

European Aviation Safety Agency

EASA TYPE-CERTIFICATE DATA SHEET

Number: E.009
Issue: 05
Date: 21 April 2009
Type: Rolls-Royce Turbomeca Ltd RTM 322 series engines

Variants
RTM 322-01/1
RTM 322-01/9
RTM 322-01/9A

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I. General

1. Type/Variants:

RTM 322-01/1, RTM 322-01/9, RTM 322-01/9A. These variants are approved for use on multi-engined civil rotorcraft at the ratings and within the operating limitations specified below, subject to compliance with the powerplant installation requirements appropriate to approved installations.

2. Type Certificate Holder:

Rolls-Royce Turbomeca Ltd
4-5 Grosvenor Place
London SW1X 7HH
England
DOA-ref: EASA.21J.192

3. Manufacturer:

Rolls-Royce plc and Turbomeca.

4. CAA/EASA Certification Application Date:

RTM 322-01/1	24 October 1989
RTM 322-01/9	11 May 1995
RTM 322-01/9A	1 April 2005

5. CAA/EASA Certification Reference Date:

RTM 322-01/1	24 October 1989
RTM 322-01/9	24 October 1989
RTM 322-01/9A	21 October 1994

6. EASA Certification Date:

RTM 322-01/1	27 April 1992
RTM 322-01/9	26 July 2004
RTM 322-01/9A	26 July 2007

EASA Type Certification for the RTM322-01/1 engine model is granted, in accordance with article 2 paragraph 3 (a)(i) of EU Commission Regulation EC 1702/2003, based on the issue of CAA United Kingdom Type Certificate No. 091.

II. Certification Basis

1. CAA/EASA Certification Basis:

1.1 Certification Specifications:

RTM 322-01/1	JAR-E change 7 dated 24 January 1986 plus orange paper amendment E/89/1.
RTM 322-01/9	JAR-E change 9 dated 21 October 1994, plus NPA-E-13 for power turbine discs.
RTM 322-01/9A	JAR-E change 9 dated 21 October 1994, plus JAR-E 810 and 840 of JAR-E Amendment 11.

1.2 Special Conditions:

RTM 322-01/1	None
RTM 322-01/9 and RTM 322-01/9A	<ul style="list-style-type: none"> • Use of One Engine Inoperative (OEI) rating structure. • Rain and hail. • Programmable Logic Devices (PLD). • Use of 30 Minute All Engines Operating (AEO) rating.

1.3 Deviations:

RTM 322-01/1	None.
RTM 322-01/9 and RTM 322-01/9A	<ul style="list-style-type: none"> • Deviation from Special Conditions for OEI rating – automatic availability of 30 second OEI rating during transition from OEI training mode. • Ingestion of rain and hail.

1.4 Environmental Standards:

RTM 322-01/9	Fuel Venting: ICAO Annex 16, Volume II, 2nd Edition, November 1993, Part 2, Chapter 2.
RTM 322-01/9A	Fuel Venting: Annex (Part 21) to Commission Regulation (EC) 1702/2003 of 27 September 2003, paragraph 21A.18(b)1.

III. Technical Characteristics

1. Type Design Definition:

RTM 322-01/1	As defined in parts list: 0 322 00 507 0
RTM 322-01/9	As defined in parts list: 0 322 00 516 0
RTM 322-01/9A	As defined in parts list: 0 322 00 549 0

2. Description:

The RTM 322 series engines are two spool turboshaft engines of modular design, comprising a three stage axial and a single stage centrifugal compressor, a reverse flow annular combustion chamber, a two stage axial flow gas generator turbine and a two stage axial flow power turbine connected to a forward mounted output drive by a transmission shaft. Control is provided by a dual-channel FADEC. The accessory gearbox is driven by the gas generator. Starter is not part of the engine type definition. The RTM322-01/1 is fitted with an inlet particle separator.

3. Equipment:

- Equipment units included in the engine type definition: refer to the Installation or Installation and Operating manual
- Equipment units to be supplied by the Aircraft Manufacturer: refer to the Installation or Installation and Operating manual

4. Dimensions:

	Overall Length (mm)	Overall Width (mm)	Overall Height (mm)
RTM322-01/1	1171	708	615
RTM322-01/9	1181	689	648
RTM 322-01/9A	1181	689	648

5. Dry Weight:

	Dry engine weight (kg) (including EECU)
RTM322-01/1	255.00
RTM322-01/9	232.15
RTM 322-01/9A	232.15

6. Ratings:

6.1 Normal Power kW:

	Take-Off (5 min)	30 min AEO	Maximum Continuous
RTM 322-01/1 ⁽¹⁾	1566	-	1518
RTM 322-01/9 ⁽²⁾	1566 ⁽³⁾⁽⁴⁾ 1611 ⁽³⁾⁽⁵⁾	1566 ⁽³⁾⁽⁴⁾ 1611 ⁽³⁾⁽⁵⁾	1566 ⁽³⁾⁽⁴⁾ 1611 ⁽³⁾⁽⁵⁾
RTM 322-01/9A ⁽²⁾	1566 ⁽³⁾	1566 ⁽³⁾	1566 ⁽³⁾

6.2 Contingency Power kW:

	Intermediate Contingency (unlimited duration)	Maximum Contingency (2 min 30 sec)	30 sec OEI	2 min OEI	30 min OEI	Continuous OEI
RTM 322-01/1 ⁽¹⁾	1518	1669	-	-	-	-
RTM 322-01/9 ⁽²⁾	-	-	2204 ⁽³⁾	1883	-	1808
RTM 322-01/9A ⁽²⁾	-	-	2204 ⁽³⁾	1993	1923	-

(1) Static sea-level rating under the following conditions:

- a. International standard atmospheric conditions at sea level.
- b. All operational air bleeds closed.
- c. Aircraft service equipment drives unloaded.
- d. Air intake comprising Air intake Bellmouth WDL 1168.20 and Debris Guard WDL 1068-29.
- e. Exhaust unit part Ref. WDL 1068-6.
- f. Output shaft speed 20900 rpm.

(2) The following conditions apply:

- a. Fuel having a net specific energy of 43100 kJ/kg and conforming in all other respects with normal fuels as defined in the Installation and Operating Manual
- b. Engine oils as specified in the Installation and Operating Manual
- c. Standard atmosphere ISO 2533-1975, on test bed
- d. No installation losses
- e. No inlet airflow distortion at the Aerodynamic Inlet Plane
- f. Test bed air inlet referenced in the Installation and Operating Manual
- g. Test bed exhaust duct referenced in the Installation and Operating Manual
- h. No customer bleed airflow or engine anti-icing airflow
- i. No accessory power off-take except that required for engine operation
- j. Output shaft speed 21675 rpm except for OEI ratings; 21154 rpm for OEI ratings

(3) This power value is flat rated due to the Helicopter gearbox torque limitation integrated into the EECU. (All declared powers are limited by the first limit reached – either thermal or mechanical. The mechanical limit is the first torque limit reached, which may be either the engine mechanical limit or an EECU torque limit.)

(4) This power value applies for engines

- Not embodying modification C3028

Or

- Embodying modification C3028 and having the NFHDIS discrete input inactive

(5) This power value applies for engines embodying modification C3028 and having the NFHDIS discrete input active

7. Control System:

The engine is equipped with a Full Authority Digital Engine Control (FADEC)

8. Fluids:

8.1 Fuel:

For list of fuels and fuel additives approved for use in each variant consult the relevant Installation or Installation and Operating Manual.

8.2 Oil:

For list of oils approved for use in each variant consult the relevant Installation or Installation and Operating Manual.

9. Aircraft Accessory Drives:

	Starter				
	Rotation direction	Rotation speed ratio to NG	Maximum static overhung moment (daN.m)	Fuse shaft breakaway torque (daN.m)	Maximum torque
RTM 322-01/1	CW	0.6447	0.23	4.9	See Installation Manual
RTM 322-01/9	CW	0.6447	3.95	7.0	See Installation and Operating Manual
RTM 322-01/9A	CW	0.6447	3.95	7.0	See Installation and Operating Manual

CW = clockwise looking aft.

10. Maximum Permissible Air Bleed Extraction:

	Maximum air delivery for aircraft services	Range of speed at which bleed may be used
RTM 322-01/1	6% of compressor inlet mass flow	Refer to the Installation Manual
RTM 322-01/9	3% of engine inlet air mass flow	Refer to the Installation and Operating Manual
RTM 322-01/9A	3% of engine inlet air mass flow	Refer to the Installation and Operating Manual

IV. Operating Limitations:

1. Climatic Operating Envelope

1.1 Operating envelope

Consult the relevant Installation or Installation and Operating Manual.

1.2 Starting and re-lighting envelopes

Consult the relevant Installation or Installation and Operating Manual.

2. Temperature Limits

2.1 Gas generator exhaust temperature (T46) limits:

	Start-up °C	Re-light °C	Ground Idle °C
RTM 322-01/1	840 maximum (momentary)	-	570 + 2A
RTM 322-01/9	See Installation and operating Manual	See Installation and operating Manual	570 + 2A
RTM 322-01/9A	See Installation and operating Manual	See Installation and operating Manual	570 + 2A

A = ambient temperature

	In-flight – Normal °C		
	Take-off	30 min AEO	Maximum Continuous
RTM 322-01/1	853	-	834
RTM 322-01/9	863	863	831
RTM 322-01/9A	895	895	873

	In-flight – Contingency °C					
	Intermediate Contingency	Maximum Contingency	30 sec OEI	2 min OEI	30 min OEI	Continuous OEI
RTM 322-01/1	834	891	-	-	-	-
RTM 322-01/9	-	-	967	903	-	866
RTM 322-01/9A	-	-	971	934	921	-

2.2 Fuel temperature:

2.2.1 Maximum temperature:

Consult the relevant Installation or Installation and Operating Manual.

2.2.2 Minimum temperature for engine starting:

Consult the relevant Installation or Installation and Operating Manual.

2.2.3 Use of anti-icing additive:

Consult the relevant Installation or Installation and Operating Manual.

2.3 Oil temperature:

	Minimum oil temperature for engine starting	Minimum oil temperature for power-up	Maximum oil temperature
RTM 322-01/1	-54°C	-10°C for oil with a 5×10^{-6} m ² /s kinematic viscosity -20°C for oil with a 3×10^{-6} m ² /s kinematic viscosity	135°C
RTM 322-01/9 and RTM 322-01/9A	-40°C for oil with a 5×10^{-6} m ² /s kinematic viscosity -40°C for oil with a 3×10^{-6} m ² /s kinematic viscosity	-10°C for oil with a 5×10^{-6} m ² /s kinematic viscosity -20°C for oil with a 3×10^{-6} m ² /s kinematic viscosity	130°C

For additional limitations related to oil temperature, consult the relevant Installation or Installation and Operating Manual.

3. Maximum / Minimum Permissible Rotor Speeds:

3.1 Gas generator speed (NG):

100 % NG	Ground Idle nominal speed	Maximum Transient Overspeed
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RTM 322-01/1	36300 rpm	23600 rpm corrected value	38683 rpm (20 sec limit)
RTM 322-01/9	36300 rpm	72% of corrected NG	101.5 DN (20 sec limit for all engines operating only)
RTM 322-01/9A	36300 rpm	72% of corrected NG	102.3 DN (20 sec limit for all engines operating only)

Maximum stabilised speed - Normal			
	Take-off	30 min AEO	Maximum Continuous
RTM 322-01/1	37760 rpm	-	37610 rpm
RTM 322-01/9	100 DN	100 DN	96 DN
RTM 322-01/9A	100 DN	100 DN	96 DN

Maximum stabilised speed - Contingency						
	Intermediate Contingency	Maximum Contingency	30 sec OEI	2 min OEI	30 min OEI	Continuous OEI
RTM 322-01/1	37610 rpm	38300 rpm	-	-	-	-
RTM 322-01/9	-	-	114 DN	105 DN	-	100.5 DN
RTM 322-01/9A	-	-	114 DN	105 DN	103 DN	-

DN = Display Number. For the definition of DN, refer to the Installation and Operating Manual.

3.2 Power turbine speed (NP):

	100 % NP	Maximum Transient Overspeed	Minimum Speed (in Flight Mode)
RTM 322-01/1 ⁽¹⁾	20900 rpm	-	17765 rpm (85%)
RTM 322-01/9 ⁽²⁾	20841 rpm	117% (20 sec limit)	85%
RTM 322-01/9A ⁽²⁾	20841 rpm	117% (20 sec limit)	85%

Maximum stabilised speed - Normal			
	Take-off	30 min AEO	Maximum Continuous
RTM 322-01/1	21400 rpm	-	21400 rpm
RTM 322-01/9	105.5%	105.5%	105.5%
RTM 322-01/9A	105.5%	105.5%	105.5%

Maximum stabilised speed - Contingency						
	Intermediate Contingency	Maximum Contingency	30 sec OEI	2 min OEI	30 min OEI	Continuous OEI
RTM 322-01/1 ⁽³⁾	21400 rpm	21000 rpm	-	-	-	-
RTM 322-01/9	-	-	102.8%	102.8%	-	105.5%
RTM 322-01/9A	-	-	102.8%	102.8%	105.5%	-

(1) During starting phase, prolonged operation within the range 57% to 85% is prohibited.

(2) Operation in the range 57% to 75% is limited to 20 seconds.

(3) Maximum stabilised speed for autorotation is 21950 rpm.

4. Torque Limits:

Maximum torque on shaft during operation:

	Take-off	Maximum Continuous	30 min AEO	30 sec OEI ⁽³⁾	2 min OEI	30 min OEI	Continuous OEI
RTM 322-01/1 ⁽¹⁾	-	-	-	-	-	-	-
RTM 322-01/9	816 Nm	816 Nm	816 Nm	995 Nm 1016 Nm ⁽²⁾	850 Nm	-	816 Nm
RTM 322-01/9A	868 Nm	868 Nm	868 Nm	1011 Nm	900 Nm	868 Nm	-

(1) 950 Nm with no time limit; 1114 Nm overtorque (20 s limit).

(2) 1016 Nm limit applicable only to engines incorporating modification C3024.

(3) Values apply at rated NP. Higher values are permitted at low Np – refer to the Installation and Operating Manual for details.

5. Pressure Limits:

5.1 Oil pressure (gauge):

	Minimum	Maximum
RTM 322-01/1 ⁽¹⁾	275 kPa (in flight)	840 kPa
RTM 322-01/9 ⁽²⁾	Refer to the Installation and Operating Manual	840 kPa
RTM 322-01/9A ⁽²⁾	Refer to the Installation and Operating Manual	840 kPa

(1) For other limitations, refer to the Installation Manual.

(2) For maximum pressure in cold conditions, refer to the Installation and Operating Manual.

5.2 Fuel pressure:

	Minimum	Maximum
RTM 322-01/1	Refer to the Installation Manual	Refer to the Installation Manual
RTM 322-01/9	Refer to the Installation and Operating Manual	Less than or equal to 150 kPa (relative pressure), in all operating phases
RTM 322-01/9A	Refer to the Installation and Operating Manual	Less than or equal to 150 kPa (relative pressure), in all operating phases

6. Installation Assumptions:

Consult the relevant Installation or Installation and Operating Manual.

7. Dispatch Limitations:

All engine systems and equipment must be functional prior to aircraft take-off. RTM 322-01/1, RTM 322-01/9 and RTM 322-01/9A engines are not herein approved for Time Limited Dispatch with any systems or equipment inoperative.

For installed engines, consult the relevant Installation or Installation and operating Manual.

V. Operating and Service Instructions

	Installation Manual	Operating Instructions	Installation and Operating Manual	Engine Base Maintenance Manual	Engine Depot Maintenance / Overhaul Manual
RTM322-01/1	IM 14	E/PH2/SE/4 11	-	2208	2209
RTM322-01/9	-	-	X 322 M8 001 2	M3-A-EBM-00-D	M3-A-EDM-00-D
RTM322-01/9A	-	-	X 322 M8 002 2	M3-B-EBM-00-D	M3-B-EDM-00-D

For Service Letters & Service Bulletins refer to SB and SL directory.

VI. Notes

1. The EECU software meets the following standards:
 - RTM 322-01/1 – RTCA/DO-178A (EUROCAE ED-12A), critical
 - RTM 322-01/9 and RTM 322-01/9A – RTCA/DO-178B, level A
2. EMI/ Lightning Qualification:
 - RTM 322-01/1 – Tests were carried out on the basis of the following documents: MIL-STD-461 for class A1B equipment, AS/AV-E8593E, MIL-STD-1757 and MIL-B-5087, SAE-4L-87-3 Rev. B. For details refer to Installation Manual IM 14.
 - RTM 322-01/9 and RTM 322-01/9A – Refer to Installation and Operating Manual for details.
3. The electronic control unit must not be installed in a designated fire zone. The installation conditions are defined in the relevant Installation or Installation and Operating Manual.
4. The engine components subjected to a limited service life are specified in the Airworthiness Limitations Section of the relevant maintenance manuals.
5. The RTM 322-01/9 and RTM 322-01/9A engine capability against ingestion of foreign matter has not been fully assessed [JAR-E 790 (a)(1) and JAR-E 800 (a)(3)]. The protection of the engine against strike/ingestion of foreign matter is to be ensured by the powerplant installation on the rotorcraft.
6. The electronic control system of the RTM 322-01/9 and RTM 322-01/9A engines provides a "TRAINING" function for training crews in an engine failure situation. Refer to the Installation and Operating Manual for the characteristics of this function.
