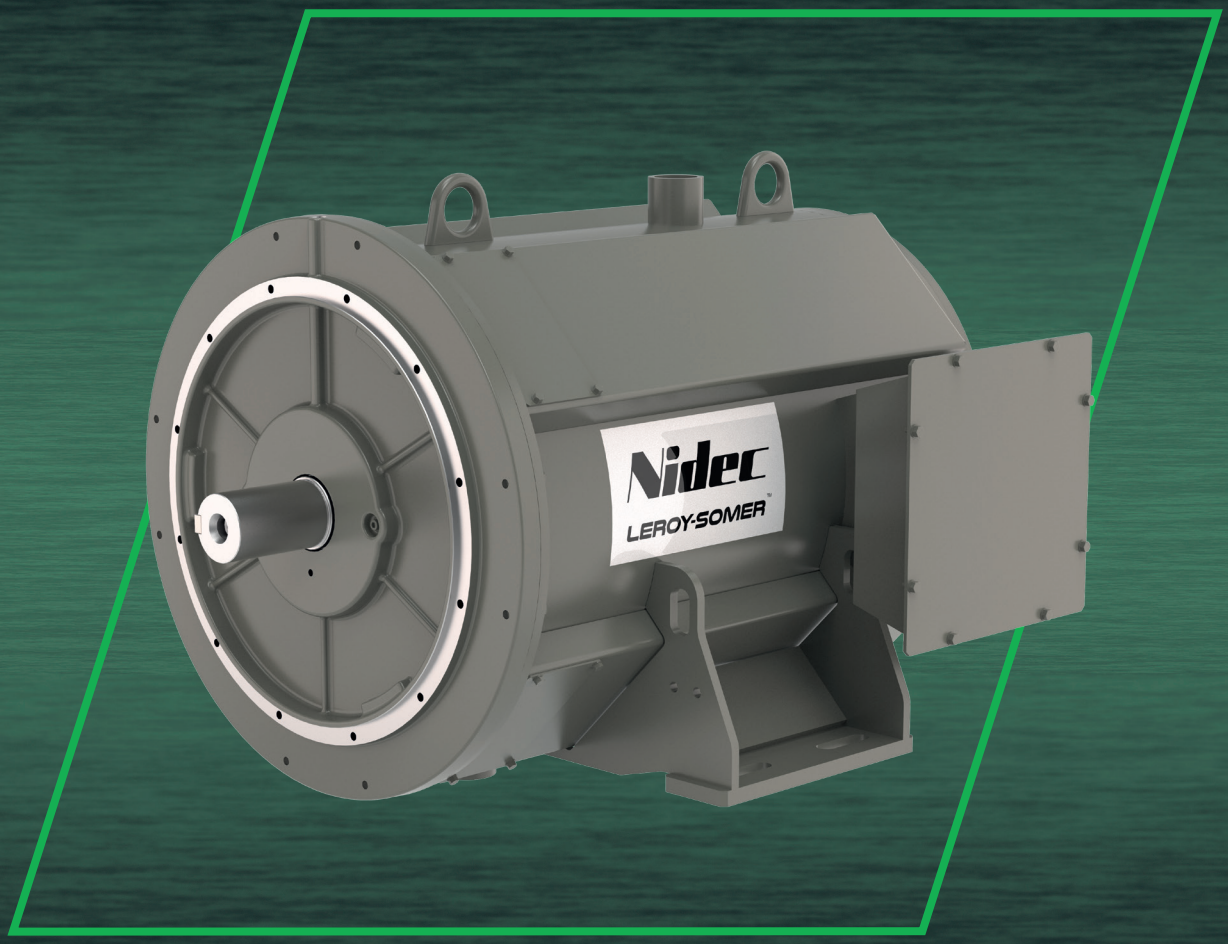
Nidec Power



LSAH 44.3

Low Voltage Alternator - 4 poles

40 to 75 kVA - 50 Hz / 50 to 94 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

The best of performance

The Leroy-Somer™ LSAH 44.3 alternator has been designed to maximize efficiency of cogeneration installations.
Thanks to its specific built-in coolant circuit, heat recovery is optimized and directly fed into the larger installation.
The Leroy-Somer™ LSAH 44.3 alternator is also perfectly suited for continuous service connected to the national grid and other applications like oil and gas.
The various design elements and construction features of the Leroy-Somer™ LSAH 44.3 alternator make it highly performant and durable.

Standards

The Leroy-Somer™ LSAH 44.3 alternator meets all key international standards and regulations such as IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA C22.2 n°100-14, UL 1446, UL 1004-1 and UL 1004-4.
EC, UKCA, CMIM, CSA, UL 1446 and UL recognized declarations and certifications are available for the LSAH 44.3.
The standards IEC 61000-6-2, IEC 61000-6-3, IEC 61000-6-4, VDE 0875G, VDE 0875N and EN 55011 allow compliance with group 1 class A for the European zone.
The Leroy-Somer™ LSAH 44.3 alternator is designed, manufactured and marketed in an ISO 9001 and ISO 14001 quality assurance environment.

Electrical characteristics and performances

- Class H insulation
- 2/3 pitch winding, standard 6-wire (6S) reconnectable
- Voltage range:
  - 50 Hz: 380V/400V/415V
  - 60 Hz: 380V/440V/480V

  Other voltages: consult us
- High efficiency and motor starting capacity

Excitation and regulation system

Excitation system		Regulation options		
AVR	**AREP**	**C.T. Current transformer for paralleling**	**Mains paralleling**	**Remote voltage potentiometer**
D350	Standard	√		√
D550	Option	√	√	√

3-phase sensing is included as a standard with digital regulators.

Protection system and options

- Designed for an operating environment up to 80°C and a maximum cooling liquid temperature of 75°C
- Water flow: 3 to 10 m^3/h
- pH of water: 7<pH<8
- Degree of protection: IP 44 (option: IP55/IP56)
- Enclosed machine cooled by heat transfer fluid
- Options:
  - Double terminal box
  - Space heater
  - Bearing sensors
  - Thermal protection for stator windings (PT100 sensors)
  - Shaft height: adapted on request
  - Remote voltage potentiometer
  - Current transformer for parallel operation
  - Single-bearing configuration
  - Reinforced paint for harsh environment

Mechanical construction

- Compact rigid assembly to better withstand generator vibrations
- Steel frame and terminal box
- Cast iron flanges and shields
- Two-bearing and single-bearing mounting
- Half-key balancing
- Greasable ball bearings: 40 000h
- Direction of rotation: clockwise and anti-clockwise (without derating)
- Noise level: 81 dBA (IEC 60034-9)
- Output cable direction: left or right

Terminal box design

- Remote voltage regulator (AVR not mounted in terminal box)
- Terminal block for voltage reconnection
- Terminal block on the left or right, or both sides (with extra cost)

General characteristics

Insulation class	H
Winding pitch	2/3 (wind. 6S)
Number of wires	6
Protection	IP 44
Cooling - Code	Water - IC7A1W7
Altitude	≤ 1 000 m
Overspeed	2 250 R.P.M.
Water flow	3 to 10 m^3/h

Excitation system	AREP
AVR type	D350
Voltage regulation (*)	± 0.25 %
Short-circuit current	300 % (3 IN) : 10s
Total Harmonic Distortion THD (**) in no-load	< 2 %
Total Harmonic Distortion THD (**) in linear load	< 5 %
Waveform: NEMA = TIF (**)	< 50
Waveform: IEC = THF (**)	< 1.5 %

(*) Steady state (**) Total harmonic distortion between phases, no-load or on-load (non-distorting)

Ratings 50 Hz - 1 500 R.P.M.

Duty max. / T° C		Continuous / 80 °C (environment) - 75 °C (liquid)																	
Class / T° K		F / 70° K (Standard)						B / 45° K						H / 90° K					
		P.F. 1			P.F. 0.8			P.F. φ 1			P.F. φ 0.8			P.F. φ 1			P.F. φ 0.8		
Y		380V	**400V**	415V	380V	**400V**	415V	380V	**400V**	415V	380V	**400V**	415V	380V	**400V**	415V	380V	**400V**	415V
LSAH 44.3 M4	kVA	40	**40**	40	50	**50**	50	32	**32**	32	40	**40**	40	44	**44**	44	55	**55**	55
	kW	*40*	***40***	*40*	*40*	***40***	*40*	*32*	***32***	*32*	*32*	***32***	*32*	*44*	***44***	*44*	*44*	***44***	*44*
LSAH 44.3 M6	kVA	52	**52**	52	65	**65**	65	42	**42**	42	52	**52**	52	57	**57**	57	71	**71**	71
	kW	*52*	***52***	*52*	*52*	***52***	*52*	*42*	***42***	*42*	*42*	***42***	*42*	*57*	***57***	*57*	*57*	***57***	*57*
LSAH 44.3 L8	kVA	60	**60**	60	75	**75**	75	48	**48**	48	60	**60**	60	66	**66**	66	82	**82**	82
	kW	*60*	***60***	*60*	*60*	***60***	*60*	*48*	***48***	*48*	*48*	***48***	*48*	*66*	***66***	*66*	*66*	***66***	*66*
LSAH 44.3 VL12	kVA	75	**75**	75	94	**94**	94	60	**60**	60	75	**75**	75	83	**83**	83	104	**104**	104
	kW	*75*	***75***	*75*	*75*	***75***	*75*	*60*	***60***	*60*	*60*	***60***	*60*	*83*	***83***	*83*	*83*	***83***	*83*

Ratings 60 Hz - 1 800 R.P.M.

Duty max. / T° C		Continuous / 80 °C (environment) - 75 °C (liquid)																	
Class / T° K		F / 70° K (Standard)						B / 45° K						H / 90° K					
		P.F. 1			P.F. 0.8			P.F. φ 1			P.F. φ 0.8			P.F. φ 1			P.F. φ 0.8		
Y		380V	440V	**480V**	380V	440V	**480V**	380V	440V	**480V**	380V	440V	**480V**	380V	440V	**480V**	380V	440V	**480V**
LSAH 44.3 M4	kVA	40	46	**50**	49	57	**62**	32	37	**40**	40	46	**50**	44	50	**55**	55	63	**69**
	kW	*40*	*46*	***50***	*39*	*46*	***50***	*32*	*37*	***40***	*32*	*37*	***40***	*44*	*50*	***55***	*44*	*50*	***55***
LSAH 44.3 M6	kVA	49	57	**62**	62	72	**78**	40	46	**50**	49	57	**62**	54	62	**68**	67	78	**85**
	kW	*49*	*57*	***62***	*50*	*58*	***62***	*40*	*46*	***50***	*39*	*46*	***50***	*54*	*62*	***68***	*54*	*62*	***68***
LSAH 44.3 L8	kVA	59	69	**75**	74	86	**94**	48	55	**60**	59	69	**75**	66	76	**83**	82	94	**103**
	kW	*59*	*69*	***75***	*59*	*69*	***75***	*48*	*55*	***60***	*47*	*55*	***60***	*66*	*76*	***83***	*66*	*75*	***82***
LSAH 44.3 VL12	kVA	74	86	**94**	93	107	**117**	59	69	**75**	74	86	**94**	82	95	**104**	103	119	**130**
	kW	*74*	*86*	***94***	*74*	*86*	***94***	*59*	*69*	***75***	*59*	*69*	***75***	*82*	*95*	***104***	*82*	*95*	***104***

Temperature and Power

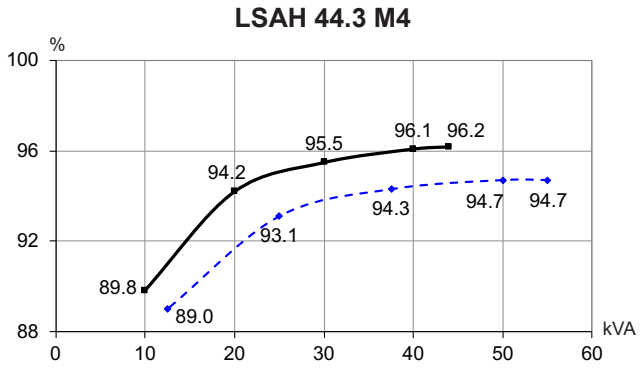
Power adjustment factor according to the coolant temperature

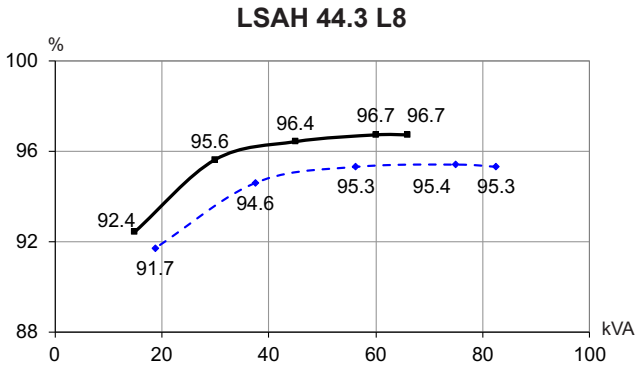
Coolant T °C	40 - 50 °C	60 - 75 °C	85 - 95 °C
Factor	1.03	1	0.97

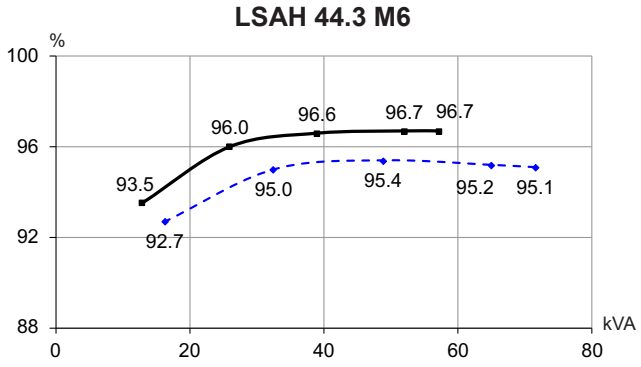
Max ΔT water (outlet vs inlet) at water temperature 40 °C to 75 °C

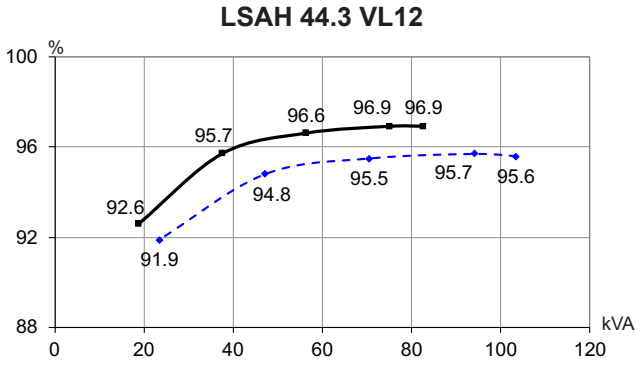
Class B	**Class F**	**Class H**
0.5 K	0.7 K	0.9 K

Efficiencies 400V - 50 Hz (--- P.F.: 0.8) (— P.F.: 1) - Class F









Reactances (%). Time constants (ms) - Class F / 400 V - P.F. 1

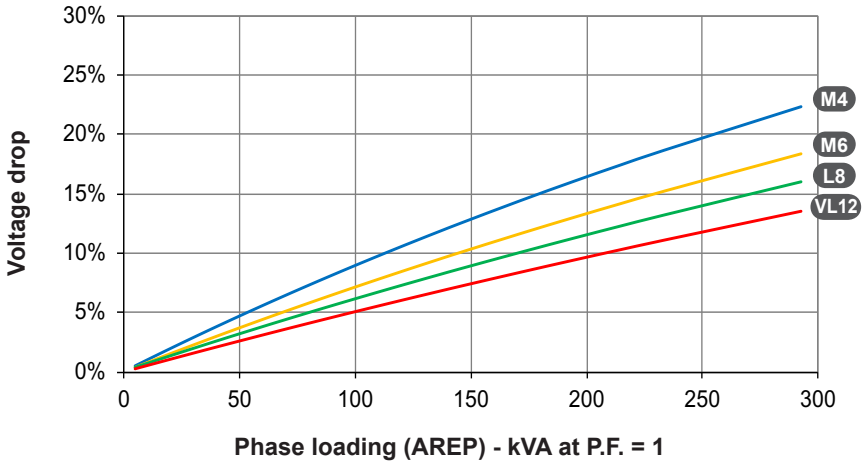
		M4	M6	L8	VL12
Kcc	Short-circuit ratio	1.28	0.67	0.93	0.99
Xd	Direct-axis synchronous reactance unsaturated	119	179	150	140
Xq	Quadrature-axis synchronous reactance unsaturated	61	91	76	71
T'do	No-load transient time constant	1 802	1 921	2 024	2 253
X'd	Direct-axis transient reactance saturated	6.6	9.3	7.4	6.2
T'd	Short-circuit transient time constant	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	3.9	5.5	4.4	3.7
T"d	Subtransient time constant	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	6.9	9.8	7.8	6.7
Xo	Zero sequence reactance	0.27	0.38	0.3	0.26
X2	Negative sequence reactance saturated	5.47	7.73	6.16	5.25
Ta	Armature time constant	15	15	15	15

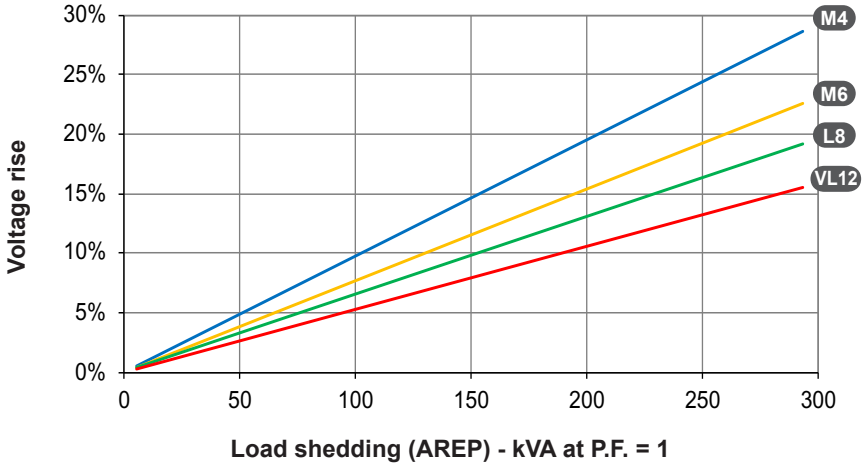
Other class F / 400 V data

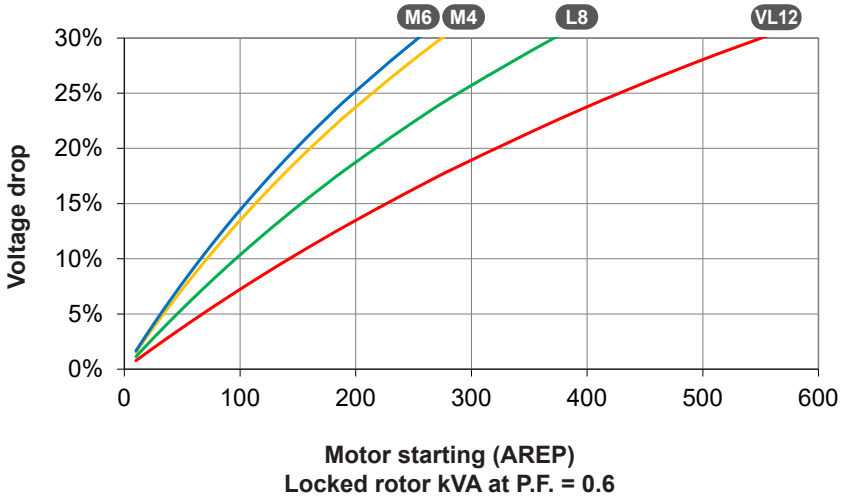
io (A)	No-load excitation current AREP	1.08	0.74	0.94	0.94
ic (A)	On-load excitation current AREP	1.4	1.35	1.42	1.39
uc (V)	On-load excitation voltage AREP	11.2	10.8	11.4	11.1
ms	Response time (ΔU = 20% transient)	500	500	500	500
kVA	Start (ΔU = 20% continuous or ΔU = 30% transient) AREP*	275	255	371	550
%	Transient ΔU (on-load 4/4) AREP - P.F.: 1 $_{LAG}$	4.8	4.8	4.8	4.8
W	No-load losses	1 212	947	1 289	1 598
W	Heat dissipation	1 602	1 740	2 006	2 374

* P.F. = 0.6

Transient voltage variation 400V - 50 Hz - Class F

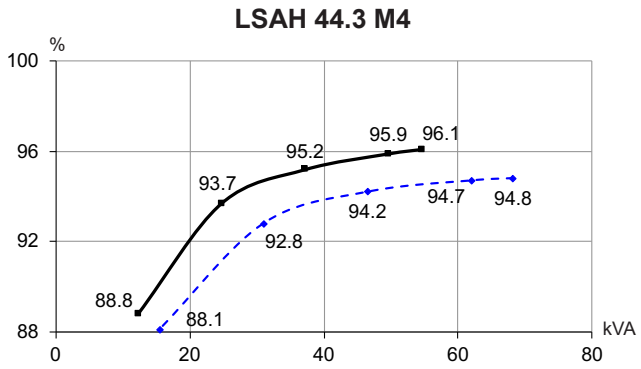


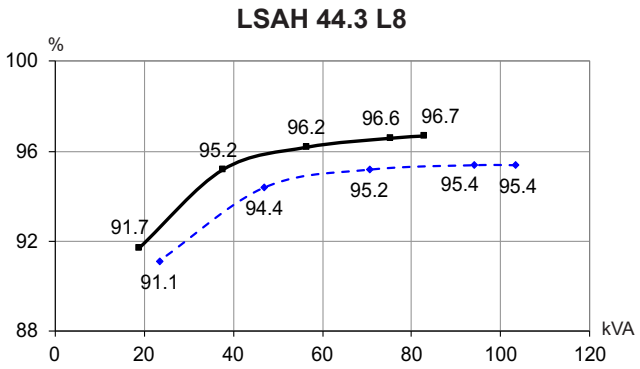


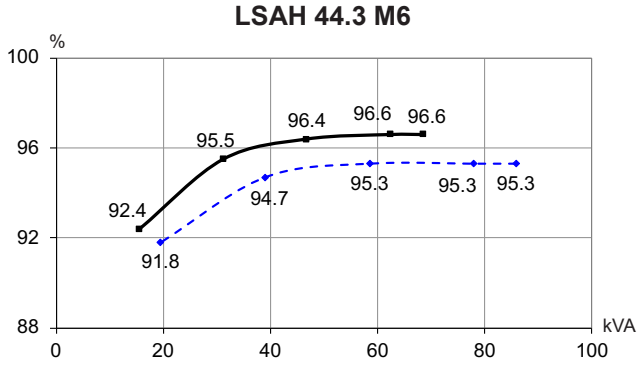


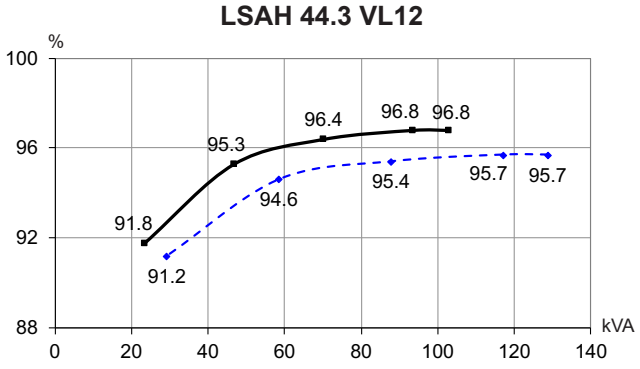
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 400V (Y), 230V (Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

Efficiencies 480V - 60 Hz (--- P.F.: 0.8) (— P.F.: 1) - Class F









Reactances (%). Time constants (ms) - Class F / 480 V - P.F. 1

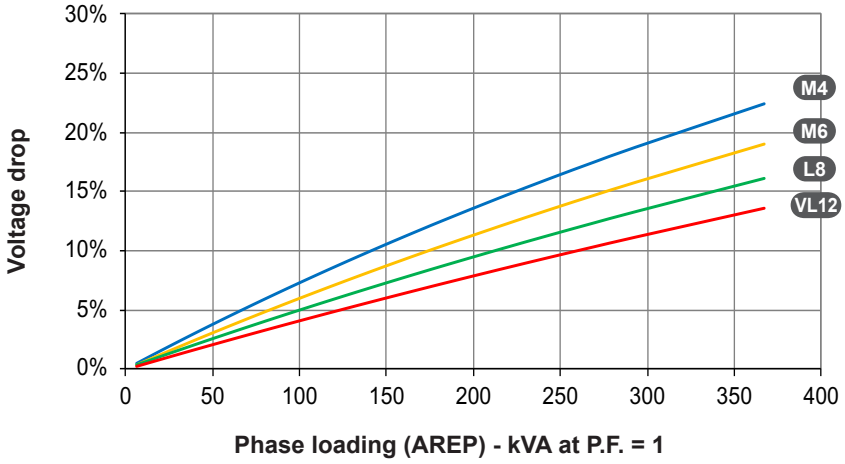
		M4	M6	L8	VL12
Kcc	Short-circuit ratio	1.24	0.67	0.89	0.96
Xd	Direct-axis synchronous reactance unsaturated	123	179	156	146
Xq	Quadrature-axis synchronous reactance unsaturated	63	91	79	74
T'do	No-load transient time constant	1 802	1 921	2 024	2 253
X'd	Direct-axis transient reactance saturated	6.8	9.3	7.7	6.4
T'd	Short-circuit transient time constant	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	4.1	5.5	4.6	3.8
T"d	Subtransient time constant	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	7.1	9.8	8.2	7
Xo	Zero sequence reactance	0.28	0.38	0.32	0.27
X2	Negative sequence reactance saturated	5.65	7.73	6.43	5.44
Ta	Armature time constant	15	15	15	15

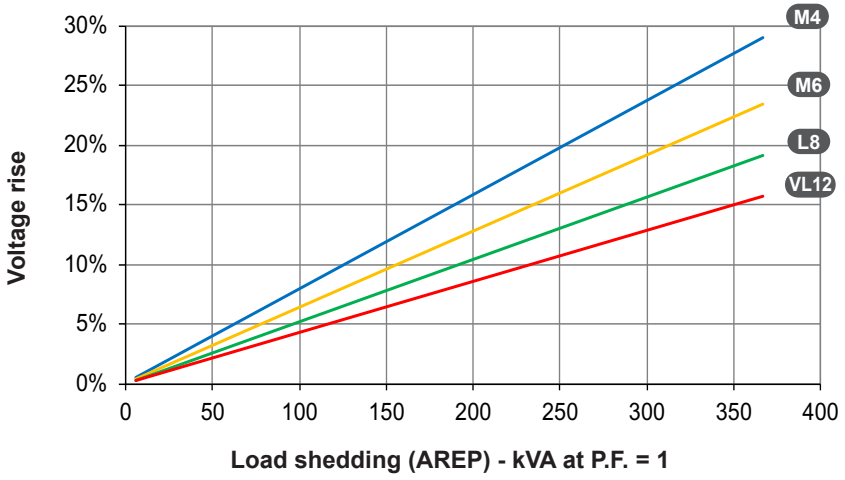
Other class F / 480 V data

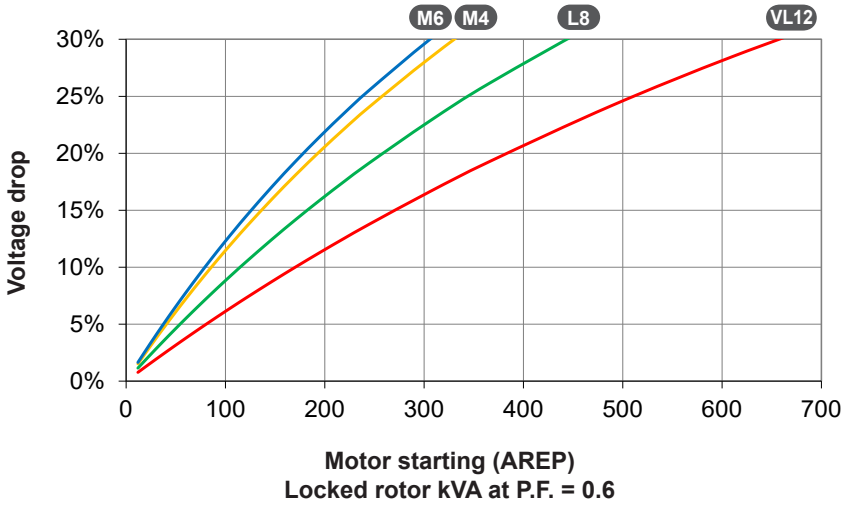
io (A)	No-load excitation current AREP	1.08	0.74	0.94	0.94
ic (A)	On-load excitation current AREP	1.41	1.34	1.45	1.4
uc (V)	On-load excitation voltage AREP	11.3	10.8	11.6	11.2
ms	Response time (ΔU = 20% transient)	500	500	500	500
kVA	Start (ΔU = 20% continuous or ΔU = 30% transient) AREP*	331	306	443	657
%	Transient ΔU (on-load 4/4) AREP - P.F.: 1 $_{LAG}$	4.8	4.8	4.8	4.8
W	No-load losses	1 696	1 373	1 823	2 253
W	Heat dissipation	2 083	2 163	2 601	3 081

* P.F. = 0.6

Transient voltage variation 480V - 60 Hz - Class F





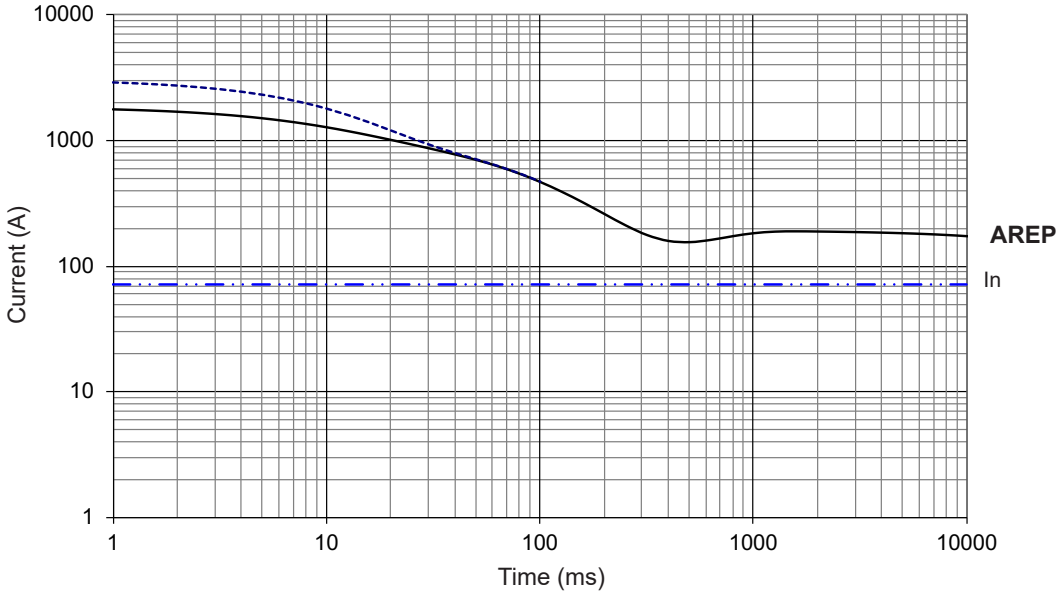


1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

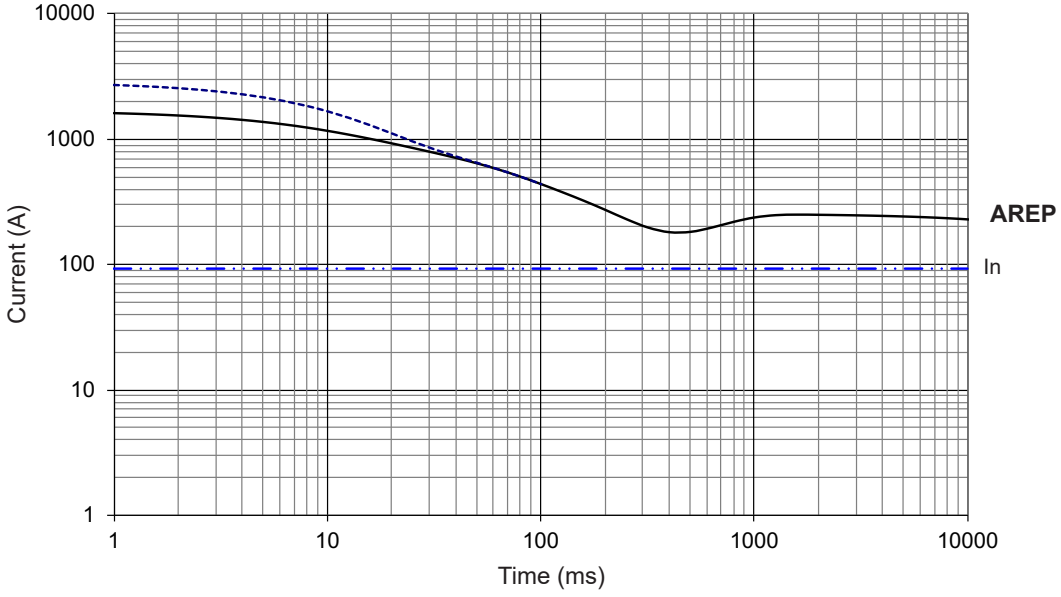
LSAH 44.3 M4

Symmetrical ——
Asymmetrical - - -



LSAH 44.3 M6

Symmetrical ——
Asymmetrical - - -

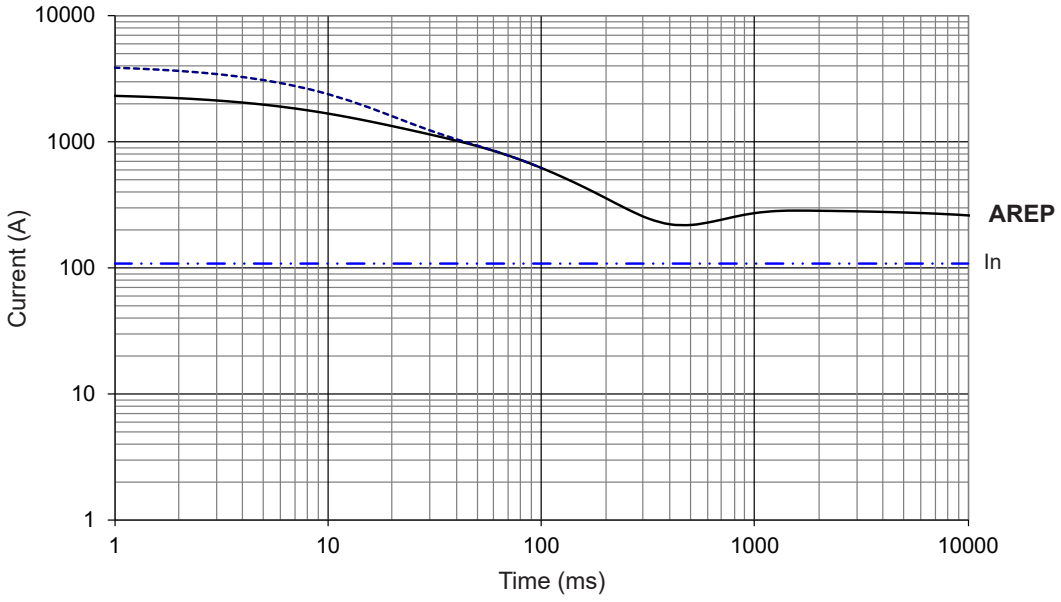


Influence due to connection
For (Δ) connection, use the following multiplication factor:
- Current value x 1.732.

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

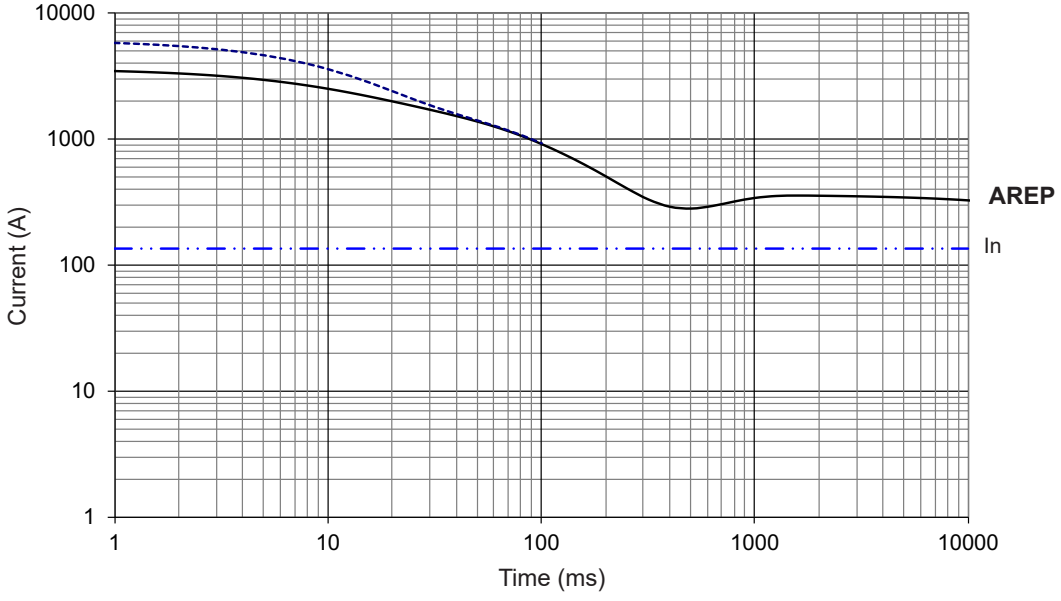
LSAH 44.3 L8

Symmetrical ——
Asymmetrical - - -



LSAH 44.3 VL12

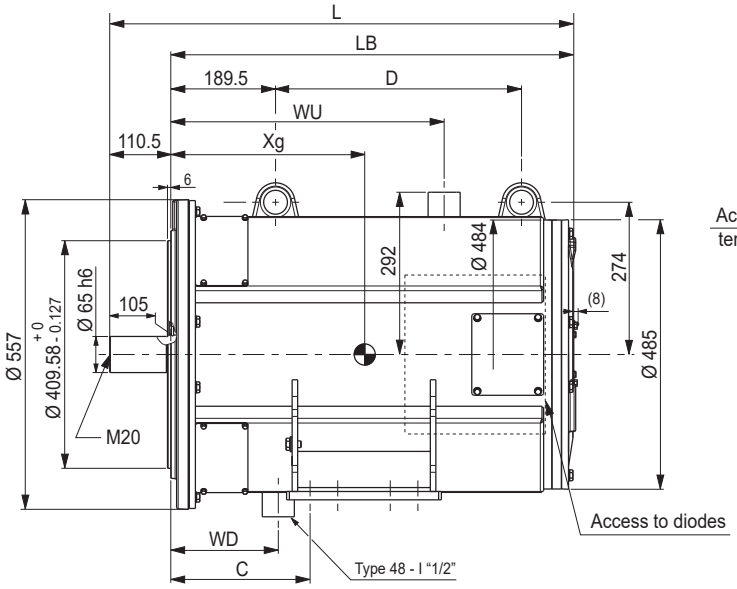
Symmetrical ——
Asymmetrical - - -

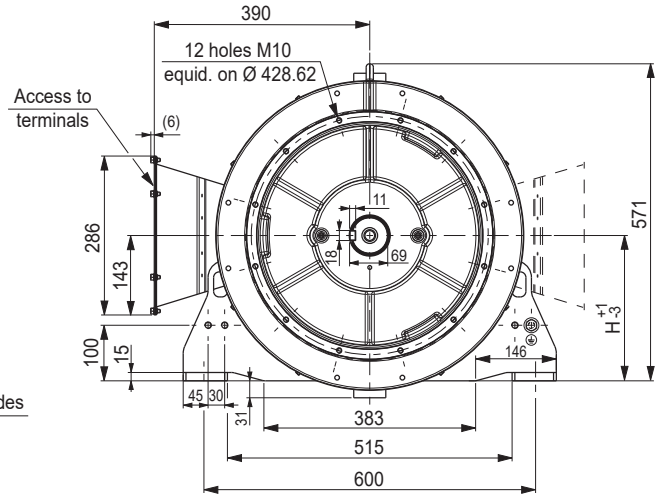


Influence due to short-circuit
Curves are based on a three-phase short-circuit.
For other types of short-circuit,
use the following multiplication factors.

	3 - phase	2 - phase L / L	1 - phase L / N
Instantaneous (max.)	1	0.87	1.3
Continuous	1	1.5	2.2
Maximum duration (AREP)	10 sec.	5 sec.	2 sec.

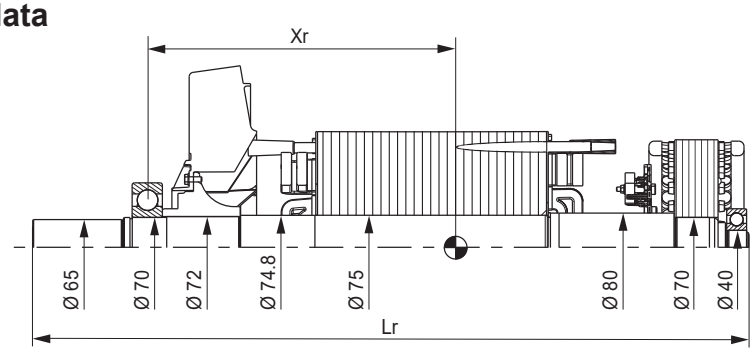
Two-bearing dimensions - Standard





Dimensions (mm) and weight (kg)									
Type	L	LB	D	WU	Xg	WD	C	H	Weight
LSAH 44.3 M4	839.5	729	445	494.5	330	194.5	252	262	545
LSAH 44.3 M6	839.5	729	445	494.5	345	194.5	252	262	580
LSAH 44.3 L8	874.5	764	480	529.5	360	194.5	252	262	622
LSAH 44.3 VL12	974.5	864	580	629.5	370	194.5	252	262	750

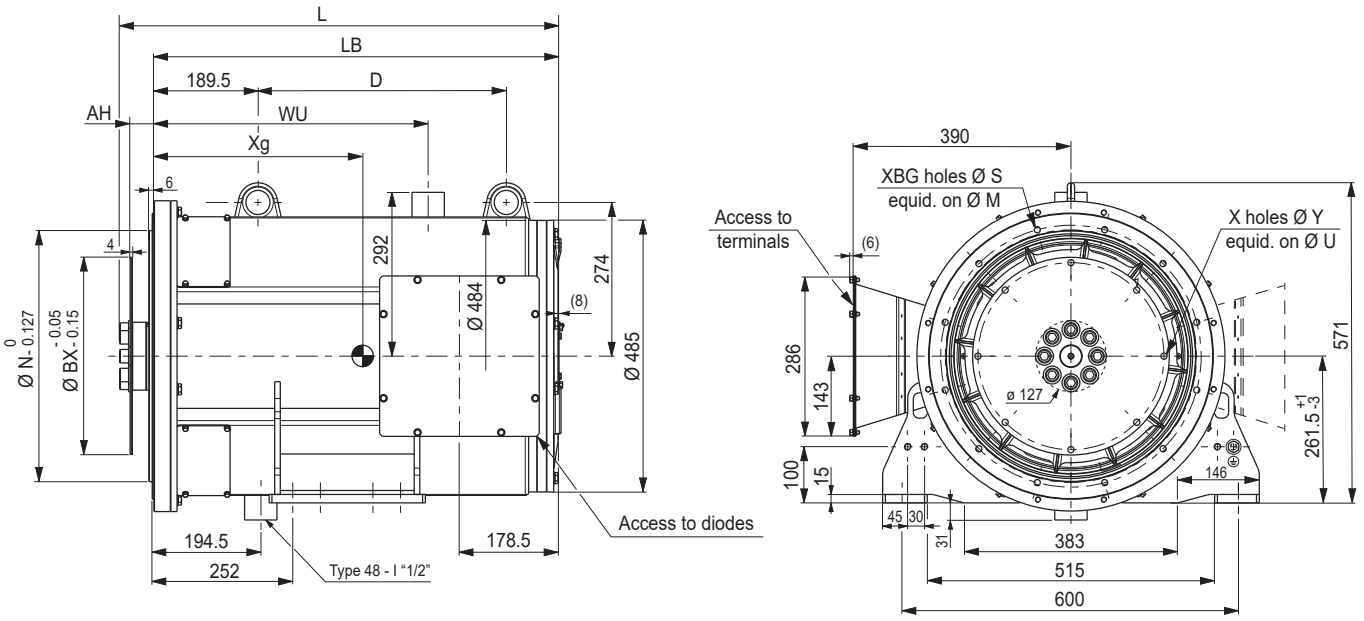
Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²): (4J = MD²)				
Type	Xr	Lr	M	J
LSAH 44.3 M4	332.5	828	135.5	0.984
LSAH 44.3 M6	347	828	147	1.098
LSAH 44.3 L8	364	863	160.5	1.206
LSAH 44.3 VL12	413	963	206	1.592

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Nidec Power website, 3D drawing files are available upon request.
The torsional analysis of the transmission is imperative. All values are available upon request.

Single-bearing dimensions - Option



Dimensions (mm) and weight (kg)						
Type	L maxi*	LB	D	WU	Xg	Weight
LSAH 44.3 M4	810	729	445	494.5	330	545
LSAH 44.3 M6	810	729	445	494.5	345	580
LSAH 44.3 L8	845	764	480	529.5	360	622
LSAH 44.3 VL12	945	864	580	629.5	370	750

Coupling			
Flange	**2**	**3**	**4**
Flex plate			
11 ½	x	x	-
10	x	x	x
8	-	x	x

* L maxi = LB + AH maxi + 19

Flange (mm)				
S.A.E.	N	M	S	XBG
4	361.95	381	11	12
3	409.58	428.62	11	12
2	447.68	466.72	11	12

Flex plate (mm)					
S.A.E.	BX	U	X	Y	AH
11 ½	352.42	333.38	8	11	39.6
10	314.32	295.28	8	11	53.8
8	263.52	244.48	6	11	62

For torsional analysis data or other request: consult us.

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Nidec Power website, 3D drawing files are available upon request.

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