TECHNICAL SPECIFICATION

Type designation: AMG 0315BS04
Application: Diesel/Gas engine Industrial Application Series
Site criteria: Land use

NOTES

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*Type definition:

AMG0315BS04 DBSI

IC/IP combination
Bearing type
Excitation type
Industrial generators

Bearing type: A-Double bearing, B-Single bearing
Excitation type: S-Shunt, A-Auxiliary winding, P-PMG

ABB Generators Ltd.
1 PERFORMANCE DATA (Calculated values)

TYPE
Type designation: AMG 0315BS04

PERFORMANCE DATA

Main standard IEC 60034
Rated power factor 0.8
Insulation class H
Temperature rise H
Ambient temperature 40 °C
Altitude over sea level ≤ 1000 m
Cooling/Protection IC0A1/IP23

Mounting arrangement IM 2105 IM 1001
Weight without/with PMG 970/995 kg 980/1000 kg
Inertia without/with PMG 5.65/5.66 kgm² 5.31/5.32 kgm²

Direction of rotation CW (Facing drive end)
Maximum overspeed 2250 rpm
Winding pitch Two thirds (2/3)
Stator winding resistance 0.00894 Ω per phase at 20°C series star connection
Rotor winding resistance 1.577 Ω at 20°C
Ex. stator winding resistance 13.80 Ω at 20°C
Ex. rotor winding resistance 0.224 Ω at 20°C

Total Harmonic Distortion At no load≤2.5%, at rated Linear balanced load ≤5%

Voltage regulation ±1%
Frequency THF<2% TIF<50
Telephone Interference 50 Hz 60 Hz

Speed 1500 rpm 1800 rpm

Cooling Air 0.47 m³/sec 0.57 m³/sec

Voltage series star 3ph. 380/220 400/231 415/240 440/254 415/240 440/254 460/266 480/277
Voltage parallel star 3ph. 190/110 200/115 208/120 220/127 208/120 220/127 230/133 240/138
Voltage series delta 3ph. 220 230 240 254 240 254 266 277
Voltage parallel delta 3ph. 110 115 120 127 120 127 133 138

Rated continuous output 355 kVA 375 kVA 375 kVA 350 kVA 400 kVA 420 kVA 440 kVA 460 kVA

Xd(u) 4.139 3.946 3.666 3.044 4.692 4.383 4.201 4.033
Xd(s) 2.958 2.560 2.150 1.468 3.715 3.288 2.965 2.616
Xq(u) 1.875 1.788 1.661 1.379 2.126 1.966 1.903 1.827
Xq(s) 1.379 1.288 1.161 0.973 1.545 1.350 1.285 1.219
X'd(u) 0.202 0.192 0.177 0.145 0.210 0.185 0.165 0.145
X'd(s) 0.184 0.175 0.161 0.132 0.210 0.195 0.179 0.166
X''d(u) 0.209 0.200 0.185 0.154 0.237 0.212 0.204 0.189
X''d(s) 0.209 0.200 0.185 0.154 0.237 0.212 0.204 0.189
X''q(u) 0.190 0.181 0.169 0.140 0.215 0.201 0.193 0.185
X''q(s) 0.190 0.181 0.169 0.140 0.215 0.201 0.193 0.185
X1(u) 0.099 0.095 0.088 0.073 0.112 0.105 0.101 0.097
X1(s) 0.099 0.095 0.088 0.073 0.112 0.105 0.101 0.097
X2(u) 0.099 0.095 0.088 0.073 0.112 0.105 0.101 0.097
X2(s) 0.099 0.095 0.088 0.073 0.112 0.105 0.101 0.097
X0(u) 0.031 0.029 0.027 0.022 0.035 0.033 0.031 0.030
X0(s) 0.031 0.029 0.027 0.022 0.035 0.033 0.031 0.030
Xp(s) 0.227 0.217 0.201 0.167 0.257 0.241 0.230 0.221

SCR (short circuit ratio), Ir0/Xd (u) 0.34 0.39 0.47 0.48 0.27 0.30 0.34 0.38
s=saturated value, u=unsaturated value, values are p.u. at rated voltage and power

Td0² 3.472 s
Td0 0.139 s
Td0 0.0116 s
Ta 0.0248 s

CE-Marking Generator fulfills the requirements of Low Voltage Directive (2006/95/EC)
Generator supplied to EEA-area will be CE-marked
2 PERFORMANCE CURVES

THREE PHASE EFFICIENCY CURVES, 50 Hz/380–440 V

380V / 50Hz / 355kVA

400V / 50Hz / 375kVA

415V / 50Hz / 375kVA

440V / 50Hz / 350kVA
THREE PHASE EFFICIENCY CURVES, 60 Hz/415–480 V

**415V / 60Hz / 400kVA**

![Graph of 415V / 60Hz / 400kVA efficiency curves]

**440V / 60Hz / 420kVA**

![Graph of 440V / 60Hz / 420kVA efficiency curves]

**460V / 60Hz / 440kVA**

![Graph of 460V / 60Hz / 440kVA efficiency curves]

**480V / 60Hz / 460kVA**

![Graph of 480V / 60Hz / 460kVA efficiency curves]
TRANSIENT VOLTAGE REGULATION CURVES

Load application (Shunt excitation):

- 400V / 50Hz / 0.8 P.F.
- 480V / 60Hz / 0.8 P.F.

Load application (Auxiliary winding or PMG excitation):

- 400V / 50Hz / 0.8 P.F.
- 480V / 60Hz / 0.8 P.F.

Load rejection (Shunt excitation):

- 400V / 50Hz / 0.8 P.F.
- 480V / 60Hz / 0.8 P.F.
TRANSIENT VOLTAGE REGULATION CURVES

Load rejection (Auxiliary winding or PMG excitation):

Locked Rotor Motor Starting Curve (Shunt excitation):

Locked Rotor Motor Starting Curve (Auxiliary winding or PMG excitation):

Note1

S [P.U] = S/S(Rated), S stands for the actual operation capacity, S(Rated) stands for the generator rated output capacity.
THREE PHASE SHORT-CIRCUIT CURVES (At no-load and rated speed, base on star connection)

Note 2
Curves are for star connection. For other connection, please use following multiplication factors:
Series delta: Current values x 1.732
Parallel star: Current values x 2

Curves are for 3-phase short-circuit. For other types of short-circuit, please use following multiplication factors:

<table>
<thead>
<tr>
<th>Type</th>
<th>Instantaneous</th>
<th>Continuous</th>
<th>Maximum duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-phase</td>
<td>1</td>
<td>1</td>
<td>10 sec.</td>
</tr>
<tr>
<td>2-phase L/L</td>
<td>0.87</td>
<td>1.5</td>
<td>5 sec.</td>
</tr>
<tr>
<td>1-phase L/N</td>
<td>1.3</td>
<td>2.2</td>
<td>2 sec.</td>
</tr>
</tbody>
</table>
3 CONFIGURATION AND SCOPE OF SUPPLY

GENERAL
The generator is designed to operate together with a diesel or gas engine.

CONSTRUCTION
The stator frame is a rigid welded steel structure construction. The stator core is built of thin electric sheet steel laminations which are insulated on both sides with heat-resistant inorganic resin.

The rotor consists of a shaft and a star shape rotor core. The shaft is machined of rolled steel. Special heat treatment is used if shaft operates under heavy conditions. The poles are manufactured of 0.5 mm sheet steel. The pole laminations are pressed and welded together with steel bars. These bars are then welded to the end plates. Rotor balancing is done acc. to ISO 1940/1. The standard balancing quality grade is G2.5.

All windings are completely vacuum pressure impregnated with high quality resin. The windings are provided with very strong bracing which withstands all expected mechanical and electrical shocks and vibrations as well as chemicals.

End shields are made of casted steel, The stator frame and stator core are welded together, and bolted with end shields.

MAIN TERMINAL SPACE
Protection class IP44, Integrated into the top module of the generator.

Supply cable entries: Closed terminal box. Cable inlet to the main terminal box to be done by the customer.

Twelve (12) leads T1 – T12 brought into the terminal box to enable internal series star, parallel star, series delta and parallel delta connection, Main terminals U, V, W and neutral point N in the main terminal box for external connection

Terminal marking acc. to IEC.

Designed for continuous current load.

FOUNDATION
The machine can be mounted using shimming, machined blocks, chock fast or on grouted sole plates or bed plate. Before using other mountings, contact us.

CONTROL SYSTEMS
General
Brushless excitation.

Automatic Voltage Regulator System
Mounted inside the main terminal box.

Analog type AVR.

Functions:
  a) 1-channel AVR.
  b) Excitation power can be from phase voltage of main terminal or auxiliary winding, PMG.
  c) Voltage set-point adjustment (local).
  d) U/f limiter.
  e) Parallel operation.
Static voltage regulation accuracy +/- 1.0 %.
Voltage recovery time after transient < 1.5 s, +/- 3.0 % (acc. to IEC 60034).
Nominal Um, range: < 90 VDC at 110 VAC input, 170 VDC at 220 VAC input.
Nominal Im, range: continuous 5 ADC.

**BEARINGS**

Non Drive-end: Rolling, sealed, free.  
Drive-end: Rolling, sealed, locked. (Double bearing)

Maximum bearing temperature 90 °C at ambient 40 °C.

**TESTING**

Testing is according to IEC and ABB internal requirements. The test may be observed by the customer without extra charges. The test procedures are described in the following documents which are available on request:
- Routine tests: MDD 8006327 (for all machines).
- Type tests: MDD 8006328 (optional, to be agreed separately).
- Special tests: MDD 8006329 (optional, to be agreed separately).

**PERFORMANCE CHARACTERISTICS AND OPERATIONAL LIMITS**

Rating for continuous running duty:
Duty type S1.

Rating for short-time duty:
10 % overload at nominal power factor for one hour at twelve hour intervals.

Overcurrent withstand capability:
1.5 times nominal current for 2 minutes.

Sustained short-circuit current:
More than 3 times nominal current for 10 seconds.

Generator shall be suitable for supplying circuits which, when supplied by a system of balanced and sinusoidal voltages:
Result in currents not exceeding a harmonic current factor of 0.05 and
Result in a system of currents where neither the negative-sequence component nor the zero-sequence component exceed 5% of the positive-sequence component

Maximum voltage unbalance is 0.5 %.
Maximum I2/IN value for continuous operation is 8 %.

Maximum (I2/IN)² x t in seconds for operation under fault conditions is 20
Maximum continuous voltage variation with rated output is ±5 %.

Maximum continuous frequency variation with rated output is ±2 %.

Maximum combined voltage and frequency variation and maximum short-time limits are acc. To IEC 60034-1:2004, Section 7.3.

Electromagnetic Compatibility (EMC)
Radiated and conducted emissions comply with the requirements of CISPR 11, Class B, Group 1, Table B.1. (IEC 60034-1, Annex B).
TOLERANCES

Efficiency $\eta$

- Machines up to and including 150 kW (or kVA)  $-15\% \text{ of } (1-\eta)$
- Machines above 150 kW (or kVA)  $-10\% \text{ of } (1-\eta)$
- Total losses (applicable to machines with ratings $>150$ kW or kVA)  $+10\% \text{ of the total losses}$
- Peak value of short-circuit current under specified conditions  $\pm 30\% \text{ of the value in the technical specification}$
- Steady short-circuit current at specified excitation  $\pm 15\% \text{ of the value in the technical specification}$
- Moment of inertia  $\pm 10\% \text{ of the value in the technical specification}$

SURFACE TREATMENT

Grade: C2, Standard color

Surface treatment C2 according to the ISO 12944 standard, for standard industrial environment.
# ACCESSORIES

## OPTIONAL ACCESSORIES

<table>
<thead>
<tr>
<th>No</th>
<th>pc/pcs</th>
<th>Item</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>Anti-condensation heater</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Current transformer</td>
<td>For parallel operation with other generators</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>PT100 for stator winding</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>PTC sensor (triple)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>PMG</td>
<td></td>
</tr>
</tbody>
</table>
5 DIMENSIONS

MAIN DIMENSIONS

Flange dimensions (mm)

<table>
<thead>
<tr>
<th>S.A.E</th>
<th>AK</th>
<th>AJ</th>
<th>BD</th>
<th>BF</th>
<th>n</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>511.18</td>
<td>530.2</td>
<td>640</td>
<td>12.7</td>
<td>12</td>
<td>15</td>
</tr>
</tbody>
</table>

Flex disc dimensions (mm)

<table>
<thead>
<tr>
<th>S.A.E</th>
<th>BX</th>
<th>P</th>
<th>AH</th>
<th>Y</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>466.6</td>
<td>438.1</td>
<td>25.4</td>
<td>13.5</td>
<td>8</td>
</tr>
</tbody>
</table>
**ROTOR DRAWINGS**

**Single bearing**

![Single bearing drawing]

**Double bearing**

![Double bearing drawing]