Press Release
MAN Truck & Bus

Greater comfort, safer and more efficient: numerous new features for MAN and NEOPLAN buses in model year 2024

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MAN Truck & Bus
Dachauer Straße 667
D-80995 Munich

Should any questions arise, please contact:
Sebastian Lindner
Phone: +49 89 1580-2001
Presse-man@man.eu
https://press.mantruckandbus.com/

General technical developments, advancing digitalisation and new legal requirements are inevitably influencing the improvements for modern bus and coach models. MAN has now bundled many of these requirements in a targeted way and upgraded the entire bus and coach range of the MAN and NEOPLAN brands with a host of new features for model year 2024. This benefits the drivers in particular, but also passengers and operators. City buses, intercity buses and coaches are now even more comfortable, safe and efficient on the road.

- **New electrics/electronics platform with higher performance**
- **Digital cockpits, awarded with the "Busworld Digital Award", set a new benchmark in the operating concept**
- **Extended assistance systems for all model series**
- **Radar-supported turn assist and lane change support LCS**
- **New brake and air suspension systems with even more functionalities**
- **Update of MAN D26 coach engines and the topography-dependent EfficientCruise gearshift program**

In recent years, MAN Truck & Bus has fundamentally revamped its bus and coach range with the introduction of numerous innovative models: NEOPLAN Tourliner (2016), MAN Lion's Coach (2017), MAN Lion's City (2018), MAN Lion's City E (2019) and MAN Lion's Intercity LE (2021). As a result of the new legal specifications on the European and global levels, manufacturers are now faced with many additional requirements that could hardly be implemented with the existing technical solutions. The regulation EU 2019/2144 for more safety in road traffic - therefore also known as the "General Safety Regulation (GSR)", which enters into force in 2024 -introduces a mandatory requirement for many assistance and safety systems that

were previously installed on a voluntary basis. In addition, the new UNECE regulations R155 (Cybersecurity Management) and R156 (Software Update Management) are the European response to increasing digitalisation and the need for secure vehicle communication. From July 2024 and therefore with immediate effect, compliance with the regulations will be mandatory for all new registrations. The new vehicle electronics platform from MAN Truck & Bus naturally meets all these requirements. The vehicles are equipped for future digital developments with update capability via secure wireless interfaces (over-the-air) and direct LAN access.

New electronics platform for all buses and coaches

The new electrical and electronics platform is based on the proven technology matrix of the MAN truck series and has been adapted to the specific needs of the bus range with its complex body electrical system. The previous Power Train Manager (PTM), the central control unit of the previous KIBES32 system, has been replaced by the Central Vehicle Manager (CVM), which offers twice the computing power that has been available so far. This massively accelerates all computing processes on board while at the same time providing extended functionality. It is therefore not just the central control unit in the driveline but also the central node for all control units in the vehicle. Some of the previous control units have been omitted and have been functionally mapped in the CVM. The previous multiplex nodes in the CAN-controlled system have also been replaced by more powerful extended input/output modules (EIOs). All other control units for individual systems such as doors and air-conditioning system, for example, have been replaced by new, more powerful components. All previous telematic and diagnostic functions were preserved and improved by over-the-air updates, among other things. The data quality for all on-board systems has been further enhanced.

Digital cockpit with SmartSelect sets new standards

The new digital cockpit for all MAN and NEOPLAN buses already impresses both drivers and experts in the bus industry: The Busworld organisation has awarded it the “Digital Award”. The award was presented for the first time by an international expert jury at Busworld Europe as part of the “Digital Mobility Solutions Conference” in 2023 October in Brussels. MAN’s digital cockpit won the award in the “Digital On-Board Comfort” category and impressed the jury with its smart operating concept.

Newly designed driver's workplace

Especially in the coach versions with the innovative SmartSelect operating system, the new, digital cockpits feature a newly designed driver's workplace that meets the highest ergonomic standards and is individually adapted for both the MAN and NEOPLAN brands in the respective colour and trim concept. The basic form of a very driver-oriented centre console that has proven itself over many years has been fundamentally retained. This is now open towards the floor so that there is significantly more freedom of movement for the driver.

The new SmartSelect control unit is installed in the middle of the console in combination with the high-quality infotainment system MMC Advanced with navigation (standard in the NEOPLAN Skyliner). This control unit is ideally positioned within the driver's reach and has a new wrist rest with stabilising function. The buttons for door and flap opening and the centrally positioned hazard warning light switch are located directly above this. Slightly higher up there are six new programmable direct access buttons and the new climate control centre. All buttons have a new design and now only have to be pressed once and no longer have rocker action. The buttons offer reliable haptic feedback and visual confirmation by means of a bright LED. They also impress with their smooth operation and precision.

Above the central operating cluster and positioned offset to the windscreen, there is a large anti-slip stowage area directly in front of the 7-inch multimedia monitor and a further stowage compartment. This functional separation of the instrument panel is continued to the left over the entire cockpit so that most active control panels are located below this line and only the important information and switches (smart tachograph 2.0 and the new electric parking brake) are in the driver's direct field of vision – this optimally prevents the driver from being distracted from the traffic. Two large, round air vents ensure the necessary supply of fresh air, while a double cup holder on the left below the driver's window and many other stowage facilities offer further comfort for the bus driver. Another example of this is the steering wheel with multiple adjustment options. It also has a new joint so that it can be folded to maximum forward position over the instrument panel in order to give the driver plenty of space during break times or when leaving the driver's seat.

Digital display

A highlight in the truest sense of the word is the new colour digital display measuring twelve inches across the diagonal. Its two half-instruments leave

a large area for information in the middle. The rev counter or power meter instrument is designed with counter movement for this purpose and has also been moved to the right. This has made it possible to double the display area compared with the previous version. The brightness of the crisp and sharp display with HD resolution can be individually adjusted and thus contributes to optimum visual information transfer.

The display offers a full screen view with large icons in 3D look and a detailed home screen view with selectable alternative displays on the right and left next to the central display. When the information positioned at the sides is selected, the two side menus move like curtains from the outside to the inside into the driver's central field of vision . In this way, different information can be displayed in parallel and optimally perceived by the driver. If an event occurs, this is moved into the foreground and cannot be overlooked.

The comfortable size of the display, the clear and easily understandable arrangement of the elements and the modern 3D views help the driver to clearly recognise all important vehicle information at a glance and to react quickly as required. Visual over-stimulation and fatigue are avoided and driving safety is increased. The display can also be updated in future via a new Ethernet connection. In the city and intercity bus model series, the new instruments are largely used in the proven driver's workplaces.

MAN SmartSelect

The new MAN SmartSelect rotary pushbutton control is also designed with driver convenience in mind and has never previously been installed in buses in this form. The entire operating concept and positioning of the MAN SmartSelect unit are not only easy to use, but also serve to ensure safety while driving. Drivers can remain in their usual position for media control and keep their attention on the road at all times. Inattentiveness or accidental steering errors that could endanger safe driving are significantly reduced.

The concept is based on the experience of MAN development engineers that a touchscreen is not ideal for operation of important functions in a commercial vehicle – with its challenging operating conditions and swiveling driver's seat. A wrist rest with a perfect ergonomic design is used for the first time in the bus field to stabilise the operating hand when performing control operations. The principles are thus: intuitive, simple and with minimum distraction. The intelligent SmartSelect control unit comprises three main elements. The first is a bottom, larger ring that is used to navigate on the menu level. Above

this is the smaller rotary pushbutton control, which can be used to select individual menus and functions. For better visibility at night, both rings are illuminated all the way around. However, the highlight is the top touch pad that allows input of alphanumeric characters for functions such as navigation, which is always coupled with SmartSelect in the coaches. The system is an absolute innovation in the bus segment and is otherwise found only in premium saloons.

MMC Advanced infotainment system

The new MMC Advanced infotainment system is standard in MAN and NEOPLAN coaches and is offered as an option for the MAN Lion's Intercity. The system has been newly designed for bus use and is operated by SmartSelect in combination with a 7-inch monitor. Operation is alternatively possible using the multifunction steering wheel, the proprietary MAN voice control system or a key control panel in intercity buses and coaches without MMC with navigation system. Here too, there is intentionally no touch function. While the vehicle and assistance system functions are called up via the multifunction steering wheel or the left drop arm and shown in the fully digital 12-inch driver's display, a separate 7-inch media display and independent control elements in the form of classic control panels (with or without MAN SmartSelect control unit) are available for displaying the media functions. This distinct separation and the logically grouped arrangement of the functional units combine to create maximum clarity. In this way, distractions while driving and accidental operating errors are significantly reduced. Clarity is also improved by the clear separation into driver mode and passenger mode, which is shown prominently at the top edge of the display at all times. The integrated and personalisable notification centre conveniently displays current relevant basic information such as incoming calls, text messages, radio stations, media playback and traffic information at the bottom of the display. All functions can be operated in driver mode and only the relevant content in passenger mode. The availability of all common current interfaces is a matter of course nowadays: Bluetooth, USB-C, AUX, SD, Wi-Fi for Wireless Apple CarPlay, Mirror Link, wired Android Auto and preparation for subsequent MAN apps and other online applications. The new Point of Interest (POI) tab in the menu is particularly relevant for coach use. Drivers can now find the nearest filling station, nearest service outlet and much more with a single click. Up to two mobile phones can be paired via Bluetooth. The visual content is output on the familiar 15- or 19-inch monitors, optionally also via modern 21-inch HD monitors. Incidentally, consistent with the vehicle concept, different content can be played on the two decks in the NEOPLAN Skyliner.

New multifunction steering wheel

The new multifunction steering wheel with adapted drop arm is seamlessly integrated into the new HMI (human-machine interface) concept. With the new MAN multifunction steering wheel, drivers can fully perform their numerous tasks conveniently and safely. With its ergonomically varying rim diameter, the steering wheel is comfortable to hold and can be operated very easily and safely. The multifunction steering wheel makes it easier for drivers to control all functions – without having to take their hands off the steering wheel. It offers numerous functions arranged in ergonomic and logically grouped function islands: the left function island is used for operation of the driver assistance systems and the right island for menu control. The infotainment system control is located further down, but can be easily reached.

Thanks to the logical and functional grouping, all control buttons can be easily reached within the respective thumb radius. There is no need to change grip to access the individual functions. Hand movement is reduced to a minimum. This means less distraction and more safety. There are four different configurations depending on the vehicle equipment. The new, larger drop arms are also convenient to use and now offer knurled thumbwheels for operation of various functions. The steering wheel is optionally available with a high-quality leather cover with baseball stitching. The multifunction steering wheel is also offered as an option for the city buses and intercity models for the first time.

Newly designed climate control centre

An optimum climate is not just extremely important for well-being but also for the driver’s concentration. The newly designed climate control centre is used in all series. This offers operating comfort similar to that in a passenger car with clearly marked and easy-to-use buttons and rotary controls. The integrated display shows the selected functions in a visually attractive and clear way. Since the settings can be recognised quickly and without any distraction, this improves both driver comfort and safety. In spite of its compact size, the control unit has plenty to offer. Bus-specific functions such as the auxiliary heater or separate control of different zones for the driver’s workplace and the passenger area can be selected and operated intuitively. In the NEOPLAN Skyliner, it goes without saying that the temperatures for the upper and lower decks can be controlled separately.

MAN OptiView digital mirror systems

Digital mirror systems are a perfect match for the new MAN digital cockpit. The innovative MAN OptiView System already made its debut at the IAA in 2018 as the world's first mirror replacements system for coaches. It has been proving itself in everyday use ever since. An ever increasing number of drivers can now rely on this innovative technology. Using two cameras on each side of the vehicle, the digital system projects the side and rear areas of the bus onto two monitors in the vehicle interior in high resolution and in real time. The contrast and brightness of the image are continuously optimised and adapted to the light conditions by means of high-quality software. It is possible to display a larger area than is the case with conventional exterior mirrors. In this way, the driver can see the previous blind spot. MAN OptiView therefore significantly reduces the risk of overlooking other road users.

Extended assistance systems for enhanced safety and convenience

The portfolio of changes for model year 2024 includes a whole host of new and extended assistance and safety systems. The ultra-modern functions are based on the extended technical possibilities of the new electronics platform and new hardware options.

MAN SafeStop Assist

One of the most significant innovations is the intelligent MAN SafeStop Assist, which will be available as an option for the MAN Lion's Intercity, MAN Lion's Coach, NEOPLAN Tourliner and NEOPLAN Skyliner from 2024 July. The active intervention system detects when the driver is no longer able to actively control the bus due to unconsciousness or similar events. In such an emergency, MAN SafeStop Assist can brake the vehicle to a standstill automatically and in a controlled manner within the limits of the system. In this way, it makes a significant contribution to reducing the danger potential of a driverless vehicle and to enabling faster first aid for the driver in the event of a medical emergency.

If MAN SafeStop Assist detects that the driver is inactive with the help of various monitoring systems and through the intelligent evaluation of the merged recorded data, it intervenes in the driving process in a three-stage warning and braking cascade. If the driver does not take control of the steering wheel despite a request, MAN SafeStop Assist initiates an emergency stop and brakes the bus to a standstill within the system limits in his own lane. It automatically activates the hazard warning lights to warn following

road users. Immediately after the vehicle has come to a standstill, MAN SafeStop Assist reliably secures the bus against unwanted rolling away by switching the system to neutral gear mode and automatically engaging the electronic parking brake. In addition, the doors are unlocked and the interior lighting is switched on.

Radar-supported Turn Assist and Lane Change Support LCS

One of the most relevant further developments is the radar-supported turn assist system for the right side of the bus that is hard for the driver to see. This can be combined with the optional Lane Change Support system for both sides. The system consists of a unit with two radar heads behind the right front wheel that together have a coverage angle of almost 180 degrees and therefore cover the whole side of the vehicle. Radar sensors have proven themselves to be more reliable than camera-based systems such as the familiar active-warning turn assist system, particularly in very poor visibility conditions. The new turn assist system therefore offers even more safety and also reduces the strain on the driver more than was previously the case.

The new turn assist system is automatically activated at speeds below 30 km/h. It does not just detect static objects in the side area within a range of up to 4.5 metres, but also calculates possible movement paths in advance. The system can therefore perform a predictive assessment of the situation and issue a visual and acoustic warning if necessary. In this way, the driver has the opportunity to intervene in good time and prevent accidents. The warning is issued by means of a three-stage warning cascade – first in visual form and then also acoustically in particularly critical situations. The visual warning warns the driver by means of a yellow LED strip installed on the A-pillar on the side facing away from the driver. This positioning means that it intentionally directs the driver’s attention towards the problem area. There is no active intervention in the brake system. The vertically mounted LED strip is installed practically flush in the A-pillar and comprises three LED modules, which light up differently depending on urgency. The output brightness adjusts automatically to the ambient light thanks to an integrated light sensor, thus preventing dazzling at night.

The new radar sensors also permit monitoring of the right side of the vehicle at speeds above 50 km/h. In combination with the optional Lane Change Support system, the left vehicle side is also included in the monitoring function. The range of the monitored area is around eight metres to the front and 80 metres to the rear and also around 4.5 metres to the sides. A radius of

around 180° is covered in each case. This enables almost complete detection of the adjacent road areas. The sensors are not only able to detect objects in the monitored area – for example, vehicles that are driving parallel or approaching – but can also detect their distance and relative speed and derive a possible collision risk from this. If the system detects a hazardous situation in the monitored area when a lane change is initiated, it warns the driver in good time. The latter can then react accordingly and actively prevent a possible collision. The system is particularly helpful when overtaking and moving back into lane on the motorway.

The system warning is also issued by means of a three-stage warning cascade. The visual warning message is generated via LED strips in the A-pillars, thereby deliberately directing the driver's attention towards the problem zone.

Collision warning system and Emergency Brake Assist EBA+ with pedestrian detection

New hardware makes it possible to implement the collision warning system and EBA+ with pedestrian detection, systems that are closely linked to each other. The wide range of visual and acoustic stimuli in urban traffic often makes it difficult for drivers to keep a reliable overview of the entire traffic situation at all times. More vulnerable road users in particular, such as pedestrians or cyclists, are easily overlooked – particularly if they are in the difficult-to-see area directly in front of the bus when pulling away, for example, at bus stops or traffic lights.

The MAN collision warning system with pedestrian detection provides a solution. When the vehicle is stationary and at low speeds of up to 10 km/h, the collision warning system detects the area in front of the front end and can therefore recognise possible obstacles and risks (such as pedestrians or cyclists). In this case, the driver is immediately warned visually and, depending on the urgency, also acoustically. It is therefore possible for them to react in good time, before a potential collision. However, the system does not automatically intervene in the driving. To ensure maximum reliability, the collision warning system combines various functional components that complement each other and work closely together by means of sensor fusion:

- A radar sensor especially developed for the near range (short-range radar) in the front of the vehicle, which is also used in other assistance system such as Emergency Brake Assist EBA (detection angle 150°)

- A longer range radar sensor (long-range radar) in the front of the vehicle (detection angle 100°)
- A new multifunction camera with increased resolution behind the windscreen (detection angle 125°)

The advanced Emergency Brake Assist EBA+ essentially uses the same hardware as the collision warning system. The function of the system, which can be activated from speeds of 10 km/h, is largely identical with the predecessor system, but more close-range data is collected and vulnerable road users are also reliably detected up to 50 km/h. This means the legal requirements for the system are even exceeded. As before, drivers are able to interrupt full braking by the system.

With model year 2024, the enhanced Emergency Brake Assist EBA+ with pedestrian detection is available as an option for all model series. Due to the mandatory requirement of the European legislator from 2024, the Lion's Coach, Tourliner and Skyliner coach models are equipped with the classic EBA system as standard.

Lane Keeping and Lane Return Assist

MAN and NEOPLAN buses and coaches have been available with the electronically assisted MAN ComfortSteering since 2022. This system makes steering much more relaxed and comfortable because it supplements the hydraulic steering system with the additional steering torque of an electric motor. MAN Lane Return Assist (LRA) has also been available since 2022. This system helps the driver to stay in lane at speeds above 60 km/h by actively steering the vehicle back into its driving lane if it should unintentionally stray across the lane marking. (This is a very important assistance system because a vehicle leaving the road is one of the most common reasons for serious bus accidents).

Adaptive Cruise Control (ACC) and Traffic Jam Assist

Adaptive Cruise Control (ACC) is one of the oldest and most well-known electronic assistance systems that most drivers now could not do without. The new long-range radar monitors the road in front of the bus and maintains a distance to the vehicle in front that can be set in four stages on the multifunction steering wheel by corresponding torque reduction or adaptive braking. As a recent new development, the system can now brake to a standstill with its additional Stop & Go function and then move off automatically without any driver intervention within a short period of two seconds. Together with

the electrical MAN Comfort Steering system, these two systems have been combined to produce a veritable Traffic Jam Assist system that not only takes over responsibility for maintaining the distance to the vehicle in front in stressful queue situations, but also performs the necessary steering corrections. Up to speeds of 60 km/h, drivers can therefore enjoy their first taste of automated driving and relax while this system does the work.

AttentionGuard

From this year, the AttentionGuard has become mandatory for all buses and coaches (new for city and intercity buses). This system has already been optionally installed in MAN and NEOPLAN coaches since 2015. From speeds of 60 km/h, the MAN AttentionGuard utilises, connects and analyses various relevant system data that is recorded during driving. It is activated automatically each time the engine is started. It takes into account both the time of day and driving time as well as the specific steering behaviour of the driver, but without making any video recordings. Using the front camera in particular, the system also continuously evaluates directional stability and steering interventions and draws conclusions about the driver's fitness to drive based on enhanced algorithms.

In addition to these key safety and assistance systems that greatly increase driving safety and comfort for drivers, the new General Safety Regulation (GSR) also requires further helpful systems that in some cases have already been offered by MAN in the required or similar form.

Alcolock preparation and Alcolock start interlock system Advanced

The statutory alcohol interlock system for engine starting known above all from Scandinavia will now be mandatory at least as a technical preparation in vehicles throughout Europe. All buses and coaches will be equipped as standard with an Alcolock preparation that includes wiring and a fixed installation location. Alcolock test devices can therefore be easily and professionally integrated in the vehicle at any time and with little effort by MAN service outlets. The test device is connected to the vehicle via a LIN bus or LIN gateway. Depending on country specifications, a bypassable version (for emergencies) and a non-bypassable version are available. If customers already decide to install the system when ordering their vehicle, they can also purchase the complete system at the same time with the Alcolock Advanced start interlock system. In coaches, this system is always installed on the B-

pillar next to the driver; in all other buses, it is installed optionally on the A- or B-pillar.

Automatic headlights and high beam assist

The automatic driving lights and high beam assist systems previously known only from the passenger car segment in some cases will now both be installed as standard in all buses and coaches. The headlights make a significant contribution to safety not just at night, but also in unfavourable weather conditions, on darker stretches of road, and in busy urban traffic at all times of day. The automatic driving lights system knows exactly when and how much light is required, thus ensuring even greater visibility and safety from model year 2024. A new system for buses and coaches is the high beam assist function, which analyses oncoming vehicles by means of the new front camera. Due to the high system quality for differentiation of road users, it is also possible to reliably detect cyclists with only a small light source. The system is activated by means of the left drop arm.

Traffic sign recognition

A further function of the front camera is integration into the traffic sign recognition system. MAN has focused on maximum reliability and technical redundancy for the traffic sign information. The solution is therefore based on the camera in combination with additional fusion algorithms of other sources. Traffic signs along the route are detected by the camera on the windscreen, classified and then output via the digital 12-inch driver's display. For even more reliable recognition of traffic signs, the system combines the visually recorded data with stored map information. This is always up to date thanks to regular updates. In this way, the driver always has the most reliable information possible about the currently applicable speed limit or other relevant traffic signs. Maximum functionality is achieved in combination with MMC Advanced with navigation system, which is able to identify commercial vehicle-specific traffic signs.

Tyre pressure monitoring system (TPMS)

Many bus and coach drivers and owners will be familiar with the tyre pressure monitoring system (TPMS), which has already been offered as an option for a long time. New here are not just the meeting of the legal requirement but also the display of the tyre temperature. This is output on

the 12-inch display in addition to the measured air pressure for each individual wheel – either when called up manually or if threshold values are exceeded. As a result, a tyre that has heated up and that could catch fire is detected early on. Also new are sensors fitted in the rim base. These no longer have to be positioned exactly and therefore do not have any maintenance requirement – something that will please the company workshop. They can calibrate themselves automatically and do not have to be taught manually.

Belt warning system and rear-view camera

Also well-known from the passenger car segment is the belt warning system with seat occupancy detection for the driver's seat with an immediate visual warning function. If the seat belt is not fastened, an additional acoustic warning is issued if the ignition is switched on and the vehicle is driven at a speed of more than 15 km/h for two minutes. A rear-view camera that automatically displays its image on the installed monitor when reverse gear is engaged was frequently installed in the past, but is now also part of the comprehensive legally required standard safety equipment.

New brake and air suspension systems with increased functionality

A further new development has been introduced for model year 2024 and together with the new electronics platform is the new Vehicle Air Suspension Control (VACS) air suspension system, which has replaced the previous ECAS. All aspects of the newly developed air suspension system are designed for maximum quality and functionality. This also results in improved control performance, even higher precision and an extended range of functions. Compared with the previous ECAS system, the VASC air suspension system has fewer components and allows easier wiring. The reason for this lies mainly in the optimised individual parts and their intelligent combination.

A solenoid valve block with integrated pressure sensor, the so-called Smart Pneumatic Actuator (SPA) module, has replaced the previously used separate solenoid valves and pressure sensors. The SPA module communicates via high-performance CAN directly with the control software installed on its own control unit. An external control unit is therefore no longer required, a fact that improves both the signal processing speed and also the response behaviour of the actuators. In concrete terms, this means shorter lifting and lowering times – also when lowering the step unit on city buses (kneeling function).

The VASC system not only enables faster kneeling, but also offers a wider range of functions than before. The lowering processes on the right and left sides and at the front as well as lowering of the entire vehicle are now more precise, more comfortable and also infinitely variable thanks to the optimised control. Two different kneeling functions can be implemented in parallel in one vehicle. An additional new function for compensation of tyre rebound when driving without a load automatically compensates for the lower weight and thus ensures maximum protection for the tyres and chassis. For vehicles with three axles, optimised traction support with axle-specific level control is another optimised feature.

The system can be optionally supplemented by an aerodynamic ride-height lowering function specifically for coaches of the MAN and NEOPLAN brands, which can be activated conveniently via the assistance system menu. When the aerodynamic drive position is activated, the driving height is reduced by 20 millimetres at speeds above 70 km/h and thus supports an energy-saving driving style. If the speed drops below 60 km/h, the normal driving height is automatically restored.

New electronic brake system and electronic parking brake

Introduction of the new electronic brake system EBS9 is also part of the new electronics platform. The system is directly connected to the new Central Vehicle Manager (CVM). Alongside the new EBS9 control unit, new two-channel pressure control valves (PCM) are used instead of the previous single-channel components. Control precision and responsiveness were able to be significantly improved with the new pedal unit using suspended pedals.

The highlight of the new brake system is the electronic parking brake, which is optionally used in the intercity buses and coaches. Instead of the previous manual pneumatic spring-loaded brake, an electronic brake-by-wire system is used here. This has a higher safety level and a redundant design so that it also functions if there is loss of air or if the supply voltage is not available. The associated electronic brake lever is optimally installed in the instrument panel in the driver's direct field of vision and activation is indicated by a bright LED diode. Like in modern passenger cars, the electronic brake is automatically deactivated upon moving off. This basic functionality corresponds to that of a halt brake and represents a significant increase in convenience for the driver. In addition to this, automatic engagement of the electronic parking brake when the driver switches off the ignition represents a significant improvement in safety. Up to now, accident statistics have still included many events with buses or coaches rolling away due to the fact that the spring-

loaded brake was accidentally not applied. With the new optional electronic parking brake, such incidents should now become a thing of the past.

Update for coach engines and MAN EfficientCruise

The highest development priority for all modern combustion engines from MAN has always been achieving maximum efficiency. Thanks to proven engineering skill from Munich and Nuremberg, each new development stage has resulted in a further reduction in fuel consumption in combination with a simultaneous increase in power. The latest example of this industrial feat is the new MAN D26 coach engine in Euro 6e emission quality for model year 2024. In spite of an additional 10 hp output and around 50 Nm more peak torque, the highly-developed 12.4-litre unit now consumes up to 2.5 per cent less fuel.

The further development of the new D26 engine is essentially based on a large number of internal engine measures that lead to an increase in engine efficiency. These include modified turbochargers (low- and high-pressure stages), a coolant pump with demand-based control, novel combustion recesses in the pistons and many other enhanced individual details. This results in fuel savings and at the same time higher performance. The performance specifications are as follows:

- **Entry-level engine:** 323 kW / 440 hp at 1,800 rpm and 2,250 Nm at 930–1,350 rpm; no B100 operation, suitable for HVO;
  MAN TipMatic or Ecolife Coach2, standard for two-axle vehicles

- **Medium-level engine:** 345 kW / 470 hp at 1,800 rpm and 2,450 Nm at 930–1,350 rpm; optional B100 operation, suitable for HVO;
  MAN TipMatic or Ecolife Coach2; standard for three-axle vehicles, optional for two-axle vehicles

- **Top engine**: 382 kW / 520 hp at 1,800 rpm and 2,650 Nm at 930–1,350 rpm; optional B100 operation, suitable for HVO;
  MAN TipMatic; standard for NEOPLAN Skyliner, optional for three-axle vehicles

Operation with environmentally friendly fuels is an important prerequisite for future viability. For this reason, all D26 engines have been capable of operation with HVO (hydrotreated vegetable oils) and the two most powerful variants also with FAME fuel B100 (in accordance with EN 14214) since the

introduction of Euro 6e. The use of HVO in particular will probably be of increasing interest for private bus companies, as the use of 100 percent pure HVO is now also permitted in Germany, as is already the case in the surrounding EU countries. Coaches equipped with the new engines also naturally comply with the noise regulations in accordance with UNECE R51.03 that have been in force since 2022: in stage 2 for engines with a power rating of above 250 kW, the maximum emissions outside the vehicle are 78 dB(A).

The new D26 power plants for MAN coaches can still be equipped with the latest version of the automated MAN TipMatic 12-speed gearbox. Alternatively, the two versions with the lower power outputs can also be paired with the innovative Ecolife Coach2 six-speed torque converter gearbox. The latter gearbox is characterised by dynamic power transmission without gearshift interruptions.

A further new development for model year 2024 has been made available exclusively with the automated MAN TipMatic 12-speed gearbox: the enhanced topographical EfficientCruise 3 gearshift program. This is optionally available for all coaches of the MAN and NEOPLAN brands. With the third generation of this intelligent, GPS-based gearshift program, fuel consumption is reduced once more by up to one per cent compared with the previous system. The update to the fuel-saving MAN EfficientCruise assistance system takes the topography of the route into account in an even more predictive manner, and now also includes infrastructure parameters such as accidents, exits or roundabouts in the highly-developed algorithm up to three kilometres ahead. Based on this information, the system automatically determines the most efficient driving style in relation to speed, traffic situation and gearshift strategy.

The basic principle of the system has remained largely unchanged: from a speed of 30 km/h, MAN EfficientCruise continuously records the course of the road with the help of three-dimensional GPS road map data, which now includes more roads than before. This takes place both when driving without assistants and in cruise control mode. Taking into account the selected navigation route, the system reliably detects uphill and downhill gradients as well as the traffic infrastructure up to three kilometres in advance – this means considerably improved efficiency. On the basis of this information, the system calculates the most efficient combination of speed, gear and usable engine torque to achieve a driving style with maximum consumption efficiency that is optimally matched to the real traffic situation. The standard repertoire of the system still includes EfficientRoll as well as dynamic coasting between acceleration and pure rolling phases.

The extent to which the system is allowed to intervene in the topographically optimised vehicle speed and engine torque is naturally still in the hands of the driver, who selects the desired speed and conveniently sets one of the four possible tolerance levels (ECO Level I – IV) on the multifunction steering wheel. The higher the selected level, the more the speed adjusted by the system may deviate from the set value. The higher the ECO level, the greater the energy saving potential. The speed range in which control takes place is clearly shown by a green bar on the 12-inch display.

An especially new feature in the third generation of MAN EfficientCruise is the fact that the system also contributes to efficiency within narrow limits during unassisted driving. The digital driver display provides the driver with system-based recommendations for efficient driving (e.g. “Take foot off accelerator”). If the driver reacts according to the information, optimum energy savings can be achieved. If the driver does not follow the instructions, MAN EfficientCruise automatically carries out hardly noticeable adjustments to a lesser extent in order to partially reduce the missed savings.