



**TAL 047**

## **Low Voltage Alternator - 4 pole**

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

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***Nidec***

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# TAL 047 - 410 to 660 kVA - 50 Hz / 510 to 825 kVA - 60 Hz

## 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

## 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
- Direction of rotation: clockwise and counterclockwise without derating



## Excitation and regulation system suited to the application

	Excitation system				Regulation options		
	AVR	Shunt	AREP	PMG	ULc/us	Remote voltage potentiometer	C.T. for paralleling
Three-phase 6-wire	R150	Standard				√	
	R180		Standard	Standard		√	√
	R450		Option	Option	√	√	√
Three-phase 12-wire*	R250	Standard			√	√	
	R180		Standard	Standard		√	√
	R450		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 ≤ 95%

## Available options

- Three-phase 12-wire with 8-terminal plates
- Excitation AREP & PMG with auxiliary winding
- ULc/us
- Customized painting (machine not painted as standard)
- 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

# TAL 047 - 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-wire (12-wire option)	Excitation system 12-wire (option)	SHUNT	AREP / PMG
Protection	IP 23	AVR type	R250	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
<b>TAL 047 A</b> kVA	390	<b>410</b>	410	385	355	<b>375</b>	375	350	415	<b>435</b>	435	410	430	<b>450</b>	450	425
kW	312	328	328	308	284	300	300	280	332	348	348	328	344	360	360	340
<b>TAL 047 B</b> kVA	430	<b>455</b>	455	430	390	<b>415</b>	415	390	455	<b>480</b>	480	455	475	<b>500</b>	500	475
kW	344	364	364	344	312	332	332	312	364	384	384	364	380	400	400	380
<b>TAL 047 C</b> kVA	475	<b>500</b>	500	460	430	<b>455</b>	455	420	505	<b>530</b>	530	490	525	<b>550</b>	550	505
kW	380	400	400	368	344	364	364	336	404	424	424	392	420	440	440	404
<b>TAL 047 D</b> kVA	525	<b>550</b>	550	535	480	<b>500</b>	500	485	555	<b>585</b>	585	565	580	<b>600</b>	600	590
kW	420	440	440	428	384	400	400	388	444	468	468	452	464	480	480	472
<b>TAL 047 E</b> kVA	585	<b>600</b>	600	570	530	<b>545</b>	545	520	620	<b>635</b>	635	605	645	<b>660</b>	660	625
kW	468	480	480	456	424	436	436	416	496	508	508	484	516	528	528	500
<b>TAL 047 F (**)</b> kVA	645	<b>660</b>	660	620	585	<b>600</b>	600	565	685	<b>700</b>	700	655	710	<b>730</b>	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

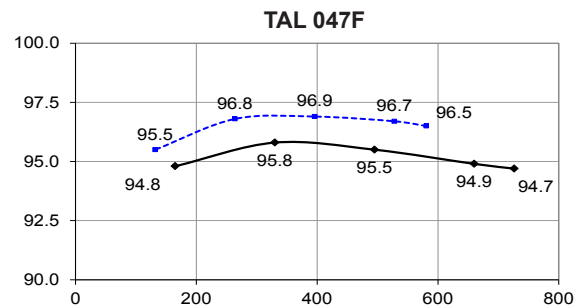
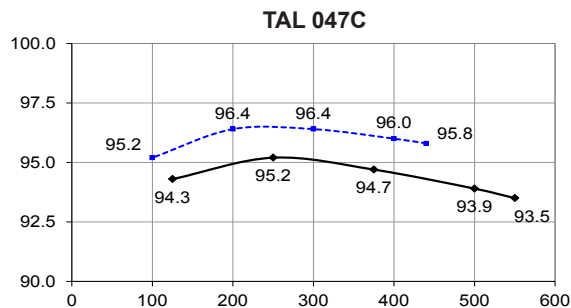
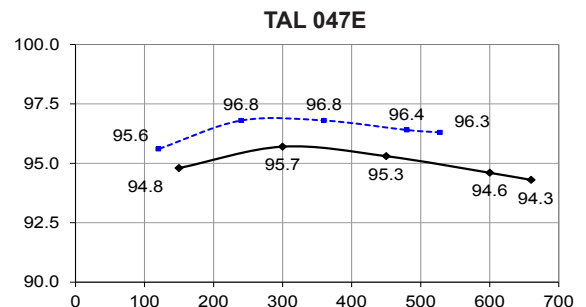
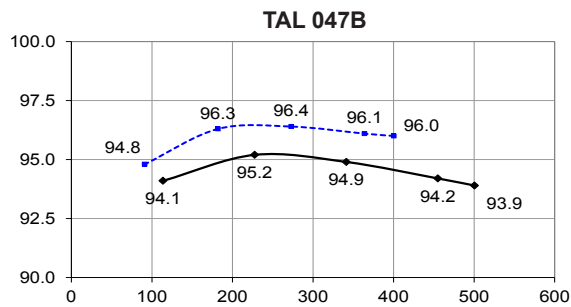
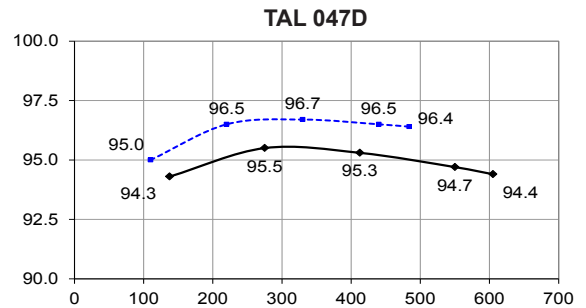
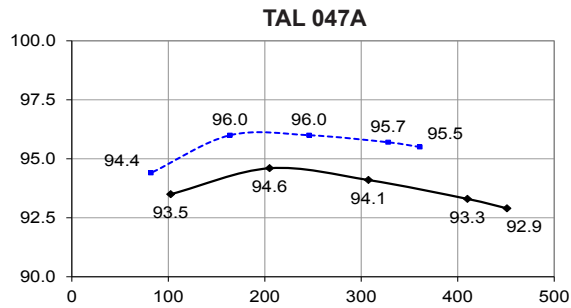
## Ratings 60 Hz - 1800 R.P.M.

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	240V		220V	240V	240V		220V	240V	240V		220V	240V	240V	
YY (*)		208V	220V	240V		208V	220V	240V		208V	220V	240V		208V	220V	240V
<b>TAL 047 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>580</b>
kW	360	384	400	408	328	348	364	372	380	408	424	432	396	424	440	464
<b>TAL 047 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	456	344	372	384	416	404	432	448	484	420	448	468	500
<b>TAL 047 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	500	380	404	428	456	440	472	500	532	456	488	520	552
<b>TAL 047 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	552	408	444	460	504	476	516	536	584	492	536	556	600
<b>TAL 047 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	600	436	480	500	548	508	560	580	636	528	580	604	660
<b>TAL 047 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	660	472	520	548	600	552	608	640	700	576	628	664	728

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

# TAL 047 - 410 to 660 kVA - 50 Hz / 510 to 825 kVA - 60 Hz

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



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

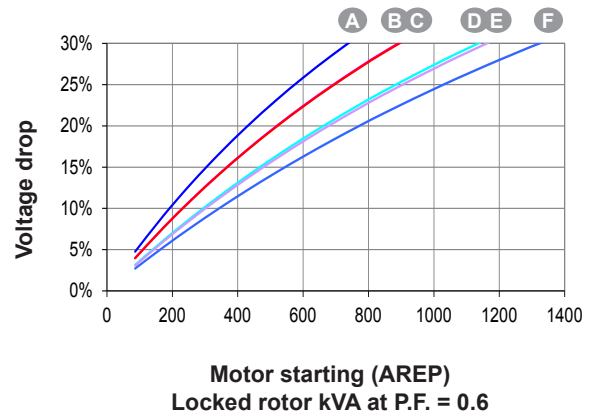
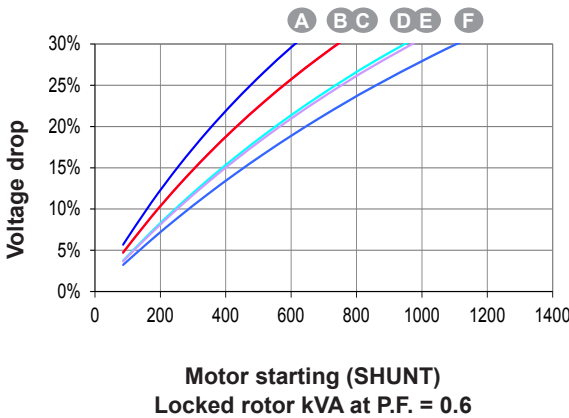
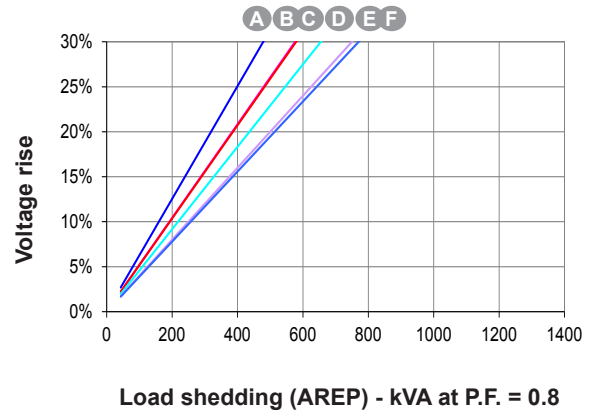
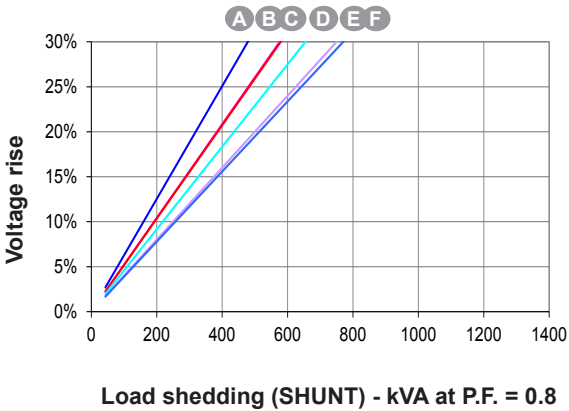
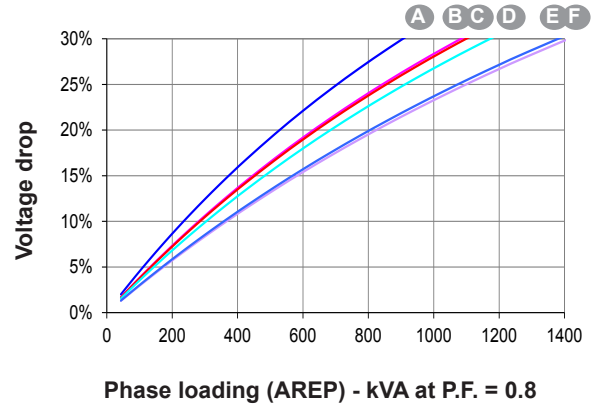
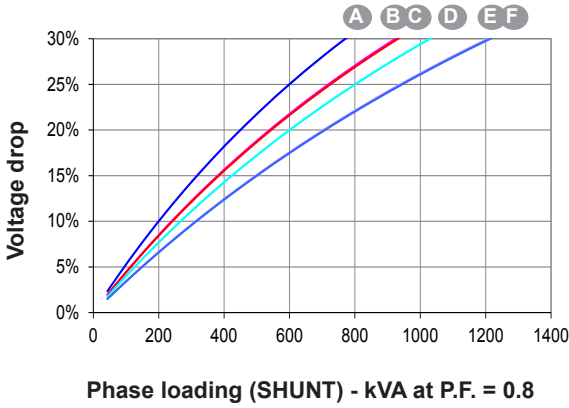
	A	B	C	D	E	F
<b>Kcc</b> Short-circuit ratio	0.35	0.34	0.31	0.39	0.32	0.36
<b>Xd</b> Direct-axis synchro. reactance unsaturated	347	338	372	310	361	328
<b>Xq</b> Quadrature-axis synchro. reactance unsaturated	177	172	189	158	184	167
<b>T'do</b> No-load transient time constant	1601	1705	1705	1773	1797	1832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

### Other class H / 400 V data

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

\* P.F. = 0.6

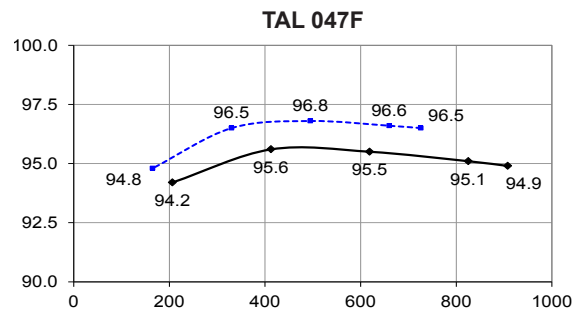
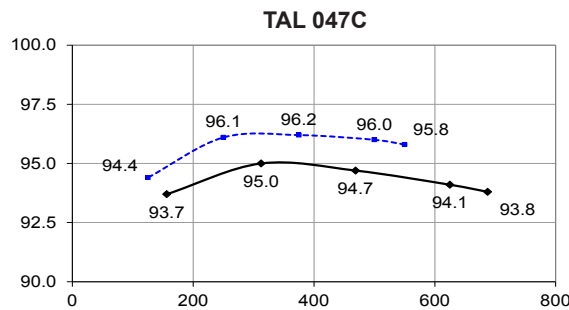
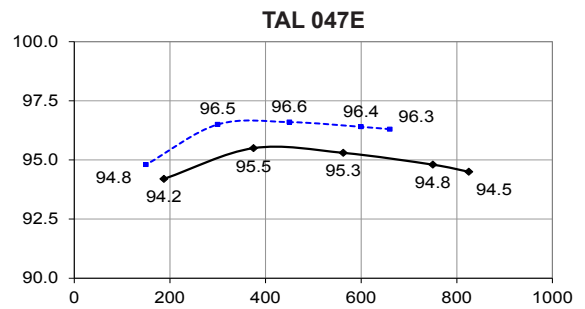
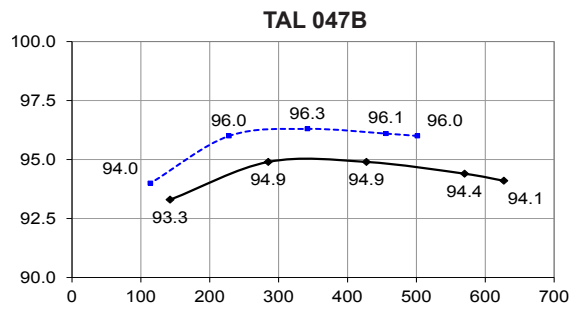
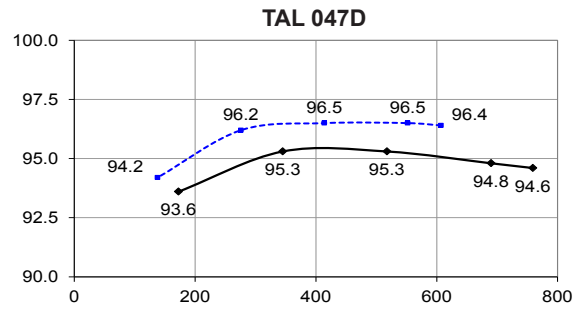
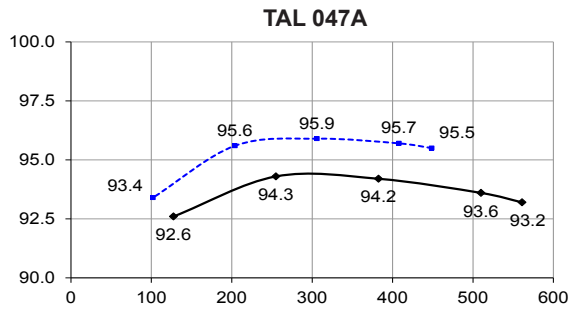
Transient voltage variation 400 V - 50 Hz



- 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 400V (Y), 230V (Δ) at 50 Hz, then kVA must be multiplied by  $(400/U)^2$  or  $(230/U)^2$ .

# TAL 047 - 410 to 660 kVA - 50 Hz / 510 to 825 kVA - 60 Hz

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



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

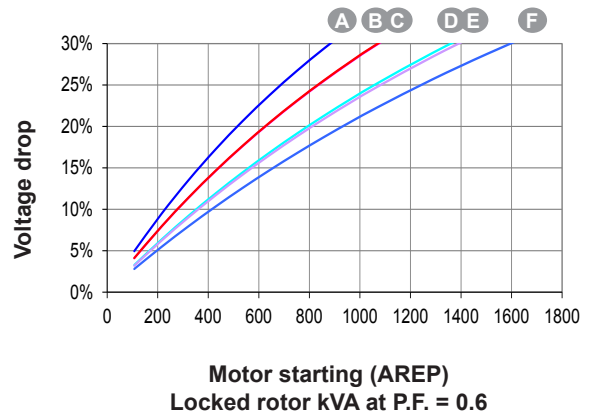
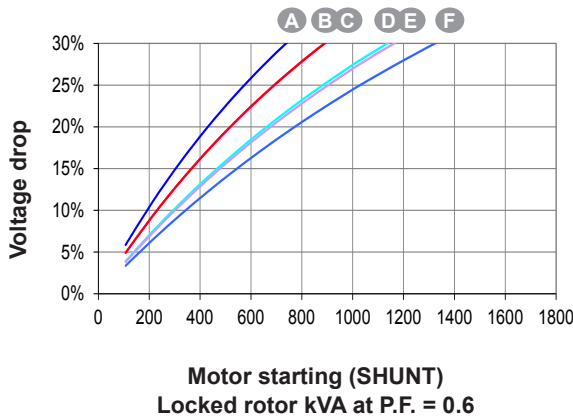
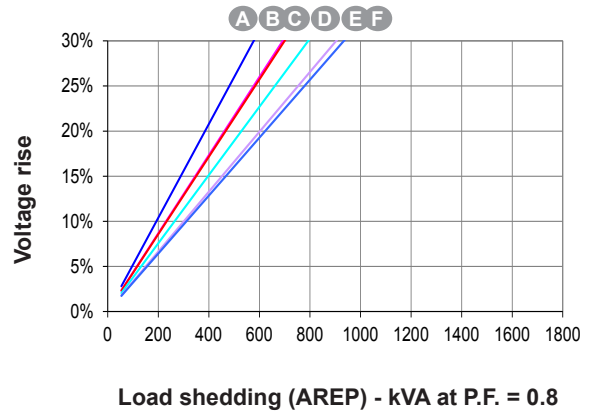
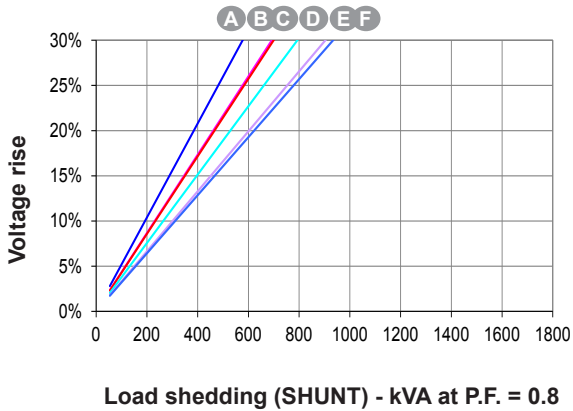
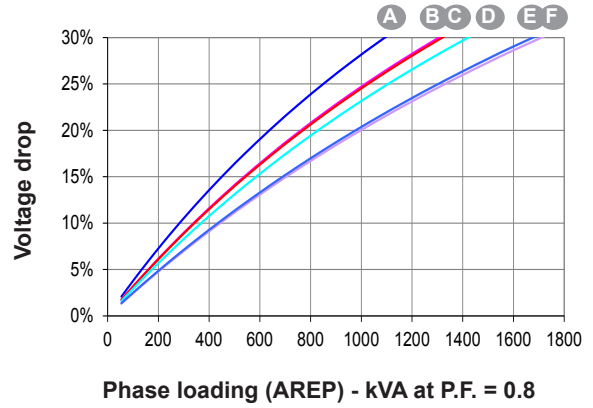
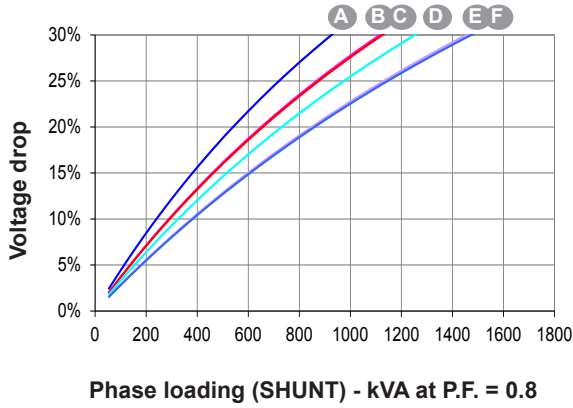
	A	B	C	D	E	F
<b>Kcc</b> Short-circuit ratio	0.34	0.32	0.3	0.37	0.3	0.35
<b>Xd</b> Direct-axis synchro. reactance unsaturated	359	353	387	324	376	342
<b>Xq</b> Quadrature-axis synchro. reactance unsaturated	183	180	197	165	191	174
<b>T'do</b> No-load transient time constant	1601	1705	1705	1773	1797	1832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

### Other class H / 480 V data

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

\* P.F. = 0.6

Transient voltage variation 480 V - 60 Hz

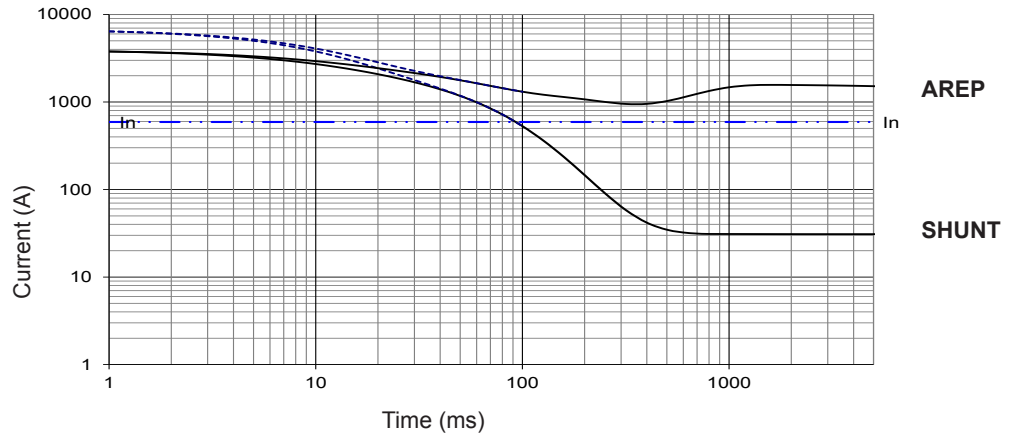


- 1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by  $K = \text{Sine P.F.} / 0.8$
- 2) For voltages other than 480V (Y), 277V ( $\Delta$ ), 240V (YY) at 60 Hz, then kVA must be multiplied by  $(480/U)^2$  or  $(277/U)^2$  or  $(240/U)^2$ .

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

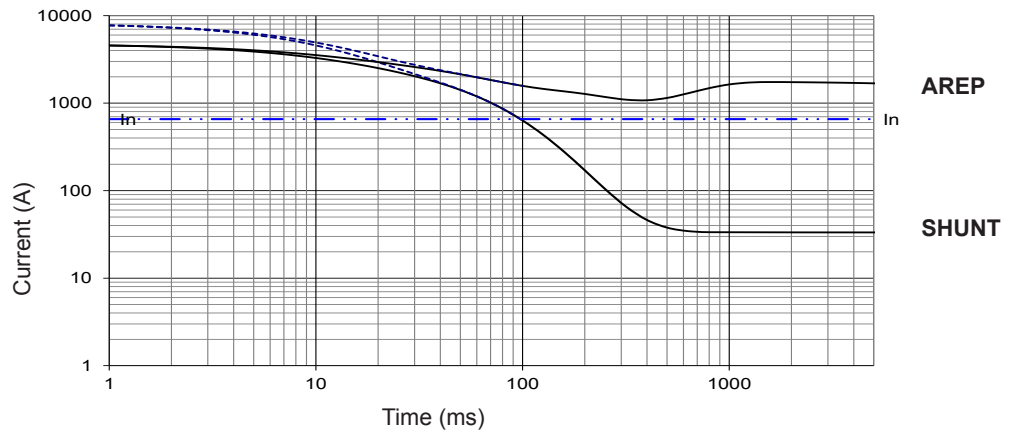
TAL 047 A

Symmetrical —  
Asymmetrical - - -



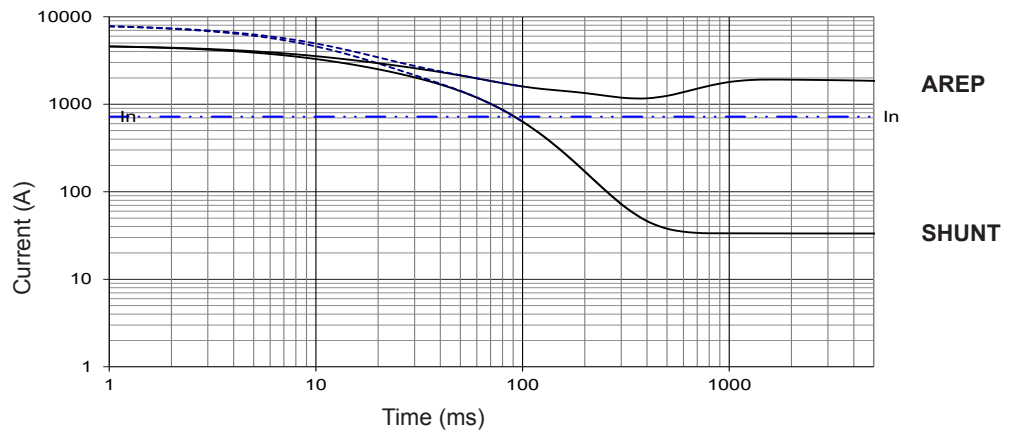
TAL 047 B

Symmetrical —  
Asymmetrical - - -



TAL 047 C

Symmetrical —  
Asymmetrical - - -



Influence due to connection

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

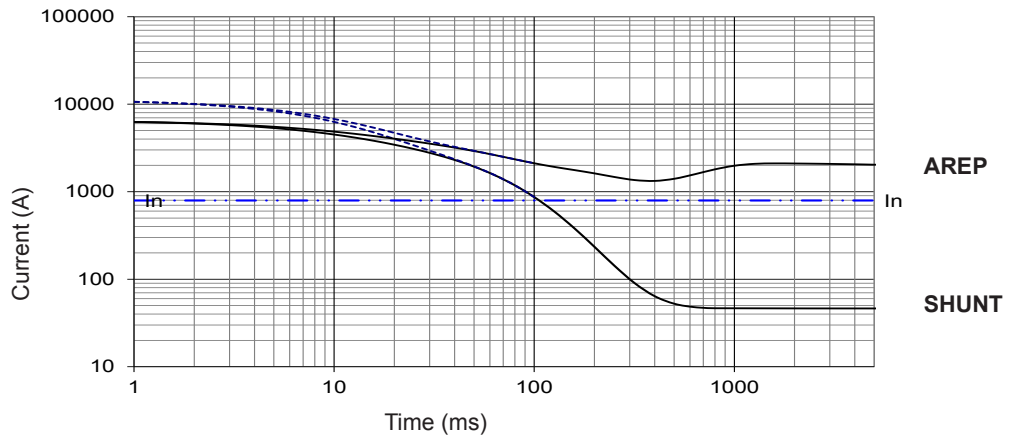
- Current value x 1.732.



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

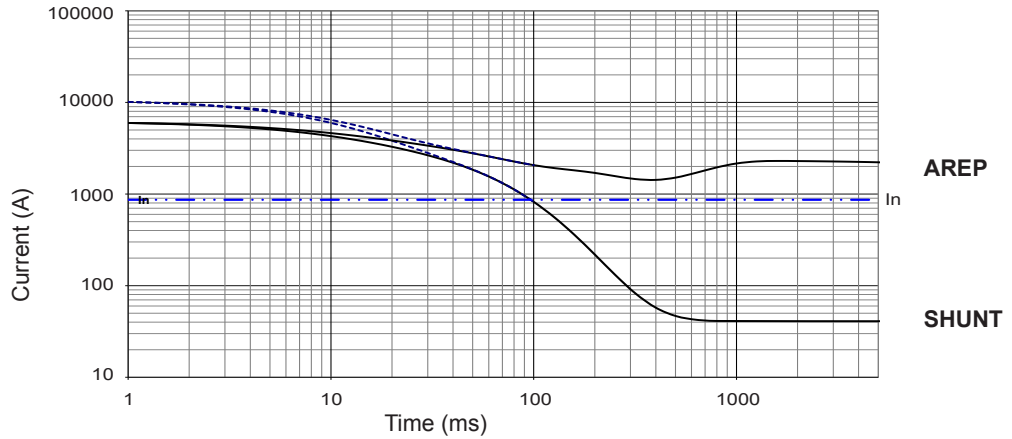
TAL 047 D

Symmetrical —  
Asymmetrical - - -



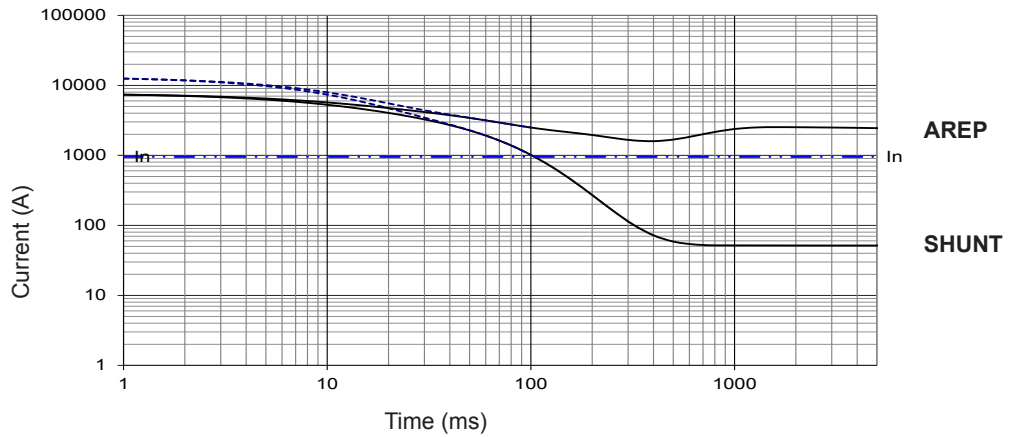
TAL 047 E

Symmetrical —  
Asymmetrical - - -



TAL 047 F

Symmetrical —  
Asymmetrical - - -

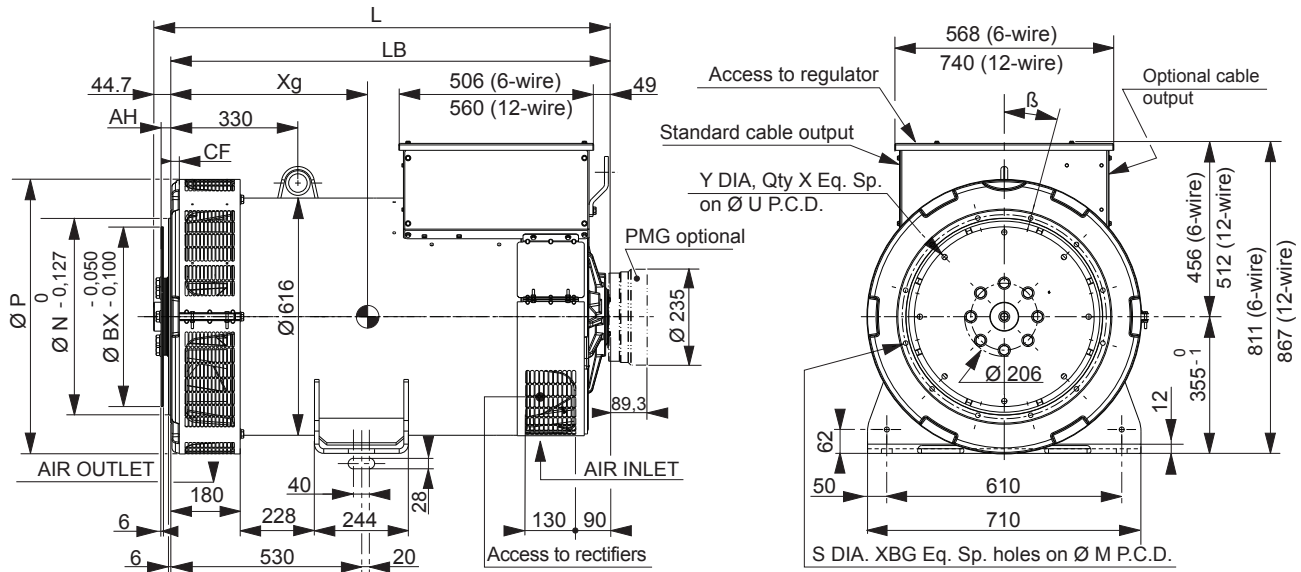


**Influence due to short-circuit**  
Curves are based on a three-phase short-circuit.  
For other types of short-circuit,  
use the following multiplication factors.

	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	

# TAL 047 - 410 to 660 kVA - 50 Hz / 510 to 825 kVA - 60 Hz

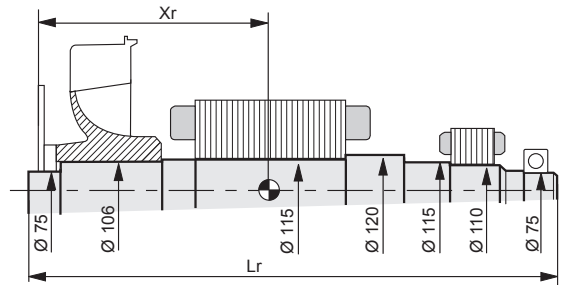
## Single bearing general arrangement



Dimensions (mm) and weight					Coupling		
Type	L without PMG	LB	Xg	Weight (kg)	Flex plate	14	18
TAL 047 A	1041	996	437	976	Flange S.A.E 1	X	
TAL 047 B	1101	1056	471	1113	Flange S.A.E 1/2	X	
TAL 047 C	1101	1056	471	1113	Flange S.A.E 0	X	X
TAL 047 D	1201	1156	511	1240			
TAL 047 E	1201	1176	520	1289			
TAL 047 F	1221	1176	545	1372			

Flange (mm)								Flex plate (mm)					
S.A.E.	P	N	M	XBG	S	β°	CF	S.A.E.	BX	U	X	Y	AH
1	713	511.175	530.225	12	12	15°	15	11 1/2	352.42	333.38	8	11	39.6
1/2	713	584.2	619.125	12	14	15°	22	14	466.72	438.15	8	14	25.4
0	713	647.7	679.45	16	14	11° 15'	42	18	571.5	542.92	6	17	15.7

## Torsional data



Type	Flex plate S.A.E. 14				Flex plate S.A.E. 18			
	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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Moteurs Leroy-Somer SAS. Siège : Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France.  
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