

FRAME

1504F

WINDING

6



MODELS LL1514F/LL1524F/LL1534F

REF: F1504FW6-1 NOVEMBER 2012

WINDING DETAILS

Code	6	Insulation class	H
Phase	3	Leads	12
Pole number	4	Pitch	0.667

MECHANICAL DETAILS

Standard protection	IP23
Overspeed	rpm 2250
Air flow 50Hz/60Hz	m ³ /s 0.1/0.13

EXCITATION DETAILS

Excitation system	SHUNT	AREP/PMG
AVR model	R220	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	220	230	240	25.4	220	230	240	250	260	270
Series delta	V	220	230	240	25.4	220	230	240	250	260	270
Parallel star	V	220	230	240	25.4	220	230	240	250	260	270

RATING

Power factor 0.8, Altitude <=1000m

Class	Rating	kVA	380	400	415	440	380	400	416	440	460	480
Class H rise BR	125/40	kVA	32.0	32.0	32.0	30.0	34.5	36.5	38.0	40.0	40.0	40.0
		kW	25.6	25.6	25.6	24.0	27.6	29.2	30.4	32.0	32.0	32.0
Class H rise PR	150/40	kVA	33.9	33.9	33.9	31.8	36.6	38.7	40.3	42.4	42.4	42.4
		kW	27.1	27.1	27.1	25.4	29.3	31.0	32.2	33.9	33.9	33.9
Class H rise PR	163/27	kVA	35.2	35.2	35.2	33.0	38.0	40.2	41.8	44.0	44.0	44.0
		kW	28.2	28.2	28.2	26.4	30.4	32.1	33.4	35.2	35.2	35.2
Class F rise BR	105/40	kVA	29.1	29.1	29.1	27.3	31.4	33.2	34.6	36.4	36.4	36.4
		kW	23.3	23.3	23.3	21.8	25.1	26.6	27.7	29.1	29.1	29.1

EFFICIENCIES

Power factor 0.8

Efficiency	Class	%	380	400	415	440	380	400	416	440	460	480
110%	Class H BR	%	86.7	87.1	87.2	87.2	86.5	86.8	87.0	87.3	87.8	88.0
100%	Class H BR	%	87.4	87.7	87.7	87.6	87.2	87.5	87.7	88.0	88.4	88.6
75%	Class H BR	%	88.9	89.0	88.9	88.4	88.9	89.1	89.3	89.5	89.7	89.7
50%	Class H BR	%	89.8	89.6	89.3	88.2	90.1	90.2	90.3	90.3	90.3	90.1
25%	Class H BR	%	88.2	87.5	86.8	84.5	89.2	89.1	89.1	88.9	88.4	87.9

CHARACTERISTIC PARAMETERS

Reactance base class H BR rating

Parameter	Unit	380	400	415	440	380	400	416	440	460	480
K _c Short-circuit ratio		0.38	0.45	0.51	0.70	0.27	0.28	0.30	0.33	0.38	0.43
X _d D-Axis synchronous reactance (unsaturated)	pu	2.92	2.64	2.45	2.04	3.78	3.61	3.48	3.27	2.99	2.75
X' _d D-Axis transient reactance (saturated)	pu	0.18	0.16	0.15	0.13	0.23	0.22	0.22	0.20	0.19	0.17
X'' _d D-Axis sub-transient reactance (saturated)	pu	0.091	0.082	0.076	0.063	0.117	0.112	0.108	0.101	0.093	0.085
X _q Q-Axis synchronous reactance (unsaturated)	pu	1.46	1.32	1.23	1.02	1.89	1.81	1.74	1.64	1.50	1.37
X'' _q Q-Axis sub-transient reactance (saturated)	pu	0.127	0.114	0.106	0.088	0.164	0.156	0.150	0.142	0.130	0.119
X ₂ Negative-sequence reactance (saturated)	pu	0.109	0.098	0.091	0.076	0.140	0.134	0.129	0.121	0.111	0.102
X ₀ Zero-sequence reactance (independent)	pu	0.008	0.007	0.007	0.005	0.010	0.010	0.009	0.009	0.008	0.007
T' _d D-Axis transient time constant	ms	50				50					
T'' _d D-Axis sub-transient time constant	ms	5				5					
T' _{do} D-Axis open-circuit time constant	ms	806				806					
T _a Armature time constant	ms	7.5				7.5					
T _r Voltage recovery time	ms	< 500ms				< 500ms					

EXCITATION VOLTAGE AND CURRENT

Parameter	Unit	380	400	415	440	380	400	416	440	460	480
No load excitation voltage	V	8.6	9.6	10.6	12.7	6.5	6.9	7.3	8.0	8.8	9.6
No load excitation current	A	0.49	0.55	0.60	0.72	0.37	0.39	0.42	0.46	0.50	0.55
Class H BR excitation voltage	V	31.4	31.8	32.6	33.4	30.4	31.2	31.8	32.8	32.8	33.2
Class H BR excitation current	A	1.78	1.81	1.85	1.90	1.73	1.77	1.80	1.86	1.86	1.89

WINDING RESISTANCE

At 20°C

Parameter	Ω	Value	Exciter field	Ω	Value
Stator line-to-line (series star)	Ω	0.426			
Main field	Ω	0.67			
			Exciter field	Ω	17.6

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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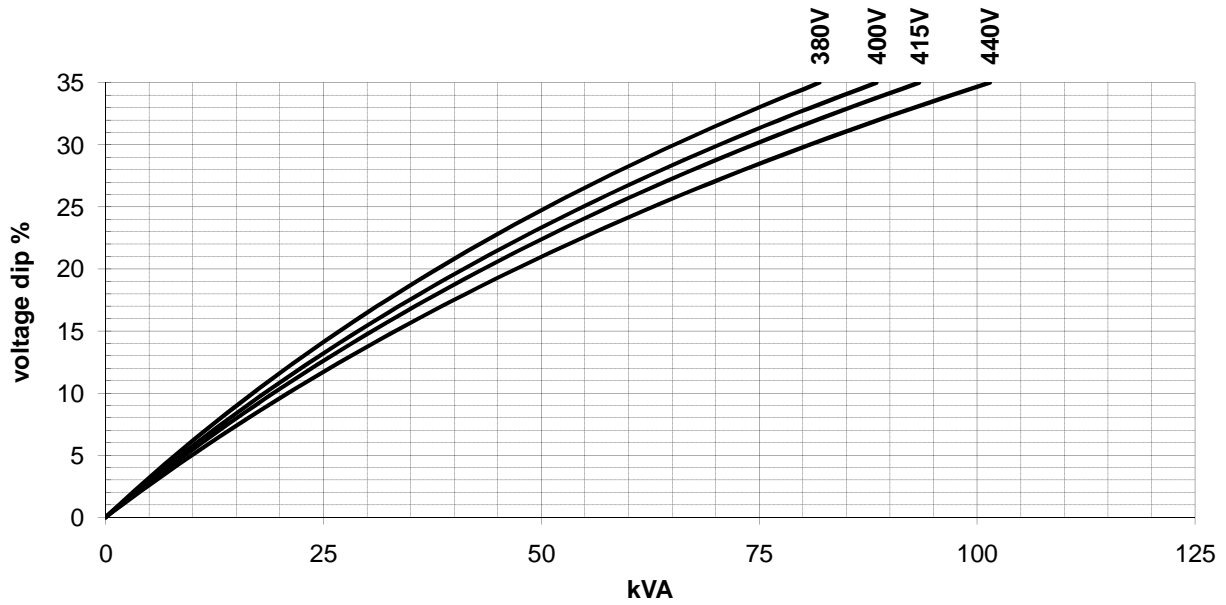
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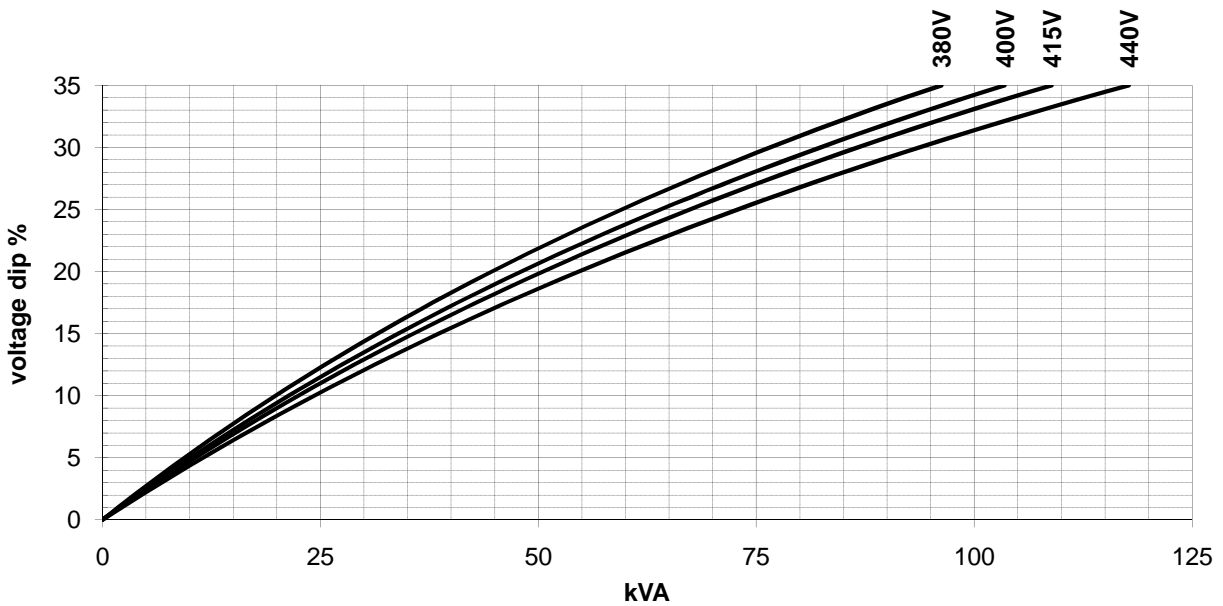
LOCKED ROTOR MOTOR STARTING CURVES

Power factor 0.6

50 Hz SHUNT



50 Hz AREP/PMG



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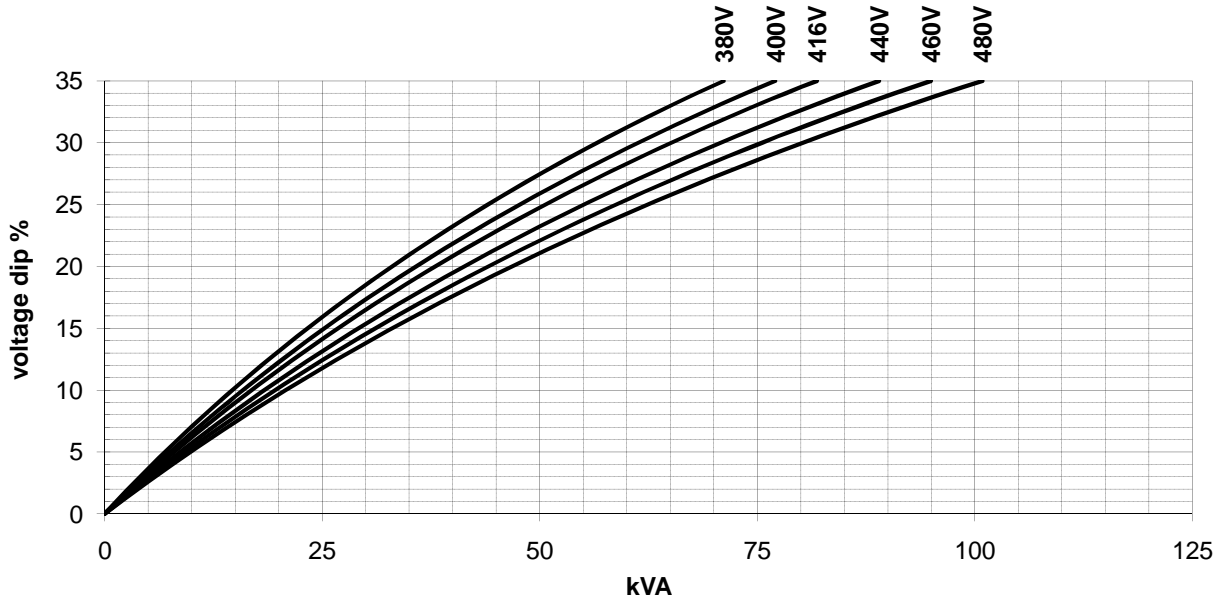
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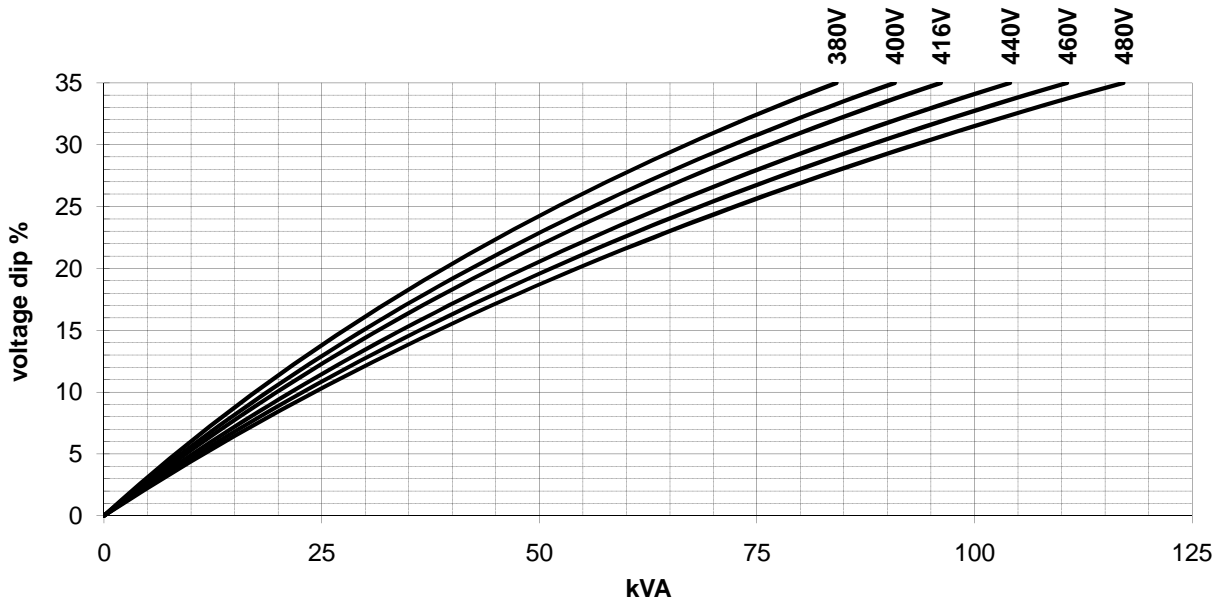
LOCKED ROTOR MOTOR STARTING CURVES

Power factor 0.6

60 Hz SHUNT



60 Hz AREP/PMG

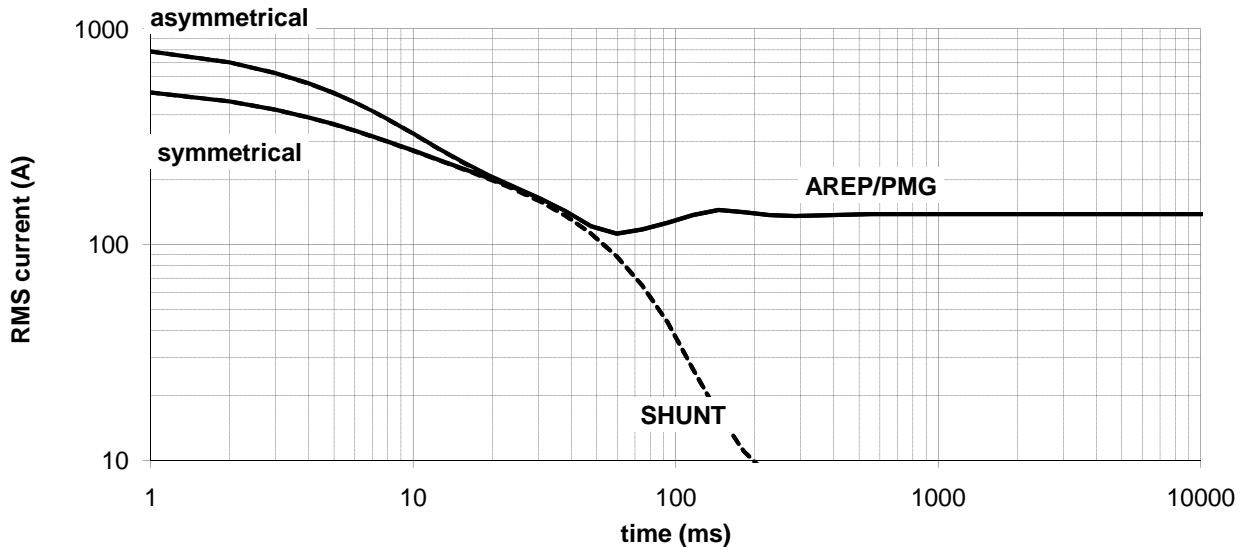


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THREE-PHASE SHORT-CIRCUIT DECREMENT CURVES*No-load excitation at rated speed***400V 50Hz, 480V 60Hz***Series star***Multiplication Factors****50Hz Voltages**

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