Nidec All for dreams

LEROY-SOMER

ALTERNATOR TECHNICAL DESCRIPTION
LSA 56 BMXL85 / 4p

LS Reference: 1906CA15_Dragon_LT5_ODP_Frise

Date: 13/09/2019

V4.13 - 06/2019

Project Manager : CA

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

cedrik.anchier@mail.nidec.com
+33 (0)2 38 60 42 26
CA

Main data

					M	C	
Generator type:	**LSA 56 BMXL85 / 4p**						
Power:	6 600	kVA	5 280	kWe	5 457	kWm	
Voltage:	13800	V	Star serial				
Rated voltage range:	+5/-5%						
Power factor - Lagging:	0,8						
Frequency:	60	Hz					
Speed:	1800	rpm					
Nominal current:	276	A					
Winding type:	p5/6						
Classes (Insulation / Temperature Rise):	H / F						
Ambient Temperature:	40	°C					
Altitude:	1000	m					

Installation

Quantity **2**

Client:	Dragon Products
Project:	Mobile group
Prime mover:	Gas turbine
Manufacturer:	BHGE
Type:	LT5
Duty:	Base Rating

Mechanical Construction

IM1105

Type of construction:	Two bearing	
Mounting arrangement:	Horizontal Axis	
Direction of rotation:	Counter clockwise (seen when facing the drive end - DE)	
Bearing type:	Sleeve	
Bearing Lubrication:	By Oil circulation, with external Oil lubrication unit	
Bearing insulation:	1 bearing insulated (NDE)	
Shaft end type:	Solid forged half coupling	
Balancing - Class (ISO 1940/1):	Without key - G1	
Flange:	None / without	
Shaft height:	710	mm
Width:	1450	mm

Sleeve bearing data

Bearing Oil cooling:	By the external lubrication unit heat-exchanger,
External bearing Oil lubrication:	Supplied by the client
Oil characteristics:	Mineral Oil (Std)
Oil inlet connection:	Location To be defined
Oil outlet connection:	Location To be defined
Bearing axial clearance:	Standard

Additional specificities

Stabilized Runaway speed:	2160 rpm - 2 min.

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Cooling Method — IC01

Degree of protection:	IP23
Coolant:	Air / Temperature: 40 °C
Air quality:	Clean
Ventilation (internal):	Self-ventilated
Filters:	Without
Ducting for air inlet:	No
Ducting for air outlet:	No

Connection, Excitation & Regulation

Parallel operation:	Between alternators (1F) - 1x //CT
Excitation:	Self-excited - Brushless - Type: AREP + PMI
Sustained 3-phase Isc:	> 3 x FLC for 10s.
AVR type:	D700 - Digital
AVR location:	For panel mounting
Alternator Voltage sensing:	Terminal box mounted voltage sensing VTs
Additional features:	
	Three-phase sensing

Terminal box

Power connection:	4 connectors (brought out neutral)
Main Terminal box location:	1 terminal box on the top
Line side outlet:	Rearwards
Gland plate:	Non magnetic - Cable gland plate not drilled
Auxiliary junction box:	4
Safety additional supply:	
	Safety relief valve (overpressure)
	-

Protection and measurement accessories

Temperature detection

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

Anti-condensation heating

Voltage: 277 V - 1Ph / Power: 500 W

Rotor protection

Shaft earthing brush

Vibration sensors

Seismic Sensors

Sensors reference: - Supplied by LS & Mounted by LS

Sensed Axis	X	Y	Z	
Nb of sensors on DE:	-	1	-	-
Nb of sensors on NDE:	-	1	-	-

Converter reference:	- Supplied by To Be Defined & Mounted by To Be Defined
Converter location:	To Be Defined

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LS Reference: 1906CA15_Dragon_LT5_ODP_Frise 1

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Transformers (Client use)

LS Supply				1
Set of 3 x CTs (measuring and/or protection):			I Primary / I Secondary / Power / Class	
Preliminary	Neutral side	S1	300 / 1A / 10VA / Cl. 0,5 FS5	1
		S2	300 / 1A / 10VA / Cl. 5P10	1
				1

-

Various items

Requested maximum noise level:	110 (dBA 1m)	1
Requested maximum vibration level:	1.8 (mm/s RMS)	1
Paint:	C3M-P - Polyurethane - RAL 7032	1
Documentation:	PDF manual	1
Documentation Language:	Anglais	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/006 003	No load characteristics, no load losses	1
QUAL/INES/006 004	Three phase short circuit characteristic	1
QUAL/INES/006 005	On load test (subject to test bench capacity)	1
QUAL/INES/006 007	Overspeed test (according to test bench limitation)	1
QUAL/INES/006 008	Calculation of efficiency by summation of losses	1
QUAL/INES/006 009	High potential test	1
QUAL/INES/006 010	Insulation resistance measurement	1
QUAL/INES/006 019	Measurement of specified vibration level	1

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ALTERNATOR ELECTRICAL DATA
LSA 56 BMXL85 / 4P
LS Reference: 1906CA15_Dragon_LT5_ODP_Frise

Date: 13/09/2019 V4.13 - 06/2019

Main data: C

Power:	**6 600**	kVA	**5 280**	kWe	**5 457**	kWm	1
Voltage:	**13800**	V	Frequency:		**60**	Hz	1
Rated voltage range:	+5% / -5%		Speed:		1800	rpm	1
Power factor - Lagging:	0,8						1
Nominal current:	276	A	Phases		3		
Insulation / Temperature rise:	H / F		Connexion		Star serial		1
Cooling:	**IC01**		Winding type:		p5/6		1
			Winding:		- 6 Wires		1
Ambient Temperature:	40	°C					1
Altitude:	1000	m	Overspeed (rpm)		2160		1
Duty: Base Rating			Total Harmonic Distortion (THD) < 5%				1

Efficiency (Base 5280 kWe) IEC

	25%	50%	75%	**100%**	110%	
Power factor - Lagging: 0,8	92,21	95,48	96,42	**96,76**	96,82	1
Power factor - Lagging: 1	92,45	95,83	96,89	**97,35**	97,46	1

Reactances (%) - (Base 6600 kVA)

		Direct axis *Unsaturated*	Direct axis *Saturated*	Quadrature axis *Unsaturated*	Quadrature axis *Saturated*	
Synchronous reactance	Xd	181	167	Xq 92	85	1
Transient reactance	X'd	25,3	21,5	X'q 92	85	1
Subtransient reactance	X"d	18,1	15,4	X"q 22,6	19,2	1
Negative sequence reactance	X2	20,3	17,3			

X0	12,7	Zero sequence reactance	1
Xl	9,0	Stator leakage reactance	
Xr	18,0	Rotor leakage reactance	
Kc	**0,60**	Short-circuit ratio	1

Time constants (s)

	Direct axis		Quadrature axis		
Open circuit transient time constant	T'do	3,97	T'qo	NA	1
Short-circuit transient time constant	T'd	0,557	T'q	NA	1
Open circuit subtransient time constant	T"do	0,039	T"qo	0,103	1
Subtransient time constant	T"d	0,028	T"q	0,025	1

Ta	0,106	Armature time constant	1

Resistances (%)

Ra	0,5	Armature resistance	R0	4,2	Zero sequence resistance	1
X/R	26,1	X/R ratio (without unit)	R2	4,1	Negative sequence resistance	

Voltage accuracy: 0,25%
Maximum inrush current for a voltage dip of 15%: 5110 kVA
when starting an AC motor having a starting power factor between 0 and 0.4

rating is provided for the specified temperature rise, by temperature sensor(ETD) measurement according to IEC60034-1

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

ALTERNATOR MAIN CURVES
LSA 56 BMXL85 / 4P

LS Reference: 1906CA15_Dragon_LT5_ODP_Frise

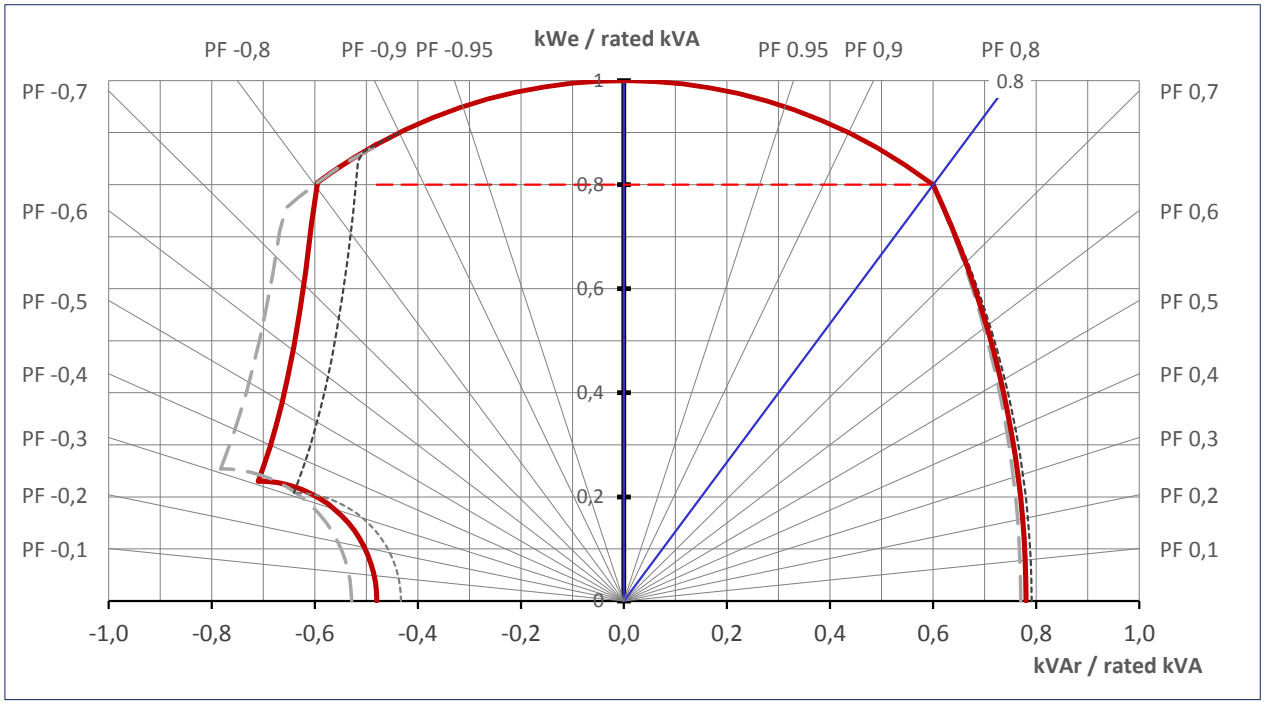
Date: 13/09/2019

6600kVA - 13800V - 60 Hz

V4.13 - 06/2019

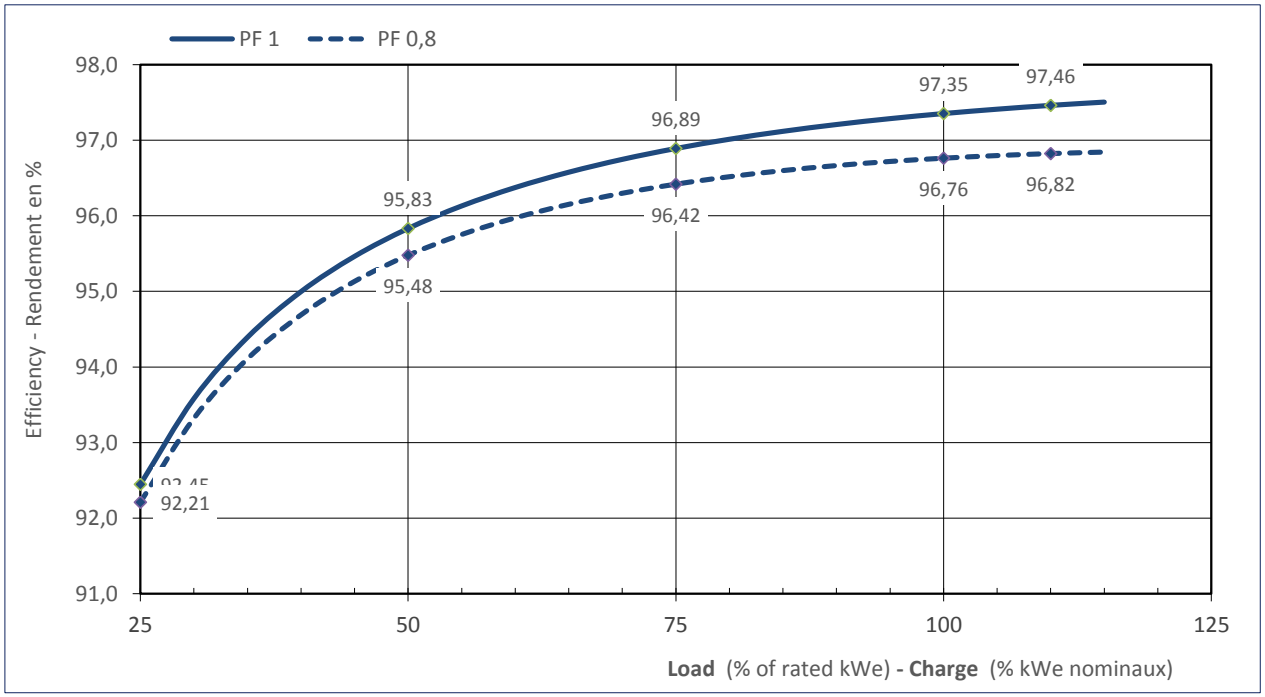
Umax	+ 5%	14 490	V
Un		**13 800**	V
Umin	- 5%	13 110	V

Capability Curve



Efficiency Curves

According to: IEC



ALTERNATOR MAIN CURVES
LSA 56 BMXL85 / 4P
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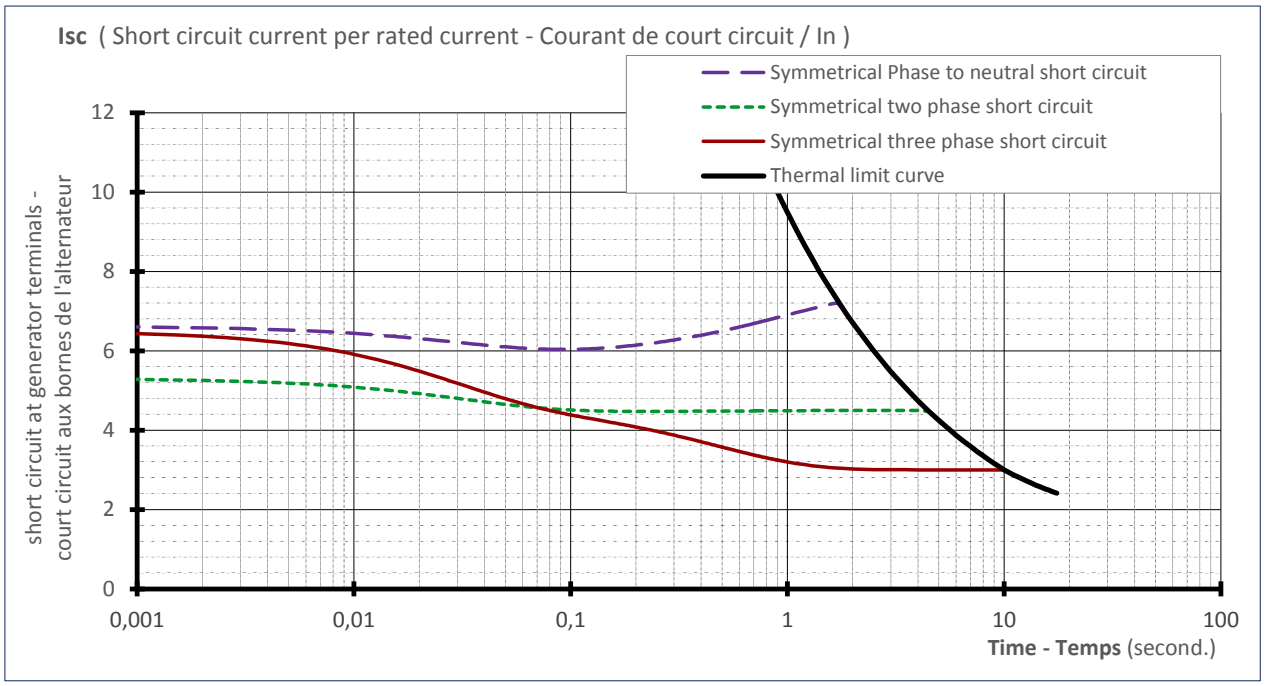
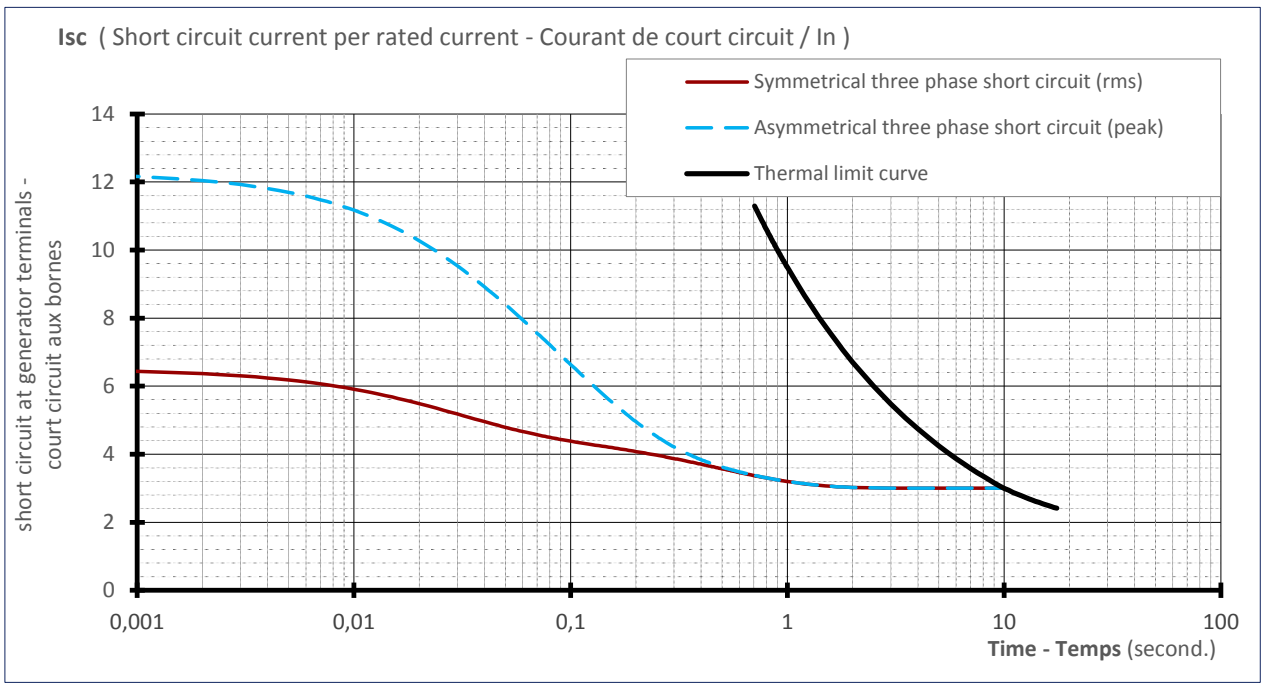
Stator Current decrement curves

Symmetrical phase to neutral short-circ	initial	1 821	A	6,6 x In			
Symmetrical two phase short-circuit	max	1 457	A	5,3 x In	In =	**276**	A
Symmetrical three phase short-circuit	value	1 776	A	6,4 x In			
Thermal Limit							



Asymmetrical three phase short-circuit	IP	3 336	A	12,1 x In



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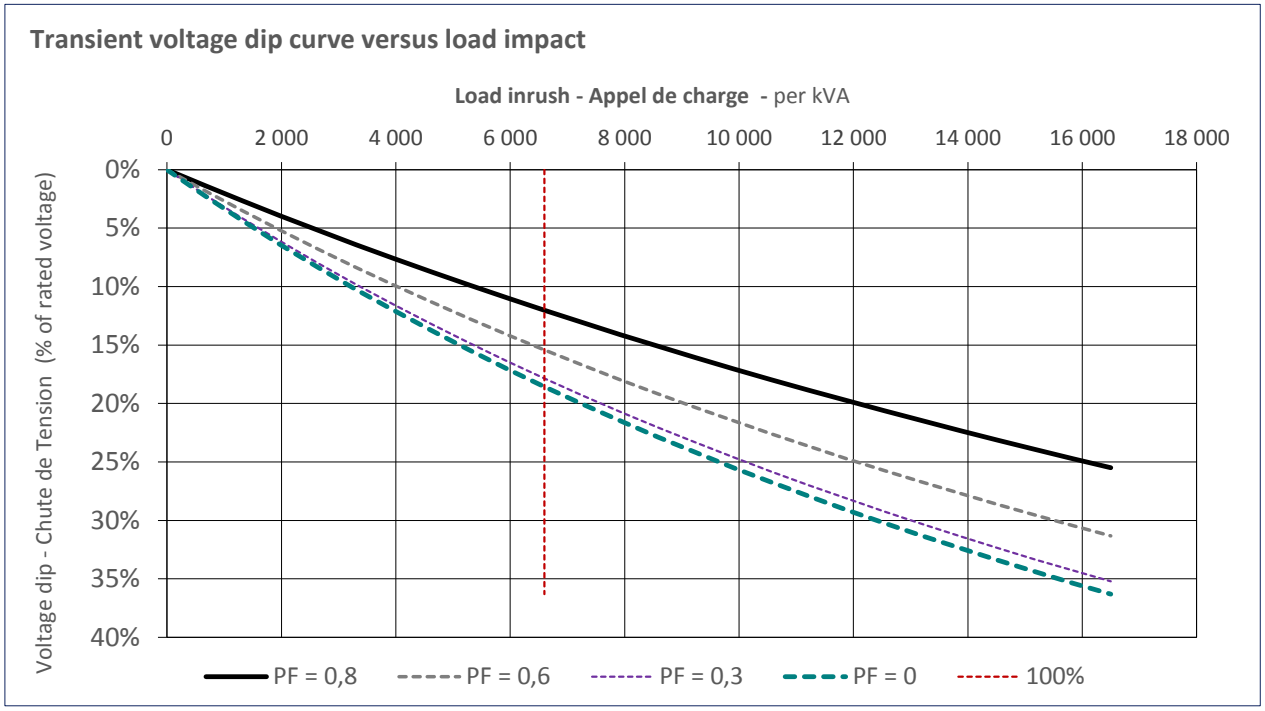
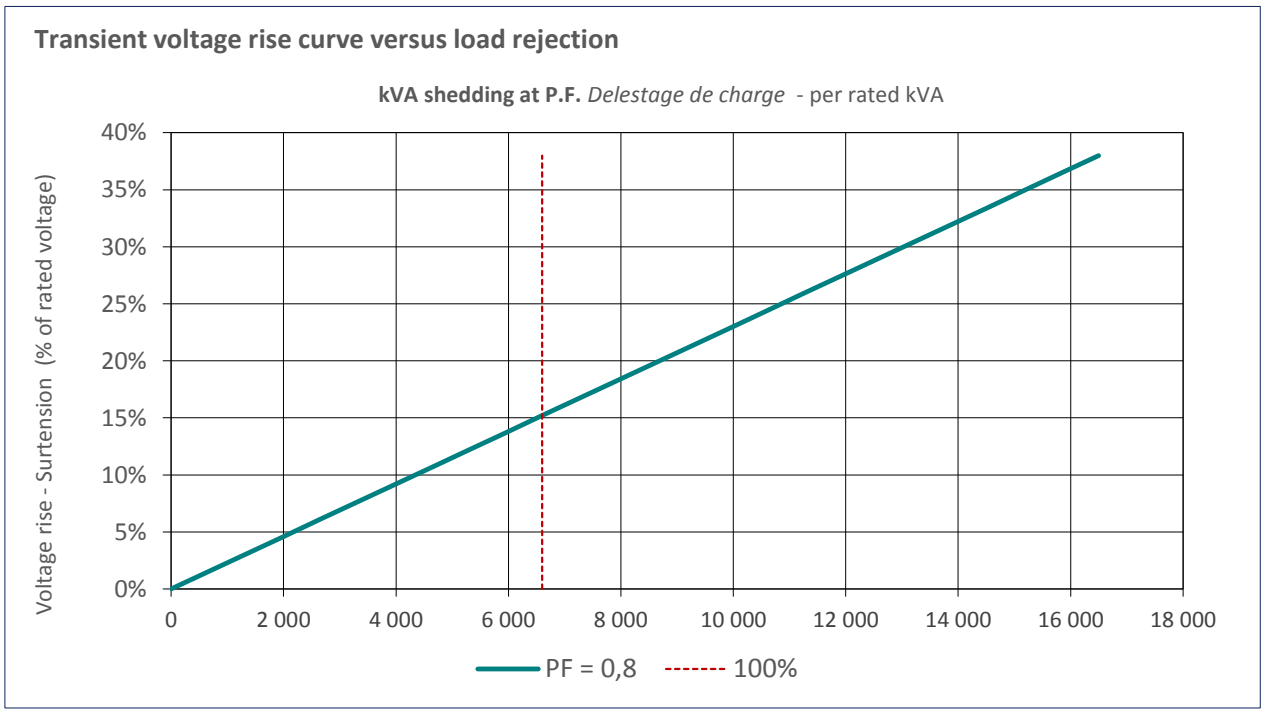
Transient Voltage Variation





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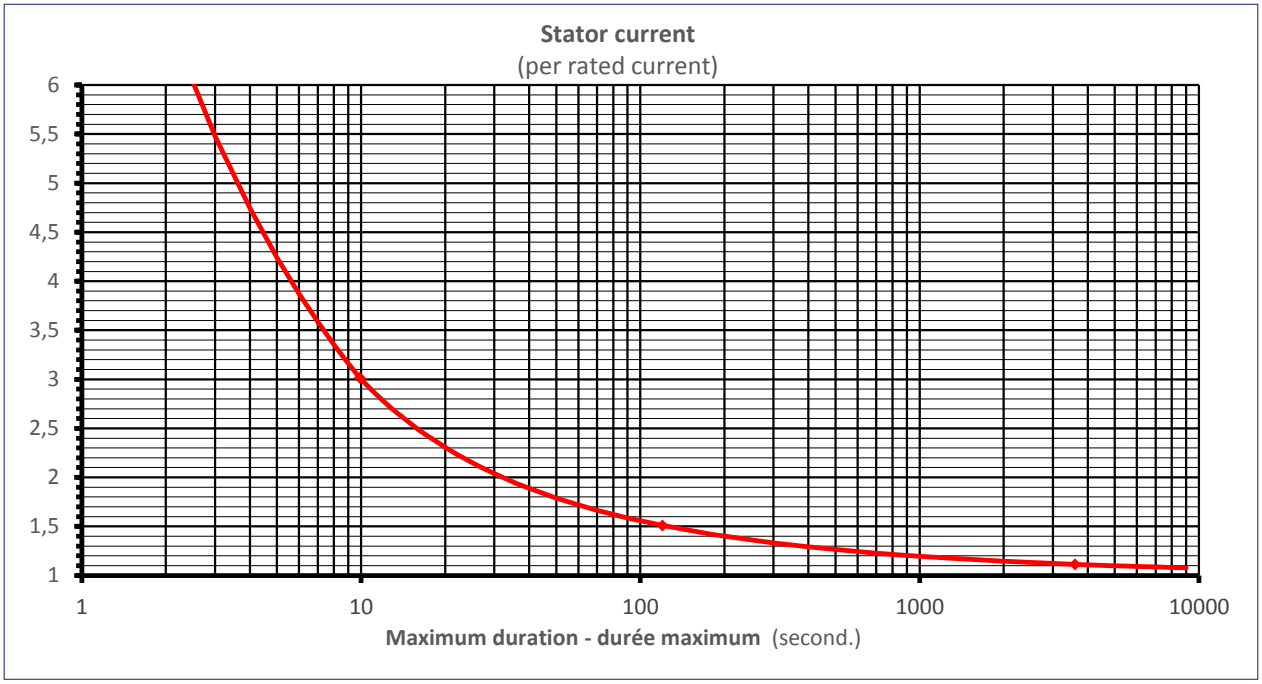
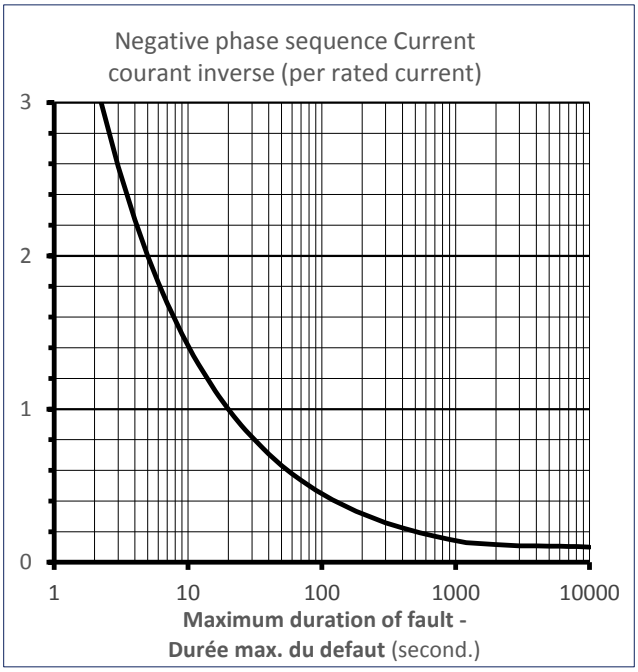
LS Reference: 1906CA15_Dragon_LT5_ODP_Frise

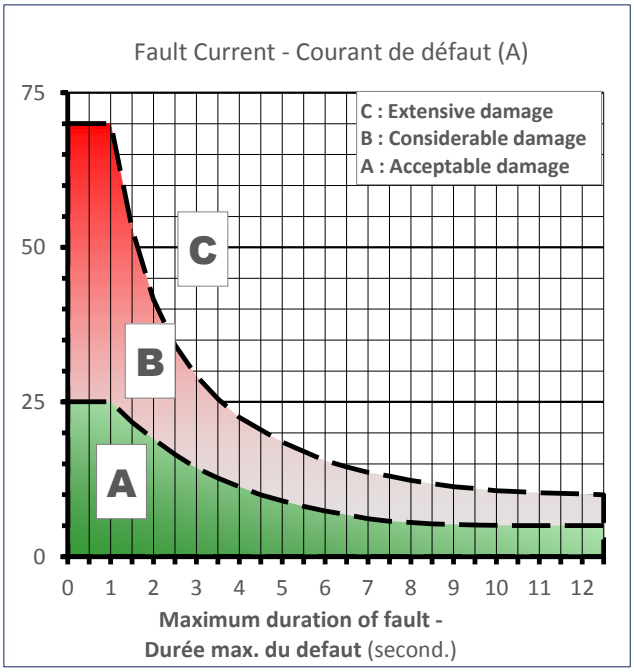
Thermal Damage Curve



Unbalance Load Curve

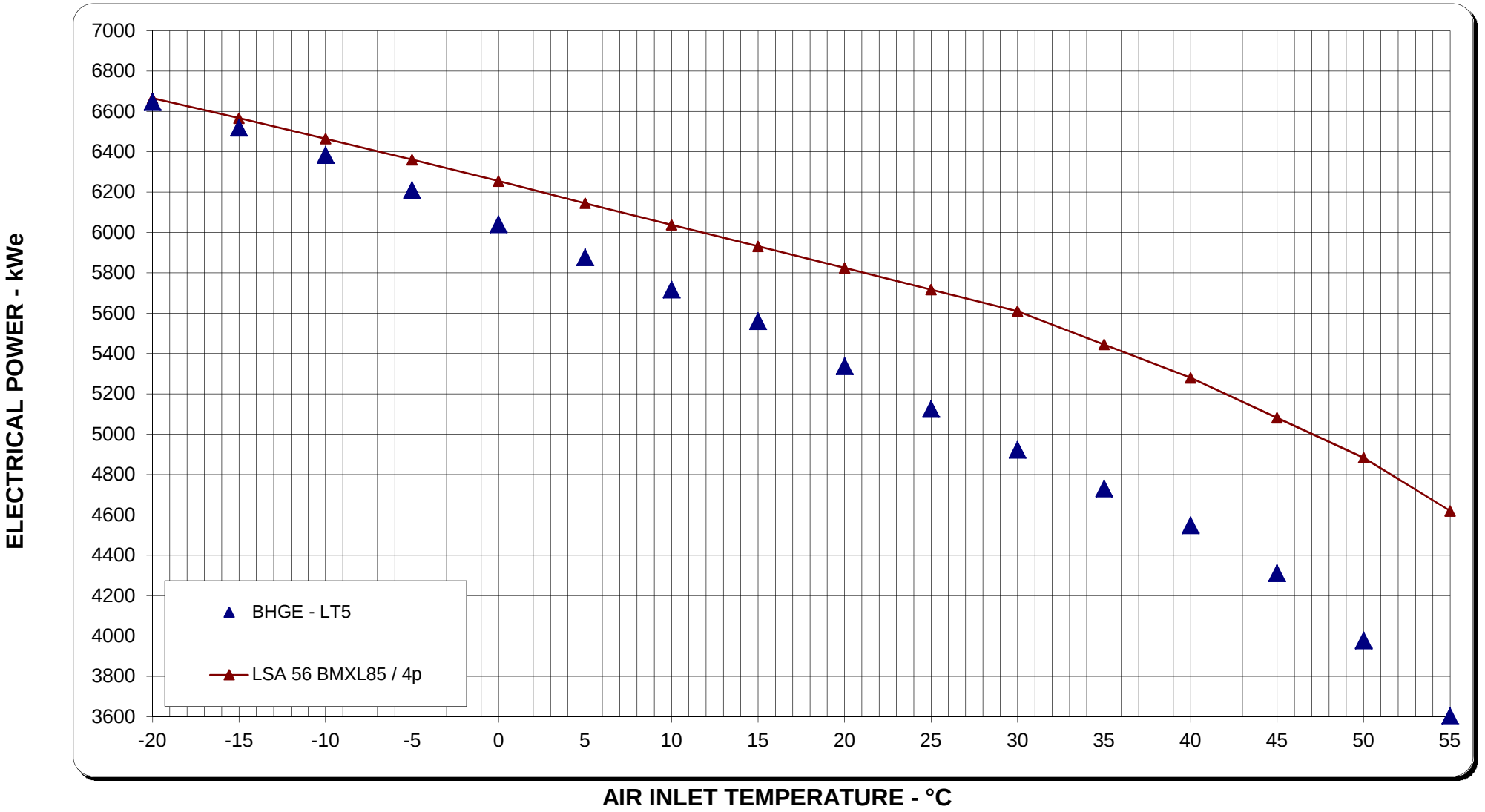


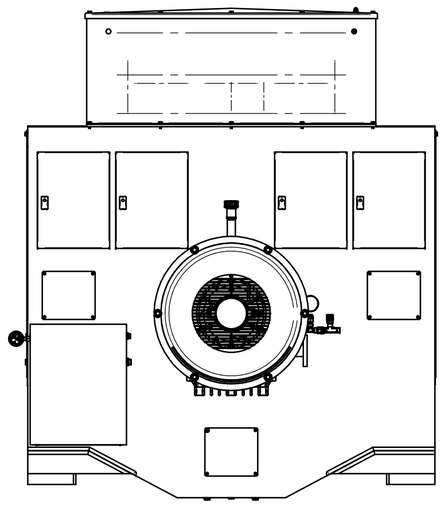
Stator Earth Fault Current

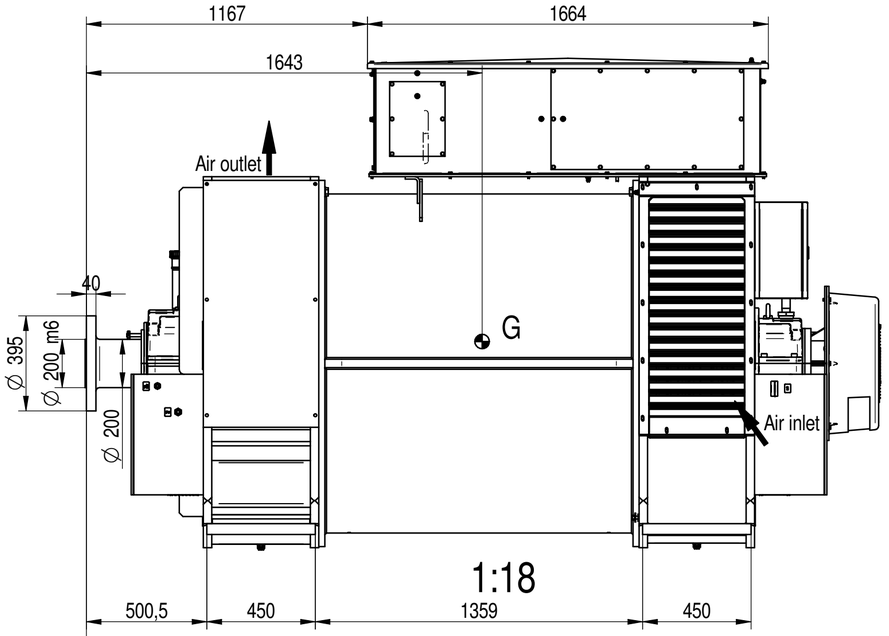


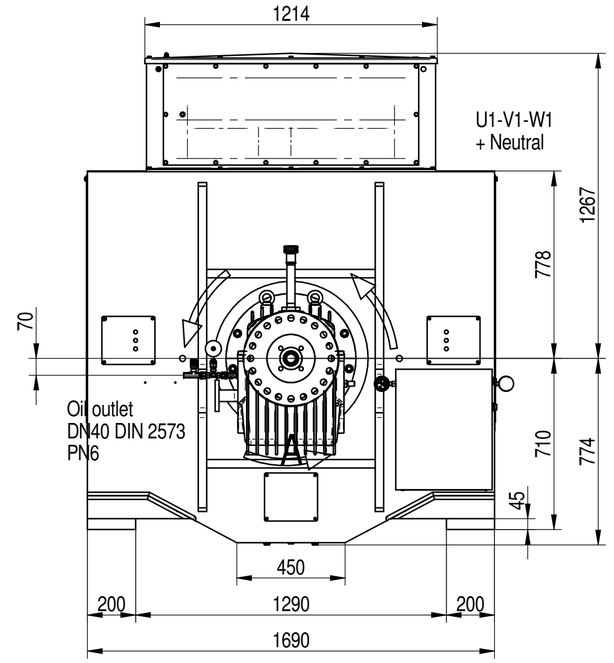
ALTERNATOR POWER CURVE

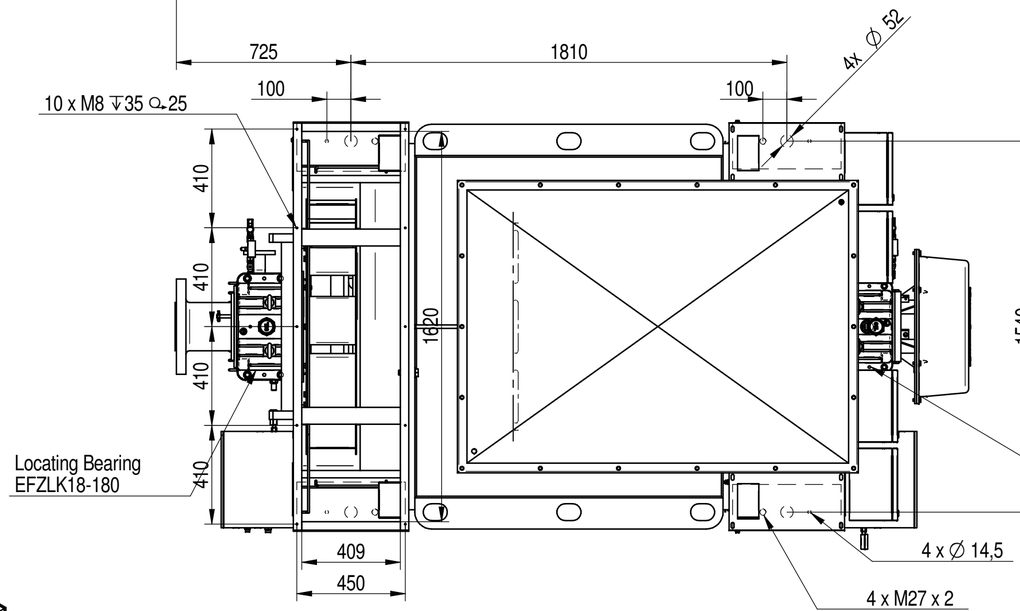
Turbine type :	**BHGE - LT5**			**Alternator type :**	**LSA 56 BMXL85 / 4p**
Turbine power ISO (15°C) :	5561 kW			**Voltage :**	13800 V
Insulation / Temperature rise :	H/F	Power Factor		**Speed / Frequency :**	1800 RPM / 60 Hz
Alternator power ISO (40°C) :	6600 kVA	0,8		**Cooling:**	ODP

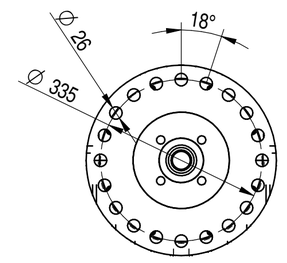






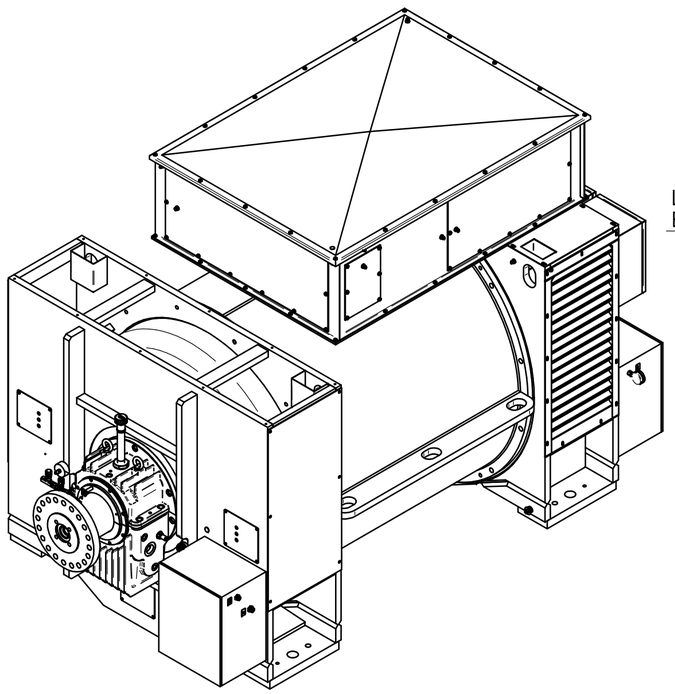






DETAIL A

Masse : 15374.7 kg



Supplied by LS:
4 jacking screws HM27x2-100
2 dowell pins A16-120

Attention : Page 1 / 1

Articles usinés : Tolérances ISO 2768-mH & rugosité générale : Ra 3.2	Articles bruts: Tolérances ISO 2768-cH	Ce plan est la propriété de la société MOTEURS LEROY SOMER et ne peut être communiqué sans son autorisation		
G	.	.	.	Projet : Mobile group
F	.	.	.	N°: 611 277
E	.	.	.	Divers: .
D	.	.	.	Machine: A56
C	.	.	.	
B	Air outlet	DLo	09/12/2019	Désignation: Encombrement
A	First Issue / première création	DLo	20/10/2019	
Rev	Description	Nom	Date	

Dessiné: D.LOPEZ le:20/10/2019
Verifié: D.LOPEZ le:20/10/2019
Visa: . le:.
Méth.: . le:.

Nidec All for dreams LEROY-SOMER

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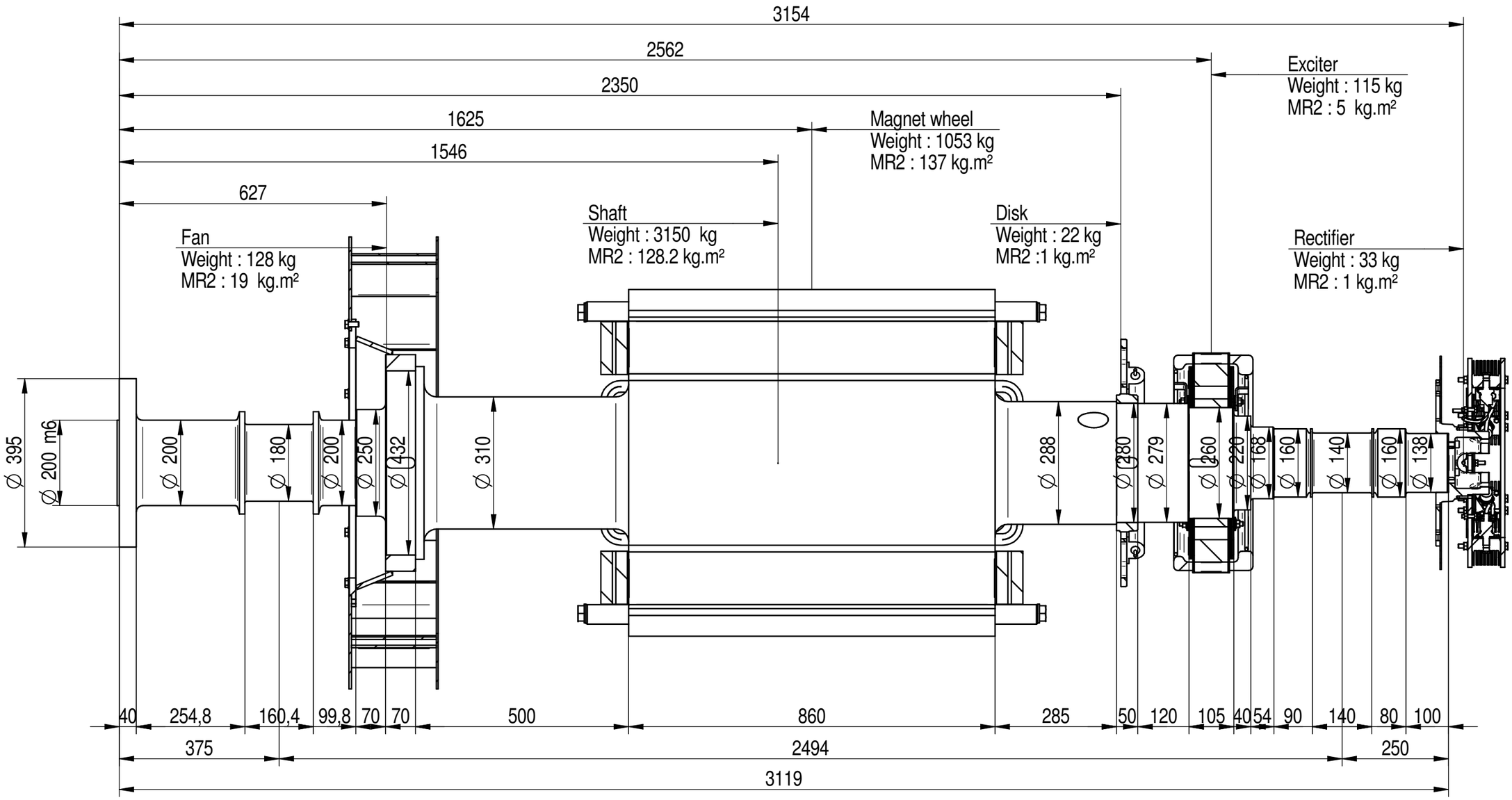
Voir échelle sous la vue

A2 | EN 611 277 | Rév B

Doc 007 C



G (gravity center) is situated to 1581 mm from drive end shaft
Total mass applied at G : 4501 kg
Magnetic attraction : 11754 N/mm
Approximate Inertia : 291.4 kg.m²

Articles usinés : Tolérances ISO 2768-mH & rugosité générale : Ra 3.2 | Articles bruts: Tolérances ISO 2768-cH | Ce plan est la propriété de la société MOTEURS LEROY SOMER et ne peut être communiqué sans son autorisation

Rev	Description	Nom	Date
G	.	.	.
F	.	.	.
E	.	.	.
D	.	.	.
C	.	.	.
B	.	.	.
A	First Issue / première création	DLo	21/10/2019

Dessiné: D.LOPEZ le:21/10/2019
Verifié: D.LOPEZ le:21/10/2019
Visa: . le:.
Méth.: . le:.

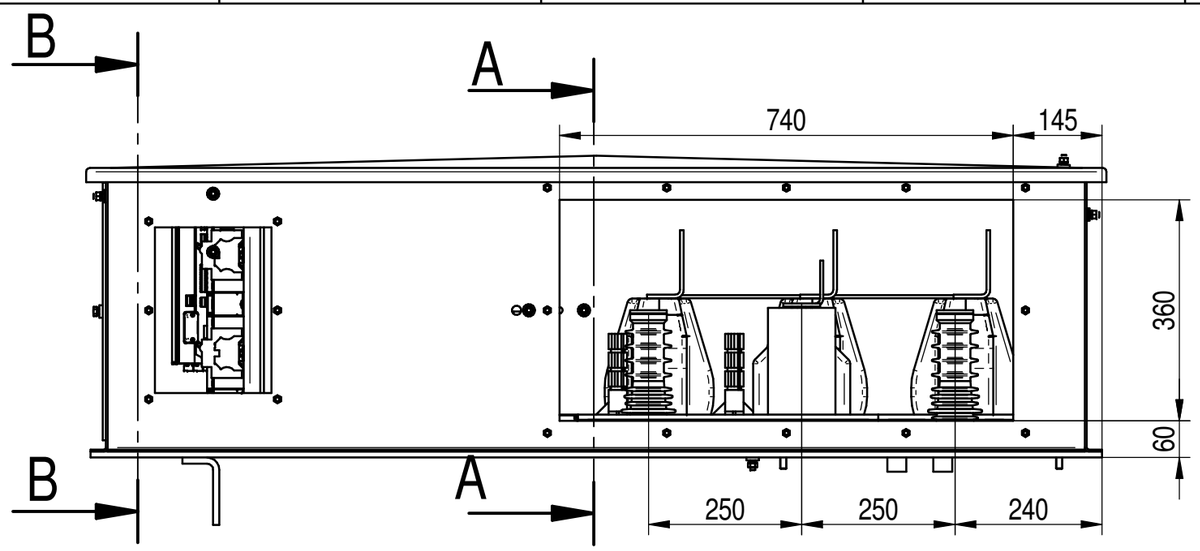
Nidec All for dreams LEROY-SOMER

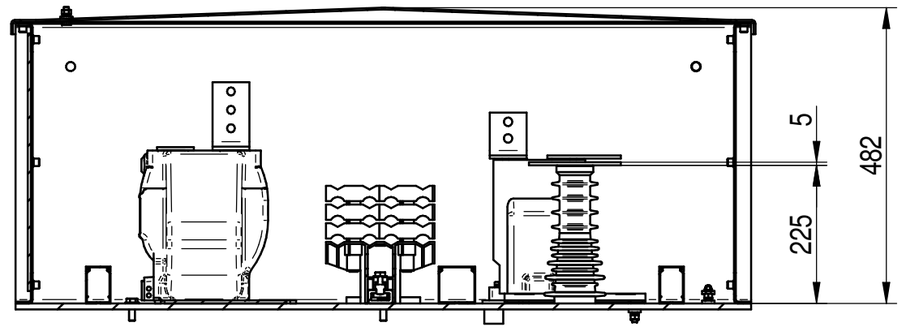
Page 1 / 1
Voir échelle sous la vue

Projet : Mobile group
N° : 611 277
Divers: .
Machine: A56
Désignation: Partie tournante

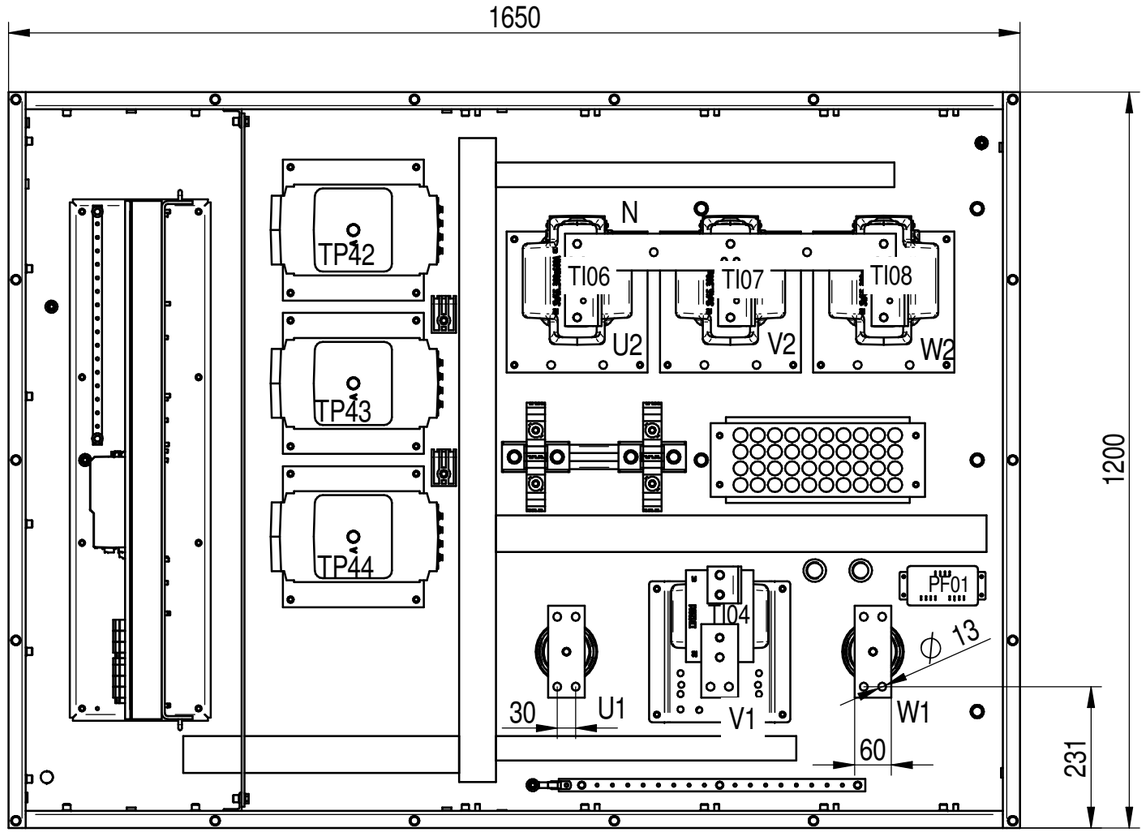
Doc:008.C

A3 | P1 611 277 | Rév A



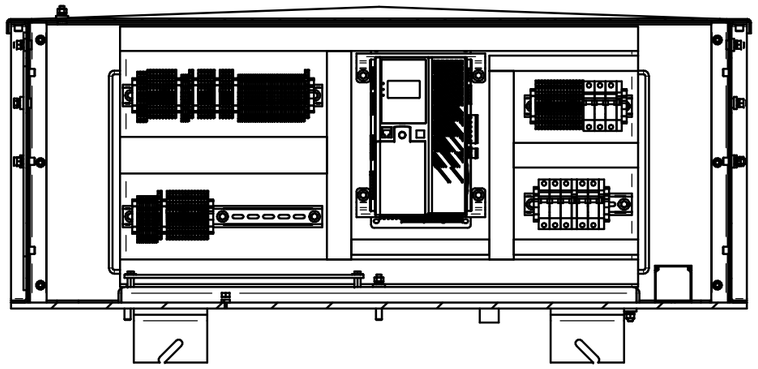


SECTION A-A



Shaft end

CABLES OUTLET



SECTION B-B

Articles usinés : Tolérances ISO 2768-mH & rugosité générale : Ra 3.2	Articles bruts: Tolérances ISO 2768-cH	Ce plan est la propriété de la société MOTEURS LEROY SOMER et ne peut être communiqué sans son autorisation

Rev	Description	Nom	Date
G	.	.	.
F	.	.	.
E	.	.	.
D	.	.	.
C	.	.	.
B	.	.	.
A	First Issue / première création	DLo	24/02/2020

Dessiné: D.LOPEZ le:24/02/2020
Verifié: D.LOPEZ le:24/02/2020
Visa: . le:.
Méth.: . le:.

Nidec All for dreams LEROY-SOMER

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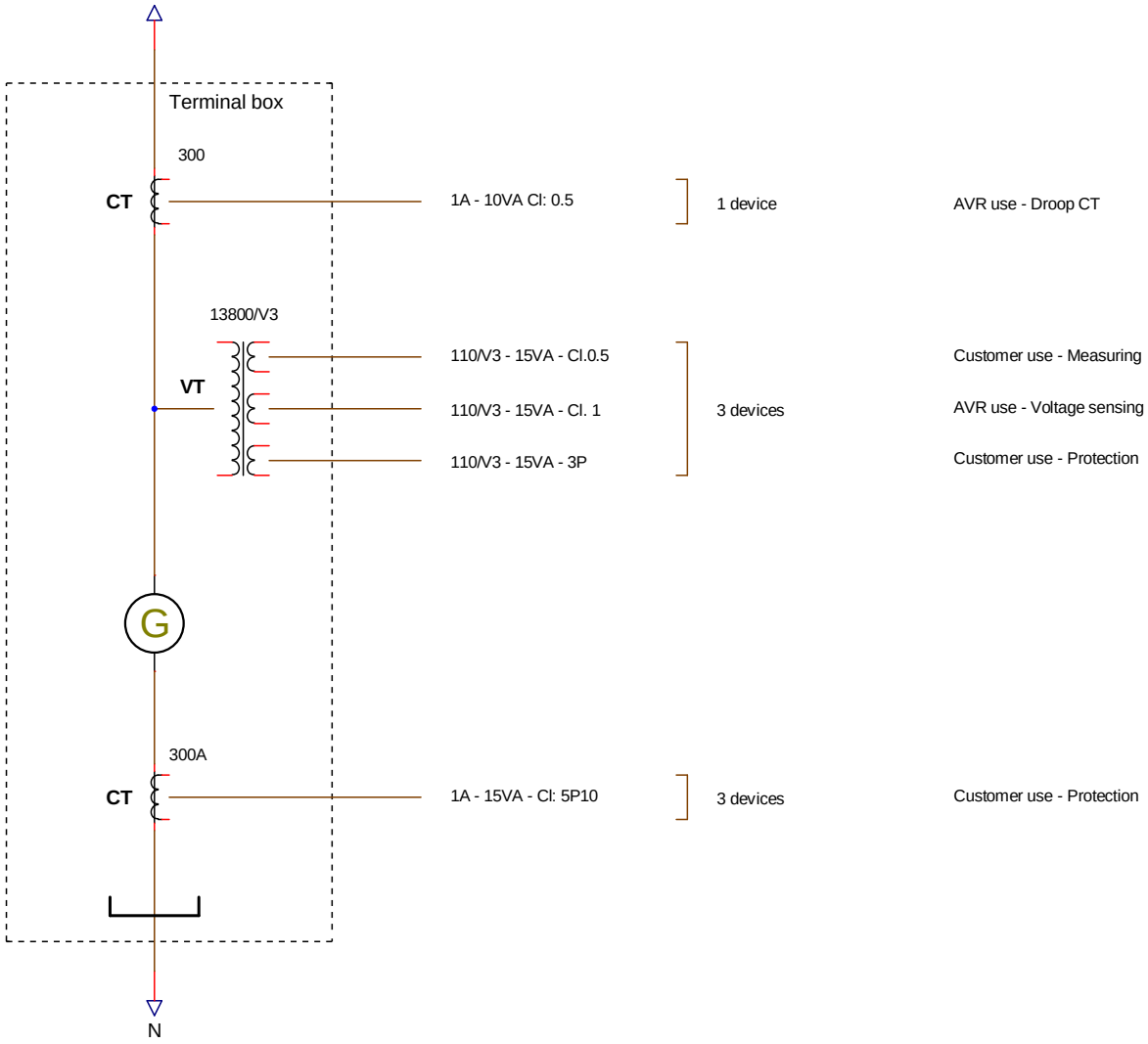
Voir échelle sous la vue

Projet : Dragon products
N°: 611 277
Doc 008 C
Divers: .
Machine: A56
Désignation: Terminals box

A3 | TB 611 277 | Rév A



Moteurs LEROY SOMER
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45 800 St Jean de Braye-FRANCE
+33.2.38.60.42.00
Savorleans.ials@mail.nidec.com

Schéma unifilaire
Single line diagram

SL 611 277 | **A**

Dessiné par: P.PERRON
Vérifié par: JF PAILLOU

D		
C		
B		
A	Création / First issue	15/01/2020

01 / 01