

1100 Series 1106A-70TAG4 Diesel Engine – Electropak

200 kVA Prime Power / 220 kVA Standby Power

Building upon Perkins proven reputation within the power generation industry, the 1100 Series range of Electropak engines now fit even closer to customers needs.

In the world of power generation success is only gained by providing more for less. With the 1106A-70TAG Perkins has engineered even higher levels of reliability, yet lowered the cost of ownership.

1100A units are designed for territories that do not require compliance to EPA or EU emissions legislation. These engines are assembled around optimal, efficient manufacturing processes with state-of-the-art technology. They are built to provide the exact power solution for customers who sell their applications into lesser regulated countries.

Focusing on our common platform theme, changes to engine envelope dimensions and connection points have been kept to a minimum.



Dependable power

- The Perkins 1106A-70TAG delivers up to 220 kVA standby at 50 Hz, providing greater productivity through an improved power to weight ratio
- This world-class power density has been achieved in a 7 litre engine, using a mechanical fuel injection system; making this engine robust for all markets, with the ability to cope with the variation of fuel qualities around the world

The 1106A has been designed for excellent load acceptance to ensure your facility is powered quickly at all conditions

Low operating costs

- Service intervals are set at 500 hours as standard.
- Perkins provides comprehensive warranty cover for two years (up to 3,000 hours), with three years on major engine components
- A low usage warranty package is also available

World class product support

- 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 finger tips, covering technical information, parts identification and ordering systems, all dedicated to maximising the productivity of your engine
- Perkins actively pursues product support excellence by insisting our distribution network invest in their territory to provide you with a consistent quality of support across the globe
- Throughout the entire life of a Perkins engine, we provide access to genuine OE specification parts giving 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

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Engine Speed rpm	Type of Operation	Typical Generator Output (Net)		Engine Power			
				Gross		Net	
		kVA	kWe	kWm	hp	kWm	hp
1500	Prime Power	200	160	178.9	240	173.9	240
	Standby (maximum)	220	176	196.3	263	191.3	256

Photographs are for illustrative purposes only and may not reflect final specification.

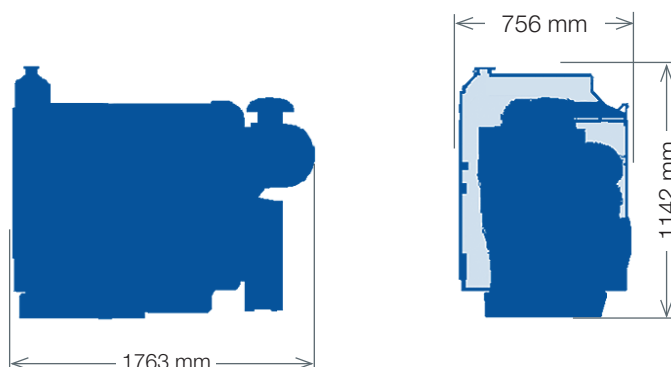
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 **Perkins®**

THE HEART OF EVERY GREAT MACHINE

1100 Series 1106A-70TAG4 Diesel Engine – Electropak

200 kVA Prime Power / 220 kVA Standby Power



Engine specification

- Tropical radiator pipes and guards
- Flywheel housing
- Flywheel and starter ring
- Oil filters
- Starter motor
- Air cleaners and brackets
- Lubricating oil sump
- Alternator
- Induction manifolds
- Exhaust manifolds
- Fuel filter
- Cold start aid
- Engine mountings

Engine data

Number of cylinders Vertical in-line 6 cylinder
Bore and stroke 105 x 135 mm (4.13 x 5.31 in)
Displacement 7.01 litres (428 in³)
Aspiration Turbocharged aftercooled
Cycle 4 stroke
Combustion system Direct injection
Compression ratio 16:1
Engine rotation Anti-clockwise viewed on flywheel
Cooling system Liquid
Total lubrication capacity 16.5 litres (4.36 US gal)
Total coolant capacity 21 litres (5.5 US gal)
Dimensions – Length 1763 mm (69.4 in) with air cleaner
Width 756 mm (29.8 in)
Height 1142 mm (45 in)
Dry weight 788 kg (1737 lbs)
Final weight and dimensions will depend on completed specification

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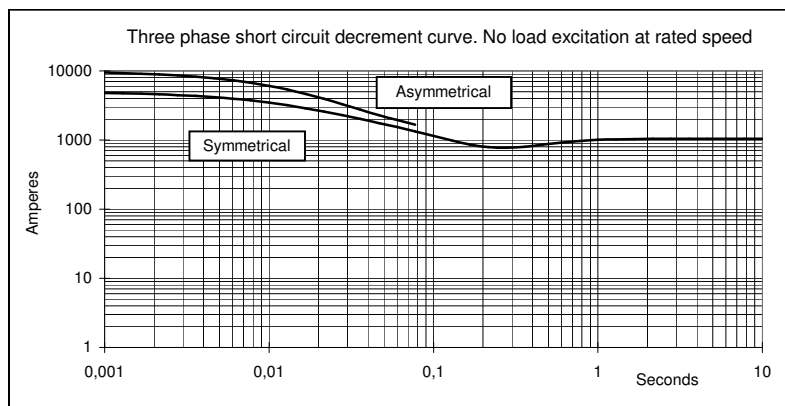
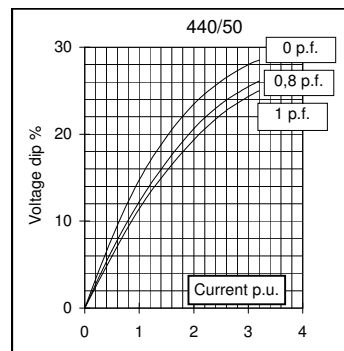
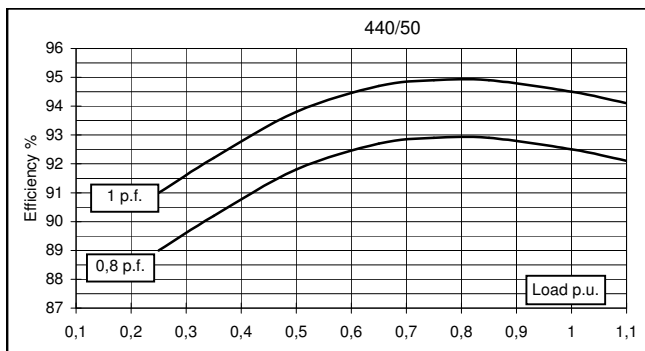
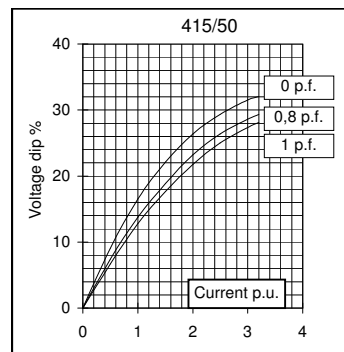
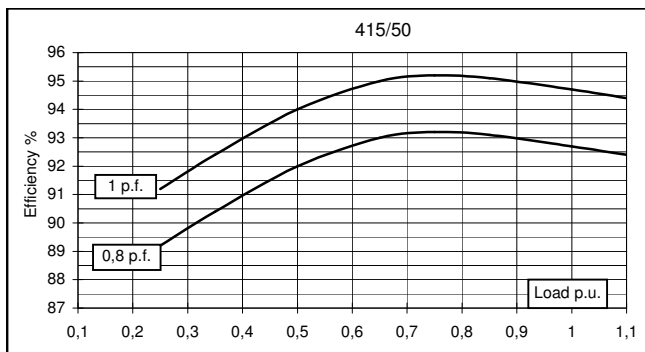
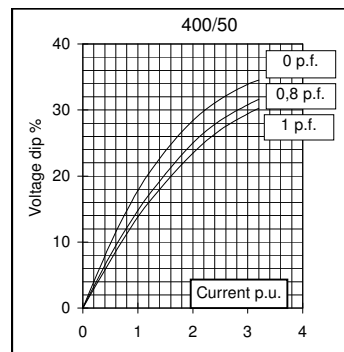
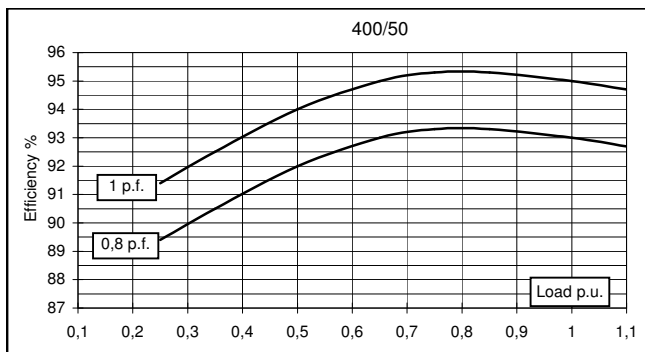
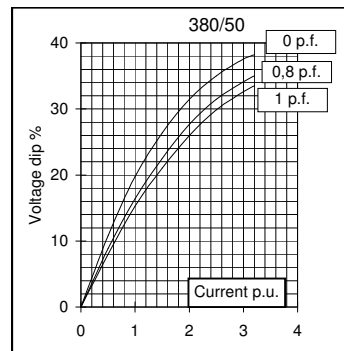
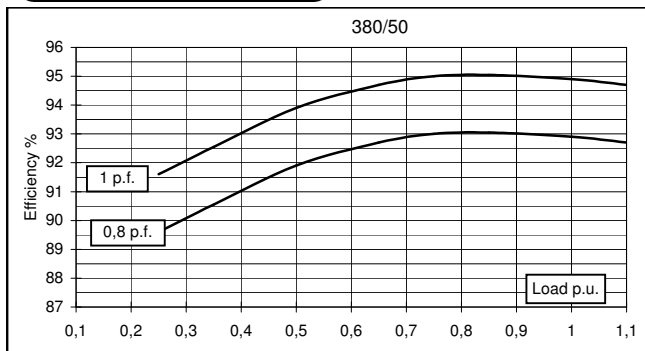
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Electrical Characteristics										
Frequency		Hz	50				60			
Voltage (series star)		V	380	400	415	440	415	440	460	480
Rated power class H		kVA	225	225	225	210	260	270	270	270
		kW	180	180	180	168	208	216	216	216
Rated power class F		kVA	207	207	207	190	240	250	250	250
		kW	166	166	166	152	192	200	200	200
Regulation with		DSR	±1 % with any power factor and speed variations between -5% +30%							
Insulation class			H							
Execution			Brushless							
Stator winding			12 ends							
Rotor			with damping cage							
Efficiencies class H	4/4	%	92,9	93	92,7	92,5	93,5	94	94,1	94,2
(see graph. for details)	3/4	%	93	93,3	93,2	92,9	93,9	94,1	94,3	94,5
	2/4	%	91,9	92	92	91,8	93,1	93,2	93,3	93,4
	1/4	%	89,6	89,4	89,2	89	90,6	90,6	90,6	90,4
Reactances (f. l.cl. F)	Xd	%	212,7	192	178,4	148,1	247,3	228,5	209,1	192
	Xd'	%	13,6	12,3	11,4	9,5	15,8	14,6	13,4	12,3
	Xd''	%	7,2	6,5	6,0	5,0	8,4	7,7	7,1	6,5
	Xq	%	117,5	106	98,5	81,8	136,6	126,1	115,4	106
	Xq'	%	117,5	106	98,5	81,8	136,6	126,1	115,4	106
	Xq''	%	24,6	22,2	20,6	17,1	28,6	26,4	24,2	22,2
	X ₂	%	17,1	15,4	14,3	11,9	19,8	18,3	16,8	15,4
	X ₀	%	2,9	2,6	2,4	2,0	3,3	3,1	2,8	2,6
Short Circuit Ratio	Kcc		0,42	0,45	0,67	1,12	0,32	0,37	0,42	0,45
Time Constants	Td'	sec.	0,083							
	Td''	sec.	0,013							
	Tdo'	sec.	1,10							
	Tα	sec.	0,018							
Short Circuit Current Capacity		%	>300				>350			
Excitation at no load	Amp.		0,55	0,67	0,8	1,1	0,3	0,4	0,5	0,65
Excitation at full load	Amp.		2,8	3	3,2	3,3	2,4	2,5	2,7	2,9
Overload (long-term)	%	1 hour in a 6 hours period 110% rated load								
Overload per 20 sec.	%	300								
Stator Winding Resistance (20 °C)	Ω	0,0085								
Rotor Winding Resistance (20 °C)	Ω	4,449								
Exciter Resistance (20 °C)	Ω	Rotor : 0,685				Stator : 15,28				
Heat dissipation at f.l.cl.H	W	13757	13548	14175	13622	14460	13787	13543	13299	
Telephone Interference		THF < 2%				TIF < 40				
Radio interference		EN61000-6-3, EN61000-6-2. For others standards apply to factory								
Waveform Distors.(THD) at f. load	LL/LN %	2,8 / 2,9								
Waveform Distors.(THD) at no load	LL/LN %	2,6 / 2,8								
Mechanical characteristics										
Protection		IP 21 (other protection on request)								
DE bearing		6318.2RS								
NDE bearing		6314.2RS								
Weight of wound stator assembly	kg	195								
Weight of wound rotor assembly	kg	128								
Weight of complete generator	kg	590								
Maximun overspeed	rpm	2250								
Unbalanced magnetic pull at f.l.cl.F	kN/mm	5,7								
Cooling air requirement	m³/min	32				39				
Inertia Constant (H)	sec.	0,114				0,137				
Noise level at 1m/7m	dB(A)	82 / 69				86 / 73				

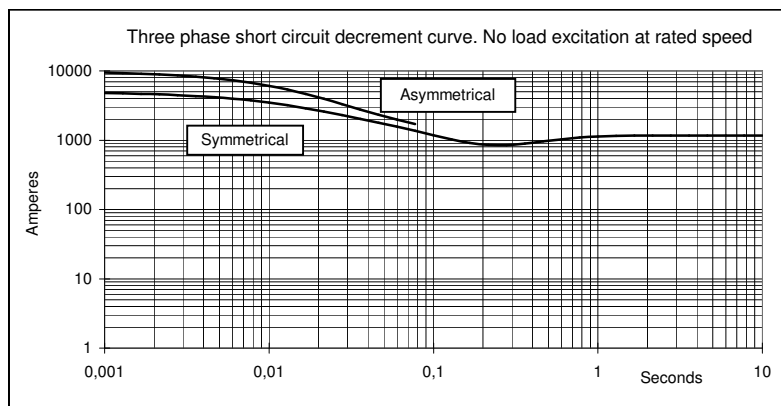
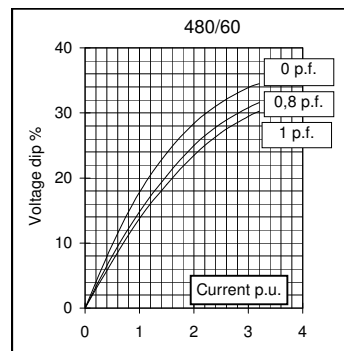
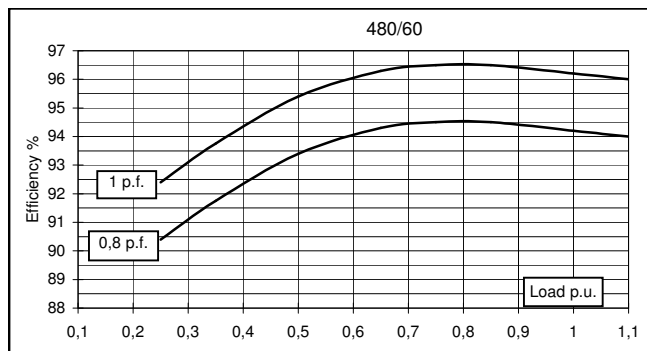
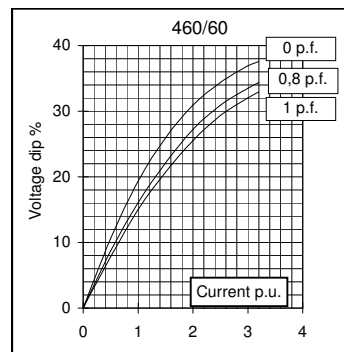
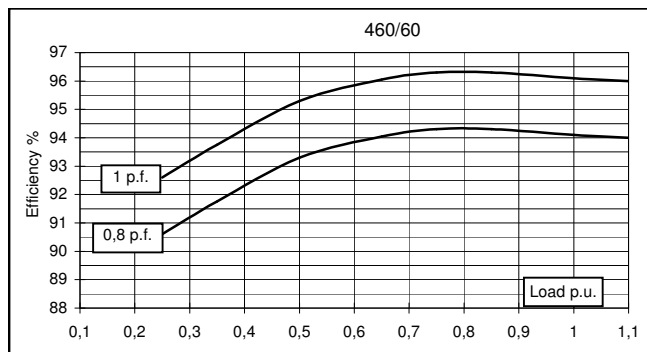
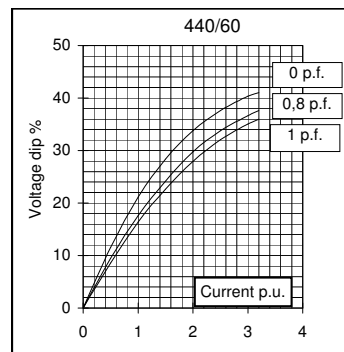
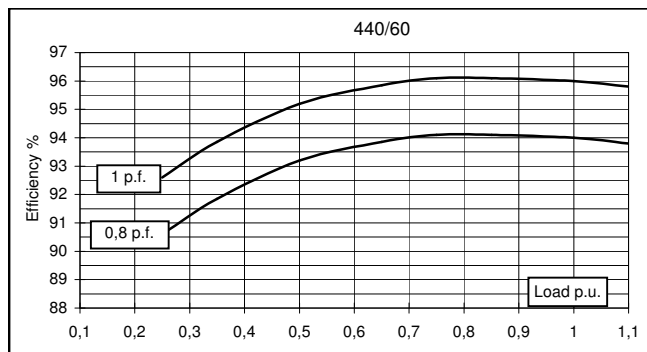
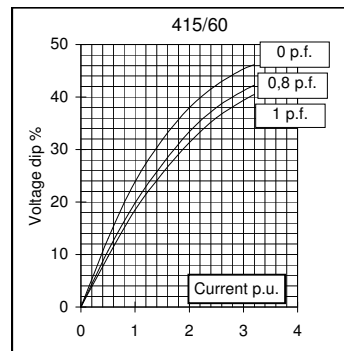
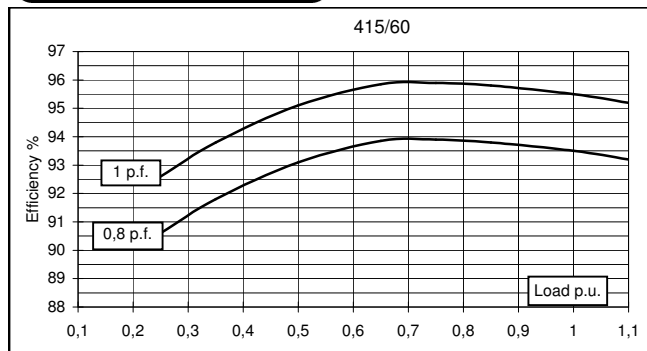
All technical data are to be considered as a reference and they can be modified without any notice

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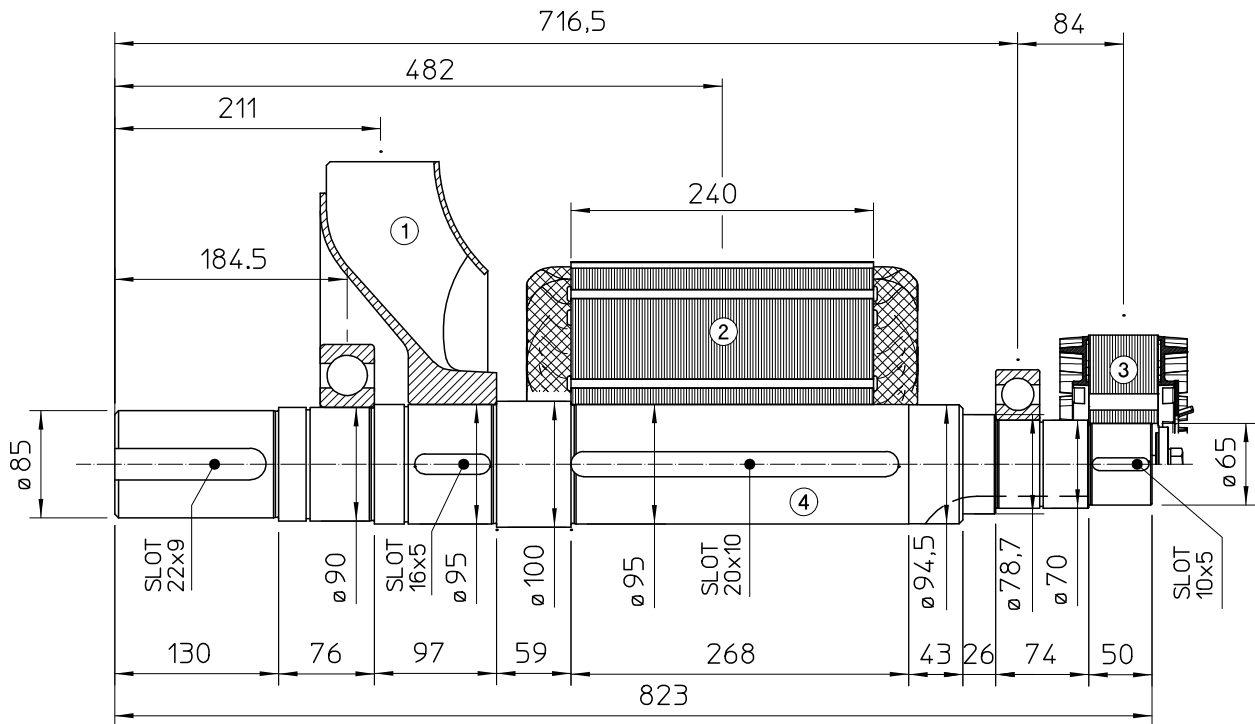
50 Hz



60 Hz

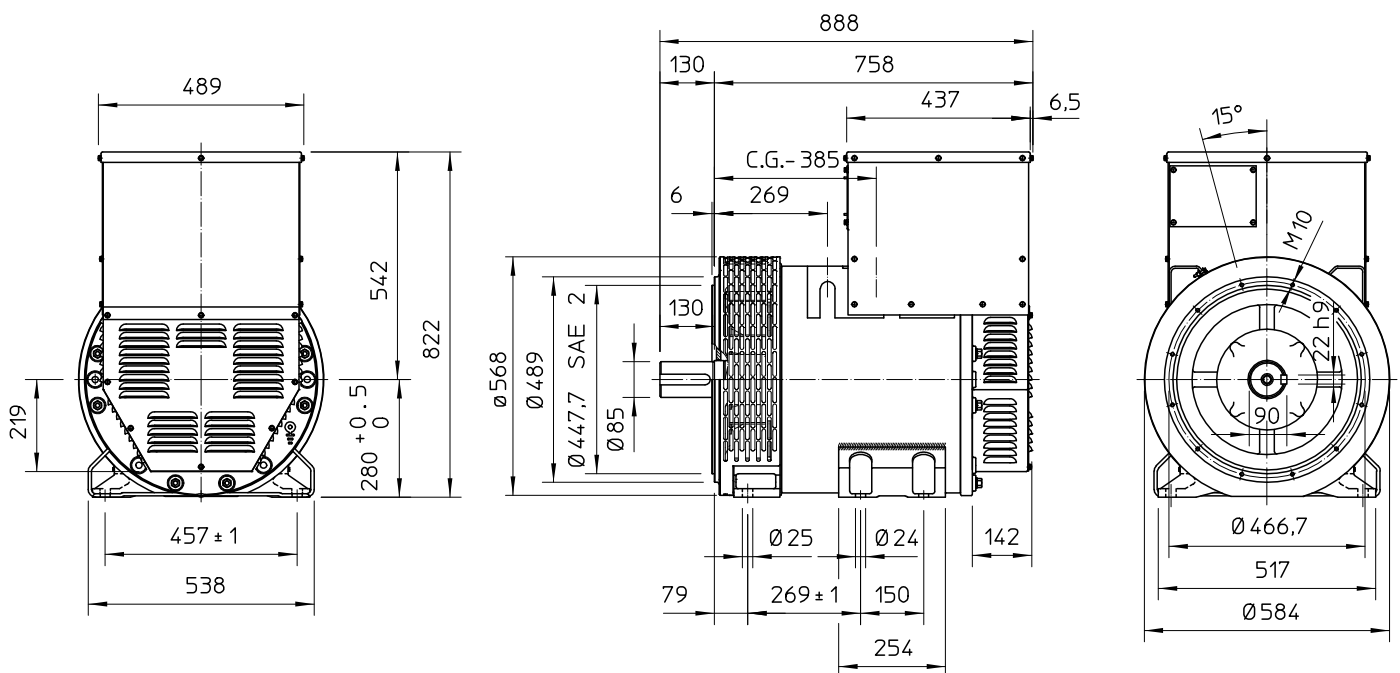


TWO BEARING MOMENTS OF INERTIA

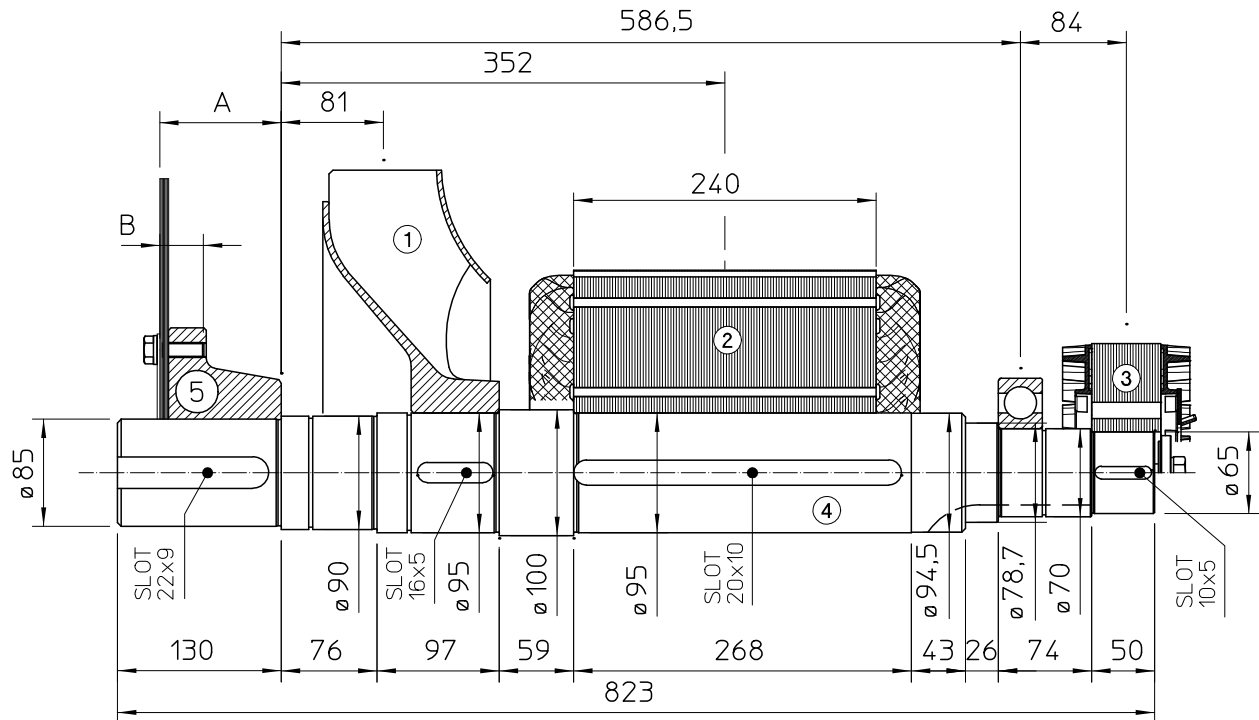


POS.	COMPONENT	WEIGHT (kg)	J (kgm ²)
1	FAN	6.1	0.1887
2	MAIN ROTOR	128	1.7593
3	EX. ROTOR	14.5	0.0874
4	SHAFT	38.5	0.0397
TOTAL		187.1	2.0751

TWO BEARING DIMENSIONS



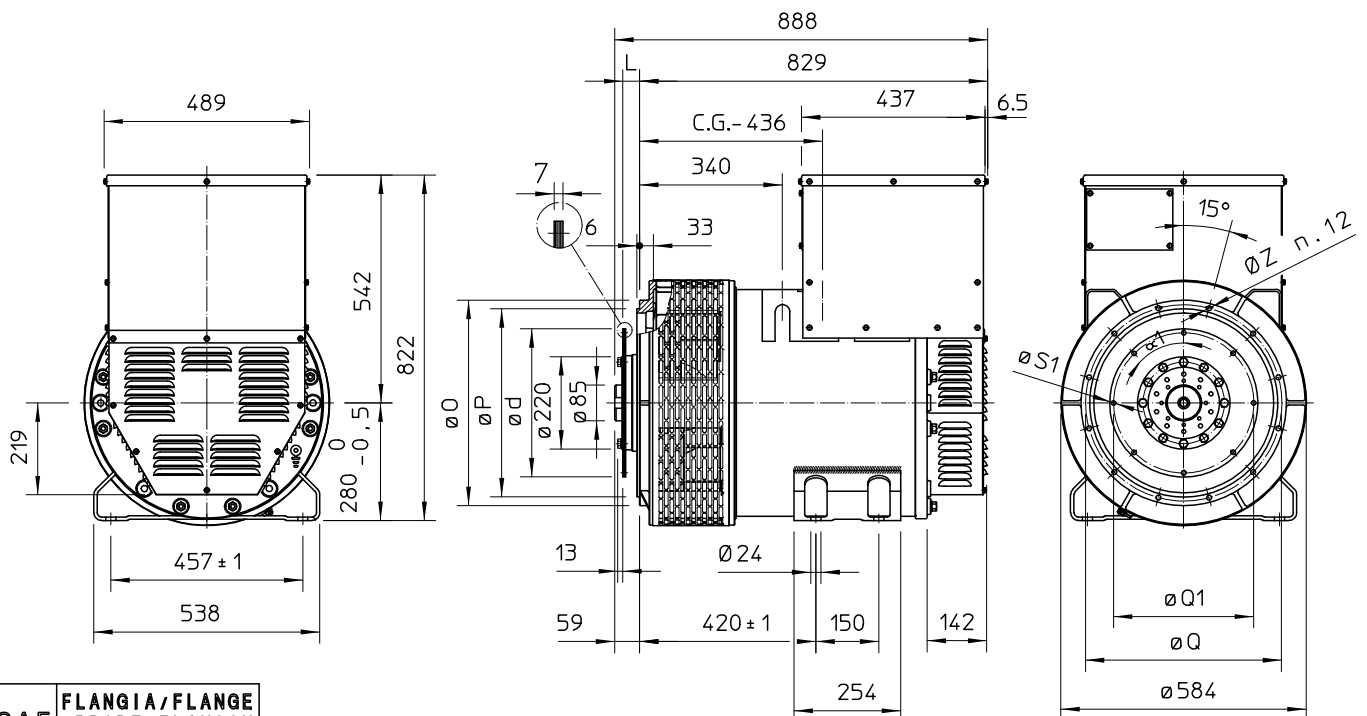
SINGLE BEARING MOMENTS OF INERTIA



POS.	COMPONENT	WEIGHT (kg)	J (kgm ²)
1	FAN	6.1	0.1887
2	MAIN ROTOR	128	1.7593
3	EX. ROTOR	14.5	0.0874
4	SHAFT	38.5	0.0397
TOTAL		187.1	2.0751

SAE N°	5	SHAFTS COUPLING FLEX PLATE			
	A	B	WEIGHT kg	J kgm ²	
11.5	110.4	41.1	20.5	0.174	
14	96.4	34.7	23.5	0.275	

SINGLE BEARING DIMENSIONS

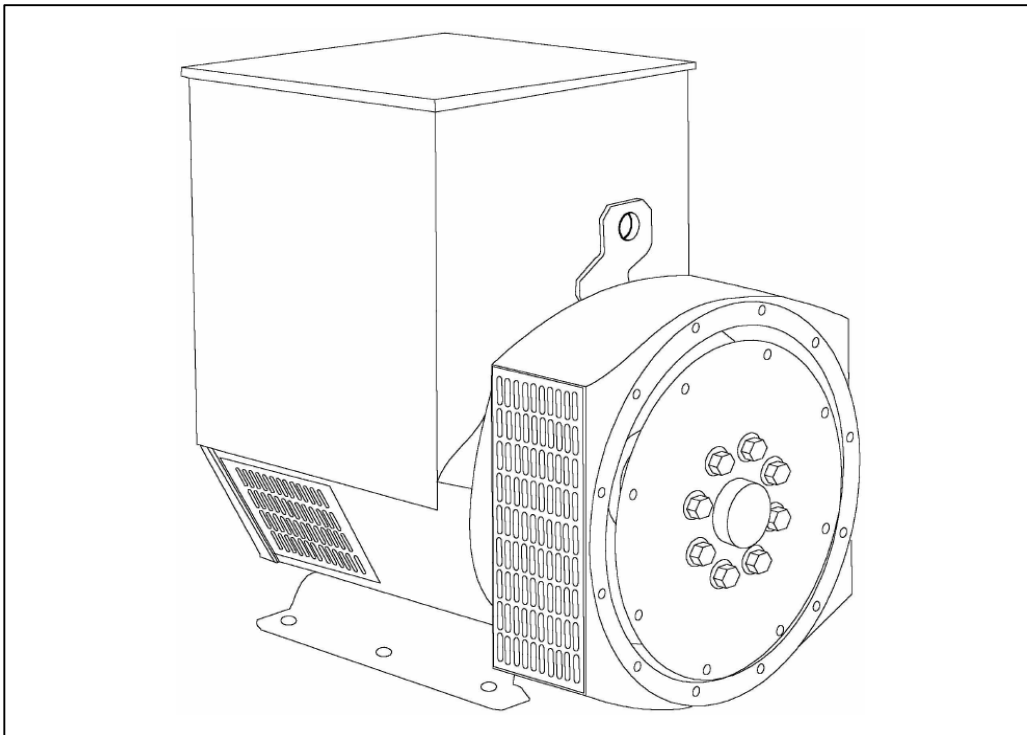


SAE N.	FLANGIA/FLANGE BRIDE/FLANSCH		
	O	P	Q
3	451	409,6	428,6
2	489	447,7	466,7
1	552	511,2	530,2
1/2	648	584,2	619,1

SAE N.	GIUNTI A DISCHI DISC COUPLING DISQUE DE MONOPALIER SCHEIBENKUPPLUNG				
	L	d	Q1	n _{fori}	S1
11 1/2	39,6	352,42	333,37	8	11
14	25,4	466,72	438,15	8	14

C.G.= GRAVITY CENTER

UCI274H - Technical Data Sheet



UCI274H

SPECIFICATIONS & OPTIONS



STANDARDS

Newage Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX460 AVR - STANDARD

With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

SX440 AVR

With this self-excited system the main stator provides power via the AVR to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.

The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

SX421AVR

This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance. Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th ...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.

All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

UCI274H

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED			
A.V.R.	SX460	SX440	SX421	
VOLTAGE REGULATION	± 1.5 %	± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT			

INSULATION SYSTEM	CLASS H		
PROTECTION	IP23		
RATED POWER FACTOR	0.8		
STATOR WINDING	DOUBLE LAYER CONCENTRIC		
WINDING PITCH	TWO THIRDS		
WINDING LEADS	12		
STATOR WDG. RESISTANCE	0.0155 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED		
ROTOR WDG. RESISTANCE	1.82 Ohms at 22°C		
EXCITER STATOR RESISTANCE	20 Ohms at 22°C		
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C		
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4, VDE 0875G, VDE 0875N. refer to factory for others		
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%		
MAXIMUM OVERSPEED	2250 Rev/Min		
BEARING DRIVE END	BALL. 6315-2RS (ISO)		
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)		

	1 BEARING		2 BEARING	
WEIGHT COMP. GENERATOR	626 kg		641 kg	
WEIGHT WOUND STATOR	253 kg		253 kg	
WEIGHT WOUND ROTOR	227.53 kg		216.57 kg	
WR ² INERTIA	1.9349 kgm ²		1.8843 kgm ²	
SHIPPING WEIGHTS in a crate	659 kg		673 kg	
PACKING CRATE SIZE	123 x 67 x 103 (cm)		123 x 67 x 103 (cm)	

	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.514 m³/sec 1090 cfm				0.617 m³/sec 1308 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
KVA BASE RATING FOR REACTANCE VALUES	200	200	200	n/a	237.5	245	245	255
Xd DIR. AXIS SYNCHRONOUS	2.11	1.91	1.77	-	2.50	2.31	2.11	2.02
X'd DIR. AXIS TRANSIENT	0.18	0.16	0.15	-	0.21	0.19	0.18	0.17
X''d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	-	0.14	0.13	0.12	0.11
Xq QUAD. AXIS REACTANCE	1.28	1.15	1.07	-	1.53	1.41	1.29	1.23
X''q QUAD. AXIS SUBTRANSIENT	0.17	0.15	0.14	-	0.20	0.18	0.17	0.16
X _L LEAKAGE REACTANCE	0.08	0.08	0.07	-	0.10	0.09	0.08	0.08
X ₂ NEGATIVE SEQUENCE	0.13	0.12	0.11	-	0.16	0.15	0.13	0.13
X ₀ ZERO SEQUENCE	0.08	0.08	0.07	-	0.10	0.09	0.08	0.08

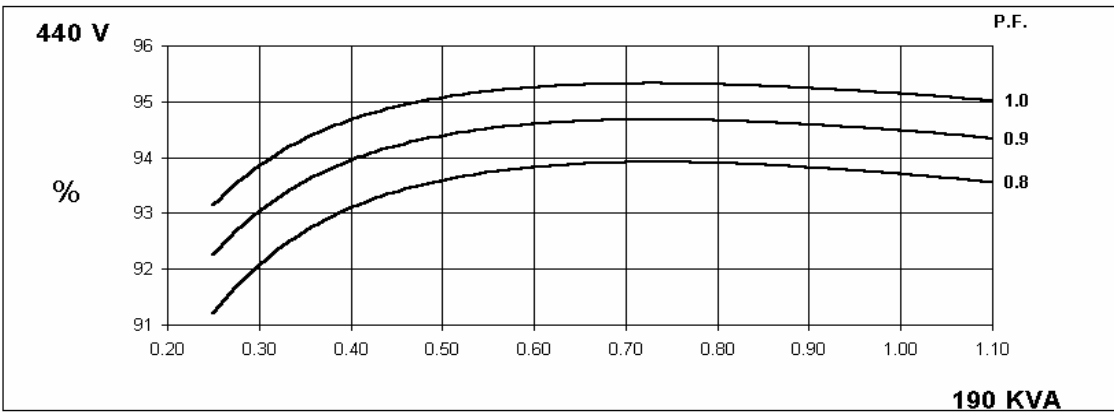
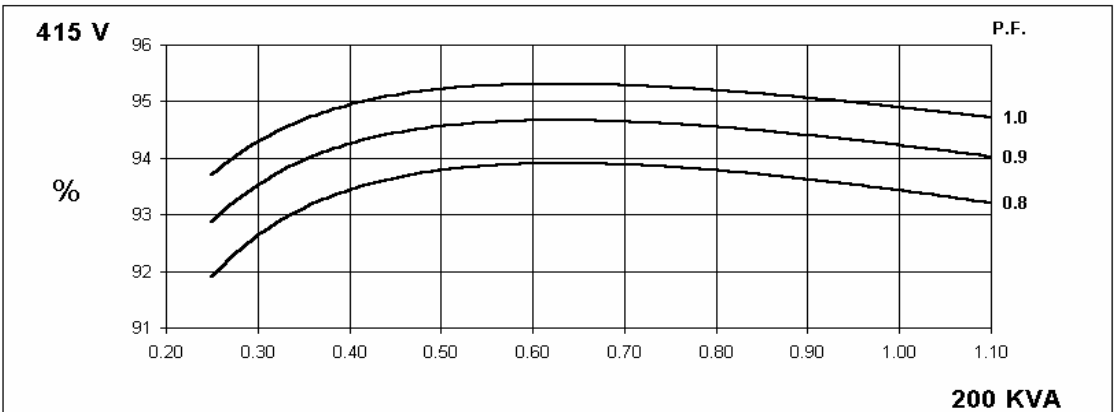
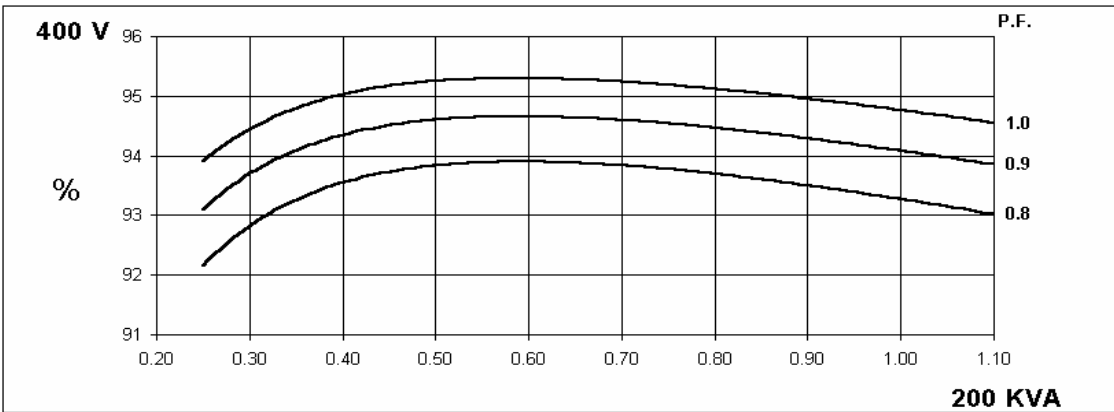
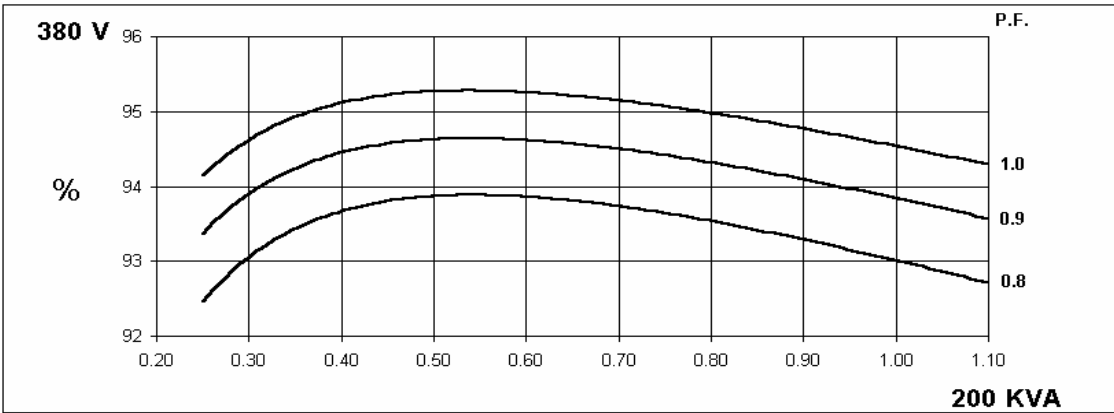
REACTANCES ARE SATURATED		VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED	
T'd TRANSIENT TIME CONST.		0.042 s	
T''d SUB-TRANSTIME CONST.		0.012 s	
T'do O.C. FIELD TIME CONST.		1.1 s	
Ta ARMATURE TIME CONST.		0.012 s	
SHORT CIRCUIT RATIO		1/Xd	

**50
Hz**

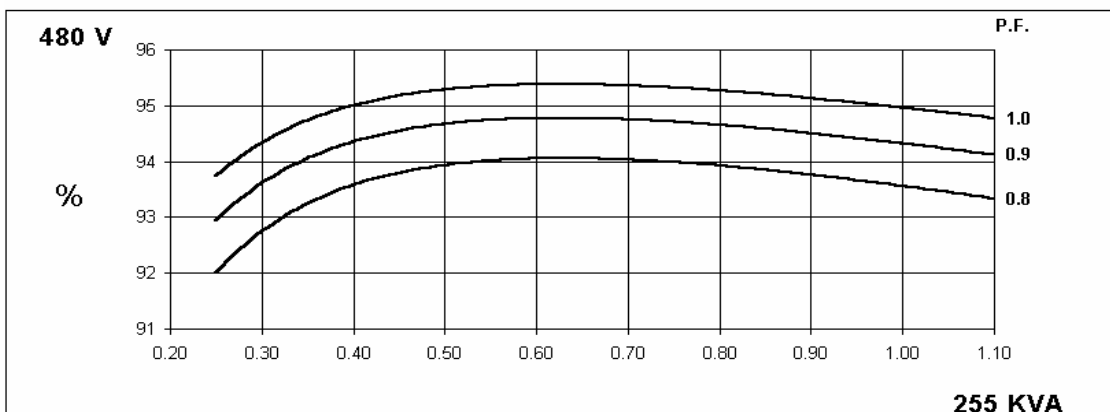
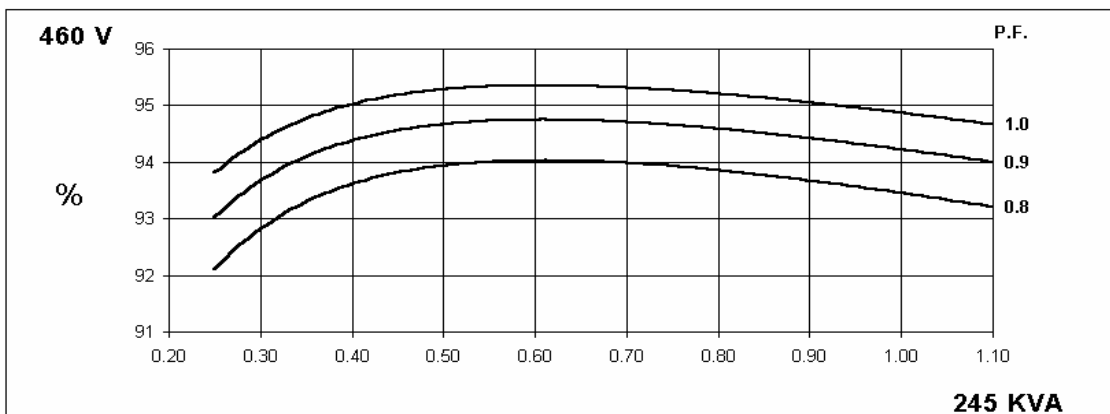
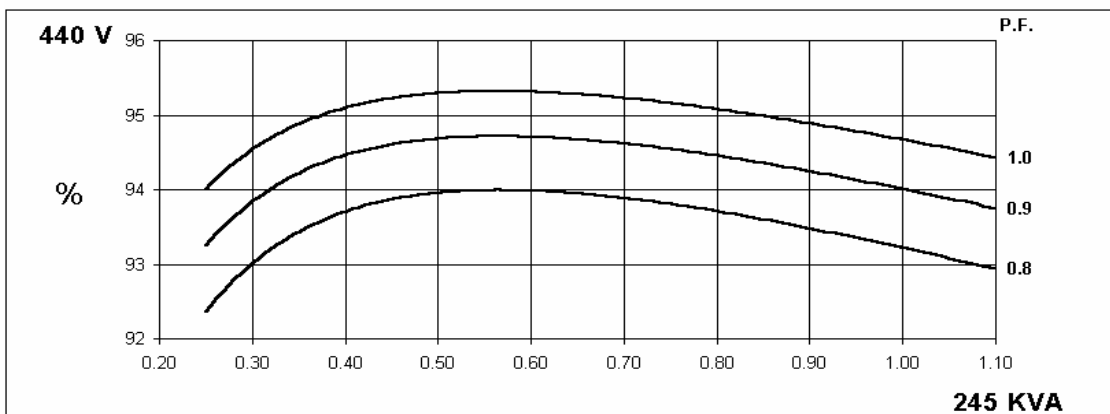
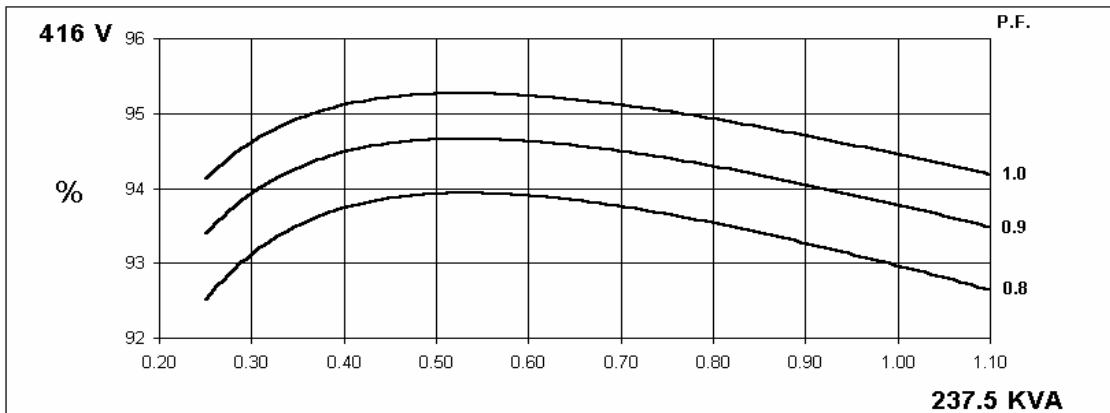
UCI274H
Winding 311



THREE PHASE EFFICIENCY CURVES



THREE PHASE EFFICIENCY CURVES



UCI274H

Winding 311

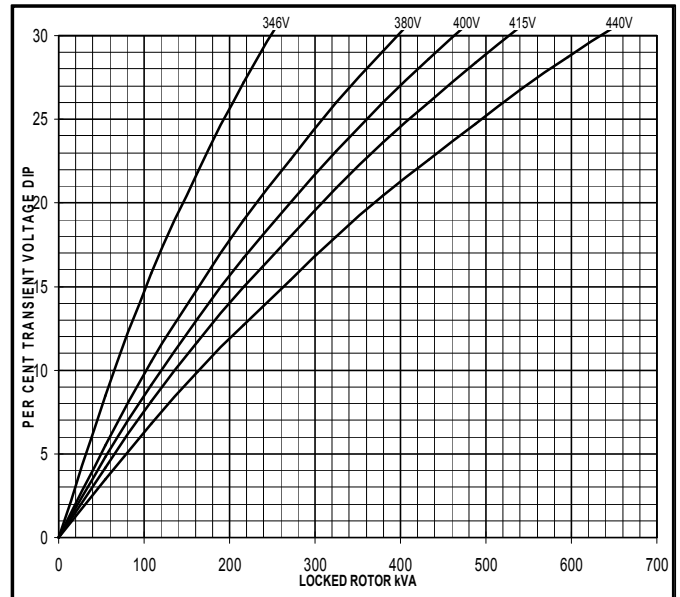
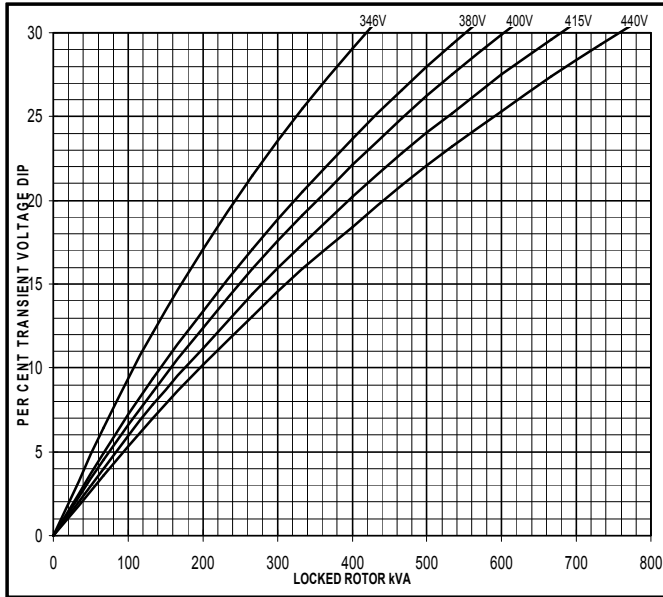


Locked Rotor Motor Starting Curve

**50
Hz**

MX

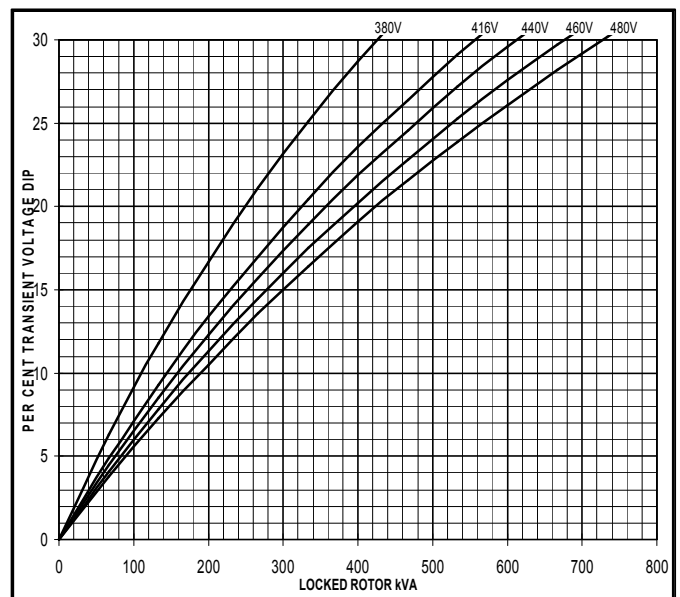
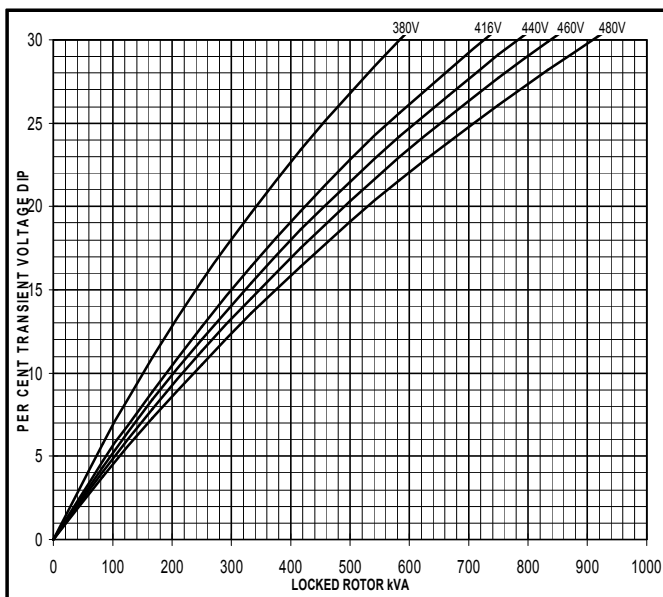
SX



**60
Hz**

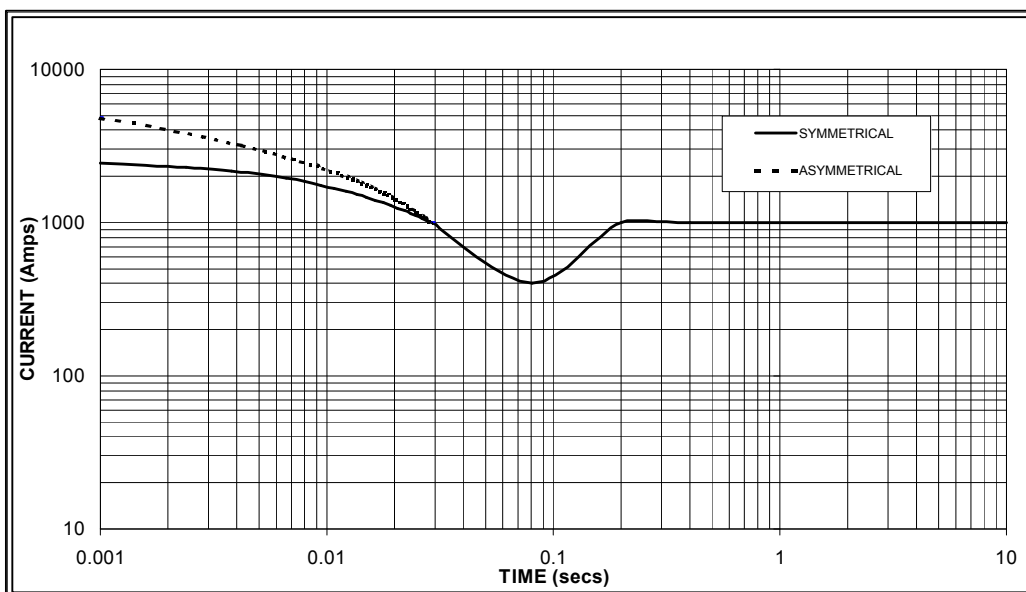
MX

SX



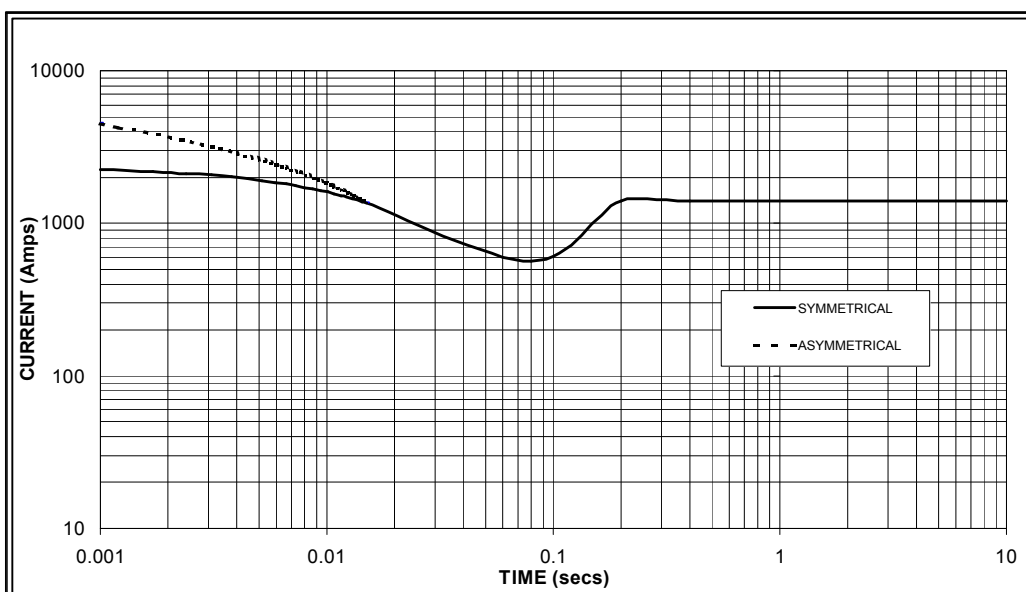
**Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.**

**50
Hz**



Sustained Short Circuit = 1,000 Amps

**60
Hz**



Sustained Short Circuit = 1,400 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.07	440v	X 1.06
415v	X 1.12	460v	X 1.12
440v	X 1.18	480v	X 1.17

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

UCI274H

Winding 311 / 0.8 Power Factor

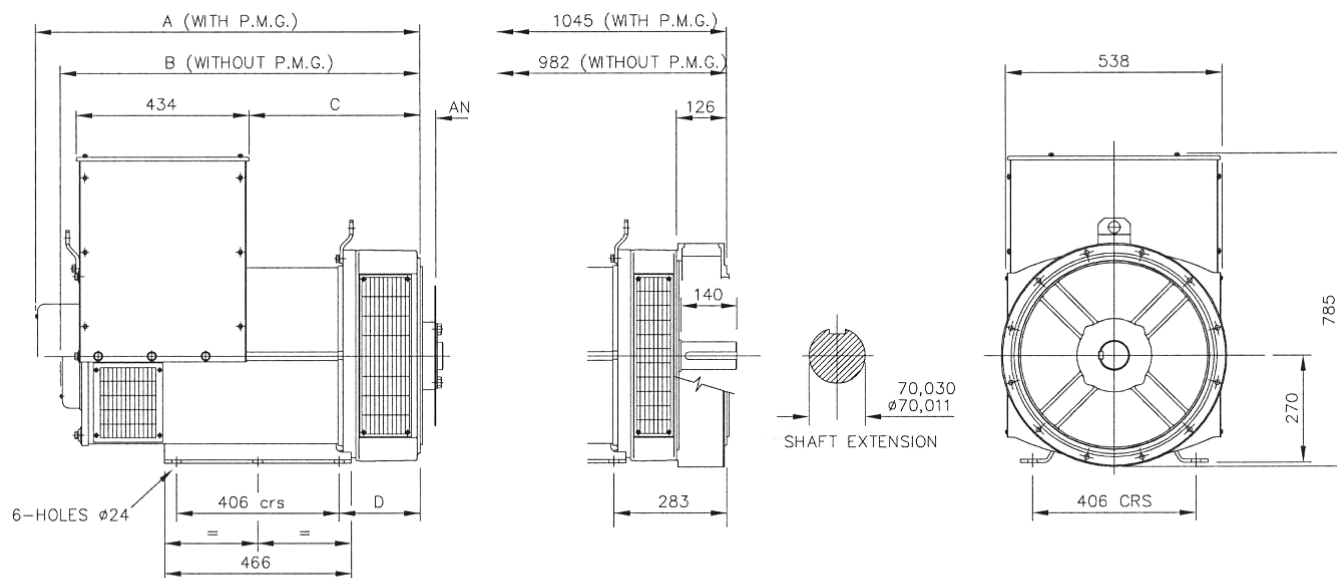


RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	182.0	182.0	182.0	n/a	200.0	200.0	200.0	n/a	212.0	212.0	212.0	n/a	220.0	220.0	220.0	n/a
	kW	145.6	145.6	145.6	n/a	160.0	160.0	160.0	n/a	169.6	169.6	169.6	n/a	176.0	176.0	176.0	n/a
	Efficiency (%)	93.3	93.5	93.6	n/a	93.0	93.3	93.4	n/a	92.8	93.1	93.3	n/a	92.7	93.0	93.2	n/a
	kW Input	156.1	155.7	155.6	n/a	172.0	171.5	171.3	n/a	182.8	182.2	181.8	n/a	189.9	189.2	188.8	n/a

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	218.8	225.0	225.0	235.0	237.5	245.0	245.0	255.0	250.0	258.8	258.8	275.0	256.3	265.0	265.0	280.0
	kW	175.0	180.0	180.0	188.0	190.0	196.0	196.0	204.0	200.0	207.0	207.0	220.0	205.0	212.0	212.0	224.0
	Efficiency (%)	93.2	93.4	93.6	93.7	93.0	93.2	93.5	93.6	92.8	93.1	93.3	93.4	92.7	93.0	93.3	93.3
	kW Input	187.8	192.7	192.3	200.6	204.3	210.3	209.6	217.9	215.5	222.4	221.9	235.5	221.2	228.0	227.2	240.1

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	978,3	915,3	439,3	216,3
SAE 2	964	901	425	202
SAE 3	964	901	425	202

COUPLING DISCS	
DISC	AN
SAE 10	53,98
SAE 11,5	39,68
SAE 14	25,40



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