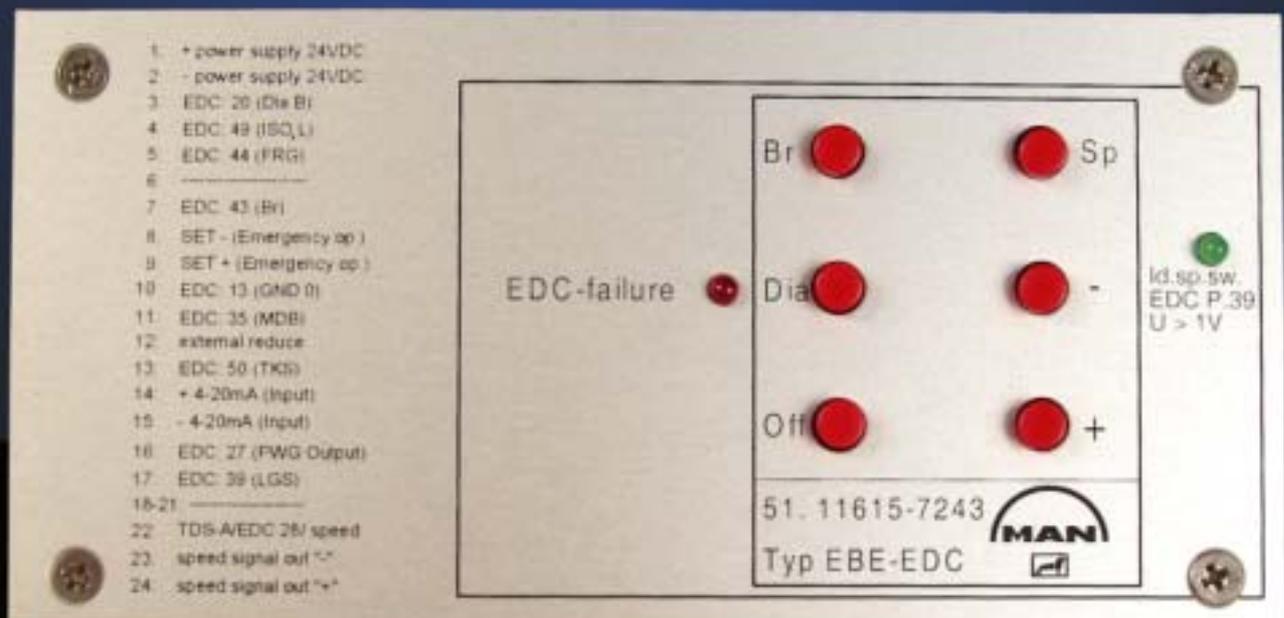


Electronically controlled diesel injection in conjunction with MAN Monitoring Diagnostic System (MMDS)



EDC M(S) 5 - D28 V marine engines
EDC MS5 - D28 D2876 in-line marine engines

*Description, testing, interfaces,
4-20 mA engine triggering system and electric gearbox triggering system*



Dear Customer

These instructions are intended to help you properly carry out repairs on the electronically controlled diesel injection system described in this document.

In writing these instructions, we have assumed that you have the necessary knowledge of control systems for working on and with the electronic diesel control.

Best regards
MAN Nutzfahrzeuge Aktiengesellschaft
Nuremberg Plant

Since our products are in continuous development, we reserve the right to make technical modifications.

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General

Important safety regulations are summarized in this quick-reference overview and arranged by topic to effectively convey the knowledge necessary to avoid accidents causing injury, damage or environmental hazard.

The engine operating manual contains further information.

Important:

Should an accident occur despite all precautionary measures, particularly one involving contact with corrosive acid, penetration of fuel under the skin, scalding by hot oil, antifreeze splashing into the eyes etc. **you must seek medical assistance immediately.**

1. Instructions for avoiding accidents likely to cause injury

Only authorized and qualified personnel are permitted to carry out inspection, adjustment and repair work

- Put gearbox of ship into neutral, if necessary unhinging gearshift lever (disconnect via remote control)
- Firmly secure units and assemblies on disassembly
- Only authorized personnel are permitted to start and operate the engine
- Do not stand too close to rotating parts while the engine is running
Wear close-fitting working clothes
- Do not touch a hot engine with bare hands:
Risk of burns
- Keep area surrounding engine, ladders and stairways free of oil and grease. Accidents caused by slipping can have serious consequences
- Only work with tools which are in good condition. Damaged or worn spanners and wrenches can slip off: Risk of injury.
- Persons must not stand under an engine suspended on a crane hook. Keep lifting gear in perfect condition
- Only open coolant circuit once the engine has cooled down. Follow the instructions given under "Maintenance and Care" in the Operating Manual exactly if it is not possible to avoid opening the coolant circuit with the engine at operating temperature.



- Do not tighten or loosen pipes and hoses that are under pressure (lubricant circuit, coolant circuit and any downstream hydraulic oil circuits): Risk of injury caused by liquids escaping under pressure.



- Do not place hands under the fuel jet when checking injection nozzles. Do not inhale fuel mist.
- Always disconnect battery when working on the electrical system
- Do not use rapid charger to start the engine. Rapid charging of batteries is only permitted with the positive and negative leads disconnected!
- Disconnect batteries only with the ignition turned off
- Follow the manufacturer's instructions for handling batteries.

Caution:

Battery acid is toxic and corrosive. Battery gasses are explosive.



- Only use suitable measuring instruments to **measure voltages!** The minimum input resistance of a measuring instrument should be 10 MΩ
- Only disconnect or connect wiring harness connectors on electronic control units with the **ignition turned off!**

Disconnect batteries and connect the positive lead to the negative lead such that they are electrically conductive before carrying out any electric welding work. Earth the welding set as close to the weld as possible. Do not route cable of welding apparatus parallel to electric lines on board the ship.

Refer to the "Welders' Code of Practice" for further accident prevention measures.

- **During painting work**, electronic components should only be exposed to high temperatures (max. 95°C) for a short period of time; 2 hours is permissible at a max. temperature of 85°C; disconnect batteries.

Limitation of liability for parts and accessories

In your own interest, we strongly recommend you use only accessories and original MAN parts expressly approved by MAN for your MAN engine. The reliability, safety and suitability of these parts and accessories have been tested specially for MAN engines. Despite us keeping a constant eye on the market, we cannot assess and be held responsible for these properties in other products, even if they bear TÜV (German testing and inspection institute) approval or any other official approval in any particular case.

Laying up or storage

Special measures must be implemented in accordance with MAN Company Standard M 3069 Part 3 if engines are to be laid up or placed into storage for more than 3 months.



Electronic diesel control EDC

General

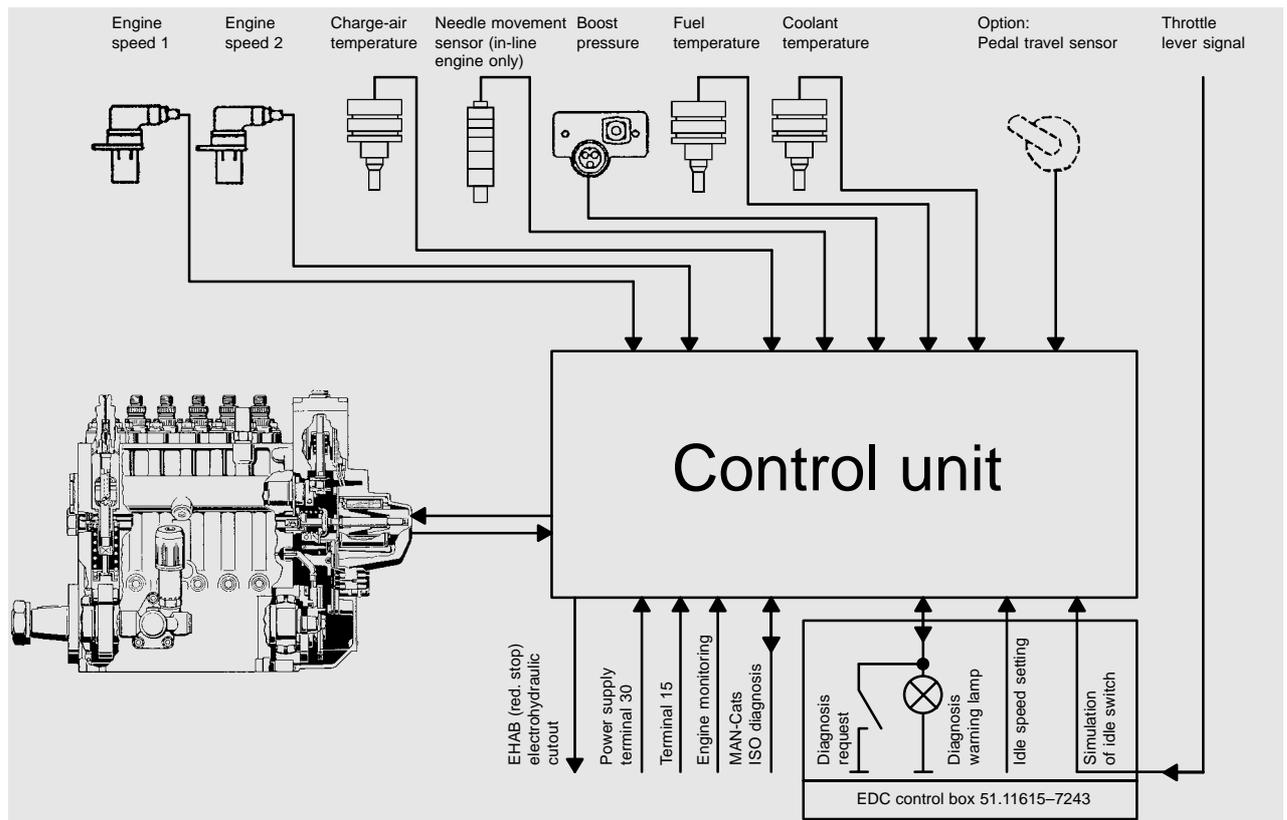
The demands made by customers and the legislators in respect of fuel consumption, exhaust emission and noise characteristics etc. on diesel engines have increased over the years and will be even more stringent in the future.

The fact that conventional mechanical injection systems have reached their performance limits has made electronically controlled fuel injection systems necessary.

Such systems increase engine efficiency, improve driving comfort and lessen the burden on the environment.

EDC (**E**lectronic **D**iesel **C**ontrol) meets these requirements.

System description: EDC M(S) 5 V engine / EDC MS5 in-line engine (D2876 LE4..)



The engine can be triggered

- mechanically with the pedal travel sensor or alternatively
- electrically with the 4–20 mA signal.

The controller contains

- the linear solenoid
- the control rod position transducer

The linear solenoid is actuated by the electronic control unit.

The control unit processes information which it receives via

- the control rod position transducer
- the pedal travel sensor (throttle lever signal) or from the 4–20 mA throttle lever
- boost pressure sensor
- coolant temperature sensor
- charge-air temperature sensor
- the engine speed sensors
- and the fuel temperature sensor (in the injection pump).

and in addition on the D2876 LE4 in-line engine

- the needle movement sensor

The expanded EDC control box 51.11615–7243 contains the following functions:

- EDC fault diagnosis with LED and flashcode
- Idle speed adjustment
- Conversion of 4–20 mA input signal into a voltage signal
- Galvanic separation of the 4–20 mA input signal from the EDC control unit
- Simulation of the idle switch if the 4–20 mA triggering system is used
- Isolation of the EDC engine speed signal (TDS signal from the EDC control unit)



System description

Communication with the MAN-Cats checking and diagnostic program is possible via an ISO interface also integrated into the terminal box.

The control unit, whose program is adapted to the engine model concerned, determines the optimum setting of the control rod and the required start of injection (only on in-line engines with MS5) from all the measured values.

To regulate the start of injection (EDC MS5), the current injection timing is recorded by the needle movement sensor in the injector holder on cylinder 1.

Start of injection is changed by means of the control-slide mechanism.

To ensure the vessel can reach the nearest workshop in the event of one or several sensors failing, an emergency operation function is integrated in the control unit which, depending on the situation, enables the vessel to continue on its way, albeit with restricted functions.

The idle speed is exactly maintained by means of the idle speed governor as long as the engine output is sufficient for this. The regulated idle speed can be varied within certain limits. The idle speed is factory set to 600 rpm. However, it can be varied within the range of 600 to 750 rpm by using the EDC control box.

Starting fuel is delivered when a lower start detection speed is exceeded. The starting fuel volume and cold idle speed are limited as a function of the coolant temperature to avoid impermissible smoke emission and unnecessary revving of the engine after starting.