A330-200 & -300 specifications

The A330-200/-300 family is powered by three main engine types. There are several MTOW, MLW & MZFW combinations and engine thrusts, making aircraft specifications complex.

The A330-200 and -300 are twin-engined, medium- and long-range widebody sisters to the four-engined long-range A340-200/-300. Both types were launched in January 1986. Initial service entry for the A330-300 took place in December 1994, while the A330-200 followed in April 1998. Since 1998, all newly certified A330 models and engine combinations have received 180-minute extended range twin-engined operations (ETOPs) approval at entry-into-service (EIS).

Ascend/Airclaims forecasts that the A330-300 will continue to be a major player in the intra-Asian market for the next 10-15 years, notwithstanding the introduction of the smaller 787 and the A350-900, both of which are targeted at longer-range markets. Ascend expects the A350-900 to replace the A330-300 over the longer term, however. A freighter conversion programme for the A330-300 is now likely, since it could make a good long-term replacement for the A300-600.

Configuration

The A330-200 and -300 are available with three engine choices: the General Electric CF6-80E1; Pratt & Whitney PW4164/8; and Rolls-Royce Trent 700. The shorter A330-200 is capable of flying up to 6,450nm with about 240 passengers. The longer -300 has a range of up to 5,400nm with 300 passengers.

The flightdeck design was finalised in 1988 and is virtually identical to that of the A320 family, with a six-screen electronic flight instrument system (EFIS) and side-stick controllers. Like the A320 family, the A330 and its sister A340 use a digital fly-by-wire (FBW) flight control system. This allows the two aircraft to benefit from a common type rating and cross-crew-qualification (CCQ). The A330 and A340 flightdecks differ only in the number of engine throttles and engine-related displays. Meanwhile, the wings are structurally similar, with differences mainly being due to the A330 having one engine pylon per wing, compared with the two on the A340.

For the passenger aircraft, there are five designations of the A330-200 series and nine of the A330-300 series. The five -200 variants are the -201, -202, -203, -223 and -243. The nine -300 variants are the -301, -302, -303, -321, -322, -323, -341, -342, and -343.

The last digit of the variant's suffix refers to the installed engine thrust rating *(see table, page 9)*.

The middle digit refers to the engine family: the use of a 0 refers to the CF6-80E1; the use of a 2 refers to a PW4000 installed on the aircraft; and the use of a 4 indicates a Trent 700 *(see table, page 9)*.

In January 2007 Airbus launched a new factory freighter variant, the A330-200F. This can carry 141,096lbs payload over 4,000nm. It should be noted that this version has only two engine choices: the PW4168 and Trent 700.

There are two variants of the A330-200 Freighter; a 'payload' version and a 'range' version. The 'payload' version can carry 151,899lbs over 3,200nm with Trent engines, or 151,330lbs with PW4170s. The 'range' version can carry its 140,875lbs gross structural payload over 4,000nm with Trent 772B-60 engines, or 140,307lbs with PW4170 engines. The disparity in structural payload capability is due to engine weight differences, and so the operating empty weight (OEW). The first two aircraft will be delivered in the autumn of 2009, according to Airbus.

Aircraft weight options

Today Airbus offers two 'basic' factory production maximum take-off weight (MTOW) options for both the A330-200 and A330-300. These are marketed in European metric units as the standard '230-tonne' aircraft (507,000lbs) and '233-tonne' aircraft (513,700lbs).

The 'basic' A330-200 is today identified in Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA) certification documentation by the weight variant number '020'. This number is not used in the name suffix. This offers an MTOW of 507,000lbs, a maximum landing weight (MLW) of 396,900lbs, and a maximum zero fuel weight (MZFW) of 370,440lbs *(see table, page 9)*.

Meanwhile, the high gross weight version today is identified in certification documentation as '052'. It has a higher MTOW of 513,700lbs, an MLW of 401,300lbs, and an MZFW of 374,850lbs *(see table, page 9)*. In addition to these two weight variants, there are many more possible combinations of MTOW, MLW and MZFW. The combination depends on individual customer requirements and engine thrust. In summary, the weights for the A330-200 series lie between the following ranges: MTOW of 192t-233t (423,288lbs-513,765lbs); MLW of 180t-182t (396,900lbs-401,300lbs); MZFW of168t-170t (370,440lbs-374,850lbs). Airbus states that the A340-200's typical OEW is 263,700lbs.

Meanwhile, the A330-300 has seven 'weight variant' numbers. According to FAA certification data, these are: '000' (basic), '001', '002', '020', '022', '050', and '052'. These draw from a range of possible MTOW, MLW and MZFW combinations. Examples of MTOWs are 405,720lbs, 467,460lbs, 478,400lbs, 507,000lbs, and 513,700lbs. The latter two are 'high gross weight' (HGW) options.

Examples of MLWs are 383,670lbs, 390,285lbs, 407,925lbs, and 412,335lbs. Examples of MZFWs are 361,620lbs, 368,235lbs, 381,465lbs, and 385,875lbs. As with the A330-200, there are additional Airbus weight variants besides those listed on the FAA certification data sheet.

To summarise for the -300 series, these span the following weight ranges: MTOW of 184t-233t (405,720lbs-513,765lbs); MLW of 174t-187t (383,670lbs-412,335lbs); and MZFW of 164t-175t (361,620lbs-385,875lbs). According to Airbus, the A330-300's typical OEW is 267,200lbs-274,500lbs.

In addition, for both the A330-200 and -300, Airbus points out that while the lower take-off weights still exist as certificated options, all recent customers have taken delivery of only the newest and most capable weight variants. This ensures ample range capability.

A330-200 Freighter

The A330-200F is the most recently launched version of the A330-200/-300 family. The A330-200F has just two combinations of weight and payload options. Airbus simply differentiates these two as 'Range Mode' and 'Payload Mode'. For Range Mode (standard

A330-200/-300 SPECIFICATIONS TABLE

Aircraft variant	Engine type	Take-off thrust	EGT redline temp	MTOW lbs	MLW lbs	MZFW lbs	OEW lbs	Max payload lbs	Fuel capacity USG	Seats 3-class	Range nm	Belly freight cu ft
A330-201	CF6-80E1A2	64,350	975	513,765	401,300	374,850	266,850	108,020	36,744	253	6,450	4,108
A330-202	CF6-80E1A4	66,870	975	513,765	401,300	374,850	266,830	108,020	36,744	253	6,450	4,108
A330-203	CF6-80E1A3	68,530	975	513,765	401,300	374,850	266,830	108,020	36,744	253	6,450	4,108
A330-223	PW4168A	68,600	620	513,765	401,300	374,850	267,635	107,215	36,744	253	6,450	4,108
A330-243	Trent 772B-60	71,100	900	513,765	401,300	374,850	267,031	107,819	36,744	253	6,450	4,108
A330-243	Trent 772C-60	71,100	900	513,765	401,300	374,850	267,031	107,819	36,744	253	6,450	4,108
A330-301	CF6-80E1A2	64,530	975	467,460	412,335	385,875	277,368	108,507	25,858	295	5,400	5,056
A330-302	CF6-80E1A4	68,870	975	513,765	412,335	385,875	277,368	108,507	25,765	295	5,400	5,056
A330-303	CF6-80E1A3	68,530	975	513,765	412,335	385,875	277,368	108,507	25,765	295	5,400	5,056
A330-321	PW4164	64,500	620	467,460	401,300	379,195	278,175	101,020	25,858	295	5,400	5,056
A330-322	PW4168	68,600	620	467,460	401,300	379,195	278,175	101,020	25,858	295	5,400	5,056
A330-323	PW4168A	68,600	620	513,765	412,335	385,875	278,175	107,700	25,765	295	5,400	5,056
A330-341	Trent 768-80	67,500	900	467,460	401,300	379,195	277,593	101,602	25,858	295	5,400	5,056
A330-342	Trent 772-60	71,100	900	513,765	401,300	379,195	277,593	101,602	25,858	295	5,400	5,056
A330-343	Trent 772B/C-60	71,100	900	513,765	412,335	385,875	277,593	108,282	25,858	295	5,400	5,056

version), the MTOW is 513,765lbs, MLW is 401,300lbs, and MZFW is 381,400lbs. For the optional Payload Mode, MTOW is 500,450lbs, MLW is 412,335lbs, and MZFW is 392,423lbs *(see table, page 10)*. Both freighter variants have the same 36,744 USG maximum total fuel capacity as the passenger -200 version.

"The payload mode option is a paper option, so is physically the same aircraft," notes Didier Lenormand, head of freighter marketing at Airbus. "To go from the range version to the payload version, the customer just needs to buy a service bulletin (SB) to change the specification of the aircraft. Moreover, to be able to have the increase in zero-fuel-weight (for the payload mode), we had to reinforce the aircraft, which necessitated a development cost on our part. We have an option that we sell because have to recover part of these development costs."

The A330-200F fuselage cross-section will be identical to the Airbus A300-600F, which will eradicate any structural difficulties associated with the design of the cargo door. The aircraft will also have a strengthened maindeck floor. Regarding changes to the landing gear bay, Lenormand explains that the attachment point of the nose landing gear to the primary aircraft structure has been lowered by about 40cm to allow the fuselage to be completely level when on the ground to aid loading of cargo. This modification results in a small blister fairing below the nose of the aircraft and does not incur a significant drag penalty.

CF6-80E1 series turbofan

The A330 series is powered by three engine types and various thrust variants of these. General Electric's engine for the A330 is the CF6-80E1 turbofan. This engine family uses a dual rotor, axial flow, annular combustor configuration. The 14-stage high pressure compressor (HPC) is driven by a two-stage high pressure turbine (HPT) and the integrated fan and low pressure compressor (LPC) are driven by a five-stage low pressure turbine (LPT).

When flat rated at 30°C for the A330, the variants deliver the following take-off thrusts: 64,530lbs for the CF6-80E1A2 (A330-201 and A330-301); and 66,870lbs for the CF6-80E1A4 (A330-202 and A330-302). The more powerful 68,530lbs CF6-80E1A3 was launched on the A330-203 and is now also available for the -303. This model includes an R88DT material HPT and new Stage 1 LPT nozzle and which permits an 'actual' exhaust gas temperature (EGT) redline of 1,060°C (corresponding to an 'indicated' EGT of 975°C).

PW4100 series turbofan

Meanwhile, Pratt and Whitney's 100-inch fan diameter PW4000-100 series are axial airflow, dual-spool turbofans with a single-stage fan, five-stage LPC, 11-stage HPC, annular combustor, two-stage HPT, and a five-stage LPT. On the A330, these deliver the following take-off thrust performance: 64,500lbs for the PW4164 (A330-321); 68,600lbs for the PW4168 for the A330-322; and 68,600lbs for the PW4168A (A330-223 and A330-323).

The PW4168A engine model provides the same take-off thrust as the PW4168 model at or below sea-level pressure altitude, and increased take-off thrust at pressure altitudes above sea-level and below 14,100ft and below temperatures of 40°C. The PW4000 series 'indicated' versus 'actual' EGT values are controlled by engine control unit (ECU) software. ECU software version SCN5C permits maximum permissible EGTs of 625°C actual and 620°C indicated for take-off (five minutes) and 600°C for maximum continuous.

Trent 700 series turbofan

Rolls-Royce has delivered several variants of the Trent 700 for the A330. This axial flow engine family uses three independent coaxially rotating shafts. The central shaft (innermost) runs through the length of the engine and links the single-stage low-pressure (LP) wide-chord-fan at the front, to a four-stage LP turbine at the rear. The next shaft links the eight-stage intermediate pressure (IP) compressor to a single-stage IP turbine. The outermost shaft links the six-stage high pressure (HP) compressor to its single-stage turbine. The combustion chamber is annular.

The original base version of this engine is the 67,500lbs thrust Trent 768-60 (A330-341). An increased thrust 71,100lbs Trent 772-60 version was

A330-200F SPECIFICATIONS

Aircraft variant	Engine	MTOW lbs	MLW lbs	MZFW lbs	OEW lbs	Structural payload-lbs
A330-200F	Trent 772C-60	500,450	412,264	392,422	240,524	151,899
A330-200F	Trent 772C-60	513,677	401,241	381,400	240,524	140,875
A330-200F	PW4170	500,450	412,264	392,422	241,093	151,330
A330-200F	PW4170	513,677	401,241	381,400	241,093	140,307

subsequently introduced (A330-342), and was first selected by Cathay Pacific. An improved version of this engine, the Trent 772B-60, delivers the same thrust and powers both the A330-243, and A330-343. The Trent 772B-60 has the same ratings as the 772-60 except between 2,000ft and 8,000ft altitude, or when the ambient temperature is greater than ISA +15°C, where the 772B-60 produces increased thrust at take-off ratings. The magnitude of this increase varies with altitude and ambient temperature and is limited to a maximum of 5.4%.

In 2006, Rolls-Royce introduced the Trent 772C-60. This model has the same ratings as the 772B-60, except at altitudes above 8,000ft where the 772C can provide more thrust in both take-off and continuous conditions. The extent of this thrust increase is dependent on altitude, temperature and Mach number, but is limited to a maximum of 8.5%. According to the original equipment manufacturer (OEM), this most recent model delivers improved fuel consumption and time on-wing, and better hot-and-high sustained performance than the 772B-60. Moreover, Rolls-Royce says the Trent 700 can accommodate any growth capability of the A330, and the latest versions incorporate materials capable of withstanding pressures and temperatures for 75,000lbs thrust.

Fuel capacities

The A330-300 is configured with fuel tanks in the wings plus a tail trim tank. The total usable fuel capacity of all the variants is very similar, but there are slight differences depending on the model and weight variant. The A330-301, A330-321/-322, A330-341/-342, and A330-342 (except for weight variants '022' and '052') all have a wing fuel capacity of 24,241USG and a tail trim tank capacity of 1,617USG, making a total of 25,858USG *(see table, page 9)*. Meanwhile, the A330-302/-303, A330-323, A330-343, A330-342 weight variant '022', and A330-342 weight variant '052' all have a wing fuel capacity of 24,119USG, plus a tail trim tank holding up to 1,646USG making a total of 25,765USG *(see table, page 9)*. For both groups, the unusable fuel is 94USG.

The A330-200 series is not only configured with fuel tanks in the wings and tail trim tank, but it also holds fuel in the centre section; similar to the long-range A340. The capacity is made up as follows: the wing tanks hold 24,119USG; the tail trim tank capacity is 1,646USG; and the centre tank holds 10,979USG. This makes a total of 36,744USG *(see table, page 9)*. Unusable fuel is 1,154USG in the A330-200. The A330-200's fuel capacity is therefore 40% more than the standard A330-300's due to use of centre section fuel.

Accommodation & interior

The A330-200 can carry 253 passengers in a typical three-class layout with 12 in first, 36 in business, and 205 in economy class (eight abreast). An alternative two-class layout for regional operations is 293 passengers, comprising 30 in first class and 263 in economy. High-density layouts up to 380 passengers (29/30in, nine-abreast). Lower-deck modular crew rest area or lavatories are available.

The A330-300 has a typical 335-seat configuration in a two-class arrangement for 30 first-class seats, at a 40-inch seat pitch, and 305 economy-class seats at a 34-inch pitch. For longer routes, a 295-seat three-class arrangement has 18 sleeper seats, 81 business-class seats at 36-inch pitch and 196 economy-class seats at 34-inch pitch. Alternatively, the aircraft can typically accommodate 12 first at a 62-inch pitch, 42 business at 40-inch pitch, and 241 economy-class seats at 32-inch pitch. Lower-deck modular crew rest area or lavatories are available.

For both the A330-200 and -300, the maximum theoretical number of passengers certified for emergency evacuation is 375 basic (three type-A and one type-1 doors installed) and 406 option (four 'type A' doors installed - Mod 40161). The highest-density seating can be realised in a nine-abreast, 29/30-inch pitch configuration with a 'Type A' option for door 3. For the A330-300, 392 passengers can be accommodated in an all-economy arrangement with 31-inch pitch at eight-abreast.

For both versions, seat pitch can be adapted in units of one inch. Galleys, lavatories and stowage bins can be located in different various groupings and locations. In-flight entertainment can be incorporated in the seats or screens mounted on partitions below the overhead stowage bins.

Freight capacities

The A330-200 passenger version's basic underfloor freight capacity is 26 LD-3s plus bulk. This configuration allows for 4,108 cu ft total capacity. Alternatively, operators can choose a layout with eight 96-inch pallets plus three LD-3s. This configuration allows for 3,572 cu ft total belly freight capacity. The larger A330-300's underfloor freight capacity is 32 LD-3s plus bulk. This configuration allows for 5,056 cu ft total capacity. Alternatively, operators can choose a layout with nine 96-inch pallets plus two 88-in pallets plus one LD-3 plus 695 cu ft bulk. This configuration allows for about 4,407 cu ft total belly freight capacity.

The dedicated A330-200F's maindeck and lower deck can accept a wide variety of cargo configurations. On the maindeck, the highest freight volume, 11,865 cu ft, is facilitated by 18 pallets in two rows each measuring 96 inches X 125 inches X 96 inches plus four pallets measuring 96 inches X 125 inches at the rear.

Other possible maindeck configurations include: 20 88-inch X 125-inch pallets, plus three 96-inch X 125-inch pallets, totalling 11,490 cu ft; or a single row of 16 96-inch X 125-inch X 96-inch pallets for 9,500 cu ft; or nine 'AMA' containers plus four 96-inch X 125-inch pallets totalling 7,840 cu ft.

There are two basic configurations on the temperature-controlled lower deck of the A300-200F. The first configuration is eight 96-inch X 125-inch X 64-inch pallets plus two LD-3s plus 695 cu ft bulk which total 4,909 cu ft. The second option is 26 LD-3s plus 695 cu ft bulk totalling 4,767 cu ft.

The maximum theoretical cargo volume on the A330-200F is therefore about 16,774 cu ft, combining the main and lower decks.

The A330-200 freighter also includes a customisable 'courier area' behind the flightdeck, protected by a 9G barrier, which can accommodate up to 12 seats and the installation of a flight crew rest compartment (FCRC). AC