

ERT45R

The only **universal system**
for testing all types of electronically controlled
diesel fuel injection pumps.

The central image shows the ERT45R InjectionPower simulator unit. The screen displays 'INJECTION SIMULATOR' with status for Hardware, Keyboard, and Video, all marked as OK. A hand is shown inserting an 'ERT45R PROGRAM CARD'. The unit is surrounded by a circular menu with segments for different pump types and brands:

- ANALOGICALLY CONTROLLED DIESEL PUMPS** (Yellow segment): BOSCH VE-HDK, BOSCH H,M,P,R, ZEXEL COVEC-T, ZEXEL COVEC-F1/F2, DELPHI DPC-N.
- COMMON RAIL DIESEL PUMPS** (Red segment): BOSCH CP1, CP3, DELPHI DFP1, DFP2, DENSO HPS, SIEMENS.
- DIGITALLY CONTROLLED DIESEL PUMPS** (Orange segment): DELPHI DP210, DENSO ED-V5, DENSO ECD-V3/V4, BOSCH VP44, VR30.

ERT45R

InjectionPower

DETEQ
Diesel & Electrical Test Equipment

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The efforts made by the engine manufacturers to comply with the **latest restrictions concerning pollution emission**, produced a wide differentiation of diesel fuel injection systems, always subject to a quick and continue evolution, from the earliest potentiometric systems to the most sophisticated digital controls, to arrive at today's widespread common rail technology.



The **ERT45R** system can be applied on any test bench for the calibration of diesel fuel injection pumps. It can also be used directly on the engine for the most common applications (i.e. Test running following engine remanufacturing).

Since 1997, the **ERT45R** has been a **DETEQ** solution to provide a platform as universal as possible to calibrate all types of electronically controlled diesel fuel injection pumps. For seven years this concept evolved. 2004 was the turning point when the **ERT45R** was **completely redesigned** in order to further expand its scope of application.

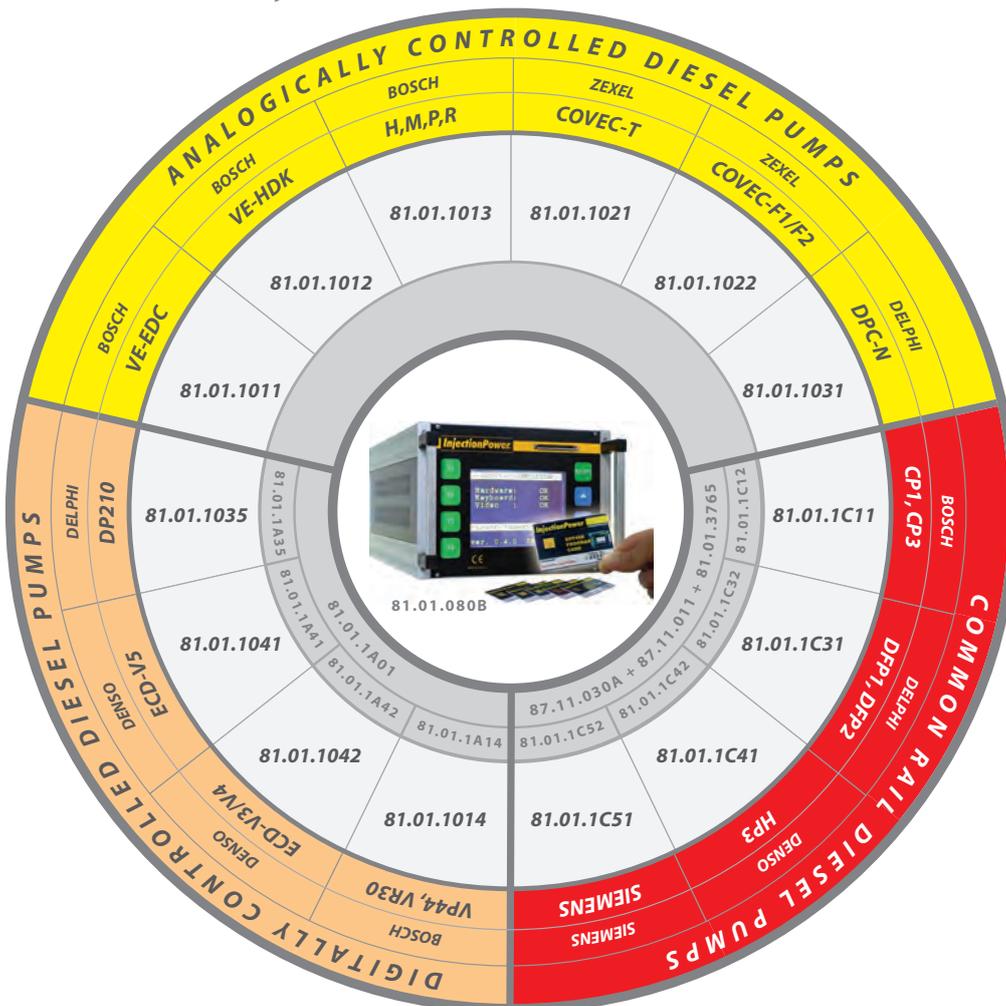
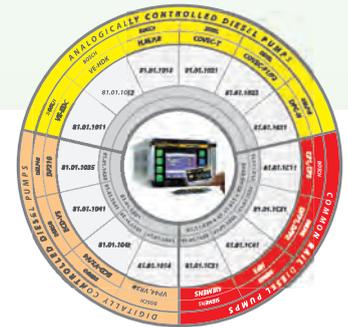
From that day, all around the globe countless completely satisfied Diesel Specialists have used the **ERT45R**, having realized this new release as a **fundamental tool necessary** to improve their everyday and future job requirements. **DETEQ** solution allows each Diesel Injection Specialists to have the equivalent of numerous simulators in only one unique piece of equipment. It is important to emphasize that with a **moderate initial cost** and at least one operating kit you have the tool that immediately solves today needs. At any point in time it can be updated to accommodate new requirements by simply purchasing the missing kit. Furthermore the same unit can be integrated with any operating kit that may be developed in the future.

ERT45R

The only **universal system** for testing all types of electronically controlled diesel fuel injection pumps.

Every diesel injection specialist dreams of a unique system for testing Bosch, Delphi, Denso, Siemens and Zexel electronically controlled diesel injection pumps and common rail as well.

DETEQ transforms this need into reality with the new **ERT45R**, the Instrument able to read the signals supplied from different transducers and simulate the controls on actuators, just the same as any electronic control unit (ECU) used in the automotive industry.



SYSTEM ERT45R

SYSTEM DESIGN

UNIVERSAL CONTROL UNIT

ANALOGICALLY CONTROLLED DIESEL PUMPS

- BOSCH VE-EDC
- BOSCH VE-HDK
- BOSCH H,M,P,R
- ZEXEL COVEC-T
- ZEXEL COVEC-F1/F2
- DELPHI DPC-N

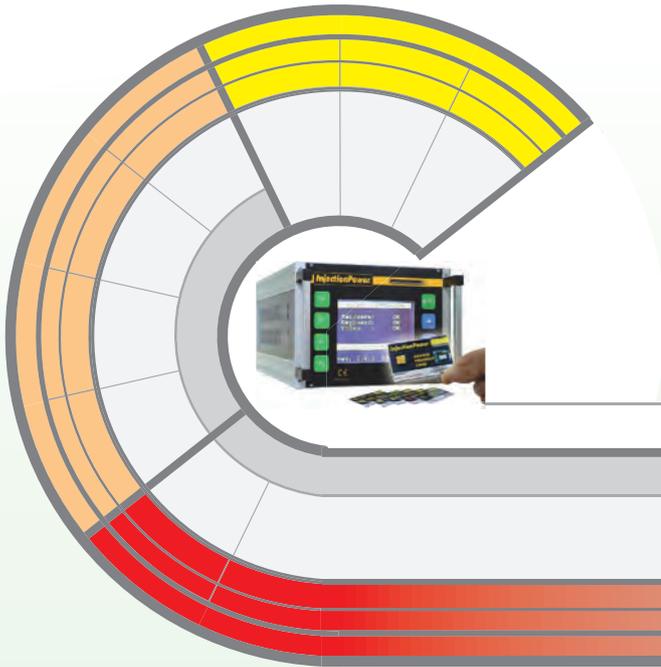
DIGITALLY CONTROLLED PUMPS

- BOSCH VP44, VR30
- DENSO ECD-V3 and ECD-V4
- DENSO ECD-V5
- DELPHI DP210

COMMON RAIL DIESEL PUMPS

- BOSCH CP1, CP2
- DELPHI DFP1, DFP2
- DENSO HP3, HP4
- SIEMENS

 **ANALOGICAL CONTROL**  **DIGITAL CONTROL**  **COMMON RAIL**



ERT45R SYSTEM

is structured on three essential levels:

- 1 - UNIVERSAL CONTROL UNIT
- 2 - ANCILLARY EQUIPMENT
- 3 - SPECIFIC OPERATIONAL KIT

In this way we obtain

a unique platform that brings together 14 different operating systems which can be grouped into 3 technologies.

 **ANALOGICAL CONTROL**  **DIGITAL CONTROL**  **COMMON RAIL**

The scope is endless,

varying from the early analog actuators (both resistive and inductive) to the high pressure pumps of common rail systems, via those injection systems with dynamic digital control.

| | BOSCH | DELPHI | ZEXEL | DENSO | SIEMENS |
|---------------------------|-----------------------------|---------------|------------------------|---------------------|----------------|
| ANALOGICAL CONTROL | VE-EDC VE-HDK H,M,P,R | DPC-N | COVEC-T COVEC-F1/F2 | | |
| DIGITAL CONTROL | VP44, VR30 | DP210 | | ECD-V3/V4 ECD-V5 | |
| COMMON RAIL | CP1, CP3 | DFP1, DFP2 | | HP3 | SIEMENS |

SYSTEM DESIGN

ERT45R

The only **universal system**
for testing all types of electronically controlled
diesel fuel injection pumps.

*The system
to focus at the first stroke,
on any application.*

Center of the system is the control unit **ERT45R**, designed to be easily programmed, according the type of pump to be tested.

1 - UNIVERSAL CONTROL UNIT



The control unit needs at least one **Operational Kit**, which includes all the components required to use the **ERT45R** system on a specific application.

3 - SPECIFIC OPERATIONAL KIT

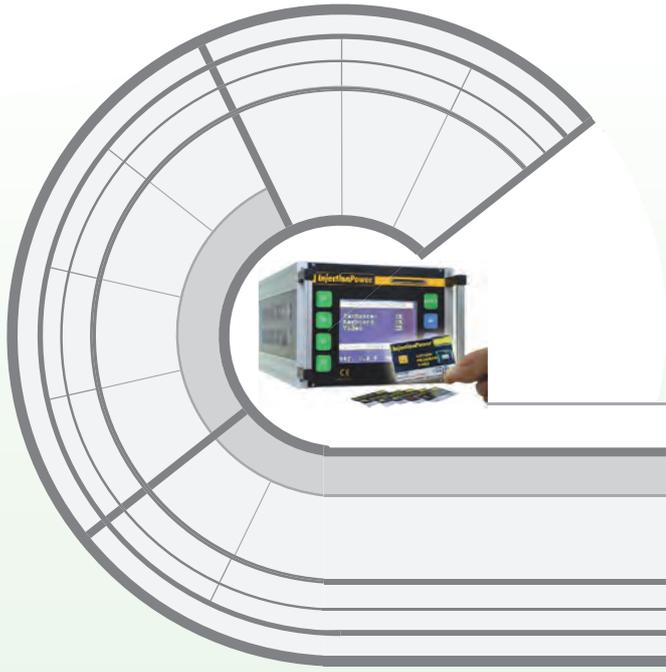
| | |
|---|--|
|  | Smartcard (plastic card equipped with microchip for the automatic programming of the simulator) |
|  | Basic cable to connect the simulator. |
|  | Adapter cable or set of adapter cables to interface the electric plugs on the pump. |
|  | Illustrated step by step manual to shows how to use the specific functions for any pump type. |
|  | Test data |

The control unit may require the use of **Ancillary Equipment** in order to handle the pump specific control technology. These additional external devices are designed to be applied on various pumps belonging to the same control technology, therefore, configuration kit are available, according to the pump which are to be interfaced.

2 - ANCILLARY EQUIPMENT

| | |
|---------------------------|---|
| ANALOGICAL CONTROL | No ancillary equipment is required. |
| DIGITAL CONTROL | For these pumps is necessary to synchronize the digital control of the injection with the angular position of the pump cam shaft. This unique system has to be applied on the test bench. The solution delivers accuracy of 0.1 degrees for precise control of injection and the accurate timing of the injection pump. |
| COMMON RAIL | Common rail pump testing requires a continuous flow meter (max 180 lt/h) and a system that can split the delivery to the rail from the return of the pressure control valve. The same system is applicable on pumps equipped with inlet metering flow valves. |

 **ANALOGICAL CONTROL**  **DIGITAL CONTROL**  **COMMON RAIL**



The control unit **ERT45R** is the foundation on which all injection diesel specialists have the power to build their own system, exactly configured according to specific needs.

- **UNIVERSAL CONTROL UNIT**
- **ANCILLARY EQUIPMENT**
- **SPECIFIC OPERATIONAL KIT**

The innovation offered by the **ERT45R** exists in the capability to be an open tool, able to concentrate in a single piece of equipment more electronic control units (ECU) applied in the automotive industry, to read signals generated by several transducers and simulate controls on different actuators. To actuate this demand of flexibility, the control unit is equipped with smartcard reader (plastic cards with microchips).



For each type of pump a special smartcard (programming card), is provided in each specific operational kit. Only after entering the appropriate smart card, will the **ERT45R** load the reading and controlling procedures dedicated to the specific type of pump. Subsequently, using the proper basic cable, the simulator is ready to be connected to the pump to be tested.

To use the **ERT45R**, at least one operating kit is required.



DETEQ
Diesel & Electrical Test Equipment

UNIVERSAL CONTROL UNIT

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The universal control unit is provided with an intuitive and **versatile interface**, to assist the operator along the different control stages. On the high resolution LCD informative and operative pages are displayed depending on the software handling the injection pump. The operator is assisted by **clear and easy to understand messages**.

The universal control unit is equipped with a very easy **Connection system**, to make the use of the simulator fast and safe.

CONNECTION SYSTEM



| | |
|---|--|
|  | Power socket Ready to be powered at 115 or 230 Volt AC, independently from the local supply. |
|  | Plug for the connection of the basic cable |
|  | Auxiliary socket |
|  | Auxiliary socket |
|  | Service socket |

USER'S INTERFACE



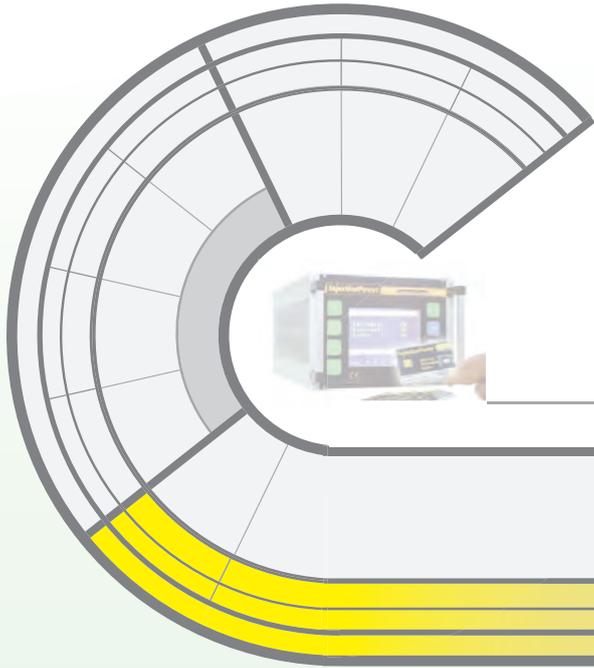
| | |
|---|---|
|  | Liquid crystal display (LCD) Wide screen to display information and commands. |
|  | Select key To browse the functions |
|  | + (up) and - (down) keys To select or change options and values. |
|  | Enter key To confirm |
|  | Functional keys Assume different meaning, in function of the pump type. |

ANALOGICAL CONTROL
 DIGITAL CONTROL
 COMMON RAIL

The *ERT45R* system

when applied to analogically controlled diesel injection pumps requires the use of the universal control unit having been programmed by the appropriate operational kit.

- UNIVERSAL CONTROL UNIT
- SPECIFIC OPERATIONAL KIT



| | BOSCH | BOSCH | BOSCH | ZEXEL | ZEXEL | DELPHI |
|------------------------|--------------|--------------|--------------|--------------|--------------|---------------|
| PUMP MODEL | VE/EDC | VE/HDK | H,M,P,R | COVEC/T | COVEC-F1/F2 | DPC-N |
| OPERATIONAL KIT | 81.01.1011 | 81.01.1012 | 81.01.1013 | 81.01.1021 | 81.01.1022 | 81.01.1031 |

In general, an **analogical signal** is the representation or processing of a physical quantity by its equivalent.

In particular, an electronically controlled actuator applied on diesel fuel injection pumps transforms the signal (normally 0,001 Volt) supplied by the vehicle **ECU** into a displacement (in mm or angular degree) to control the fuel flow, as previously done by mechanical, pneumatic or hydraulic regulators.

In electronics, a signal is called analogical whenever its representing values are continuous between its relative min and max values.

When applied to diesel fuel injection pumps **analogical technology** represents the first step to improve the fuel control, through the electronic signal.

The universal control unit concentrates in one device only both reading and stabilized power supply systems to a maximum 15 Amps.

ANALOGICALLY CONTROLLED DIESEL INJECTION PUMPS

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Recommended optional accessories

Checking the electrical status of the actuators and sensors is recommended, for any electronically controlled diesel fuel injection pump, especially for those analogically controlled. The **OTA** is a very easy to use interface to perform these tests.

By means of the proper sensor, **ERT45R** control unit carries out the functions of an electronic advance reader. The standard configuration includes the sensor and adapters for (Delphi DPA, DPC, DPCN, DP200, DPS and Bosch VE pumps).

ELECTRICAL CHECKS



OTA (81.21.090) - just install the two test leads of the multimeter in any configuration. Connect the adapter cable and simply rotate the two knobs on the OTA, in order to select the necessary pin combination.



MM (81.21.202) - any multimeter is suitable for these tests but Deteq recommends an auto ranging one with a four digit scale, with audible alarm.

ELECTRONIC ADVANCE READER



81.01.1001

After having set the zero reference point, the advance value of the timing piston is displayed directly on the **ERT45R** screen and it can be converted into mm or degrees, according the selected reading scale.



ANALOGICAL CONTROL
 DIGITAL CONTROL
 COMMON RAIL

The *ERT45R* system

when applied to digitally controlled diesel injection pumps requires the use of the universal control unit having to be programmed by the appropriate operational kit and supported by the supplementary equipment, which must be specifically configured according to the type of pump.

- UNIVERSAL CONTROL UNIT
- ANCILLARY EQUIPMENT
- SPECIFIC OPERATIONAL KIT



| | BOSCH | DENSO | DENSO | DELPHI |
|------------------------|--------------|------------------|--------------|---------------|
| PUMP MODEL | VP44,VR30 | ECD/V3 ECD/V4 | ECD/V5 | DP210 |
| OPERATIONAL KIT | 81.01.1014 | 81.01.1042 | 81.01.1041 | 81.01.1035 |

In general, a **digital system** converts real-world information to binary numeric form. In electronics, although digital representations are separate, the information represented can be either separate or continuous.

This system is much more accepted by the most modern electronic control units (**ECU**), implementing more sophisticated control on the injection, in order to comply with restrictions on noise and pollutions.

In particular, the **accurate timing** between the engine and the injection pump, together with multiple injections **perfectly synchronized** with the pump cam shaft allows us to recover energy and obtain a better combustion.

DIGITALLY CONTROLLED DIESEL INJECTION PUMPS

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The ancillary equipment (81.01.1A01) is necessary to support the **ERT45R** universal control unit for the test of the digitally controlled pumps on any test bench and is composed of:

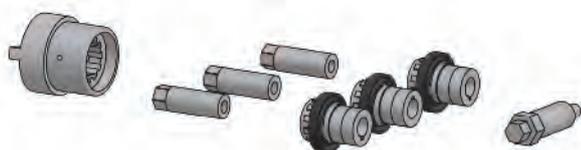
- DIGITAL PUMP COUPLING SYSTEM
- DIGITAL PUMP CLAMPING BRACKET.

The standard configuration needs to be completed by means of the correspondent kits, applicable to the specific type of pump.

ANCILLARY EQUIPMENT CONFIGURATION

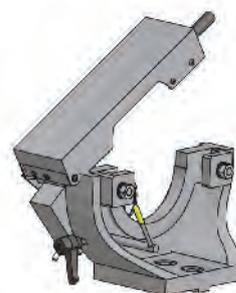
| BOSCH | DENSO | DENSO | DELPHI |
|------------|------------------|------------|------------|
| VP44,VR30 | ECD/V3 ECD/V4 | ECD/V5 | DP210 |
| 81.01.1A14 | 81.01.1A42 | 81.01.1A41 | 81.01.1A35 |

DIGITAL PUMP COUPLING SYSTEM



The traditional coupling is *split in two half's*: pump side and bench side.
In this way, it is possible to install/remove the pump to/from the test bench, without affecting the phase. The proper puller is included.

DIGITAL PUMP CLAMPING BRACKET



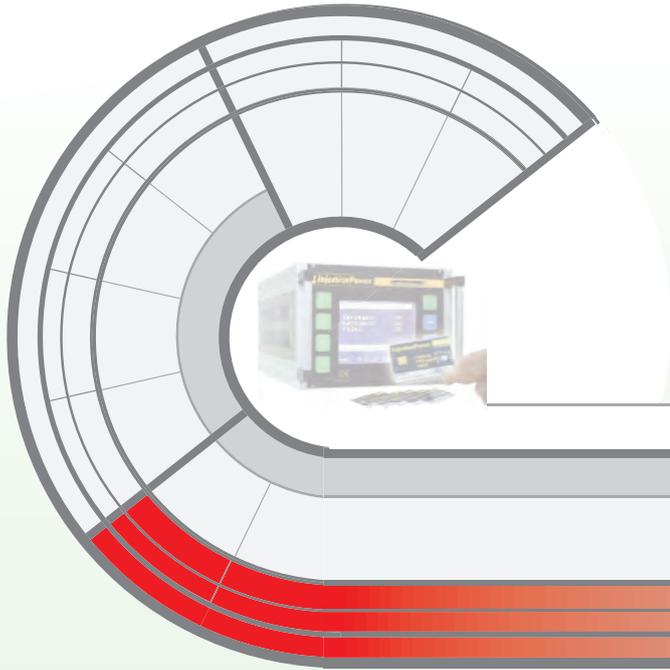
The traditional *pump clamping bracket* is replaced by the specially designed device, keeping all the features of the traditional system, but it is equipped with a *angle sensor* allowing the necessary accuracy, of the 0,1 degrees.

ANALOGICAL CONTROL
 DIGITAL CONTROL
 COMMON RAIL

The *ERT45R* system

when applied to diesel common rail high pressure pumps requires the use of the universal control unit to be programmed by the appropriate operational kit and supported by the supplementary equipment, which must be specifically configured according to the type of pump.

- UNIVERSAL CONTROL UNIT
- ANCILLARY EQUIPMENT
- SPECIFIC OPERATIONAL KIT



| | <i>BOSCH</i> | <i>DELPHI</i> | <i>DENSO</i> | <i>SIEMENS</i> |
|------------------------|-------------------|-------------------|-------------------|-------------------|
| <i>PUMP MODEL</i> | <i>CP1, CP3</i> | <i>DFP1, DFP2</i> | <i>HP3</i> | <i>SIEMENS</i> |
| <i>OPERATIONAL KIT</i> | <i>81.01.1C11</i> | <i>81.01.1C31</i> | <i>81.01.1C41</i> | <i>81.01.1C51</i> |

Common rail high pressure pumps are hydraulic pumps which have to supply the fuel at the pressure levels requested by the Electronic Central Unit according to the vehicle working conditions and performance requests.

Differently from other testing solutions, the selected test method is to isolate the pump from the other components of common rail systems. In this way, on any test bench, *ERT45R* can be used to **completely control** all hydraulic features of the pump, in particular the plunger efficiency, the leakage and the flow.

After having proved the mechanical pump quality, it is possible to verify the operations of the electronically controlled sensor and actuators as well.

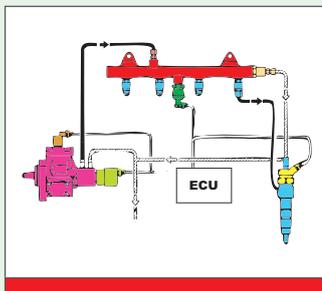


Diagram illustrating the basic layout of a *common rail system*.

DIESEL COMMON RAIL HIGH PRESSURE PUMPS

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The ancillary equipment necessary to support the ERT45R universal control unit for the test of the common rail pumps on any test bench is composed of 3 items:

1 - BASIC CABLE



Basic Cable: for all-makes common rail pumps

81.01.3765

The standard configuration requires it to be completed by means of the correspondent arranging kits, according the specific type of pump.

COMPLEMENTARY EQUIPMENT CONFIGURATION

| BOSCH | DELPHI | DENSO | SIEMENS |
|------------|--------------|------------|------------|
| CP1 CP3 | DFP1 DFP2 | HP3 | SIEMENS |
| 81.01.1C12 | 81.01.1C132 | 81.01.1C42 | 81.01.1C52 |

2 - FL400 FLOW METER



87.11.011

Designed to measure two flow lines: delivery to the rail and return by the pressure control valve

Measuring range up to 180 lt/h

Stabilized measuring system

Plug to connect the device to ERT45R universal control unit.

3 - TEST ACCUMULATOR



87.11.030A



Digital thermometer



Pressure sensor



Pressure control valve

The test accumulator includes a master pressure control valve.



COMPANY LOCATION

*To arrange a demonstration
call 01535 670002*

Authorized Dealer:

DB DIESELS

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Keighley - West Yorkshire
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