



AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL - BRASIL

TYPE CERTIFICATE DATA SHEET Nº EM-9604

Type Certificate Holder:

CFM INTERNATIONAL
PO Box 15514
Cincinnati, Ohio 45215-0514
USA

EM-9604-01
Sheet 01
CFM INTERNATIONAL

CFM56-5 SERIES

September 2007

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 9604 meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Brazilian Aeronautical Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other instructions.

I - MODELS

CFM56-5, CFM56-5-A1/F, CFM56-5A3, CFM56-5A4, CFM56-5A4/F, CFM56-5A5, CFM56-5A5/F

TYPE

High bypass turbofan; coaxial front fan/booster driven by multi-stage low-pressure turbine, multi-stage compressor with one-stage high pressure turbine and annular combustor.

CFM56-5, CFM56-5-A1/F, CFM56-5A3, CFM56-5A4

RATINGS

(See NOTE 4)

	CFM56-5	CFM56-5-A1/F	CFM56-5A3	CFM56-5A4
Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lbf)	11 120 (25 000)	-- --	11 787 (26 500)	9 786 (22 000)
Maximum continuous, sea level, static thrust, daN (lbf)	10 540 (23 700)	-- --	-- --	9 195 (20 670)

		CFM56-5	CFM56-5-A1/F	CFM56-5A3	CFM56-5A4	
AMBIENT TEMPERATURE	Takeoff °C (°F)	30 (86)	--	--	45 (113)	
	Maximum continuous °C (°F)	25 (77)	--	--	--	
FUEL SYSTEMS (See NOTE 8)	Fuel Pump / SNECMA P/N	301-785-501-0	--	--	--	
	(Combined boost and single element gear-type pump)	301-785-502-0	--	--	--	
	Hydro Mechanical Unit / GE P/N	1348M79P04	--	--	--	
		1348M79P06 thru P09	--	--	--	
ELECTRONIC ENGINE CONTROL	Electronic Control Unit / GE P/N	1459M55P11 thru P18	1459M55P15 thru P18	--	1519M83P10 1820M27P07	
		1549M83P01 thru P05	1519M83P02 thru P05	--	--	
		1820M27P01 thru P02	--	--	--	
		Identification Plugs / SNECMA P/N	320-586-001-0 320-586-201-0 320-586-301-0	320-586-021-0 320-586-221-0	320-586-031-0 320-586-231-0	366-414-201-0 366-414-205-0
	OIL	Synthetic type conforming to GE Specification D50TF1, Type I and Type II. CFMI Service Bulletin CFM56-79-001 lists approved brand oils.				
	IGNITION SYSTEM	Two ignition units Unison and Simmons / (GE P/N)	1538M69P01	--	--	--
			9238M66P05	--	--	--
9238M66P07			--	--	--	
9238M66P08			--	--	--	
Two igniter plugs Unison and Champion / (GE P/N)		1374M12P01	--	--	--	
		1374M13P01	--	--	--	
		1374M13P05	--	--	--	

		CFM56-5	CFM56-5-A1/F	CFM56-5A3	CFM56-5A4
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 422 (95.3)	--	--	--
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)	--	--	--
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 101 (82.73)	--	--	--
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 331 (5 139)	--	--	--
CENTER OF GRAVITY LOCATIONS	Station, mm (in)	5 255 ± 25	--	--	--
	engine only (refer to installation drawing)	(206.1 ± 1)	--	--	--
		CFM56-5A4/F, CFM56-5A5, CFM56-5A5/F			
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lbf)	9 786 (22 000)	10 453 (23 500)	--	--
	Maximum continuous, sea level static thrust, daN (lbf)	9 195 (20 670)	--	--	--
	AMBIENT TEMPERATURE	Takeoff °C (°F)	45 (113)	37 (98.6)	--
	Maximum continuous °C (°F)	25 (77)	--	--	--

		CFM56-5A4/F	CFM56-5A5	CFM56-5A5/F
FUEL SYSTEMS (See NOTE 8)	Fuel Pump / SNECMA P/N	301-785-501-0	--	--
	(Combined boost and single element gear-type pump)	301-785-502-0	--	--
	Hydro Mechanical Unit / GE P/N	1348M79P04	--	--
		1348M79P06 thru P09	--	--
ELECTRONIC ENGINE CONTROL	Electronic Control Unit / GE P/N	1519M83P10	--	--
		1820M27P07	--	--
	Identification Plugs / SNECMA P/N	336-414-210-0 336-414-215-0	336-414-220-0 336-414-225-0	336-414-220-0 336-414-225-0
OIL	Synthetic type conforming to GE Specification D50TF1, Type I and Type II. CFMI Service Bulletin CFM56-79-001 lists approved brand oils.			
IGNITION SYSTEM	Two ignition units Unison and Simmons / (GE P/N)	1538M69P01	--	--
		9238M66P05	--	--
		9238M66P07	--	--
		9238M66P08	--	--
	Two igniter plugs Unison and Champion / (GE P/N)	1374M12P01	--	--
		1374M13P01	--	--
1374M13P05		--	--	
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 422 (95.3)	--	--
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)	--	--
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 101 (82.73)	--	--

		CFM56-5A4/F	CFM56-5A5	CFM56-5A5/F
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 331 (5 139)	--	--
CENTER OF GRAVITY LOCATIONS	Station, mm (inches) engine only (refer to installation drawing)	5 255 ± 25 (206.1 ± 1)	--	--
IMPORT REQUIREMENTS	Each engine imported separately and/or spare parts must be accompanied by an Airworthiness Certificate for Export and/or an Airworthiness Approval Tag respectively, issued by DGAC France, attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the ANAC approved type design.			
CERTIFICATION BASIS	Brazilian Type Certificate No. 9604 based on the RBHA 33 (Brazilian Requirements for Aeronautical Certification), which endorses the FAR 33 effective 01 February 1965, with Amendments 33-1 through 33-10 thereto. In addition, the engines in compliance with the emissions requirements of SFAR No. 27-5.	<u>Model</u> CFM56-5, CFM56-5A1/F, CFM56-5A3, CFM56-5A4, CFM56-5A4/F, CFM56-5A5, CFM56-5A5/F	<u>Application</u> 16 June 1996	<u>Issued TC</u> 17 September 1996
PRODUCTION BASIS	Not applicable.			

NOTES:**NOTE 1**

- Turbine Exhaust Gas (T495)
(Indicated / See NOTE 5)
- Takeoff (5 min.)
 - Maximum continuous
 - Starting

Maximum Permissible Temperature (All Models)

For engine configurations designated by a suffix for specific installations (see NOTE 12), refer to the appropriate S.O.I. for maximum operating temperatures.

As measured by a harness of nine thermocouples located at the second stage low-pressure turbine vane:

890°C
855°C
725°C

- NOTE 1 (Cont.)**
- Time temperature envelope refer to model's S.O.I. TP.01.11
 - Fuel Pump Inlet Oil Supply Refer to the appropriate Installation Manual.
 - Continuous operation 140°C / 284°F
 - Transient (15 minutes) 155°C / 311°F
- NOTE 2** Fuel and oil pressure limits.
- Fuel limits.
Operation and air / ground starting pressure limits extend from a minimum fuel pressure of not less than 5.5 psia (37.9 kPa absolute) above the fuel vapor pressure to a maximum of 60 psig (413.7 kPa gauge), relative to atmosphere, with vapor / liquid ratio of zero at all conditions. For limits, see Installation Manual, Part A, Section 5, Figures A2 through A5.
- Oil limits.
The minimum pressure limit at idle is 13 psid (89.6 kPa differential) and varies up to 45 psid (310.2 kPa differential) at cruise thrust. The maximum pressure limit during cold starts is 300 psid (2 069 kPa differential), limited by a pressure relief valve. See NOTE 14.
- NOTE 3**
- | <u>Electrical</u> | <u>Accessory Drive Provisions (All Models)</u> |
|---------------------------------------|--|
| Rotation (1) | CCW |
| Speed ratio to core | 0.5947:1 |
| Maximum torque (inch-pounds) | |
| Continuous | 135 kW |
| Static | 9 492 |
| Maximum overhung moment (inch-pounds) | 1 000 |
| <u>Hydraulic Pump</u> | |
| Rotation | CCW |
| Speed ratio to core | 0.256:1 |
| Maximum torque (inch-pounds) | |
| Continuous | 1 500 |
| Static | 4 400 |
| Maximum overhung moment (inch-pounds) | 160 |
- (1) Facing Drive Pad: CW = Clockwise / CCW = Counterclockwise

- NOTE 4** Engine Rating are based on calibrated stand performance under the following conditions:
 Takeoff thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature:
 - Std + 15°C (30°C, 86°F) for -5, -5A3 & -5-A1/F
 - Std + 30°C (45°C, 113°F) for -5A4 & -5A4/F
 - Std + 22°C (37°C, 98.6°F) for -5A5 & -5A5/F
 Maximum continuous is nominally independent of ambient temperature (flat rated) to std +10°C (25°C, 77°F)
 Zero customer bleed and horsepower extraction;
 No scrubbing drags;
 100% inlet recovery; and
 Based on CFM International referee separate flow exhaust system with primary exhaust nozzle (core) P/N 15-25200-2014 and fan nozzle P/N 4013356-302.
- NOTE 5** CFM56-5, -5A4, 5A5 Indicated 890°C EGT redline corresponds to actual of 890°.
 CFM56-5A3, -5-A1/F, -5A4/F, -5A5/F. Indicated 890°C EGT redline correspond to actual of 915°C, and indicated 855° EGT redline corresponds to actual of 880°C.
- NOTE 6**
- | | <u>Maximum Permissible Engine Rotor Speeds (All Models)</u> | |
|-------------------------------|---|--|
| Low-pressure rotor (N1), rpm | 5 100 (102%) | |
| High-pressure rotor (N2), rpm | 15 183 (105%) | |
- NOTE 7**
- | | <u>Maximum Permissible Air Bleed Extraction (All Models)</u> | |
|---|--|--|
| LOCATION | FAN CORRECTED SPEED | FLOW LIMIT |
| Fan discharge | 20% - 100% N1K | 2% fan airflow |
| HPC Stage 5 only | 20% - 100% N1K | 10% core airflow |
| Compressor discharge only | 20% - 61.0% N1K | 14% core airflow |
| | 61.0% - 82.5% N1K | Linear variation from 14% - 7% core airflow |
| HPC Stage 5 and compressor discharge combined | 82.5 - 100% N1K | 10% core airflow |
| | 20% - 61.0% N1K | 14% core airflow |
| | 61.0% - 82.5% N1K | Linear variation from 14% - 10% core airflow |
| | 82.5% - 100% N1K | 10% core airflow |
- NOTE 8** Approved fuel conforming to GE Specification D50TF2. MIL-T-5624, Grades JP-4 or JP-5, ASTM D 1655, Jet A, A1 and B are consistent with this GE Specification.
 Primary fuel is Jet A, with other fuels listed being acceptable alternates. No fuel control adjustment is required when changing from primary to alternate fuels. Use of aviation gasoline is not authorized. Consult Specific Operating Instructions for additive usage.

- NOTE 9** Life limits established for critical rotating components are published in the CFM56-5 Shop Manual, Chapter 5.
- NOTE 10** Power setting, power checks and control of engine thrust output in all operations is to be based on CFMI engine charts referring to fan speed. Fan speed sensors are included in the engine assembly for this purpose.
- NOTE 11** Reserved
- NOTE 12** A suffix may be added to the basic engine model number on the engine nameplate to identify minor variations in engine configuration, installation components or reduced ratings peculiar to aircraft installation requirements. For example: CFM56-5xx
Engines that have a suffix to the basic model number are identified in CFM International Service Bulletin No. CFM56-5-72-001, and are summarized below:
(1) CFM56-5-A1, basic model for Airbus A320
- NOTE 13** The minimum permissible idle inflight corresponds to $N_2=58.8\%$ (8 500 rpm), which is a non-adjustable limit, preset into the ECU control schedule.
- NOTE 14** During negative g operation only, it is permissible to operate below minimum oil pressure (13 psid) for a maximum of 10 seconds. See Specific Operating Instruction, Section 6.
- NOTE 15** The models shown on this TCDS have the following general characteristics:
- | MODEL | CHARACTERISTICS |
|--------------|--|
| CFM56-5 | Basic model. |
| CFM56-5-A1/F | Same as CFM56-5 except EGT limits increased through introduction of hot section modifications. This model was originally certified as CFM56-5A2 but that designation was changed at the request of the manufacturer. |
| CFM56-5A3 | Same as CFM56-5-A1/F except for increased takeoff thrust rating. |
| CFM56-5A4 | Same as CFM56-5A3 except for reduced thrust takeoff rating and lower EGT limits. |
| CFM56-5A4/F | Same as CFM56-5A3 except for reduced thrust takeoff rating. |
| CFM56-5A5 | Same as CFM56-5A3 except for reduced thrust takeoff rating and lower EGT limits. |
| CFM56-5A5/F | Same as CFM56-5A3 except for reduced thrust takeoff rating. |

NOTE 16 The CFM56-5, -5-A1/F, -5A3, -5A4, -5A4/F, -5A5, -5A5/F FADEC series engines have been approved to operate with faults present in the control system, based on satisfaction of FAR 33 requirements and appropriate engine control system reliability requirements. FAA approved criteria pertaining to dispatch and maintenance requirements for the engine control system are specified in GE Document No. GEK 98455, which defines the dispatchable configurations and maximum operating intervals. A control system reliability monitoring program has been established with CFMI, as a contingency of the dispatch criteria approval, to ensure that overall engine control system and specific component failure rates do not exceed the maximum values permitted by the reliability analysis.

NOTE 17 The normal 5 minutes takeoff rating may be extended to 10 minutes for engine out contingency.

II – MODEL CFM56-5B1, CFM56-5B1/P, CFM56-5B1/2P, CFM56-5B2, CFM56-5B2/P, CFM56-5B2/2P, CFM56-5B3/P, CFM56-5B3/2P, CFM56-5B4, CFM56-5B4/P, CFM56-5B4/2P, CFM56-5B5, CFM56-5B5/P, CFM56-5B6, CFM56-5B6/P, CFM56-5B6/2P, CFM56-5B7, CFM56-5B7/P, CFM56-5B8/P, CFM56-5B9/P, CFM56-5B9/2P, CFM56-5C2.

TYPE High bypass turbofan; coaxial front fan / booster driven by multi-stage low-pressure turbine, multi-stage compressor with one-stage high-pressure and annular combustor.
CFM56-5B2/P Series only: Double Annular Combustor.

CFM56-5B1, CFM56-5B1/P, CFM56-5B1/2P, CFM56-5B2

		CFM56-5B1	CFM56-B1/P	CFM56-5B1/2P	CFM56-5B2
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lb)	13 344 (30 000)	--	--	13 789 (31 000)
	Maximum continuous, sea level static thrust, daN (lb)	12 940 (29 090)	--	--	--
	AMBIENT TEMPERATURE				
	Takeoff °C (°F)	30 (86)	--	--	--
	Maximum continuous °C (°F)	25 (77)	--	--	--

		CFM56-5B1	CFM56-B1/P	CFM56-5B1/2P	CFM56-5B2
FUEL SYSTEMS	Fuel pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-401-0	--	--	--
		301-785-501-0	--	#	301-785-501-0
(See NOTE 7 for Approved Fuels)	Hydro mechanical unit GE P/N	1348M79	--	--	--
ELECTRONIC ENGINE CONTROL	Electronic control unit GE P/N	1820M89	--	1820M88	1820M89
		1820M36	--	1820M87	1820M36
		2042M13	--	--	--
		2042M14	--	--	--
	Identification plugs SNECMA P/N	338-046-001-0	338-112-701-0	338-122-801-0	338-046-020-0
		338-046-005-0	338-122-705-0	338-112-805-0	338-046-025-0
		338-046-002-0	338-128-650-0	338-125-301-0	338-046-021-0
		338-046-006-0	338-128-655-0	338-125-305-0	338-046-026-0
		338-046-004-0	338-046-004-0	338-046-090-0	338-046-023-0
				338-046-095-0	
				338-047-070-0	
				338-047-075-0	
				338-046-004-0	
OIL	Synthetic type conforming to GE Specification D50TF1, Type 1 and Type 2. CFMI Service Bulletin / CFM56-5B 79-001 lists approved oil brands.				
IGNITION SYSTEM (GE P/N)	Two ignition units Unison	9238M66	--	--	--
		9238M66	--	--	--
		9238M66	--	--	--
	Two igniter plugs Unison and Champion	1374M12	--	--	--
		1374M13	--	#	1374M13
		1374M13	--	--	--
PRINCIPAL DIMENSIONS	Length, mm (in)	2 599.7	--	--	--
	(fan case forward flange to LPT rear frame aft flange)	(102.3)			
	Width, mm (in)	1 908 (75.12)	--	--	--
	(fan casing forward flange diameter)				

		CFM56-5B1	CFM56-B1/P	CFM56-5B1/2P	CFM56-5B2
	Height, (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)	--	--	--
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 454.8 (5 412.9)	--	2 500.6 (5 512.9)	2 454.8 (5 412.9)
CENTER OF GRAVITY LOCATIONS	Station, mm (inches) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)	-- --	-- --	-- --
CFM56-5B2/P, CFM56-5B2/2P, CFM56-5B3/P, CFM56-5B2/2P					
		CFM56-5B2/P	CFM56-5B2/2P	CFM56-5B3/P	CFM56-5B3/2P
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lb)	13 789 (31 000)	-- --	14 234 (32 000)	-- --
	Maximum continuous, sea level static thrust, daN (lb)	12 940 (29 090)	-- --	-- --	-- --
AMBIENT TEMPERATURE	Takeoff °C (°F)	30 (86)	--	--	--
	Maximum continuous °C (°F)	25 (77)	--	--	--
FUEL SYSTEMS (See NOTE 7 for approved Fuels)	Fuel pump / SNECMA P/N	301-767-401-0	--	--	--
	(Combined boost and single element gear-type pump)	301-785-501-0	#	301-785-501-0	#
	Hydro mechanical unit GE P/N	1348M79	--	--	--

		CFM56-5B2/P	CFM56-5B2/2P	CFM56-5B3/P	CFM56-5B3/2P
ELECTRONIC ENGINE CONTROL	Electronic control unit GE P/N	1820M89	1820M88	1820M89	1820M88
		1820M36	1820M87	1820M36	1820M87
		2042M13	--	--	--
		2042M14	--	--	--
	Identification plugs SNECMA P/N	338-122-720-0	338-046-023-0	338-122-730-0	338-122-732-0
		338-122-725-0	338-122-820-0	338-122-735-0	338-122-830-0
		338-128-660-0	338-122-825-0	338-128-675-0	338-122-835-0
		338-128-665-0	338-125-320-0	338-128-675-0	338-128-320-0
		338-046-023-0	338-125-325-0	338-122-732-0	338-128-325-0
			338-127-400-0		338-128-310-0
		338-127-405-0		338-128-315-0	
		338-046-080-0		338-128-300-0	
		338-046-085-0		338-128-305-0	
OIL	Synthetic type conforming to GE Specification D50TF1, Type 1 and Type 2. CFMI Service Bulletin / CFM56-5B 79-001 lists approved oil brands.				
IGNITION SYSTEM (GE P/N)	Two ignition units Unison	9238M66	--	--	--
	Two igniter plugs Unison and Champion	1374M12	--	--	--
		1374M13	#	1374M13	#
PRINCIPAL DIMENSIONS	Length, mm (in)	2 599.7	--	--	--
	(fan case forward flange to LPT rear frame aft flange)	(102.3)	--	--	--
	Width, mm (in)	1 908 (75.12)	--	--	--
	(fan casing forward flange diameter)				
	Height, mm (in)	2 105 (82.87)	--	--	--
	(bottom of accessory gearbox to top of fan casing forward flange)				

		CFM56-5B2/P	CFM56-5B2/2P	CFM56-5B3/P	CFM56-5B3/2P
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 454.8 (5 412.9)	2 500.6 (5 512.9)	2 454.8 (5 412.9)	2 500.6 (5 512.9)
CENTER OF GRAVITY LOCATIONS	Station, mm (in) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)	-- --	-- --	-- --
CFM56-5B5, CFM56-5B5/P, CFM56-5B4, CFM56-5B4/P					
		CFM56-5B5	CFM56-5B5/P	CFM56-5B4	CFM56-5B4/P
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lb)	9 785 (22 000)	-- --	12 010 (27 000)	-- --
	Maximum continuous, sea level static thrust, daN (lb)	9 008 (20 250)	-- --	10 840 (24 370)	-- --
AMBIENT TEMPERATURE	Takeoff °C (°F)	45 (113)	--	--	--
	Maximum continuous °C (°F)	25 (77)	--	--	--
FUEL SYSTEM (See NOTE 7 for Approved Fuels)	Fuel pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-401-0 301-785-501-0	-- --	-- --	-- --
	Hydromechanical unit GE P/N	1348M79	--	--	--

		CFM56-5B5	CFM56-5B5/P	CFM56-5B4	CFM56-5B4/P
ELECTRONIC ENGINE CONTROL	Electronic control unit GE P/N	1820M89	--	--	--
		1820M36	--	--	--
		2042M13	--	--	--
		2042M14	--	--	--
	Identification plugs SNECMA P/N	338-046-050-0	338-112-750-0	338-046-040-0	338-046-043-0
		338-046-055-0	338-122-755-0	338-046-045-0	338-122-740-0
		338-046-052-0	338-128-690-0	338-046-041-0	338-122-745-0
		338-128-695-0	338-046-046-0	338-128-680-0	
		338-046-052-0	338-046-043-0	338-128-685-0	
OIL	Synthetic type conforming to GE Specification D50TF1, Type 1 and Type 2. CFMI Service Bulletin / CFM56-5B 79-001 lists approved oil brands.				
IGNITION SYSTEM (GE P/N)	Two ignition units Unison	9238M66	--	--	--
		9238M66	--	--	--
		9238M66	--	--	--
	Two igniter plugs Unison and Champion	1374M12	--	--	--
		1374M13	--	--	--
PRINCIPAL DIMENSIONS	Length, mm (in)	2 599.7	--	--	--
	(fan case forward flange to LPT rear frame aft flange)	(102.3)			
	Width, (fan casing forward flange diameter)	1 908 (75.12)	--	--	--
	Height, (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)	--	--	--
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 454.8	--	--	--
		(5 412.9)	--	--	--
CENTER OF GRAVITY LOCATIONS	Station, mm (in)	5 202 ± 25	--	--	--
	engine only (refer to installation drawing)	(204.8 ± 1)	--	--	--

CFM56-5B4/2P, CFM56-5B6, CFM56-5B6/P, CFM56-5B6/2P

		CFM56- 5B4/2P	CFM56- 5B6	CFM56- 5B6/P	CFM56- 5B6/2P
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lb)	12 010 (27 000)	10 453 (23 500)	-- --	-- --
	Maximum continuous, sea level static thrust, daN (lb)	10 840 (24 370)	9 008 (20 250)	-- --	-- --
	AMBIENT TEMPERATURE				
	Takeoff °C (°F)	45 (113)	--	--	--
	Maximum continuous °C (°F)	25 (77)	--	--	--
FUEL SYSTEMS (See NOTE 7 for Approved Fuels)	Fuel pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-401-0 301-785-501-0	-- --	-- --	-- #
	Hydromechanical unit GE P/N	1348M79	--	--	--
	ELECTRONIC ENGINE CONTROL	Electronic control unit GE P/N	1820M88 1820M87 2042M13 2042M14	1820M89 1820M36 -- --	-- -- -- --
	Identification plugs SNECMA P/N	338-046-043-0 338-122-840-0 338-122-845-0 338-125-340-0 338-125-345-0 338-128-410-0 338-128-415-0 338-128-400-0 338-128-405-0	338-046-060-0 338-046-065-0 338-046-062-0 -- -- -- -- -- --	338-125-760-0 338-122-765-0 338-129-700-0 338-129-705-0 338-046-062-0 -- -- -- --	338-122-860-0 338-122-865-0 338-125-360-0 338-125-365-0 338-128-430-0 338-128-435-0 338-128-420-0 338-128-425-0 338-046-062-0
OIL	Synthetic type conforming to GE Specification D50TF1, Type 1 and Type 2. CFMI Service Bulletin / CFM56-5B 79-001 lists approved oil brands.				

		CFM56-5B4/2P	CFM56-5B6	CFM56-5B6/P	CFM56-5B6/2P
IGNITION SYSTEM (GE P/N)	Two ignition units Unison	9238M66 9238M66 9238M66	--	--	--
	Two igniter plugs Unison and Champion	1374M12 #	-- 1347M13	--	-- #
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 599.7 (102.3)	--	--	--
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)	--	--	--
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)	--	--	--
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 500.6 (5 512.9)	2 454.8 (5 412.9)	--	2 500.6 (5 512.9)
CENTER OF GRAVITY LOCATIONS	Station, mm (in) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)	--	--	--
CFM56-5B7, CFM56-5B7/P, CFM56-5B8/P, CFM56-5B9/P					
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lb)	12 010 (27 000)	--	9 607 (21 600)	10 363 (23 300)
	Maximum continuous, sea level static thrust, daN (lb)	10 840 (24 370)	--	8 478 (19 060)	9 008 (20 250)
	Takeoff °C (°F)	45 (113)	--	--	--
	Maximum continuous °C (°F)	25 (77)	--	--	--

		CFM56-5B7	CFM56-5B7/P	CFM56-5B8/P	CFM56-5B9/P
FUEL SYSTEMS (See NOTE 7 for Approved Fuels)	Fuel pump / SNECMA P/N	301-797-401-0	--	--	--
	(Combined boost and single element gear-type pump)	301-785-501-0	--	--	--
	Hydro mechanical unit GE P/N	1348M79	--	--	--
ELECTRONIC ENGINE CONTROL	Electronic control unit GE P/N	1820M89	--		
		1820M36	--		
		2042M13	--	--	--
		2042M14	--	--	--
	Identification plugs SNECMA P/N	338-128-440-0	338-128-450-0	338-130-001-0	338-130-010-0
		338-128-445-0	338-128-455-0		
338-126-941-0		338-128-470-0 338-128-475-0 338-126-941-0			
OIL	Synthetic type conforming to GE Specification D50TF1, Type 1 and Type 2. CFMI Service Bulletin / CFM56-5B 79-001 lists approved oil brands.				
IGNITION SYSTEM (GE P/N)	Two ignition units Unison	9238M66	--	--	--
	Two igniter plugs Unison and Champion	1374M12	--	--	--
		1374M13	--	--	--
PRINCIPAL DIMENSIONS	Length, mm (in)	2 599.7	--	--	--
	(fan case forward flange to LPT rear frame aft flange)	(102.3)			
	Width, mm (in)	1 908 (75.12)	--	--	--
	(fan casing forward flange diameter)				
Height, mm (in)	2 105 (82.87)	--	--	--	
(bottom of accessory gearbox to top of fan casing forward flange)					
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 454.8	--	--	--
		(5 412.9)	--	--	--
CENTER OF GRAVITY LOCATIONS	Station, mm (in)	5 202 ± 25	--	--	--
	engine only (refer to installation drawing)	(204.8 ± 1)	--	--	--

CFM56-5B9/2P, CFM56-5C2

		CFM56-5B9/2P	CFM56-5C2
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lb)	10 453 (23 500)	13 878 (31 200)
	Maximum continuous, sea level static thrust, daN (lb)	9 008 (20 250)	12 587 (28 300)
AMBIENT TEMPERATURE	Takeoff °C (°F)	45 (113)	30 (86)
	Maximum continuous °C (°F)	25 (77)	--
FUEL SYSTEMS (See NOTE 7 for Approved Fuels)	Fuel pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-401-0 301-785-501-0	-- --
	Hydro mechanical unit GE P/N	1348M79	--
ELECTRONIC ENGINE CONTROL	Electronic control unit GE P/N	1820M89 1820M36 2042M13 2042M14	1754M93 1799M97 1799M98 1851M41 1851M42 1851M43 1960M82 1960M83 1960M55 1960M56
	Identification plugs SNECMA P/N	338-130-010-0	337-151-901-0 337-151-905-0
OIL	Synthetic type conforming to GE Specification D50TF1, Type 1 and Type 2. CFMI Service Bulletin / CFM56-5B 79-001 lists approved oil brands. For model CFM56-5B9/2P.		

		CFM56- 5B9/2P	CFM56- 5C2
IGNITION SYSTEM (GE P/N)	Two ignition units Unison	9238M66	9238M66 9238M66 9238M66
	Two igniter plugs Unison and Champion	1374M12 1347M13	-- --
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 599.7 (102.3)	2 622 (103.2)
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)	1 946 (76.61)
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)	2 250 (88.58)
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 500.6 (5 512.9)	2 644.4 (5 830)
CENTER OF GRAVITY LOCATIONS	Station, mm (in) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)	5 232 ± 25 (206. ± 1)
IMPORT REQUIREMENTS	Each engine imported separately and/or spare parts must be accompanied by an Airworthiness Certificate for Export and/or an Airworthiness Approval Tag respectively, issued by DGAC France, attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the ANAC approved type design.		

CERTIFICATION BASIS		<u>Models</u>	<u>Application</u>	<u>Issued TC</u>
Brazilian Type Certificate No. 9604 based on the RBHA 33 (Brazilian Requirements for Aeronautical Certification), which endorses the FAR 33 effective 01 February 1965, with Amendments 33-1 through 33-10 thereto. In addition, the engines in compliance with the emissions requirements of SFAR No. 27-5 (CFM56-5C2) and RBHA 34 which endorses FAR Part 34 (all other models).		CFM56-5B1, CFM56-5B2, CFM56-5B4, CFM56-5B5, CFM56-5B6	16 June 1996	17 Sep. 1996
NOTE: CFM56-5B1/2, CFM56-5B2/2, CFM56-5B4/2 and CFM56-5B6/2 are being removed of the Type Certificate No. 9604 since they have been either converted to another CFM56 model rating or are out of service.		CFM56-5B1/P, CFM56-5B1/2P, CFM56-5B2/P, CFM56-5B2/2P, CFM56-5B3/P, CFM56-5B3/2P, CFM56-5B4/P, CFM56-5B4/2P, CFM56-5B5/P, CFM56-5B6/P, CFM56-5B6/2P, CFM56-5B7, CFM56-5B7/P, CFM56-5B8/P, CFM56-5B9/P, CFM56-5B9/2P, CFM56-5C2	5 Apr. 2004	30 Sep. 2005

PRODUCTION BASIS Not applicable.

NOTES:

NOTE 1 Maximum permissible temperature (All Models).

	CFM56-5B and -5B/P Series	CFM56-5B/2 and 5B/2P Series	CFM56-5C Series
Turbine exhaust gas (T495) (Indicated / See NOTE 5)	As measured by a harness of nine thermocouples located at the second stage low-pressure turbine vane:		
• Takeoff (5 min.)	950°C	950°C	950°C
• Maximum continuous	915°C	915°C	915°C
• Starting	725°C	725°C	725°C
• Time temperature envelope refer to model's S.O.I.	CFM -TP.01.13	CFM -TP.01.13	CFM -TP.01.12
Fuel pump inlet oil supply	Refer to the appropriate Installation Manual.		
• Continuous operation	140°C / 284°F	140°C / 284°F	140°C / 284°F
• Transient (15 minutes)	155°C / 311°F	155°C / 311°F	155°C / 311°F

NOTE 2 Fuel and oil pressure limits.

Fuel limits.

Operation and air / ground starting pressure limits extend from a minimum fuel pressure of not less than 5.5 psia (37.9 kPa absolute) above the true fuel vapor pressure to a maximum of 50 psig (344.8 kPa gauge), relative to atmosphere, with vapor / liquid ratio of zero at all conditions. For limits, see Installation Manual, Part A, Section 5, Figures A2 through A5.

Oil limits.

The minimum pressure limit at idle is 13 psid (89.6 kPa differential) and varies up to 45 psid (310.2 kPa differential) at cruise thrust. The maximum pressure limit during cold starts is 300 psid (2 069 kPa differential), limited by a pressure relief valve. See NOTE 13.

NOTE 3ElectricalAccessory drive provisions (All Models)

	CFM56-5B engine models	CFM56-5C engine models
Rotation (1)	CCW	CCW
Speed ratio to core	0.5947:1	0.5947:1
Maximum torque (inch-pounds)	135 kW	135 kW
Continuous		
Static	9 492	9 492
Maximum overhung moment (inch-pounds)	1 000	1 000
HYDRAULIC PUMP		
Rotation	CCW	CCW
Speed ratio to core	0.256:1	0.256:1
Maximum torque (inch-pounds)	1 500	1 500
Continuous		
Static	4 400	4 400
Maximum overhung moment (inch-pounds)	160	183

CW = CLOCKWISE / CCW = COUNTERCLOCKWISE

- NOTE 4** Engine Rating are based on calibrated stand performance under the following conditions:
 Takeoff thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature of:
 - Std + 15°C (30°C, 86°F) for CFM56-5B1, -5B1/P, -5B1/2P, -5B2, -5B2/P, -5B2/2P, -5B3/P, -5B3/2P, 5C2.
 - Std + 30°C (45°C, 113°F) for CFM56-5B4, -5B4/P, -5B4/2P, -5B5, -5B5/P, -5B6, -5B6/P, -5B6/2P, -5B7, -5B7/P, 5B8/P, -5B9/P, 5B9/2P.
 Maximum continuous is nominally independent of ambient temperature (flat rated) up to ambient temperature to std +10°C (25°C, 77°F) for all models.
 Zero customer bleed and horsepower extraction;
 No scrubbing drags;
 100% inlet recovery;
 based on CFM International long duct flow flight exhaust system for all CFM56-C engine models.
 Based on CFM International referee separate flow exhaust system with primary exhaust nozzle and fan nozzle for all CFM56-5B engine models.
- NOTE 5** Maximum permissible engine rotor speeds (See NOTE 18)
- | | All CFM56-5B Engines Model | CFM56-5C2 |
|-------------------------------|----------------------------|----------------|
| Low-pressure rotor (N1), rpm | 5 200 (104%) | 4 800 (100.3%) |
| High-pressure rotor (N2), rpm | 15 183 (105%) | 15 183 (105%) |
- NOTE 6** Maximum permissible air bleed extraction (All Models)
- | Location: | FAN CORRECTED SPEED | FLOW LIMIT |
|---|--|--|
| - Fan discharge | All speed above minimum idle | 2% fan airflow |
| - HPC Stage 5 only | All speed above minimum idle | 10% core airflow |
| - Compressor discharge only | Minimum idle to 61.0% N1K
61.0% - 82.5% N1K
82.5 - 100% N1K | 14% core airflow
Linear variation from 14% - 7% core airflow
7% core airflow |
| - HPC Stage 5 and compressor discharge combined | Minimum idle to 61.0% N1K
61.0% - 82.5% N1K

82.5% - 100% N1K | 14% core airflow
Linear variation from 14% - 10% core airflow
10% core airflow |
- NOTE 7** Approved fuel conforming to GE Specification D50TF2. MIL-T-5624, Grades JP-4 or JP-5, ASTM D 1655, Jet A, A1 and B are consistent with this GE Specification.
 Primary fuel is Jet A, with other fuels listed being acceptable alternates. No fuel control adjustment is required when changing from primary to alternate fuels. Use of aviation gasoline is not authorized. Consult Specific Operating Instructions for additive usage.

- NOTE 8** Life limits established for critical rotating components are published in Chapter 5 of the CFM56-5B Shop Manual, CFMI-TP-SM.9, for the CFM56-5B engine models, and the CFM56-5C Shop Manual, CFMI-TP.SM.8, for the CFM56-5C engine models.
- NOTE 9** Power setting, power checks and control of engine thrust output in all operations is to be based on CFMI engine charts referring to fan speed. Fan speed sensors are included in the engine assembly for this purpose.
- NOTE 10** Reserved
- NOTE 11** The engine manufacture supplies the nacelle system and attachment fittings **NS-CFM56-5G01**, the total exhaust system ES-CFM56-5G01, and the engine-assembled EBU 736L699, which have been approved for installation on all CFM56-5C engine models in accordance with RBHA/FAR 33
- NOTE 12** The minimum permissible idle in flight corresponds to N2=58.8% (8 500 rpm), which is a non-adjustable limit, preset into the ECU control schedule.
- NOTE 13** During negative -g operation only, it is permissible to operate below minimum oil pressure (13 psid) for a maximum of 10 seconds. See Specific Operating Instruction, Section 6.
- NOTE 14** The models shown on this TCDS have the following general characteristics:
- | MODEL | CHARACTERISTICS |
|--------------|---|
| CFM56-5C2 | Basic Model |
| CFM56-5B1 | Similar to CFM56-5C2 except for new fan and booster and CFM56-5 LP turbine and revised thrust ratings. |
| CFM56-5B2 | Same as CFM56-5B1 except for increased thrust ratings. |
| CFM56-5B4 | Same as CFM56-5B1 except for decreased thrust rating. |
| CFM56-5B5 | Same as CFM56-5B1 except for decreased thrust rating. |
| CFM56-5B6 | Same as CFM56-5B1 except for decreased thrust rating. |
| CFM56-5B7 | Same as CFM56-5B1 except for decreased thrust rating. |
| CFM56-5B1/P | Same as CFM56-5B1 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B1/2P | Same as CFM56-5B1/2 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B2/P | Same as CFM56-5B2 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B2/2P | Same as CFM56-5B2/2 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B3/P | Same as CFM56-5B1 except for increased thrust rating and redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B3/2P | Same as CFM56-5B1 except for increased thrust rating and redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. CFM56-5B3/2P has a dual annular combustor. |
| CFM56-5B4/P | Same as CFM56-5B4 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |

- NOTE 14 (Cont.)**
- | | |
|--------------|--|
| CFM56-5B4/2P | Same as CFM56-5B4/2 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B5/P | Same as CFM56-5B5 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B6/P | Same as CFM56-5B6 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B6/2P | Same as CFM56-5B6/2 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B7/P | Same as CFM56-5B7 except for redesigned high-pressure compressor, high-pressure turbine, and low-pressure turbine. |
| CFM56-5B8/P | Same as CFM56-5B1/P except for reduced thrust rating. |
| CFM56-5B9/P | Same as CFM56-5B1/P except for reduced thrust rating. |
| CFM56-5B9/2P | Same as CFM56-5B1/2P except for reduced thrust rating. |
- NOTE 15** The CFM56-5B and CFM56-5C FADEC series engines have been approved to operate with certain faults present in the control system, based on satisfaction of RBHA/FAR 33 requirements and appropriate engine control system, based system reliability requirements. FAA approved criteria pertaining to dispatch and maintenance requirements for the engine control system are specified in General Electric Document No. GEK 103085 (-5B family) and GEK 100741 (-5C family), which define the dispatchable configurations and maximum operating intervals.
A control system reliability monitoring program has been established with CFMI, as a contingency of the dispatch criteria approval, to ensure that overall engine control system and specific component failure rates do not exceed the maximum values permitted by the reliability analysis.
- NOTE 16** The normal 5 minutes takeoff rating may be extended to 10 minutes for engine out contingency.
- NOTE 17** For the CFM56-5B/P and -5B/2P series engines, the actual maximum permissible turbine exhaust gas temperature (EGT) is 10°C lower than the indicated EGT. An indicated EGT of 950°C corresponds to an actual EGT of 940°C, and an indicated EGT of 915°C corresponds to an actual EGT of 905°C.
For CFM56-5C2 engine, the actual maximum permissible N1 rotor speed is higher than the indicated N1 of 4 800 rpm (100.3%) corresponds to an actual N1 of 4 985 rpm (104.2%)
- NOTE 18**
- | | |
|------------------------------|---|
| CFM56-5B series includes: | CFM56-5B1, -5B2, -5B4, -5B5, -5B6, -5B7 |
| CFM56-5B/P series includes: | CFM56-5B1/P, -5B2/P, -5B3/P, -5B4/P, -5B5/P, -5B6/P, -5B7/P, -5B8/P, -5B9/P |
| CFM56-5B/2P series includes: | CFM56-5B1/2P, -5B2/2P, -5B3/2P, -5B4/2P, -5B6/2P, -5B9/2P |

III - MODEL	CFM56-5B1/3, CFM56-5B2/3, CFM56-5B3/3, CFM56-5B4/3, CFM56-5B5/3, CFM56-5B6/3, CFM56-5B7/3, CFM56-5B8/3, CFM56-5B9/3				
TYPE	High bypass turbofan; coaxial front fan/booster driven by multi-stage low-pressure turbine, multi-stage compressor with one-stage high pressure turbine and annular combustor.				
	CFM56-5B1/3, CFM56-5B2/3, CFM56-5B3/3, CFM56-5B4/3				
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lbf)	CFM56- 5B1/3 13 345 (30 000)	CFM56- 5B2/3 13 789 (31 000)	CFM56- 5B3/3 14 234 (32 000)	CFM56- 5B4/3 12 010 (27 000)
	Maximum continuous, sea level static thrust, daN (lbf)	12 940 (29 090)	-- --	-- --	10 840 (24 370)
AMBIENT TEMPERATURE	Takeoff °C (°F)	30 (86)	--	--	45 (113)
	Maximum continuous °C (°F)	25 (77)	--	--	--
FUEL SYSTEMS (See NOTE 8)	Fuel Pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-402-0	--	--	--
	Hydro Mechanical Unit / GE P/N	1348M79	--	--	--
ELECTRONIC ENGINE CONTROL	Electronic Control Unit / GE P/N	2123M55 2123M56	1820M36 1820M89 2042M13 2042M14	2123M55 2123M56 # #	-- -- # #
	Identification Plugs / SNECMA P/N	338-046-004-0	338-046-023-0	338-122-732-0	338-046-043-0
OIL	Synthetic type conforming to GE Specification D50TF1, Type I and Type II. CFM Service Bulletin CFM56-5B 79-001 lists approved brand oils.				
IGNITION SYSTEM	One ignition unit Unison / (GE P/N)	9238M66	--	--	--
	Two igniter plugs Unison and Champion / (GE P/N)	1374M12 1374M13	-- --	-- --	-- --

		CFM56- 5B1/3	CFM56- 5B2/3	CFM56- 5B3/3	CFM56- 5B4/3
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 599.7 (102.3)	--	--	--
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)	--	--	--
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)	--	--	--
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 455.2 (5 412.9)	--	--	--
CENTER OF GRAVITY LOCATIONS	Station, mm (inches) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)	--	--	--
CFM56-5B5/3, CFM56-5B6/3, CFM56-5B7/3, CFM56-5B8/3					
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lbf)	CFM56- 5B5/3 9 786 (22 000)	CFM56- 5B6/3 10 453 (23 500)	CFM56- 5B7/3 12 010 (27 000)	CFM56- 5B8/3 9 608 (21 600)
	Maximum continuous, sea level static thrust, daN (lbf)	9 008 (20 250)	9 008 (20 250)	10 840 (24 370)	8 478 (19 060)
AMBIENT TEMPERATURE	Takeoff °C (°F)	45 (113)	--	--	--
	Maximum continuous °C (°F)	25 (77)	--	--	--
FUEL SYSTEMS (See NOTE 8)	Fuel Pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-402-0	--	--	--
	Hydro Mechanical Unit / GE P/N	1348M79	--	--	--

		CFM56- 5B5/3	CFM56- 5B6/3	CFM56- 5B7/3	CFM56- 5B8/3
ELECTRONIC ENGINE CONTROL	Electronic Control Unit / GE P/N	2123M55	--	--	--
		2123M56	--	--	--
	Identification Plugs / SNECMA P/N	338-046-052-0	338-046-062-0	338-126-941-0	338-130-001-0
OIL	Synthetic type conforming to GE Specification D50TF1, Type I and Type II. CFM Service Bulletin CFM56-5B 79-001 lists approved brand oils.				
IGNITION SYSTEM	One ignition unit Unison / (GE P/N)	9238M66	--	--	--
	Two igniter plugs Unison and Champion / (GE P/N)	1374M12	--	--	--
		1374M13	--	--	--
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 599.7 (102.3)	--	--	--
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)	--	--	--
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)	--	--	--
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 455.2 (5 412.9)	-- --	-- --	-- --
CENTER OF GRAVITY LOCATIONS	Station, mm (inches) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)	-- --	-- --	-- --

	CFM56-5B9/3	CFM56-5B9/3
RATINGS (See NOTE 4)	Takeoff (5 min. see NOTE 17), sea level, static thrust, daN (lbf)	10 364 (23 300)
	Maximum continuous, sea level static thrust, daN (lbf)	9 008 (20 250)
		CFM56-5B9/3
AMBIENT TEMPERATURE	Takeoff °C (°F)	45 (113)
	Maximum continuous °C (°F)	25 (77)
FUEL SYSTEMS (See NOTE 8)	Fuel Pump / SNECMA P/N (Combined boost and single element gear-type pump)	301-797-402-0
	Hydro Mechanical Unit / GE P/N	1348M79
ELECTRONIC ENGINE CONTROL	Electronic Control Unit / GE P/N	2123M55 2123M56
	Identification Plugs / SNECMA P/N	338-130-010-0
OIL	Synthetic type conforming to GE Specification D50TF1, Type I and Type II. CFM Service Bulletin CFM56-5B 79-001 lists approved brand oils.	
IGNITION SYSTEM	One ignition unit Unison / (GE P/N)	9238M66
	Two igniter plugs Unison and Champion / (GE P/N)	1374M12 1374M13
PRINCIPAL DIMENSIONS	Length, mm (in) (fan case forward flange to LPT rear frame aft flange)	2 599.7 (102.3)
	Width, mm (in) (fan casing forward flange diameter)	1 908 (75.12)
	Height, mm (in) (bottom of accessory gearbox to top of fan casing forward flange)	2 105 (82.87)

		CFM56-5B9/3		
WEIGHT (DRY)	Includes basic engine accessories and optional equipment as listed in manufacturers engine specification, including engine mounted portions of the condition monitoring instrumentation, kg (lb)	2 455.2 (5 412.9)		
CENTER OF GRAVITY LOCATIONS	Station, mm (inches) engine only (refer to installation drawing)	5 202 ± 25 (204.8 ± 1)		
IMPORT REQUIREMENTS	Each engine imported separately and/or spare parts must be accompanied by an Airworthiness Certificate for Export and/or an Airworthiness Approval Tag respectively, issued by DGAC France, attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the ANAC approved type design.			
CERTIFICATION BASIS	RBHA 33 (Brazilian Requirements for Aeronautical Certification), which endorses the FAR 33 effective 01 February 1965, with Amendments 33-1 through 33-11, thereto.	<u>Models</u> CFM56-5B1/3 CFM56-5B2/3 CFM56-5B3/3 CFM56-5B4/3 CFM56-5B5/3 CFM56-5B6/3 CFM56-5B7/3 CFM56-5B8/3 CFM56-5B9/3	<u>Application</u> 2 August 2007	<u>Issued TC</u> 21 September 2007
PRODUCTION BASIS	Not applicable.			

NOTES:**NOTE 1** Maximum Permissible Temperature (All Models).

Turbine exhaust gas (T495) (Indicated / See NOTE 5)	As measured by a harness of nine thermocouples located at the second stage low-pressure turbine vane:
• Takeoff (5 min.)	950°C
• Maximum continuous	915°C
• Starting	725°C
• Time temperature envelope refer to model's S.O.I.	CFM -TP.01.13
Fuel pump inlet oil supply	Refer to the appropriate Installation Manual.
• Continuous operation	140°C / 284°F
• Transient (15 minutes)	155°C / 311°F

NOTE 2 Fuel and Oil Pressure Limits.

Fuel limits.

Operation and air / ground starting pressure limits extend from a minimum fuel pressure of not less than 5.5 psia (37.9 kPa absolute) above the true fuel vapor pressure to a maximum of 50 psig (344.8 kPa gauge), relative to atmosphere, with vapor / liquid ratio of zero at all conditions. For limits, see Installation Manual, Part A, Section 5, Figures A2 and A4. For limits with the aircraft boost pump inoperative, see Installation Manual, Part A, Section 5, Figures A3 and A5.

Oil limits.

The minimum pressure limit at idle is 13 psid (89.6 kPa differential) and varies up to 45 psid (310.2 kPa differential) at cruise thrust. The maximum pressure limit during cold starts is 300 psid (2 069 kPa differential), limited by a pressure relief valve. See NOTE 13.

NOTE 3 Electrical Accessory drive provisions (All Models)

Rotation (1)	CCW
Speed ratio to core	0.5947
Pad Rating (kW)	135
Shear Torque (in-lb)	9 492
Maximum overhung moment (in-lb)	1 000

NOTE 3Hydraulic pump**(Cont.)**

Rotation (1)	CCW
Speed ratio to core	0.256
Pad Rating (kW)	1 500
Shear Torque (in-lb)	4 400
Maximum overhung moment (in-lb)	160

(1) CW = CLOCKWISE / CCW = COUNTERCLOCKWISE

NOTE 4Engine Rating are based on calibrated stand performance under the following conditions:

Takeoff thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature of:

- Std + 15°C (30°C, 86°F) for CFM56-5B1/3, -5B2/3 and -5B3/3.
- Std + 30°C (45°C, 113°F) for CFM56-5B4/3, -5B5/3, -5B6/3, -5B7/3, -5B8/3 and -5B9/3.

Maximum continuous is nominally independent of ambient temperature (flat rated) up to ambient temperature to std +10°C (25°C, 77°F) for all models.

Zero customer bleed and horsepower extraction;

No scrubbing drags;

100% inlet recovery;

Based on CFM International referee separate flow exhaust system with primary exhaust nozzle and fan nozzle for all CFM56-5B engine models.

NOTE 5Maximum Permissible Engine Rotor Speeds (See NOTE 18)

All CFM56-5B Engines Model

Low-pressure rotor (N1), rpm	5 200 (104%)
High-pressure rotor (N2), rpm	15 183 (105%)

NOTE 6Maximum permissible air bleed extraction (All Models)

LOCATION:	FAN CORRECTED SPEED	FLOW LIMIT
- Fan discharge	All speed above minimum idle	2% fan airflow
- HPC Stage 5 only	All speed above minimum idle	10% core airflow
- Compressor discharge only	Minimum idle to 61.0% N1K	14% core airflow
	61.0% to 82.5% N1K	Linear variation from 14% - 7% core airflow
	Above 82.5% N1K	7% core airflow
- HPC Stage 5 and compressor discharge combined	Minimum idle to 61.0% N1K	14% core airflow
	61.0% to 82.5% N1K	Linear variation from 14% - 10% core airflow
	Above 82.5% N1K	10% core airflow

- NOTE 7** Approved fuel conforming to GE Specification D50TF2. MIL-T-5624, Grades JP-4 or JP-5, ASTM D 1655, Jet A, A1 and B are consistent with this GE Specification.
Primary fuel is Jet A, with other fuels listed being acceptable alternates. No fuel control adjustment is required when changing from primary to alternate fuels. Use of aviation gasoline is not authorized. Consult Specific Operating Instructions for additive usage.
- NOTE 8** Life limits established for critical rotating components are published in Chapter 5 of the CFM56-5B Shop Manual, CFMI-TP-SM.9, for the CFM56-5B engine models.
- NOTE 9** Power setting, power checks and control of engine thrust output in all operations is to be based on CFMI engine charts referring to fan speed. Fan speed sensors are included in the engine assembly for this purpose.
- NOTE 10** The minimum permissible idle in flight corresponds to $N_2=58.8\%$ (8 500 rpm), which is a non-adjustable limit, preset into the ECU control schedule.
- NOTE 11** During negative -g operation only, it is permissible to operate below minimum oil pressure (13 psid) for a maximum of 10 seconds. See Specific Operating Instruction, Section 6.

NOTE 12 The models shown on this TCDS have the following general characteristics:

<u>MODEL</u>	<u>CHARACTERISTICS</u>
CFM56-5B3/3	Similar to CFM56-5B/P except for new HPC blades, HPT blades LPT nozzle 1 and combustor.
CFM56-5B1/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B2/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B4/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B5/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B6/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B7/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B8/3	Same as CFM56-5B3/3, but lower T/O thrust.
CFM56-5B9/3	Same as CFM56-5B3/3, but lower T/O thrust.

- NOTE 13** The CFM56-5B FADEC series engines have been approved to operate with certain faults present in the control system, based on satisfaction of RBHA/FAR 33 requirements and appropriate engine control system, based system reliability requirements. FAA approved criteria pertaining to dispatch and maintenance requirements for the engine control system are specified in General Electric Document No. GEK 103085 (-5B family), which define the dispatchable configurations and maximum operating intervals. A control system reliability monitoring program has been established with CFMI, as a contingency of the dispatch criteria approval, to ensure that overall engine control system and specific component failure rates do not exceed the maximum values permitted by the reliability analysis.
- NOTE 14** The normal 5 minutes takeoff rating may be extended to 10 minutes for engine out contingency.
- NOTE 15** The CFM56-5B/3 series engines are in compliance with the emissions requirements in 14 CFR Part 34, effective 10 September 1990, as amended by 34-1 through 34-3 and in compliance with 40 CFR Part 87, effective 19 December 2005 until such time as 14 CFR Part 34 is amended to include such requirements.
- NOTE 16** CFM56-5B/3 series includes: CFM56-5B1/3, -5B2/3, -5B4/3, -5B5/3, -5B6/3, -5B7/3, -5B8/3, -5B9/3.



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