



EMERSON[™]
Industrial Automation



4938 en - 2012.04 / a

 **LEROY[®]
SOMER**

PARTNER ALTERNATORS

LSA 53.1

General features and rating4

ALTERNATOR :
LSA 53.1 M80 / 3000kVA - 400V - 50Hz - 1500rpm - 4P

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Ratings		kVA / kWe - Cos ϕ = 0,8		3 phase
Duty / Ambient	Continuous duty (BR) / 40°C		PR* / 40°C	PR* / 27°C
Temperature Rise	Class.H/125°K	Class.F/105°K	150°K	163°K
Voltage (*)	380 V - 415 V	380 V - 415 V	380 V - 415 V	380 V - 415 V
kVA	3000	2736	3180	3300
kWe	2400	2189	2544	2640

(*) Y connection

* PR= Peak rating

Reactances (%) - class H - 3000 kVA - 400 V

		unsaturated	saturated
Short-circuit ratio	Kcc	0,350	
Direct axis synchronous reactance	Xd	305,0%	285,7%
Quadrature axis synchronous reactance	Xq	183,0%	171,4%
Direct axis transient reactance	X'd	31,40%	26,7%
Quadrature axis transient reactance	X'q	183%	171,4%
Direct axis subtransient reactance	X''d	17,1%	14,5%
Quadrature axis subtransient reactance	X''q	21,4%	18,2%
Negative sequence reactance	X2	19,3%	16,4%
Zero sequence reactance	X0	3,4%	
Stator leakage reactance	Xs or Xl	8,6%	
Rotor leakage reactance	Xr	24,8%	

Time constants (s)

Open circuit direct axis transient time constant	T'do	3,060
Open circuit quadrature axis transient time constant	T'qo	NA
Short-circuit direct axis transient time constant	T'd	0,315
Short circuit quadrature axis transient time constant	T'q	NA
Open circuit direct axis subtransient time constant	T''do	0,048
Open circuit quadrature axis subtransient time constant	T''qo	0,197
Subtransient direct axis time constant	T''d	0,026
Subtransient quadrature axis time constant	T''q	0,023
Armature time constant	Ta	0,068

Resistance

Armature resistance	Ra	0,901
X/R ratio	X/R	16,130
Zero sequence resistance	R0	1,133
Negative sequence resistance	R2	3,860

Other data - Class H - 3000 kVA - 400 V

No load excitation current	io (A)	1,3
Full load excitation current	ic (A)	5,1
Full load excitation voltage	uc (V)	61
Air flow	m3/s	2,8

Efficiencies (%) 3phase - class H - 3000 kVA - 400 V

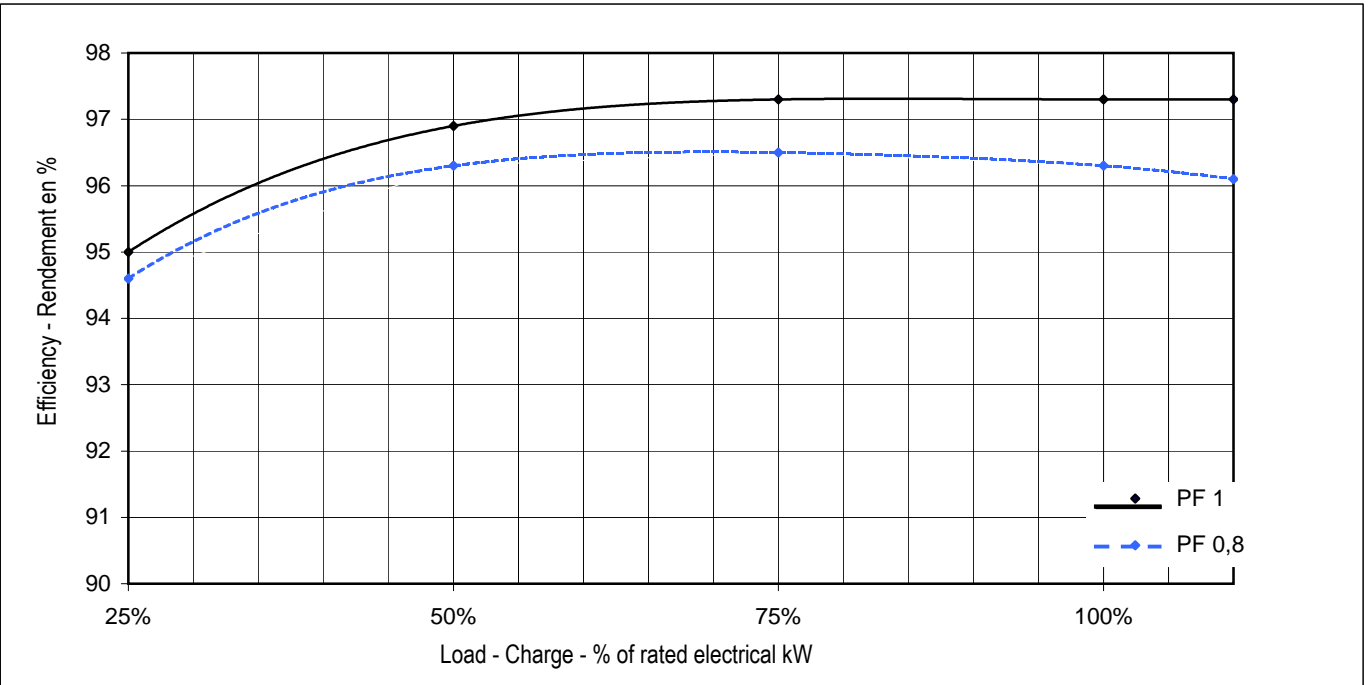
COS ϕ = 0,8					COS ϕ = 1				
25%	50%	75%	100%	110%	25%	50%	75%	100%	110%
94,6	96,3	96,5	96,3	96,1	95,0	96,9	97,3	97,3	97,3

ALTERNATOR :

LSA 53.1 M80 / 3000kVA - 400V - 50Hz - 1500rpm - 4P

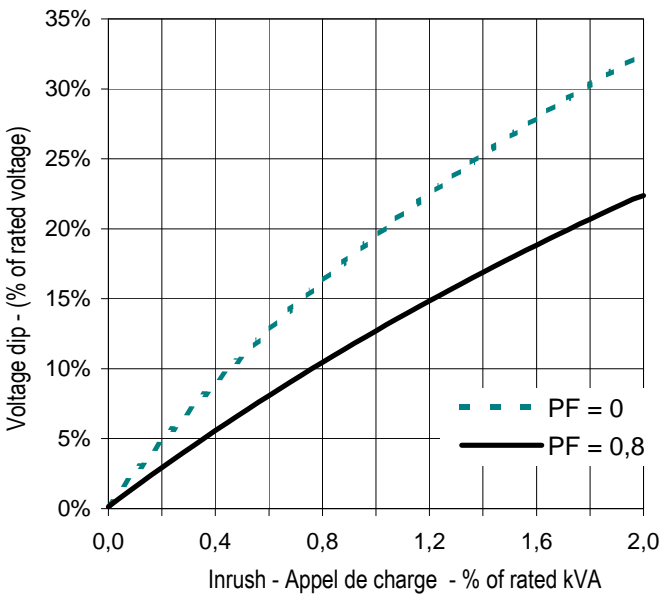
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Efficiencies P.F. 1 / P.F. 0,8

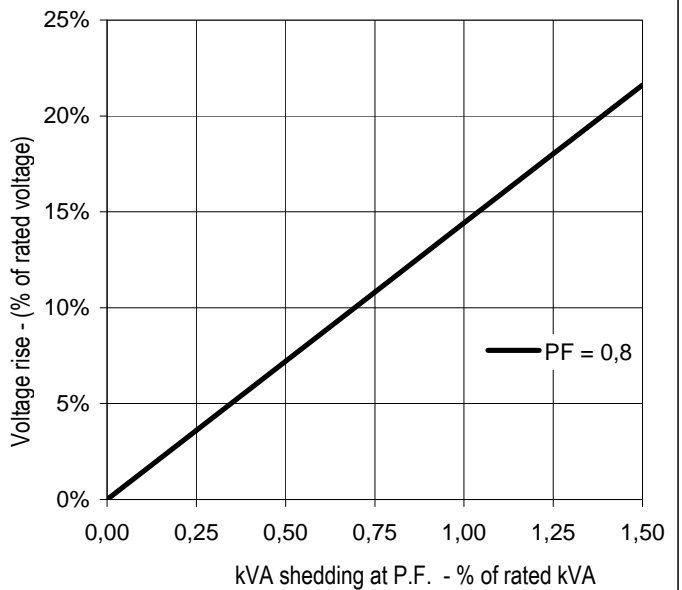


Transient voltage variation : 400 V - 50 Hz

Transient voltage dip curve versus load impact



Transient voltage rise curve versus load rejection

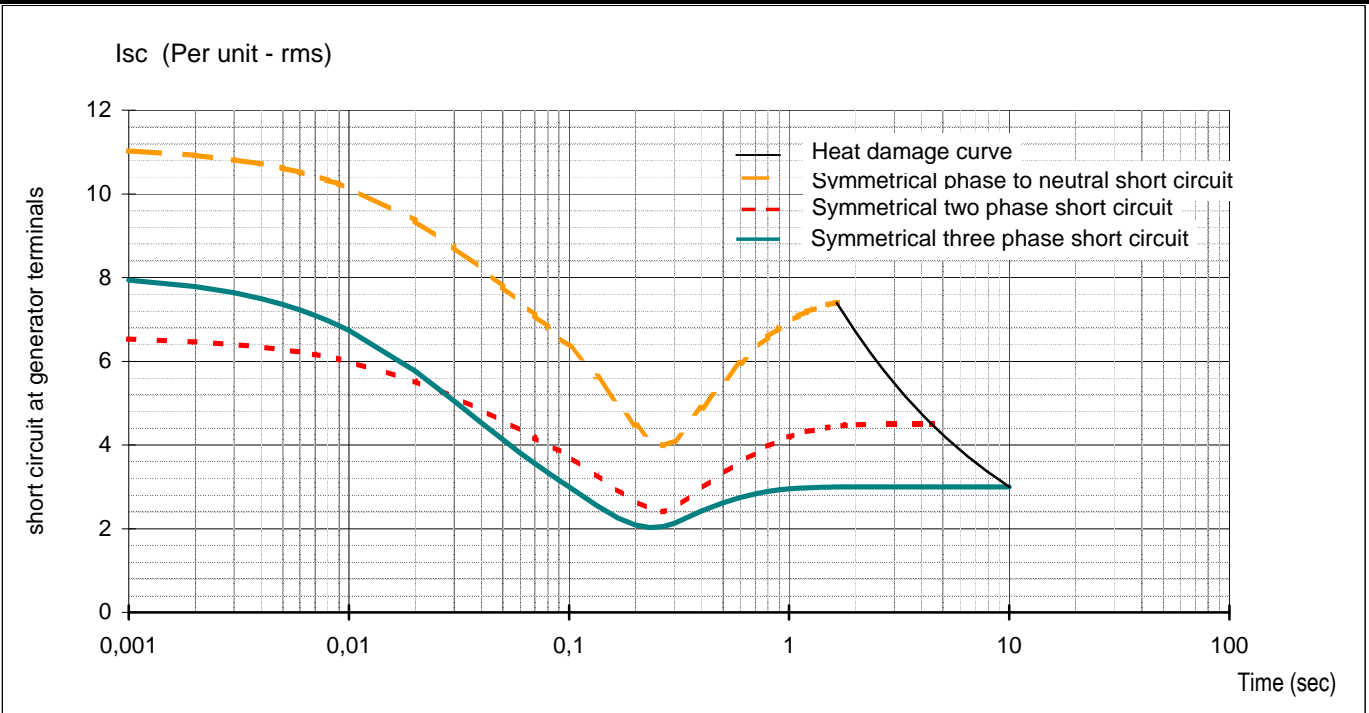


ALTERNATOR :

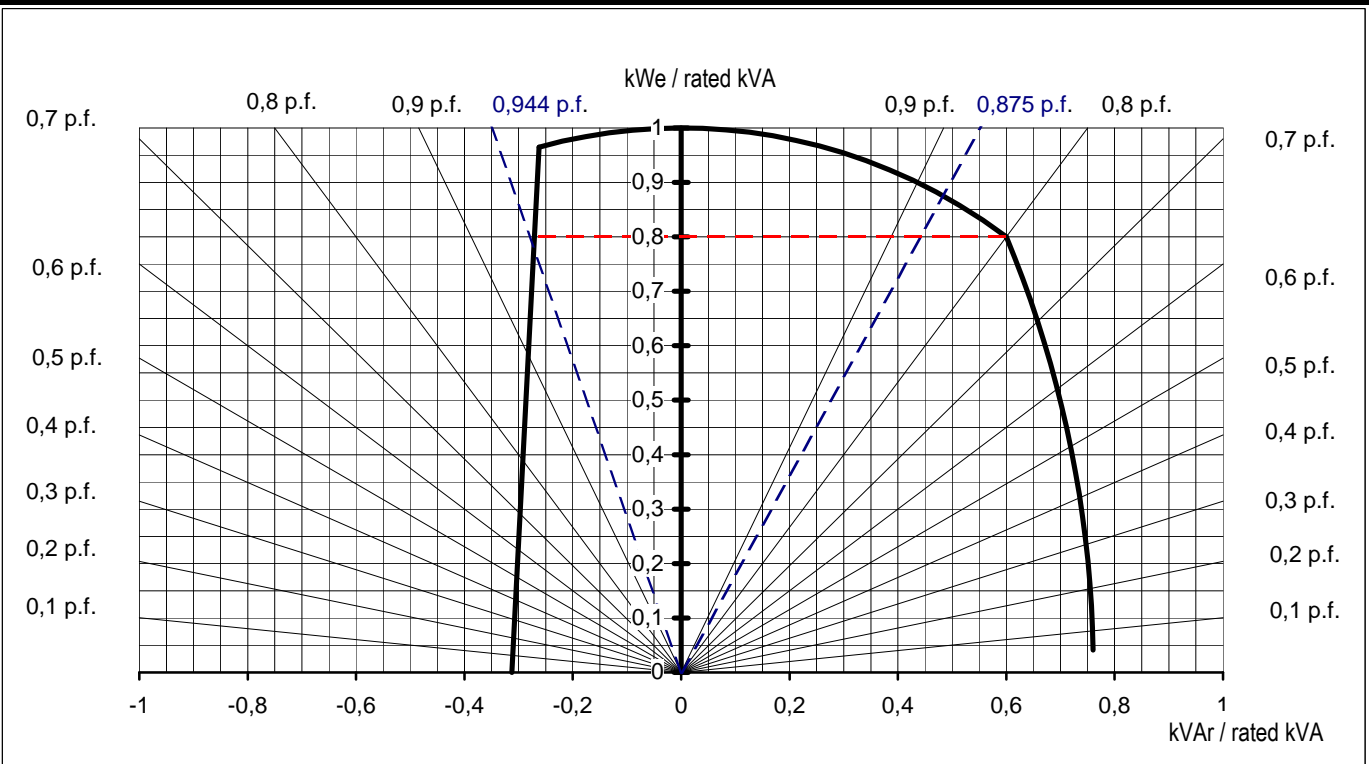
LSA 53.1 M80 / 3000kVA - 400V - 50Hz - 1500rpm - 4P

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



Capability curve (PQ diagram)



SPECIALLY ADAPTED FOR GENSET APPLICATIONS

The alternator is designed to be suitable for typical generator set applications, such as: backup, base production, cogeneration, rental, telecommunications, etc.

COMPLIANT WITH INTERNATIONAL STANDARDS

The alternator complies with the main international standards and regulations
IEC 60034, NEMA MG 1.22, ISO 8523/3, CSA on request, etc.

It can be integrated into a CE marked generator set

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

TOP OF THE RANGE ELECTRICAL PERFORMANCE

- Class H insulation.
- Standard 6-wire winding, 2/3 pitch for Low Voltage, and 5/6 pitch for Medium & High Voltage
- Other voltages are possible with optional adapted windings.
- High efficiency and motor starting capacity.

EXCITATION AND REGULATION SYSTEM SUITED TO THE APPLICATION

The alternator can be supplied with 'AREP+PMI' or PMG excitation system, according to the alternator specification. Standard excitation system is AREP with R449 A.V.R.

Excitation system			Regulation options			
A.V.R.	AREP+PMI	PMG	C.T. mains //	R726 mains //	R731 3 phase sensing	Option external Pot.
R 449	std	Option	√	Option	Option	Option
D 510	Option	Option	√	included	included	Option

Voltage regulation accuracy $\pm 0,5\%$

PROTECTION SYSTEM SUITED TO THE ENVIRONMENT

- The alternator is IP 23 in standard.
- Standard winding protection for clean environments with relative humidity $\leq 95\%$.

Options :

- IP43 - IP44 : filters on air inlet and air outlet...
- Space heaters.
- Thermal protection for stator windings &/or bearings (PT100)
- Protection or metering CTs

REINFORCED MECHANICAL STRUCTURE USING FINITE ELEMENT MODELLING

- Compact and rigid assembly to better withstand genset or engine vibrations.
- Steel frame.
- Cast iron flanges and shields.
- Twin-bearing and single-bearing versions designed to be suitable for most engines on the market.
- Half-key balancing.
- Regreasable bearings.
- Clockwise rotation in standard

ACCESSIBLE TERMINAL BOX DESIGNED FOR OPTIONAL EQUIPMENT

- Easy access to the voltage regulator and to the connections.
- Possible incorporation of accessories for paralleling, protection and measurement.

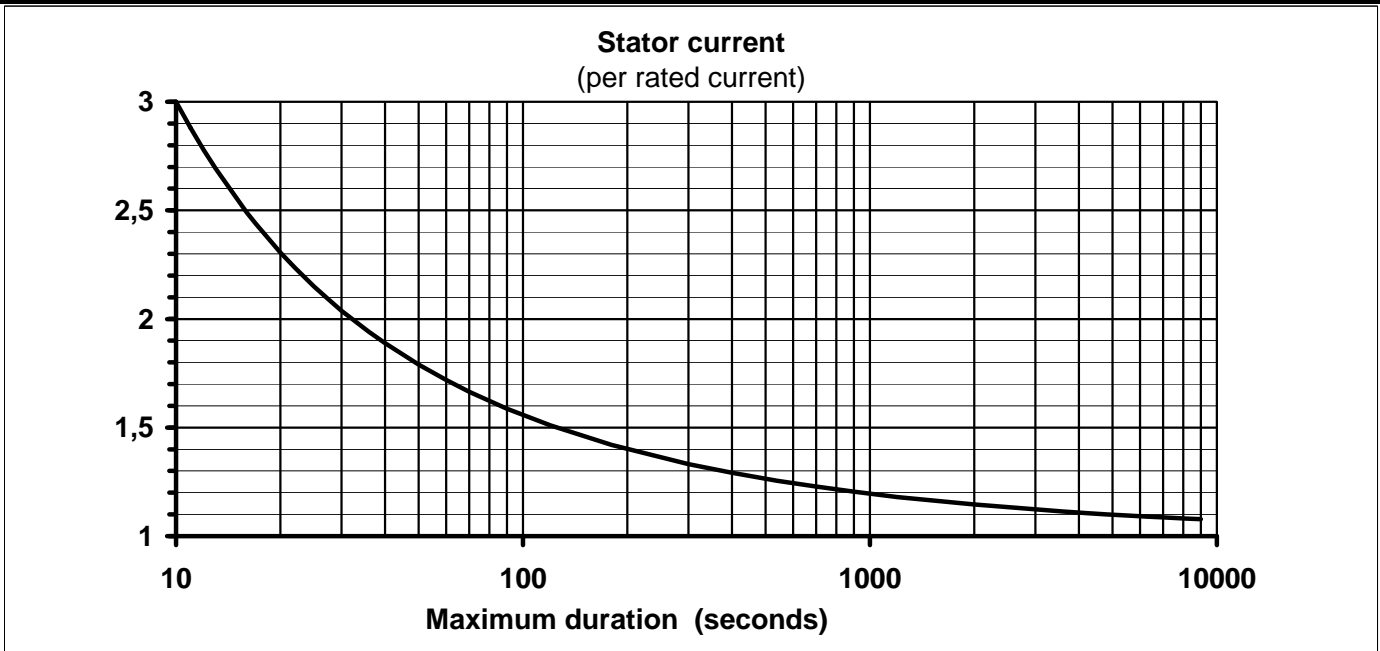
COMMON DATA

Insulation class	H	Excitation system	AREP+PMI ou PMG
Winding pitch	p2/3	Voltage regulation accuracy (*)	$\pm 0,5 \%$
Terminals	6	Sustained short-circuit current	300% (3 IN) / 10s
Drip proof	IP 23	Total harmonic (**) DHT	< 3,5%
Altitude	≤ 1000 m	Waveform : NEMA= TIF - (**)	< 50
Over speed	2250 min-1	Waveform : C.E.I. = FHT - (**)	< 2%

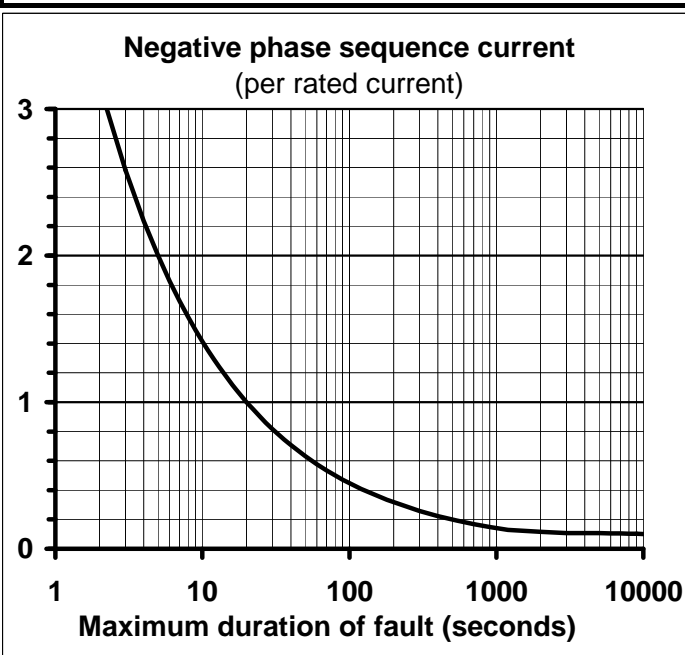
(*) steady state duty. (**) total harmonic content line to line , at no load or full rated linear and balanced load.

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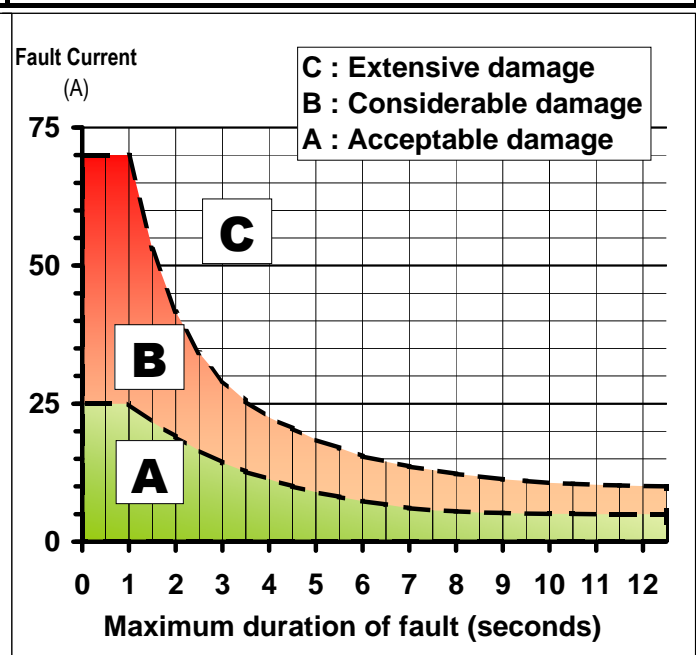
Thermal damage curve



Unbalanced load curve



Stator Earth Fault Current



ALTERNATOR :

LSA 53.1 M80 / 3600kVA - 480V - 60Hz - 1800rpm - 4P

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Ratings		kVA / kWe - Cos ϕ = 0,8		3 phase
Duty / Ambient	Continuous duty (BR) / 40°C		PR* / 40°C	PR* / 27°C
Temperature Rise	Class.H/125°K	Class.F/105°K	150°K	163°K
Voltage (*)	456 V - 480 V	456 V - 480 V	456 V - 480 V	456 V - 480 V
kVA	3600	3283	3816	3960
kWe	2880	2626	3053	3168

(*) Y connection

* PR= Peak rating

Reactances (%) - class H - 3600 kVA - 480 V

		unsaturated	saturated
Short-circuit ratio	Kcc	0,350	
Direct axis synchronous reactance	Xd	305,0%	285,7%
Quadrature axis synchronous reactance	Xq	183,0%	171,4%
Direct axis transient reactance	X'd	31,40%	26,7%
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Subtransient direct axis time constant	T''d	0,026
Subtransient quadrature axis time constant	T''q	0,023
Armature time constant	Ta	0,068

Resistance

Armature resistance	Ra	0,751
X/R ratio	X/R	19,356
Zero sequence resistance	R0	1,133
Negative sequence resistance	R2	3,860

Other data - Class H - 3600 kVA - 480 V

No load excitation current	io (A)	1,3
Full load excitation current	ic (A)	5,1
Full load excitation voltage	uc (V)	61
Air flow	m3/s	2,8

Efficiencies (%) 3phase - class H - 3600 kVA - 480 V

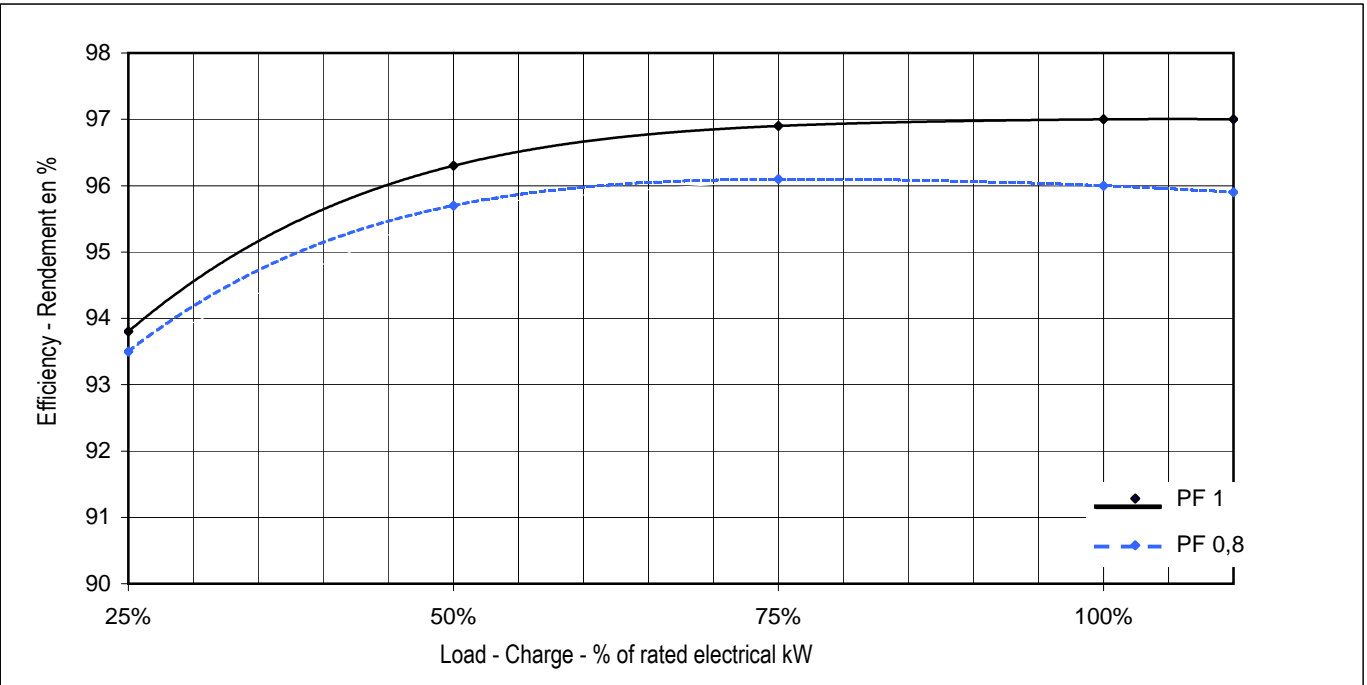
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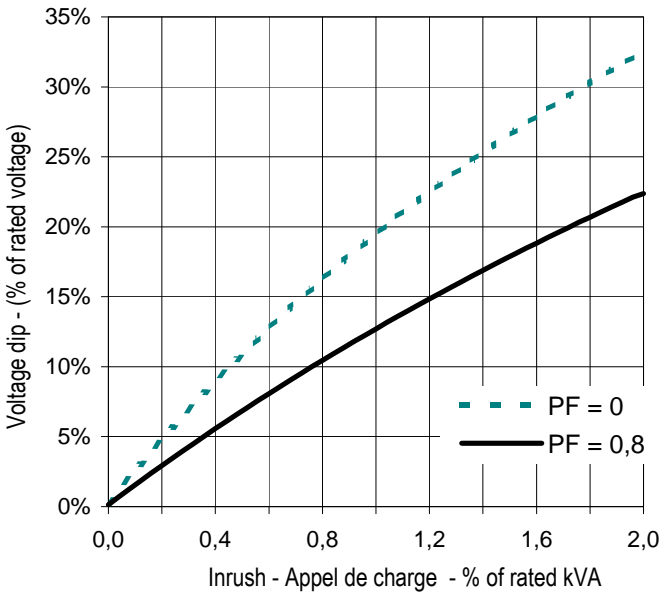
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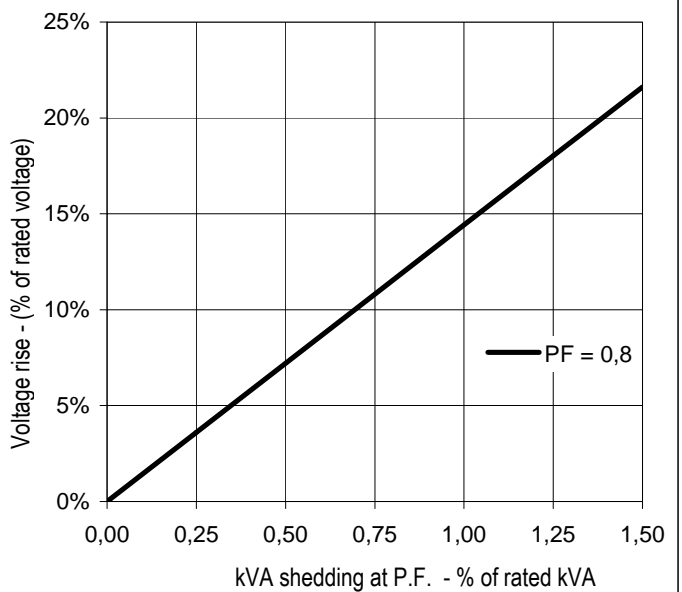


Transient voltage variation : 480 V - 60 Hz

Transient voltage dip curve versus load impact



Transient voltage rise curve versus load rejection

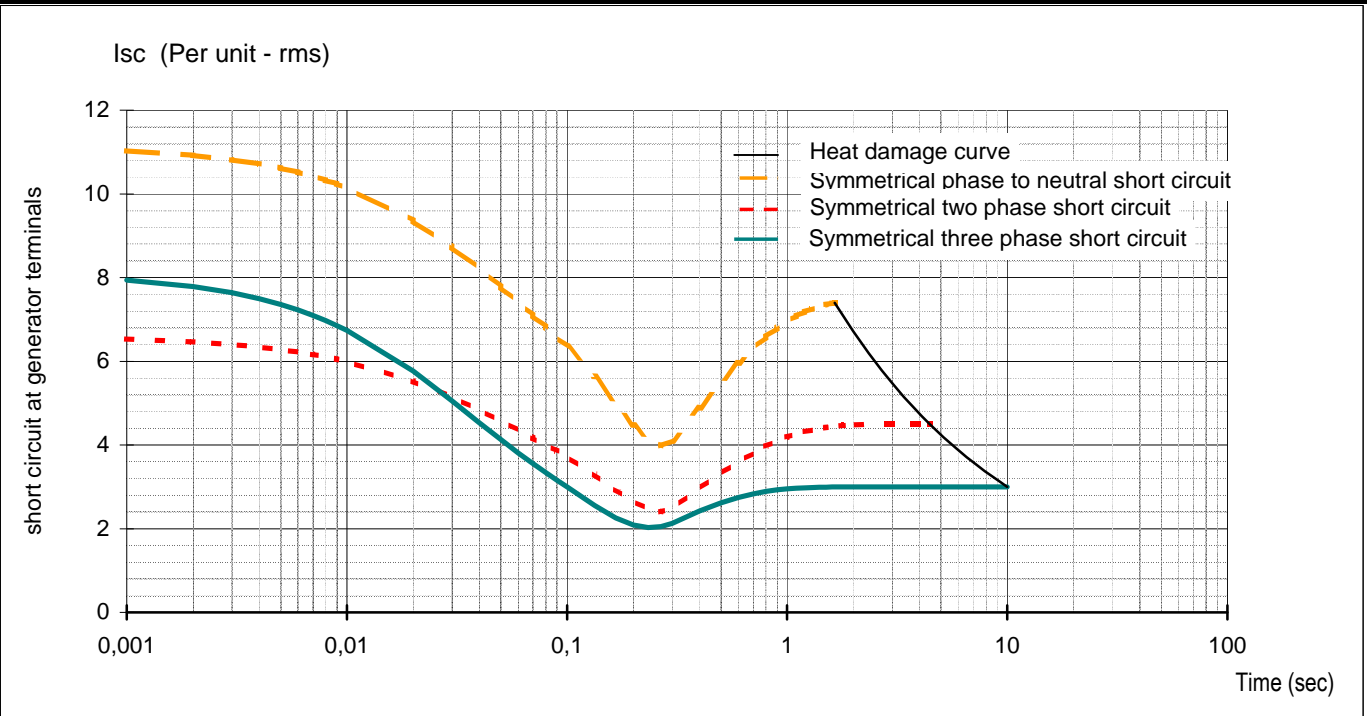


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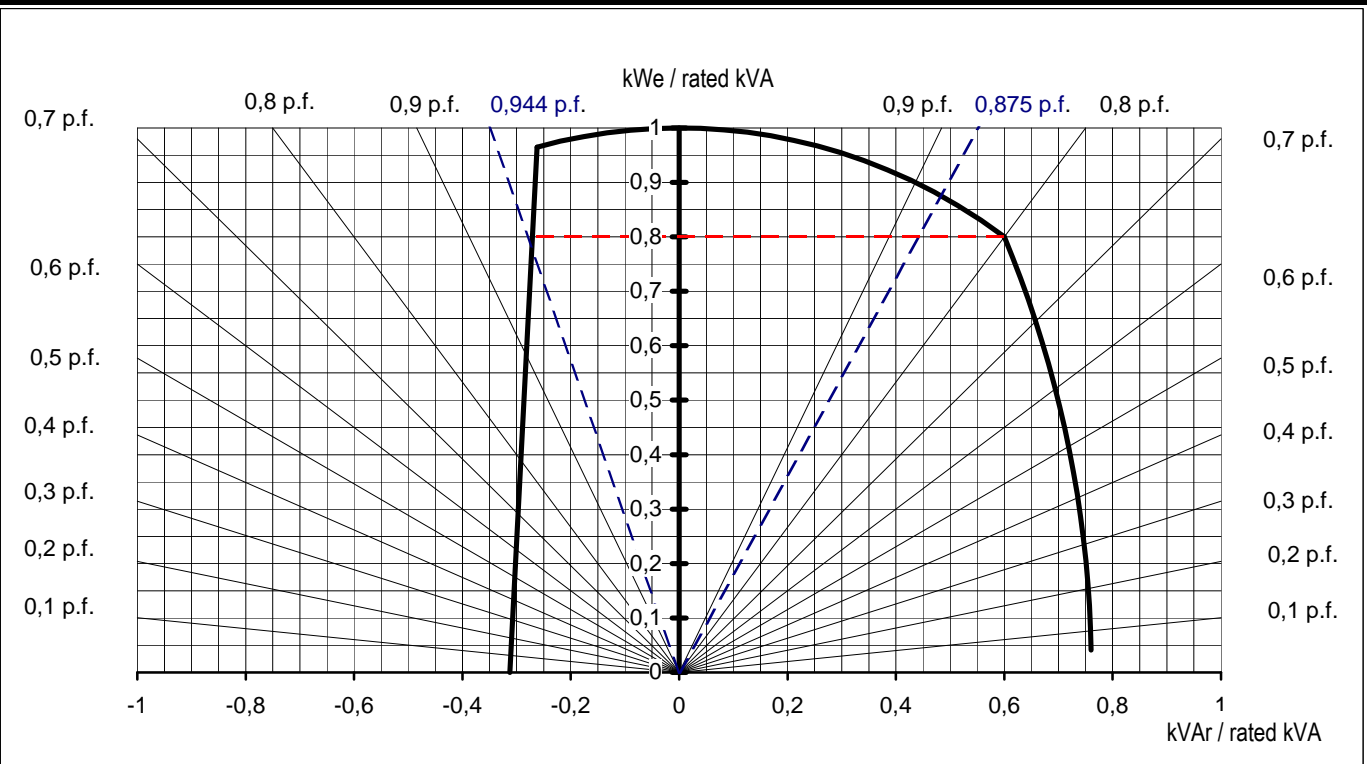
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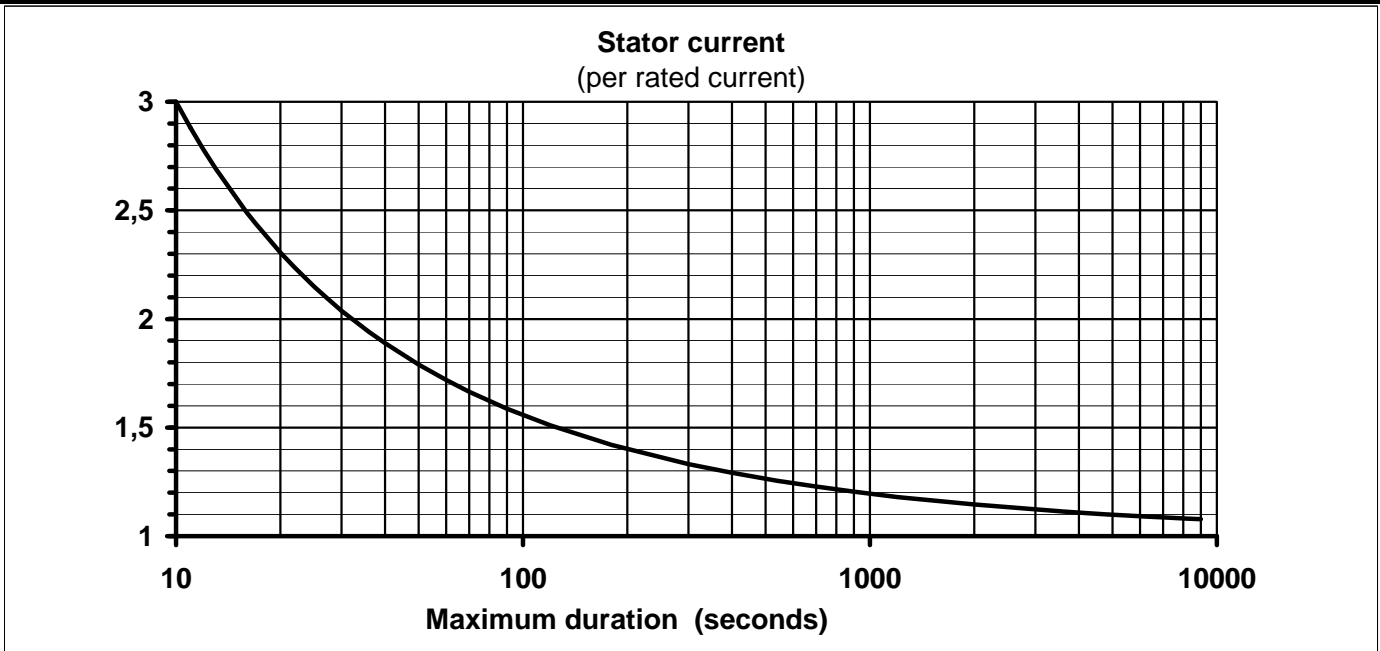
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Altitude	≤ 1000 m	Waveform : NEMA= TIF - (**)	< 50
Over speed	2250 min-1	Waveform : C.E.I. = FHT - (**)	< 2%

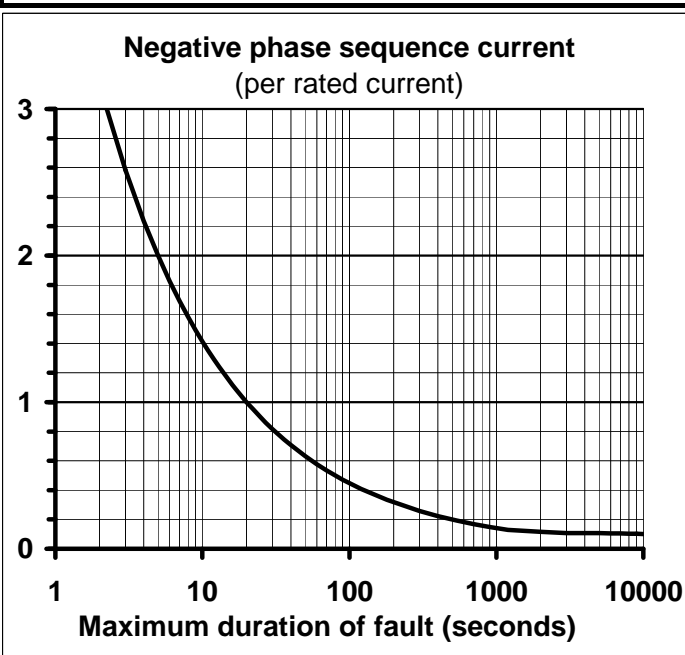
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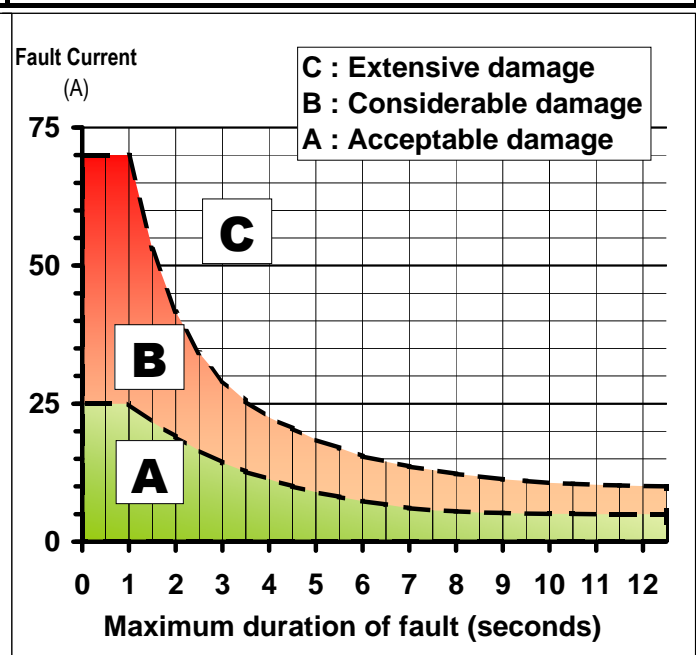
Thermal damage curve



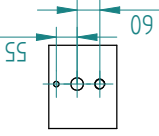
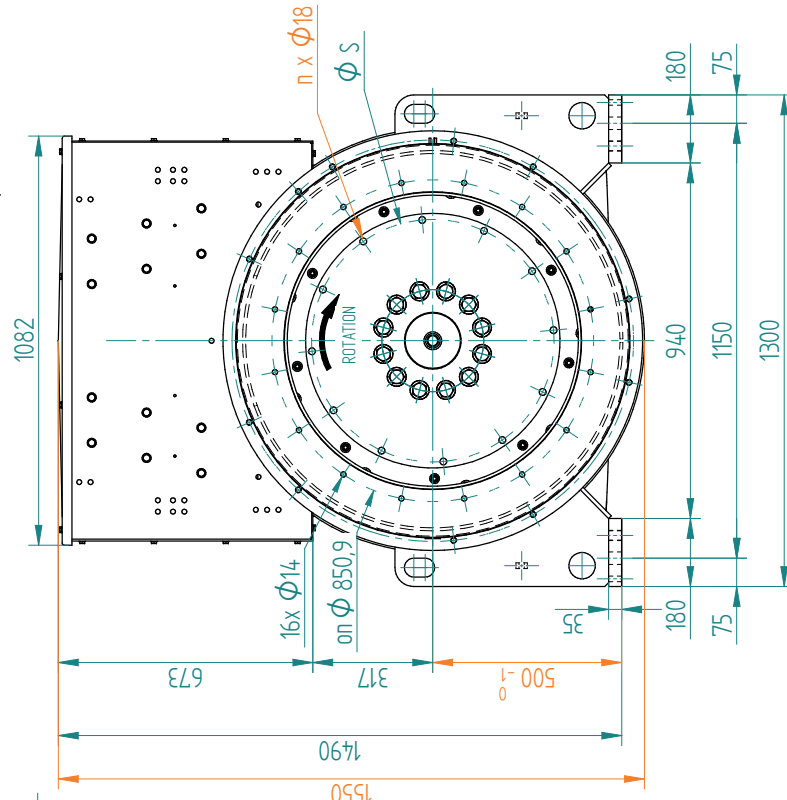
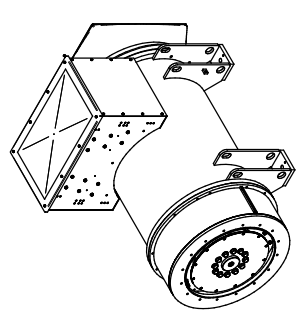
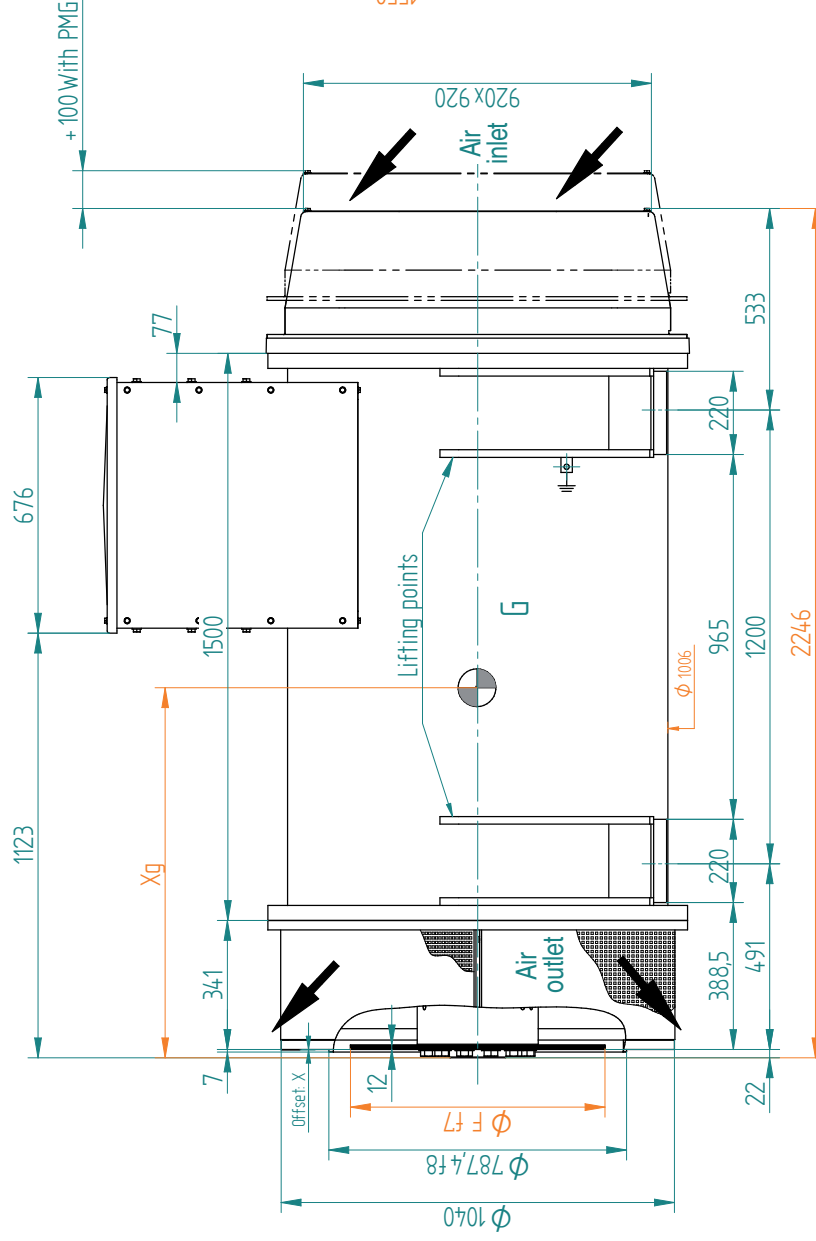
Unbalanced load curve



Stator Earth Fault Current



ALTERNATOR			FLANGE SAE			FLEXPLATE SAE			
VOLTAGE	SIZE	WEIGHT [kg]	STATOR LENGTH [mm]	Xg [mm]	TYPE	X [mm]	Φ F [mm]	Φ S [mm]	n [pcs]
LOW VOLTAGE	M70	5480	1500	942	SAE 00-18	15.8	571.5	542.9	6
	M80	6060	1500	982	SAE 00-21	0	673.1	641.3	12



- 4 x 14,5 (Dowell pin)
- 4 x Φ 33 (Fixation)
- 4 x M27 x 2 (Jacking screw)

Supplied by Leroy Somer:
 2 dowel pins A 16-120
 4 jacking screw HM27x2-100

G	Revisions	Numero	03.2004	Legende	03.2004	Contenu	03.2004
F	Project	Numero		Designation		Designation	
E	Divers	Numero		Designation		Designation	
D	Machine	Numero		Designation		Designation	
C	Machine	Numero		Designation		Designation	
B	Machine	Numero		Designation		Designation	
A	Machine	Numero		Designation		Designation	

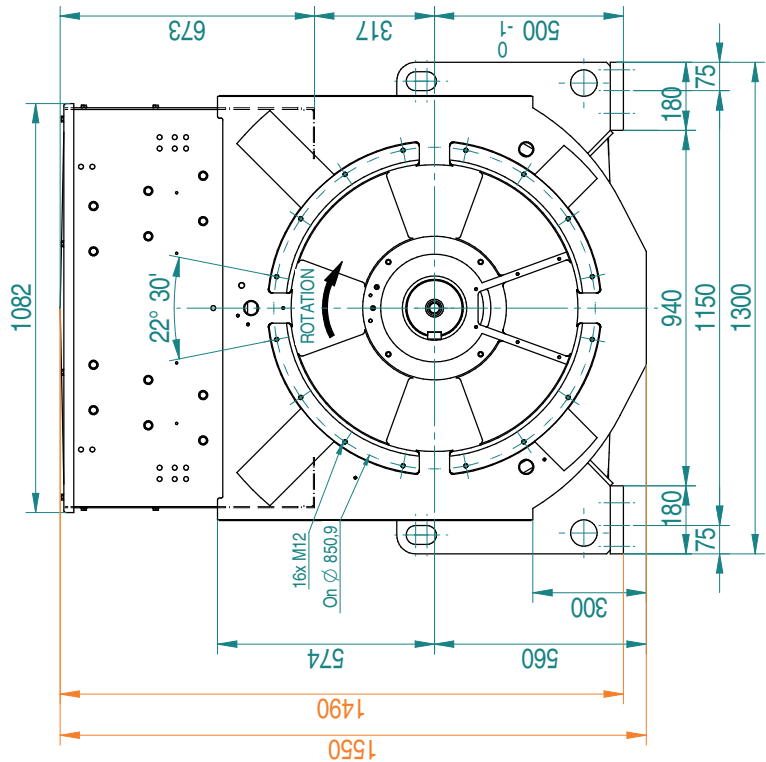
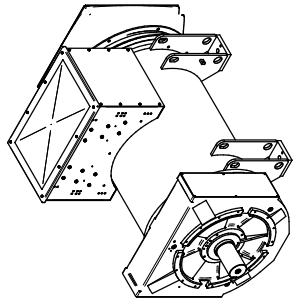
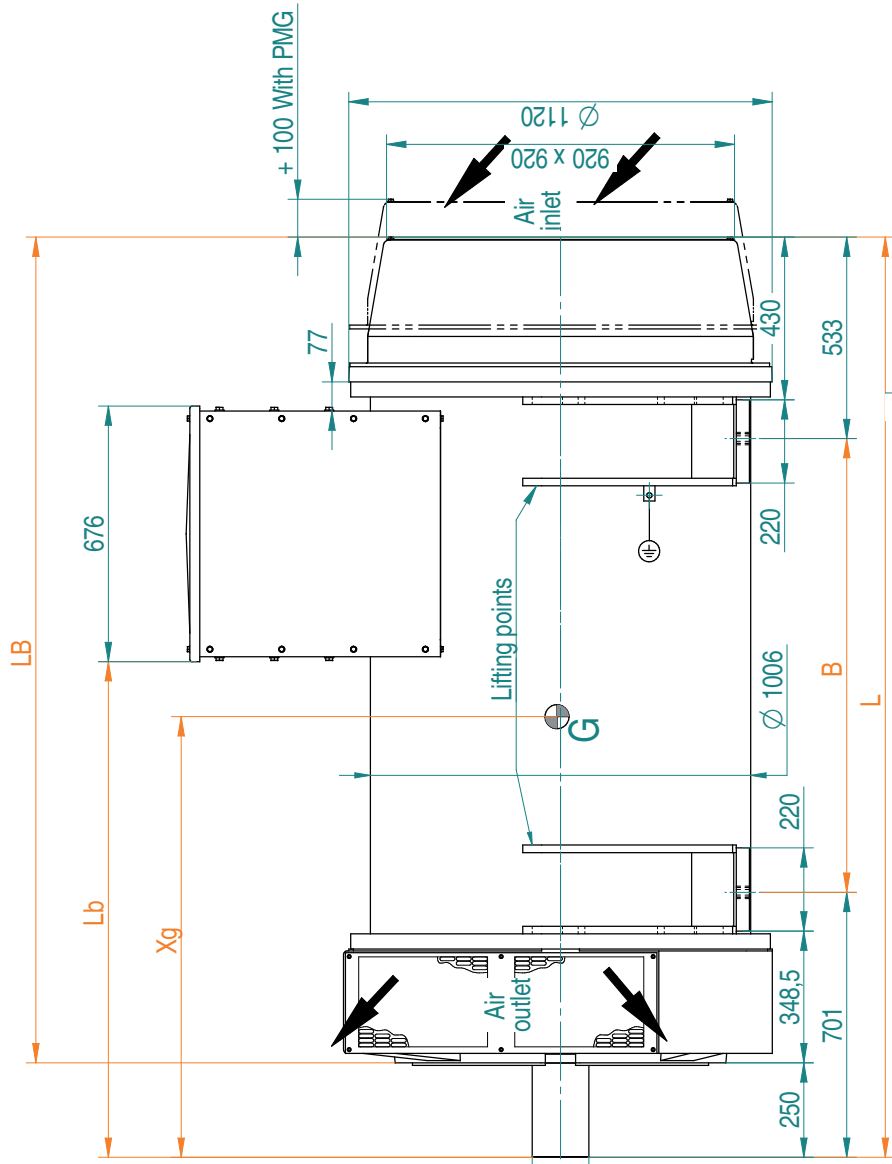
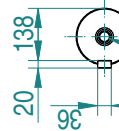
Date: 03.02.2011
 Design: F. CLOUENOUS
 Verifie: Y. MESSIN
 M.B.:
 M.B.:

Catalogue
 Rotor P1 753 1000
 LSA 53.1 / 4P BT
 Encombrement Monopolar
 Single bearing dimensions
 EN 753 1000

Type shown: LSA 53.1 / 4p M80
 Flexplate used: SAE 00-21

VOLTAGE	SIZE	WEIGHT [kg]	STATOR LENGTH [mm]	L [mm]	B [mm]	LB [mm]	Lb [mm]	Xg [mm]
LOW VOLTAGE	M70	5560	1500	2434	1200	2191	1311	1120
	M80	6170	1500	2434	1200	2191	1311	1165

NFE 22-177



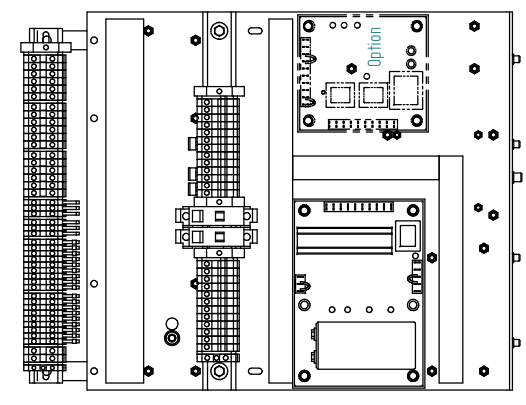
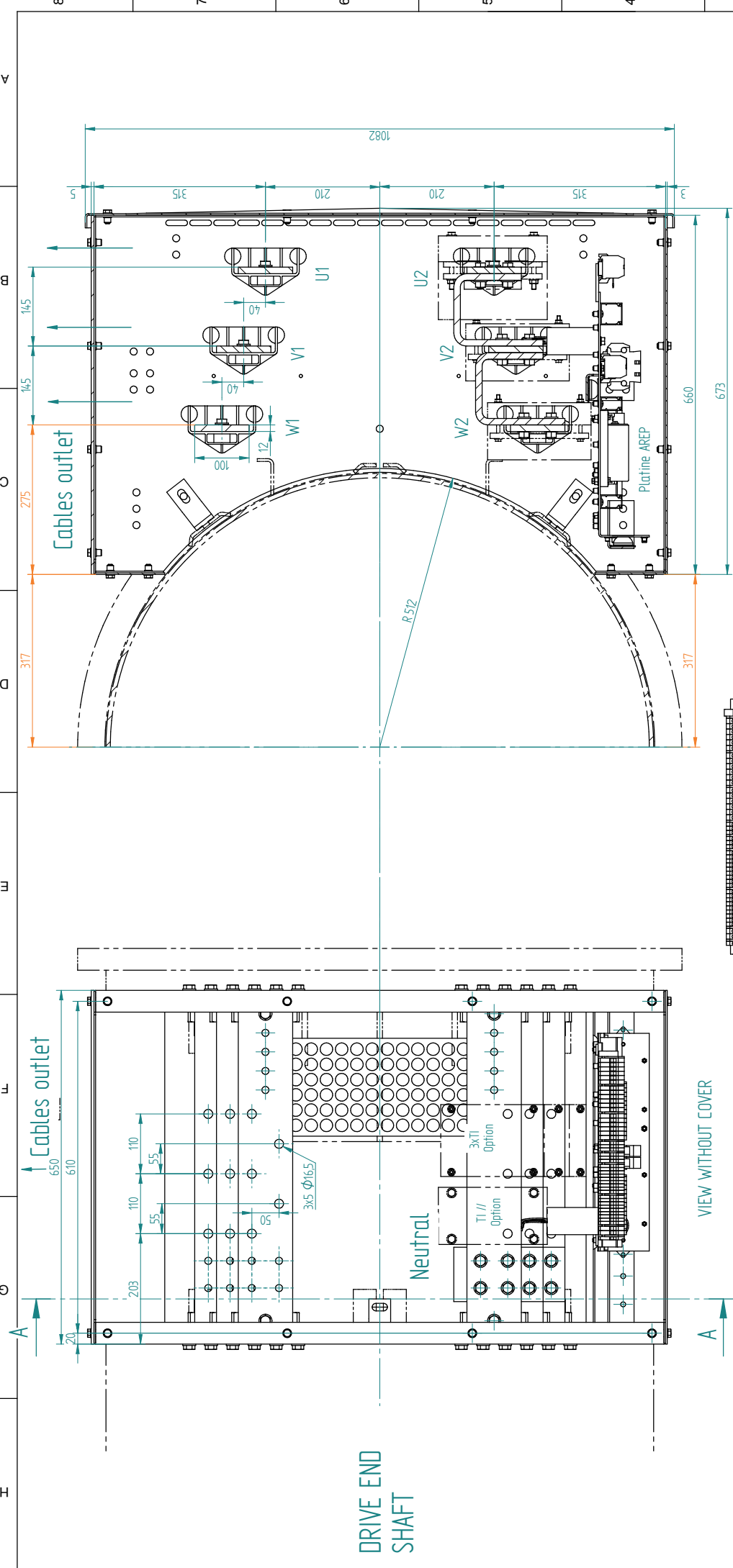
Supplied by Leroy Somer
4 jacking screws HM27-2
2 dowell pins A16-120

G	Project:	Catalogue
F	N°:	
E	Drawing:	Rotor P1 753 2000
D	Machine:	LSA 53.1 / 4P BT
C	Designation:	
B	Rev. Description	G.C. 28.01.2011
A	First issue / première édition	Norm

Designé par:	G. Chauvette	le: 28.01.2011
Vérifié par:	Yannick Messin	le: 03.02.2011
Matr.:		

Page 1/1	A2	EN 753 2000
Rev	A	

Type Showtr: LSA 53.1 / 4p M80



VIEW A-A

VIEW WITHOUT COVER

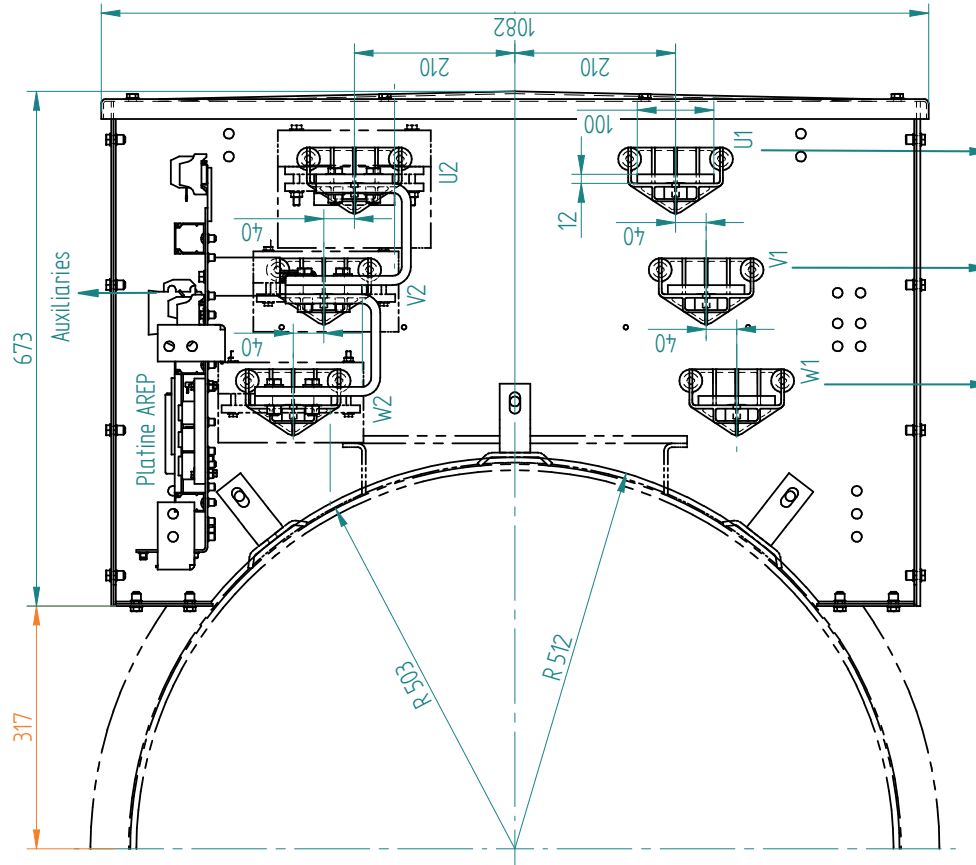
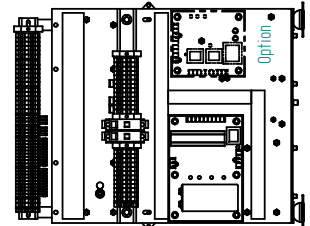
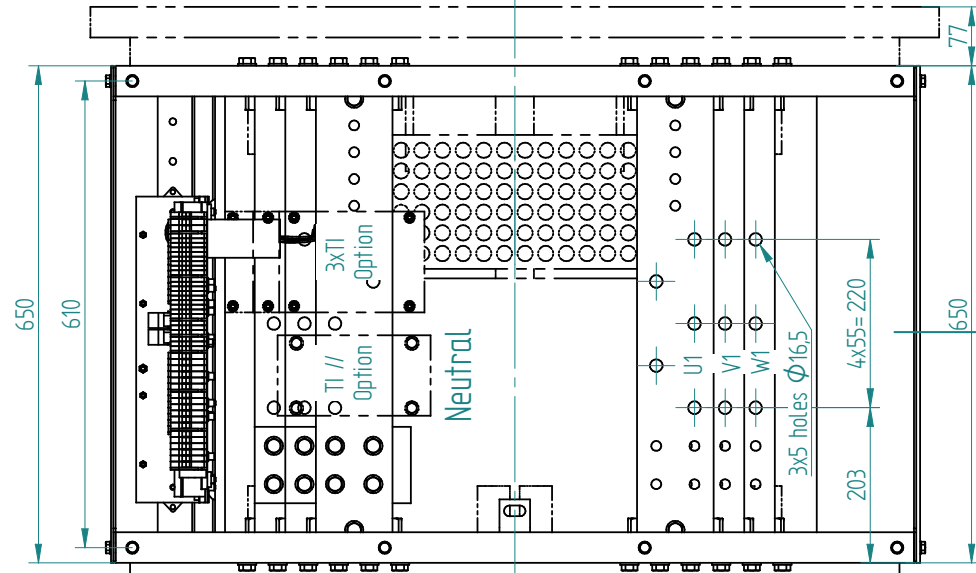
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F	N° :	
E	Divers :	
D	Machine :	
C	Désignation :	
B	Norme :	
A	Date :	11.10.2010
Rev Description A First Issue / première édition Norm L.T. 11.10.2010		
Dessiné : L. TOHIZAN le: 11.10.2010 Vérifié : G. CHALUETTE le: 11.10.2010 Visé : le: le: MdB: le: le:		
Plan Catalogue Sortie à gauche LSA53.1 BT 4P Terminal box Boîte à bornes BT TB 753 1000		
Page 1 / 1 Sous le nom		Rev A2



LSA SOMER
ORLEANS-FRANCE

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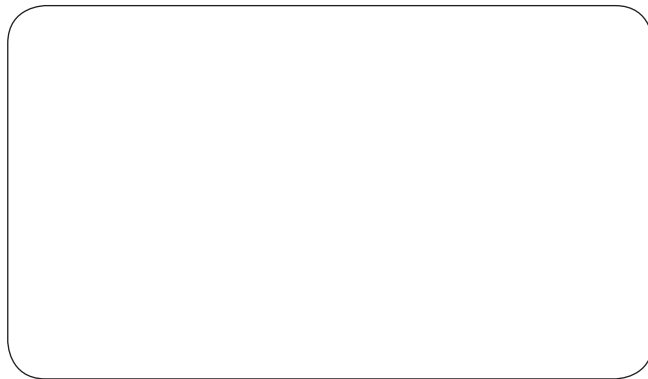
Code : B0 753 1002
 Masse : 138,6 kg



1:7

Articles usinés : Tolérances ISO 2768-mH & rugosité générale : Ra 3,2		Articles bruts : Tolérances ISO 2768-H		Ce plan est la propriété de la société MOTELURS LEROY SOMIER et ne peut être communiqué sans son autorisation	
G	Projet :				
F	N° :				
E	Divers :				
D	Machine :				
C					
B	Designation :				
A	First issue / première création	D.H	22.04.2010	Norm	Date
Description		Boîte à bornes A53 BT			
Dessiné : D. Hussonnois		le: 22.04.2010		Date	
Vérifié : D. Hussonnois		le: 22.04.2010		Date	
Visé :		le :		Date	
Méth. :		le :		Date	
				Page 1 / 1	
				Voir échelle sous la vue	
				A3	
				Rev	
				A	
				ORLEANS-FRANCE	
				LEROY SOMIER	

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