

FRAME

3104H

WINDING

6



MODELS LL 3114H / LL3124H / LL3134H

REF: F3104HW6-0 SEP 2013

WINDING DETAILS

Code	6	Insulation class	H
Phase	3	Leads	12
Pole number	4	Pitch	2/3

MECHANICAL DETAILS

Standard protection	IP23
Overspeed	rpm 2250
Air flow 50Hz/60Hz	m ³ /s 0.25/0.3

EXCITATION DETAILS

Excitation system	SHUNT	AREP/PMG
AVR model	R250	R438
Sustained short-circuit current	-	300%
Steady state voltage regulation	+/-0,5%	+/-0,5%

WAVEFORM

Line voltage on no load or balanced linear rated load

Total harmonic content THC	<2%
Telephone influence factor TIF (NEMA)	<50%
Telephone harmonic factor THF (IEC)	<2%

LINE VOLTAGE

No overvoltage tolerance for 440V 50Hz excitation level

Frequency / speed	50Hz / 1500rpm					60Hz / 1800rpm					
	V	380	400	415	440	380	400	416	440	460	480
Series star	V	380	400	415	440	380	400	416	440	460	480
Series delta	V	220	230	240		220	230	240			
Parallel star	V		200	208	220		200	208	220	230	240

RATING

Power factor 0.8, Altitude <=1000m

Class	Rating	kVA	135.0	135.0	135.0	125.0	135.0	145.0	150.0	160.0	169.0	169.0
Class H rise BR	125/40	kVA	135.0	135.0	135.0	125.0	135.0	145.0	150.0	160.0	169.0	169.0
		kW	108.0	108.0	108.0	100.0	108.0	116.0	120.0	128.0	135.2	135.2
Class H rise PR	150/40	kVA	143.1	143.1	143.1	132.5	143.1	153.7	159.0	169.6	179.1	179.1
		kW	114.5	114.5	114.5	106.0	114.5	123.0	127.2	135.7	143.3	143.3
Class H rise PR	163/27	kVA	148.5	148.5	148.5	137.5	148.5	159.5	165.0	176.0	186.0	186.0
		kW	118.8	118.8	118.8	110.0	118.8	127.6	132.0	140.8	148.8	148.8
Class F rise BR	105/40	kVA	124.5	124.5	124.5	114.0	123.0	132.0	136.5	145.5	154.0	154.0
		kW	99.6	99.6	99.6	91.2	98.4	105.6	109.2	116.4	123.2	123.2

EFFICIENCIES

Power factor 0.8

Efficiency	Class	%	92.4	92.5	92.4	92.0	92.6	92.7	92.8	92.9	92.9	92.9
110%	Class H BR	%	92.4	92.5	92.4	92.0	92.6	92.7	92.8	92.9	92.9	92.9
100%	Class H BR	%	92.8	92.8	92.7	92.2	92.9	93.0	93.1	93.2	93.1	93.1
75%	Class H BR	%	93.5	93.4	93.1	92.3	93.5	93.6	93.7	93.7	93.6	93.4
50%	Class H BR	%	93.7	93.3	92.9	91.4	93.6	93.7	93.7	93.6	93.4	93.1
25%	Class H BR	%	91.9	91.0	90.1	87.2	91.6	91.6	91.5	91.2	90.9	90.1

CHARACTERISTIC PARAMETERS

Reactance base class H BR rating

Parameter	Unit	0.35	0.44	0.50	0.75	0.25	0.27	0.29	0.33	0.36	0.41
K _c Short-circuit ratio		0.35	0.44	0.50	0.75	0.25	0.27	0.29	0.33	0.36	0.41
X _d D-Axis synchronous reactance (unsaturated)	pu	3.58	3.23	3.00	2.47	4.29	4.16	3.98	3.80	3.67	3.37
X' _d D-Axis transient reactance (saturated)	pu	0.17	0.15	0.14	0.12	0.20	0.20	0.19	0.18	0.17	0.16
X'' _d D-Axis sub-transient reactance (saturated)	pu	0.101	0.091	0.085	0.070	0.121	0.117	0.112	0.107	0.103	0.095
X _q Q-Axis synchronous reactance (unsaturated)	pu	2.15	1.94	1.80	1.48	2.58	2.50	2.39	2.28	2.20	2.02
X'' _q Q-Axis sub-transient reactance (saturated)	pu	0.203	0.183	0.170	0.140	0.243	0.236	0.226	0.215	0.208	0.191
X ₂ Negative-sequence reactance (saturated)	pu	0.152	0.137	0.127	0.105	0.182	0.177	0.169	0.161	0.156	0.143
X ₀ Zero-sequence reactance (independent)	pu	0.002	0.002	0.002	0.002	0.003	0.003	0.002	0.002	0.002	0.002
T' _d D-Axis transient time constant	ms		100					100			
T'' _d D-Axis sub-transient time constant	ms		10					10			
T' _{do} D-Axis open-circuit time constant	ms		2129					2129			
T _a Armature time constant	ms		15					15			
T _r Voltage recovery time	ms		< 500ms					< 500ms			

EXCITATION VOLTAGE AND CURRENT

Parameter	Unit	6.9	8.0	9.1	11.6	4.9	5.3	5.7	6.3	7.0	8.0
No load excitation voltage	V	6.9	8.0	9.1	11.6	4.9	5.3	5.7	6.3	7.0	8.0
No load excitation current	A	0.53	0.62	0.70	0.90	0.38	0.41	0.44	0.49	0.54	0.62
Class H BR excitation voltage	V	29.2	30.2	31.6	33.3	25.0	26.1	26.5	28.0	29.6	30.3
Class H BR excitation current	A	2.26	2.33	2.44	2.57	1.93	2.02	2.05	2.16	2.29	2.34

WINDING RESISTANCE

At 20° C

Stator line-to-line (series star)	Ω	0.057				Exciter field			Ω	12.9
Main field	Ω	3.03								

According to: IEC 60034, UTE NFC51.111, VDE 0530, BS 4999/5000, NEMA MG 1-33
 Values quoted are typical. In line with our policy of continuous improvement, we reserve the right to change specification without notice.

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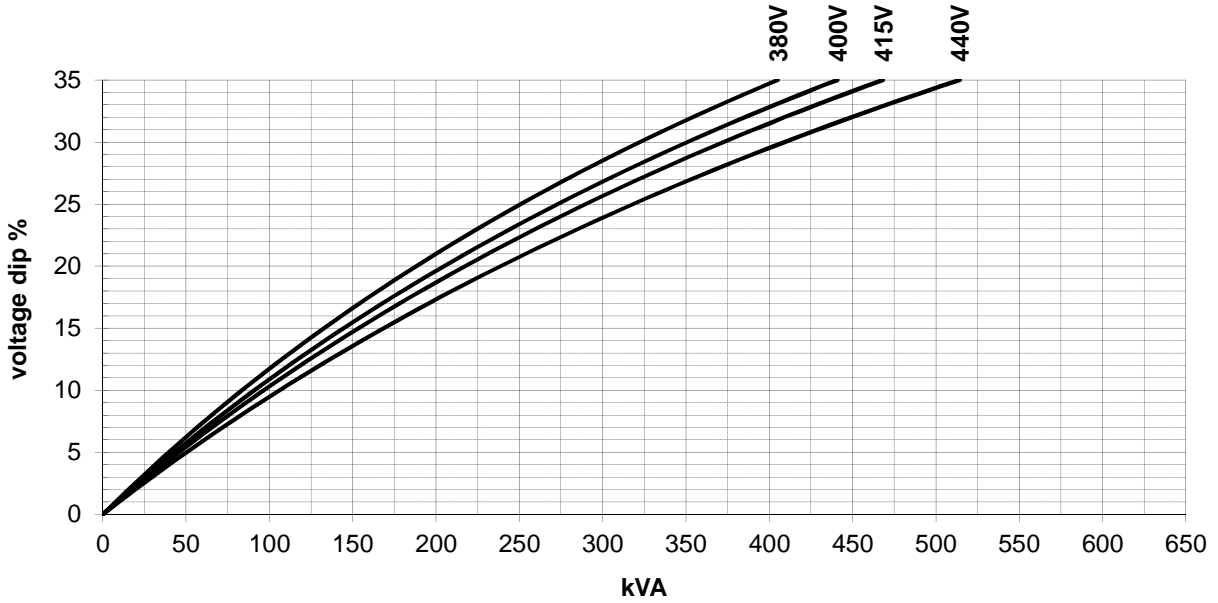
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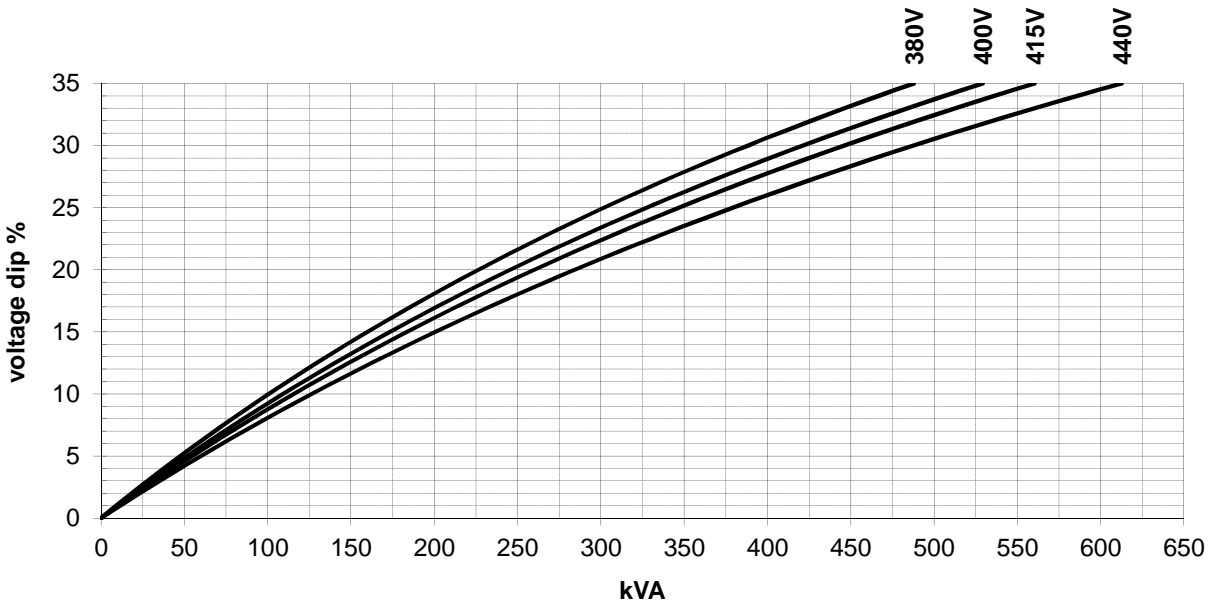
LOCKED ROTOR MOTOR STARTING CURVES

Power factor 0.6

50 Hz SHUNT



50 Hz AREP/PMG



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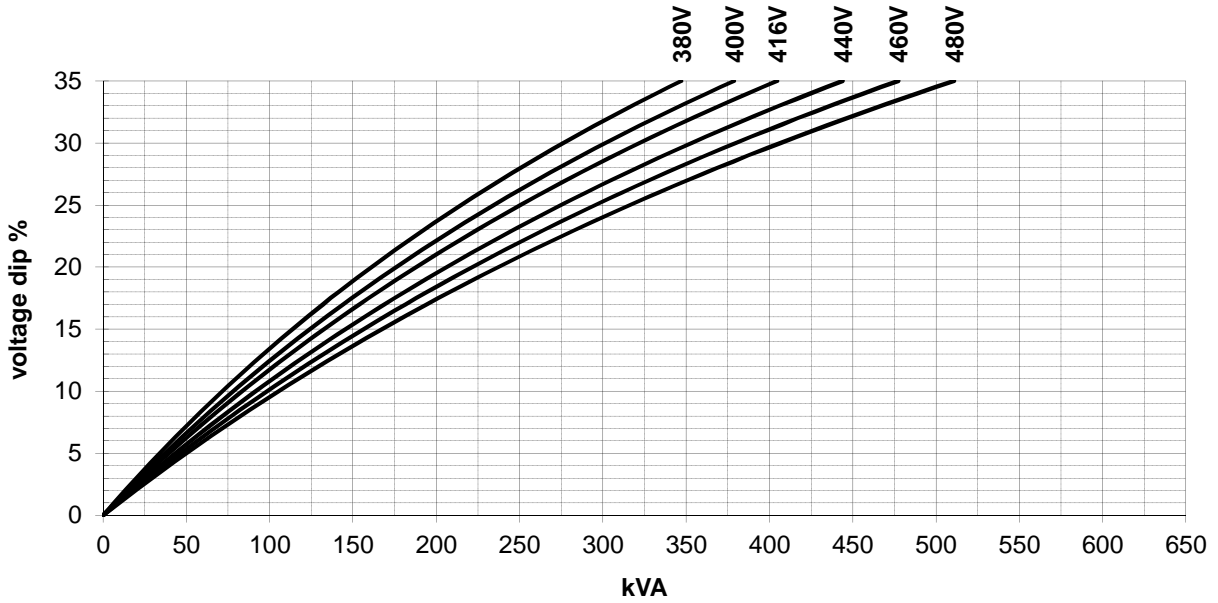
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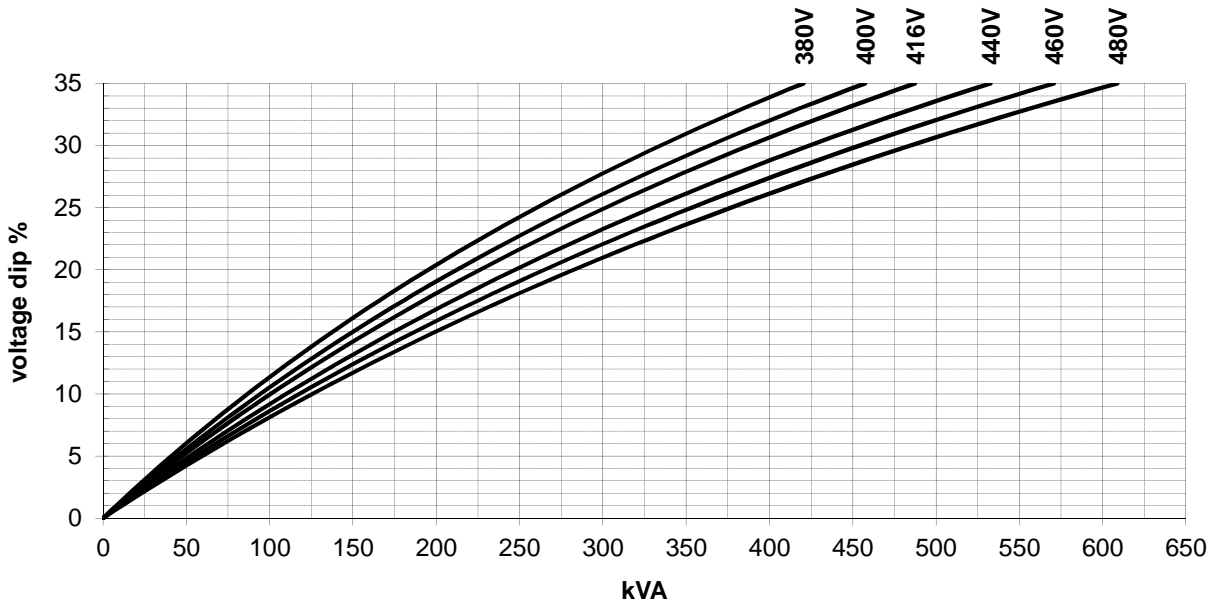
LOCKED ROTOR MOTOR STARTING CURVES

Power factor 0.6

60 Hz SHUNT



60 Hz AREP/PMG

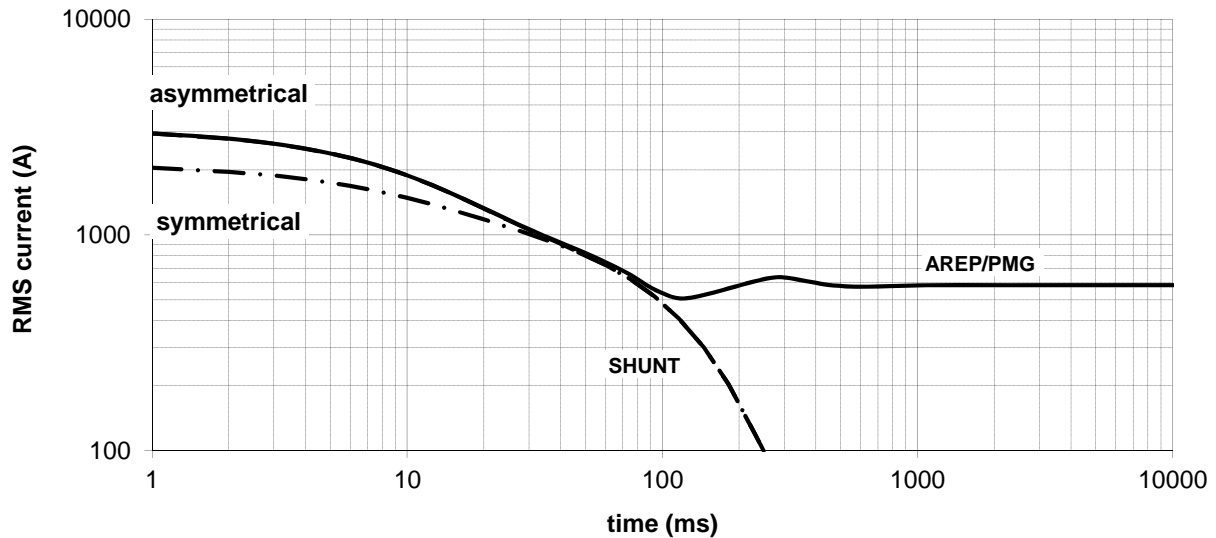


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THREE-PHASE SHORT-CIRCUIT DECREMENT CURVES*No-load excitation at rated speed***400V 50Hz, 480V 60Hz***Series star***Multiplication Factors****50Hz Voltages**

380 400 415 440

Multiplication Factor

0.95 1.00 1.04 1.10

*Apply factor up to 2xT'd, remainder of curve unchanged***60Hz Voltages**

380 400 416 440 460 480

Multiplication Factor

0.79 0.83 0.87 0.92 0.96 1.00

*Apply factor up to 2xT'd, remainder of curve unchanged***Winding Connection****Series Star****Parallel Star****Series Delta****Multiplication Factor**

1.00

2.00

1.73

Apply factor to the complete curve