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TECHNIK SERVICE NEWS

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Dear Readers,

We can look back on a successful and eventful 2018.

Together with the Valeo Group, we presented ourselves for the first time with our HVAC products for buses in Hall 16 at IAA Commercial Vehicles. With new innovations such as our electric rooftop air conditioning unit REVO-E Pro and the SPump PWM/CAN circulation pump, we have also continued to progress in the field of e-mobility. But electromobility is driving us not only on the product side: it is also placing increasing demands on our service network. Our service team must deal increasingly with e-buses from China that are equipped with air conditioning products from Valeo. One of our main goals again in 2019 will be to prepare a seamless change in service from diesel to electrobuses.

Besides the developments in e-mobility, 2018 marked the start-off for the topic of predictive maintenance. Early detection of defects in our systems is becoming increasingly important in order to minimise the downtimes of vehicles.

The coming year promises to be as multi-faceted as the existing year has closed. We are already in the midst of trade fair preparations for 2019. In February, Valeo Thermal Commercial Vehicles (TCV) is scheduled to make a presence at the VDV Conference for Electrobus in Berlin. Furthermore, in March we will be exhibiting our latest products and innovations at BUS-2BUS in Berlin, and this will be followed by UITP in Stockholm in June. Busworld, to be held for the first time next year in Brussels, promises to be the highlight of the trade fair year. It goes without saying that we will not relax our efforts on the product side in 2019. Here we are continuously broadening our product portfolio for electric air conditioning systems and expanding our control concepts for total thermal management in the bus of the future. The Valeo Team is already looking forward to your positive input next year and hopes you enjoy reading the current issue of Technik Service News!

Frank Färber

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For most efficient use of the limited electric energy of the traction batteries we need innovative and efficient heating systems for buses.

INNOVATIVE HEATING CONCEPTS FOR ELECTROBUSES

The Roadmap 2050 of the European Union has set some ambitious goals. By the year 2050 the CO₂ emissions of all perpetrators are to be cut by 80% compared to the base year 1990. To achieve this, CO₂ emissions in the road transport sector alone must be cut by an ambitious 95%. These requirements will inevitably lead to electrification of the power train. For local public transport, predominantly in the form of bus operations, this is an enormous challenge.

In electrically powered buses the 'range' is directly dependent on the capacity of the electrochemical energy storage, traction batteries. When power is drawn, the chemically bound energy they contain is directly converted to electric energy. At present, lithium-ion batteries with current energy densities of 0.2 kWh/kg are deemed to be the basis for future electrification. In contrast, diesel fuel has an energy content of 11.8 kWh/kg. This comparison underlines the central challenge facing HVAC applications (heating, ventilation, air conditioning), because – depending on the geographic region and operating conditions – the energy requirement for heating may be greater than for propelling the vehicle itself.

The required electric energy must be provided by the traction battery, thereby reducing the range of the vehicle. In order to deploy the limited electric energy of the traction batteries as efficiently as possible, there is a clear need for innovative and efficient heating systems for

buses. The required heating power can basically be supplied in two different operating conditions: preheating at the start of operations and heating to maintain the set interior temperature. Fig. 1 shows the heating power requirement at different outside temperatures in

order to maintain the preset interior temperature.

The necessary power requirement for preheating at the start of operations is disproportionately higher than in heating mode during the journey. Against this background, particular importance must be attached to the targeted vehicle preconditioning from a so-called 'off-board' energy supply, as in this way the energy resources in the vehicle battery can be saved to a large extent. Along the line, however, the aim must be to use the electrical energy resources carried in the bus in the best way possible. The necessary heating power can, for example, be fed in by electric heaters. The COP (coefficient of performance) in this case is at

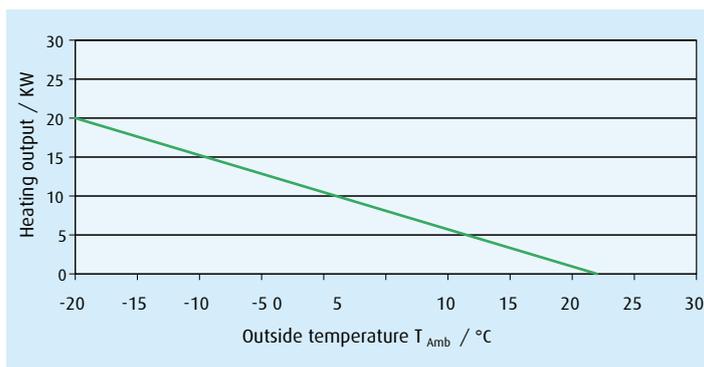


Fig. 1: Bus heating power requirement as a factor of ambient temperature.



The power requirement for preheating at the start of operations is much higher than for heating operation while on the road. In view of this, special importance must be attached to preconditioning the vehicle.

best 1 and defines the relationship between the useful heat output and the electrical energy input.

However, feeding the required heat output via a heat pump system is a more efficient and thus more effective energy-saving method. This is a highly interesting approach, as air conditioning systems and heat pump basically consist of identical components and today almost all vehicles have an air conditioning system. Heat pump functionality can be realised simply by reverse circulation. The characteristic feature of heat pumps is that the thermal energy stored in the environment is absorbed by a change in the state of aggregation of the coolant (evaporation). With the aid of the compressor capacity, this thermal energy is boosted (pumped) to a higher and thus useable temperature level for heating purposes. In order to save actual electric energy, however, with the aid of heat pump operation, further inherent characteristics must be taken into account.

At lower outside temperatures below approx. 5 °C the water vapour in the air condenses and freezes on the lamellas. Ice forms on the external heat exchanger (condenser in heat pump operation). Among other things, the ice coating inhibits heat transfer, and there is a dramatic drop in efficiency. A defrosting device is necessary in order to operate the system in heat pump mode. Due to a newly developed and fully automatic defrosting device, the Valeo's latest generations of systems can guarantee continu-

ous and highly efficient use. The ice-bound external heat exchanger can be heated up as needed and thus de-iced within a short time. The thermodynamic properties of the coolant used and compressor operating limits also play a key role here. Coolants should have suitable pressure and temperature ranges, together with a large volumetric cooling capacity. For use in bus heat pump systems this means that the boiling temperature of the coolant at atmospheric pressure should be below -30 °C. This lower limit

(system pressure > 1013.25 mbar) ensures that in heat pump operation at -20 °C outside temperature no air is suctioned into the system by leakage.

Fig. 2 shows the experimentally measured application limits of Valeo heat pump systems with coolant R744, R449A and R134a. Only with coolant R744 (CO₂) can the systems be operated as a heat pump at outside temperatures of -20 °C. In future, the development of innovative heating concepts for electrobuses will continue to represent an extremely exciting field of activity in the Valeo research and development departments. Currently, we are pursuing innovative approaches to holistic system optimisation: from the use of new coolants in heat pump systems and innovative control strategies to the use of radiant heat by means of infrared heaters.

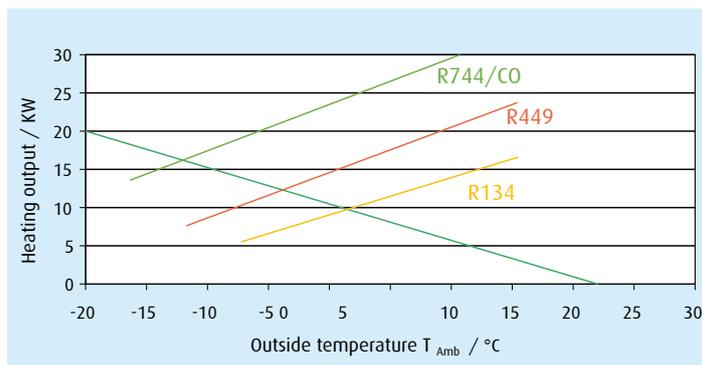


Fig. 2: Heating output in heat pump operation, independently of coolant used and outside temperature.

10TH ANNIVERSARY OF CITYSPHERE

Initially conceived and developed as modular a/c unit for refitting non-air conditioned city buses, today the Citysphere is an inherent part of series production with almost all major vehicle manufacturers. With an eye to the environment and operating costs in their choice of air conditioning for city buses, more and more transport undertakings are opting for the modular a/c unit with its patented air circulation system. With over 16,000 units produced, this year the Citysphere is celebrating its 10-year anniversary.

What began in 2008 with the first order for Autobus Oberbayern GmbH has developed into a rooftop air conditioning unit that has revolutionised the city bus market in the moderate climate zones of Western Europe. Alone in the DACH Region, to date approx. 13,000 buses carry a Citysphere on their roof.

Small unit – big impact

Other requirements apply for comfort in the city bus than in the touring coach. Not only the additional fuel costs should be kept as low as possible, but also the service and maintenance costs. In this respect the Citysphere with its low life-cycle costs is simply unparalleled. It cools the interior not as usual by a radical reduction in temperature, but through a combination of cooling and air circulation. A radial fan generously distributes the cooled air directly into the passenger compartment and ensures pleasant temperatures without annoying draughts. This so-called wind-chill effect is completely adequate as air conditioning in moderate climate zones and is a far more effective way of creating a comfortable interior climate in the city bus.

Additional consumption of fuel in comparison to non-air conditioned buses is hardly noticeable. Due to the hermetic sealing concept the Citysphere is additionally virtually maintenance-free and has ensured to date unrivalled low life-cycle costs.

From a retrofit solution to series production

In its initial phase, the modular a/c unit was offered to transport undertakings that had previously foregone air conditioning for cost reasons, as an option for retrofitting their buses. Gradually, however, vehicle manufacturers also became alert, for efficiency and LCC costs are no longer topics that concern only the cost-conscious transport operator. Today, the Citysphere is being installed in series at MAN, Evobus, Iveco, Scania, Volvo, Solaris and many smaller manufacturers. On account of its small coolant requirements (only a fraction of full air conditioning) it is also an attractive solution in view of the escalating cost of coolant R134a. In order to ensure that the Citysphere remains an eco-friendly and reliable city bus solution in future, Valeo is

currently working on a solution with alternative coolants such as CO2 and 1234yf.

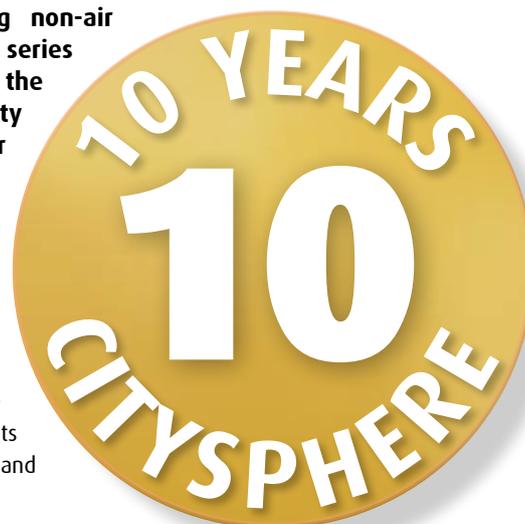
Unique on the market

To date there are no comparable products on the market, even though other manufacturers attempt to copy the Citysphere. However, the latter are no match in terms of performance and technical standard. The critical differences lie in the PWM controlled, semi-hermetic scroll compressor with integral motor and infinitely variable power control, and the system's air manifold with integral radial fan. Other products currently on the market have only a (separate) motor that is adjustable in steps and a compressor. With the aid of integral radial fans in the air manifold, the Citysphere distributes the cooled air throughout the bus, whereby benchmark products introduce air into the vehicle only at certain points. Where the Citysphere guarantees a combination of cooling and patented direct air

intake along an optimum comfort curve, other products on the market are less flexible and can often be controlled only in three fixed stages. These characteristics are supplemented by further standalone features: the Citysphere's fans are PWM-controlled; they consist of a fresh air portion of 15%, and the system is virtually maintenance-free. Furthermore, it fulfils the requirements of VDV Directive 236/1.

Nevertheless, the Citysphere will not be resting on its laurels. In the next few years a second generation of modular a/c units is planned. The latter will be oriented to the future requirements and technologies of the city bus market.

Here's to 10 more successful years for Citysphere!



Major order in Utrecht/Netherlands: 138 Mercedes-Benz Citaros, each with three Citysphere units for the Solo and five for the articulated bus (in total 558 Citysphere units).



Major order for Rheinbahn AG: 74 Solaris New Urbino articulated buses, each with three Citysphere units.

CHRISTIAN SCHILDER PROMOTED TO HEAD OF AFTER-SALES

With effect from 01.10.2018 Christian Schilder, 47 years old, assumed the role of Head of After-Sales. He is thus responsible for the service and spare parts management sector, as well as the supervision of public passenger transport, chassis manufacturers and service partners.



Christian Schilder

In his capacity as new Head of After-Sales, he is responsible for the pan-European expansion of the dealer organisation structure with a focus on service and spare parts management. In particular, the cooperation with selected, qualified and certified service partners will play a key role. With the advancing developments in electromobility, his tasks will include in ongoing support and consultation for HVAC systems in buses with alternative drives.

Prior to his employment at Valeo, Schilder was able to gain a high

level of expertise in After-Sales as plant manager Service & Sales at Scania Deutschland GmbH and previous to that as Service Manager at MAN Truck & Bus Germany Division. He completed his law studies with an MBA in General Management Competences at the universities of Linz and Krems (Austria). In addition, he also passed the Master Examination in Motor Vehicle Mechanics.

KLAUS FLÖRSHEIMER APPOINTED TRAINING MANAGER

Valeo Thermal Commercial Vehicles has recruited Klaus Flörsheimer in the role of training manager. As of the beginning of next year he will assume responsibility for the expansion of the pan-European training programme.



Klaus Flörsheimer

Klaus Flörsheimer has been employed by the company since 2001 and in the past few years he has been responsible as applications engineer for the customers Iveco Bus and the train manufacturer Alstom. In addition, he has worked as project manager on an air conditioning system for Alstom's iLint train. In his new position he will be responsible for the training programme for vehicle manufacturers, public transport undertakings, service partners and workshops. He will also be carrying out in-house training on products and related technologies at the Gilching location. Further tasks and goals lie in

special training programmes offered worldwide for trainers (Train the Trainer) at partners, manufacturers and Valeo locations. Besides this, with technical innovations greater use is to be made of online media for fast data retrieval.

Prior to his employment at Valeo/Spheros he spent several years in technical field service for Webasto Bus GmbH (subsequently Spheros GmbH). He completed his studies in mechanical engineering at the Vocational College in Mannheim.



The Thermal Systems Division for the Bus presented itself for the first time in Hall 16 at IAA together with the Valeo Group.

LOOKING BACK ON A SUCCESSFUL IAA

Over 250,000 visitors came to this year's IAA in Hanover, to gain an overview of industry innovations. And the proportion of industry specialists exceeded 80%! The focus of the leading trade fair for Transport, Logistics and Mobility was on areas of future interest: electromobility, digitisation and urban logistics. The central message of this IAA was: Electromobility is coming to our streets; the models are going into series production! This applies in particular to e-transporters, and increasingly to city buses.



With the new REVO-E Pro Valeo celebrated a world premiere.

Valeo is also looking back on a successful trade fair experience: the Thermal Systems Division presented itself for the first time in Hall 16 together with the Valeo Group. Here again, the predominant topic was electromobility. The air conditioning specialist celebrated a world premiere at the leading trade fair for commercial vehicles with the new REVO-E Pro. The new rooftop air conditioning unit for electrobuses is responsible for cooling and heating the electrobus. With its heat pump technology it manages to efficiently heat the electrobus even at outside temperatures of up to -15 °C and thus possesses a unique selling point on the market. In addition, the Product Group TCV (Thermal Commercial Vehicles) showcased efficient HVAC compo-

nents such as the emission-reduced Thermo plus heater that is ideally suited to use in the electrobus on account of its unrivalled low emission values, and its SPump pump generation with the new PWM and CAN versions.

We thank all customers, service partners and other interested parties for their numerous visits to our trade fair stand and the constructive discussions that took place.



Retrofitted bus with electric drive at eMove360° Exhibition in Munich.

First e-trofit bus with Valeo HVAC system at eMove360° Exhibition

REFITTING INSTEAD OF RE-BUYING: A NEW LEASE OF LIFE FOR DIESEL BUSES

At the world's biggest trade fair for electromobility and networked and autonomous driving "eMove360°" in Munich from 16-18 October 2018, in-tech GmbH presented itself with its first e-trofit prototype bus.

The engineering company specialising in electronics and software has set itself the goal of converting existing diesel buses to electric drive – classic retrofitting that is modularly and individually adapted to the different customer requirements. Compared to the new purchase of an e-bus, a conversion is up to 50% less costly and gives the diesel bus, so-to-speak, a new lease of life. In addition, this approach saves the consumption of valuable resources and the solution is therefore extremely sustainable. Besides the total electrification of the drive, the refitting is focused on the complete replacement of the vehicle's HVAC system. In this project, Valeo is responsible for the total heating and air conditioning works, and supplies all the necessary devices and components.

Holistic approach to air conditioning

One of the key components is the newly developed REVO-E Pro with heat pump technology for electro-buses. The all-electric rooftop unit is capable of simultaneous air conditioning and heating.

Due to its optimised heat pump with virtual icing sensors and a fully automatic hot gas defrosting, the unit can be operated at outside temperatures of up to -5 °C (coolant R134a) and up to -15 °C (coolant R449A).

At low outside temperatures the Thermo H is ideal as an auxiliary heating concept to supplement the heat pump. The hybrid heater combines the advantages of both energy forms (electricity and die-

sel) in one device. Emission-free preheating is thus possible before going on the road, and at low outside temperatures additional fossil-fuel heating is possible in order to avoid an unnecessary load on the traction battery storage.

The newly developed SPump 500 W CAN version ensures coolant flow. With a flow rate of over 10,000 l/h and high counterpressure stability (0.5 bar counterpressure) the pump delivers the required high power needed for e-bus applications. The CAN interface permits demand-oriented speed control, which enables optimum tuning to the overall vehicle systems, conserving energy and increasing the range.

Furthermore, the delivery contents include a frontbox for air condition-

ing of the driver's section, sidewall heaters for heating the floor zone, as well as all small parts such as valves and sensors.

The different system components can be interconnected and controlled in combination with intelligent software via the central control unit HMI SC1000. Depending on outside conditions (mainly temperature), the battery charging status and the geographical position the control system always selects the component with maximum efficiency. Through this holistic approach to ecological and economical air conditioning of electrobuses at the highest level, the limited energy resources of the traction battery are put to best-possible use and the range of the vehicle is maximised.

ELECTROBUSES: VALEO, SWM AND MVG AGREE TO INNOVATION PARTNERSHIP

Stadtwerke München (SWM) and Münchner Verkehrsgesellschaft (MVG) have become key drivers in the development of electrobuses: to this end SWM and MVG have entered into an innovation partnership with Valeo. The purpose of the joint venture is to realise more efficient air conditioning and heating in electrobuses by the use of a heat pump.

Besides the joint venture with Valeo, further innovation partnerships already exist between MVG and the vehicle manufacturers MAN and EBUSCO B.V. The basic purpose of the cooperations is to test new products or develop partial components under real operating conditions at MVG.

Latest generation of heat pump

At the focus of the partnership with Valeo is the conversion of an e-bus already in operation at MVG. This vehicle – fitted with the latest Valeo heat pump generation – is the first to be put into public service at MVG in Munich. The system should heat the passenger compartment even in winter at temperatures below 0° and as a fall-back solution it should make the existing diesel auxiliary heating virtually redundant. The heat pump that was hitherto installed functions only at temperatures significantly above 0° C. For system optimisation, the vehicle was fitted out with extensive measuring instruments that record



The Valeo heat pump heater installed in this MVG service bus heats the passenger compartment even at temperatures below zero.

all operational conditions and environmental parameters in long-term operation along the line. The analysis of the readings supplies critical findings for Valeo, in its endeavours to make the heat pump technology even more efficient in the long term. In addition to battery efficiency, air conditioning in

electrobuses constitutes one of the primary challenges in the development of series-production-ready e-vehicles. MVG Bus Manager Ralf Willrett says: "The range and thus deployment of our electrobuses should not be dependent on the weather. That is why we need heating and air conditioning sys-

tems that – as far as possible – do not draw their energy from the vehicle batteries. Diesel auxiliary heating can also only be an interim solution until heat pumps are so efficient that they can operate at full capacity in almost any weather. We want the operation of our e-buses to be climate-neutral."

TRADE FAIRS AND EXHIBITIONS 2019

WE ARE LOOKING FORWARD TO MEETING YOU

	Date	Trade Fair	Location
February	05 – 06.02.2019	10th VDV Conference on Electrobus	Berlin, Germany
March	19 – 21.03.2019	BUS2BUS	Berlin, Germany
	21 – 23.03.2019	Transport 2019	Herning, Denmark
April	01 – 02.03.2019	Hausmesse TS Fahrzeugtechnik	Weida, Germany
	08 – 14.04.2019	bauma München	Munich, Germany
May	07 – 10.05.2019	FIAA Madrid	Madrid, Spain
June	09 – 12.06.2019	UITP Global Public Summit	Stockholm, Sweden
	April & June	Solarisposium	Poland
October	02 – 03.10.2019	Coach and Bus UK	NEC Birmingham, UK
	18 – 23.10.2019	Busworld Europe	Brussels, Belgium
November	21 – 23.11.2019	Czechbus	Prague, Czech Republic

Use of alternative fuels in Valeo bus heaters

FOR THE SAKE OF THE ENVIRONMENT

Valeo now offers its fuel-burning Thermo heaters for use with alternative fuels such as HVO (hydrogenated vegetable oils) and GTL (gas-to-liquids) an. With up to 50% less soot particles and CO2 emissions the heaters are even more climate-friendly.

Due to their nature (HVO consists of vegetable oils / GTL is a synthetic diesel fuel that is produced from biogas, among other things) alternative fuels reduce greenhouse emissions, are simple in application, odourless and guarantee clean and efficient burning of the fuel. Particularly the CO2 avoidance potential of HVO and GTL in contrast to conventional fossil fuels must be noted.

Furthermore, alternative fuels are 100% renewable and sustainable.

Clean combustion in the heater

The use of alternative fuels in bus heaters results in a brighter flame in the burner that is more difficult for the flame detector to recognise and may adversely impact the



Valeo's fuel burning Thermo heaters are suitable for the use of alternative fuels such as HVO and GTL.

combustion behaviour. With the use of an additional component and optimised software, Valeo can

guarantee perfect functioning of both flame recognition and combustion stability.

in compliance with the requested retrofit of fuel hoses and filters, the heaters Thermo, Thermo E, Thermo S and Thermo plus are now designed according to DIN EN 15940 for use with alternative fuels such as HVO and GTL. already installed heaters can also be retrofitted at any time, thus reducing emissions.

The extension to include alternative fuels makes Valeo Thermo heaters attractive not only for diesel buses, but also for use in electrobuses. For due to the limited energy resources the latter is still reliant on an additional, fuel-operated heater at lower outside temperatures.

50 VOLVO HYBRID BUSES WITH VALEO'S REVO-E A/C SYSTEM FOR SINGAPORE

The Land Transport Authority (LTA) in Singapore has signed a contract with Volvo Buses for the delivery of 50 Volvo 7900 hybrid chassis. Egyptian body builder MCV is constructing the bodywork. The buses are being air conditioned by Valeo's REVO-E all-electric rooftop air conditioning unit.



Volvo 7900 Hybrid Chassis with the bodywork from MCV.

In order to ensure a pleasant interior bus climate despite tropical climatic conditions, major alterations must be made to the bus and its air conditioning system. On account of the pioneering role of Singapore in south-east Asian local public transport, the order is also pathbreaking for other megacities in this region.

With a cooling capacity of 25 kW (European version) the REVO-E excels in particular with its intelligent energy management. The generation of cooling capacity is demand-

oriented depending on the available energy, in order to avoid unnecessary stress on the traction batteries in the electric or hybrid bus. To ensure that the bus interior is pleasantly cool, even in the hot and humid climate of south-eastern Asia, the system's cooling capacity had to be increased to 30 kW and the regulating parameters adjusted in order to reach the target temperature. Furthermore, important modifications were made on the buses: tinted double-glazing of the windows and additional insulation

of the bodywork and roof ducts now protect the bus from the effects of extreme heat exposure. The fully-electric rooftop air conditioning unit is now able to cool the hybrid bus in extreme climatic conditions, offering optimum energy-efficiency. The first vehicles were already handed over in September

2018. The remaining buses are to be delivered to Singapore by the end of the year.

Service and maintenance training for LTA, MCV and Volvo

Because air conditioning has high priority in public transport in south-

east Asia on account of the hot and humid climate – and the systems are often up to 18 hours in continuous operation – service and maintenance play a critical role. For this reason Valeo organised a training workshop for the colleagues from LTA, MCV and Volvo in which important content was conveyed

on the subjects of sensitisation in handling high-voltage technology, control logics and in particular practical work or troubleshooting on the vehicle. A specialist of Valeo Thermal Commercial Vehicles was available directly on site.



The REVO-E Pro electric rooftop conditioning unit can be used at outside temperatures up to -15 °C.

REVO-E PRO: COOLING AND HEATING IN THE ELECTROBUS WITH EXTENDED OPERATING TEMPERATURE RANGE

With the new REVO-E Pro rooftop air conditioning unit with heat pump technology for electrobuses, due to go into series production in the second quarter of 2019, Valeo is celebrating a world premiere. Thanks to the virtual icing sensors and a fully automatic hot gas defrosting, the unit can be operated at outside temperatures of up to -5 °C with coolant R134a and up to -15 °C with R449A.

Icing of the external heat exchanger, which occurs due to a physical effect of the condenser when the heat pump is operated at below 5 °C, is successfully eliminated by the system's defrosting device. This makes it possible to heat efficiently even at low outside temperatures with a high COP (coefficient of performance). The energy resources of

the vehicle battery are thus conserved and the range is maximised.

A real stand-alone solution

With a cooling capacity of up to 25 kW and a heating capacity of up to 16 kW the REVOE Pro also features intelligent energy management, i.e. the cooling/heating output is generated according to demand,

depending on the available energy. The electric compressor is infinitely adjustable, offers optimum efficiency and is extremely low-noise thanks to the physical scroll compressor. Together with the Valeo control element SC 620, the REVO-E Pro is a real standalone solution, i.e. all a/c and control components are compactly integrated into the

unit and the control concept is uncoupled from the on-board systems. The new air conditioning system can thus be installed in virtually any bus worldwide, regardless of vehicle design. Due to the integration of all components carrying coolant, the closed system is efficient, airtight and almost maintenance-free.

THERMO E+ FOR MINI-, MIDIBUSES AND AS AN AUXILIARY HEATER FOR ELECTROBUSES

Based on the previous model Thermo E, the new Thermo E+ heater, alongside the 20 and 32 kW models, is the first 12 kW version. Whereas the first two were developed primarily for the Chinese, Russian and North American markets, the 12 kW version is suitable for use in mini- and midibuses worldwide.

As an auxiliary heating to supplement the heat pump, the Thermo E+/ 12 kW heater is also ideal for

use in electrobuses, which are today reliant on an additional fuel-powered heater due to their limited

energy resources at low outside temperatures.

For the highest degree of service and maintenance friendliness, it offers the option of fast data retrieval via Valeo's Diagnosis Thermo Test (DTT). In addition, the circulation pump can be externally controlled without additional electronics and independently of the heater, further reducing fuel consumption. The Thermo E+ is also designed for use with alternative fuels such as HVO (hydrogenated vegetable oils) and GTL (gas-to-liquids) in accordance with DIN EN 15940. The temperature sensors with a self-protection function furthermore guarantee a high quality and safety standard.

With a length of 435 mm and a weight of 13.6 kg, the 12 kW version is one of the shortest and most lightweight heaters in its class. This is in turn reflected in reduced fuel consumption. Available in 12 or 24 Volt as a single or dual fuel feed system, the Thermo E+ can be deployed at outside temperatures of up to -40 °C and is thus extremely powerful and robust. Highly efficient heat transfer coupled with clean combustion help to achieve the highest-possible efficacy. The device produces emission values that are significantly below the legal limits.



The new 12 kW version of the Thermo E+ is one of the shortest and most lightweight heaters in its class.

PREMIERE: FUEL CELL TRAIN TAKES TO THE TRACKS

In mid-September, the world's first hydrogen powered train – fitted with Valeo's air conditioning system – started on its inaugural run in Bremervörde.

The emission-free regional train "Coradia iLint" built by Alstom will operate regular services, carrying passengers on a route of almost 100 kilometres between the towns of Bremervörde, Cuxhaven, Bremerhaven and Buxtehude. Alstom is proposing to put a total of 14 hydrogen fuel cell-powered trains into operation for the Lower Saxony Regional Transport Group by the end of 2021. In the long term, hydrogen-powered fuel cell trains will be replacing diesel as a means of propulsion on the rails.

Valeo air conditioning in the iLint

The development of the climate concept for the hydrogen fuel cell train represented a major challenge

for the team. Valeo's R&D teams were thus involved in the project right from the beginning. The chief components of the modern, energy-efficient air conditioning are the REVO-E rooftop air conditioning unit, the SPump recirculating pump and the Thermo DC electric heater with intelligent control. The Valeo air conditioning system features control electronics that ensures a high standard of communication between all components and integrates them into the vehicle's overall system. Subject to the driving profile and the available energy, it ensures that they are always working at an optimum level.

About the "Coradia iLint"

The Coradia iLint was developed by



Coradia iLint, the world's first hydrogen-powered train.

the German-French Alstom teams. The emission-free passenger train was built in the largest production facility of French train manufacturer Alstom in Salzgitter. The project has received the support of the Federal Ministry of Transport and Digital

Infrastructure. The development of the Coradia iLint was sponsored by the Federal Government within the scope of the National Innovation Program for Hydrogen and Fuel Cell Technology (NIP).



With new features such as variable speed control and an intelligent diagnosis function, the SPump circulation pump (PWM and CAN versions) saves energy and offers a solution for any application.

New SPump with additional PWM and CAN versions

ELECTRICAL CIRCULATION PUMP WITH TOMORROW'S TECHNOLOGY

Valeo has added three new versions to the SPump product family: the electric circulation pump with ON/OFF control is now available with additional control and communication interfaces PWM (pulse width modulation) and CAN, together with a more powerful 500 W version. By virtue of new features such as a variable speed control and intelligent diagnosis function, the pump now consumes particularly low levels of energy, making it the designated solution for all kinds of commercial vehicles with hybrid, plugin or electric drive.

The pumps represent the core piece of the water circuit and serve to ensure the coolant flow in pre-heating or cooling mode, as well as when the vehicle is on the road. The SPump circulation pump with the new PWM and CAN (Interface) versions offers further critical advantages for the customer: both versions have a variable speed control, enabling optimum synchronisation with the vehicle's overall system and curbing energy consumption, thus increasing the range. In addition, the intelligent diagnosis function in the pump issues early warning signals on the basis of automatic error recognition

and records critical operating data. That makes the pump particularly interesting for commercial vehicles with hybrid, plugin or electric drives that are reliant on efficient energy management. The SPump PWM/CAN can also be deployed in the areas of agriculture, construction machines, for cooling of electrical components (e.g. battery) and other special applications.

SPump CAN for even more flexibility and performance

The customised parameter configuration of the CAN versions also permits flexible integration into various vehicle systems. Thanks

to a modular concept, up to nine pumps can be installed in a system under one part number. Installation is easy and fast, thanks to the reduced cabling requirements. Furthermore, an additional 500 W CAN version offers the high performance needed for e-bus applications with a flow rate of over 10,000 l/h (at 0.5 bar counter-pressure).

The SPump pump generation at a glance

Shorter dimensions of 205 mm, lower weight of 2.3 kg (compared to its predecessor, the Valeo Aquavent) and watertight, magnetically coupled EC motor (IP6K9K tested)

with integral controller permit diverse installation options for the pump. Additional functions such as an anti-lock system, extended run-dry protection, optional speed control (PWM or CAN signal) and self-protection in the event of overheating make the SPump to be suitable for extreme climatic conditions. In addition, the pump is ideal for higher outside temperatures (from -40 °C up to +95 °C). With a service life exceeding 30,000 hours, the flow rates and flow characteristics with counterpressure are 50% increased compared to the previous series.

IVECO CROSSWAY LE NOW AVAILABLE WITH CITYSPHERE A/C SYSTEM

Valeo was commissioned by Verkehrsbetrieb KVG Stade GmbH to install air conditioning systems in 60 Iveco Crossway Low Entry (LE) vehicles for deployment in Stade, Buxtehude, Lüneburg, Wolfsburg and Celle. The bus operator had set its preference on the modular Citysphere a/c unit, with appealingly low life-cycle costs. The Crossway was thus available for the first time with a Valeo air conditioning system ex works in Vysoké Myto (Iveco Czech Republic). The vehicles were already delivered to the transport undertaking in August 2018.



The Iveco Crossway LE is now available ex works with Citysphere.

With a production area of over 225,000 m² and more than 3,000 vehicles built every year, the Iveco facility in the Czech Republic is one of Europe's leading manufacturers of city and intercity buses.

About Busgruppe KVG Stade

The members of Busgruppe KVG Stade with head office in Stade are Kraftverkehr Lüneburg, Verkehrsbe-

triebe Ostthannoversche VOG, Cebus and Verkehrsbetriebe Bachstein. These companies operate regular bus services in Buxtehude, Cuxhaven, Lüneburg, Stade and Winsen (Luhe) together with overland lines, school and commuter services in districts of Cuxhaven, Harburg, Lüneburg, Rotenburg (Wümme) and Stade. The company's fleet mainly consists of Mercedes-Benz

Citaro, MAN Lion's City, Setra and Volvo buses – 100% equipped with Valeo HVAC systems.

120 Cityspheres for KVG Stade

The tender requirements for the vehicles in accordance with VDV Directive 236/1 included a life-cycle cost-optimised on-board system whose method of air condition-

ing distinguished itself in major respects from conventional full air conditioning. It quickly became clear that the modular Citysphere a/c unit was the right solution. In addition to its unique, patented air circulation system in the passenger compartment, the unit features significantly lower life-cycle costs. What is so special about the Citysphere: in contrast to full air conditioning the increase in fuel consumption is hardly noticeable. Each of the 60 Iveco vehicles has been equipped with a master system for the front, and a slave system for the rear passenger compartment. Valeo has been supporting KVG Stade in the selection of an air conditioning system at every stage since the publication of the tender. "The excellent cooperation and commitment of the people at Valeo, together with the eco-friendly and LCC-optimised air conditioning systems, were key factors in our decision," says Thies Henning Tietje (Technical Director of Busgruppe KVG Stadt GmbH).



60 Iveco vehicles were each equipped with a master unit for the front and a slave unit for the rear passenger compartment.



The air diffuser plate of the Citysphere provides the unique wind-chill effect in the passenger compartment.

MEASURES TO IMPROVE THE COMBUSTION PROCESS IN VALEO DIESEL HEATERS: THE DUST PROTECTION KIT

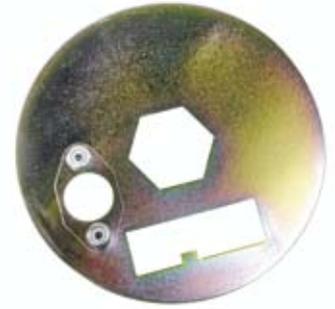
Valeo is constantly working on the improvement of its heaters. A recurring theme in the use of these heaters is the soiling of the viewing window on the disk (see Fig.) due to dirty combustion air suctioned in by the heater. This dirt accumulates on the viewing window of the disk, with the result that the flame detector is hardly able to recognise

the flame. This can lead to malfunctions in the combustion process or even flame cut-out, and an entry is made in the error memory.

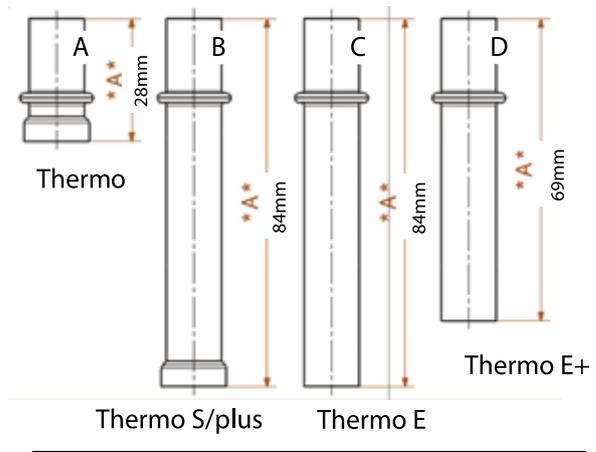
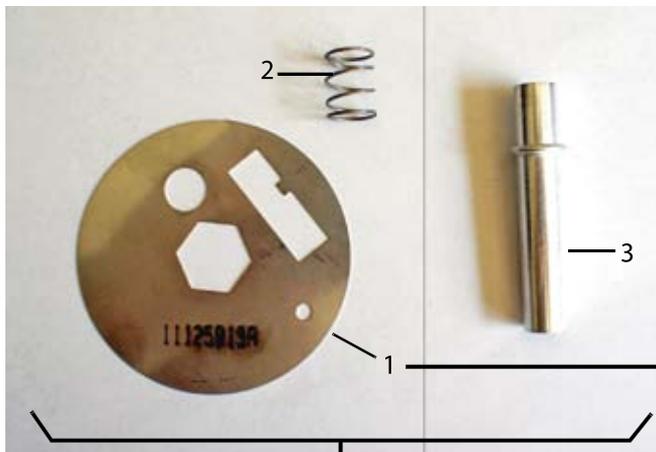
A dust protection kit has been developed in order to avoid these malfunctions. Retrofitting this kit prevents the contamination of the viewing window in the disk. The

dust protection kit can be quickly and easily retrofitted in all diesel heaters as needed.

The following overview shows which dust protection kit is right for your heaters:



Disk with ID number 88440



		Kit (1)+(2)+(3)	(1)	(3)
Thermo	•	11136322_	11125857_	A
Thermo	--	11136323_	11125859_	A
Thermo S	--	11136324_	11125816_	B
Thermo E	•	11136325_	11125819_	C
Thermo E	--	11136326_	11125816_	C
Thermo plus	•	1113632 8_	1112581 9_	B
Thermo plus	--	1113632 7_	1112581 6_	B
Thermo E+	•	1113632 9_	11122247_	D
Thermo E+	--	11136330_	11122213_	D

			(1)	(2)	(3)
DE	Baureihe	• Düsenstockvorwärmung	Scheibe	Feder	Schutzrohr
EN	series	• nozzle block preheater	disc	spring	protection tube
FR	type	• chauffage de por te-gicleur	disque	ressort	tube protectrice
IT	serie	• preriscaldamento portage llo	rondella	molla	pozzetto

Testing heaters/circulation pumps

ENDURANCE TESTING TO ENSURE LONG-TERM WARMTH...

An important building block in our product development is testing up to the end of the service life. For example, our salt-spray mist chamber in Neubrandenburg exposes heaters and individual components to environmental simulation. Because our heaters are used in a wide range of altitudes, we also test in the Alps at heights of up to 2,800 m.



Testing environmental simulation

A corrosive atmosphere is created in the test chamber by spraying a saline solution that simulates an accelerated corrosive attack on the samples. Real ambient conditions can be accelerated at different rates by varying the concentration of the saline solution, temperature and pH value.

Endurance testing of circulation pumps

Up to ten circulation pumps can be tested fully automatically under close-to-real-life conditions on the state-of-the-art endurance test stand. The test stand consists of a climate chamber, a heating and cooling aggregate for the water circuit and a storage tank, to which the feed lines with the measure-

ment and control instruments are attached. A further component of the test stand is a measurement cabinet for recording readings and powering the batteries. The system has a medium and ambient temperature control. In addition, system pressure and the respective flow can be set differently.

Further test stands at our Neubrandenburg location:

- Walk-in climate chamber (temperature range -40 °C to +100 °C)
- Temperature shock chamber (temperature range -70 °C to +200 °C)
- Heater endurance tests
- Motor measurement test bench
- Fuel pump test stand



Testing heaters/circulating pumps

