

BERU – the specialist in Diesel Cold-Start Technology.

BERU is the world's leading supplier of Diesel Cold-Start Technology. For nearly 100 years, BERU has been developing BERU spark plugs and glow plugs – and it continues to shape the market today with countless patented innovations.

The market share in diesel engines worldwide is continuing to grow. The market share in diesel engines has almost reached the 50 percent mark in Europe. In addition, in the USA, it is increasing at a much more significant rate than that of petrol hybrids. Increasingly stricter emission limits, coupled with endeavours to continue reductions in fuel consumption, are already indicating significant effects on future diesel engine designs. BERU is taking account of this development – with innovative developments such as the ISS instant start system, the pressure sensor glow plug PSG or the BERU glow plug with ceramic heating rod.



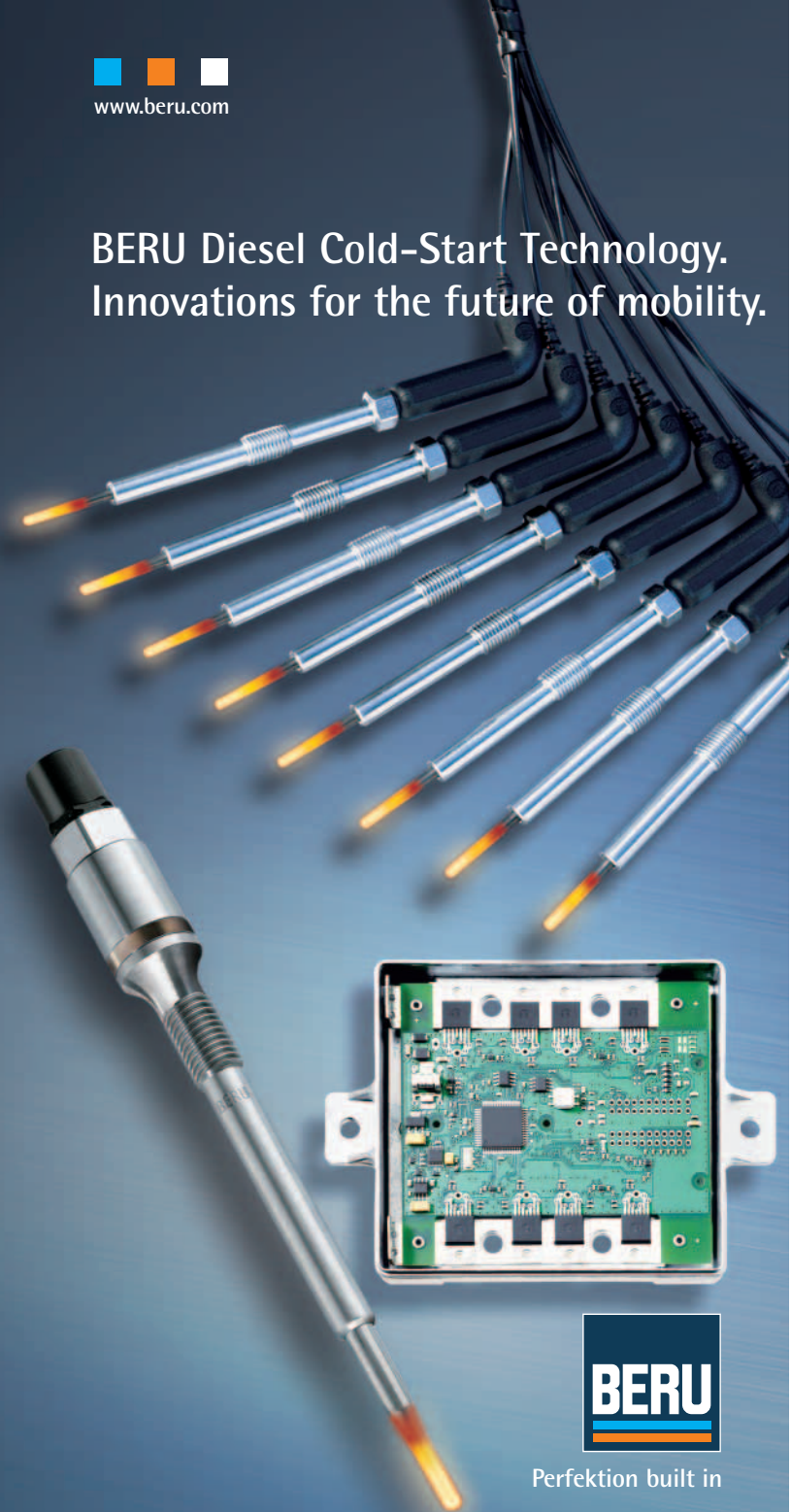
The research and development centre in Ludwigsburg with state-of-the-art test laboratories and test equipments.



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Perfektion built in

Safe start: BERU ISS Instant Start System.

As early as in 2000, BERU launched the series production of a diesel instant start system. This cold start system guarantees – even at extremely low temperatures of $-30\text{ }^{\circ}\text{C}$ – an "SI engine like key start", stable idling, clean load assumption and low emissions.

The new generation of the ISS

As a consistent continuation of this technology, BERU developed the second generation of the ISS with integrated preheating of intake air. Here, the ISS control unit controls the glow plug quick-start function and provides optimum actuation to the heater flange in communication with the engine control unit. Unlike the glow plug, which creates the purely local ignition conditions for the air-fuel mixture, a heater flange increases the temperature of the air flowing into the cylinder, thus producing better conditions for fuel ignition throughout.

Use in the passenger vehicle sector

The second-generation ISS is currently mainly used for light duty trucks. However, due to tighter exhaust gas regulations, the BERU system will also move into the passenger vehicle sector.

Advantages of the BERU ISS

- "SI engine like key start" down to $-15\text{ }^{\circ}\text{C}$ (at $-25\text{ }^{\circ}\text{C}$ only 2 seconds pre-heating)
- Temperature control for pre-, after and intermediate heating
- Easy and flexible application
- OBD-compatible, operation of all conventional interfaces
- Engine and control-independent
- High flexibility of the glow plugs ensure a broad range of applications
- Increase in the electrical load on the engine and therefore better support for the diesel particle filter regeneration in the low load range

Clean technology: BERU PSG Pressure Sensor Glow Plug.

The future exhaust emission limits demand a drastic reduction in particles and nitrogen oxides. Among other things, this also requires optimisation of the combustion. With its concept of the intelligent PSG Pressure Sensor Glow Plug, BERU AG created the technical conditions.

Integrated sensor technology

The PSG pressure sensor glow plug measures the pressure in the engine combustion chamber by means of an integrated sensor and sends the data to the engine's control electronic. These accurate and long-term stable pressure signals allow the compliance with the ever-stricter exhaust emission limits – through the setup of a closed-loop regulatory circuit. This allows not yet available, clearly extended functionalities – combustion control, cylinder balancing, maximum load pressure regulation, compensation for different fuel qualities, durable stability, improvement of cold starts, NVH/acoustics optimisation, diagnostics.

Innovative award winner

This trend-setting concept has already been awarded with numerous international innovation prizes – and will hold, without doubt, a key position in the continuing reduction of diesel emissions. One of the biggest European diesel engine manufacturer has already placed an order for series production of the developed and market-ready BERU PSG. As from 2008, it will be installed in the manufacturer's vehicles.

Technical features of the BERU PSG

- Reliable measuring of the combustion chamber pressure under series production conditions
- High precision and durable stability
- Permits series production of closed-loop regulatory circuits in diesel engines for the first time
- Pressure measuring elements without direct combustion chamber contact
- Contributes to the compliance with the emission standards Euro IV, Euro V, Tier II and LEV II
- With piezo-resistive pressure sensor
- Measuring range up to 200 bar

High loading capacity: BERU Ceramic Glow Plug.

The demands placed on modern diesel engines, such as smooth performance, less emissions and high output, generally induce a poorer start-up response – a future problem that will be amplified through low-compression diesel engines. In addition to the efficient cold-start function of the glow plugs, the engine designers expect product solutions that assist in the availability of the required heat energy as otherwise the engine would generate stronger emissions due to excessive cooling of the engine.

Here, ceramic glow plugs offer appropriate solutions: Through a fast temperature increase, a high maximum temperature and a long service life.

Technical features of the BERU Ceramic Glow Plug

- Heating temperature up to $1,300\text{ }^{\circ}\text{C}$
- Extremely fast heat-up time to $1,300\text{ }^{\circ}\text{C}$ in under 3 seconds
- Longer service life
- Optimised closed-loop control for pre-, after and intermediate heating
- Exact measurement of the glow plug resistance
- Innovative production process



SI engine like key start



Integrated sensor technology



1,300 °C in under 3 seconds