TYPE-CERTIFICATE DATA SHEET

EASA.E.033

for
TP400-D6 Engine

Type Certificate Holder
EPI Europrop International GmbH
Pelkovenstrasse 147
80992 München
Germany

For Models:

TP400-D6

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I. General

1. Type/ Model

Type: TP400-D6

Models:
TP400-D6

The TP400-D6 engine is approved for use on multi-engined aircraft 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

EPI Europrop International GmbH
Pelkovenstrasse 147
80992 München
Germany

DOA ref.: EASA.21J.076

3. Manufacturer

MTU Aero Engines AG under license of Europrop International GmbH

EASA Production Organisation Approval DE.21G.0053

4. Date of Application

5 June 2003

5. Certification Reference Date

17 December 2009

6. EASA Type Certification Date

06 May 2011

II. Certification Basis

1. EASA Certification Basis

1.1. Airworthiness Standards

- CS-E, Amendment 1 dated 10 December 2007
- FAR33.90 – Initial Maintenance Inspection

1.2. Special Conditions (SC)

None

1.3. Equivalent Safety Findings (ESF)

None

1.4. Deviations

None

1.5. Environmental Protection

- CS-34.2 Engine Emissions
- CS-34.1 Fuel Venting

III. Technical Characteristics

1. Type Design Definition

The Engine Type Design is defined in the following Drawing Introduction Sheet (DIS):

DIS 1002, Issue 2 (plus approved modifications) or later approved issues.

2. Description

Three spool axial flow Turbopropeller engine consisting of a Propeller Reduction Gearbox, a five stage axial-flow intermediate pressure compressor, a six stage axial-flow high pressure compressor, an annular combustion chamber, a single stage axial-flow high pressure turbine, a single stage axial-flow intermediate pressure turbine, a three stage axial-flow low pressure turbine, an accessory gearbox and a Full Authority Digital Engine Control (FADEC).

3. Equipment

Engine equipment and engine-mounted aircraft equipment is specified in the Installation Manual.

4. Dimensions

- Overall Length: 4180 mm (front of PGB to rear of primary nozzle)
- Maximum Diameter (radius): 1218 mm (radius from centre line measured at lowest point)

5. Dry Weight

The maximum engine weight including complete engine accessory equipment but without fluid and instrumentation (tolerance is +/- 11 kg):

max engine dry weight (kg)	without Propeller brake Kit	with Propeller Brake Kit
baseline engine (propeller CW)	1938.1	1959.9
handed engine (propeller CCW)	1965.1	1986.9

6. Ratings

- Uprated Take-off (5 minutes): 8251 kW
- Normal Take-off (5 minutes): 7971 kW
- Maximum Continuous: 7971 kW

See Note 6

7. Control System

The engine is equipped with a Full Authority Digital Engine Control (FADEC) System, including the Engine Control Unit and Application Software (STD4.0.2 or later approved standards). Protection functionality is provided by the Engine Protection and Monitoring Unit (EPMU) STD 4.0.3., or later approved standards as authorised in DIS 1002 Issue 2 (plus approved modifications) or later approved issues of the DIS.

8. Fluids (Fuel, Oil, Coolant, Additives)

Approved fuels, additives and oils are listed in the Operating Instructions

9. Aircraft Accessory Drives

	Variable Frequency Generator Pad "75 kVA"	**Hydraulic Pump Pad**
Pad Specification	AS971A	AS469B
Spline Lubrication	wet	wet
Rotation (1)	CCW	CCW
Speed Range [min^{-1}]	14448 to 18121	3839 to 4816
Max. accessory wet weight [kg]	46	22,3
Max. overhung static moment [Nm]	135	40
Max. continuous mechanical extraction [Nm]	41	121
Overload	(2)	(3)
Shear Torque [Nm] (4)	420	560

(1) Rotation is defined facing the AGB pad
(2) VFG Overload definition:
- 116 kW during 5 minutes cumulated within the whole AGB lifetime
- 160 kW during 5 seconds cumulated within the whole AGB lifetime

(3) Hydraulic Pump Overload definition:
- 140 Nm during 15 minutes cumulated within the whole AGB lifetime

(4) Maximum buyer furnished equipment fuse shear torque must provide assurance that the torque capability of the gearbox drive is not exceeded to comply to CS-E80(a) requirement.

10. AGB Power Extraction Limits:

Engine Power Setting	Combined VFG electrical load and Hydraulic Pump load	Combined mechanical power extraction of VFG and Hydraulic Pump at the AGB load pad
MCL and below (Within the entire envelope: -2000ft<altitude<35000ft)	49 kW	58 kW
Between MCL and MCT (Outside the Take-off envelope: 11000ft<altitude<35000ft)	92 kW	109 kW
Between MCL and Take-off (Within the Take-off envelope: -2000ft<altitude<11000ft)	126,8 kW	149 kW

MCL→Max. Climb MCT→Max. Continuous

Note: A mechanical efficiency of 85% of both, VFG and EDP has been used to convert the electrical and mechanical power extraction from VFG and EDP to the mechanical power.

11. PGB accessory drive capacities

	HP Propeller Pump Drive	PCM Mounting Pad	AFP Mounting Pad
Pad Definition	EPIX600237 (LH PGB) EPIX600239 (RH PGB)	EPIX601243 [3]	EPIX601235 [3]
Spline Lubrication	Wet (PGB Oil from accessory)	N/A	N/A
Rotation [1]	CW (LH PGB) CCW (RH PGB)	N/A	N/A
Pad Face Material	A357 Al	A357 Al	A357 Al
Gear Ratio to LP Spool [2]	8360:5418=1,543	N/A	N/A
Max. Accessory Weight	5,0 kg	10,2 kg	9,5 kg
Max. stat. Overhung Moment (1g)	2,3 Nm	9,7 Nm	12,4 Nm
Pad Rating	15.0 kW @ 5418 rpm [3]	N/A	N/A
Normal Continuous Operating Torque	26,4 Nm[3]	N/A	N/A
Shear Torque [Nm]	113 Nm[3] (min. material properties and min. shear diameter)	N/A	N/A

[1] Rotation is defined facing the pad [2] 100%LP Speed: 8360 rpm [3] REMS PGB (M111002, M121002)

12. Maximum Permissible Air Bleed Extraction

PWSD	Max Stage 3 (WRTP305)	PWSD	Max Stage 6 (WRTP305)	PWSD	Max Stage 3 + 6 (WRTP305)
[hp]	*[kg*K$^{0.5}$/kPa]*	*[hp]*	*[kg*K$^{0.5}$/kPa]*	*[hp]*	*[kg*K$^{0.5}$/kPa]*
200	0,0619	200	0,0917	200	0,127
1000	0,0613	1000	0,0917	1000	0,122
1720	0,0598	1720	0,0917	1720	0,113
2460	0,0594	2460	0,0917	2460	0,111
3210	0,0596	3210	0,0917	3210	0,112
3970	0,0593	3970	0,0917	3970	0,113
4730	0,0588	4730	0,0917	4730	0,112
5480	0,0585	5480	0,0917	5480	0,110
6220	0,0580	6220	0,0588	6220	0,0998
6970	0,0567	6970	0,0431	6970	0,0906
7740	0,0563	7740	0,0427	7740	0,0898
8500	0,0552	8500	0,0248	8500	0,0711
9250	0,0551	9250	0,0244	9250	0,0706
10000	0,0445	10000	0,0244	10000	0,0682
10750	0,0454	10750	0,0240	10750	0,0693
11770	0,0449	11770	0,0136	11770	0,0585

IV. Operating Limitations

1. Temperature Limits

1.1 Climatic Operating Envelope

Refer to the Engine Operating Instructions for details of the Climatic Operating Envelope.

1.2 Turbine Gas Temperature (TGT) – Trimmed

- Maximum prior to Ground Start: 150°C
- Starting on Ground: 850°C
- Starting in Flight: 997°C
- Maximum Take-off: 997°C
- Maximum Continuous: 997°C
- Maximum Overtemperature (20 seconds): 1015°C
- Maximum during NL/NP overspeed: 725°C

1.3 Fuel temperature

Declared Primary Fuels (except JP4 and Jet B):

Ambient Temperature	**LP Pump Fuel Inlet Temperature**	**Maximum Altitude**
Up to ISA +40°C	Up to +55°C	Up to 16600 ft
Up to ISA +35°C	Up to +50°C	Up to 35000 ft

JP4 and Jet B:

Boost pump	**Ambient Temperature**	**LP Pump Fuel Inlet Temperature**	**Maximum Altitude**
On	Up to ISA +15°C	Up to +30°C	37500 ft
Off	Up to ISA+15°C	Up to +30°C	32500 ft
On	Between ISA +15°C and ISA +25°C	Up to +40°C	37500ft at Mach ≥ 0.35 32500 ft at Mach < 0.35
Off	Between ISA+15 and ISA+25	Up to +40°C	14000 ft
On	Above ISA+25°C	Up to +55°C	22500 ft at Mach ≥ 0,25 12500 ft at Mach < 0,25
Off	Above ISA +25°C	Any temperature	Flight Not Authorised

Additional limitations have been established to cope with higher fuel temperatures at lower altitudes (<6000ft).

Relaxed LP Pump Fuel Inlet Temperatures below +6000 ft for all declared primary fuels

Boost pump	Ambient Temperature	LP Pump Fuel Inlet Temperature	Maximum Altitude
On	Up to ISA+15°C	Up to +33°C	6000 ft
Off	Up to ISA+15°C	Up to +33°C	6000 ft
On	Between ISA+15°C and ISA+25°C	Up to +43°C	6000 ft
Off	Between ISA+15°C and ISA+25°C	Up to +43°C	6000 ft
On	Above ISA+25°C	Up to +58°C	6000 ft
Off	Above ISA+25°C (for primary fuels except JP4 and Jet B)	Up to +58°C	6000 ft
	Above ISA +25°C (for JP4 and Jet B)	Any temperature	Flight Not Authorised

1.4 Oil temperature

- Minimum for Starting: EOT and GOT minus 40°C
- Minimum before accelerating above idle:
  +50°C EOT and +60°C GOT if initial EOT and/or GOT temperature is lower than -30°C
  +50°C EOT and +42°C GOT if initial EOT and/or GOT temperature is greater or equal to -30°C
- Maximum: +160°C EOT or +150°C GOT

EOT: Engine Oil Temperature GOT: Gearbox Oil Temperature

2. Pressure Limits

2.1 Fuel pressure

Under normal operating conditions the fuel pressure at the engine LP pump inlet must be kept 34 kPa above the true vapour pressure of the fuel with a vapour/liquid ratio equal to zero but below 207 kPa gauge.

The maximum allowable pressure at the engine LP fuel pump inlet after shutdown is 345 kPa gauge.

2.2 Oil pressure

- Minimum EOP for NH < 83% (14940rpm): 350 kPa
- Minimum EOP for NH > 97% (17460rpm): 500 kPa
- Minimum GOP: 250 kPa

3. Maximum / Minimum Permissible Rotor Speeds

Rating	Rotor Speed		
	NH	NI	NP
Uprated Take-off **[min^{-1}]**	18396 (102,2%)	10470 (104,7%)	864 (102,6%)
Normal Take-off **[min^{-1}]**	18396 (102,2%)	10470 (104,7%)	864 (102,6%)
Max. Continuous **[min^{-1}]**	18396 (102,2%)	10470 (104,7%)	846 (100,5%)
Transient (max. 20 sec.) **[min^{-1}]**	18430 (102,4%)	10575 (105,75%)	948 (112,6%)

NH → HP spool speed, NI → IP spool speed, NP → propeller speed, PGB transmission ratio=9,929:1

4. Installation Assumptions

Refer to Installation Manual for details.

5. Time Limited Dispatch

Information on engine operation with FADEC system dispatch limitations is contained in the respective Time Limits Manual.

V. Operating and Service Instructions

Document	Document Reference
Installation Manual	D6.0020.02 Issue 07 or later approved issues
Operating Instructions Manual	D6.0020.03 Issue 04 or later approved issues
Engine Manual	D6.0025.01 Identification of Manuals Issue 01 or later approved issue
Maintenance Manual	D6.0025.01 Identification of Manuals Issue 01 or later approved issue
Time Limits Manual	D6.0025.02Airworthiness Limitations Issue 04 or later approved issue
Service Bulletins	As issued by EPI Europrop International GmbH

VI. Notes

1. Life Limited Critical Parts and Airworthiness Limitations are included in the respective Time Limits Manual.

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

3. Information on lightning protection and electromagnetic compatibility is contained in the Installation Manual.

4. The TP400-D6 engine must be installed with a Nacelle Air Intake Standard as defined in the Engine Installation Manual D6.0020.02.

5. Propellers to be used with the TP400-D6 engine must have mounting and functioning characteristics which are compatible with the engine and its control system. The TP400-D6 engine and control system has been designed and tested to be compatible with the Ratier-Figeac propeller P/Ns FH385/386.

6. The ratings shown under III.6. are achieved at sea level and ISA standard day conditions using a defined test bed configuration for the air intake and exhaust system with all optional bleeds closed and the aircraft service equipment drives unloaded, at a lower fuel heating value of 42798 kJ/kg.

7. Operation in freezing fog conditions below minus 9°C is prohibited.

8. There are two configurations of the PGB. CW (M11XXXX) turning the propeller clockwise when viewed from the rear of the engine and CCW (M12XXXX), turning the propeller anticlockwise when viewed from the rear of the engine.

9. The maximum allowed ceiling pressure altitude for aircraft take-off is 14600 ft.

10. The duration of negative or zero ‘g’ must not exceed a period of 20 seconds.

11. The maximum crosswind component for ground operations is 40 knots.

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

CS-E Certification Specifications for Engines
DIS Drawing Introduction Sheet (Type Design Definition)
EASA European Union Aviation Safety Agency
EEC Electronic Engine Controller
ESF Equivalent Safety Finding
FADEC Full Authority Digital Engine Control
HP High Pressure
LP Low Pressure
TCDS Type Certificate Data Sheet

II. Type Certificate Holder Record

EPI Europrop International GmbH

III. Change Record

Issue	Date	Changes	TC issue
Issue 01	06 May 2011	Initial Issue	06 May 2011
Issue 02	16 May 2011	Change of TC Holder's name	16 May 2011
Issue 03	29 May 2013	DIS update; correction to engine weight; change to accessory loading; increasing the oil temperature limits	
Issue 04	04 September 2013	Changes to the oil system	
Issue 05	23 June 2014	Major Change Approval No. 10049608 introduction of an ECU Application Software STD4 as per CHP430-13-0008 issue 02	
Issue 06	27 June 2014	Major Change Approvals No. 10043575 and 10047953: Introduction of JP4 and Jet-B Fuels, and limitation alteration related to the use of JP4 and Jet-B fuels as per CHP 450-11-0011 issue 01	
Issue 07	04 July 2019	- New TCDS format - Change of TC Holder's registered address - STD4.0.2/STD4.03.3 SW introduced and P/Ns deleted (EASA Major Change Approvals 10063462 & 10057147) - Revised fuel temperatures (EASA Major Change Approval 10065450) - Revised NI speeds (EASA Major Change Approval 10067806) - Editorial changes to Notes 1. and 8. - Note 11. (EASA Major Change Approval 10056492)	04 July 2019

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