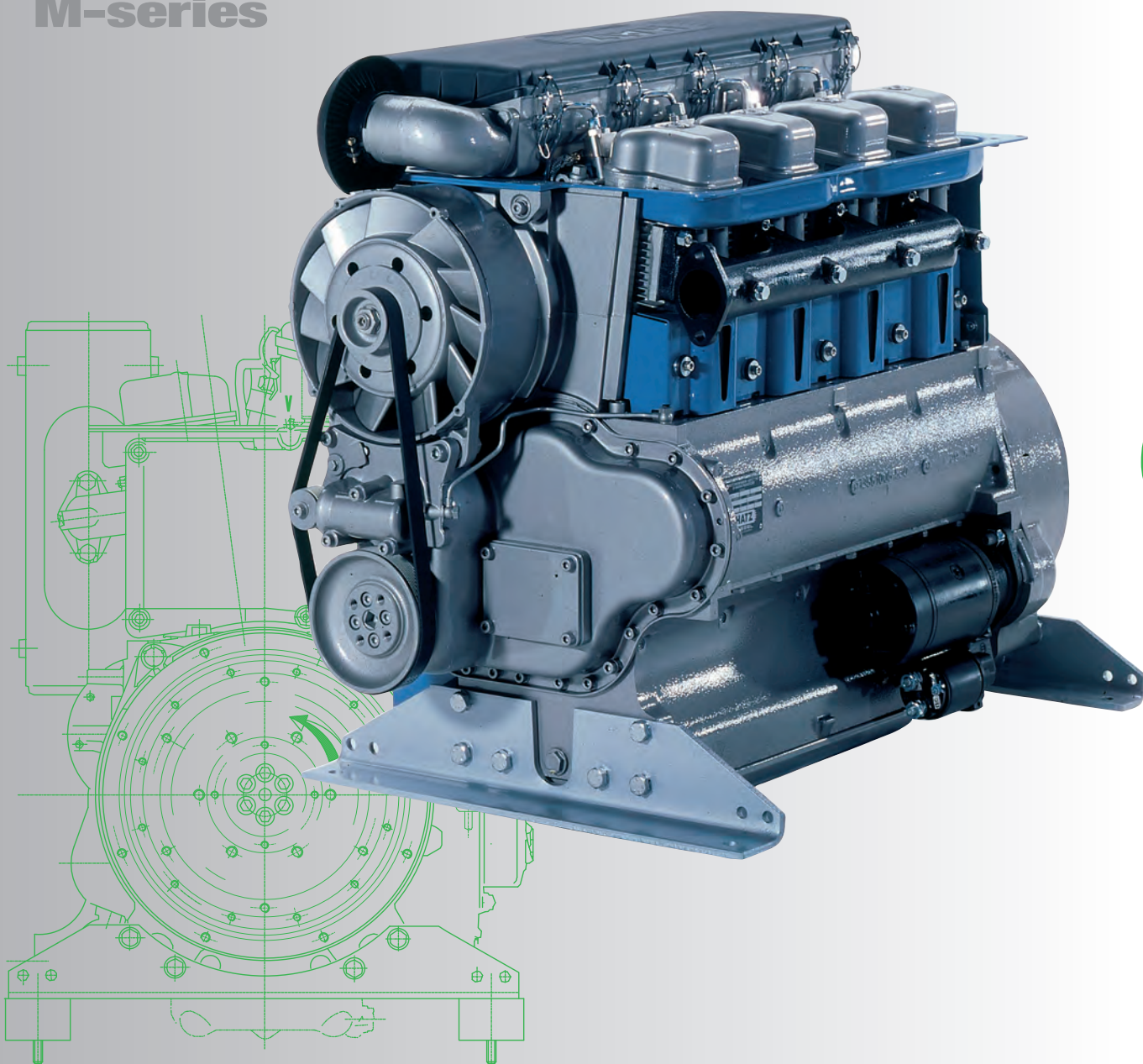




M-series



2M41 • 14.8 - 28.3 kW 3M41 • 22.5 - 43.3 kW 4M41 • 30.6 - 57.5 kW

MULTICYLINDER IN MODULAR SYSTEM

2M41 • 3M41 • 4M41

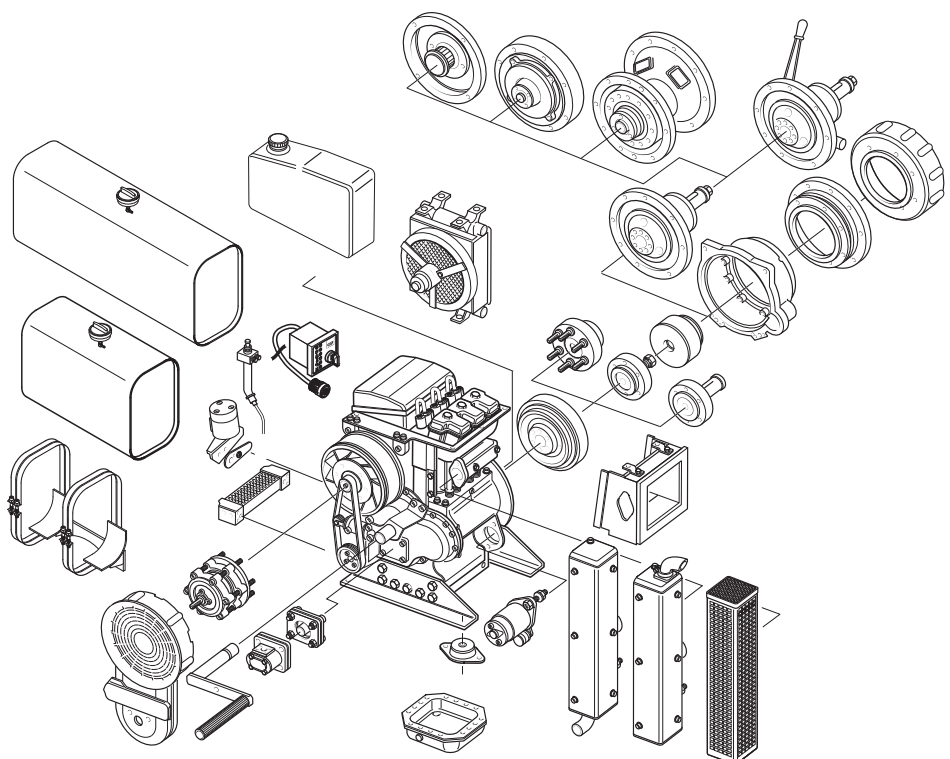
DESIGN

- Aircooled 2, 3 and 4-cylinder fourstroke Diesel engines.
- Grey cast iron crankcase, grey cast iron vertical in-line cylinders.
- Crankshaft and conrod running on shell-bearing.
- Individual cylinders (grey cast iron), individual cylinder-heads (light metall) and individual injection pumps.
- Removal of piston and conrod possible in upwards direction.
- Direct injection with multi-hole nozzle.
- Control of valves by rockers, pushrods, tappets and camshaft.
- Separate camshaft for drive of injection pumps with centrifugal variable speed governor and automatic injection timer.
- Pressure lubrication system with gear pump. Oilcooler and replaceable filter element in main flow.
- Axial-type blower fan with integrated alternator.

CHARACTERISTICS

- The Diesel engine ready for installation and operation.
- All-purpose industrial Diesel engines.
- Extremely low fuel- and oil consumption.
- Exhaust emission well below all valid limits for operating machines in EU, USA and Japan.
- Robust, and long-lived engine.
- Extensive parts interchangeability due to modular system.
- Low repair cost due to individual cylinders, individual cylinder-heads and individual injection-pumps.
- Unusual reliability because of:
 - Automatic belt control
 - Automatic extra fuel device
 - Dry-type airfilter, protected against severe contamination
 - Gearwheels to drive camshafts and oil pump
- Easy to service because of:
 - Automatic injection pump bleeding
 - Operating and maintenance points at one engine side only
 - Hydraulic belt tensioner

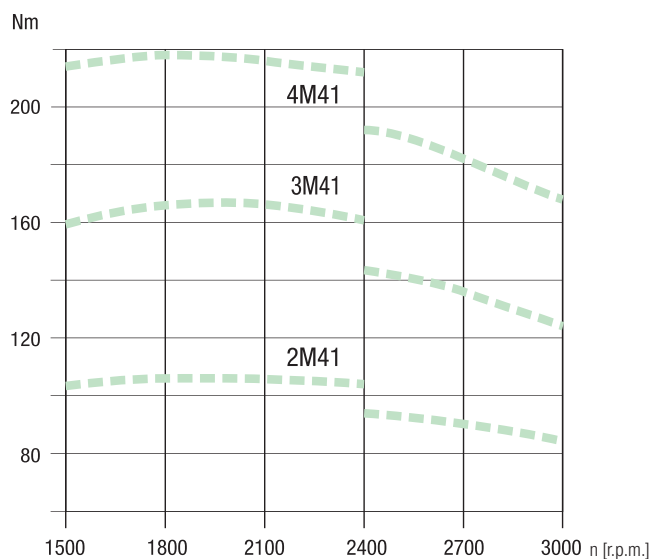
ADDITIONAL EQUIPMENT



TECHNICAL DATA		2M41	3M41	4M41
▶ Number of cylinders		2	3	4
▶ Bore x stroke	mm	102 x 105	102 x 105	102 x 105
	inches	4.02 x 4.13	4.02 x 4.13	4.02 x 4.13
▶ Displacement	l	1.716	2.574	3.432
	cu.in.	104.7	157.0	209.4
▶ Mean piston speed at 3000 r.p.m.	m/s	10.5	10.5	10.5
	ft/min	2067	2067	2067
▶ Compression ratio		20.0	20.0	20.0
▶ Lub. oil consumption, related to full load		max. 1 % of fuel consumption		
▶ Lub. oil capacity max. / min.	l	5.5 / 3.0	8.5 / 5.0	14.0 / 5.0
	US qts	5.8 / 3.2	9.0 / 5.3	14.8 / 5.3
▶ Speed control	Idle speed	approx. 900 r.p.m.		
	static speed droop	approx. 5% at 3000 r.p.m.		

TORQUE

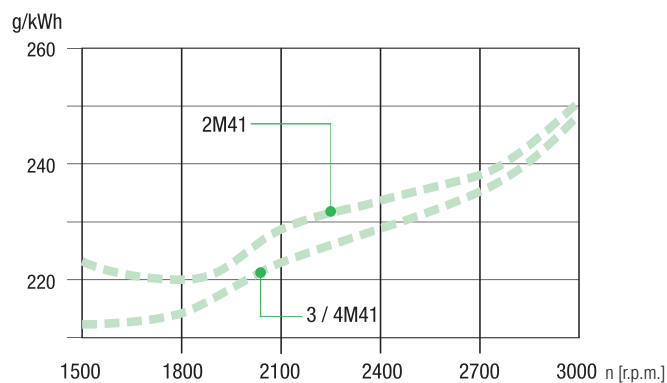
--- = at B-power according to ISO 3046-1



▶ Performance data refer to Standard Reference Conditions of ISO 3046-1: + 25 °C (77 °F), 100 kPa, relative humidity 30 %. During running-in period the output increases by approx. 5 % which is taken into consideration at delivery. Power reduction acc. to ISO 3046-1. Standard values:
 Above 100 m ALT approx. 1 % per 100 m.
 Above 25 °C (77 °F) approx. 4 % per 10 °C (50 °F).
 The power taken from charging alternator also has to be added to the demand of power.

SPECIFIC FUEL CONSUMPTION

--- = at B-power according to ISO 3046-1



INSTALLATION DATA		2M41	3M41	4M41
▶ Combustion air required at 3000 r.p.m. approx. ¹⁾	m ³ / min	2.6	3.9	5.2
	cu.ft./min	92	138	184
▶ Cooling air required at 3000 r.p.m. approx. ¹⁾	m ³ / min	29	39	49
	cu.ft./min	1024	1377	1730
▶ Moment of inertia	SAE-flywheel 8"	0.64 kgm ² (15.2 lb.ft ²)	0.65 kgm ² (15.4 lb.ft ²)	0.67 kgm ² (15.9 lb.ft ²)
	flywheel for F+S clutch	0.49 kgm ² (11.6 lb.ft ²)	0.50 kgm ² (11.9 lb.ft ²)	0.51 kgm ² (12.1 lb.ft ²)
▶ Starter		12 V - 2.7 kW (3.7 HP) — 24 V - 4.0 kW (5.4 HP)		
▶ Alternator charging current at 3000 / 1500		14 V - 60 / 42 A — 28 V - 40 / 28 A		
▶ Battery capacity	min / max Ah	12 V - 88 / 143 Ah — 24 V - 55 / 110 Ah		

¹⁾ For other r.p.m. there is a linear reduction in the air requirement

PERMISSIBLE LOAD ON POWER-TAKE-OFF POINTS

Flywheel side

Power-take-off at full engine torque.

- max. permissible axial force F2 = 2700 N
- max. permissible radial force F1

$$F1 = \frac{400\,000}{L \text{ (mm)} - 73} \text{ (N)}$$

This data decreases by half if the direction of belt tension is upwards.
If the radial force exceeds the permissible data F1 an outboard-bearing is necessary.

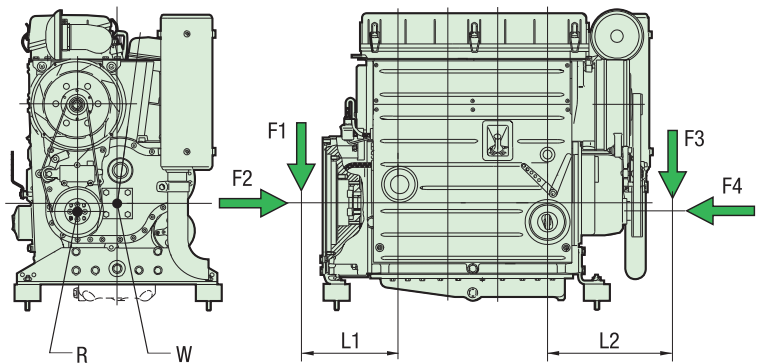
Governor side

Drive pulley R:

- max. permissible torque 32 Nm
- max. permissible axial force F4 = 1770 N
- max. permissible radial force F3 (belt tension in any direction)

$$F3 = \frac{228\,330}{L2 \text{ (mm)} - 76} \text{ (N)}$$

All power-take-offs = engine speed



Shaft W

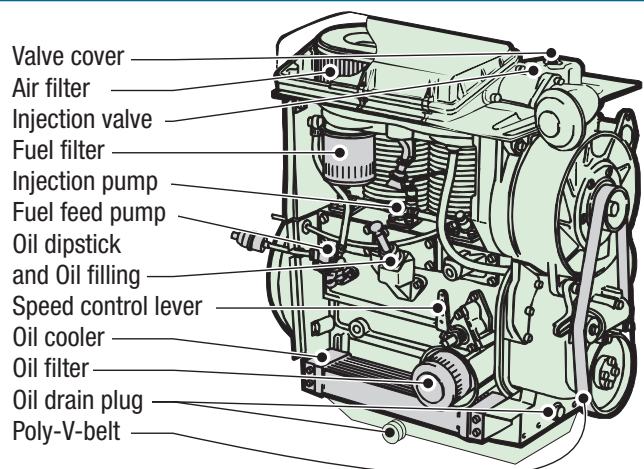
Max. permissible torque 70 Nm. Axial and radial forces not permitted.
Suitable for hydraulic pump-drive.

MAINTENANCE AND OPERATING POINTS

For the engine to achieve its maximum life, it is essential for it to be serviced meticulously at regular intervals.

The better the accessibility, the more promptly and conscientiously the engine will be maintained.

Please convince yourself personally that all service and operation points are easily accessible before delivering your machine to the customer.



ELECTRICAL EQUIPMENT

The engine-mounted components, such as starter, alternator and switches, are connected to the instrument box by means of a 2 m cable harness. The engine is started and controlled from this instrument box. Instrument box and cable harness are part of the additional equipment and supplied according to the number of electrical safety features which are required.

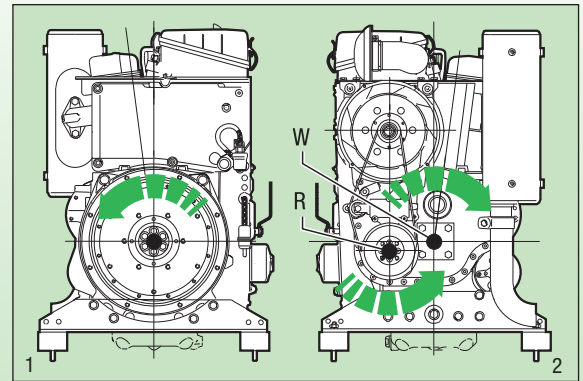
If the engine has to be started at temperatures below - 10 °C, it must be equipped with a pre-heating system (glow plug) (additional equipment). Further additional equipment includes automatic start and stop, remote control etc.

Please ask for drawings and wiring diagrams.

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POWER-TAKE-OFF AND SENSE OF ROTATION

- Main power-take-off at flywheel (pict. 1).
- Power-take-off crankshaft governor side with engine speed. Maximum permissible torque 70 Nm, axial and radial forces not permissible but for drive of hydraulic pumps only (pict. 2/W).
- Power-take-off belt pulley with engine speed. Maximum permissible torque 32 Nm, for axial and radial power-take-off (pict. 2/R).
- Sense of rotation see picture 1 and 2.
- Engine flangeable at flywheel-side.

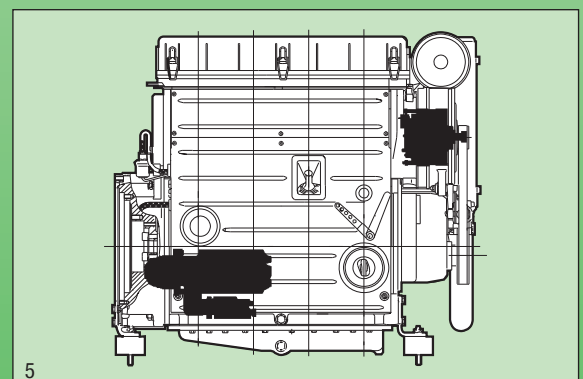
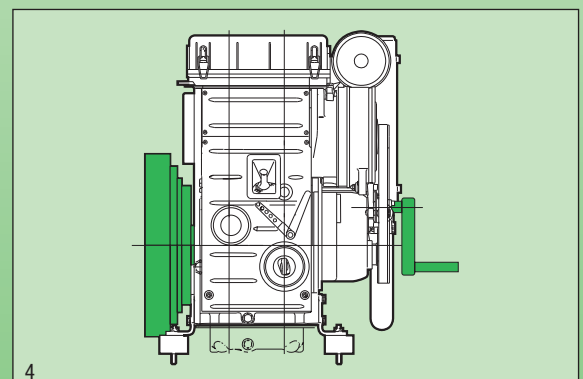
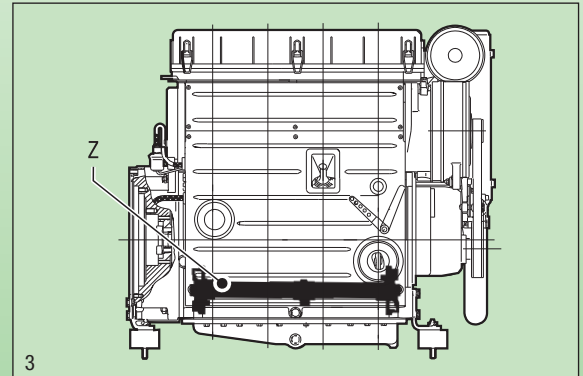


ENGINE MODELS

- **Model . M41** : up to 3000 r.p.m.
- **Model . M41Z** : up to 3000 r.p.m. with additional balancing shaft „Z“ (pict. 3). (deduct the required absorbed power for the balancing shaft in your calculation, depending on cylinders 0.3-1.5 kW)

ENGINE VARIANTS (PICT. 4/5)

- Crankhandle start on governor side, heavy flywheel ($n_{max} = 2600$ r.p.m.).
- Electric start 12 V / 24 V, standard flywheel
- Electric start 12 V / 24 V, heavy flywheel ($n_{max} = 2600$ r.p.m.).



WEIGHT

	2M41		3M41		4M41	
	kg	lbs.	kg	lbs.	kg	lbs.
Crankhandle start or electric start 12 V or 24 V, heavy flywheel	294	648	—	—	—	—
Electric start 12 V or 24 V, standard flywheel	258	569	308	679	373	822

SCOPE OF DELIVERY OF ENGINE

Engine tested for full load on test bench. Engine fitted with blower fan, variable speed governor, injection timer, lubricating oilfilter, dry-type air filter, hydraulic belt tensioner, automatic stop in case of belt failure, automatic extra fuel device, automatic injection pump bleeding, eye hook for transport of engine (only suitable to carry the engine weight). Painting in HATZ standard colours. No oil in engine.

Additional equipment: Gaskets for 1st maintenance.

ADDITIONAL EQUIPMENT

Thanks to the complete programme of additional equipment every engine can be adapted to the special requirements of every application. As a minimum, every engine needs the “additional equipment, necessary for operation”.

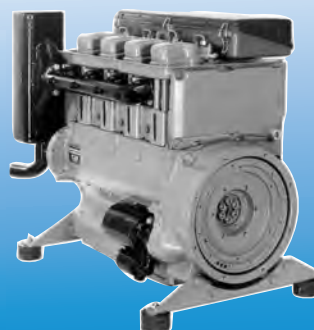
You find out details at our HATZ-contracting partners.

PERFORMANCE TABLE			2M41		3M41		4M41	
Norm	Hatz-Spec.	r.p.m.	kW*	HP*	kW*	HP*	kW*	HP*
▶ Vehicle output acc. to DIN ISO 1585.	NF	3000	28.3	38.5	43.3	58.9	57.5	78.2
		2600	26.9	36.6	40.6	55.2	53.8	73.2
		2350	25.3	34.4	38.1	51.8	51.0	69.4
▶ ISO net brake fuel stop power (IFN) for strong intermittent load acc. to ISO 3046-1.	NB _{Si}	3000	27.7	37.7	42.0	57.1	56.1	76.3
		2600	26.4	35.9	39.9	54.3	53.4	72.6
		2350	24.3	33.0	37.2	50.6	49.7	67.6
▶ ISO net brake fuel stop power (IFN) for intermittent load acc. to ISO 3046-1.	NB	3000	26.3	35.8	39.8	54.1	53.1	72.2
		2600	25.0	34.0	37.8	51.4	50.6	68.8
		2300	25.4	34.5	38.9	52.9	52.0	70.7
		2000	22.4	30.5	34.5	46.9	46.0	62.6
		1800	20.2	27.5	31.1	42.3	41.3	56.2
		1500	16.4	22.3	25.0	34.0	34.0	46.2
▶ ISO-standard power (ICXN) (10% overload permissible) ▶ ISO-standard fuel stop power (no overload permissible) acc. to ISO 3046-1. For constant speed and constant load (ICFN).	NS (NA)	3000	23.7	32.2	35.8	48.7	47.8	65.0
		2600	22.5	30.6	34.0	46.2	45.5	61.9
		2300	22.9	31.1	35.0	47.6	46.8	63.6
		2000	20.2	27.5	31.1	42.3	41.4	56.3
		1800	18.2	24.8	28.0	38.1	37.2	50.6
		1500	14.8	20.1	22.5	30.6	30.6	41.6

* Performance specifications without exhaust certificates. Performance tables with exhaust certificates upon request.

EXHAUST REDUCED TYPES ON REQUEST

EPA (interim) TIER IV
CARB (interim) TIER IV
97/68/EG-II
97/68/EG-III A

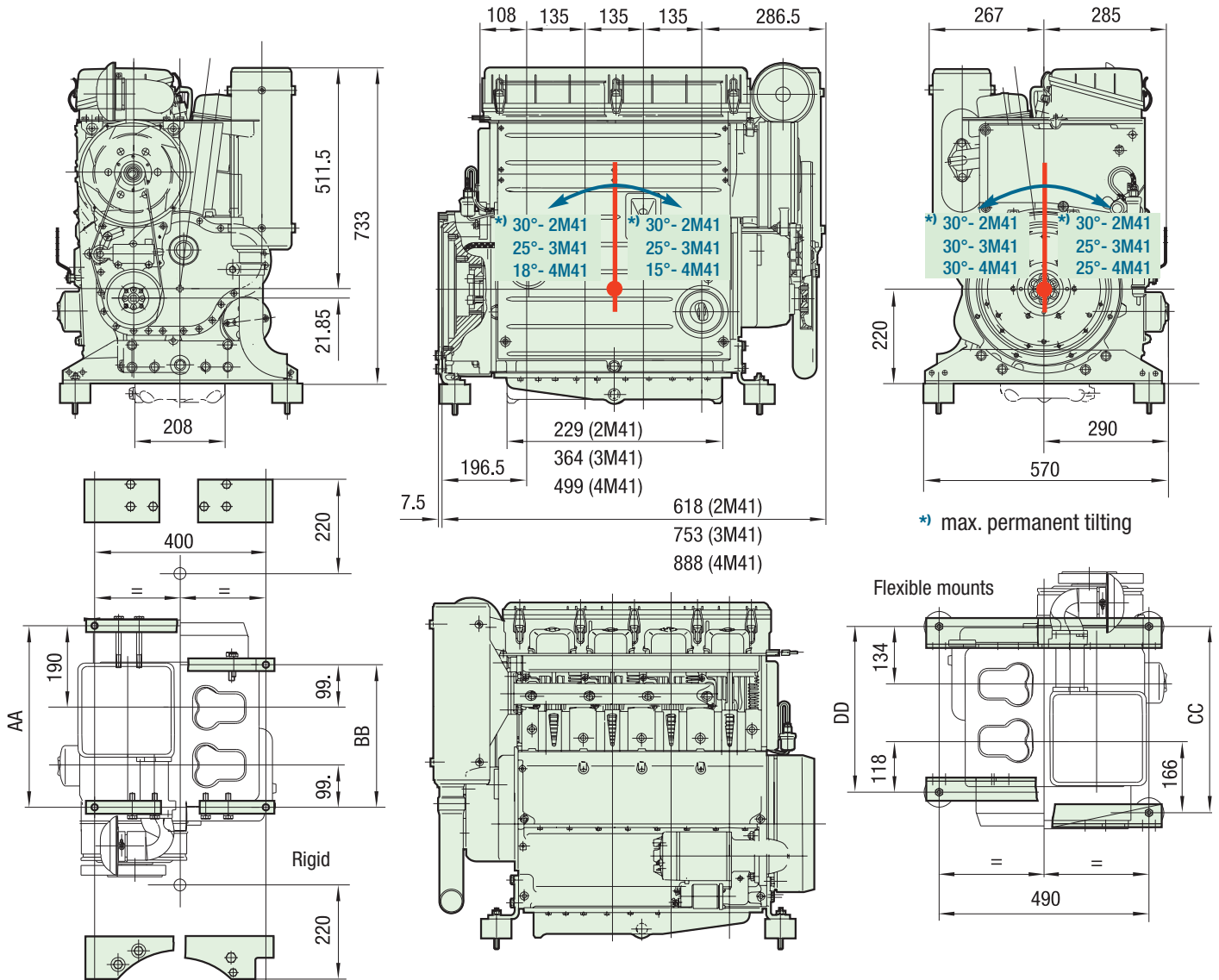


ARAI-Indien

DIMENSIONS

Spread at outlines ± 3 mm due to tolerance.

2M41 • 3M41 • 4M41

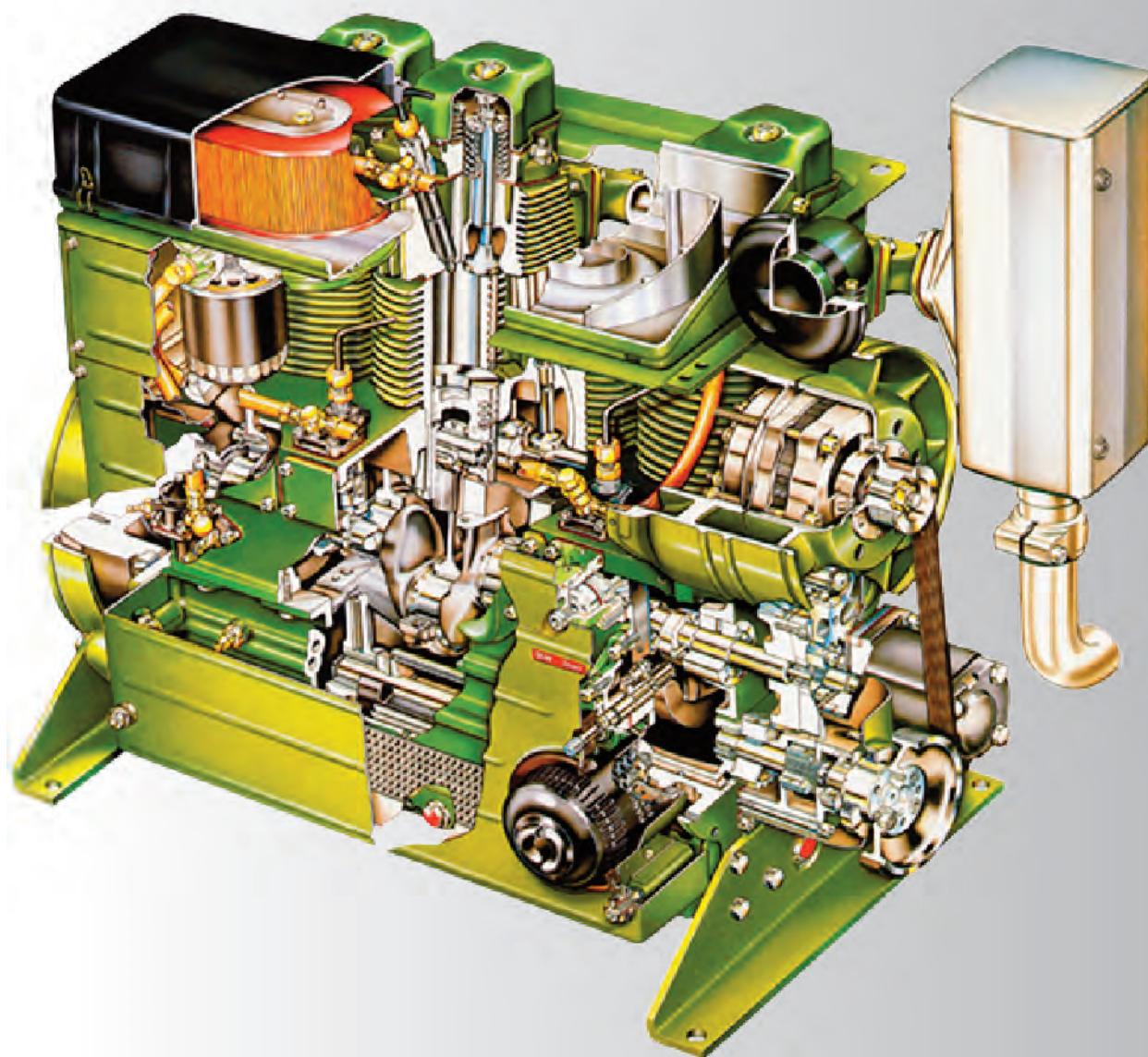


ENGINE MOUNTING

Flexible mounting is recommended for M-Series engines. The flexible mounting keeps the noise level of the driven unit low. Another possibility is the flexible mounting with elevated engine brackets. Please ask for drawings. Rigid mounting is possible only up to an operating speed of 2300 r.p.m.

	AA	BB	CC	DD
2M41	424	333	435	387
3M41	559	468	570	522
4M41	694	603	705	657

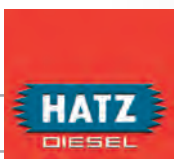
► Drawings with detailed - and connection measures can either be demanded or downloaded as pdf- resp. dxf-file which are shown in the Internet.



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