

# TENAX SERIES

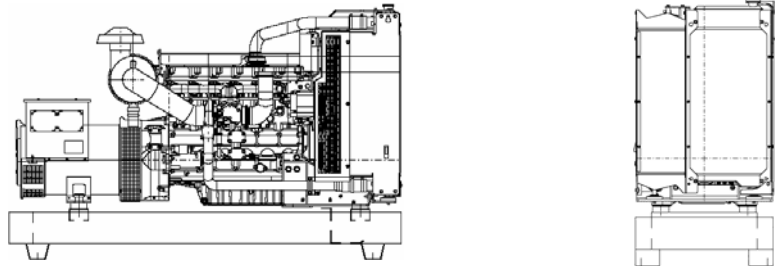
**DIESEL GENERATOR**  
**GROUPE ELECTROGENE DIESEL**  
**GRUPO ELECTROGENO DIESEL**  
**GRUPPO ELETTOGENO DIESEL**

MODEL  
 MODÈLE  
 MODELO  
 MODELLO

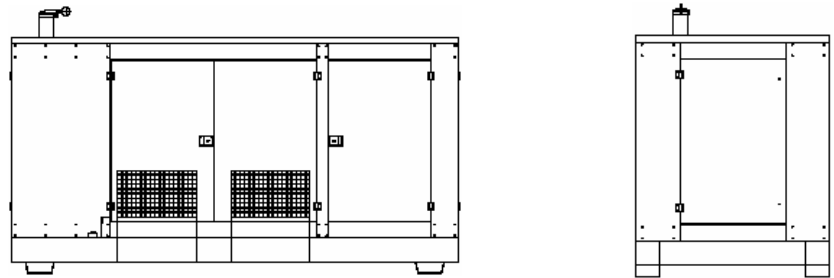
## PK 201 T\*



### SKID



### SUPER SILENT



GENERATING SET PERFORMANCE PERFORMANCES DU GROUPE PRESTACIONES DEL GRUPO PRESTAZIONI DEL GRUPPO		50 Hz		60 Hz	
Voltage Voltage Voltaje Tensione		V	400 / 230	V	220 / 127
Continuous Power Puissance service continue Potencia servicio continuo Potenza servizio continuo	PRP	kVA	180	kVA	200
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza	LTP	kVA	200	kVA	220
Continuous Power Puissance service continue Potencia servicio continuo Potenza servizio continuo	PRP	kWe	144	kWe	160
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza	LTP	kWe	160	kWe	176
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	70 %	l/h	27,8	l/h	32,9

ENGINE MOTEUR MOTOR MOTORE	PERKINS		1106C E66TAG4	
PERFORMANCE PERFORMANCES PRESTACIONES PRESTAZIONI	1500 rpm		1800 rpm	
Continuous Power Puissance service continue Potencia servicio continuo Potenza servizio continuo	PRP	kWm	158,4	kWm 177,3
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza	LTP	kWm	175,5	kWm 196,3
Specific fuel consumption Consommation spécifique combustible Consumo específico de combustible Consumo specifico combustibile		g/kWh	50 % 211,6 75 % 212,7 100 % 206,9 110 % 204,9	g/kWh 50 % 231,6 75 % 222,7 100 % 211,1 110 % 207,5
Diesel 4 Stroke – Injection type Diesel 4 temps – Type injection Diesel 4 tiempos – Tipo de inyeccion Diesel a 4 tempi – Tipo di iniezione				Direct Directe Directa Diretta
Aspiration type Type d'aspiration Tipo de aspiracion Tipo d'aspirazione				Turbocharged Suraalimentée sobrealimentato sovralimentata
Cooling system Refroidissement Sistema de refrigeracion Raffreddamento				Water Eau Agua Acqua
Speed governor Régulateur de tours Regulador Regolatore di giri				Electronic Electronique Electronico Elettronico
Cylinders, numbers and arrangement Nombre et disposition des cylindres Cilindros, numero y disposicion Numero e disposizione dei cilindri				6L
Total displacement Cylindrée totale Cilindrata total Cilindrata totale			cm <sup>3</sup>	6.600
Bore x stroke Alésage x course Diámetro x carrera Alesaggio x corsa			mm	105.0 x 127.0
Compression ratio Rapport de compression Relación de compresión Rapporto di compressione				16.2 :1
Engine electric system voltage Voltage système électrique moteur Voltaje sistema eléctrico motor Voltaggio sistema elettrico motore				12 V
Derating for temperature Déclassement pour temperature Declasamiento para temperatura Declassamento per temperatura			0 ÷ 27°C	0
			> 27 °C	1 % / 5°C
Derating for altitude Déclassement pour altitude Declasamiento para altitud Declassamento per altitudine			0 ÷ 1000 m	0
			> 1000m	1,5 % / 500 m
Derating for relative humidity Déclassement pour humidité relative Declasamiento para humedad relativa Declassamento per umidità relativa			30°C & 50% RH	0
			30°C & >RH 50%	0,45 % / 10% RH

ALTERNATOR ALTERNATEUR ALTERNADOR ALTERNATORE		LEROY SOMER					
PERFORMANCE PERFORMANCES PRESTACIONES PRESTAZIONI		1500 rpm		1800 rpm			
Model Modèle Modelo Modello		LSA 46.2 M3		LSA 46.2 M3			
Continuous Power Puissance service continué Potencia servicio continuo Potenza servizio continuo		40 °C	KVA kWe	<b>180</b> 144	KVA kWe	<b>220</b> 176	
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza		40 °C	KVA kWe	<b>195</b> 156	KVA kWe	<b>228</b> 182	
Stand-by Power Puissance service secours Potencia servicio emergencia Potenza servizio in emergenza		27 °C	KVA kWe	<b>203</b> 162	KVA kWe	<b>237</b> 190	
Efficiency Rendement Eficienza Efficienza			1/4 2/4 3/4 4/4	90,8 % 92,8 % 92,5 % 91,7 %		1/4 2/4 3/4 4/4	90,0 % 92,6 % 92,7 % 92,1 %
Standard winding connections Liaison des bobinages Tipo de conexión Collegamento avvolgimenti			Y			YY	
Exciter Eccitatrice Excitador Eccitatrice		<b>brushless</b> rotating exciter design with solid state pivotante <b>sans brosses</b> avec pont de diodes pivotants puente de diodos <b>sin escobillas</b> rotantes rotante <b>senza spazzole</b> 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						± 0,5 %	
Waveform distortion Taux d'harmonique Distorsión forma de onda Distorsione forma d'onda						IEC	< 2%
Insulation class Classe d' isolation Clase de aislamiento Classe di isolamento						H	
Enclosure Degré de protection mécanique Grado de protección mecánica Grado di protezione meccanica						IP 23	
Maximun overspeed Survitesse Régimen máximo Velocità di fuga						2250 min	
AVR model with <b>300%</b> shortcircuit current Modèle AVR avec un <b>courant</b> de court-circuit du <b>300%</b> Modelo AVR con una <b>corriente</b> de corto circuito del <b>300%</b> Modello AVR con <b>corrente</b> di corto circuito del <b>300%</b>						(3 In) : 10s	<b>R 448</b> AREP
Derating for temperature Déclassement pour temperature Decasamiento para temperatura Declassamento per temperatura						0 ÷ 40°C	0
						> 40 °C	3 % / 5°C
Derating for altitude Déclassement pour altitude Decasamiento para altitud Declassamento per altitudine						0 ÷ 1500 m	0
						1500 ÷ 2500 m	3% / 500 m
						2500 ÷ 3000 m	4% / 500 m

**LOGISTIC INFORMATION**  
**INFORMATIONS LOGISTIQUES**  
**INFORMATION LOGISTICA**  
**INFORMAZIONI LOGISTICHE**

	Integrated fuel tank capacity Capacité réservoir intégré Capacidad Tanque integrado Capacità Serbatoio integrato			Weight Poids Peso Peso	Dimensions Cotes d'encombrement Medidas externas Dimensioni d'ingombro			
	( L. )				(kg)	(cm)		
	STD	EXTRA 1	EXTRA 2			L	W	H
OPEN SKID VERSION VERSION SUR SKID VERSION ABIERTA VERSIONE APERTA	205	317	ON REQUEST	1770	240	85	150	
SOUND PROOF VERSION VERSION INSONORISEE VERSION INSONORISADA VERSIONE INSONORIZZATA	324	489	ON REQUEST	2470	365	125	226	

**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"> <li>• Heavy duty steel base frame</li> <li>• Vibration dampers</li> <li>• Integrated fuel tank</li> <li>• Silencer industrial type</li> <li>• Battery</li> <li>• Control panel model <b>ACP 7310 AUS</b></li> <li>• Push button start</li> <li>• Emergency stop button</li> <li>• Sound proof canopy of galvanized steel with residential silencer for <b>Super Silent</b> version</li> </ul>	<ul style="list-style-type: none"> <li>• Châssis acier</li> <li>• Amortisseurs de vibrations</li> <li>• Réservoir intégré</li> <li>• Silencieux industriel</li> <li>• Batterie</li> <li>• Coffret de contrôle <b>ACP 7310 AUS</b></li> <li>• Bouton de démarrage</li> <li>• Bouton arrêt d'urgence</li> <li>• Capote d'insonorisation d'acier galvanisé avec silencieux <b>résidentiel</b> pour la version <b>Super Silent</b></li> </ul>	<ul style="list-style-type: none"> <li>• Telar de acero</li> <li>• Apagadores de vibracion</li> <li>• Tanque combustible</li> <li>• Silenciador industrial</li> <li>• Batería</li> <li>• Cuadro electrico <b>ACP 7310 AUS</b></li> <li>• Botón de arranque</li> <li>• Botón parada de emergencia</li> <li>• Cabina de insonorización de acero cincado con silenciador <b>residencial</b> por la versión <b>Super Silent</b></li> </ul>	<ul style="list-style-type: none"> <li>• Basamento in acciaio</li> <li>• Antivibranti</li> <li>• Serbatoio integrato</li> <li>• Silenziatore industriale</li> <li>• Batteria avviamento</li> <li>• Quadro elettrico <b>ACP 7310 AUS</b></li> <li>• Avviamento con pulsante a pressione</li> <li>• Cabina di insonorizzazione di acciaio zincato con marmitta <b>residenziale</b> per la versione <b>Super Silent</b></li> </ul>

**MANUAL CONTROL PANEL**  
**COFFRET ELECTRIQUE MANUEL**  
**CUADRO ELECTRICO MANUAL**  
**QUADRO ELETTRICO MANUALE**

**ACP 7310 AUS**  
**400A (400 V - 3 ph - 50Hz - 1500 rpm)**  
**630A (220 V - 3 ph - 60Hz - 1800 rpm)**

<b>STANDARD EQUIPMENT:</b> 4 poles circuit breaker Electronic control board <b>DSE 7310</b> Control panel box key Emergency Stop button	<b>EQUIPEMENT STANDARD:</b> Disjoncteur de protection 4 pôles Fiche électronique <b>DSE 7310</b> Clé pour serrure du coffret Interrupteur d'arrêt d'urgence	<b>EQUIPAMIENTO STANDARD:</b> Interruptor magnetotermico 4 polos Carta electronica <b>DSE 7310</b> Llave cuadro Botón de parada de emergencia	<b>EQUIPAGGIAMENTO STANDARD:</b> Interruttore magnetotermico 4 poli Scheda elettronica <b>DSE 7310</b> Chiave quadro Pulsante di arresto di emergenza
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	<b>DSE 7310</b>	<b>CONTROL BOARD</b> <b>CARTE ELECTRONIQUE DE CONTROL</b> <b>CARTA ELETTRONICA DE CONTROL</b> <b>SCHEDA ELETTRONICA DI CONTROLLO</b>
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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) <b>ACP 7320 ATS</b></p> 	<p><b>COMPLETE CONTROL PANEL FREE STANDING TYPE</b> Equipment: control board, circuit breaker, battery charger, transfer switch, box key. <b>COFFRET ELECTRIQUE COMPLET TYPE ARMOIRE SEPRE DU GROUPE</b> Equipement : carte électronique de contrôle, disjoncteur de protection, chargeur de batterie, inverseur de source, clé coffret. <b>CUADRO ELECTRICO COMPLETO EN ARMARIO SEPARADO DEL GRUPO</b> Equipamiento: carta electronica de controllo, interruptor magnetotermico, cargador de bateria, transferencial, llave quadro. <b>QUADRO ELETRICO COMPLETO SEPARATO DAL GRUPPO</b> Equipaggiamento: scheda elettronica di controllo, interruttore magnetotermico, carica batteria, telecommutazione e chiave quadro.</p>
<p>2) <b>ACP 7320 AMF</b></p> 	<p><b>AMF CONTROL PANEL FITTED ON THE GEN-SET WITHOUT TRANSFER SWITCH</b> Equipment: control board, circuit breaker, battery charger, box key. <b>COFFRET ELECTRIQUE MONTE SUR LE GROUPE SANS INVERSEUR DE SOURCE</b> Equipement : carte électronique de contrôle, disjoncteur de protection, chargeur de batterie, clé coffret. <b>CUADRO ELECTRICO MONTADO SOBRE EL GRUPO SIN TRANSFERENCIAL</b> Equipamiento: carta electronica de controllo, interruptor magnetotermico, cargador de bateria, llave quadro. <b>QUADRO ELETRICO MONTATO SUL GRUPPO ELETTROGENO SENZA TELECOMMUTAZIONE</b> Equipaggiamento: scheda elettronica di controllo, interruttore magnetotermico, carica batteria, chiave quadro.</p>
<p>3) <b>ACP 7320 STS</b></p> 	<p><b>CONTROL PANEL FITTED ON THE GEN-SET WITH TRANSFER SWITCH SUPPLIED IN A SEPARATED BOX</b> Equipment: control board, circuit breaker, battery charger, box key, separate transfer switch. <b>COFFRET ELECTRIQUE MONTE SUR LE GROUPE + INVERSEUR DE SOURCE FOURNI DANS UN COFFRET SEPRE</b> Equipement : carte électronique de contrôle, disjoncteur de protection, chargeur de batterie, inverseur de source séparé, clé coffret. <b>CUADRO ELECTRICO MONTADO SOBRE EL GRUPO CON TRANSFERENCIAL SEPARADO</b> Equipamiento: carta electronica de controllo, interruptor magnetotermico, cargador de bateria, llave quadro, transferencial separado. <b>QUADRO ELETRICO MONTATO SUL GRUPPO ELETTROGENO CON TELECOMMUTAZIONE SEPARATA</b> Equipaggiamento: scheda elettronica di controllo, interruttore magnetotermico, carica batteria, chiave quadro, telecommutazione in armadio separato.</p>

**CONTROL BOARD  
CARTE ELECTRONIQUE DE CONTROL  
CARTA ELECTRONICA DE CONTROL  
SCHEDA ELETRONICA DI CONTROLLO**

<b>GB</b>	<b>F</b>	<b>E</b>	<b>I</b>
<p>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.</p>	<p>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.</p>	<p>La DSE7320 es una carta de control para arranque 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.</p>	<p>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.</p>
<b>FEATURES</b>	<b>EQUIPEMENT</b>	<b>EQUIPMENT</b>	<b>EQUIPAGGIAMENTO</b>
<p>Stop/restart – Auto – Manual – Start LCD display scroll Event log view Acoustic alarm</p>	<p>Fiche électronique de contrôle DSE7320 Disjoncteur de protection Chargeur de batterie Bouton poussoir arrête d’urgence</p>	<p>Ficha electrónica de control DSE7320 Interruptor magnetotermico Cargador de batería Boton de parada de emergencia</p>	<p>Scheda elettronica di controllo DSE7320 Interruttore magnetotermico Carica batteria Pulsante stop emergenza</p>
<b>DIGITAL MEASURING</b>	<b>MESURES NUMERIQUES</b>	<b>MEDIDAS DIGITALES</b>	<b>MISURAZIONI DIGITALI</b>
<p>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 %</p>	<p>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 %</p>	<p>Voltimetro (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 Voltimetro tensión de red Voltimetro batería Frecuencia red Tensión de carga Numero de arranques Nivel carburante %</p>	<p>Volmetro 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 Volmetro tensione rete Volmetro batteria Frequenza rete Tensione di carica Contavviamenti Livello carburante %</p>
<b>INDICATORS</b>	<b>INDICATEURS</b>	<b>INDICADORES</b>	<b>INDICATORI</b>
<p>Mains live Generator live Mains contactor closed Generator contactor closed Engine running</p>	<p>Présence secteur Présence tension générateur Inverseur secteur fermé Inverseur générateur fermé Moteur en marche</p>	<p>Presencia tensión de red Presencia tensión grupo Transferencial red cerrado Transferencial grupo cerrado Motor en marcha</p>	<p>Presenza tensione di rete Presenza tensione generatore Erogazione da rete Erogazione da gruppo Motore avviato</p>
<b>PROTECTIONS</b>	<b>PROTECTIONS</b>	<b>PROTECCIONES</b>	<b>PROTEZIONI</b>
<p>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</p>	<p>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</p>	<p>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</p>	<p>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 Sovracorrente Sovra/sotto tensione della batteria</p>

**SOUNDPROOF CANOPY  
CAPOTE D'INSONORISATION  
CAPOTA DE INSONORIZACION  
CABINA INSONORIZATA**

GB	F	E	I
<p>The TecnoGen 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 TecnoGen 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 manutention. Les matériaux d'insonorisation sont fortement résistant au feu et auto-extinguibles.</p>	<p>La capota insonorizada TecnoGen 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 bullonata 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 TecnoGen 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 10 points  
Notre qualité résumée en 10 points  
Nuestra calidad en 10 puntos  
La nostra qualità in 10 punti**

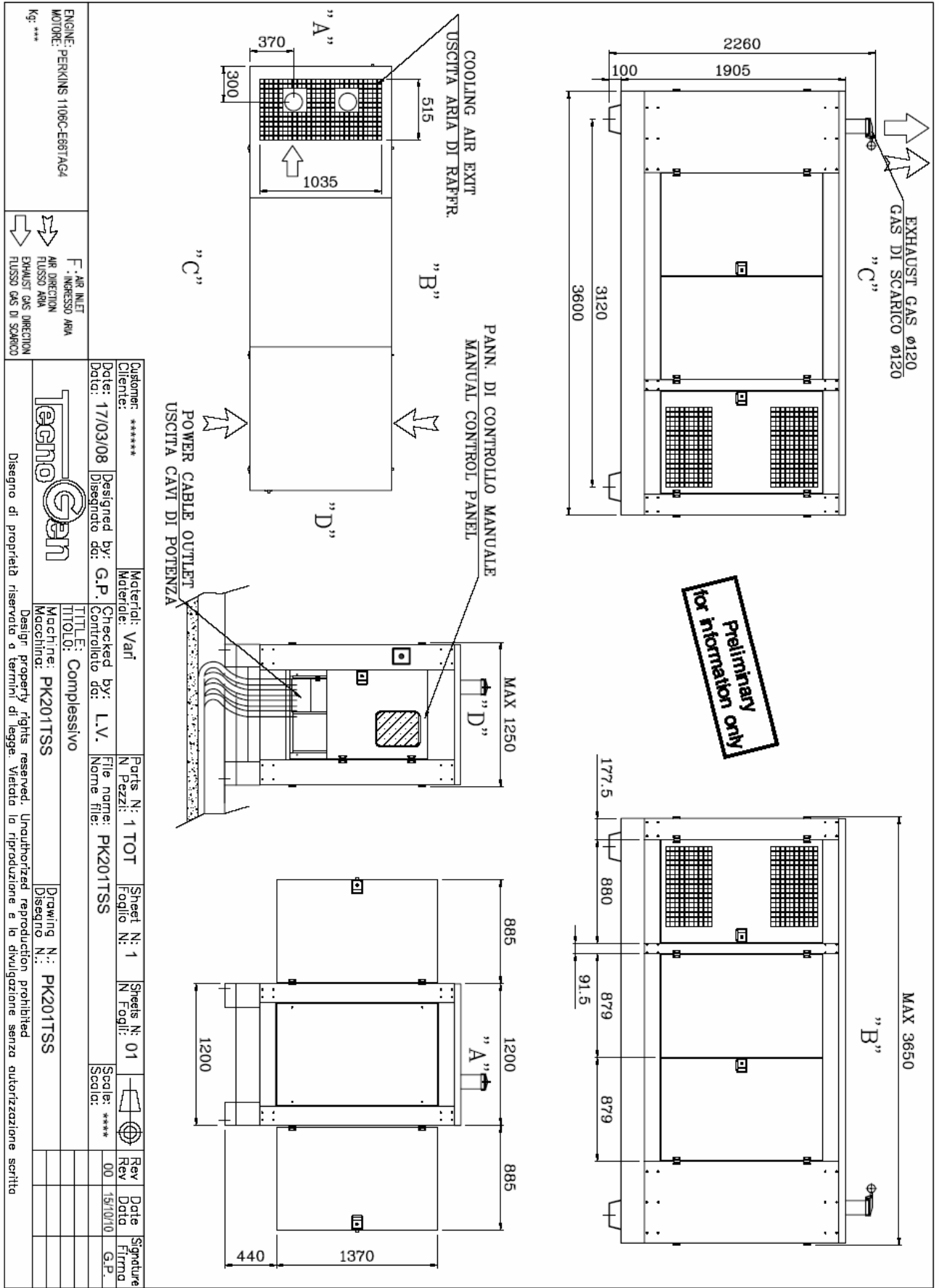
1		Internal residential silencer for lower sound levels Silencieux interne pour un niveau bas de bruit Silenciador interno para un nivel de rumorosidad más bajo Silenziatore interno per un livello di rumorosità più basso
2		Integrated fuel tank of different sizes Réservoirs de combustible disponibles, 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		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
8		High serviceability level Haut niveau d'accessibilité pour la manutention Alto nivel de accesibilidad para la manutención Alto livello di accessibilità per la manutenzione
9		Large cable entry area for easy installation Grande zone d'entrée 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
10		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

**OPEN SKID VERSION DRAWING  
DESSIN VERSION SUR SKID  
DIBUJO VERSION ABIERTA  
DISEGNO VERSIONE APERTA**

**Preliminary  
for information only**

Customer: *****	Material: Vari	Parts N: 1 TOT	Sheet N: 1
Client: *****	Material: Vari	N Pezzi: 1	N Fogli: 1
Date: 04/07/08	Designed by: G.P.	Checked by: M.B.	Scale: ***
Date: 04/07/08	Disegnato da: G.P.	Controllo da: M.B.	Scale: ***
<b>TECNOGEN</b>		Machine: PK201T	
ENGINE: PERKINS 1106C-E68TAG4 MOTORE: PERKINS 1106C-E68TAG4		Drawing N.: PK201T	
Kg: _____			
Disegno di proprietà riservata a termini di legge. Vietata la riproduzione e la divulgazione senza autorizzazione scritta			

**SOUND PROOF VERSION DRAWING  
DESSIN VERSION INSONORISEE  
DIBUJO VERSION INSONORISADA  
DISEGNO VERSIONE INSONORIZZATA**





# 1100 Series

## 1106C-E66TAG4

### Diesel Engine - ElectropaK

175.5 kWm @ 1500 rev/min  
196.3 kWm @ 1800 rev/min

#### Power to Meet your Needs

Hitting the key power nodes required by the market, the 1106C-E66TAG4 ElectropaK has been developed to provide a clean and cost effective power solution.

#### State of the Art Design

The 1106C-E66TAG4 incorporates the latest common-rail fuel system technologies with a closely optimised air-management system which is overseen by the latest generation of electronic engine control. This allows the 1106C ElectropaK range to deliver high power density, low exhaust emissions with the minimum of heat rejection and excellent fuel economy.

#### Worldwide Power Solution

The 1106C has been designed to be worldwide fuel tolerant, including kerosene, jet aviation fuel and 5% biofuel (RME). Options are available to meet local market needs.

#### Product Support

- Perkins actively pursues product support excellence by ensuring our distribution network invest in their territory - strengthening relationships and providing more value to you, our customer
- Through an experienced global network of distributors and dealers, fully trained engine experts deliver total service support around the clock, 365 days a year. They have a comprehensive suite of web based tools at their fingertips covering technical information, parts identification and ordering systems, all dedicated to maximising the productivity of your engine
- Throughout the entire life of a Perkins engine, we provide access to genuine OE specification parts and service. We give 100% reassurance that you receive the very best in terms of quality for lowest possible cost .. wherever your Perkins powered machine is operating in the world

#### Long-term Power Solution

The 1106C-E66TAG ElectropaK range has been designed to fully comply with EU Stage II emissions regulations, providing an emissions compliant power solution for the future.

*Certified against the requirements of EU2007 legislation for non-road mobile machinery, powered by constant speed engines (EU97/68/EC Stage II).*

The 1106C-E66TAG ElectropaKs are the latest addition to Perkins 1100 Series Electric Power line-up. Offering improved power density from a compact package, these ElectropaK's build on Perkins reputation within the Power Generation Industry.

These ultra clean engines are assembled on a new high technology production line. Frequent computerised checks during the production process ensure high build quality is maintained throughout.

Hitting the key power nodes required by the market, the 1106C-E66TAG product line-up consists of three models offering a power solution for both Prime and Standby applications, in 50 Hz and 60 Hz territories.

Engine speed (rev/min)	Type of Operation	Typical generator output (net)		Engine power			
		kVA	kWe	Gross		Net	
				kWm	bhp	kWm	bhp
1500	Prime	180.0	144.0	163.3	218.9	158.4	212.4
	Standby (maximum)	200.0	160.0	180.4	242.0	175.5	235.3
1800	Prime	200.0	160.0	185.3	248.4	177.3	237.7
	Standby (maximum)	219.0	175.0	204.3	274.0	196.3	263.2

The above ratings represent the engine performance capabilities to conditions specified in ISO 8528/5  
Derating may be required for conditions outside the test conditions; consult Perkins Engines Company Limited  
Generator powers are typical and are based on typical alternator efficiencies and a power factor  
Fuel specification: Consult Perkins Engines Company Limited (various fuel specifications are available)  
Lubricating oil: multi-grade oil conforming to API-CH4/C14 must be used

#### Rating Definitions

Prime Power: Power available at variable load in lieu of a main power network. Overload of 10% is permitted for 1 hour in every 12 hours' operation  
Standby (maximum): Power available at variable load in the event of a main power network failure. No overload is permitted

# 1100 Series

## 1106C-E66TAG4

### Standard ElectropaK Specification

#### Air inlet

- Mounted air filter and turbocharger

#### Cooling system

- 27" belt-driven pusher fan and guards
- Radiator (incorporating air-to-air charge cooler + fuel cooler)
- Water pump

#### Electric system

- 12 volt starter motor
- 12 volt, 100 amp alternator with DC output

#### Flywheel and housing

- High inertia flywheel
- SAE2 flywheel housing

#### Fuel system

- Electronic governing (confirms to Class G3 ISO 8528-5)
- Fuel filter

#### Literature

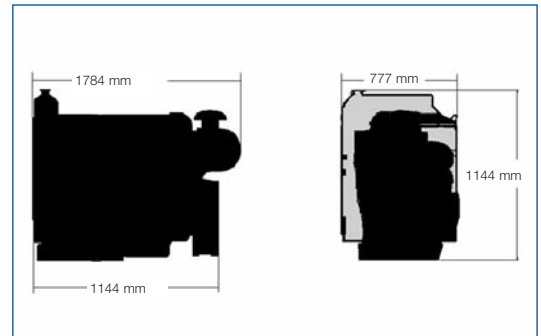
- User's Handbook

#### Lubrication system

- Flat-bottomed isolated aluminium sump
- Oil filter

#### Start aids

- Glow plugs



Engine Speed	Fuel Consumption			
	1500 rev/min		1800 rev/min	
	g/kWh	l/hr	g/kWh	l/hr
Standby	204.9	44.0	207.5	50.5
Prime power	206.9	40.2	211.1	41.3
110% of prime power	205.1	43.8	208.0	50.4
75% of prime power	212.7	31.0	222.7	36.8
50% of prime power	211.6	20.5	231.6	25.5

### General Data

Number of cylinders	6 in-line
Bore and stroke	105 mm x 127 mm
Displacement	6.6 litres
Aspiration	Turbocharged air-to-air charge cooled
Cycle	4 stroke
Combustion system	Direct injection
Compression ratio	16.2:1
Rotation	Anti-clockwise viewed on flywheel
Cooling system	Water
Dimensions	Length 1784 mm* Width 777 mm Height 1144 mm
Dry weight	714 kg
Wet weight	757 kg

\* Length includes air cleaner  
Final weight and dimensions will depend on completed specification



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Distributed by

### SPECIALLY ADAPTED FOR APPLICATIONS

The LSA 46.2 alternator is designed to be suitable for typical generator applications, such as: backup, standard production, cogeneration, marine applications, rental, telecommunications, etc.

### COMPLIANT WITH INTERNATIONAL STANDARDS

The LSA 46.2 alternator conforms to the main international standards and regulations:

IEC 60034, NEMA MG 1.22, ISO 8528/3, CSA, UL 1446, UL 1004B on request, marine regulations, etc.

It can be integrated into a CE marked generator.

The LSA 46.2 is designed, manufactured and marketed in an ISO 9001 and ISO 14001 environment.

### TOP OF THE RANGE ELECTRICAL PERFORMANCE

- Class H insulation.
- Standard 12-wire re-connectable winding, 2/3 pitch, type no. 6 .
- Voltage range: 220 V - 240 V and 380 V - 415 V (440 V) - 50 Hz / 208 V - 240 V and 380 V - 480 V - 60 Hz.
- High efficiency and motor starting capacity.
- Other voltages are possible with optional adapted windings:
  - 50 Hz: 440 V (no. 7), 500 V (no. 9), 600 V (no. 22 or 23), 690 V (no. 10 or 52)
  - 60 Hz: 380 V and 416 V (no. 8), 600 V (no. 9).
- Total harmonic content < 2,5 %.
- R 791 interference suppression conforming to standard EN 55011 group 1 class B standard for European zone (CE marking).

### EXCITATION AND REGULATION SYSTEM SUITED TO THE APPLICATION

Excitation system				Regulation options				
Voltage regulator	SHUNT	AREP	PMG	T.I. Current transformer for paralleling	R 726 Mains paralleling	R 731 3-phase sensing	R 734 3-phase sensing on mains paralleling unbalanced	P Remote voltage potentiometer
R 250	Std	-	-	-	-	-	-	√
R 448	optional	Std	Std	√	√	√	√	√
DECS 100	-	optional	optional	√	included	included	NA	√

Voltage regulator accuracy +/- 0.5% - √ : possible adaptation - NA : not possible.

### PROTECTION SYSTEM SUITED TO THE ENVIRONMENT

- The LSA 46. 2 is IP 23.
- Standard winding protection for clean environments with relative humidity δ 95 %, including indoor marine environments.
- Options:
  - Filters on air inlet and air outlet (IP 44).
  - Winding protections for harsh environments and relative humidity greater than 95%.
  - Space heaters.
  - Thermal protection for windings and shields.

### REINFORCED MECHANICAL STRUCTURE USING FINITE ELEMENT MODELLING

- Compact and rigid assembly to better withstand generator vibrations.
- Steel frame.
- Cast iron flanges and shields.
- Twin-bearing and single-bearing versions designed to be suitable for engines on the market.
- Half-key balancing.
- Greased for life bearings (regreasable bearings optional).

### ACCESSIBLE TERMINAL BOX PROPORTIONED FOR OPTIONAL EQUIPMENT

- Easy access to the voltage regulator and to the connections.
- Possible clusion of accessories for paralleling, protection and measurement.
- 8 way terminal block for reconnecting voltage reconnection.
- DECS 100 digital AVR with external fitting possible.

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## Common data

Insulation class	H	Excitation system	SHUNT	A R E P or PMG
Winding pitch	2/3 ( N° 6 )	A.V.R. model	R 250	R 448
Terminals	12	Voltage regulation (*)	± 0,5 %	± 0,5 %
Drip proof	IP 23	Sustained short-circuit current	-	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total harmonic TGH / THC (**)	at no load < 2,5 % - on load < 2,5 %	
Overspeed	2250 min <sup>-1</sup>	Waveform : NEMA = TIF (**)	< 50	
Air flow	0,43 m³/s (50Hz)/ 0,51 (60Hz)	Wave form : I.E.C. = THF (**)	< 2 %	

(\*) Steady state duty. (\*\*) Total harmonic content line to line, at no load or full rated linear and balanced load.

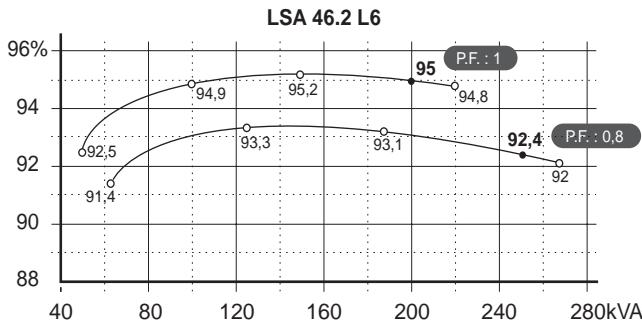
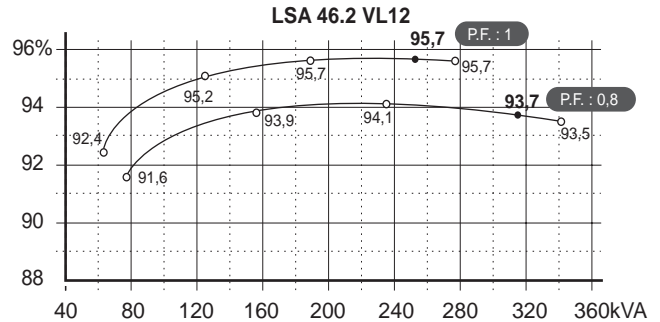
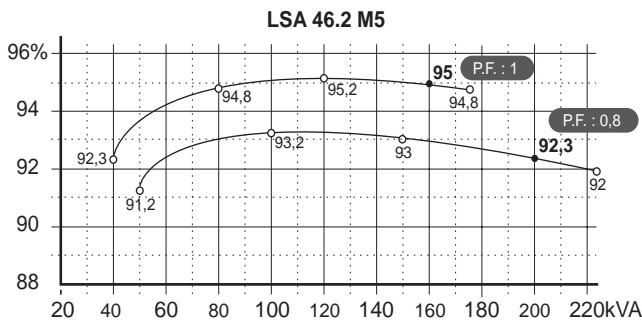
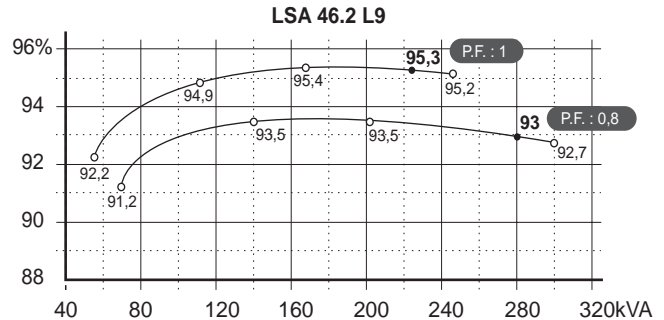
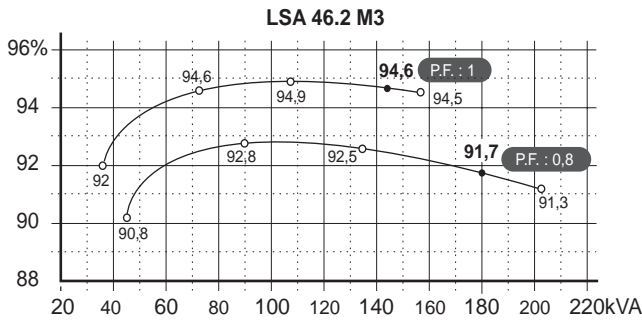
## Ratings 50 Hz - 1500 R.P.M.

kVA / kW - Power factor = 0,8																					
Duty T°C	Continuous duty 40°C					Continuous duty 40°C					Stand-by / 40 °C			Stand-by / 27 °C							
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	
<b>46.2 M3</b>	kVA	<b>180</b>	<b>180</b>	<b>180</b>	<b>160</b>	104	<b>168</b>	<b>168</b>	<b>168</b>	<b>146</b>	97	<b>195</b>	<b>195</b>	<b>195</b>	<b>175</b>	110	<b>203</b>	<b>203</b>	<b>203</b>	<b>180</b>	114
	kW	<b>144</b>	<b>144</b>	<b>144</b>	<b>128</b>	83	<b>134</b>	<b>134</b>	<b>134</b>	<b>116</b>	78	<b>156</b>	<b>156</b>	<b>156</b>	<b>140</b>	88	<b>162</b>	<b>162</b>	<b>162</b>	<b>144</b>	91
<b>46.2 M5</b>	kVA	<b>200</b>	<b>200</b>	<b>200</b>	<b>175</b>	116	<b>184</b>	<b>184</b>	<b>184</b>	<b>160</b>	108	<b>214</b>	<b>214</b>	<b>214</b>	<b>190</b>	123	<b>223</b>	<b>223</b>	<b>223</b>	<b>200</b>	127
	kW	<b>160</b>	<b>160</b>	<b>160</b>	<b>140</b>	93	<b>147</b>	<b>147</b>	<b>147</b>	<b>128</b>	86	<b>171</b>	<b>171</b>	<b>171</b>	<b>152</b>	98	<b>178</b>	<b>178</b>	<b>178</b>	<b>160</b>	102
<b>46.2 L6</b>	kVA	<b>250</b>	<b>250</b>	<b>240</b>	<b>205</b>	141	<b>217</b>	<b>217</b>	<b>217</b>	<b>190</b>	131	<b>254</b>	<b>260</b>	<b>254</b>	<b>225</b>	150	<b>266</b>	<b>275</b>	<b>266</b>	<b>237</b>	156
	kW	<b>200</b>	<b>200</b>	<b>192</b>	<b>164</b>	113	<b>174</b>	<b>174</b>	<b>174</b>	<b>152</b>	105	<b>203</b>	<b>208</b>	<b>203</b>	<b>180</b>	120	<b>213</b>	<b>220</b>	<b>213</b>	<b>190</b>	125
<b>46.2 L9</b>	kVA	<b>280</b>	<b>280</b>	<b>280</b>	<b>215</b>	154	<b>250</b>	<b>250</b>	<b>250</b>	<b>195</b>	142	<b>290</b>	<b>290</b>	<b>290</b>	<b>240</b>	165	<b>300</b>	<b>300</b>	<b>300</b>	<b>250</b>	170
	kW	<b>224</b>	<b>224</b>	<b>224</b>	<b>172</b>	123	<b>200</b>	<b>200</b>	<b>200</b>	<b>156</b>	114	<b>232</b>	<b>232</b>	<b>232</b>	<b>192</b>	132	<b>240</b>	<b>240</b>	<b>240</b>	<b>200</b>	136
<b>46.2 VL12</b>	kVA	<b>315</b>	<b>315</b>	<b>300</b>	<b>260</b>	187	<b>276</b>	<b>276</b>	<b>260</b>	<b>230</b>	170	<b>327</b>	<b>327</b>	<b>310</b>	<b>285</b>	200	<b>341</b>	<b>341</b>	<b>325</b>	<b>300</b>	208
	kW	<b>252</b>	<b>252</b>	<b>240</b>	<b>208</b>	150	<b>221</b>	<b>221</b>	<b>208</b>	<b>184</b>	136	<b>262</b>	<b>262</b>	<b>248</b>	<b>228</b>	160	<b>273</b>	<b>273</b>	<b>260</b>	<b>240</b>	166

## Ratings 60 Hz - 1800 R.P.M.

kVA / kW - Power factor = 0,8																					
Duty T°C	Continuous duty 40°C					Continuous duty 40°C					Stand-by / 40 °C			Stand-by / 27 °C							
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	220V	240V		240V	220V	240V		240V	220V	240V		240V	220V	240V		240V	
YY				208V				208V				208V				208V				208V	
<b>46.2 M3</b>	kVA	<b>192</b>	<b>205</b>	<b>220</b>	<b>228</b>	128	<b>177</b>	<b>189</b>	<b>198</b>	<b>210</b>	119	<b>203</b>	<b>219</b>	<b>228</b>	<b>244</b>	136	<b>211</b>	<b>225</b>	<b>237</b>	<b>255</b>	141
	kW	<b>154</b>	<b>164</b>	<b>176</b>	<b>182</b>	102	<b>142</b>	<b>151</b>	<b>158</b>	<b>168</b>	95	<b>162</b>	<b>175</b>	<b>182</b>	<b>195</b>	109	<b>169</b>	<b>180</b>	<b>190</b>	<b>204</b>	113
<b>46.2 M5</b>	kVA	<b>205</b>	<b>219</b>	<b>230</b>	<b>250</b>	136	<b>190</b>	<b>203</b>	<b>211</b>	<b>225</b>	126	<b>219</b>	<b>235</b>	<b>245</b>	<b>262</b>	145	<b>227</b>	<b>242</b>	<b>252</b>	<b>273</b>	151
	kW	<b>164</b>	<b>175</b>	<b>184</b>	<b>200</b>	109	<b>152</b>	<b>162</b>	<b>169</b>	<b>180</b>	101	<b>175</b>	<b>188</b>	<b>196</b>	<b>210</b>	116	<b>182</b>	<b>194</b>	<b>202</b>	<b>218</b>	121
<b>46.2 L6</b>	kVA	<b>257</b>	<b>276</b>	<b>289</b>	<b>300</b>	173	<b>239</b>	<b>255</b>	<b>265</b>	<b>278</b>	160	<b>276</b>	<b>295</b>	<b>308</b>	<b>324</b>	184	<b>285</b>	<b>304</b>	<b>317</b>	<b>337</b>	192
	kW	<b>206</b>	<b>221</b>	<b>231</b>	<b>240</b>	138	<b>191</b>	<b>204</b>	<b>212</b>	<b>222</b>	128	<b>221</b>	<b>236</b>	<b>246</b>	<b>259</b>	147	<b>228</b>	<b>243</b>	<b>254</b>	<b>270</b>	154
<b>46.2 L9</b>	kVA	<b>296</b>	<b>316</b>	<b>328</b>	<b>344</b>	197	<b>273</b>	<b>291</b>	<b>302</b>	<b>302</b>	182	<b>313</b>	<b>338</b>	<b>351</b>	<b>357</b>	209	<b>326</b>	<b>348</b>	<b>366</b>	<b>375</b>	220
	kW	<b>237</b>	<b>253</b>	<b>262</b>	<b>275</b>	158	<b>218</b>	<b>233</b>	<b>242</b>	<b>242</b>	146	<b>250</b>	<b>270</b>	<b>281</b>	<b>286</b>	167	<b>261</b>	<b>278</b>	<b>293</b>	<b>300</b>	176
<b>46.2 VL12</b>	kVA	<b>333</b>	<b>357</b>	<b>372</b>	<b>381</b>	220	<b>309</b>	<b>329</b>	<b>341</b>	<b>347</b>	200	<b>359</b>	<b>383</b>	<b>397</b>	<b>412</b>	235	<b>370</b>	<b>399</b>	<b>415</b>	<b>429</b>	243
	kW	<b>266</b>	<b>286</b>	<b>298</b>	<b>305</b>	176	<b>247</b>	<b>263</b>	<b>273</b>	<b>278</b>	160	<b>287</b>	<b>306</b>	<b>318</b>	<b>330</b>	188	<b>296</b>	<b>319</b>	<b>332</b>	<b>343</b>	194

## Efficiencies 50 Hz - P.F. : 1 / P.F. : 0,8



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

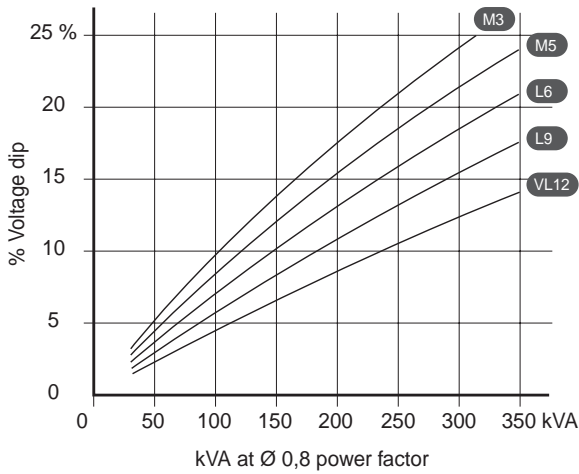
	M3	M5	L6	L9	VL12
<b>Kcc</b> Short-circuit ratio	0,44	0,45	0,41	0,48	0,5
<b>Xd</b> Direct axis synchro.reactance unsaturated	312	301	327	294	273
<b>Xq</b> Quadra. axis synchr.reactance unsaturated	187	180	196	176	164
<b>T'do</b> Open circuit time constant	1971	2042	2105	2175	2253
<b>X'd</b> Direct axis transient reactance saturated	15,8	14,7	15,5	13,5	12,1
<b>T'd</b> Short-Circuit transient time constant	100	100	100	100	100
<b>X''d</b> Direct axis subtransient reactance saturated	9,5	8,8	9,3	8,1	7,2
<b>T''d</b> Subtransient time constant	10	10	10	10	10
<b>X''q</b> Quadra. axis subtransient reactance saturated	11,8	10,9	11,5	10	8,9
<b>Xo</b> Zero sequence reactance unsaturated	0,5	0,8	0,7	0,7	0,5
<b>X2</b> Negative sequence reactance saturated	10,6	9,9	10,4	9,1	8,1
<b>Ta</b> Armature time constant	15	15	15	15	15

### Other data - Class H / 400 V

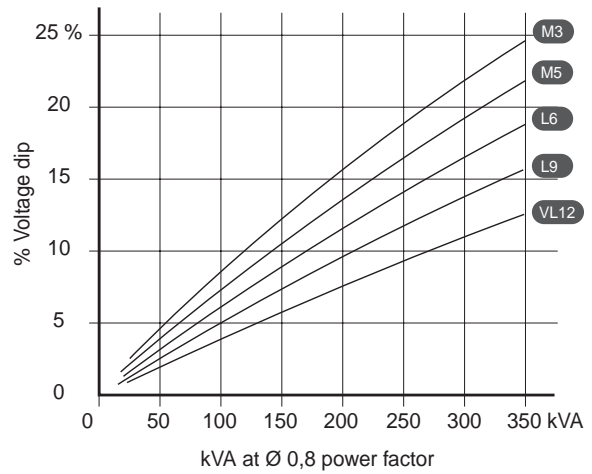
	M3	M5	L6	L9	VL12
<b>io (A)</b> No load excitation current (SHUNT / AREP or PMG)	1	1	1	1,1	1
<b>ic (A)</b> Full load excitation current (SHUNT / AREP or PMG)	3,9	3,7	4	3,9	3,4
<b>uc (V)</b> Full load excitation voltage (SHUNT / AREP or PMG)	33	32	34	33	33
<b>ms</b> Recovery time ( $\Delta U = 20\%$ trans.)	500	500	500	500	500
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust.) or ( $\Delta U = 50\%$ trans.) SHUNT	340	397	462	538	694
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust.) or ( $\Delta U = 50\%$ trans.) AREP	371	434	504	583	760
<b>%</b> Transient dip (rated step load) SHUNT / PF : 0,8 LAG	16,2	15,4	15,9	14,6	12,9
<b>%</b> Transient dip (rated step load) AREP / PF : 0,8 LAG	14,3	13,7	14,1	13	11,4
<b>W</b> No load losses	2810	3040	3690	4340	4800
<b>W</b> Heat rejection	12900	13180	16400	16810	16730

## Transient voltage variation 400 V - 50 Hz

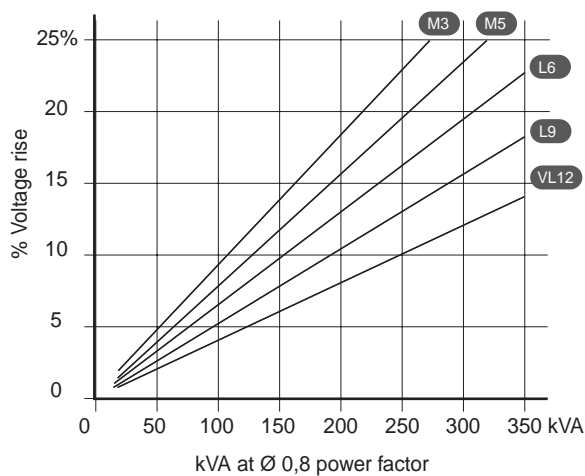
Load application (SHUNT excitation)



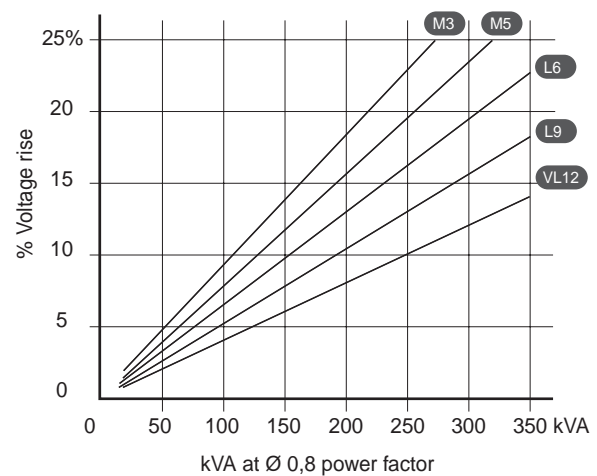
Load application (AREP or PMG excitation)



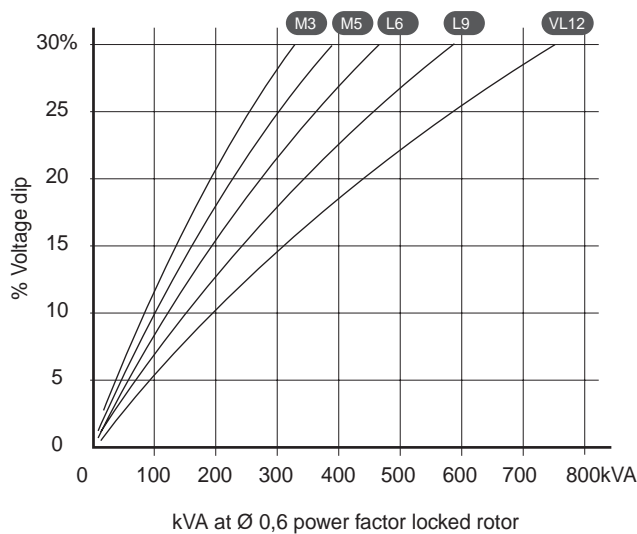
Load rejection (SHUNT excitation)



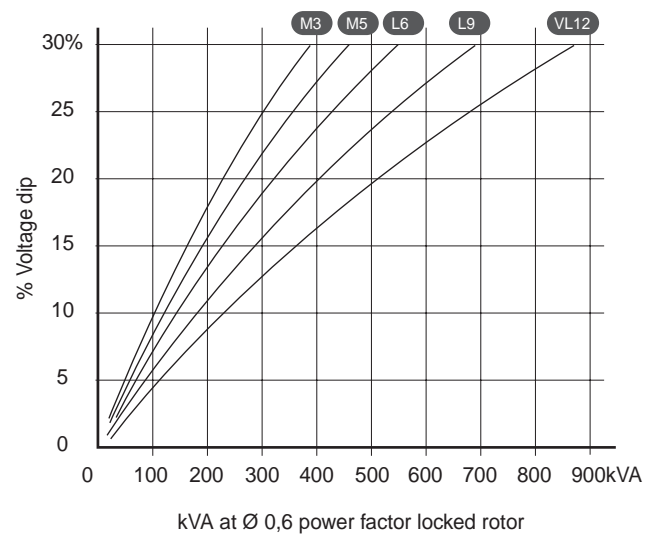
Load rejection (AREP or PMG excitation)



Motor starting (SHUNT excitation)

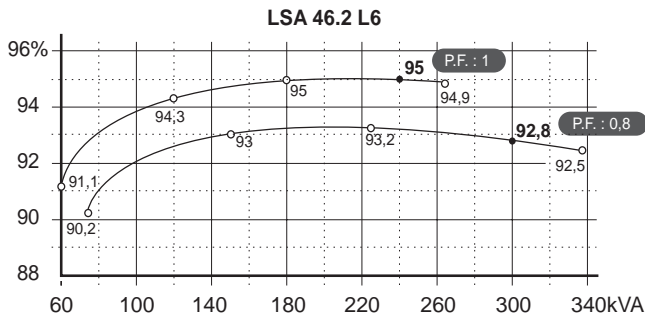
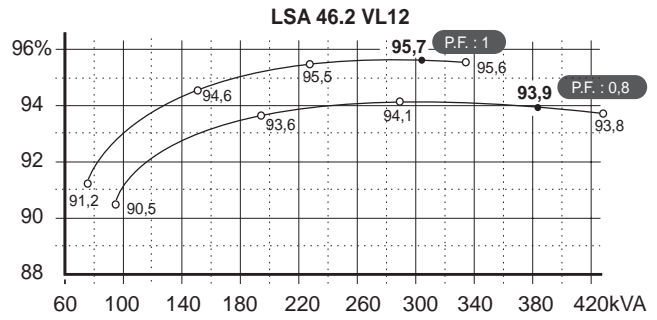
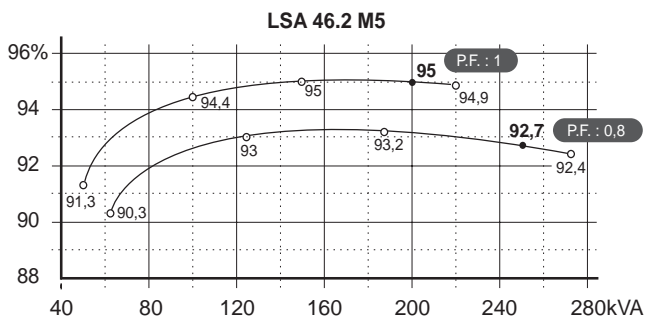
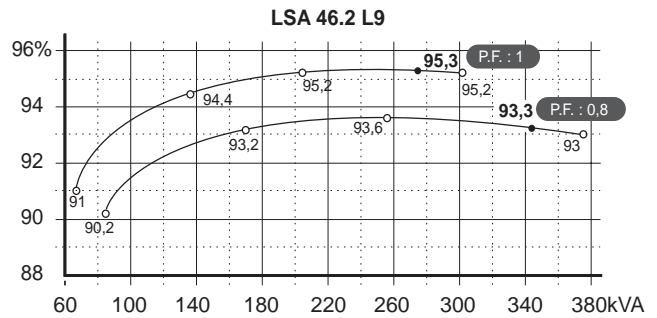
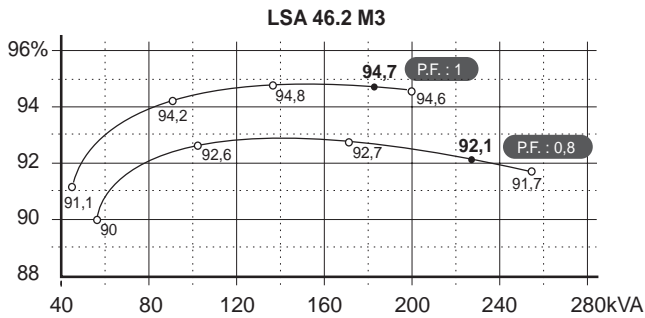


Motor starting (AREP or PMG excitation)



- 1) For a starting P.F. differing from 0,6 , the starting kVA must be multiplied by  $(\text{Sine } \varnothing / 0,8)$
- 2) For voltages other than 400V(Y) , 230V( $\Delta$ ) at 50 Hz, then kVA must be multiplied by  $(400/U)^2$  or  $(230/U)^2$ .

## Efficiencies 60 Hz - P.F. :1 / P.F. : 0,8



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

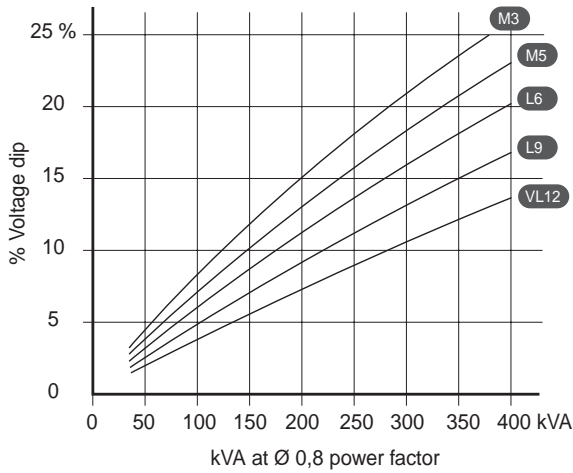
	M3	M5	L6	L9	VL12
<b>Kcc</b> Short-circuit ratio	0,41	0,43	0,41	0,47	0,5
<b>Xd</b> Direct axis synchro.reactance unsaturated	329	314	327	300	275
<b>Xq</b> Quadra. axis synchr.reactance unsaturated	197	188	196	180	165
<b>T'do</b> Open circuit time constant	1971	2042	2105	2175	2253
<b>X'd</b> Direct axis transient reactance saturated	16,7	15,3	15,5	13,8	12,2
<b>T'd</b> Short circuit transient time constant	100	100	100	100	100
<b>X"d</b> Direct axis subtransient reactance saturated	10	9,2	9,3	8,2	7,3
<b>T"d</b> Subtransient time constant	10	10	10	10	10
<b>X"q</b> Quadra. axis subtransient reactance saturated	12,4	11,4	11,5	10,2	9
<b>Xo</b> Zero sequence reactance unsaturated	0,5	0,5	0,6	0,4	0,4
<b>X2</b> Negative sequence reactance saturated	11,2	10,3	10,4	9,3	8,2
<b>Ta</b> Armature time constant	15	15	15	15	15

### Other data - Class H / 480 V

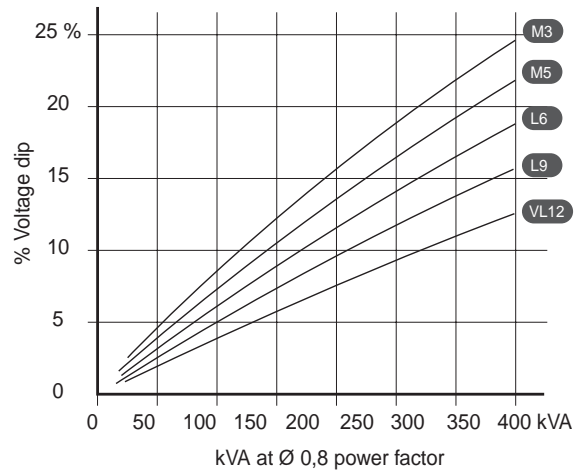
	M3	M5	L6	L9	VL12
<b>io (A)</b> No load excitation current (SHUNT / AREP or PMG)	1	1	1	1,1	1
<b>ic (A)</b> Full load excitation current (SHUNT / AREP or PMG)	4	3,8	3,9	3,8	3,4
<b>uc (V)</b> Full load excitation voltage (SHUNT / AREP or PMG)	34	32	33	33	33
<b>ms</b> Recovery time ( $\Delta U = 20\%$ trans.)	500	500	500	500	500
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust.) or ( $\Delta U = 50\%$ trans.) SHUNT	420	496	575	673	867
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust.) or ( $\Delta U = 50\%$ trans.) AREP	461	540	629	732	953
<b>%</b> Transient dip (rated step load) SHUNT / PF : 0,8 LAG	16,7	15,8	15,9	14,8	13
<b>%</b> Transient dip (rated step load) AREP / PF : 0,8 LAG	14,8	14,1	14,1	13,1	11,5
<b>W</b> No load losses	4180	4500	5530	6430	7090
<b>W</b> Heat rejection	15570	15680	18500	19690	19510

## Transient voltage variation - 480 V - 60 Hz

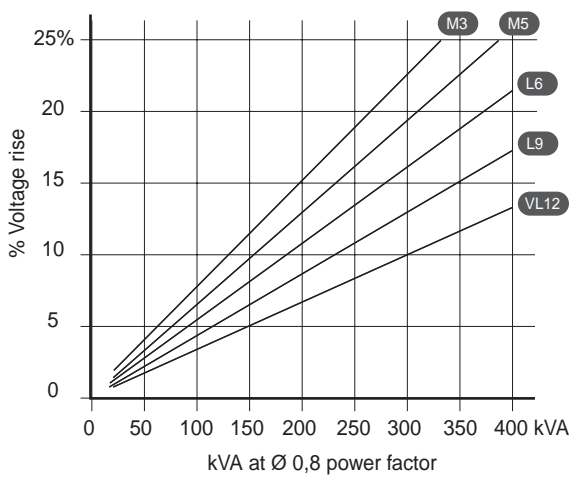
Load application (SHUNT excitation)



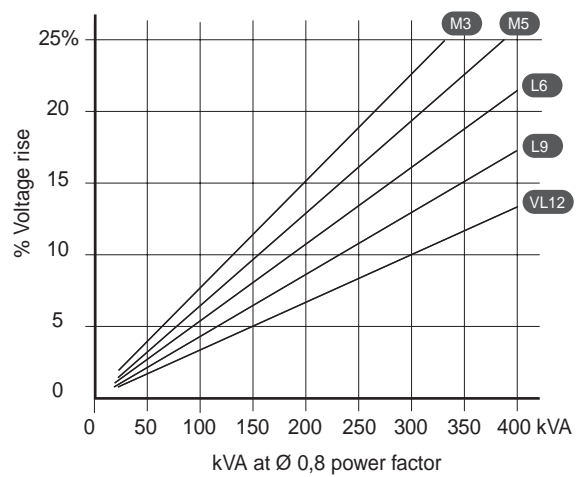
Load application (AREP or PMG excitation)



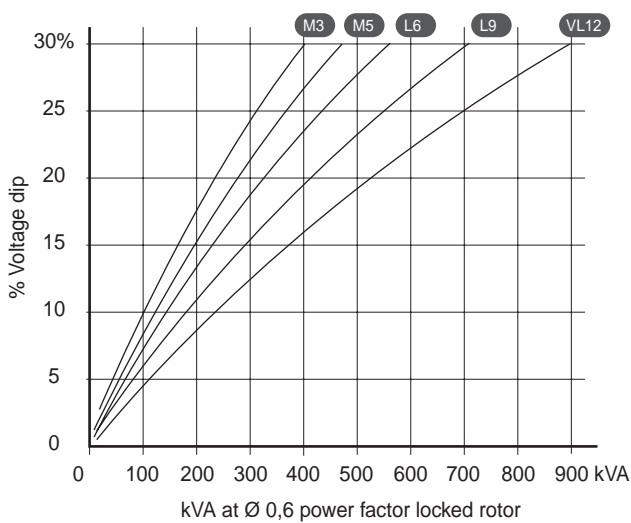
Load rejection (SHUNT excitation)



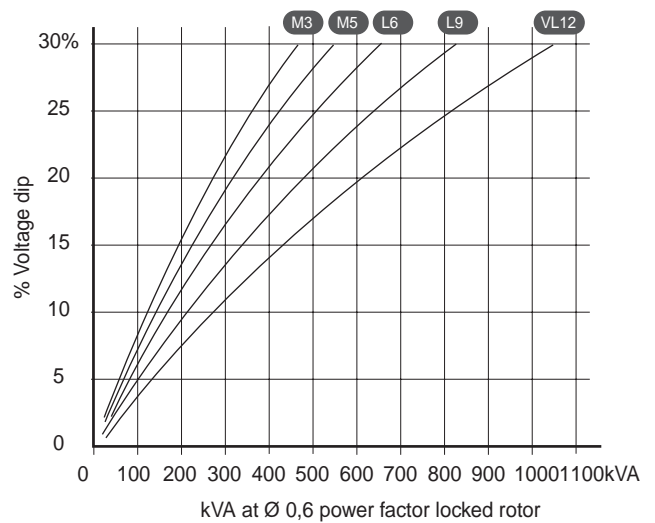
Load rejection (AREP or PMG excitation)



Motor starting (SHUNT excitation)



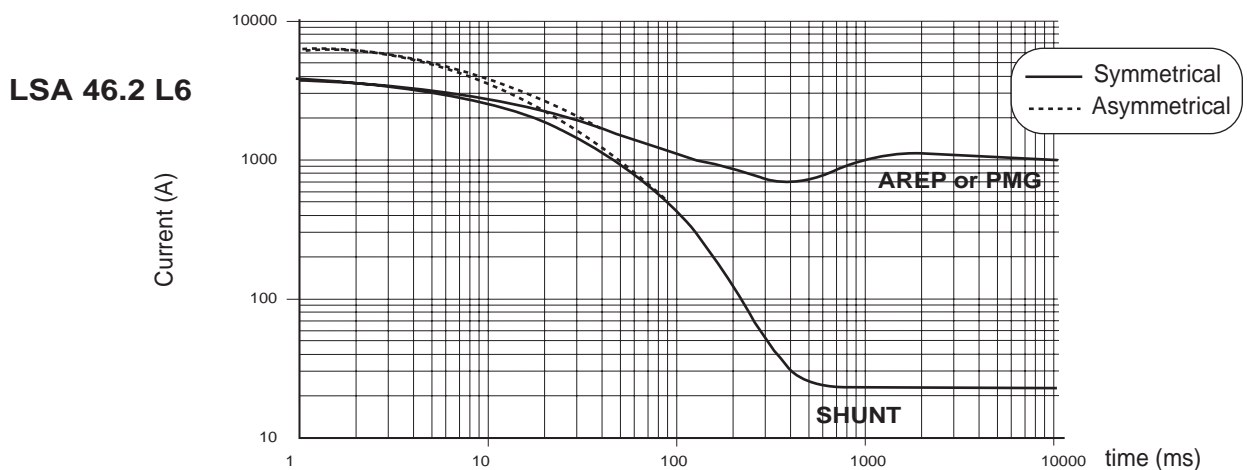
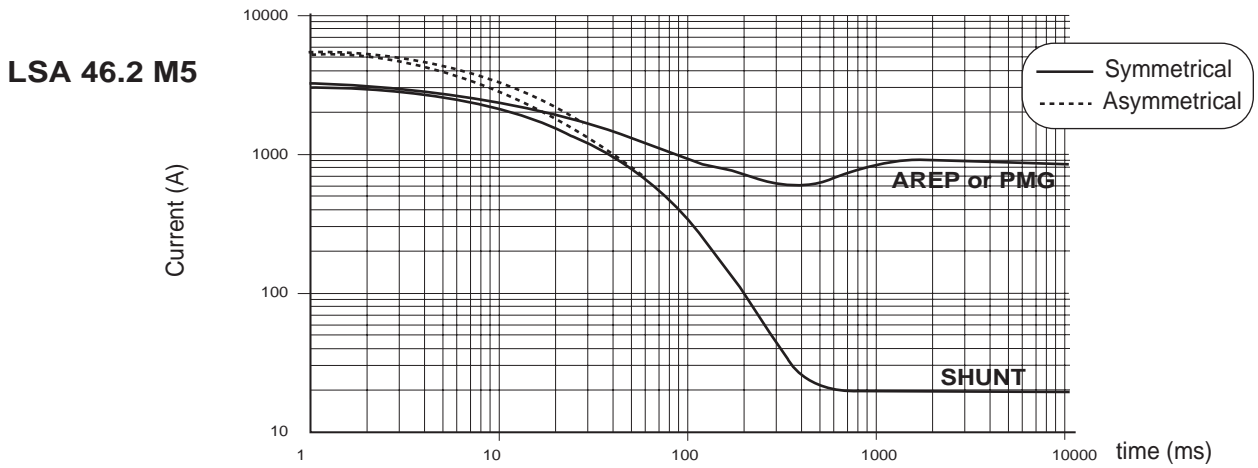
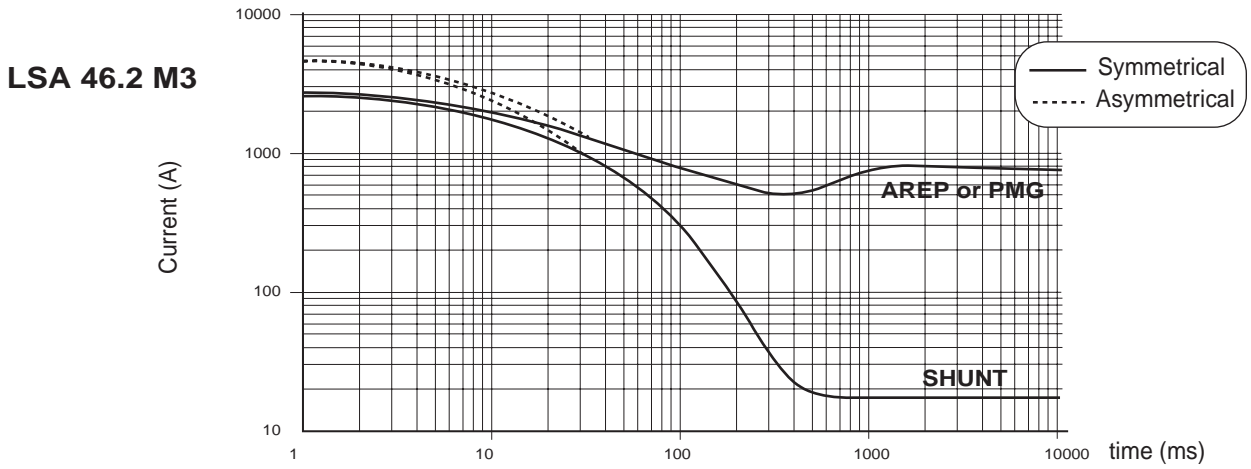
Motor starting (AREP or PMG excitation)



- 1) For a starting P.F. differing from 0,6 , the starting kVA must be multiplied by  $(\text{Sine } \varnothing / 0,8)$
- 2) For voltages other than 480V(Y), 277V( $\Delta$ ), 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)**



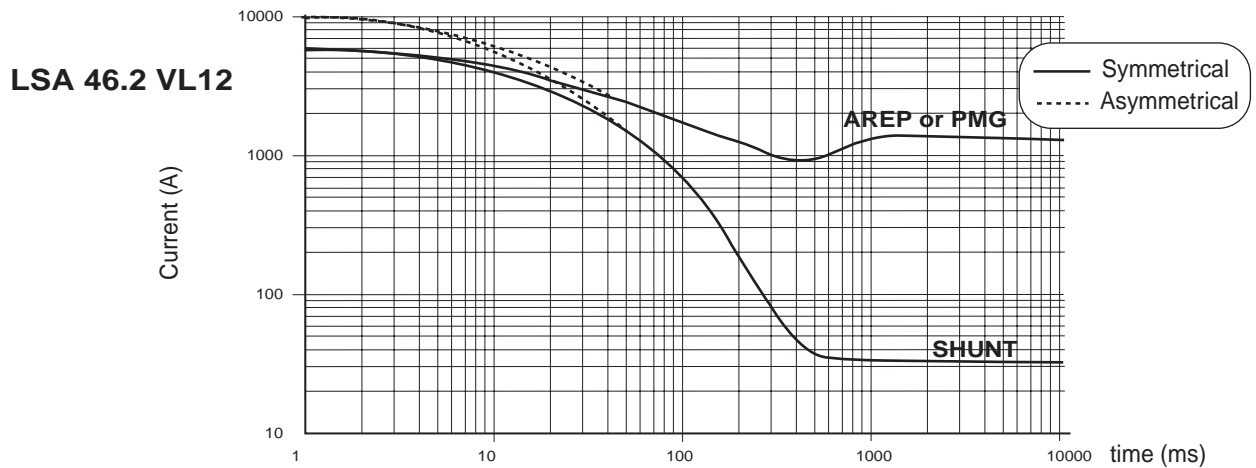
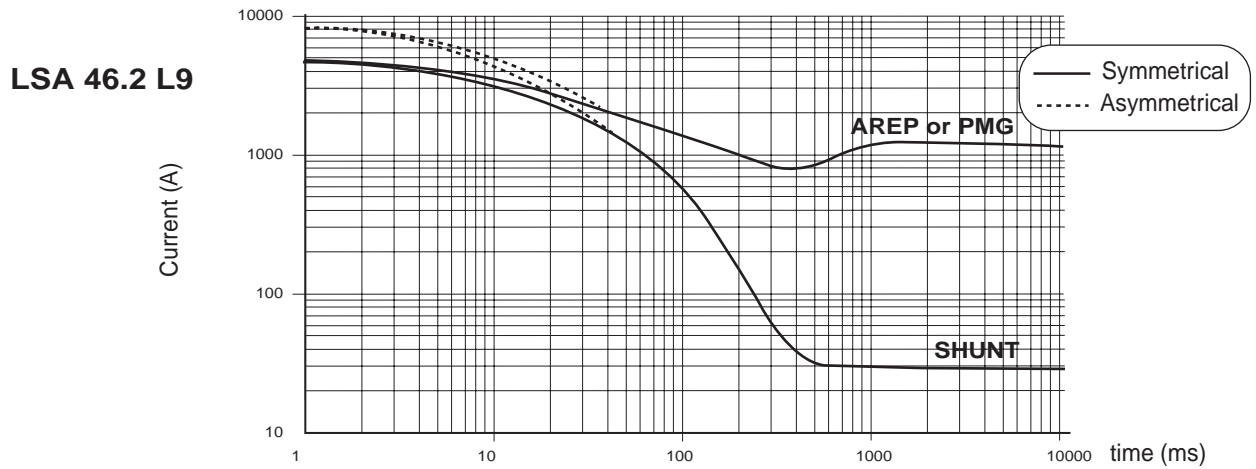
**Influence due to connexion.**

Curves shown are for star connection (Y).

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)**



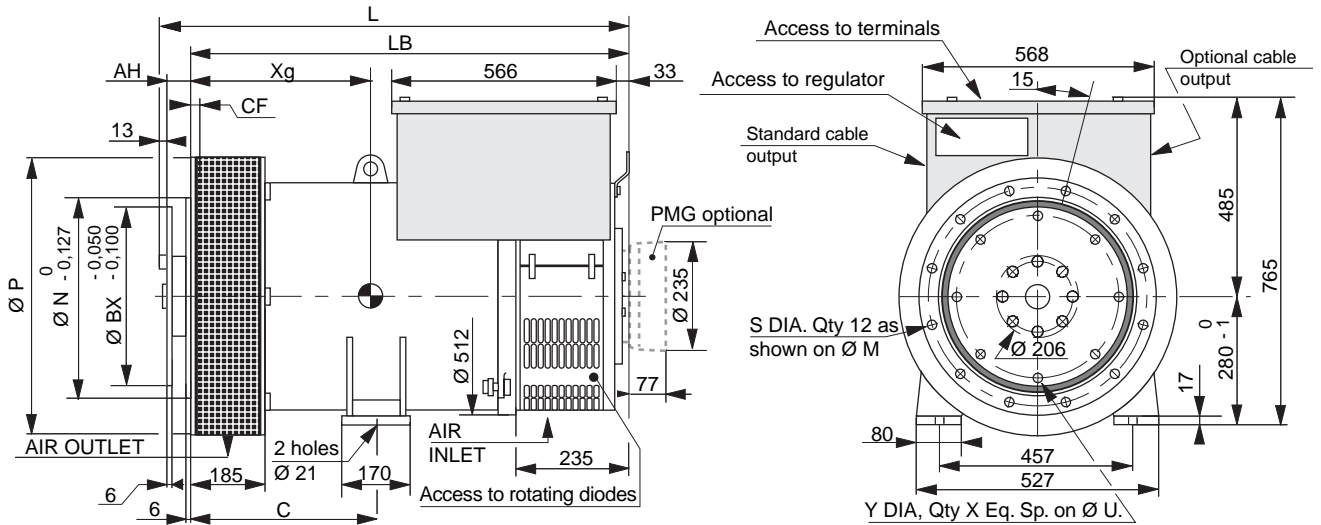
**Influence due to short-circuit.**

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

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

	<b>3 phase</b>	<b>2 phase L - L.</b>	<b>1 phase L - N.</b>
<b>Instantaneous (Max)</b>	1	0,87	1,3
<b>Sustained</b>	1	1,5	2,2
<b>Max sustained duration (AREP/ PMG)</b>	10 sec.	5 sec.	2 sec.

## Single bearing dimensions



Frame dimensions					
TYPE	L max without PMG	LB	Xg	C	Weight (kg)
LSA 46.2 M3	973	920	460	429	585
LSA 46.2 M5	973	920	470	429	625
LSA 46.2 L6	1083	1030	460	429	710
LSA 46.2 L9	1083	1030	485	429	775
LSA 46.2 VL12	1175	1130	530	525	895

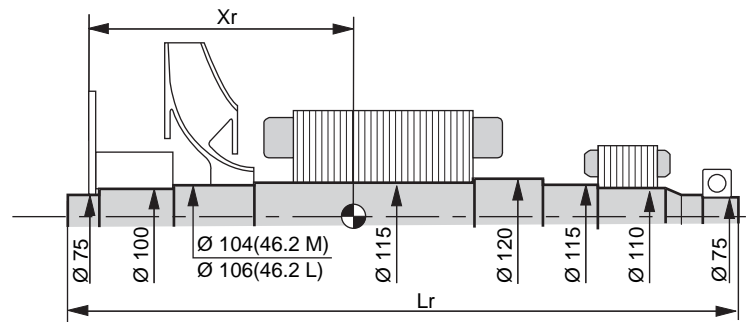
Coupling		
Flex plate	11 <sup>1/2</sup>	14
Flange S.A.E 3	X	
Flange S.A.E. 2	X	
Flange S.A.E 1	X	X
Flange S.A.E. 1/2		X

Flange (mm)						
S.A.E.	P	N	M	S	R	CF
3	575*/623	409,575	428,625	11	345*/368	24*/17
2	575*/623	447,675	466,725	11	345*/368	24*/17
1	575*/623	511,175	530,225	12	345*/368	24*/17
1/2	651	584,2	619,125	14,5	382	17

Flex plate (mm)					
S.A.E.	BX	U	X	Y	AH
11 1/2	352,42	333,38	8	11	39,6
14	466,72	438,15	8	14	25,4

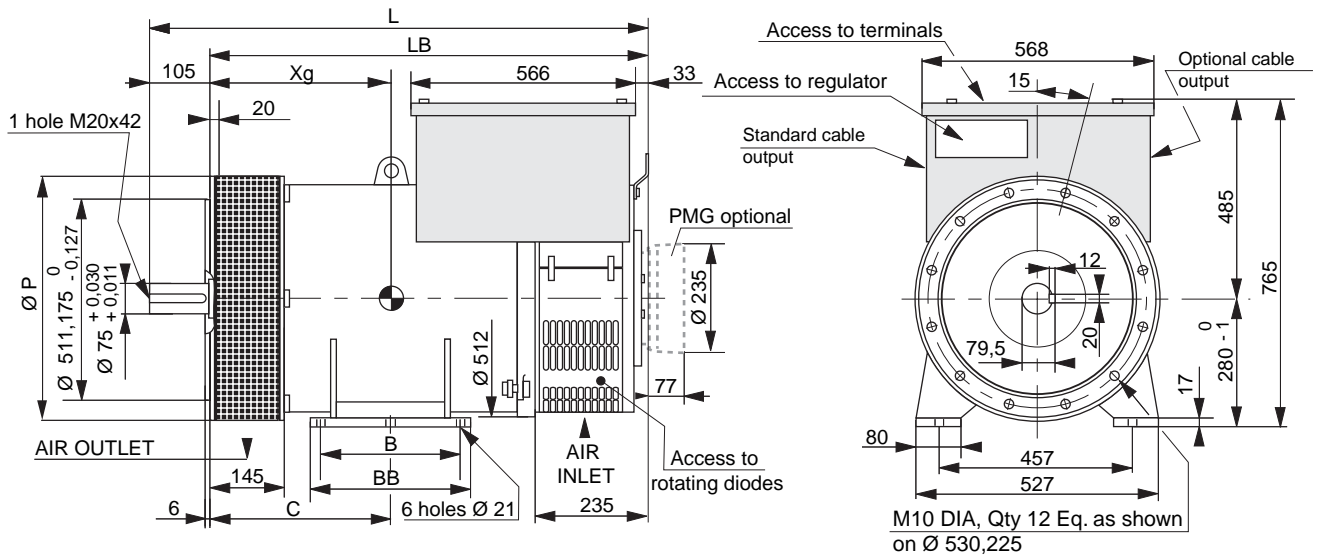
\* : dimensions LSA 46,2 M

## Torsional analysis data



Gravity center : Xr (mm), Rotor length Lr (mm), Weight : M (kg), Moment of inertia : J (kgm <sup>2</sup> ) : (4J = MD <sup>2</sup> )								
TYPE	Flex plate S.A.E. 11 1/2				Flex plate S.A.E. 14			
	Xr	Lr	M	J	Xr	Lr	M	J
LSA 46.2 M3	422	935	229	1,78	407	935	229,4	1,909
LSA 46.2 M5	434	935	245	1,948	419	935	245,3	2,077
LSA 46.2 L6	466	1045	278	2,329	451	1045	278,8	2,458
LSA 46.2 L9	485	1045	304,3	2,605	474	1045	304,9	2,724
LSA 46.2 VL12	540	1145	357	3,1	529	1145	357,6	3,216

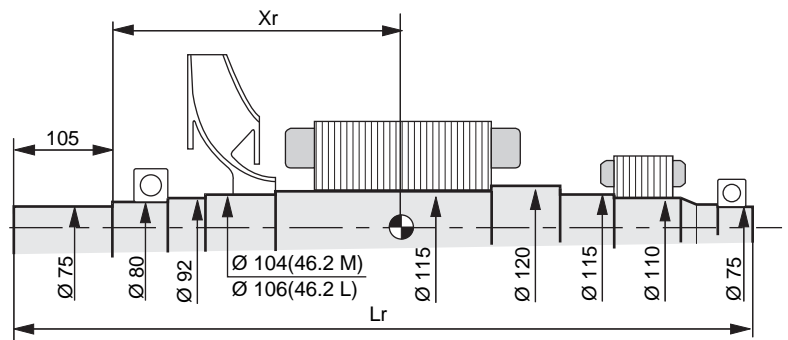
## Two bearing dimensions



### Frame dimensions

TYPE	L max without PMG	LB	P	C	BB	B	R	Xg	Weight (kg)
LSA 46.2 M3	985	880	575	389	418	368	345	400	570
LSA 46.2 M5	985	880	575	389	418	368	345	410	615
LSA 46.2 L6	1095	990	623	389	418	368	368	430	705
LSA 46.2 L9	1095	990	623	389	418	368	368	455	770
LSA 46.2 VL12	1195	1090	623	485	610	560	368	500	885

## Torsional analysis data



### Gravity center : Xr (mm), Rotor length Lr (mm), Weight : M (kg), Moment of inertia : J (kgm<sup>2</sup>) : (4J = MD<sup>2</sup>)

TYPE	Xr	Lr	M	J
LSA 46.2 M3	395	955	199,9	1,57
LSA 46.2 M5	404	955	215,8	1,738
LSA 46.2 L6	436	1065	247,6	2,109
LSA 46.2 L9	453	1065	273,7	2,385
LSA 46.2 VL12	502	1165	323,8	2,845

# DSECONTROL<sup>®</sup> MONITORING WITH INTELLIGENCE.



## DSE7310 & DSE7320

AUTO START & AUTO MAINS FAILURE CONTROL MODULES (COMMUNICATIONS & EXPANSION)



The DSE7310 and DSE7320 are new control modules for single gen-set applications. The modules have been developed from the successful DSE5310 and DSE5320 Series and incorporate a number of advanced features to meet the most demanding on-site applications.

The DSE7310 is an Automatic Start Control Module and the DSE7320 is an Auto Mains (Utility) Failure Control Module. Both modules have been designed to start and stop diesel and gas generating sets that include electronic and non-electronic engines. The DSE7320 includes the additional capability of being able to monitor a mains (utility) supply.

Both modules include USB, RS232 and RS485 ports as well as dedicated DSENet<sup>®</sup> terminals for expansion device connectivity.

The modules are simple to operate and feature a newly designed menu layout for improved clarity. Enhanced features include a real time clock for enhanced event and performance monitoring, ethernet communications for low cost monitoring, mutual standby to reduce engine wear and tear, trend analysis to assist in the detection of patterns in engine status and preventative maintenance designed to detect if engine parts have developed fault conditions so they can be replaced before a major problem occurs.

### FEATURES

- Backed up real time clock
- 132 x 64 pixel LCD display
- Configurable display languages
- USB connectivity
- Robust module enclosure
- Five-key menu navigation
- Durable soft touch membrane buttons
- Fully configurable via PC software
- LED and LCD alarm indication
- Engine exercise mode
- Configurable start & fuel outputs
- kWh monitoring
- Automatic load transfer
- Eight configurable digital inputs
- Six configurable outputs
- Configurable timers and alarms
- Modbus RTU
- Magnetic pick-up
- Front panel programming
- Multiple date and time exercise scheduler
- SMS messaging
- Power save mode
- PIN protected programming
- User selectable RS232 & RS485 communications
- DSENet<sup>®</sup> compatible
- Ethernet communications via DSE860/865
- Customer logo display capability
- Multiple date and time maintenance scheduler
- Configurable display pages
- Programmable load shedding/acceptance
- Trend analysis
- Preventative maintenance
- kW overload protection
- Unbalanced load protection
- PDA compatible PC software
- Flexible sender input
- Configurable SCADA output page

### NEW FEATURES

- True dual mutual standby with load balancing timer
- Fan control for additional cooling
- 'Protections Disabled' facility
- Fuel usage monitoring and low fuel alarm
- Support for up to three remote display units
- Automatic sleep mode
- Easy access, configurable diagnostics page shows summary of output states
- Improved programmable event log (250) showing date and time
- Manual fuel pump control
- Alternative configuration
- Multiple date and time scheduler
- 3 Programmable Maintenance alarms with comms alert
- Customisable status screens
- Low fuel level alarm delay
- Charge alternator fail warning and shutdown alarms with user programmable delay
- Independent Earth fault trip
- Sleep mode
- Load switching (Load shedding and dummy load outputs)
- Manual speed trim (on CAN engines that support this feature)
- Additional display screens to help with modern diagnostics
- Security levels – PC software has password system to control access to PC software features
- Operator configurable virtual LEDs visible in SCADA

### SPECIFICATION

#### DC SUPPLY

**CONTINUOUS VOLTAGE RATING**  
8V to 35V Continuous

**CRANKING DIP PROTECTION**  
Able to survive 0V for 50ms, providing supply was at least 10V before dropout and supply recovers to 5V. This is achieved without the need for internal batteries

**CHARGE FAIL/ EXCITATION**  
0V to 35V fixed power source 2.5W

**MAXIMUM STANDBY CURRENT**  
160mA at 12V 80mA at 24V

**MAXIMUM OPERATING CURRENT**  
340mA at 12V 160mA at 24V

#### ALTERNATOR INPUT

**RANGE**  
15V - 333V (L-N) 50Hz - 60Hz  
(Minimum 15V AC Ph-N)

**ACCURACY**  
1% of full scale true RMS sensing

**SUPPORTED TOPOLOGIES**  
3 phase 4 wire  
3 phase 3 wire  
Single phase 2 wire  
2 phase 3 wire L1 & L2  
2 phase 3 wire L1 & L3

#### MAINS/UTILITY INPUT (DSE7320 ONLY)

**RANGE**  
15V - 333V (L-N) 50Hz - 60Hz  
(Minimum 15V AC Ph-N)

**ACCURACY**  
1% of full scale true RMS sensing

**SUPPORTED TOPOLOGIES**  
3 phase 4 wire  
3 phase 3 wire  
Single phase 2 wire  
2 phase 3 wire L1 & L2  
2 phase 3 wire L1 & L3

#### CT'S

**BURDEN**  
0.5VA

**PRIMARY RATING**  
1A - 8000A (user selectable)

**SECONDARY RATING**  
1A or 5A secondary (user selectable)

**ACCURACY OF MEASUREMENT**  
1% of full load rating

**RECOMMENDATIONS**  
Class 1 required for instrumentation  
Protection class required if using for protection

## SPECIFICATION

### MAGNETIC PICKUP

#### VOLTAGE RANGE

+/- 0.5V minimum (during cranking) to 70V peak

#### FREQUENCY RANGE

10,000 Hz (max)

### RELAY OUTPUTS

#### OUTPUT A (FUEL)

15 Amp DC at supply voltage

#### OUTPUT B (START)

15 Amp DC at supply voltage

#### OUTPUTS C & D

8 Amp 250V (Volt free)

#### AUXILIARY OUTPUTS E,F,G,H

2 Amp DC at supply voltage

### DIMENSIONS

#### OVERALL

240mm x 181.1mm x 41.7mm  
9.4" x 7.1" x 1.6"

#### PANEL CUT-OUT

220mm x 160mm  
8.7" x 6.3"  
Max panel thickness 8mm (0.3")

## TESTING STANDARDS

### ELECTRICAL SAFETY/ ELECTROMAGNETIC COMPATIBILITY

#### BS EN 60950

Safety of Information Technology Equipment, including Electrical Business Equipment

#### BS EN 61000-6-2

EMC Generic Immunity Standard (Industrial)

#### BS EN 61000-6-4

EMC Generic Emission Standard (Industrial)

### ENVIRONMENTAL

#### BS EN 60068-2-1

Cold Temperature -30°C

#### BS EN 60068-2-2

Hot Temperature +70°C

#### BS EN60068-2-30 HUMIDITY

Test Db cyclic  
93% RH @ 40°C for 48 hours

#### BS EN 60068-2-6 VIBRATION

10 sweeps at 1 octave/minute in each of 3 major axes  
5Hz to 8Hz @ +/-7.5mm constant displacement  
8Hz to 500Hz @ 2gn constant acceleration

#### BS EN 60068-2-27 SHOCK

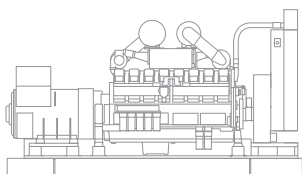
3 half sine shocks in each of 3 major axes  
15gn amplitude, 11ms duration

#### BS EN 60529 DEGREES OF PROTECTION PROVIDED BY ENCLOSURES

- **IP65** (Front of module when installed into the control panel with the supplied sealing gasket)

#### NEMA RATING (APPROXIMATE)

- **12** (Front of module when installed into the control panel with the supplied sealing gasket)



**ELECTRONIC ENGINE CAPABILITY**

## BENEFITS

- 132 x 64 pixel ratio makes information easy to read
- Real time clock provides accurate event logging
- PC software is license free
- Set maintenance periods can be configured to maintain optimum engine performance
- Ethernet communications provides advanced remote monitoring at low cost
- Modules can be integrated into building management systems
- Preventative maintenance avoids expensive engine down time
- Advanced PCB layout ensures high reliability
- Robust design
- Extensive performance monitoring

## OPERATION

The modules are operated via the START, STOP, AUTO and MANUAL soft touch membrane buttons on the front panel. The DSE7320 also has a TEST button. Both modules include load switch buttons. The main menu system is accessed using the five navigation buttons to the left of the LCD display.

## CONFIGURATION

The modules can be configured using the front panel buttons or by using the PC software and a USB lead.

## COMMUNICATIONS

The DSE7310 & DSE7320 have a number of different communication capabilities.

## SMS Messaging

When the module detects an alarm condition, it has the ability to send an SMS message to a dedicated mobile number (s), notifying an engineer of the exact time, date and reason why the engine failed (GSM Modem and SIM Card required).

## Remote Communications

When the module detects an alarm state, it dials out to a PC notifying the user of the condition (Modem required).

## Remote Control

The module can be controlled remotely using either a GSM Modem, Ethernet via DSE860/865 or via RS485. Using a modem allows the module to be controlled from any distance. Using RS485 limits the distance to 1km (0.6 miles).

## Building Management

The module has been designed to be integrated into new and existing building management systems, using RS485.

## PC Software

The module has the ability to be configured and monitored from a remote PC, using the PC software and a USB lead.

## INPUTS & OUTPUTS

Analogue inputs are provided for oil pressure, coolant temperature and fuel level. These connect to conventional engine mounted resistive sender units to provide accurate monitoring and protection facilities. They can also be configured to interface with digital switch type inputs for low oil pressure and high coolant temperature shutdowns. Eight user configurable digital inputs are also included, plus one flexible sender.

Relays are provided for fuel solenoid output, start output and six additional configurable outputs. On these configurable outputs a range of different functions, conditions or alarms can be selected.

## INSTRUMENTATION

The modules provide advanced metering facilities, displaying the information on the LCD display. The information can be accessed using the five-key menu navigation to the left of the display.

### 7310

#### Generator Instruments

Volts, Hz, Amps, kW, kVA, Pf, kWh, kVAr, kVArh, KVAh

#### Engine Instruments

RPM, Oil Pressure, Coolant Temperature, Hours Run, Charging Voltage, Battery Volts.

#### Electronic Engines

Enhanced Instrumentation and Engine ECU diagnostics via electronic engine interface.

### 7320

#### Generator Instruments

Volts, Hz, Amps, kW, kVA, Pf, kWh, kVAr, kVArh, KVAh

#### Engine Instruments

RPM, Oil Pressure, Coolant Temperature, Hours Run, Charging Voltage, Battery Volts.

#### Electronic Engines

Enhanced instrumentation and Engine ECU diagnostics via electronic engine interface.

#### Mains/Utility Instruments

Volts, Frequency, Amps (optional when CT's are fitted load side of the line)

## RELATED MATERIALS

### TITLE

DSE7xxx Manual  
DSE72xx/73xx PC Software Manual  
DSE2130 Data Sheet  
DSE2157 Data Sheet  
DSE2548 Data Sheet  
DSE860/865 Data Sheet

### PART NO'S

057-074  
057-077  
053-060  
053-061  
053-062  
055-071

## DSENET®

DSENet® is a collection of expansion modules that have been created to work with DSENet® compatible control modules. DSENet® allows up to 20 different expansion devices to be used at a time. 10 of these devices can be of the same type (excluding DSE2130). The expansion modules available are:

## Available Now

DSE2157 Relay Output Expansion Module  
DSE2130 Input Expansion Module  
DSE2548 Annunciator Module  
Remote Display Module

## Coming Soon

FET Output Expansion Module  
NFPA 110 Interface Module  
Identification Dongle

## EVENT LOG

The module includes a comprehensive event log that shows the most recent 250 alarm conditions and the date and time that they occurred. This function assists the user when fault finding and maintaining a generating set.

## ELECTRONIC ENGINE COMPATIBILITY

- CAT
- Cummins
- Deutz
- John Deere
- MTU
- Perkins
- Scania
- Volvo
- IVECO
- Generic
- Plus additional manufacturers

# DSE7310 & DSE7320

