

Automatic Power Reserve, (APR, 10 minutes)

SHP	NA*	NA	1650
ESHP	NA	NA	1723
Output Shaft RPM	NA	NA	1552

* Not Applicable (NA)

PRINCIPLE DIMENSIONS OF BASIC ENGINE

Refer to the Installation Drawings for each specific engine model configuration for dimensions and center of gravity location.

WEIGHT

<u>MODEL</u>	<u>Weight, dry, lbs.</u>
TPE331-14A	581
TPE331-14B	592
TPE331-14F	620
TPE331-14GR	620
TPE331-14HR	633
TPE331-15AW	659

The engine weights shown herein are that of the engine assemblies. Not included are Engine Parts List, or Engine Equipment List items coded "A" together with their attaching hardware (See Note 12).

PROPELLER OUTPUT SHAFT SPEED RATIO

<u>MODEL</u>	<u>Propeller-shaft to engine rotor ratio</u>
TPE331-14A	1:22.6546
TPE331-14B	1:22.6794
TPE331-14F	1:22.6546
TPE331-14GR	1:22.9671
TPE331-14HR	1:22.9285
TPE331-15AW	1:25.1108

FUEL

Engine operation is approved with the following aviation turbine fuels:

- Honeywell International Inc. EMS53111 (Type A)
- Honeywell International Inc. EMS53112 (Type A-1)
- Honeywell International Inc. EMS53112 (British D. Eng. R.D. 2494 Issue 7)
- Honeywell International Inc. EMS53113 Class A (British D. Eng. R.D. 2386 Issue 8)
- Honeywell International Inc. EMS53113 (Type A, JP-4 and Class B-Type B)
- Honeywell International Inc. EMS53116 (Type JP-5)

Other approved fuels are listed in the Installation Manual (IM)-3500 for -14A, -14B, IM-7364 for TPE331-14F, IM-6350 for TPE331-15AW and IM-7544 for TPE331-14GR, -14HR. Fuels not containing anti-icing inhibitors may have MIL-I-27686E Fuel System Icing Inhibitor, or an equivalent inhibitor, added, but not in excess of 0.15 percent by volume.

Aviation gasoline MIL-G-5572D, Grade 80/87, not in excess of 1,000 gallons per 100 hours of operation, may be used for emergency fuel operation.

Aviation gasoline MIL-G-5572D, Grade 100/130, not in excess of 250 gallons per 100 hours of operation, may be used for emergency fuel operation. Total usage must be limited to 7,000 gallons during any 3,000 hour period. If combinations of the above aviation gasolines are used, the following formula is required for establishing proportions of combinations during any 3,000 hour period:

$$\frac{\text{Amount of Grade 100/130 (low lead, gal.)}}{7,000 \text{ gal.}} + \frac{\text{Amount of Grade 80/87 gal.}}{30,000 \text{ gal.}} < 1.0$$

If 25 percent or more of aviation gasoline is used at anytime, one quart of aviation grade oil must be added to the mixture for 100 gallons of aviation gasoline.

Shell ASA-3 anti-static additive, or equivalent, in amounts to bring the fuel up to 300 conductivity units may be used, but in no event shall the additive exceed 1 ppm.

Biobor JF Biocide (Sohio or equivalent) 270 ppm maximum (20 ppm of elemental boron) may be used in the fuel for pesticide purposes.

OIL

Oils conforming to Honeywell International Inc. Specification EMS 53110 (Type I and Type II)

CERTIFICATION BASIS

14 CFR part 33 dated February 1, 1965 and Amendment 1, 2, 3, 4, 5, 6, 7, 8 and 9 exemption No. 82-ANE-004-E dated December 23, 1982.

Model	Part 33 Certification Basis	Date of Application	Date of Issuance/Amended
-14A	*as stated above	10/05/81	4/26/84
-14B	*	10/05/81	4/26/84
-15AW	*	7/06/84	12/05/88
-14F	*	5/03/88	5/24/89
-14GR	*	7/26/89	7/13/92
-14HR	*	7/26/89	7/13/92

PRODUCTION BASIS

Production Certificate No. 413 issued March 4, 1965. Reissued Production Certificate No. 413NM to Honeywell International Inc. on January 25, 2000.

NOTE 1. MAXIMUM PERMISSIBLE TEMPERATURES

Exhaust gas temperature, deg F(deg C)

	TPE331 Engine Model	
	-14A, -14B -14F, -15AW	-14GR, -14HR
Maximum Continuous	1134(612)	1159(626) (See Notes 14 & 18A)
Takeoff (5 minute)	1134(612)	1122(605)
Automatic Power Reserve (APR)	Not applicable	1191(644) (See Note 18B)

The above APR, Takeoff and Maximum Continuous exhaust gas temperatures are for uninstalled U.S. Standard sea-level conditions. Exhaust gas temperature will vary as a function of ambient conditions, engine operating speed and installation effects. Consult Installation Manual IM-3500 for TPE331-14A,-14B, IM-7364 for TPE331-14F, IM-6350 for TPE331-15AW or IM-7544 for TPE331-14GR,-14HR for other than standard day sea-level limits. (See NOTE 13).

TPE331-14A,-14B,-14F

-15AW14GR/HRExhaust gas temperatureduring starting deg F (deg C) for 5 seconds

1429 (776)

1607 (875)

See IM for more complete operating limits and actions if above temperature is exceeded

Oil temperature, deg F (deg C)Condition

Engine Model	Oil Type	<u>Starting</u> (Minimum)	<u>Ground Idle</u> (Maximum)	<u>Above Ground Idle to</u> <u>Hot oil SHP Limit</u> (Range for 5 min)	<u>Above</u> <u>Hot Oil</u> <u>SHP Limit</u> Maximum	<u>Hot Oil</u> <u>SHP</u> <u>Limit</u>
All	MIL-L-7808	-40 (-40)	200 (93)	175-200 (79-93)	175 (79)	1000
All	MIL-L-7808G	-40 (-40)	230 (110)	187-215 (86-102)	187 (86)	1000
-14A	MIL-L-23699	-40 (-40)	260 (127)	230-260 (110-127)	230 (110)	1000
-14B	"	"	"	"	"	"
-14F	"	"	"	"	"	"
-14GR	"	"	"	"	"	1500
-14HR	"	"	"	"	"	"
-15AW	"	"	230 (110)	230 (110) Max	N/A	1650

Ambient Air Temperature, deg F (deg C)

	<u>Starting</u>	<u>Operation</u>
Minimum	-65 (-54)	---
Maximum	131 (55)	131 (55)

Engine External Components Surface Temperature Limits

See Installation Manual IM-3500 for TPE331-14A,-14B, IM-7364 for TPE331-14F, IM-6350 for TPE331-15AW and IM-7544 for TPE331-14GR,-14HR

NOTE 2: Pressure Limits

	TPE331 Engine Model		
	-14A, -14B, <u>-14F</u>	<u>-14GR, -14HR</u>	<u>-15AW</u>
Fuel pump inlet pressure	See IM	See IM	See IM
Oil pressure at inlet connection to the engine, minimum	5 psia	5 psia	5 psia
Oil operating pressure at ground idle (Minimum at 65 percent speed)	15 psig	15 psig	15 psig
Normal oil operating range (95 to 100 percent speed)	35 to 70 psig (130 to 230F oil temp.)	45 to 75 psig (122 to 230F oil temp.)	45 to 75 psig (130 to 230F oil temp.)

Minimum water-methanol augmentation manifold inlet pressure (TPE331-14GR,-14HR, & -15AW) 7 psig (See NOTE 17) 7 psig (See NOTE 17) 7 psig (See NOTE 17)

NOTE 3. The engine ratings are based on:

Dynamometer operation at U.S. Standard Atmosphere, Sea-Level Static Conditions.

Honeywell EMS53111 aviation turbine fuel Type A with lower heating value of 18,400 BTU per pound.

MIL-L-23699B Type II

No bleed-air extraction.

No anti-icing airflow.

No external accessory loads.

Zero inlet loss.

Exhaust gas discharging to ambient-static pressure through the turbine exhaust diffuser furnished with the engine.

NOTE 4. Equivalent shaft horsepower (ESHP) for static conditions is based on:

$$\text{ESHP} = \frac{\text{Net thrust, pounds} + \text{SHP}}{2.5}$$

NOTE 5. ACCESSORY PROVISIONS

	All Models	TPE331 Engine Model					
		-15AW <u>-14A, -14F</u>	<u>-14B</u>	<u>-14GR</u>	<u>-14HR</u>		
(a) Aircraft Accessory							
Type of drive: (one each)							
AS961-1CT		X	X				
AND 20001 Type XI-B				X	X		
Drive Modifications:		Rotation, T _s , T _O , Stud pattern rotated 37 deg.		Rotation, T _c , Stud pattern rotated 37 deg.			
Rotation (facing drive pad)	CCW						
RPM at 100% engine speed		4010	4014	4087	4080		
Maximum torque (lb-in)							
T _c , continuous torque	300						
T _O , overload torque	375						
T _s , static torque	1,650						
Overhung moment (lb-in)	100						
Speed ratio, drive to engine rotor		0.11488	0.11488	0.11466	0.11466		
		TPE Engine Model					
(B) Starter, Starter- Generator	All Models	-14A	-14B	-14F	-15AW	-14GR	-14HR
Type of drive: (one each)	AS468 Type AV-1						
Drive Modification:	Rotation, RPM T _c , T _O , T _s						
Rotation (facing drive pad)	CCW						
RPM at 100% engine speed		11,881	11,894	11,881	11,885	12,115	12,095

Maximum torque (lb-in)							
T _C , continuous torque	132						
T _O , overload torque	265						
T _S , static torque	2,200						
Overhung moment (lb-in)		6,300*	6,300*	500	500	600	600
Speed ratio, drive to engine rotor		0.34054	0.34054	0.34054	0.34054	0.33989	0.33989

*Maximum overhung moment allowed at 1g when starter generator is restrained to engine casing.

NOTE 5. ACCESSORY PROVISIONS - CONTINUED

		TPE331 Engine Models			
		14A,14F, <u>-15AW</u>	<u>-14B</u>	<u>-14GR</u>	<u>-14HR</u>
(C) <u>Propeller Governor</u>	<u>All Models</u>				
Type of drive: (one each)	AND20010				
Drive Modifications:	Rotation, RPM stud length & negative torque system supply port				
Rotation (facing drive pad)	CCW				
RPM at 100 percent engine speed		3739	3743	3807	3801
Maximum torque (lb-in)					
T _C , continuous torque	125				
T _O , overload torque	188				
T _S , static torque	825				
Overhung moment (lb-in)	125				
Speed ratio, drive to engine rotor	0.10714				
(D) <u>Propeller Pitch Control</u>					
Type of drive: (one each)	Mounting pad provides overhung moment of 30 in-lb				
(E) <u>Auxiliary Aircraft Accessory</u>		<u>TPE331-15AW</u>	<u>TPE331-14F</u>		
Type of drive: (one each)		AND20002 Type XII D Modified	AND20002 Type XII D Modified		
Drive modifications:		Rotation, RPM T _C , T _O , T _S & stud pattern rotated 30 deg.	Rotation, RPM T _C , T _O , T _S & stud pattern rotated 30 deg.		

Rotation (facing drive pad)	CCW	CCW
RPM at 100 percent engine speed	12,254	12,511
Maximum torque (lb-in)		
T _C , continuous torque	309	300
T _O , overload torque	463	463
T _S , static torque	1,700	1,700
Overhung moment (lb-in)	500	500
Speed ratio, drive to engine rotor	0.35107	0.35844

NOTE 6. Maximum allowable propeller shaft torque as sensed by the torque sensor, in pound-feet:

	TPE331-14A, <u>-14B, 14F</u>	<u>TPE331-15AW</u>	TPE331-14GR, <u>-14HR</u>
5 minute torque limit:	4262	6234	5584
Maximum continuous torque limit:	4262	6234	5584

See IM for transient engine over torque limits.

NOTE 7. Propeller Output Shaft, (Bolted Flange) Maximum Speed Percent (RPM):

	TPE331-14A, <u>-14B, -14F</u>	<u>TPE331-15AW</u>	TPE331-14GR, <u>-14HR</u>
Normal operation	100.0(1540)	100.0(1390)	100.0(1552)
Continuous operation	101.0(1555)	101.0(1404)	101.0(1568)
Transient limit	104.0(1602)	104.0(1446)	104.0(1614)

NOTE 8. Propeller Output Shaft, (Bolted Flange) Direction of Rotation:

	TPE331-14A, <u>-14F,-14GR,-15AW</u>	TPE331-14B, <u>-14HR</u>
Rotation when looking forward at turbine exhaust flange	CW	CCW

NOTE 9.

High Pressure (HP) Compressor discharge bleed air - Up to 12 percent of the engine airflow is available for bleed air purposes (except during starting). Of this 12 percent total, 1.0 percent is used by the engine mounted anti-icing system.

NOTE 10.

Low Pressure (LP) Compressor interstage bleed air - Up to 10 percent of the engine airflow is available as option except total of HP and LP bleed not to exceed quantity allowed for HP bleed. These engines meet FAA requirements for adequate turbine disk integrity and rotor blade containment and do not require external armoring.

NOTE 11.

These engines meet FAA requirements for operation in icing conditions within the envelope defined in Part 25, Appendix C.

NOTE 12.

Variations in engine configuration and installation components are identified by a suffix to the basic model number on the engine nameplate; i.e. TPE331-14A-XY ("X" denotes Honeywell installed configurations rating code number(s) and "Y" denotes Honeywell equipment code letter(s) of aircraft manufacturer), and an Engine Parts List or Equipment List number. Certain features of these components are influenced by aircraft design considerations. In the Engine Parts List or Equipment List, those items coded "A" have been demonstrated as compatible with the basic engine during engine certification testing; however, the operation, functioning and rigging of these in a specific aircraft installation must be demonstrated during certification. Subsequent design change to the engine associated with these factors is the responsibility of the aircraft manufacturer and must be in compliance with Part 33.

NOTE 13.

The TPE331-14A,-14B,-14F,-14GR,-14HR and -15AW engine have been designed to accommodate a "Variable Red Line/Auto-Start" (VRL) temperature indicating system and an automatic "Torque and Gas Temperature Limiting" system. The temperature limiting system for these engines will vary with the operating condition to produce rated shaft power without exceeding the maximum rated temperature (see Note 3).

With the VRL inoperative, the EGT limit the TPE331-14A,-14B,-14F,-14GR,-14HR, and -15AW engines will vary as a function of ambient conditions. Consult IM for off-standard day EGT limits.

Component interface and installation requirements of the aircraft-installed components are also described in IM-3500 for TPE331-14A, -14B model engines, IM-7364 for TPE331-14F engine model, IM-6350 for TPE331-15AW model engine and IM-7544 for TPE331-14GR,-14HR model engines.

NOTE 14.

Certain engine parts are life limited. These are listed in FAA approved Honeywell International Inc. Service Bulletins as follows:

Engine Models	Honeywell Service Bulletins
TPE331-14A, -14B	TPE331-72-7002 dated February 27, 1995, or later FAA approved revisions
TPE331-14F	TPE331-72-7050 dated June 17, 1994, or later FAA approved revisions
TPE331-14GR, -14HR	TPE331-72-7082 dated April 2, 1999, or later FAA approved revisions
TPE331-15AW	TPE331-72-7502 dated May 17, 1994, or later FAA approved revisions

NOTE 15.

Transient operation of propeller output shaft speed above 104 percent to a maximum of 106.0 percent is allowable for fuel control overspeed governor test when the propeller is on the start locks. Refer to engine maintenance manual for proper procedures and limitations for this test.

NOTE 16.

The power management system incorporates a limited authority IEC (Integrated Engine Computer) that limits engine maximum torque and maximum exhaust gas temperature. This device incorporates digital circuitry. The software programming procedures have been determined to meet the "critical" category under the guidelines of RTCA document DO 178.

NOTE 17.

Augmented performance for the TPE331-14GR,-14HR and TPE331-15AW models may be obtained by the addition of a water-methanol injection system. Water-methanol mixture must conform to that shown in FAA approved installation manual IM-6350 for the TPE331-15AW and IM-7544 for the TPE331-14GR,-14HR. The torque limit remains as shown in NOTE 6. Exhaust gas temperature limit remains as per NOTE 1, except that for IEC-inoperative mode, EGT limits per the appropriate IM must be used.

	<u>TPE331-14GR,-14HR</u>	<u>TPE331-15AW</u>
SHP at sea level, static, ambient temperature limit	1650	1645
Sea level, static, ambient temperature limit, deg F (deg C)	131(55)	100(38)
Minimum Water/Methanol flow rate, lb/hr	1680	1680
Maximum Water/Methanol flow rate, lb/hr	1850	1850

NOTE 18.

- A) The Continuous Power Reserve (CPR) mode of the IEC provides engine operation with EGT between 1105°F and 1159°F, inclusive, and meets Part 33 requirements. The CPR mode is available only with the IEC operational (refer to Installation Manual IM-7544). The torque limit remains as shown in Note 6. Engine operation above 1104°F EGT requires applying engine hour and cycle maintenance factors in accordance with Engine Maintenance Manuals 72-04-05 and 72-04-07, and Service Bulletins TPE 331-72-7081 dated December 22, 1995, and TPE331-72-7082 dated December 22, 1995. The use of CPR mode in an aircraft installation must be certified per Part 23 or 25 requirements (refer to Note 12 - items coded "A").
- B) The Automatic Power Reserve (APR) feature of the IEC is a 10-minute emergency power rating which automatically increases engine power and the VRL temperature in the event of power loss in another engine. The torque limit remains as shown in NOTE 6.

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