

403D-11

400

19.7kW (Gross) @ 3000 rpm

Variable speed Generator set

Series

Basic technical data

Number of cylinders	3
Cylinder arrangement	Vertical in-line
Cycle	4 stroke
Induction system	Naturally aspirated
Compression ratio	22.7:1
Bore	77.0 mm (3.0 in)
Stroke	81.0 mm (3.2 in)
Cubic capacity	1.131 litres (69 in ³)
Direction of rotation	Anticlockwise
Firing order	1, 2, 3

Total Weight

Dry (estimated)	129.2 kg (284.8 lb)
Wet (estimated)	138.7 kg (305.8 lb)

Overall dimensions

Height	729.5 mm (28.7 in)
Length	777.0 mm (30.6 in)
Width	438.0 mm (28.7 in)

Centre of gravity

Forward from rear of block	148.0 mm
Above centre line of block	83.0 mm

Moments of inertia

Engine rotational components	0.119459 kgcm ²
Flywheel	1.51 kgm ² (0.31 lbf ²)

Performance

Note: All data based on operation to ISO/TR14396, ISO3046/1 standard reference conditions

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.

Note: All ratings certified to within 5 ± %.

Test conditions

Air temperature	25°C (°F)
Barometric pressure	100 kPa (14.50 lb/in ²)
Relative humidity	30%

Sound Level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre .79.0 dB(A)

General installation, 403D-11 19.7kW @ 3000 rpm

Designation	Units	Type of operation and application										
		Engine speed rev/min										
		1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
Gross engine power	kWm	6.0	7.4	8.9	10.6	12.4	13.6	14.7	16.1	17.3	18.4	19.7
Brake mean effective pressure	kPa	637	654	675	703	731	722	709	712	706	697	697
Mean piston speed	m/s	2.7	3.2	3.8	4.3	4.9	5.4	5.9	6.5	7.0	7.6	8.1
Fan power absorption (0 Pa static pressure)	kW	0.07	0.12	0.19	0.28	0.4	0.6	0.7	0.9	1.2	1.5	1.9
Engine nett engine power	kWm	5.9	7.3	8.7	10.3	12.0	13.1	14.0	15.2	16.1	16.9	17.9
Engine coolant flow 35 kPa	l / min	18.3	21.9	25.4	29.0	32.6	36.2	39.6	43.9	47.1	50.4	54.1
Combustion air flow	m ³ /min	0.61	0.7	0.79	0.87	0.96	1.0	1.1	1.2	1.3	1.4	1.5
Exhaust gas flow maximum	m ³ /min	1.0	1.4	1.7	2.0	2.3	2.6	3.1	3.4	3.7	3.9	4.5
Exhaust gas temperature maximum	°C	348	417	438	461	500	545	580	600	580	630	650
Cooling fan air flow (Pusher)	m ³ /min	16.8	20.4	23.4	27.0	30.0	33.0	37.2	39.6	43.2	46.8	49.8

Energy balance

Designation	Units	Type of operation and application										
		Engine speed rev/min										
		1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
Energy in fuel (fuel heat of combustion)	kW	18.8	23.1	27.8	33.1	38.8	42.5	45.9	50.6	55.4	60.6	65.6
Gross heat to power	kW	6.0	7.4	8.9	10.6	12.4	13.6	14.7	16.1	17.3	18.4	19.7
Energy to coolant and lubricating oil	kW	6.0	7.4	8.9	10.6	12.4	13.4	14.3	16.0	17.6	19.5	21.0
Energy to exhaust	kW	5.6	6.9	8.3	9.9	11.6	12.5	13.0	14.0	15.7	17.7	19.5
Heat to radiation	kW	1.1	1.4	1.7	2.0	2.3	3.0	3.9	4.5	4.8	5.0	5.4

Fuel consumption

Fuel consumption given 100% power rating @ rev/min											
Rev/min	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
sfc g/kWh	279	292	273	261	261	264	267	266	253	264	265
litres/hr	2.0	2.6	2.9	3.3	3.9	4.3	4.7	5.2	5.3	5.9	6.3

Cooling system

Recommended coolant: 50% ethylene glycol with a corrosion inhibitor (BS 658 :1992 or MOD AL39) and 50% clean fresh water.

Total coolant capacity

With radiator 5.2 litre (9.16 pt)
 Without radiator 1.9 litre (3.34 pt)
 Maximum top tank temperature 110°C (230°F)
 Thermostat operation range..... 75 - 87°C (167 - 188 °F)

Radiator

Face area 0.145 m² (1.56 m²)
 Rows and materials 2 row Aluminium
 Gills/inch and material 14.5 Aluminium fins per inch
 Width of matrix 330.0 mm (13.0 in)
 Height of matrix 440.0 mm (17.3 in)
 Pressure cap setting 95.0 kPa (13.8 lb/in²)

Fan

Type Pusher
 Diameter 320 mm (12.6 in)
 Number of blades..... 7
 Material Plastic
 Drive ratio 1.285:1

Cold start recommendations

Minimum cranking speed @ 1800 rpm

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	20W	420	590	1	72
-15°C	10W	420	590	1	72
-20°C	5W	540	740	1	647

Fuel system

Type of injection Pintle nozzle
 Fuel injection pump Cassette
 Nozzle opening pressure 13.93 MPa (0.54 lb/in²)

Fuel lift pump

Flow/hour 63.0 l/hr (13.8 g/hr)
 Pressure 10.0 kPa
 Maximum suction head 0.8 m using 6 mm bore pipe
 Maximum pressure head 3.0 m using 6 mm bore pipe
 Governor type Mechanical

Fuel specification

USA FED Off Highway
 Density 0.840 - 0.865 (kg/l @ 15°C)
 Viscosity 2.0 - 3.2 (mm²/s @ 40°C)
 Sulphur content 0.0007 - 0.0015 (% mass)
 Cetane No 40 - 50
 Europe Off Highway EU 2004/26/EC Stage 3B/4
 Density 0.833 - 0.837 (kg/l @ 15°C)
 Viscosity 2.3 - 3.3 (mm²/s @ 40°C)
 Sulphur content 0.001 maximum (% mass)
 Cetane No 54 maximum

Induction system

Maximum air intake restriction of engine

Clean filter..... 3.0 kPa
 Dirty filter..... 6.4 kPa
 Air filter type Dry element type

Exhaust system

Maximum back pressure for total system 10.2 kPa (1.5 lb/in²)
 Inside diameter of outlet flange 34 mm (1.3 in)

Electrical system

Alternator 12 volts
 Starter motor..... 12 volts

Engine mounting

Maximum static bending moment at rear face of block... TBA Nm (lbf ft)

Lubrication system

Total oil capacity

Total system..... 4.9 l (8.62 pt) Unbalanced
 Minimum 3.4 l (5.98pt) Unbalanced

Lubricating oil pressure

Relief valve opens 304 - 500 kPa (44 - 73 lb/in²)
 At maximum no-load speed 196 - 392 kPa (28 - 68 lb/in²)

Maximum continuous oil temperature

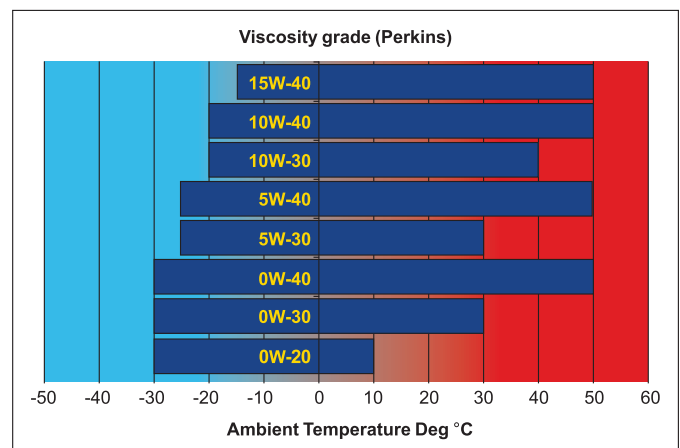
Maximum 125°C
 Intermittent 135°C

Maximum engine operating angles

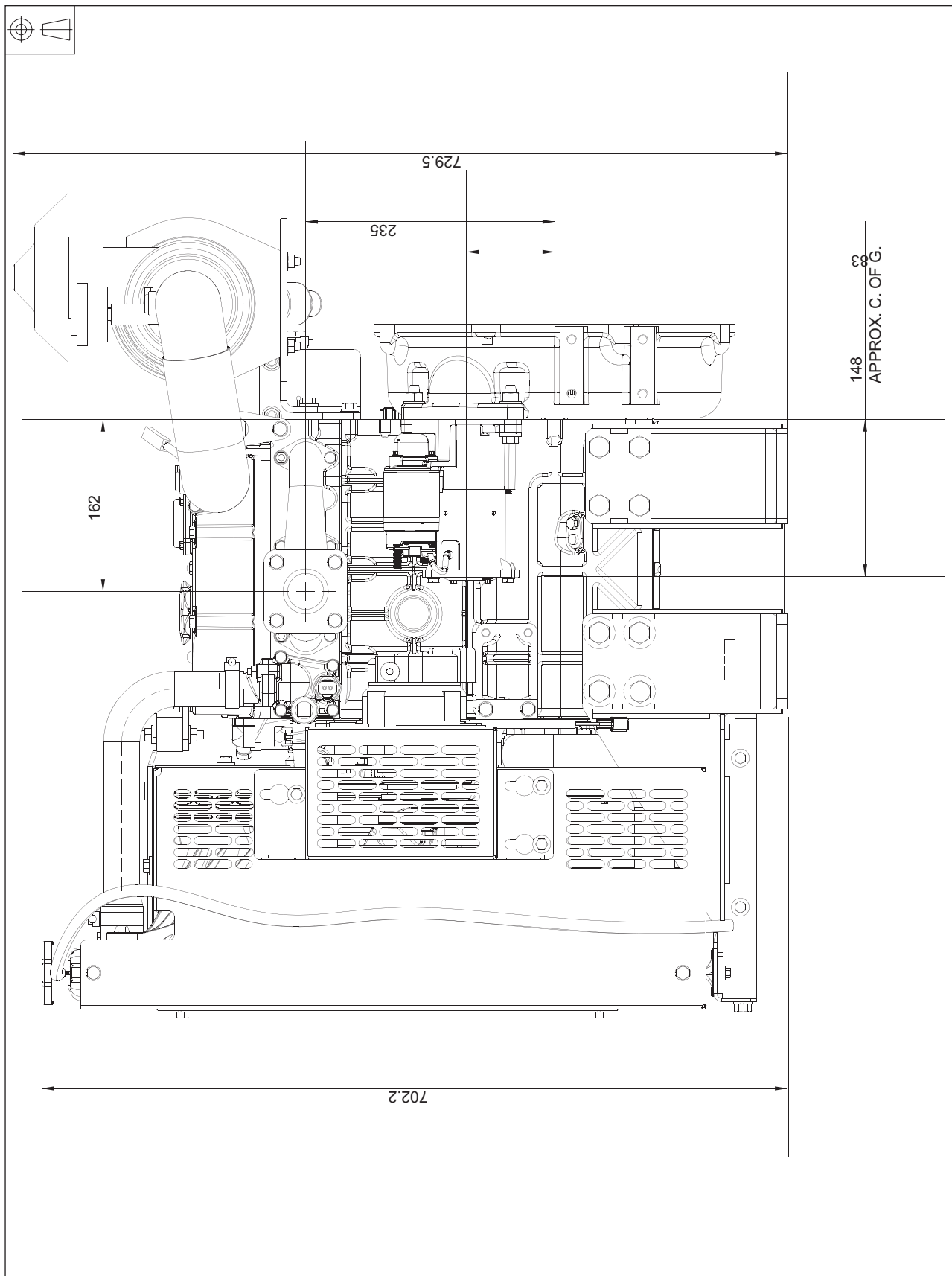
Front up, front down, right side or left side 35° Unbalanced

Recommended SAE viscosity

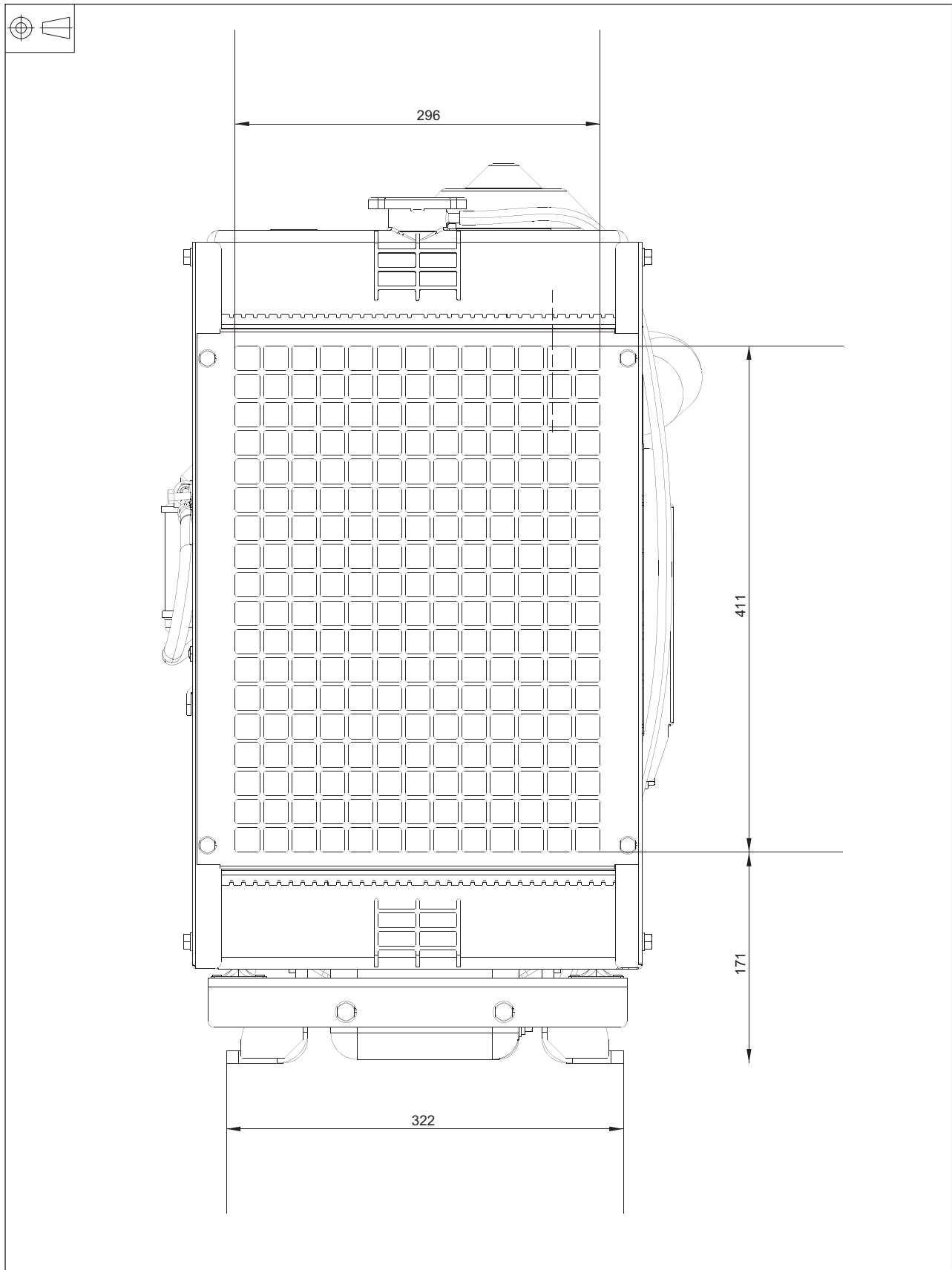
A single or multi grade lubricating oil which conforms to API CG4 / CH4 or ACEA E3 / E5 must be used, see illustration below:



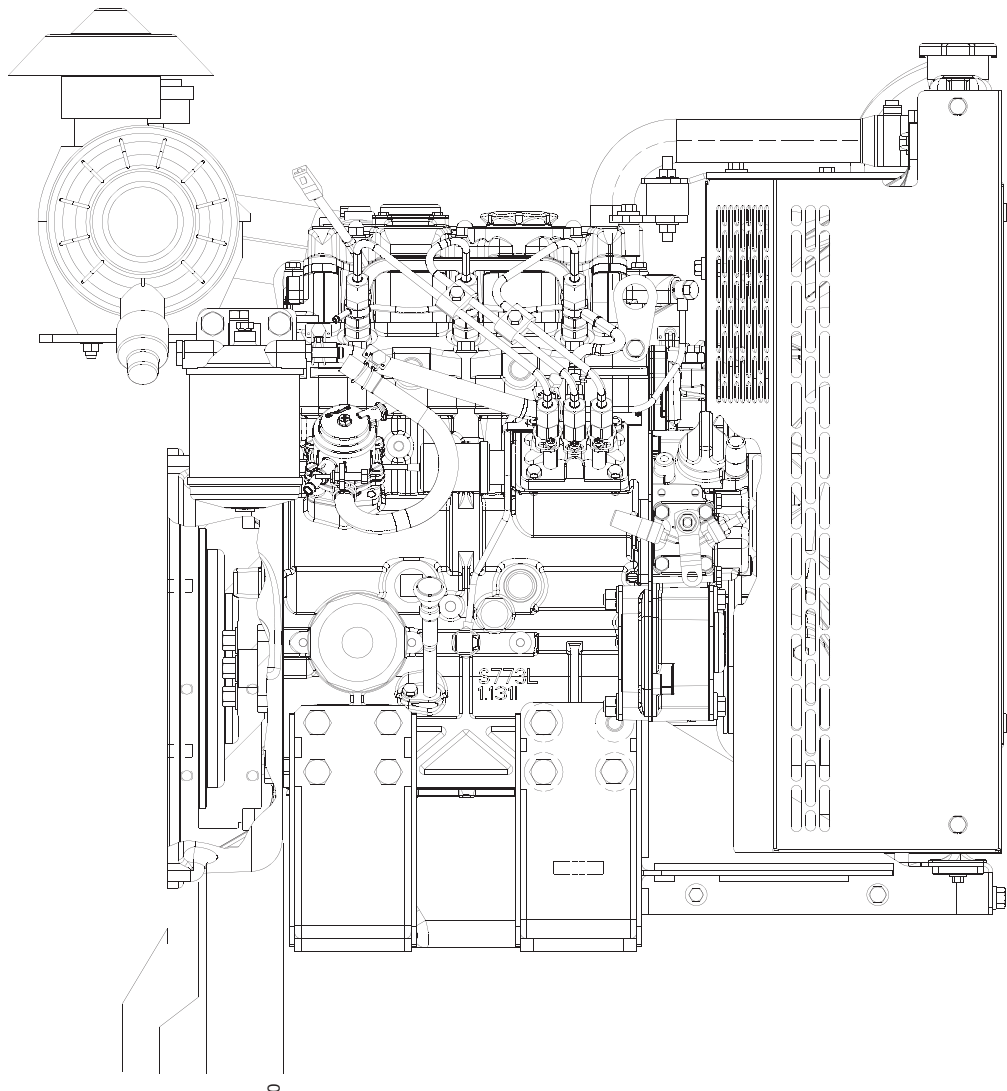
403D-11 - Left side view



403D-11 - Front view

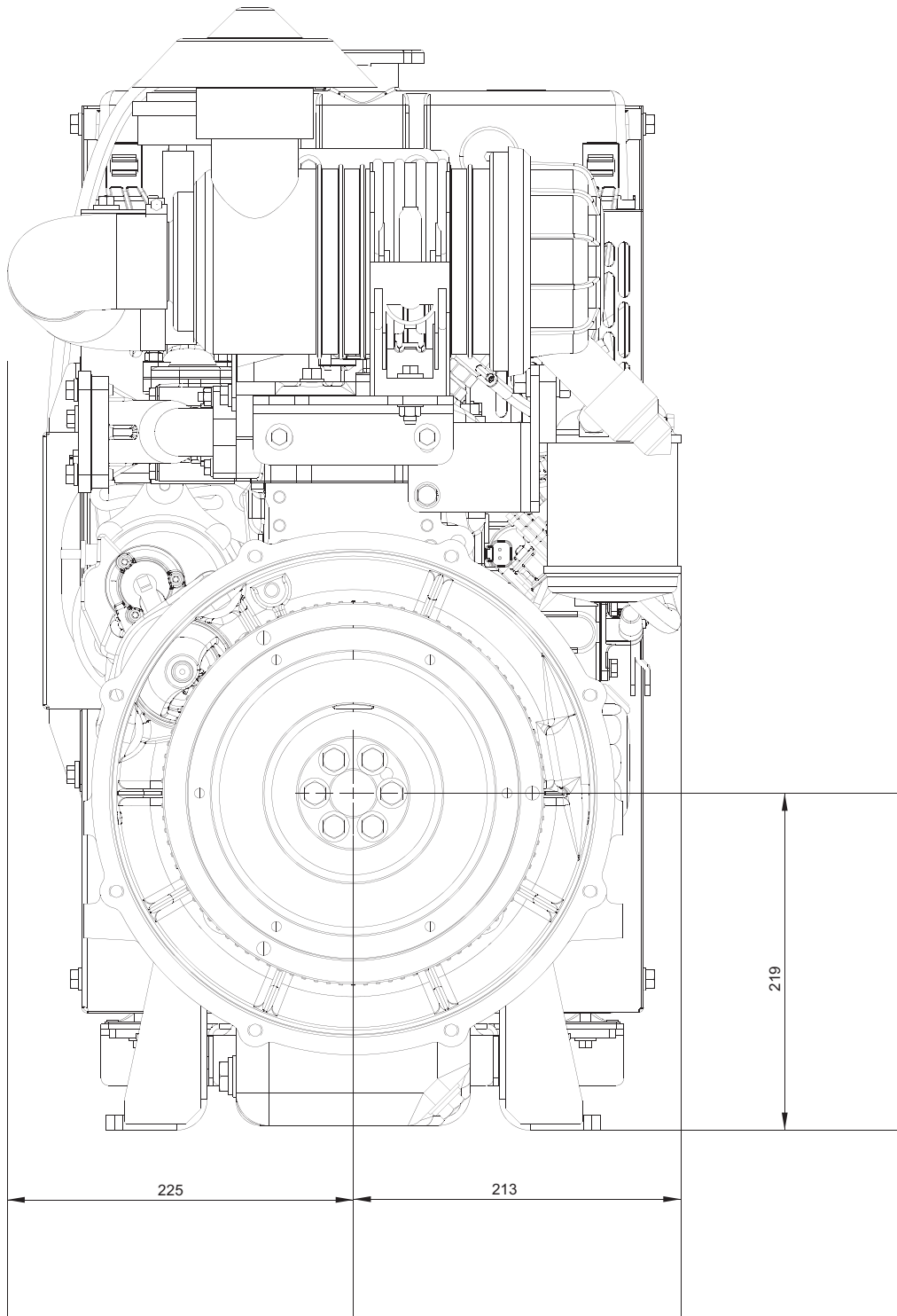


403D-11 - Right side view

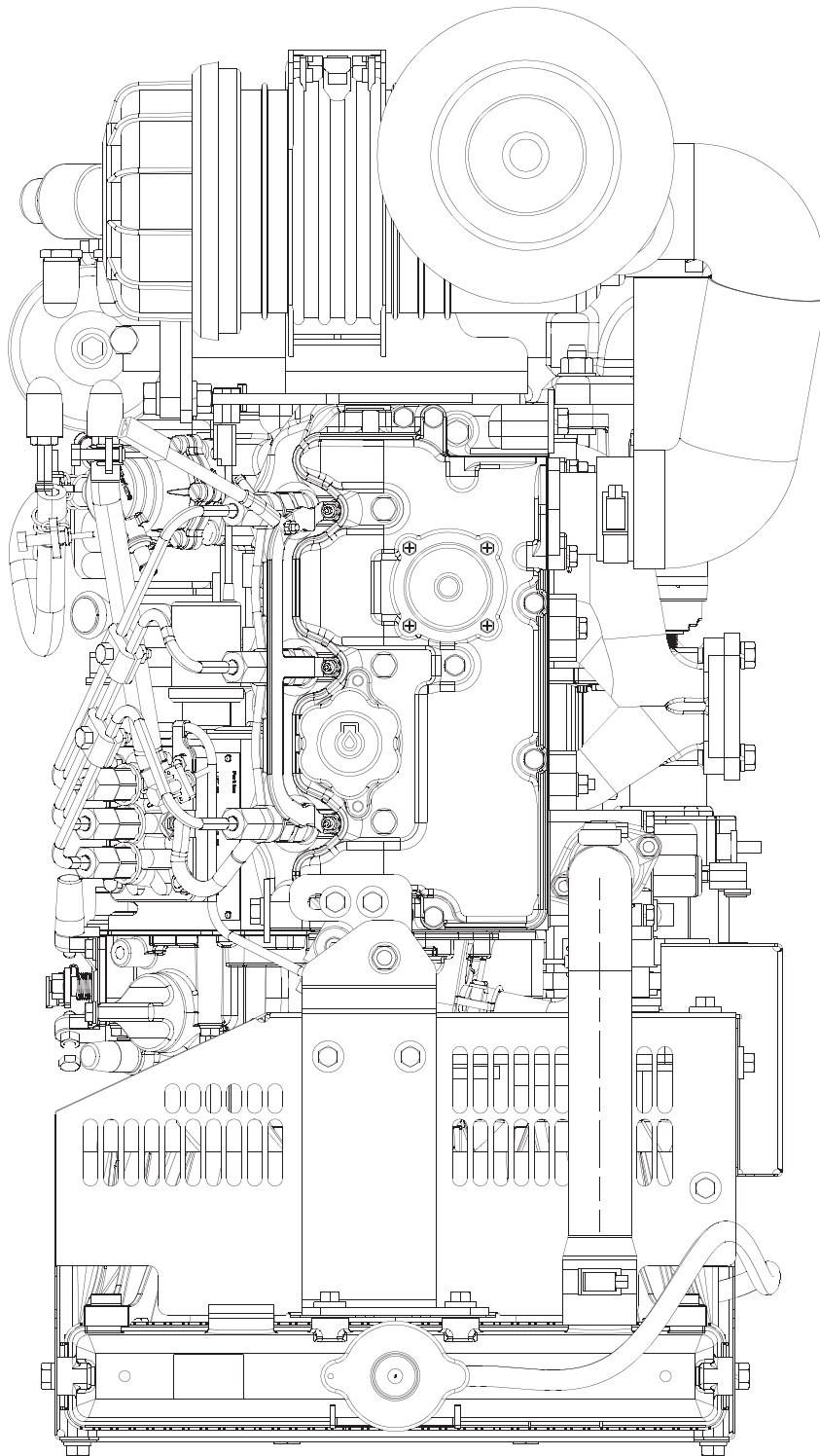


90 TO END FW HSG
66 TO FLAT FACE OF FW
59.8 TO Ø215.9 SPOT FACE
Ø184.2 PILOT

403D-11 - Rear view



403D-11 - Plan view



403D-11 - Underside view

