

**ALTERNATOR TECHNICAL DESCRIPTION**

**LSA 53.2 M7 / 4p**

LS Reference: 2000kVA\_H\_F\_45deg.C

Date: 03-05-2017

V4.05Nbeta - 04/2017

Moteurs Leroy-Somer  
Electric Power Generation - Orleans  
1 rue de la Burelle - 45800 Saint Jean de Braye - France

Main data		EXT	C
Generator type:	<b>LSA 53.2 M7 / 4p</b>		
Power:	2 000 kVA	1 600 kW <sub>e</sub>	1 664 kW <sub>m</sub>
Voltage:	6600 V	Star serial	
Rated voltage range:	+5/-5%		
Power factor - Lagging:	0,8		
Frequency:	50 Hz		
Speed:	1500 rpm		
Nominal current:	175 A		
Winding type:	p5/6		
Classes (Insulation / Temperature Rise):	H / F		
Ambient Temperature:	45 °C		
Altitude:	1000 m		

Installation		Quantity
Prime mover:	Reciprocating engine	1
Manufacturer:	-	
Type:	-	
Duty:	Base Rating	

Mechanical Construction		IM1101
Type of construction:	Two bearing	
Mounting arrangement:	Horizontal Axis	
Direction of rotation:	Clockwise (seen when facing the drive end - DE)	
Bearing type:	Anti-friction	
Bearing Lubrication:	Regreasable	
Bearing insulation:	Not insulated	
Shaft end type:	Cylindrical with keyway	
Balancing - Class (ISO 1940/1):	Half key - G2,5 (std)	
Flange:	None / without	
Shaft height:	500 mm	
Width:	1150 mm	

Additional specificities	
Stabilized Runaway speed:	1800 rpm - 2 min.

Cooling Method		IC01
Degree of protection:	IP23	
Coolant:	Air / Temperature: 45 °C	
Air quality:	Clean	
Ventilation (internal):	Self-ventilated	
Filters:	Without	
Ducting for air inlet:	No	
Ducting for air outlet:	No	

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**Connection, Excitation & Regulation**

Parallel operation:	Between alternators (1F)	1
Excitation:	Self-excited - Brushless - Type: AREP + PMI	1
Sustained 3-phase Isc:	> 3 x FLC for 10s.	1
AVR type:	D510C - Digital	1
AVR location:	In terminal box	1
Alternator Voltage sensing:	Terminal box mounted voltage sensing VTs	1
Additional features:	Three-phase sensing	1

**Terminal box**

Power connection:	6 connectors (3 neutrals brought out)	1
Main Terminal box location:	On Top	1
Line side outlet:	Left hand side (seen when facing the drive end - D)	1
Gland plate:	Standard - Cable gland plate not drilled	1

**Protection and measurement accessories**

**Temperature detection**

Stator windings:	6 x 3-wire Pt100 RTDs	1
Combined guide and thrust bearing - DE:	1 x 3-wire Pt100 RTD	1
Guide bearing - NDE:	1 x 3-wire Pt100 RTD	1

**Anti-condensation heating**

Voltage: 230 V - 1Ph / Power: 500 W

**Various items**

532\_4\_6300\_50\_5

Paint:	PE - Primary - RAL 7032	1
Documentation:	PDF manual	1
Documentation Language:	English	1

**Controls**

QUAL/INES/006 001	Measurement of winding resistance	1
QUAL/INES/006 021	Insulation check on sensors (when fitted)	1
QUAL/INES/006 002	Voltage balance and phase order check	1
QUAL/INES/006 007	Overspeed test (according to test bench limitation)	1
QUAL/INES/006 009	High potential test	1
QUAL/INES/006 010	Insulation resistance measurement	1

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**Main data:**

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Voltage:	<b>6600</b> V	Frequency:	<b>50</b> Hz	1
Rated voltage range:	+5% / -5%	Speed:	<b>1500</b> rpm	1
Power factor - Lagging:	0,8	Phases	<b>3</b>	1
Nominal current:	<b>175</b> A	Connexion	Star serial	1
Insulation / Temperature rise:	H / F	Winding type:	p5/6	1
Cooling:	<b>IC01</b>	Winding:	- 6 Wires	1
Ambient Temperature:	<b>45</b> °C	Overspeed (rpm)	<b>1800</b>	1
Altitude:	<b>1000</b> m	Total Harmonic Distortion (THD) < 5%		1
Duty: Base Rating				

**Efficiency ( Base 1600 kWe )**

	25%	50%	75%	<b>100%</b>	110%	IEC
<b>Power factor - Lagging: 0,8</b>	94,2	96,1	96,3	<b>96,2</b>	96,0	1
<b>Power factor - Lagging: 1</b>	94,6	96,7	97,1	<b>97,2</b>	97,2	1

**Reactances (%) - ( Base 2000 kVA )**

		Unsaturated	Saturated		Unsaturated	Saturated
	Direct axis			Quadrature axis		
Synchronous reactance	Xd	254	218	Xq	130	111
Transient reactance	X'd	28,0	23,8	X'q	130	111
Subtransient reactance	X''d	16,1	13,7	X''q	16,8	14,3
Negative sequence reactance	X2	16,5	14,0			
X0	10,2	Zero sequence reactance				
XI	8,1	Stator leakage reactance				
Xr	21,7	Rotor leakage reactance				
<b>Kc</b>	<b>0,46</b>	Short-circuit ratio				

**Time constants (s)**

	Direct axis	Quadrature axis
Open circuit transient time constant	T'do 2,90	T'qo NA
Short-circuit transient time constant	T'd 0,320	T'q NA
Open circuit subtransient time constant	T''do 0,036	T''qo 0,146
Subtransient time constant	T''d 0,021	T''q 0,019
Ta 0,036	Armature time constant	

**Resistances (%)**

Ra 1,5	Armature resistance	R0 3,4	Zero sequence resistance
X/R 9,4	X/R ratio (without unit)	R2 3,3	Negative sequence resistance

Voltage accuracy: 0,25%

Maximum inrush current for a voltage dip of 15%: 1399 kVA

when starting an AC motor having a starting power factor between 0 and 0.4

According to: I.E.C. 60034.1 - 60034.2 - NEMA MG 1-32

Products and materials shown in this catalogue may, at any time, be modified in order to follow the latest technological developments, improve the design or change conditions of utilization

**COURBES PRINCIPALES ALTERNATEUR  
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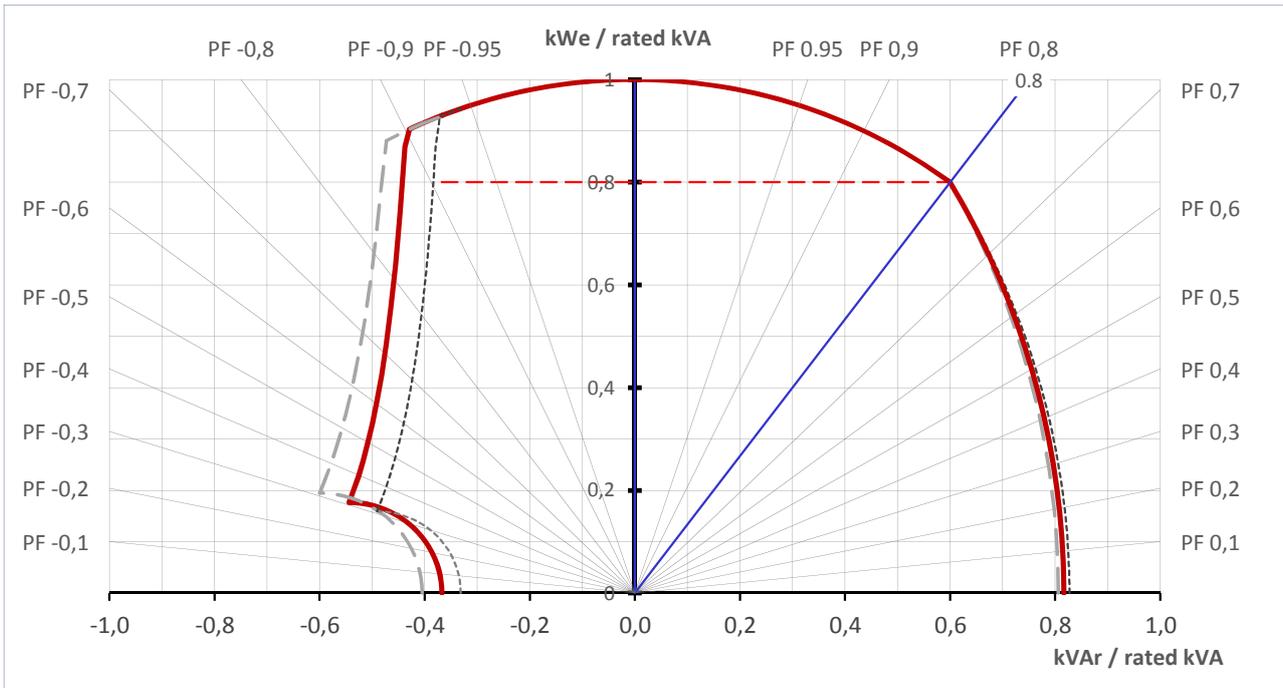
Date : 03-05-2017

**2000kVA - 6600V - 50 Hz**

V4.05Nbeta - 04/2017

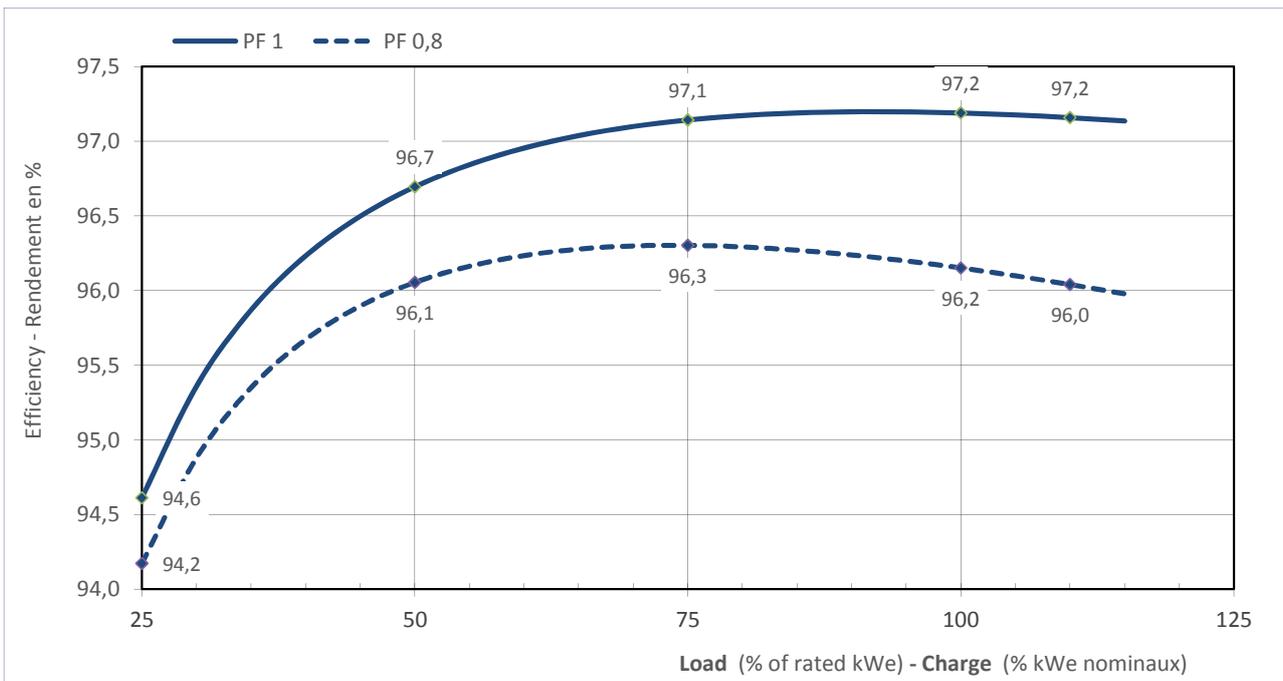
**Diagramme PQ (courbe de capacité)**

---	Umax + 5%	6 930	V
—	Un	<b>6 600</b>	V
- - -	Umin - 5%	6 270	V



**Courbes de rendement**

Suivant : IEC

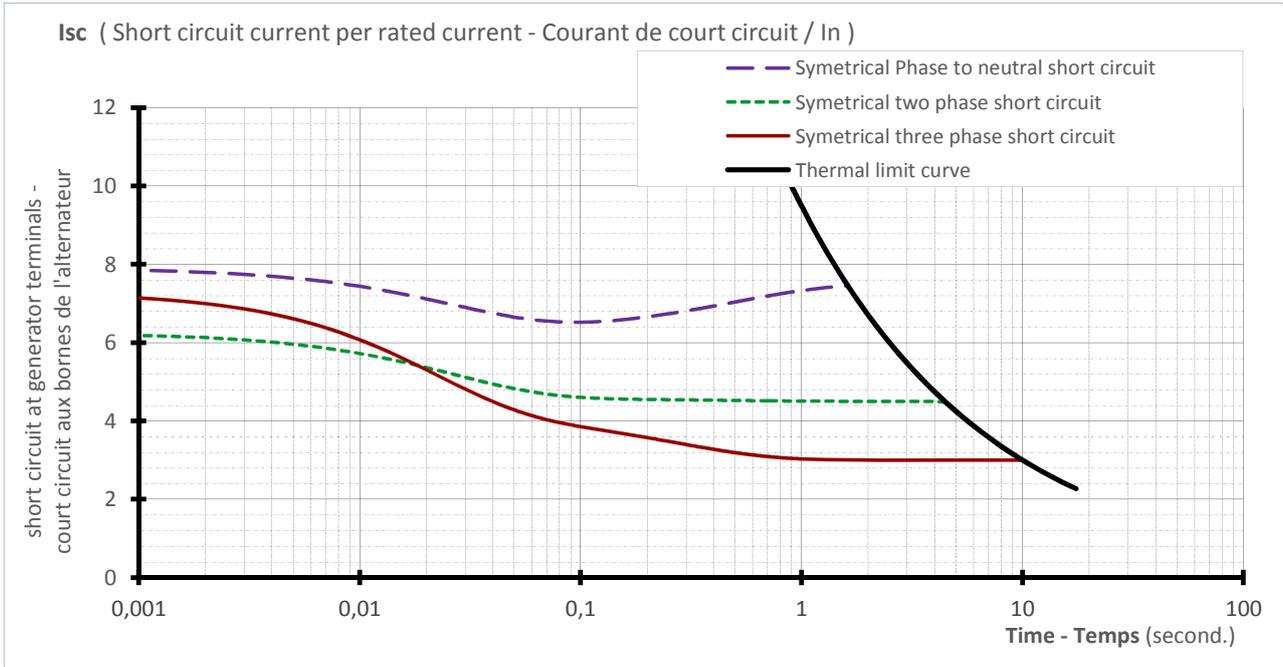


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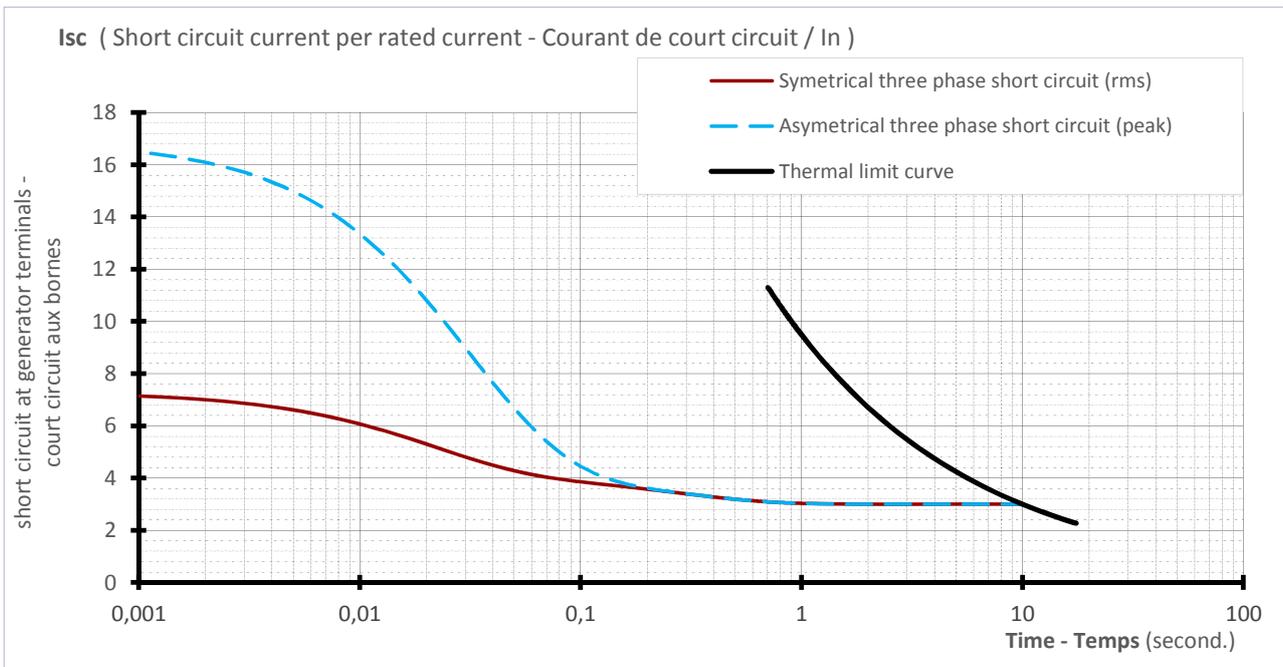
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**Courbes de court-circuit à vitesse nominale (connexion Y)**

Court-circuit symétrique phase neutre		initial	1 373	A	7,8 x In	
Court-circuit symétrique biphasé		max	1 082	A	6,2 x In	In = 175 A
Court-circuit symétrique triphasé		value	1 250	A	7,1 x In	
Limite Thermique						



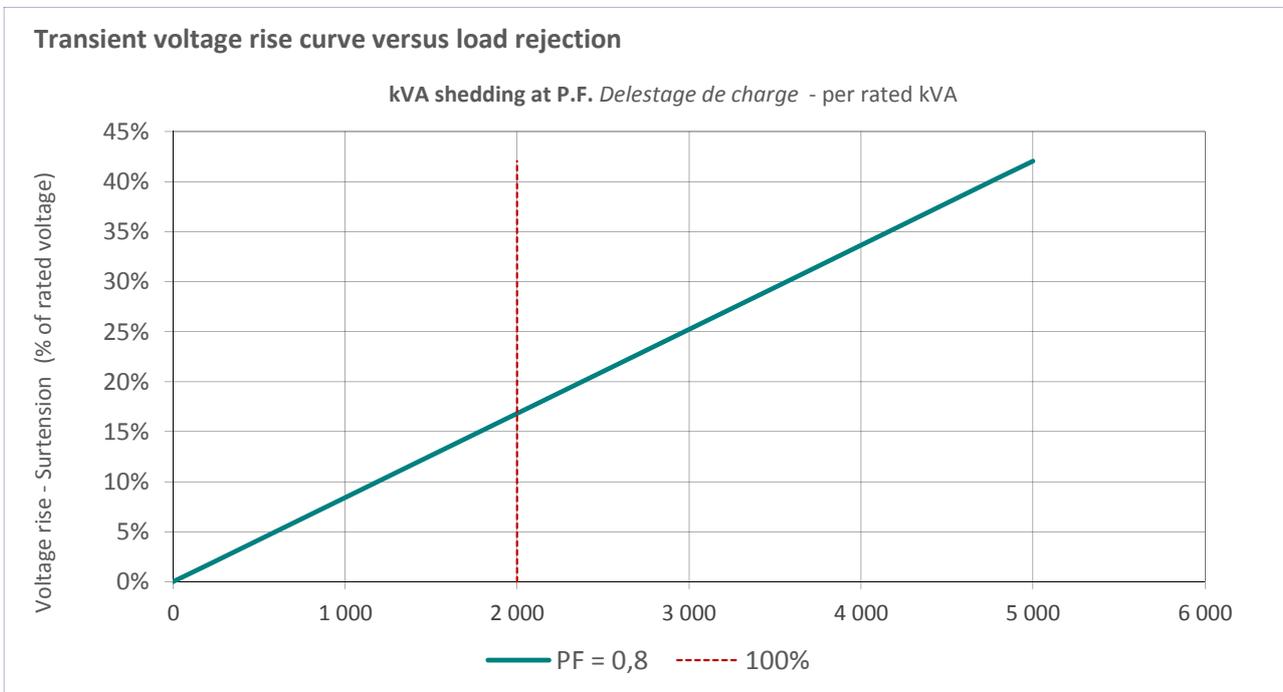
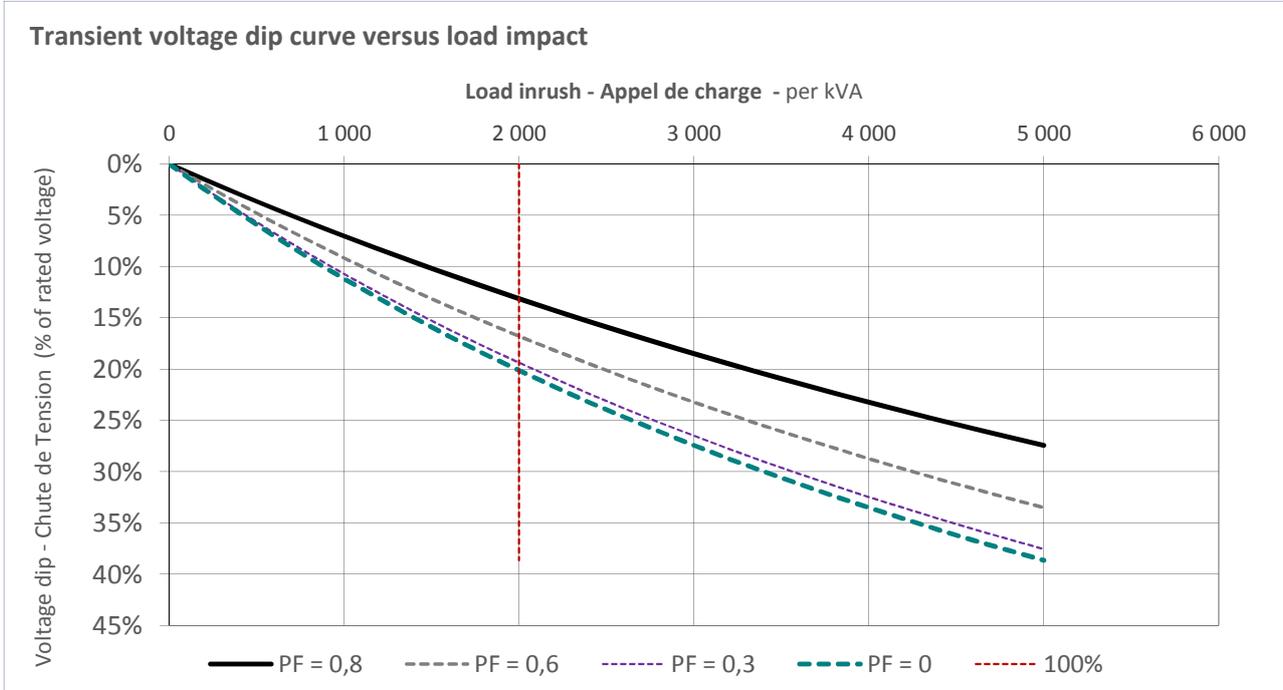
Court-circuit asymétrique triphasé		IP	2 858	A	16,3 x In
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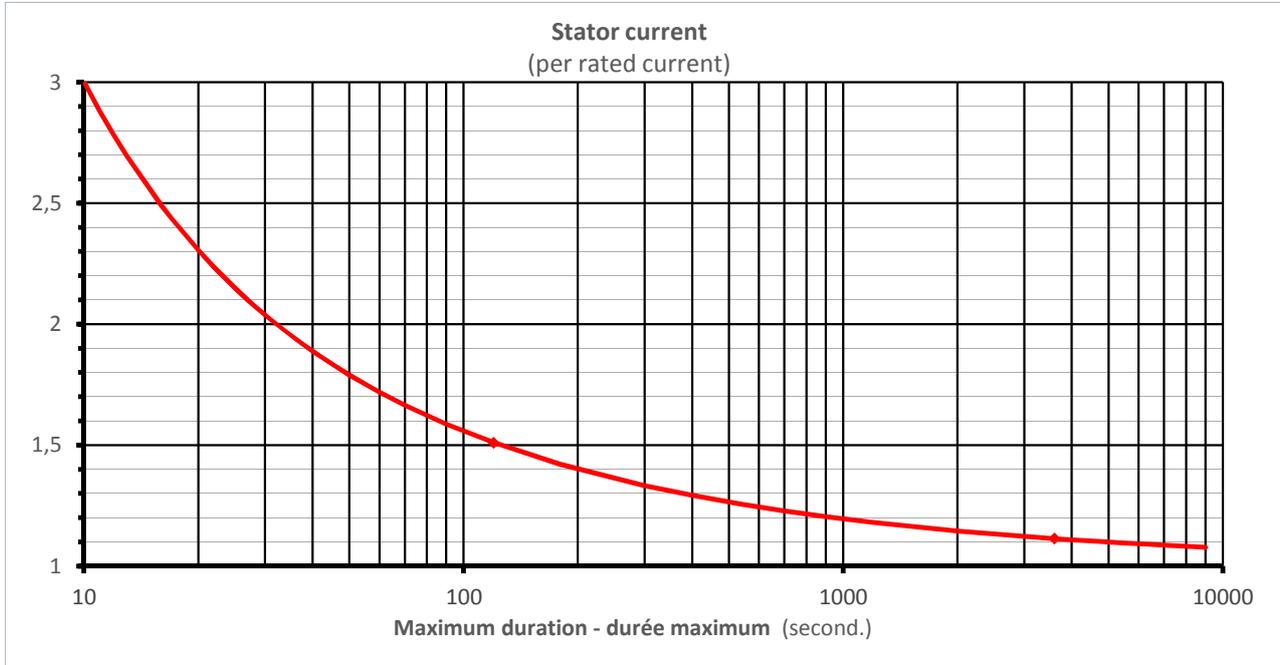
**Variation de tension transitoire**



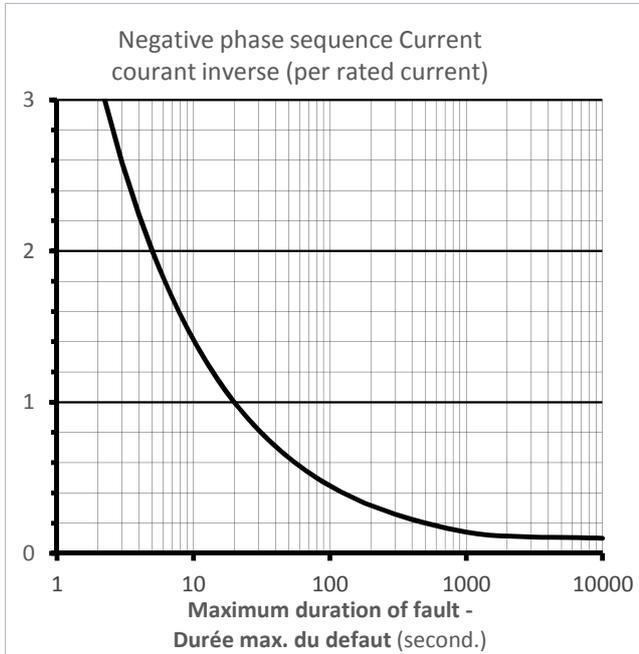
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**Courbe de limite thermique**



**Courbe de charge déséquilibrée**



**Courant de défaut de masse Stator**

