

TAL 0473

Low Voltage Alternator - 4 pole

410 to 660 kVA - 50 Hz / 510 to 825 kVA - 60 Hz
Electrical and mechanical data

LEROY-SOMER[™]

Nidec
All for dreams

The best of performance

Nidec Leroy-Somer TAL 0473 alternator has been designed to offer you the best power generation performances. With its meticulous design and optimized architecture, the TAL 0473 strikes the perfect balance between compactness, reliability, performance and longevity. Whatever your application, the TAL 0473 will meet your needs and will adapt to all situations.

Standards

Nidec Leroy-Somer TAL 0473 alternator meets all key international standards and regulations, including IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA C22.2 n°100-14 and UL 1446 (UL 1004 on request). Also compliant with IEC 61000-6-2, IEC 61000-6-3, IEC 61000-6-4, VDE 0875G, VDE 0875N and EN 55011, group 1 class A for European zone. Nidec Leroy-Somer TAL 0473 alternator can be integrated in EC marked generator set, and bears EC and CMIM markings. It is designed, manufactured and marketed in an ISO 9001 and ISO 14001 quality assurance environment.

Electrical characteristics and performances

- Class H insulation
- Shunt excitation
- Low voltage winding:
 - Three-phase 50 Hz: 220V - 240V and 380V - 415V (440V)
 - 60 Hz: 208V - 240V and 380V - 480V
- 6-terminal plates in 6-wire version or suitable for 12-wire option
- Optimized performance

Excitation and regulation system

	Excitation system				Regulation options		
	AVR	SHUNT	AREP+ (option)	PMG (option)	UL _{C/US}	Remote voltage potentiometer	C.T. Current transformer for paralleling
Three-phase 6-wire	R150	Standard				√	
	R180		Standard	Standard		√	√
	D350	Option	Option	Option	√	√	√*
Three-phase 12-wire	R150	Standard				√	
	R250	Option			√	√	
	R180		Standard	Standard		√	√
	D350	Option	Option	Option	√	√	√*

*: only with AREP+ or PMG

Protection system and options

- Degree of protection: IP 23
- Complete winding protection for non-harsh environments with relative humidity ≤ 95%
- Options:
 - Three-phase 12-wire version with 9-terminal plates
 - AREP+ or PMG excitation
 - UL_{C/US}
 - Customized painting (unpainted machine as standard)
 - Space heater
 - Droop kit for alternator paralleling
 - Stator sensors
 - Winding 8 optimized for three-phase 380V / 416V - 60 Hz
 - Reinforced winding protection for harsh environments and relative humidity greater than 95% (system 2 - 4): for TAL 0473 A, D & F apply a derating coefficient of 0.95

Mechanical construction

- Compact and rugged assembly to withstand engine vibrations
- Steel frame
- Cast iron flanges and shields
- Single-bearing design to be suitable with most diesel engines
- Greased for life bearings
- Standard direction of rotation: clockwise when looking at the drive end view (for anti-clockwise, derate the machine by 5%)

Terminal box design

- Easy access to AVR and terminals
- Standard terminal box with possibility of mounting measurement CTs
- Possibility of current transformer for parallel operation



TAL 0473 - 410 to 660 kVA - 50 Hz / 510 to 825 kVA - 60 Hz

General characteristics

Insulation class	H	Excitation system 6-wire	SHUNT	AREP+ / PMG
Winding pitch	2/3 (wind.6S - 6-wire / wind.6 - 12-wire)	AVR type	R150	R180
Number of wires	6 (12 option)	Excitation system 12-wire (option)	SHUNT	AREP+ / PMG
Protection	IP 23	AVR type	R150	R180
Altitude	≤ 1000 m	Voltage regulation (**)	± 0.8 %	± 0.5 %
Overspeed	2250 R.P.M.	Total Harmonic Distortion THD (***) in no-load	< 1.5 %	
Air flow 50 Hz	0.9 m ³ /s	Total Harmonic Distortion THD (***) in linear load	< 5 %	
Air flow 60 Hz	1.1 m ³ /s	Waveform: NEMA = TIF (***)	< 50	
AREP+/PMG Short-circuit current = 2.7 I _n : 5 seconds (*)		Waveform: I.E.C. = THF (***)	< 2%	

(*) D350: 10 seconds (**) Steady state (***) Total harmonic distortion between phases, no-load or on-load (non-distorting)

Ratings 50 Hz - 1500 R.P.M.

kVA / kW - P.F. = 0.8																	
Duty / T° C		Continuous / 40 °C				Continuous / 40 °C				Stand-by / 40 °C				Stand-by / 27 °C			
Class / T° K		H / 125° K				F / 105° K				H / 150° K				H / 163° K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
Δ		220V	230V	240V		220V	230V	240V		220V	230V	240V		220V	230V	240V	
YY (*)			200V		220V		200V		220V		200V		220V		200V		220V
TAL 0473 A	kVA	390	410	410	400	355	375	375	364	413	435	435	424	429	450	450	440
	kW	312	328	328	320	284	300	300	291	330	348	348	339	343	360	360	352
TAL 0473 B	kVA	455	455	455	445	415	415	415	405	480	480	480	472	500	500	500	490
	kW	364	364	364	356	332	332	332	324	384	384	384	378	400	400	400	392
TAL 0473 C	kVA	500	500	500	455	455	455	455	414	530	530	530	482	550	550	550	500
	kW	400	400	400	364	364	364	364	331	424	424	424	386	440	440	440	400
TAL 0473 D	kVA	525	550	550	540	478	500	500	491	557	585	585	572	578	600	600	594
	kW	420	440	440	432	382	400	400	393	446	468	468	458	462	480	480	475
TAL 0473 E	kVA	600	600	600	500	545	545	545	455	635	635	635	530	660	660	660	550
	kW	480	480	480	400	436	436	436	364	508	508	508	424	528	528	528	440
TAL 0473 F	kVA	645	660	660	630	587	600	600	573	684	700	700	668	710	730	730	693
	kW	516	528	528	504	470	480	480	458	547	560	560	534	568	584	584	554

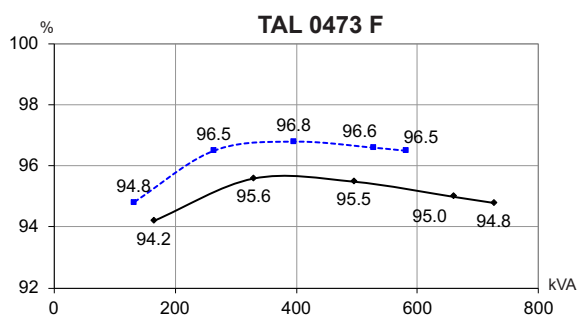
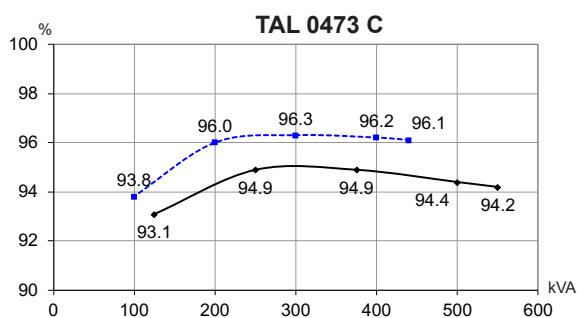
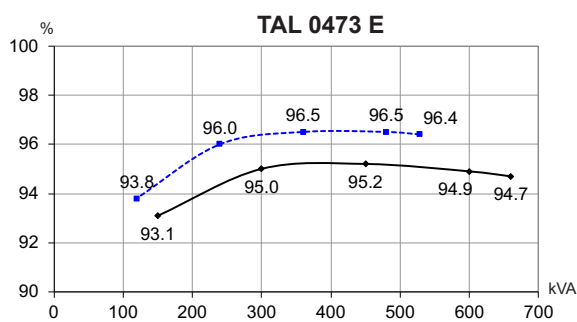
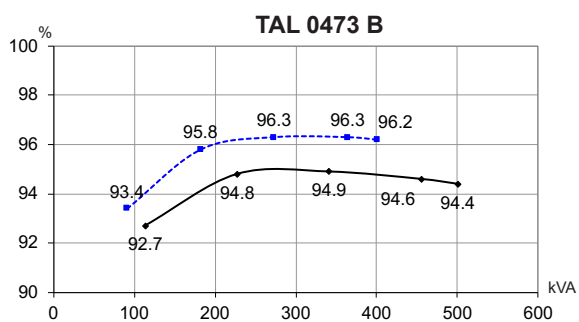
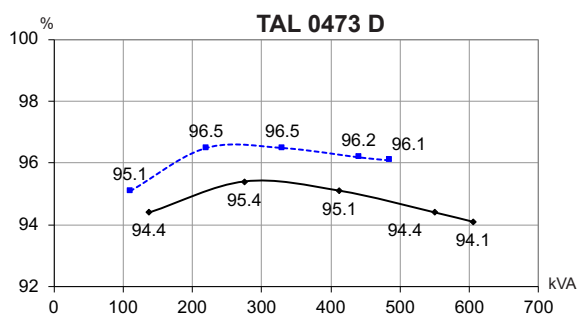
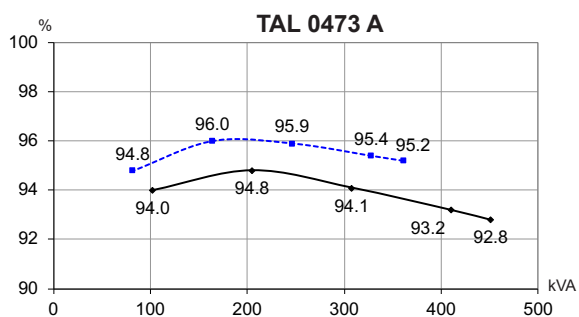
(*) 12-wire option

Ratings 60 Hz - 1800 R.P.M.

kVA / kW - P.F. = 0.8																	
Duty / T° C		Continuous / 40 °C				Continuous / 40 °C				Stand-by / 40 °C				Stand-by / 27 °C			
Class / T° K		H / 125° K				F / 105° K				H / 150° K				H / 163° K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V
Δ		220V	240V			220V	240V			220V	240V			220V	240V		
YY (*)			208V	220V	240V		208V	220V	240V		208V	220V	240V		208V	220V	240V
TAL 0473 A	kVA	450	480	500	510	410	435	455	465	475	510	530	540	495	530	550	560
	kW	360	384	400	408	328	348	364	372	380	408	424	432	396	424	440	448
TAL 0473 B	kVA	475	510	530	570	430	465	480	520	505	540	560	605	525	560	585	625
	kW	380	408	424	456	344	372	384	416	404	432	448	484	420	448	468	500
TAL 0473 C	kVA	520	555	590	625	475	505	535	570	550	590	625	665	570	610	650	690
	kW	416	444	472	500	380	404	428	456	440	472	500	532	456	488	520	552
TAL 0473 D	kVA	560	610	630	690	510	555	575	630	595	645	670	730	615	670	695	750
	kW	448	488	504	552	408	444	460	504	476	516	536	584	492	536	556	600
TAL 0473 E	kVA	600	660	685	750	545	600	625	685	635	700	725	795	660	725	755	825
	kW	480	528	548	600	436	480	500	548	508	560	580	636	528	580	604	660
TAL 0473 F	kVA	650	715	755	825	590	650	685	750	690	760	800	875	720	785	830	910
	kW	520	572	604	660	472	520	548	600	552	608	640	700	576	628	664	728

(*) 12-wire option

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



Reactances (%). Time constants (ms) - Class H / 400 V

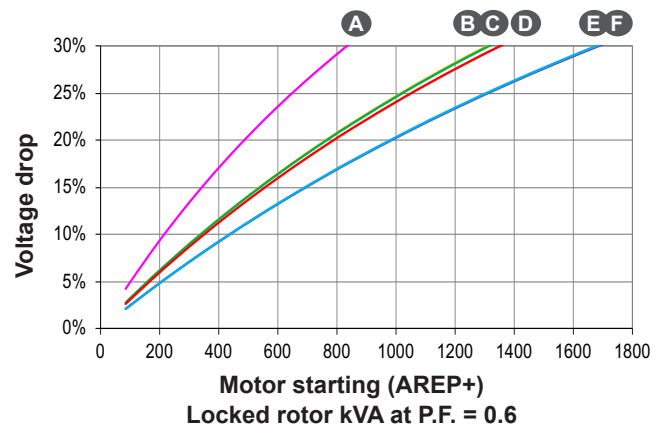
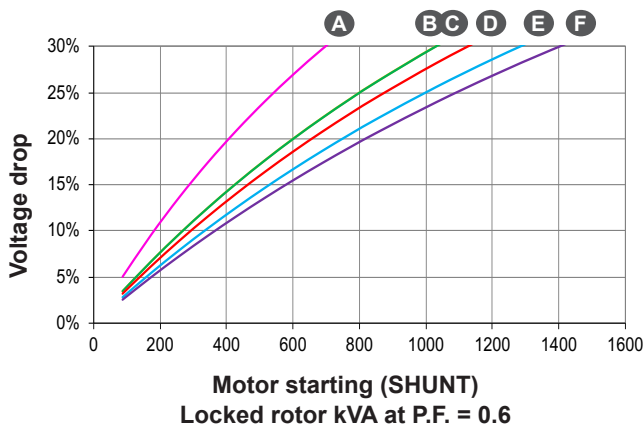
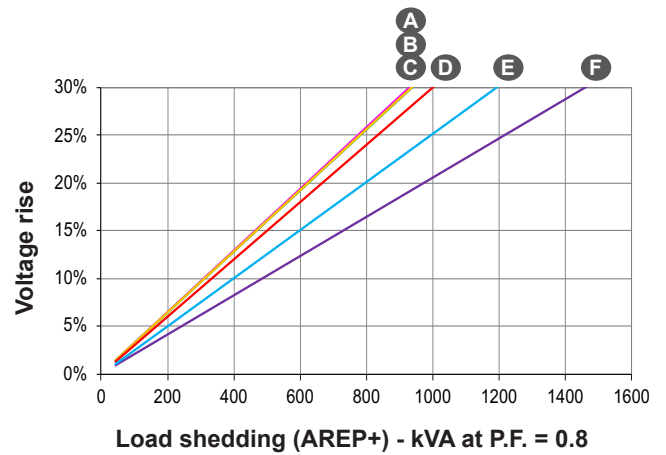
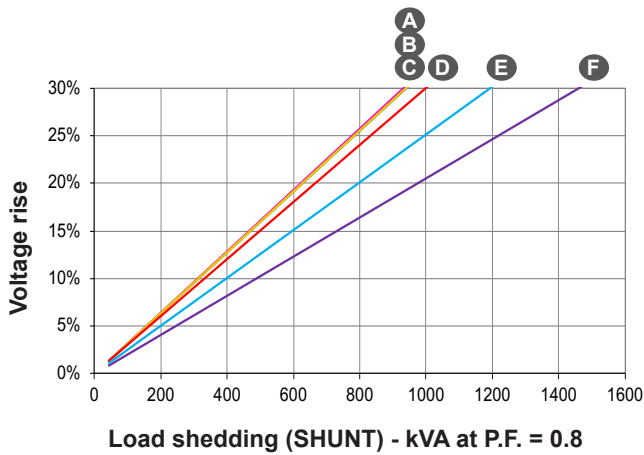
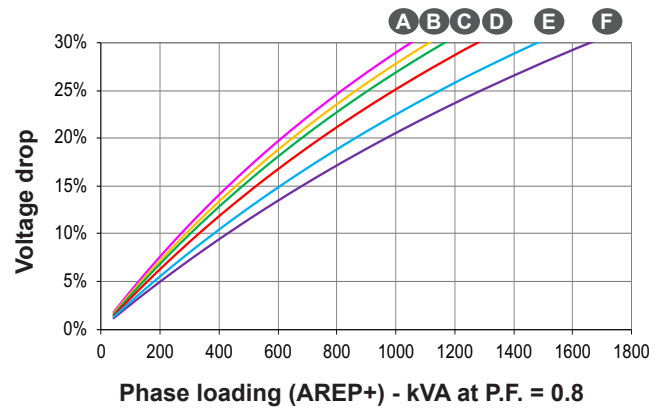
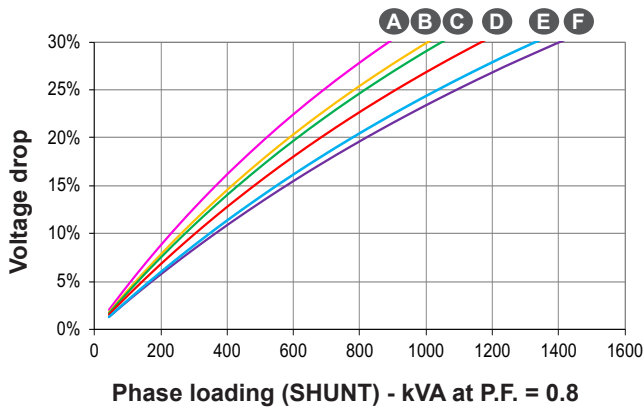
	A	B	C	D	E	F
Kcc Short-circuit ratio	0.25	0.52	0.47	0.32	0.55	0.41
Xd Direct-axis synchronous reactance unsaturated	483	302	332	403	294	343
Xq Quadrature-axis synchronous reactance unsaturated	246	154	169	205	150	175
T'do No-load transient time constant	1968	1982	1982	1987	1994	1996
X'd Direct-axis transient reactance saturated	24.5	15.2	16.7	20.3	14.7	17.2
T'd Short-circuit transient time constant	100	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	17.2	10.6	11.7	14.2	10.3	12
T''d Subtransient time constant	10	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	19.2	13.6	14.9	18.9	14.7	17.4
Xo Zero sequence reactance	1.02	0.63	0.69	0.84	0.61	0.71
X2 Negative sequence reactance saturated	18.23	12.15	13.35	16.6	12.52	14.74
Ta Armature time constant	15	15	15	15	15	15

Other class H / 400 V data

io (A) No-load excitation current SHUNT/AREP+	0.68	1.07	1.07	0.8	1.13	0.93
ic (A) On-load excitation current SHUNT/AREP+	3.63	3.35	3.62	3.5	3.47	3.44
uc (V) On-load excitation voltage SHUNT/AREP+	37.9	34.9	37.7	36.4	36	35.6
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500	500
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) SHUNT/AREP+*	697/836	1026/1309	1029/1314	1125/1352	1284/1682	1398/1679
% Transient ΔU (on-load 4/4) SHUNT/AREP+ - P.F.: 0.8 _{LAG}	16.5/14.4	16.3/14.9	17.1/15.6	14.4/12.5	18/16.8	17.6/16.1
W No-load losses	3935	6288	6288	5194	7696	6770
W Heat dissipation	23728	20427	23283	25761	25676	27502

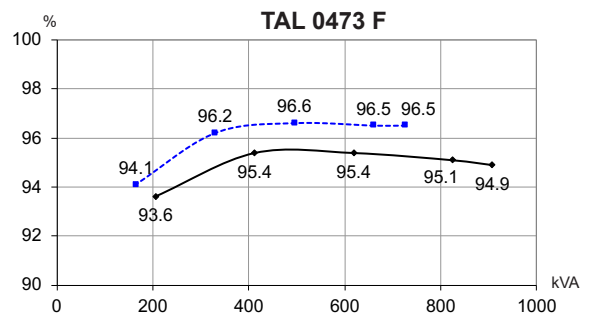
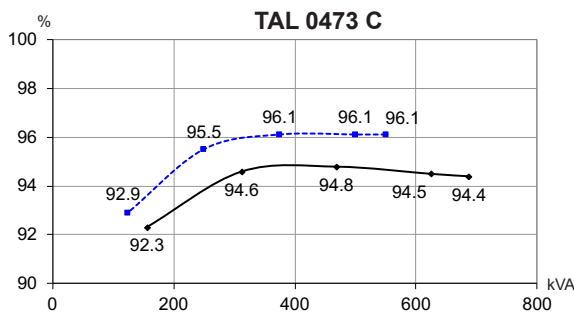
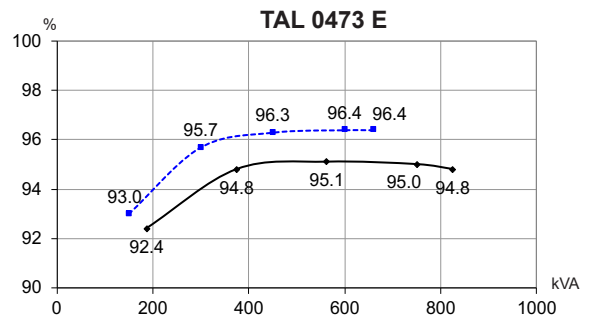
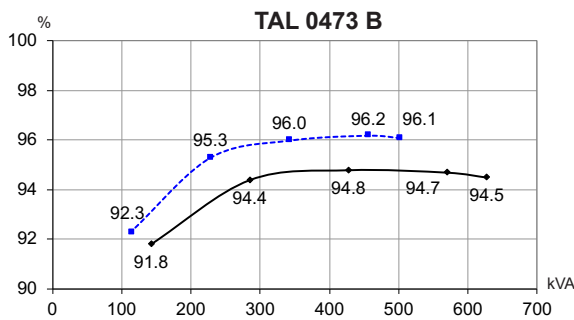
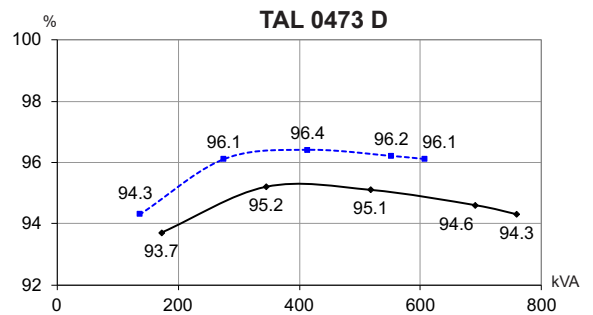
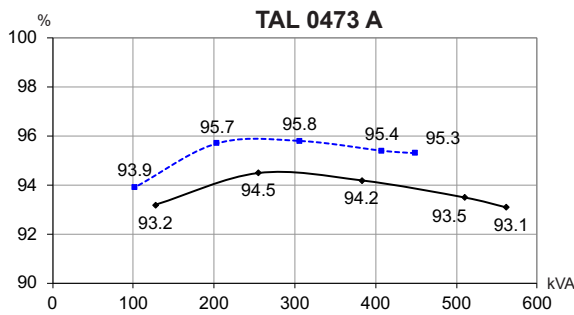
* P.F. = 0.6

Transient voltage variation 400 V - 50 Hz



- For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$
- For voltages other than 400V (Y), 230V (Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.
- Transient performance of the PMG option, consult us.

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



Reactances (%). Time constants (ms) - Class H / 480 V

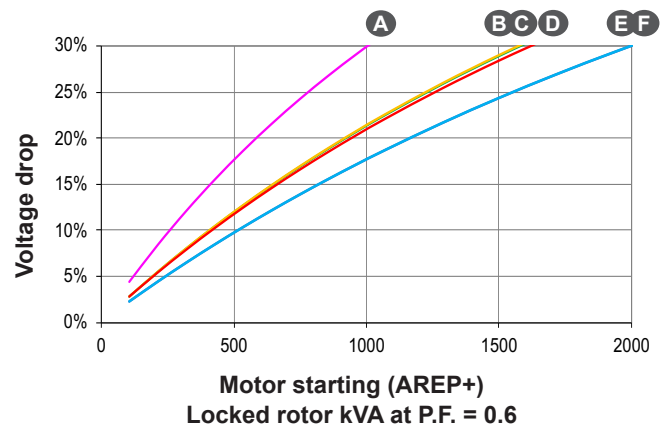
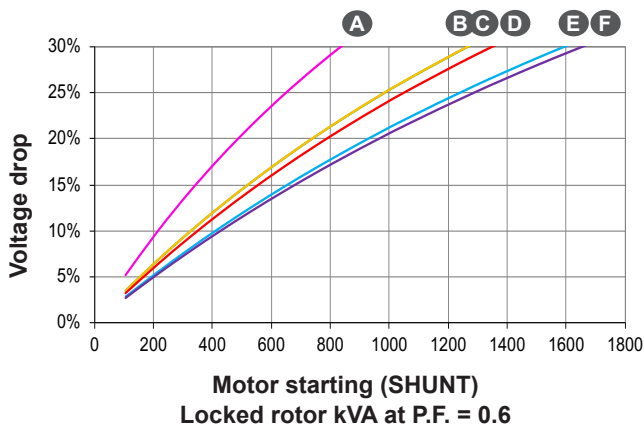
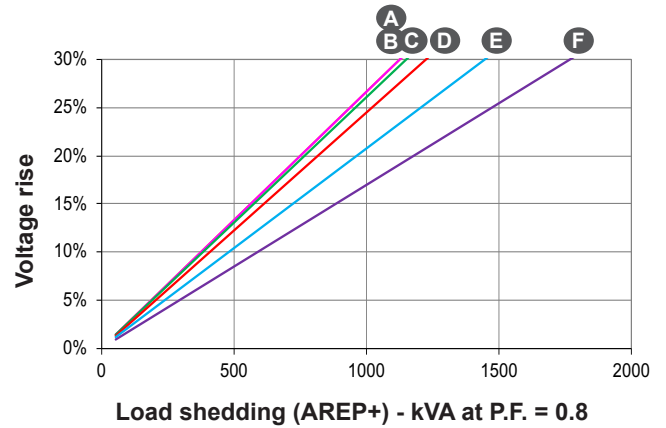
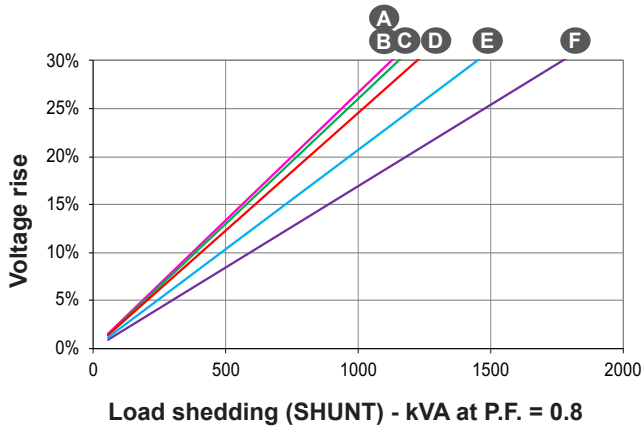
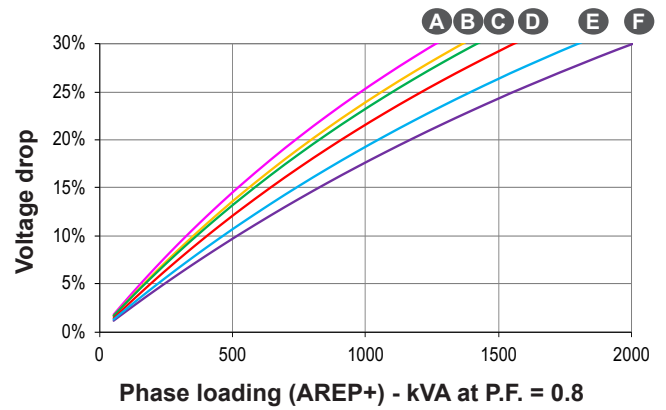
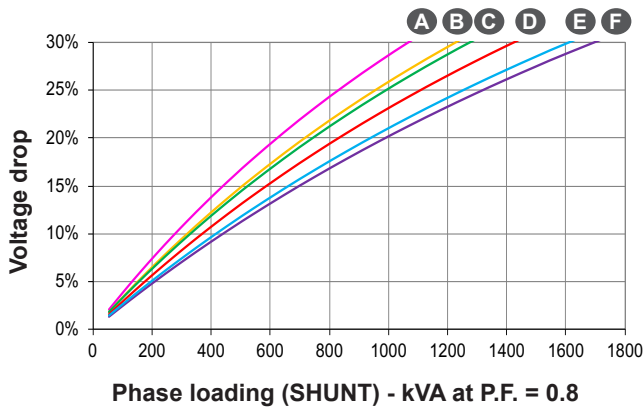
	A	B	C	D	E	F
Kcc Short-circuit ratio	0.24	0.5	0.45	0.31	0.52	0.39
Xd Direct-axis synchronous reactance unsaturated	501	315	345	422	309	361
Xq Quadrature-axis synchronous reactance unsaturated	255	160	176	215	157	184
T'do No-load transient time constant	1968	1982	1982	1987	1994	1996
X'd Direct-axis transient reactance saturated	25.4	15.9	17.4	21.2	15.5	18
T'd Short-circuit transient time constant	100	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	17.8	11.1	12.2	14.8	10.8	12.6
T''d Subtransient time constant	10	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	19.9	14.2	15.6	19.8	15.4	18.3
Xo Zero sequence reactance	1.06	0.66	0.72	0.88	0.64	0.75
X2 Negative sequence reactance saturated	18.89	12.68	13.91	17.35	13.15	15.48
Ta Armature time constant	15	15	15	15	15	15

Other class H / 480 V data

io (A) No-load excitation current SHUNT/AREP+	0.68	1.07	1.07	0.8	1.11	0.92
ic (A) On-load excitation current SHUNT/AREP+	3.7	3.41	3.68	3.58	3.5	3.49
uc (V) On-load excitation voltage SHUNT/AREP+	38.8	35.7	38.5	37.4	36.5	36.3
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500	500
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) SHUNT/AREP+*	834/1000	1270/1579	1267/1572	1348/1619	1598/1995	1660/1992
% Transient ΔU (on-load 4/4) SHUNT/AREP+ - P.F.: 0.8 _{LAG}	17/14.8	16.6/15.2	17.4/15.9	14.9/12.9	18.5/17.2	18.1/16.5
% No-load losses	6155	9429	9429	7916	11204	10008
W Heat dissipation	28350	25384	28574	31485	31564	33709

* P.F. = 0.6

Transient voltage variation 480 V - 60 Hz

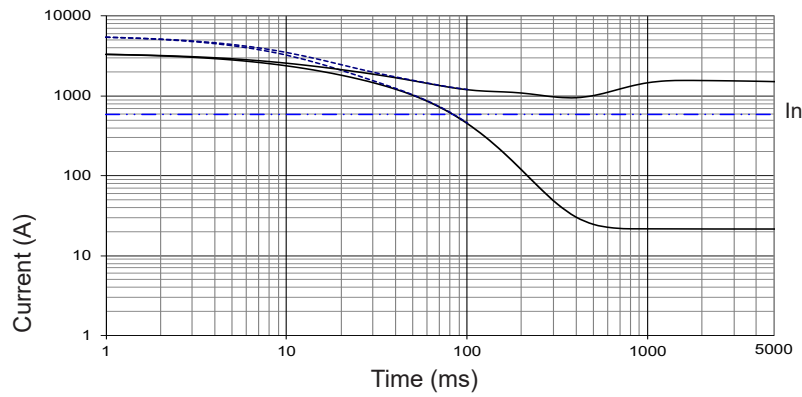


- For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$
- For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.
- Transient performance of the PMG option, consult us.

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

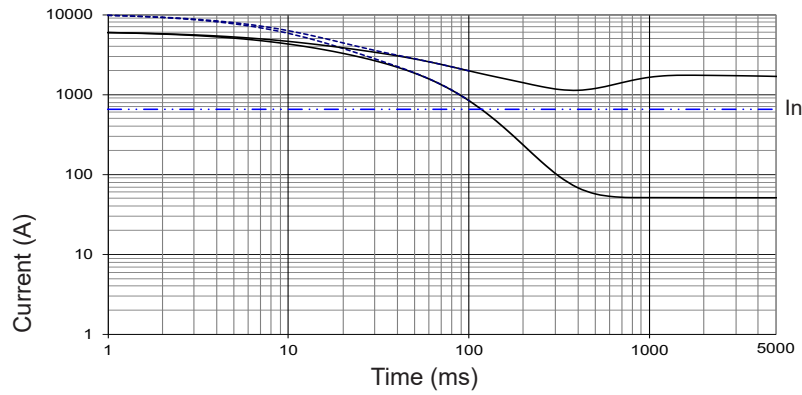
TAL 0473 A

Symmetrical —
Asymmetrical - - -



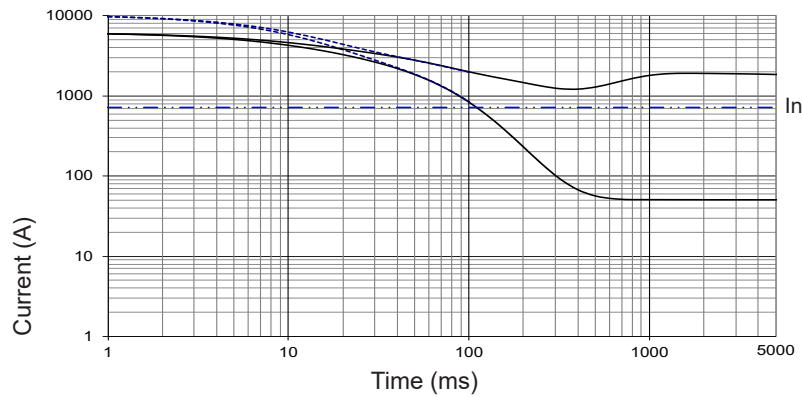
TAL 0473 B

Symmetrical —
Asymmetrical - - -



TAL 0473 C

Symmetrical —
Asymmetrical - - -



Influence due to connection

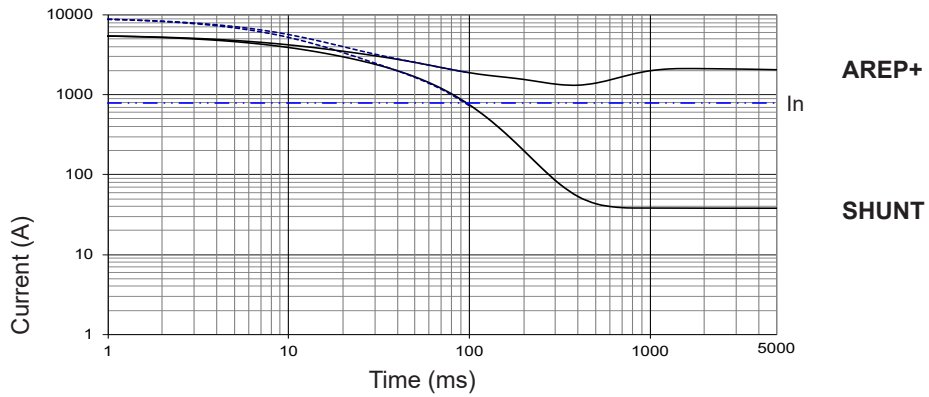
For (Δ) connection, use the following multiplication factor:

- Current value x 1.732.

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

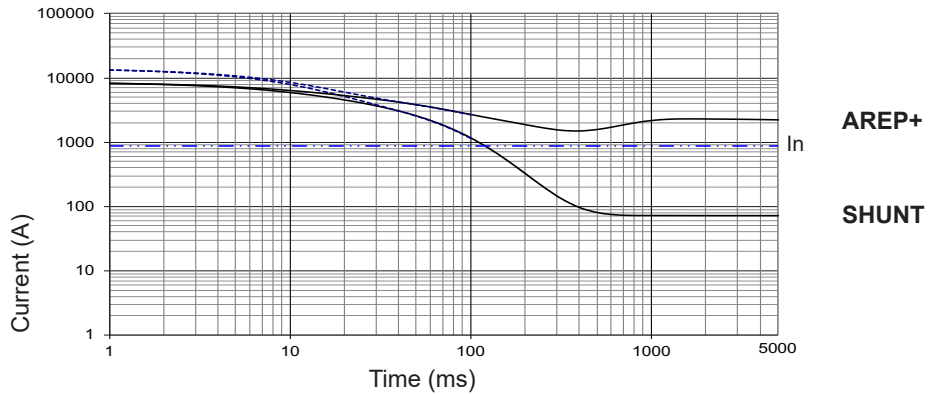
TAL 0473 D

Symmetrical —
Asymmetrical - - -



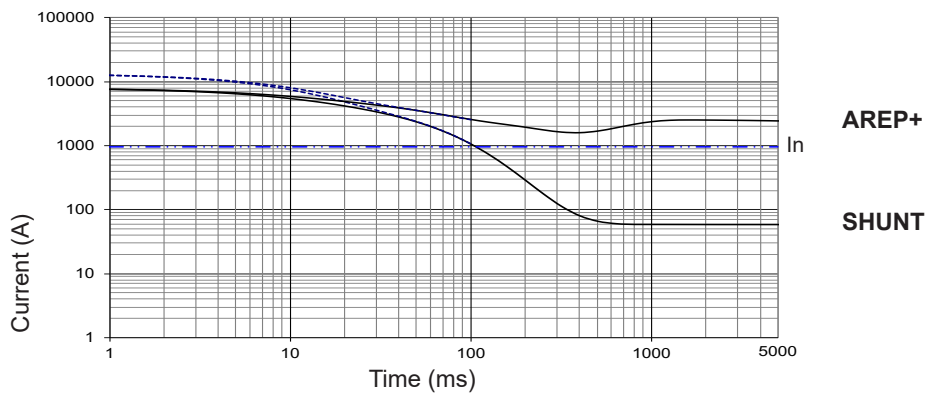
TAL 0473 E

Symmetrical —
Asymmetrical - - -



TAL 0473 F

Symmetrical —
Asymmetrical - - -

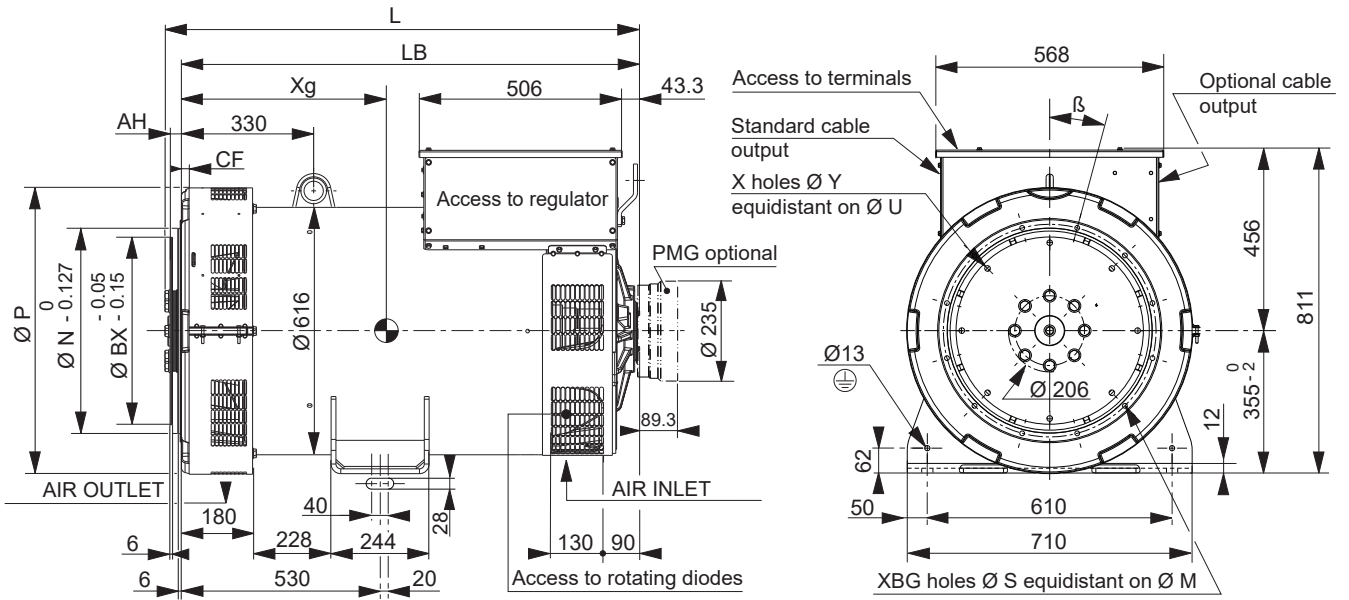


Influence due to short-circuit

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+/PMG)		1.5	

Single-bearing dimensions

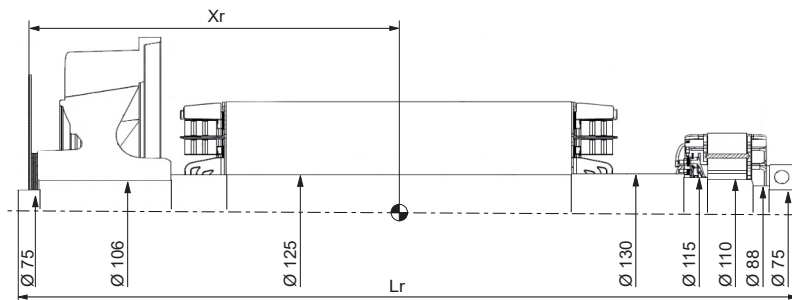


Dimensions (mm) and weight					Coupling			
Type	L without PMG maxi*	LB	Xg	Weight (kg)	Flex plate	11 ½	14	18
TAL 0473 A	1048	996	451	1013	Flange S.A.E 1	X	X	
TAL 0473 B-C	1108	1056	485	1142	Flange S.A.E ½		X	
TAL 0473 D	1208	1156	515	1230	Flange S.A.E 0		X	X
TAL 0473 E	1228	1176	543	1366				
TAL 0473 F	1228	1176	552	1414				

* L maxi = LB + AH maxi + 13

Flange (mm)							Flex plate (mm)					
S.A.E.	P	N	M	XBG	S	β°	S.A.E.	BX	U	X	Y	AH
1	713	511.175	530.225	12	12	15°	11 ½	352.42	333.38	8	11	39.6
½	713	584.2	619.125	12	14	15°	14	466.72	438.15	8	14	25.4
0	713	647.7	679.45	16	14	11° 15'	18	571.5	542.92	6	17	15.7

Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²): (4J = MD²)												
Flex plate	S.A.E. 11 ½				S.A.E. 14				S.A.E. 18			
	Xr	Lr	M	J	Xr	Lr	M	J	Xr	Lr	M	J
TAL 0473 A	436	1036	413	6.7	421	1023	414	6.77	411	1015	414	7.03
TAL 0473 B-C	473	1096	456	7.3	457	1083	456	7.41	447	1075	457	7.67
TAL 0473 D	502	1196	491	7.8	487	1183	492	7.88	477	1175	492	8.14
TAL 0473 E	533	1216	545	8.7	518	1203	546	8.83	508	1195	546	9.09
TAL 0473 F	544	1216	563	9.1	529	1203	564	9.18	519	1195	564	9.44

NOTE : Dimensions are for information only and may be subject to modifications. The torsional analysis of the transmission is imperative. All values are available upon request.

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