

**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**<sup>™</sup>

***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, EAC 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 <sub>C/US</sub>	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

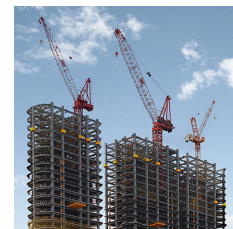
- Degree of protection: IP 23
- Complete winding protection for non-harsh environments with relative humidity ≤ 95%
- Options:
  - Three-phase 12-wire version with 9-terminal plates
  - AREP+ or PMG excitation
  - UL<sub>C/US</sub>
  - Customized painting (unpainted machine as standard)
  - Space heater
  - 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



### 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 <sup>3</sup> /s	Total Harmonic Distortion THD (***) in linear load	< 5 %	
Air flow 60 Hz	1.1 m <sup>3</sup> /s	Waveform: NEMA = TIF (***)	< 50	
AREP+/PMG Short-circuit current = 2.7 I <sub>n</sub> : 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.			
<b>Y</b>		380V	<b>400V</b>	415V	440V	380V	<b>400V</b>	415V	440V	380V	<b>400V</b>	415V	440V	380V	<b>400V</b>	415V	440V
<b>Δ</b>		220V	<b>230V</b>	240V		220V	<b>230V</b>	240V		220V	<b>230V</b>	240V		220V	<b>230V</b>	240V	
<b>YY (*)</b>			<b>200V</b>		220V		<b>200V</b>		220V		<b>200V</b>		220V		<b>200V</b>		220V
<b>TAL 0473 A</b>	kVA	390	<b>410</b>	410	400	355	<b>375</b>	375	364	413	<b>435</b>	435	424	429	<b>450</b>	450	440
	kW	312	<b>328</b>	328	320	284	<b>300</b>	300	291	330	<b>348</b>	348	339	343	<b>360</b>	360	352
<b>TAL 0473 B</b>	kVA	455	<b>455</b>	455	445	415	<b>415</b>	415	405	480	<b>480</b>	480	472	500	<b>500</b>	500	490
	kW	364	<b>364</b>	364	356	332	<b>332</b>	332	324	384	<b>384</b>	384	378	400	<b>400</b>	400	392
<b>TAL 0473 C</b>	kVA	500	<b>500</b>	500	490	455	<b>455</b>	455	449	530	<b>530</b>	530	519	550	<b>550</b>	550	539
	kW	400	<b>400</b>	400	392	364	<b>364</b>	364	359	424	<b>424</b>	424	415	440	<b>440</b>	440	431
<b>TAL 0473 D</b>	kVA	525	<b>550</b>	550	540	478	<b>500</b>	500	491	557	<b>585</b>	585	572	578	<b>600</b>	600	594
	kW	420	<b>440</b>	440	432	382	<b>400</b>	400	393	446	<b>468</b>	468	458	462	<b>480</b>	480	475
<b>TAL 0473 E</b>	kVA	600	<b>600</b>	600	550	545	<b>545</b>	545	501	635	<b>635</b>	635	583	660	<b>660</b>	660	605
	kW	480	<b>480</b>	480	440	436	<b>436</b>	436	401	508	<b>508</b>	508	466	528	<b>528</b>	528	484
<b>TAL 0473 F</b>	kVA	645	<b>660</b>	660	630	587	<b>600</b>	600	573	684	<b>700</b>	700	668	710	<b>730</b>	730	693
	kW	516	<b>528</b>	528	504	470	<b>480</b>	480	458	547	<b>560</b>	560	534	568	<b>584</b>	584	554

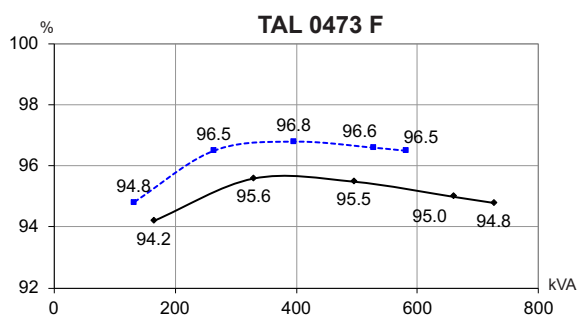
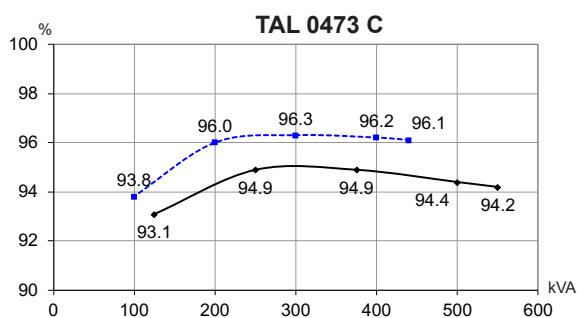
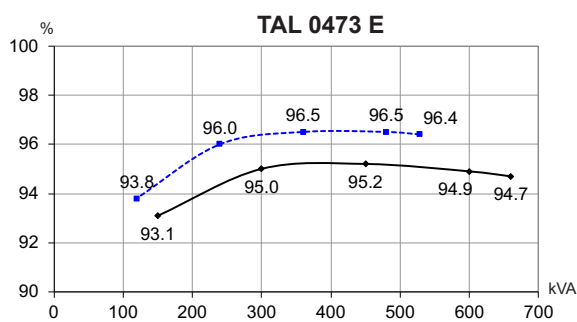
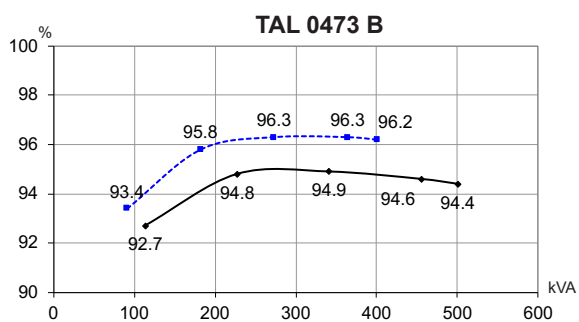
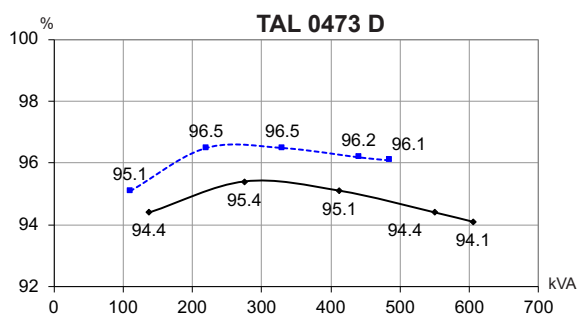
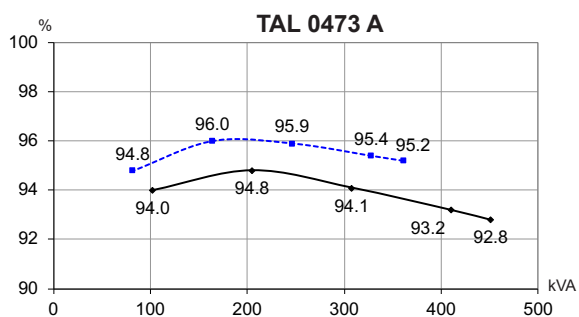
(\*) 12-wire option

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

(\*) 12-wire option

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



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

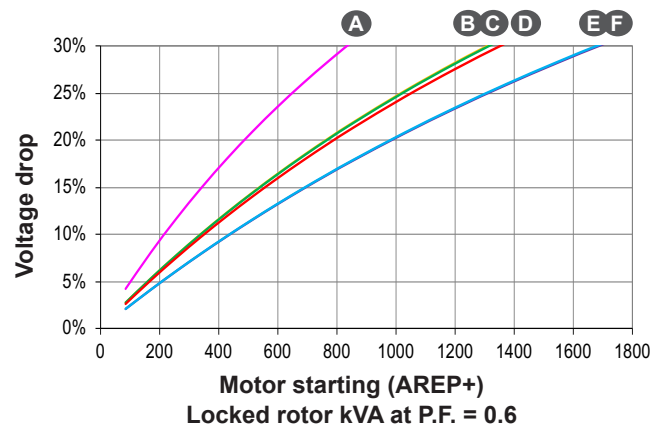
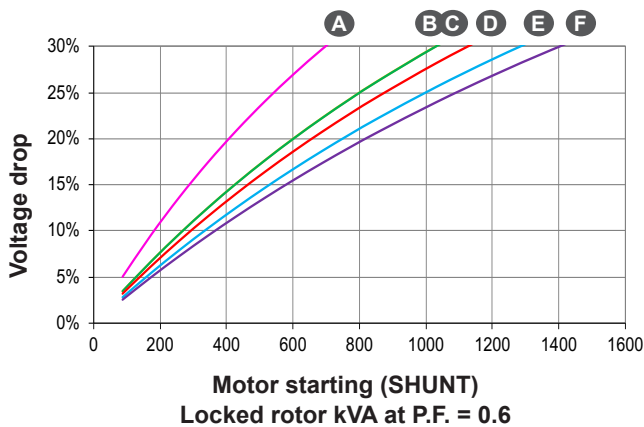
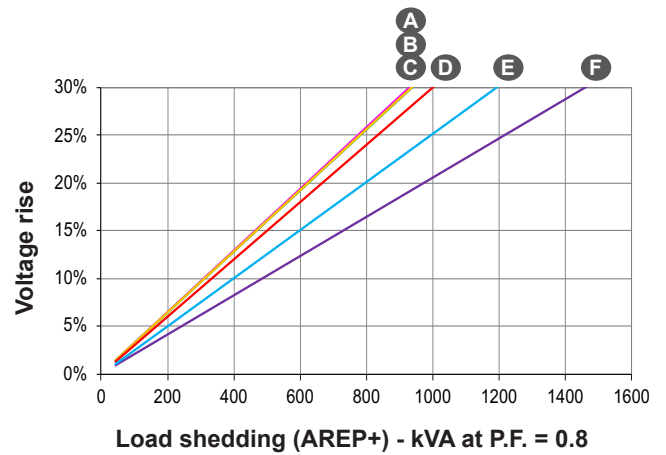
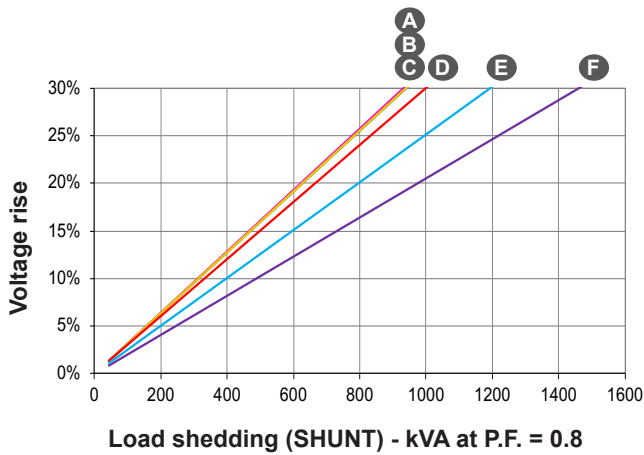
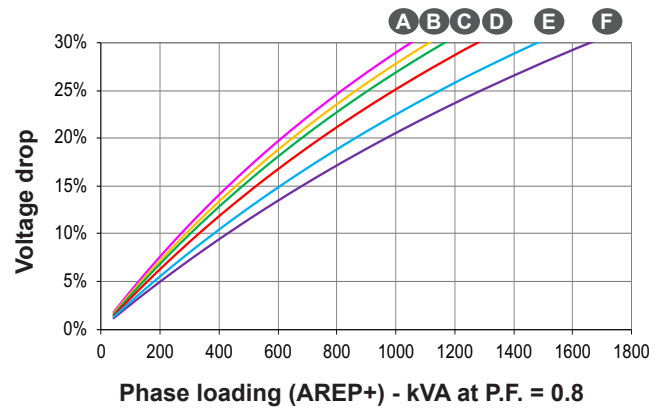
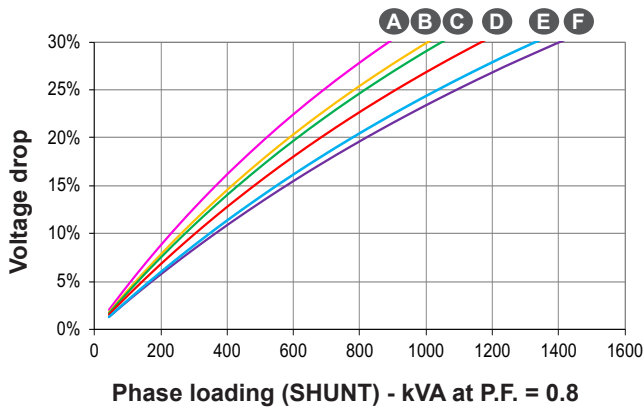
	A	B	C	D	E	F
<b>Kcc</b> Short-circuit ratio	0.25	0.52	0.47	0.32	0.55	0.41
<b>Xd</b> Direct-axis synchronous reactance unsaturated	483	302	332	403	294	343
<b>Xq</b> Quadrature-axis synchronous reactance unsaturated	246	154	169	205	150	175
<b>T'do</b> No-load transient time constant	1968	1982	1982	1987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

Other class H / 400 V data

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

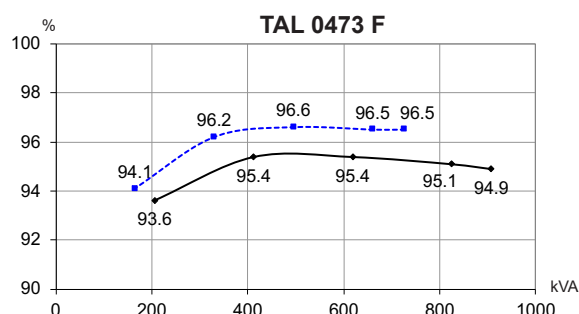
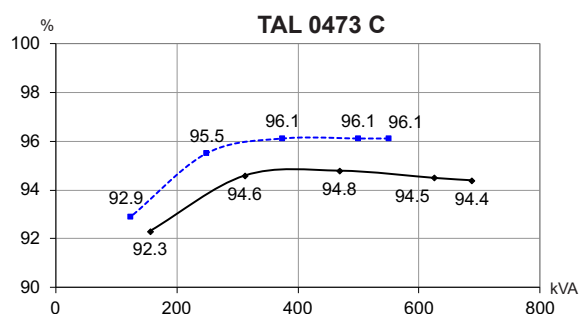
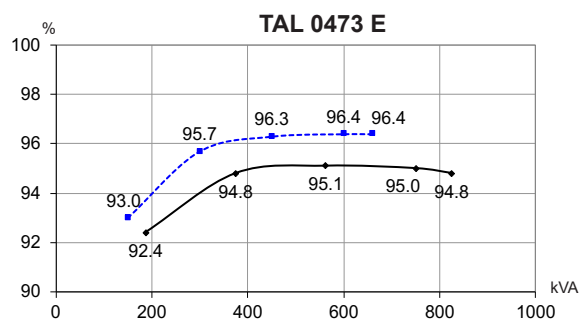
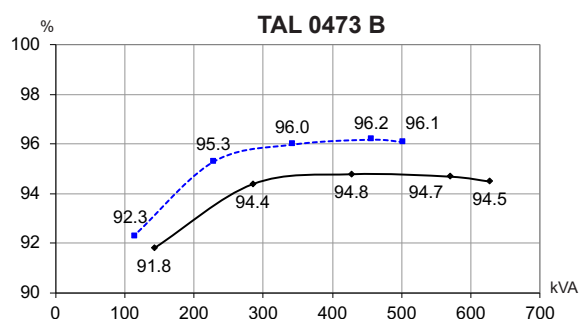
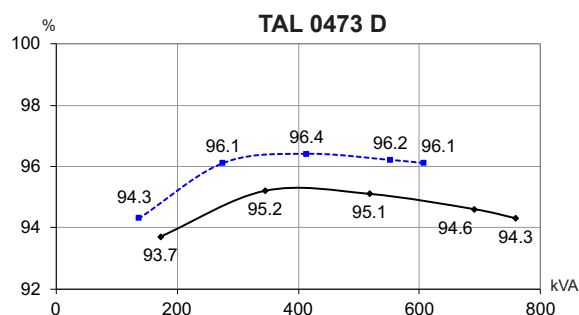
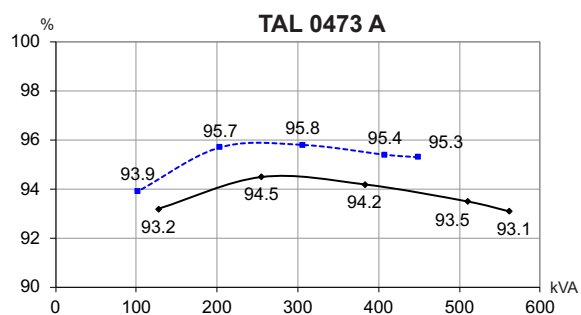
\* P.F. = 0.6

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 ( $\Delta$ ) 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

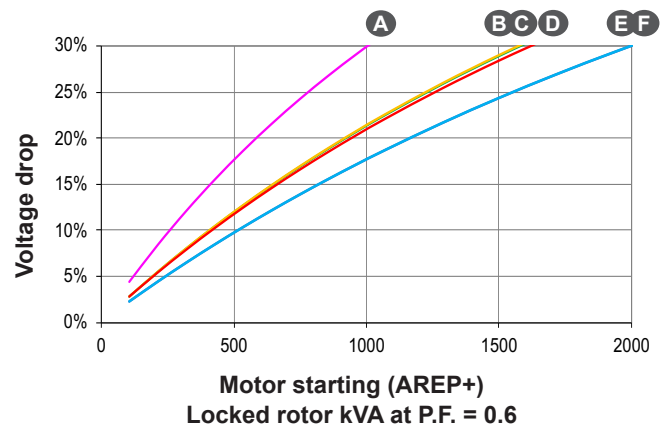
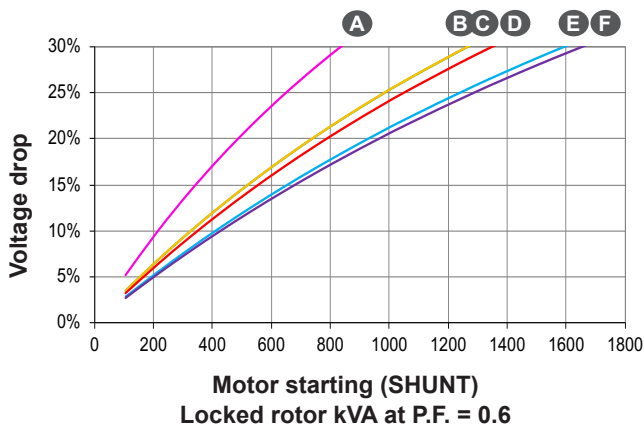
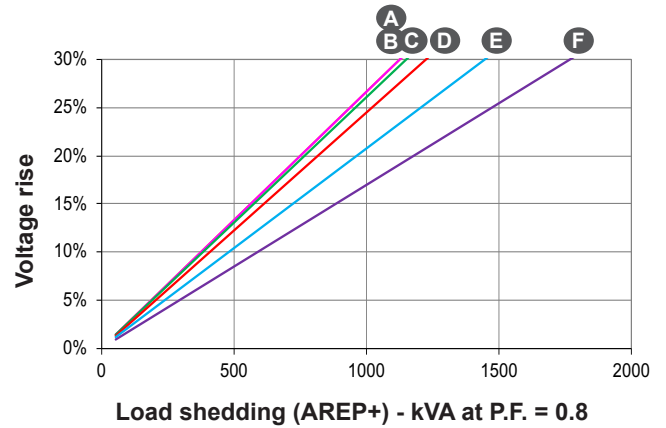
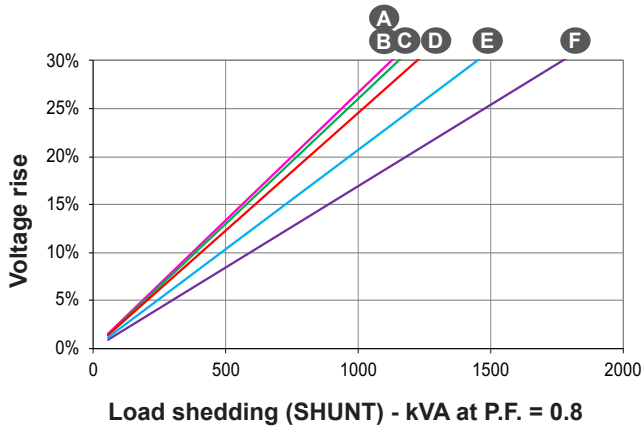
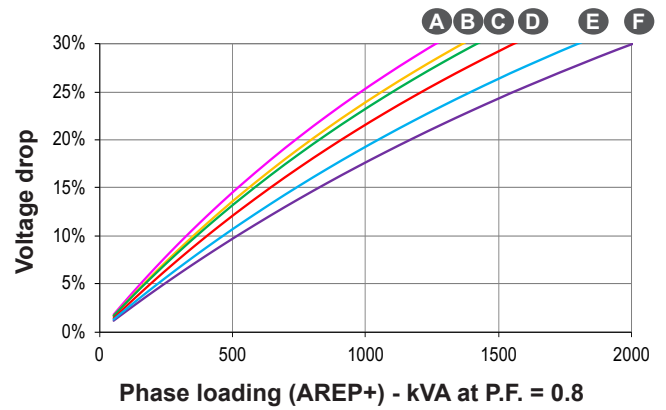
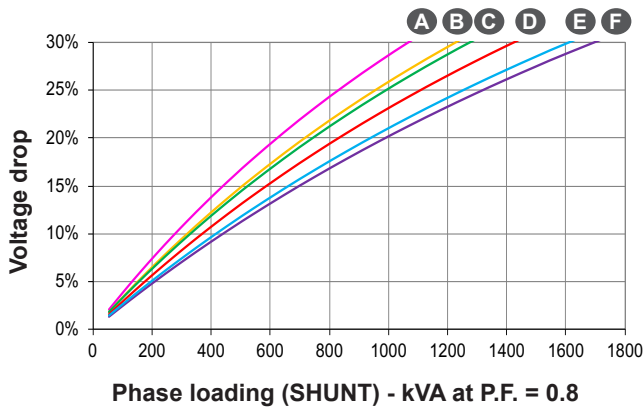
	A	B	C	D	E	F
<b>Kcc</b> Short-circuit ratio	0.24	0.5	0.45	0.31	0.52	0.39
<b>Xd</b> Direct-axis synchronous reactance unsaturated	501	315	345	422	309	361
<b>Xq</b> Quadrature-axis synchronous reactance unsaturated	255	160	176	215	157	184
<b>T'do</b> No-load transient time constant	1968	1982	1982	1987	1994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

Other class H / 480 V data

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

\* P.F. = 0.6

Transient voltage variation 480 V - 60 Hz

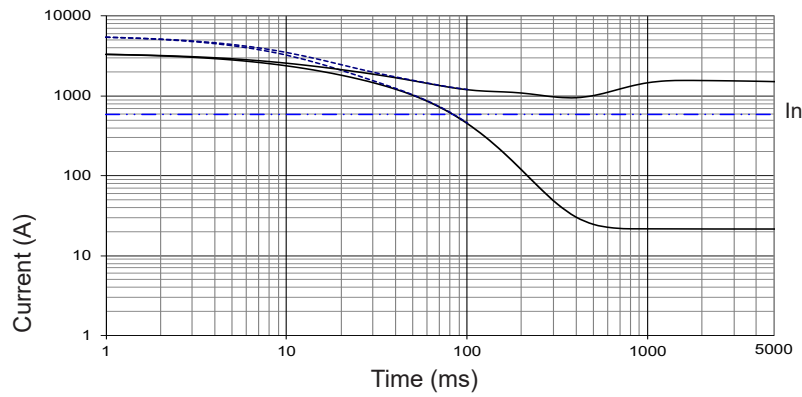


- For a starting P.F. other than 0.6, the starting kVA must be multiplied by  $K = \text{Sine P.F.} / 0.8$
- For voltages other than 480V (Y), 277V ( $\Delta$ ), 240V (YY) at 60 Hz, then kVA must be multiplied by  $(480/U)^2$  or  $(277/U)^2$  or  $(240/U)^2$ .
- Transient performance of the PMG option,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

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

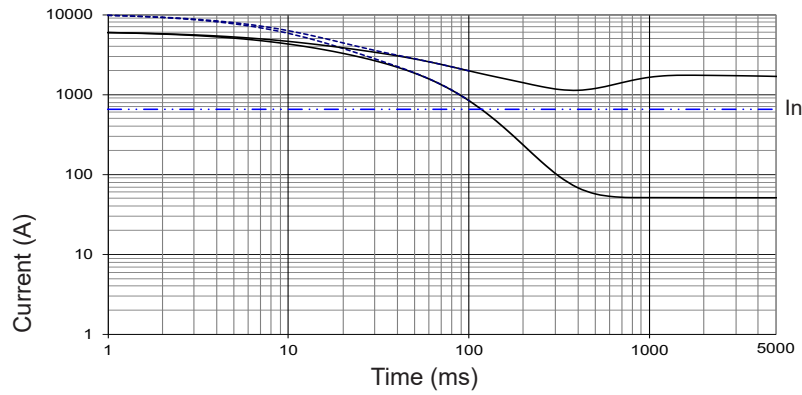
**TAL 0473 A**

Symmetrical —  
Asymmetrical - - -



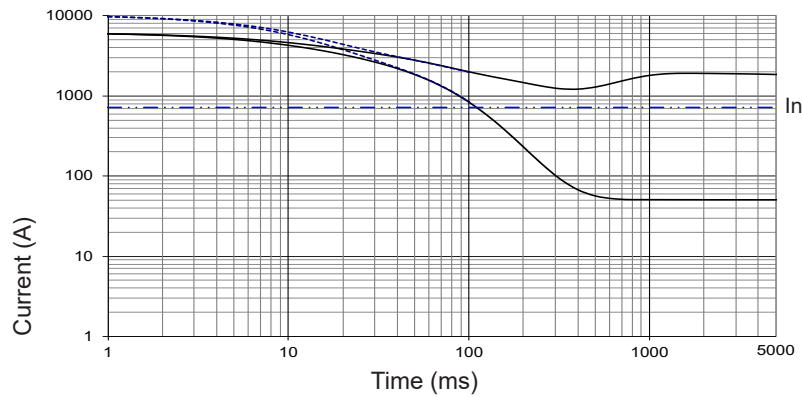
**TAL 0473 B**

Symmetrical —  
Asymmetrical - - -



**TAL 0473 C**

Symmetrical —  
Asymmetrical - - -



**Influence due to connection**

For ( $\Delta$ ) connection, use the following multiplication factor:

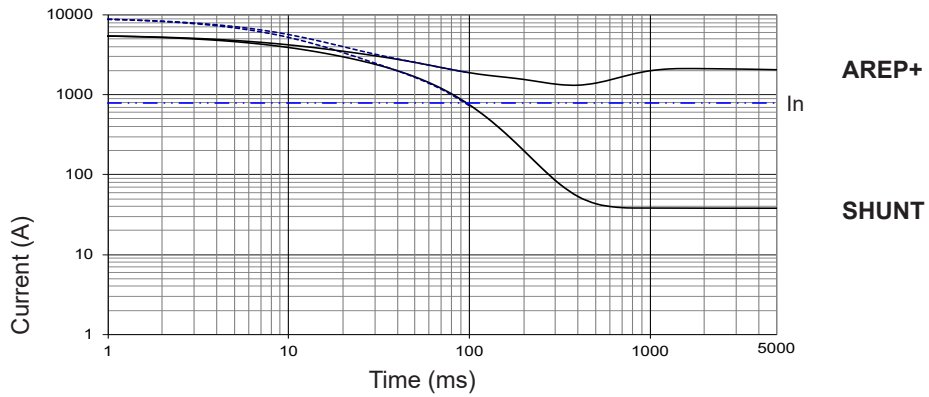
- Current value x 1.732.



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

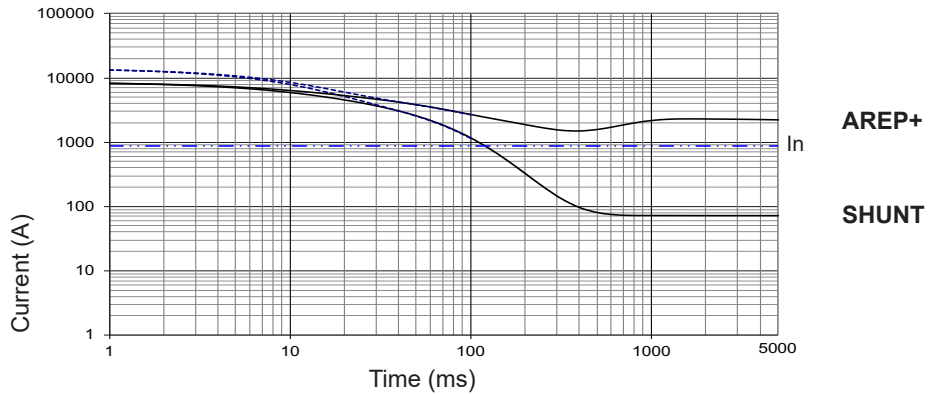
TAL 0473 D

Symmetrical —  
Asymmetrical - - -



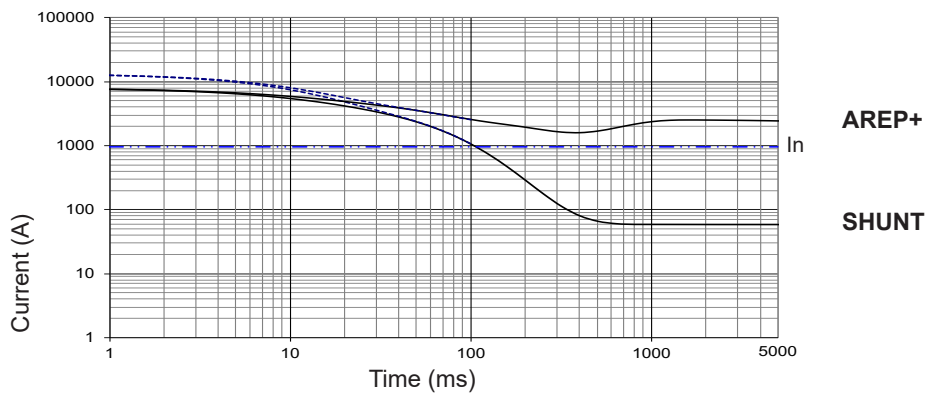
TAL 0473 E

Symmetrical —  
Asymmetrical - - -



TAL 0473 F

Symmetrical —  
Asymmetrical - - -

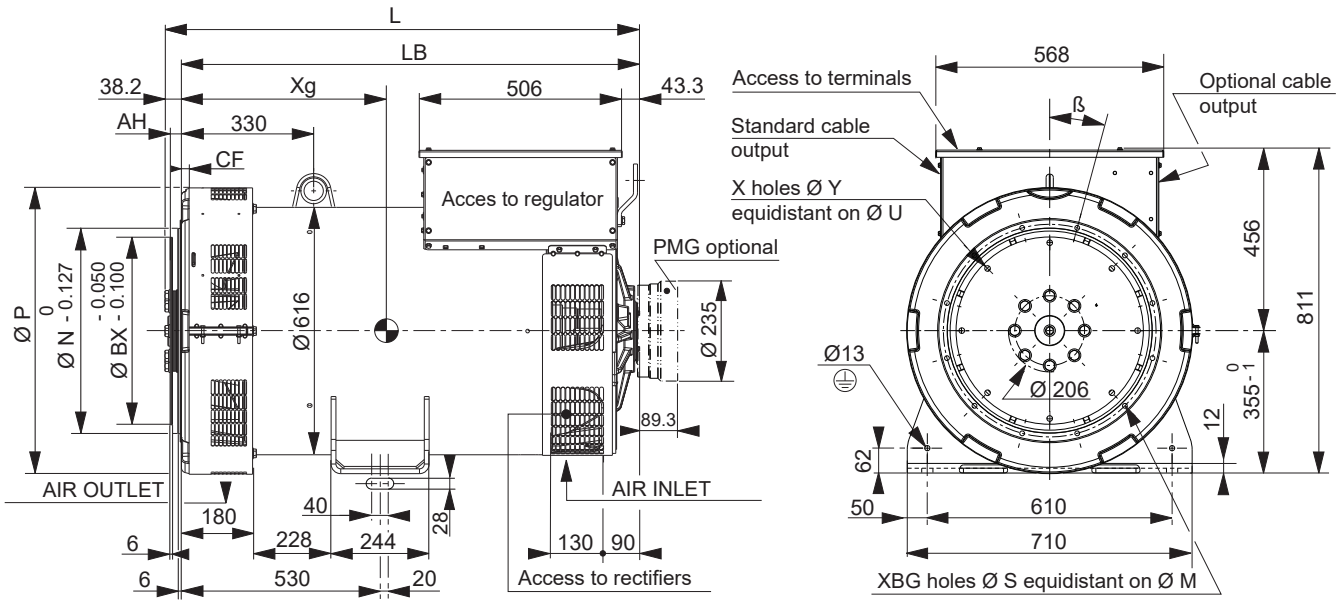


**Influence due to short-circuit**

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

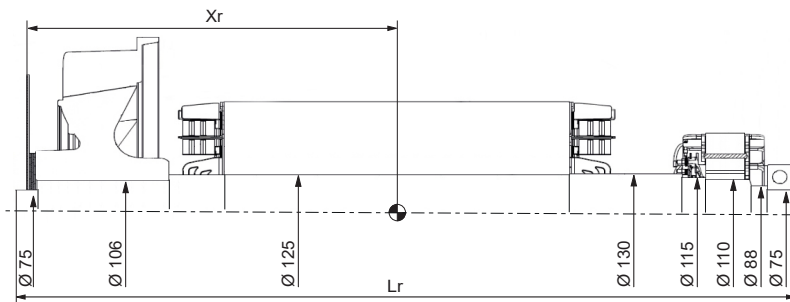


Dimensions (mm) and weight					Coupling			
Type	L without PMG maxi*	LB	Xg	Weight (kg)	Flex plate	11 ½	14	18
TAL 0473 A	1048	996	451	1013	Flange S.A.E 1	X	X	
TAL 0473 B-C	1108	1056	485	1142	Flange S.A.E ½		X	
TAL 0473 D	1208	1156	515	1230	Flange S.A.E 0		X	X
TAL 0473 E	1228	1176	543	1366				
TAL 0473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