MONOBLOCK DIESEL

AUTOMOTIVE HEAVY DUTY APPLICATIONS

2,4,6 Cylinder

www.steyr-motors.com
The STEYR MONOBLOCK engine family consists of a number of design solutions which are the key for highest power density, reliability and safety in operation under all operational profiles and environments. The engines are built for heavy duty applications like light commercial and military vehicles, marine applications and stationary power plants. Due to the exceptional robust cooling behaviour and the reliable operation even with poor fuel qualities the STEYR MONOBLOCK engines achieved a unique image with vehicle manufacturers and operators around the world.

The STEYR MONOBLOCK is a highly efficient single casting from special high tensile alloy. The design shows a “free liner”, with a uniform and most effective cooling jacket, valve seats from “Stellit” material and inserted valve guides. Due to the fact that the design is free from high torque cylinder head bolts and cylinder head gasket there is no deformation to the roundness of the cylinders, no extra stress from different temperature levels.

Just a MONOBLOCK design offers an unlimited flow of cooling water and provides a uniform and effective cooling in the most critical upper section of the cylinder liner while conventional cylinderblock / cylinderhead – designs always result in “hot spots”, extra stress due to different temperature levels and cylinderhead bolts.

Durability, safety, robust cooling behaviour were the guidelines of the design and led us to this unrivalled product range of compact high speed diesels.

The STEYR MONOBLOCK engine family is equipped with a high pressure STEYR multi-fuel injection system with two stage injection nozzle and up to 2000 bar injection pressure. Design and material selection have been specifically matched to operate the engines with many types and qualities of diesel fuels like diesel (F54, DIN EN 590), kerosene (JP8 / F34) or maritime diesel fuel (DMA, DME). The unique design solution provides a pure mechanical “limp home” – capability even when the electronic engine management is out of operation (optional).
ENGINEERING

INNOVATION WITH LIGHTNESS

On-going innovations and customer focused development are important components of the core expertise that we have built through years of working together with our customers in order to meet their individual challenges. We would be pleased to support you in the development of your own engineering products and to provide our know-how and experience throughout the entire process.

FORWARD THINKING IN POWER TRAIN

WHY TO CHOOSE

Today’s technical complexity of combustion engines, electric machines, batteries, several control systems and transmissions is demanding a big background but also deep and detailed knowledge during development.

STEYR MOTORS offers on one side the development of diesel engines including their cooling, exhaust after-treatment, control system and on the other side the production of the developed engines. Apart from that we support you with our best knowledge in layout and control design of the entire power pack including the above mentioned subsystems.

The interaction optimization from simple transmissions with the diesel engine up to complex power packs like „Diesel-Electric and Hybrids“ result in efficient, silent and low emission products for multi-purpose use.
The STEYR MOTORS 2 cylinder horizontal parallel twin diesel engine is a very unique design supporting the most compact and lightweight DC generator available. The core engine is based on the robust STEYR MOTORS M1 monoblock design which has a long history in the light commercial, marine and military markets. Satisfied customers all over the world trust in the STEYR MOTORS monoblock engine family.

**STEYR MOTORS - M12 ENGINE GENERATOR UNIT**

- 25 kW diesel electric generator
- Small, lightweight and fuel efficient
- 2 cylinder DI-diesel engine
- Permanent magnet alternator
- Voltages 28 VDC – 600 VDC

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**STEYR MOTORS - M12 ENGINE**

The ultracompact features direct injection, turbo charging, mass balancing system for smooth operation and an integrated intercooler (optional) for fuel-efficient and low emission usage. The combination of these unique features gives the most economic enhancement for electric vehicles.
PERMANENT MAGNET GENERATOR

- Compact and lightweight
- Low maintenance and high reliability
- NdFeB magnets for high efficiency
- Multi-pole high frequency design provides low electrical ripple
- Direct engine mount for compact design
- IP classification (controller) IP67

LOW MAINTENANCE AND HIGH RELIABILITY

- The permanent magnet alternator has no extra bearings, couplings, brushes, slip rings, or rotating fields so there are no alternator parts to wear out.
- Each stator lamination stack is fully bonded to create a stator without voids which prevents moisture penetration, corrosion, and swelling.
- The steel magnet ring and magnets are 100% Nickel plated. The magnets are bonded with high temperature aerospace epoxy, then epoxy painted to further seal the surfaces. This provides excellent salt fog corrosion resistance.
- The magnets are mounted on the inside of the ring so there are no centrifugal forces pulling against the epoxy bonds.
- There are no electronic parts (diodes, etc.) or electrical connections inside the alternator. There is nothing to short or vibrate loose inside the alternator.
- Alternator MTBF exceeding 100,000 hours as there are no parts which rub, wear, or overheat under normal operating conditions.

<table>
<thead>
<tr>
<th>Base Engine Type</th>
<th>M12 TCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cylinders</td>
<td>2</td>
</tr>
<tr>
<td>Number of valve per cylinder</td>
<td>2</td>
</tr>
<tr>
<td>Injection system</td>
<td>Unit injector</td>
</tr>
<tr>
<td>Charging system</td>
<td>Single stage, waste gate</td>
</tr>
<tr>
<td>Displacement (lt)</td>
<td>1.06</td>
</tr>
<tr>
<td>Bore/Stroke (mm)</td>
<td>85/94</td>
</tr>
<tr>
<td>Rated Power (kW/HP)</td>
<td>26.4/36</td>
</tr>
<tr>
<td>Speed (1/min)</td>
<td>3800</td>
</tr>
<tr>
<td>Max. torque (Nm)</td>
<td>76</td>
</tr>
<tr>
<td>At speed (1/min)</td>
<td>2000</td>
</tr>
<tr>
<td>Min. fuel consumption (g/kWh)</td>
<td>210</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>104</td>
</tr>
<tr>
<td>Emission standard</td>
<td>EU Nonroad 97/68/EG (Stage IIIA), EURO III – V, EURO VI T</td>
</tr>
</tbody>
</table>

1) in preparation  | TDI = turbo charged, intercooled

Technical modifications as well as erratas, misprints and typeset errors are subjects to change.
The STEYR MOTORS 4 cylinder inline diesel engine is the perfect choice for light commercial, SUV and Pick-up, passenger car and industrial (stationary) applications. This robust 4 cylinder engine is part of the M1 monoblock engine family of STEYR MOTORS and is already successfully running all over the globe – even in the most critical environments such as high altitude and extreme temperatures.

STEYR MOTORS - M14 ENGINE

The M14 engine features an internal, geared mass-balancing system with specific design, lowest vibration and noise. The front end accessory drive has been designed for a wide variability for auxiliary allocation and adaptation for specific vehicle requirements. Turbo charger characteristics as well as the calibration of the electronic management system can be adapted to specific powertrain requirements.
THE PERFECT FIT FOR LIGHT-COMMERCIAL APPLICATIONS

Base engine type | M14 TCA (36 kW) | M14 VTI (95 kW) | M14 VTI (110 kW)
--- | --- | --- | ---
Number of cylinders | 4 | 4 | 4
Number of valve per cylinder | 2 | 2 | 2
Injection system | Unit injector | Unit injector | Unit injector
Charging system | Single Stage, VTS | Single Stage, VTS | Single Stage, VTS
Displacement (lt) | 2,1 | 2,1 | 2,1
Bore/Stroke (mm) | 85/94 | 85/94 | 85/94
Rated Power (kW/HP) | 36/50 | 95/129 | 110/149
Speed (1/min) | 2500 | 3800 | 3800
Max. torque (nm) | 160 | 295 | 320
At speed (1/min) | 1500 | 1800 | 1800
Min. fuel consumption (g/kWh) | 202 | 204 | 202
Weight (kg) (dry, excl. FEAD) | 175 | 179 | 182
Emission standard | STAGE III A | EURO III | EURO III - IV
Application | Industrial | HD | HD, PC

TCA = turbo charged, aftercooled / VTI = variable turbine geometry, intercooled / VTG = variable turbine geometry / HD = heavy duty / PC = passenger car

Technical modifications as well as regional and local errors are subject to change.
The STEYR MOTORS 6 cylinder inline diesel engine has been selected by many manufacturers of medium-duty vehicles, hybrid trolley busses, light-protected military vehicles and special purpose aggregates worldwide. The Monoblock design is the basis for a most compact core engine while the surrounding housings, manifolds and auxiliaries can be easily adapted to all vehicle requirements.

**STEYR ENGINE - M16**

- Sequential charging
- Direct intercooling
- 6 cylinder DI-diesel engine
- Multifuel capability
- Prepared for single bearing generator

Due to the unrivaled cooling capacity, sequential charging system, direct intercooling and the many variations for oil sumps, front-end accessory drives, transmission flanges and more, the M16 engine is the better choice compared to larger, heavier, low-speed truck type engines.

In combination with a permanent magnet generator, the STEYR M16 high-speed diesel engine gives a most compact power generation package, most times with just half the weight and packaging dimension compared to low-speed engines.
FOR HEAVY DUTY DEMANDS

MONOBLOCK DIESEL – automotive engine series

Technical modifications as well as changes, misprints and typeset errors are subject to change.

Base engine type | M16 VTI (135 kW) | M16 VTI (160 kW) | M16 SCI
--- | --- | --- | ---
Number of cylinders | 6 | 6 | 6
Number of valve per cylinder | 2 | 2 | 2
Injection system | Unit injector | Unit injector | Unit injector
Charging system | Single Stage, VTG | Single Stage, VTG | 2 Stage
Displacement (lt) | 3.2 | 3.2 | 3.2
Bore/Stroke (mm) | 85/94 | 85/94 | 85/94
Rated Power (kW/HP) | 135/184 | 160/218 | 225/304
Speed (1/min) | 3550 | 3600 | 4300
Max. torque (nm) | 370 | 500 | 680
At speed (1/min) | 2000 | 2050 | 2200
Min. fuel consumption (g/kWh) | 204 | 204 | 205
Weight (kg) (dry, excl. FEAD) | 255 | 255 | 280
Emission standard | EURO V | EURO III | EURO III

VTI = variable turbine geometry, intercooled / SCI = sequential charged, intercooled / VTG = variable turbine geometry

M16 VTI 160 kW 3600 RPM

M16 SCI 225 kW 4300 RPM

MONOBLOCK DIESEL – automotive engine series
The STEYR Monoblock engine family has been designed for a most compact core engine and is built from the best high performance materials. Together with the experienced engineering team STEYR MOTORS is able to customize all engines even for the most challenging specifications. During such a customization program state of the art CAE-technologies such as finite element analysis, vibration and noise prediction, flow calculations as well as sophisticated tests on full dynamic emission test stands will be applied to guarantee the shortest time-to-market procedure.

Your requirements will be supported by a specifically assigned project team during all engineering phases, prototyping, first installation and commissioning of the test vehicles up to continuous production.

Your fielded vehicles will be well backed up by our worldwide aftersales and service network. STEYR MOTORS offers you a full service starting with performance and power train simulation, engineering of your customized engine, up to the series production.

CUSTOMIZED

2, 4, 6 CYLINDER

CUSTOMIZED

FEATURES

- Monoblock design for highest cooling capacity and low cylinder wear
- Multi fuel capability (Jet A, Jet A1, DIN EN 590) with no power loss (together with optional fuel density compensation)
- Most compact installation and packaging dimensions due to the high adaptability of manifolds, oil sumps and transmission flanges
- Low weight
- High durability
- Fast engine heat-up for low fuel consumption and quick power response
- Easy maintainable – A unique solution for multi purpose
- Turbocharged (optionally with integrated intercooler)
- Permanent magnet alternator
- Electronic high-pressure injection system
- Extreme altitude performance due to special charging system
The combination of the highly durable STEYR Monoblock high-speed diesel engine with permanent magnet generators opens up a world full of new opportunities:

- small to medium electric cars with range extender
- hybrid busses
- trolley busses and railway systems independent of overhead powerlines
- commercial and military vehicles with independent electric wheel motors
- most compact mobile generators
- and many more

These newly developed solutions not only enable environmentally friendly, sustainable driving, but also make the dream of independence from existing energy systems and traditional supply points come true.

**POWER GENERATION**

<table>
<thead>
<tr>
<th>Engine model</th>
<th>M12 TCA</th>
<th>M16 TCA</th>
<th>M16 TCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Auxiliary power unit for armoured military vehicles</td>
<td>Range Extender / Main propulsion engine for hybrid trolley busses</td>
<td>Auxiliary power unit for railway systems</td>
</tr>
<tr>
<td>Power output (KVA)</td>
<td>17</td>
<td>120</td>
<td>180</td>
</tr>
<tr>
<td>Volt</td>
<td>28</td>
<td>300 - 900</td>
<td>1800 - 3600</td>
</tr>
<tr>
<td>Length (mm)</td>
<td>1000</td>
<td>2000</td>
<td>1035</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>500</td>
<td>1000</td>
<td>1300</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>465</td>
<td>500</td>
<td>1640</td>
</tr>
</tbody>
</table>

TCA = turbo charged, aftercooled exact dimension depending on application
To use QR-Codes you need a Smart-Phone App. For example „Red Laser“ for iPhone and „Barcode Scanner“ for Android. The installed App will automatically recognize it when you point your camera at the QR Code.
Your preferred App is available in your trusted App-Store.
(Terms according to your mobile phone provider)