



## Sabre CRi Master

Advanced, Compact, All-Makes  
Common Rail Injector Tester

**2018**  
Brochure  
Update

**New**  
Test  
Features

**New**  
Software  
interface

**Unique**  
Patented  
Technology



# Welcome

## Key Features Overview

- Fast-Typically one minute per test step
- Simplified & fast injector clamping
- High flow output for optimum high & low pressure
- Patented Closed-Loop power management
- Advanced temperature monitoring
- Rapid installation & use
- Trolley available for mobility in the workshop
- Award winning bench platform
- High pressure upgrade kit available

Simplified  
Usability



Flexible &  
Adaptable



Innovative  
Design



OE  
Heritage



## Ultimate User Flexibility

Central to the Sabre's design are exceptional levels of user-control enabling the full customisation of test conditions & parameters. This means technicians with a range of training levels can work with the Sabre. It is comprehensive & accurate in basic modes, and provides more advanced settings when the technician is ready.

The Sabre is flexible enough to evolve as your workshop's services evolve. With a variety of functions that can be upgraded you are able to unlock future return on investment for your workshop.

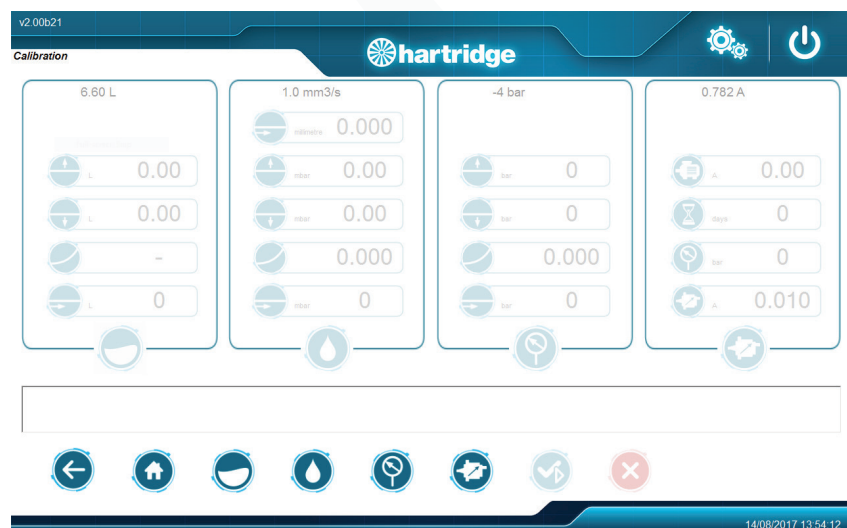
Whatever your needs, the Sabre CRi Master ensures the highest standards of common rail injector testing capability are achieved. Whether your requirement is for a fast & accurate function tester or a repair-quality evaluation of injector performance.



The Sabre CRi Master



The award winning platform



The Sabre arrives fully calibrated for immediate use



# New Features

## Additional Test Steps

The Sabre CRi Master's new software now has additional test functions. **Nozzle Opening Pressure (NOP)** checks for correct mechanical function of the nozzle to open at the required pressure to achieve the intended atomisation.

**Minimum Drive Pulse (MDP)** is a dynamic delivery sweep test that provides more than just the minimum drive pulse (MDP) but also the ability to determine the profile of the delivery curve thanks to the new graph functions implemented into the magmah<sup>sharp</sup> software.

Specific testing has also been developed for the new internal pressure sensor in **Denso's latest injector technology, I-ART**, measuring the fluctuations of pressure & temperature to ensure accurate testing. Thanks to these enhanced features the workshop can offer a wider range of services.

## Injector Coding

Our comprehensive development process provides validated coding on the Sabre CRi Master for Bosch, Continental, & Denso injectors. The Sabre's reliable testing, combined with the accurate coding parameters, delivers trust worthy All-Makes coding in one machine.

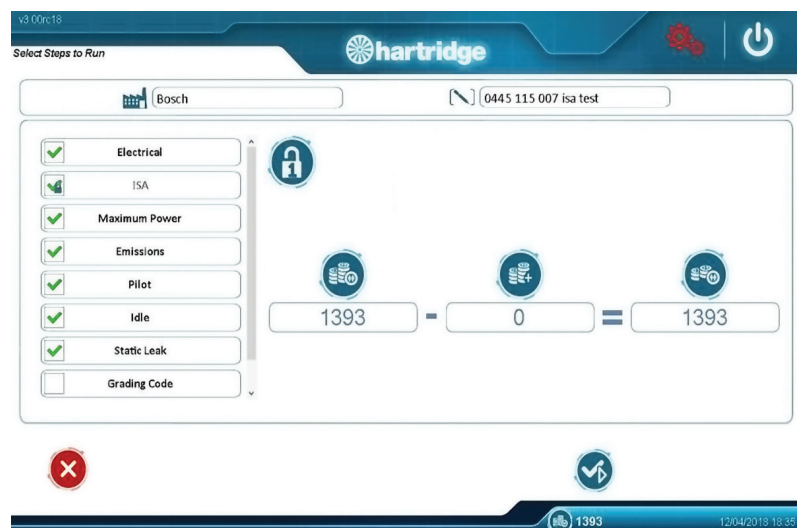
## Smarter Licences

The Sabre CRi Master & Expert versions are now more flexible than ever. The workshop can now unlock functions, test steps, or coding only when they need to, & not need to pay for functionality they wouldn't use; all managed by the magmah<sup>Sharp</sup> software. Credit bundles ensure the user has a ready supply of credits to unlock functions as needed & maintain smooth operation in the workshop.



Injector and application ready to test

“Hartridge test plans are developed using our own unique OE Heritage to ensure the highest levels of accuracy”



Smarter licencing enables the user to unlock only what they need

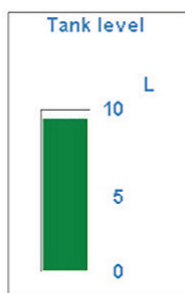
# Technology

## Advanced Temperature Management

The Sabre is ready to test injectors from the second you switch it on. No warm up period is needed. By using constant temperature monitoring the machine automatically applies a temperature offset to compensate for temperature variances, i.e. when testing from cold. This allows the Sabre to provide exceptional precision in any ambient temperature.

The Sabre also uses 3 air-to-oil heat exchangers to regulate & stabilise temperatures. This superior cooling performance enables injectors to run for extended test periods with no danger of overheating & ensures test-to test & machine-to-machine repeatability.

Metering temperature	23.0 °C
Back leak temperature	23.3 °C
Resistance	189.38 $\Omega$
Injector capacitance	0.00 $\mu$ F
Inductance	0.00 mH
Response Time	0 $\mu$ S
Quantity	0.0 mm <sup>3</sup> /st
Back leak flow	-0.7 mL/min



Fluid tank level information

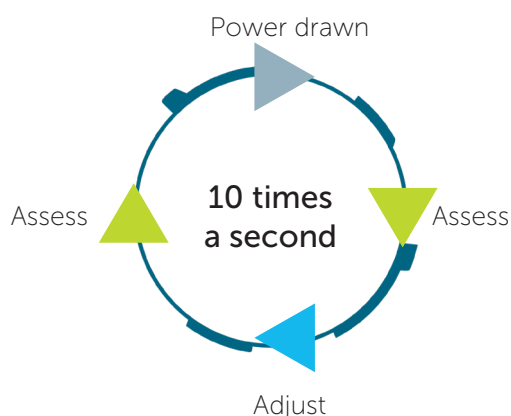
## Upgradable Pressure

Alongside the development of the Sabre CRi Expert is an in-field upgrade kit for the Sabre CRi Master. The upgrade kit will mean that you can invest in a Sabre Master safe in the knowledge you can upgrade if required. You will be able to test the latest generations of high flow, high pressure common rail injectors up to 2,700 bar.

## Patented Power Management

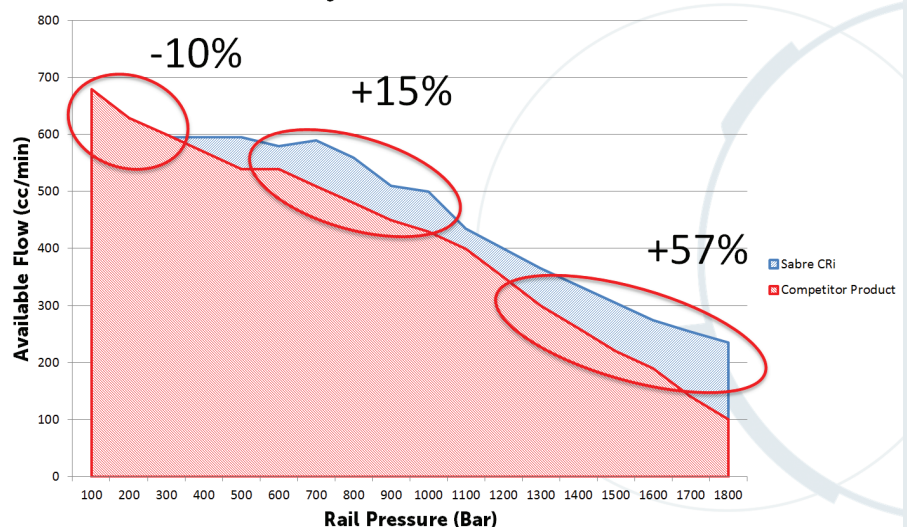
The Sabre's unique, patented Closed-Loop technology constantly monitors the power used by the internal pump 10 times a second. This makes sure the Sabre's operation remains stable, & that full power of the pump is available to maximise flow output at high rail pressures.

Not only does it ensure that the power draw is constantly balanced, but it means the Sabre can be powered by domestic power supplies making installation & use in the workshop straightforward & instant.



"Closing the loop" with patented power management

### Hydraulic Performance



The Sabre CRi Master produces superior hydraulic flow & pressure

# Testing

## Full Event Response Time (FERT)

Unlike other methods of measuring injector response time which only monitor electrical signals to determine solenoid actuation, Hartridge measures the full event. FERT includes all internal elements of the injector to give you a complete view of the response time of the injector from electrical activation to the injection event.

## Library of test plans

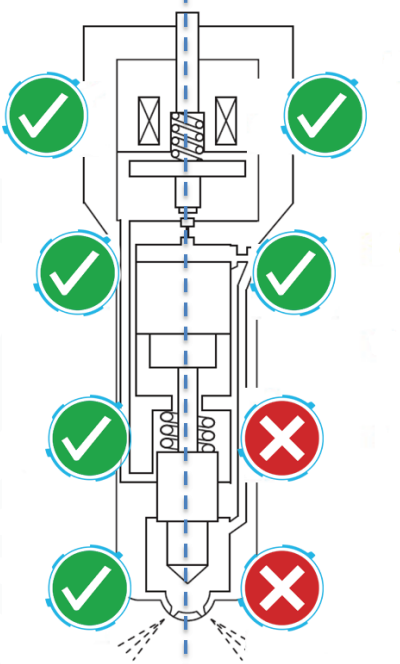
Hartridge test plans are developed using our own unique OE Heritage to ensure the highest levels of accuracy. Hartridge have developed a huge library of full test plans including coil & piezo variants. Thanks to the smarter credit licencing the workshop can unlock specific tests as needed. Hartridge continue to develop and release new test plans as part of the support of the Sabre.

## Intuitive Touch Screen

The touch screen perfectly combines ease of use with simplicity of design. Our bespoke programming & icons on the Windows 10 magmah<sup>Sharp</sup> interface is regularly updated. Even more ease-of-use has been built in with:

- Streamlined test selection method
- Picture guides to show what tooling to use
- New screen layout of test parameters per step
- New test 'exit' mode if a step fails

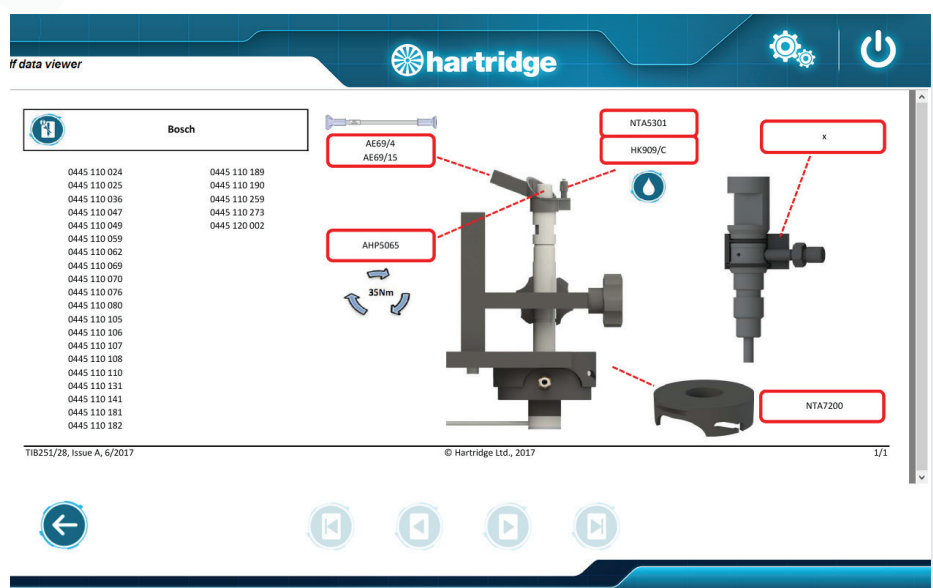
### Hartridge FERT Competitor Products



The Sabre CRi Master includes these events



Intuitive use of the Sabre CRi Master



The new software contains visual guides for the technician



# Specification

## Installation Requirements

Two domestic electrical mains connections are required:

- High voltage: 1 of 200-240 Vac (10amps) & 1 of 200-240 Vac (16amps)
- Low voltage: 1 of 100-120 vac (10amps) & 1 of 200-240 Vac (16amps)\*

\*with step up transformer.

The machine weighs 160kg fully loaded with calibration fluid, & 145kg without. You must use ISO4113 calibration fluid. Dimensions are 610mm (W), 610mm (D), & 1100mm (H)

## Technical Specification

- |                             |                            |
|-----------------------------|----------------------------|
| • Rail pressure:            | 1-1800 bar                 |
| • Injection speed:          | 120-3000 imp               |
| • Pulse width:              | 0-4000 $\mu$ S             |
| • Time delay:               | 0-600 seconds              |
| • Tank capacity:            | 10 litres                  |
| • Tank filtration:          | 2 $\mu$ m                  |
| • Metering unit filtration: | 60 $\mu$ m                 |
| • Backleak filtration:      | 60 $\mu$ m                 |
| • High pressure flow:       | 600-250 cc/min             |
| • Fluid cooling:            | Air-to-oil heat exchangers |

## Injector Measurements

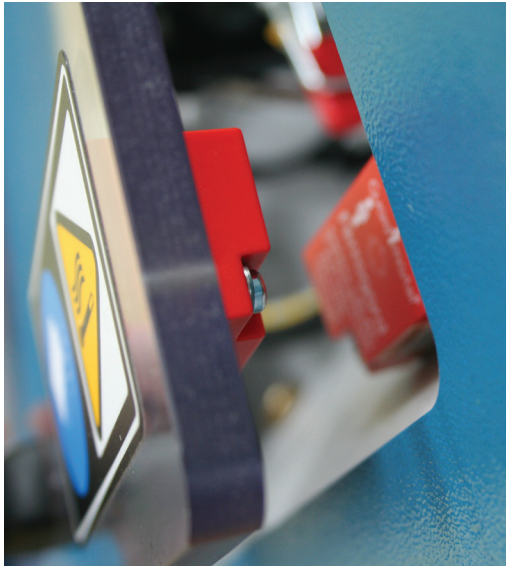
- |                                     |                            |
|-------------------------------------|----------------------------|
| • Coil resistance:                  | 0-200 $\Omega$             |
| • Inductance (coil injectors only): | 0-20 mH                    |
| • Capacitance (piezo injectors):    | 0-12 $\mu$ F               |
| • Response time measurements:       | 0-999 $\mu$ S              |
| • Backleak flow measurements:       | 0-290 mL/min               |
| • Delivery measurements:            | 0-400 mm <sup>3</sup> /str |
| • Backleak temperature:             | 0-180°                     |

For specification of the Sabre CRi Expert please refer to the brochure for the Sabre CRi Expert.

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Continuous development is taking place. Hartridge reserves the right to alter the design &/or specification without prior notice.  
Hartridge 2018 / Sabre CRi Master V5.0



You must use ISO3114 calibration fluid