

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E00057EN	TCDS NUMBER E00057EN REVISION 9* DATE: October 31, 2012, Rolls-Royce Deutschland Ltd & Co KG MODELS: BR700-710A1-10 BR700-710A2-20 BR700-710C4-11 BR700-725A1-12
--------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E00057EN) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER Rolls-Royce Deutschland Ltd & Co KG
 (formerly Rolls-Royce Deutschland GmbH, formerly BMW Rolls-Royce GmbH)
 Eschenweg 11
 D-15827 Dahlewitz
 Germany

I. MODELS	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
TYPE	Two spool axial flow engine consisting of a single stage fan, a ten stage axial flow compressor, an annular combustion chamber, a two stage axial flow high pressure turbine, a two/three* stage low pressure turbine, an accessory gearbox, a thrust reverser** and a Full Authority Digital Engine Control (FADEC) *BR700-710A1-10, BR700-710A2-20, BR700-710C4-11 feature a two stage axial flow low pressure turbine. BR700-725A1-12 features a three stage axial flow low pressure turbine ** BR700-725A1-12 is designed for use with a Thrust reverser, but it is not part of the engine Type Design.			

RATINGS (See NOTE 5)

Maximum Continuous Thrust
 lbf/kN (See NOTE 18)
 Take-off Thrust, lbf/kN (See
 NOTE 18)

BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
14,450/64.3	14,450/64.3	14,450/64.3	14,975/66.6
14,750/65.6	14,750/65.6	15,385/68.4	16,900/75.2

TYPE DESIGN DEFINITION

BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
DIS 10002 Issue 03 or later approved issues	DIS 10005 Issue 02 or later approved issues	DIS 10012 Issue 01 or later approved issues	Except for the EEC P/N, which is defined in note 10, the build standard is defined in DIS 10016 Issue 01 Revision D or later approved issues

*

PAGE	1	2	3	4	5	6	7	8
REV.	9	9	9	9	6	6	9	6

LEGEND: "-" INDICATES "SAME AS PRECEDING MODEL"
"-" INDICATES "DOES NOT APPLY"
NOTICE: SIGNIFICANT CHANGES, IF ANY, ARE BLACK LINED IN THE LEFT MARGIN.

EQUIPMENT

E-TR150/95-(FR), issues 03 'Engine Equipment Classification' or later approved issues	E-TR427/96-(FR), issue 01 'Engine Equipment Classification' or later approved issues	E-TR466/01-(FR), issue 01 'Engine Equipment Classification' or later approved issues	See Installation Manual O-TR1458/08
---------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------	-------------------------------------

I. MODELS (cont'd)

OVERALL DIMENSIONS (mm/in)

	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
Length	4669/183.8	4669/183.8	4660/183.5	3297/129.8
Diameter	1820/71.6	1820/71.6	1785/70.3	950/37.4* *(radius from center line measured at the lowest point of AGB)

WEIGHT (DRY) (kg/lbs)

1851.2/4081.2	1891/4168.9	1818.4/4008.9	1635.2/3598.1
---------------	-------------	---------------	---------------

CERTIFICATION BASIS

BR700-710A1-10, BR700-710A2-20, BR700-710C4-11:
 FAR 33, effective February 1, 1965, as amended by 33-1 through 33-15, FAR 33.76 as amended by 33-20 and FAR 33.78 as amended by 33-19 and FAR 34.
 BR700-725A1-12:
 FAR 33, effective February 1, 1965, as amended by 33-1 through 33-20, and FAR34

MODEL	APPLICATION DATE	TYPE CERTIFICATE ISSUED	TYPE CERTIFICATE CANCELLED
BR700-710A1-10	Oct. 05, 1993	Sept. 16, 1996	
BR700-710A2-20	Sept. 07, 1994	Aug. 1, 1997	
BR700-710C4-11	Feb.28, 2001	June 26, 2002	
BR700-725A1-12	August 2, 2007	December 16, 2009	

PRODUCTION BASIS
 IMPORT REQUIREMENTS

To be considered for installation on United States registered aircraft, each engine to be exported to the United States shall be accompanied by a certificate of airworthiness for export, or certifying statement endorsed by the exporting cognizant civil airworthiness authority, which contains the following language:

These engines conform to the United States type design (Type Certificate Number E00057EN) and are in a condition for safe operation.

These engines have been subjected by the manufacturer to a final operational check and are in a proper state of airworthiness.

Reference FAR Section 21.500, which provides for the airworthiness acceptance of aircraft engines or propellers manufactured outside of the United States for which a United States type certificate has been issued.

Additional guidance is contained in FAA Advisory Circular 21-23, Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products, imported into the United States.

NOTE 1. Maximum Rotational Speeds:

	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
Low Pressure Turbine N1 (%)				
-Maximum Take-off (See NOTE 18)	101.1	102.1	101.1	102.8
-Maximum Continuous	101.0	102.1	101.0	102.8
-Maximum Overspeed (20 sec.)	101.5	102.5	101.5	104.3
-Reverse Thrust (max. 30 sec.)	70	70	70	78.1
-Acceleration to Takeoff with Cross Winds above 20 kts	66*	66*	66*	Refer to Operating Instructions OI-725-7BR
-Stabilized engine operation is not approved for aircraft static on the ground	between 66 and 80**	between 66 and 80**	between 66 and 80**	
High Pressure Turbine N2 (%)				
-Maximum Take-off (See NOTE 18)	99.6	99.6	99.6	100.0
- Maximum Continuous	98.9	98.9	98.9	98.7
-Maximum Overspeed (20 sec.)	99.8	99.8	99.8	101.3

*Until a forward speed of 20 kts is reached. Above 20 kts forward speed, a slam acceleration to take-off is required.

** Acceleration or deceleration through this band must not exceed 10 seconds (forward thrust only).

BR700-710: 100% N1 equals 7431 RPM, 100% N2 equals 15898 RPM

BR700-725: 100% N1 equals 7000 RPM, 100% N2 equals 15898 RPM

NOTE 2. Temperature Limits

	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
Turbine Gas Temperature (Trimmed) °C/°F				
Take-off (See NOTE 18)		900/1652		900/1652
Maximum Continuous		860/1580		885/1625
Maximum over temperature (20 sec.)		905/1661		920/1688
Maximum prior to start on ground		150/302		150/302
Starting on ground		700/1292		700/1292
Starting in flight		850/1562		850/1562

Oil temperatures (°C/°F)	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
Minimum for Starting	-30/-22	-40/-40	-30/-22	-40/-40
Minimum for Acceleration for take-off	20/68			
Maximum	160/320			

Fuel Temperatures (°C/°F)	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11	BR700-725A1-12
Minimum inlet temp.				
Within the T/O envelope		-40/-40		
Outside the T/O envelope		-45/-49		
Maximum inlet temp.				
At Sea level		54/129		
At 51,000 ft		47/117		
Between sea level and 51,000 ft.		linear interpolation between the temperature for sea level and 51,000 ft		

NOTE 3. Fuel and Oil Pressure Limits

Fuel and oil pressure limits are the same for both BR700-710A1-10, BR700-710A2-20, BR700-710C4-11 and BR700-725A1-12 except where noted.		
Fuel Pressure	Minimum permissible fuel pressure at LP fuel pump inlet:	34.5 kPa/5.0 psig
Differential Oil Pressures:	Minimum Acceptance for Flight in the Range:	
	Idle to 72.3% N2:	241.2 kPa/35 psid
	72.3% N2 to 90% N2:	straight line interpolation from 241.2 kPa/35 psid to 310.3 kPa/45 psid
	Above 90% N2:	310.3 kPa/45 psid
	Minimum to Complete Flight:	
	Idle to 72.3% N2:	172.3 kPa/25 psid
	72.3% N2 to 90% N2:	straight line interpolation from 172.3 kPa/25 psid to 241.2 kPa/35 psid
	Above 90% N2:	241.2 kPa/35 psid

NOTE 4.

Bleed Extraction:

For BR700-710 $EPR = P50/P20$: The amounts of bleed extraction from stages 5 and 8, respectively, are related to the core entry mass flow, W26. The amount of fan bleed extraction is related to the fan entry mass flow, W1A.

For BR700-725,

$$NHRT2 = \frac{\text{Mechanical HP Speed [rpm]}}{\sqrt{\text{Engine Inlet Temperature [K]}}} = \frac{NH}{\sqrt{T2}}$$

Stage 5 and stage 8 HP compressor customer bleed is expressed as a percentage of HP Compressor entry mass flow W26.

- Fan bleed flow is expressed as percentage of the fan tip entry mass flow W12.

- Further details regarding acceptable conditions for customer bleed air extractions are defined in the installation Manual

For BR700-710A1-10:

Power Range	Normal Flow (%)			Maximum Flow (%)		
	Stage 5	Stage 8	Fan	Stage 5	Stage 8*	Fan
Idle to 1.06 EPR		7.8		3.0	12.1	0.6
1.06 to 1.3 EPR	4.4	4.2	0.2	8.3	7.9	1.6
Above 1.3 EPR	4.3		0.4	8.5	8.0	1.8

* Stage 8 bleed is cleared for operation up to and including Maximum Continuous rating.

For BR700-710A2-20:

Power Range	Normal Flow (%)			Maximum Flow (%)		
	Stage 5	Stage 8	Fan	Stage 5	Stage 8*	Fan
Idle to 1.06 EPR		7.8	0.4	3.0	12.1	0.6
1.06 to 1.3 EPR	4.4	4.2	0.4	8.3	7.9	0.9
Above 1.3 EPR	4.3		0.4	8.5	8.0	1.1

* Stage 8 bleed is cleared for operation up to and including Maximum Continuous rating.

For BR700-710C4-11:

Power Range	Normal Flow (%)			Maximum Flow (%)		
	Stage 5	Stage 8	Fan	Stage 5	Stage 8*	Fan
Idle to 1.06 EPR		7.7		3.0	12.0	0.6
1.06 to 1.3 EPR	4.3	4.1	0.2	8.2	7.8	1.6

Above 1.3 EPR	4.2		0.4	8.3	7.8	1.8
---------------	-----	--	-----	-----	-----	-----

*Stage 8 bleed is cleared for operation up to and including Maximum Continuous rating.

For BR700-725A1-12:

HP Bleed Stage 5

Nominal		Maximum	
NHRT2	% W26	NHRT2	% W26
Idle - 675	6.5	Idle - 700	7.7
675 - 850	10.1	700 - 875	10.1
850 - MTO	6.5	875 - MTO	8.6

HP Bleed Stage 8

Nominal		Maximum	
NHRT2	% W26	NHRT2	% W26
Idle - 790	13.6	Idle - 800	14.1
790 - MTO	9.3	800 - MTO	13.6

LP (Fan) Bleed

Nominal		Maximum	
NHRT2	% W12	NHRT2	% W12
Idle - 700	1.4	Idle - 720	1.5
700 - 775	1.7	720 - MTO	1.9
775 - MTO	1.7		

NOTE 5.

The ratings are defined at sea level ISA standard day conditions and a defined test bed configuration for the air intake and exhaust systems with all optional bleeds closed and the aircraft service equipment drives unloaded, at a fuel low heat value of 43179 kJ/kg (22721 CHU/kg).

NOTE 6.

ACCESSORY DRIVE PROVISIONS for BR700-710A1-10:

	Direction* of Rotation	Transmission Ratio	Torque daNcm (lbs/in)	Weight kg (lbs)	Static Overhang Moment daNcm (lbs/in)	Maximum Power Extraction kW (hp)
Main Engine Fuel Pump including Fuel Metering Unit	CW	0.530	2670 (2363)	20.5 (45.2)	395.45 (350)	26.9 (36.1)
Hydraulic Pump No. 1	CCW	0.270	4180 (3700)	8.91 (19.64)	81 (71.7)	18.6 (24.9)
Hydraulic Pump No. 2	CCW	0.275	4180 (3700)	8.91 (19.64)	81 (71.7)	18.6 (24.9)
Generator	CW	0.520	4125 (3651)	32.61 (71.9)	564.92 (500)	32.7 (43.9)
Generator FADEC ¹	CW	1.998		1.0 (2.2)	10 (8.85)	1.0 (1.34)
Starter ²	CCW	0.986	8470 (7497)	15.56 (34.3)	227 (201)	
Oil Pump	CCW	0.408	518 (458)	9.07 (20)	66 (58.4)	3.2 (4.3)

*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft

1) Dedicated Generator (PMA)

2) Air Turbine Starter

ACCESSORY DRIVE PROVISIONS for BR700-710A2-20:

	Direction* of Rotation	Transmission Ratio	Torque daNcm (lbs/in)	Weight kg (lbs)	Static Overhang Moment daNcm (lbs/in)	Maximum Power Extraction kW (hp)
Main Engine Fuel Pump including Fuel Metering Unit	CW	0.530	2670 (2363)	20.5 (45.2)	395.45 (350)	26.9 (36.1)
Hydraulic Pump	CCW	0.335	3051 (2700)	6.57 (14.5)	61 (54)	10.3 (13.8)
Generator No. 1	CW	1.083	2830 (2505)	20.0 (44.2)	325 (287.6)	52 (69.7)
Generator No. 2	CCW	1.080	2830 (2505)	20.0 (44.2)	325 (287.6)	52 (69.7)
Generator FADEC ¹	CW	1.998		1.0 (2.2)	10 (8.85)	1.0 (1.34)
Starter ²	CCW	0.986	8470 (7497)	15.56 (34.3)	227 (201)	
Oil Pump	CCW	0.421	518 (458)	9.07 (20)	66 (58.4)	3.2 (4.3)

*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft

1) Dedicated Generator (PMA) 2) Air Turbine Starter

ACCESSORY DRIVE PROVISIONS for BR700-710C4-11:

	Direction* of Rotation	Transmission Ratio	Torque daNcm (lbs/in)	Weight kg (lbs)	Static Overhang Moment daNcm (lbs/in)	Maximum Power Extraction kW (hp)
Hydraulic Pump No. 2	CCW	0.275	4180 (3700)	8.91 (19.64)	81(71.7)	18.6(24.9)
Generator (IDG)	CW	0.520	4125 (3651)	32.61 (71.9)	565 (500)	32.75(43.9)

*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft

ACCESSORY DRIVE PROVISIONS for BR700-725A1-12:

	Direction* of Rotation	Transmission Ratio	Shear Torque [Nm]	Weight kg	Static Overhang Moment [Nm]	Contin. Torque Extraction [Nm]
Hydraulic Pump	CW	0.261	406.75	14.55	16.37	120
Generator (IDG)	CW	0.522	412.5	32.61	56.5	109
Air Turbine Starter (ATS)	CW	0.988	847	9.99	6.76	415

*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft

NOTE 7.**Operating and Service Instructions:**

Installation Drawing and Manual	<u>BR700-710A1-10</u> E-TR206/95 Issue 6 or later approved issues	<u>BR700-710A2-20</u> E-TR364/95 Issue 1 or later approved issues
Operating Instructions	OI-710-1BR	OI-710-2BR
Maintenance Manual	M-710-1BR	M-710-2BR
Engine Manual	E-710-1BR	E-710-2BR
Time Limits Manual	T-710-1BR	T-710-2BR
Installation Drawing and Manual	<u>BR700-710C4-11</u> E-TR240/01-(FR)-ISS01 or later approved issues	<u>BR700-725A1-12</u> O-TR1458/08 Issue 2 or later approved issues
Operating Instructions	OI-710-4BR	OI-725-7BR
Maintenance Manual	M-710-4BR	M-725-7BR
Engine Manual	E-710-4BR	E-725-7BR*
Time Limits Manual	T-710-4BR	T-725-7BR

* See Note 12

Service bulletins, structural repair manuals, vendor manuals, aircraft flight manuals, and overhaul and maintenance manuals which contain a statement that the document is EASA approved are accepted by the FAA and are considered FAA approved. These approvals pertain to the type design only

NOTE 8.

The engines are equipped with a thrust reverser:

BR700-710A1-10: P/N 04G0001-039 (left hand engine) and P/N 04G0001-041 (right hand engine) or later approved standards.

BR700-710A2-20: P/N 07G0001-005 (left hand engine) and P/N 07G0001-007 (right hand engine) or later approved standards.

BR700-710C4-11: P/N 25G0001-001 (left hand engine) and P/N 25G0001-003 (right hand engine) or later approved standards.

BR700-725A1-12: P/N RD00103001-1 (left hand engine) and P/N RD00103001-2 (right hand engine) or later approved standards.

Operation of these thrust reversers is approved for ground use only. Use for power back is not approved.

NOTE 9.

Life limited critical parts are included in the respective Time Limits Manual

NOTE 10.**FADEC:**

BR700-710A1-10: EEC P/N 1501KDC01-817 or later approved standards.

BR700-710A2-20: EEC P/N 1520KDC01-605, or later approved standards.

BR700-710C4-11: EEC P/N 1505KDC01-002, or later approved standards.

BR700-725A1-12: EEC P/N G3010ECU01AJ or later approved standards

The EEC software has been developed and verified in accordance with RTCA/DO-178B respectively ED-12B Level A.

NOTE 11.

Lightning and EMI protection capability of the electronic engine control system, are specified in the BR700-710A1-10, BR700-710A2-20, BR700-710C4-11 and BR700-725A1-12 Installation Manuals.

NOTE 12.

Removed at Revision 7

NOTE 13.

Information on engine operation with FADEC system dispatch limitations is contained in report E-TR361/96 (FR) Issue 00 or later approved issues for BR700-710A1-10 and Report E-TR737/96 (FR) Issue 1 or later approved issues for the BR700-710A2-20, and report E-TR080/02-(FR)-ISS01, or later approved issues, for the BR700-710C4-11, and time limits manual T-725-7BR for the BR700-725A1-12

-
- NOTE 14.** The engine meets the smoke and hydrocarbon emission requirements of FAR 34 and the carbon monoxide and nitrogen oxide requirements of International Civil Aviation Organization Standards.
- NOTE 15.** The engine meets the fuel venting emissions requirements of FAR 34.
- NOTE 16.** Approved fuels and fuel additives are listed in the latest applicable issue of the applicable engine Operating Instructions.
- NOTE 17.** Approved oils are listed in the latest applicable issue of the applicable engine Operating Instructions.
- NOTE 18.** Use of take-off thrust for more than five minutes (not to exceed ten minutes) is approved for use only in the event of an inoperative engine due to shutdown or failure.
- NOTE 19.** The maximum permissible engine inlet distortion limit is specified in the applicable engine Installation Manual.

---THE END---