# FRAME 5114F/ 5124F WINDING 6

**MODELS** LL5114F / LL5124F / LL5134F

REF: F5104FW6-0 AUGUST 2016

## 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 | $m^3/s$ | 0.48 / 0.58 |

## EXCITATION DETAILS

| | SHUNT | AREP/PMG |
|---|---|---|
| Excitation system | | |
| AVR model | R250 | R450M |
| Sustained short-circuit current | - | 300%:10s |
| 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 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 H rise BR** | **125/40** | **kVA** | **200** | **200** | **200** | **173** | **198** | **208** | **217** | **229** | **240** | **250** |
| | | *kW* | *160* | *160* | *160* | *138* | *158* | *167* | *173* | *183* | *192* | *200* |
| **Class H rise PR** | **150/40** | **kVA** | **212** | **212** | **212** | **183** | **210** | **221** | **230** | **243** | **254** | **265** |
| | | *kW* | *170* | *170* | *170* | *146* | *168* | *177* | *184* | *194* | *203* | *212* |
| **Class H rise PR** | **163/27** | **kVA** | **220** | **220** | **220** | **190** | **218** | **229** | **238** | **252** | **264** | **275** |
| | | *kW* | *176* | *176* | *176* | *152* | *174* | *183* | *191* | *202* | *211* | *220* |
| **Class F rise BR** | **105/40** | **kVA** | **182** | **182** | **182** | **157** | **180** | **190** | **197** | **209** | **218** | **228** |
| | | *kW* | *146* | *146* | *146* | *126* | *144* | *152* | *158* | *167* | *174* | *182* |

## EFFICIENCIES

*Power factor 0.8*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 110% | Class H BR | % | 91.9 | 92.1 | 92.1 | 92.0 | 92.0 | 92.2 | 92.4 | 92.6 | 92.6 | 92.6 |
| 100% | Class H BR | % | 92.3 | 92.4 | 92.4 | 92.1 | 92.3 | 92.5 | 92.7 | 92.9 | 92.9 | 92.9 |
| 75% | Class H BR | % | 93.1 | 93.0 | 92.9 | 92.1 | 92.9 | 93.1 | 93.2 | 93.3 | 93.3 | 93.2 |
| 50% | Class H BR | % | 93.3 | 93.0 | 92.6 | 91.0 | 92.9 | 93.0 | 93.1 | 93.2 | 93.0 | 92.9 |
| 25% | Class H BR | % | 91.4 | 90.7 | 89.8 | 86.4 | 90.5 | 90.6 | 90.5 | 90.6 | 90.2 | 90.0 |

## CHARACTERISTIC PARAMETERS

*Reactance base class H BR rating*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $K_c$ | Short-circuit ratio | | 0.37 | 0.45 | 0.52 | 0.80 | 0.27 | 0.29 | 0.31 | 0.35 | 0.38 | 0.43 |
| $X_d$ | D-Axis synchronous reactance (unsaturated) | pu | 4.31 | 3.89 | 3.62 | 2.78 | 5.12 | 4.87 | 4.68 | 4.42 | 4.23 | 4.06 |
| $X'_d$ | D-Axis transient reactance (saturated) | pu | 0.33 | 0.30 | 0.28 | 0.21 | 0.39 | 0.37 | 0.36 | 0.34 | 0.32 | 0.31 |
| $X''_d$ | D-Axis sub-transient reactance (saturated) | pu | 0.165 | 0.149 | 0.138 | 0.106 | 0.196 | 0.186 | 0.179 | 0.169 | 0.162 | 0.155 |
| $X_q$ | Q-Axis synchronous reactance (unsaturated) | pu | 2.16 | 1.95 | 1.81 | 1.39 | 2.56 | 2.43 | 2.34 | 2.21 | 2.12 | 2.03 |
| $X''_q$ | Q-Axis sub-transient reactance (saturated) | pu | 0.213 | 0.192 | 0.178 | 0.137 | 0.253 | 0.240 | 0.231 | 0.218 | 0.209 | 0.200 |
| $X_2$ | Negative-sequence reactance (saturated) | pu | 0.269 | 0.243 | 0.226 | 0.173 | 0.320 | 0.304 | 0.292 | 0.276 | 0.264 | 0.253 |
| $X_0$ | Zero-sequence reactance (independent) | pu | 0.004 | 0.004 | 0.003 | 0.003 | 0.005 | 0.005 | 0.005 | 0.004 | 0.004 | 0.004 |
| $T'_d$ | 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 | | | 1308 | | | | 1308 | | | |
| $T_a$ | Armature time constant | ms | | | 15 | | | | 15 | | | |
| $T_r$ | Voltage recovery time | ms | | | < 500 | | | | < 500 | | | |

## EXCITATION VOLTAGE AND CURRENT

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No load excitation voltage | V | 12.2 | 14.0 | 15.7 | 19.6 | 7.9 | 8.5 | 9.1 | 10.2 | 11.2 | 12.6 |
| No load excitation current | A | 0.83 | 0.95 | 1.07 | 1.33 | 0.54 | 0.58 | 0.62 | 0.69 | 0.76 | 0.86 |
| Class H BR excitation voltage | V | 45.7 | 46.6 | 48.2 | 47.5 | 36.7 | 37.5 | 38.2 | 39.7 | 41.4 | 43.7 |
| Class H BR excitation current | A | 3.11 | 3.17 | 3.28 | 3.23 | 2.50 | 2.55 | 2.60 | 2.70 | 2.82 | 2.97 |

## WINDING RESISTANCE

*At 20 °C*

| | | | | |
|---|---|---|---|---|
| Stator line-to-line (series star) | Ω | 0.0420 | Exciter field | Ω 14.70 |
| Main field | Ω | 0.27 | | |

According to: IEC 60034, UTE NFC51.111, VDE 0530, BS 4999/5000, NEMA MG 1-33

| FRAME | 5114F/ 5124F | WINDING | 6 |
|---|---|---|---|

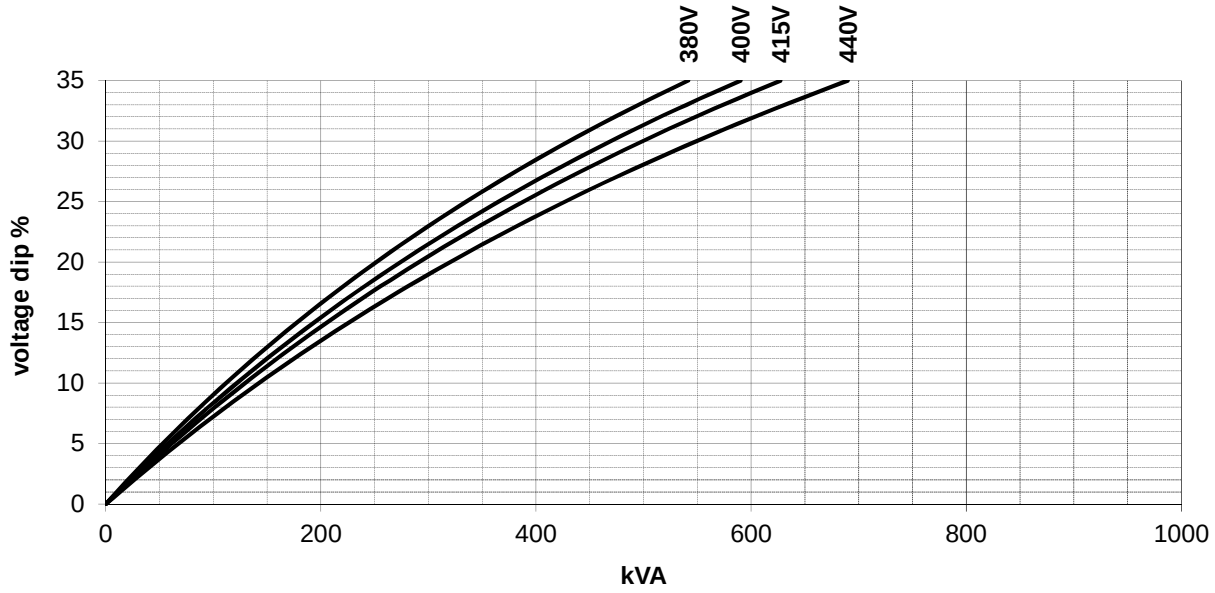
**MODELS** **LL5114F / LL5124F / LL5134F**

REF: F5104FW6-0 AUGUST 2016

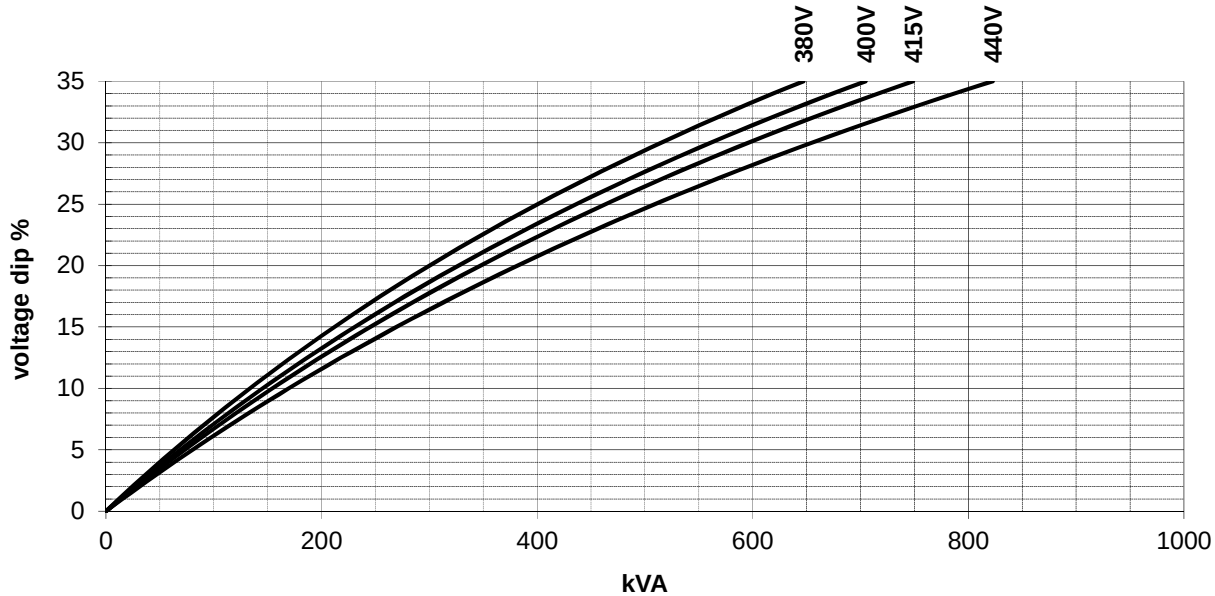
## LOCKED ROTOR MOTOR STARTING CURVES

*Power factor 0.6*

### 50 Hz SHUNT




### 50 Hz AREP / PMG




According to: IEC 60034, UTE NFC51.111, VDE 0530, BS 4999/5000, NEMA MG 1-33

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|---|---|---|---|

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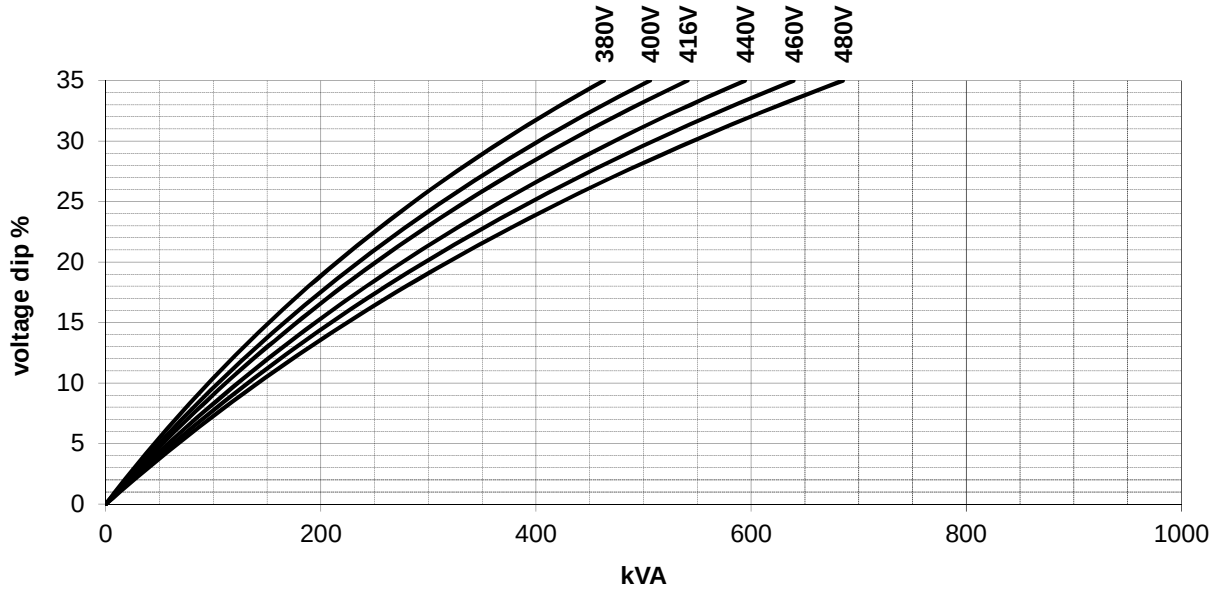
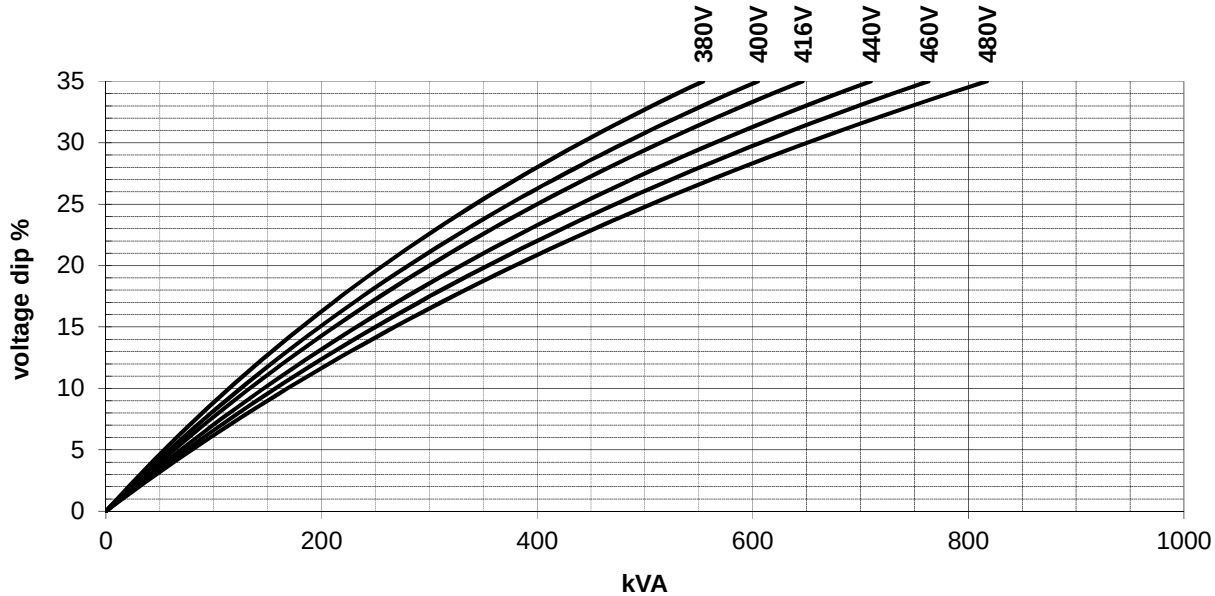
## LOCKED ROTOR MOTOR STARTING CURVES

*Power factor 0.6*

### 60 Hz SHUNT




### 60 Hz AREP / PMG




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.

# FRAME 5114F/ 5124F WINDING 6

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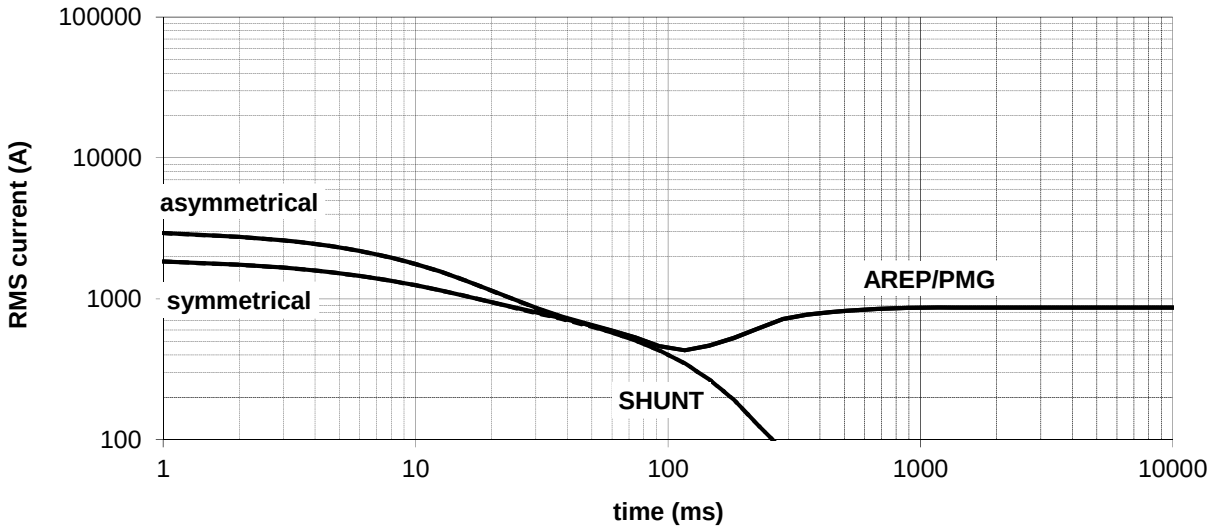
## THREE-PHASE SHORT-CIRCUIT DECREMENT CURVES

*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*

According to: IEC 60034, UTE NFC51.111, VDE 0530, BS 4999/5000, NEMA MG 1-33