

404D-22TA

400

49.2 kW @ 2800 rpm

Series

Industrial Open Power Unit

Basic technical data

Number of cylinders	4
Cylinder arrangement	Vertical inline
Cycle	4 stroke
Induction system	Turbocharged and air charge cooled
Combustion system	Indirect injection
Compression ratio	23:3.1
Bore	84 mm
Stroke	100 mm
Cubic capacity	2.216 litres
Direction of rotation when viewed from flywheel	Anticlockwise
Firing order	1, 3, 4, 2

Weight of IOPU

Dry	302 kg
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Overall dimensions of IOPU

Height	998 mm
Length (from rear of air cleaner to front face of radiator)	1050 mm
Width (including mounting brackets)	710 mm

Moments of inertia (mk²)

Engine rotational component	0.44 kgm ²
Flywheel	1.07 kgm ²

Centre of gravity (engine only)

Forward from rear of block	147 mm
Above centre line of block	79 mm
Offset to RHS of centre line	3 mm

Performance

Note: All data based on operation to ISO/TR14396 standard reference conditions.

Test conditions

Air temperature	25°C
Barometric pressure	100 kPa
Relative humidity	30%
Air inlet restriction at maximum power (nominal)	5.0 kPa
Exhaust back pressure at maximum power (nominal)	9.0 kPa
Fuel temperature (inlet pump)	40 °C
All ratings certified to within	± 5%

Sound level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre

49.2 kW gross @ 2800 rev/min (no fan)	85.1 dB(A)
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Note: If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department.

General installation, 404D-22TA IOPU @ 2800 rpm

Designation	Units	Type of operation and application
Gross engine power	kWb	49.2
Brake mean effective pressure	kPa	951.8
Mean piston speed	m/s	9.3
Fan power absorption	kWm	3.2
IOPU nett engine power	kW	46.0
Engine coolant flow, against a 90 kPa restriction @ rated speed with 1.25:1 pulley ratio	litres/min	75.8
Combustion air flow	m ³ /min	3.72
Exhaust gas flow (maximum)	m ³ /min	11.2
Exhaust gas temperature outlet (maximum)	°C	620
Specific Fuel Consumption (SFC) gross	g/kWhr	257

Energy balance

Designation	Units	Type of operation and application
Energy in fuel (heat of combustion)	kWt	150.8
Energy in power output (gross)	kWb	49.2
Energy to cooling fan	kWm	3.2
Energy in power output (nett)	kWm	46.0
Energy to coolant and lubricating oil	kWt	47.4
Energy to exhaust	kWt	39.8
Energy to charge cooler	kWt	2.6
Energy to radiation	kWt	11.8

Caution: The airflows shown in this table will provide acceptable cooling for an open power unit operating in ambient temperatures of up to 53 °C (46 °C if a canopy is fitted with an airflow restriction of up to 0,125 kPa). If the power unit is to be enclosed totally, a cooling test must be done to check that the engine cooling is acceptable. If there is insufficient cooling, contact your Perkins Distributor or Perkins Technical Service Department.

Cooling system

Radiator

Radiator face area	0.250 m ²
Number of rows and materials	5 rows, Aluminium,
Matrix density and material	38 tubes per row, 10 fins/inch, Aluminium
Width of matrix	438.8 mm
Height of matrix	570.0 mm
Pressure cap setting	110 kPa

Charge cooler

Face area	0.1 m ²
Number of rows and materials	2 rows, Aluminium
Matrix density and material	9 rows, 5.5 fins/inch, Aluminium
Width of matrix	191.1 mm
Height of matrix	550.0 mm

Fan

Diameter	457 mm
Drive ratio	1.25:1
Number of blades	7
Material	Plastic
Type	Puller
Airflow at rated speed	67.8 m ³ /min
Airflow at maximum torque speed	39.9 m ³ /min
Power absorbed @ maximum rated speed	3.2 kW

Coolant (total system capacity)

With radiator	11.7 litres
Without radiator	3.6 litres
Maximum top tank temperature	112 °C
Thermostat operation range	82 - 95 °C
Coolant pump drive type and ratio	Centrifugal, belt driven, 1.25:1
Maximum static pressure head on water pump	30.4 kPa

Note: Recommended coolant: BS6580 - 1992, ASTM D3306 and Perkins ELC coolants to 1E1966.

Electrical system

Voltage	12 volts, negative ground
Alternator output	65 amps
Starter motor power	2.0 kW
Number of teeth on flywheel	126
Number of teeth on pinion	9
Minimum cranking speed	150 rev/min
Engine stop method	Electric shut off solenoid

Note: For further information on the electrical system, refer to the Application and Installation Manual.

Exhaust system

Maximum back pressure for total system	10.2 kPa
Inside diameter of outlet flange	42 mm

Cold start recommendations

Minimum starting temperature	Grade of engine lubricating oil	Battery specifications			
		BS3911 Cold start amps	SAEJ537 Cold cranking amps	Number of batteries required	Commercial reference number
0°C	20 W	540	740	1	647
-15°C	10 W	540	740	1	647
-20°C	5 W	600	780	1	655

Note: Battery capacity is defined by the 20 hour rate

Note: If a change to a low viscosity oil is made, the cranking torque necessary at low ambient temperatures is much reduced. The starting equipment has been selected to take advantage of this. It is important to change to the appropriate multigrade oil in anticipation of operating in low ambient temperatures

Note: Breakaway current is dependent on battery capacity available. Cables should be capable of handling the transient current which may be up to double the steady cranking current.

Fuel system

Type of injection	Indirect
Fuel injection pump	Cassette type
Fuel atomiser	Pintle nozzle
Nozzle opening pressure	14.7 MPa
Priming pump	Manual

Fuel lift pump

Fuel lift pump type	Mechanical (camshaft driven)
Maximum fuel supply restriction at lift pump outlet	16.9 kPa
Flow/hour	1.05 litres/min
Pressure	10 kPa
Maximum suction head	1.5 m
Maximum static pressure head	3.0 m
Governor type	Mechanical
Maximum fuel filter service interval	500 hours

Fuel specification

Density	0.840 - 0.865
Viscosity	2.0 - 3.2 (mm ² /s @ 40 °C)
Sulphur content	0.0007 - 0.0015 (% mass)
Cetane No.	40 - 09

Note: BS2869 Class 2 (off highway, gas oil); DIN EN590 DERV (Class A to F and 0 to 4).

Fuel consumption

2800 rev/min @ 100% power	15 litres/hour
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Induction system

Maximum air intake restriction

Clean filter	3.0 kPa
Dirty filter	8.0 kPa
Air filter type	Dry element type

Mountings

Maximum static bending moment at rear face of block	1400 Nm (lbf ft)
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Torque capability

Continuous	75.3 Nm
Intermittent	89.7 Nm

Lubrication system

Lubricating oil capacity

Maximum	10.6 litres
Minimum	8.9 litres
Sump drain plug tapping size	M16
Shutdown switch: pressure setting (when fitted)	29.4 to 68.6 kPa
Lubricating oil flow	20.4 litres/min

Lubricating oil pressure

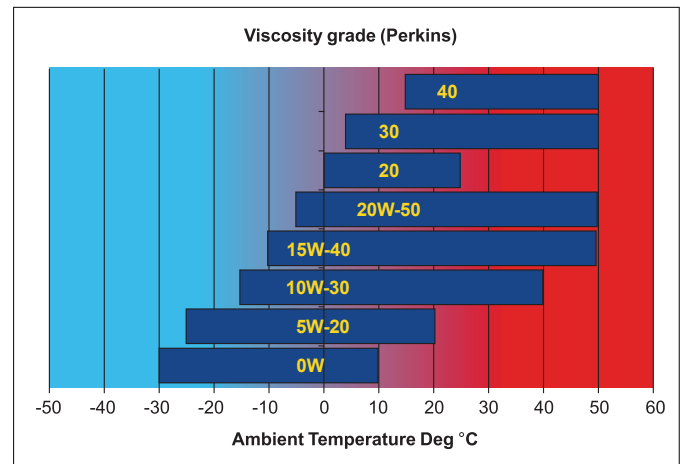
Relief valve opens	304 - 500 kPa
At maximum no-load speed	196 - 392 kPa
At rated no-load speed	120 - 392 kPa
At minimum speed	49 kPa
Maximum oil temperature	
Continuous operation	125 °C
Intermittent operation	135 °C
Oil pump speed and drive method gerotor (gear driven off crankshaft)	1490 rev/min
Oil consumption at full load rated speed	>0.2%

Normal operating angles

Front and rear	35°
Side	35°

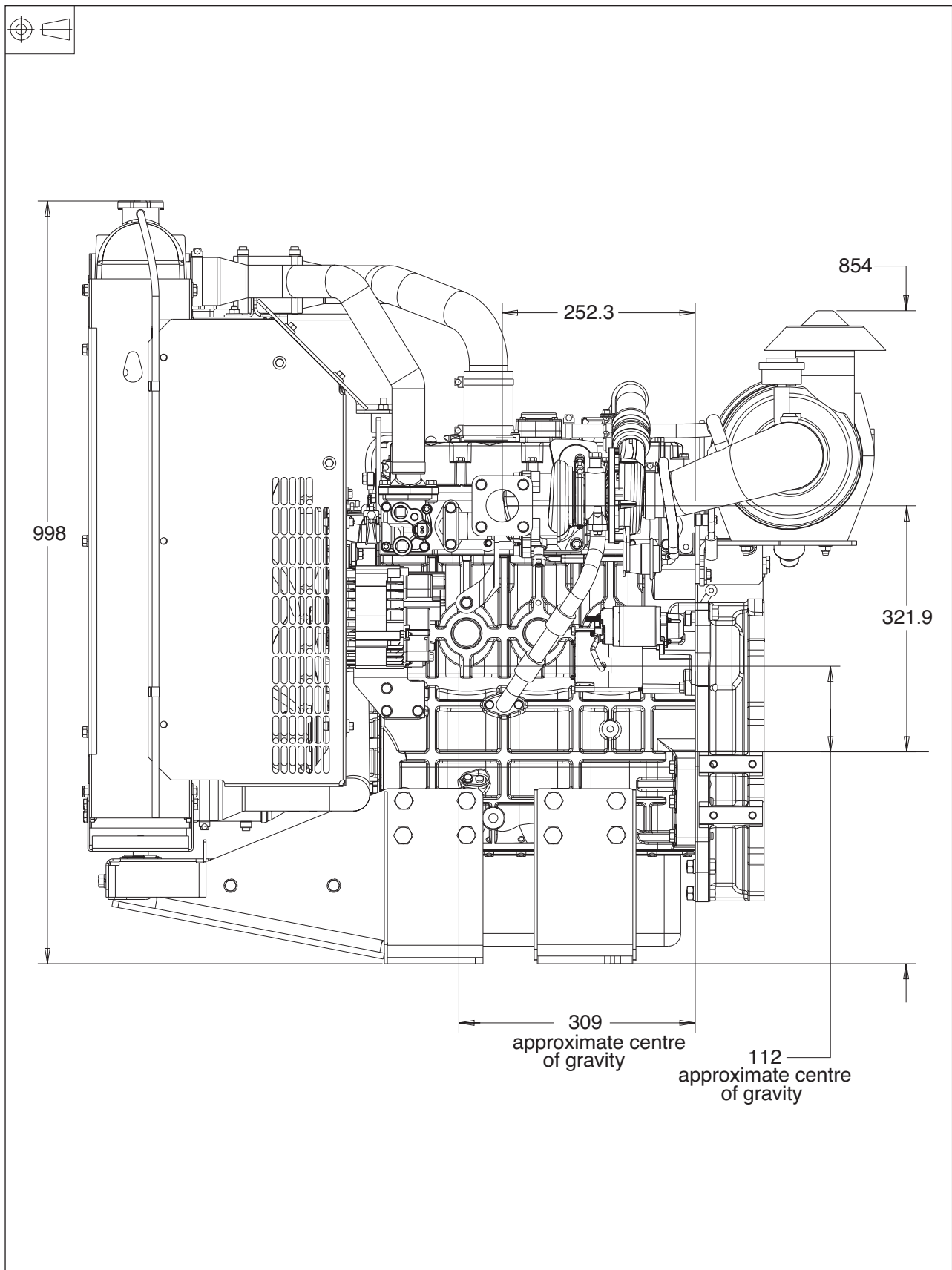
Recommended SAE viscosity

A single or multigrade oil conforming to API-CH-4 or ACEA E5 must be used.

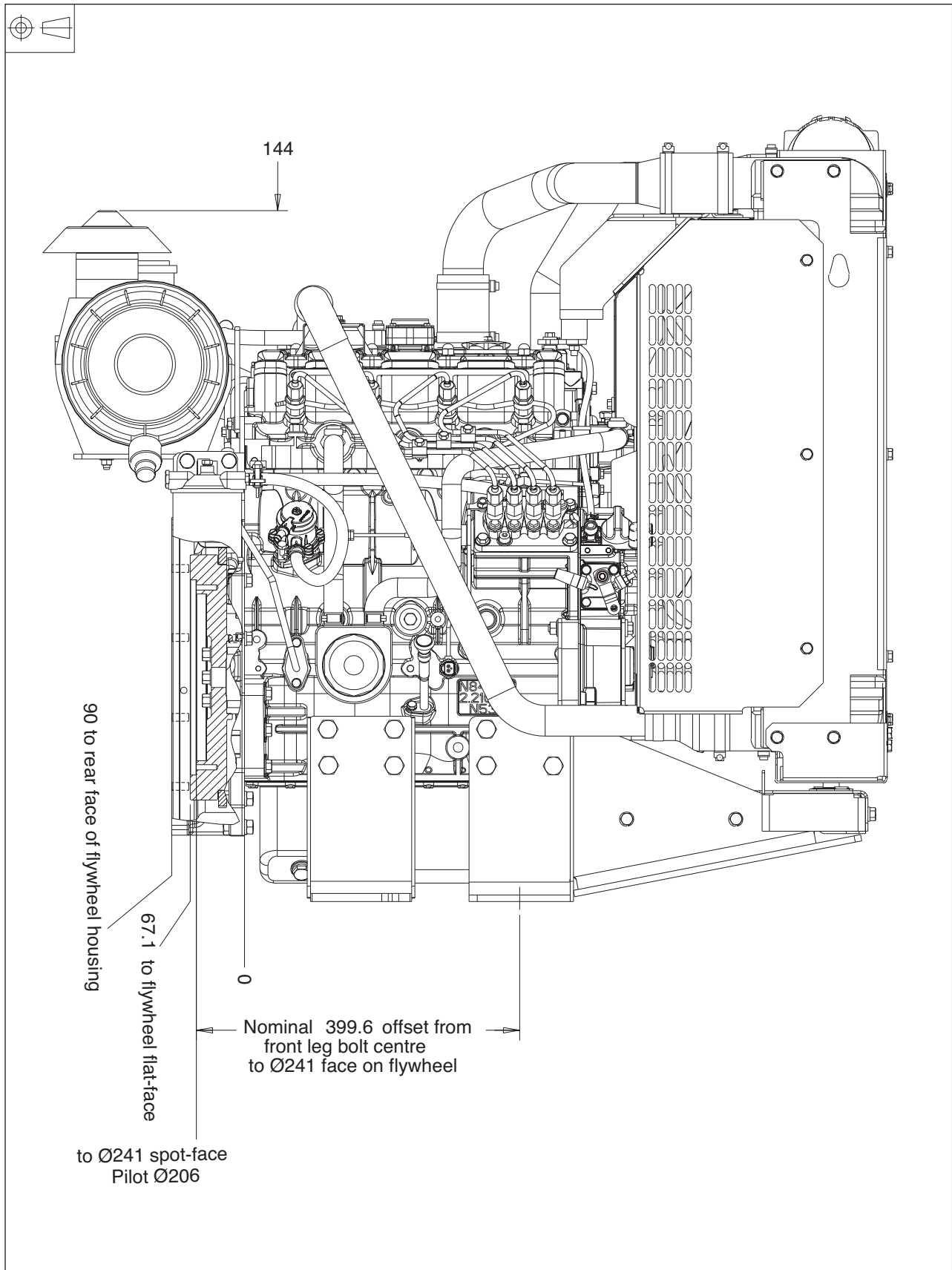


Note: For additional notes on lubricating oil specifications, refer to the Operation and Maintenance Manual

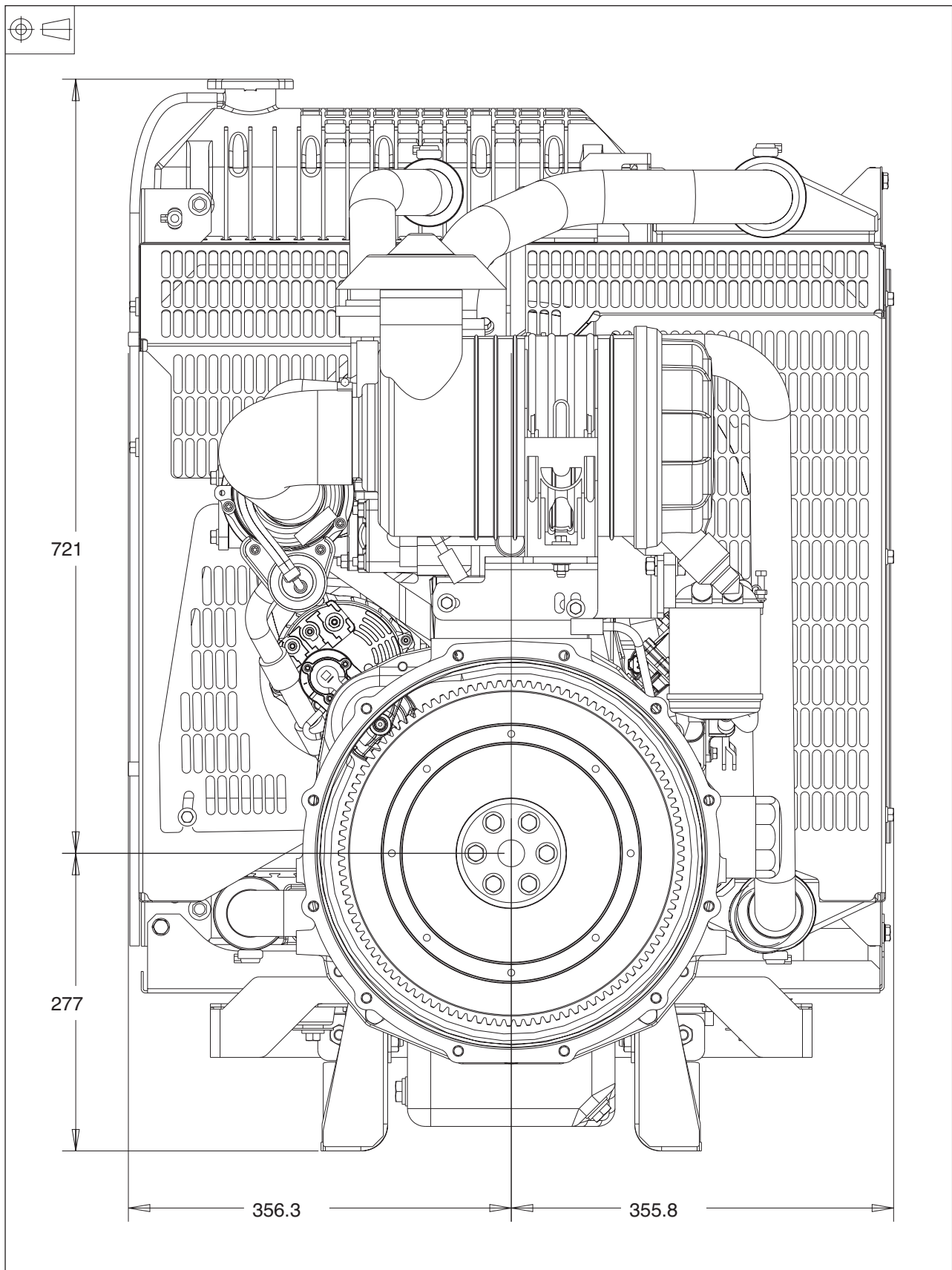
404D-22TA IOPU - Left side view



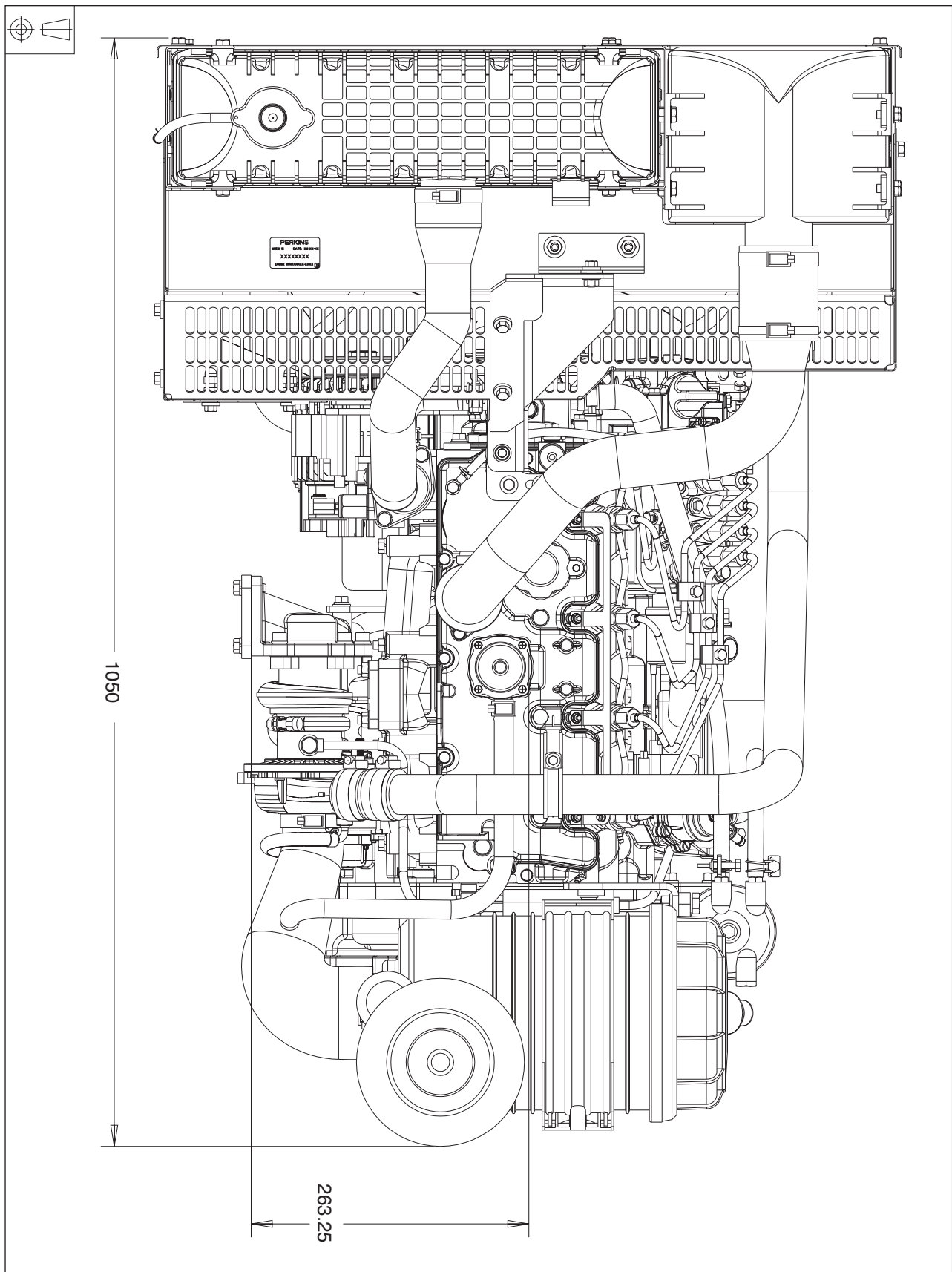
404D-22TA IOPU - Right side view



404D-22TA IOPU - Rear view



404D-22TA IOPU - Plan view



404D-22TA IOPU - View from the bottom

