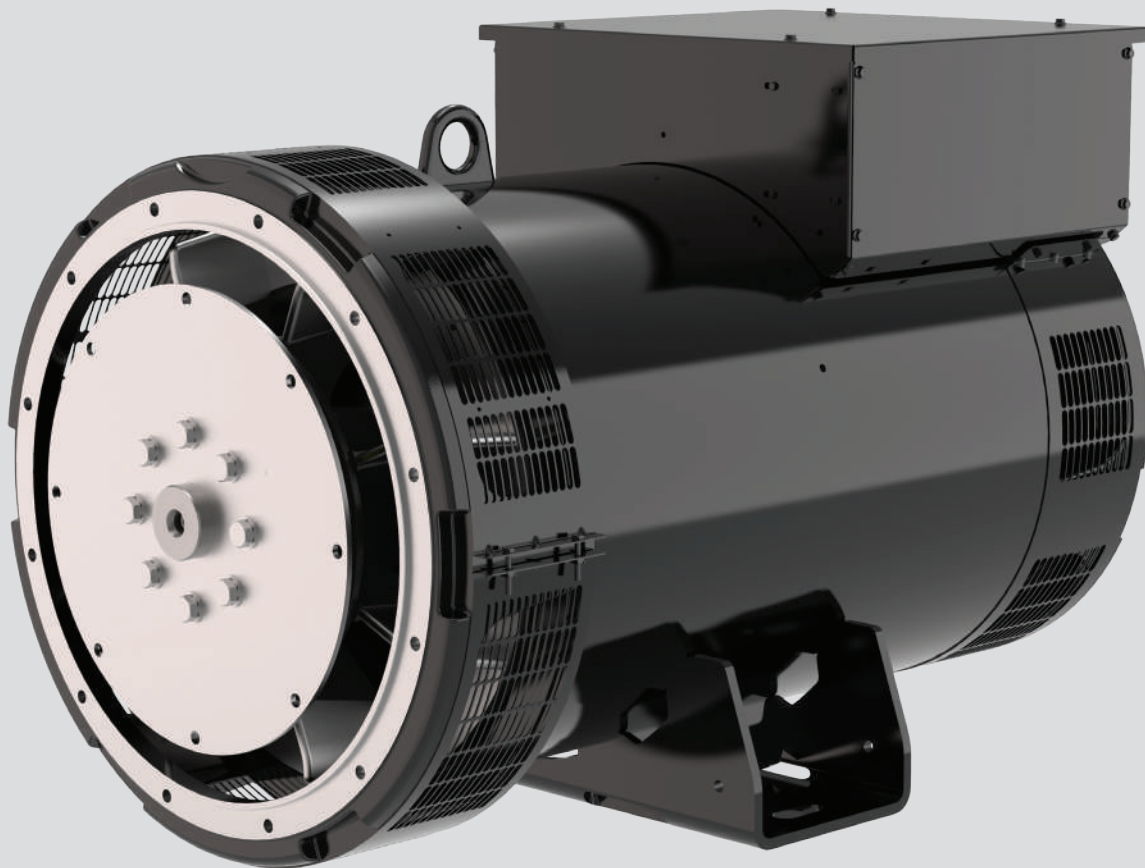




TAL 047

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

Adapted to needs

The TAL alternator range is designed to meet the needs of general applications such as prime power and stand-by.

Compliant with international standards

The TAL range complies with international standards and regulations: IEC 60034 and derivative.

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

Electrical design

- Class H insulation
- Shunt excitation
- Low voltage winding:
 - Three-phase 50 Hz: 380V - 400V - 415V - 440V / 220V - 230V - 240V
 - 60 Hz: 380V - 416V - 440V - 480V / 220V - 208V - 240V
- 6-terminal plates in 6-wire version or suitable for 12-wire option
- Optimized performance
- Complies with EN 61000-6-3, EN 61000-6-2, EN 55011, group 1 class B for European zone (EC marking)

Robust design

- 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
- Sealed for life bearing
- Standard direction of rotation: clockwise when looking at the drive end view (for anti-clockwise, derate the machine by 5%)

Excitation and regulation system suited to the application

	Excitation system				Regulation options		
	AVR	SHUNT	AREP (option)	PMG (option)	ULc/us	Remote voltage potentiometer	C.T. 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	√	√	√

√: Possible option *:with larger terminal box

Compact terminal box

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

Environment and protection

- IP Code IP 23
- Standard winding protection for non-harsh environments with relative humidity $\leq 95\%$

Available options

- Three-phase 12-wire with 9-terminal plates
- AREP or PMG excitation
- ULc/us
- Customized painting
- Space heaters
- Droop kit for alternator paralleling
- Stator sensors
- Winding 8 optimized for three-phase 380V - 416 V / 60 Hz
- Winding protection for harsh environments and relative humidity greater than 95% (system 2 - 4): for TAL 047 F apply a derating coefficient of 0.97



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-wire (12-wire option)	Excitation system 12-wire (option)	SHUNT	AREP / PMG
Protection	IP 23	AVR type	R150	R180
Altitude	≤ 1000 m	Voltage regulation (*)	± 1 %	
Overspeed	2250 R.P.M.	Total Harmonic Distortion THD (**) in no-load	< 1.5 %	
Air flow (m³/s)	0.9	Total Harmonic Distortion THD (**) in linear load	< 5 %	
Air flow (m³/s)	1.1	Waveform: NEMA = TIF (**)	< 50	
AREP Short-circuit current = 2.7 In : 5 second		Waveform: I.E.C. = THF (**)	< 2%	

(*) 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 (*)				220V				220V				220V				220V
TAL 047 A kVA	390	410	410	385	355	375	375	350	415	435	435	410	430	450	450	425
kW	312	328	328	308	284	300	300	280	332	348	348	328	344	360	360	340
TAL 047 B kVA	430	455	455	430	390	415	415	390	455	480	480	455	475	500	500	475
kW	344	364	364	344	312	332	332	312	364	384	384	364	380	400	400	380
TAL 047 C kVA	475	500	500	460	430	455	455	420	505	530	530	490	525	550	550	505
kW	380	400	400	368	344	364	364	336	404	424	424	392	420	440	440	404
TAL 047 D kVA	525	550	550	535	480	500	500	485	555	585	585	565	580	600	600	590
kW	420	440	440	428	384	400	400	388	444	468	468	452	464	480	480	472
TAL 047 E kVA	585	600	600	570	530	545	545	520	620	635	635	605	645	660	660	625
kW	468	480	480	456	424	436	436	416	496	508	508	484	516	528	528	500
TAL 047 F (**) kVA	645	660	660	620	585	600	600	565	685	700	700	655	710	730	730	680
kW	516	528	528	496	468	480	480	452	548	560	560	524	568	584	584	544

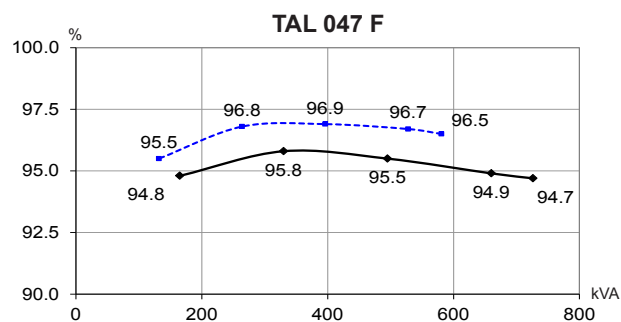
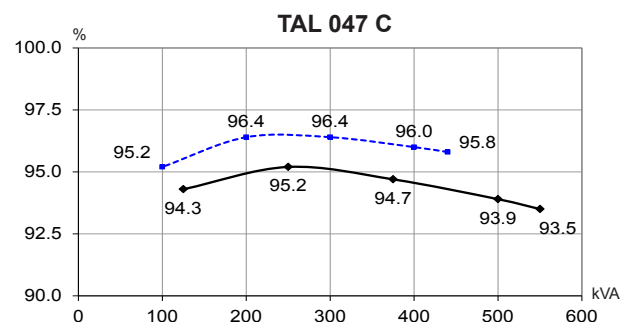
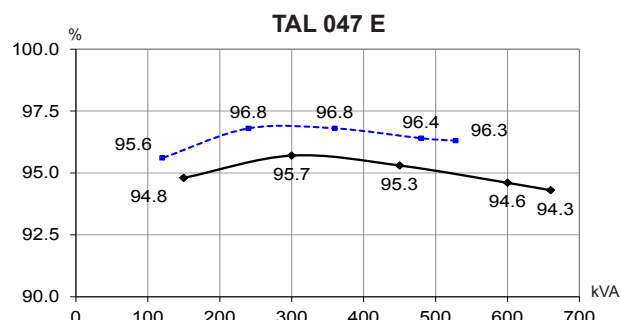
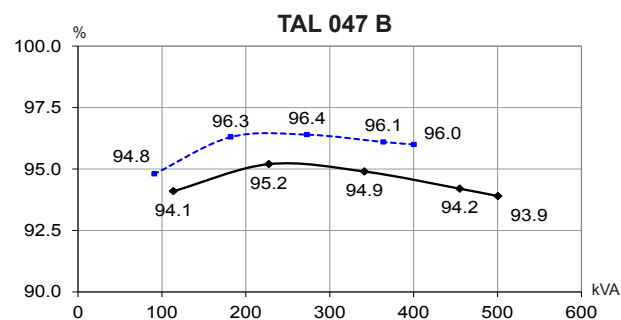
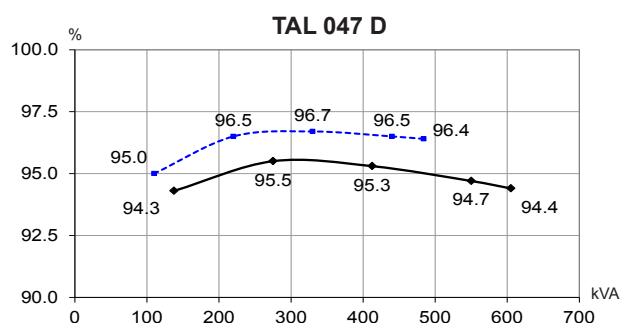
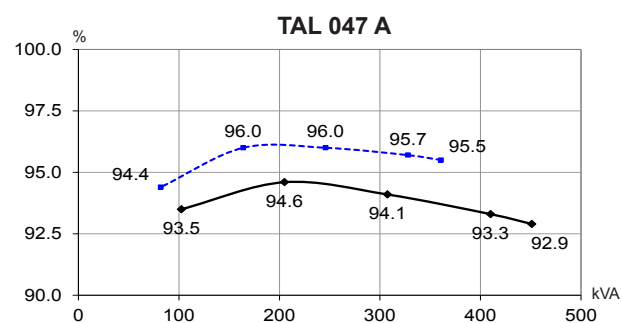
(*) 12-wire option (**) 6-wire only

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 047 A kVA	450	480	500	510	410	435	455	465	475	510	530	540	495	530	550	580
kW	360	384	400	408	328	348	364	372	380	408	424	432	396	424	440	464
TAL 047 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 047 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 047 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 047 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 047 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 (**) 6-wire only

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



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

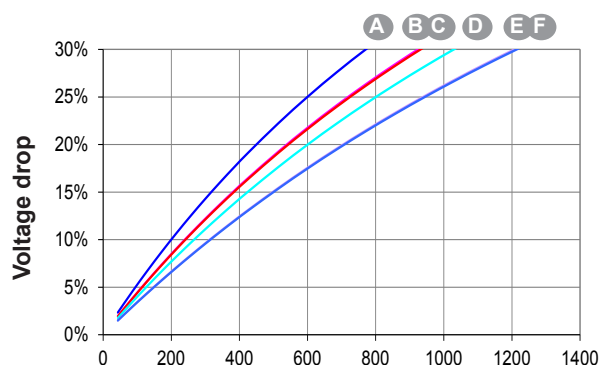
	A	B	C	D	E	F
Kcc Short-circuit ratio	0.35	0.34	0.31	0.39	0.32	0.36
Xd Direct-axis synchro. reactance unsaturated	347	338	372	310	361	328
Xq Quadrature-axis synchro. reactance unsaturated	177	172	189	158	184	167
T'do No-load transient time constant	1601	1705	1705	1773	1797	1832
X'd Direct-axis transient reactance saturated	21.6	19.8	21.8	17.5	20	17.9
T'd Short-circuit transient time constant	100	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	15.1	13.9	15.2	12.2	14	12.5
T''d Subtransient time constant	10	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	16.6	17.4	19.1	16.5	19.5	18
Xo Zero sequence reactance	0.9	0.82	0.9	0.72	0.83	0.74
X2 Negative sequence reactance saturated	15.91	15.66	17.21	14.41	16.8	15.31
Ta Armature time constant	15	15	15	15	15	15

Other class H / 400 V data

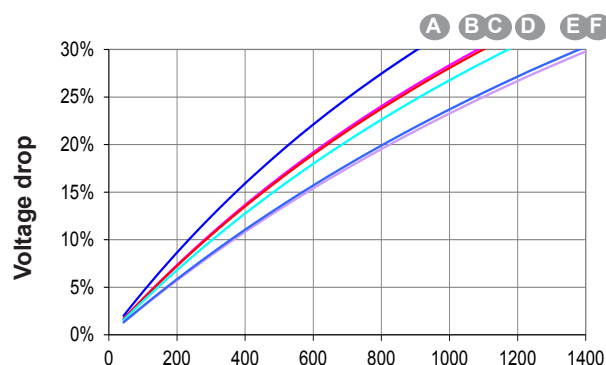
io (A) No-load excitation current SHUNT/AREP	0.97	0.87	0.87	0.97	0.85	0.93
ic (A) On-load excitation current SHUNT/AREP	4.24	3.72	4.06	3.79	3.89	3.87
uc (V) On-load excitation voltage SHUNT/AREP	44.2	38.7	42.2	39.4	40.3	40.1
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500	500
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) SHUNT*	612	743	742	947	970	1105
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) AREP*	738	891	894	1135	1162	1324
% Transient ΔU (on-load 4/4) SHUNT - P.F.: 0.8 _{LAG}	18.6	17.5	18.7	18.7	17.6	18.9
% Transient ΔU (on-load 4/4) AREP - P.F.: 0.8 _{LAG}	16.3	15.3	16.4	16.8	15.4	17
W No-load losses	4261	4376	4376	5192	4831	5487
W Heat dissipation	23451	22295	25923	24391	27055	27875

* P.F. = 0.6

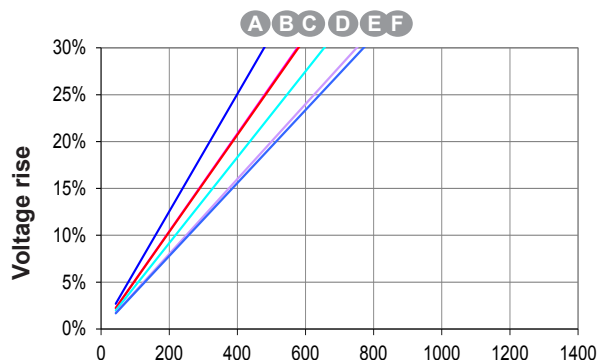
Transient voltage variation 400 V - 50 Hz



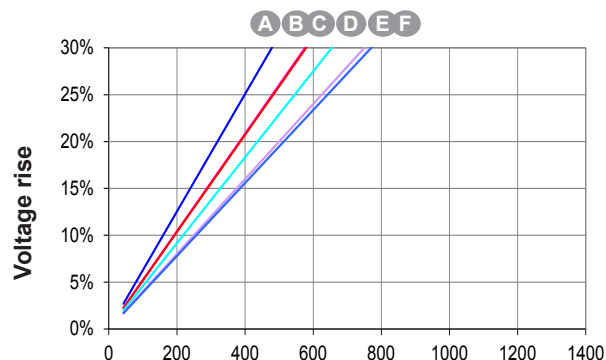
Phase loading (SHUNT) - kVA at P.F. = 0.8



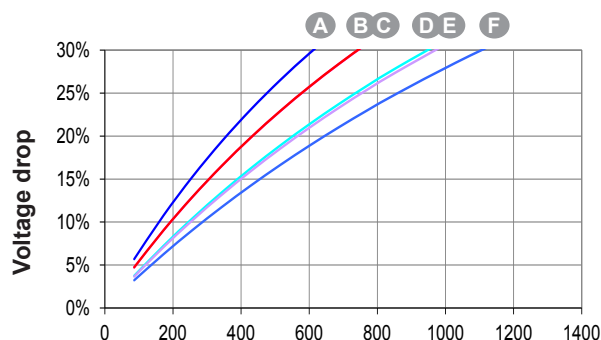
Phase loading (AREP) - kVA at P.F. = 0.8



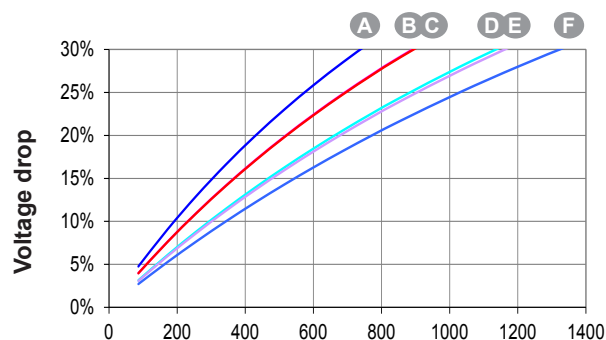
Load shedding (SHUNT) - kVA at P.F. = 0.8



Load shedding (AREP) - kVA at P.F. = 0.8



Motor starting (SHUNT)
Locked rotor kVA at P.F. = 0.6

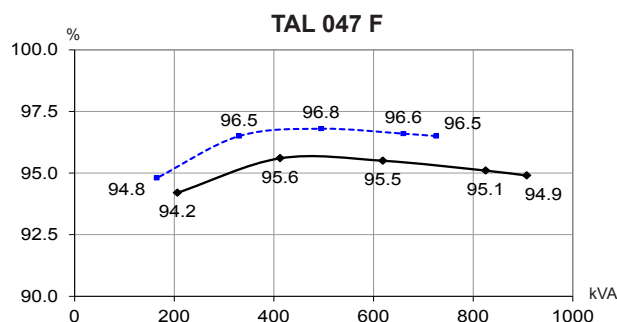
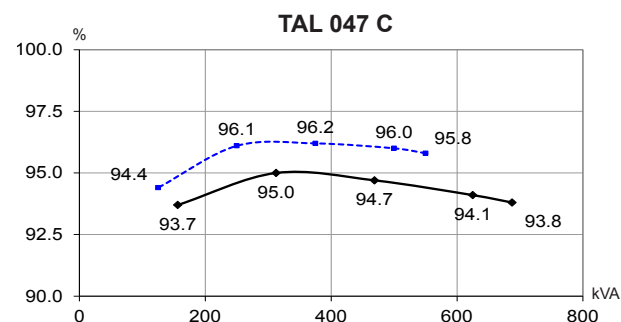
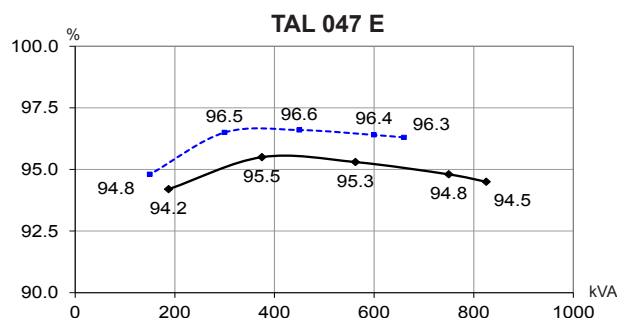
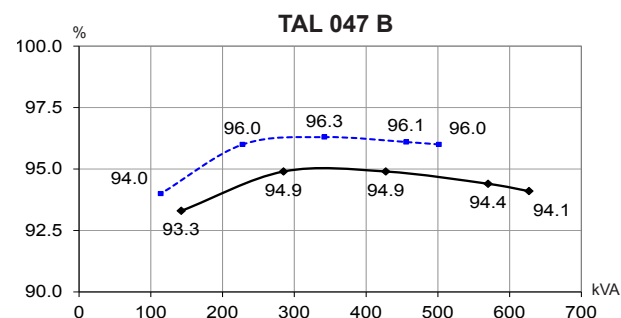
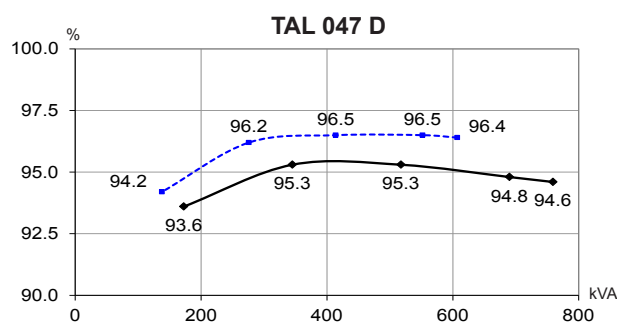
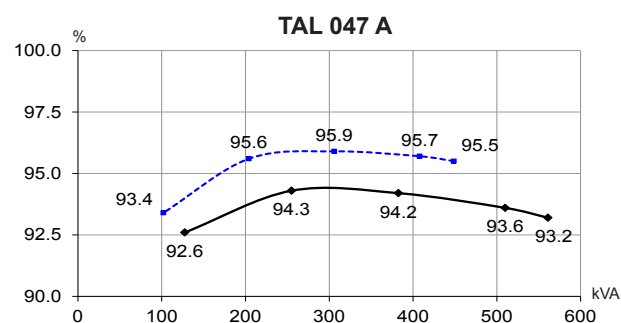


Motor starting (AREP)
Locked rotor kVA at P.F. = 0.6

1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$

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



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

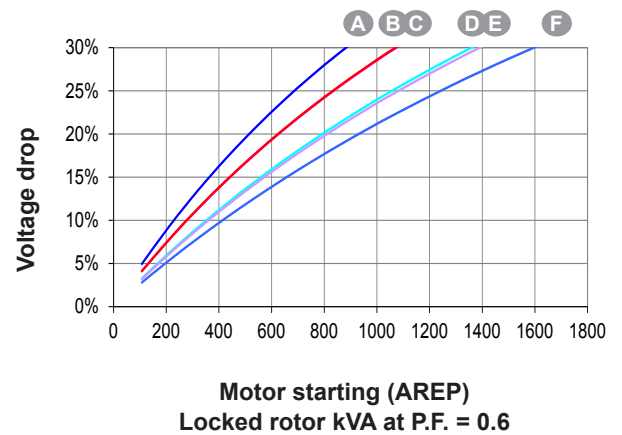
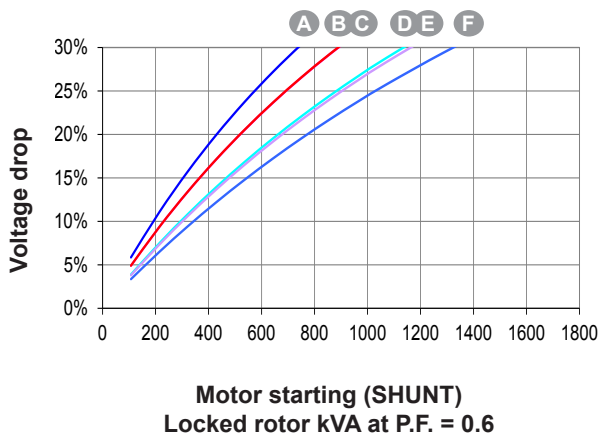
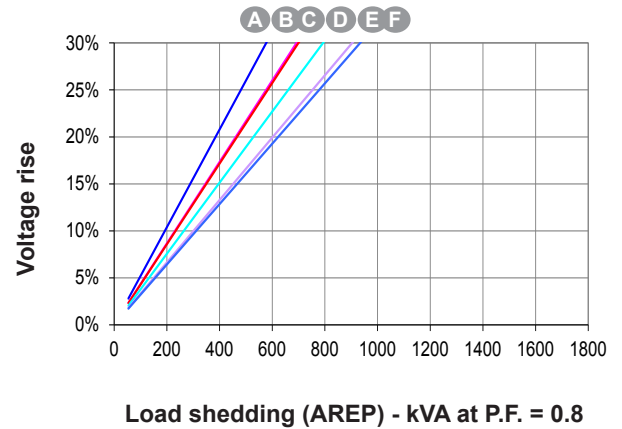
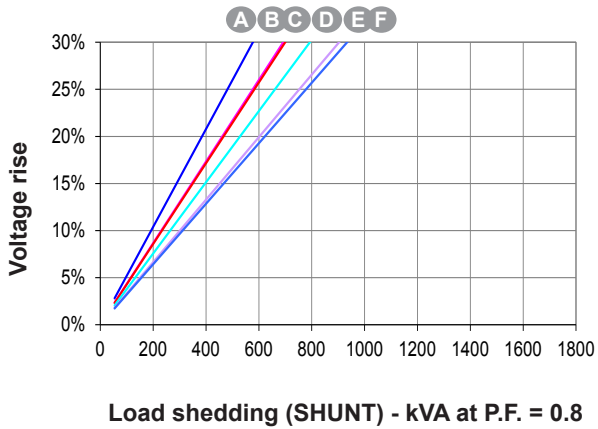
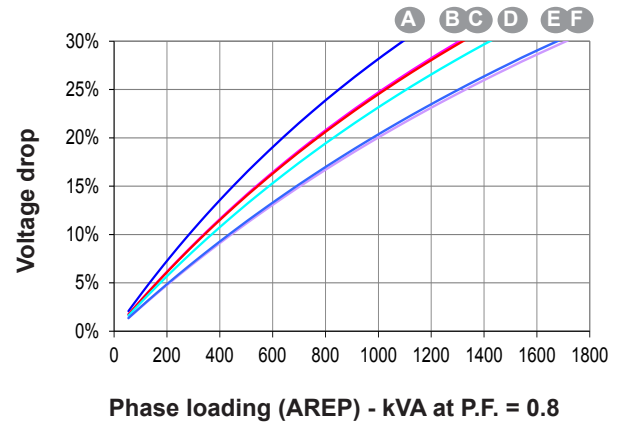
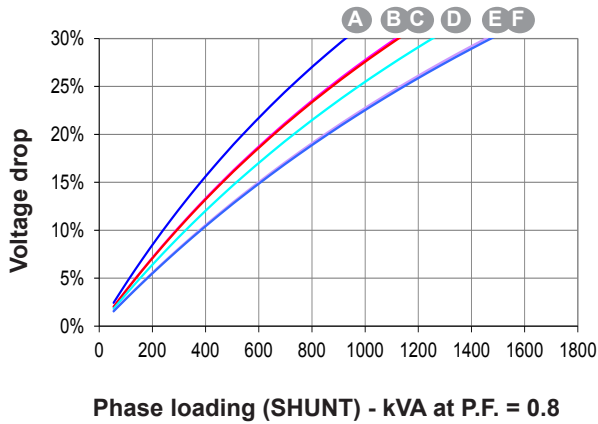
	A	B	C	D	E	F
Kcc Short-circuit ratio	0.34	0.32	0.3	0.37	0.3	0.35
Xd Direct-axis synchro. reactance unsaturated	359	353	387	324	376	342
Xq Quadrature-axis synchro. reactance unsaturated	183	180	197	165	191	174
T'do No-load transient time constant	1601	1705	1705	1773	1797	1832
X'd Direct-axis transient reactance saturated	22.4	20.7	22.7	18.3	20.9	18.6
T'd Short-circuit transient time constant	100	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	15.7	14.5	15.9	12.8	14.6	13
T''d Subtransient time constant	10	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	17.2	18.1	19.9	17.3	20.3	18.8
Xo Zero sequence reactance	0.93	0.86	0.94	0.76	0.87	0.77
X2 Negative sequence reactance saturated	16.5	16.35	17.92	15.07	17.5	15.95
Ta Armature time constant	15	15	15	15	15	15

Other class H / 480 V data

io (A) No-load excitation current SHUNT/AREP	0.97	0.87	0.87	0.97	0.85	0.93
ic (A) On-load excitation current SHUNT/AREP	4.31	3.81	4.15	3.88	3.97	3.94
uc (V) On-load excitation voltage SHUNT/AREP	45.1	39.8	43.3	40.5	41.3	41
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*	738	890	889	1135	1162	1324
kVA Start ($\Delta U = 20\%$ cont. or $\Delta U = 30\%$ trans.) AREP*	883	1074	1071	1360	1391	1597
% Transient ΔU (on-load 4/4) SHUNT - P.F.: 0.8 _{LAG}	19.1	18	19.3	19.2	18.2	19.4
% Transient ΔU (on-load 4/4) AREP - P.F.: 0.8 _{LAG}	16.7	15.8	16.9	17.2	15.9	17.4
W No-load losses	6583	6766	6766	7888	7408	8312
W Heat dissipation	27879	27031	31057	29695	32579	33674

* P.F. = 0.6

Transient voltage variation 480 V - 60 Hz

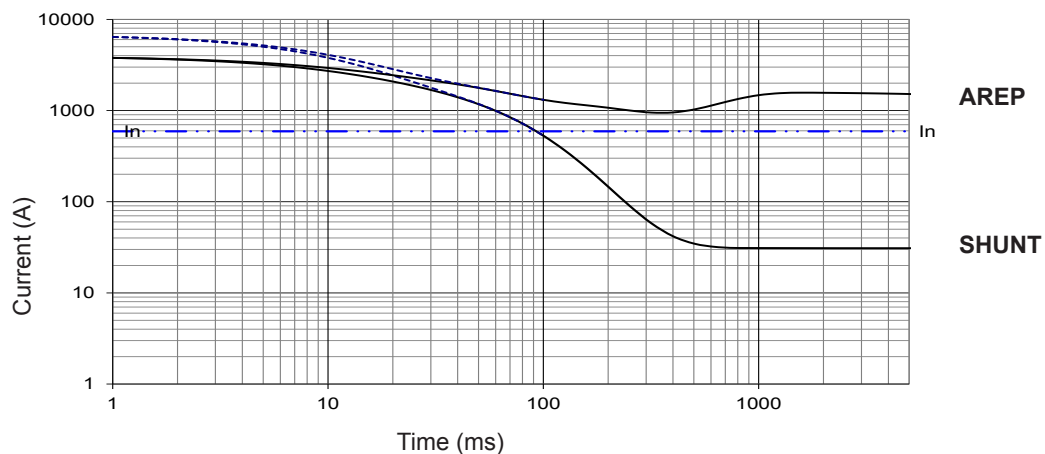


- 1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$
- 2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

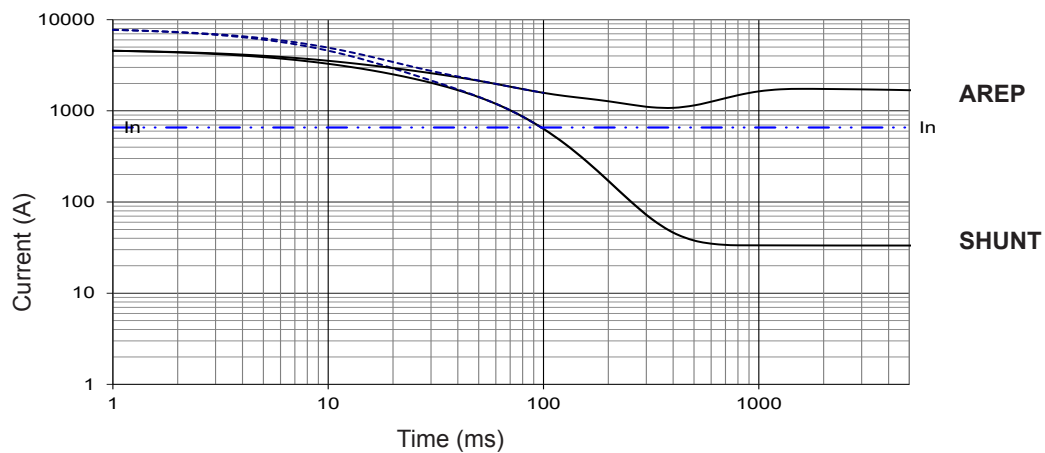
TAL 047 A

Symmetrical —
Asymmetrical - - -



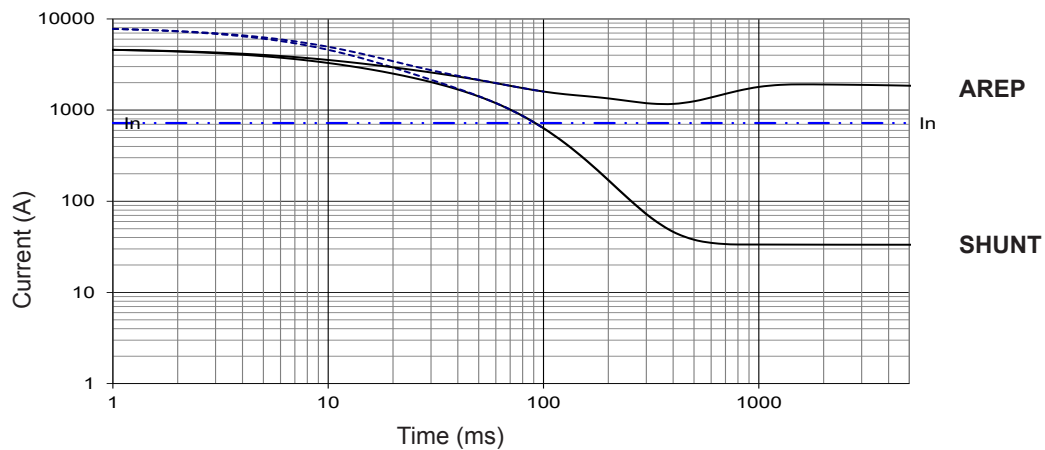
TAL 047 B

Symmetrical —
Asymmetrical - - -



TAL 047 C

Symmetrical —
Asymmetrical - - -



Influence due to connection

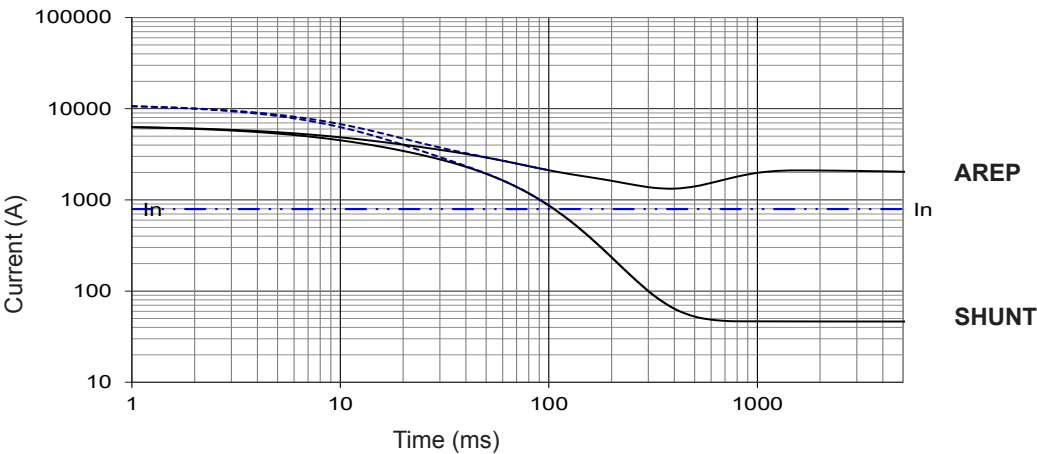
For (Δ) connection, use the following multiplication factor:

- Current value x 1.732.

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

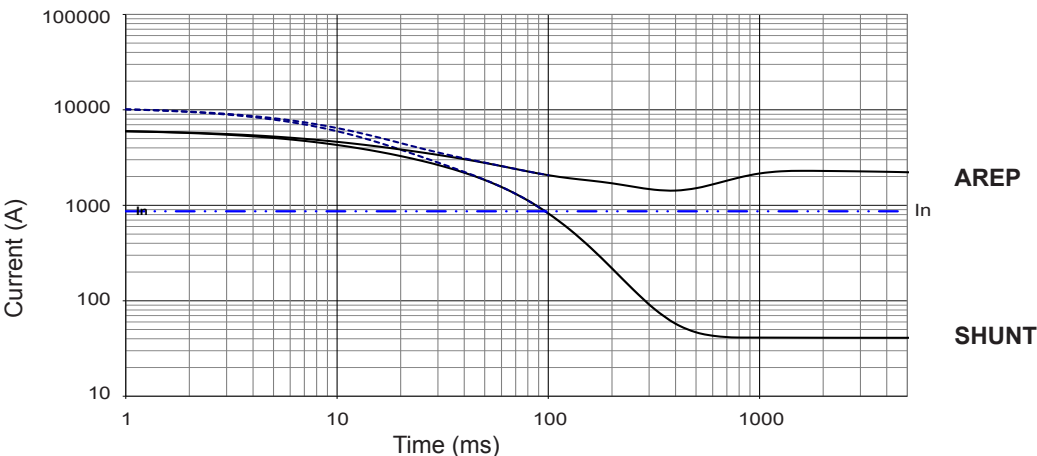
TAL 047 D

Symmetrical —
Asymmetrical - - -



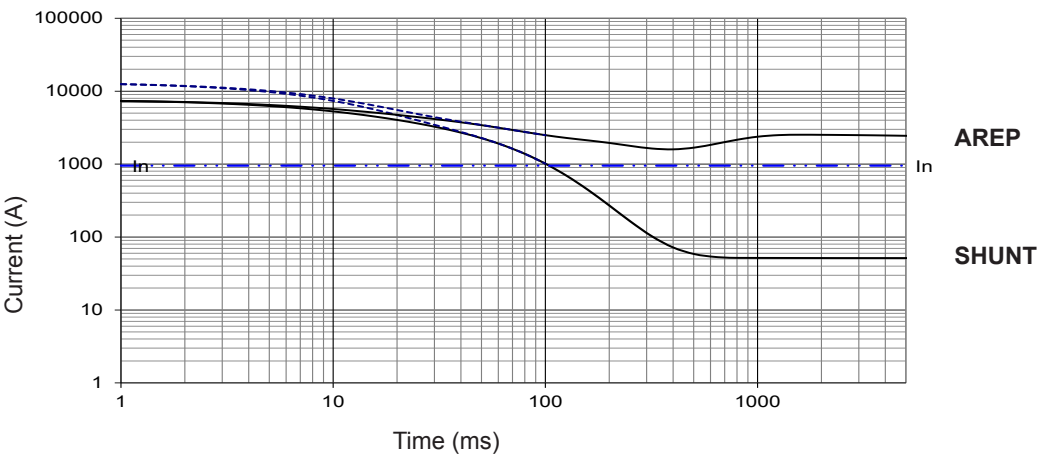
TAL 047 E

Symmetrical —
Asymmetrical - - -



TAL 047 F

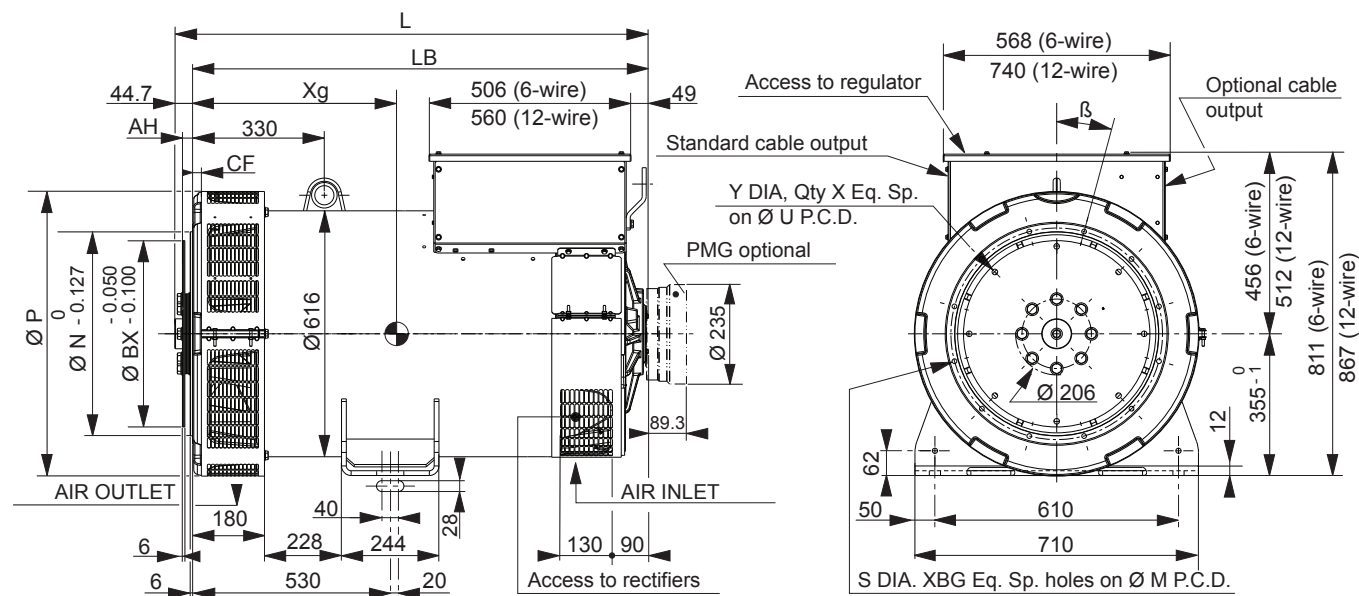
Symmetrical —
Asymmetrical - - -



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		1.5	

Single bearing general arrangement



Dimensions (mm) and weight

Type	L without PMG max.	LB max.	Xg	Weight (kg)
TAL 047 A	1041	996	437	976
TAL 047 B	1101	1056	471	1113
TAL 047 C	1101	1056	471	1113
TAL 047 D	1201	1156	511	1240
TAL 047 E	1201	1156	520	1289
TAL 047 F	1221	1176	545	1372

Coupling

Flex plate	14	18
Flange S.A.E 1	X	
Flange S.A.E 1/2	X	
Flange S.A.E 0	X	X

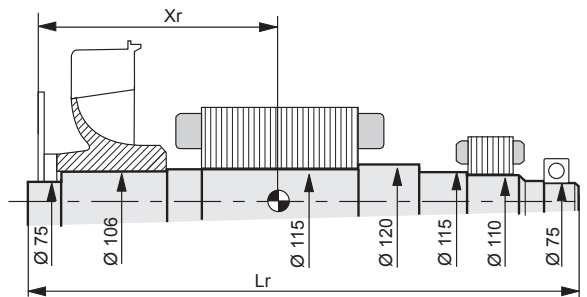
Flange (mm)

S.A.E.	P	N	M	XBG	S	β°	CF
1	713	511.175	530.225	12	12	15°	15
1/2	713	584.2	619.125	12	14	15°	22
0	713	647.7	679.45	16	14	11° 15'	42

Flex plate (mm)

S.A.E.	BX	U	X	Y	AH
11 1/2	352.42	333.38	8	11	39.6
14	466.72	438.15	8	14	25.4
18	571.5	542.92	6	17	15.7

Torsional 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. 14				S.A.E. 18			
Type	Xr	Lr	M	J	Xr	Lr	M	J
TAL 047 A	418.3	1020	374.9	5.92	408.5	1020	376	6.18
TAL 047 B	456	1080	426.6	6.77	446	1080	427.7	7.03
TAL 047 C	456	1080	426.6	6.77	446	1080	427.7	7.03
TAL 047 D	496	1180	477	7.5	486	1180	478.1	7.76
TAL 047 E	507	1180	493.8	7.8	497	1180	494.9	8.06
TAL 047 F	528	1200	525.2	8.32	518	1200	526.3	8.58

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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