

GX SERIES

STAGE V EMISSION COMPLIANT

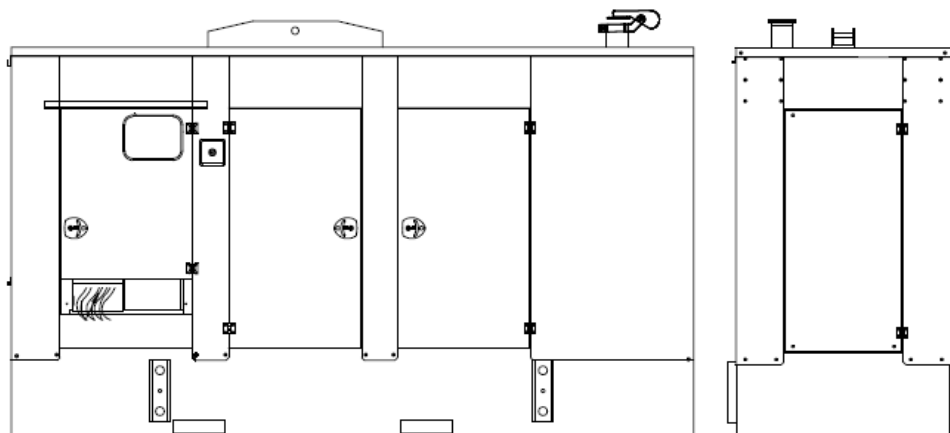
DIESEL GENERATOR
GROUPE ELECTROGENE DIESEL
GRUPO ELECTROGENO DIESEL
GRUPPO ELETTROGENO DIESEL

MODEL
 MODELE
 MODELO
 MODELLO

GX166F V




SOUNDPROOF VERSION



GENERATING SET PERFORMANCE PERFORMANCES DU GROUPE PRESTACIONES DEL GRUPO PRESTAZIONI DEL GRUPPO		50 Hz	60 Hz
Voltage Voltage Voltaje Tensione		V 400 / 230	V ---
Prime Power Puissance service continue Potencia servicio continuo Potenza servizio continuo	PRP	kVA 150	kVA ---
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza	LTP	kVA 165	kVA ---
Prime Power Puissance service continue Potencia servicio continuo Potenza servizio continuo	PRP	kWe 120	kWe ---
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza	LTP	kWe 132	kWe ---
Power factor Facteur de puissance Factor de potencia Fattore di potenza	cos φ	0,8	0,8
Fuel consumption Consommation combustible Consumo de combustible Consumo combustibile	80 %	l/h 24,0	l/h ---


ENGINE MOTEUR MOTOR MOTORE		FPT		N67 STAGE V EMISSION COMPLIANT	
PERFORMANCE PERFORMANCES PRESTACIONES PRESTAZIONI		1500 rpm		1800 rpm	
Prime Power					
Puissance service continue	PRP	kWm	136	kWm	---
Potencia servicio continuo					
Potenza servizio continuo					
Stand-by Power					
Puissance service secours	LTP	kWm	145	kWm	---
Potencia servicio emergencia					
Potenza servizio in emergenza					
Specific fuel consumption					
Consommation spécifique combustible		g/kWh	50 % ---	g/kWh	50 % ---
Consumo específico de combustible			80 % ---		80 % ---
Consumo específico combustible			100 % ---		100 % ---
Diesel 4 Stroke – Injection type					Direct
Diesel 4 temps – Type injection					Directe
Diesel 4 tiempos – Tipo de inyeccion					Directa
Diesel a 4 tempi – Tipo di iniezione					Diretta
Aspiration type					Turbocharged
Type d'aspiration					Suraalimentée
Tipo de aspiracion					sobrealimentato
Tipo d'aspirazione					sovralimentata
Cooling system					Water
Refroidissement					Eau
Sistema de refrigeracion					Agua
Raffreddamento					Acqua
Speed governor					Electronic
Régulateur de tours					Électronique
Regulador					Eléctronico
Regolatore di giri					Elettronico
Cylinders, numbers and arrangement					
Nombre et disposition des cylindres					6 L
Cilindros, numero y disposicion					
Numero e disposizione dei cilindri					
Total displacement					
Cylindrée totale				cm ³	6728
Cilindrata total					
Cilindrata totale					
Bore x stroke					
Alésage x course				mm	104 x 132
Diametro x carrera					
Alesaggio x corsa					
Engine electric system voltage					
Voltage système électrique moteur					12 - 24 V
Voltaje sistema eléctrico motor					
Voltaggio sistema elettrico motore					

ALTERNATOR ALTERNATEUR ALTERNADOR ALTERNATORE		LERROY SOMER				
PERFORMANCE PERFORMANCES PRESTACIONES PRESTAZIONI		1500 rpm		1800 rpm		
Model Modèle Modelo Modello		LSA 44.3 L10		---		
Prime Power Puissance service continue Potencia servicio continuo Potenza servizio continuo		40 °C	kVA kWe	150 120	kVA kWe	--- ---
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza		40 °C	kVA kWe	159 127	kVA kWe	--- ---
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza		27 °C	kVA kWe	165 132	kVA kWe	--- ---
Efficiency Rendement Eficiencia Efficienza			1/4 2/4 3/4 4/4	90,5 % 93,2 % 93,5 % 93,0 %	1/4 2/4 3/4 4/4	--- % --- % --- % --- %
Standard winding connections Liaison des bobinages Tipo de conexión Collegamento avvolgimenti		Y		---		
Exciter Excitatrice Excitador Excitatrice		brushless rotating exciter design with solid state pivotante sans brosses avec pont de diodes pivotants puente de diodos sin escobillas rotantes rotante senza spazzole con ponte di diodi rotanti				
Poles Poles Polos Poli		4				
Phases Phases Fases Fasi		3 + N				
Wires Fils Hilos Morsetti		12				
Voltage regulation Regulation Voltage Regulación voltaje Regolazione tensione		± 0,25 %				
Insulation class Classe d'isolation Classe de aislamiento Classe di isolamento		H				
Enclosure Degré de protection mécanique Grado de protección mecánica Grado di protezione meccanica		IP 23				
Maximum overspeed Survitesse Régimen máximo Velocità di fuga		2250 min ⁻¹				
AVR model with 300% shortcircuit current Modèle AVR avec un courant de court-circuit du 300% Modelo AVR con una corriente de corto circuito del 300% Modello AVR con corrente di corto circuito del 300%				(3 In) : 10s	D 350 AREP	
Derating for temperature Déclassement pour temperature Declasamiento para temperatura Declasseamento per temperatura				0 ÷ 40°C > 40 °C	0 3 % / 5°C	
Derating for altitude Déclassement pour altitude Declasamiento para altitud Declasseamento per altitudine				0 ÷ 1500 m 1500 ÷ 2500 m 2500 ÷ 3000 m	0 3% / 500 m 4% / 500 m	

LOGISTIC INFORMATION INFORMATIONS LOGISTIQUES INFORMATION LOGISTICA INFORMAZIONI LOGISTICHE						
	Integrated fuel tank capacity Capacité réservoir intergré Capacidad Tanque integrado Capacità Serbatoio integrato		Weight Poids Peso Peso	Dimensions Cotes d'encombrement Medidas externas Dimensioni d'ingombro		
	(L.)			(cm)		
	STD	EXTRA1	(kg)	L	W	H
SOUND PROOF VERSION VERSION INSONORISEE VERSION INSONORISADA VERSIONE INSONORIZZATA	600	ON REQUEST	3390	390	113	239
AdBlue tank	78	ON REQUEST				
GENSET STANDARD EQUIPMENT EQUIPEMENT STANDARD GROUPE ELECTROGENE EQUIPAMIENTO STANDARD GRUPO ELECTROGENO EQUIPAGGIAMENTO STANDARD GRUPPO ELETTROGENO						
GB	F	E	I			
<ul style="list-style-type: none"> Lifting eye Vibration dampers Integrated bunded fuel tank Battery Manual autostart control panel With DSE7310 Emergency stop button Sound proof canopy of galvanized steel with residential silencer Fork lift guides 	<ul style="list-style-type: none"> Crochet de levage Amortisseurs de vibrations Réservoir intégré avec bac de rétention Batterie Coffret de contrôle manuel autostart avec DSE7310 Bouton arrêt d'urgence Capote d'insonorisation d'acier galvanisé avec silencieux résidentiel Supports pour fourches 	<ul style="list-style-type: none"> Gancho central Apagadores de vibracion Tanque combustible integrado con bandeja para la recogida de líquidos Bateria Cuadro manual autostart con DSE7310 Botón parada de emergencia Cabina de insonorización de acero cincado con silenciador residencial Supportes para carretilla 	<ul style="list-style-type: none"> Gancio centrale di sollevamento Antivibranti Serbatoio integrato con vasca di raccolta liquidi Batteria Quadro manuale autostart con DSE7310 Pulsante arresto di emergenza Cabina di insonorizzazione di acciaio zincato con marmitta residenziale Porta forche 			
MANUAL AUTOSTART CONTROL PANEL COFFRET ELECTRIQUE MANUEL AUTOSTART CUADRO ELECTRICO MANUAL AUTOSTART QUADRO ELETTRICO MANUALE AUTOSTART						
Q7310 AUS						
225 A (400 V - 3 ph - 50Hz – 1500 rpm)						
STANDARD EQUIPMENT: 4 poles circuit breaker Electronic control board DSE 7310 Control panel box key Emergency Stop button	EQUIPEMENT STANDARD: Disjoncteur de protection 4 pôles Fiche électronique DSE 7310 Clé pour serrure du coffret Interrupteur d'arrêt d'urgence	EQUIPAMIENTO STANDARD: Interruptor magnetotermico 4 polos Carta electronica DSE 7310 Llave cuadro Botón de parada de emergencia	EQUIPAGGIAMENTO STANDARD: Interruttore magnetotermico 4 poli Scheda elettronica DSE 7310 Chiave quadro Pulsante di arresto di emergenza			
	DSE 7310 CONTROL BOARD CARTE ELECTRONIQUE DE CONTROL CARTA ELECTRONICA DE CONTROL SCHEDA ELETTRONICA DI CONTROLLO					
PROTECTIONS	PROTECTIONS	PROTECCIONES	PROTEZIONI			
Low oil pressure High engine temperature Low fuel level Fail to start Fail to stop Emergency stop Over/under generator frequency Over/under generator voltage Over/under speed Fuel level Belt breakage Over current Over/under battery voltage	Basse pression huile moteur Haute température moteur Basse niveau combustible Non démarrage Non arrêt Arrêt d'urgence Sur/sous générateur fréquence Sur/sous générateur voltage Sur/sourvitesse Niveau de combustible Rupture courroie Surcourant Sur/sus la tension de batterie	Baja presión aceite Elevada temperatura motor Baja nivel carburante Falta de arranque Falta de parada Parada de emergencia Sobre/bajo generatore frecuencia Sobre/bajo generatore voltaje Sobre/bajo velocidad nivel de combustible Ruptura correa Corriente maxima Sobre/bajo voltaje de la batería	Bassa pressione olio Alta temperatura motore Basso livello di carburante Mancato avviamento Mancato arresto Stop d'emergenza Sovra/sotto frequenza generatore Sovra/sotto voltaggio generatore Sovra/sotto velocità Livello del carburante Rottura cinghia Sovraccorrente Sovra/sotto tensione della batteria			
DIGITAL METERS	VOYANT NUMERIQUE POUR	VISOR DIGITAL PARA	MISURATORE DIGITALE PER			
Generator volts (3 phases) Generator amperes (3 phases) Generator frequency KW-meter kVA-meter Cos φ-meter Rpm meter Gen set hours counter Battery Volts	Voltmètre générateur (3 phases) Ampèremètre générateur (3 phases) Fréquencemètre générateur KW-mètre kVA- mètre Cos φ- mètre Tm mètre Totalisateur d'heures de marche Voltmètre batterie	Voltmetro (3 fases) Amperimetro (3 fases) Frecuencimetro KW- metro kVA- metro Cos φ-metro Revoluciones por minuto metro Medida horas de marcha Voltmetro batería	Voltmetro tensione generatore (3 fasi) Amperometro generatore (3 fasi) Frequenzimetro generatore KW- metro kVA- metro Cos φ-metro Gm metro Contaore di funzionamento gruppo Voltmetro batteria			

**AUTOMATIC CONTROL PANEL
COFFRET ELECTRIQUE AUTOMATIQUE
CUADRO ELECTRICO AUTOMATICO
QUADRO ELETRICO AUTOMATICO**

<p>1)</p> <p>Q 7320 ATS</p> 	<p>COMPLETE CONTROL PANEL FREE STANDING TYPE Equipment: control board, circuit breaker, battery charger, transfer switch, box key.</p> <p>COFFRET ELECTRIQUE COMPLET TYPE ARMOIRE SEPRE DU GROUPE Equipement : carte électronique de contrôle, disjoncteur de protection, chargeur de batterie, inverseur de source, clé coffret.</p> <p>CUADRO ELECTRICO COMPLETO EN ARMARIO SEPARADO DEL GRUPO Equipamiento: carta electronica de controllo, interruptor magnetotermico, cargador de bateria, transferencial, llave quadro.</p> <p>QUADRO ELETRICO COMPLETO SEPARATO DAL GRUPPO Equipaggiamento: scheda elettronica di controllo, interruttore magnetotermico, carica batteria, telecommutazione e chiave quadro.</p>
<p>2)</p> <p>Q 7320 AMF</p> 	<p>AMF CONTROL PANEL FITTED ON THE GEN-SET WITHOUT TRANSFER SWITCH Equipment: control board, circuit breaker, battery charger, box key.</p> <p>COFFRET ELECTRIQUE MONTE SUR LE GROUPE SANS INVERSEUR DE SOURCE Equipement : carte électronique de contrôle, disjoncteur de protection, chargeur de batterie, clé coffret.</p> <p>CUADRO ELECTRICO MONTADO SOBRE EL GRUPO SIN TRANSFERENCIAL Equipamiento: carta electronica de controllo, interruptor magnetotermico, cargador de bateria, llave quadro.</p> <p>QUADRO ELETRICO MONTATO SUL GRUPPO ELETTROGENO SENZA TELECOMMUTAZIONE Equipaggiamento: scheda elettronica di controllo, interruttore magnetotermico, carica batteria, chiave quadro.</p>
<p>3)</p> <p>Q 7320 STS</p> 	<p>CONTROL PANEL FITTED ON THE GEN-SET WITH TRANSFER SWITCH SUPPLIED IN A SEPARATED BOX Equipment: control board, circuit breaker, battery charger, box key, separate transfer switch.</p> <p>COFFRET ELECTRIQUE MONTE SUR LE GROUPE + INVERSEUR DE SOURCE FOURNI DANS UN COFFRET SEPRE Equipement : carte électronique de contrôle, disjoncteur de protection, chargeur de batterie, inverseur de source séparé, clé coffret.</p> <p>CUADRO ELECTRICO MONTADO SOBRE EL GRUPO CON TRANSFERENCIAL SEPARADO Equipamiento: carta electronica de controllo, interruptor magnetotermico, cargador de bateria, llave quadro, transferencial separado.</p> <p>QUADRO ELETRICO MONTATO SUL GRUPPO ELETTROGENO CON TELECOMMUTAZIONE SEPARATA Equipaggiamento: scheda elettronica di controllo, interruttore magnetotermico, carica batteria, chiave quadro, telecommutazione in armadio separato.</p>








 <p>DSE 7320</p>	<p>CONTROL BOARD CARTE ELECTRONIQUE DE CONTROL CARTA ELECTRONICA DE CONTROL SCHEDA ELETRONICA DI CONTROLLO</p>
--	---

GB	F	E	I
The DSE7320 is an Automatic Mains Failure Control Module designed to automatically start and stop diesel generating sets that include electronic and non electronic engines. The module also provides excellent genset monitoring and protection features.	La DSE7320 est une carte de contrôle projetée pour démarrer et arrêter automatiquement groupes électrogènes diesels avec moteurs électroniques et non électroniques. La carte représente un système excellent de contrôle et de protection du groupe électrogène.	La DSE7320 es una carta de control para arrancar y parar automáticamente grupos electrógenos diesel con motores electrónicos y no electrónicos. La carta constituye un excelente sistema de control y protección del grupo electrógeno.	La DSE7320 è una scheda di controllo progettata per avviare e arrestare automaticamente gruppi elettrogeni diesel con motori elettronici e non elettronici. La scheda costituisce un eccellente sistema di controllo e di protezione del gruppo elettrogeno.
FEATURES	EQUIPEMENT	EQUIPMENT	EQUIPAGGIAMENTO
Stop/restart – Auto – Manual – Start LCD display scroll Event log view Acoustic alarm	Fiche électronique de contrôle DSE7320 Disjoncteur de protection Chargeur de batterie Bouton poussoir arrête d'urgence	Ficha electrónica de control DSE7320 Interruptor magnetotermico Cargador de batería Boton de parada de emergencia	Scheda elettronica di controllo DSE7320 Interruttore magnetotermico Carica batteria Pulsante stop emergenza
DIGITAL MEASURING	MESURES NUMERIQUES	MEDIDAS DIGITALES	MISURAZIONI DIGITALI
Generator volts (3 phases) Generator amperes (3 phases) Generator frequency KW-meter kVA-meter Cos φ- meter Rpm meter Water temperature (optional) Oil pressure (optional) Gen set hours counter Mains volts Battery volts Mains frequency Charging voltage Start-counter Fuel level %	Voltmètre générateur (3 phases) Ampèremètre générateur (3 phases) Fréquencemètre générateur KW-mètre kVA- mètre Cos φ- mètre Tm mètre Température eau (facultatif) Pression huile (facultatif) Totalisateur d'heures de marche Voltmètre secteur Voltmètre batterie Fréquence réseau Tension de charge Compteur démarrages Niveau combustible %	Voltmetro (3 fases) Amperimetro (3 fases) Frecuencimetro KW- metro kVA- metro Cos φ- metro Revoluciones por minuto metro Termometro agua (opcional) Presión aceite (opcional) Medida horas de marcha Voltmetro tensión de red Voltmetro batería Frecuencia red Tensión de carga Numero de arranques Nivel carburante %	Voltmetro tensione generatore (3 fasi) Amperometro generatore (3 fasi) Frequenzimetro generatore KW- metro kVA- metro Cos φ- metro Gm metro Temperatura acqua (facoltativo) Pressione olio (facoltativo) Contaore di funzionamento gruppo Voltmetro tensione rete Voltmetro batteria Frequenza rete Tensione di carica Contavviamenti Livello carburante %
INDICATORS	INDICATEURS	INDICADORES	INDICATORI
Mains live Generator live Mains contactor closed Generator contactor closed Engine running	Présence secteur Présence tension générateur Inverseur secteur fermé Inverseur générateur fermé Moteur en marche	Presencia tensión de red Presencia tensión grupo Transferencial red cerrado Transferencial grupo cerrado Motor en marcha	Presenza tensione di rete Presenza tensione generatore Erogazione da rete Erogazione da gruppo Motore avviato
PROTECTIONS	PROTECTIONS	PROTECCIONES	PROTEZIONI
Low oil pressure High engine temperature Low fuel level Fail to start Fail to stop Emergency stop Over/under frequency Over/under voltage Over/under speed Fuel level Belt breakage Over current Over/under battery voltage	Bas pression huile moteur Haute température moteur Bas niveau combustible Non démarrage Non arrêt Arrêt d'urgence Sur/sous fréquence Sur/sous voltage Sur/sous vitesse Niveau de combustible Rupture courroie Surcourant Sur/sus la tension de batterie	Baja presión aceite Elevada temperatura motor Baja nivel carburante Falta de arranque Falta de parada Parada de emergencia Sobre/bajo frecuencia Sobre/bajo voltaje Sobre/bajo velocidad nivel de combustible Ruptura correa Corriente maxima Sobre/bajo voltaje de la batería	Bassa pressione olio Alta temperatura motore Basso livello di carburante Mancato avviamento Mancato arresto Stop d'emergenza Sovra/sotto frequenza Sovra/sotto voltaggio Sovra/sotto velocità Livello del carburante Rottura cinghia Sovraccorrente Sovra/sotto tensione della batteria

SOUNDPROOF CANOPY
CAPOTE D'INSONORISATION
CAPOTA DE INSONORIZACION
CABINA INSONORIZZATA

GB	F	E	I
<p>The Bruno Super Silent soundproof canopy has been designed with the aim of achieving the maximum noise level reduction and to provide a perfect cooling of the engine. The cooling airflow is forced through fixed circuits. The canopy is suitable for tropical ambient application. The exhaust gas silencer is residential type internally mounted. The canopy is completely built of hot galvanized carbon sheet steel. The sheets have a thickness 20/10. The structure is fully bolted, fixed by a special polyethylene sealing, completely free from electrical installation. All the panels can be easily removed. The cab is provided with doors of wide opening for easy access to generating set for the maintenance operations. The soundproofing materials are highly fire resistant and self-extinguishing.</p>	<p>La capote insonorisée Bruno Super Silent à été conçue pour atteindre le niveau de bruit le mineur possible et un refroidissement du moteur parfait. Le souffle d'air refroidissant est canalisé en circuits fixes. La capote est apte à être utilisée dans les ambiances tropicales. Le silencieux des gaz d'échappement, de type résidentiel, est mis à l'intérieur de la capote. La cabine est construite en acier galvanisé à chaud. Les tôles ont une épaisseur de 20/10. La structure est complètement boulonnée et fixée à travers des garnitures spéciales au polyéthylène. Tous les panneaux sont facilement amovibles. La cabine est dotée de portes avec grandes ouvertures qui permettent un accès facile au groupe électrogène pour les opérations de maintenance. Les matériaux d'insonorisation sont fortement résistant au feu et auto-extinguibles.</p>	<p>La capota insonorizada Bruno Super Silent tiene sido planeada con el objetivo de alcanzar el menor nivel de rumorosidad posible y un perfecto enfriamiento del motor. El soplo de aire es canalizado en circuitos fijos. La cabina es apta a ser utilizada en ambientes tropicales. El silenciador de los gases de descargue, de tipo residencial, es colocado dentro de la cabina. La cabina es construida en acero cincado. Las chapas tienen un espesor de 20/10. La estructura es completamente bullonada y montada con sellos especiales de polietilene. Todos los paneles son fácilmente removibles. La cabina es dotada con puertas con amplias aberturas que permiten el fácil acceso al grupo electrógeno por las operaciones de manutención. Los materiales insonorizantes son muy resistentes al fuego y auto-extinguentes.</p>	<p>La cabina insonorizzata Bruno Super Silent è stata progettata allo scopo di raggiungere il minor livello di rumorosità possibile e un perfetto raffreddamento del motore. Il soffio d'aria raffreddante è canalizzato in circuiti fissi. La cabina è adatta ad essere utilizzata in ambienti tropicali. Il silenziatore dei gas di scarico, di tipo residenziale, è collocato all'interno della cabina. La cabina è costruita in acciaio zincato a caldo. Le lamiere hanno uno spessore di 20/10. La struttura è completamente bullonata e fissata tramite speciali sigilli al polietilene. Tutti i pannelli sono facilmente rimovibili. La cabina è dotata di porte con ampie aperture che consentono il facile accesso al gruppo elettrogeno per le operazioni di manutenzione. I materiali insonorizzanti sono altamente resistenti al fuoco e autoestinguenti.</p>

Our quality in 13 points
Notre qualité résumée en 13 points
Nuestra calidad en 13 puntos
La nostra qualità in 13 punti

1		Internal residential silencer for lower sound levels Silencieux interne pour un niveau bas de bruit Silenciador interno para un nivel de rumorosidad más bajo Silenziatore interno per un livello di rumorosità più basso
2		Integrated fuel tank of different sizes Réservoirs de combustible disponibles, sur demande, de capacité supérieure Tanques integrados disponibles, como opción, de capacidad superior Serbatoi integrati disponibili, su richiesta, di capacità superiore
3		Control panel viewing window to easily check status of generating set Fenêtre de visualisation du panneau de contrôle pour un contrôle plus facile du status opérationnel du groupe Ventana de visualización del panel de control por un más fácil control del estatus operativo del grupo Finestra di visualizzazione del pannello di controllo per un più facile controllo dello status operativo del gruppo
4		Lockable access doors for extra safety and security Porte d'accès avec serrure pour une sûreté majeure Puertas de acceso con cerradura para una mayor seguridad Porte di accesso con serratura per una maggiore sicurezza
5		Galvanized bolts Boulons galvanisés Pernos cincados Bulloni zincati
6		Emergency stop button Interrupteur d'arrêt d'urgence Botón parada de emergencia Pulsante arresto di emergenza
7		Fuel tank cap with external key (optional) Bouchon gasoil avec clé positionne à l'extérieur (en option) Tapo gasoleo con llave situado a l'externo (opcional) Tappo gasolio con chiave posizionato all'esterno (in opzione)
8		Fully banded base frame Réservoir amovible avec bague de retention Tanque integrado sfilabile con el envase para recoger los líquidos Serbatoio integrato sfilabile con vasca raccolta liquidi
9		Central lifting hook Crochet central d'enlèvement Gancho de elevación Gancio di sollevamento centrale
10		Doors location convenient to controls and service area Placement des portes pour rendre les contrôles plus faciles Colocación de las puertas para facilitar los controles Collocazione delle porte per facilitare i controlli
11		High serviceability level Haut niveau d'accessibilité pour la manutention Alto nivel de accesibilidad para la manutención Alto livello di accessibilità per la manutenzione
12		Large cable entry area for easy installation Grande zone d'entré des câbles pour une installation plus facile Amplia área de entrada cables para una instalación fácil Ampia area di entrata cavi per una facile installazione
13		Galvanized metal steel sheet pre-treated prior to powder coating Tôles en acier galvanisé pré-traitées avant le vernissage à poudre Chapas de acero cincado pre-tratadas antes de la pintura a polvo Lamiere di acciaio zincato pre-trattate prima della verniciatura a polvere



N67TEVP06.00 G-DRIVE STAGE V



Brochure main description @1500rpm @1800rpm

Application & simbol		Power Generation	
Engine identification main		N67	
Engine identification rating	kW	150	175
Engine features		PG G-Drive	
Emission feature		Stage V	

Main characteristics @1500rpm @1800rpm

Emission certification		Stage V	
Commercial code (for order)		N67TEVP06.00	
Other Commercial code		F4HGE615C	
Technical code (original plant engine code, on engine block)		F4HGE615C*V001	
Technical homologation code		F4HGE615C*V	
Stand-by power (gross) [mech]	kW	150	175
Specific power	kW/l	22,3	26,1
Electric commercial power (estimation alternator power output)	kWe [kVA]	135,2 [169]	158 [197,5]
BMEP	bar	17,9	17,4
Oil consumption on mission (average)	% fuel consumption	0,3	
Cycle		diesel 4 stroke	
Air charging system pattern		Turbocharged aftercooled	
Number of cylinder		6	
Configuration (cylinder arrangement)		in line	
Bore	mm	104	
Stroke	mm	132	
Stroke / Bore		1,27	
Displacement	l	6,7	
Unit Displacement	l	1,12	
Bore pitch	mm	120	
Valves per cylinder		4	
Cooling system type		liquid	
Direction of rotation (looking flywheel)		anti-clockwise	
Compression ratio		17 : 1	
Firing order		1 - 5 - 3 - 6 - 2 - 4	
Injection type		direct - electronic common rail	
Engine brake configuration		-	
Be10		8000 h	
Cylinder Head			
Single / Multiple		single	
Material		cast iron	
Head air circulation		crossflow	
Intake valve dia.	mm	33	
Exhaust valve dia.	mm	33	
Camshaft			
Layout		OHV	
Cam carrier		no	
Material and Heat treatment		chilled cast iron	
Valve train		mechanical tappet & push rod	



N67TEVP06.00 G-DRIVE STAGE V



Main characteristics		@1500rpm	@1800rpm
Drivetrain (timing system)			gear tappet
Valve actuation			tappet & push rod
Variable valve actuation system			no
Cylinder block (crankcase)			No Structural
Material of cylinder block			cast iron
Type of liners			dry
Liners replaceable; (slip fit or interference fit)			no
Bearing caps			machined cast iron
Crankcase Ventilation			yes
Oil separator			coalescent filter
Crankshaft & counterweights			
Material			forged steel
Acceptable Inertia (clutch)	kgm ²		0,75
Balancing			no
Turbocharger & EGR system			
Turbocharger type			fixed geometry with wastegate valve
Turbocharger supplier			Borgwarner
Turbocharger control			WG pneumatic control
Pressure after turbocharger compressor	mbar		1750
Max turbine inlet temperature	°C		700
Temperature after turbocharger compressor	°C		
Method of cooling the turbocharger			oil lubricated
Turbo protection devices			WG + software strategy
EGR type			-
EGR control strategy			-
EGR recirculation rate			-
Valve			-
Cooler			-
Control			-
Air mass measurement			-
Exhaust flap			
Exhaust flap supplier			Pierburg
Actuation type			electronic actuator
Exhaust flap cooling			yes
Switchability (1500-1800 rpm)			
Emission level 1500 rpm			Stage V
Emission level 1800 rpm			T4B (from end 2019)
Front power take off			
PTO type			-
Max torque available from front of crankshaft (no side load)	Nm		400
Power take off on gear train			
SAE A 9 teeth	Nm		-
SAE A 11 teeth	Nm		-
SAE B 13 teeth	Nm		-
SAE B (DIN 5482)	Nm		-
SAE 2B 15 teeth(ANSI B92,1)	Nm		-
References values			
Engine dimension LxWxH (indicative values)	mm		1103 x 764 x 1164



N67TEVP06.00 G-DRIVE STAGE V



Main characteristics		@1500rpm	@1800rpm
G-Drive Dimension LxWxH (indicative values)	mm		
Max permissible engine inclination	deg		25
Engine Weight - Dry (no fluids, value purely indicative)	kg		454
Engine Weight - Wet (with fluids, value purely indicative)	kg		469
G-Drive Weight - Dry (no fluids, value purely indicative)	kg		610
G-Drive Weight - Wet (with fluids, value purely indicative)	kg		N/A
Center of gravity (FFOB or RFOB according to picture, standard engine layout)	mm		N/A
Principal moment of inertia (reference on center of gravity, standard engine layout)	kgm ²		N/A
Principal moment of inertia (reference matrix based on center of gravity, standard engine layout)	kgm ²		N/A
Center of gravity (FFOB or RFOB according to picture, standard IPU/G-Drive layout)	mm	X = -20,1 mm, Y = 178,4 mm, Z = -405,4	
Principal moment of inertia (reference on center of gravity, standard IPU/G-Drive layout)	kgm ²	Ix = 3,3322568e+07 kgm ² , Iy = 6,4960636e+07 kgm ² , Iz = 7,9486493e+07	
Principal moment of inertia (reference matrix based on center of gravity, standard IPU/G-Drive layout)	kgm ²		N/A
Mass moment of inertia - rotating components (excluding flywheel)	kgm ²		0,33
Mass moment of inertia - standard flywheel	kgm ²		0,7 - 1,3
Bending moment on the flywheel housing	Nm	Point 1: within safety factor with mass 130 kg @ max Z: 380 mm Point 2: within safety factor with mass 55 kg @ max Z: 750 mm Point 3: within safety factor with mass 36 kg @ max Z: 1050mm	
Flywheel housing SAE sizing			
Flywheel SAE sizing			
Bending moment on PTO	Nm		140
Max static mounting surface load	N		N/A
Crankshaft thrust bearing pressure limit			not available
Intermittent load:	MPa		-
Continuous load:	MPa		15
Rear main bearing load	MPa		-
Max bending moment available from front of the crankshaft:			not available
0 deg	Nm		100
90 deg	Nm		270
180 deg	Nm		270
Environmental operating conditions			
Max altitude for declared performances	m		1500
Max ambient temperature for declared performances	°C	depends from inlet air temperature, max temperature is 45°	
Min guaranteed temperature for cold start w/o any aid (stand alone engine)	°C		- 15
Min guaranteed temperature for cold start with grid heater (stand alone engine)	°C		- 20
Min guaranteed temperature for cold start with grid heater and block heater (stand alone engine)	°C		- 30
Time preheating for manifold heater	s	- 3°C = 0 s ; - 30°C = 21	
Time post heating for manifold heater	s	- 3°C : 0 s ; - 20°C : 200	
Low idle continuous operation time (reccomended)	h		3
Engine performance		1500 rpm	1800 rpm
Continuous power (gross) [mech]	kW	109	127



N67TEVP06.00 G-DRIVE STAGE V



Main characteristics		@1500rpm	@1800rpm
Prime power (gross) [mech]	kW	141	159
Stand-by power (gross) [mech]	kW	150	175
Fan consumption [mech]	kW	5	8,5
Continuous power (net) [mech]	kW	104	119
Prime power (net) [mech]	kW	136	151
Stand-by power (net) [mech]	kW	145	167
Typical generator output		120	140
Generator available power @ Prime power	kW	156	179
Generator available power @ Stand by	kW	172	198

Power limitation according to ambient conditions

Ambient temperature above xx°C	%/5°C (xx°C)	2
Altitude > 1000 < 3000m above sea level	%/500m	3
Altitude > 3000m above sea level	%/500m	6

Power limitation due to safety protections

Max water temperature (Switch on of the MIL lamp)	°C	104
Start derating: switch on of the warning coolant temperature lamp (amber color)	°C	106
Max derating (50% derating) switch on of the high coolant temperature lamp (redcolor)	°C	110
Altitude level: gradual reduction of transient response by smoke map correction from	m	2000
Fuel temperature	°C	70
Intake manifold air temperature	°C	70
ATS Max gas inlet temperature	°C	580
Max allowed exhaust temperature	°C	600
Turbine overheating protection	°C	700
Turbine overspeed protection	rpm	-
Oil temperature protection	°C	125
Oil pressure protection (min engine rpm)	bar	0,5

Fuel System

Fuel density	kg/l	0,835
Injection system type		electronic common rail
Injection pump manufacturer		Bosch
Injection model type		CRSN2-16
Injection model pump		Bosch CP3.3
Injection pressure	bar	1600
Injector		Bosch CRIN2-16
Injector installation (sleeve, sealing flat or conical)		vertical - no sleeve - flat seal
Injector nozzle		8 x 400
Engine fuel compatibility		see dedicated GOLD Book document on fluids
Feed pump on engine		integrated in high pressure pump
Max fuel flow supply line	l/h	280
Nominal feed pressure	bar	0,5 - 1
Fuel filter		single cartridge, left side
Fuel filter clogging sensor	bar	0,009
Max continuous allowable fuel temperature (without derating)	°C	70
Max relative pressure at gear pump inlet	bar	0
Min relative pressure at gear pump inlet	bar	- 0,5
Max back flow relative pressure	bar	0,2



N67TEVP06.00 G-DRIVE STAGE V



Fuel System

Max back flow restriction	bar	0,2
Max heat rejection to return fuel	kW	0,65
Max fuel flow return line	kg/h	455
Min fuel tank venting requirement	m ³ /h	0,4
Prefilter / Water separator micron size	µm	30

Air Intake System

		@1500rpm	@1800rpm
Aftercooling system type		air to air	
Interstage cooling type		-	
RoA (Temperature raise between ambient and inlet to engine)	°C	≤ 25	
Filter air intake temperature (warm air ricirculatuion)	°C	≤ 5	
Max intake manifold temperature	°C	50	
Compressor inlet pressure (with new air filter)	hPa	≥ - 45	
Compressor inlet pressure (with dirty air filter)	hPa	≥ - 65	
Air filter type		-	
Loads on turbocharger on compressor intake	kg	2,5	
Loads on turbocharger on compressor outlet	kg	2,5	
Charge air flow (max)	kg/h	690	870

Exhaust System

		@1500rpm	@1800rpm
Max back pressure (after exhaust flap) @ rated power with clean system	hPa	250	
Max mechanical load on turbine flange	kg	0	
Max ambient temperature for exhaust flap actuator	°C	105	
Max exhaust temperature After Treatment System	°C	550	
Max exhaust flow rate	kg/h	996	
Energy to exhaust	kW	107	124,8

After Treatment System

After Treatment System	DOC + SCRof + CUC		
POC	-		
DPF	Yes		
DOC	Yes		
SCR	Yes		
Urea Dosing System	Yes		
AdBlue mixer	yes		
ATS sensors	temperature, delta pressure, humidity, NOx		
DPF regeneration strategy	active and passive		

Lubrication System

Oil sump capacity	l	14,7
Oil sump capacity, max level	l	14,7
Oil sump capacity, min level	l	8,8
Oil system capacity including filter	l	16
Oil pump type		gear pump
Oil pump drive arrangement		driven by gear
Min oil pump flow	l/min	~ 12
Max oil pump flow (@rated speed)	l/min	~ 50
Min oil pressure @ low idle (engine oil temp at 120°C)	kPa (bar)	60 (0,6)



N67TEVP06.00 G-DRIVE STAGE V



Lubrication System

Min oil pressure @ rated speed (engine oil temp at 120°C)	kPa (bar)	350 (3,5)
Max oil pressure @ rated speed (engine oil temp at 120°C)	kPa (bar)	350 (3,5)
Max oil temperature @ full load (in main gallery)	°C	< 120
Max oil pressure peak on cold engine	bar	15
Oil cooler type		water cooled
Transducer for indicating oil temperature and pressure		signal from ECU
Max engine angularity - longitudinal / transversal (std oil pan)	deg	< 35° (depends on the oil pan)
Allowed engine gradability during installation on vehicle	deg	+/- 4°
Oil servicing intervals	h	see dedicated GOLD Book document on fluids
Oil filter type		single cartridge, right side
Oil filter capacity	l	1
Max oil content admitted in blow by gas (after filter)	g/h	0,3
Oil for cold condition mission (T° ambient < -25°C)		see dedicated GOLD Book document on fluids

Cooling system

@1500rpm

@1800rpm

Type (water to water or air to water)		water to water
Recommended coolant		see dedicated GOLD Book document on fluids
Min radiator cap pressure	kPa	0,7
Warnnig setting first threshold	°C	102
Max additional restriction (cooling system)	Pa	N/A
Air to boil (prime power, open genset configuration). For further information see GB document	°C	55
Air flow (prime power, open genset configuration)	m³/s	
Air to boil (stand by, open genset configuration). For further information see GB document	°C	N/A
Air flow (stand by, open genset configuration)	m³/s	
EGR Cooler water flow (for ΔT=6°C)	l/s	-
LP-CAC water flow (for ΔT=6°C)	l/s	-

Fan

Diameter	mm	655
Number of blades		12
Drive ratio		1,4
Speed		2115 (@50Hz) / 2538 (@60Hz)
Air flow		3,8 (m3/s) @50Hz / 4,8 (m3/s) @60Hz
Power consumption		4,8 (kWm) @50Hz) / 8,3 (kWm) @60Hz

Radiator

Core dimensions LxWxh	mm	758 x 308 x 1163
Dry weight	kg	
Radiator coolant capacity	l	13
Optimum coolant temperature range @engine out (50% glycol)	°C	83 ÷ 99
Engine Water pump Type		centrifugal pump
Engine water pump drive		driven by belt
Coolant capacity (engine only)	l	12,6
Coolant capacity (radiator & hoses)	l	15
Thermostat type		wax type
Thermostat position		on cylinder head
Thermostat opening / fully open temperature	°C	80 ÷ 90



N67TEVP06.00 G-DRIVE STAGE V



Cooling system		@1500rpm	@1800rpm
Recommended coolant circuit pressurization range (relative)	hPa	N/A	
Coolant engine pressure outlet – inlet (delta pressure, open thermostat, high idle conditions)	hPa	< 0,2	
Coolant engine pressure outlet – inlet (only with remote thermostat, ex. retarder)	hPa	-	
Min coolant pressure (no pressure cap and thermostat closed)	hPa	1	
Coolant water pump inlet pressure (water temperature 60-100°C)	hPa	0,5	
Coolant flow to radiator @rated speed	l/h	190	
Min coolant expansion space (% total cooling system capacity)	%	Expansion Tank volume (and max level) must consider also coolant thermal expansion to avoid coolant loss in high temperature conditions. This can be checked in ATB Power Test	
Max coolant flow to accessories @ rated speed from cab heater	l/min	1200	
Engine out coolant to ambient @rated speed	delta °C	not available	
Engine out coolant to ambient @torque speed	delta °C	not available	
Charge air cooler outlet to ambient @max rpm - CAC dT	delta °C	25	
Pump water flow	l/min	154	185

Electrical, Electronic and Control Systems

System voltage	V	12 - 24	
Engine control unit		MD1	
ECU software		P1603 V45.1	
ECU Vehicle connection		with or w/o interface box	
ECU operating range	°C	- 30 ÷ + 95°C	
Temperature of ECU case for <5' after power up	°C	+ 85	
ECU rated continuous temperature	°C	+ 80	
ECU communication protocol		SAE J1939 or FPT	
Min power supply for ECU operation	V	9	
Max power supply for ECU operation	V	32	
Battery wire connection resistance value @20°C (from battery to ECU)	mΩ	≤ 80	
Diagnostic connector type		on board	
Min cranking speed TDC @-30°C	rpm	75	
Average cranking speed	rpm	115	
N° tooth pinion/crown gear		10 / 125	
Min battery voltage	V	9(12V System) - 16(24V System)	
Mean battery voltage	V	11(12V System) - 18,4(24V System)	
Min battery current	Ah	130 (24V)	
Mean battery current	Ah	500 (24V)	
Max starting circuit resistance (to starter)	mΩ	< 70	

Cold starting

Without air preheating	°C	- 15
With air preheating (if available)	°C	- 25

Emission gaseus and particulales

NOx (Oxides of nitrogen) [NRSC]	g/kWh	see homologation certificate
HC (Hydrocarbons) [NRSC]	g/kWh	see homologation certificate
NOX+HC [NRSC]	g/kWh	see homologation certificate



N67TEVP06.00 G-DRIVE STAGE V



Emission gaseus and particulales

CO (Carbon monoxide) [NRSC]	g/kWh	see homologation certificate
PM (Particlutes) [NRSC]	g/kWh	see homologation certificate
CO2 (Carbon Dioxide) [NRSC]	g/kWh	see homologation certificate
NOx (Oxides of nitrogen) [NRSC]	g/kWh	see homologation certificate
HC (Hydrocarbons) [NRSC]	g/kWh	see homologation certificate
NOX+HC [NRSC]	g/kWh	see homologation certificate
CO (Carbon monoxide) [NRSC]	g/kWh	see homologation certificate
PM (Particlutes) [NRSC]	g/kWh	see homologation certificate
CO2 (Carbon Dioxide) [NRSC]	g/kWh	see homologation certificate

Maintenance

Oil drain interval		see dedicated GOLD Book document on fluids
Oil filter change		see dedicated GOLD Book document on fluids
Oil refilling time		daily check to evaluate oil refill necessity
Approved engine oil specifications		see dedicated GOLD Book document on fluids
CCV filter change		1200 h
Fuel filter change		600 h
Fuel pre-filter change		600 h
Belt replacement		1200 h
Valve lash check /adjustment		2400 h
AdBlue filter Change		see dedicated GOLD Book document
DPF filter service		see dedicated GOLD Book document
Coolant change		see dedicated GOLD Book document on fluids

Engine Noise

Overall sound pressure (engine only)	dBA	93
Overall sound pressure (with accessories only)	dBA	N/A
Exahust noise (w/o Muffler)	dBA	N/A
Noise spectrum (octave analysis performed at the position of maximum noise) - diagram	Table dB-Hz	N/A
A-weight sound power level LW function of power (value calculated respecting standard ISO 3744 and 3746. For further information see GB document)		
0% (no load)	dBA	
75% (partial load)	dBA	
100% (full load)	dBA	
110% (overload)	dBA	

Step Load (for further information see GB document)

		@1500rpm	@1800rpm
G1 (% of PrP)	%	N/A	N/A
G2 (% of PrP)	%	N/A	N/A
G3 (% of PrP)	%	N/A	N/A
G1 (% of PrP) [open flap]	%	-	-
G2 (% of PrP)[open flap]	%	-	-
G3 (% of PrP)[open flap]	%	-	-
G1 (% of PrP) [closed flap]	%	-	-
G2 (% of PrP) [closed flap]	%	-	-
G3 (% of PrP) [closed flap]	%	-	-
Removal load (G1)	%	-	-
Removal load (G2)	%	-	-



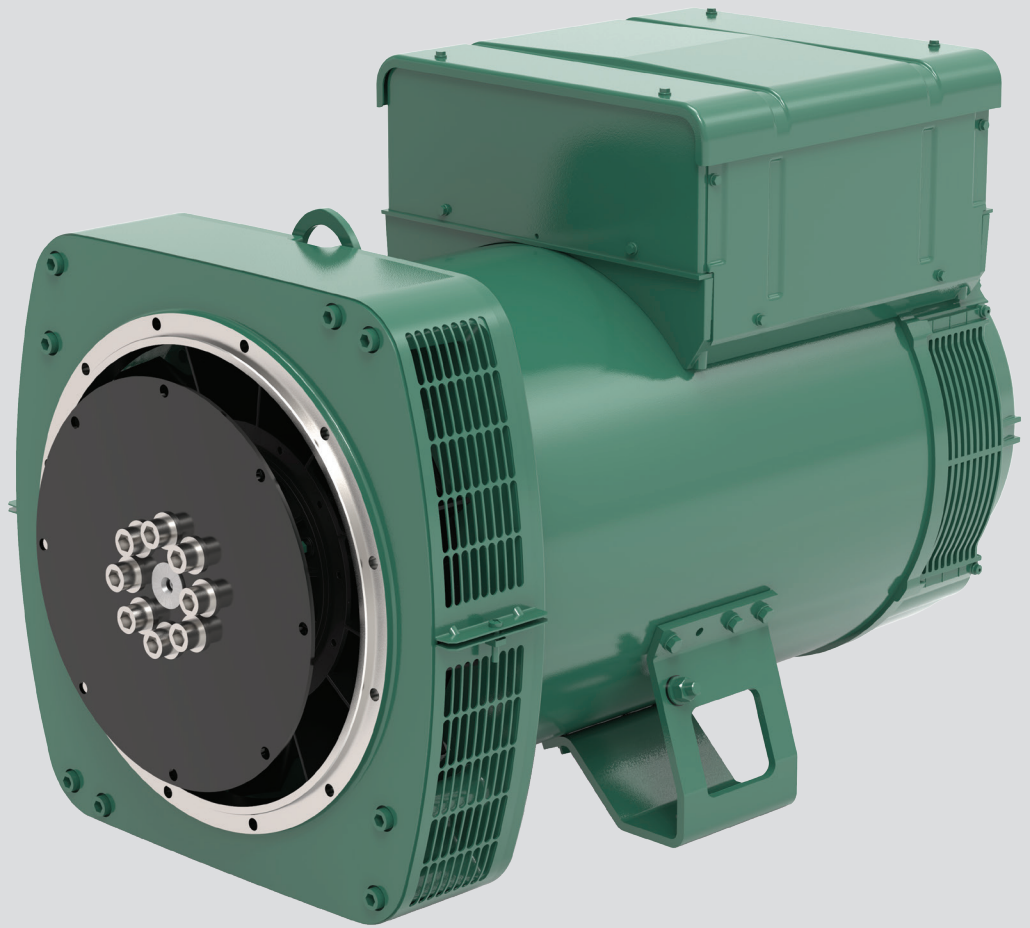
N67TEVP06.00 G-DRIVE STAGE V



Step Load (for further information see GB document)		@1500rpm	@1800rpm
Removal load (G3)	%	-	-
Emergency (xxx)	%	-	-
Emergency (xxx)	%	-	-
Emergency (xxx)	%	-	-

Maximum Rating Performance Data		@1500rpm	@1800rpm
Torque	Nm	955	928
Ambient Temperature	°C		
EGR Rate	%	-	-
Fuel Flow	g/s	9,6	9,4
Fuel consumption (BSFC) (prime power)	(kg/h) [g/kWh]	(27,5) [194]	(31,2) [196]
Fuel consumption (BSFC) (stand by)	(kg/h) [g/kWh]	(30,3) [195]	(34,3) [196]
Fuel consumption (BSFC) (80% prime power)	(kg/h) [g/kWh]	(21,2) [194]	(25,1) [198]
Fuel consumption (BSFC) (50% prime power)	(kg/h) [g/kWh]	(13,6) [201]	(16,3) [204]
Fuel consumption (BSFC) (25% prime power)	(kg/h) [g/kWh]	(7,5) [222]	(9,3) [234]
AdBlue consumption (prime power)	% of fuel cons	N/A	N/A
AdBlue consumption (stand by)	% of fuel cons	N/A	N/A
AdBlue consumption (80% prime power)	% of fuel cons	N/A	N/A
AdBlue consumption (50% prime power)	% of fuel cons	N/A	N/A
AdBlue consumption (25% prime power)	% of fuel cons	N/A	N/A
Exhaust Gas Flow	kg/h	721	904

Design air handling system data		@1500rpm	@1800rpm
EGR flow	kg/h	-	-
EGR pressure	kPa	-	-
Boost pressure (compressor outlet)	kPa	-	-
Pressure drop on charge air cooling system	kPa	-	-
Max temperature after HP-Compressor	°C	-	-
Boost temperature (includes EGR effect)	°C	-	-
ATS back pressure	kPa	-	-
Exhaust Gas Temp between HP-TC	°C	-	-
Max Exhaust Gas Temp (after TC)	°C	-	-
Max admitted back pressure after SCR	kPa	-	-
Max admitted back pressure after TC	kPa	-	-
Power engine coolant without EGR & CAC (prime power)	kW [kcal/kWh]	-	-
Power engine coolant without EGR & CAC (stand by)	kW [kcal/kWh]	-	-
Power high Temperature EGR Cooler (engine water) (prime power)	kW [kcal/kWh]	-	-
Power high Temperature EGR Cooler (engine water) (stand by)	kW [kcal/kWh]	-	-
Power to coolant due to EGR LP-Circuit (prime power)	kW [kcal/kWh]	-	-
Power to coolant due to EGR LP-Circuit (stand by)	kW [kcal/kWh]	-	-
Total Power to coolant (prime power)	kW [kcal/kWh]	57,1	66,6
Total Power to coolant (stand by)	kW [kcal/kWh]	63,4	74
Total pump water flow	l/s	2,57	3,08
Radiator Coolant Flow (5% less if continuous deaerating system, coolant according to FPT norms)	l/min	-	-
EGR Cooler water flow (for ΔT=6°C)	l/s	-	-
LP-CAC water flow (for ΔT=6°C)	l/s	-	-



LSA 44.3

Low Voltage Alternator - 4 pole

70 to 200 kVA - 50 Hz / 88 to 250 kVA - 60 Hz
Electrical and mechanical data

LEROY-SOMER™

Nidec
All for dreams

Specially adapted to applications

The LSA 44.3 alternator is designed to be suitable for typical generator applications, such as: backup, prime power, cogeneration, marine applications, rental, telecommunications, etc.

Compliant with international standards

The LSA 44.3 alternator conforms to the main international standards and regulations: IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA C22.2 n°100-14, UL 1446 (UL 1004 on request), marine regulations, etc.

It can be integrated into a EC marked generator.

The LSA 44.3 is designed, manufactured and marketed in an ISO 9001 environment and ISO 14001.

Top of the range electrical performance

- Class H insulation
- Standard 12 wire re-connectable winding, 2/3 pitch, type no. 6
- Voltage range:
 - 50 Hz: 220 V - 240 V and 380 V - 415 V (440 V)
 - 60 Hz: 208 V - 240 V and 380 V - 480 V
- High efficiency and motor starting capacity
- Other voltages are possible with optional adapted windings:
 - 50 Hz: 440 V (no. 7), 500 V (no. 9), 690 V (n°10 or 52)
 - 60 Hz: 380 V and 416 V (no. 8), 600 V (no. 9)
- Complies with EN 61000-6-3, EN 61000-6-2, EN 55011, group 1 class B for European zone (EC marking)

Reinforced mechanical structure using finite element modelling

- Compact rigid assembly to better withstand generator vibrations
- Steel frame and terminal box
- Aluminium/cast iron flanges and shields
- Two-bearing and single-bearing versions designed to be suitable for commercially-available heat engines
- Half-key balancing two bearing
- Permanently greased bearings (20 000h)
- Direction of rotation: clockwise and anti-clockwise (without derating)

Excitation and regulation system suited to the application

Excitation system				Regulation options			
Voltage regulator	SHUNT	AREP (option)	PMG (option)	C.T. Current transformer for paralleling	Mains paralleling	3-phase sensing	Remote voltage potentiometer
R250	Standard	-	-	-	-	-	√
D350	-	Standard	Standard	√	-	√	√
D550	Option	Option	Option	√	√	√	√

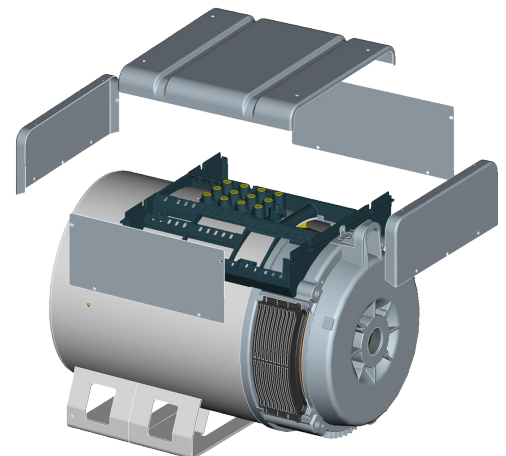
√ : Possible option

Compact and design terminal box

- Easy access to the AVR (lid) and to the connections
- Terminal block for reconnecting the voltage

Protection system suited to the environment

- The LSA 44.3 is IP 23
- Standard winding protection for clean environments with relative humidity ≤ 95%, including indoor marine environments
- Options:
 - Filters on air inlet: derating 5%
 - Filters on air inlet and air outlet (IP 44) : derating 10%
 - Space heaters
 - Thermal protection for stator windings
 - Winding protection for harsh environments and relative humidity greater than 95%
 - Shaft height: H = 225 mm on demand
 - Cable outlet at right



LSA 44.3 - 70 to 200 kVA - 50 Hz / 88 to 250 kVA - 60 Hz

General characteristics

Insulation class	H	Excitation system	SHUNT	AREP / PMG
Winding pitch	2/3 (wdg 6)	AVR type	R250	D350
Number of wires	12	Voltage regulation (*)	± 0.5%	± 0.25%
Protection	IP 23	Short-circuit current	-	300% (3 IN): 10 s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**) in no-load	< 2%	
Overspeed	2250 min ⁻¹	Total Harmonic Distortion THD (**) on linear load ...	< 5%	
Air flow	0.25m ³ /s, 50 Hz - 0.30m ³ /s, 60 Hz	Waveform: NEMA = TIF (**)	< 50	
Air flow (***)	0.29m ³ /s, 50 Hz - 0.34m ³ /s, 60 Hz	(*) Steady state. (**) Total harmonic distortion between phases, no-load or on-load (non-distorting).		

(***) Only for LS 44.3 L12, VL13 & VL14

Ratings 50 Hz - 1500 R.P.M.

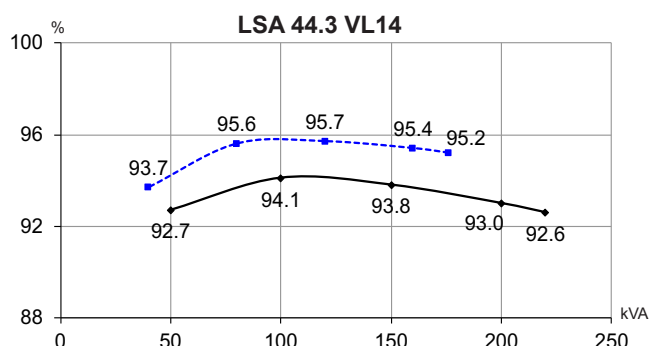
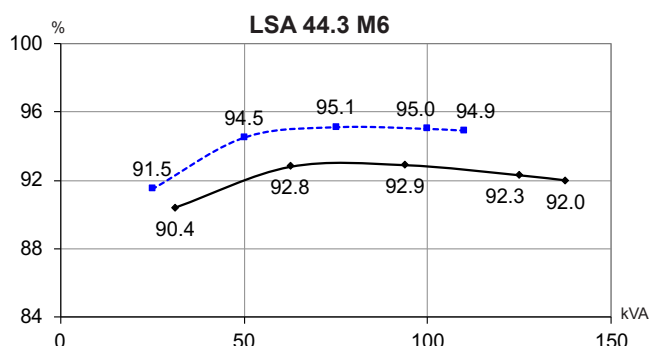
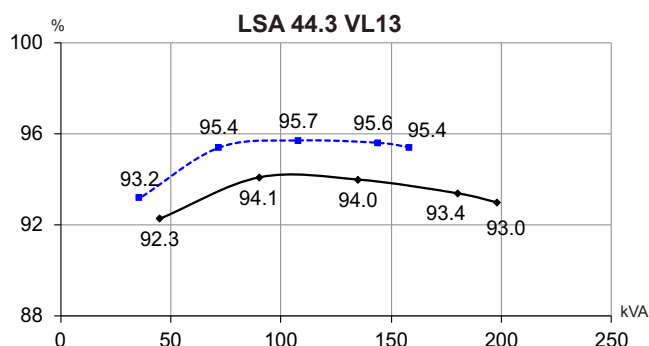
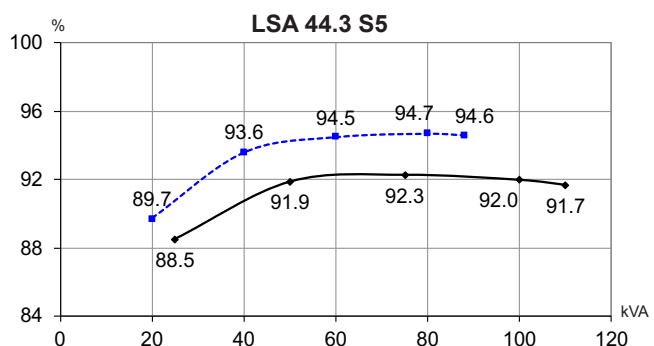
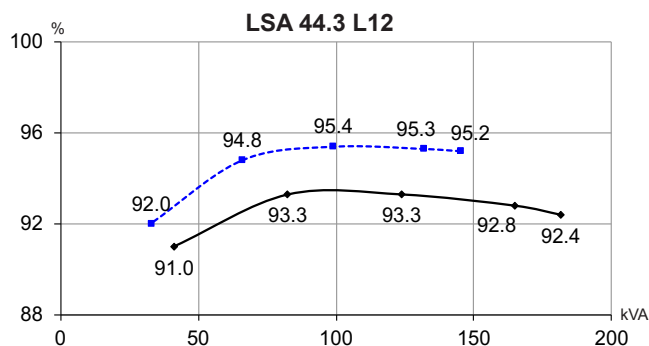
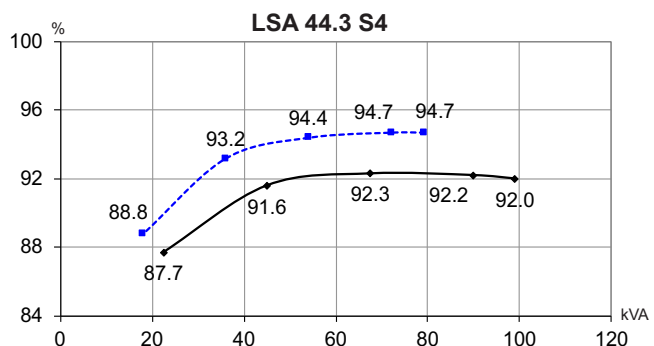
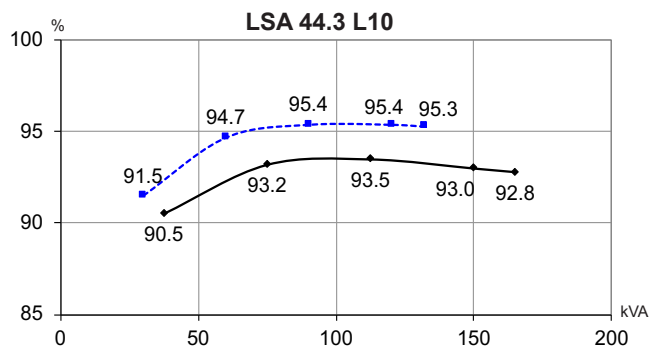
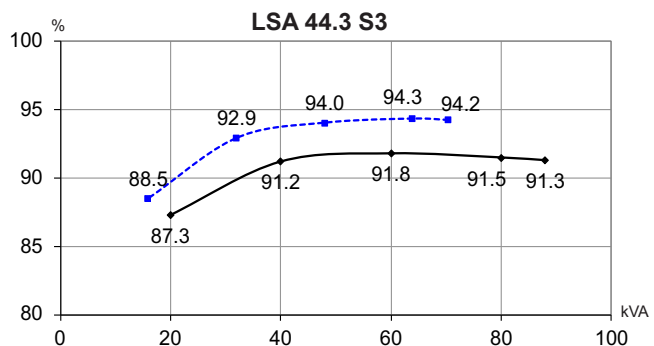
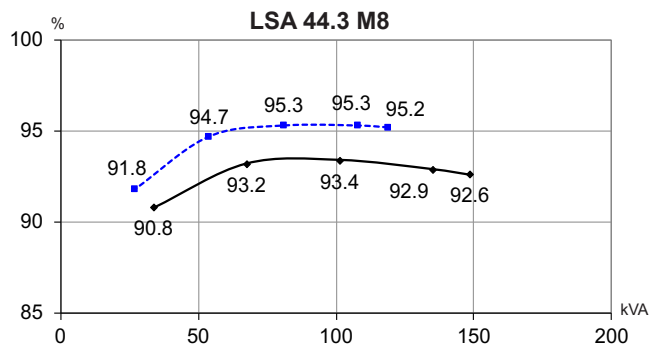
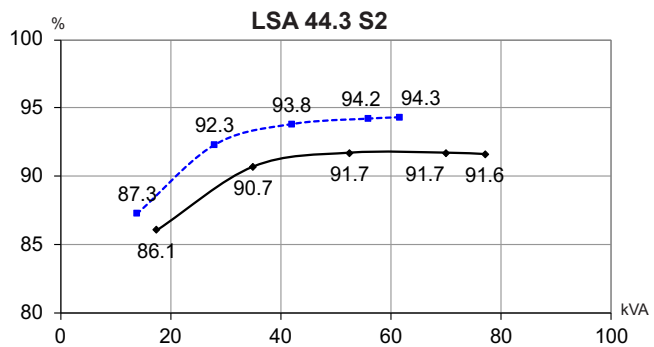
kVA / kW * - P.F. = 0.8		Continuous duty/40°C					Continuous duty/40°C					Stand-by/40°C					Stand-by/27°C				
Duty/T°C		H/125°K					F/105°K					H/150°K					H/163°K				
Class/T°K		H/125°K					F/105°K					H/150°K					H/163°K				
Phase		3 ph.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.	
Y		380V	400V	415V	440V	ΔΔ	380V	400V	415V	440V	ΔΔ	380V	400V	415V	440V	ΔΔ	380V	400V	415V	440V	ΔΔ
Δ		220V	230V	240V	230V		220V	230V	240V	230V		220V	230V	240V	230V		220V	230V	240V	230V	
YY		220V				220V				220V				220V				220V			
LSA 44.3 S2	kVA	70	70	70	63	42	64	64	64	57	38	74	74	74	67	45	77	77	77	69	46
	kW	56	56	56	50	33.5	51	51	51	46	30.5	59	59	59	54	36	62	62	62	55	37
LSA 44.3 S3	kVA	80	80	80	72	48	73	73	73	66	44	85	85	85	76	51	88	88	88	79	53
	kW	64	64	64	58	38.5	58	58	58	53	35	68	68	68	61	41	70	70	70	63	42
LSA 44.3 S4	kVA	90	90	90	81	54	82	82	82	74	49	95	95	95	86	57	100	100	100	89	59
	kW	72	72	72	65	43	66	66	66	59	39	76	76	76	69	46	80	80	80	71	47
LSA 44.3 S5	kVA	100	100	100	90	60	91	91	91	82	55	106	106	106	95	64	110	110	110	99	66
	kW	80	80	80	72	48	73	73	73	66	44	85	85	85	76	51	88	88	88	79	53
LSA 44.3 M6	kVA	125	125	125	113	67	114	114	114	103	61	133	133	133	120	71	138	138	138	124	74
	kW	100	100	100	90	54	91	91	91	82	49	106	106	106	96	57	110	110	110	99	59
LSA 44.3 M8	kVA	135	135	135	122	73	123	123	123	111	66	143	143	143	129	77	150	150	150	134	80
	kW	108	108	108	98	58	98	98	98	89	53	114	114	114	103	62	120	120	120	107	64
LSA 44.3 L10	kVA	150	150	150	135	80	137	137	137	123	73	159	159	159	143	85	165	165	165	149	88
	kW	120	120	120	108	64	110	110	110	98	58	127	127	127	114	68	132	132	132	119	70
LSA 44.3 L12	kVA	165	165	165	138	88	150	150	150	126	80	175	175	175	150	93	182	182	182	157	97
	kW	132	132	132	110	70	120	120	120	101	64	140	140	140	120	74	146	146	146	126	78
LSA 44.3 VL13	kVA	180	180	180	171	90	164	164	164	156	82	191	191	191	181	95	200	200	200	188	99
	kW	144	144	144	137	72	131	131	131	125	66	153	153	153	145	76	160	160	160	150	79
LSA 44.3 VL14	kVA	192	200	200	192	100	175	182	182	175	91	204	212	212	204	106	211	220	220	211	110
	kW	154	160	160	154	80	140	146	146	140	73	163	170	170	163	85	169	176	176	169	88

Ratings 60 Hz - 1800 R.P.M.

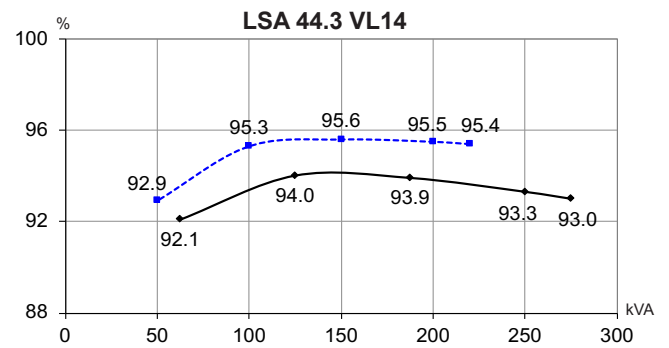
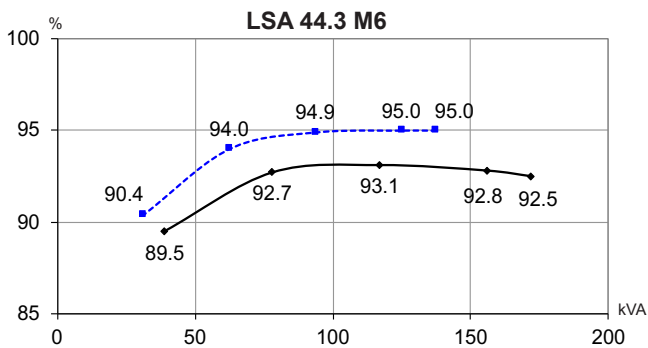
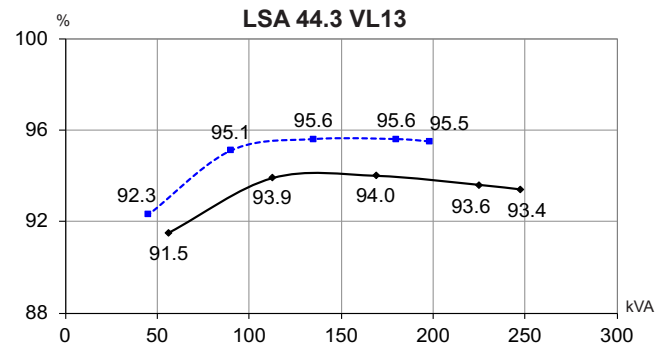
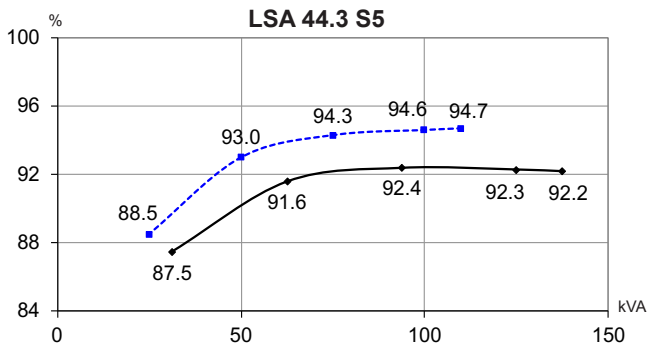
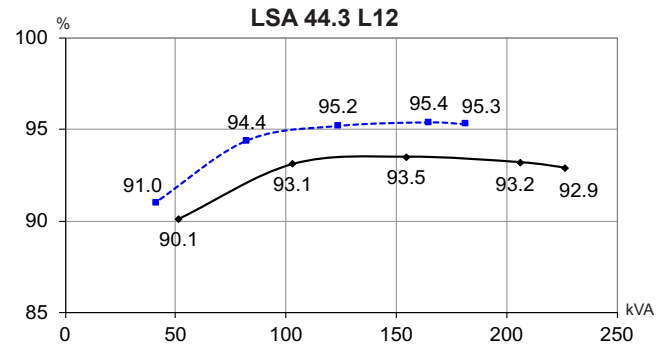
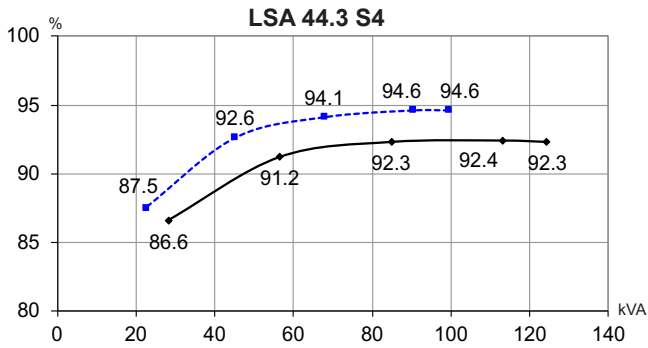
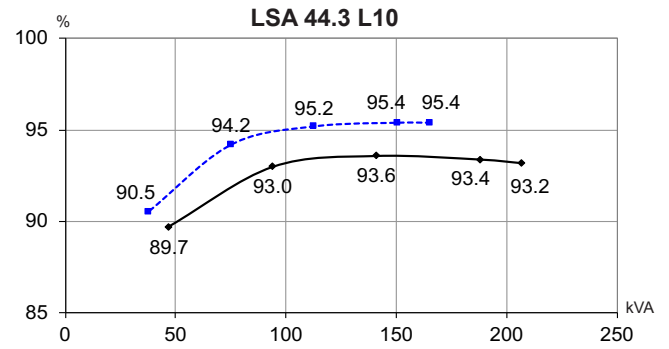
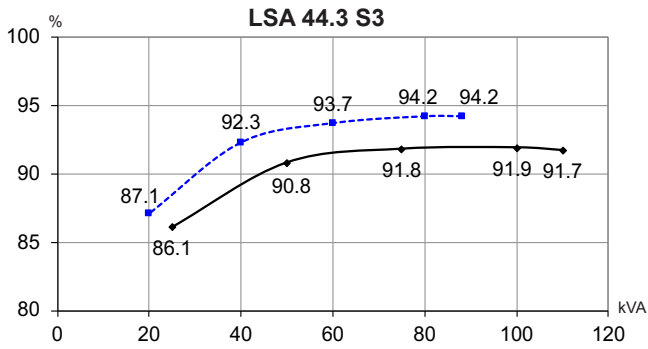
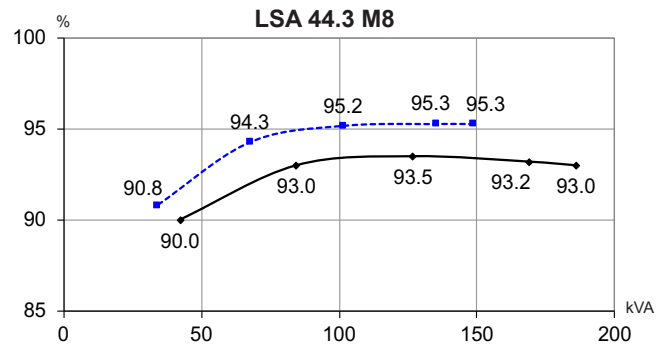
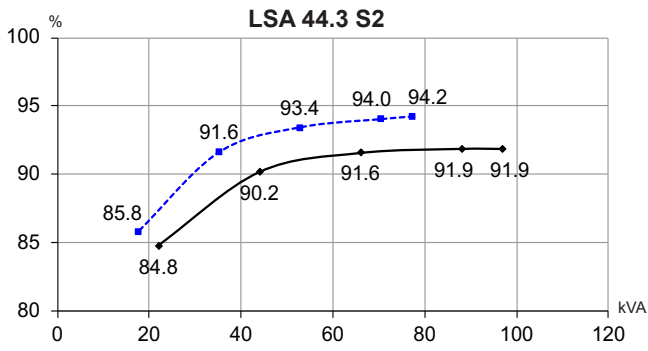
kVA / kW * - P.F. = 0.8		Continuous duty/40°C					Continuous duty/40°C					Stand-by/40°C					Stand-by/27°C				
Duty/T°C		H/125°K					F/105°K					H/150°K					H/163°K				
Class/T°K		H/125°K					F/105°K					H/150°K					H/163°K				
Phase		3 ph.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.	
Y		380V	416V	440V	480V	ΔΔ	380V	416V	440V	480V	ΔΔ	380V	416V	440V	480V	ΔΔ	380V	416V	440V	480V	ΔΔ
Δ		220V	240V	240V	240V		220V	240V	240V	240V		220V	240V	240V	240V		220V	240V	240V	240V	
YY		208V			240V		208V			240V		208V			240V		208V			240V	
LSA 44.3 S2	kVA	69	76	80	88	46	63	69	73	80	42	73	81	85	93	49	76	84	88	97	51
	kW	55	61	64	70	37	50	55	58	64	33.5	58	65	68	74	39	61	67	70	78	41
LSA 44.3 S3	kVA	79	87	92	100	52	72	79	84	91	47	84	92	98	106	55	87	96	101	110	57
	kW	63	70	74	80	42	58	63	67	73	37.5	67	74	78	85	44	70	77	81	88	46
LSA 44.3 S4	kVA	89	98	103	113	59	81	89	94	103	54	94	104	109	120	63	98	108	113	124	65
	kW	71	78	82	90	47	65	71	75	82	43	75	83	87	96	50	78	86	90	99	52
LSA 44.3 S5	kVA	99	108	115	125	65	90	99	105	114	59	105	114	122	133	69	109	119	127	138	72
	kW	79	86	92	100	52	72	79	84	91	47	84	91	98	106	55	87	95	102	110	58
LSA 44.3 M6	kVA	124	135	143	156	76	113	123	130	142	69	131	143	152	165	81	136	149	157	172	84
	kW	99	108	114	125	61	90	98	104	114	55	105	114	122	132	65	109	119	126	138	67
LSA 44.3 M8	kVA	134	146	155	169	81	122	133	141	154	74	142	155	164	179	86	147	161	171	186	89
	kW	107	117	124	135	65	98	106	113	123	59	114	124	131	143	69	118	129	137	149	71
LSA 44.3 L10	kVA	148	163	172	188	95	135	148	157	171	86	157	173	182	199	101	163	179	189	207	105
	kW	118	130	138	150	76	108	118	126	137	69	126	138	146	159	81	130	143	151	166	84
LSA 44.3 L12	kVA	165	179	189	206	105	150	163	172	187	96	175	190	200	218	111	182	197	208	227	116
	kW	132	143	151	165	84	120	130	138	150	77	140	152	160	174	89	146	158	166	182	93
LSA 44.3 VL13	kVA	180	195	210	225	113	164	177	191	205	102	191	207	223	239	119	200	215	231	250	124
	kW	144	156	168	180	90	131	142	153	164	82	153	166	178	191	95	160	172	185	200	99
LSA 44.3 VL14	kVA	200	215	230	250	125	182	196	209	228	114	212	228	244	265	133	220	237	253	275	136
	kW	160	172	184	200	100	146	157	167	182	91	170	182	195	212	106	176	190	202	220	109

* Values are rounded-off and are subject to change without notice by the manufacturer.

Efficiencies 400 V - 50 Hz (— P.F.: 0.8) (----- P.F.: 1)



Efficiencies 480 V - 60 Hz (— P.F.: 0.8) (----- P.F.: 1)



Reactances (%). Time constants (ms) - Class H / 400 V

	S2	S3	S4	S5	M6	M8	L10	L12	VL13	VL14
Kcc Short-circuit ratio	0.68	0.59	0.61	0.55	0.45	0.44	0.49	0.44	0.37	0.33
Xd Direct-axis synchro. reactance unsaturated	239	273	258	287	329	323	305	335	343	381
Xq Quadrature-axis synchro. reactance unsaturated	121	139	131	146	167	165	155	171	175	194
T'do No-load transient time constant	2308	2308	2211	2211	2154	2112	2077	2077	2025	2025
X'd Direct-axis transient reactance saturated	10.3	11.8	11.6	12.9	15.2	15.3	14.6	16.1	16.9	18.8
T'd Short-circuit transient time constant	100	100	100	100	100	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	6.2	7	7	7.7	9.1	9.1	8.8	9.6	10.1	11.3
T''d Subtransient time constant	10	10	10	10	10	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	13.2	15.1	14.5	16.1	18.6	18.3	17.4	19.1	19.7	21.9
Xo Zero sequence reactance	0.43	0.49	0.48	0.54	0.63	0.63	0.61	0.67	0.7	0.78
X2 Negative sequence reactance saturated	9.74	11.13	10.75	11.95	13.89	13.78	13.11	14.42	14.96	16.62
Ta Armature time constant	15	15	15	15	15	15	15	15	15	15

Other class H / 400 V data

io (A) No-load excitation current SHUNT	0.75	0.75	0.73	0.73	0.66	0.62	0.67	0.67	0.78	0.78
io (A) No-load excitation current AREP	0.97	0.97	0.94	0.94	0.85	0.81	0.86	0.86	0.78	0.78
ic (A) On-load excitation current SHUNT	2.07	2.33	2.11	2.31	2.47	2.37	2.45	2.71	3.17	3.53
ic (A) On-load excitation current AREP	2.67	3	2.71	2.98	3.18	3.05	3.15	3.49	3.17	3.53
uc (V) On-load excitation voltage SHUNT	23.1	25.8	26.5	28.9	30.6	29.3	29.9	32.7	16.2	17.9
uc (V) On-load excitation voltage AREP	18.6	20.7	21.3	23.2	24.5	23.5	24	26.3	16.2	17.9
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500	500	500	500	500	500
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) SHUNT*	184	184	292	293	310	334	371	379	487	487
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) AREP*	222	221	344	344	366	400	414	414	545	545
% Transient ΔU (on-load 4/4) SHUNT - P.F.: 0.8 _{LAG}	13.3	14.5	11.6	12.4	13.8	13.8	13.4	14.3	13	13.9
% Transient ΔU (on-load 4/4) AREP - P.F.: 0.8 _{LAG}	11.8	12.9	10.4	11.1	12.3	12.3	12	12.7	11.6	12.4
W No-load losses	2174	2174	2396	2396	2387	2478	2894	2946	2670	2670
W Heat dissipation	5025	5892	6073	6935	8254	8251	8914	10236	10165	11933

* P.F. = 0.6

Reactances (%). Time constants (ms) - Class H / 480 V

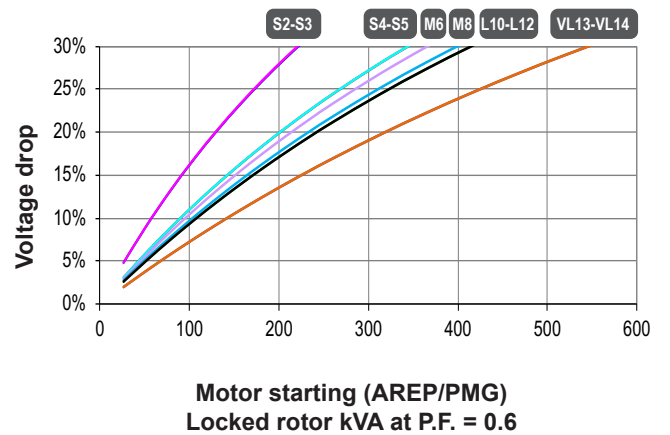
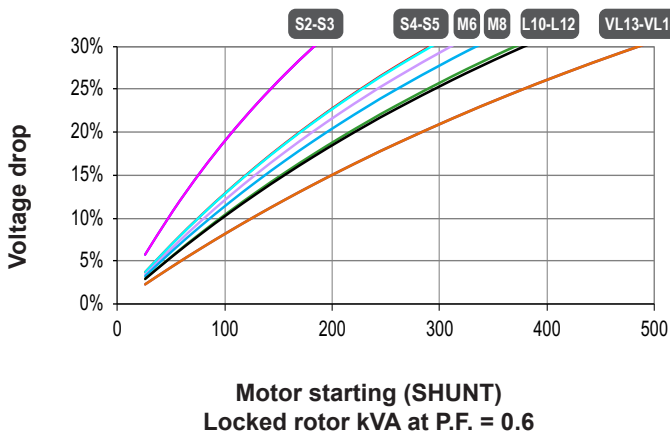
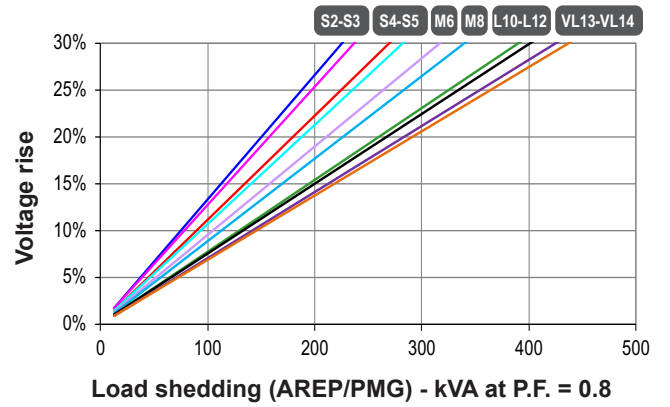
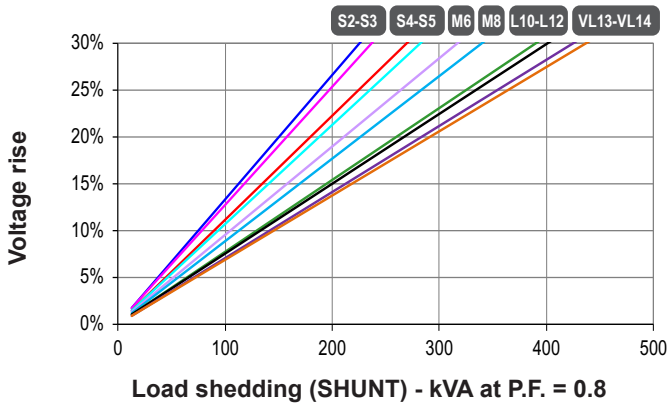
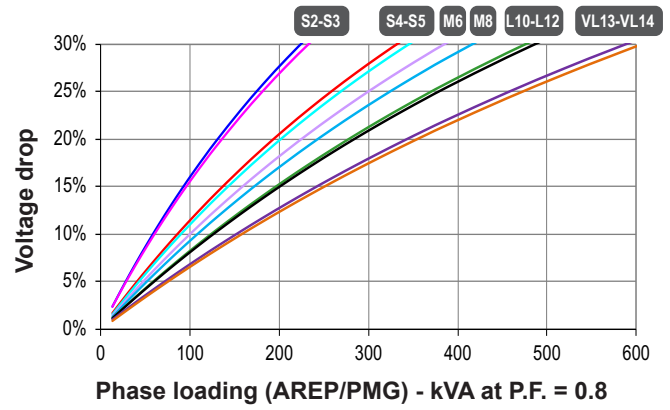
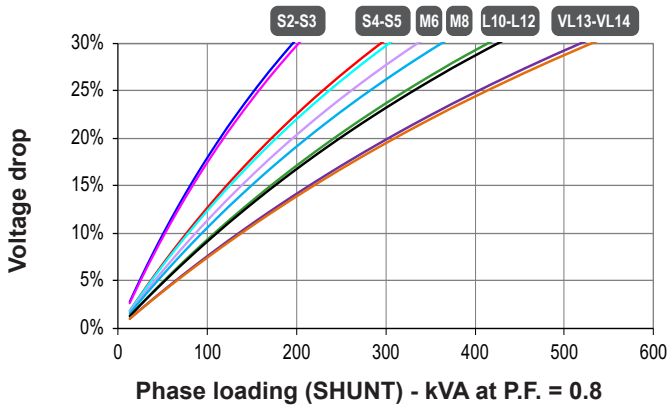
	S2	S3	S4	S5	M6	M8	L10	L12	VL13	VL14
Kcc Short-circuit ratio	0.65	0.57	0.58	0.53	0.43	0.42	0.47	0.43	0.36	0.32
Xd Direct-axis synchro. reactance unsaturated	250	284	270	299	342	337	318	349	358	397
Xq Quadrature-axis synchro. reactance unsaturated	127	145	137	152	174	172	162	178	182	202
T'do No-load transient time constant	2308	2308	2211	2211	2154	2112	2077	2077	2025	2025
X'd Direct-axis transient reactance saturated	10.8	12.3	12.2	13.5	15.8	15.9	15.3	16.8	17.6	19.6
T'd Short-circuit transient time constant	100	100	100	100	100	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	6.5	7.3	7.3	8.1	9.5	9.5	9.2	10	10.6	11.7
T''d Subtransient time constant	10	10	10	10	10	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	13.9	15.7	15.1	16.7	19.3	19.1	18.1	19.9	20.5	22.8
Xo Zero sequence reactance	0.45	0.51	0.5	0.56	0.66	0.66	0.63	0.7	0.73	0.81
X2 Negative sequence reactance saturated	10.2	11.59	11.25	12.44	14.44	14.37	13.7	15	15.59	17.32
Ta Armature time constant	15	15	15	15	15	15	15	15	15	15

Other class H / 480 V data

io (A) No-load excitation current SHUNT	0.75	0.75	0.73	0.73	0.66	0.62	0.67	0.67	0.77	0.77
io (A) No-load excitation current AREP	0.97	0.97	0.94	0.94	0.85	0.81	0.86	0.86	0.77	0.77
ic (A) On-load excitation current SHUNT	2.08	2.31	2.13	2.32	2.47	2.38	2.44	2.68	3.21	3.56
ic (A) On-load excitation current AREP	2.67	2.98	2.75	2.99	3.18	3.06	3.14	3.45	3.21	3.56
uc (V) On-load excitation voltage SHUNT	23.5	26	27	29.4	31	29.7	30.3	33	16.6	18.3
uc (V) On-load excitation voltage AREP	18.8	20.8	21.7	23.6	24.9	23.9	24.3	26.5	16.6	18.3
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500	500	500	500	500	500
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) SHUNT*	220	222	352	351	374	403	465	466	589	587
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) AREP*	265	265	422	423	446	481	541	544	708	706
% Transient ΔU (on-load 4/4) SHUNT - P.F.: 0.8 _{LAG}	13.7	14.9	12	12.7	14.1	14.2	13.8	14.7	13.3	14.3
% Transient ΔU (on-load 4/4) AREP - P.F.: 0.8 _{LAG}	12.2	13.2	10.7	11.4	12.6	12.6	12.3	13	11.9	12.7
W No-load losses	3188	3188	3501	3501	3506	3639	4217	4308	3928	3928
W Heat dissipation	6152	7047	7349	8241	9669	9747	10581	11988	12155	14140

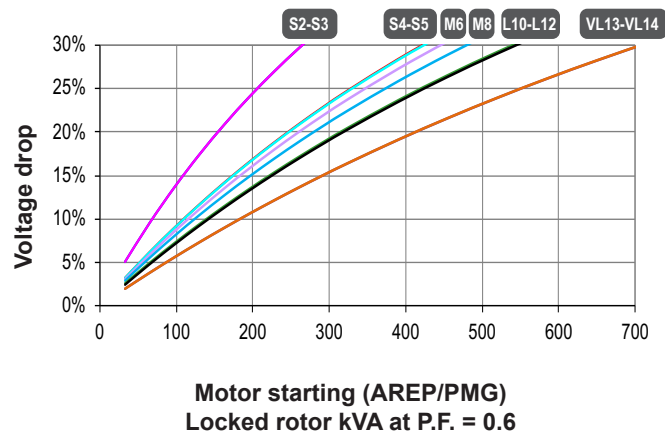
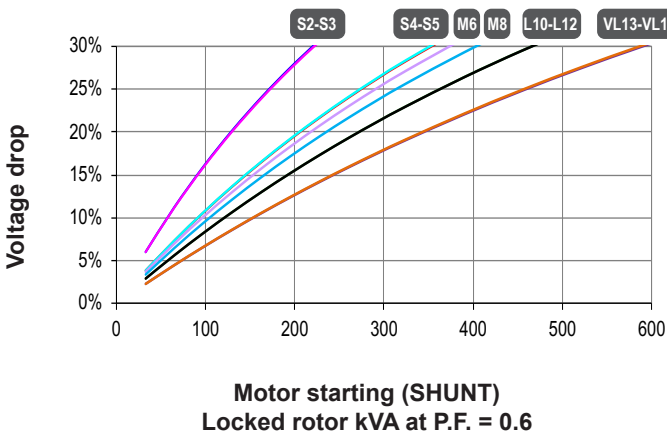
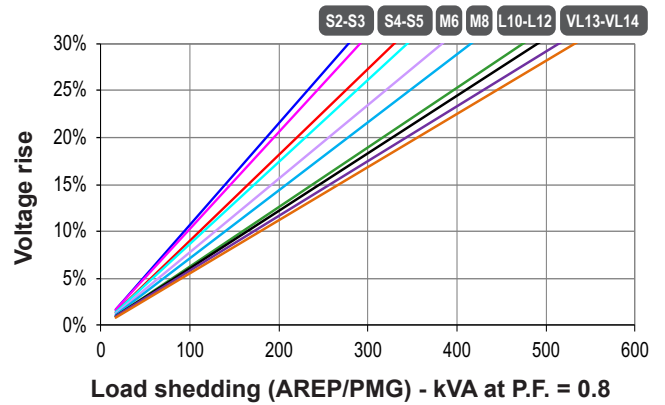
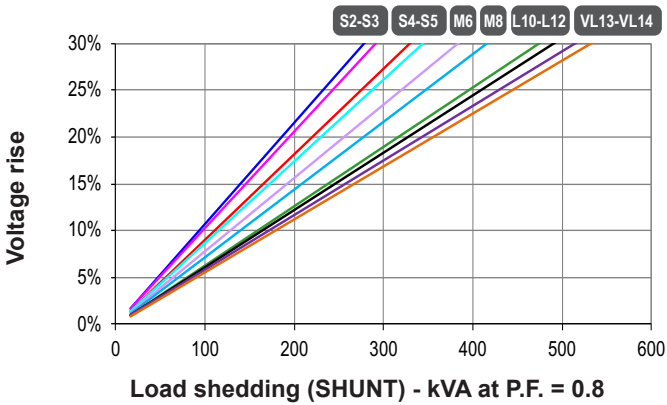
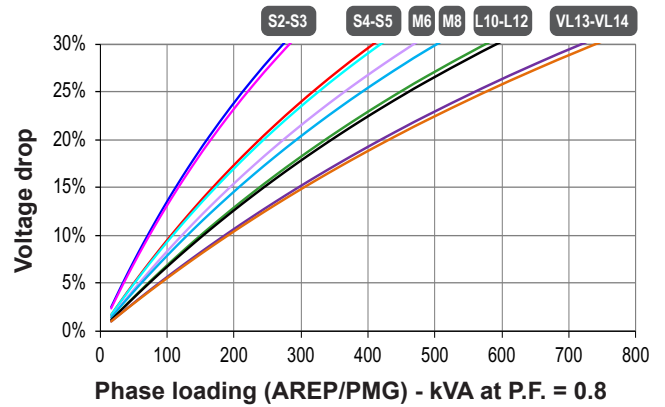
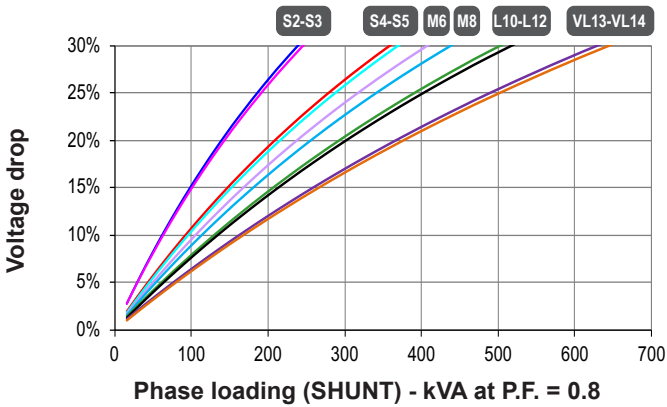
* P.F. = 0.6

Transient voltage variation 400V - 50 Hz



1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$
 2) For voltages other than 400V (Y), 230V (Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

Transient voltage variation 480V - 60 Hz

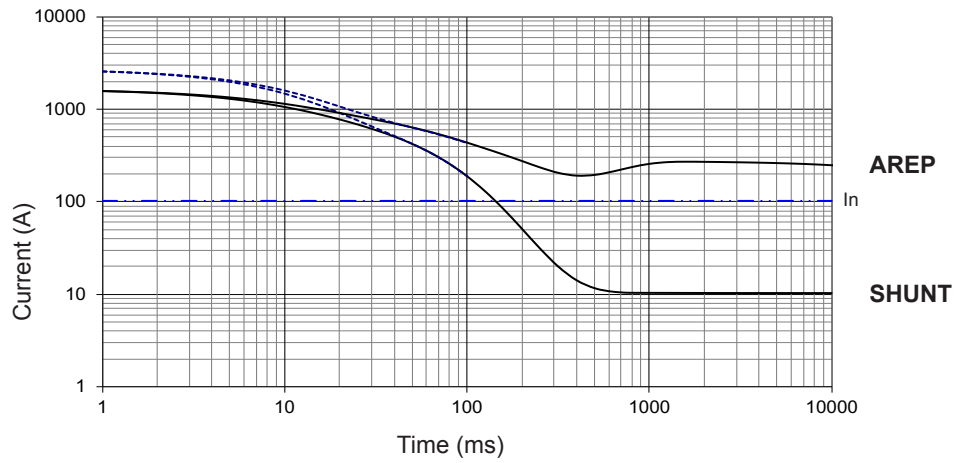


1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.6$
 2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

3-phase short-circuit curves at no load and rated speed (star connection Y)

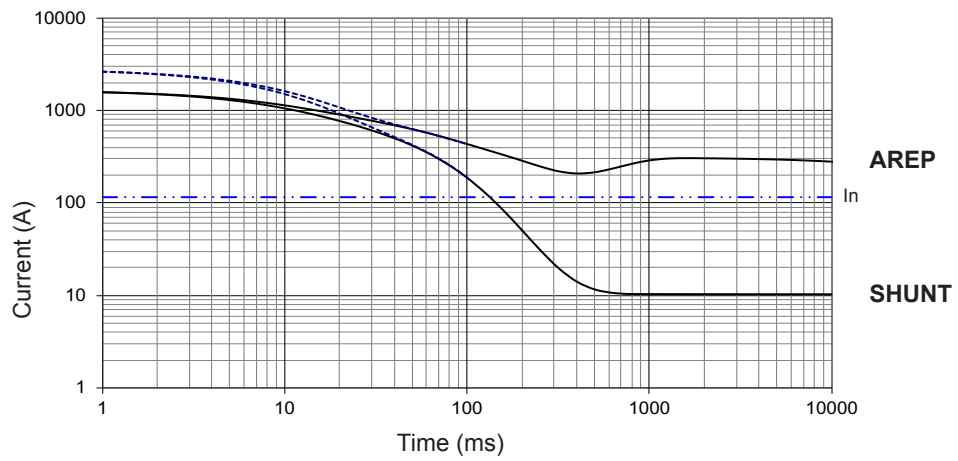
LSA 44.3 S2

Symmetrical —
Asymmetrical - - -



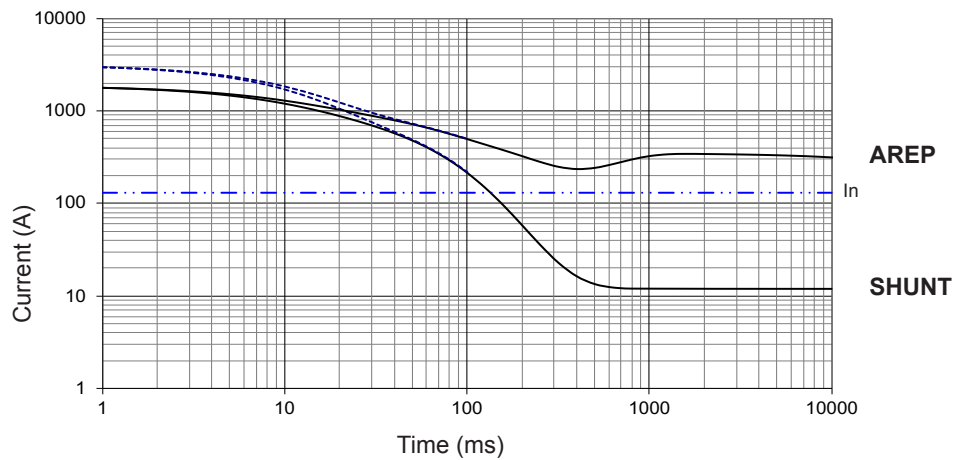
LSA 44.3 S3

Symmetrical —
Asymmetrical - - -



LSA 44.3 S4

Symmetrical —
Asymmetrical - - -



Influence due to connection

Curves shown are for star (Y) connection.

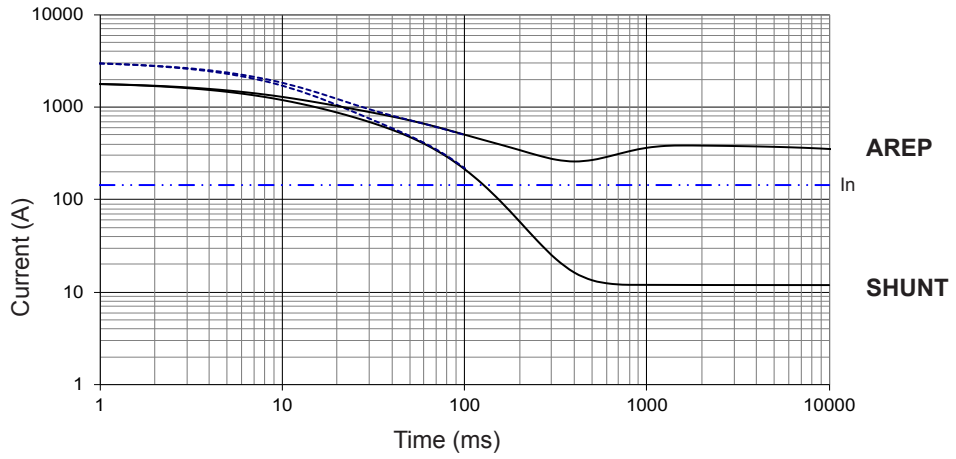
For other connections, use the following multiplication factors:

- Series delta : current value x 1.732
- Parallel star : current value x 2

3-phase short-circuit curves at no load and rated speed (star connection Y)

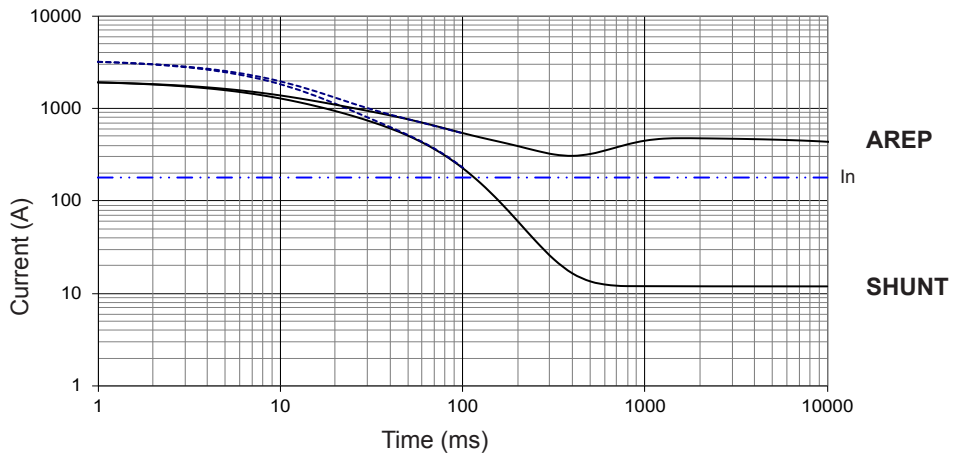
LSA 44.3 S5

Symmetrical —
Asymmetrical - - -



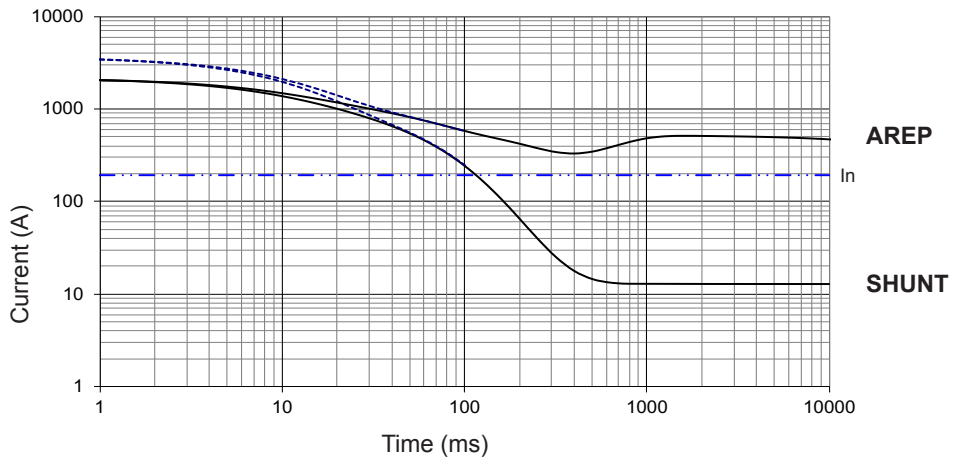
LSA 44.3 M6

Symmetrical —
Asymmetrical - - -



LSA 44.3 M8

Symmetrical —
Asymmetrical - - -



Influence due to short-circuit

Curves are based on a three-phase short-circuit.

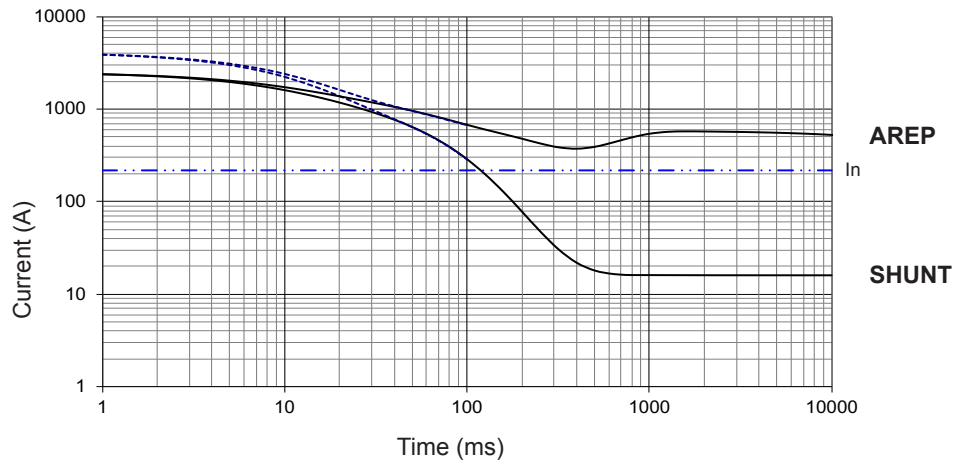
For other types of short-circuit, use the following multiplication factors.

	3-phase	2-phase L/L	1-phase L/N
Instantaneous (max.)	1	0.87	1.3
Continuous	1	1.5	2.2
Maximum duration (AREP/PMG)	10 sec.	5 sec.	2 sec.

3-phase short-circuit curves at no load and rated speed (star connection Y)

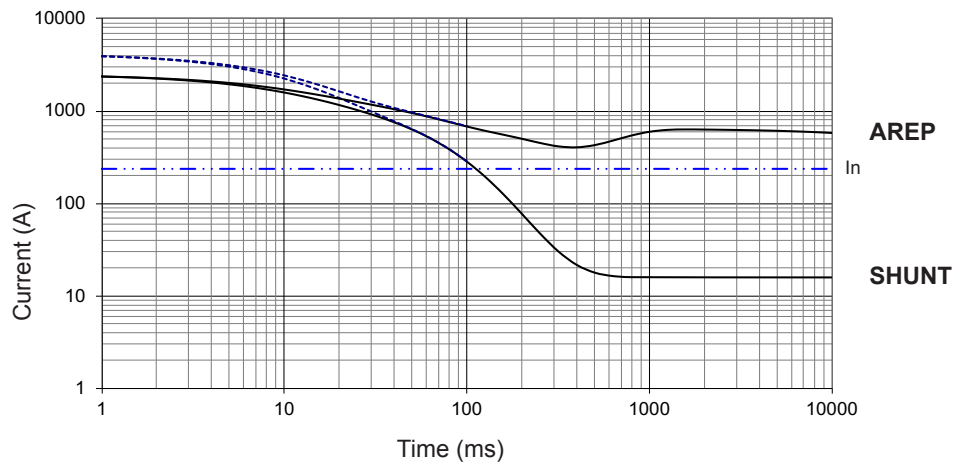
LSA 44.3 L10

Symmetrical —
Asymmetrical - - -



LSA 44.3 L12

Symmetrical —
Asymmetrical - - -



Influence due to connection

Curves shown are for star (Y) connection.

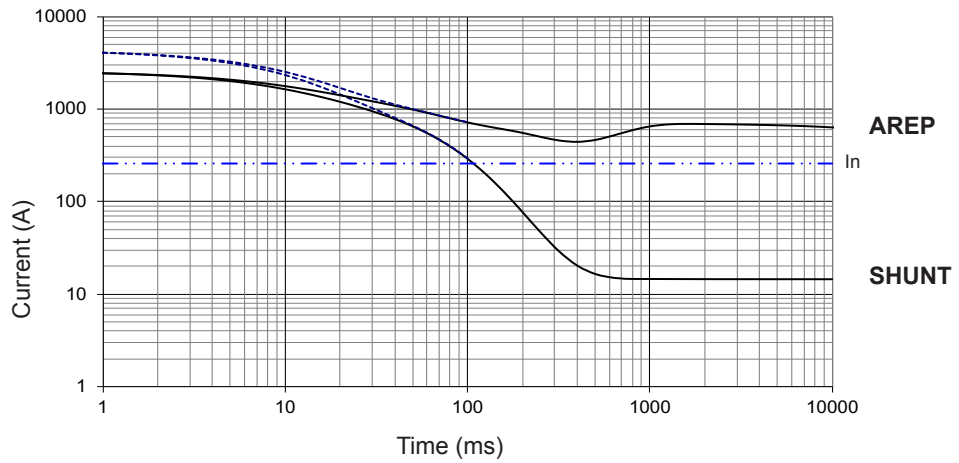
For other connections, use the following multiplication factors:

- Series delta : current value x 1.732 - Parallel star : current value x 2

3-phase short-circuit curves at no load and rated speed (star connection Y)

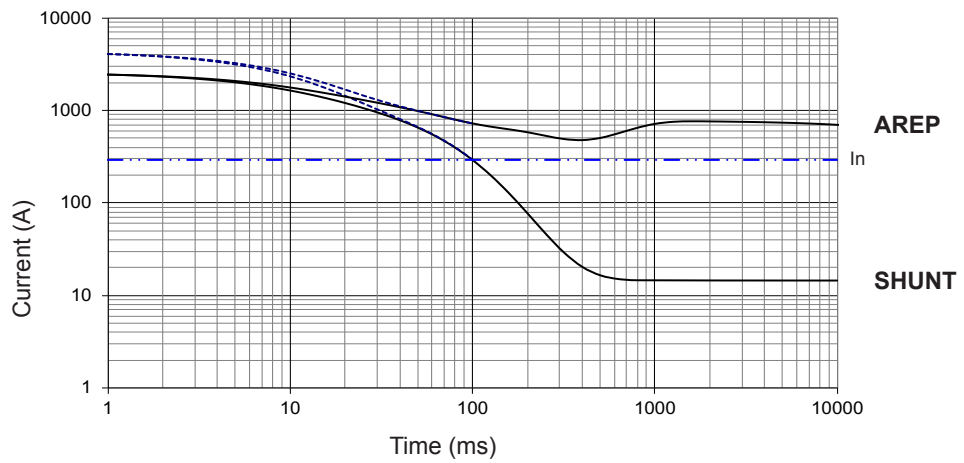
LSA 44.3 VL13

Symmetrical —
Asymmetrical - - -



LSA 44.3 VL14

Symmetrical —
Asymmetrical - - -



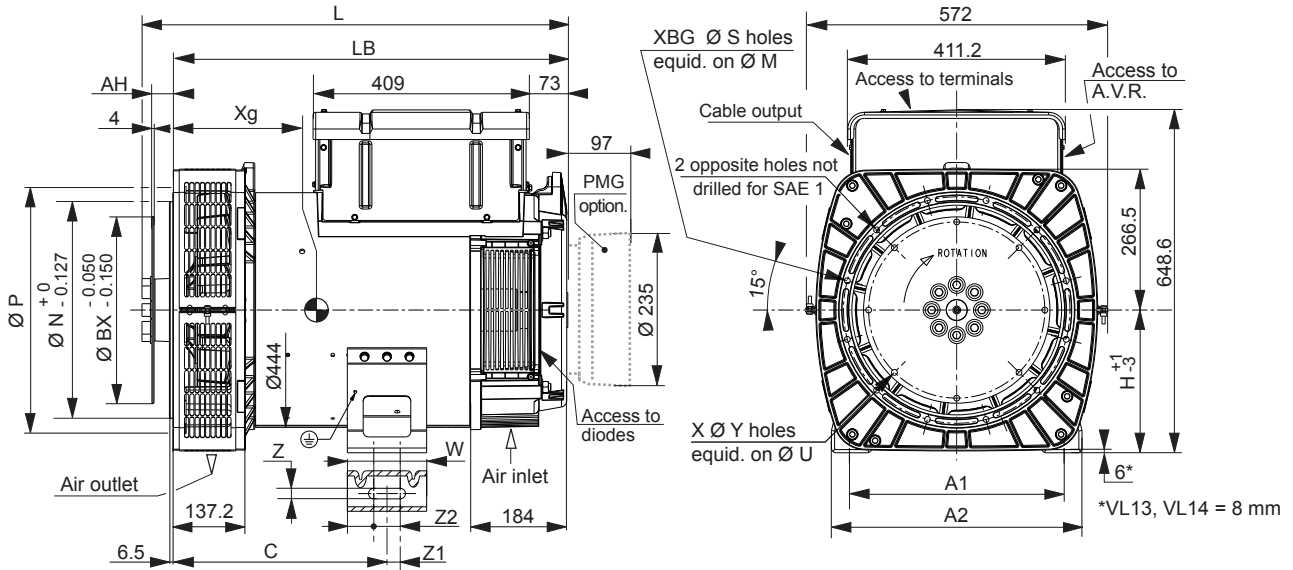
Influence due to short-circuit

Curves are based on a three-phase short-circuit.

For other types of short-circuit, use the following multiplication factors.

	3-phase	2-phase L/L	1-phase L/N
Instantaneous (max.)	1	0.87	1.3
Continuous	1	1.5	2.2
Maximum duration (AREP/PMG)	10 sec.	5 sec.	2 sec.

Single bearing dimensions



Dimensions (mm) and weight				
Type	L without PMG maxi*	LB	Xg	Weight (kg)
LSA 44.3 S2	758	677	313	295
LSA 44.3 S3	758	677	313	295
LSA 44.3 S4	758	677	329	332
LSA 44.3 S5	758	677	329	332
LSA 44.3 M6	828	747	353	368
LSA 44.3 M8	828	747	365	398
LSA 44.3 L10	868	787	383	433
LSA 44.3 L12	868	787	383	433
LSA 44.3 VL13	953	872	416	554
LSA 44.3 VL14	953	872	416	554

* L maxi = LB + AH maxi + 19

Shaft height (mm)		
	Standard	Option
H	270	225* 280**
Feet length		
C	405	332.5 429
A1	406	356 457
A2	474	474 541
Z	20	14.5 20
Z1	25	20 25
Z2	50	40 50
W	150	120 150

Coupling				
Flange	1	2	3	4
14	x	-	-	-
11 1/2	x	x	x	-
10	x	x	x	x
8	-	-	x	x

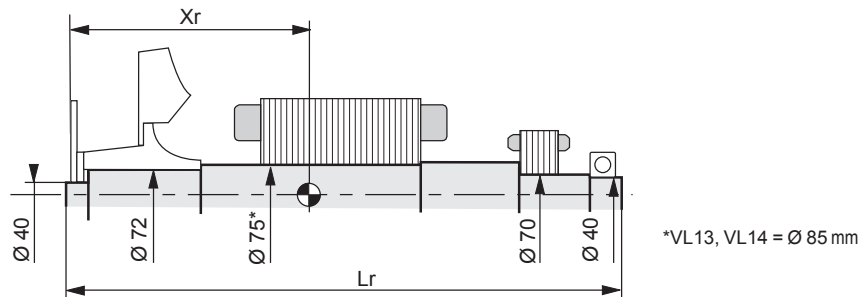
Flange (mm)					
S.A.E.	P	N	M	S	XBG
4	400	361.95	381	11	12
3	445	409.58	428.62	11	12
2	485	447.68	466.72	11	12
1	560.5*	511.18	530.23	12	10

Flex plate (mm)					
S.A.E.	BX	U	X	Y	AH
14	466.72	438.15	8	14	25.4
11 1/2	352.42	333.38	8	11	39.6
10	314.32	295.28	8	11	53.8
8	263.52	244.48	6	11	62

* VL13 and VL14 = 550 mm

* Not available for VL13 and VL14
** Available only for VL13 and VL14

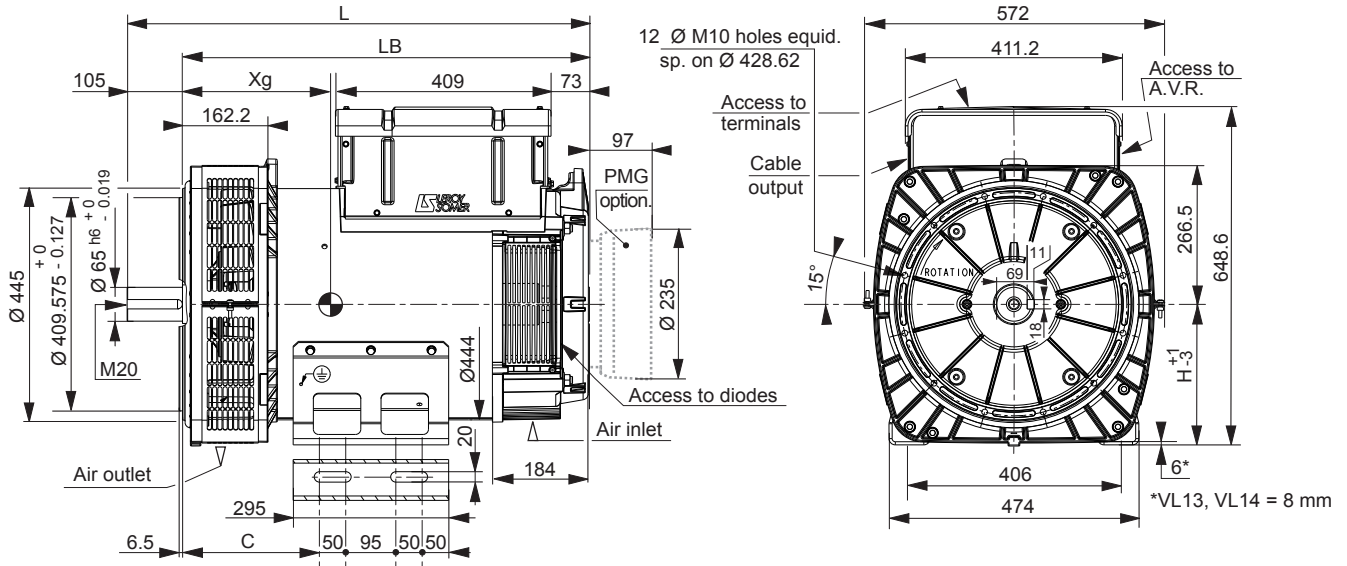
Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²): (4J = MD²)																
Flex plate	S.A.E. 8				S.A.E. 10				S.A.E. 11 1/2				S.A.E. 14			
	Xr	Lr	M	J	Xr	Lr	M	J	Xr	Lr	M	J	Xr	Lr	M	J
LSA 44.3 S2	362	729	121	0.855	353	729	121	0.868	322	729	127	0.883	318	729	123	1.007
LSA 44.3 S3	362	729	121	0.855	353	729	121	0.868	322	729	127	0.883	318	729	123	1.007
LSA 44.3 S4	383	729	139	1.013	372	729	139	1.026	359	729	138	1.041	337	729	141	1.165
LSA 44.3 S5	383	729	139	1.013	372	729	139	1.026	359	729	138	1.041	337	729	141	1.165
LSA 44.3 M6	408	799	154	1.129	399	799	154	1.142	386	799	153	1.157	364	799	156	1.281
LSA 44.3 M8	418	799	165	1.236	410	799	165	1.249	397	799	165	1.264	373	799	168	1.388
LSA 44.3 L10	438	839	181	1.371	429	839	181	1.384	417	839	180	1.399	397	839	183	1.523
LSA 44.3 L12	437	839	181	1.381	428	839	181	1.394	416	839	181	1.409	396	839	184	1.533
LSA 44.3 VL13	473	922.4	224	1.739	465	914	224	1.753	451	899	224	1.769	436.5	906	231	1.899
LSA 44.3 VL14	473	922.4	224	1.739	465	914	224	1.753	451	899	224	1.769	436.5	906	231	1.899

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Leroy-Somer site, 3D drawing files are available upon request.
The torsional analysis of the transmission is imperative. All values are available upon request.

Two bearing dimensions

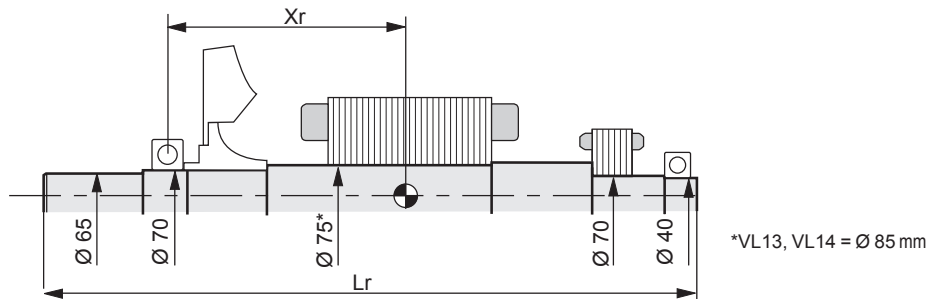


Dimensions (mm) and weight

Type	L without PMG	LB	Xg	C	H*	Weight (kg)
LSA 44.3 S2	807	702	333	260	270	301
LSA 44.3 S3	807	702	333	260	270	301
LSA 44.3 S4	807	702	350	260	270	338
LSA 44.3 S5	807	702	350	260	270	338
LSA 44.3 M6	877	772	373	260	270	374
LSA 44.3 M8	877	772	385	260	270	404
LSA 44.3 L10	917	812	403	260	270	439
LSA 44.3 L12	917	812	393	260	270	439
LSA 44.3 VL13	1002	897	422	285	270	555
LSA 44.3 VL14	1002	897	422	285	270	555

* H options: 225 mm, not available for VL13 and VL14, or 280 mm, available only for VL13 and VL14. Drawing available upon request.

Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²): (4J = MD²)

Type	Xr	Lr	M	J
LSA 44.3 S2	309	793	117	0.825
LSA 44.3 S3	309	793	117	0.825
LSA 44.3 S4	329	793	135	0.988
LSA 44.3 S5	329	793	135	0.988
LSA 44.3 M6	353	863	149	1.096
LSA 44.3 M8	363	863	161	1.203
LSA 44.3 L10	383	903	176	1.346
LSA 44.3 L12	382	903	177	1.356
LSA 44.3 VL13	409	988	219.5	1.706
LSA 44.3 VL14	409	988	219.5	1.706

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Leroy-Somer site, 3D drawing files are available upon request. The torsional analysis of the transmission is imperative. All values are available upon request.

LEROY-SOMER[™]

www.leroy-somer.com/epg

[Linkedin.com/company/leroy-somer](https://www.linkedin.com/company/leroy-somer)
[Twitter.com/Leroy_Somer_en](https://twitter.com/Leroy_Somer_en)
[Facebook.com/LeroySomer.Nidec.en](https://www.facebook.com/LeroySomer.Nidec.en)
[YouTube.com/LeroySomerOfficiel](https://www.youtube.com/LeroySomerOfficiel)



Nidec
All for dreams

© Nidec 2020. The information contained in this brochure is for guidance only and does not form part of any contract. The accuracy cannot be guaranteed as Nidec have an ongoing process of development and reserve the right to change the specification of their products without notice.

Moteurs Leroy-Somer SAS. Siège : Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France.
Capital social : 65 800 512 €, RCS Angoulême 338 567 258.