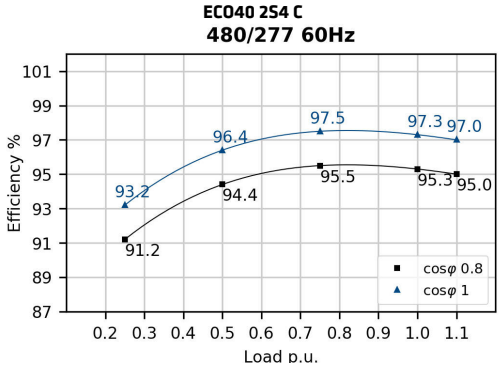
ECO40 VL4 C
400/230 50Hz

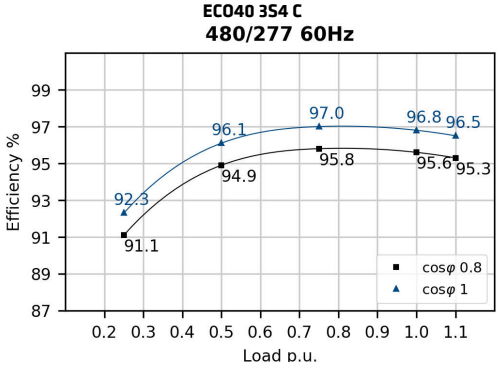


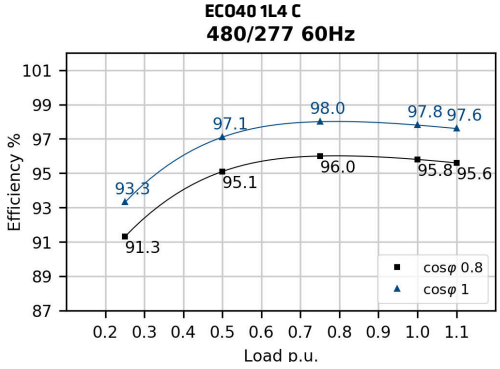
Efficiencies @ 60Hz

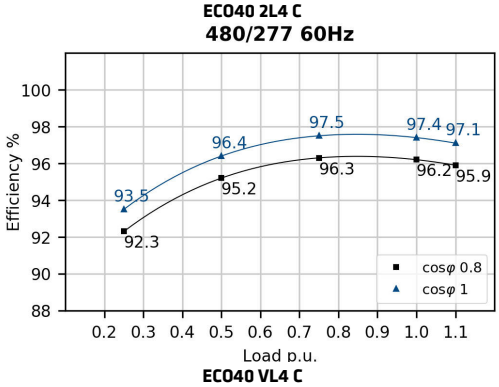
Models		415V 60Hz					440V 60Hz					460V 60Hz					480V 60Hz				
		0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1	0.25	0.5	0.75	1	1.1
ECO40 1S4 C	%	90,4	93,3	94,5	94,4	94,2	90,6	93,8	94,9	94,8	94,7	90,8	94,0	95,2	95,1	94,9	91,0	94,2	95,3	95,2	95,0
ECO40 2S4 C	%	90,6	93,5	94,6	94,5	94,3	90,9	94,0	95,1	95,0	94,8	91,1	94,2	95,3	95,2	94,9	91,2	94,4	95,5	95,3	95,0
ECO40 3S4 C	%	90,5	93,9	95,2	95,0	94,7	90,7	94,5	95,5	95,3	95,1	90,9	94,7	95,7	95,5	95,3	91,1	94,9	95,8	95,6	95,3
ECO40 1L4 C	%	91,0	94,7	95,5	95,3	95,1	91,1	94,8	95,7	95,6	95,5	91,1	94,9	95,8	95,7	95,6	91,3	95,1	96,0	95,8	95,6
ECO40 2L4 C	%	92,1	94,8	95,6	95,5	95,1	92,1	94,9	96,0	95,9	95,6	92,2	95,0	96,1	96,0	95,7	92,3	95,2	96,3	96,2	95,9
ECO40 3L4 C	%	91,4	94,8	95,8	95,7	95,3	91,5	95,0	96,1	96,0	95,7	91,7	95,2	96,4	96,2	95,9	92,1	95,5	96,6	96,4	96,0
ECO40 VL4 C	%	91,4	94,8	95,9	95,8	95,4	91,7	95,1	96,3	96,1	95,8	92,0	95,4	96,7	96,5	96,2	92,2	95,6	96,8	96,6	96,1

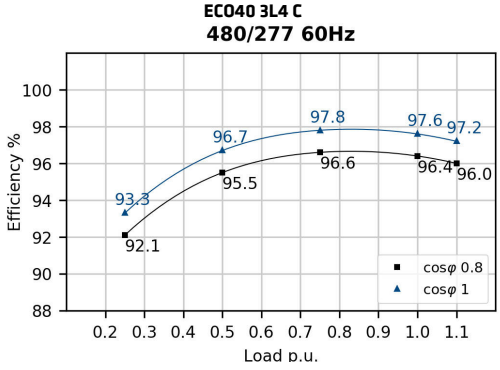


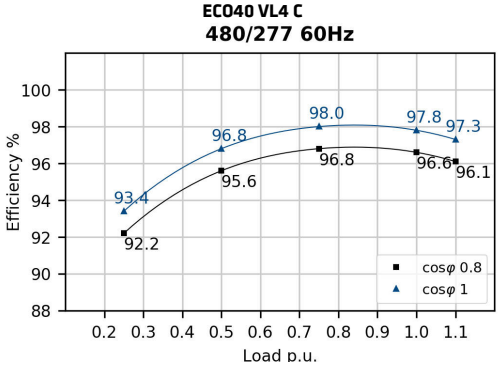








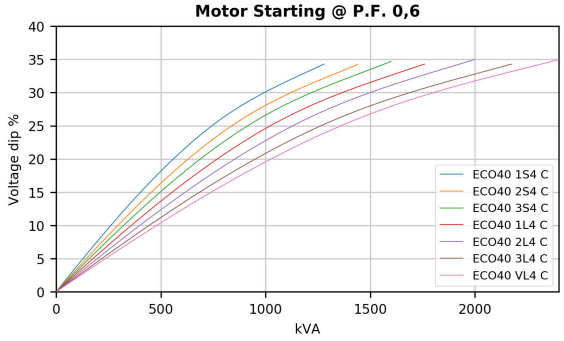




Transients voltage

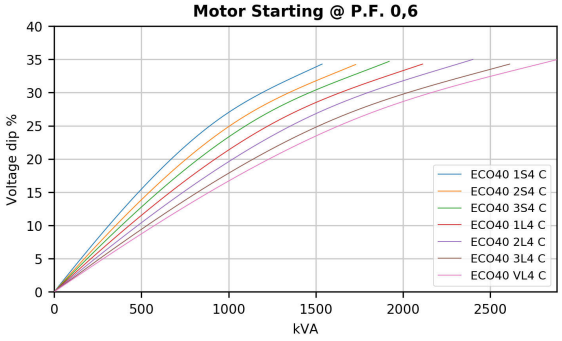
400V - 50Hz

Motor Starting @ P.F. 0,6

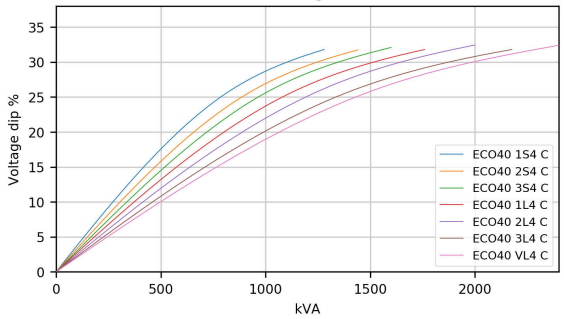


480V - 60Hz

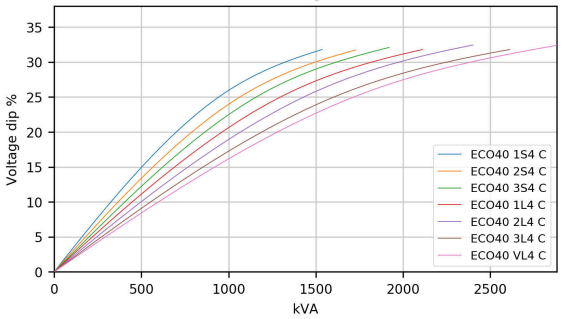
Motor Starting @ P.F. 0,6



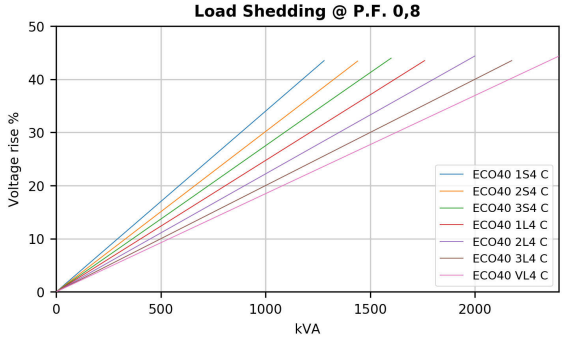
Phase Loading @ P.F. 0,8



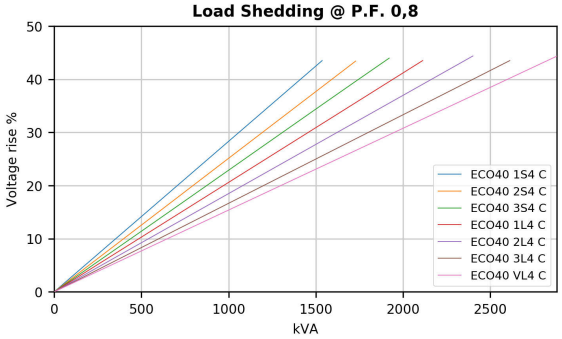
Phase Loading @ P.F. 0,8



Load Shedding @ P.F. 0,8



Load Shedding @ P.F. 0,8



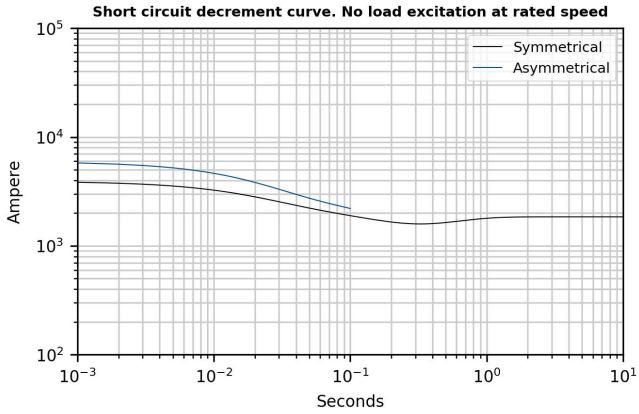
In order to scale transient curves as a function of a power factor or voltage if not indicated, please proceed as follows:

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.

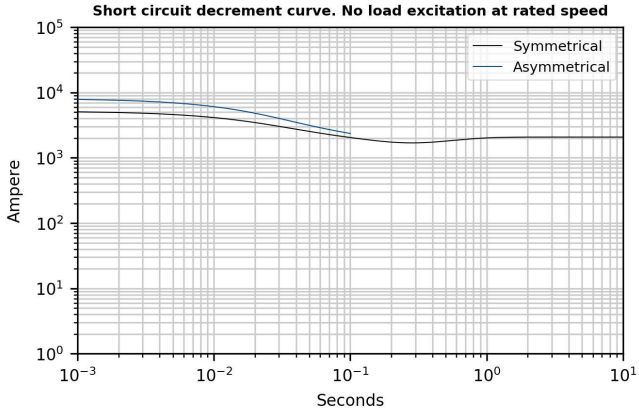
Voltage coefficient corrector (VCC):
VCC=(400/Vnew)2 if 50 Hz; VCC=(480/Vnew)2 if 60 Hz
Example. VCC at 415V 60 Hz is 1.338 [VCC=(480/415)^2]. This means that the voltage fall at a given power at 415V is equivalent to the one that can be read on the power factor 0.6 curve if the load is considered 1.338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

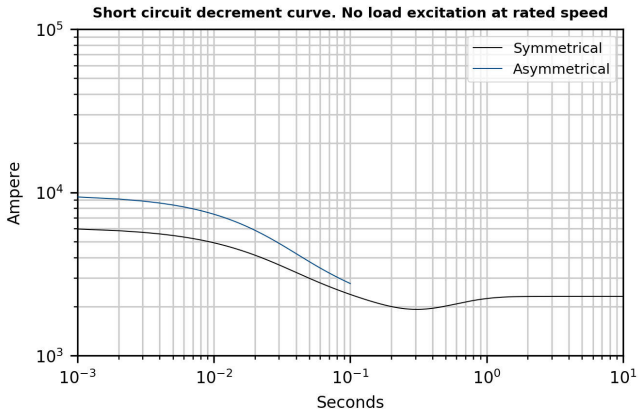
ECO40 1S4 C



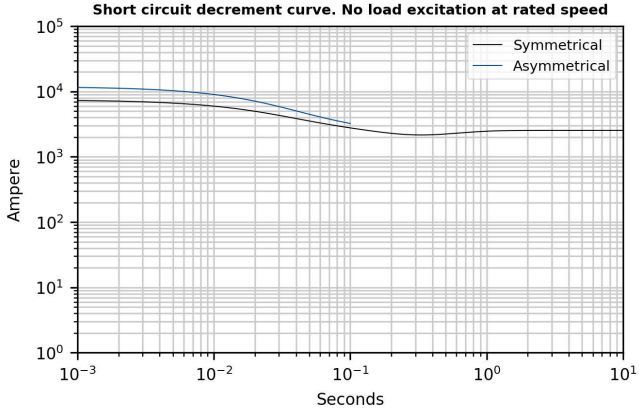
ECO40 2S4 C



ECO40 3S4 C



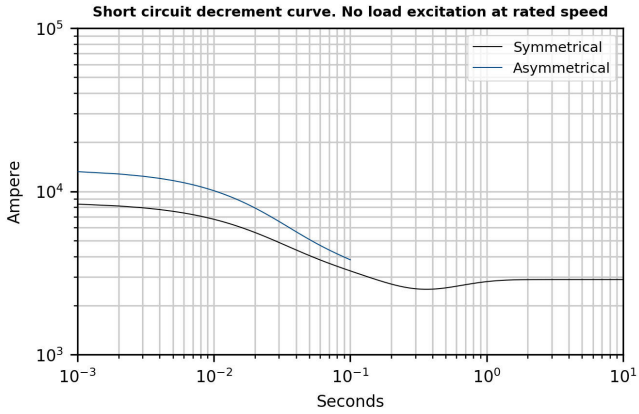
ECO40 1L4 C



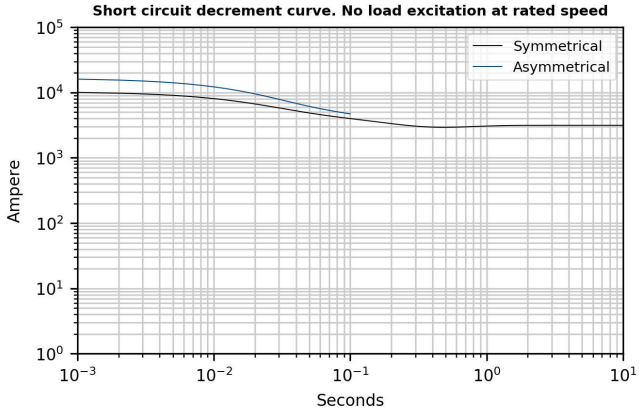
*Please refer to tables at page 6

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

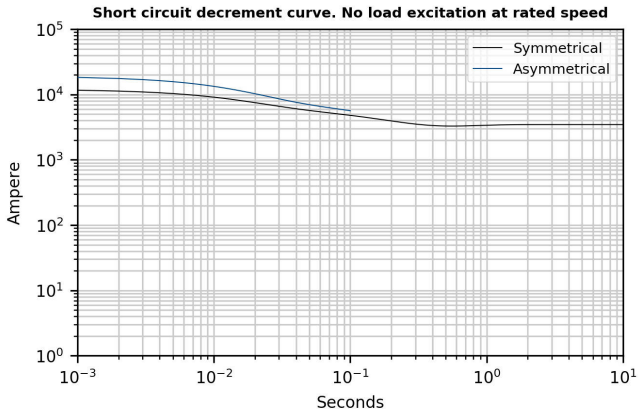
ECO40 2L4 C



ECO40 3L4 C



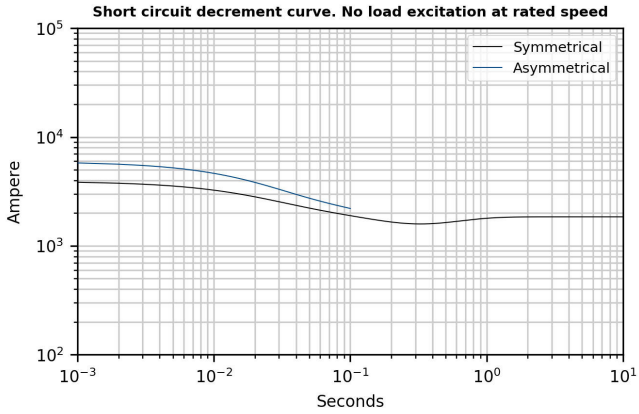
ECO40 VL4 C



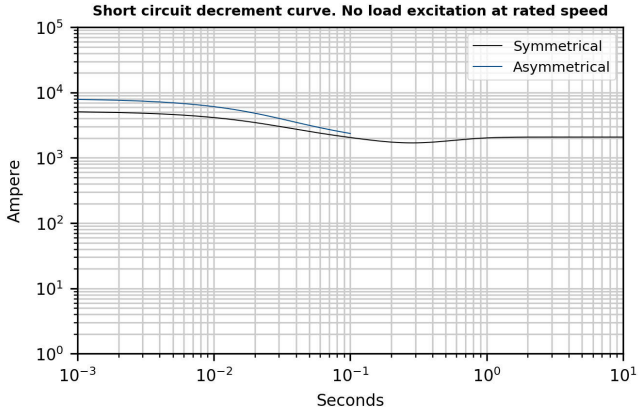
*Please refer to tables at page 6

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

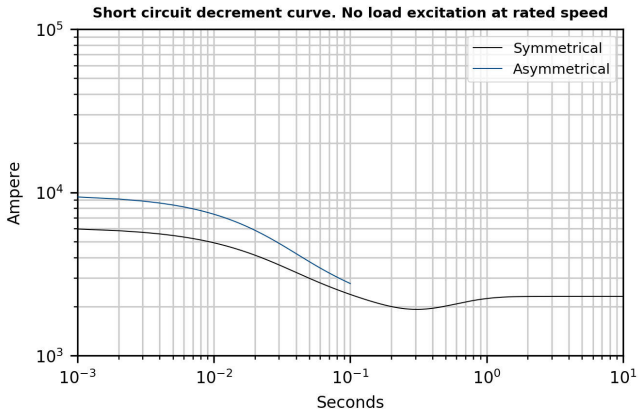
ECO40 1S4 C



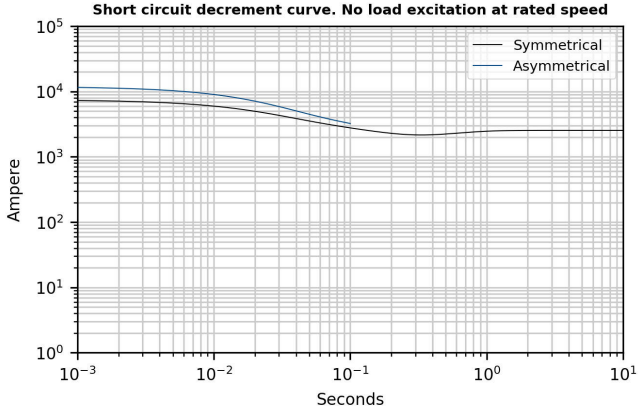
ECO40 2S4 C



ECO40 3S4 C



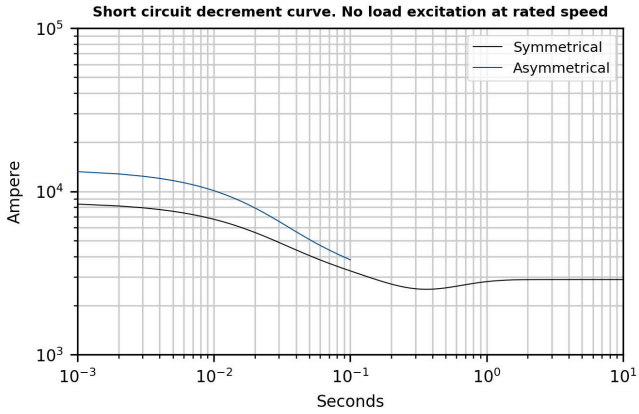
ECO40 1L4 C



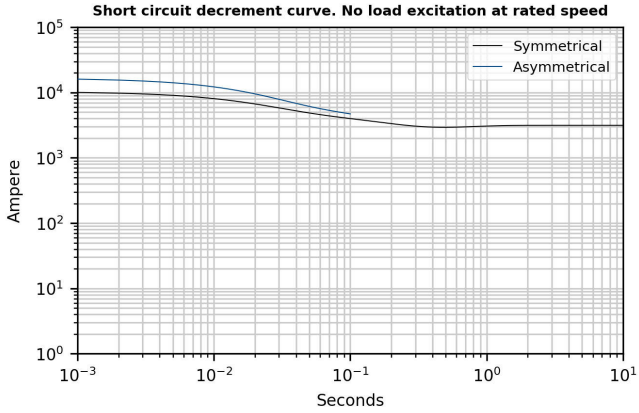
*Please refer to tables at page 6

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

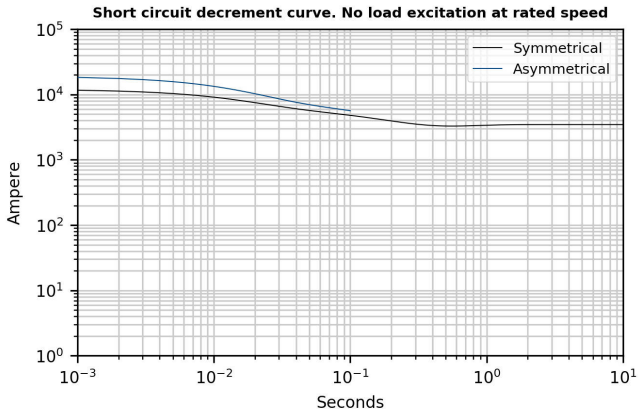
ECO40 2L4 C



ECO40 3L4 C



ECO40 VL4 C

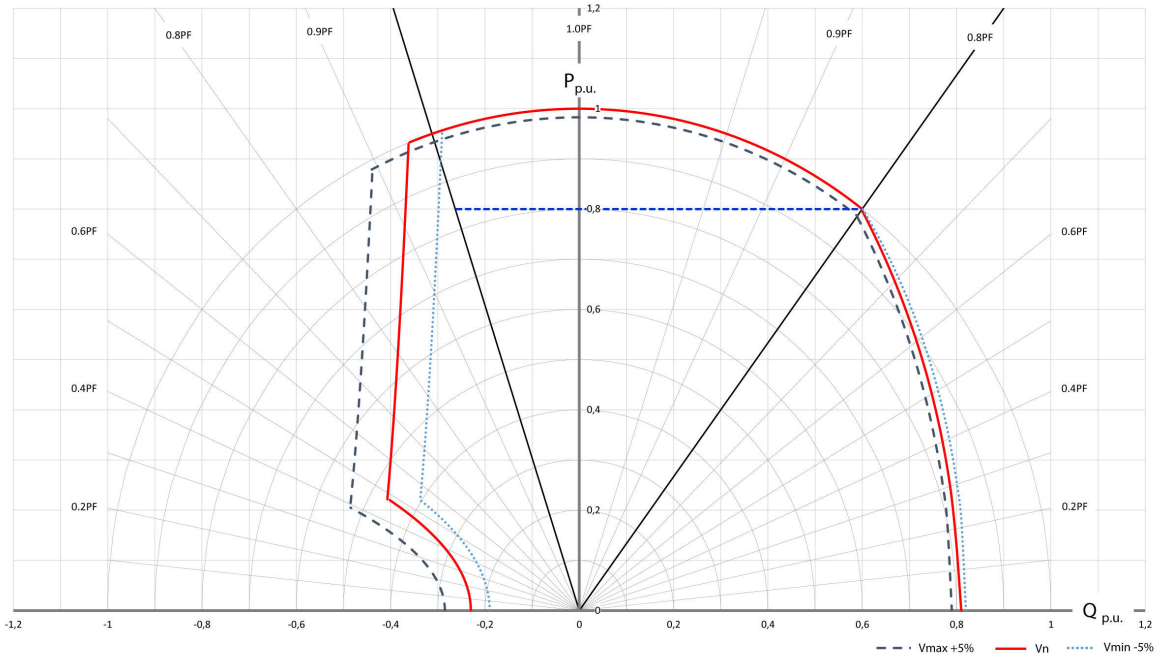


*Please refer to tables at page 6

Additional Characteristics

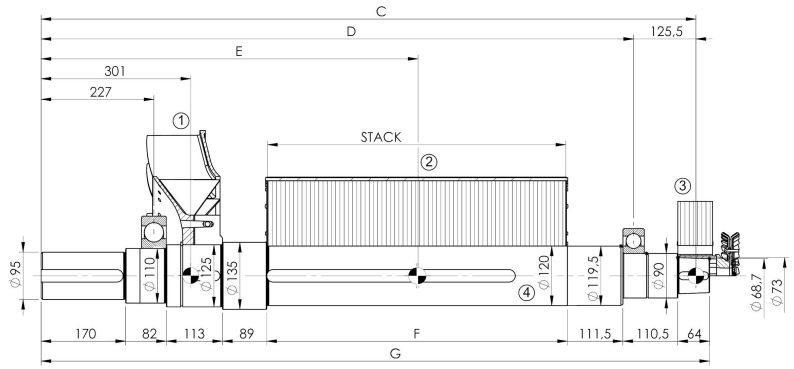
Data		ECO40 1S4 C		ECO40 2S4 C		ECO40 3S4 C		ECO40 1L4 C		ECO40 2L4 C		ECO40 3L4 C		ECO40 VL4 C	
		50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Damper cage		Copper													
Single stator coil resistance (20°C)	Ω	0,017		0,013		0,014		0,01		0,0086		0,009		0,008	
Rotor Winding Resistance (20°C)	Ω	4,488		4,881		5,176		6,025		1,376		1,5		1,592	
Stator Exciter Resistance (20°C)	Ω	8,85		8,85		8,85		8,85		8,85		8,85		8,85	
Rotor Exciter Resistance (20°C)	Ω	0,317		0,317		0,317		0,317		0,05		0,05		0,05	
Auxiliary Winding Resistance (20°C)	Ω	0,558		0,521		0,54		0,476		0,55		0,481		0,3	
Weight of complete generator	kg	1049,0		1133,0		1208,0		1323,0		1458,0		1536,0		1752,0	
Unbalanced magnetic pull	kN/mm	5,0		5,9		6,5		6,1		6,5		6,8		6,9	
Air flow	m^3/min	54,0	64,8	54,0	64,8	54,0	64,8	54,0	64,8	54,0	64,8	54,0	64,8	54,0	64,8
Noise level at 1m/7m	dB(A)	94/82	98/88	94/82	98/88	94/82	98/88	94/82	98/88	94/82	98/88	94/82	98/88	94/82	98/88

PQ Diagram



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

MOMENTS OF INERTIA - DOUBLE BEARING



POS.	1		2		3		4		TOTAL	
COMPONENT	FAN		MAIN ROTOR		EXCITER ROTOR		SHAFT *			
TYPE	WEIGHT [kg]	J [kgm²]	WEIGHT [kg]	J [kgm²]	WEIGHT [kg]	J [kgm²]	WEIGHT [kg]	J [kgm²]	WEIGHT [kg]	J [kgm²]
ECO40 1S / 4C	12,4	0,4387	215,8	4,4392	37,3	0,4415	83,3	0,1435	348,8	5,4629
ECO40 2S / 4C			249,1	5,1183					382,1	6,1420
ECO40 3S / 4C			277,9	5,7070					410,9	6,7307
ECO40 1L / 4C			306,8	6,2966			98,0	0,1703	454,5	7,3471
ECO40 2L / 4C			339,8	6,8833					487,6	7,9338
ECO40 3L / 4C			353,3	7,1545					501,0	8,2050
ECO40 VL / 4C			435,0	8,8036			107,0	0,1866	591,7	9,8704

DIMENSION / TYPE	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
ECO40 1S / 4C	1052,5	927,0	580,5	340,0	1080,0
ECO40 2S / 4C			603,0		
ECO40 3S / 4C			623,0		
ECO40 1L / 4C	1217,5	1092,0	643,0	505,0	1245,0
ECO40 2L / 4C			685,5		
ECO40 3L / 4C			695,5		
ECO40 VL / 4C	1317,5	1192,0	755,5	605,0	1345,0

* Shaft mass and inertia also include rotor keys

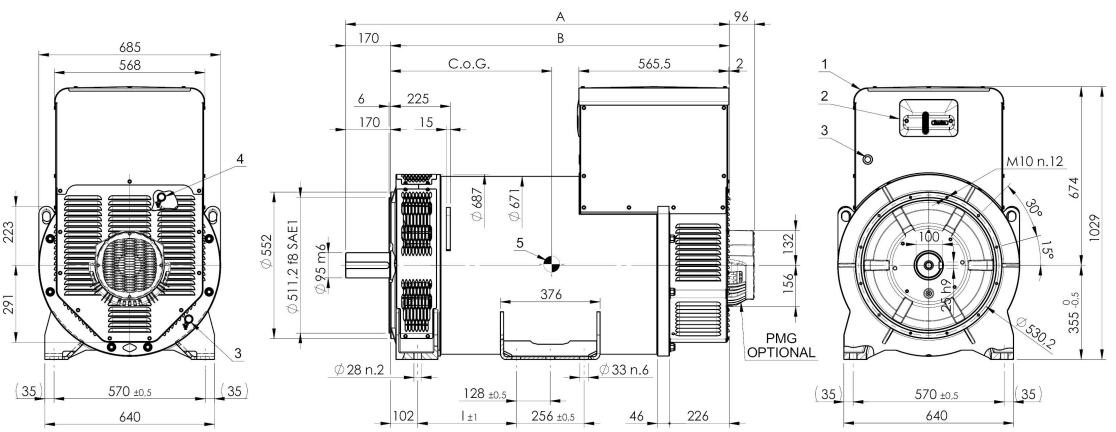
REV.	DATE	REVIEWS	DESIGN BY	APPROVED BY
00	27/05/2022	FIRST ISSUE	Nardi F.	Manfrin R.

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DESCRIPTION: MOMENTS OF INERTIA - DOUBLE BEARING ECO40C

FORMAT	SCALE	REF.DOC.	PART N.	MODEL REV.	DRW REV.
A4	1:8	PP00092	D00054	00	00

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TIPO / TYPE TYPE / TYPE	CoG [mm] Standard version	CoG [mm] PMG version	A [mm]	B [mm]	l [mm]
ECO40 1S / 4C	446	457	1183	1013	207
ECO40 2S / 4C	457	467			
ECO40 3S / 4C	467	477			
ECO40 1L / 4C	515	525	1348	1178	372
ECO40 2L / 4C	539	548			
ECO40 3L / 4C	545	554			
ECO40 VL / 4C	601	609	1448	1278	372

1)	REMOVABLE COVER FOR ACCESS TO MAIN TERMINALS
2)	REMOVABLE PANEL FOR ACCESS TO AVR
3)	RUBBER GROMMET - DG21
4)	SCREWS M16 FOR GROUNDING
5)	CENTER OF GRAVITY (C.o.G.) - NO OPTIONAL MOUNTED

REV.	DATE	REVIEWS	DESIGN BY	APPROVED BY
00	13/07/2022	FIRST ISSUE	Nardi F.	Manfrin R.

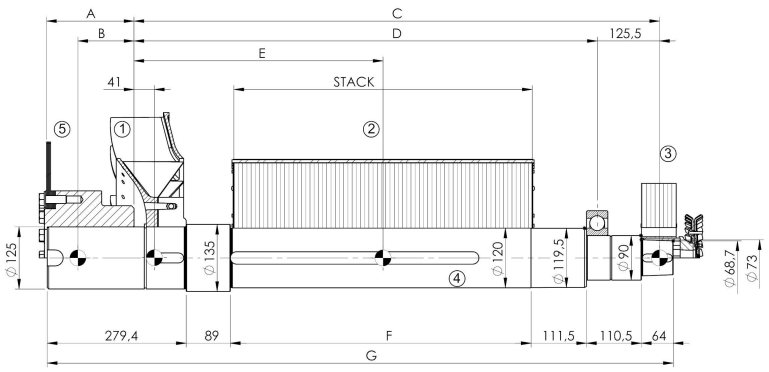
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DESCRIPTION: OVERALL DIMENSIONS - B3B14 COUPLING ECO40C

FORMAT	SCALE	REF.DOC.	PART N.	MODEL REV.	DRW REV.
A4	1:15	PP00092	D00047	00	00

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MOMENTS OF INERTIA - SINGLE BEARING



SAE N.	5 | SHAFTS COUPLING FLEX PLATE			
	A	*B*	*WEIGHT [kg]*	*J [kgm²]*
14	175,7	112,8	55,1	0,7503
18	165,7	113,8	58,2	1,0848

POS.	1		2		3		4		TOTAL	
COMPONENT	FAN		MAIN ROTOR		EXCITER ROTOR		SHAFT *			
	WEIGHT	J	WEIGHT	J	WEIGHT	J	WEIGHT	J	WEIGHT	J
TYPE	[kg]	[kgm²]	[kg]	[kgm²]	[kg]	[kgm²]	[kg]	[kgm²]	[kg]	[kgm²]
ECO40 1S / 4C	12,4	0,4387	215,8	4,4392	37,3	0,4415	83,5	0,1541	349,0	5,4735
ECO40 2S / 4C			249,1	5,1183					382,3	6,1526
ECO40 3S / 4C			277,9	5,7070					411,1	6,7413
ECO40 1L / 4C			306,8	6,2966			98,2	0,1809	454,7	7,3577
ECO40 2L / 4C			338,5	6,8582					486,4	7,9193
ECO40 3L / 4C			353,3	7,1545					501,2	8,2156
ECO40 VL / 4C			435,0	8,8036			107,2	0,1972	591,9	9,8810

* Shaft mass and inertia also include rotor keys

DIMENSION / TYPE	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
ECO40 1S / 4C	792,5	667,0	326,1	340,0	994,4
ECO40 2S / 4C			348,6		
ECO40 3S / 4C			368,6		
ECO40 1L / 4C	957,5	832,0	388,6	505,0	1159,4
ECO40 2L / 4C			431,1		
ECO40 3L / 4C			441,1		
ECO40 VL / 4C	1057,5	932,0	501,1	605,0	1259,4

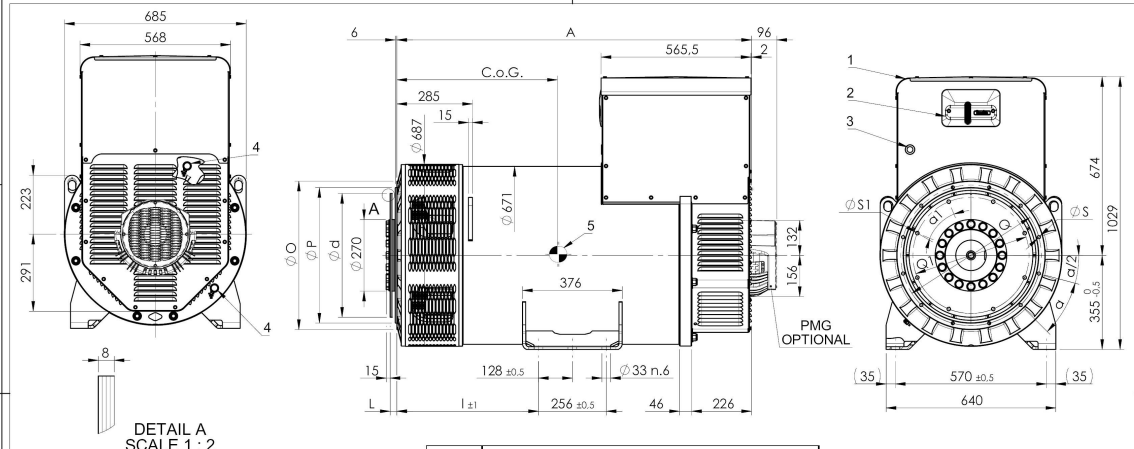
REV.	DATE	REVIEWS	DESIGN BY	APPROVED BY
01	11/01/2023	SHAFT & HUB DIAMETER, DISCKS TH.,	Trevisan M.	Manfrin R.
00	27/05/2022	FIRST ISSUE	Nardi F.	Manfrin R.

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DESCRIPTION: MOMENTS OF INERTIA - SINGLE BEARING ECO40C

FORMAT	SCALE	REF.DOC.	PART N.	MODEL REV.	DRW REV.
A4	1:8	ECR00045	D00051	01	01

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TIPO / TYPE	CoG [mm]		A	l
TYPE / TYPE	Standard version	PMG version	[mm]	[mm]
ECO40 1S / 4C	482	493	1073	369
ECO40 2S / 4C	494	504		
ECO40 3S / 4C	505	515		
ECO40 1L / 4C	553	563	1238	534
ECO40 2L / 4C	578	587		
ECO40 3L / 4C	585	593		
ECO40 VL / 4C	642	650	1338	534

SAE N.	FLANGIA / FLANGE BRIDE / FLANSCH					
	O	*P*	*Q*	*S*	*N*	*α*
1	560	511,2	530,2	12	12	30°
1/2	654	584,2	619,1	14	12	30°
0	711	647,7	679,5	14	16	22,5°

SAE N.	GIUNTI A DISCHI / DISC COUPLING DISQUE DE MONOPALIER / SCHEIBENKUPPLUNG					
	d	*L*	*Q1*	*S1*	*N1*	*α 1*
14	466,72	25,4	438,15	13,5	8	45
18	571,50	15,7	542,92	16,7	6	60

1)	*REMOVABLE COVER FOR ACCESS TO MAIN TERMINALS*
2)	*REMOVABLE PANEL FOR ACCESS TO AVR*
3)	*RUBBER GROMMET DG-21*
4)	*SCREWS M16 FOR GROUNDING*
5)	*CENTER OF GRAVITY (C.o.G.) IN CONFIGURATION SAE 1 FLYWHEEL 14 - NO OPTIONAL MOUNTED*

REV.	DATE	REVIEWS	DESIGN BY	APPROVED BY
01	23/08/2023	UPDATE DISKS, SHAFT, HUB	Trevisan M.	Trevisan M.
00	27/05/2022	FIRST ISSUE	Nardi F.	Manfrin R.

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DESCRIPTION: OVERALL DIMENSIONS - MD35 COUPLING ECO40C

FORMAT	SCALE	REF.DOC.	PART N.	MODEL REV.	DRW REV.
A4	1:15	ECR00045	D00045	01	01

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