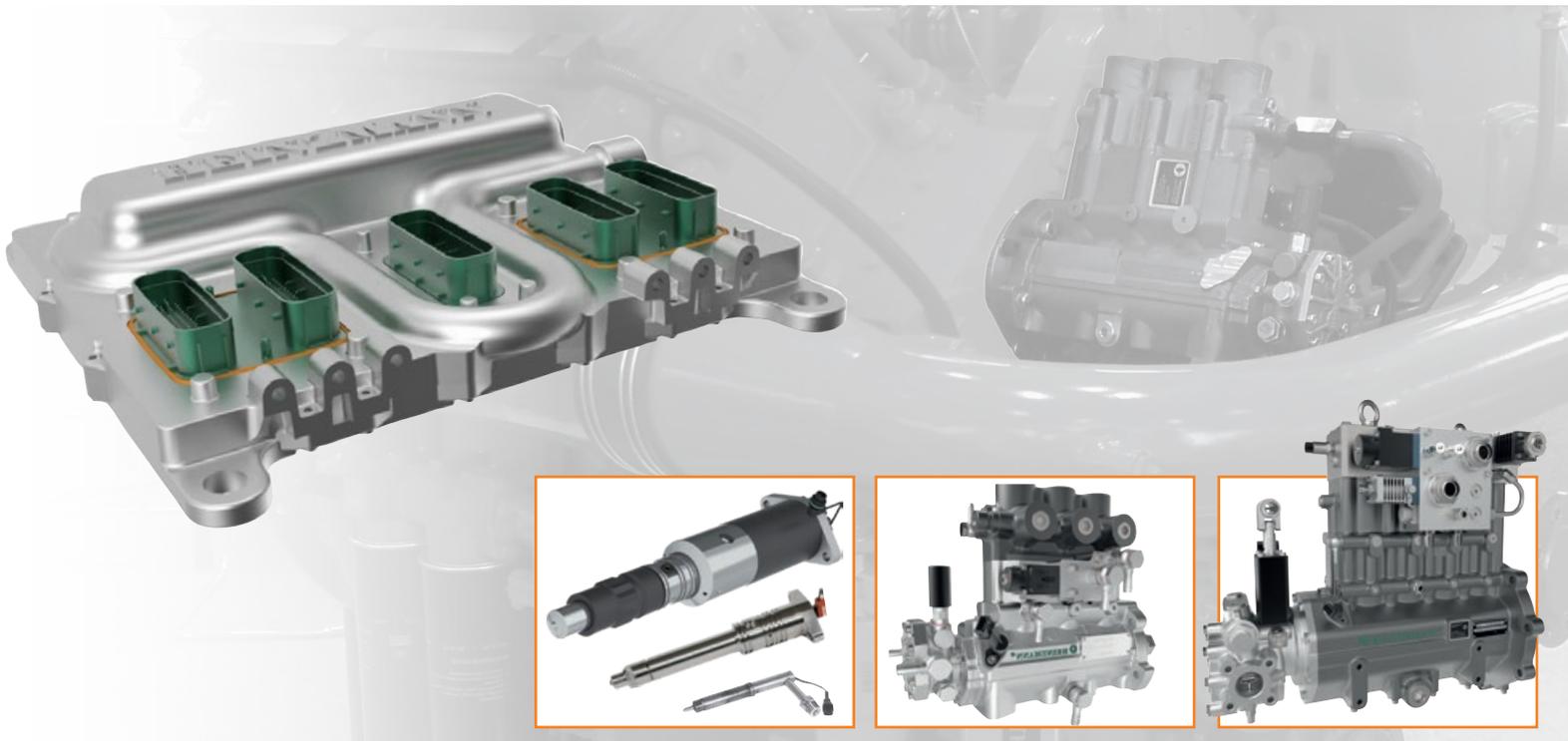




ODYSSEUS



Complete Common Rail Solutions

- ▶ Various sizes of injectors, pumps & EFI controls
- ▶ Engine sizes from 30 up to 1,250 kW/cyl.
- ▶ System pressure up to 2,500 bar
- ▶ All components from one supplier
- ▶ Applicable for diesel fuels and heavy fuel oil

ODYSSEUS

Common Rail (CR)

HEINZMANN offers the ODYSSEUS Common Rail Fuel Injection System including complete fuel injection equipment (high-pressure pumps, injectors, accumulators, high-pressure piping, safety valves).

The product range of ODYSSEUS hydraulic high-pressure components covers engine power outputs **from 150 up to 10,000 kW and more** for different engine sizes, applications and fuel qualities.

HEINZMANN also supplies a micro pilot common rail fuel injection system for gas engines.

HEINZMANN has more than 100 years of experience with speed governing of industrial engines. Today our digital engine management systems DARDANOS include all aspects of the present state of engine control, monitoring and diagnosis. They meet the international requirements of classification societies such as German Lloyd, Lloyd's Register, ABS and DNV. HEINZMANN satisfies customer needs with regards to instrumentation, cable harness design and adaptation as well as commissioning and worldwide customer care.

The high-precision ODYSSEUS hydro-mechanical components and the sophisticated engine management systems DARDANOS forge an integrated and complete solution for modern fuel injection technology.

All key components – hydraulics, electronic hardware and software – are developed and manufactured in-house exclusively by HEINZMANN.

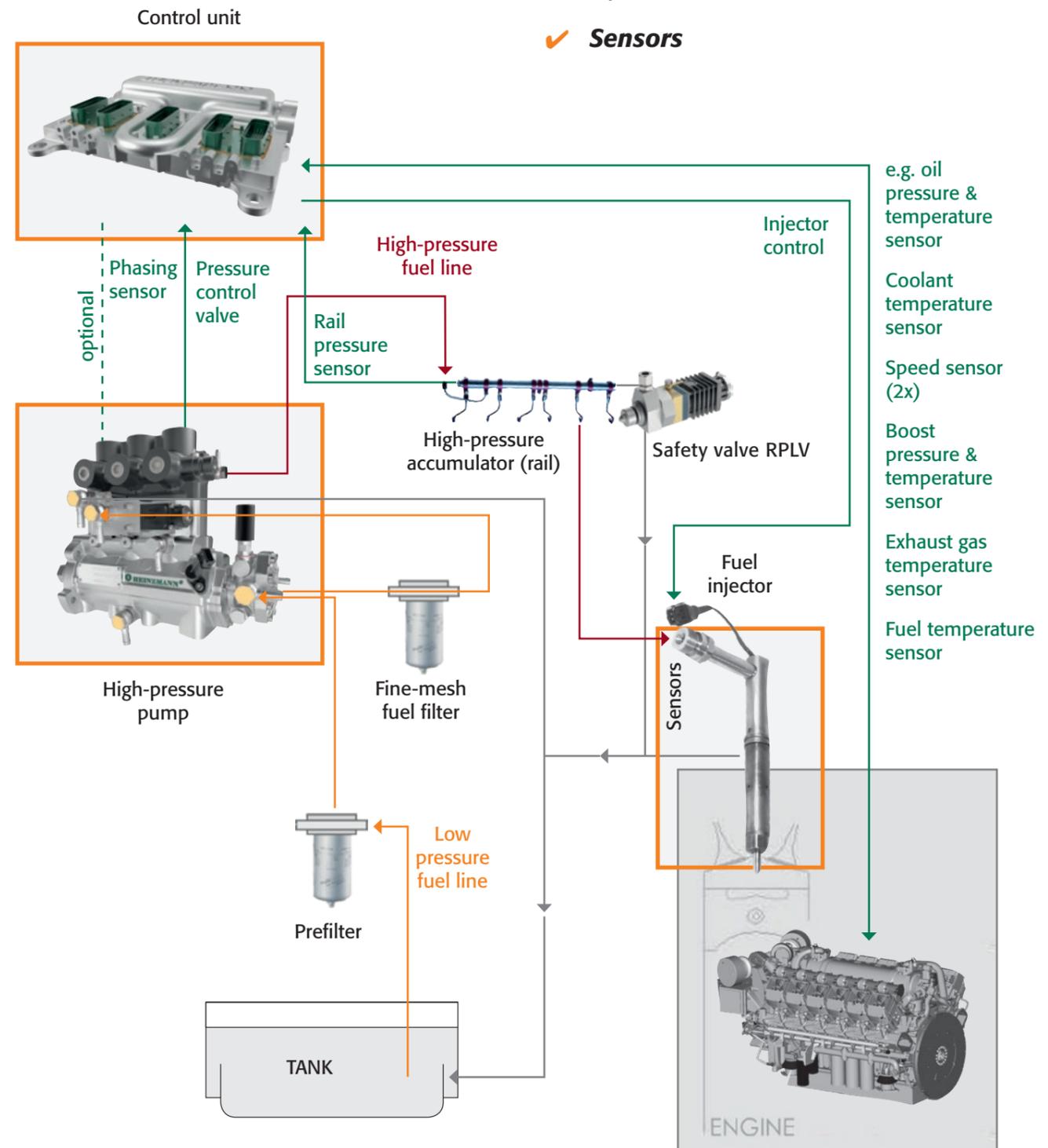
ODYSSEUS Benefits

- ✓ **Permanently high fuel system pressures at any engine speed/load point for optimised fuel vaporisation inside the combustion chamber**
- ✓ **Flexibly programmable multiple injection strategy**
- ✓ **Engine speed/load dependent injection mapping**
- ✓ **Injectors can be adapted to fit various cylinder heads**
- ✓ **Wide range of control units: for engines up to 24 cylinders**
- ✓ **Safe and compact fuel rail and piping**
- ✓ **Cable harness adapted to engine configuration**
- ✓ **Complete common rail system startup, support for combustion optimisation and system training by HEINZMANN Technical Service**
- ✓ **Utilisation of state of the art FEM and CFD software in the design process**
- ✓ **Hydraulic system evaluation utilising 1D and 3D professional finite elements simulation software**
- ✓ **Applicable for micro pilot common rail fuel injection for gas engines**

ODYSSEUS SYSTEM COMPONENTS

The HEINZMANN ODYSSEUS Common Rail System consists of

- ✓ **Control Unit**
- ✓ **High-pressure Pump**
- ✓ **Rail**
- ✓ **Injectors**
- ✓ **Sensors**



HEINZMANN components

ODYSSEUS HIGH-PRESSURE PUMPS

Unique crank mechanism

HEINZMANN common rail high-pressure pumps feature the new and unique crank mechanism design. The reciprocal movement of pressure elements is driven by a solid con-rod connection with pump crank shaft. This state-of-the-art principle in the field of diesel fuel pumps is featured in all HEINZMANN pumps in various versions and sizes for different applications, delivery rates and fuel qualities (distillate and heavy fuel oils).

The HEINZMANN high-pressure pump family design excels with high delivery rates and high pump efficiencies because of relatively compact but robust design especially for the needs of industrial applications even under demanding environmental conditions (vibration, dust, off-road application, etc.).

Low wear

In operation, HEINZMANN high-pressure pumps are practically wear-free when inspected after operation for the normal service lifespan of conventional diesel fuel common rail pumps. This is because commonly available cam-roller pumps suffer wear due to line contact of the cam and roller. In contrast the connecting rod bearings of HEINZMANN's HDP-K pumps are designed to run hydrodynamically on a film of lubricant.

HEINZMANN HDP-K pumps use a mechanical con-rod mechanism instead of a spring return like in conventional pumps to return the pistons on non- pressure stroke. Thus, there is no risk of accelerated wear due to roller-jumping at maximum operating speeds as in cam-roller pumps.

The connecting rod bearings decouple side forces (typical stress effects on pump plungers and elements within cam-roller solutions) which are generated by rotation of pump shaft. A cross-head piston with special plunger connection design transmits virtually no side-force effects on the HDP-K plungers. This results in very low wear effects on pump elements and coated plungers as well as correspondingly long TBO periods.

The above mentioned plunger connection mechanism has a fail-safe function. The mechanism disconnects non-destructively plunger from cross-head piston and crank shaft in case of malfunction and keeps the pumps working.

ODYSSEUS HDP-K series

The HEINZMANN HDP-K high-pressure pump family consists of three basic sizes: HDP-K2, HDP-K3 and HDP-K4. They all stand out due to

- Unique crank mechanism design
- Good serviceability
- Robust design, rated for long endurance
- Flow control valve with HEINZMANN solenoid (actuated via DARDANOS ECU)
- With or without prefeed pump
- Engine oil lubricated

HDP-K2

- 2 pressure elements
- System pressures up to 2,200 bar
- Versions with 6, 8, 10 & 12 mm stroke
- Plunger diameter: Ø 8 mm
- Pump speed up to 2,400 rpm
- Delivery rates up to 2.5 l/min
- Flange mounted



HDP-K2

HDP-K3

- 3 pressure elements
- System pressures up to 2,200 bar
- Versions with 12 & 16 mm stroke
- Plunger diameter: Ø 10, Ø 12, Ø 14 mm
- Pump speed up to 3,000 rpm (12 mm stroke)
- Delivery rates up to 15 l/min (1 x pump; redundant concept: 2 x pump up to 30 l/min)
- Easy adaptable (flange or socket version)



HDP-K3

High-pressure pump HDP-K3 HFO

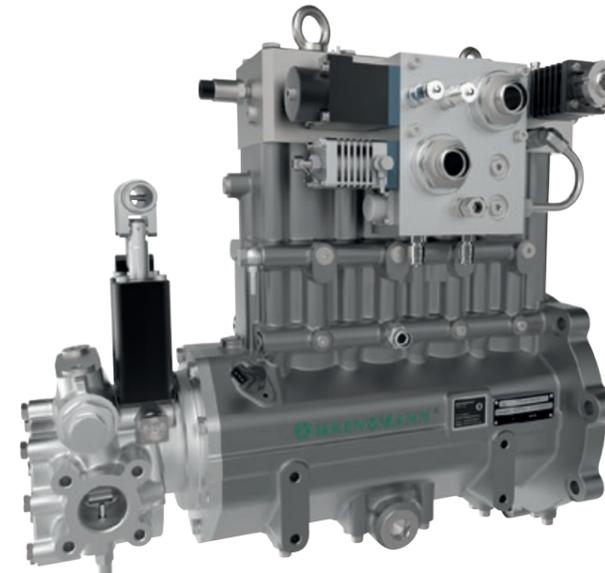
- 3 pressure elements
- System pressures up to 2,200 bar
- Designed for HFO operation
- Delivery rates up to 15 l/min (1 x pump; redundant concept: 2 x pump up to 30 l/min)
- Special two-way HFO/lube-oil sealing concept
- Mix oil drain
- Special design for high-temperature operation (HFO)



HDP-K3 HFO

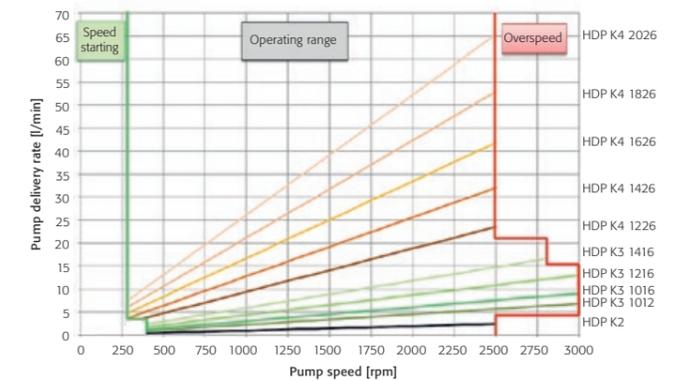
High-pressure pump HDP-K4 HFO

- 4 pressure elements
- System pressures up to 2,400 bar
- Designed for HFO operation
- Delivery rates up to 65 l/min (1 x pump; redundant concept: 2 x pump up to 130 l/min)
- Special two-way HFO/lube-oil sealing concept
- Mix oil drain
- Special design for high-temperature operation (HFO)



HDP-K4 HFO

Flow Rates of HEINZMANN High-Pressure Pumps



ODYSSEUS INJECTORS

HEINZMANN has developed a completely new injector generation with sophisticated features:

Static leak free design

The new ICR-DS injector generation features a static leak free design. Only a small amount of control volume returns to fuel backflow. HEINZMANN has achieved a considerable reduction of fuel backflow by 75 % (compared to conventional leakage afflicted common rail injector designs) and of fuel return temperatures.

The pressurised fuel enters ICR-DS injectors through the high-pressure fuel port directly into the injector integrated accumulation volume. The integrated accumulation volume (rail volume) has a beneficial effect on damping peak pressures within the hydraulic system and especially within highly stressed inner parts of injectors. HEINZMANN has achieved reduction of peak pressures inside ICR-DS injectors by 25 % by means of integration of accumulation volume. The achieved good fuel flow within the accumulator is of highest importance especially for HFO operation.

HEINZMANN fuel injection nozzles have only one single central bore-hole which acts as needle guide and fuel feed at the same time. Injectors and nozzles for HFO operation feature less susceptibility to cat-fines and lacquering effects.

ODYSSEUS ICR-DS series

The electronically controlled injectors are actuated by HEINZMANN solenoid technology with strong magnetic force, fast response time and compact size.

ODYSSEUS ICR-DS-50

For engines with cylinder power up to 50 kW

- Small-sized common rail injector for injection pressures up to 2,000 bar and injection quantities in a range of 2...200 mm³/shot
- Designed for distillate diesel fuels
- Suitable/adaptable for micro pilot common rail fuel injection systems



ODYSSEUS ICR-DS-100

For engines with cylinder power up to 100 kW

- Medium-sized common rail injector for injection pressures up to 2,200 bar and injection quantities in a range of 10...500 mm³/shot
- Designed for distillate diesel fuels
- Suitable/adaptable for micro pilot common rail fuel injection systems
- With integrated fuel filter
- Option with integrated accumulator and flow limiter



ODYSSEUS ICR-DS-200

For engines with cylinder power up to 200 kW

- Medium-sized common rail injector for injection pressures up to 2,500 bar and injection quantities in a range of 50...2,500 mm³/shot
- Designed for distillate diesel fuels
- With integrated accumulator, flow limiter and fuel filter



ODYSSEUS ICR-DS-300

For engines with cylinder power up to 300 kW

- Large-sized common rail injector for injection pressures up to 2,200 bar and injection quantities in a range of 50...4,000 mm³/shot

- Designed for distillate diesel fuels and heavy fuel oil (HFO)

- Cooled nozzle



ODYSSEUS ICR-DS-500

For engines with cylinder power up to 500 kW

- Large-sized common rail injector for injection pressures up to 2,200 bar and injection quantities in a range of 70...9,000 mm³/shot
- Designed for distillate diesel fuels and heavy fuel oil (HFO)
- Cooled nozzle



ODYSSEUS ICR-DS-1000

For engines with cylinder power up to 1,250 kW

- Large sized common rail injector for injection pressure up to 2,400 bar and injection quantities in a range of 150...14,000 mm³/shot
- Designed for distillate diesel fuels and heavy fuel oil (HFO)
- Cooled nozzle
- Sealed and cooled control armature separated from fuel line
- Accumulator volume integrated, no rail accumulator required
- Built in flow limiter
- High multi-injection accuracy



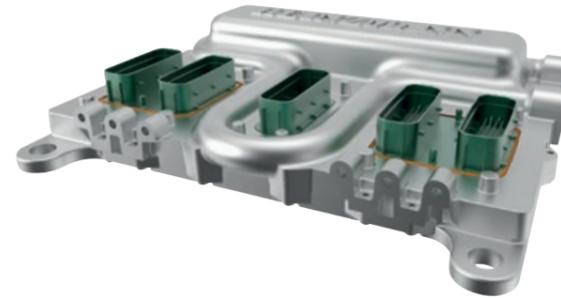
ODYSSEUS CONTROL UNITS

DARDANOS MVC series

The DARDANOS series is designed as universal speed controllers for engines with electronically-controlled injection systems for diesel, gas and dual fuel engines.

In addition to their primary purpose of controlling speed, these controllers provide additional features that offer other benefits for your combustion engines.

MVC 01-24 for up to 24 cylinders

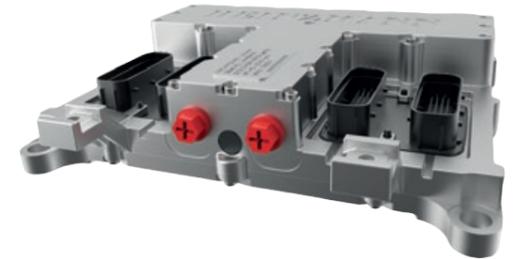


MVC 04-6 for up to 6 cylinders



The HEINZMANN devices are based on an outstanding experience and technological background in EFI control systems. They offer optimised fuel efficiency, increase of engine power, lower environmentally harmful emissions and reduced smoke especially during startup and acceleration.

MVC 03-8 for up to 8 cylinders



Technical information

EFI control systems	MVC 01-24	MVC 03-8	MVC 04-6
Supply voltage	15 ... 33 VDC (nom. 24 VDC)	12 ... 33 VDC (nom. 24 VDC)	12 ... 33 VDC (nom. 24 VDC)
Max. inj. boost/hold current	30/18 A	26/13 A	26/13 A
Ambient temperature	-40 ... +80 °C -40 ... +125 °C with cooling	-40 ... +80 °C -40 ... +120 °C with cooling	-40 ... +80 °C no cooling
Permissible humidity	up to 95 % at 55 °C	up to 95 % at 55 °C	up to 95 % at 55 °C
Degree of protection	IP6K9K	IP69K	IP6K9K
Vibration	max. ±2 mm at 10 ... 24 Hz max. 0.24 m/s at 24 ... 64 Hz max. 9g at 64 ... 2000 Hz	max. ±2 mm at 10 ... 24 Hz max. 0.24 m/s at 24 ... 64 Hz max. 9g at 64 ... 2000 Hz	max. ±2 mm at 10 ... 24 Hz max. 0.24 m/s at 24 ... 64 Hz max. 9g at 64 ... 2000 Hz
Shock level	30 g, 11 ms – half sine wave	30 g, 11 ms – half sine wave	30 g, 11 ms – half sine wave

HIGH-PRECISION MANUFACTURING

Production takes place at HEINZMANN under optimum conditions and features production processes that are sustainable, environmentally friendly and conserve energy. The state-of-the-art machinery enables

ultramodern production processes. An outstanding example is the high-precision manufacturing of common rail components at our Schönau site.

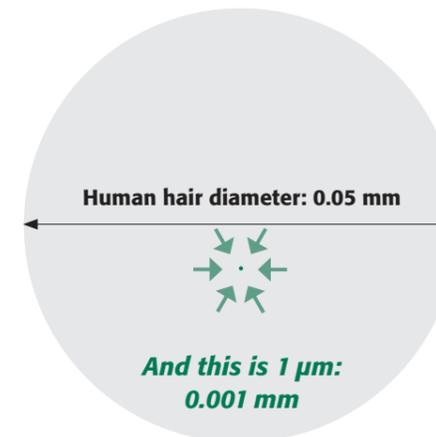


Cleanroom assembly

All ODYSSEUS high-precision components like plungers, valves or nozzles manufactured and cleaned in our production areas, are assembled in special cleanrooms.

The cleanrooms are separated from the production area by two-gate air locks. This ensures the elimination of dust particles in the ambient air.

ODYSSEUS components are mounted under ideal conditions in order to guarantee their high quality and reliability.



High-precision: what is 1 µm?

HEINZMANN is able to perform manufacturing in high-precision areas below 1 µm, less than 0.001 mm.

To demonstrate the accuracy which is needed, the illustration shows the comparison of the human hair diameter and one µm.

High-precision machinery

- High-precision external grinding machines (Studer)
- High-precision internal grinding machines (Studer)
- Centreless grinding machine (Tschudin)
- High-precision coordinate grinding machine (SIP Hauser)
- Precision CNC-lathes (Mazak, Spinner, Schaublin)
- Precision CNC-milling machines (Heller, Hermle)
- Highest quality lapping machines (Stähli)
- Honing machines (Gehring, Pemamo)
- EDM drilling machines (Posalux)
- Hydro-erosive rounding and calibrating machines (Sonplas)
- ECM machines (Kennametal)
- Demagnetizer (Maurer Magnetic)
- Ultrasonic cleaning equipment



HIGH-PRECISION MEASUREMENT AND QUALITY ASSURANCE

HEINZMANN products stand for reliability and precision. Product quality is of highest priority at HEINZMANN, so every product is checked before, during and after

manufacturing using sophisticated techniques. Maximum precision is achieved by using state-of-the-art measuring and test equipment.



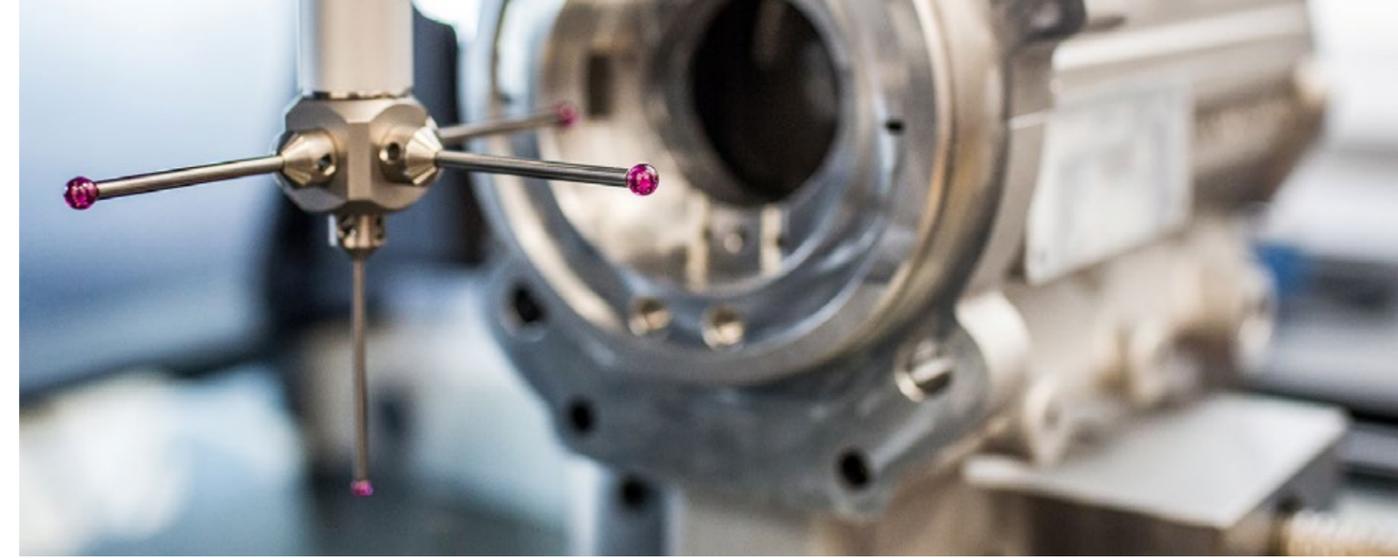
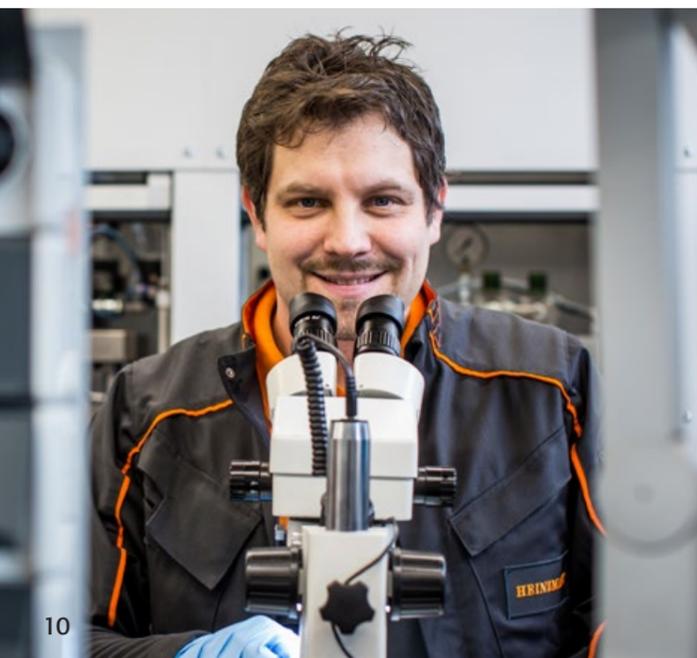
Endurance test benches

Once our products have been manufactured, their load-bearing capacity is examined using high-tech endurance test benches. The durability of HEINZMANN ODYSSEUS high-pressure parts and complete systems are tested in non-stop operation twenty-four hours a day, seven days a week to ensure that all components satisfy the highest quality standards.

Quality control equipment

HEINZMANN carries out analyses for quality control of prototypes and serial parts in their own modern equipped laboratories. All test results are documented and stored in secured internal and external data bases. Our own material laboratory is able to prepare probes for metallurgical, structural and hardness analyses within minutes. With high end optical instruments, internal structures such as rounding of spray holes, galleries, bore crossings, etc., surfaces are inspected and documented.

- **Dimensional control: 3D coordinate measurement**
- **Contour measuring: Roundness, parallelism, cylindricity, straightness**
- **Surface measuring: Roughness**
- **Shape testing: Measurement of shape and position tolerances**



COMMISSIONING AND AFTER SALES SERVICE

One of our strengths is the comprehensive on-site service that we provide for our customers. Our service team focusses on an optimal customer support during installation, commissioning and system calibration. We travel to our customers and provide them with assistance, no matter where they may be based. Short response times are a matter of course. HEINZMANN boasts a large network of authorised service providers all over the world.

As experts in handling HEINZMANN products, a team of experienced service engineers takes on the tasks of installation, order processing, repair and maintenance. In addition to overhauling components, they also deliver and install spare parts kept in storage on-site.

HEINZMANN offers expertise and state-of-the-art testing facilities, enabling us to support customers in the

optimisation of their engines equipped with HEINZMANN common rail systems.

We deliver turnkey solutions tailored for OEM or retrofit applications. Our development program focuses on the optimisation of the combustion process in diesel engines.

HEINZMANN has the ideal solution, whatever is required, be it power, fuel efficiency, acoustic performance, or compliance with legal requirements for engine modifications, such as future international emission restrictions. Future enhancements can be achieved by reducing engine exhaust emissions (e.g. NO_x, HC, CO and particulates), combustion noise and fuel consumption. The growing demands of our customers are the driving force at HEINZMANN.



HEINZMANN Group

Quality & Precision
since 1897

The Group started in 1897 with
Heinzmann GmbH & Co. KG,
and now includes
HEINZMANN UK,
HEINZMANN China,
HEINZMANN Korea,
HEINZMANN India,
HEINZMANN Australia,
HEINZMANN AUTOMATION,
REGULATEURS EUROPA,
and CPK Automotive as
member companies.

The HEINZMANN Group
operates numerous global
subsidiaries, including eight
production sites and an
international distributor
network.

Our product portfolio
comprises engine
management system
solutions, as well as exhaust
gas aftertreatment solutions,
for industrial combustion
engines and turbines. It also
encompasses automation
systems, primarily for the
shipping industry.



● Head office ● Subsidiaries ● Subsidiaries with production facilities ● Distributors and dealers

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