

# MAN After Sales Service Readiness

Information on the new Lion's City



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# 1

## MAN After Sales Service Readiness

# MAN After Sales Service Readiness

Dear Partner in the commercial organisation,

MAN Truck & Bus AG is a quality-oriented innovative company that is renowned for its continuous improvement of sustainable technologies and optimisation of its vehicles and components, among other characteristics.

The MAN After Sales Service Readiness team supports the commercial organisation in launching new products. Alongside training activities, ordering special tools and the timely availability of all necessary spare parts in the respective country, the team also focuses on country-specific matters.

All business areas pool their resources to perform an After Sales Service Readiness Check, which is carried out alongside national operations many months before production starts.

By working together with you, we can ensure that our customers experience the quality of our products and the reliability of the After Sales services right from the beginning of the production process.

We look forward to working with you to prepare your markets for new products, and in doing so, guaranteeing a successful launch.

Best regards,

Rolf Schmidt-Robin  
Head of Service Engineering



Christian Frisch  
Head of Readiness & Remeasurement



2

A city bus that embodies  
**PERFECTION.**



# The new Lion's City



Modern, dynamic  
design

New MAN  
D15 engine













Lower weight, lower  
consumption level

Optional  
MAN EfficientHybrid

Independent wheel  
suspension

Optimised  
flap concept

# City bus portfolio

SOP			2019				2020			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
The new Lion's City	Low entry	10 m								
		12 m		 May 2019  12C (A21/A37)	 August 2019  12C (A21/A37)					
		14 m								
		≥ 18 m	 May 2019 18C (A23)	 May 2019  18C (A23)	 August 2019  18C (A23)			 19C (A40)	 	



## Vehicle and engine variants

Vehicle type	Length (m)	Diesel engine MAN D1556	
		Power rating (kW/hp)	Torque (Nm)
12C	12.185	206/280	1200
		243/330	1400
		265/360	1600
18C/19C	18.06/18.75	243/360	1400
		265/360	1600

# 2.1

## Engine variants

# MAN D1556 Euro 6d

# New generation of engines – the MAN D15 – for the new Lion's City

## Positioning of the MAN D15 engine

- Official designation: MAN D1556 LOH (diesel)
- 9 l engine D1556 LOH Euro 6d with 280, 330 and 360 hp as optimum size between
  - 6.8 l engine D0836 LOH Euro 6d with 290 hp and
  - 10.5 l engine D2066 LUH Euro 6d with  $\leq 400$  hp
- Clear concept:
  - **One** engine for all city buses
  - **One** variant (vertical only) reduces the diversity of models.
  - **One** exhaust gas aftertreatment system
- Vertical D15 engine integrated into the engine tower



# Informationen zum D15 Euro 6d

## Newly developed nine-litre inline six-cylinder engine for buses

- Common Rail injection system (Denso) max. 2500 bar
- Does not feature an exhaust gas recirculation system (EGR)
- Launch of the LIN\*-alternator
- New: EVBec \*\*\* (downstream of the turbo charger) for the engine braking system
- Single-stage turbocharging with direct intercooling
- Plastic oil pan
- New fuel filter system (pre-filter and hand priming pump mounted on the chassis)

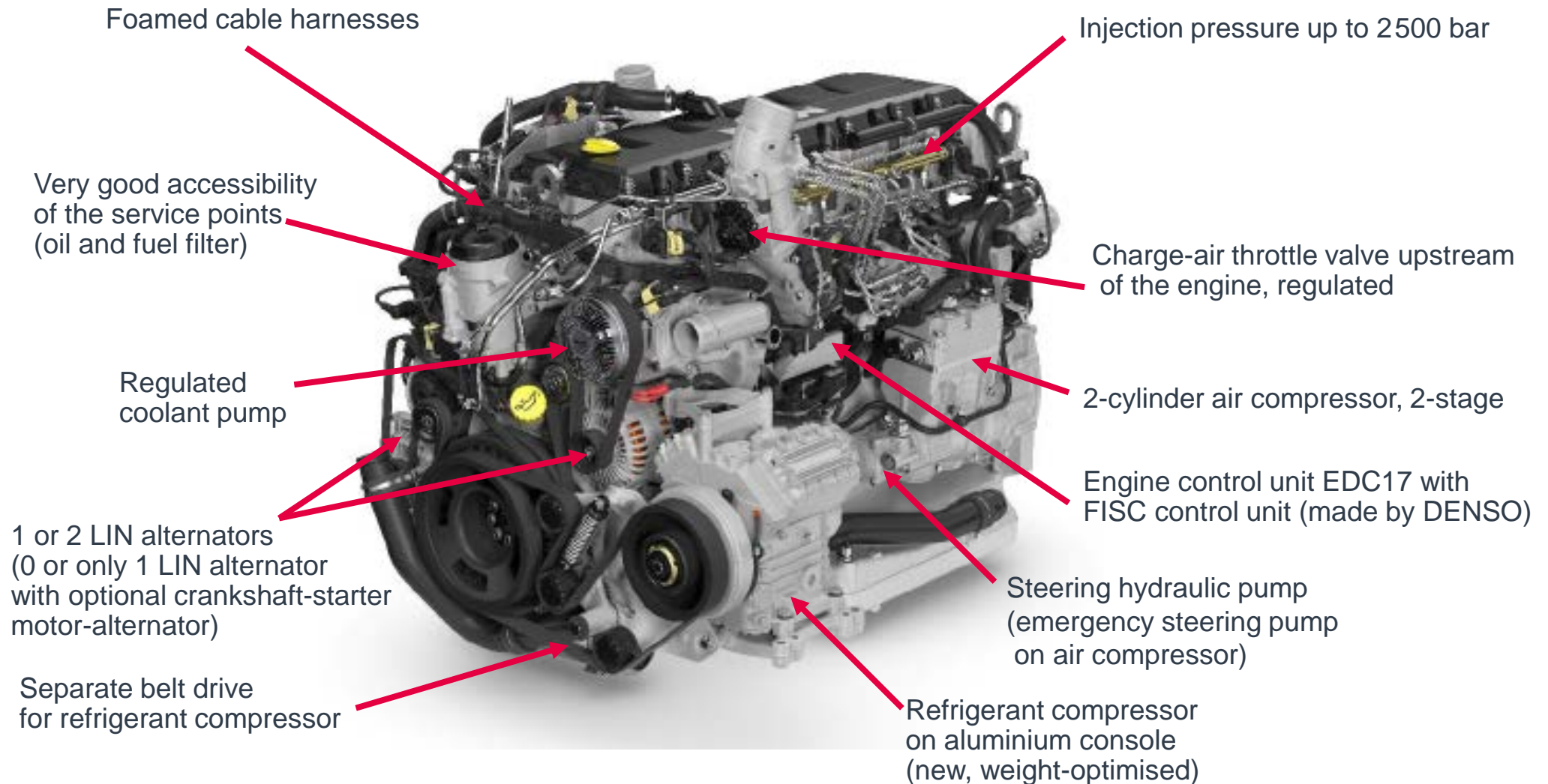


\* LIN alternator: Local Interconnect Network

\*\* TurboEVB: Turbo Exhaust Valve Brake

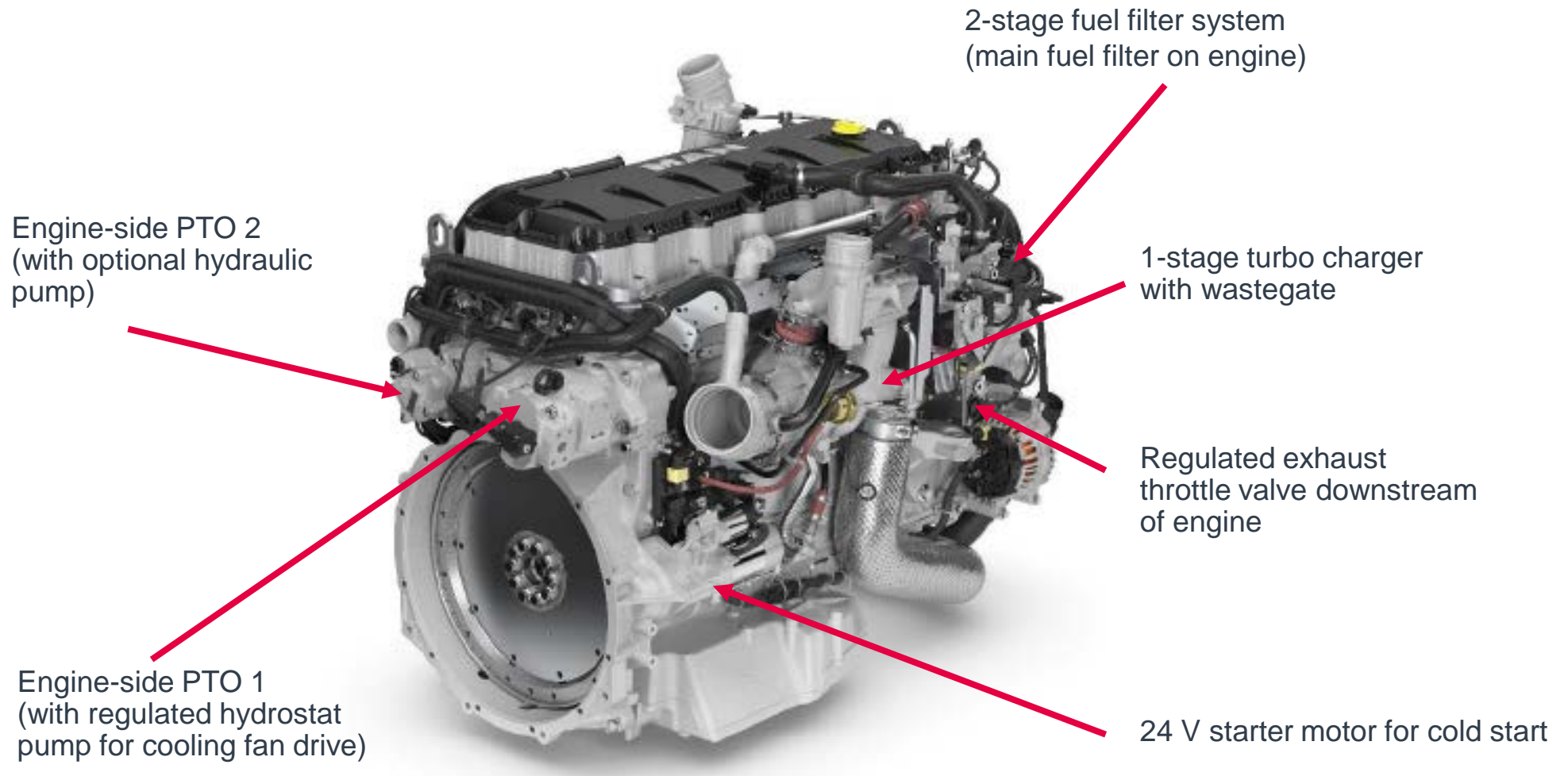
\*\*\* EVBec: Electronically controlled Exhaust Valve Brake

# Technical features





# Technical features



# Engine variants

## Possible fuels

MAN diesel engines can be operated with diesel fuels complying with the following standards:

- European standard EN 590
- DIN EN 590 (Germany)
- British Standards BS 2869 Class A1 (GB)
- ÖNORM EN 590 (Austria)
- ASTM D 975 No. 1 D (USA)

For the operation of Euro 6d engines, the sulphur content must not exceed 10 ppm, the water content must not exceed 200 ppm and the overall contamination of the fuel must not exceed 24 mg/kg.

Fuel type	Diesel		
Engine series	D1556LOH12	D1556LOH11	D1556LOH10
Output	280 hp	330 hp	360 hp
Torque	1,200 Nm	1,400 Nm	1,600 Nm

# MAN E1856 Euro 6d

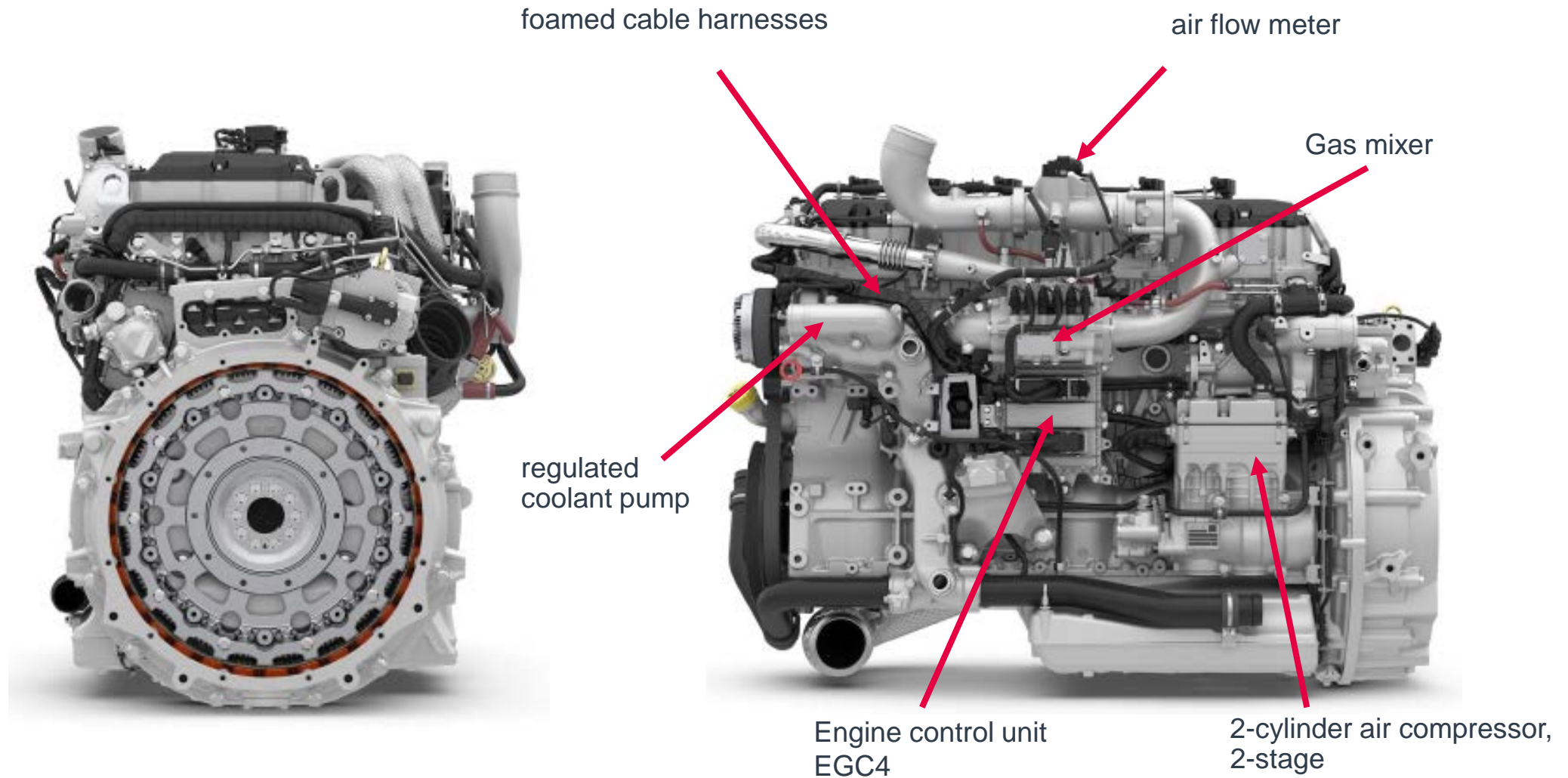
# Information on MAN E18 Euro 6d

## Introduction

- The E1856 is a newly developed 9.5-litre four-valve inline six-cylinder engine designed to comply with the Euro 6d emissions limits and for use in buses/coaches.
- The E1856 was developed on the basis of the D1556 engine for use in buses.
- The engines are designed for global use and in the long term will replace the E2876 series of engines for bus applications.
- The engine has been designed such that it is suitable for use in cold and hot climates.
- The CNG injection system functions in the same way as the E28 engine with approximately 8 bar of rail pressure and comes from Bosch.
- The design complies with the Euro 6d emissions limits thanks to the newly developed exhaust gas recirculation system. Exhaust gas aftertreatment is performed via a three-way catalytic converter
- In conjunction with the exhaust gas recirculation process, a high compression ratio of 13:1 enables highly economical fuel consumption values with low exhaust gas emissions.

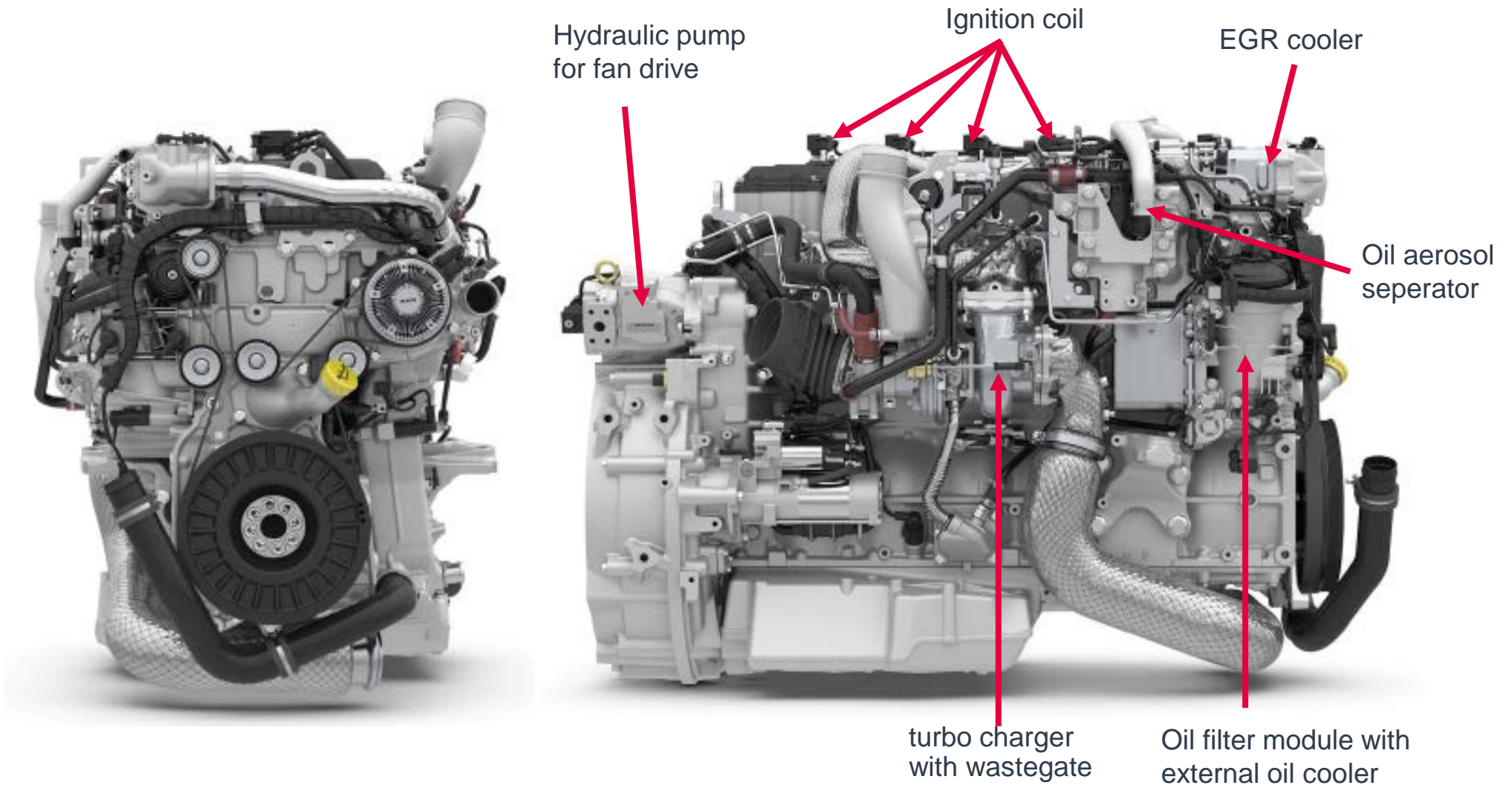


# Technical features





## Technical features



# Gas qualities and engine variants

## Gas qualities

The engine tank can be filled with all CNG quality levels from

- L-gas (= "low calorific gas", proportion of methane: 82%)
- to H-gas (= "high calorific gas", proportion of methane: 97%)

Treated biogas can also be used to fill the engine tank, provided that it meets the quality standards of natural gas and is subject to corresponding treatment.

In accordance with MAN requirements, the quality of natural gas used must meet the requirements of the DIN 51624 or DIN EN 16723-2 standard.

Fuel type	Natural gas	
Engine series	E1856LOH01	E1856LOH02
Output	280 hp	320 hp
Torque	1,200 Nm	1,400 Nm



# MAN EfficientHybrid



# The new Lion's City with MAN EfficientHybrid

## System concept

- The optional installation of the MAN EfficientHybrid system provides the new Lion's City with intelligent energy management for increased efficiency and improved driving comfort.
- A core component of this innovative hybrid system is a crankshaft starter motor alternator (CSA) installed in the driveline between the engine and gearbox.

## Advantages and customer benefits

- The CSA is a robust and wear-free electric motor that can operate as an alternator when the vehicle is coasting or braking; alternatively, it can also operate as a starter motor.
- The electrical energy stored in the electrical roof components of the hybrid system can also be used to supply the consumers via the 24-V vehicle electrical system of the new Lion's City.
- No pollutant emissions at bus stops when the engine stops, as well as a quick, silent start when the vehicle moves off.

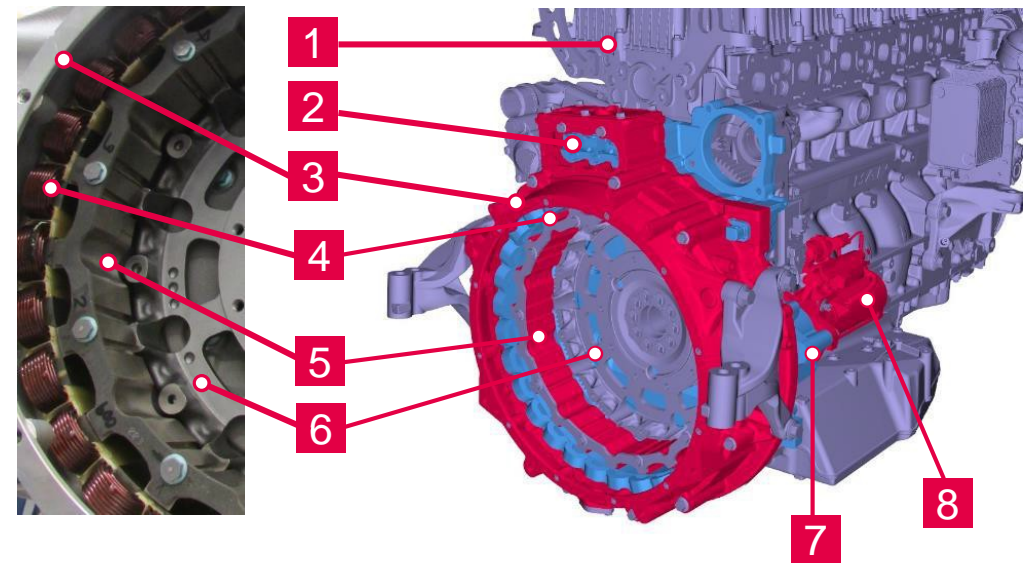


# System components

## Attached to the MAN D15/E18 engine

- The CSA\* is located between the engine and gearbox.
- As an electric machine, the CSA<sup>1</sup> converts electrical energy into mechanical energy (**motor** operation when the engine is started) and mechanical energy into electrical energy (**alternator** operation when brake energy is recuperated).
- If the new Lion's City is optionally equipped with the MAN EfficientHybrid system, a CSA enclosure (3) that contains the CSA stator (4) is attached to the flywheel housing (7).
- The CSA rotor (5) is made up of a stack of sheets and the rotor bracket (6). This is connected to the crankshaft and replaces the oscillating weight of the flywheel that is otherwise present.

<sup>1</sup> CSA = crankshaft starter motor alternator



- |   |                    |
|---|--------------------|
| 1 | MAN D15/E18 engine |
| 2 | Terminal box       |
| 3 | CSA enclosure      |
| 4 | CSA stator         |
| 5 | CSA rotor          |

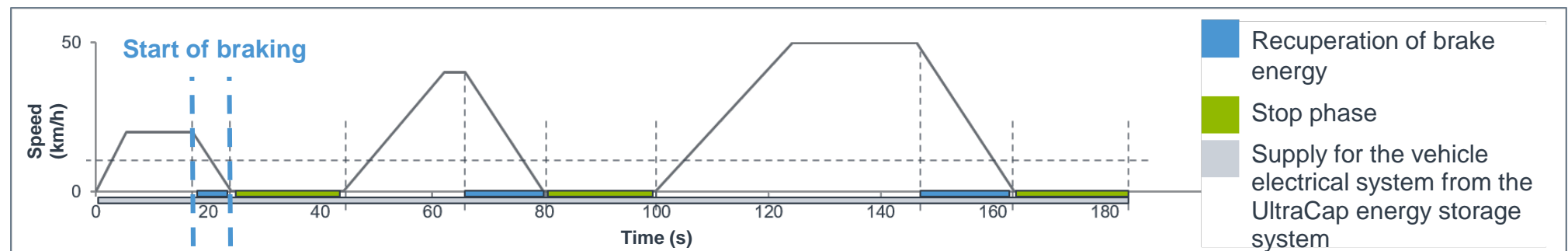
- |   |                                       |
|---|---------------------------------------|
| 6 | CSA rotor: Rotor bracket (= flywheel) |
| 7 | Flywheel housing                      |
| 8 | 24-V starter motor for cold starts    |

# Intelligent energy management

## MAN EfficientHybrid with stop-start function and recuperation

- During coasting phases, the CSA acts as an alternator and generates electrical energy, which is then stored in the UltraCap module ( $48\text{ V}_{\text{DC}}$ ).
- When the vehicle is at a standstill, the internal combustion engine stops and is then started immediately before the vehicle moves off again. When the vehicle is at a stop, the voltage converter supplies the vehicle electrical system with energy from  $48\text{ V}$  to  $24\text{ V}$  from the UltraCap energy storage system. The energy for starting the internal combustion engine, which is provided by the CSA acting as a motor ( $48\text{ V}_{\text{AC}}$ ), is also taken from the UltraCap storage system via the inverter ( $48\text{ V}_{\text{DC}}/48\text{ V}_{\text{AC}}$ ).
- No energy is generated for the vehicle electrical system when the vehicle is accelerating or travelling at a constant speed, thereby reducing the burden on the internal combustion engine. Energy from the UltraCap storage system is used for the supply to the vehicle electrical system.

## Example driving cycle for light city traffic (SORT 2)



# System components

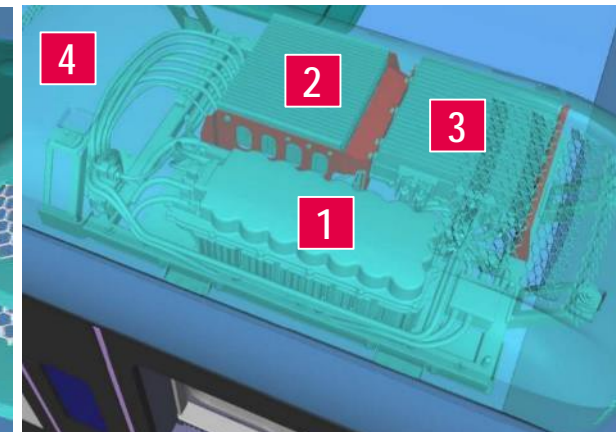
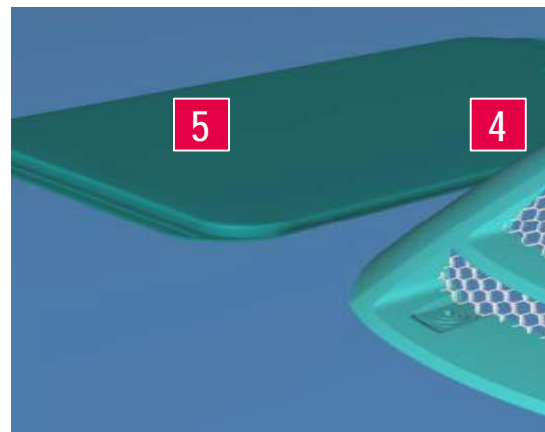
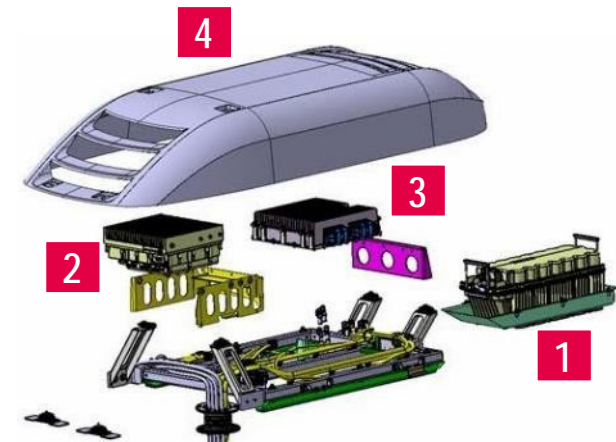
## System components on the vehicle roof

- All high-voltage components are installed outside of the passenger area underneath a hood on the vehicle roof (4) .

### The roof hood provides:

- Mechanical protection for the power components (1) to (3).
- Aerodynamic openings for optimum cooling air flow.
- Touch protection when using the rear emergency roof hatch (5).

- 1 UltraCap energy storage system ( $48\text{ V}_{\text{DC}}$ )
- 2 Inverter ( $48\text{ V}_{\text{AC}}/48\text{ V}_{\text{DC}}$ )
- 3 DC/DC xonverter ( $48\text{ V}_{\text{DC}}/24\text{ V}_{\text{DC}}$ )
- 4 Roof hood with cooling air openings
- 5 Emergency roof hatch



# 2.2

## Diesel engine specifications

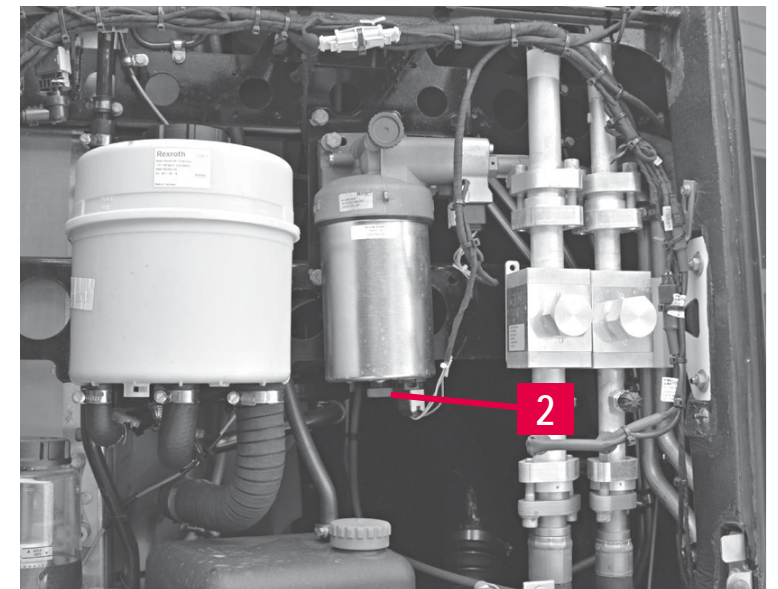
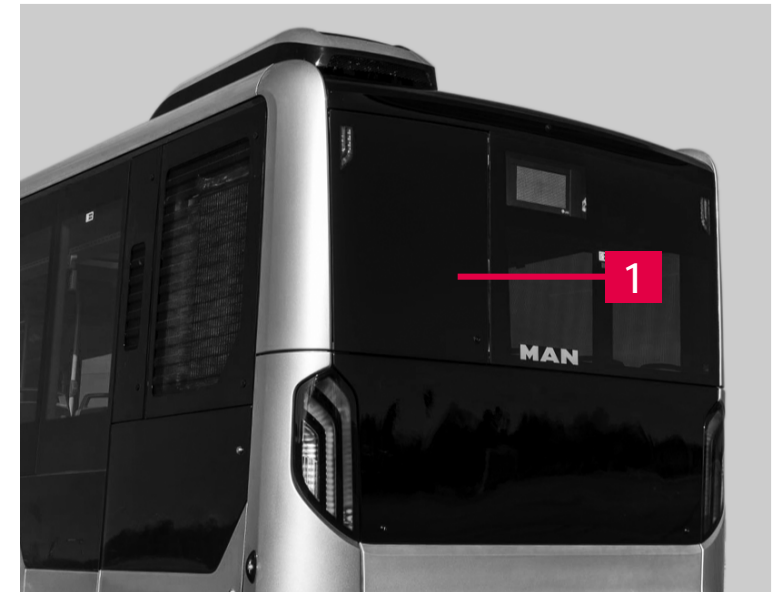
# Fuel system

## Installation location of the fuel pre-filter

The fuel pre-filter is located behind the maintenance flap in the rear (1).

## Advantages of the fuel pre-filter

- The hand priming pump is no longer positioned on the main filter; it is now integrated into the new pre-filter.
- The combination of the mixing valve, particulate pre-filter and water trap in a single component improves cold start capability (mixing valve) and allows effective water separation (based on a two-stage water separation concept).





# Fuel system – fuel pre-filter

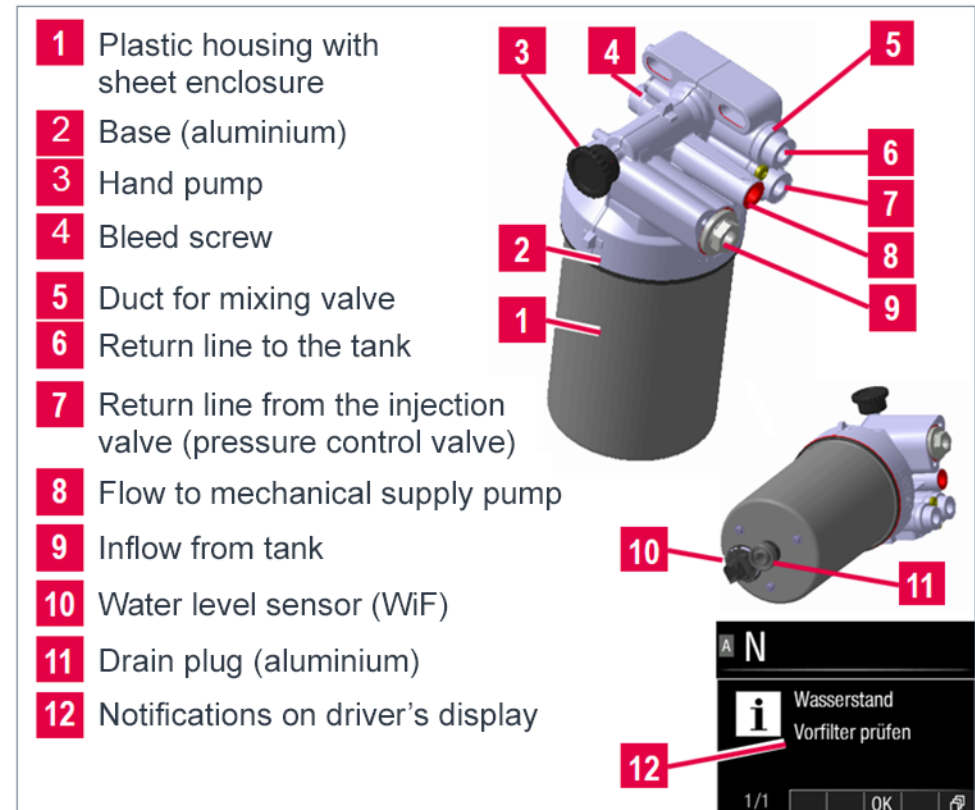
## Fuel pre-filter

The pre-filter is located on the fuel tank and comprises:

- First stage of particulate separation
- Water separation

## Advantages of the fuel pre-filter

- The hand priming pump is no longer positioned on the main filter; it is now integrated into the new pre-filter.
- The combination of the mixing valve, particulate pre-filter and water trap in a single component improves cold start capability (mixing valve) and allows effective water separation (based on a two-stage water separation concept).



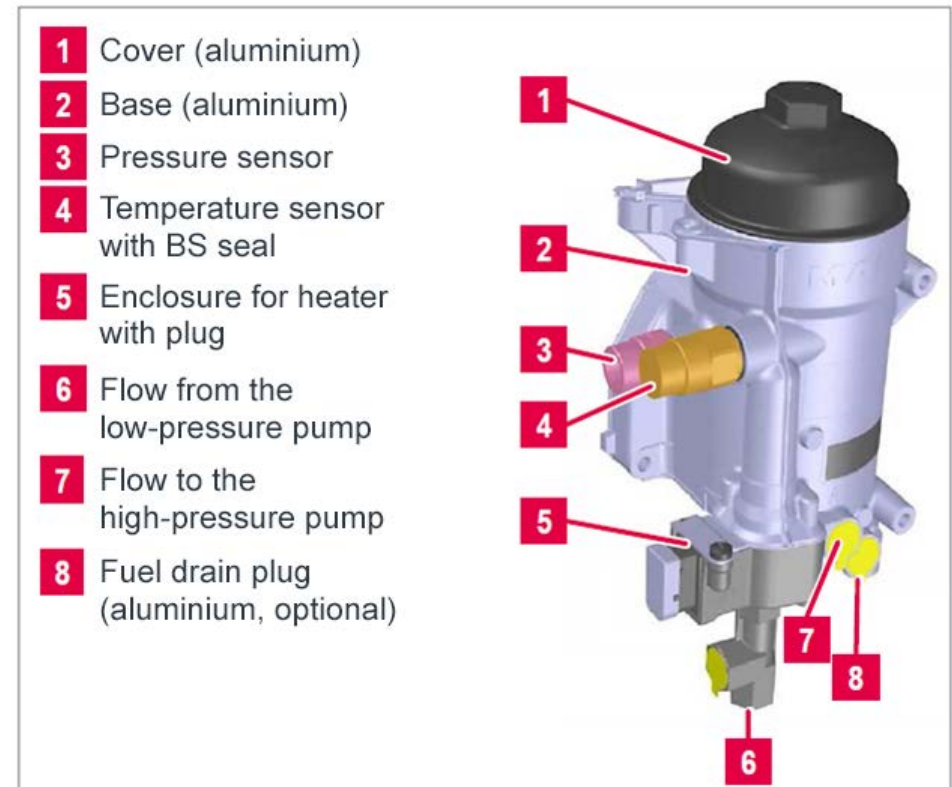
# Fuel system – main fuel filter

## Main fuel filter

- The modified main fuel filter on the engine ensures maximum fuel purity to enable reliable operation of the Common Rail injection system via:
  - Increased separation efficiency (particles)
  - Electric fuel heating (optional)

## Advantages of the main fuel filter

- The main filter is securely mounted on the engine and features a fine filtering system in the low-pressure circuit; the pre-filter and the hand pump are attached to the vehicle frame.
- The optional electric fuel heater on the main filter further enhances the effect of the mixing valve to prevent paraffinisation of the fuel filter.





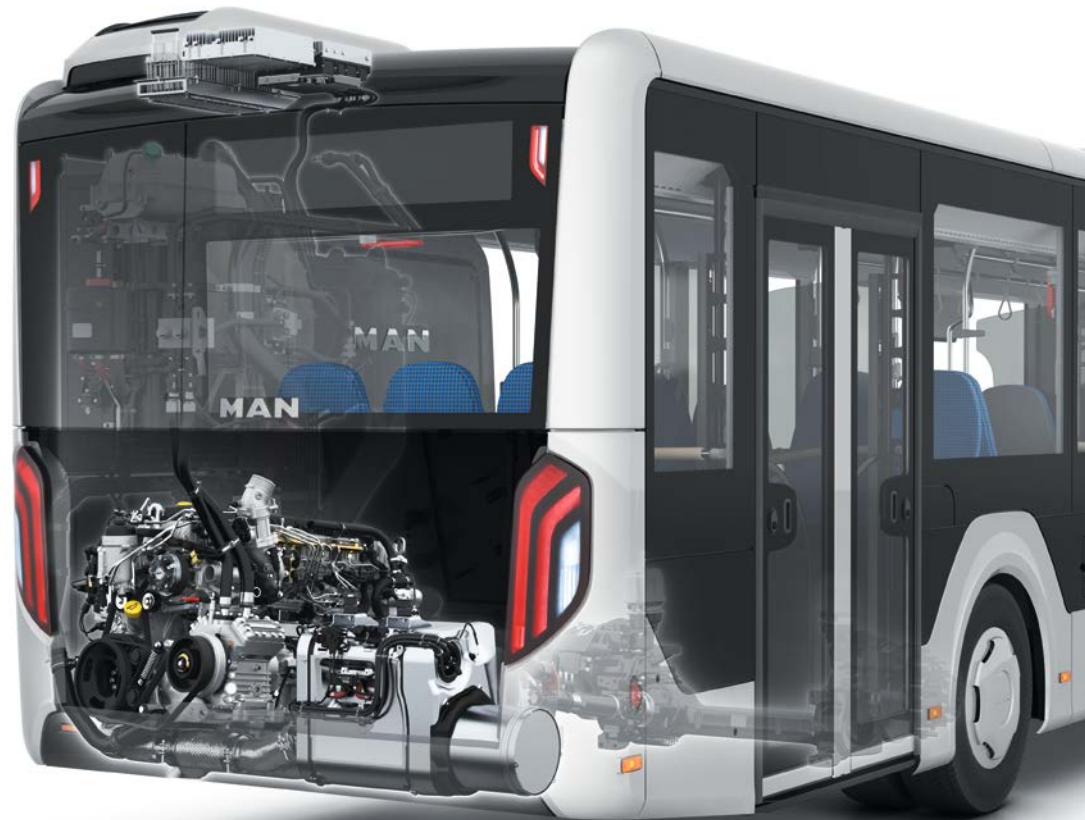
# 2.3

## Exhaust gas aftertreatment system of the diesel engine

# Exhaust gas aftertreatment system

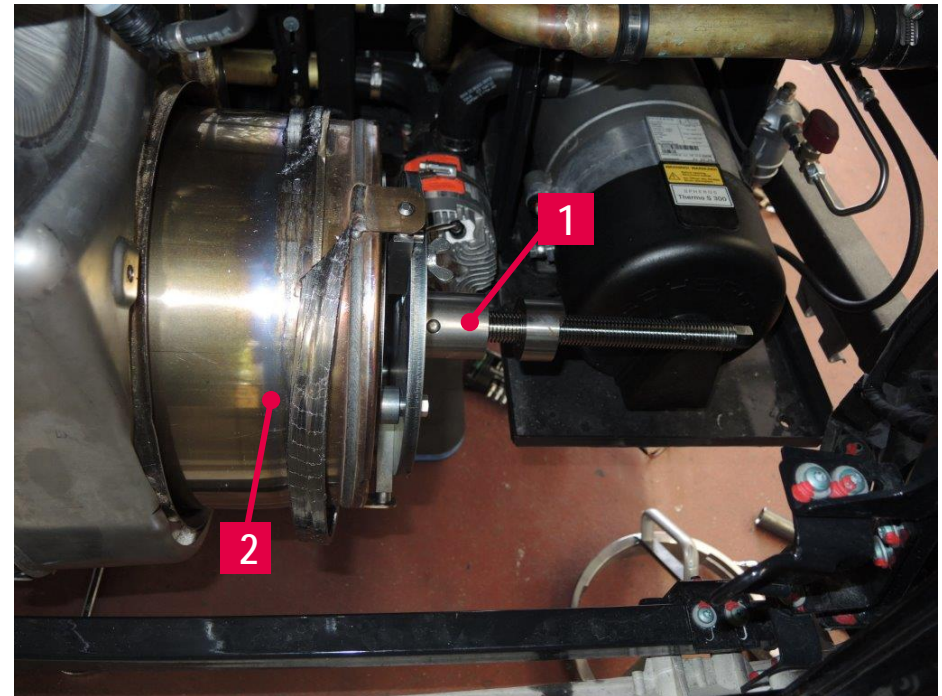
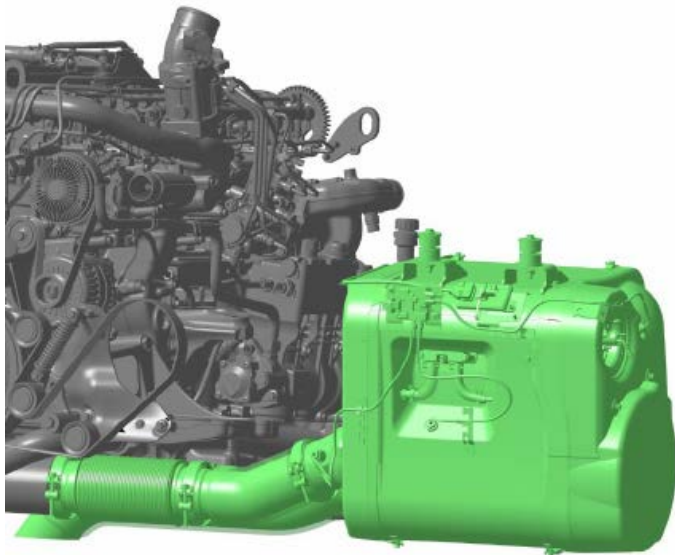
## Key innovations

- In the MAN D15, exhaust gas aftertreatment is specifically tailored to the Euro 6d emission standard.
- The continuously self-regenerating MAN CRT filter and the selective catalytic reduction (SCR) system are combined.
- Silencers with exhaust gas aftertreatment components have been simplified compared to current AGN systems.
- The silencers are designed for use with diesel fuels with a sulphur content of up to 10 ppm.
- Introduction of a new airless urea-metering system.



# Removal of the diesel particulate filter

The new compact design of the exhaust gas aftertreatment system significantly reduces the amount of work required to remove, install or replace the DPF.

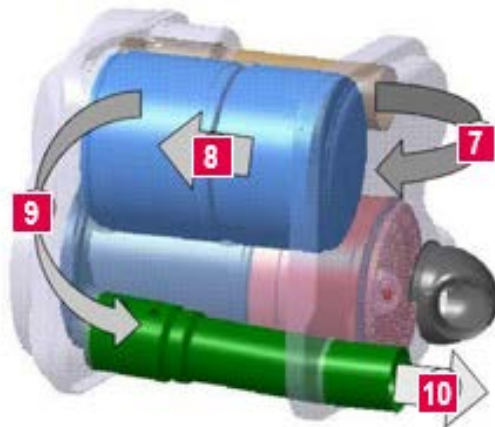
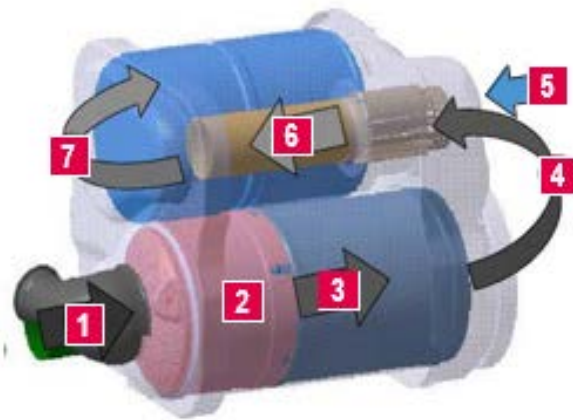


1 10.5-inch extractor tool for the diesel particulate filter

2 Dieselparticulate filter (DPF)  
Image shows DPF (2) partially removed.

# Exhaust silencer design

## Basic design of the exhaust silencer for the Euro 6 exhaust gas aftertreatment system



- 1 Exhaust gas flow (inlet)
- 2 Diesel oxidising catalytic converter DOC
- 3 Diesel particulate filter DPF
- 4 Deflection/service hood
- 5 Airless AdBlue injection
- 6 Mixing tract for airless AdBlue injection
- 7 Deflection hood upstream of SCR
- 8 SCR catalytic converter with ammonia-blocking catalytic converter
- 9 Deflection hood downstream of SCR
- 10 Exhaust gas flow (outlet)

# 3

## Volumes of natural gas

# 3.1

## CNG storage system

# Overview of the high-pressure system

## Gas cylinders

The new Lion's City with gas-powered drive only uses type 4 gas cylinders in accordance with ECE-R110.

These cylinders comprise an inner container made of HDPE\* with a wrapping made of a carbon fibre/glass fibre/epoxy resin composite.

The gas cylinders are arranged lengthways on the roof.

The following three variants are available:

- Four cylinders at 315 litres = 1,260 l
- Five cylinders at 338 litres = 1,690 l
- Five cylinders at 375 litres = 1,875 l

Tank capacities according to vehicle type	
12C	1,260 l and 1,690 l
14C	1,690 l and 1,875 l
18C	1,690 l and 1,875 l
19C	1,690 l and 1,875 l

\*HDPE = high density polyethylene



# Natural gas infrastructure within the vehicle

**The new Lion's City with CNG-powered drive can be filled up with fuel on the right-hand side between door 1 and the front axle. There is also the option of installing an additional tank neck behind the front flap.**

The following variants are available:

- NGV 2 – fast fuelling
- NGV 1 – slow fuelling (in the same way as a passenger car)
- NGV 2 – fast fuelling + NGV 1 – slow fuelling
- NGV 1 – slow fuelling + NGV 1 – slow fuelling

Note:

- NGV = Natural Gas Vehicle; the designation 'NGV1' is derived from US standard ANSI NGV 1 for CNG fuelling nozzles with a small transverse section. CNG fuelling nozzles with a large transverse section are designated as 'NGV2' – however, this is not an official designation. (The US standard ANSI NGV 2 is for CNG containers – not fuelling nozzles.)
- The fuelling speed depends primarily on the capability of the CNG filling station; it is therefore not possible to specify flow rates. At a high-capacity CNG filling station, a 1,200-litre CNG system can be filled via the NGV 2 tank neck in approximately five to six minutes.



# Overview of the high-pressure system

## Piping/cover

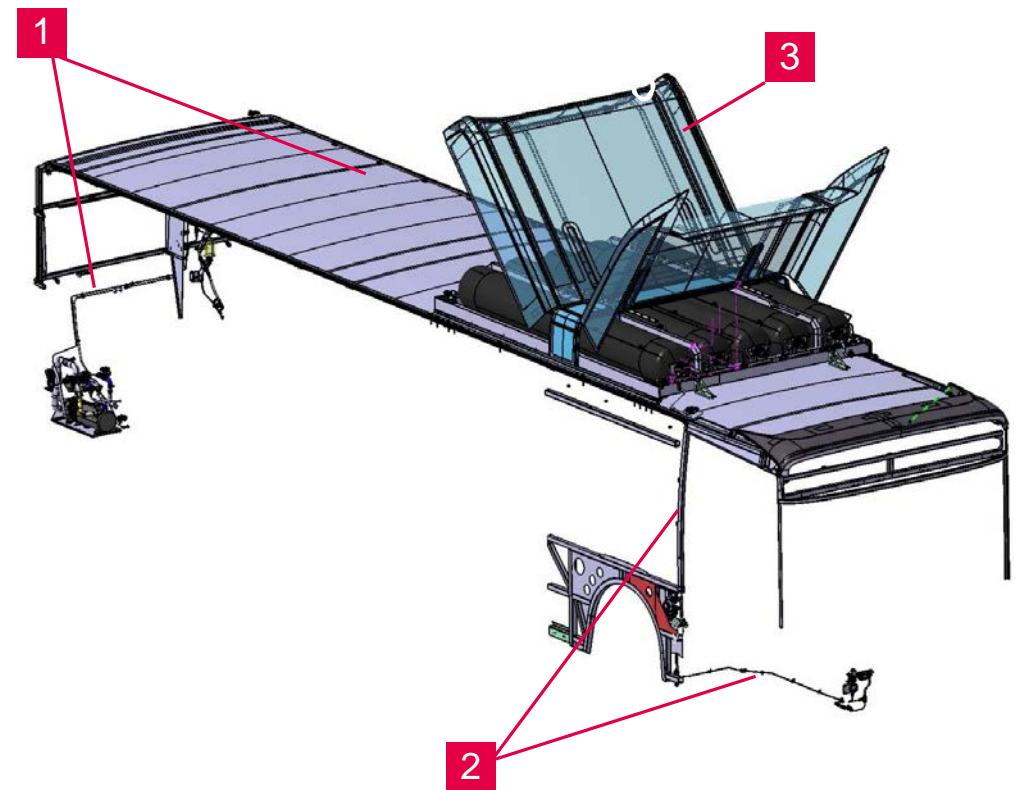
The piping is made up of seamless stainless steel pipes in accordance with MAN standard M3512.

The connecting elements are double clamping ring pipe unions made of stainless steel.

- The gas pipe from the CNG system to the engine runs along the left-hand side of the bus roof. (1)
- The gas pipe from the filling unit to the CNG system runs along the right-hand side wall to the roof (2).

## Ease of maintenance

- The CNG storage system is protected by a cover hood (3).
- The cover hood consists of large flaps at the front and rear, which are secured to a narrow middle section and the frame of the CNG system.
- The components of the cover hood can be fully dismantled.



# 4.0

## General vehicle topics

# 4.1

## Door systems

# General improvements to the door systems

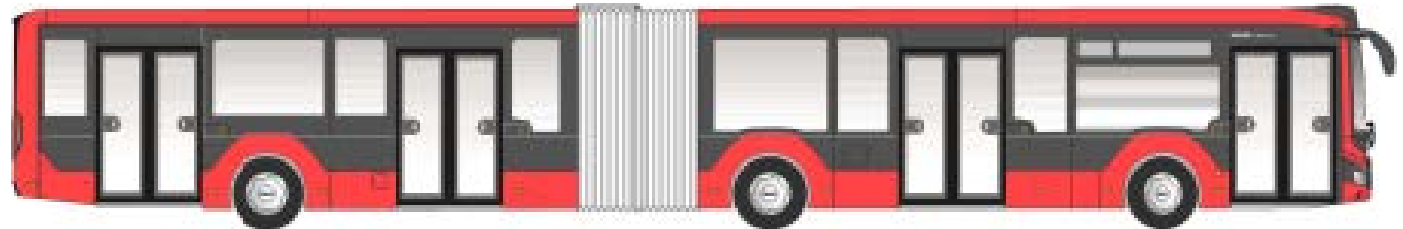
## Advantages of the MAN door system

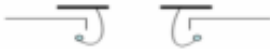
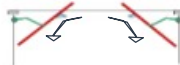




The newly developed door system is especially impressive thanks to its high level of operational reliability, increased quality and reduced Life Cycle Cost (LCC):

- Doors now 10 cm wider
- Harmonious, rapid and direct door movement
- Modular kit systems, resulting in a cost-effective supply of spare parts with high availability
- Lubrication and adjustment procedures no longer necessary
- Only a few setting parameters during operation
- Reliable components
- Stable drives – equipped with power reserves – protected against contamination
- All turning columns are integrated into a turning column shaft in the partition wall. This improves the level of finger trap protection and makes it easier to clean the vehicle
- There is a choice of:
  - Pneumatic outward-swinging doors (OSD-p)
  - Pneumatic inward-swinging doors (ISD-p)
  - Electrohydraulically driven inward-swinging doors (ISD-e) and
  - Electrohydraulically driven swing/sliding doors (SSD-e).



# Overview of door systems in the new Lion's City



MAN door system		Door 1 to door 4	
Door variants	OSD-p (double leaf)	ISD-p/ISD-e (double leaf)	SSD-e (double leaf)
Function (top view)			
Door view (opened)			
Separate door operating mechanisms	Available on door 1		

OSD = outward-swinging door | ISD = inward-swinging door | SSD = swing/sliding door | p = pneumatically driven | e = electrohydraulically driven

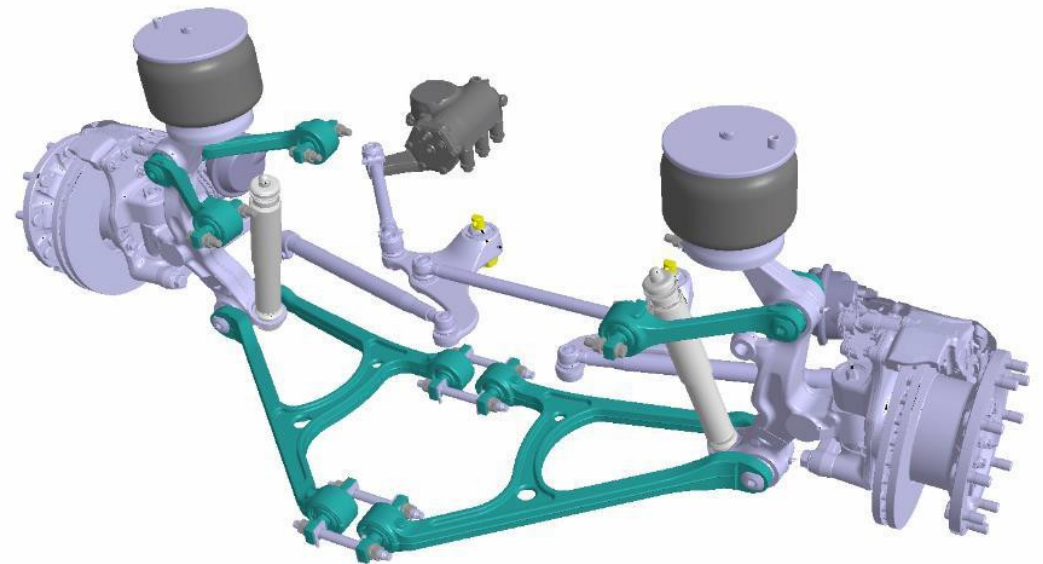
# 4.2

Running gear

# Advantages of independent wheel suspension

**As the first MAN city bus, the new Lion's City features independent wheel suspension**

- Wheels are directed individually via struts and guides
- When a wheel rolls over uneven sections of a road, the movements are only transmitted from the wheel and hub carrier through the body and to the opposite wheel side to a minimal extent
- Nearly independent wheel movements on the respective vehicle sides
- Particularly suitable for vehicles with a high centre of gravity due to higher suspension roll stiffness and lower lateral inclination
- Lower unsprung masses that have to be controlled by the suspension and the damping system in particular



# Best possible coordination of comfort and stability

## New generation of shock absorbers

The new PCV shock absorber (Premium Comfort Valve) replaces the shock absorber technology used to date and will be the new standard feature in all buses.

The new generation of shock absorbers is not backward compatible.

## Increased driving comfort

- Purely hydraulic vibration damper
- Shock absorber features new oil-guiding concept
- Reduced circulation noises for even greater driving comfort





# 4.3

## Pivoting joint

# Pivoting joint for the 18C design

## Advantages in contrast to the predecessor model

- Mechanics optimised in terms of shape and materials
- Lightweight turntable (aluminium) offers greater rigidity, making it easier for passengers to keep their footing
- Higher torques and greater rolling movements can be absorbed
- New electrics and hydraulics enable high and continuously adjustable damping torque
- A hydraulic damping system protects the pivoting joint against damage (curbs any jackknifing) and stabilises the articulated bus at high speeds and on tight corners, preventing the rear section from rocking or breaking away.

## Integrated anti-jackknifing protection

When driving backwards in manoeuvring mode, excessive kink angles must be avoided to prevent damage to the kink joint.

## Function

- Activation of the brake while driving backwards and exceeding a kink angle threshold
- Activation of a warning signal and message while exceeding a kink angle threshold. In the new version, the warning signal becomes louder and louder as the limit stop is approached.
- Reduced throttle: reduction of the available engine torque to zero while driving backwards and exceeding a kink angle threshold
- Manual deactivation of the brakes is possible when at a standstill (by pressing the button)



# Electronic pivoting joint and anti-jackknifing control system

## Warning signals for the driver

- If the electronic pivoting joint and anti-jackknifing control system (ATC 2) intervenes in the driving process by reducing the torque, the driver is notified via a message on the display that there is less engine torque available than has been requested (via the position of the accelerator).
- The following message appears: "Pivoting joint, power reduced".
- In an emergency, the driver can disable the reduction of engine torque via the kickdown function (accelerator position) in order to increase the available torque again.
- For more information, please refer to the documentation accompanying the vehicle.

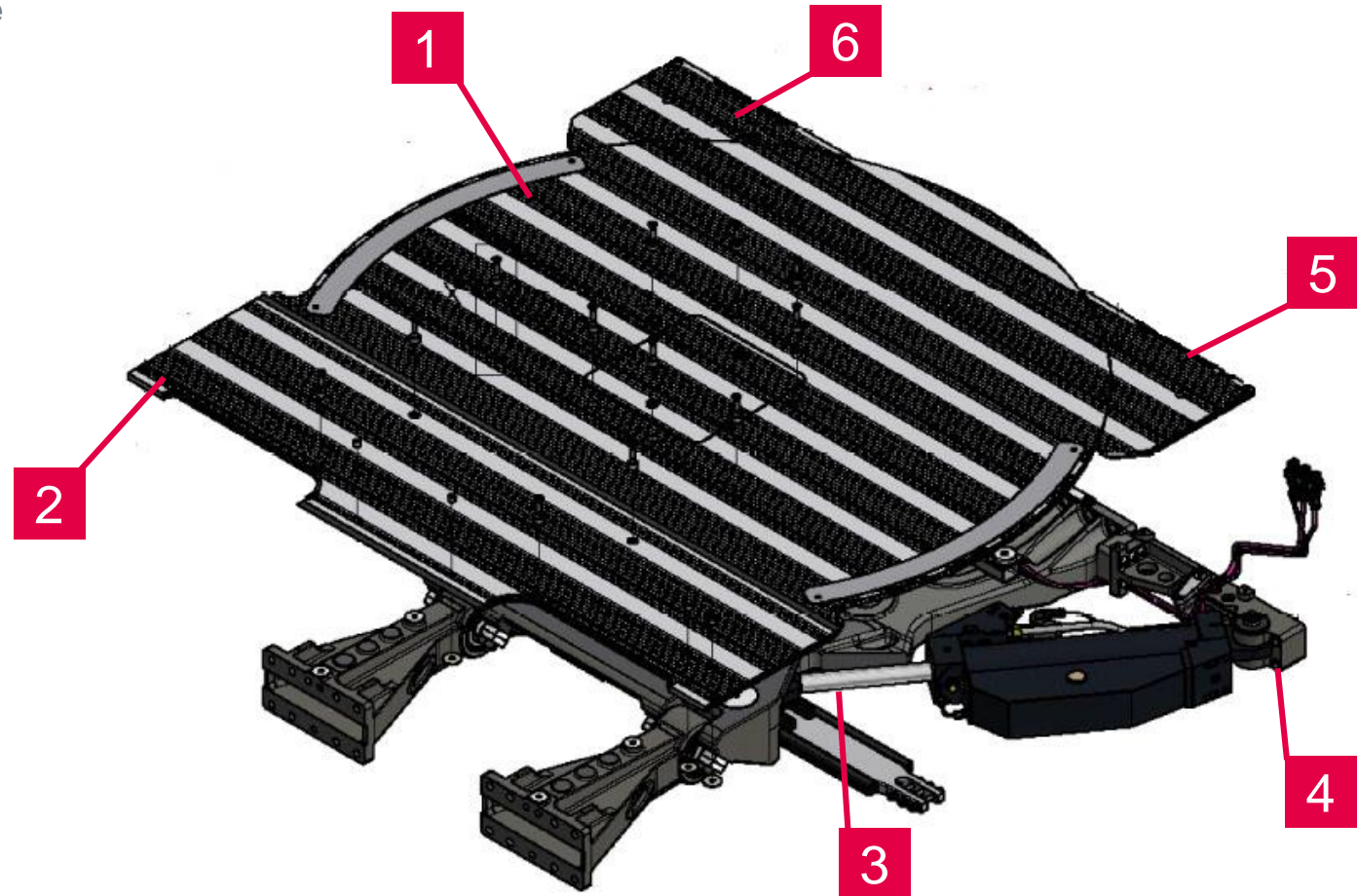
## Overview of display messages

No.	Function	Display text	Comments
1	Activation of button while driving forwards (high damping request)	Pivoting joint, high damping active	
2	Activation of button while driving backwards (brake override)	Anti-jackknife protection not active	
3	Kink angle $\geq 48^\circ$	Anti-jackknifing protection active	
4	Torque reduction (previously $17^\circ$ )	Pivoting joint, power reduced	
5	Override of torque reduction (kickdown)	—	Message from point 4 disappears.
6	Other fault messages and malfunctions	Anti-jackknifing protection malfunction	Collective message is shown on the display; detailed messages are stored in the diagnostic memory.

# Overview of components

## Pivoting joint with turntable

- 1 Turntable
- 2 Turntable right angle
- 3 Hydraulic cylinder
- 4 Joint
- 5 Wedge, left
- 6 Wedge, right



# 4.4

## Electronic Air Management system (EAM)

# Overview

## Electronic Air Management (EAM) function description

With the new system, air treatment is no longer a permanent process; instead, the process is controlled electronically in accordance with vehicle parameters in line with demand.

- The EAM combines the functionality of the air dryer, pressure controller and multi-circuit protection valve in the compressed air system of the commercial vehicle.
- The intake of air is controlled via software that activates the air compressor.
- Different pressure levels can be set.
- Compressed air can be distributed to six different consumer circuits.
- In the event of a leakage, the consumer circuits are protected against each other so that only the affected circuit fails.
- Basic functions are maintained for the remaining five circuits.
- Brake circuit pressure is recorded and sent to the instrument cluster.



# Air dryer cartridge

## Modifications to the existing spare part

- The thread of the air dryer cartridge has changed to M41x1.5 rolled after heat treatment
- **Therefore, only MAN Genuine parts can be used (MAN item number: 81.52155-0044)**
- Please note: The air dryer cartridge is **not** backward compatible

## Oil separation

- Air filtration, drying and oil separation take place in the replaceable air dryer cartridge to prevent oil from seeping into the compressed air system
- The air dryer cartridge regenerates by removing the air from circuits 1 + 2 by means of a solenoid valve
  - The regeneration tank is no longer used
- The volume of regeneration air required is determined by the control unit
- Automatic regeneration stops once the system pressure is reached, thereby reducing compressed air consumption





# Intelligent air management

Electronic air treatment enables all compressed air consumers to be supplied with clean and dry compressed air. In the air management system of the new Lion's City, the air compressor is also connected to an Electronic Air Module (EAM).

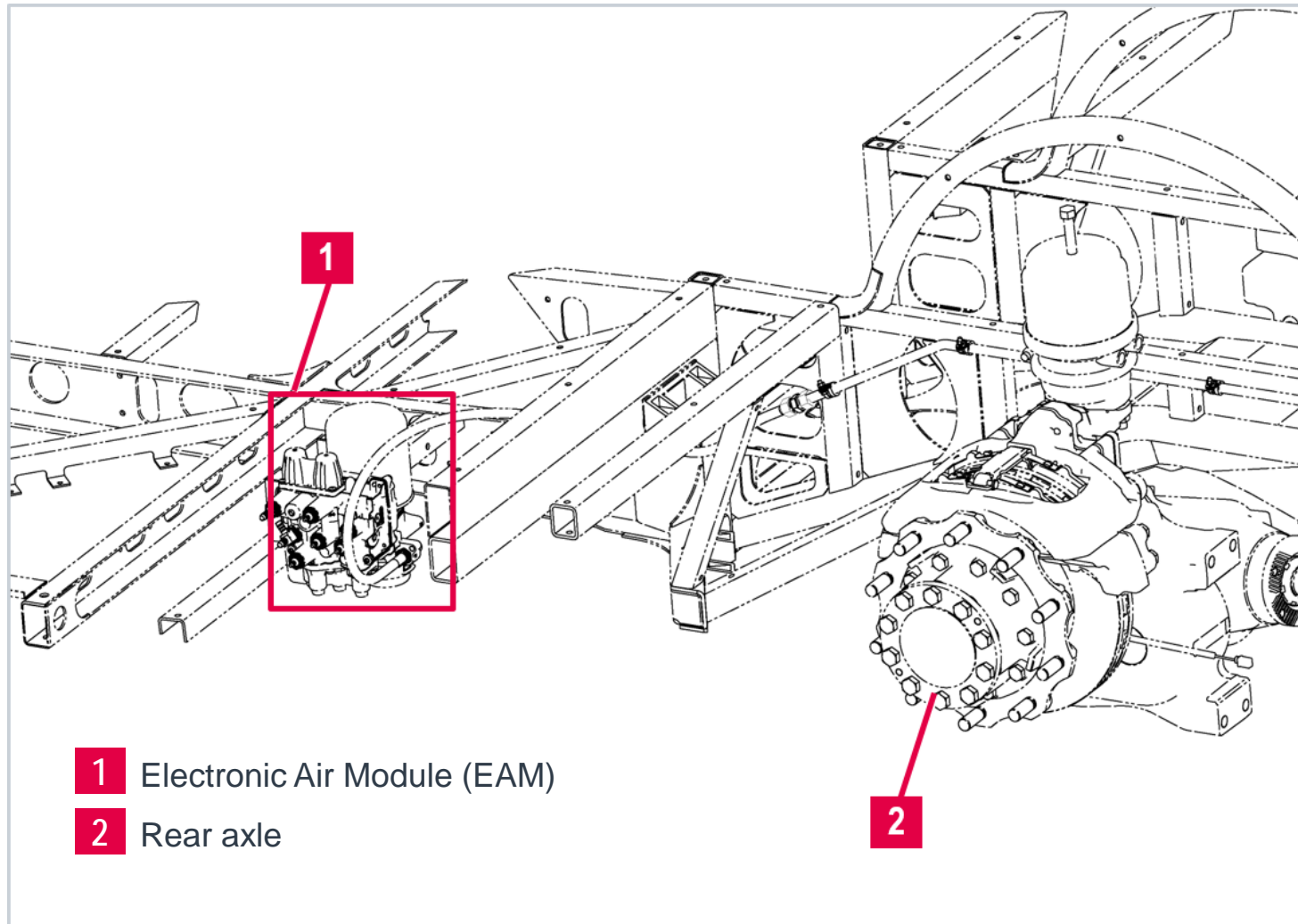
- In the compressed air system, the EAM combines the functionality of the air dryer, pressure controller and multi-circuit protection valve and supplies the various consumers with compressed air
- Central control element in the compressed air system
- The intake of air is controlled via software that activates the air compressor
- Communication with Power Train Manager (PTM): detects vehicle status
- When the vehicle accelerates, the system is in idle mode
- Compressed air is generated when the vehicle brakes
- When the engine is switched off, the line is vented

## Advantages

- Reduced air conveyance via intelligent triggering of the air compressor
- Reduced air consumption via regeneration in line with demand

# Installation location of the Air Management system

In the new Lion's City, the Electronic Air Module (EAM) is located in front of the rear axle on the left-hand side.



4.5

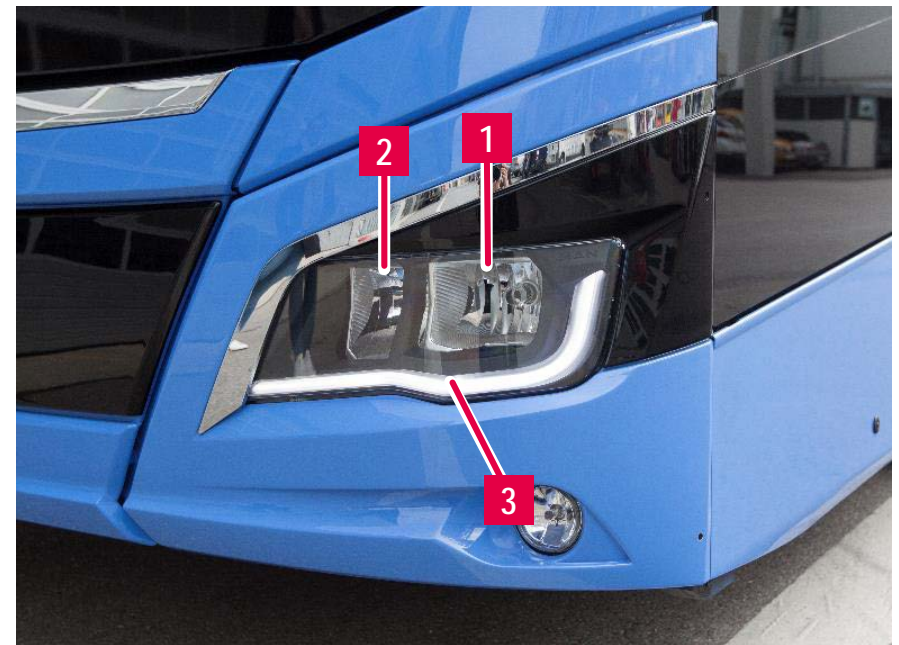
Exterior

# Full LED headlights as standard

## New lighting technology as standard

The full LED main headlights use LEDs for all lighting functions:

- Low-beam headlights
- High-beam headlights
- Parking lights
- Daytime driving lights<sup>1)</sup> and indicators<sup>1)</sup> in a modern strip light design
- SE: H7 front headlights (halogen)



- 1 Low-beam headlights
- 2 High-beam headlights
- 3 Parking lights/daytime driving lights/turn indicators

1) These lighting functions are performed via LEDs – even in the case of the standard halogen lighting design which is still available.

# Windscreen cleaning system

## Features

- Nozzles directly on the windscreen wiper
- Larger wiper water container: now 20 litres (standard)
- Integrated, high-performance pumps with fill level sensor (display in driver's workplace)
- Intake fittings located directly in the wiper water tank – automatic venting during filling
- Innovative fastening concept: container is inserted and secured with just two screws
- Windscreen = standard, headlights = special equipment (SE)

## Advantages

- Greater pump output
- Ergonomically optimised arrangement of the filler neck

## Customer benefits

- Improved cleaning performance due to increased pump output
- Easier to fill the container
- Timely warning via fill level sensor

# Full LED rear lights

## New lighting technology at the rear as well

As a new and characteristic MAN design feature, the new Lion's City is equipped with full LED rear lights as standard.

- Sidelight
- Reverse light
- Brake light
- Indicator
- Rear fog light

## Advantages

- Easy to replace, as rear corner is easy to open
- Thermal decoupling of rear light from warm engine compartment air (service life of LED increases at low operating temperatures)

## Customer benefits

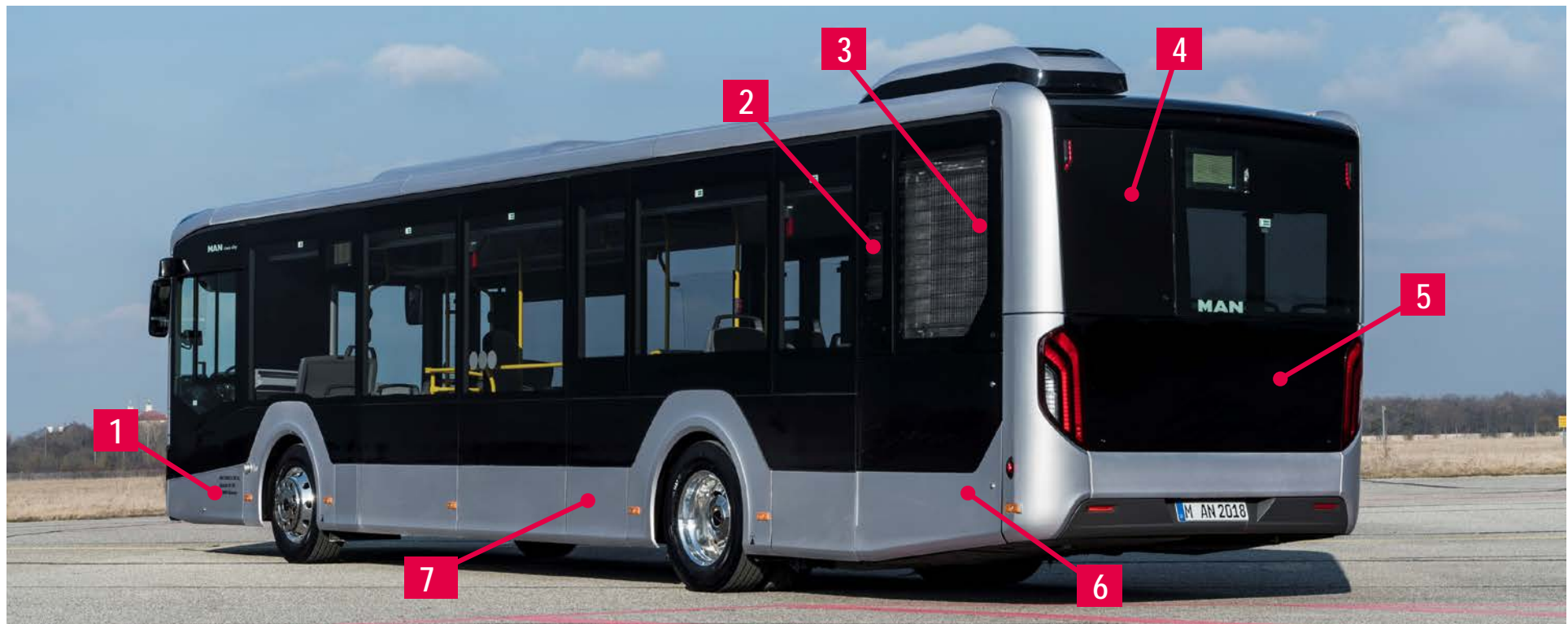
- Lower costs due to very long service life
- Lower power consumption
- Increased safety due to better visibility



# Flaps on the 12C Solobus

## Solobus, 12 m

The optimised flap concept of the new Lion's City improves the accessibility of components, thereby making it easier to perform maintenance and diagnostic activities.



- |   |   |
|---|---|
| 1 Battery flap  | 5 Engine compartment flap   |
| 2 Air intake flap (only to be used by workshop personnel)       | 6 Engine compartment maintenance flap (only to be used by workshop personnel) |
| 3 Cooling air duct flap (only to be used by workshop personnel) | 7 Side flap (only to be used by workshop personnel)                           |
| 4 Maintenance flap  |   |



# Flaps on the 12C Solobus



- 8** Central front flap
- 9** Headlight flap
- 10** Tank flap (AdBlue)
- 11** Tank flap (diesel fuel)
- 12** Side flap (only to be used by workshop personnel)

# Flaps on the 18C articulated bus



**1** Side flap (only to be used by workshop personnel)

**2** Air intake flap (only to be used by workshop personnel)

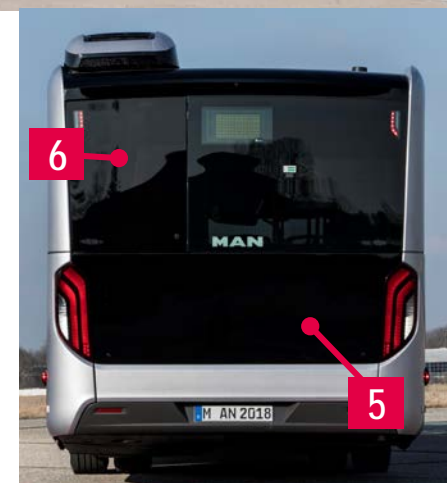
**3** Cooling air ductflap (only to be used by workshop personnel)

**4** Engine compartment maintenance flap (only to be used by workshop personnel)

**5** Engine compartment flap (only to be used by workshop personnel)

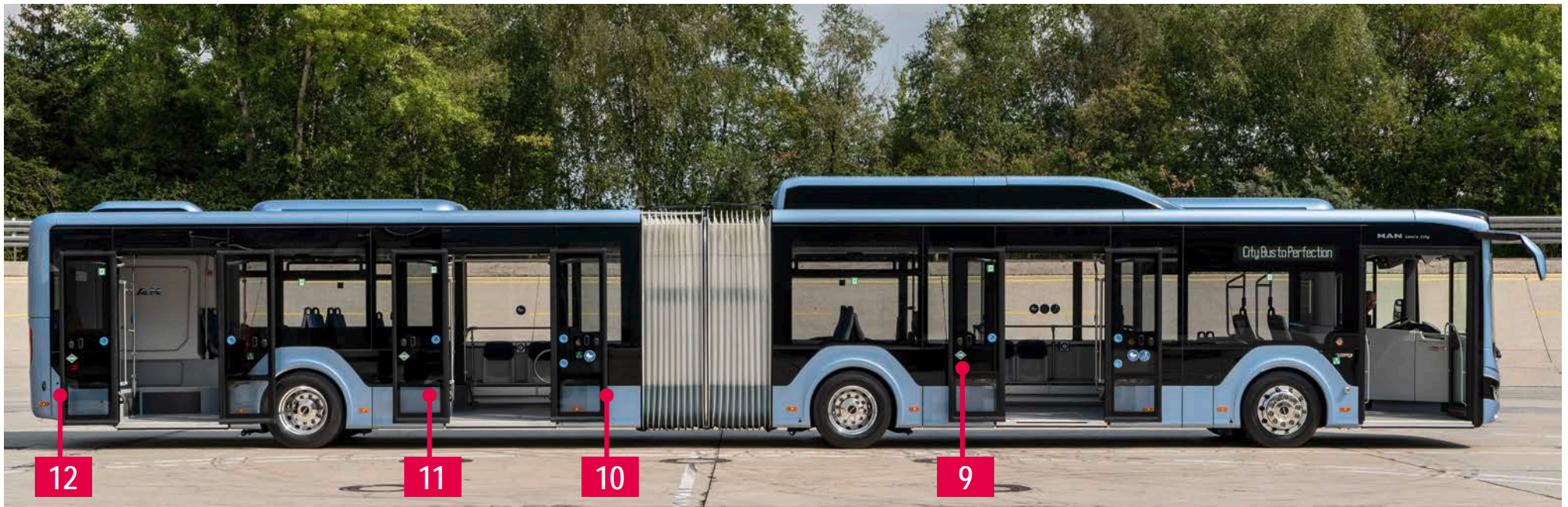
**6** Maintenance flap

**7** Side flap (special equipment – hot oil tank)



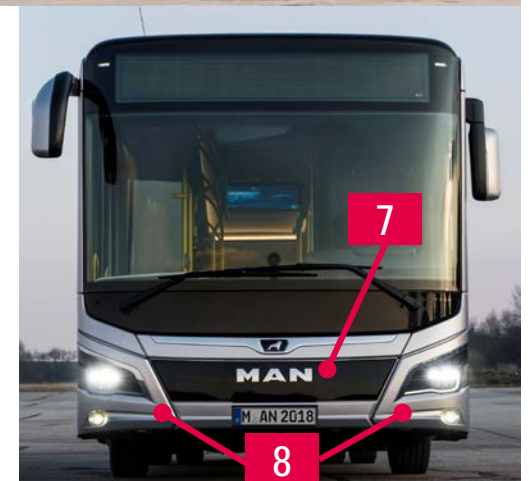


# Flaps on the 18C articulated bus



- 7** Headlight flap
- 8** Headlight flap
- 9** Tank flap (diesel fuel)
- 10** Battery flap (mechanical battery main switch)

- 11** Tank flap (AdBlue)
- 12** Side flap (only to be used by workshop personnel)



# The flaps in detail

## 1 Maintenance flap (rear)

- Service centre flap: central access for service operations
- Made from glass on an aluminium frame (bonded)

## 2 Engine compartment flap

- Reduced weight: newly designed engine compartment flap without a steel frame

## 3 Side flap on left-hand side

- Access for engine maintenance (flap only to be used by workshop personnel)
- Made from aluminium
- Two catches (lockable), hinge on left-hand side

## 4 Flap for air intake

- Air intake for engine (flap only to be used by workshop personnel)
- Aluminium flap with perforated plate



# The flaps in detail

## 5 Cooling air duct flap

- Cooling air supply (flap only to be used by workshop personnel)
- Aluminium flap with perforated plate
- Hinged at side, hinge on left-hand side
- High air flow with low dirt permeability

### Advantages

- Large cooling air cut-out and high air flow reduce radiator running time
- Lower level of contamination due to dirt from roads as the radiator is mounted on top

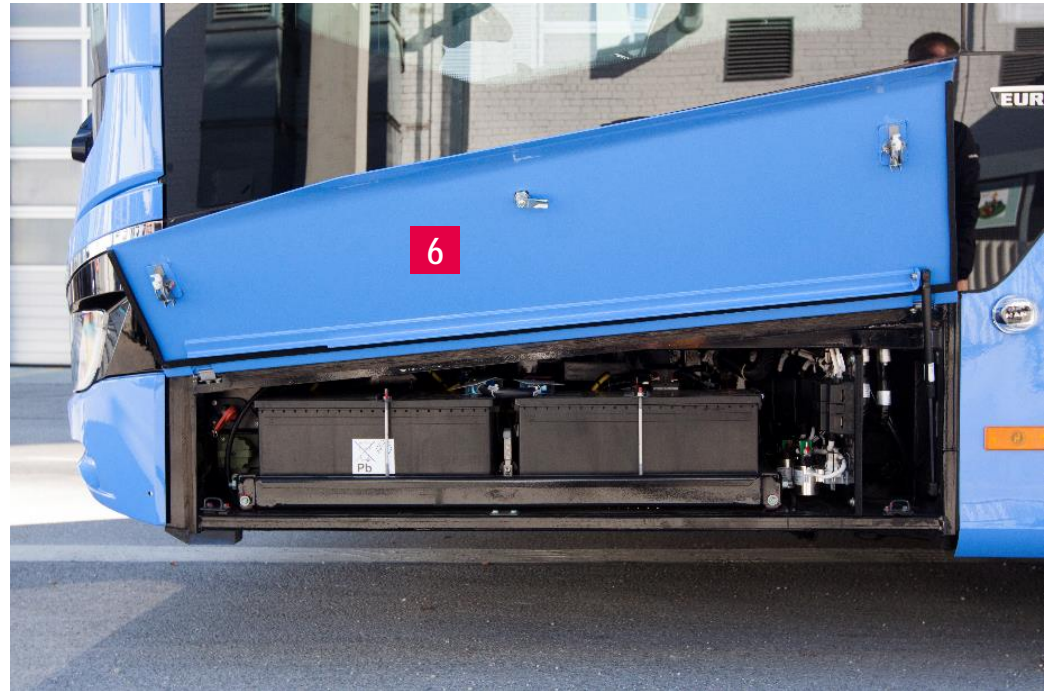




# The flaps in detail

## 6 Battery flap

- Access to battery
- 12C: front left-hand side
- 18C: right-hand side behind the folding bellows
- Hinge at top, catches bottom centre
- The gas-pressure shock absorber supports the battery flap
- Battery can be pulled outwards on slide



# Segmented side wall

## Features

- Vertical and horizontal segmentation of the side wall (glass transitions into plastic without any conspicuous joints)
- SMC material (fibre-reinforced plastic)
- Plug connection system for quick replacements in the event of damage, no adhesion
- Smaller segments

## Advantages

- Easier to paint (due to smaller segments) with shorter workshop stopover

## Customer benefits

- Lower TCO
- Time saving during side wall replacement
- Good spare parts availability





# Side windows

## Features

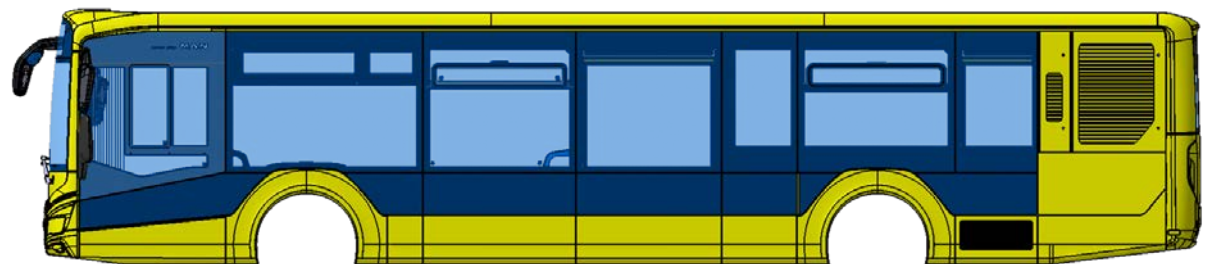
- One hundred and eighty-two variants available in total (12C, 18C)
- Glazing visually extended downwards thanks to additional segmentation (maintenance-friendly and modern)
- **Glass types:**
  - Single-pane safety glass (SPSG), 4 mm
  - Double-pane safety glass (DPSG), 4 mm/12 mm/4 mm
- **Tints:**
  - Light grey, transparency 55% (standard)
  - Venus grey 40, transparency 35% (SE)
  - Darker tints for less sunlight and thereby reduced heating of the interior
  - Panes fully blacked-out beneath the railing

## Advantages

- Smooth, robust and flush surfaces
- Low air resistance
- High energy efficiency of tinted panes

## Customer benefits

- Easy to clean
- Resistant to scratches and impacts
- Attractive design
- Improved view for passengers looking outwards



# Driver's window

## Variants

Glass type:

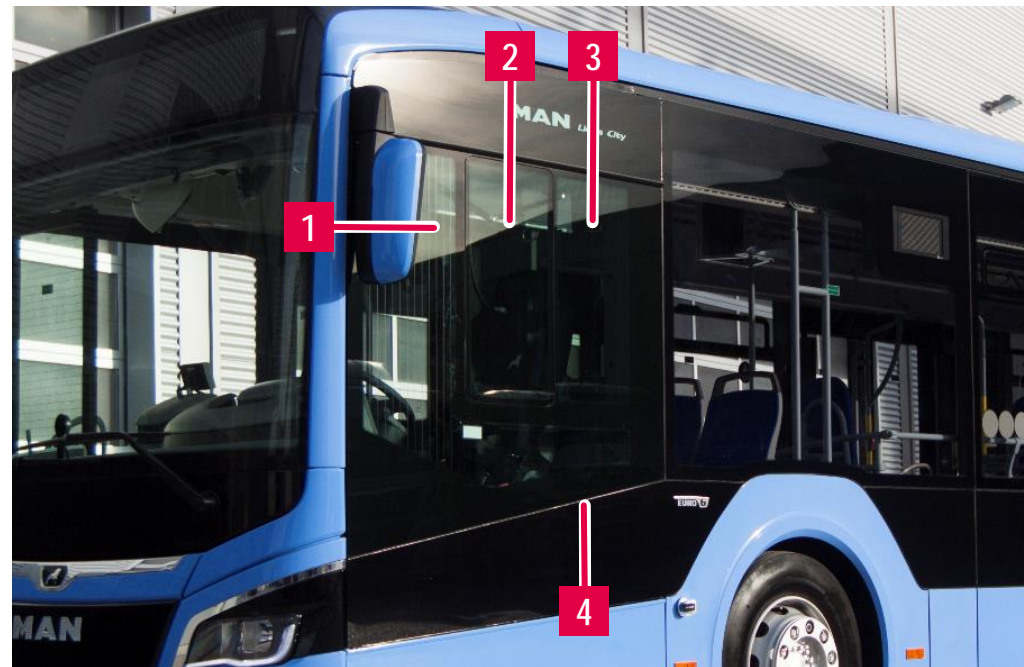
- SPSPG\* without heated sliding pane, manually operated
- SPSPG\* with heated sliding pane, electrically operated
- DPSPG\*, electrically operated
- Mirror cut-out:
  - Hanging mirror
  - Upright mirror

## Features

- Front area of pane heated
- Improved water management
- Heating wires only 0.4 mm thick
- Multi-part glazing (horizontally divided, making accident repairs easier)

\*SPSPG = single-pane safety glass

\*\*DPSPG= double-pane safety glass



- 1 Front, heated pane area with optimised heating wires
- 2 Sliding window with optimised closing mechanism

- 3 Non-moving pane
- 4 Division of glazing

# 4.6

## Driver's workplace

# Driver's workplace

## Ergonomic design

With regard to the design of the driver's workplace, MAN has placed the utmost importance on meeting the ergonomic requirements of drivers of different sizes and statures. This involves various aspects such as the following:

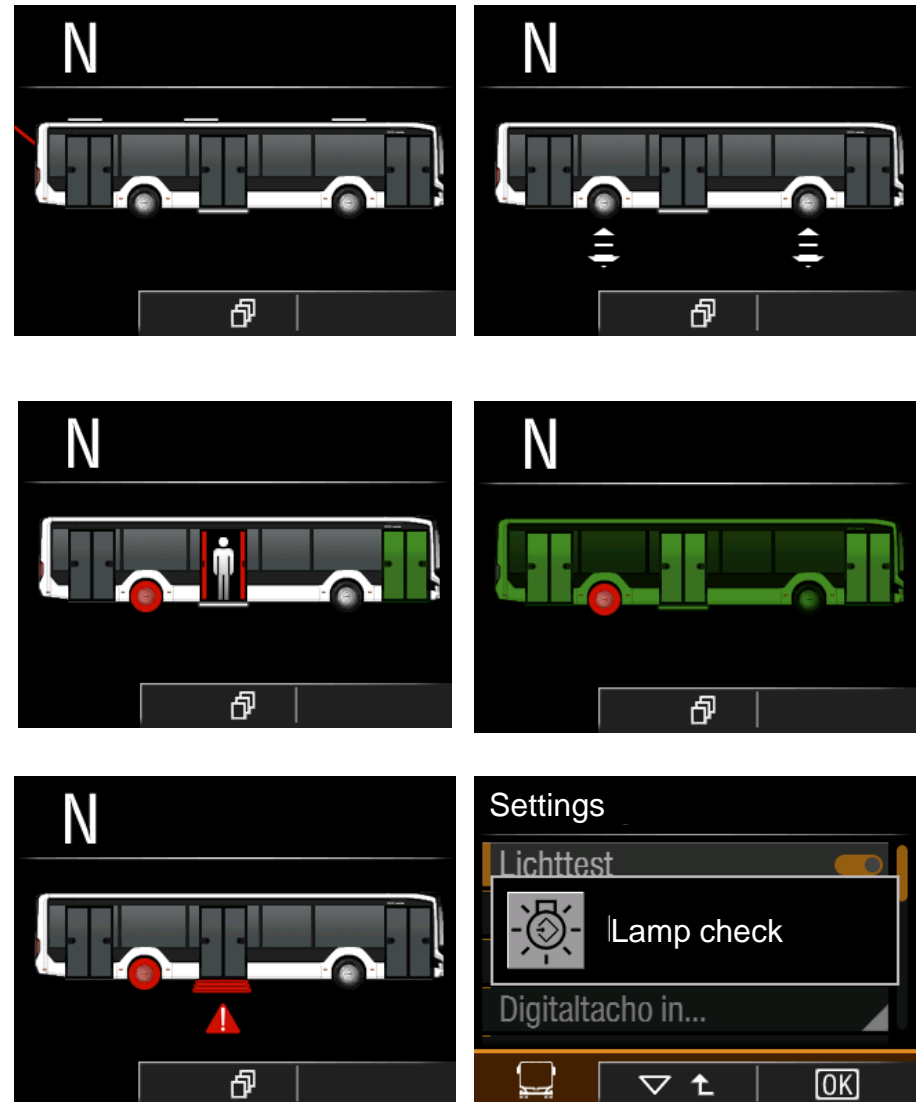
- Viewing angle looking outwards
- Readability of the instruments and accessibility of controls
- Positioning and adjustment of the driver's seat
- Driver's workplace positioned 110 mm higher
- Rotatable driver's seat available as special equipment
- Bottle compartment in the side control panel
- Being able to access a beverage while driving



# Colour display

## Features

- Change from Baseline to Highline colour display
- High-resolution four-inch colour display as standard
- Same range of functions as before
- Operation via buttons on instrument cluster as before
- Use of colour and optimised high-resolution symbols and graphics
- Optimised texts and MAN lettering
- Display:
  - Start screen appears when the ignition is switched "on"
  - Main menu – vehicle data
  - Bus-stop menu



# New designation: IT compartments

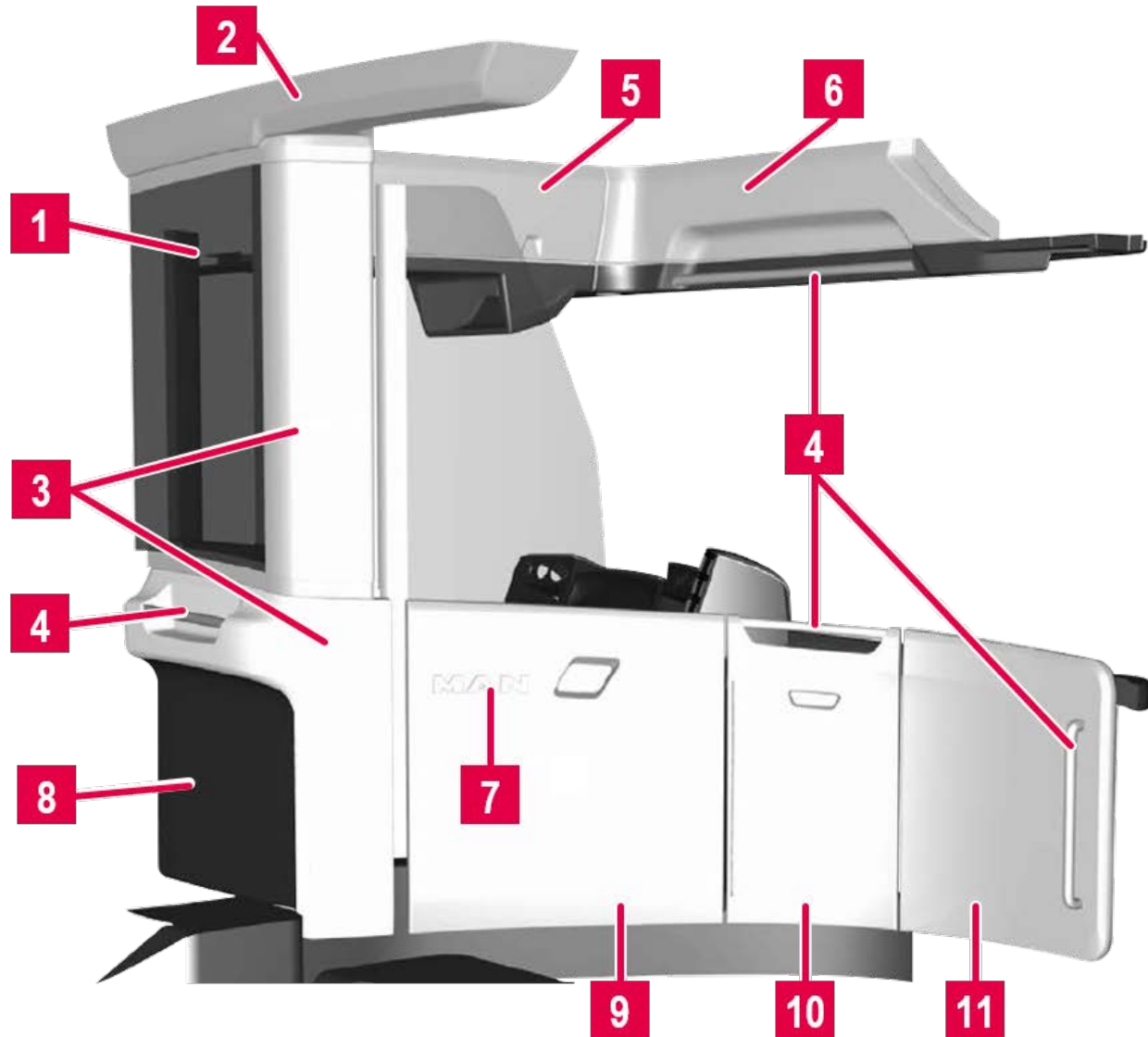
The old designations "Euro box" and "stowage box" are no longer used

- Four IT compartments available in the new Lion's City
- Four options to choose from
  - Without 19-inch frame
  - With empty 19-inch frame
  - With 19-inch insert frame (equipment must be specified by ASR)
  - 19-inch insert frame provided (equipment must be specified by ASR)



# Driver's cabin

- 1 Black tinted glass
- 2 Transverse channel
- 3 Rear wall
- 4 Uprights
- 5 IT compartments
- 6 Upper front interior panelling
- 7 Logo
- 8 Rear wall flap
- 9 Driver's door
- 10 Fire extinguisher door
- 11 Front wall cover



# 4.7

## Maintenance management



# With activated service interval calculator as standard

**The maintenance system in the new Lion's City monitors the maintenance appointments of parametrisable maintenance components**

## **Features**

- Display of maintenance system data on the driver's display in the driver's workplace
- Monitoring of all cyclical service appointments (Power Train Manager [PTM] parameters)
- Calculation of forecast appointments for all monitored components
- Provision of maintenance system data via web-based maintenance data portal
- Early information for the bus company or driver regarding when the bus needs to go to the workshop again
- Calculation of the remaining mileage of the individual maintenance components

## **Customer benefits**

- Relevant data and information regarding the maintenance status of the respective vehicle in real time
- The maintenance data transmitted shows at a glance when a particular vehicle needs to be scheduled for a maintenance appointment
- As a result, the workshop can efficiently plan maintenance operations in advance that are precisely tailored to the use and wear of the vehicle

# Accessible data

The maintenance data can be viewed on the vehicle display or in the MAN maintenance data portal.

## **FWS mode (flexible maintenance system)**

- Downtime in months
- Max. mileage in kilometres
- Max. fuel consumption in litres
- Max. engine operating time in hours

## **ZWS mode (time-based maintenance system)**

- Mandatory follow-up appointment as calendar date

## **Monitored components and appointments**

- Engine, gearbox and axle oil
- Cooling system
- Air filter
- Air dryer
- Front/rear axle steering
- Valve clearance
- Fixed inspection S12 32
- Fixed inspection S6 34
- Statutory inspections: Tachograph, HU, environmental sustainability test, SP
- Inspection appointments to be freely selected by the customer

# Innovations in the field of maintenance

Maintenance components	Engine	Emission standard	Homologated fuel types	New Lion's City Solo	New Lion's City articulated bus	Service interval calculator for maintenance components on/off	MAN standard	Mileage [km]	Duration [months]
Engine oil	D1556LOH	Euro 6d	EN 590, EN 15940	x	x	on	M 3677	80,000 km	18 months
Valve clearance	D1556LOH	Euro 6d	EN 590, EN 15940	x	x	off	-	Every third engine oil change	

## Notes:

- The valve clearance is to be set every third engine oil change
- Use of biodiesel in accordance with EN 14214 not approved.
- The service interval calculator is always active regardless of the driver's workplace.

## Maintenance innovations in the new Lion's City Diesel

- Maintenance checklist: Check no longer necessary(4,000–5,000 km)



# 4.8

## Vehicle diagnostics

# Diagnostics with MAN-cats

The MAN-cats® basic diagnosis includes the following functions and is available in 24 languages.

Reading out and transmitting legally required data (e.g. IUPR)

Setting customer-specific parameters (such as maximum speed limitation, intermediate speeds and torque limits)

Identification (vehicle/control unit)

Setting parameters/ immobiliser

Reading out/clearing the error memory

Calibration

MAN Genuine Software (spare part software)

Displaying measured values (monitoring)

Setting parameters, including feedback to the Corporate Centre

Flashing operations for control units that support this function

Performing and confirming maintenance work



The MAN Genuine software available is stored in MANTIS.  
Additional vehicle parameters can be applied for via MANTED.

# MAN-cats® III, circuit diagram concept of the new Lion's City

## Advantages of the new system of generating circuit diagrams

### ➤ **Simple**

- ✓ Call up from the error memory, monitoring, circuit diagram search engine

### ➤ **Fast**

- ✓ Diagrams created in just a few seconds

### ➤ **Specific**

- ✓ Circuit diagrams between two components, physical and logical view, control unit connection diagram

### ➤ **Informative**

- ✓ Detailed information on wires, plug connectors and contacts
- ✓ Can be printed as a PDF file with a legend

### ➤ **Interactive**

- ✓ Detailed information available by moving the mouse pointer over objects on the screen, circuit diagram generated step by step

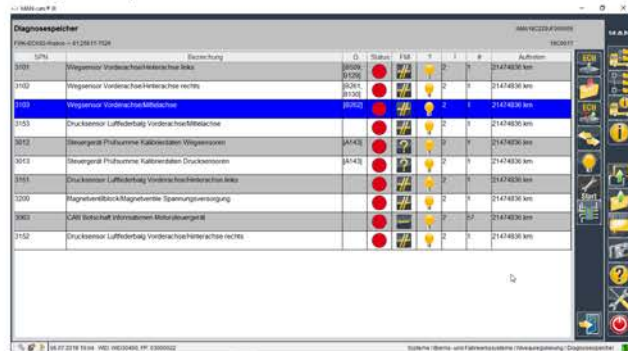
### ➤ **Multiple languages**

- ✓ Translated into all MAN-cats® III languages

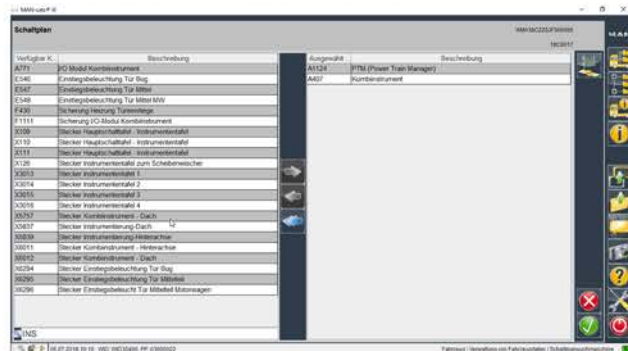
# MAN-cats® III, circuit diagram concept of the new Lion's City

## Effective circuit diagram generation

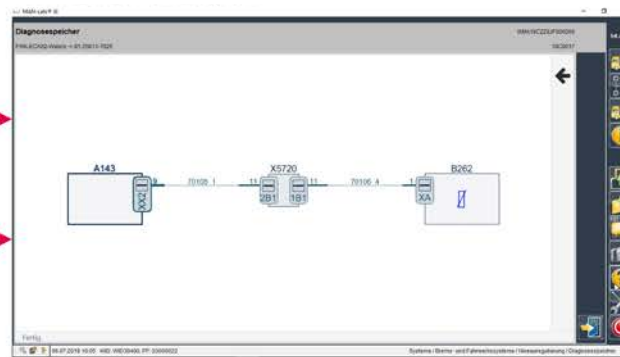
diagnostic memory



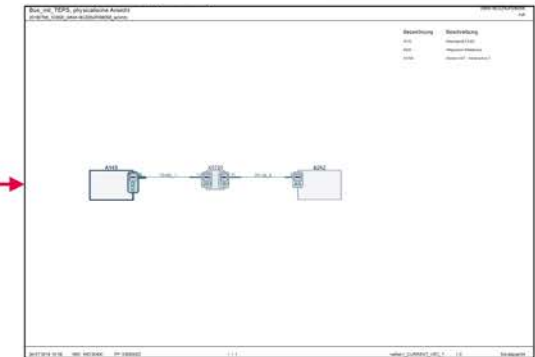
circuit diagram search engine, two components



generated circuit diagram



[circuit diagram \(PDF\)](#)



# 5

## Preparatory measures



# 5.1

## Essential special tools

# MAN special tools

## Essential special tools

Special tools guarantee a high level of repair and service quality as well as high customer satisfaction.

There is the perfect special tool for each vehicle in our wide range of trucks and buses.

The teams developing our vehicles and workshop equipment work together closely so as to minimise the amount of special tools required for new models and to maximise the use of existing workshop equipment.

Further information can be found in the relevant issue of TOOL NEWS, available in the MAN After Sales Portal. The following slides list the special tools required to manage the features of the new Lion's City.

If you have any questions regarding this, please contact the MAN special tool development team at [support-workshopequipment@man.eu](mailto:support-workshopequipment@man.eu).




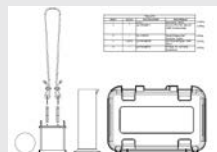

# MAN special tools

In accordance with the **MAN service partner standards**, the workshops are equipped with a basic range of MAN mandatory tools. This basic set of equipment must be updated on an ongoing basis as new **mandatory tools** become available. The tool list can be found on the After Sales Portal of MAN Truck & Bus AG:

[Home](#) > [Repair and maintenance](#) > [Workshop equipment](#) > [Operating and office equipment](#)



1. MAN mandatory tools: Special tools that are required for repairs in accordance with workshop levels A, B and C. These tools must be in the workshop at all times and audited on a regular basis.
2. MAN recommended tools: Special tools that optimise repair work. Importer or workshop can decide whether the tools should be purchased, e.g. if a workshop specialises in a particular unit. It is generally advisable to provide these tools. The specific quantities required are coordinated with the Corporate Centre so that the availability of the tools in the quantity and timeframe required can be scheduled and guaranteed.

# MAN special tools





MAN item number	Designation	Figure	Note
80.99602-6053*	10.5-inch extractor tool for the diesel particulate filter		New tool
80.99607-6243	Quantity test kit and AdBlue nozzle spray pattern		New tool set all engine series
08.77501-6002	Endoscope VAS 6748B		<b><u>Please note:</u></b> Mandatory since 2011 If this is already on hand, then there is no need to invest

\*expected to be available for order from April 2019

# MAN special tools

MAN item number	Designation	Figure	Note
Easily procured	PA11W guide tube (10x 1   800 mm long)		Mixing line and SCR input inspection <ul style="list-style-type: none"> <li>Lion's City with D15 engine</li> </ul>
Easily procured	Telescopic light		Can be sourced via the retail market

# MAN special tools

MAN item number	Designation	Figure	Note
80.99642-0006	Discharge box		Discharging UltraCaps
08.78020-9024	Insulation-measuring device Fluke 1503		Equipotential bonding measurement
80.99641-0083	10-m measurement line, black		Equipotential bonding measurement
08.78020-9026 (also part of 80.99641-6059)	Voltage tester		

# MAN special tools

MAN item number	Designation	Figure	Note
	Working platform <a href="http://www.euoline-leitern.de">www.euoline-leitern.de</a>		
09.87002-0002	Barrier (recommendation)		
08.00054-1000	High-voltage tool kit		Equipotential bonding measurement

# 5.2

## Spare parts



# MAN Genuine Parts

## Availability of new spare parts

Availability for all MAN Genuine parts that are being launched as part of the new Lion's City is guaranteed via the usual standard process.

The structure of the established discount groups is also retained, as per the current integration.

Due to the highly variable and restricted radii of city buses, it is not practical to stock an exhaustive range of tools in the workshop.

**If necessary, the ticket system (TCS) can be used to obtain a stock recommendation based on a vehicle identification number.**

No changes regarding spare part supply are therefore in place for the new Lion's City.



5.3

## MAN Services

# MAN ServiceContracts

## Customised Services, flat-rate price.

The MAN ServiceContracts service overview provides you with a clear and simple summary of the available modules.

This is how to take a standard repair and maintenance contract and tailor it to suit your own personal requirements.

PROACTIVE MAINTENANCE	REPAIR AND MAINTENANCE CONTRACT / PRODUCT	OIL CHANGE INCL. VALVE CLEARANCE SETTING	MAINTENANCE AND SERVICE	WEAR-AND-TEAR REPAIRS	DRIVELINE REPAIRS	COMPLETE VEHICLE REPAIRS	GENERAL OPTIONS  <small>statutory measures, refilling quantities</small>	MOBILITY OPTIONS  <small>MAN breakdown service, tyre service, collect/ return service</small>	FITTING AND INSTALLATION OPTIONS  <small>cooling units, liftgates</small>
MAN SERVICECARE	Comfort Oil	✓	—	—	○	○	○	○	○
	Comfort	✓	✓	—	○	○	○	○	○
	Comfort Plus	✓	✓	—	✓	○	○	○	○
	Comfort Super	✓	✓	✓	✓	✓	○	○	○
	Comfort Managed	Flexible and customised scope of services							
	Driveline guarantee/ expansion package	—	—	—	✓	—	—	—	—
	Complete vehicle guarantee	—	—	—	✓	✓	—	—	—

✓ Included

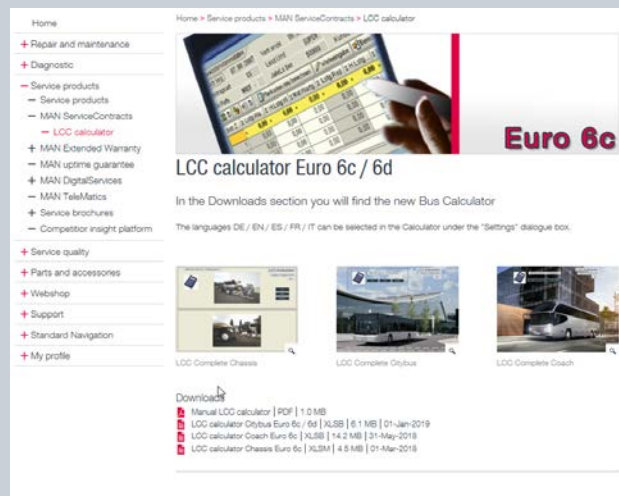
○ Optional

— Not included

# MAN ServiceContracts

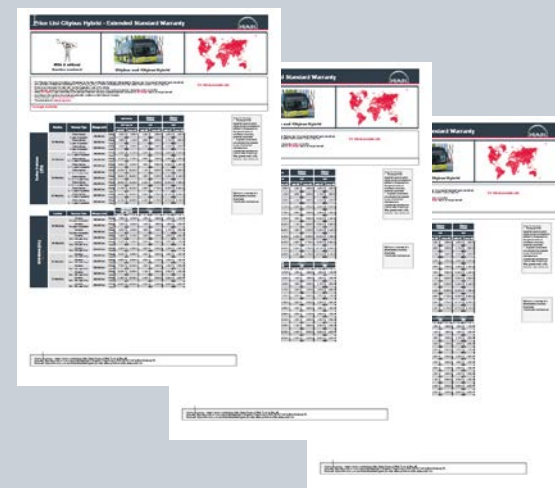
## MAN ServiceContracts

- The current budgeted standard costs for creating local repair and maintenance contracts can be viewed in the LCC calculator.
- As part of the progressing project, the costs are being updated on an ongoing basis.
- Available for 12C/18C models.



## MAN extended warranties

- The extended warranties for the new Lion's City are already available.
- Further information and the respective price list can be found in the MAN After Sales Portal under the "Service products" category.



5.4

## MAN Academy

# Qualification levels as per DGUV Information 200-005

## Level 1

**MAN Truck & Bus employee that has received training on high-voltage systems**

**Level 1 AHW-01a Training on vehicles with high-voltage systems**

Vehicle-related training courses (Lion's City Hybrid, Lion's City EfficientHybrid etc.) (2UE)

## Level 2

**Automotive engineering electrician employed by MAN Truck & Bus (for non-intrinsically safe high-voltage vehicles)**

**Level 2b: AH-02b Basic module for non-intrinsically safe high-voltage vehicles (32UE)**

**plus at least one advanced module on vehicles**

- AH-02d Advanced module for non-intrinsically safe high-voltage vehicles – *Lion's City Hybrid (16UE) or*
- AH-02e Advanced module for non-intrinsically safe high-voltage vehicles – *Lion's City EfficientHybrid (16UE)*

## Level 3

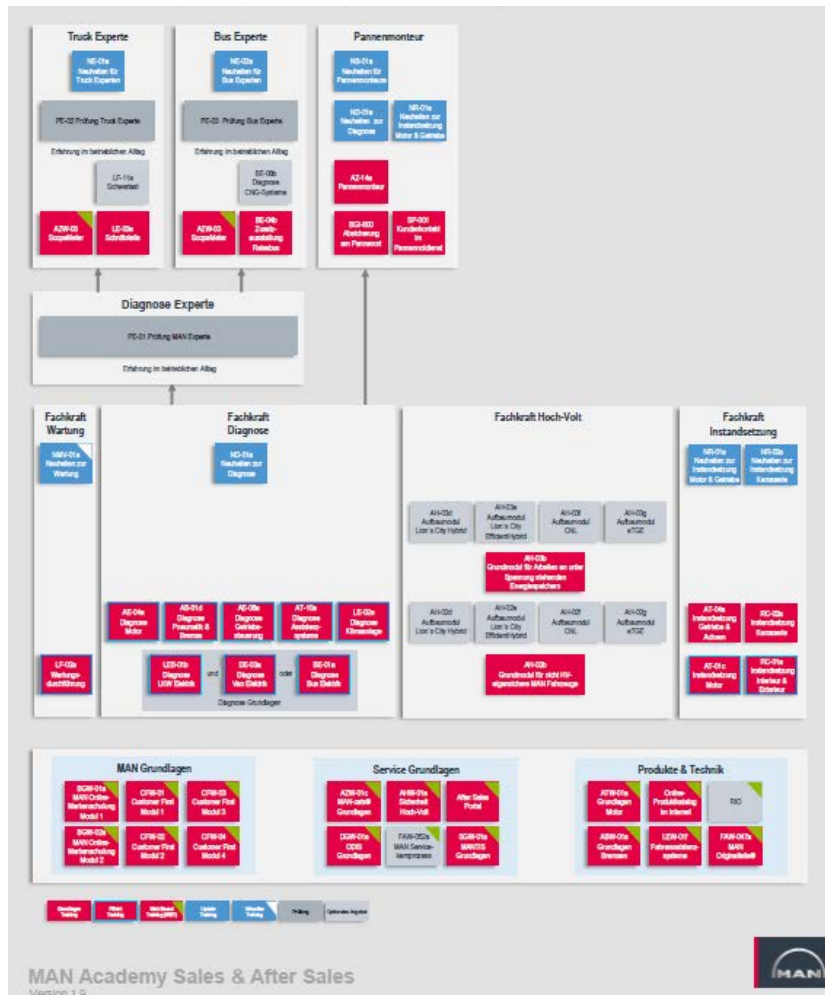
**Automotive engineering electrician with authorisation to carry out work on live systems for MAN Truck & Bus (for non-intrinsically safe high-voltage vehicles)**

**Level 3a: AH-03b Basic module for work on live energy storage systems**

**plus at least one advanced module on energy storage systems**

- AH-03d Advanced module for work on live energy storage systems – *Lion's City Hybrid (16UE) or*
- AH-03e Advanced module for work on live energy storage systems – *Lion's City EfficientHybrid (4UE)*

# Seminar programme 2019



## New developments for bus experts (NE-02a)

# Advanced module for non-intrinsically safe high-voltage MAN vehicles – Lion's City EfficientHybrid (AH-02e)

can be booked as regular training





## Readiness checklist – new Lion's City

5.5

# Market Readiness? Check!



## + Special tools

All mandatory special tools and workshop equipment are available in the workshops.

☐

## + Spare parts

A stock recommendation based on a vehicle identification number is available.

☐

## + MAN repair and maintenance contracts

Broadening of the existing repair and maintenance contracts for the new Lion's City is completed.

☐

## + Training measures

Training sessions are carried out for trainers and workshops.

☐

5.6

## List of abbreviations

# List of abbreviations

Abbreviation	Description
EGR	Exhaust gas recirculation
OSD-p	Pneumatic outward-swinging door
CNG	Compressed natural gas
CRT	Continuously regenerating trap
DC	Direct current
DOC	Diesel Oxidising Catalytic Converter
DPF	Diesel particulate filter
DPSG	Double-pane safety glass
EAM	Electronic air management
SPSG	Single-pane safety glass
ESS	Energy-saving system
EVBeC	Electronically controlled exhaust valve brake/electronically controlled engine brake
FAP	Fill level sensor
FWS	Flexible maintenance system
HDPE	High density polyethylene
HU	Main inspection
ISD-e	Electrohydraulically driven inward-swinging door
ISD-p	Pneumatic inward-swinging door

# List of abbreviations

Abbreviation	Description
IUPR	In-Use-Performance-Ratio
CSA	Crankshaft starter motor alternator
LCC	Life-cycle cost
LIN	Local Interconnect Network
NGV	Natural gas vehicle
PCV	Premium Comfort Valve
PTM	Power Train Manager (replaces the vehicle management computer)
SCR	Selective Catalytic Reduction
SP	Safety inspection
SSD-e	Electrohydraulically driven swing/sliding door
TCS	Ticket system
Turbo EVB	Turbo Exhaust Valve Brake
ZWS	Time-based maintenance system

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